ScanMaster Designer

User Manual

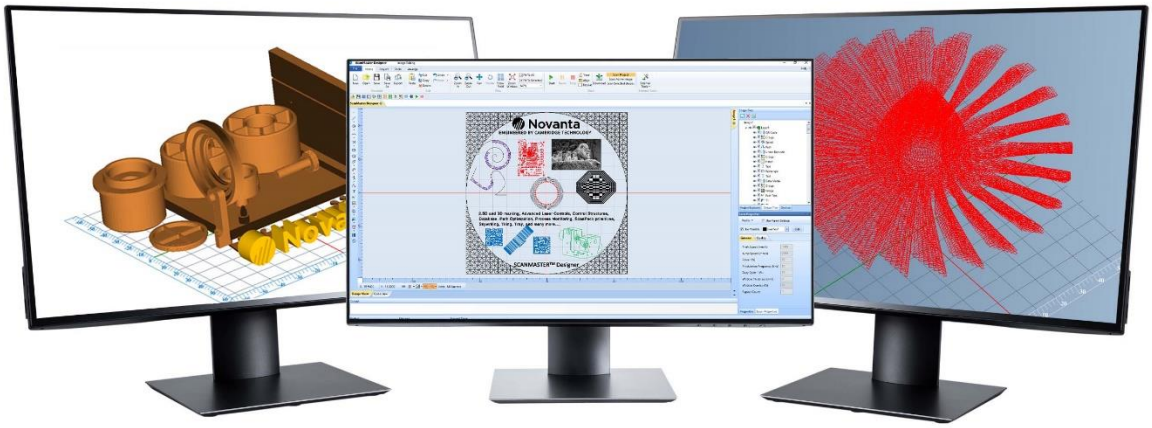

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TABLE OF CONTENTS

Table of Contents 2

List of Figures 11

1 Important Information 1

1.1 Safety Symbols 1
1.2 Safety Labels 2
1.3 Customer Support 2

2 Introduction 4

2.1 General Notes 4
2.2 ScanMaster Architecture 4
2.3 Document Conventions Project Concepts 7
2.4 Scan Controllers 8
2.5 Using ScanMaster Designer Help 8
2.5.1 Contents tab 9
2.5.2 Index tab 10
2.5.3 Search tab 11
2.5.4 Favorites tab 11
2.5.5 Printing a Help Topic 12
2.5.6 Copying Examples 12

3 Getting Started 13

3.1 System Requirements 13
3.2 ScanMaster Designer Installation 13
3.2.1 To install ScanMaster Designer 13
3.2.2 Uninstalling ScanMaster Designer 15
3.2.3 Repairing or ScanMaster Designer 16
3.3 Starting ScanMaster Designer 17
3.3.1 Starting ScanMaster Designer from Your Desktop 17
3.3.2 Starting ScanMaster Designer from Your Start Menu 17
3.4 Exiting ScanMaster Designer 19

3.5 Workspace Elements 20
3.6 Recommended Workflow 20
3.7 Job Creation Example 23
3.8 What is Laser Marking? 24
3.9 Scan Controller Cards 24

4 The ScanMaster Designer Interface 25
4.1 The File tab 25
4.2 Quick Access Toolbar 26
4.2.1 Customize the Quick Access Toolbar 26
4.2.2 Place the Quick Access Toolbar above/below the ribbon 27
4.3 The Ribbon 27
4.3.1 Minimize/Maximize the ribbon 27
4.3.2 Home 28
4.3.3 Project 30
4.3.4 Tools 32
4.3.5 Arrange 35
4.4 The Drawing Canvas and the Script Window 38
4.4.1 The Drawing Canvas 38
4.4.2 Script Window 40
4.5 Project Explorer 41
4.6 Shape Tree 46
4.6.1 Layers 46
4.6.2 To Enable or Disable Marking 48
4.7 Properties Window 49
4.7.1 Shape Properties 49
4.7.2 Laser Properties 50
4.8 Laser Properties - Quality Tab 52
4.8.1 Profiles 58
4.9 Connecting to Devices 65
4.9.1 Connect to a particular card 65
4.9.2 Disconnect a Scan Controller 65
4.10 Output Window 66
4.10.1 Arranging windows and panels on the screen 67
4.11 Role-based Access Control 69

4.11.1 Users 70
4.11.2 Add a new role 72
4.11.3 Enable Login 73
4.11.4 Export/Import Login Data 74
4.11.5 User Logging 74
4.11.6 User Files 75

5 Managing Projects 76
5.1 Before you create a new Project 76
5.2 Preferences vs. Settings 76
5.3 The Application Preferences Window 78
5.3.1 General 78
5.3.2 Keyboard Shortcuts 83
5.3.3 Saving 84
5.3.4 Application Folders 85
5.3.5 Laser 87
5.3.6 Laser Settings Editor 90
5.3.7 Controller 92
5.3.8 External Hardware 93
5.3.9 Canvas (2D) 99
5.3.10 Canvas (3D) 101
5.3.11 Tiling 102
5.3.12 Project Scripts 105
5.3.13 Transformation 106
5.3.14 Marking Area 108
5.4 Creating a New Project 109
5.4.1 Adding an Image to a Project 109
5.5 Opening an existing Project 111
5.6 Closing a Project 113
5.6.1 Closing a Project from the Project Name Tab 113
5.6.2 Closing a Project from the File Menu 114
5.7 Saving a Project 115
5.8 Exporting a Project 115

6 **Working with Shapes and Text** 116

Table of Contents

6.1 The Drawing Shapes Toolbar 116
6.2 Basics of Inserting Shapes 117
6.2.1 Using the Mouse to Insert a Shape 117
6.2.2 Entering Parameters to Insert a Shape 117
6.3 Geometric Shapes 119
6.3.1 Insert a Dot 119
6.3.2 Insert a Line 122
6.3.3 Insert a Circle 127
6.3.4 Insert an Arc 133
6.3.5 Insert a Polyline 138
6.3.6 Insert a Rectangle 142
6.3.7 Insert a Symmetric Polygon 144
6.3.8 Insert an Ellipse 147
6.3.9 Insert an Elliptical Arc 151
6.3.10 Insert a Bezier Path 155
6.3.11 Insert a Path 159
6.3.12 Insert a Spiral 163
6.4 Enter and Modify Text in a Drawing 168
6.4.1 Insert Text in a Drawing 168
6.4.2 Basic Text Formatting 173
6.4.3 Dynamic Text 174
6.4.4 Cutting Text with the Cut Icon 182
6.4.5 Copying Text with the Copy Icon 182
6.4.6 Pasting Text with the Paste Icon 183
6.4.7 Zooming Text with the Zoom Factor Dropdown 183
6.4.8 Superscript and Subscript 184
6.4.9 Turning Characters Upside Down with the Upside Down Icon 188
6.4.10 Reversing Characters with the Backward Icon 189
6.4.11 Changing the Text Font 190
6.4.12 Undoing the Last Action with the Undo Icon 190
6.4.13 Redoing an Undone Action with the Redo Icon 191
6.4.14 Changing the Text Height 191
6.4.15 Setting the Horizontal Character Gap with the Character Gap Icon 191
6.4.16 Making Text Bold 194
6.4.17 Making Text Italic 194
6.4.18 Setting Text Kerning 195

6.4.19 Applying Hatching Patterns to Text 196
6.4.20 Formatting Tools on the Character Tab 208
6.4.21 Unicode Support 214
6.4.22 Inserting Path Text 217
6.5 Vector Images 224
6.5.1 Inserting a Vector Image using Location & Size 224
6.5.2 Inserting a Vector Image using Absolute Units 225
6.6 Raster Images 228
6.6.1 Insert Raster Images 228
6.6.2 Image Processing Operations 229
6.6.3 Change image properties 241
6.7 Drill Shapes 255
6.7.1 Importing a drill shape using Location & Size 255
6.7.2 Importing a drill shape using Absolute Units 257
6.7.3 Drill Shape Properties 261
6.8 Barcode Shapes 263
6.8.1 Insert a Barcode 264
6.8.2 Barcode Parameters 264
6.9 Barcode Properties 267
6.9.1 Properties of non-Data Matrix, non-QR, and non PDF Barcode Types 268
6.9.2 Properties of the Data Matrix Barcode Type 268
6.9.3 Properties of QR Barcode Types 270
6.9.4 Properties of PDF Barcode Types 271

7 Modifying Shapes 277
7.1 Changing the view 277
7.1.1 To Zoom In/Zoom Out 277
7.1.2 Pan 277
7.1.3 Rotate 278
7.1.4 Show Field 278
7.1.5 Zoom Window 280
7.1.6 Fit To All 280
7.2 Selecting Shapes 280
7.2.1 Hotspots on a Selected Shape 281
7.2.2 Cutting, Copying, and Pasting Selected Shapes 281

7.2.3 Moving Selected Shapes 281
7.3 Hotspot Editing 282
7.4 Moving the Endpoint Hotspots on a Line 283
7.4.1 Moving Circle Hotspots to Change the Radius of a Circle 284
7.4.2 Moving Arc Hotspots to Change Arc Attributes 286
7.4.3 Moving Polyline Endpoint Hotspots to Change Polyline Endpoints 291
7.4.4 Moving Resizing Hotspots on Rectangular Shapes 292
7.4.5 Moving Ellipse Hotspots to Change the Length or Width of an Ellipse 295
7.4.6 Moving Hotspots to Change an Elliptical Arc 296
7.4.7 Using Bezier Path Hotspots to Modify Bezier Path Transitions 301
7.4.8 Moving Path Text Hotspots to Change the Path Text Location 303
7.4.9 Using Hotspots to Modify a Spiral 305
7.5 Editing Shapes 310
7.5.1 Cut 310
7.5.2 Copy 310
7.5.3 Paste 310
7.6 Paste on absolute position 311
7.7 Moving Shapes 312
7.7.1 Dragging by a non-hotspot area on the shape 312
7.7.2 Dragging by a centerpoint hotspot or a midpoint hotspot 313
7.7.3 Nudging 314
7.7.4 Using the Move tool from the Tools | Transform panel 314
7.7.5 Move to Origin 314
7.8 Cloning Shapes 315
7.9 Scaling Shapes 315
7.9.1 Scaling with the boundary box popup menu 316
7.9.2 Scale Value 317
7.9.3 Scale Width 318
7.9.4 Scale Height 319
7.9.5 Scale to Rectangle 321
7.10 Rotating Shapes 323
7.10.1 Using the Rotate tool to rotate a Shape 323
7.10.2 Using the arrow hotspot to rotate a Shape 324
7.11 Mirroring Shapes 325
7.12 Arranging Shapes 327
7.12.1 The Arrange | Align Panel 327

7.12.2 The Arrange | Make Same Size Panel 328
7.12.3 The Arrange | Vertically Distribute Panel 330
7.12.4 The Arrange | Spacing Panel 331
7.12.5 The Arrange | Measure Panel 332
7.13 Undo and Redo 333
7.13.1 Undo 333
7.13.2 Redo 334

8 Advanced Shape Operations 335
8.1 Hatch Operations 335
8.1.1 Inserting a Hatch Pattern in a Shape 335
8.1.2 Renaming a Hatching Pattern 338
8.1.3 Hatch Types 339
8.1.4 Filling multiple shapes with hatching 347
8.1.5 Edit Hatch Parameters 348
8.1.6 Remove Hatch Association 351
8.1.7 Deleting a hatching pattern from a Shape 351
8.2 Array Operations 352
8.2.1 Rectangular Array 352
8.2.2 Polar Array 358
8.3 Modifying Operations 376
8.3.1 Trim and extend shapes 377
8.3.2 Join, break and divide 380
8.3.3 Explode shapes 384
8.3.4 Group and ungroup Shapes 385
8.3.5 Fillet or chamfer shapes 387
8.3.6 Bridging Shapes 390
8.4 Optimize Operations 391
8.4.1 Show Jumps 391
8.4.2 Marking Order 392
8.4.3 Path Optimize 395
8.4.4 Directional Optimize 397
8.4.5 Simplify Polylines 398
8.5 Quality Operations 400
8.5.1 Cutter Compensation 400

8.5.2 Remove Overlaps 402
8.5.3 Marking Quality 403
8.5.4 Inserting Basic 3D Shapes 404

9 Process Automation 405
9.1 Tiling 405
9.1.1 Initializing the Tiling Grid 405
9.1.2 The Properties Tab 437
9.1.3 Edit Cells in the tiling grid 444
9.1.4 Code View 447
9.2 Tray Marking 448
9.2.1 Initializing the Tray Grid 449
9.2.2 Scanning Options 470
9.2.3 Aligning and Tracing Options 470
9.3 Database Connectivity 472
9.3.1 Initializing the Database Connectivity instance 473
9.3.2 Query Management 481
9.4 ScanScript Assistant 487
9.5 Dll Automation 487
9.5.1 Initializing the Dll Automation Object 488
9.5.2 Member Selection 489
9.5.3 Edit Selected Members 491
9.5.4 Auto Generated Script 492

10 Hardware-related Operations 493
10.1 Connecting to Devices 493
10.2 Laser Marking Operations 495
10.2.1 Start, pause, stop marking 495
10.2.2 Trace shapes before marking 496
10.3 Working with jobs 497
10.3.1 Downloading Scanning Jobs 497
10.4 IO Bits Monitor 500
10.5 Configuring Devices 500
10.6 SMC Device Configuration Editor 501
10.6.1 User Configuration 513

10.7 Laser Diagnostics 522

11 How to Script in ScanScript 524
11.1 About Language Construct 524
11.2 Control Structures 525
11.2.1 Operators 526
11.3 ScanScript Commands 529
11.4 ScanScript Execution Model 530
11.5 To start scripting 532
11.5.1 Methods 533

12 Extending ScanScript Capabilities through the ScanMaster Designer Extentions Framework 536
12.1 Extention Folder 536
12.1.1 Sample Script 540
12.1.2 Contents of snFile.txt: 541
12.2 Send and receive arguments to the ScanMaster API 541
12.2.1 System.SendCommand 541
12.2.2 System.ReceiveCommand 542

13 Appendix 544
13.1 Snap Commands 544
13.1.1 Snap to Angle 544
13.1.2 Snap to Grid 546
13.1.3 Snap to Objects 547
13.2 ScanMaster Designer Shortcut Keys 554

14 Index 556

LIST OF FIGURES

Figure 1: ScanMaster Architecture....6
Figure 2: Project Concept....7
Figure 3: The Contents Tab of the ScanMaster Designer Online Help Window....9
Figure 4: The Index Tab of the ScanMaster Designer Online Help Window....10
Figure 5: The Search Tab of the ScanMaster Designer Online Help Window....11
Figure 6: The Favorites Tab of the ScanMaster Designer Online Help Window....11
Figure 7: The Print Button....12
Figure 8: The ScanMaster Designer Setup Wizard....14
Figure 9: Uninstalling ScanMaster Designer....15
Figure 10: The Uninstall Dialog Box....16
Figure 11: The ScanMaster Designer Setup Wizard....16
Figure 12: The ScanMaster Designer Desktop Shortcut....17
Figure 13: The Start button on the Windows Taskbar....17
Figure 14: The Windows Start Menu....17
Figure 15: The Start-up screen....18
Figure 16: The Exit Button on the File Menu....19
Figure 17: Workspace Elements....20
Figure 18: Example....23
Figure 19: The Designer Start Button....25
Figure 20: The Quick Access Toolbar....26
Figure 21: Adding a Command to the Quick Access Toolbar....26
Figure 22: Removing a Command from the Quick Access Toolbar....26
Figure 23: The Place Quick Access Toolbar menu....27
Figure 24: An Example of the Ribbon....27
Figure 25: Minimizing the Ribbon....28

List of Figures

Figure 26: The Home Tab 28
Figure 27: The Project tab 30
Figure 28: The Tools Tab 32
Figure 29: The Arrange Tab 35
Figure 30: The Drawing Canvas 38
Figure 31: The Grid 39
Figure 32: ScanMaster ScanScript 40
Figure 33: The Project Explorer 41
Figure 34: Creating a 2D Image in the Project Explorer 41
Figure 35: Opening an Image for Editing 43
Figure 36: Deleting an Existing Image 43
Figure 37: Renaming an Image 44
Figure 38: Exporting an Image 45
Figure 39: Using the "Move Up" and "Move Down" Arrows in the Project Explore 45
Figure 40: The Shape Tree 46
Figure 41: The Layer Properties Window 47
Figure 42: Shape Properties 49
Figure 43: Laser Properties – General 50
Figure 44: The Laser Properties Quality Tab 52
Figure 45: Too Short of a Mark Delay 53
Figure 46: Too Short of a Jump Delay 53
Figure 47: Issues with Polygon Delays 54
Figure 48: Variable polygon delay scaling 54
Figure 49: Issues with Laser On Delays 55
Figure 50: Profile Options 58
Figure 51: Selecting the Material Library Option from the Profile Menu 58
Figure 52: The Material Library Window 59

List of Figures

Figure 53: Load Profile....60
Figure 54: Save Profile dialog....61
Figure 55: Save marking profile....62
Figure 56: Material Library....63
Figure 57: The use Variable checkbox....64
Figure 58: Laser Variables....64
Figure 59: Devices – Not connected to a card....65
Figure 60: Devices – Connected to a card....65
Figure 61: ScanScript Output Window Interface Customization....66
Figure 62: Hidden panels....67
Figure 63: Moving the panel....68
Figure 64: The panel after moving....68
Figure 65: Preferences – Users and Groups tab....69
Figure 66: Preferences - Users and Groups Login Screen....70
Figure 67: Add new user....71
Figure 68: Add new role....72
Figure 69: Login dialog....73
Figure 70: Change Password dialog....74
Figure 71: Preferences - User Files....75
Figure 75: Preferences – General Tab....78
Figure 72: The External Tools Dialog Box....79
Figure 73: Application Restart Prompt....81
Figure 74: The ScanMaster Designer GUI after Reset Layout....82
Figure 75: The Keyboard Shortcuts Tab of the Application Preferences Window....83
Figure 76: The Saving Tab of the Application Preferences Window....84
Figure 77: The Application Folders Tab of the Application Preferences Window....85
Figure 78: Preferences - Users and Groups Login Screen....86

List of Figures

Figure 79: The Laser Tab of the Application Preferences Window: Laser Options 87
Figure 80: The Laser Tab of the Application Preferences Window: Align/Trace Options 88
Figure 81: The Laser Type Screen 90
Figure 82: The Laser Type Deletion Prompt 91
Figure 83: The Controller Tab of the Application Preferences Window 92
Figure 84: The External Hardware Tab of the Application Preferences Window 93
Figure 85: The Hardware Import Wizard 94
Figure 86: The Hardware File Deletion Prompt 95
Figure 87: Select Hardware 96
Figure 88 : Hardware Object 96
Figure 89 : Context Menu 96
Figure 90 : Hardware Properties 97
Figure 91 : Hardware Script 98
Figure 92 : Edit Hardware Script 98
Figure 93: The Canvas (2D) Tab of the Application Preferences Window 99
Figure 94: The Canvas (3D) Tab of the Application Preferences Window 101
Figure 95: Preferences, General Tab 102
Figure 96: Preferences, Friendly Names Tab 103
Figure 97: Preferences, Post Process Tab 104
Figure 98: Preferences, regenerate the hatching area 105
Figure 99: The Project Scripts Tab of the Application Preferences Window 105
Figure 100: The Transformation Tab of the Application Preferences Window 106
Figure 101: The Marking Area Tab of the Application Preferences Window 108
Figure 103: Selecting Create 2D Image from the popup menu 110
Figure 104: Open an Existing Project 111
Figure 105: The Currently Loaded Project in ScanMaster Designer 112
Figure 106: The Close Icon on a Project Name Tab 113

List of Figures

Figure 107: The Close Icon on a Project Name Tab....113
Figure 108: Close project....114
Figure 109: The Close Icon on a Project Name Tab....114
Figure 110: The Drawing Shapes Toolbar....116
Figure 111: Parameter Entry Boxes....117
Figure 112: The Insert Circle Popup....118
Figure 113: Entering Coordinates of the Center of the Circle....118
Figure 114: The inserted circle....119
Figure 115: Dot....120
Figure 116: A Dot Hotspot....120
Figure 117: Moving a dot by dragging its hotspot....121
Figure 118: Dot properties....122
Figure 119: The Insert Line Popup....122
Figure 120: Inserting a line with the 2 Points Option....123
Figure 121: The Insert Line Popup....123
Figure 122: Line - Length & Angle....124
Figure 123: Line Properties....125
Figure 124: The Insert Circle popup....127
Figure125: Inserting a Circle with the 2 Point Option....127
Figure 126: The Insert Circle Popup....128
Figure 127: 3 Point Circle....128
Figure 128: The Insert Circle popup....129
Figure 129: Circle - Center and Radius....129
Figure 130: the Insert Circle Popup....130
Figure 131: Circle - Center and Diameter....130
Figure 132: the Insert Circle Popup....131
Figure 133: Circle - Tangent Tangent Radius....131

List of Figures

Figure 134: Circle Properties 132
Figure 135: The Insert Arc popup 133
Figure 136: Start, End and Center Arc 133
Figure 137: The Insert Arc Popup 134
Figure 138: Start, Center and Sweep Angle Arc 134
Figure 139: The Insert Arc Popup 135
Figure 140: Center, Start and Sweep Angle 135
Figure 141: The Insert Arc Popup 136
Figure 142: 3 Point Arc 136
Figure 143: Arc Properties 137
Figure 144: The Insert Polyline popup 138
Figure 145: Polyline 138
Figure 146: The Insert Polyline Popup 139
Figure 147: Polyline - Segment Length and Angle 139
Figure 148: Polyline properties 140
Figure 149: Drawing a rectangle 142
Figure 150: Rectangle Properties 142
Figure 151: Symmetric Polygon 144
Figure 152: Polygon - Inner and Outer Radius 144
Figure 153: Symmetric Polygon Properties 145
Figure 154: The Insert Ellipse Popup 147
Figure 155: Ellipse - Center, Major Length and Angle, Minor Length 148
Figure 156: the Insert Ellipse Popup 149
Figure 157: Ellipse - Major Axis, Minor Axis Length 149
Figure 158: Ellipse Properties 150
Figure 159: The Insert Elliptical Arc Popup 151
Figure 160: The major and minor axes and the start angle 151

List of Figures

Figure 161: The sweep angle and the completed elliptical arc....152
Figure 162: The Insert Elliptical Arc Popup....152
Figure 163: Defining the major axis....153
Figure 164: Defining the minor axis, the start angle, and the sweep angle....153
Figure 165: The completed elliptical arc....153
Figure 166: Elliptical Arc Properties....154
Figure 167: The Insert Bezier Path Popup....155
Figure 168: Bezier Path....155
Figure 169: The Insert Bezier Path Popup....156
Figure 170: Bezier Path Smoothness Dialog Box....156
Figure 172: Specify the Start Point of the Path....159
Figure 173: The Subshape Popup (Arc and Bezier Options)....159
Figure 174: The Subshape Popup (Polyline and Bezier Options)....160
Figure 175: Drawing a Bezier Path....161
Figure 176: A Path....161
Figure 177: Path Properties....162
Figure 178: The Spiral Editor....163
Figure 179: A Spiral....164
Figure 180: Spiral Editor - Inner Radius....164
Figure 181: Spiral Editor - Outer Radius....165
Figure 182: Spiral Editor - Adjusting Pitch....165
Figure 183: Spiral Properties....166
Figure 184: Text Editor....168
Figure 185: The Text Editor Showing Text across Several Lines....169
Figure 186: The Canvas Showing Text across Several Lines....169
Figure 187: The Text popup....171
Figure 188: The Text Box with Hotspots....171

List of Figures

Figure 189: Text Properties 172
Figure 190: Formatting Toolbar 173
Figure 191: Dynamic Text – Method 1 175
Figure 192: Accessing variables through Script 176
Figure 193: Dynamic Text - Method 2 176
Figure 194: Accessing variables through Script 177
Figure 195: Date 180
Figure 196: Time 181
Figure 197: The Cut Icon in the Text Formatting Toolbar 182
Figure 198: The Copy Icon in the Text Formatting Toolbar 182
Figure 199: The Paste Icon in the Text Formatting Toolbar 183
Figure 200: The Zoom Factor Drop-down Box on the Text Formatting Toolbar 183
Figure 201: Superscript/Subscript 184
Figure 202: The Superscript Icon and the Subscript Icon on the Text Formatting Toolbar 184
Figure 203: The Superscript Icon and the Subscript Icon on the Text Formatting Toolbar 185
Figure 204: The Superscript/Subscript Scale Factors Icon on the Text Formatting Toolbar 186
Figure 205: The Superscript/Subscript Dialog Box 186
Figure 206: The Upside Down Icon on the Text Formatting Toolbar 188
Figure 207: Upside Down Character in the Text Editor 188
Figure 208: The Backward Icon on the Text Formatting Toolbar 189
Figure 209: Reverse Characters in the Text Editor 189
Figure 210: Reverse Characters on the Drawing Canvas 189
Figure 211: Font styling options 190
Figure 212: The Undo Icon in the Text Formatting Toolbar 190
Figure 213: The Redo Icon in the Text Formatting Toolbar 191
Figure 214: Changing the Text Height 191
Figure 215: The Character Gap Icon on the Text Formatting Toolbar 192

List of Figures

Figure 216: The Character Gap Dialog Box....192
Figure 217: Horizontal Character Gap in the Text Editor....192
Figure 218: Horizontal Character Gap on the Drawing Canvas....193
Figure 219: The Bold Icon in the Text Formatting Toolbar....194
Figure 220: The Italic Icon in the Text Formatting Toolbar....194
Figure 221: The Kerning Icon on the Text Formatting Toolbar....195
Figure 222: Kerning is Not Applied to Characters....195
Figure 223: Kerning is Applied to Characters....195
Figure 224: Line Hatch Example in the Text Editor....198
Figure 225: Line Hatch Example on the Drawing Canvas....199
Figure 226: Offset Hatch Example in the Text Editor....200
Figure 227: Offset Hatch Example on the Drawing Canvas....200
Figure 228: Offset In-Out Hatch Example on the Drawing Canvas....201
Figure 229: Helix Hatch Example in the Text Editor....203
Figure 230: Helix Hatch Example on the Drawing Canvas....203
Figure 231: The Hatch Icons Toolbar and the List of Applied Hatch Patterns....204
Figure 232: The Show/Hide Hatch Icon (Toggled on) on the Text Formatting Toolbar....204
Figure 233: The Show/Hide Hatch Icon (Toggled off) on the Text Formatting Toolbar....204
Figure 234: Show/Hide Hatch Example (Toggled on) in the Text Editor....205
Figure 235: Show/Hide Hatch Example (Toggled off) in the Text Editor....205
Figure 236: The Selected Text and Hatch Pattern....206
Figure 237: The Mark Outline Icon (Toggled on) on the Text Formatting Toolbar....207
Figure 238: The Mark Outline Icon (Toggled off) on the Text Formatting Toolbar....207
Figure 239: Mark Outline Toggled On and Off....207
Figure 240: The Word Wrap Icon in the Text Formatting Toolbar....208
Figure 241: The Character Tab in the Text Editor....208
Figure 242: Rotation Angle....209

List of Figures

Figure 243: Oblique Angle 210
Figure 244: Scale X 210
Figure 245: Scale Y 211
Figure 246: Line Spacing - Factor 212
Figure 247: Line Spacing Exactly 213
Figure 248: The Text Alignment Buttons 213
Figure 249: Unicode Support –Language Pack 214
Figure 250: Input Method Editor 215
Figure 251: Character Map 216
Figure 252: Text along the Path of a Circle 217
Figure 253: Path Text 218
Figure 254: Path Text 218
Figure 255: Path Text Properties Window 219
Figure 256: Ascender Option of the Align Property 219
Figure 257: Descender Option of the Align Property 220
Figure 258: Baseline Option of the Align Property 220
Figure 259: Center Option of the Align Property 220
Figure 260: The Start to End Option of the Direction Property 220
Figure 261: The End to Start Option of the Direction Property 221
Figure 262: Path Text with zero and non-zero Start Offsets 221
Figure 263: Selecting the Distance to Path Property 222
Figure 264: The Effects of the Deform Property 222
Figure 265: Text Editor with the Path Tab 223
Figure 266: The Open Vector Image dialog box 224
Figure 267: The File Importing Log dialog box 225
Figure 268: An inserted Vector image 225
Figure 269: The Open Vector Image dialog box 225

List of Figures

Figure 270: The File Importing Log dialog box 226
Figure 271: The Group Shape Properties window 226
Figure 272: The X, Y coordinates and Elevation fields of the Group Shape Properties window 226
Figure 273: The Width, and Height of the Group shape Properties window....227
Figure 272: An inserted Vector image(based on Absolute Units) 227
Figure 273: The Behaviour of the Group shape Properties window....227
Figure 274: The Open Image File Dialog Box....228
Figure 275: Example of an Inserted Raster Image 229
Figure 276: Image Processing Operations Popup Menu 229
Figure 277: Grayscale Applied to an Image....230
Figure 278: An Image with Inverted Colors....230
Figure 279: The Image Contrast Dialog Box 231
Figure 280: An Example of Image Contrast....231
Figure 281: Image Brightness dialog box 232
Figure 282: Image Brightness Sample 232
Figure 283: Error Diffusion 233
Figure 284: Error Diffusion Sample 233
Figure 285: Reset Aspect Ratio....234
Figure 286: Raster Image Moved to the Point of Origin (0,0) 234
Figure 287: Specify the Rotating Reference Point....235
Figure 288: Specify the Rotating Angle 235
Figure 289: Selection Hotspots and Scaling Hotspots....236
Figure 290: Specify the Updated Position of the Scaling Hotspot 236
Figure 291: The Image Operations Popup Menu with Additional Scaling Options....237
Figure 292: The Scale Factors Dialog Box....238
Figure 293: A Cloned Raster Image 238
Figure 294: Grouping Images, Shapes, and Text 239

List of Figures

Figure 295: The Ungroup Option....240
Figure 296: Ungrouping Images, Shapes, and Text....241
Figure 297: The Geometry Page of the Properties Tab....242
Figure 298: The Rasterization Page of the Properties Tab....242
Figure 299: The Pulse Width Method of Raster Marking....244
Figure 300: The Power Method of Raster Marking....245
Figure 301: The Port Dropdown on the Rasterization page....245
Figure 302: The Laser On Time Method of Raster Marking....246
Figure 303: The Max Laser On Time Field on the Rasterization Page....246
Figure 304: The Jump and Fire Method of Raster Marking....247
Figure 305: The Jump and Fire Parameters on the Rasterization Page....248
Figure 306: Pixel Energy Profile Editor – Curve Mode....249
Figure 307: Manually edit bars....250
Figure 308: Save as Presets....251
Figure 309: The Presets Window....252
Figure 310: Custom Patterns....253
Figure 311: The Advanced Tab....254
Figure 312: Enable non progressive marking mode....254
Figure 313: The Open Drill File dialog box....255
Figure 314: The Drill Shape Location prompt....255
Figure 315: The Drill Shape Size prompt....256
Figure 316: The Drill Shape on the Drawing Canvas....256
Figure 317: The Open Drill File dialog box....257
Figure 318: Detail of the Drill Shape Properties window....257
Figure 319: The X, Y, and Z coordinate fields of the Drill Shape Properties window....258
Figure 320: The Width, Height, and Angle fields of the Drill Shape Properties window....258
Figure 321: Drill Shape example (based on Absolute Units)....258

List of Figures

Figure 322: Flip Horizontal and Flip Vertical 258
Figure 323: Selecting a drill pattern 259
Figure 324: The execution modes 259
Figure 325: The unique properties of each drill pattern 259
Figure 326: The Use Shape Laser Properties checkbox 260
Figure 327: The Drill Shape Properties window 261
Figure 328: The Barcodes Dialog Box 264
Figure 329: The Properties Tab for non-Data Matrix, non-QR, and non- PDF Barcode Types 268
Figure 330: The Properties Tab for the Data Matrix Barcode Types 269
Figure 331: The Properties Tab for a QR Barcode Type 270
Figure 332: The Properties Tab for a PDF Barcode Type 271
Figure 333: Human Readable Text in Barcode 272
Figure 334: Human Readable Text, Font Properties 273
Figure 335: Human Readable Text, Justify Text 273
Figure 336: Human Readable Text, Override Default Height 273
Figure 337: Human Readable Text, Margins 274
Figure 338: Human Readable Text, Margins sample 274
Figure 339: Human Readable Text, Line Hatch Properties 274
Figure 340: Human Readable Text, Font Embed 275
Figure 341: Human Readable Text, Serial Number 276
Figure 342: View 277
Figure 343: Hotspots on a selected Shape 281
Figure 344: Modifying a rectangle by dragging a midpoint hotspot 282
Figure 345: Modifying a rectangle by dragging a corner hotspot 283
Figure 346: Line Hotspots 283
Figure 347: Moving an endpoint hotspot 284
Figure 349: Changing the radius of a circle 285

List of Figures

Figure 350: Arc Hotspots 286
Figure 352: Using the Arrow Hotspot to Change the Start Angle of an Arc 288
Figure 353: Using the Start Angle Hotspot to Change the Start Angle of an Arc 288
Figure 354: Changing the Sweep Angle of an Arc 289
Figure 355: Changing the Radius of an Arc 290
Figure 356: Polyline Hotspots 291
Figure 357: Moving a Polyline Endpoint by Its Hotspot 291
Figure 358: Rectangular shape hotspots 292
Figure 359: Resizing a rectangular shape by dragging a midpoint hotspot 293
Figure 360: Resizing a rectangular shape by dragging a corner hotspot 293
Figure 361: Symmetric polygon hotspots 294
Figure 362: Resizing a symmetric polygon by moving a resizing hotspot 294
Figure 363: Ellipse Hotspots 295
Figure 364: Changing the Length of an Ellipse by Dragging a Resizing (Vertex) Hotspot 295
Figure 365: Changing the Width of an Ellipse by Dragging a Resizing (Co-vertex) Hotspot 296
Figure 366: Elliptical Arc Hotspots 296
Figure 367: Changing the Length of the Major Axis of an Elliptical Arc 297
Figure 368: Changing the Length of the Minor Axis of an Elliptical Arc 298
Figure 369: Changing the Sweep Angle of an Elliptical 299
Figure 370: Changing the Start Angle and the Sweep Angle of an Elliptical Arc 300
Figure 371: Bezier Path hotspots 301
Figure 372: The selected Bezier Path 301
Figure 373: Bezier Path hotspots and control handles 301
Figure 374: Path text hotspots 303
Figure 375: Changing the start offset of path text 303
Figure 376: Changing the distance of path text from its associated shape 304
Figure 377: Spiral Hotspots 305

List of Figures

Figure 378: Resizing a Spiral with Hotspots 306
Figure 379: The Outer Radius Hotspot 306
Figure 380: Changing the Outer Radius of a Spiral 307
Figure 381: The Inner Radius Hotspot 308
Figure 382: Changing the Inner Radius of a Spiral 308
Figure 383: The Pitch Hotspot 309
Figure 384: Changing the pitch of a spiral 309
Figure 385: Pasting a Shape on the Drawing Canvas 311
Figure 386: Paste on absolute position 311
Figure 387: Dragging a Shape by a Non-hotspot area 312
Figure 388: Midpoint and centerpoint hotspots 313
Figure 389: Dragging a Shape by the midpoint hotspot or the centerpoint hotspot 313
Figure 396: Cloning Example 315
Figure 390: Selecting the Scale Option from the popup menu 316
Figure 391: Dragging a hotspot on the boundary box 316
Figure 392: A scaled Shape without the boundary box 316
Figure 393: The boundary box popup menu 317
Figure 394: Scale Factor 317
Figure 395: Specify start point of length 318
Figure 396: Specify end point of length 318
Figure 397: Dragging the crosshairs to the new end point 319
Figure 398: Specify start point of length 320
Figure 399: Specify end point of length 320
Figure 400: Dragging the crosshairs to the new end point 320
Figure 401: Specify scaling start point of rectangle 321
Figure 402: Specify scaling end point of rectangle 321
Figure 403: Dragging the crosshairs to the new end point 322

List of Figures

Figure 404: Rotating Shapes....323
Figure 405: The arrow hotspot....324
Figure 406: The arrow hotspot....324
Figure 407: The Mirror dialog box....325
Figure 408: Mirror Options....325
Figure 409: Mirror Samples....326
Figure 410: Mirror Sample 2....326
Figure 411: The Arrange Tab on the Ribbon....327
Figure 412: Example of an alignment operation....327
Figure 413: Example of a resizing operation....329
Figure 414: Example of a vertical distribution operation....330
Figure 415: Example of a horizontal spacing operation....331
Figure 416: Example of a vertical spacing operation....332
Figure 417: Linear Measurement Example....332
Figure 418: The Actions History list....333
Figure 419: The Undo History list....334
Figure 420: Hatch Patterns....335
Figure 421: The Hatch option on the popup menu....336
Figure 422: Hatch Window....337
Figure 423: Displaying the Rename prompt in the Shape Tree....338
Figure 424: Entering a new name for a hatching pattern....338
Figure 425: Line Hatch parameters....339
Figure 426: Line Hatch Samples....342
Figure 427: Offset Hatch parameters....343
Figure 428: Offset Hatch examples....344
Figure 429: Offset In Out Hatch parameters....344
Figure 430: Offset In Out Hatch....345

List of Figures

Figure 431: Helix Hatch Window....346
Figure 432: Helix hatch examples....347
Figure 433: Selecting Shape hatching....348
Figure 434: The Edit Hatch option....348
Figure 435: The Hatch window....349
Figure 436: The Properties window for hatching....350
Figure 437: Remove Hatch Association....351
Figure 438: Deleting a hatching pattern....352
Figure 439: The Tools | Array panel....352
Figure 440: Rectangular Array dialog box....353
Figure 441: The Starting Cell buttons....353
Figure 442: The Starting Cell buttons....354
Figure 443: The copied Shape....355
Figure 444: Rectangular Array....355
Figure 445: Rectangular Array hotspots....356
Figure 446: Removing a column from a Rectangular Array....357
Figure 447: Changing the row offset of a Rectangular Array....358
Figure 448: Polar Array dialog box....359
Figure 449: The copied Shape....361
Figure 450: Polar Array Example....361
Figure 451: Polar Array hotspots....362
Figure 452: Moving a Polar Array by dragging its center point hotspot....362
Figure 453: Rotating array elements by dragging the array element rotation hotspot....363
Figure 454: Placing the Object Base point in the center of the array element....364
Figure 455: Rotating array elements around the center point....364
Figure 456: Array elements after rotating around the center point....364
Figure 457: Placing the Object Base point in the upper-left corner of the array element....365

List of Figures

Figure 458: Rotating array elements around the upper-left corner 366
Figure 459: Array elements after rotating around the upper-left corner.....366
Figure 460: Placing the Object Base point at the top-side midpoint of the array element.....366
Figure 461: Rotating array elements around the top-side midpoint 367
Figure 462: Array elements after rotating around the top-side midpoint.....367
Figure 463: Placing the Object Base point at the upper-right corner of the array element.....368
Figure 464: Rotating array elements around the upper-right corner 368
Figure 465: Array elements after rotating around the upper-right corner.....368
Figure 466: Placing the Object Base point at the right-side midpoint of the array element.....369
Figure 468: Array elements after rotating around the right-side midpoint.....369
Figure 469: Placing the Object Base point in the lower-right corner of the array element.....370
Figure 470: Rotating array elements around the lower-right corner 370
Figure 471: Array elements after rotating around the lower-right corner 370
Figure 472: Placing the Object Base point at the bottom-side midpoint of the array element 371
Figure 473: Rotating array elements around the bottom-side midpoint 371
Figure 474: Array elements after rotating around the bottom-side midpoint 371
Figure 475: Placing the Object Base point at the lower-left corner of the array element 372
Figure 476: Rotating array elements around the lower-left corner.....373
Figure 477: Array elements after rotating around the lower-left corner 373
Figure 478: Placing the Object Base point at the left-side midpoint of the array element 373
Figure 479: Rotating array elements around the left-side midpoint 374
Figure 480: Array elements after rotating around the left-side midpoint.....374
Figure 481: The Polar Array before and during rotation.....375
Figure 482: The Polar Array after rotation 375
Figure 483: The Polar Array before and during the changing of the radius.....376
Figure 484: The Polar Array after the radius is changed 376
Figure 485: Before Trimming.....377

List of Figures

Figure 486: Trimming using Normal Mode 378
Figure 487: Trimming using Fence Mode 378
Figure 488: Extend 379
Figure 489: Before Joining 380
Figure 490: Join Dialog 380
Figure 491: Join Samples 381
Figure 492: Break Samples 381
Figure 493: After Break 382
Figure 494: Before Dividing 382
Figure 495: Divide Dialog 382
Figure 496: Insert Points 383
Figure 497: Break 383
Figure 498: Explode 384
Figure 499: Shape Tree - Before/After Explode 384
Figure 500: A grouping example 385
Figure 501: The Shape Tree before and after grouping 385
Figure 502: A grouping example 386
Figure 503: The Shape Tree before and after ungrouping 386
Figure 504: Clicking on the lines to fillet 387
Figure 505: Specifying the fillet radius 387
Figure 506: The finished fillet 387
Figure 507: Clicking on the lines to chamfer 389
Figure 508: Specifying the chamfer distance 389
Figure 509: The finished chamfer 389
Figure 510: Bridge 390
Figure 511: Optimize 391
Figure 512: Example of the Show Jumps command 391

List of Figures

Figure 513: Marking Order 392
Do the following to select the starting point for marking a Shape: 392
Figure 514: The Marking Order context menu 392
Figure 515: The Marking Order context menu 393
Figure 516: Reversed marking direction 393
Figure 517: The Marking Order context menu 394
Figure 518: The tracing of laser jumps 395
Figure 519: The Path Optimizer dialog box 395
Figure 520: Path Optimization example 396
Figure 521: Directional Optimization example 397
Figure 522: The Simplify Polylines Window 398
Figure 523: Manipulated Polylines 399
Figure 524: The Quality Group 400
Figure 525: Cutter Compensation 400
Figure 526: Applying Cutter Compensation 401
Figure 527: Remove Overlaps 402
Figure 528: Remove Overlap Sample 402
Figure 529: The Marking Quality dialog box 403
Figure 530: Marking Quality example 403
Figure 531: The New Tiling Grid dialog box 406
Figure 532: Examples of rectangular cells and mosaic cells 406
Figure 533: Examples of the Vertical and Horizontal Tiling Orientation 407
Figure 534: Specify Cell Size or Fit to contents (Linear Tiling Orientation) 408
Figure 535: Specify Cell Size or Fit to contents (Rectangular or Mosaic Tiling Orientation) 409
Figure 536: The Grid Properties windows for Linear tiling grids 411
Figure 537: The Grid Properties windows for Rectangular and Mosaic tiling grids 412
Figure 538: The location coordinates of the tiling grid 413

List of Figures

Figure 539: The XY table movement values 414
Figure 540: The Scan Order buttons 414
Figure 541: The Starting Cell buttons 415
Figure 542: The four Starting Cell options 415
Figure 543: Selecting a Starting Cell option from the context menu 415
Figure 544: The Scan Direction buttons 416
Figure 545: The four Scan Direction options 416
Figure 546: Selecting a Scan Direction option from the context menu 416
Figure 547: The Scan Direction dropdown list 417
Figure 548: The Top to Bottom Scan Direction option 417
Figure 549: The Bottom to Top Scan Direction option 418
Figure 550: The Left to Right Scan Direction option 418
Figure 551: The Right to Left Scan Direction option 419
Figure 552: The Grid Information section for linear tiling grids 419
Figure 553: The Grid Information section for rectangular tiling grids 420
Figure 554: Example of resizing columns and rows 421
Figure 555: Dragging a cell border 421
Figure 556: The resized cell 422
Figure 557: The Add Column button and the Delete Column button 422
Figure 558: The selected column position 422
Figure 559: The added column 423
Figure 560: The tiling grid context menu 423
Figure 561: The selected column 424
Figure 562: After deleting the column 424
Figure 563: The tiling grid context menu 425
Figure 564: The Distribute Columns Equally button 425
Figure 565: The Use Equal Column Width dialog box 426

List of Figures

Figure 566: The Add Row button and the Remove Row button 426
Figure 567: The selected row position 427
Figure 568: The added row 427
Figure 569: The tiling grid context menu 428
Figure 570: The selected row position 428
Figure 571: After deleting the row 428
Figure 572: The tiling grid context menu 429
Figure 573: The Distribute Rows Equally button 429
Figure 574: The Use Equal Row Height dialog box 430
Figure 575: Cell location swapping 430
Figure 576: The tiling grid context menu 431
Figure 577: The tiling grid context menu 432
Figure 578: The Tile adding options dialog box 432
Figure 579: New Images in the Project Explorer 433
Figure 580: The Mosaic tiling grid context menu with Join Vertex 434
Figure 581: Join Vertex example 434
Figure 582: The Mosaic tiling grid context menu 435
Figure 583: Delete Line example 435
Figure 584: Delete Line example 436
Figure 585: The Mosaic tiling grid context menu 436
Figure 586: Break Line example 436
Figure 587: The Properties tab 437
Figure 588: The Image Selection list on the Properties tab 438
Figure 589: The Tiling Mode radio buttons 438
Figure 590: The Script section of the Properties tab 439
Figure 591: The Variable Name field 439
Figure 592: Creating the before-cell or before-tiling function 440

List of Figures

Figure 593: The Edit Function dialog box 440
Figure 594: Creating the after-cell or after-tiling function 441
Figure 595: The Edit Function dialog box 441
Figure 596: Overlapping length 442
Figure 597: Overlapping length application 442
Figure 598: Total Part Size 442
Figure 599: Hardware 443
Figure 600: Cell Properties window 444
Figure 601: Synchronize with selected images warning 445
Figure 602: Edit Shape Properties 446
Figure 603: Code View of the Tilling View 447
Figure 604: The Tray 448
Figure 605: Tray Marking Properties 449
Figure 606: Tray Properties – General 450
Figure 607: Tray Properties – Grouping 450
Figure 608: Groups 451
Figure 609: Tray Properties – Cells 451
Figure 610: Tray Properties - Tray Details 452
Figure 611: Tray Angle, Margin X and Margin Y 453
Figure 612: The Marking Direction buttons 453
Figure 613: The Starting Cell buttons 454
Figure 614: The four Starting Cell options 455
Figure 615: The Scan Direction buttons 455
Figure 616: The four Scan Direction options 456
Figure 617: Scan Direction options 457
Figure 618: Variable Name 457
Figure 619: Creating the before-cell or before-tray function 458

List of Figures

Figure 620: The Edit Function dialog box 458
Figure 621: Creating the After-cell or After-tray function 459
Figure 622: The Edit Function dialog box 459
Figure 623: Cell View 461
Figure 624: Cell Dimensions for Rectangular and Circular cells 461
Figure 625: Recipe composition 462
Figure 626: Tray Angle 463
Figure 627: Selection section 463
Figure 628: Selection Mode Examples – All, Even Columns, and Even Rows 466
Figure 629: Selection Mode Examples – Odd Columns, Odd Rows, and Rectangular Region 466
Figure 630: Selection Mode Examples – Single Cell, Specific Column, and Specific Row 467
Figure 631: Parameters section 467
Figure 632: Selected Images 469
Figure 633: The Home | Mark Group 470
Figure 634: Database Connectivity Properties window 473
Figure 635: Database File Selection 474
Figure 636: Using ODBC Data Source 474
Figure 637: Add Connection window 475
Figure 638: Successfully connected message dialog 476
Figure 639: Dropdown list of predefined data source names 477
Figure 640: Connection String for a predefined data source name 477
Figure 641: Select Data Source dialog box 478
Figure 642: The Machine Data Source tab 479
Figure 643: List of drivers 480
Figure 644: List of data sources 480
Figure 645: Database Connectivity object on the Project Explorer 481
Figure 646: SQL Select Query 482

List of Figures

Figure 647: ScanScript Assistant....487
Figure 648: Selecting a dll file....488
Figure 649: The Member Selection Screen....489
Figure 650: The Selected Members Screen....490
Figure 651: The Edit Selected Members Window....491
Figure 652: The Script Tab....492
Figure 653: Connecting to a card....493
Figure 654: Marking Operations....495
Figure 655: Start Marking....495
Figure 656: Align Part....496
Figure 657: Download Job....497
Figure 658: Manage Jobs....498
Figure 659: View scanning jobs....498
Figure 660: Rename Jobs....499
Figure 661: The IO Bits Monitoring Window....500
Figure 662: Laser Diagnostics – laser off....522
Figure 663: Laser Diagnostics - Laser off....523
Figure 664: Clicking New on the Home Tab....532
Figure 665: Dropdown menu with a list of commands....533
Figure 666: Dropdown menu with a list of properties....533
Figure 667: Snap to angle....545
Figure 668: Snap to grid....546
Figure 669: Snap to end point....547
Figure 670: Snap to mid points....548
Figure 671: Snap to center....549
Figure 672: Snap to nodes....550
Figure 673: Tracking....551

List of Figures

Figure 674: Snap to quadrants 552
Figure 675: Snap to intersection 553
Figure 676: Snap to extension 554

1 IMPORTANT INFORMATION

For your protection, carefully read these instructions before installing and operating the scan head.
Retain these instructions for future reference.

Novant reserves the right to update this user manual at any time without prior notification.

If product ownership changes, this manual should accompany the product.

1.1 SAFETY SYMBOLS

This manual uses the following symbols and signal words for information of importance.

DANGER

Indicates a hazardous situation which, if not avoided, will result in serious injury or death.

WARNING

Indicates a hazardous situation which, if not avoided, could result in serious injury or death.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

IMPORTANT

Indicates information considered important but not directly hazard related (e.g. security, hygiene, or equipment or property damage).

1.2 SAFETY LABELS

DANGER

Laser radiation
can cause severe retinal and corneal burns, burns on the skin, and may pose a fire risk.

- To avoid injury and reduce risk of fire, please follow the control measures and safety guidelines provided by the laser's manufacturer, and those established by your Laser Safety Officer (LSO), Radiation Safety Officer (RSO), or safety department of your business or institution.

ESD WARNING

Electrostatic discharge and improper handling
can damage MOVIA scan head's electronics.

- Keep the equipment sealed until it is located at a proper static control station.

1.3 CUSTOMER SUPPORT

Before contacting Novanta for assistance, review appropriate sections in the manual that may answer your questions.

After consulting this manual, please contact one of our worldwide offices between 9 AM and 5 PM local time.

Americas, Asia Pacific

Novanta Headquarters, Bedford, USA
Phone: +1-781-266-5700
Email: photonics@novanta.com

Europe, Middle East, Africa

Novanta Europe GmbH, Wackersdorf, Germany
Phone: +49 9431 7984-0
Email: photonics@novanta.com

Milan, Italy
Phone: +39-039-793-710
Email: photonics@novanta.com

China

Novanta Sales & Service Office, Shenzhen, China
Phone: +86-755-8280-5395
Email: photonics.china@novanta.com

Novanta Sales & Service Office, Suzhou, China
Phone: +86-512-6283-7080
Email: photonics.china@novanta.com

Japan

Novanta Service & Sales Office, Tokyo, Japan
Phone: +81-3-5753-2460
Email: photonics.japan@novanta.com

2 INTRODUCTION

2.1 GENERAL NOTES

Novanta reserves the right to make changes to the products covered in this manual to improve performance, reliability or manufacturability.

Although every effort has been made to ensure accuracy of the information contained in this manual, Novant assumes no responsibility for inadvertent errors. Contents of the manual are subject to change without notice.

2.2 SCANMASTER ARCHITECTURE

ScanMaster Designer is a powerful software application that is designed to support Novanta's Scan Controllers. With ScanMaster Designer you can create and scan virtually any image using text, linear barcodes, 2D data matrix barcodes, QR-Codes, or imported graphics. ScanMaster Designer also features ScanScript, a powerful scripting language with a comprehensive library of commands for supporting any laser scanning scenario.

The ScanMaster Designer user interface provides the following:

- Object design with easy-to-use CAD features
- Barcode marking
- Vector/Raster image marking
- Image processing features
- True Type® and Ovf font support
- Automatic Date and Serial Number Generation
- Digital input/output capabilities
- Comprehensive help files on CAD and ScanScript commands

Once you have selected your Novanta scan head, you can select your Scan Controller and software. Novanta’s suite of scan control products enables you to synchronize mirror motion with laser firing

and integrate these products with your own software and hardware. ScanMaster Designer supports the ScanMaster Controller (SMC). The SMC can be controlled with either the ScanMaster Application Programming Interface (SMAPI) or ScanMaster Designer.

ScanMaster Designer is user software with a contemporary “look and feel” and all the functionality you need to create and control your scan jobs. Its intuitive graphic design environment, import capabilities, and editing tools make job creation easy. ScanMaster Designer is well-suited for system integrators and small-volume OEM runs.

SMAPI provides most of ScanMaster Designer‘s scanning functionalities for use with your own user interface. This high-level API will allow you to programmatically incorporate complex objects (such as 1D and 2D barcodes, fonts, arcs, circles and more) into your scanning jobs. This API also supports ScanScript, Novanta's scripting language that enables complex job structures and flow control.

The following diagram is a visual representation of the ScanMaster architecture. It shows how ScanMaster Designer connects to the Scan Controllers and other scanner products.

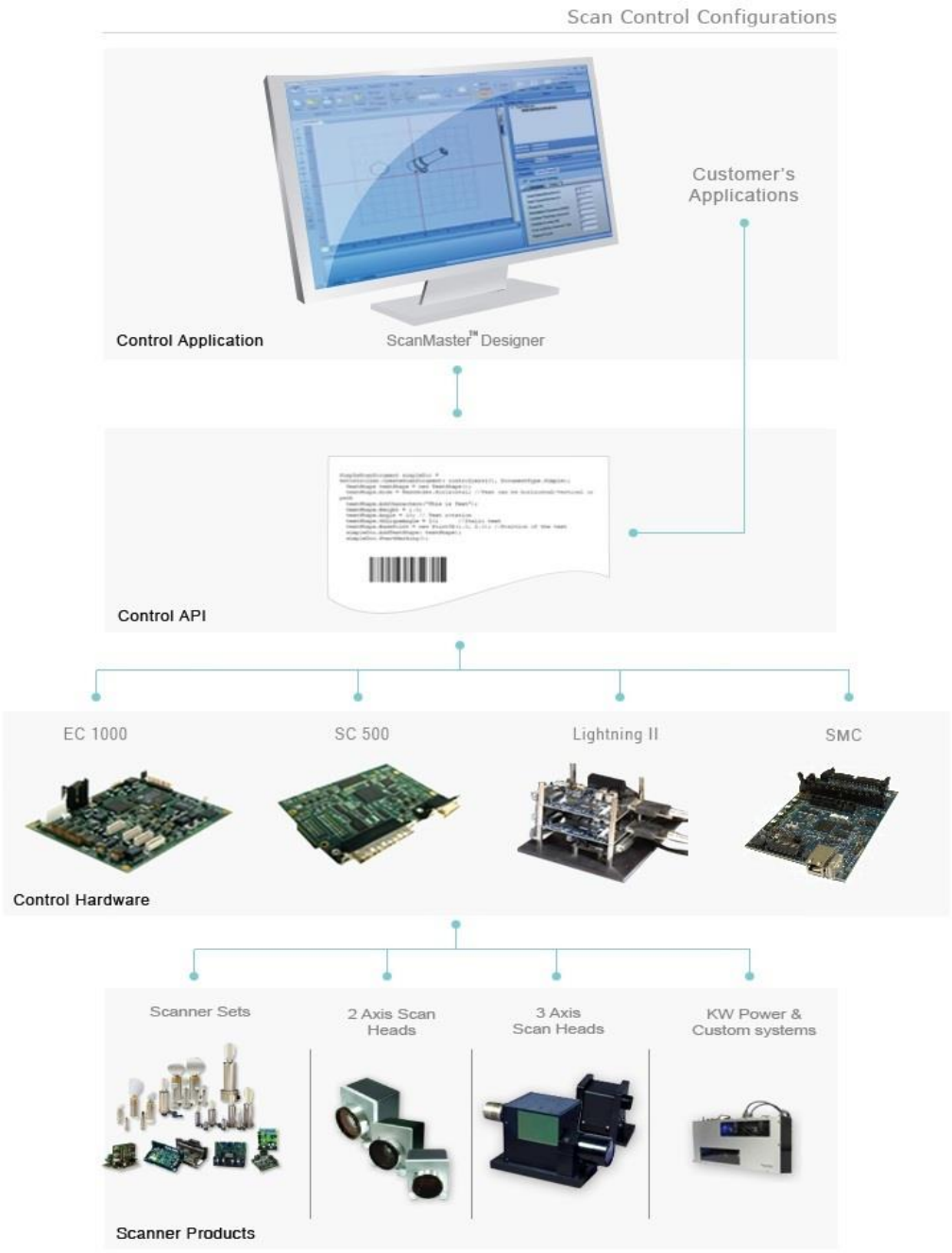


FIGURE 1: SCANMASTER ARCHITECTURE

2.3 DOCUMENT CONVENTIONS PROJECT CONCEPTS

A job is represented in **ScanMaster Designer** as a Project. A Project consists of two entities—The **Script** and the **Image**.

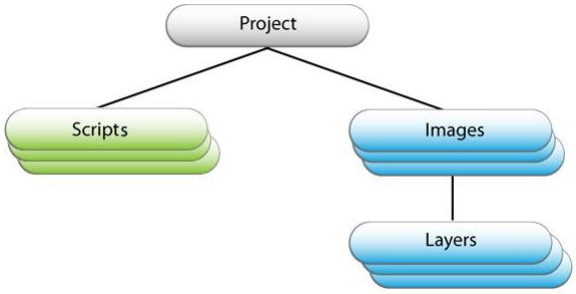


FIGURE 2: PROJECT CONCEPT

An Image is a drawing that is made up of one or more Layers that hold shapes and other elements (text strings, barcodes and pictures). Layers simplify the creation of complex images and are used to define the order of execution. Each Image is associated with its own set of laser properties. Layers usually inherit the parent image's properties but can also be associated with their own set of laser properties.

Though seemingly similar, layers only exist in the context of the image they are part of, while images are addressable entities that can be selected for individual execution or manipulated by the script.

Apart from one or more images, the project virtually contains one **Composite Image**, which is made up of all the drawings in the different images. The Composite Image helps you align and arrange the drawings in the various images to optimize the output prior to execution.

The **Script** entity is used to provide execution of flow control, to support integration with the rest of the system, and to allow programmatic manipulation of Images and settings.There is no restriction on the number of Images and Scripts in a Project. The tabs on the right side of the Drawing Canvas provide a means to select an Image or the Script, as well as a visual indication of the available Images and the currently active one.

ScanMaster Designer offers a graphical representation of this hierarchical structure through the Project Explorer window (Scripts and Images) and the Shape Tree window (Layers and Shapes).

2.4 SCAN CONTROLLERS

ScanMaster Designer supports the following Scan Controllers from Novanta:

SMC – The SMC is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems. The SMC control board is specifically designed for remote embedding and control of a scan head and laser system. It is capable of controlling two scan heads, each with up to three motion axes, with concurrent laser timing control. The SMC also provides integrated synchronization I/O for connection to factory automation equipment. The SMC also has the ability to interface directly with LightningTM II digital scan heads. It also supports integrated ScanPack sky-writing capability for those heads. It is a more modular design supporting a wide variety of lasers using specialized laser adapters and cables.

2.5 USING SCANMASTER DESIGNER HELP

The online help for ScanMaster Designer includes a comprehensive table of contents and a full text-search capability, to help you find information for using the product.

Book icons open to reveal sub-books and topics. Double-click on a book icon to expand the table of contents and view topics inside the book. When you double-click a book icon that is already expanded, the topics will be hidden. The left side of the window displays the table of contents, and the right-side pane displays information relevant to the selected topic. You may use the Back and Forward buttons on the toolbar to navigate through the pages.

Finding a Help Topic

The following Browse and Search options are available through the **ScanMaster Designer** Help:

2.5.1 Contents tab

1. Click the **Contents** tab to browse through the table of contents.
2. Double-click the **Book Icons** to reveal sub books and topic entries.
3. Click on the desired **Table of Contents** entry to view the topic.

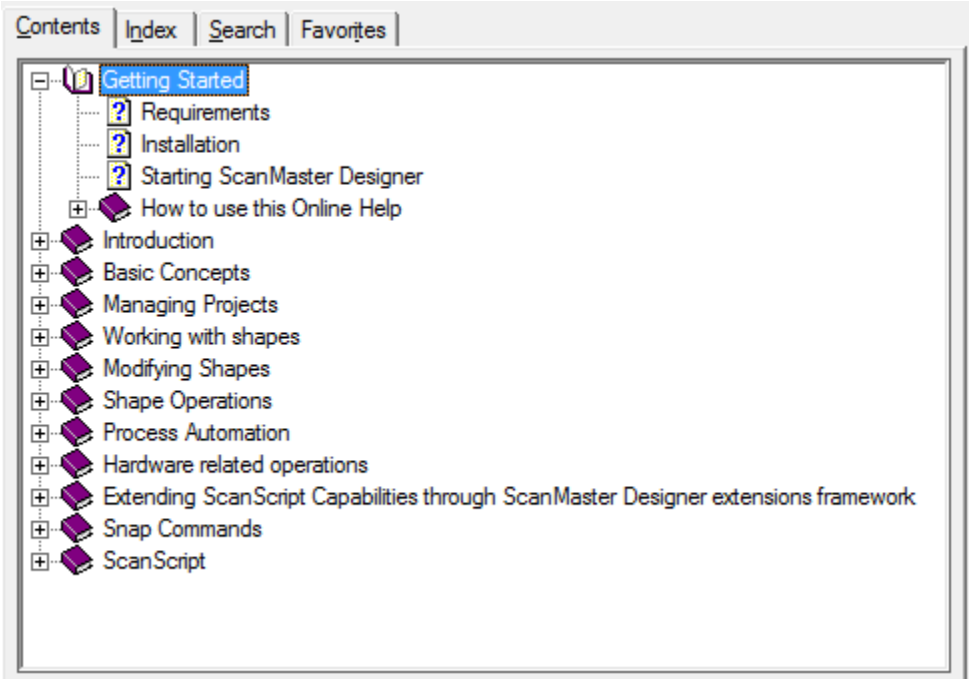


FIGURE 3: THE CONTENTS TAB OF THE SCANMASTER DESIGNER ONLINE HELP WINDOW

2.5.2 Index tab

1. Click the **Index** tab to browse through the index entries.
2. Type the keyword or topic you wish to search.
3. Double-click on the desired **Topic** from the list of results to display the topic entry.

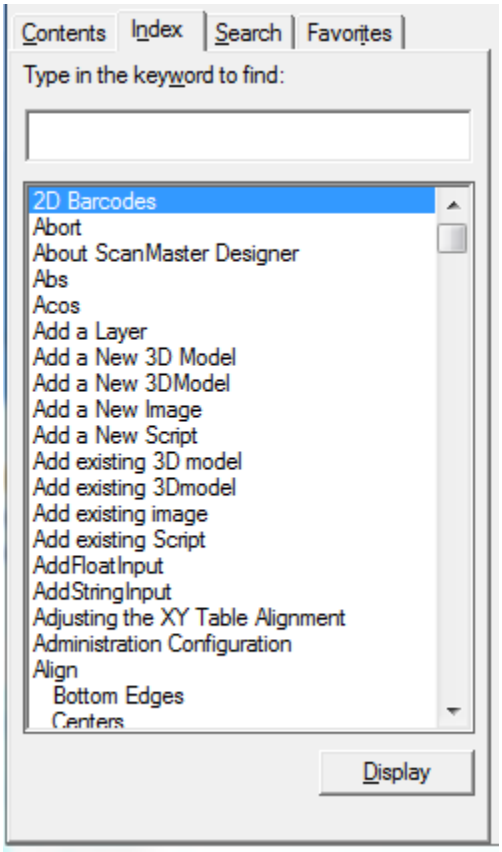


FIGURE 4: THE INDEX TAB OF THE SCANMASTER DESIGNER ONLINE HELP WINDOW

2.5.3 Search tab

1. Click the **Search** tab and enter a word or a phrase to search for.
2. Click **List Topics.** The search results will be displayed under **Select Topic to display** section.
3. Select the relevant topic and click **Display**.

FIGURE 5: THE SEARCH TAB OF THE SCANMASTER DESIGNER ONLINE HELP WINDOW

2.5.4 Favorites tab

1. Click the **Add** button on the **Favorites** tab.
2. The **Topics** section will display the links to the topics that you have added to your **Favorites**.
3. If you select a topic and click **Display**, the topic opens to the right.

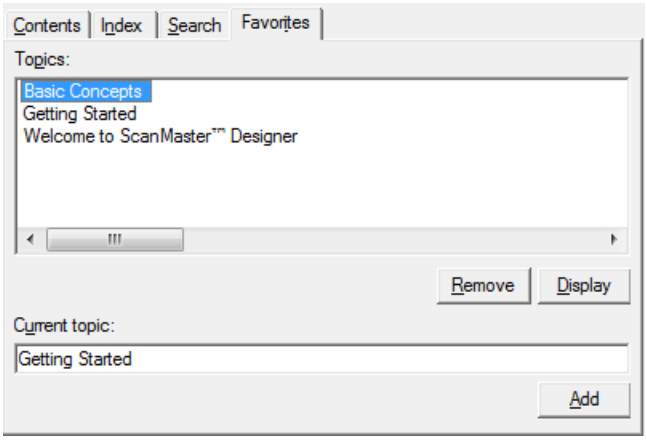


FIGURE 6: THE FAVORITES TAB OF THE SCANMASTER DESIGNER ONLINE HELP WINDOW

2.5.5 Printing a Help Topic

1. Select the help topic you wish to print.
2. In the Help window, click **Print** Print.
3. Select the desired printing options; you may print just the selected topic or the selected topic and all its subtopics.
4. Click the **Print** button.

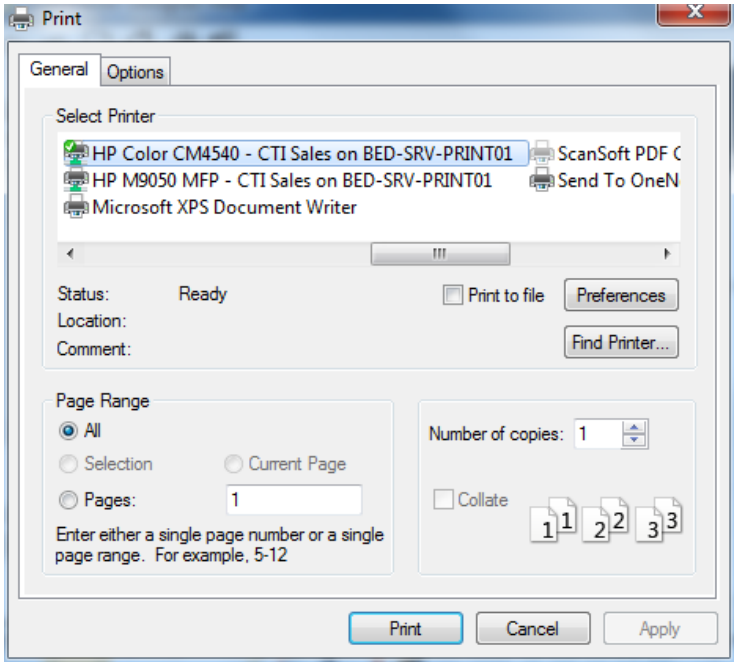


FIGURE 7: THE PRINT BUTTON

2.5.6 Copying Examples

In "How to script in ScanScript" you will find useful script codes. Use these examples to learn and understand ScanScript methods. To copy and use these examples:

1. Click the **Copy** button on the example box header.
2. Paste them on the **ScanScript** editor by pressing **Ctrl + V** or by right-clicking and selecting **Paste**.

3 GETTING STARTED

This Section describes how to install and start the ScanMaster Designer application. This section also introduces key features of the program and provides tips for establishing a good workflow.

3.1 SYSTEM REQUIREMENTS

The following are the minimum requirements for installing and running ScanMaster Designer on your computer:

- Processor: 1GHz
- Memory: 4 GB
- Hard Disk Space: 1GB
- Display: 1024 x 768 High Color (16-bit)
- Windows 7 or Windows XP Professional with Service Pack 2 or higher

3.2 SCANMASTER DESIGNER INSTALLATION

3.2.1 To install ScanMaster Designer

Do the following to install ScanMaster Designer on your computer:

1. Run the ScanMaster Designer Installer.exe

by double clicking on it.
2. You will see the following screen.

FIGURE 8: THE SCANMASTER DESIGNER SETUP WIZARD

3. Click Next to begin the installation process. The License Agreement will be presented. You are advised to read the terms of the license carefully before proceeding with the installation. If you decline the license terms, the installation cannot proceed. Click I Agree to proceed with the installation.

4. At this point of the installation process, you cannot change the destination folder of ScanMaster Designer. To change the destination folder, select the new folder and click Next.

Note: Changing the destination folder is not recommended unless you have specific reasons for doing so.

5. Select the Scan Controller you want to use with ScanMaster Designer and click Next.

6. Now you see the Ready to Install page. You can verify that you have provided accurate information and click Install. Otherwise, you can go back and provide accurate information. After the installation has completed, you will be required to restart your machine.

3.2.2 Uninstalling ScanMaster Designer

To uninstall ScanMaster Designer, go to Start in the lower left hand corner of your computer screen and select All Programs and then the Novanta folder. Inside that folder is a file named 'Uninstall'. Click on this file to invoke the uninstallation process. This takes a few seconds.

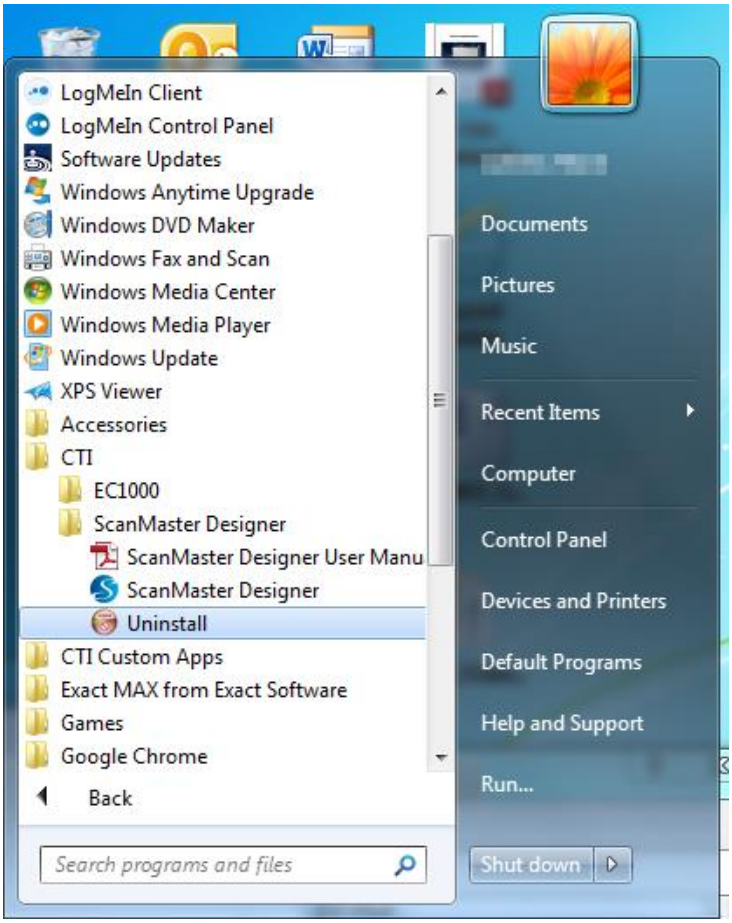


FIGURE 9: UNINSTALLING SCANMASTER DESIGNER

1. Left-click the Uninstall button in the following screen.

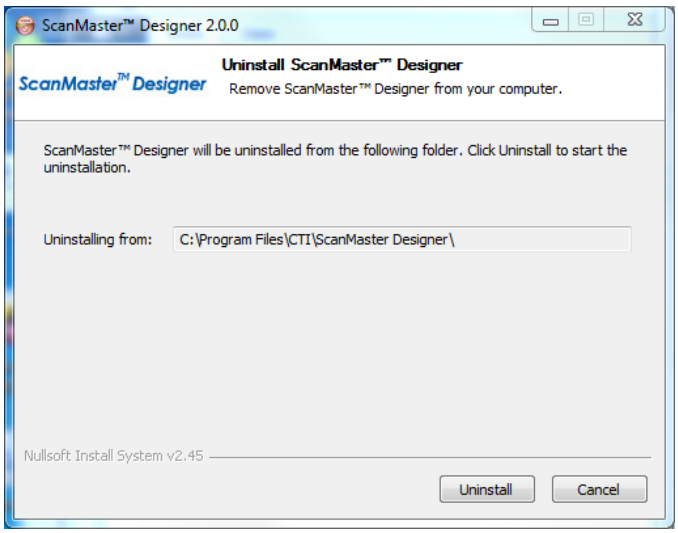


FIGURE 10: THE UNINSTALL DIALOG BOX

3.2.3 Repairing or ScanMaster Designer

In order to repair ScanMaster Designer, you must locate the original installer program used to install the software.

1. Double-click on the installer program icon to display the following screen.

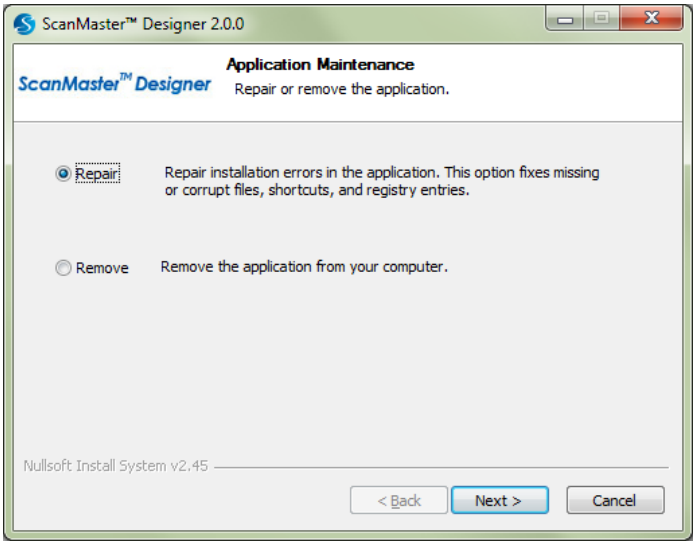


FIGURE 11: THE SCANMASTER DESIGNER SETUP WIZARD

2. Select the Repair option and click Next, and click Install in next screen that is displayed.

3.3 STARTING SCANMASTER DESIGNER

You can start ScanMaster Designer from your desktop or from your Start Menu.

3.3.1 Starting ScanMaster Designer from Your Desktop

To start ScanMaster Designer from your desktop, double-click the following shortcut.

FIGURE 12: THE SCANMASTER DESIGNER DESKTOP SHORTCUT

3.3.2 Starting ScanMaster Designer from Your Start Menu

To start ScanMaster Designer from your Start Menu, do the following:

1. Left-click the Start button on your Windows taskbar.

FIGURE 13: THE START BUTTON ON THE WINDOWS TASKBAR

This displays the Start menu.

2. Select Programs and locate the Novanta folder and then locate the ScanMaster Designer sub-folder.

3. Click the ScanMaster Designer icon.

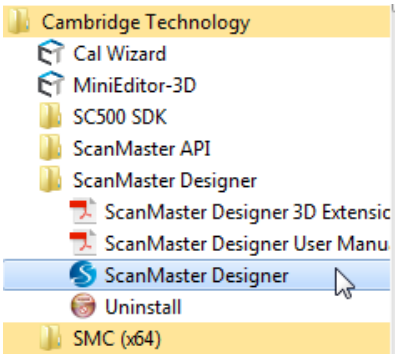


FIGURE 14: THE WINDOWS START MENU

The following window will appear.

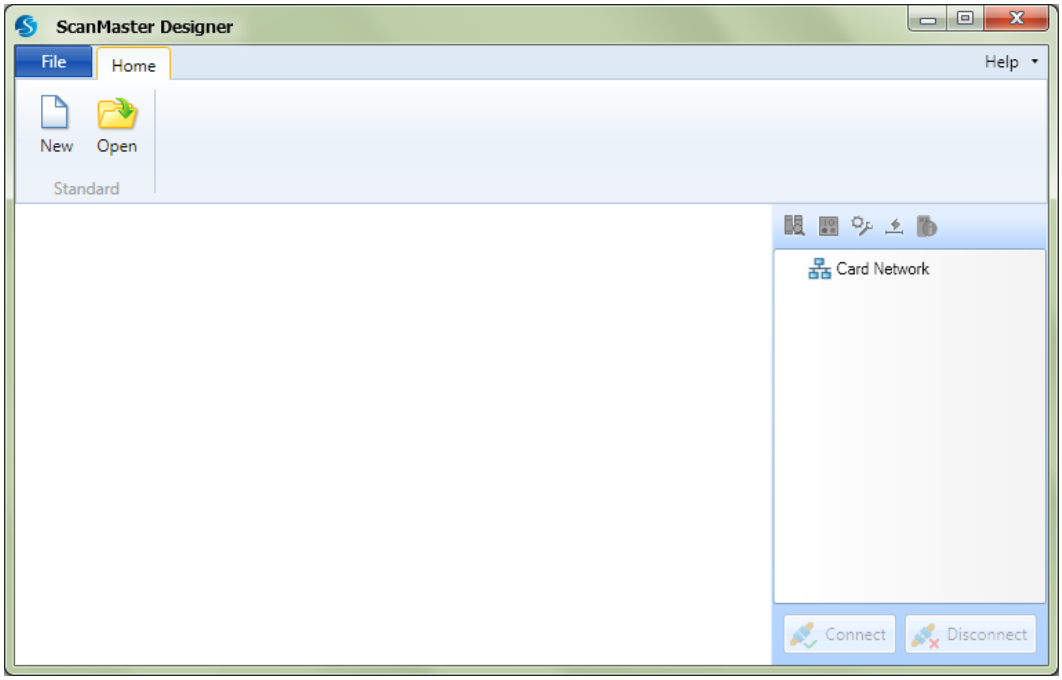


FIGURE 15: THE START-UP SCREEN

To start a new project, click New from the Home tab.

To open an existing project, click Open from the Home tab.

A basic marking job is created by placing different shapes such as text, geometric shapes, and barcodes on the Drawing Canvas. Each shape has its unique properties, which can be modified. In addition, laser marking properties are available to precisely control the marking dimensions. See “Section 5: Managing Projects” for detailed information about creating projects.

3.4 EXITING SCANMASTER DESIGNER

To exit ScanMaster Designer, click the Exit button

in the lower-right corner of the File menu.

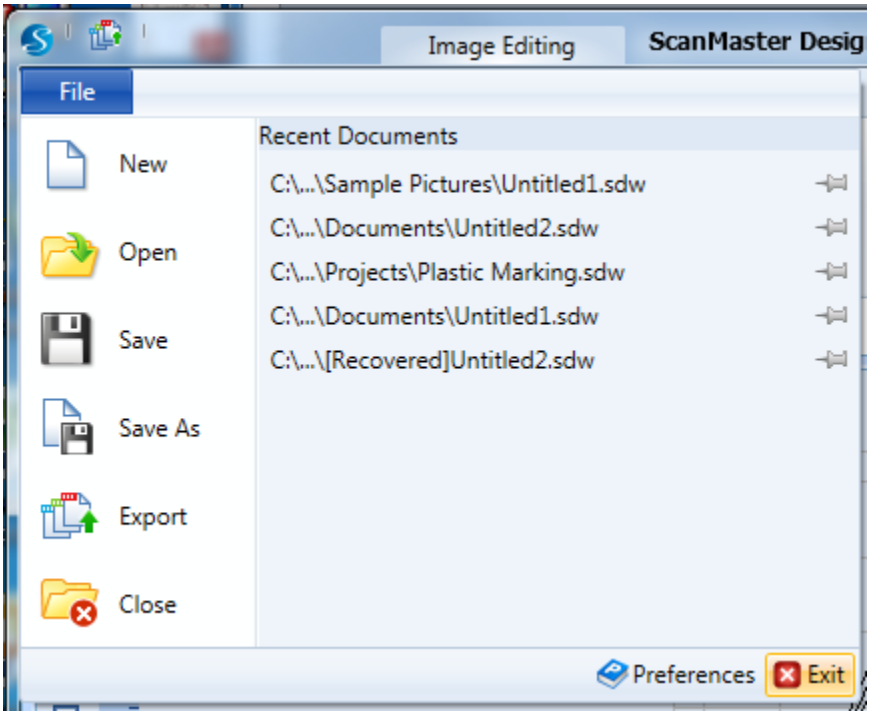


FIGURE 16: THE EXIT BUTTON ON THE FILE MENU

3.5 WORKSPACE ELEMENTS

The following figure contains an overview of the Graphical User Interface (GUI) elements of ScanMaster Designer.

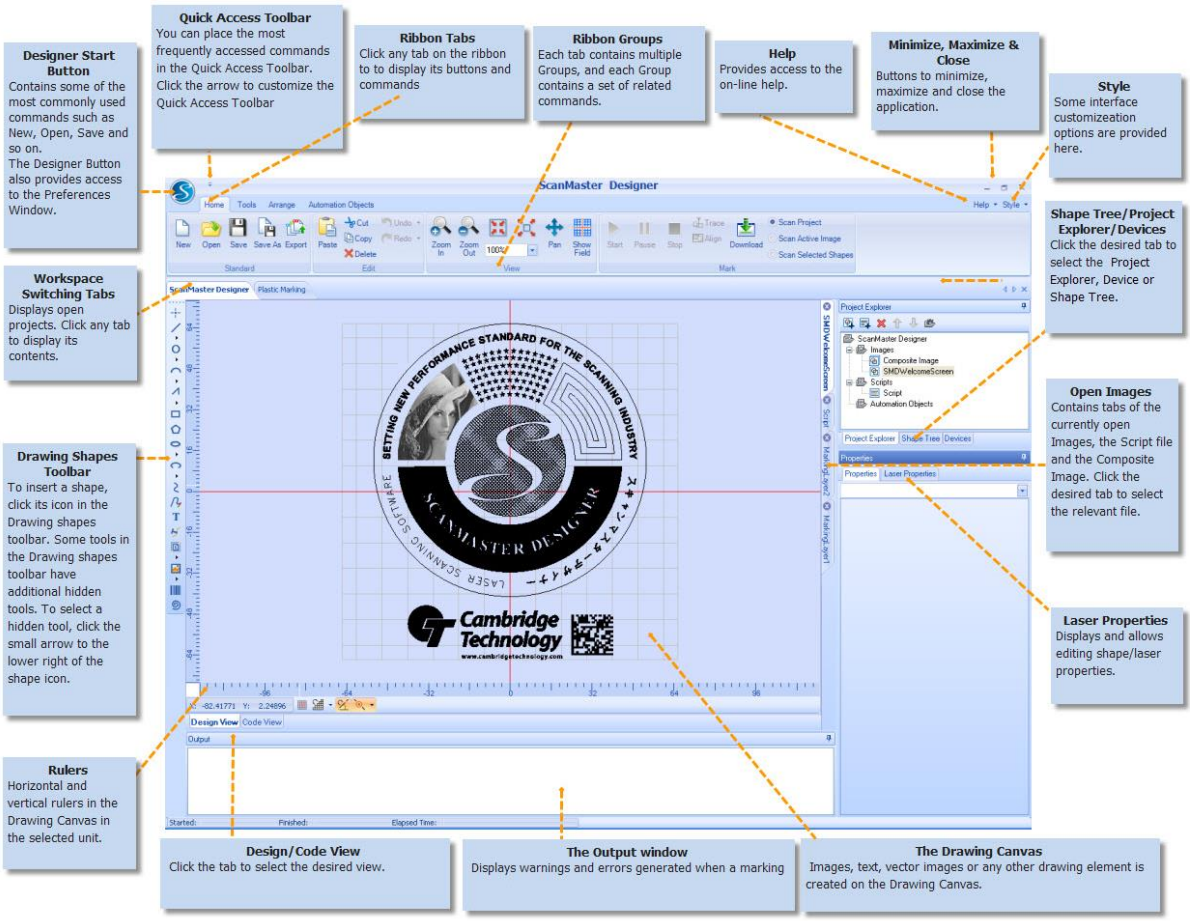


FIGURE 17: WORKSPACE ELEMENTS

3.6 RECOMMENDED WORKFLOW

1. Create a Job. A "Job" is a simple program that contains Images and a Script that are executed in the prescribed order. Click New to create a job from scratch or click Open to load an existing job.
2. Design and edit with Drawing Shapes Tools.

3. **Insert a shape.**

To insert a shape, click its icon in the Drawing Shapes Toolbar. Some tools in the Drawing Shapes Toolbar have additional hidden tools, as indicated by the small triangle to the lower right of the shape icon. To select a hidden tool, click on the triangle and the Shapes List appears. Then, click the option you want.

4. **Select a shape.**

Before you can edit a shape, you must first select it. To select multiple shapes, use any of the following options:

- Ctrl + A to select all shapes in the current image.
- Shift + Click to add a shape to the selection.
- Click and drag over a region to select shapes that are completely included (top-left to lower-right, blue region) or partially included (lower-right to top-left, green region).

5. **Edit and modify shapes.**

The ScanMaster Designer is equipped with a rich collection of editing tools that you can use to edit your image. The Tools and Arrange options on the Ribbon will allow you to edit and modify shapes.

6. **Arrange complex jobs into a simple hierarchy (Projects, Images, Layers, and Shapes).**

Shapes placed in an Image can be grouped into Layers in the Shape Tree. Each Layer can contain many Shapes. Grouping Shapes into Layers will allow you to establish a proper marking order. You can work on many Images at any given time. The hierarchy of the Images and the Scripts can be viewed from the Project Explorer tab. You can also change the current project settings from this panel.

7. **Set Shape and Laser properties.**

When a Shape is selected, its geometrical properties such as the X and Y coordinates, width, height, and laser settings will be listed in the Properties window of the ScanMaster Designer window. You can access and edit these properties as desired.

8. **Save projects.**

When you use the Save command, ScanMaster Designer saves Project and Shapes information to the current project file. However, when you use the Save As command, ScanMaster Designer rewrites the project/shapes information into a new file. While working with the ScanMaster Designer, save projects frequently and create backup copies of important files. The Auto

Recovery setting in the application preferences enables ScanMaster Designer to automatically save a copy of the current workspace for specified time period. This may be used to recover a file in case an unexpected application crash occurs.

9. **Connect to the Controller.**

ScanMaster Designer supports multiple Scan Controllers. In order to start the execution of a job, you need to first connect to a specific Scan Controller. Click the Devices tab to see a list of available Scan Controllers. Click on the device you wish to select and then press Connect.

Once you connect to a particular Scan Controller, the Connect button will be disabled and the buttons in the Mark group will be enabled.

10. **Execute/Download the job.**

Run, pause and stop marking

- Click Start to activate the marking process.
- Click Pause to pause the marking. (Please note that some of the Scan Controllers do not support the pause operation.)
- Click Stop to terminate the marking process.

Tracing Shapes and aligning parts

If the system has a guide laser pointer, do the following:

- Click Trace to trace the current Job. This will give you an idea of how the laser moves during the actual marking.
- Click Align to trace the bounding box of the current Job's Composite Image (the maximum extent of all the shapes) to help you identify the area of the actual marking. This is useful for part aligning.

The guide laser's Speed and Repetition Count are set in Preferences.

Downloading Jobs

If the connected scan controller has an on-board flash memory, you can download the job for future execution by clicking **Download** .

3.7 JOB CREATION EXAMPLE

In the following example, we create a Rectangle and a Circle for marking:

1. Create a new Project by clicking on the New button on the Home tab.
2. Place a Rectangle and a Circle on the Drawing Canvas. These tools can be found in the Drawing Shapes Toolbar.

   First click Insert Rectangle. You can place the rectangle anywhere on the Drawing Canvas. To do that, click with the mouse at the appropriate coordinates within the view and hold it down. Now drag the mouse to the position you want to specify as the rectangle's opposite corner and release the mouse.
3. Follow the same procedure to draw a Circle.
4. If you wish to edit the shape properties (position, size, etc.) of the rectangle or the circle, you can do so by clicking on the Properties tab on the lower right panel on the screen.
5. If you wish to edit the properties of the laser, click the Laser Properties tab on the lower-right panel on the window.
6. Once you make the necessary changes, save your project.
7. Connect to the Scan Controller.
8. Click the Devices tab on the upper right panel on the screen. Select the relevant Scan Controller and click Connect. Once you connect to the card, the Mark group on the Ribbon will bet enabled. (See Chapter 9: Hardware related operations for other laser marking operations.)
9. Scan Shapes.

Click Start to activate the marking process.

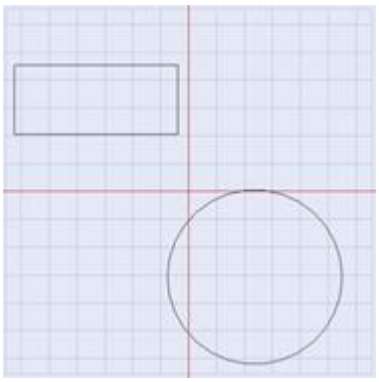


FIGURE 18: EXAMPLE

3.8 WHAT IS LASER MARKING?

3D laser marking refers to the laser marking performed on a 3D workspace. 3D laser marking comprises a range of 3D related processes including all types of Surface Markings, Engraving, Sub Layer Laser Engraving and Prototyping. 3D laser marking technology is widely used by many industries such as packaging, automobile manufacturing, jewelry and etc.

ScanMaster™ Designer software allows you to create a digital 3D model and apply 2D images to a 3D surface. This application facilitates 3D marking with either projection or wrapping styles.

This application also enables you to do laser engravings by specifying different sections and layers. More detailed information about these features will be discussed in this document.

The marking procedure can be customized using the ScanScript language in which you can experience the advanced capabilities not available through the user interface.

Note: A detailed description about **Projection** and **Wrapping** styles and their differences will be discussed in the appendix of this document. Refer Appendix A of this document.

3.9 SCAN CONTROLLER CARDS

There are four different Scan Control cards available which are supported by ScanMaster™ Designer software:

1. ScanMaster Controller - The SMC is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems. The Ethernet-connected SMC board is designed to permit remote embedding and control of a scan-head and laser system. It is capable of controlling two scan-heads with up to three motion axes each with concurrent laser timing control. It also provides integrated synchronization I/O for connection to factory automation equipment.
2. EC1000 - The EC1000 is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems. The EC1000 control board is specifically designed for remote embedding and control of a scan-head and laser system. It is capable of controlling two scan-heads with up to three motion axes each with concurrent laser timing control. It also provides integrated synchronization I/O for connection to factory automation equipment. The EC1000 controller card is the core of the SM1000 Controller Module.

4 THE SCANMASTER DESIGNER INTERFACE

4.1 THE FILE TAB

The File tab

provides easy access to some of the most commonly used commands and recently used Projects. The tab is located in the upper-left corner of the ScanMaster Designer window.

Clicking on the File tab displays a vertical list of options. Select an option to launch the associated command. In addition to command access, the File tab enables you to view and access recently opened documents and pin documents to the Recent Documents list for quick access. To pin an item to the Recent Items, click the pin icon next to the relevant file name. Note that the Pin option is toggle-able, where indicates an item that is not currently pinned and indicates that it is pinned.

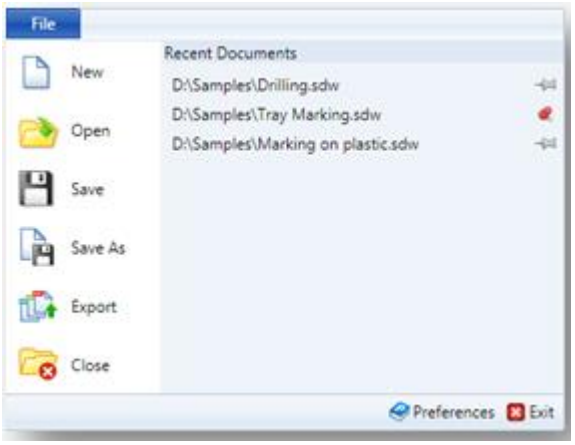


FIGURE 19: THE DESIGNER START BUTTON

4.2 QUICK ACCESS TOOLBAR

The **Quick Access Toolbar** is helpful for accessing frequently used tools in ScanMaster Designer**.** By default it is disabled and in Quick Access Toolbar

The **Quick Access Toolbar** is helpful for accessing frequently used tools in ScanMaster Designer**.** By default it is disabled and invisible until an item is added as shown in the following section. When first enabled, it is placed at the top of the ScanMaster Designer window, next to the **ScanMaster Designer** icon and is always available to the user, regardless of which tab is selected in the **Ribbon**. Also, you can place the **Quick Access Toolbar** below the **Ribbon** by selecting that option from the right-click menu.

FIGURE 20: THE QUICK ACCESS TOOLBAR

4.2.1 Customize the Quick Access Toolbar

To add a command to the **Quick Access Toolbar**, right-click the command, and then select **Add to Quick Access Toolbar** from the menu.

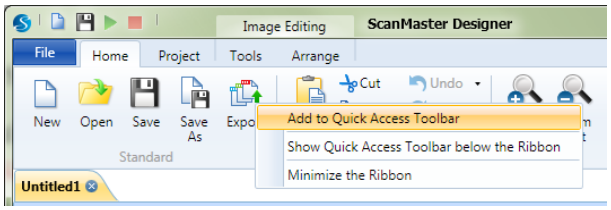


FIGURE 21: ADDING A COMMAND TO THE QUICK ACCESS TOOLBAR

To remove a command from the **Quick Access Toolbar**, right-click it and then select **Remove** from **Quick Access Toolbar** from the menu.

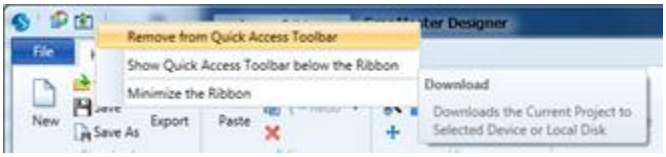


FIGURE 22: REMOVING A COMMAND FROM THE QUICK ACCESS TOOLBAR

4.2.2 Place the Quick Access Toolbar above/below the ribbon

By default, the **Quick Access Toolbar** is placed at the top of the ScanMaster Designer window next to the **File** tab. If desired, you have the option to place the **Quick Access Toolbar** below the ribbon. Select **Show Quick Access Toolbar** below the **Ribbon** from the right-click menu and it will be moved below the **Ribbon.**

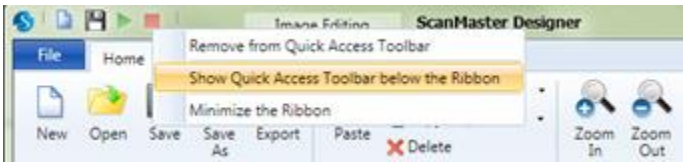


FIGURE 23: THE PLACE QUICK ACCESS TOOLBAR MENU

4.3 THE RIBBON

The **Ribbon** provides easy access to ScanMaster Designer tools and commands that can be used to create and edit drawings. Tools are logically grouped into a collection of Ribbon tabs. Each tab contains multiple **Groups**, and each **Group** contains a set of related commands. The **Ribbon** is docked on top of the ScanMaster Designer **Drawing Canvas**.

As your mouse passes over the **Ribbon**, tool tips will be displayed. The following figure shows the **Ribbon** for the **Home** tab.

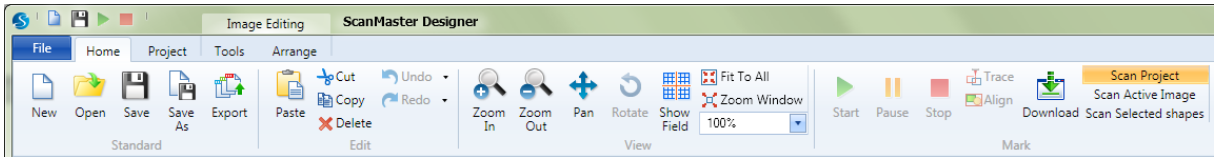


FIGURE 24: AN EXAMPLE OF THE RIBBON

4.3.1 Minimize/Maximize the ribbon

To maximize working space, you can reduce the **Ribbon** to see only the tabs in ScanMaster Designer. You can minimize the ribbon by right-clicking on the **Ribbon** and selecting **Minimize the Ribbon** from the menu.

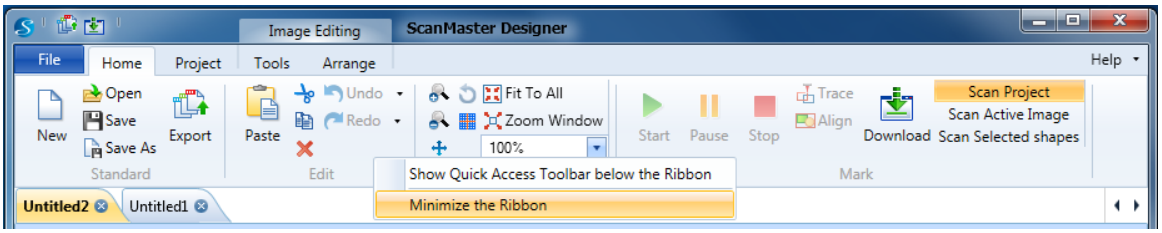


FIGURE 25: MINIMIZING THE RIBBON

To maximize the ribbon, right-click on the **Ribbon** and deselect **Minimize the Ribbon** again.

The following sections describe all of the tabs that are available on the **Ribbon**.

4.3.2 Home

The **Home** tab on the **Ribbon** contains the following commands (some menu commands will be enabled once you connect to a Scan Controller).

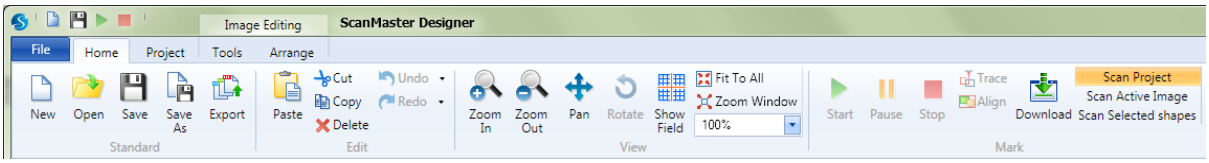


FIGURE 26: THE HOME TAB

Standard

The **Home | Standard** panel of ScanMaster Designer includes commands for creating, opening, and saving a new project and exporting images as **.svi** files.

Icon	Command	Description
	New	Creates and opens a new project.
	Open	Opens a saved project.
	Save	Saves the current project.
	Save As	Saves the current project under a different name.
	Export	Exports images as **.svi** files to a location on the host machine.

Edit

The **Home | Edit** panel of ScanMaster Designer includes commands for undoing and redoing actions and cutting, copying, pasting, and deleting shapes in the ScanMaster Designer workspace.

Icon	Command	Description
	Paste	Pastes objects that were cut or copied into the current workspace.
	Cut	Cuts the selected objects from the current workspace and sends them to the Clipboard.
	Copy	Copies all selected objects to the Clipboard.
	Delete	Deletes all selected objects.
	Undo	Reverses the last action performed. You may also undo any of the last few actions that were performed by clicking the arrow next to the Undo icon and selecting the action(s) to undo.
	Redo	Re-applies the action that you undid last. You may also redo any of the last few actions that were performed by clicking the arrow next to the Redo icon and selecting the action(s) to redo.

View

The **Home | View** panel of ScanMaster Designer includes commands for zooming, panning, and rotating the Drawing Canvas in the ScanMaster Designer workspace.

Icon	Command	Description
	Zoom In	Enlarges the display size of the workspace on the screen.
	Zoom Out	Reduces the display size of the workspace on the screen.
	Pan	Allows you to quickly move around the canvas at the same magnification you have currently set.
	Rotate	Rotates the 3D Drawing Canvas.
	Show Field	Zooms to display the entire Drawing Canvas field to a specified resolution.
	Fit to All	Adjusts the zoom level to fit the entire contents of the drawing into the current view.
	Zoom Window	Offers a quick way to view a selected area of the drawing.
100%	Zoom Factor	Allows you to zoom in or out by the specified zoom factor.

Mark

The **Home | Mark** panel of ScanMaster Designer includes commands for marking, scanning, and downloading scanning jobs to flash memory.

Icon	Command	Description
	Start	Starts marking.
	Pause	Pauses marking.
	Stop	Stops marking.
	Trace	Traces the outer line of the drawing.
	Align	Traces the bounding box of the current job.
	Download	Downloads scanning jobs to flash memory in the controller or to USB memory.
Scan Project	Scan Project	Scans the whole project including execution of the script.
Scan Active Image	Scan Active Image	Scans all of the shapes in the selected image.
Scan Selected shapes	Scan Selected Shapes	Scans only the shapes that you select in the selected image.

4.3.3 Project

The **Project** tab contains process automation tools and advanced marking features.

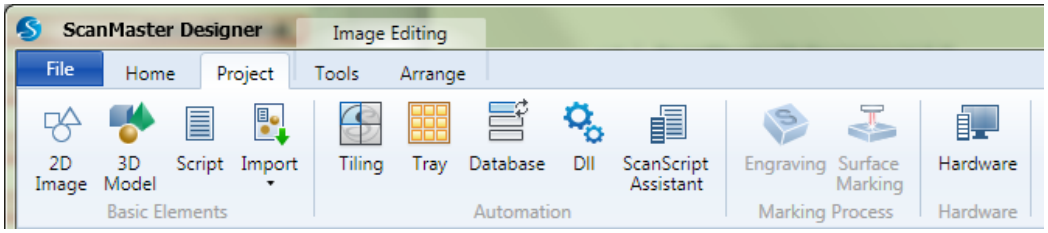


FIGURE 27: THE PROJECT TAB

Basic Elements

The **Project | Basic Elements** panel of ScanMaster Designer includes commands for adding a script or images to the project.

Icon	Name	Description
	2D Image	Adds a 2D image to the project.
	3D Model	Adds a 3D image to the project.
	Script	Adds a script to the project.

	Import	Imports an existing 2D image, 3D image, or Script file to the project.

Automation

The **Project | Automation** panel of ScanMaster Designer includes commands for launching the ScanScript Assistant and adding automation objects (Tiling, Tray, Database, or DLL) to a project.

Icon	Name	Description
	Tiling	Adds a Tiling automation object to the project.
	Tray	Adds a Tray automation object to the project.
	Database	Adds a Database automation object to the project.
	Dll	Adds a DLL automation object to the project.
	ScanScript Assistant	Launches the ScanScript Assistant program that provides functionalities to operate automation objects properly.

Marking Process

The **Project | Marking Process** panel of ScanMaster Designer includes commands for engraving and surface marking.

Note: These commands are only available if the 3D Extensions are enabled.

Icon	Name	Description
	Engraving	Creates relief impressions in a substrate. Refer to the ScanMaster Designer 3D Extensions Manual for more information.

Hardware

The **Project | Hardware** panel of ScanMaster Designer includes the **Hardware** command for creating and adding hardware control to the Project.

Icon	Name	Description
	Hardware	Creates and adds hardware control to the Project.

4.3.4 Tools

The **Tools** tab on the **Ribbon** provides the following options to modify shapes and text.

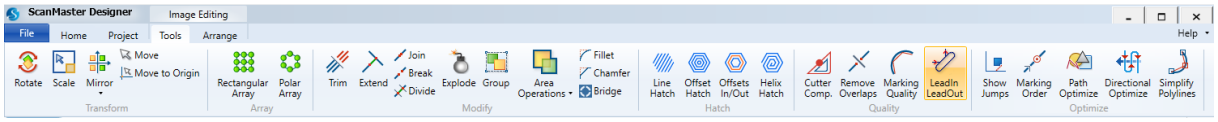


FIGURE 28: THE TOOLS TAB

Transform

The **Tools | Transform** panel of ScanMaster Designer provides the following commands for moving, scaling, and rotating shapes.

Icon	Command	Description
	Rotate	Rotates a shape around a point of reference on the canvas.
	Scale	Changes the current size of a shape.
	Mirror	Creates a symmetrical mirror image of the selected shape according to the specified mirror line.
	Move	Moves the selected shape(s) to the new position that you specify on the canvas.
	Move to Origin	Moves the selected shape(s) to the origin of the canvas.

Array

The Tools | Array panel of ScanMaster Designer provides the following commands for creating and managing duplicates of a particular shape.

Icon	Command	Description
	Rectangular Array	Creates copies of a selected shape, or shapes, in rows and columns at a specified spacing.
	Polar Array	Creates copies of a selected shape, or shapes, in a circular pattern, based on a specified centerpoint.

Modify

Icon	Command	Description
	Trim	Removes a selected section from a given shape.
	Extend	Extends a shape or a part of a shape to touch another shape in a drawing.
	Join	Joins shapes that have a gap between them by using any of the following styles: **Extend or Trim**, **Shift One End** or **Insert Lines**.
	Break	Splits a shape into two or more parts by specifying a point on the shape or by drawing a line.
	Divide	Divides a particular shape into two or more separate parts.
	Explode	Breaks a shape into its primitive shapes.
	Group	Combines several shapes to create one shape.
	Fillet	Connects two adjacent lines with an arc that is tangent to the object and has a specified radius.
	Chamfer	Connects two lines to meet in a flattened or bevelled corner
	Bridge	Creates a gap of a specified distance between two shapes.

Hatch

The **Tools | Hatch** panel of ScanMaster Designer is used to fill shapes and text with closely spaced parallel lines, also known as hatching. Without hatching, only the outline of the logo or the object will be marked. With hatching, the shape will be filled with any of the available filling styles. You can add more than one hatch pattern to a single drawing.

Icon	Command	Description
	Line Hatch	Fills the selected shape with lines.
	Offset Hatch	Fills the selected shape with the Offset Hatch pattern.
	Offsets In/Out	Fills the selected shape with the Offsets In/Out Hatch pattern.
	Helix Hatch	Fills the selected shape with the Helix Hatch pattern.

Quality

The **Tools | Quality** panel of ScanMaster Designer includes commands for applying Cutter Compensation, removing overlapping lines, and controlling the marking quality of circular shapes.

Icon	Command	Description
	Cutter Comp.	Applies Cutter Compensation, which is an offset that accounts for variations in beam width.
	Remove Overlaps	Removes overlapping lines.
	Marking Quality	Controls the marking quality of circular shapes.
	Lead-in/Lead-out	Adds marking extensions to a shape to permit entering a shape at an angle along a straight edge. Useful for avoiding localized "hot-spots" in foil cutting.

Optimize

The **Tools | Quality** panel of ScanMaster Designer includes commands for visually representing jumps and the marking order of shapes and optimizing marking paths and polylines.

Icon	Command	Description
	Show Jumps	Graphically represents the movements of the laser beam between shapes.
	Marking Order	Gives a visual representation of the order in which a particular shape will be marked, as well as the mark's starting point.
	Path Optimize	Optimizes the marking order of shapes placed on the canvas by decreasing the number of vector moves performed by the scan head, thereby reducing the cycle times.
	Directional Optimize	Directionally optimize the marking path to match the material flow in mark-on-the-fly applications.
	Simplify Polylines	Simplifies the polylines by removing the unnecessary vertices within the error limit.

4.3.5 Arrange

The **Arrange** commands are used to locate shapes relative to each other.

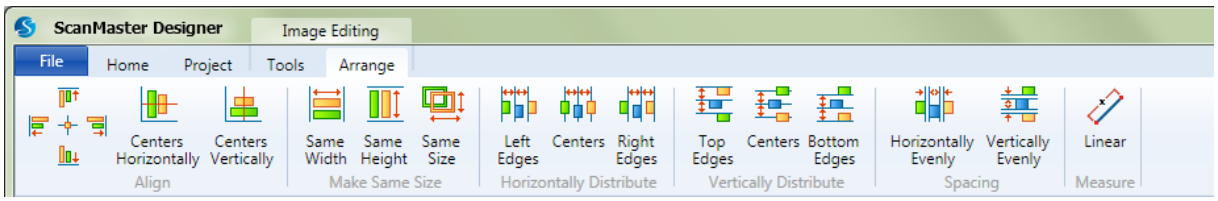


FIGURE 29: THE ARRANGE TAB

Align

The **Arrange | Align** panel of ScanMaster Designer includes commands for adjusting a shape in relation to other shapes or specifying a static orientation of a shape, or set of shapes, in relation to others.

Icon	Name	Description
	Align Left Edges	Aligns the left edge of all other selected shapes to the left edge of the initially selected shape.
	Align Right Edges	Aligns the right edge of all other selected shapes to the right edge of the initially selected shape.
	Align Bottom Edges	Aligns the bottom edge of all other selected shapes to the bottom edge of the initially selected shape.
	Align Top Edges	Aligns the top edge of all other selected shapes to the top edge of the initially selected shape.
	Align Centers	Aligns the centers of all other selected shapes to the center of the initially selected shape.
	Align Centers Horizontally	Aligns shapes horizontally in line with the center of the initially selected shape.
	Align Centers Vertically	Aligns shapes vertically in line with the center of the initially selected shape.

Note: Use the **Shift +** selection mechanism to select the initial shape.

Make Same Size

The **Arrange | Make Same Size** panel of ScanMaster Designer includes commands for making all shapes the same height or width.

Icon	Name	Description
	Make Same Width	Makes all shapes the same width.
	Make Same Height	Makes all shapes the same height.
	Make Same Size	Makes all shapes the same width and height.

Note: The initially selected shape determines the size of the rest of the selected shapes.

Horizontally Distribute

The **Arrange | Horizontally Distribute** panel of ScanMaster Designer includes commands for distributing shapes from left to right.

Icon	Name	Description
	Left Edges (Horizontally)	Distributes the spaces proportionately between the left edges of the leftmost and rightmost shapes, in a horizontal order.
	Centers (Horizontally)	Distributes the spaces proportionately between the centers of the leftmost and rightmost shapes, in a horizontal order.
	Right Edges (Horizontally)	Distributes the spaces proportionately between the right edges of the leftmost and rightmost shapes, in a horizontal order.

Note: Distribute commands will be applied only for three or more objects.

Vertically Distribute

The **Arrange | Vertically Distribute** panel of ScanMaster Designer includes commands for distributing shapes from top to bottom.

Icon	Name	Description
	Top Edges (Vertically)	Distributes the spaces proportionately between the top edges of the topmost and bottommost shapes, in vertical order.
	Centers (Vertically)	Distributes the spaces proportionately between the centers of the topmost and bottommost shapes, in vertical order.
	Bottom Edges (Vertically)	Distributes the spaces proportionately between the bottom edges of the topmost and the bottommost shapes, in vertical order.

Spacing

The **Arrange | Spacing** panel of ScanMaster Designer includes commands for distributing shapes evenly.

Icon	Name	Description
	Horizontally Evenly	Distributes the spaces proportionately between the leftmost and the rightmost shapes, in horizontal order.
	Vertically Evenly	Distributes the spaces proportionately between the topmost and bottommost shapes, in vertical order.

Measure

The **Arrange | Measure** panel of ScanMaster Designer includes the **Linear** commands for measuring the linear distance between two points on the canvas.

Icon	Name	Description
	Linear	Measures the linear distance between two points on the canvas.

4.4 THE DRAWING CANVAS AND THE SCRIPT WINDOW

4.4.1 The Drawing Canvas

ScanMaster Designer provides a two-dimensional Drawing Canvas for designing 2D images. Shapes placed on the canvas are defined relative to the coordinate system of the Drawing Canvas. Two rulers are provided that run horizontally across the bottom and vertically along the left side of the canvas. The X Axis and the
Y Axis are indicated by two red lines that intersect at the center of the Drawing Canvas (Origin 0, 0).

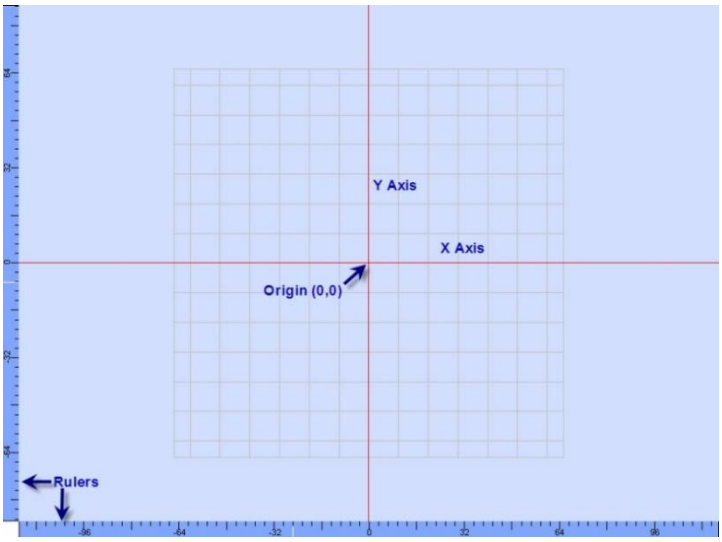


FIGURE 30: THE DRAWING CANVAS

Grid

The Drawing Canvas can include a grid, as shown in the above figure. The grid is useful for aligning shapes and other graphics on the Drawing Canvas. To select a grid option, left-click the arrowhead next to the Grid icon and select a grid option (Line, Dot, or Blank) from the drop-down menu.

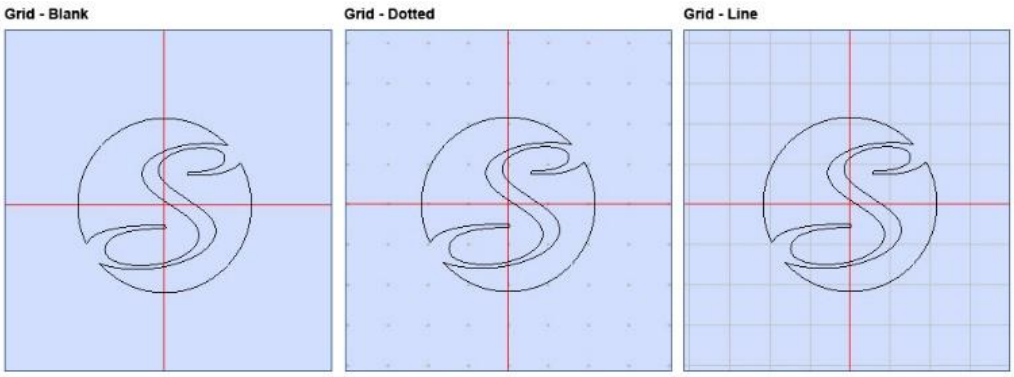


FIGURE 31: THE GRID

To exit ScanMaster™ Designer, click the **Close** button on the top right of the screen or select **Exit** from the **ScanMaster™ Designer** button.

Snap Tools

The **Snap** tools just below the Drawing Canvas make it easier to draw and modify shapes on the Drawing Canvas. They help you to pick an exact point on the Drawing Canvas or based on other Shapes.

Icon	Command	Description
	Grid	Positions shapes to the closest intersection of the grid.
	Snap to Angle	Snap to a specified angle, relative to the last point in steps of 45 degrees.
	Snap to Objects	Allows you to specify precise locations on objects. The following object snap methods are available: **End Points**, **Mid Points**, **Center**, **Nodes**, **Tracking**, **Quadrants**, **Intersection**, and **Extension**

4.4.2 Script Window

The Script tab allows you to access the ScanMaster Designer ScanScript files of a project. It provides a means to communicate with external handlers and other controllers to automate a marking process. (See Chapter 11 for more information on ScanScript.)

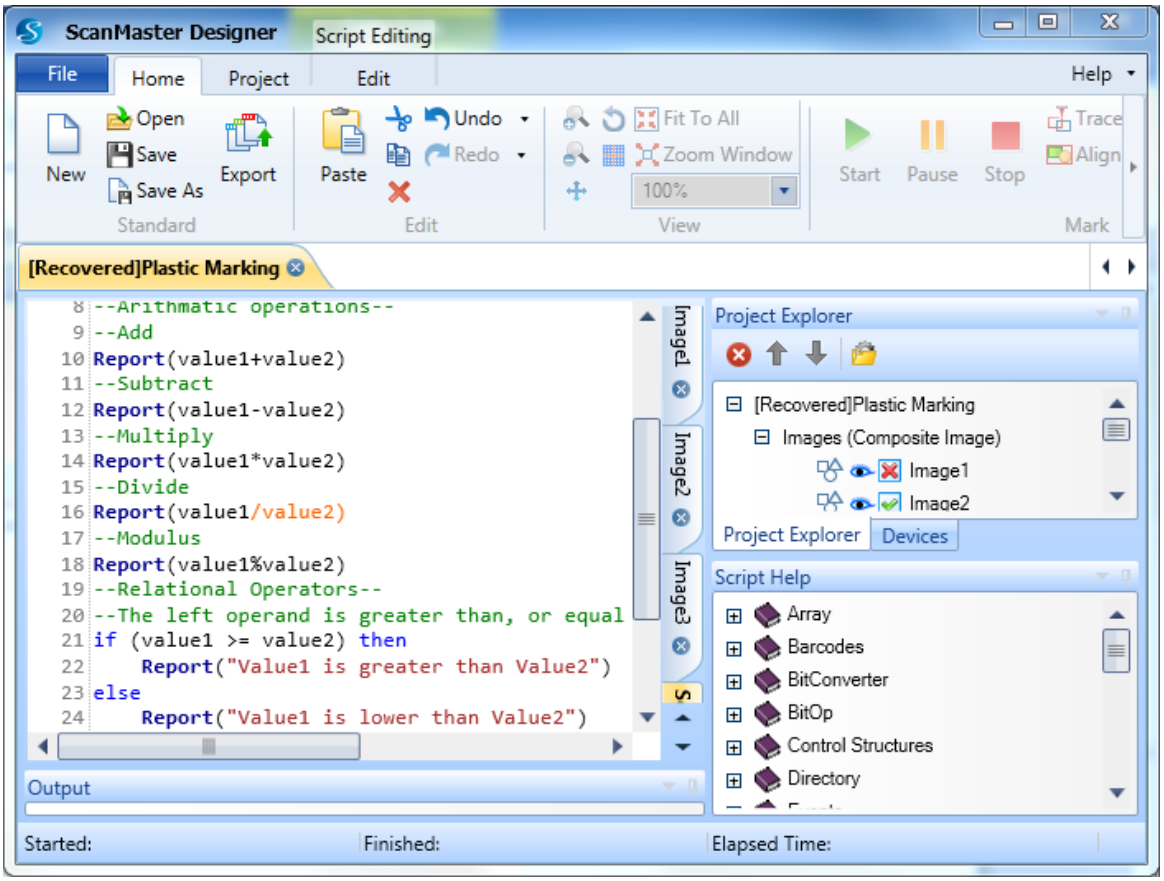


FIGURE 32: SCANMASTER SCANSCRIPT

4.5 PROJECT EXPLORER

A project can have several Images. Images created in the ScanMaster Designer are listed in a tree structure in the **Project Explorer**. The current Project is shown in the top level, with corresponding Images and the Script files below it. Right-click on an element in the **Project Explorer** to access its corresponding actions.

To view the **Project Explorer**, click the **Project Explorer** tab.

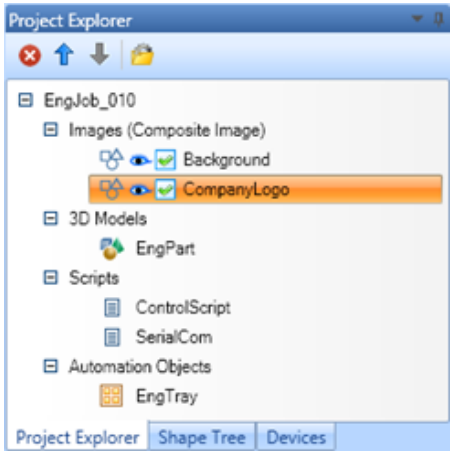


FIGURE 33: THE PROJECT EXPLORER

Create a New 2D Image

To create a new 2D Image, do one of the following:

1. Left-click the **2D Image** command on the **Project** | **Basic Elements** panel of the **Ribbon** or
2. In the **Project Explorer**, right-click on a Project name and select Create 2D Image from the context menu.

A new 2D Image will be added to the Project.

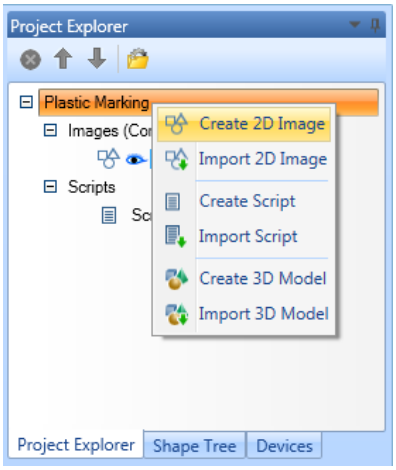


FIGURE 34: CREATING A 2D IMAGE IN THE PROJECT EXPLORER

Import an Existing 2D Image (Import Image File)

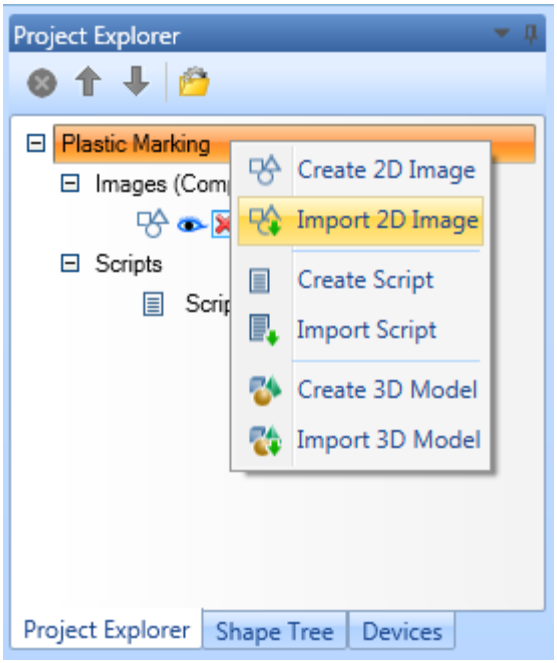
To import a new 2D Image, do one of the following:

- Left-click the **Import** icon on the **Project | Basic Elements** panel of the **Ribbon** and select **2D Image** from the context menu or
- In the **Project Explorer**, right-click on a project name and select **Import 2D Image** from the context menu.

The **Open Vector Image File** dialog box will be displayed. Browse and select the file that you want to import.

Note: ScanMaster allows you to import any of the following file types: **svi, dxf, ai, pdf, drill files (nc, tp)**, or **plt**.

The imported 2D Image will be added to the Project.



Note: If specific **Laser Properties** were set for a particular Image, those properties will be imported along with the Image.

Open an Image for editing

To open an Image for editing, do one of the following:

- Left-click on the tab for that Image on the right-hand side of the Drawing Canvas or
- Left-click on the Image name in the Project Explorer.

In this figure, the Image Tiling6_Cell0 is selected in both the Project Explorer and in the tab on the right-hand side of the Drawing Canvas.

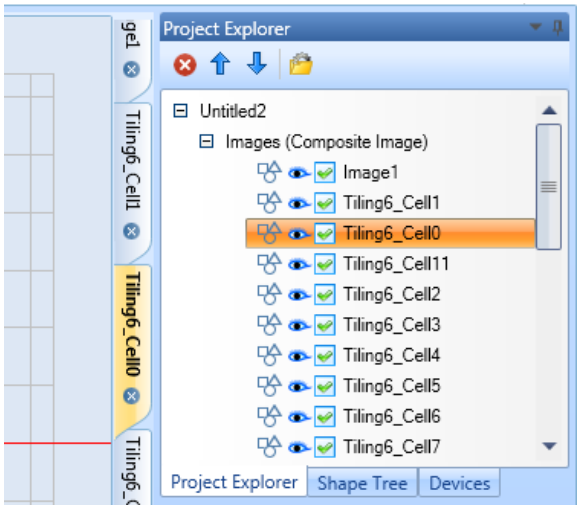


FIGURE 35: OPENING AN IMAGE FOR EDITING

Delete an existing Image

Do the following to delete an Image in the Project Explorer:

1. Select the Image you want to delete.
2. Left-click the Delete Image icon or right-click on the Image and select Delete from the context menu.
3. A confirmation message will be displayed. Click Yes to delete.

The selected image will be removed from the project.

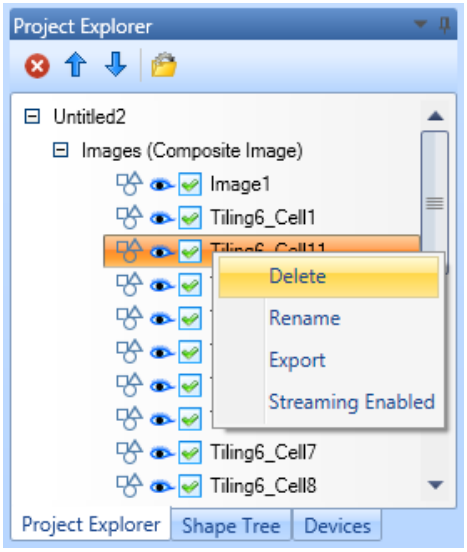


FIGURE 36: DELETING AN EXISTING IMAGE

Rename an Image

Do the following to rename an image in the **Project Explorer**:

1. Right click on the image name in the **Project Explorer**.
2. From the right click menu, select the **Rename** option. This displays the **Enter New Name** dialog box.
3. Type the new name in the **Enter New Name** dialog box, and press the **OK** button.

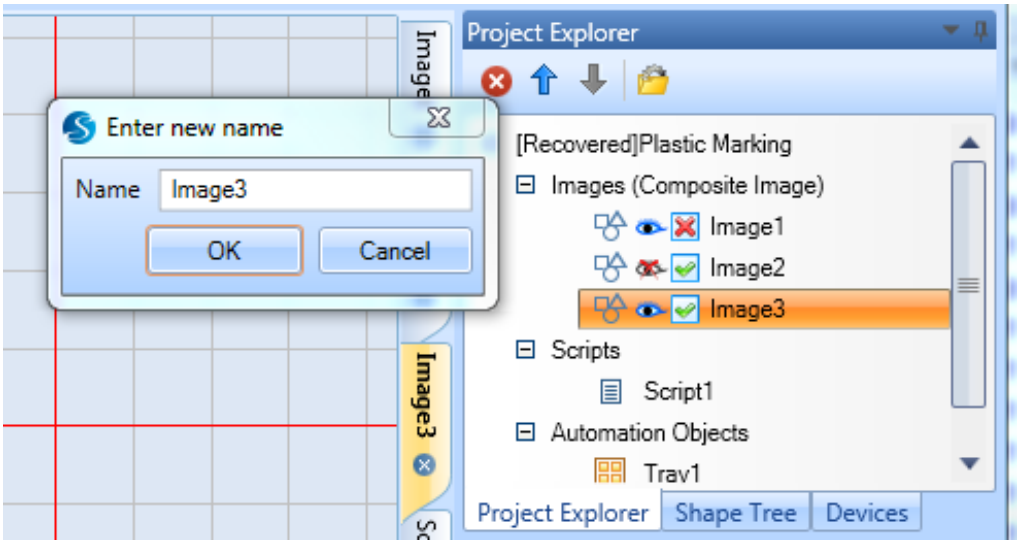


FIGURE 37: RENAMING AN IMAGE

Export an Image

Do the following to export an Image in the **Project Explorer:**

1. Select the Image in the **Project Explorer** and

   left-click the **Export** icon on the Home | Standard panel of the Ribbon or

2. In the **Project Explorer**, right-click on a Project name and select **Export** from the context menu.

3. The **Save As** dialog box will be displayed. Browse to the desired location, enter a name for the file, and click the **Save** button.

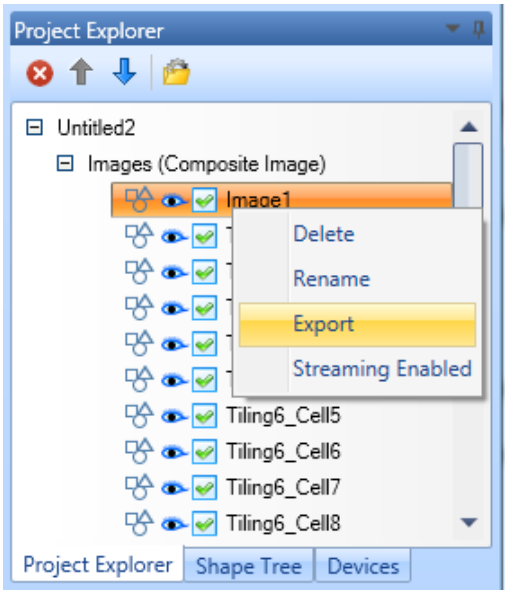


FIGURE 38: EXPORTING AN IMAGE

The files will be saved in .svi **format.**

Reorder Images

Do the following to reorder Images in the Project Explorer:

1. Select the Image to be reordered on the **Project Explorer**.
2. Use the **Move Up** arrow or the **Move Down** arrow to reorder the Image as required.

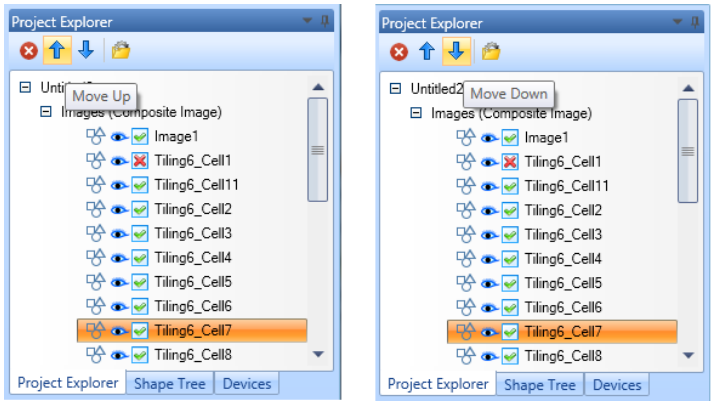


FIGURE 39: USING THE "MOVE UP" AND "MOVE DOWN" ARROWS IN THE PROJECT EXPLORE

4.6 SHAPE TREE

ScanMaster Designer uses Layers for organizing and structuring drawing Shapes in an Image. In the **Shape Tree**, the Shapes are listed in the order in which they will be marked. A Shape can be selected by clicking on the corresponding element in the **Shape Tree**. Multiple shapes may be selected by Shift-clicking on a range of shapes, or Control-clicking to select multiple individual shapes.

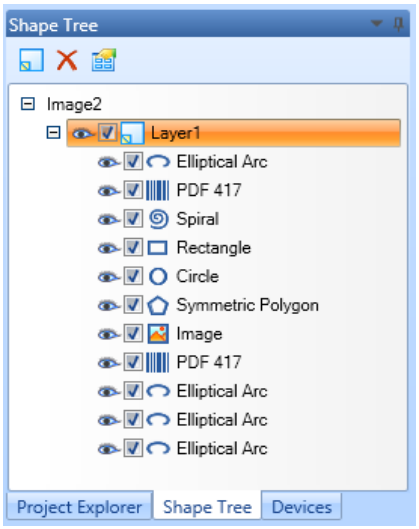


FIGURE 40: THE SHAPE TREE

4.6.1 Layers

When a Shape is selected, it will be highlighted in the **Shapes Tree** and on the **Drawing Canvas**. Shapes are scanned in the order in which they are listed in the **Shape Tree**. To change the order, click on the Shape and drag it to a new position in the **Shape Tree.** The new position can be in the same Layer or in a different Layer.

Add a Layer

To create a new Layer, click the **Add Layer** button in the **Shape Tree**.

Remove a Layer

Do the following to remove a Layer:

1. Select a Layer from the **Shape Tree**.
2. Click **Remove Layer**.

3. A confirmation message will be displayed. Click **Yes** to remove the Layer.

Rename a Layer

Renaming a Layer allows you to give the Layer a name that reflects its contents. This helps users to easily identify Layers in the panel.

Do the following to rename a Layer:

1. Right click the Layer name and select **Rename**.
2. Type the new name and **OK**.

Changing Layer Properties

Layer properties can be changed by clicking the **Layer Properties** button on the **Shape Tree** window. The **Layer Properties** window will be displayed. All the Layers associated with the Image are listed on the left side of the **Layer Properties** window.

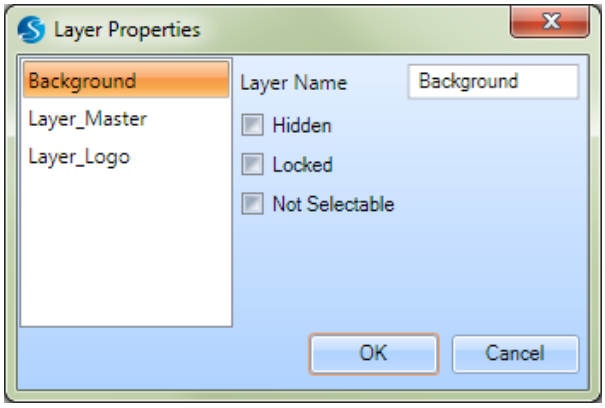


FIGURE 41: THE LAYER PROPERTIES WINDOW

Property	Description
Layer Name	This field displays the name of the Layer. You can change the Layer name by entering a new one in this field.
Hidden	If **Hidden** is selected, then the particular Layer or object will not be visible on the Drawing Canvas. If the Layer or object is hidden, its eye drop will have a red "X" on it, as in the following example:
Locked	If **Locked** is selected, then the objects on the Layers cannot be moved from their positions. **Note:** Even when **Locked** is selected, other operations (e.g., Mirroring, Snapping) can be done without any restrictions.
Not Selectable	If **Not Selectable** is selected, then the Shapes in the particular Layer cannot be selected from the Drawing Canvas. None of the Shapes operations (except Snapping) can be performed on these Shapes.

The **Hidden** property can be selected from the **Layer Properties** window or from the **Shape Tree**.

- To select the **Hidden** property from the **Laser Properties** window, select the **Hidden** check box. This applies the **Hidden** property to all of the objects that the Layer contains.
- To select the **Hidden** property from the **Shape Tree**, left-click the eye drop icon in front of a Layer or object. With this method, the **Hidden** property can be applied to an entire Layer or to individual objects that the Layer contains.

4.6.2 To Enable or Disable Marking

Click on the tick in front of a Layer name or object name to enable or disable marking. If you click the tick in front of a Layer name, marking will be enabled or disabled for the entire Layer. If you click the tick in front of an object, marking will be enabled or disabled for the individual object.

4.7 PROPERTIES WINDOW

The properties window contains two tabs: **Properties** and **Laser Properties**. The **Properties** tab displays geometrical properties of the currently selected Shape. The **Laser Properties** tab displays the general properties and delay properties of the currently selected Shape.

4.7.1 Shape Properties

The **Properties** tab enables viewing and editing properties of the selected Shape. Changes to these values take effect immediately. If Shape properties are changed, the Shape is immediately redrawn on the canvas.

You can display or hide the properties panel by using the **Auto-Hide** toggle in the upper-right corner of the **Properties** tab – the **Properties** tab and the **Laser Properties** tab will be minimized to the right side of the SMD window.

A sample illustration of a selected Shape's properties is shown below:

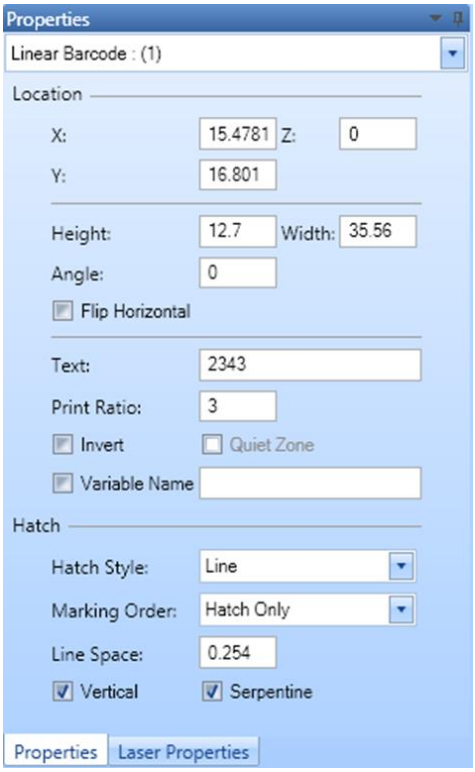


FIGURE 42: SHAPE PROPERTIES

4.7.2 Laser Properties

Depending on the marking job, and the required marking quality, you may have to specify different laser parameters. The **Laser Properties** tab allows you to view and edit laser properties for a particular marking job. The two laser property types are **General** and **Quality**.

The properties in the **Laser Properties** tab will change according to the **Modulation View Option** and the **Laser Type**. The former is set on the **General** tab of the **Application Preferences** window, and the latter is set on the **Laser** tab of the **Application Preferences** window. Refer to "Laser Options Tab Laser Type" on page 87 for more information on these settings.

Note: If **Use Parent Settings** is selected, the laser properties of the Shape cannot be edited in the **Laser Properties** tab; all of the Shape's laser properties will be inherited from the Layer.

Laser Properties – General Tab

The **Laser Properties** tab of ScanMaster Designer describes the laser parameters which will be applied during the laser marking processes.

The **Profile** menu in the **Laser Properties** window allows you to load predefined settings or save current settings for later retrieval, and the **Use Variable** option allows you to enable accessing of the profile within the main ScanScript script. This permits run-time modification of each of the laser properties.

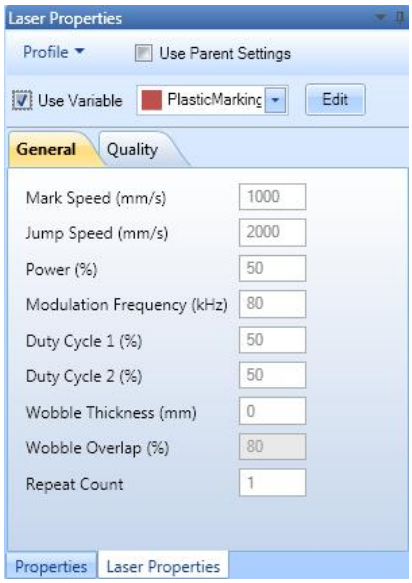
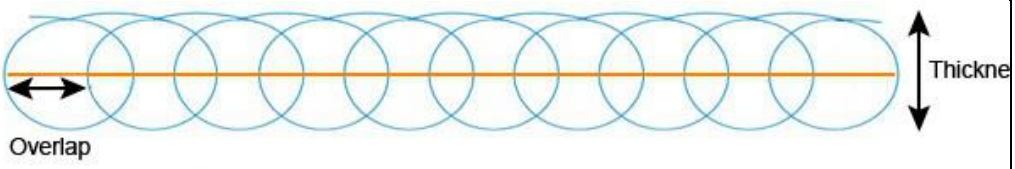


FIGURE 43: LASER PROPERTIES – GENERAL

Laser Property	Description
Mark Speed	Sets the speed during marking.
Jump Speed	Sets the speed during jumping. **Note:** A jump causes a (typically) rapid movement of the scanner mirrors to a new position. No marking occurs during a jump.
Power	Sets the laser power as a percentage.
Modulation Frequency	Sets the laser modulation frequency in kHz.
Duty cycle for Channel 1 /Pulse Width for Channel 1	Sets duty cycle or the pulse width for channel 1 as a percentage. The modulation can be displayed as Frequency and Duty Cycle or as Pulse Period and Pulse Width. Refer to "**Error! Reference source not found.**" on page **Error! Bookmark not defined.** for more information on how to display the modulation. You can select the Channel from the Preferences window.
Pulse Period	Elapsed time from the beginning of one pulse to the beginning of the next pulse
Wobble Thickness	Sets the wobble thickness. 
Wobble Overlap	Sets the wobble overlap. The overlap distance is 100 minus the Wobble Overlap value as a percentage of the thickness.
Repeat Count	Sets the number of times that an object will be marked. Repeat count of the shapes are handled individually.

4.8 LASER PROPERTIES - QUALITY TAB

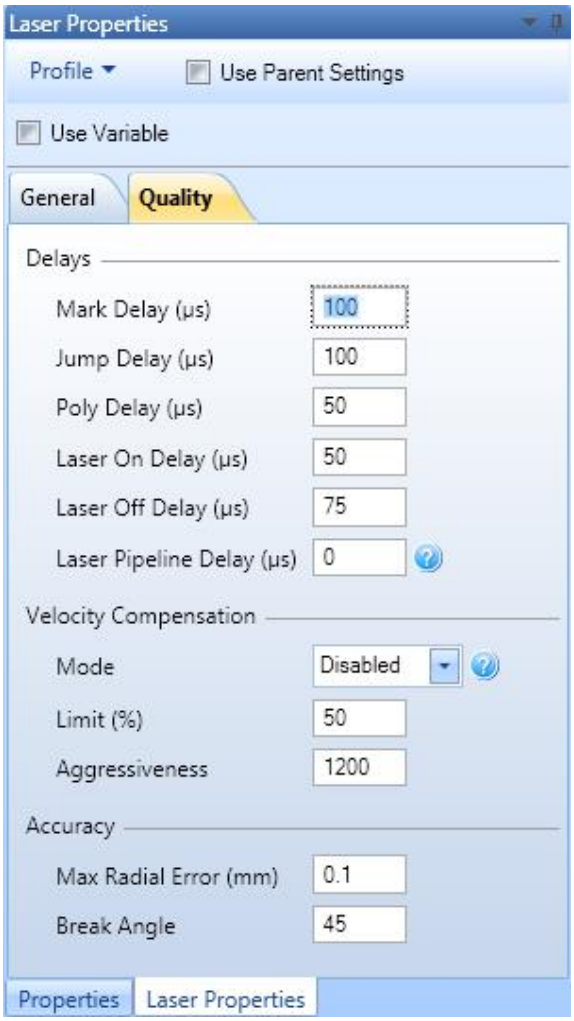


FIGURE 44: THE LASER PROPERTIES QUALITY TAB

Mark Delay

A delay at the end of marking a line segment allows the mirrors to move to the required position, prior to executing the next mark command. Too short of a **Mark Delay** will allow the subsequent jump command to begin before the system mirrors get to their final marking position; the end of the current mark will turn towards the direction of the jump vector, as shown in the following figure. Too long of a **Mark Delay** will cause no visible marking errors but will add to the overall processing time.

FIGURE 45: TOO SHORT OF A MARK DELAY

Jump Delay

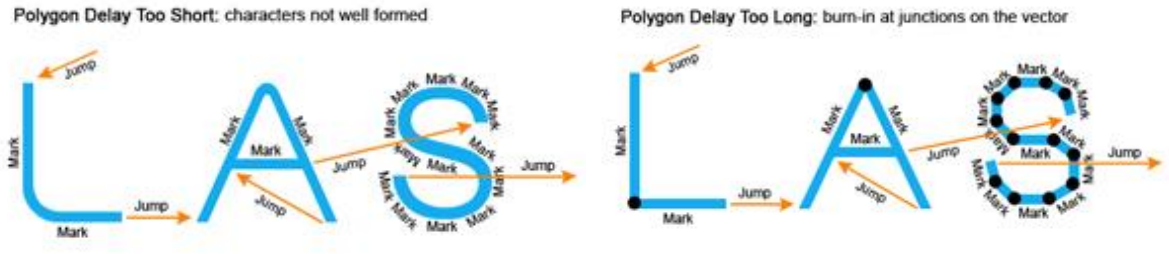
During a jump, the system mirrors accelerate rapidly to get to the next marking position—ideally at the fastest speed possible—to minimize the overall marking time. As with all accelerations, mirror inertia and system inertia create a slight lag at the beginning of the acceleration. Likewise, the system will require a certain delay (settling time) at the end of the jump, as it decelerates to precisely the correct location required for accurate marking.

Too short of a **Jump Delay** will cause marking to start before mirrors are properly settled, resulting in inadvertent marking. Too long of a **Jump Delay** will have no visible effect, but marking is delayed, so overall job production time (marking time) increases.

FIGURE 46: TOO SHORT OF A JUMP DELAY

Poly Delay

A **Poly Delay** (polygon delay) is a delay automatically inserted between two consecutive marking segments. The delay allows enough time for the galvos and mirror to "catch-up" with the command signal, before a new command is issued to move on to the next point. If **variable polygon delay mod**e is selected, then the delay is variable and changes as a function of how large an angular change is required, to move on to the next point. The larger the angular change, the longer it takes for the



galvos to change direction and accelerate to the required speed in the new direction. The delay is scaled proportionally to the size of the angle.

FIGURE 47: ISSUES WITH POLYGON DELAYS

If the **variable polygon delay feature** is selected in the laser preferences, then the polygon delay value will be scaled as a function of the angular change at the vertex according to the following diagram.

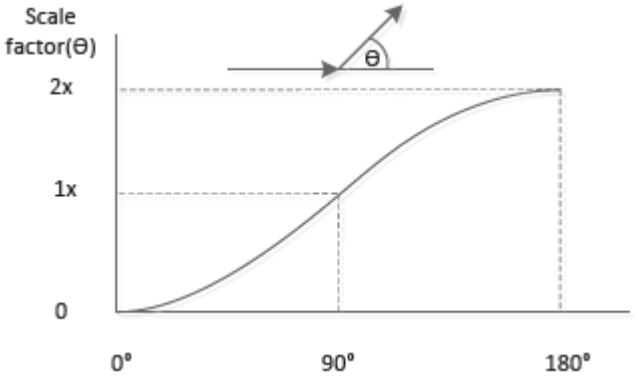


FIGURE 48: VARIABLE POLYGON DELAY SCALING

Laser On Delay

The **Laser On Delay** can be used to prevent burn-in effects at the start of a vector. This delay is typically used to turn on the laser, after the first few micro steps of a mark command, to ensure that

the laser's motion control systems (mirrors, etc.) are "up to speed" before marking. The vectors must be scanned with a constant velocity to ensure uniform marking. This delay can have either a positive or negative value and will vary with different marking media (some media require a burn-in time to begin marking). The goal is to adjust **Laser On Delay** to ensure uniform marking with no variations of intensity throughout the desired vector. Too short of a delay will typically cause burn-in effects, and too long of a delay, will typically cause skipping (missed line segments).

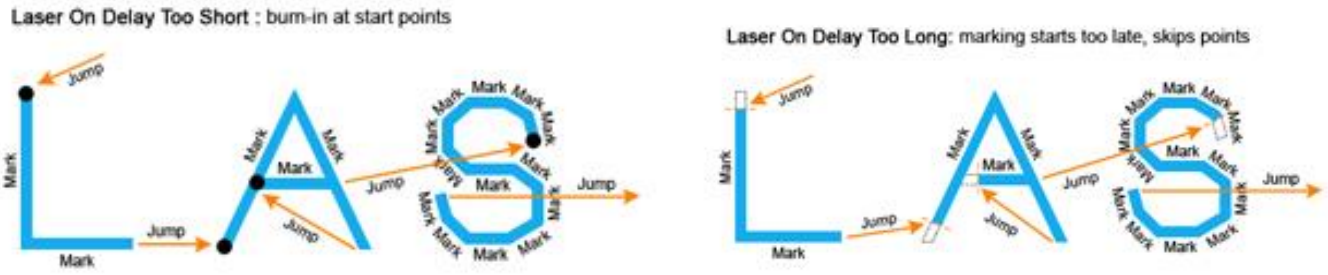
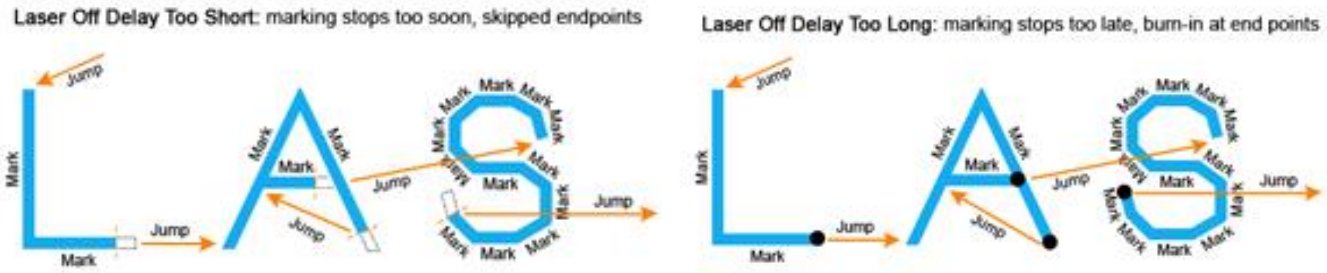


FIGURE 49: ISSUES WITH LASER ON DELAYS

Laser Off Delay

The **Laser Off Delay** can be used to prevent burn-in effects at the end of a vector. This delay is typically used to turn off the laser just before the last few micro steps of a mark command, to ensure that the marking stops exactly where it is supposed to stop. The goal is to adjust the **Laser Off Delay** to ensure uniform marking with no variations of intensity throughout the desired vector. Too short of a delay will typically cause skipping of line segments, and too long of a delay will typically cause burn-in at the end of line segments.



Laser Pipeline Delay

The **Laser Pipeline Delay** shifts all of the laser timing signals relative to the generation of the position commands. This shifting compensates for the finite amount of time it takes for the servos to process the command information. By using this compensation, it is possible to have a **Laser On Delay** value of zero, since all of the laser timing signals are shifted to synchronize the time the laser actually starts emitting with the time the galvos actually start.

The advantage of being able to set **Laser On Delay** to zero is that—even if mark vectors are very short—the laser will always be guaranteed to turn on. Otherwise, if the vectors are so short that they complete in a time less than the **Laser On Delay**, the laser will not turn on and faulty marking will result. Because the laser may not turn off at the same rate that it turns on, **Laser Off Delay** is used to synchronize the laser and galvo timing at the end of a move. This adjustment should be done after the start of mark-vector/laser timing is synchronized using **Laser Pipeline Delay**. Normally, the galvos respond slower than the laser, so the resulting **Laser Pipeline Delay** will almost always be greater than zero. If, however, the laser has a very slow turn-on, it may be necessary to turn the laser on before the galvo commands are issued. This is done by setting the **Laser On Delay** to a negative value and the **Laser Pipeline Delay** to zero.

Velocity Compensation

Velocity Compensation allows users to change the average laser power property in real-time, based on the simulated velocity of the scanners. The **Velocity Compensation** settings are useful because the velocity of the spot slows down as the galvos trace out an arc or sharp corner. (This slowdown is due to the inability of the galvos to instantaneously change speed or direction.) Too low a marking speed may nonetheless result in an excessive mark depth or burning, particularly in the corners where only partial penetration may be desired. Average laser power "at the work surface" can be controlled in one of three ways (DutyCycle, Power, or Frequency), depending on the type of laser being used.

The Velocity Compensation settings are the following:

- **Mode** – Sets the mode of operation; **Disabled, Duty cycle** (pulse width changes), **Frequency** (pulse period changes) **& Power** (analog or digital power changes).
- **Limit** – Sets the limit of maximum compensation as a percentage of the normal marking power level. Its range is 0 (maximum compensation) to 100% (no compensation).
- **Aggressiveness** – Sets how aggressively the system will compensate for velocity changes. The higher the number, the quicker the change will be applied. This number directly correlates to the tuning bandwidth of the galvo servos.

Accuracy

The Accuracy settings are the following:

- Break Angle – The angle between contiguous vectors below which Max Radial Error is ignored and servo dynamics smooth the transition. Often useful for vectorized fonts, where curves are approximated by polylines with small angle changes.
- Max Radial Error – The allowable deviation from commanded trajectory, above which “Skywriting” is activated.

4.8.1 Profiles

A profile consists of laser settings specified in the **Laser Properties** section. The laser settings will differ depending on the marking material and process. By saving these settings as a profile, you can avoid repeating the process for a Shape that uses the same parameters. The following options are available in the Profile menu: **Quick Load**, **Material Library**, **Save**, **Copy**, and **Paste**.

The **Profile** menu is available on the **Laser Properties** window. Left-click the **Profile** menu to see its options.

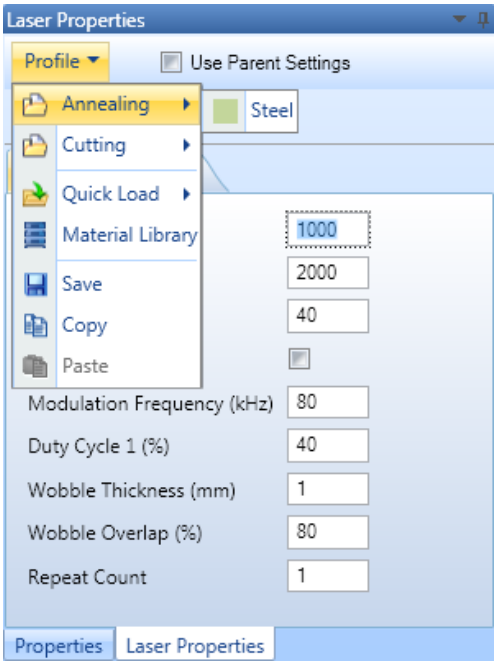


FIGURE 50: PROFILE OPTIONS

Working with Profiles in the Material Library

The Material Library contains profiles for marking options. This section describes how to manage profiles in the Material Library.

To display the Material Library, select the Material Library option from the Profile menu.

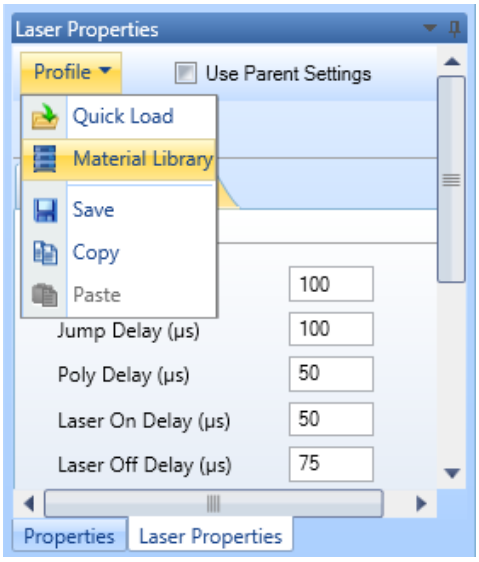


FIGURE 51: SELECTING THE MATERIAL LIBRARY OPTION FROM THE PROFILE MENU

The **Material Library** window is displayed as shown in the following figure.

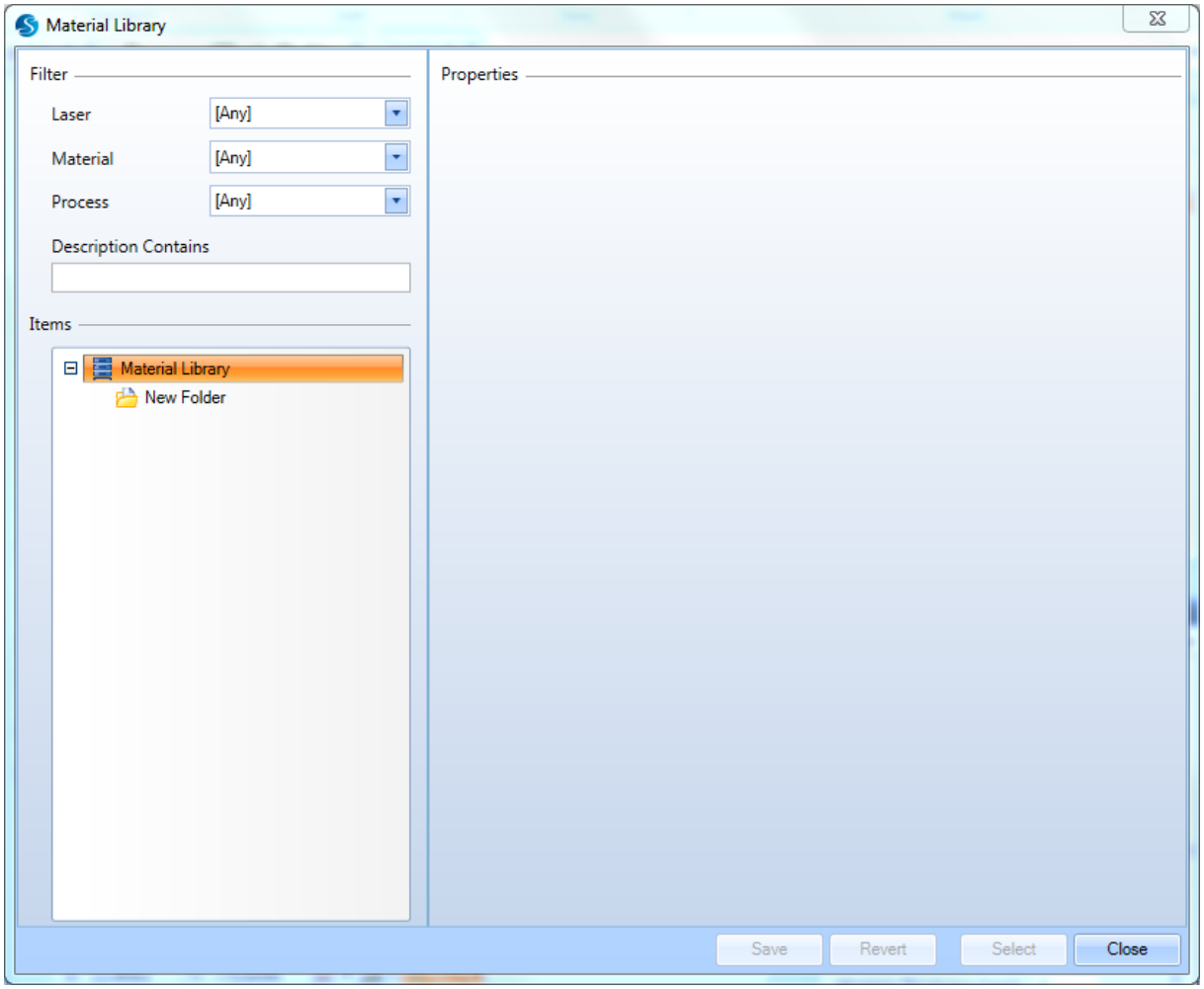


FIGURE 52: THE MATERIAL LIBRARY WINDOW

Load a Profile

Saved profiles can be retrieved from the **Material Library**.

Do the following to load a profile:

1. Select the shape for which you wish to apply the profile.
2. From the **Profile** list in the **Properties** tab, select **Quick Load**. The saved profile will appear in the relevant folder structure.

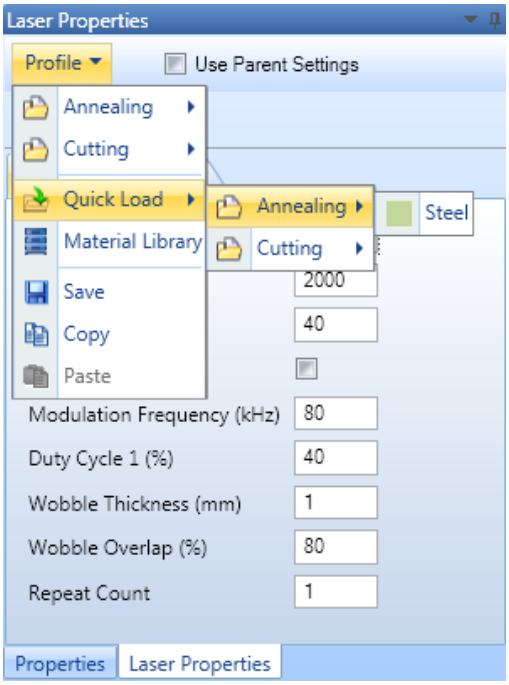


FIGURE 53: LOAD PROFILE

Add new folders

You can add new folders under **Material Library**. To add a new folder, right-click on the **Items** list in the **Material Library** window and select **New Folder**.

Rename a Profile

You can rename profiles listed under the **Material Library**.

Right-click on the profile name you wish to rename and select **Rename**. Type the new name and press the **OK** button.

Delete a Profile

Select the profile you want to delete, right-click on it and select **Delete**.

Add a new Profile to the Material Library

A Shape's laser properties can be added to the **Material Library** for later retrieval.

Do the following to add and save a profile:

1. Click **Profile** | **Save** in the **Laser Properties** section. The **Save Marking Profile** window will be displayed.
2. Select the type of Laser from the **Laser** list.
3. In the **Material** list, select a material type. If materials are not available click the **Edit** button to add new materials or edit the existing ones.
4. Select a process from the **Process list**.
5. If you wish to apply a color for the selected Shape, click the color selection button and select the desired color from the color palette.
6. In ScanMaster Designer the saved profile can include a specific Logo/Image for identification. Click **Load Image**, locate the Image you wish to load from the **Open** dialog box, and click **Open**.
7. The current settings will be displayed under the **General** and **Quality** tabs. You can change these settings if necessary.
8. Specify a brief description of the profile in the **Description** box.
9. Finally click **Save**. The following window will be displayed.

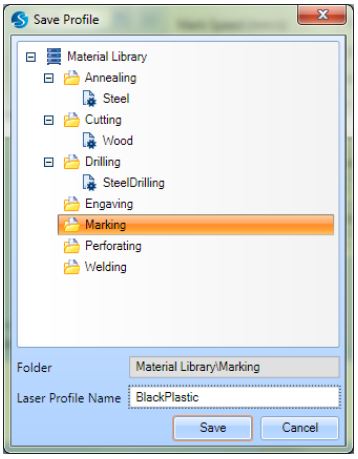


FIGURE 54: SAVE PROFILE DIALOG

10. Select a folder and give an appropriate name for the profile.

11. Click **Save**.

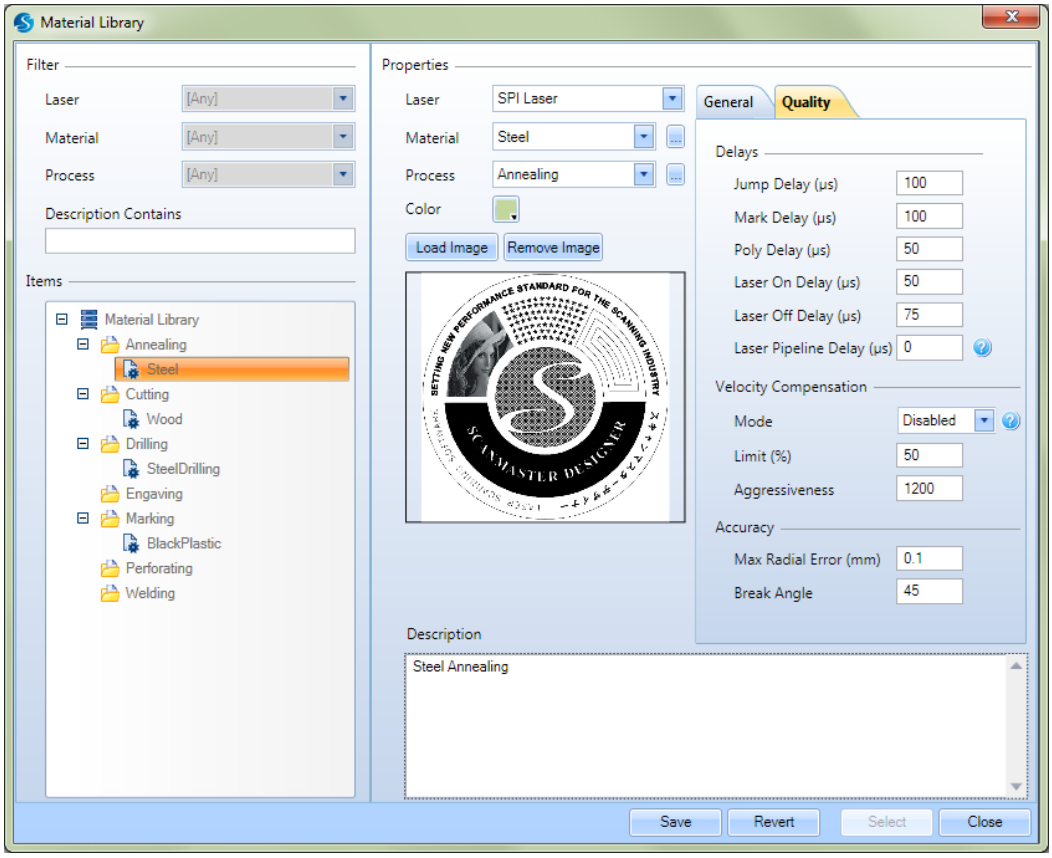


FIGURE 55: SAVE MARKING PROFILE

Searching for a Profile

You can search for a particular Laser profile using the in-built filters of the **Material Library.** To search for a Laser profile:

1. Click Profile | Material Library on the Laser Properties panel. This will load the Material Library window.
2. Use the Laser, Material, Process and Description Contains fields to sort the list of Laser profiles.
3. If a match (or matches) have been found based on the specified criteria, these would be displayed in the Laser profiles list.
4. Select the Laser profile, perform any edits as required, and click OK to load the Laser profile.

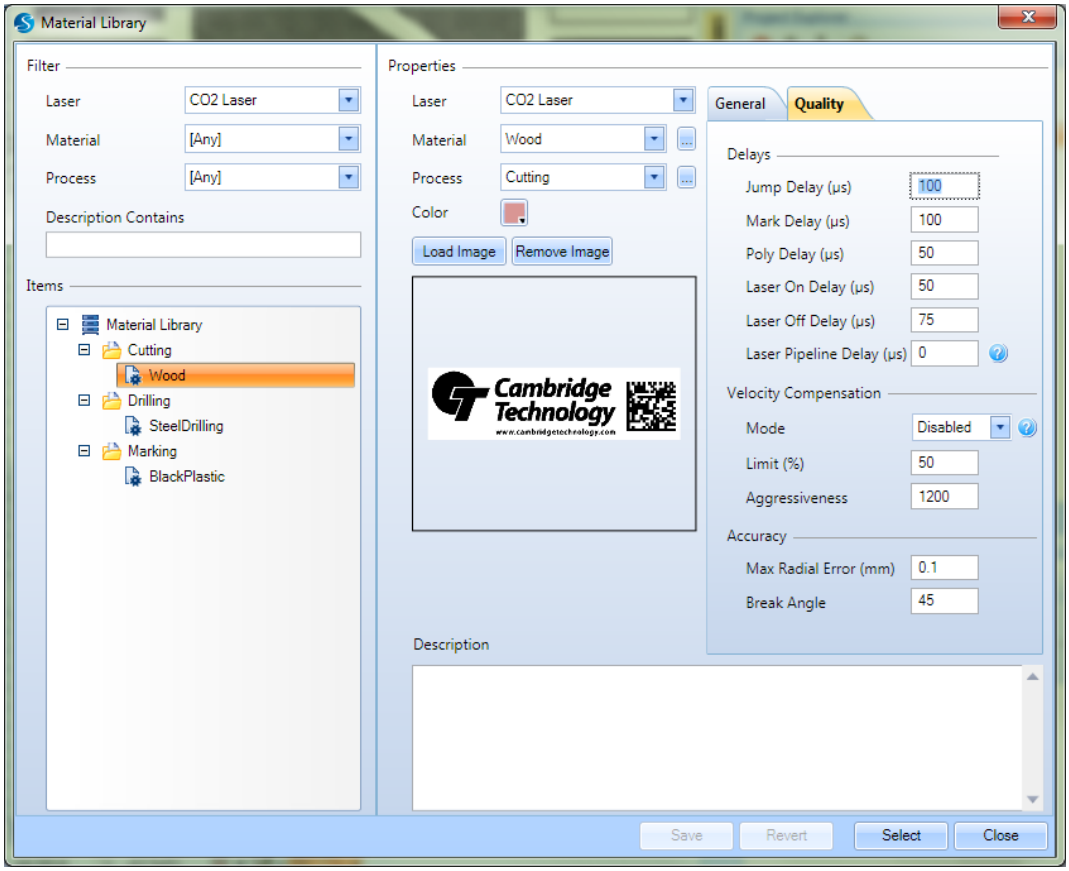


FIGURE 56: MATERIAL LIBRARY

Copy and paste Profiles

You can copy a Laser profile and apply it to a different Shape.

5. Load the Laser profile or select the Shape that contains the profile you wish to copy.
6. From the **Profile list**, select **Copy**.
7. Select the Shape to paste the copied profile to.
8. From **Profile list**, select **Paste**. The Laser properties of the selected shape will update accordingly.

Laser Variables

You can load saved Laser properties from the **Use Variable** option on the **Laser Properties** tab. Any laser variable you saved or created will be accessible from this menu.

FIGURE 57: THE USE VARIABLE CHECKBOX

To load a Laser variable from this menu, first deselect **Use Parent Settings** and click on the **Use variable** check box. If you have saved any variables previously, they will be listed in the menu and the following screen will be displayed.

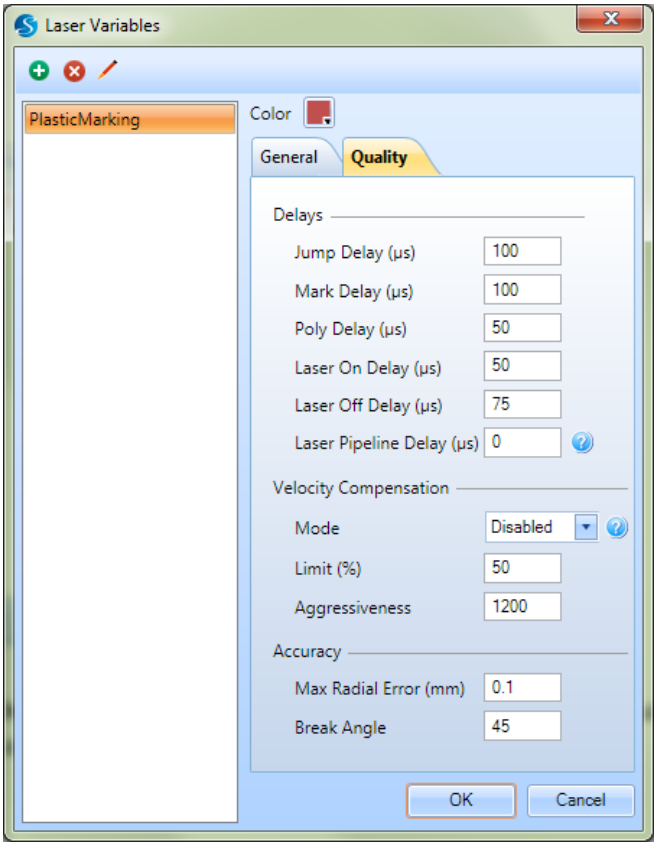


FIGURE 58: LASER VARIABLES

You can change the **General** and **Quality** settings and assign a color for the variable. Once you make the necessary changes, click **OK**. You can also add, delete, and rename new laser settings files.

4.9 CONNECTING TO DEVICES

The **Devices** section is located to the right of the ScanMaster Designer window. All available scan controllers will be listed in this window. Note that ScanMaster Designer may have already connected to the specified Scan Controller automatically. See Device Auto Connect.

4.9.1 Connect to a particular card

Do the following to connect a device to a particular Scan Controller:

1. Go to the **Devices** tab. All of the connected Scan Controllers will be listed.
2. Select the Scan Controller.
3. Click the **Connect** icon.

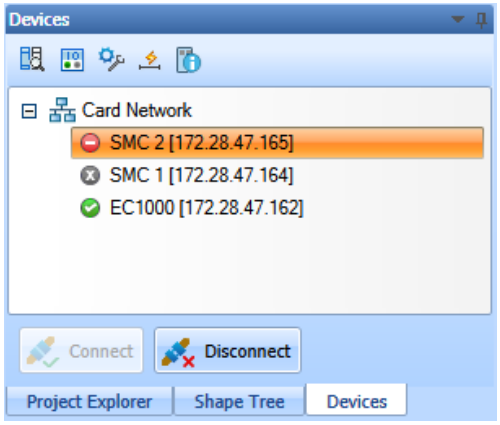


FIGURE 59: DEVICES – NOT CONNECTED TO A CARD

Note: When the user is connected to a particular Scan Controller, the **Connect** button will become disabled and the **Laser Marking** buttons will be enabled. In the above example, the user is connected to the card while the "SMC 2" card is indicated as busy.

4.9.2 Disconnect a Scan Controller

Do the following to disconnect a Scan Controller:

1. Select the Scan Controller you wish to disconnect.
2. Click the **Disconnect** icon.

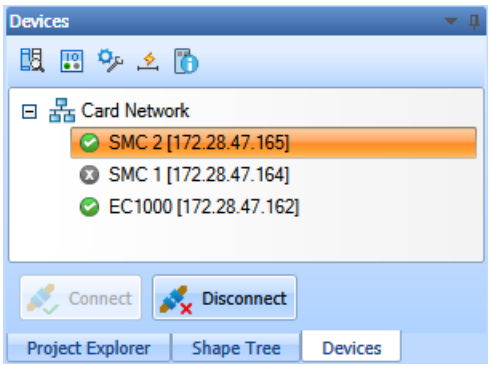


FIGURE 60: DEVICES – CONNECTED TO A CARD

4.10 OUTPUT WINDOW

The **Output** window is used to display ScanScript **Report** messages, error messages, and the stack trace of the errors generated by a ScanScript program.

Report messages can be used to provide any useful information generated within the script to the user.

A stack trace can be used to determine where an error occurred. It displays a stack trace from its invocation point. It includes the source script file name, function name and program line number. This feature is especially useful when the function that generated the error is nested within other functions. Furthermore, when several script files are in use and if the same function is being used by several scripts the stack will tell you where to go if there was an exception.

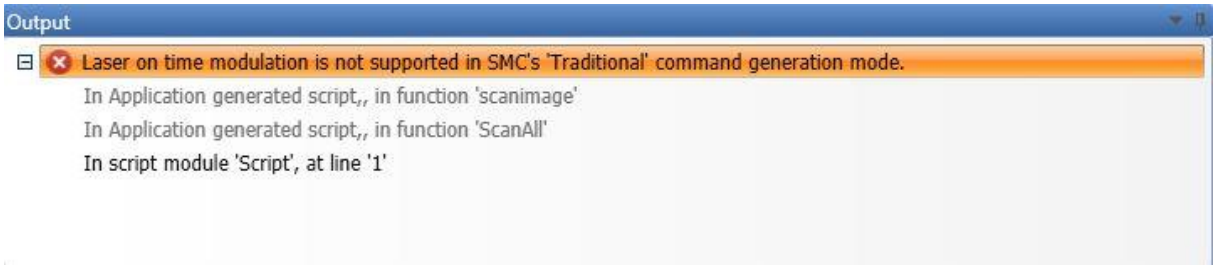


FIGURE 61: SCANSCRIPT OUTPUT WINDOW INTERFACE CUSTOMIZATION

4.10.1 Arranging windows and panels on the screen

To maximize your ScanMaster Designer screen real estate, use the **Auto-Hide** toggle button which can either show or hide the particular window panel. This button is available on all of the display panels.

When **Auto-Hide** is turned on, the panel will remain hidden until you move the mouse pointer over it. The hidden panel will be displayed until you move the mouse pointer away.

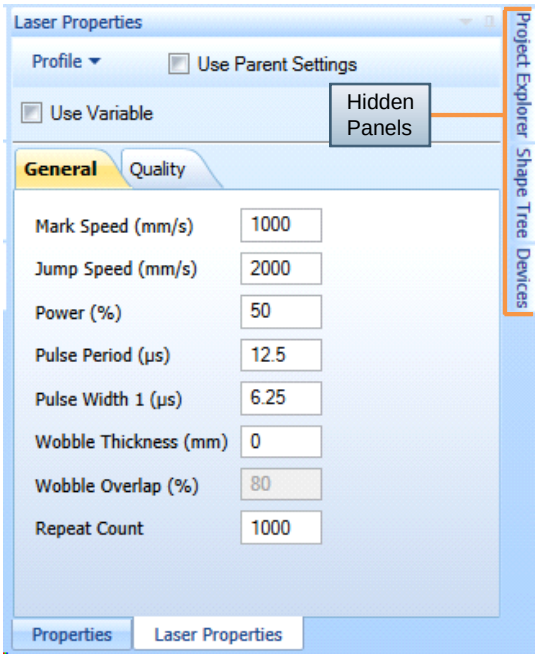


FIGURE 62: HIDDEN PANELS

Move panels in the ScanMaster Designer window

Do the following to move a particular panel from its default position:

1. Click on the tab header or a blank portion of the relevant panel's title bar.
2. Hold down the left mouse button, and drag the mouse pointer to the place on the screen where you want the panel.

   A guide diamond appears. The four arrows of the diamond point toward the four sides of the screen. Four other arrows point to the four edges of the screen.
3. Move the mouse pointer to the position on your screen where you want the panel, then move the pointer over the corresponding portion of the guide diamond. The designated area is shaded.
4. To dock the window in the position indicated, release the mouse button.

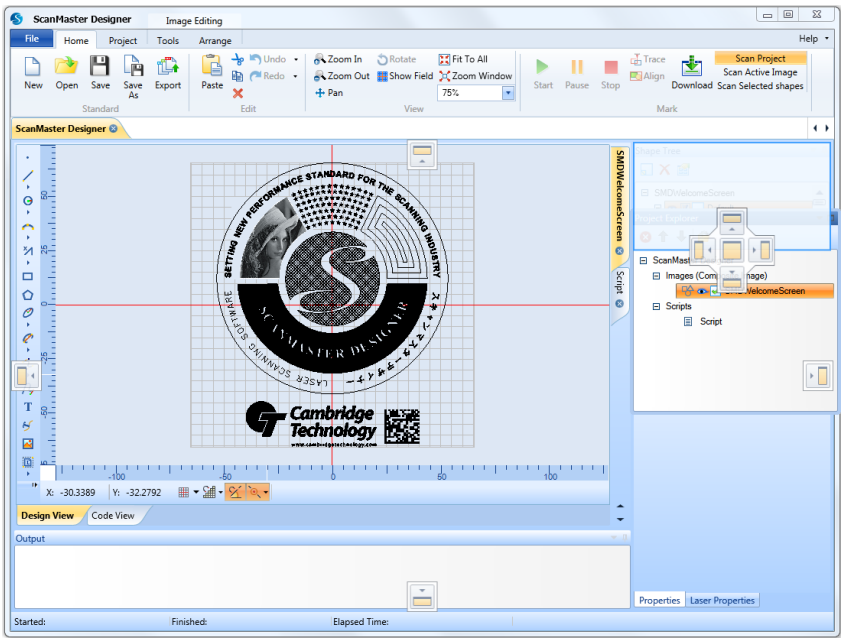


FIGURE 63: MOVING THE PANEL

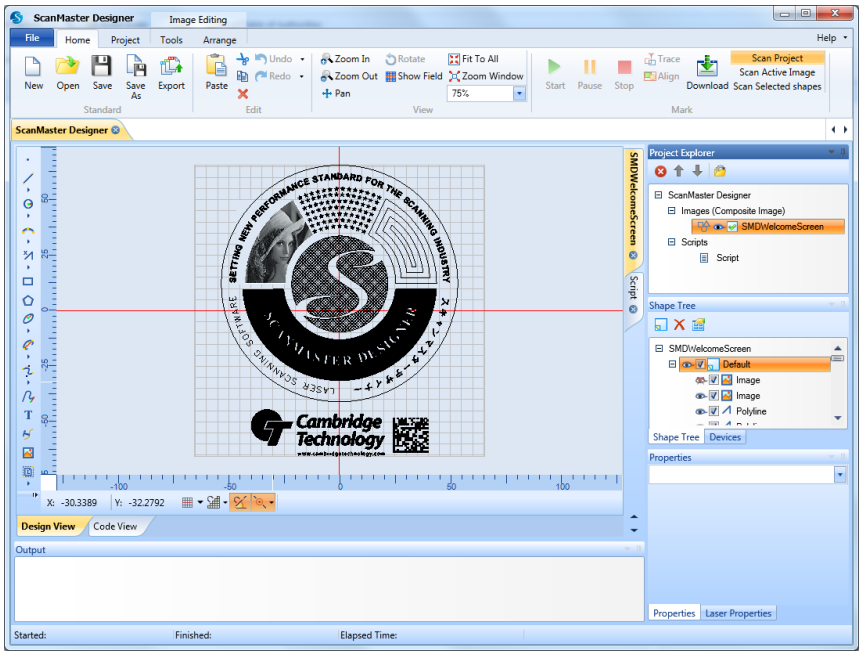


FIGURE 64: THE PANEL AFTER MOVING

4.11 ROLE-BASED ACCESS CONTROL

ScanMaster Designer allows you to restrict access to functionalities by managing user permissions. In Role-based Access Control, roles are created for various jobs and permission to perform certain operations is then assigned to roles.

The **Users and Groups** option in the **Preferences** window allows you to manage users and their roles.

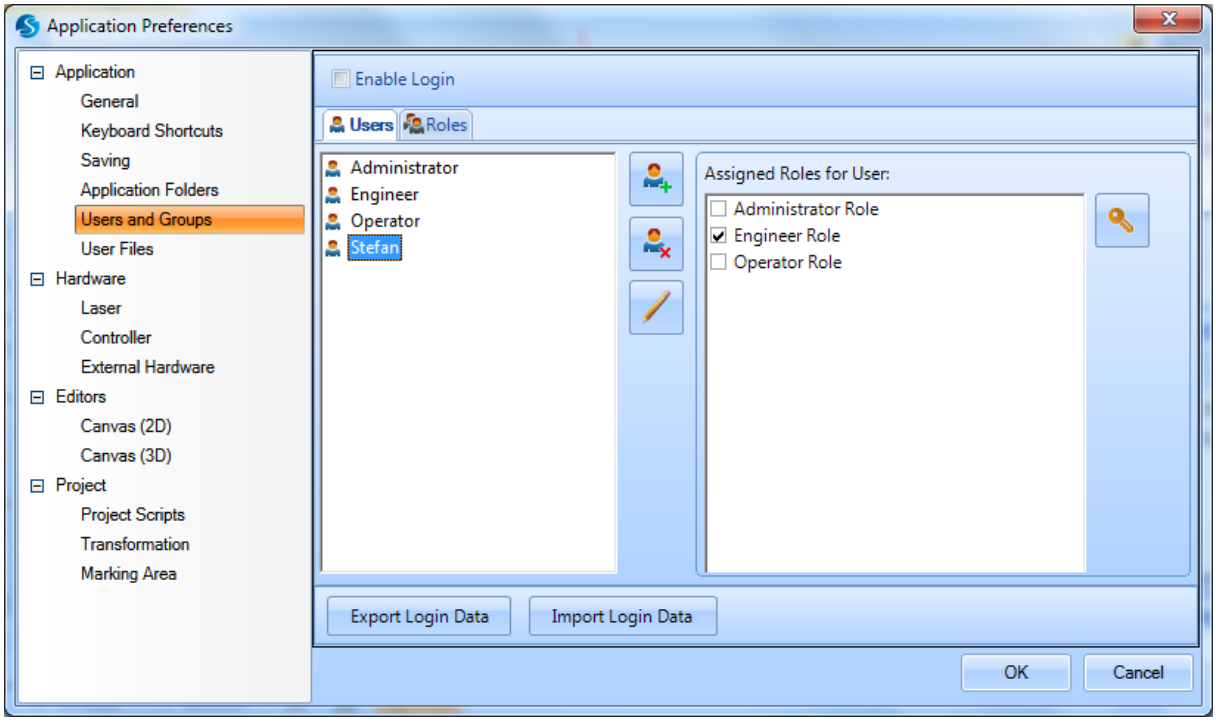


FIGURE 65: PREFERENCES – USERS AND GROUPS TAB

Note: Only users with administrative privileges will have access to the **Users and Groups** tab in the **Preferences** window. If the account by which you are currently logged-in does not have administrative privileges, you will be required to enter an administrative account login, as shown in the following window.

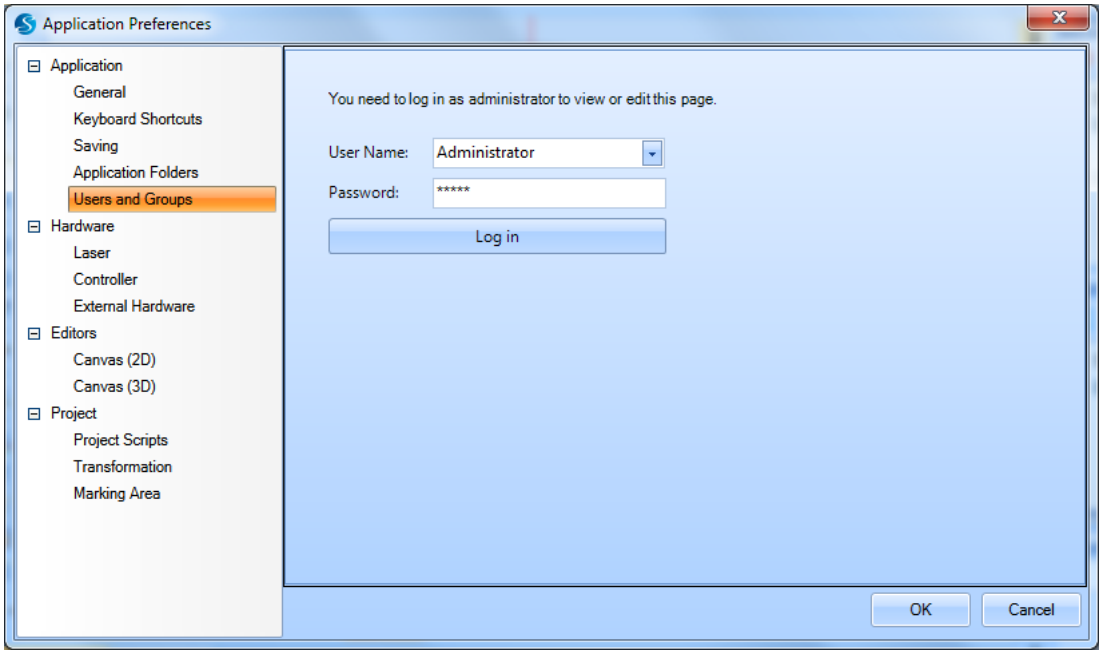


FIGURE 66: PREFERENCES - USERS AND GROUPS LOGIN SCREEN

4.11.1 Users

Users take on assigned roles such as **Administrator**, **Operator**, or **Engineer**. Apart from these default users, you can add as many users as required. A user can have multiple roles.

Add new users

Do the following to add a new user to the system:

1. Click Add in the Users tab in the Users and Groups page in Preferences.

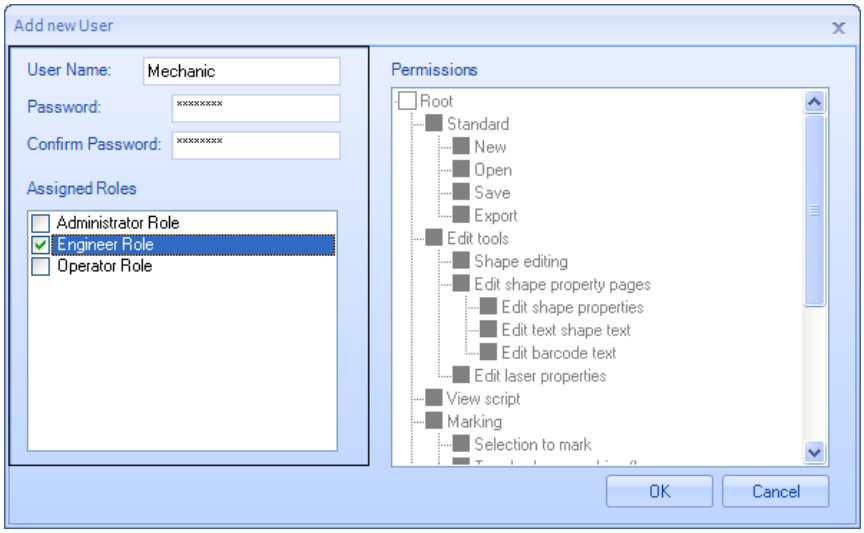


FIGURE 67: ADD NEW USER

2. Enter the **User Name** and **Password** for the new user.
3. Assign the necessary roles. A user can have more than one role. Permissions for the selected role will be displayed in the **Permissions** pane. Permissions will be assigned at the time of creating Roles.
4. Click **OK**.

Remove users

Do the following to remove an existing user:

1. Select the relevant user.
2. Click **Remove**.

4.11.2 Add a new role

A role defines the tasks that an end user sees in ScanMaster Designer. Permissions are assigned to roles. Follow the given steps to add a new role:

1. Navigate to Preferences | Users and Groups and click Add from the Roles tab.

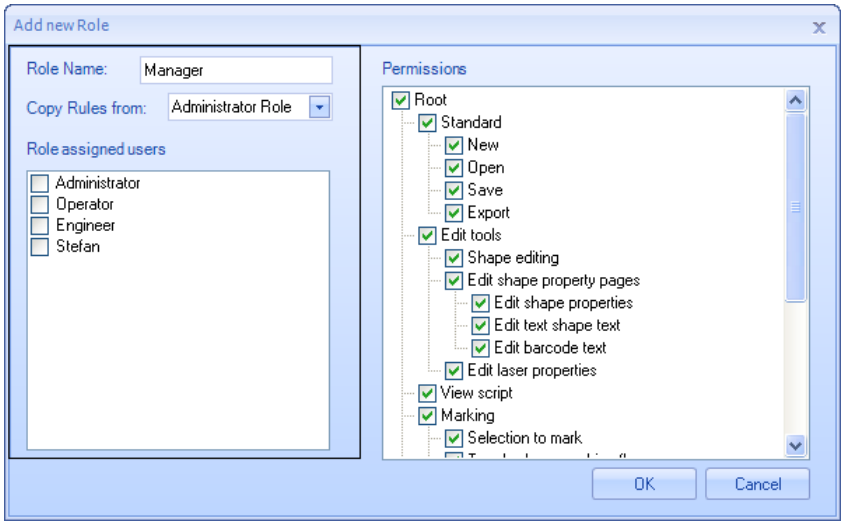


FIGURE 68: ADD NEW ROLE

2. Enter a name for the new role in the **Role Name** field.
3. You can copy permissions assigned to the existing roles. Once you copy the permissions you can manually edit them by selecting or deselecting the options. If you have a role that contains the permissions you want to grant to users, but you want to remove or add one or two permissions without having to add all the other permissions manually, you can copy the existing role.
4. Select the type of role by checking the relevant checkboxes from the **Role assigned users** list of checkboxes.
5. Make the necessary modifications to the permissions using the **Permissions** list of checkboxes.
6. Click **OK** to save changes.

4.11.3 Enable Login

To enable the Login screen click **Enable Login**. Next time when you start ScanMaster Designer you will be prompted with a login screen:

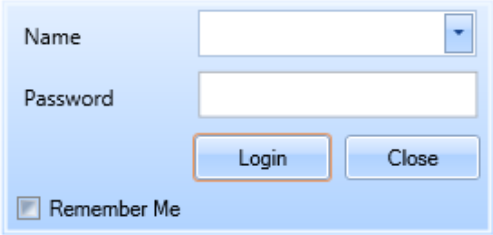


FIGURE 69: LOGIN DIALOG

1. **Note:** The **Username** and **Password** fields are case-sensitive in the ScanMaster Designer login screen.
2. If you click the **Remember Me** checkbox, you will not be prompted to login again on the same computer, unless you intentionally logout of ScanMaster Designer (using the **Logout** option).
3. Once logged in the user name will be displayed next to the **Help** button in the upper-right corner of the screen.
4. Clicking on the arrow next to the user name will give access to the **Log out** and **Change Password** options; you can log out any time by clicking on the **Log out** option.
5. **Note:** Once intentionally logged out, stored credentials (if the **Remember Me** options was selected), will be lost and you will be required to enter your login credentials once again to log in to ScanMaster Designer.

Change Password

The account password could be changed by clicking the drop down arrow beside the currently logged in as notification. Fill out the fields below to change the password.

FIGURE 70: CHANGE PASSWORD DIALOG

Type your old password, type your new password, type your new password again to confirm it, and then press **OK**.

4.11.4 Export/Import Login Data

The following options can be used to transfer login credentials of a userbase, along with their role permissions, to an offsite location:

- **Export Login Data** – specifies that login data will be exported as a **Login data file**. You can export the username, password and permissions.
- **Import Login Data** – specifies that login data will be imported as a **Login data file**. You can import the username, password and permissions.

4.11.5 User Logging

ScanMaster Designer contains an in-built user logging mechanism, where the logout and login times of each user is tracked. This login session information is saved in the installation directory of ScanMaster Designer, within the UserLogger.txt file.

4.11.6 User Files

The **User Files** option in **Preferences** allows you to define the list of files that each user is permitted to access. If the '**Can only open files that is in the job list'** option in **Permissions** is selected the relevant user can only access the files defined in this job list. You can add any amount of **.sdw** files to this list.

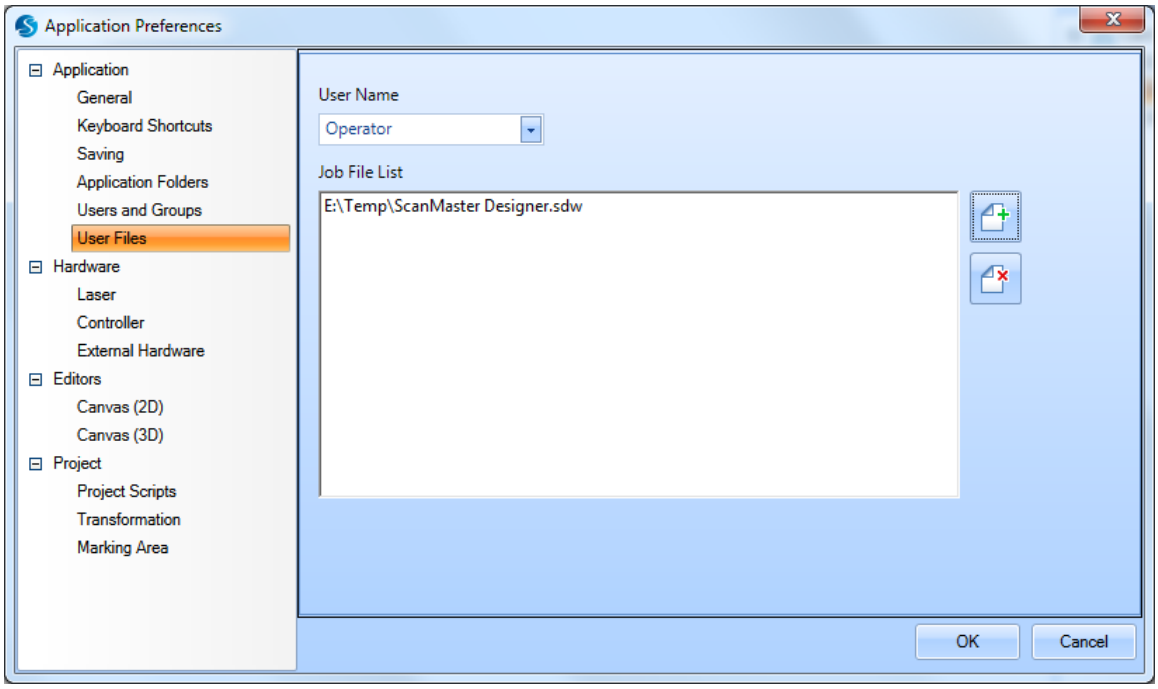


FIGURE 71: PREFERENCES - USER FILES

Select the **User Name** and click the **Add File** button to add the files to the list. To remove a file from the list, first select it and click the **Delete File** button. (See Preferences for more information.)

5 MANAGING PROJECTS

5.1 BEFORE YOU CREATE A NEW PROJECT

Before you create a new Project, do the following:

1. Get familiar with the project structure, the program default settings, and the supported drawing file formats. The following section ("Preferences vs. Settings") provides detailed information regarding application and project settings.
2. Make sure the correct unit of measurement is set.
3. Use **Rulers** and set the relevant grid lines for accurate positioning and alignment of elements on the Drawing Canvas.
4. If you do not already have a basic understanding of the software interface, see Chapter 4: ScanMaster Designer Interface.
5. Create a project hierarchy; before you begin a project determine the order of execution and create **Images** accordingly.
6. Make sure to embed the required text fonts, as the Scan Controller does not contain any text fonts of its own.

Save documents frequently, and create backup copies of important files.

Note: All ScanMaster Designer drawings will be saved in .**sdw** format. However, you can export drawings as .**svi** files and the scripts as .**lsc** files.

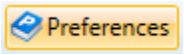
5.2 PREFERENCES VS. SETTINGS

Preferences are the project default settings to be used for any new project you create in ScanMaster Designer. They are displayed in the **Application Preferences** window, which is shown in Figure 75 on page 78.

Project Settings relate to the settings of the currently active project. They are organized in **General, Laser, Transform, Text embeds, Scripting** and **Marking Area** tabs.

You can change the settings of the current project you are working on by clicking **Project Settings** in the **Project Explorer** window.

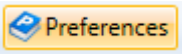
5.3 THE APPLICATION PREFERENCES WINDOW

To display the **Application Preferences** window, left-click the **File** tab to display the **File** menu, and then left-click the **Preferences** button 

in the lower-right corner of the **File** menu.

5.3.1 General

The following figure shows the **General** tab in the **Application Preferences** window.

Note: The **General** tab is displayed when you left-click the Preferences button 

to display the **Application Preferences** window.

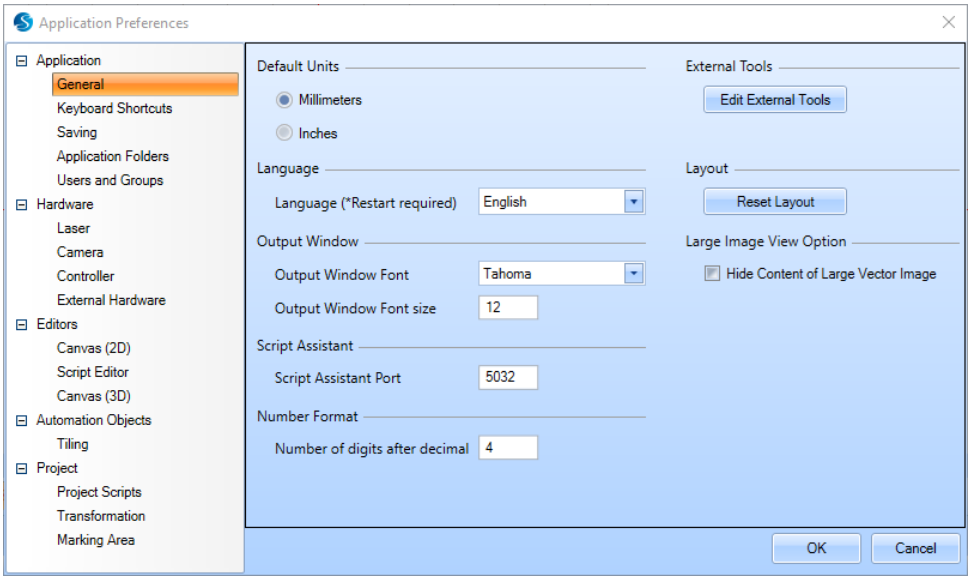


FIGURE 75: PREFERENCES – GENERAL TAB

Default Units

The **Default Units** setting is used to measure positions, distances, and speeds. There two options for **Default Units** are **Millimeters** and **Inches**.

Language

The **Language** setting is used to change the application language. Select the required language using the dropdown list and restart the application for changes to take effect.

Output Window

The **Output Window** settings allow you to change the font and the font size of the Output Window.

Script Assistant

The **Script Assistant Port** is used to access external files or databases for advanced marking applications (e.g., tray marking by means of input from a remote location).

Number Format

The **Number of digits after decimal** specifies the number of decimal places to see when numbers are shown in the text boxes.

External Tools

Left-click the **External Tools** button to display the **External Tools** dialog box. The **External Tools** dialog box is used to add items for launching external tools to the **Ribbon**.

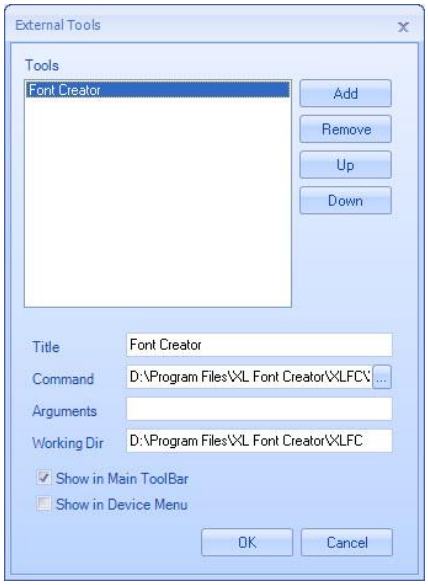


FIGURE 72: THE EXTERNAL TOOLS DIALOG BOX

Adding an External Tool

Do the following to add an External Tool from the **External Tools** dialog box:

1. Click the **Add** button and enter the name for the tool in the **Title** field.
2. In the **Command** field, enter the path of the tool to be added, or click **Browse** icon to navigate and select the tool to be added.
3. In the **Arguments** field, you can specify the information that is to be passed to a command when it is launched.
4. In the **Working Dir** field, you can specify the working directory for the tool.
5. Select one or both of the following check boxes to specify where the external tool button will be displayed:
6. **Show in Main ToolBar** –Displays the external tool button in the Ribbon.
7. **Show in Device Menu** –Displays the external tool button in the device menu that appears when you right-click on a connected Scan Controller.
8. Click **OK** to commit the changes.

Removing an External Tool

Do the following to remove an External Tool from the **External Tools** dialog box:

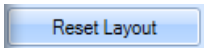
1. Highlight the tool that you want to remove in the **Tools** list.
2. Click the **Remove** button.

Tool ordering

Do the following to position tools in a specific order:

1. Select the tool to be repositioned by clicking on the relevant title.
2. Rearrange the titles as required, using the **Up**/**Down** commands.
3. Click **OK** to commit changes.

Resetting the Docking GUI Layout and Quick Access Bar

To return the Docking GUI layout, and the **Quick Access Bar**, to their default locations, left-click the **Reset Layout** button 

on the **General** tab of the **Application Preferences** window.

Note: The **Reset Layout** button can also be used to bring all elements back into the GUI in the event you cannot see any of the display panel.

When you left-click the **Reset Layout** button, the following dialog box is displayed.

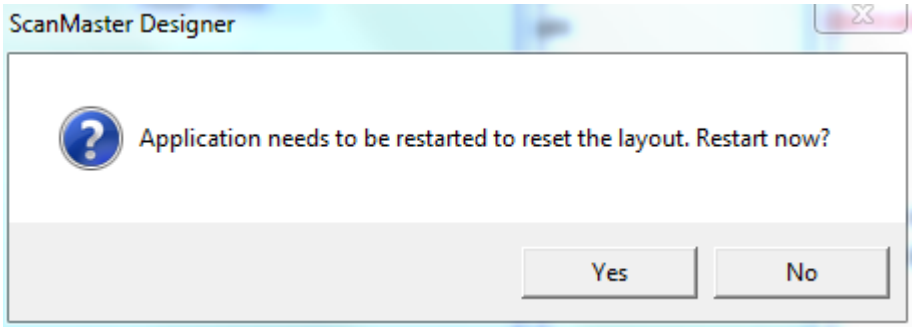


FIGURE 73: APPLICATION RESTART PROMPT

Click the **Yes** button to reset the GUI layout and restart the application.

Click the **No** button to cancel the reset and return to the **General** tab of the **Application Preferences** window.

The following figure shows how the GUI will look after the Docking GUI Layout and **Quick Access Bar** are reset with the **Reset Layout** button. Note that all of the GUI windows are at their default locations and there are no icons in the **Quick Access Bar**.

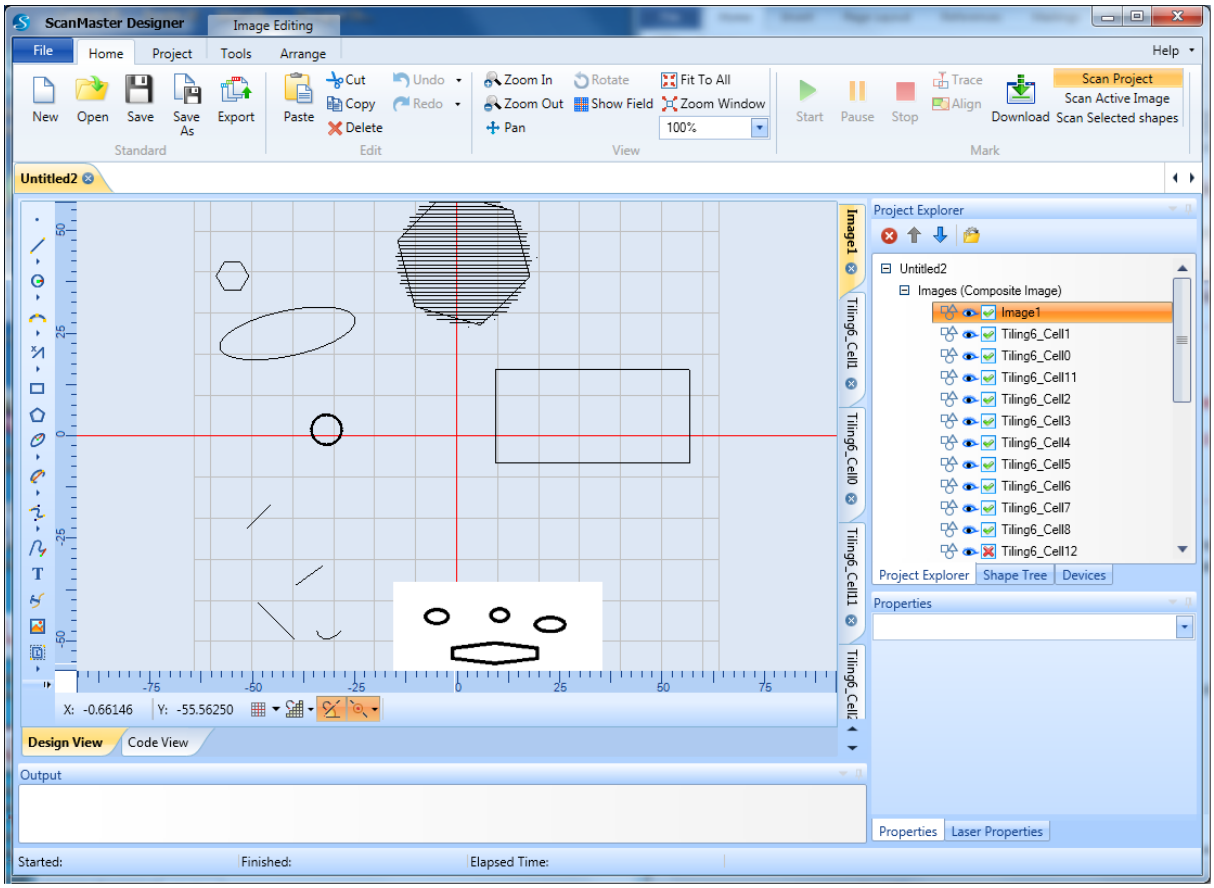


FIGURE 74: THE SCANMASTER DESIGNER GUI AFTER RESET LAYOUT

Large Image View Option

The **General** tab of the **Application Preferences** window contains the **Large Image View Option** setting, which specifies whether large vector images (e.g., logos) will be hidden or shown. Select **Hide Content of Large Vector Image** to hide large vector images. Deselect it to *show* large vector images.

Note: Users typically opt to hide large vector images if they find it difficult to work with them on the Drawing Canvas.

5.3.2 Keyboard Shortcuts

The following figure shows the **Keyboard Shortcuts** tab of the **Application Preferences** window. You can use the **Keyboard Shortcuts** tab to assign keyboard shortcuts to frequently used commands.

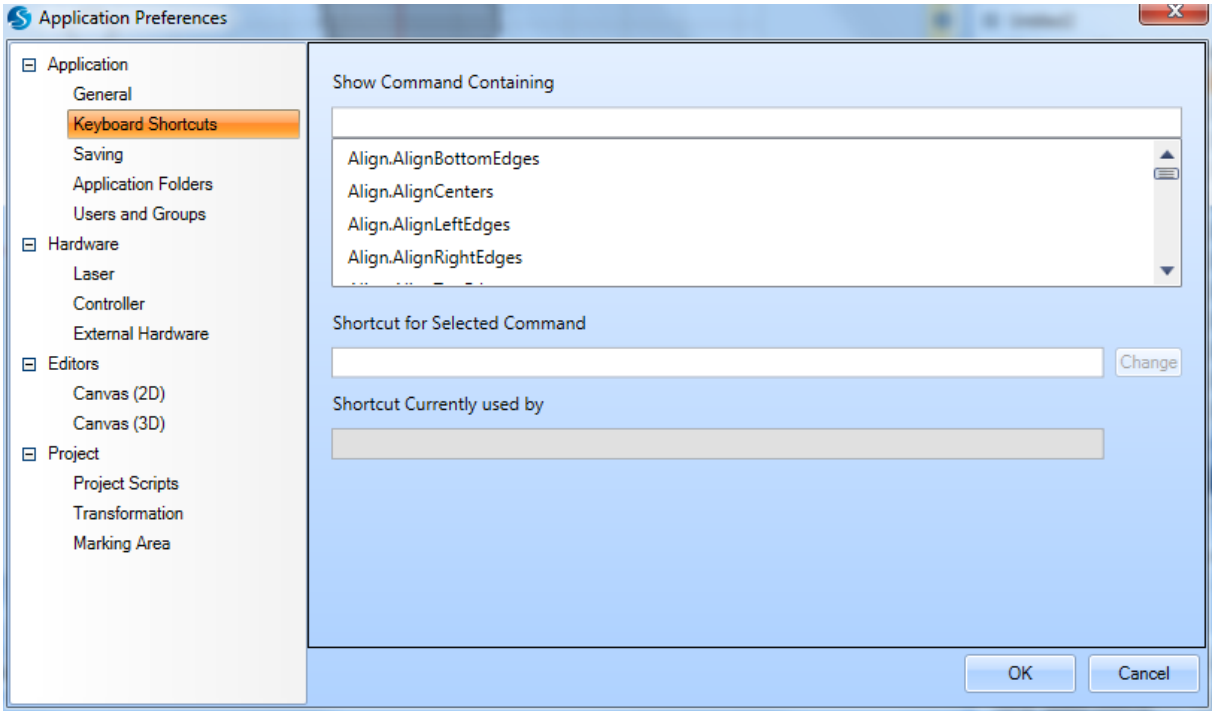


FIGURE 75: THE KEYBOARD SHORTCUTS TAB OF THE APPLICATION PREFERENCES WINDOW

Do the following to configure a keyboard shortcut for a particular command:

1. Select the command by scrolling though the list of commands, or enter a filter to search for a particular command using the **Show Command Containing** field.
2. Put the cursor in the **Shortcut for Selected Command** field and press the combination of keys you wish to specify for that command. If the key combination you specify is currently bound to another command, this will be indicated in the **Shortcut currently used by** field.
3. Click the **OK** button to commit your changes.

5.3.3 Saving

The following figure shows the **Saving** tab of the **Application Preferences** window. You can use the **Saving** tab to specify the Auto Recovery frequency and whether saved scanning jobs will be accessible through the ScanMaster Application Programming Interface (SMAPI).

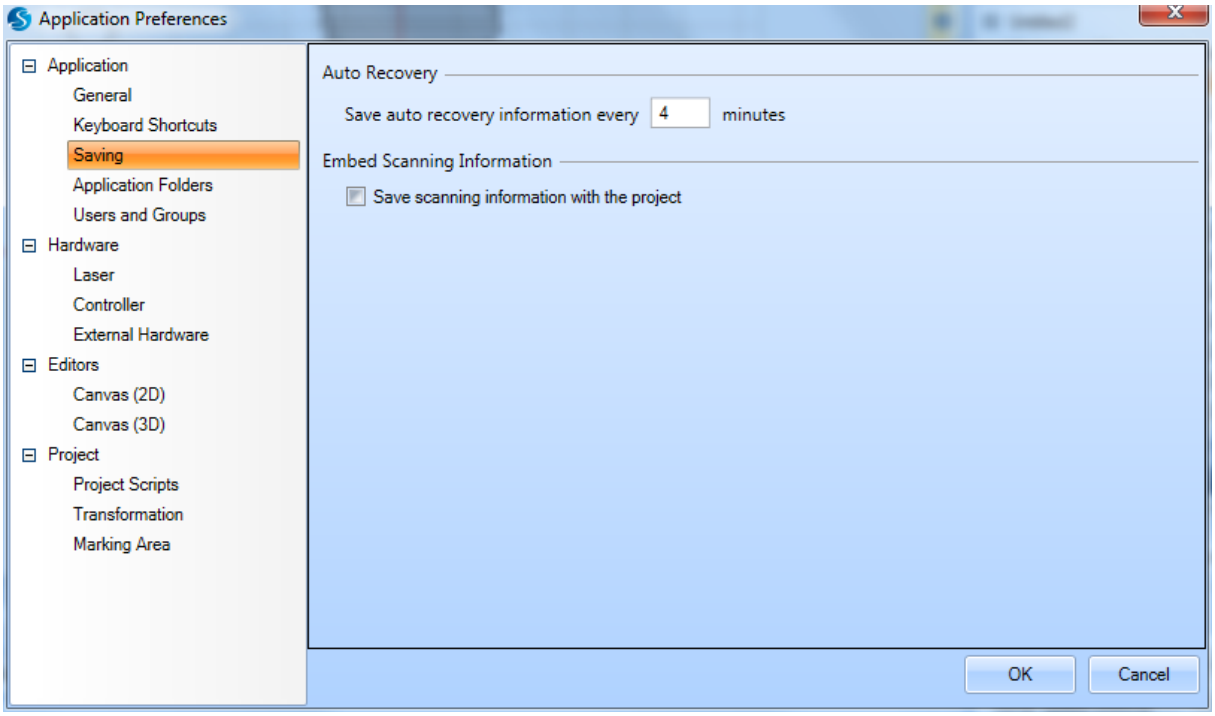


FIGURE 76: THE SAVING TAB OF THE APPLICATION PREFERENCES WINDOW

Auto Recovery

The **Auto Recovery** feature ensures that ScanMaster Designer periodically saves your current project. You can specify the frequency (in minutes) by which the project is saved by entering a value in the text entry field.

Embed Scanning Information

When this option is selected, the saved scanning jobs (.**sdw** files) will contain an SMAPI format. Subsequently these .**sdw** files will be accessible through the SMAPI.

5.3.4 Application Folders

The following figure shows the **Application Folders** tab of the **Application Preferences** window. You can use the **Application Folders** tab to change the saving paths of the Material Library, Laser Information, Pre/Post Script Configuration, Auto Saved Files, and Logs.

When you change the location of any of these paths, make sure that every ScanMaster Designer user who needs access to the path has read and write access to it.

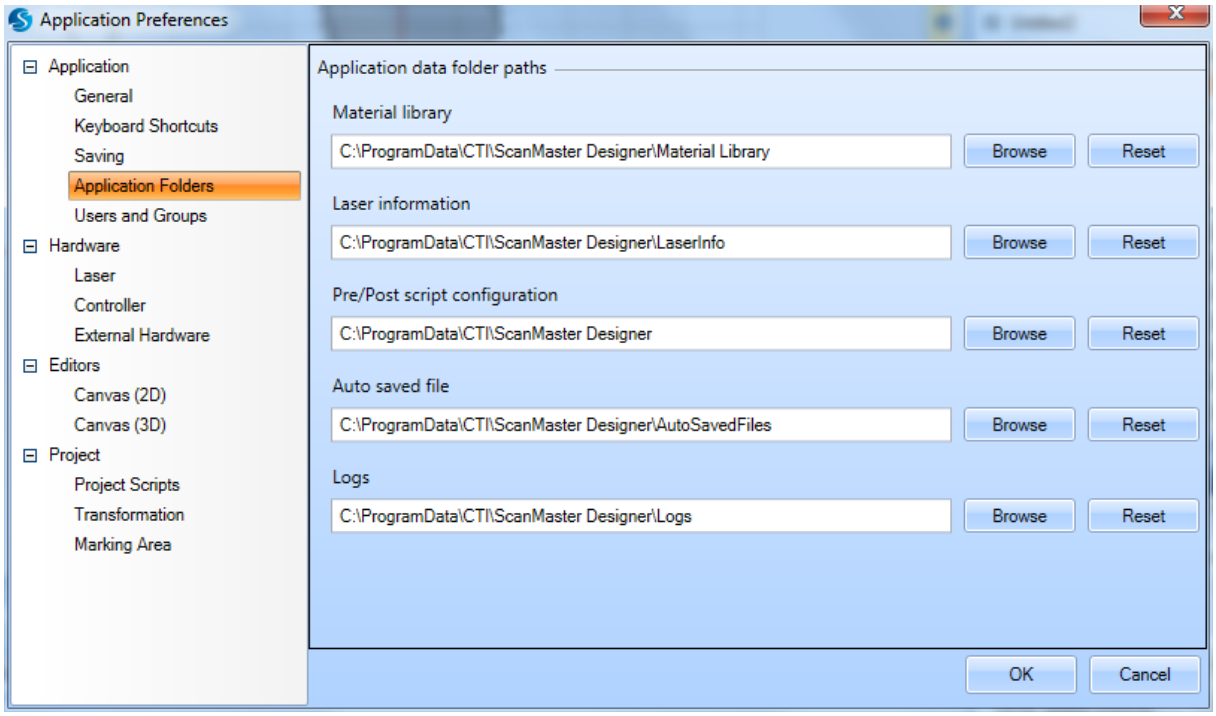


FIGURE 77: THE APPLICATION FOLDERS TAB OF THE APPLICATION PREFERENCES WINDOW

To change a path, type a new path in the text entry field or click the **Browse** button to browse to an existing path.

Click the **Reset** button to reset a path to its default value.

Users and Groups

The following figure shows the login screen for the **Users and Groups** tab of the **Application Preferences** window. This login screen is the first screen displayed when the **Users and Groups** tab is selected. You must log in as an administrator to use any of the features of the **Users and Groups** tab.

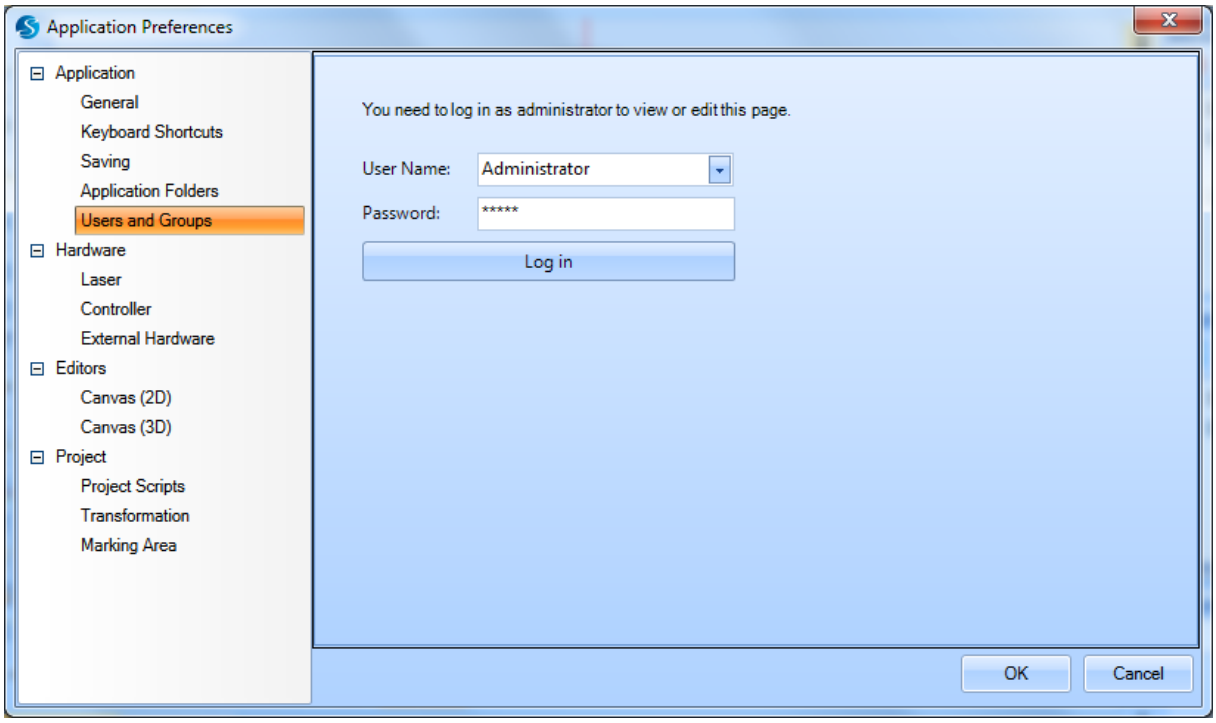


FIGURE 78: PREFERENCES - USERS AND GROUPS LOGIN SCREEN

For more information on the **Users and Groups** tab, refer to "Role-based Access Control" on page 70.

5.3.5 Laser

The following figure shows the **Laser** tab of the **Application Preferences** window. You can use the **Laser Options** tab to specify a Laser Type and its beam width and image streaming. You can use the **Align/Trace Options** to specify Align/Trace Options, including dry run speed, count, and general laser parameters specifically for Align and trace operation.

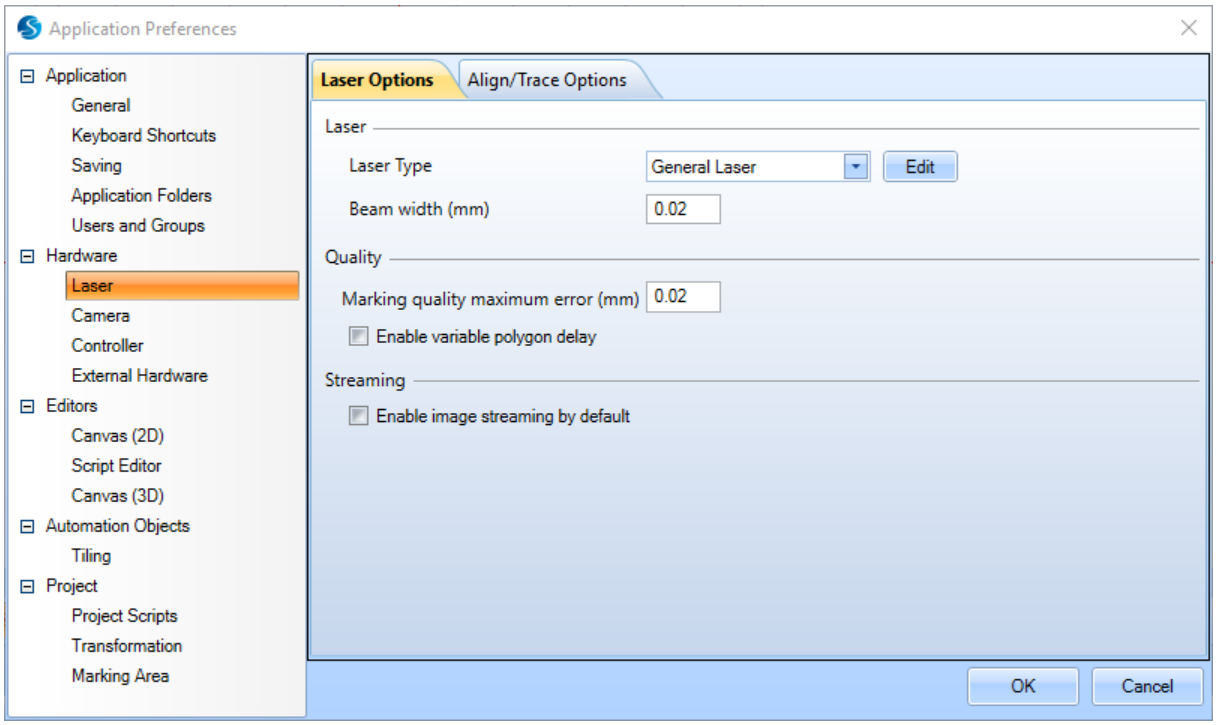


FIGURE 79: THE LASER TAB OF THE APPLICATION PREFERENCES WINDOW: LASER OPTIONS

Laser Options Tab

Laser Type

The **Laser Type** dropdown allows you to select the appropriate laser type to be used. Clicking on the **Edit** button will display the **Laser Settings Editor**. You can use the **Laser Settings Editor** to add and delete laser types as well as specify **Default Laser Properties** and other settings for a laser type. Refer to page **Error! Bookmark not defined.** for more information about the **Laser Settings Editor**.

Beam width

The **Beam width** field is used to set the width of the laser beam.

Marking Quality Maximum Error

The **Marking quality maximum error** setting is the maximum error allowed when marking curves.

Enable image streaming by default

Select **Enable image streaming by default** to specify streaming mode as the default scanning mode for Images. Streaming is required when scanning a large Image which cannot be fully downloaded to the device due to its limited memory.

Align/Trace Options Tab

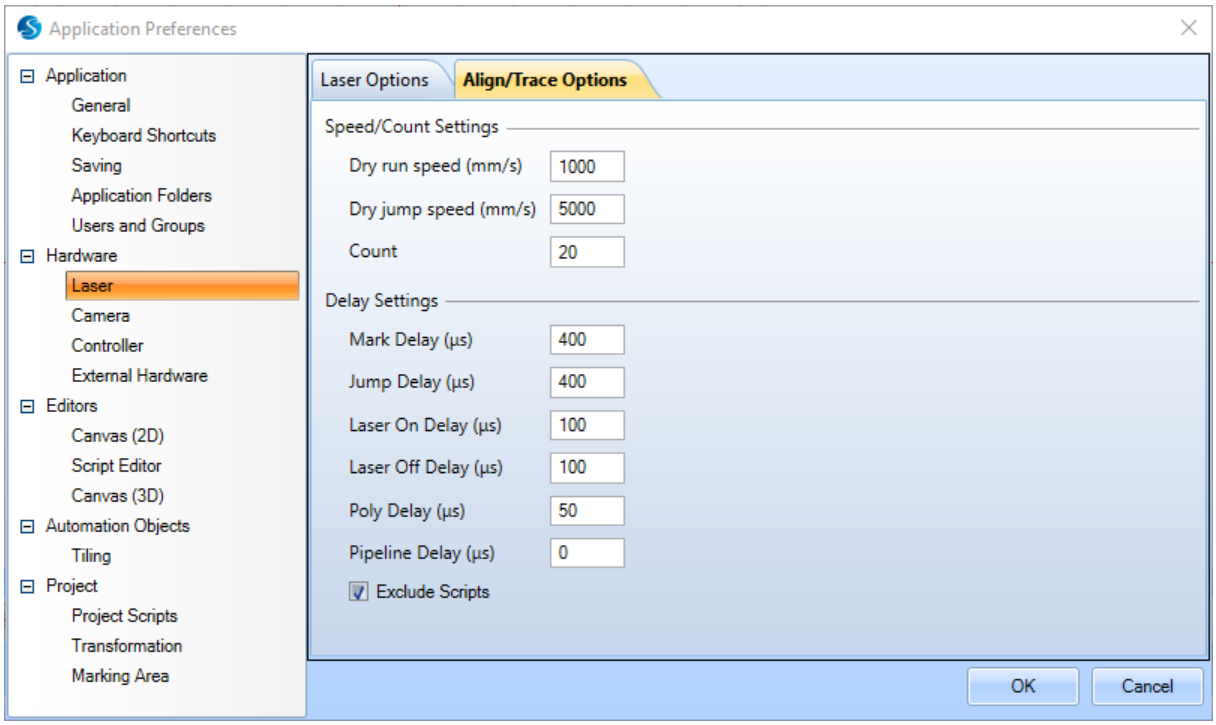


FIGURE 80: THE LASER TAB OF THE APPLICATION PREFERENCES WINDOW: ALIGN/TRACE OPTIONS

Speed/Counts Settings

Dry run speed

The Dry run speed setting is the speed that will be used to execute a dry run of an align or trace operation. This is the speed of the galvos when the laser would normally be on.

Dry jump speed

The **Dry jump speed** setting is the speed that will be used to execute the jumps during a dry run of an align or trace operation.

Count

The **Count** setting is the number of times that an align or trace operation will be repeated.

Delay settings

The delay settings permit more accurate rendering of the traced shape using the laser pointer.

Mark Delay

The delay inserted after each simulated mark.

Jump Delay

The delay inserted after each jump.

Laser On Delay

The delay inserted before turning on the pointer at the beginning of a simulated mark.

Laser Off Delay

The delay inserted before turning the pointer off at the end of a series of connected simulated marks.

Poly Delay

The delay inserted at each vertex.

Pipeline Delay

An additive delay to the Laser On/Off delays

Exclude Scripts

If checked, do not execute job pre-/post-scripts when performing the tracing/aligning funcitons.

5.3.6 Laser Settings Editor

The **Laser Settings Editor** is used to add and delete laser types as well as specify **Default Laser Properties** and other settings for a laser type. Left-click the **Edit** button in the top screen of the **Laser** tab to display the **Laser Settings Editor**.

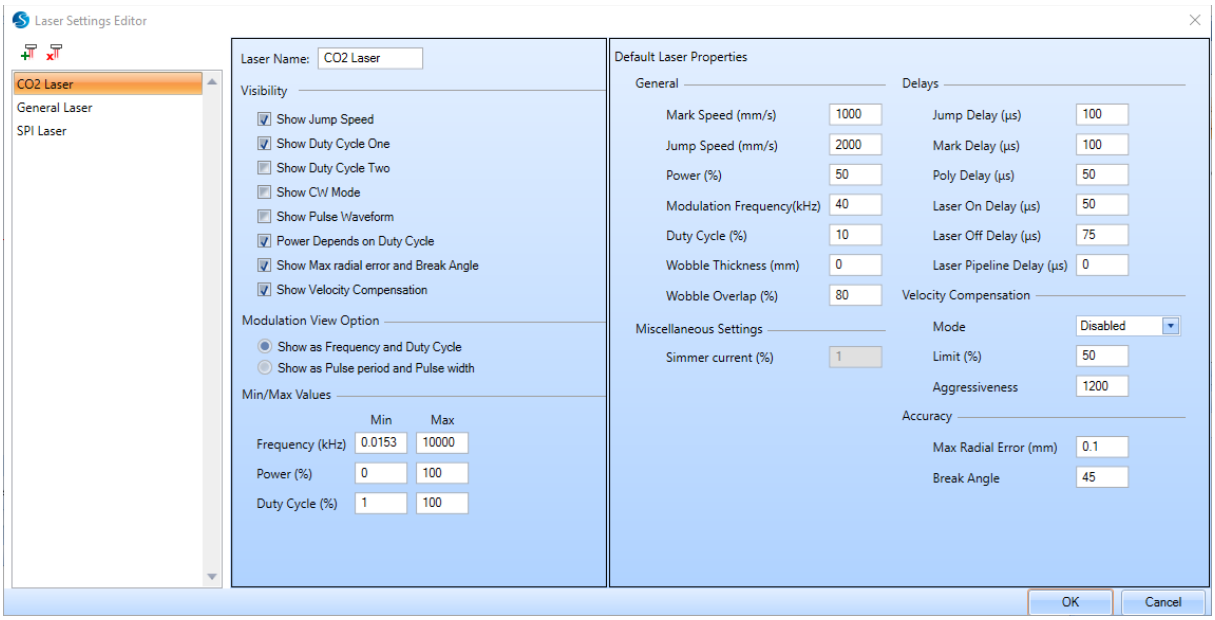


FIGURE 81: THE LASER TYPE SCREEN

The **Laser Settings Editor** contains default laser properties and other settings for the laser type. Refer to "Laser Properties" on page 52 for descriptions of the default laser properties.

Adding a New Laser Type

Do the following to add a new laser type with the **Laser Settings Editor**:

1. Click the **Add laser file icon** in the upper-left corner of the **Laser Settings Editor**.

This creates a new laser type with the default name **Custom Laser_*n***, where ***n*** is a unique numerical value. The settings for **Custom Laser_*n*** are displayed in the **Laser Settings Editor**.

2. Modify settings for the new laser type in the **Laser Settings Editor**.
3. Click the **OK** button to save the new laser type and exit the **Laser Settings Editor**. (Clicking the Cancel button will exit the **Laser Settings Editor** without saving the new laser type.)

Deleting a Laser Type

Do the following to delete a laser type with the **Laser Settings Editor**:

1. From the available list of laser types, select the laser type that you want to delete.
2. Left-click **Remove laser file icon** in the upper-left corner of the **Laser Settings Editor**.
3. The following dialog box is displayed:

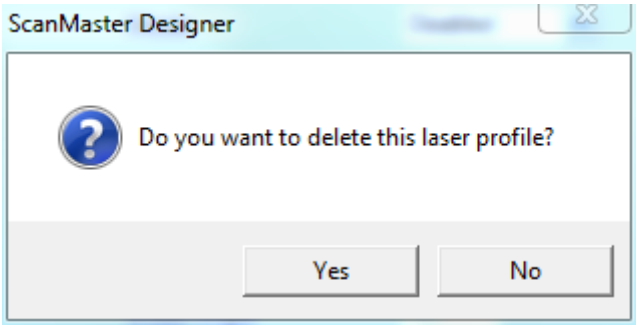


FIGURE 82: THE LASER TYPE DELETION PROMPT

4. Left-click the **Yes** button to delete the laser type.
5. **Note:** Left-clicking the **No** button will cancel the deletion.
6. Left-click the **OK** button in the **Laser Settings Editor** to make the deletion permanent.
7. **Note:** Left-clicking the **OK** button in the **Laser Settings Editor** commits any changes made in the **Laser Settings Editor** since the last time the **OK** button was clicked. Left-clicking the **Cancel** button abandons any changes made in the **Laser Settings Editor** since the last time the **OK** button was clicked.

5.3.7 Controller

The following figure shows the **Controller** tab of the **Application Preferences** window. You can use the **Controller** tab allows you to configure the **Auto Connect** feature for ScanMaster Designer.

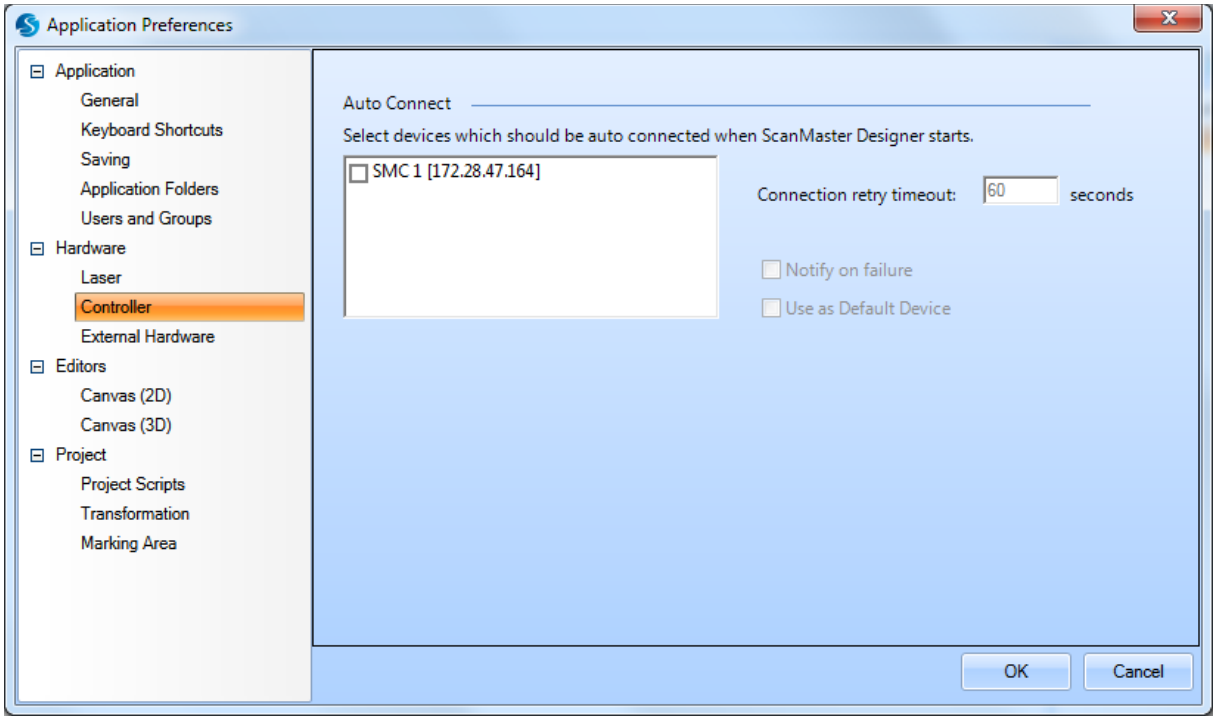


FIGURE 83: THE CONTROLLER TAB OF THE APPLICATION PREFERENCES WINDOW

Select the devices that are to be auto connected upon ScanMaster Designer start-up by selecting the checkbox beside the device name.

Connection retry timeout

The **Connection retry timeout** is the length of time (in seconds) that ScanMaster Designer will attempt to automatically reconnect in the event of a connection failure. You can enter a value for this setting in the text box.

Notify on failure

Select the **Notify on failure** checkbox if you want to be notified of a connection attempt failure.

Use as Default Device

Select the **Use as Default Device** checkbox to use the currently selected device as the default device for connection.

5.3.8 External Hardware

The following figure shows the **External Hardware** tab of the **Application Preferences** window. You can use the External **Hardware** tab to specify available hardware devices (such as XY-Tables) and their respective functions.

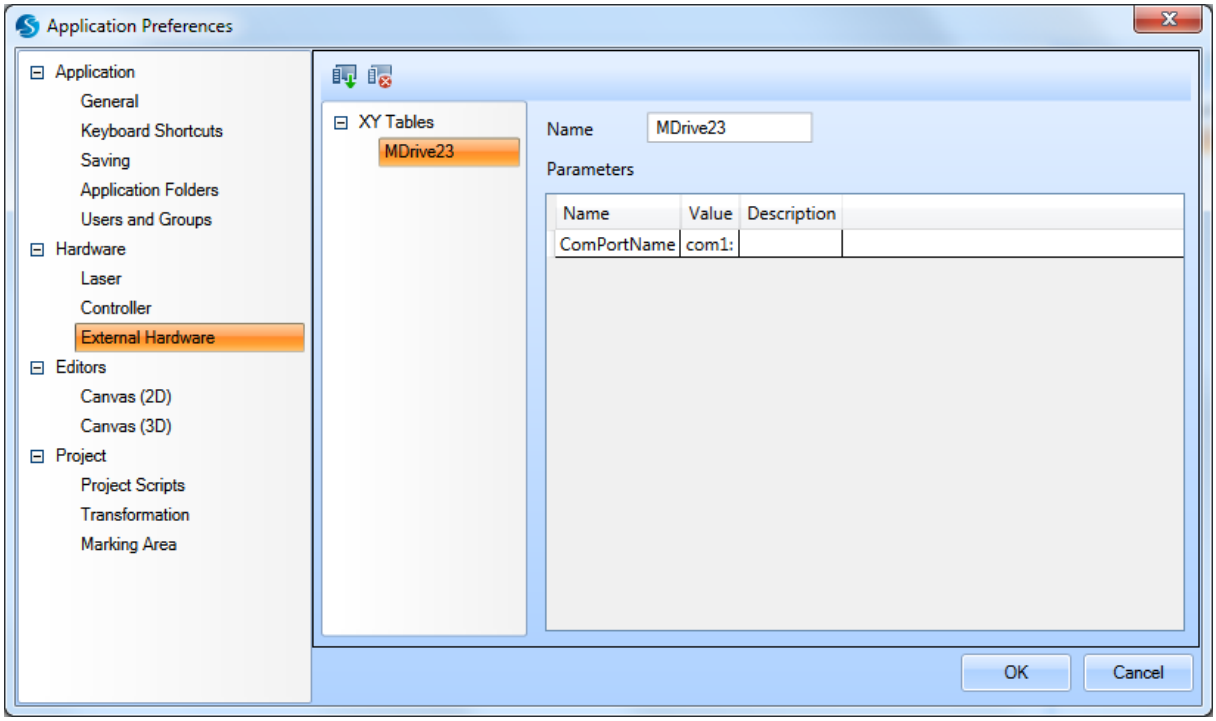


FIGURE 84: THE EXTERNAL HARDWARE TAB OF THE APPLICATION PREFERENCES WINDOW

Selecting a hardware file from the directory tree on the **External Hardware** tab displays its parameters.

A hardware object can have many parameters which are used within its script. You can change the values of those parameters in the same page.

Creating a New Hardware File

Do the following to create a new **Hardware** file:

1. Left-click the **Create Hardware** icon in the **External Hardware** tab. This displays the **Hardware Import Wizard**.

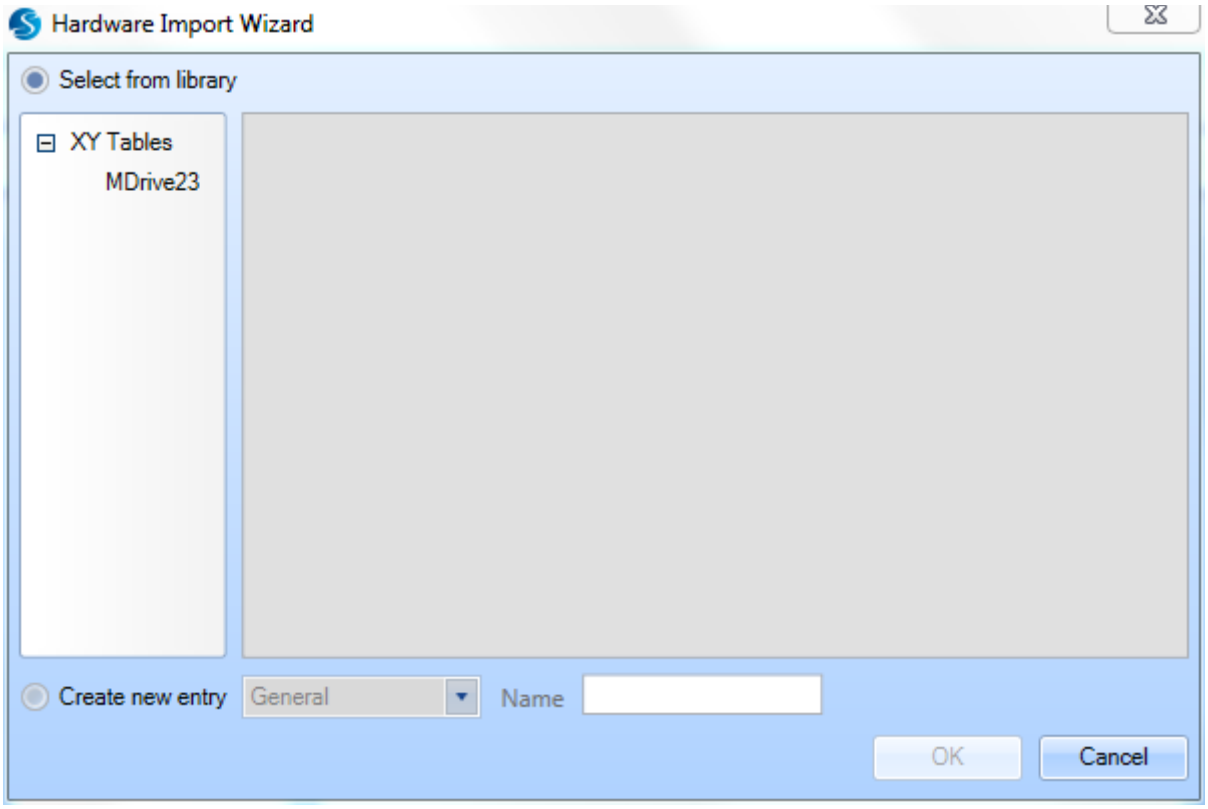


FIGURE 85: THE HARDWARE IMPORT WIZARD

2. Select one of the following options in the **Hardware Import Wizard**:
   - **Select from library** – allows you to select an existing **Hardware** file.

     If you select this option, do the following:

     a. Select a **Hardware** file from the tree structure in the **Hardware Import Wizard**.
     b. Click the **OK** button in the **Hardware Import Wizard**. This exits the **Hardware Import Wizard** and saves the **Hardware** file in the **External Hardware** tab.
   - **Create new entry** – allows you to create a new **Hardware** file.

     If you select this option, do the following:

a. Select the **Hardware** file type from the dropdown list in the **Hardware Import Wizard**.
b. Type a name for the **Hardware** file in the **Name** field of the **Hardware Import Wizard**.
c. Click the **OK** button in the **Hardware Import Wizard**. This exits the **Hardware Import Wizard** and saves the **Hardware** file in the **External Hardware** tab.

Deleting a Hardware File

To delete an existing hardware file, do the following in the **External Hardware** tab:

1. Select the **Hardware** file that you want to delete.
2. Left-click the **Delete Hardware** icon .
3. The following dialog box is displayed:

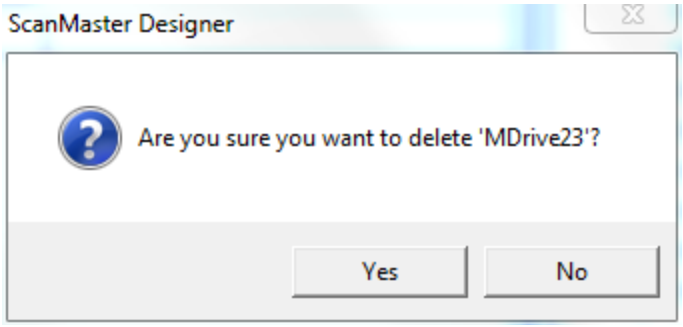


FIGURE 86: THE HARDWARE FILE DELETION PROMPT

3. Left-click the **Yes** button to delete the hardware file.

Note: Left-clicking the **No** button will cancel the deletion.

4. Left-click the **OK** button in the **External Hardware** tab to make the deletion permanent.

Note: Left-clicking the **OK** button in the **External Hardware** tab commits any changes made in the **External Hardware** tab since the last time the **OK** button was clicked. Left-clicking the **Cancel** button abandons any changes made in the **External Hardware** tab since the last time the **OK** button was clicked.

Creating a Hardware Object

You can add a hardware to the project. To initialize a hardware object.

1. Click the Hardware button located in the Hardware group in Project tab. The following dialog would be displayed:

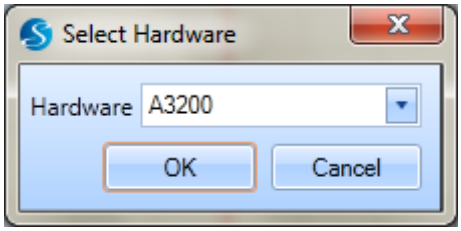


FIGURE 87: SELECT HARDWARE

2. Select the Hardware to be used and click 'OK'.
3. The Hardware object will be added.

FIGURE 88 : HARDWARE OBJECT

4. To enable editing right click on the selected hardware and use the context menu given.

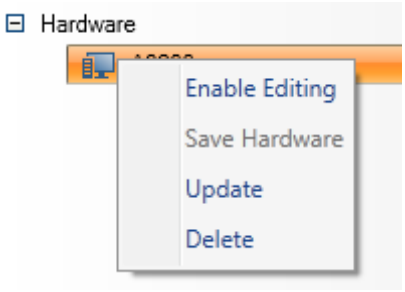


FIGURE 89 : CONTEXT MENU

5. After completing the editing user needs to Save Hardware to apply the changes.
6. Update function will apply the changes of the Hardware properties from other projects.
7. Delete function can be used to remove the selected hardware.

Properties

Parameters

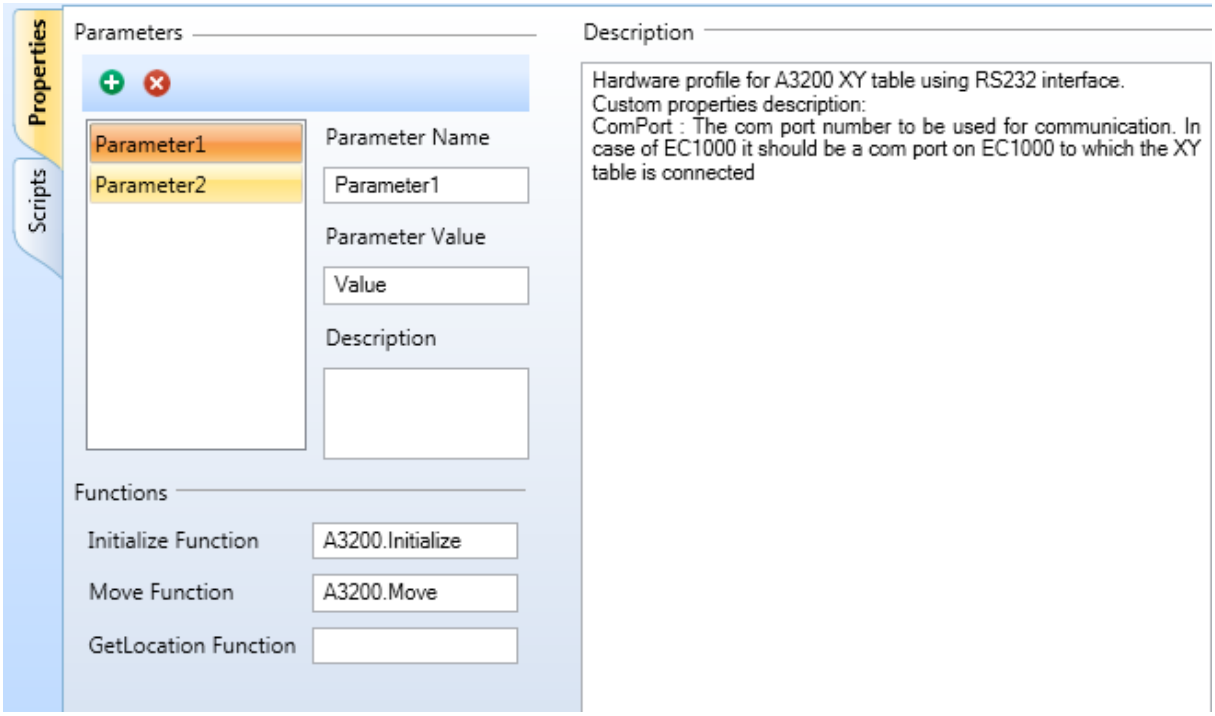


FIGURE 90 : HARDWARE PROPERTIES

User can add parameters using the add button, each parameter has a name, value and a description.

Functions

User can add an initialize function, move function and a GetLocation Function. These functions can be edited using the scripts.

Script

The ScanScript implementation corresponding to the selected hardware will be automatically implemented once the required members are selected. This code can be seen be turning in to the Script window by clicking the Script tab.

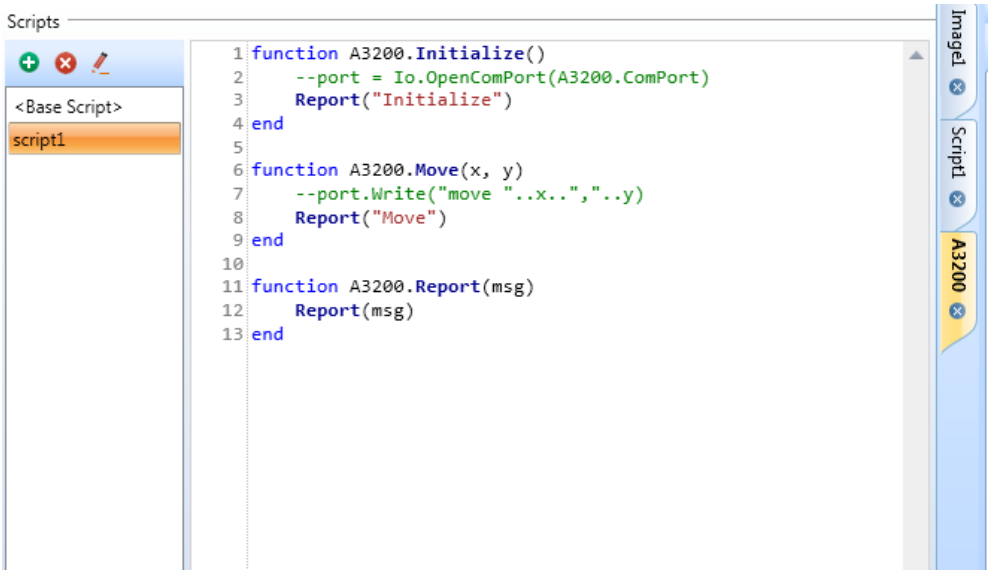


FIGURE 91 : HARDWARE SCRIPT

User can further modify the script to extent the behavior of the code as required.

User can edit the add or delete scripts and edit the script name.

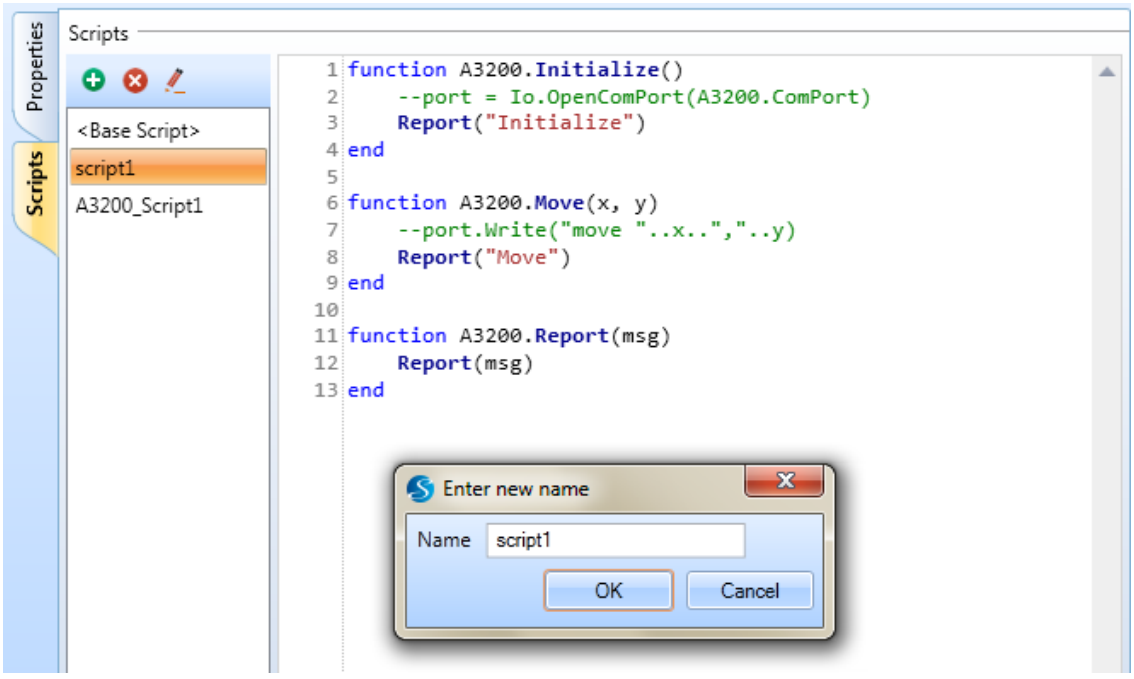


FIGURE 92 : EDIT HARDWARE SCRIPT

5.3.9 Canvas (2D)

The following figure shows the **Canvas (2D)** tab of the **Application Preferences** window. You can use the **Canvas (2D)** tab to specify the colors, grid spacing, and Nudge settings for the 2D Canvas in ScanMaster Designer.

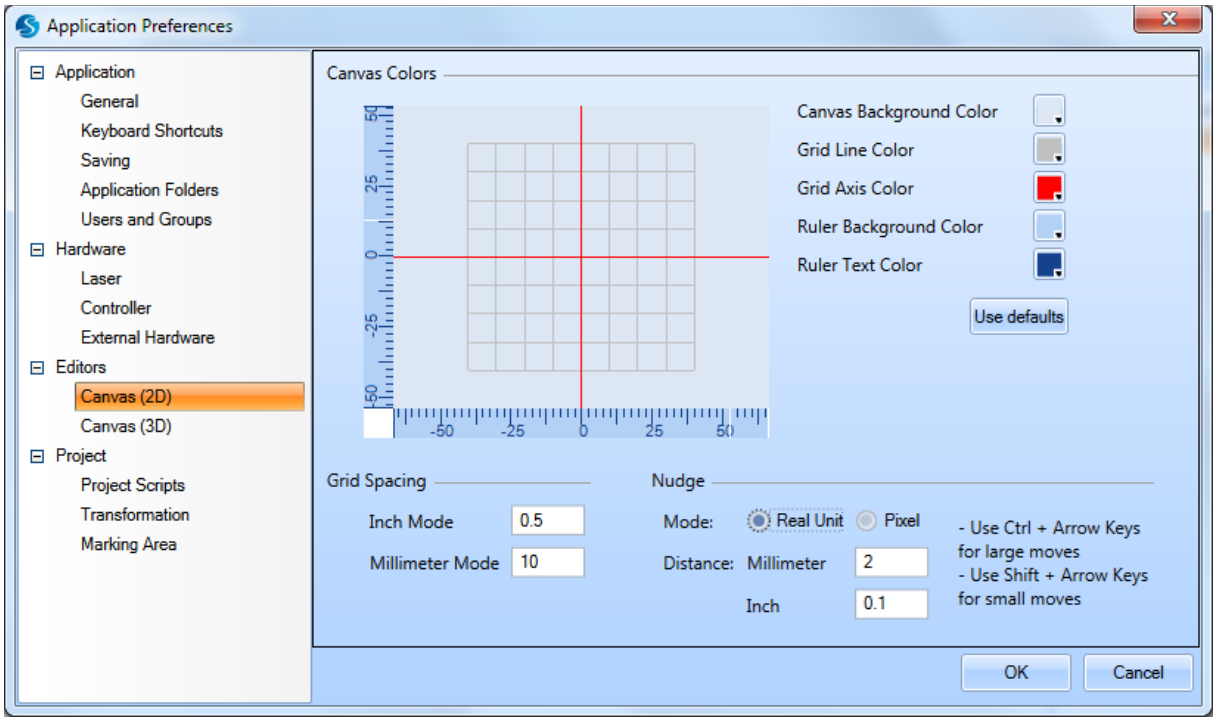


FIGURE 93: THE CANVAS (2D) TAB OF THE APPLICATION PREFERENCES WINDOW

Canvas Colors

The **Canvas Colors** section allows you to specify the colors of the canvas elements.

To change the color of an element, left-click the color dropdown and select the required color from the preset colors. (You can also use the **More Colors** option on the displayed menu, which allows you to specify RGB values to match a specific color.)

Use defaults

Click the **Use Defaults** button to reset the colors of the canvas elements to their default values.

Grid Spacing

You can display the **Grid** as a rectangular pattern of lines or dots. The spacing between the grid lines is called "grid spacing". Use the following settings to specify the grid spacing values:

- **Inch Mode** – The grid spacing value when the **Default Units** is Inches
- **Millimeter Mode** – The grid spacing value when the **Default Units** is Millimeters

Note: The **Default Units** is specified in the **General** tab of the **Application Preferences** window. Refer to "General" on page 78 for more information on specifying the **Default Units** in the **General** tab of the **Application Preferences** window.

Nudge

The **Nudge** settings allow you to change how selected Shapes on the Drawing Canvas are moved when you press cursor keys. The **Distance** setting is the distance by which the Shape is moved in each step in the direction of the cursor key. The **Mode** setting determines whether the distance is measured in real units or pixels.

If you hold a Control key while cursor key is pressed, the Shape will move 4 times the specified distance. If you hold a Shift key, the Shape will move one fourth of the specified distance.

5.3.10 Canvas (3D)

The following figure shows the **Canvas (3D)** tab of the **Application Preferences** window. You can use the **Canvas (3D)** tab to specify the colors and grid spacing for the 3D Drawing Canvas in ScanMaster Designer.

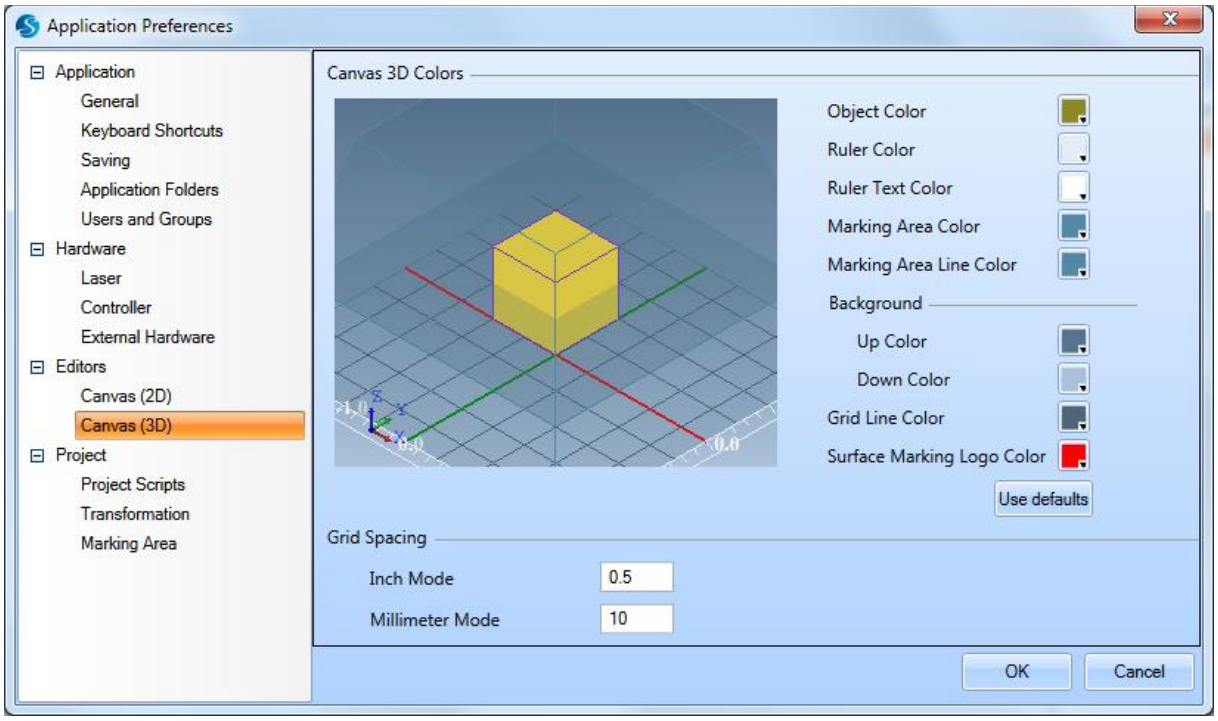


FIGURE 94: THE CANVAS (3D) TAB OF THE APPLICATION PREFERENCES WINDOW

Canvas 3D Colors

The **Canvas 3D Colors** section allows you to specify the colors of the canvas elements.

To change the color of an element, left-click the color dropdown and select the required color from the preset colors. (You can also use the **More Colors** option on the displayed menu, which allows you to specify RGB values to match a specific color.)

Use defaults

Click the **Use Defaults** button to reset the colors of the canvas elements to their default values.

Grid Spacing

You can display the **Grid** as a rectangular pattern of lines or dots. The spacing between the grid lines is called "grid spacing". Use the following settings to specify the grid spacing values:

- **Inch Mode** – The grid spacing value when the Default Units is Inches
- **Millimeter Mode** – The grid spacing value when the Default Units is Millimeters

Note: The **Default Units** is specified in the **General** tab of the **Application Preferences** window. Refer to "General" on page 78 for more information on specifying the **Default Units** in the **General** tab of the **Application Preferences** window.

5.3.11 Tiling

Select the default values for the tiling automation object of the ScanMaster project. These settings will be use to initialize a new tiling object every time it gets created.

The tiling object preferences are categorized in to three sections namely,

1. General
2. Friendly Names
3. Post Process

General

In the general section following settings are available

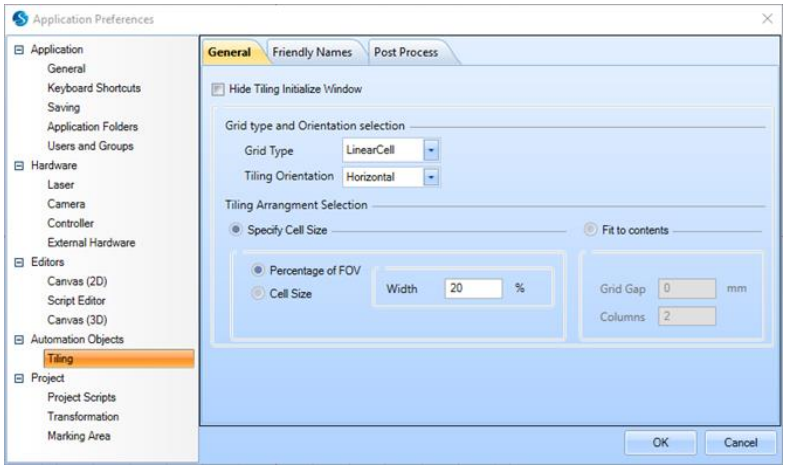


FIGURE 95: PREFERENCES, GENERAL TAB

Hide Tiling Initialize Window:

Select this option to avoid showing the tiling wizard window, each time you create a new tiling object. A tiling object with the last selected default values will be added to the project.

Grid type and Orientation selection:

Set default properties for grid type and orientation for the tiling object.

Note: Refer Process Automation, Tiling for more details.

Tiling Arrangement Selection

Select the default layout of the cells and the default sizes for the tiling object

Note: Refer Process Automation, Tiling for more details.

Friendly Names:

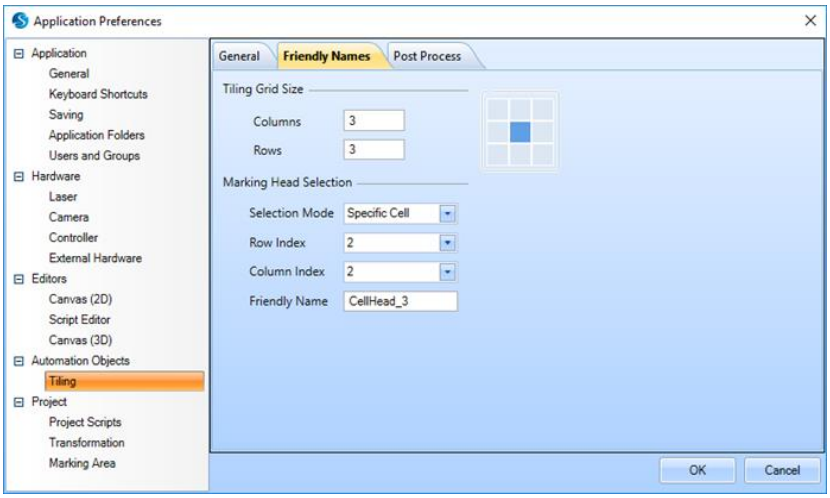


FIGURE 96: PREFERENCES, FRIENDLY NAMES TAB

In a multi scan head environments, each marking head may be designated with a friendly name. The friendly names can be assigned to the cells in your default tiling grid, to choose a default marking head, on which that cell will be marked.

Tiling Grid Size:

Set the tiling grid size of your scanning environment. Enter the Column size, Row size and press enter. A small grid view will be created on the right side. You can click on a cell to select it.

Marking Head Selection:

Select a specific cell or set of cells and assign a friendly name (i.e. A marking head) to it. The Selection mode allows selecting a specific cell, a row, column or all the cells or to select a single cell simply click on the small grid view on the right. Use the friendly name text box to specify the friendly name of the marking head to use.

Post Process :

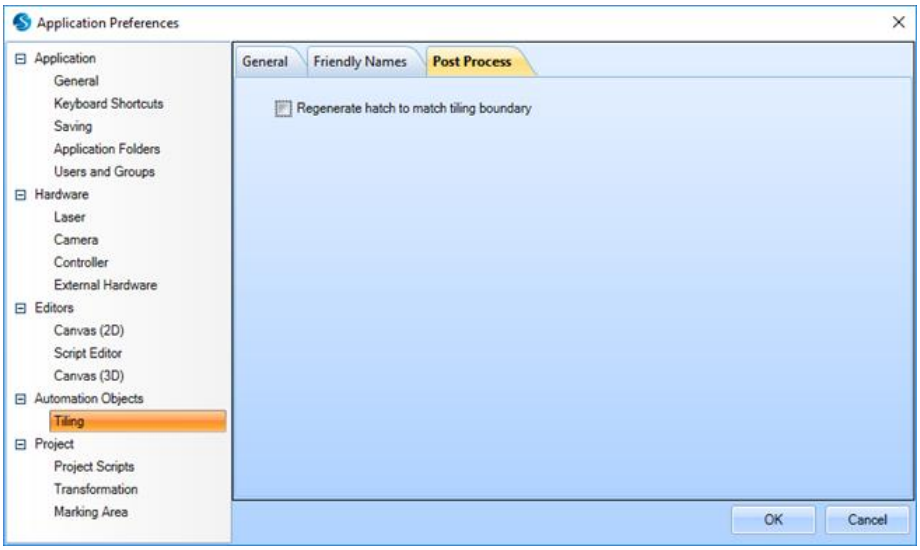


FIGURE 97: PREFERENCES, POST PROCESS TAB

The post process consists of one setting which allows to control the hatching boundaries of each shape after tiling. In some situations, shapes may get divided along the tiling boundaries and if the shapes were hatched before, tiling could introduce small imperfections along the tiling boundaries. To fine tune further this setting will allow either to keep the hatching boundaries intact after tiling OR it can modify the hatching boundaries to match the tiling boundaries and regenerate the hatching area for qualified shapes.

Example:

If the tiling grid breaks down an initially closed shape in to several open segments (Left part of the below picture), you can use this feature to close all those open segments along the cell boundaries and regenerate hatching to each cell again. (Right part of the below picture)

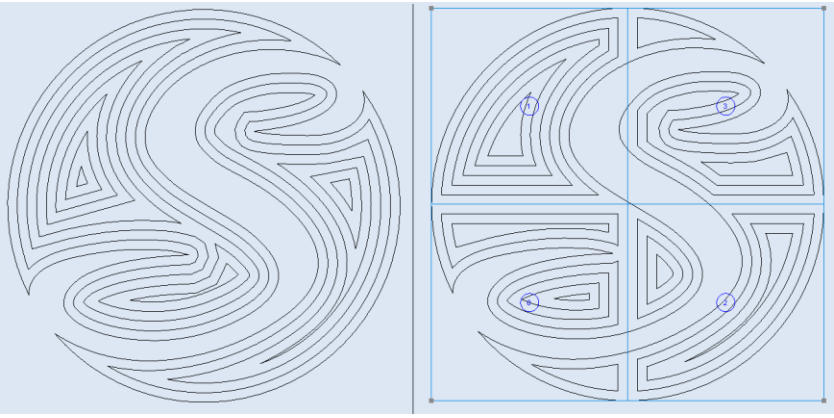


FIGURE 98: PREFERENCES, REGENERATE THE HATCHING AREA

5.3.12 Project Scripts

The following figure shows the **Project Scripts** tab of the **Application Preferences** window. You can use the **Project Scripts** tab to specify the **Default User Script File** and the scripts that will be executed before or after the **Default User Script File**.

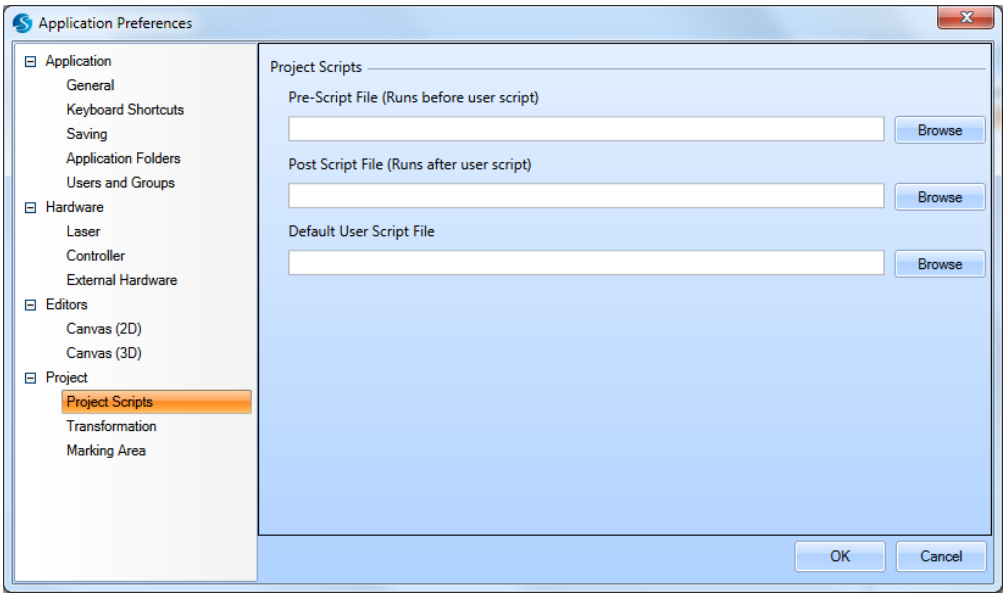


FIGURE 99: THE PROJECT SCRIPTS TAB OF THE APPLICATION PREFERENCES WINDOW

To specify a script, left-click the **Browse** button to browse to an existing script. Any script that you select must be in the Laser ScanScript (***.lsc**) file format. The scripts are typically created in the Script Window of the ScanMaster Designer GUI with the ScanScript programming language.

To specify a script, left-click the **Browse** button to browse to an existing script. Any script that you select must be in the Laser ScanScript (***.lsc**) file format. The scripts are typically created in the Script Window of the ScanMaster Designer GUI with the ScanScript programming language.

Pre-Script File (Runs before user script)

When a script is inserted in this field, it will be run *before* the **Default User Script File** in the project.

Post-Script File (Runs after user script)

When a script is inserted in this field, it will be run *after* the **Default User Script File** in the project.

Default User Script File

When a script is inserted in this field, it will be run as the default script when a new project is created.

5.3.13 Transformation

The following figure shows the **Transformation** tab of the **Application Preferences** window. You can use the **Transformation** tab to set **Offset** and **Rotation** settings. These settings will be applied to the whole project including Images, Automation Objects, Hardware, and 3D Engravings.

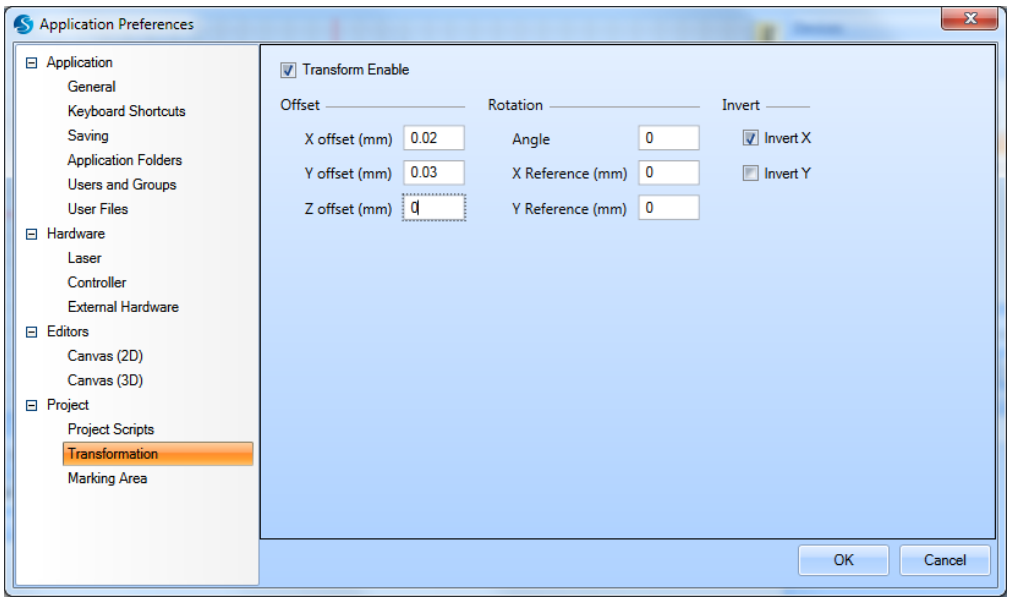


FIGURE 100: THE TRANSFORMATION TAB OF THE APPLICATION PREFERENCES WINDOW

Transform Enable

When **Transform Enable** is selected, the **Offset**, **Rotation**, and **Invert** settings on the **Transformation** tab will be automatically applied to the whole project. When **Transform Enable** is deselected, these settings will *not* be automatically applied to the whole project.

- **Offsets** - Is the movement to a specific direction. You can specify the related **X**, **Y** and **Z offsets** which would be applied to the whole project.
- **Rotation** - Is the motion around a specific point in a plane. You may specify the values for **Angle**, **X Reference** and **Y Reference** which will be applied to entire project.
- **Invert X/Y** – Swaps X and Y orientations.

X offset

The **X offset** setting is the X-axis offset specified in the default units (Millimeters or Inches).

Y offset

The **Y offset** setting is the Y-axis offset specified in the default units (Millimeters or Inches).

Z offset

The **Z offset** setting is the Z-axis offset specified in the default units (Millimeters or Inches).

Angle

The **Angle** setting is the angle of rotation around the point specified by **X Reference** and **Y Reference**.

X Reference

The **X Reference** setting is the X coordinate of the point that serves as the center of the angle of rotation. (The angle of rotation is specified in the above-described **Angle** setting.)

Y Reference

The **Y Reference** setting is the Y coordinate of the point that serves as the center of the angle of rotation. (The angle of rotation is specified in the above-described **Angle** setting.)

5.3.14 Marking Area

The following figure shows the **Marking Area** tab of the **Application Preferences** window. You can use the **Marking Area** tab to change the marking area width and height. It also shows the top and bottom field dimensions if it is a 3D galvo.

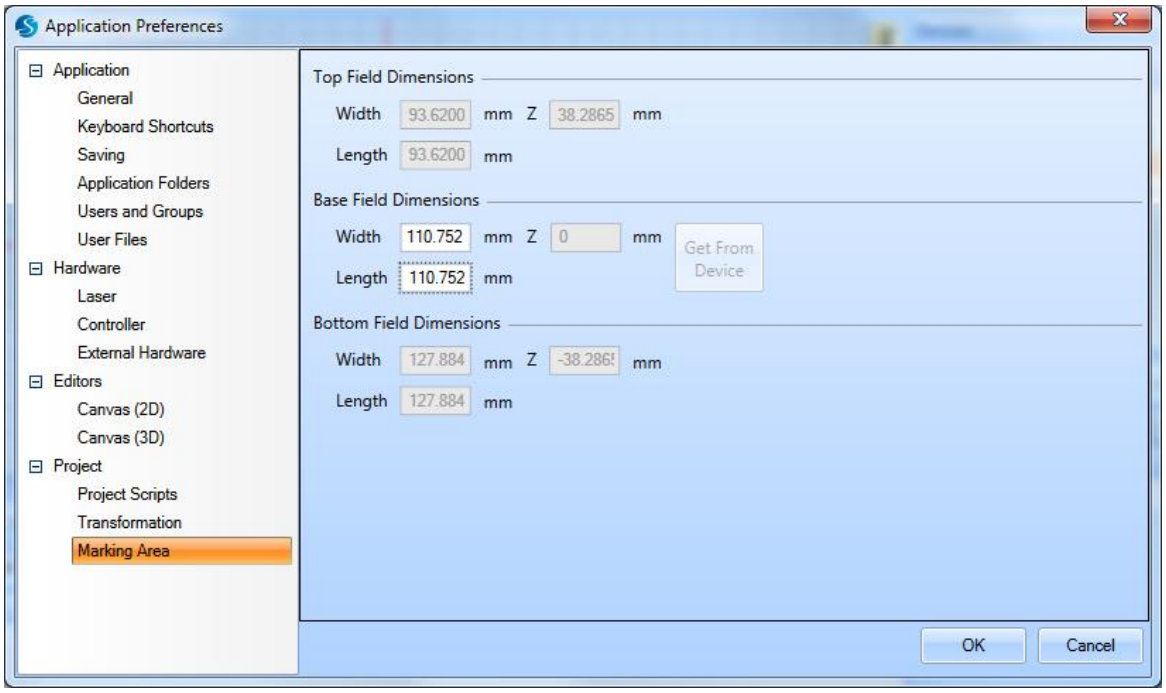


FIGURE 101: THE MARKING AREA TAB OF THE APPLICATION PREFERENCES WINDOW

In order to change the field size, enter the Base Field Dimension Width and Height. Or else, if ScanMaster Designer is connected to a device and is currently selected, you can automatically populate the values by clicking on the **Get From Device** button.

5.4 CREATING A NEW PROJECT

To create a new project, left-click the **New** icon from the **Home** tab or press **Ctrl + N.**

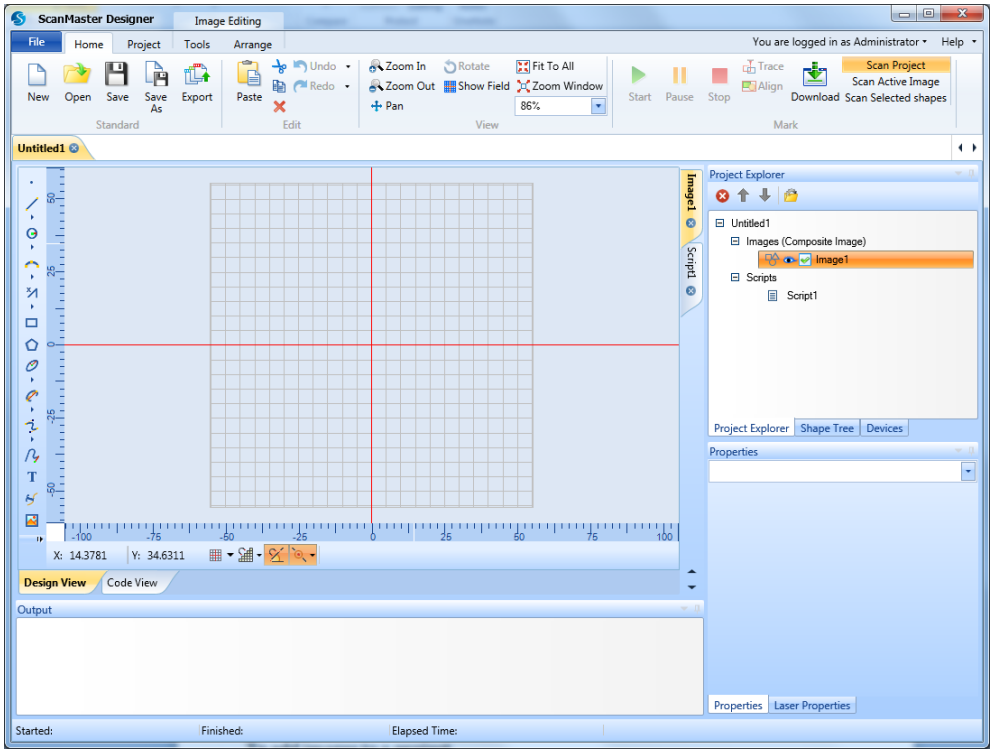


Figure 102: Main Screen

5.4.1 Adding an Image to a Project

You can add an image to a project from the **Ribbon** or from the **Project Explorer**.

When you add an image, it appears on the Canvas and is listed in the **Images** tree of the **Project Explorer**. The new image has the default name of **Image*n***, where ***n*** is a unique numerical value.

Adding an Image from the Ribbon

To add an image from the Ribbon, left-click the **2D Image** icon on the Project tab.

Adding an Image from the Project Explorer

To add an image from the Project Explorer, do the following:

1. Right-click the project name in the **Project Explorer**.
2. Select **Create 2D Image** from the popup menu.

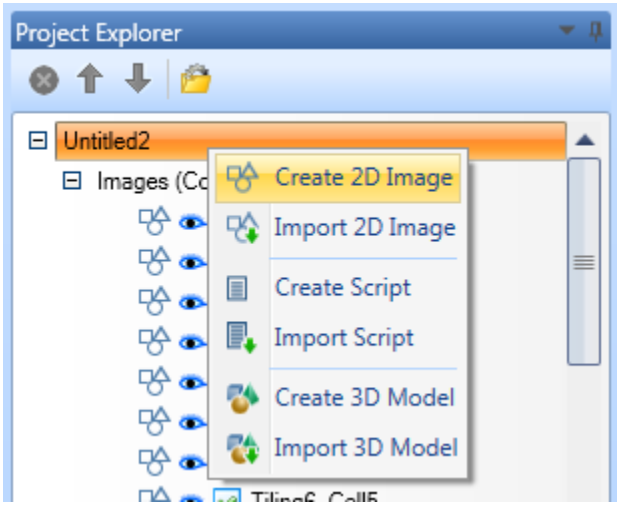


FIGURE 103: SELECTING CREATE 2D IMAGE FROM THE POPUP MENU

5.5 OPENING AN EXISTING PROJECT

Do the following to open a previously saved ScanMaster Designer (***.sdw**) project:

1. Choose **Open** from the **Home** tab, press **Ctrl+O**, or do one of the following from the Ribbon:

    - Left-click the **Open** icon on the **Home** tab or
    - Select the **Open** option from the **File** menu.

2. The **Open** dialog box will be displayed. Browse to the desired project and highlight it.

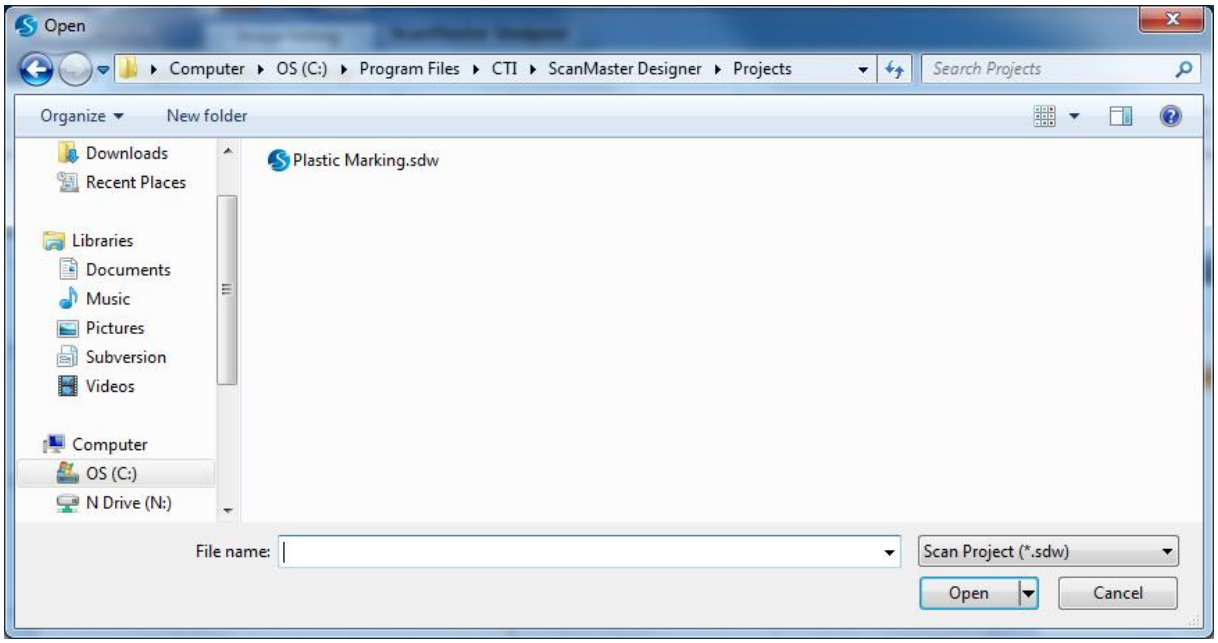


FIGURE 104: OPEN AN EXISTING PROJECT

3. Left-click the **Open** Button in the **Open** dialog box. The selected project will be loaded into ScanMaster Designer.

Note: The name of the currently loaded project appears on the highlighted tab at the top of the ScanMaster Designer Drawing Canvas. For example, **Plastic Marking** is the currently loaded project in the following example.

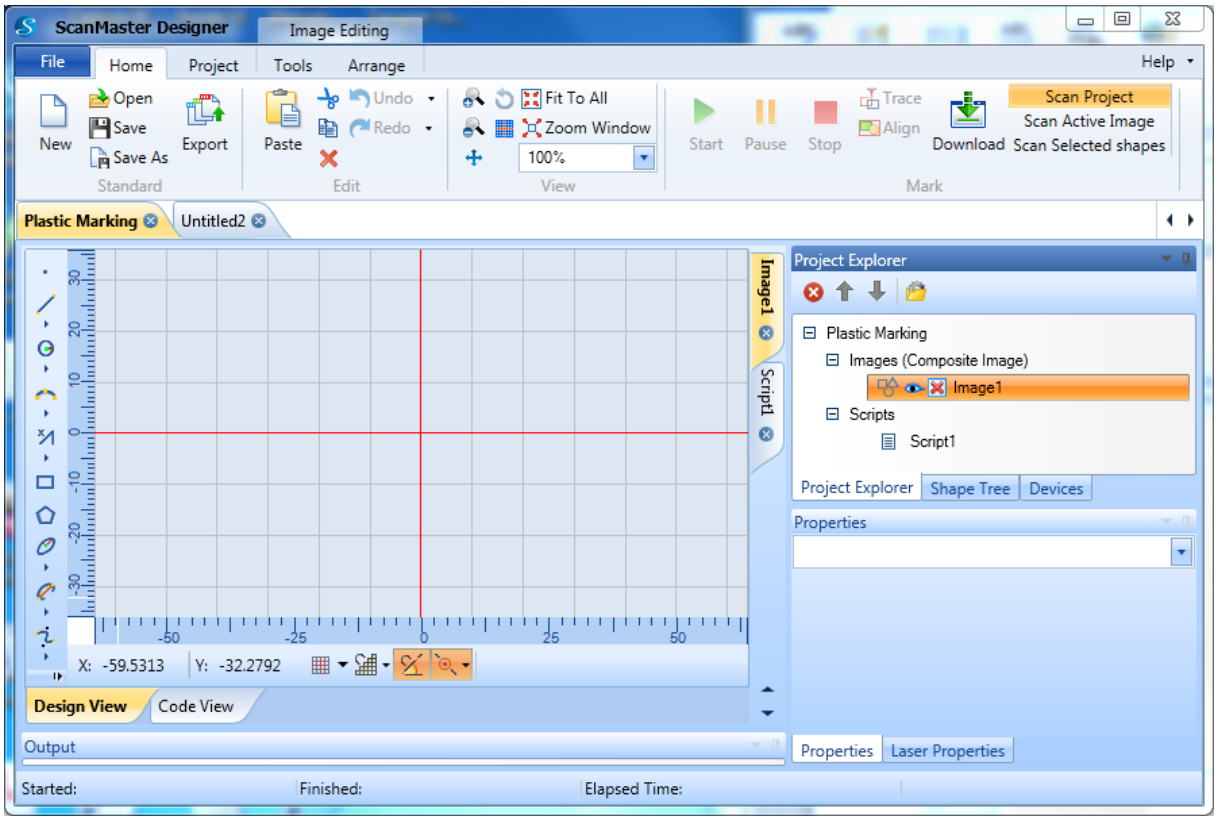


FIGURE 105: THE CURRENTLY LOADED PROJECT IN SCANMASTER DESIGNER

5.6 CLOSING A PROJECT

ScanMaster Designer allows users to close already open Projects individually. You can close a Project from the **Project Name** tab or from the **File** menu.

5.6.1 Closing a Project from the Project Name Tab

Do the following to close a project from the project name tab**:**

1. Place the screen cursor on the **Close** icon for the name tab of the project that you want to close.

   In the following example, the screen cursor has been placed on the **Close** icon for the **Plastic Marking** project, which is now red.

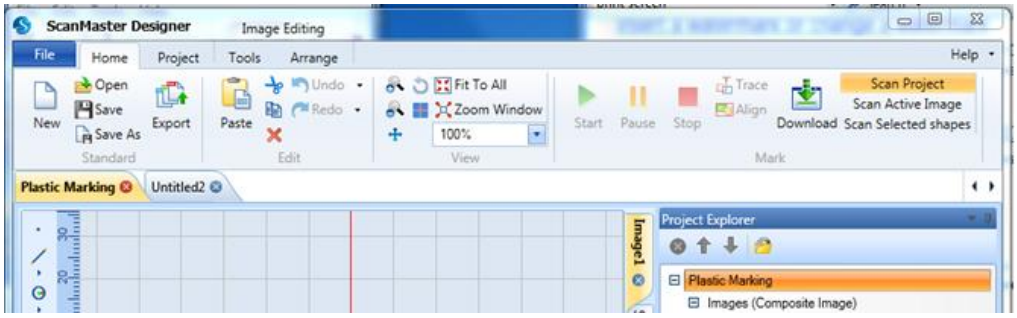


FIGURE 106: THE CLOSE ICON ON A PROJECT NAME TAB

2. Left-click the red **Close** icon on the **Project Name** tab. If the project does not contain any unsaved changes, it is immediately closed.

If the project contains any unsaved changes, the following dialog box is displayed.

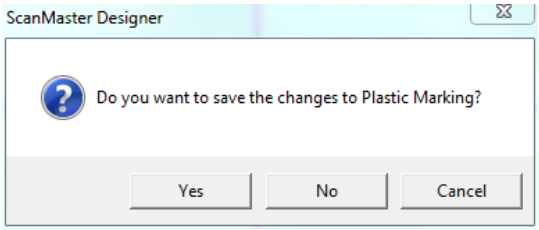


FIGURE 107: THE CLOSE ICON ON A PROJECT NAME TAB

3. Left-click the **Yes** button to save the changes and close the project.

Note: Left-clicking the **No** button will abandon the unsaved changes and close the project. Left-clicking the **Cancel** button will abandon the close operation and leave the project open.

5.6.2 Closing a Project from the File Menu

The currently loaded Project can be closed from the **File** menu. (The **Project Name** tab of the currently loaded Project is highlighted as shown in **Figure 105:"The Currently Loaded Project in ScanMaster Designer"** on page 112. See "Closing a Project from the Project Name Tab" on page 113 to close a Project other than the one that is currently loaded.)

Do the following to close the currently loaded Project from the **File** menu**:**

1. Left-click on the **File** tab and select the **Close** option from the **File** menu.

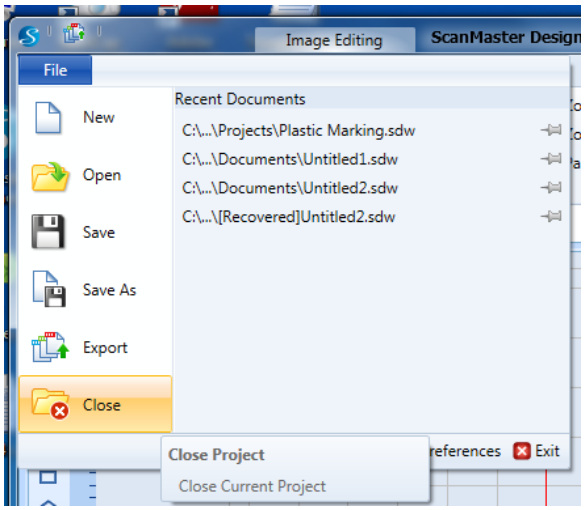


FIGURE 108: CLOSE PROJECT

2. If the Project does not contain any unsaved changes, it is immediately closed. If the Project contains any unsaved changes, the following dialog box is displayed.

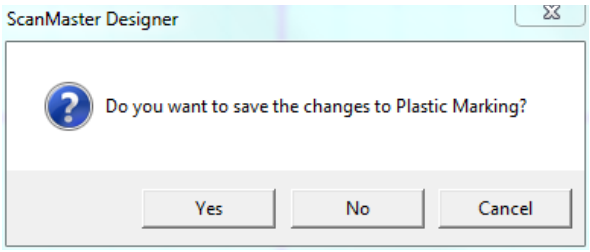


FIGURE 109: THE CLOSE ICON ON A PROJECT NAME TAB

3. Left-click the **Yes** button to save the changes and close the Project.

Note: Left-clicking the **No** button will abandon the unsaved changes and close the Project. Left-clicking the **Cancel** button will abandon the close operation and leave the Project open.

5.7 SAVING A PROJECT

You can use the **Save** and **Save As** commands to store your work. The first time an unnamed Project is saved, the **Save As** dialog box appears. **ScanMaster Designer** saves its drawing projects as files with extensions ending in **.sdw.**

1. Choose **Save** or **Save As** on the **Home | Standard** panel.
   The **Save As** dialog box will appear.
2. Type a new name for the Project or keep the existing name.
3. Click **Save.**

5.8 EXPORTING A PROJECT

ScanMaster Designer allows you to export images as **.svi** files to a location on the host machine or on the scan control card.

1. Click **Export** on the **Home | Standard** panel.
2. The **Save As** dialog box will appear. Select the preferred location to save the image.
3. Enter a file name.
4. Click **Save**.

6 WORKING WITH SHAPES AND TEXT

6.1 THE DRAWING SHAPES TOOLBAR

The Drawing Shapes Toolbar provides commands for drawing shapes and inserting text, raster images, vector images, barcodes, and spirals. The following figure contains an illustration of the Drawing Shapes Toolbar.

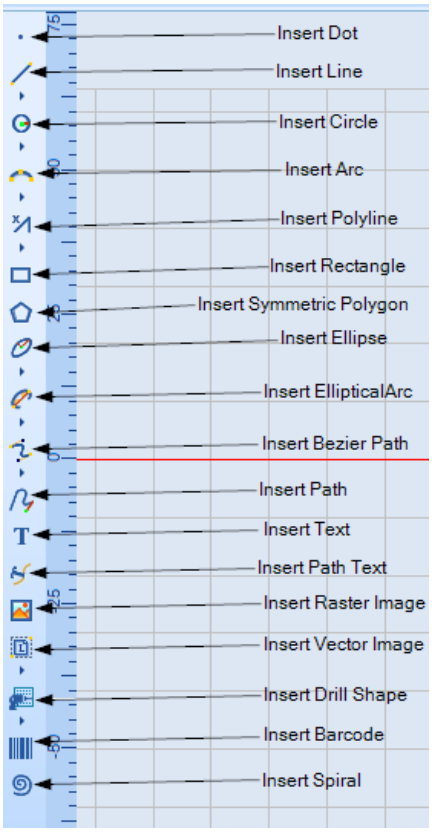


FIGURE 110: THE DRAWING SHAPES TOOLBAR

To insert a shape, click its icon on the **Drawing Shapes** Toolbar. Some tools in the Drawing shapes toolbar have additional hidden tools. To select a hidden tool, click the small triangle below the shape icon.

6.2 BASICS OF INSERTING SHAPES

You can insert a Shape by using the mouse or by entering parameters.

6.2.1 Using the Mouse to Insert a Shape

Do the following to insert a shape by using the mouse:

1. Left-click a shape icon on the **Drawing Shapes** Toolbar.
2. Place a cursor anywhere on the Drawing Canvas and click the left mouse button again.

You may have to drag the mouse and click on additional locations to draw the intended shape.
Note: The following sections provide overviews of the two main methods for inserting shapes from the **Drawing Shapes** Toolbar.

Refer to the following sections for the details of how to insert shapes with each icon on the **Drawing Shapes** Toolbar:

- "Geometric Shapes" on page 119
- "Enter and Modify Text " on page 168
- "Path Text" on page 217
- "Vector Image" on page 224
- "Raster Image" on page 228
- "Drill Shapes" on page 255
- "Barcode Shapes" on page 263

6.2.2 Entering Parameters to Insert a Shape

Do the following to insert a shape by entering parameters:

1. Left-click a shape icon on the Drawing Shapes Toolbar.
2. Place the cursor anywhere on the Drawing Canvas. The following box will appear.

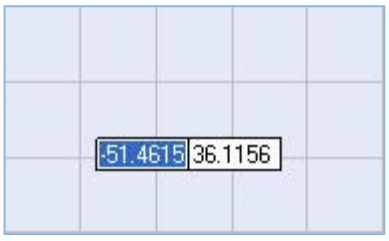


FIGURE 111: PARAMETER ENTRY BOXES

3. Enter the X coordinate of the starting point in the first box. (The first box is highlighted as shown in the above figure.)
4. Press the tab key to highlight the second box.
5. Enter the Y coordinate of the starting point and press the **Enter** key. Repeat this process to enter the coordinates of the next point, and so, on until the desired shape is formed.

For example, by repeating the following steps you can draw a circle:

1. On the Drawing Shapes Toolbar, left-click the arrowhead on the **Insert Circle** icon to display the **Insert Circle** popup.

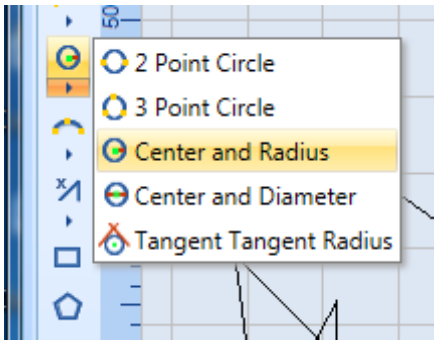


FIGURE 112: THE INSERT CIRCLE POPUP

2. Select the **Center and Radius** option from the **Insert Circle** popup.

3. Move the screen cursor onto the Drawing Canvas and enter the coordinates of the center point of the circle (-10, 20).

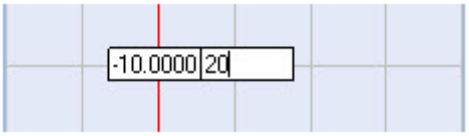


FIGURE 113: ENTERING COORDINATES OF THE CENTER OF THE CIRCLE

4. Press the **Enter** key.
5. Enter the radius (50) and press the **Enter** key.

   The following figure shows the circle that would be created by executing the preceding steps.

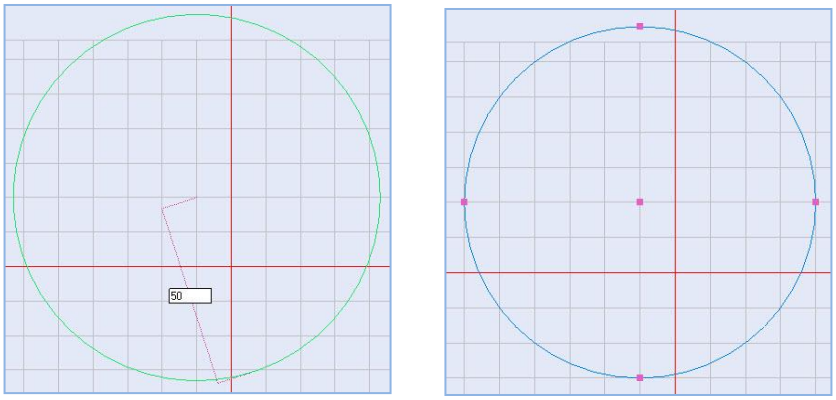


FIGURE 114: THE INSERTED CIRCLE

6.3 GEOMETRIC SHAPES

The following geometric Shapes can be inserted with the Drawing Shapes Toolbar in ScanMaster Designer:

- Dot
- Line
- Circle
- Arc
- Polyline
- Rectangle
- Symmetric Polygon
- Ellipse
- Elliptical Arc
- Bezier Path
- Spiral
- Path

6.3.1 Insert a Dot

The **Insert Dot** tool will insert a dot in your drawing at a position that you select on the Drawing Canvas.

Do the following to insert a dot on the Drawing Canvas:

1. Left-click the **Dot** icon on the Drawing Shapes Toolbar.
2. Left-click anywhere on the Drawing Canvas to place the dot.

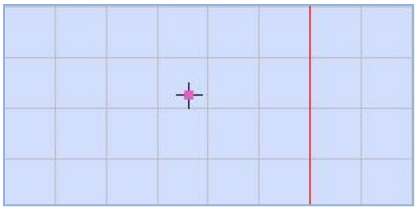


FIGURE 115: DOT

Note: A dot is indicated by a pixel at the center and a cross for more visibility.

Moving a Dot

A dot has a single hotspot, which represents the location coordinates of the dot. For example, the dot in the following figure has location coordinates of (-56.8854, -55.6948) as shown in the yellow-highlighted fields on the lower-left corner of the figure.

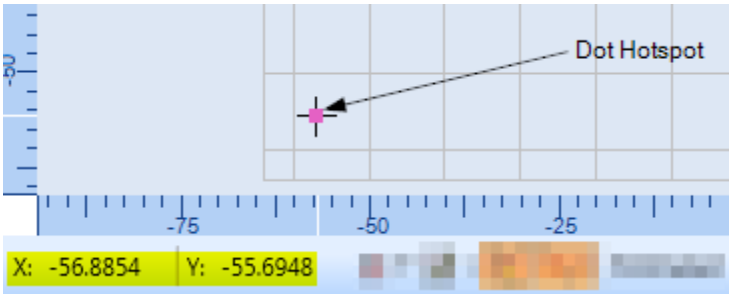


FIGURE 116: A DOT HOTSPOT

You can use the dot hotspot to move the dot.

Do the following to move a dot by its hotspot:

1. Select the dot and place the mouse over the dot hotspot.
2. Press the left mouse button and hold it down while you drag the mouse and the dot to the desired location.
3. When the dot is at the desired location, release and click the left mouse button. The following figure shows an example of a dot that has been moved by dragging its hotspot.

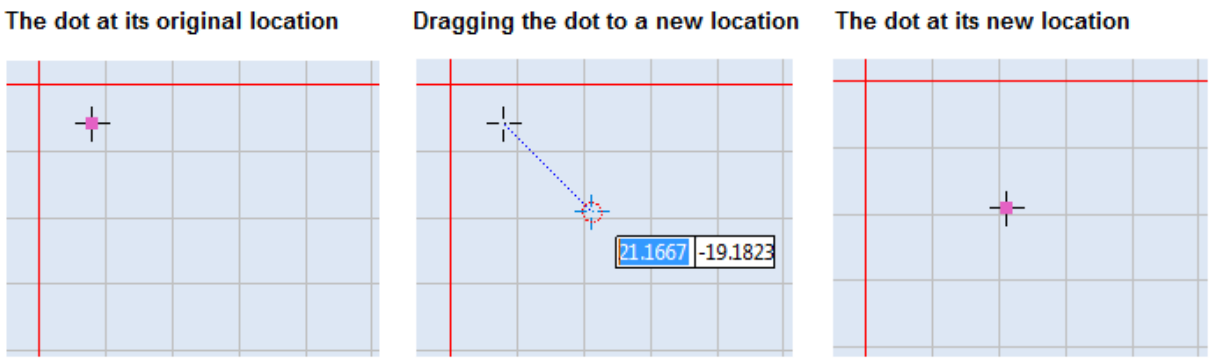


FIGURE 117: MOVING A DOT BY DRAGGING ITS HOTSPOT

You can also move a Dot by nudging or by using the **Move** or **Move to Origin** tool. Refer to "Moving Shapes" on page 312 to move a Dot by any of these methods.

Note: You cannot move a Dot by dragging on a non-hotspot area because there are no non-hotspot areas on a Dot.

Dot Properties

When you select a dot in the Drawing Canvas, its properties will be displayed in the **Properties** window of ScanMaster Designer. You can change the dot's position by giving different parameter values through the **Properties** window.

The dot properties are the following:

X – The X coordinate of the dot

Y – The Y coordinate of the dot

Z – The Z coordinate of the dot

Note: The Z property is only used for scanning on 3-Axis systems. The range of allowable values for the Z property is defined in the **Marking Area** tab of the **Project Settings** tab.

Dot Duration – The length of time (in microseconds) the laser will dwell in this location

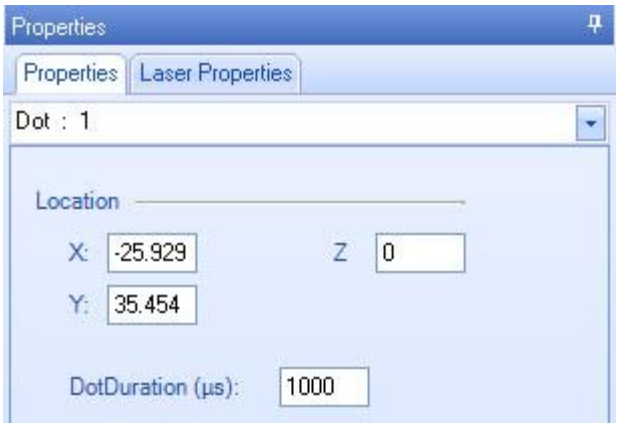


FIGURE 118: DOT PROPERTIES

6.3.2 Insert a Line

The **Insert Line** tool will draw a single straight line from one point to another. A line has two ends: the start point and the end point. There are two methods of drawing a line: **2 Points** and **Length and Angle**.

2 Points

The **2 Points** method will draw a line from one point to another.

Do the following to draw a line with the **2 Points** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead **b**elow the **Insert Line** icon to display the **Insert Line** popup.
2. Select the **2 Points** option from the **Insert Line** popup.

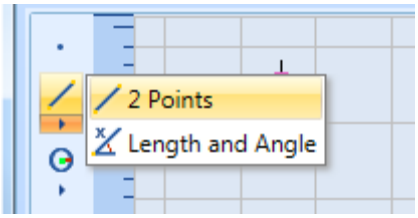


FIGURE 119: THE INSERT LINE POPUP

3. On the Drawing Canvas, place the crosshairs on the starting point and click the left mouse button. When you move the crosshairs, you will see a preview of the line.
4. Move the crosshairs to the end point and click the left mouse button.

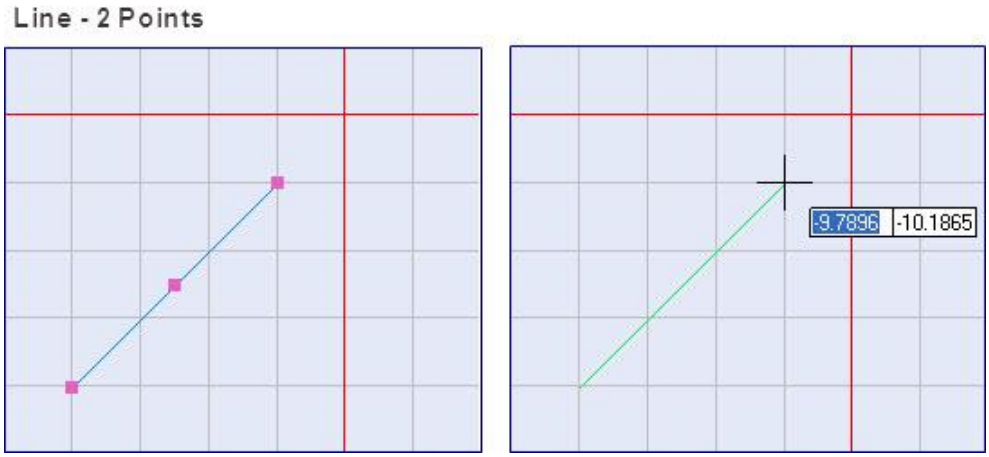


FIGURE 120: INSERTING A LINE WITH THE 2 POINTS OPTION

Length and Angle

The **Length and Angle** method is used to draw lines by entering the desired length and angle.

Do the following to draw a line with the **Length and Angle** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Line** icon to display the **Insert Line** popup.

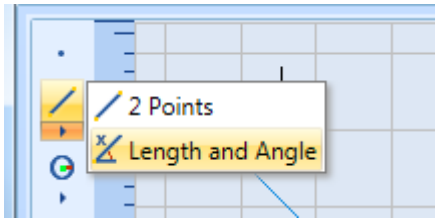


FIGURE 121: THE INSERT LINE POPUP

2. Select the **Length and Angle** option from the **Insert Line** popup.
3. On the canvas, place the crosshairs on the starting point and click the left mouse button. When you move the crosshairs, you will see a preview of the line.

4. Move the mouse until the line is of the desired length and angle. Then click the left mouse button to specify the endpoint of the line.
5. If you are concerned about the exact dimensions of the line, you may specify the exact length and/or angle in the boxes that appear next to the length and angle indicators. Use the Tab key to toggle between these boxes. You can enter one of them in the box and use the mouse to specify the other.

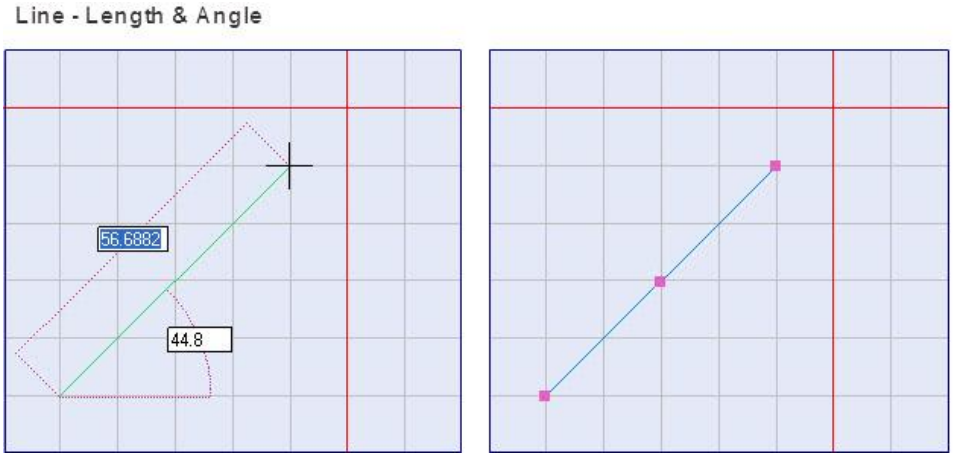


FIGURE 122: LINE - LENGTH & ANGLE

Note: When drawing lines at an angle, you can start measuring the angle at 0 degrees, which is a horizontal line. If you draw a line at 90 degrees, the line will be a vertical line.

Line Properties

When you select a line in the Drawing Canvas, its properties will be displayed in the **Properties** window of ScanMaster Designer. You can change the length, position, or angle of the line by giving it different parameter values through the **Properties** window.

The line properties are the following:

- **Start X** – The X coordinate of the line start point
- **Start Y** – The Y coordinate of the line start point
- **Start Z** – The Z coordinate of the line start point
- **End X** – The X coordinate of the line end point
- **End Y** – The Y coordinate of the line end point
- **End Z** – The Z coordinate of the line end point
- **Note**: The Z properties **(Start Z** and **End Z)** are only used for scanning on 3-Axis systems. The range of allowable values for the Z properties is defined in the **Marking Area** tab of the **Project Settings** tab.
- **Length** – The length of the line

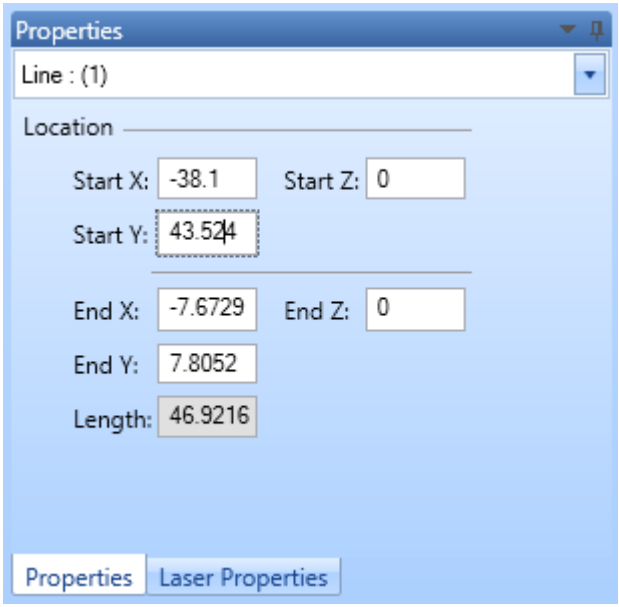


FIGURE 123: LINE PROPERTIES

Note: The **Length** parameter is displayed for informational purposes only and cannot be changed in the Properties tab.

Changing Line Properties by Moving Hotspots

You can change line properties by moving line hotspots as described in the following sections:

- "**Error! Reference source not found.**" on page **Error! Bookmark not defined.** describes how to change the length and angle of a line by moving its endpoint hotspots.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move a line without changing its length or angle.

- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a line.

6.3.3 Insert a Circle

The **Insert Circle** tool will draw a circle by one of several methods. Click the arrowhead beneath the **Insert Circle** icon to access the **Insert Circle** popup, which lists the following options:

- **2 Point Circle**
- **3 Point Circle**
- **Center and Radius**
- **Center and Diameter**
- **Tangent Tangent Radius**

To draw a 2 Point Circle

The **2 Point Circle** method will draw a circle using a line, which represents the diameter of the circle.

Do the following to draw a circle with the **2 Point Circle** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the Insert Circle icon to display the Insert Circle popup.
2. Select the 2 Point Circle option from the Insert Circle popup.
3. Place the crosshairs on any location on the Drawing Canvas.

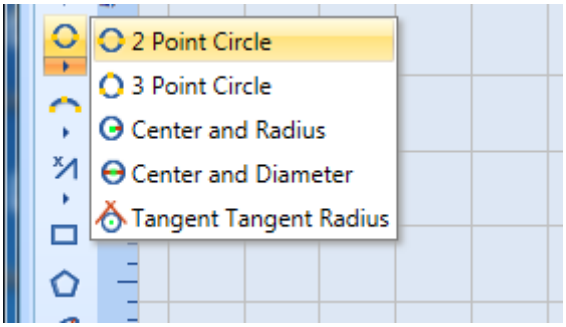


FIGURE 124: THE INSERT CIRCLE POPUP

4. Click the left mouse button and move the crosshairs in the desired direction and to the required size. The circle will be previewed as you move the crosshairs.

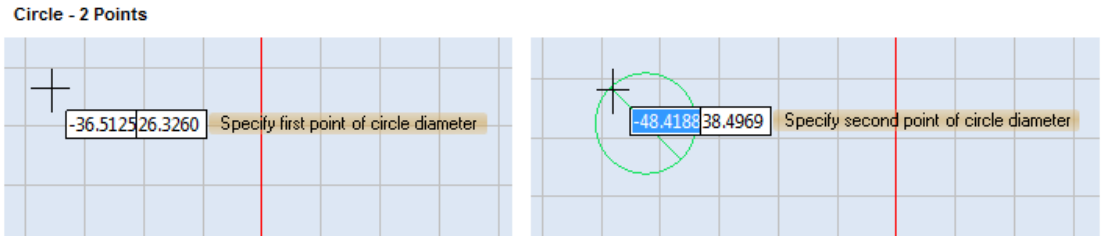


FIGURE125: INSERTING A CIRCLE WITH THE 2 POINT OPTION

5. When the circle is at the desired size, click the left mouse button. The finished circle is displayed.

To draw a 3 Point Circle

The **3 Point Circle** method will draw a circle using three points on the circle line.

Do the following to draw a circle with the **3 Point Circle** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the **Insert Circle** icon to display the **Insert Circle** popup.

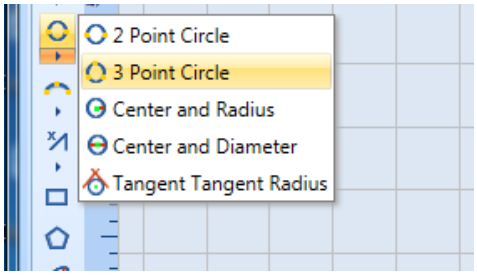


FIGURE 126: THE INSERT CIRCLE POPUP

2. Select 3 Point Circle from the Insert Circle popup.
3. Set the first and the second points by clicking the left mouse button.
4. Drag the crosshairs in the desired direction, and to the required size, and left -click again.

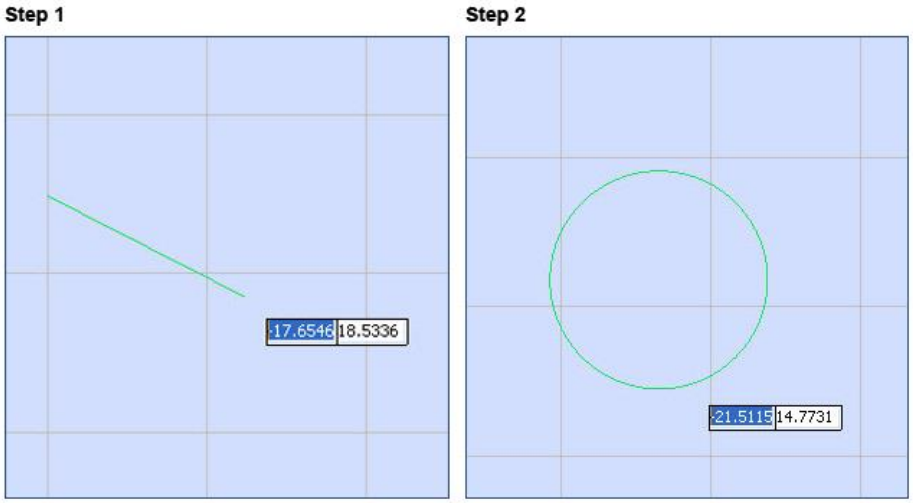


FIGURE 127: 3 POINT CIRCLE

To draw a Center and Radius Circle

The **Center and Radius** method will draw a circle using the center point and the radius of the circle.

Do the following to draw a circle with the **Center and Radius** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Circle** icon to display the **Insert Circle** popup.

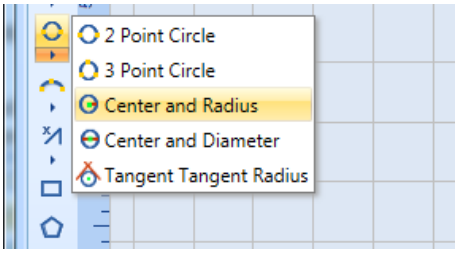


FIGURE 128: THE INSERT CIRCLE POPUP

2. Select the **Center and Radius** option from the **Insert Circle** popup.
3. Set the center of the circle by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you get the required radius. The circle will be previewed as you drag the mouse.
5. Click the left mouse button when you have the desired radius.

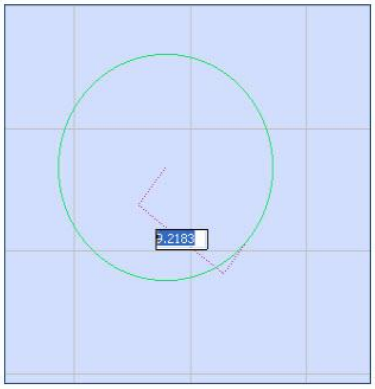


FIGURE 129: CIRCLE - CENTER AND RADIUS

To draw a Center and Diameter Circle

The **Center and Diameter** method will draw a circle using the center point and the diameter of the circle.

Do the following to draw a circle with the **Center and Diameter** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the **Insert Circle** icon to display the **Insert Circle** popup.

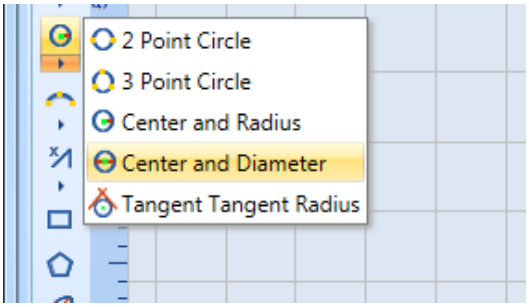


FIGURE 130: THE INSERT CIRCLE POPUP

2. Select the **Center and Diameter** option from the **Insert Circle** popup.
3. Set the center of the circle by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you get the required diameter. The circle will be previewed as you drag the mouse.
5. Click the left mouse button when you have the desired diameter.

FIGURE 131: CIRCLE - CENTER AND DIAMETER

To draw a Tangent, Tangent & Radius Circle

The **Tangent Tangent Radius** method will draw a circle tangent to two shapes.

Do the following to draw a circle with the **Tangent Tangent Radius** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Circle** icon to display the **Insert Circle** popup.

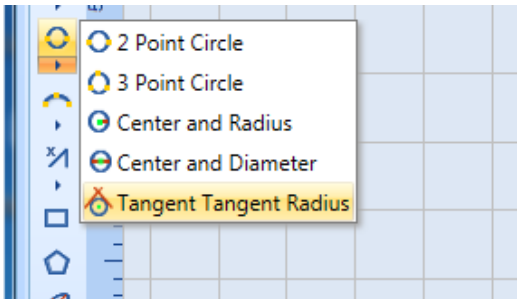


FIGURE 132: THE INSERT CIRCLE POPUP

2. Select Tangent Tangent Radius from the Insert Circle popup.
3. Left-click the two objects which will be used as the tangents. (The circle will be created when you left-click the second object.)
4. Drag the mouse to move the center point of the circle and change the size of the circle.
5. Left-click the mouse to finish drawing the circle.

Note: As an alternative to dragging the mouse to specify circle's center point and change its size, you can type the circle's radius in the parameter-entry box and press the **Enter** key. This will create a circle with the specified radius.

FIGURE 133: CIRCLE - TANGENT TANGENT RADIUS

Circle Properties

When you select a circle on the Drawing Canvas, its properties will be displayed in the **Properties** tab of ScanMaster Designer**.** You can change the location and size of the circle by giving different parameter values through the **Properties** tab.

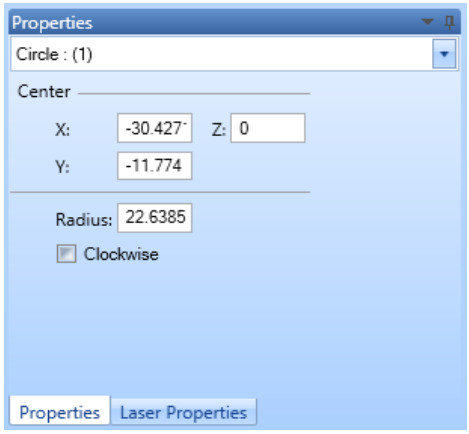


FIGURE 134: CIRCLE PROPERTIES

The circle properties are the following:

- **X** – The **X** coordinate of the center of the circle
- **Y** – The **Y** coordinate of the center of the circle
- **Z** – The **Z** coordinate of the center of the circle

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Clockwise** – When this checkbox is selected, the direction of marking for the circle is clockwise. When this checkbox is *not* selected, the direction of marking for the circle is counterclockwise. (Counterclockwise is the default direction of marking.)

Changing Circle Properties by Moving Hotspots

You can change circle properties by moving circle hotspots as described in the following sections:

- "Moving Circle Hotspots to Change the Radius of a Circle" on page 284 describes how to change the length and angle of a circle by moving its resizing hotspots.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move a circle.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a circle.

6.3.4 Insert an Arc

The **Insert Arc** tool will draw an arc by one of several methods. Left-click the arrowhead beneath the **Insert Arc** icon to access the **Insert Arc** popup with the following options:

- Start, End and Center
- Start, Center and Sweep
- Center, Start and Sweep Angle
- 3 Point Arc

To draw a Start, End and Center Arc

The **Start, End and Center** method will draw an arc using a start point, an end point, and a center point.

Do the following to draw an arc with the **Start, End and Center** method:

1. On the **Drawing Shape**s Toolbar, left-click the arrowhead below the **Insert Arc** icon to display the Insert Circle popup.
2. Select the **Start**, **End** and **Center** option from the **Insert Arc** popup.
3. Set the start point of the arc by clicking the left mouse button anywhere on the Drawing Canvas.

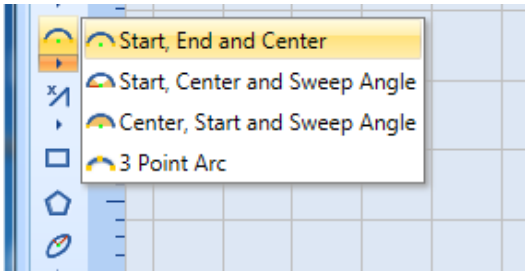


FIGURE 135: THE INSERT ARC POPUP

4. Drag the mouse to where you want the end point of the arc and click the left mouse button.
5. Drag the mouse to move the centerpoint of the arc.
6. When the centerpoint of the arc is at the desired location, click the left mouse button. This completes the drawing of the arc.

FIGURE 136: START, END AND CENTER ARC

To draw a Start, Center and Sweep Angle Arc

The Start, Center and Sweep Angle method will draw an arc using a start point, a center point, and a sweep angle.

Do the following to draw an arc with the Start, Center and Sweep Angle method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the Insert Arc icon to display the Insert Arc popup.

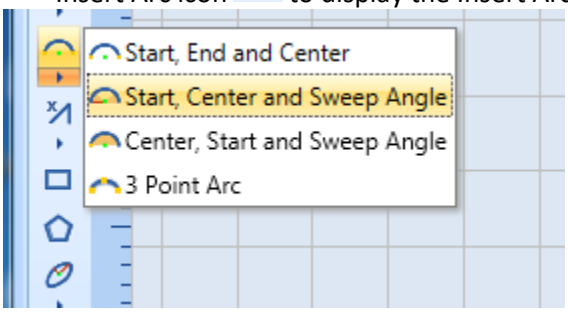


FIGURE 137: THE INSERT ARC POPUP

2. Select the Start, Center and Sweep Angle option from the Insert Arc popup.
3. Set the start point of the arc by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse to where you want the centerpoint of the arc and click the left mouse button.
5. Drag the mouse to preview the sweep angle of the arc. Once you get the desired sweep angle, click the left mouse button. This completes the creation of the arc.

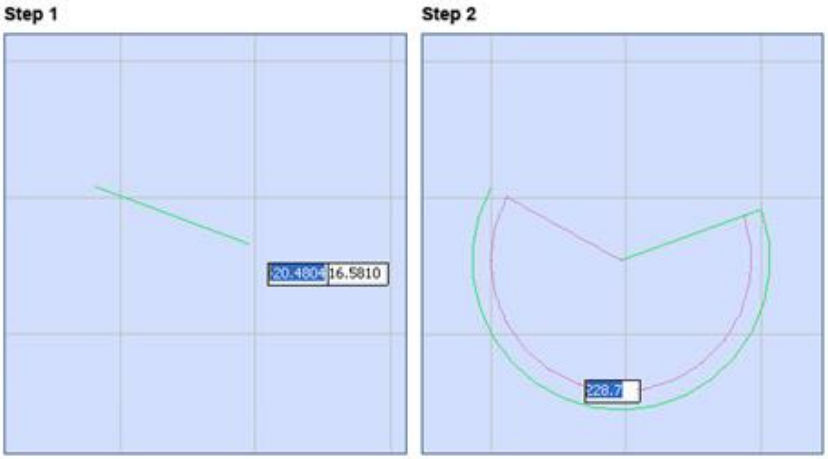


FIGURE 138: START, CENTER AND SWEEP ANGLE ARC

To draw a Center, Start and Sweep Angle Arc

The **Center, Start and Sweep Angle** method will draw an arc using a center point, a start point, and a sweep angle.

Do the following to draw an arc with the **Center, Start and Sweep Angle** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Arc** icon to display the **Insert Arc** popup.

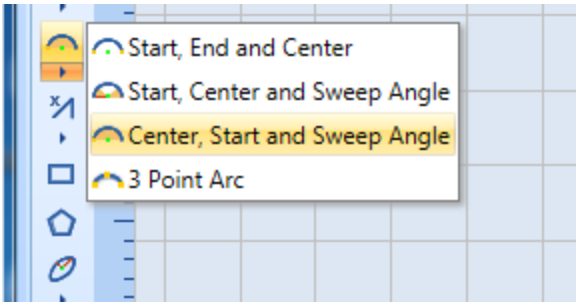


FIGURE 139: THE INSERT ARC POPUP

2. Select the **Center, Start and Sweep Angle** option from the **Insert Arc** popup.
3. Set the centerpoint of the arc by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse to where you want the start point of the arc and click the left mouse button.
5. Drag the mouse to preview the sweep angle of the arc. Once you get the desired sweep angle, click the left mouse button. This completes the creation of the arc.

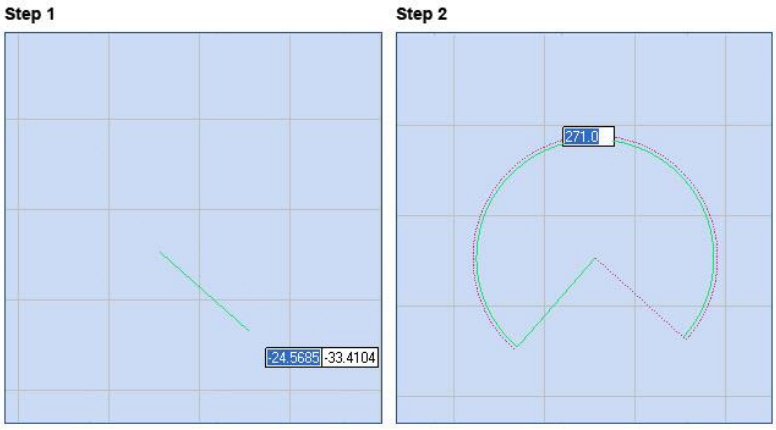


FIGURE 140: CENTER, START AND SWEEP ANGLE

To draw a 3 Point Arc

Use the **3 Point Arc** method to draw an arc by specifying 3 points on the arc.

Do the following to draw an arc with the **3 Point Arc** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Arc** icon to display the **Insert Arc** popup.

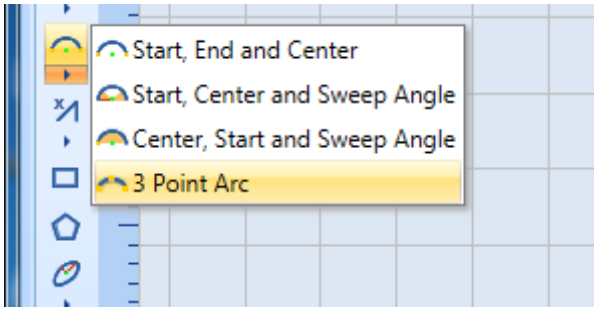


FIGURE 141: THE INSERT ARC POPUP

2. Select the **3 Point Arc** option from the **Insert Arc** popup.
3. Set the first point of the arc by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse to where you want the second point of the arc and click the left mouse button.
5. Drag the mouse to where you want the third point of the arc and click the left mouse button. This completes the drawing of the arc.

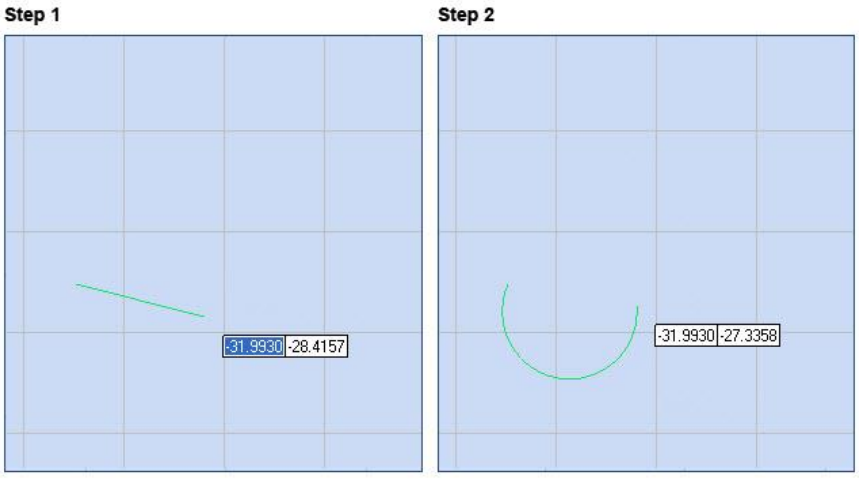


FIGURE 142: 3 POINT ARC

Arc Properties

When you select an arc on the Drawing Canvas, its properties will be displayed in the **Properties** tab of ScanMaster Designer. By entering parameters in the **Properties** tab, you can change the location, radius, start angle, and sweep angle of the arc.

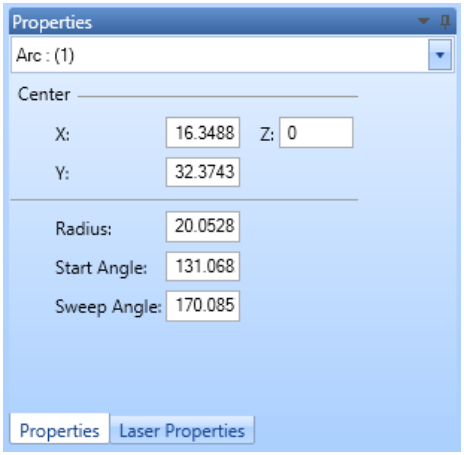


FIGURE 143: ARC PROPERTIES

The arc properties are the following:

- **X** – The X coordinate of the center of the arc
- **Y** – The Y coordinate of the center of the arc
- **Z** – The Z coordinate of the center of the arc

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Radius** – The radius of the arc
- **Start Angle** – The start angle of the arc
- **Sweep Angle** – The sweep angle of the arc

Changing Arc Properties by Moving Hotspots

You can change arc properties by moving arc hotspots as described in the following sections:

- "Moving Arc Hotspots to Change Arc Attributes" on page 286 describes how to change the length and angle of an arc by moving its endpoint hotspots.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move an arc (i.e, change the location of its centerpoint).
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of an arc.

6.3.5 Insert a Polyline

You can use the **Points** method or the **Segment Length and Angle** method to draw a polyline in ScanMaster Designer.

Points

The **Points** method will draw a polyline by specifying the start points and end points of line segments.

Do the following to draw a polyline with the **Points** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Polyline** icon to display the **Insert Polyline** popup.
2. Select the **Points** option from the **Insert Polyline** popup.

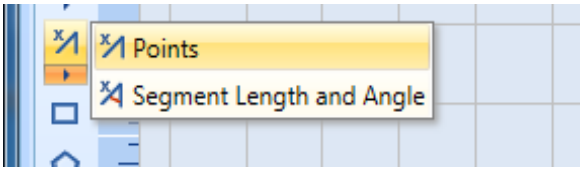


FIGURE 144: THE INSERT POLYLINE POPUP

3. Place the crosshairs where you want to begin the first polyline segment and click the left mouse button.
4. Move the crosshairs to the end of the first line segment and click the left mouse button. This completes the first polyline segment.
5. Continue to move the crosshairs and click the left mouse button to draw as many additional polyline segments as you want.
6. Right-click at the end of the last line segment and select **Close** or **End Polyline**. Selecting **Close** will connect the last segment of a polyline with the first.

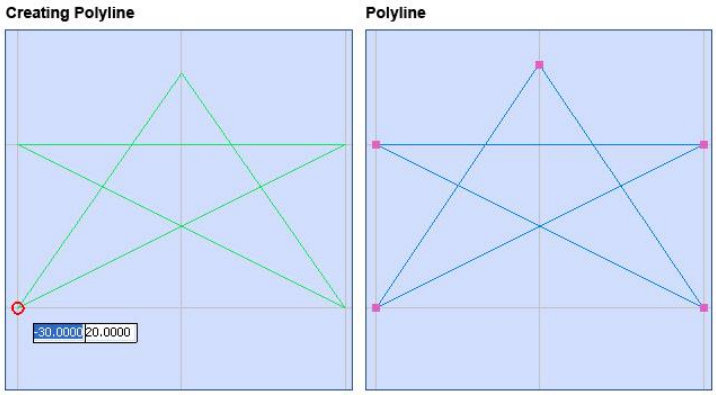


FIGURE 145: POLYLINE

Segment Length and Angle

The **Segment Length and Angle** method will draw a polyline by specifying the start points and end points of polyline segments.

Do the following to draw a polyline with the **Segment Length and Angle** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Polyline** icon to display the **Insert Polyline** popup.

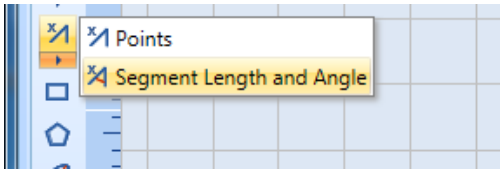


FIGURE 146: THE INSERT POLYLINE POPUP

2. Select the **Segment Length and Angle** option from Insert Polyline popup.
3. Place the crosshairs where you want to begin the first polyline segment and click the left mouse button.
4. Drag the crosshairs to the end of the first line segment and click the left mouse button. This completes the first line segment.

Note: As an alternative to dragging the crosshairs, you can specify the polyline endpoint and angle by typing in the parameter entry boxes that display with the previewed polyline.

5. Continue to move the crosshair and click the left mouse button to draw as many additional polyline segments as you want.
6. Right-click at the end of the last polyline segment and select **Close** or **End Polyline**. Selecting **Close** will connect the last segment of a polyline with the first.

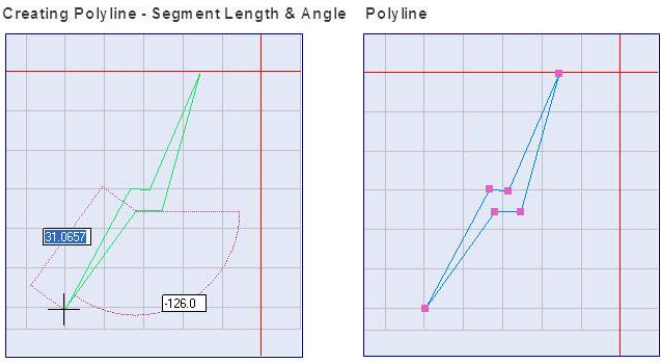


FIGURE 147: POLYLINE - SEGMENT LENGTH AND ANGLE

Polyline Properties

When you select a polyline in the Drawing Canvas, its properties will be displayed in the **Properties** tab of ScanMaster Designer**.** You can change any of the vertices in a polyline—as well as the "open" or "closed" status of a polyline—by entering different values in the **Properties** tab.

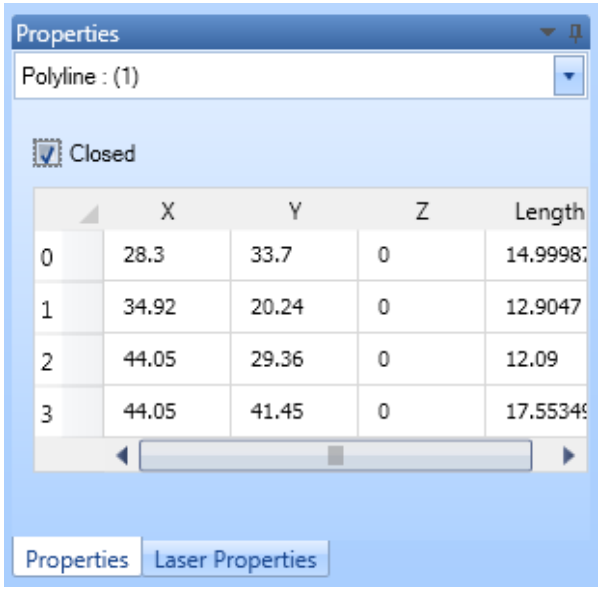


FIGURE 148: POLYLINE PROPERTIES

If the **Closed** checkbox is selected, the polyline is closed. If the **Closed** checkbox is deselected, it means that the polyline is open; changing the **Closed** checkbox from selected to deselected will remove the last line segment in the polyline.

The table in the **Properties** tab for a polyline contains the following information in each column:

7. **X** – The X coordinate of the start point of each line segment in the polyline
8. **Y** – The Y coordinate of the start point of each line segment in the polyline
9. **Z** – The Z coordinate of the start point of each line segment in the polyline
10. **Note:** The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.
11. **Length** – The length of each line segment in the polyline

Changing Polyline Properties by Moving Hotspots

You can change polyline properties by moving polyline hotspots as described in the following sections:

- "Moving Polyline Endpoint Hotspots to Change Polyline Endpoints" on page 291 describes how to change the length and angle of a polyline by moving its endpoint hotspots.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a polyline.

6.3.6 Insert a Rectangle

The **Insert Rectangle** tool will draw a rectangle diagonally in any direction from a starting point.

Do the following to draw a rectangle with the **Insert Rectangle** tool:

1. Left-click the Insert Rectangle icon from the Drawing Shapes Toolbar.
2. Specify a corner of the rectangle by clicking the left mouse button anywhere on the Drawing Canvas.
3. Drag the mouse diagonally to the opposite corner of the rectangle.
4. Click the left mouse button at the opposite corner to complete the drawing of the rectangle.

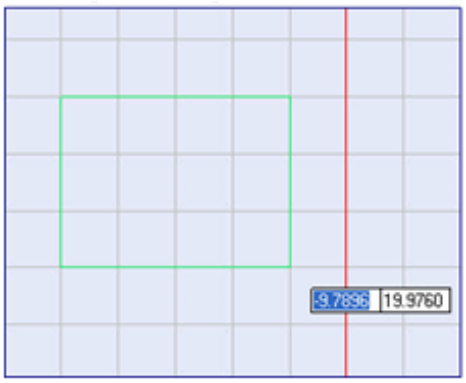


FIGURE 149: DRAWING A RECTANGLE

Rectangle Properties

When you select the rectangle, its properties will be displayed on the **Properties** tab. You may edit those parameters as necessary.

The rectangle properties are the following:

- **X** – The **X** coordinate of the rectangle start point
- **Y** – The **Y** coordinate of the rectangle start point
- **Z** – The **Z** coordinate of the rectangle start point

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Width** – The width of the rectangle
- **Height** – The height of the rectangle
- **Angle** – The angle of rotation of the rectangle

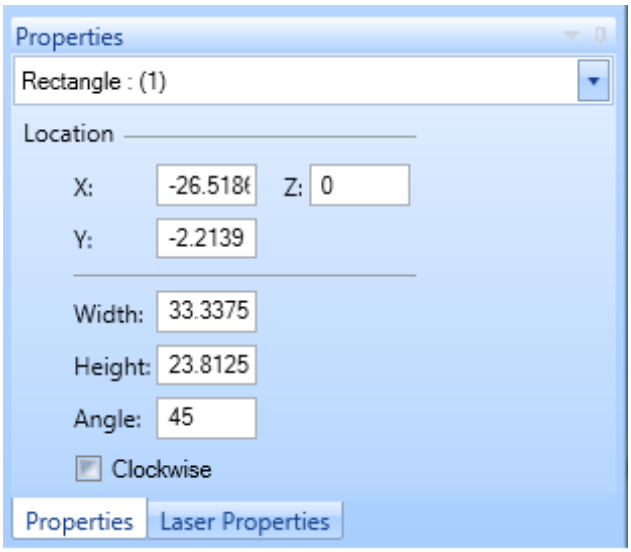


FIGURE 150: RECTANGLE PROPERTIES

- **Clockwise** – When this checkbox is selected, the direction of marking for the rectangle is clockwise. When this checkbox is *not* selected, the direction of marking for the rectangle is counterclockwise. (Counterclockwise is the default direction of marking.)

Changing Rectangle Properties by Moving Hotspots

You can change rectangle properties by moving hotspots as described in the following sections:

- "Moving Resizing Hotspots on Rectangular Shapes" on page 292 describes how to change the height or width of a rectangle by moving its resizing hotspots.

"Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a rectangle.

6.3.7 Insert a Symmetric Polygon

The **Insert Symmetric Polygon** command allows you to create polygons with equal sides and angles.

Do the following to draw a rectangle with the **Insert Symmetric Polygon** tool:

1. Select the **Insert Symmetric Polygon** command from the **Shapes** toolbar. The following window will be displayed.

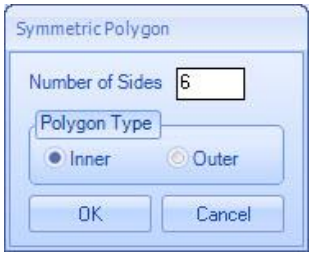


FIGURE 151: SYMMETRIC POLYGON

2. Enter the number of sides and select the **Polygon Type** (**Inner** or **Outer**).
3. Click the **OK** button.
4. Place the crosshairs on the Drawing Canvas and click the left mouse button to specify the centerpoint of the polygon.

Note: You may also type the coordinates of the center point in the parameter-entry boxes.

5. Drag the mouse to specify the radius of the polygon.
6. When the polygon has reached its desired radius, click the left mouse button. This completes the drawing of the symmetric polygon.

Note: You may also type the radius of the polygon in the parameter-entry boxes.

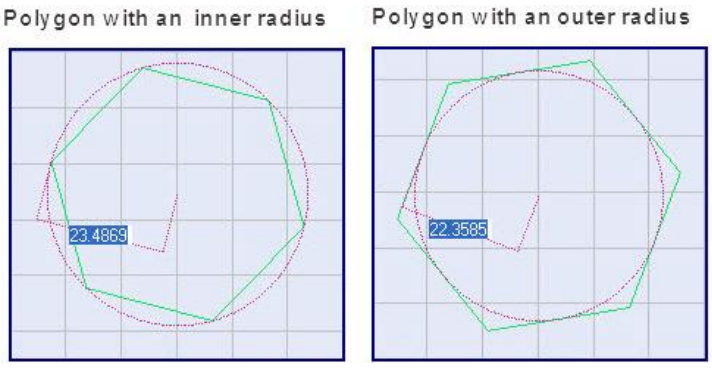


FIGURE 152: POLYGON - INNER AND OUTER RADIUS

Symmetric Polygon Properties

When you select a symmetric polygon on the Drawing Canvas, its properties will be displayed in the **Properties** tab of the ScanMaster Designer. You can change these properties by entering different parameter values in the **Properties** tab.

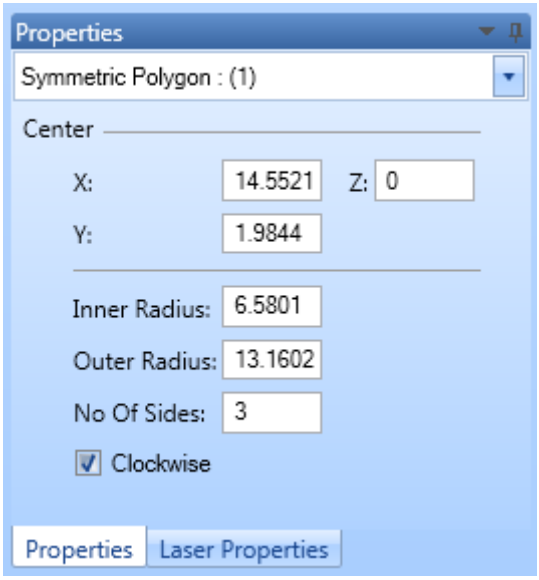


FIGURE 153: SYMMETRIC POLYGON PROPERTIES

The symmetric polygon properties are the following:

- **X** – The **X** coordinate of the center of the polygon
- **Y** – The **Y** coordinate of the center of the polygon
- **Z** – The **Z** coordinate of the center of the polygon

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Inner Radius** – The inner radius of the polygon
- **Outer Radius** – The outer radius of the polygon
- **No Of Sides** – The number of sides of the polygon
- **Clockwise** – When this checkbox is selected, the direction of marking for the polygon is clockwise. When this checkbox is not selected, the direction of marking for the polygon is counterclockwise. (Counterclockwise is the default direction of marking.)

Changing Symmetric Polygon Properties by Moving Hotspots

You can change symmetric polygon properties by moving symmetric polygon hotspots as described in the following sections:

- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move a symmetric polygon.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a symmetric polygon.

6.3.8 Insert an Ellipse

You can use the **Insert Ellipse** tool will draw an ellipse with either of the following methods:

- Center, Major Length and Angle, Minor Length
- Major Axis, Minor Axis Length.

Center, Major Length and Angle, Minor Length

The **Center, Major Length and Angle, Minor Length** method will draw an ellipse based on the center point, major length (longest diameter), axis angle, and minor length (shortest diameter) of the ellipse.

Do the following to draw an ellipse with the **Center, Major Length and Angle, Minor Length** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the Insert Ellipse icon to display the Insert Ellipse popup.

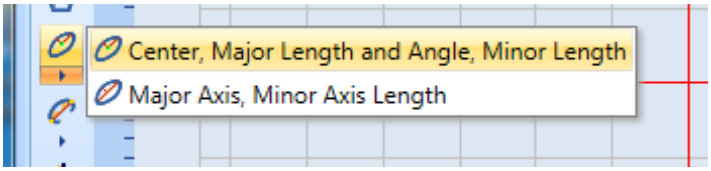


FIGURE 154: THE INSERT ELLIPSE POPUP

2. Select the Center, Major Length and Angle, Minor Length option from the Insert Ellipse popup.
3. Set the center point of the ellipse by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you achieve the desired major length and axis angle. Then click the left mouse button.
5. Drag the mouse until you achieve the desired minor length. Then click the left mouse button. This completes the drawing of the ellipse.

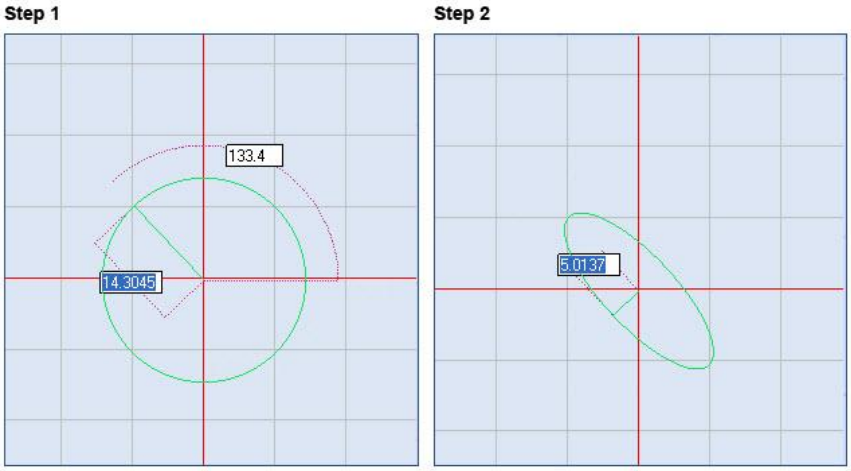


FIGURE 155: ELLIPSE - CENTER, MAJOR LENGTH AND ANGLE, MINOR LENGTH

Major Axis, Minor Axis Length

The **Major Axis, Minor Axis Length** method will draw an ellipse based on the first and second points of the ellipse major axis (longest diameter) and the second point of the ellipse minor axis (shortest diameter).

Do the following to draw an ellipse with the **Major Axis, Minor Axis Length** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Ellipse** icon to display the **Insert Ellipse** popup.

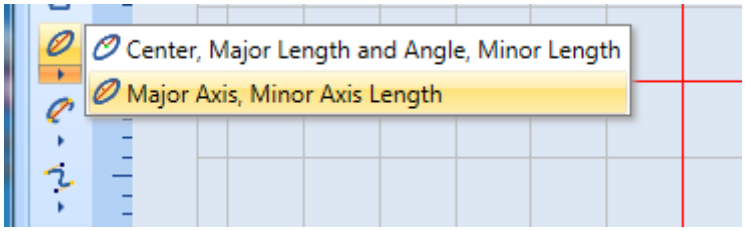


FIGURE 156: THE INSERT ELLIPSE POPUP

2. Select the Major Axis and Minor Axis Length option from the Insert Ellipse popup.
3. Set the first point of the ellipse major axis by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you achieve the desired major length and axis angle. Then click the left mouse button.
5. Drag the mouse to the point that you want to specify as the second point of the minor axis. Then click the left mouse button. This completes the drawing of the ellipse.

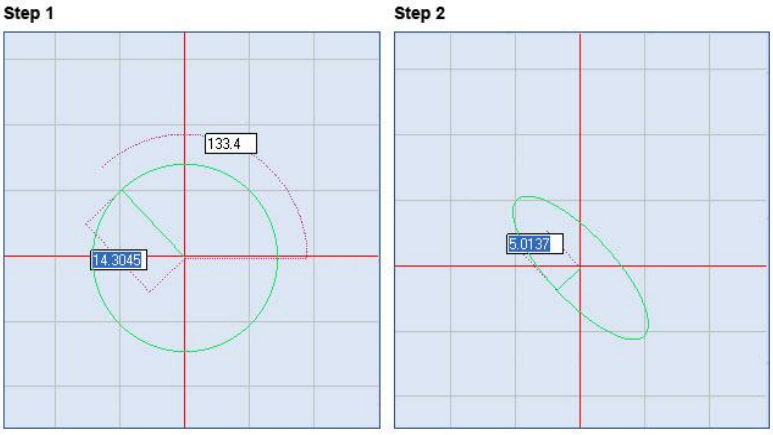


FIGURE 157: ELLIPSE - MAJOR AXIS, MINOR AXIS LENGTH

Ellipse Properties

When you select an ellipse on the Drawing Canvas, its properties will be displayed in the **Properties** tab of the ScanMaster Designer. You can change the parameter values of the ellipse by entering new values in the **Properties** tab.

The ellipse properties are the following:

- **X** – The **X** coordinate of the center of the ellipse
- **Y** – The **Y** coordinate of the center of the ellipse
- **Z** – The **Z** coordinate of the center of the ellipse
  Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.
- **Major Length** – The length of the major axis of the ellipse

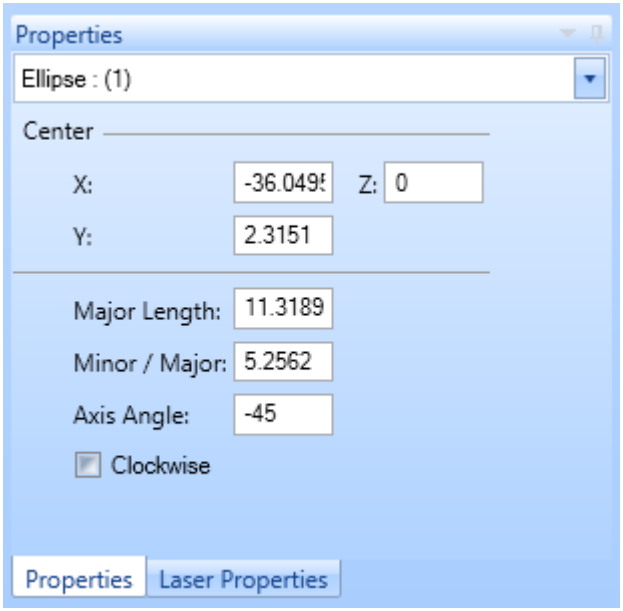


FIGURE 158: ELLIPSE PROPERTIES

- **Minor Length** – The length of the minor axis of the ellipse
- **Axis Angle** – The axis angle of the ellipse
- **Clockwise** – When this checkbox is selected, the direction of marking for the ellipse is clockwise. When this checkbox is not selected, the direction of marking for the ellipse is counterclockwise. (Counterclockwise is the default direction of marking.)

Changing Ellipse Properties by Moving Hotspots

You can change ellipse properties by moving ellipse hotspots as described in the following sections:

- "Moving Ellipse Hotspots to Change the Length or Width of an Ellipse" on page 295 describes how to change the length or width of an ellipse by moving its resizing hotspots.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move an ellipse.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of an ellipse.

6.3.9 Insert an Elliptical Arc

The Insert Elliptical Arc tool will draw an elliptical arc by one of two methods: A, B, Start Angle, Sweep Angle or Center, A, B, Start Angle, Sweep Angle.

A, B, Start Angle, Sweep Angle

The **A, B, Start Angle, Sweep Angle** method allows you to draw an elliptical arc by specifying the Major Length; Minor Length; and Axis, Start, and Sweep Angles of the arc.

Do the following to draw an ellipse with the **A, B, Start Angle, Sweep Angle** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the Insert Elliptical Arc icon to display the Insert Elliptical Arc popup.

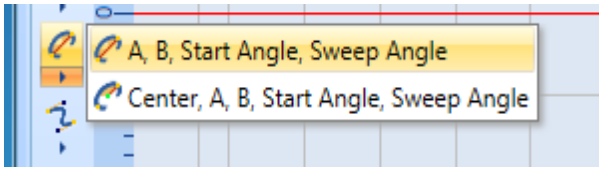


FIGURE 159: THE INSERT ELLIPTICAL ARC POPUP

2. Select the A, B, Start Angle, Sweep Angle option from the Insert Elliptical Arc popup.
3. Set the first point of the arc major axis by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you reach the desired angle and endpoint of the major axis. Then click the left mouse button.
5. Drag the mouse until you reach the desired endpoint of the minor axis. Then click the left mouse button.
6. Drag the mouse around the arc until you reach the desired start angle of the arc. Then click the left mouse button.

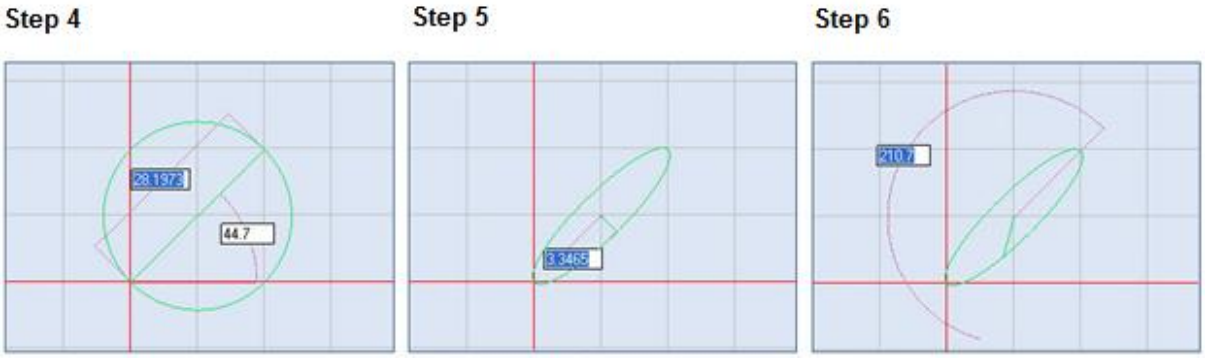


FIGURE 160: THE MAJOR AND MINOR AXES AND THE START ANGLE

7. Drag the mouse around the arc until you reach the desired sweep angle of the arc. Then click the left mouse button. This completes the drawing of the elliptical arc.

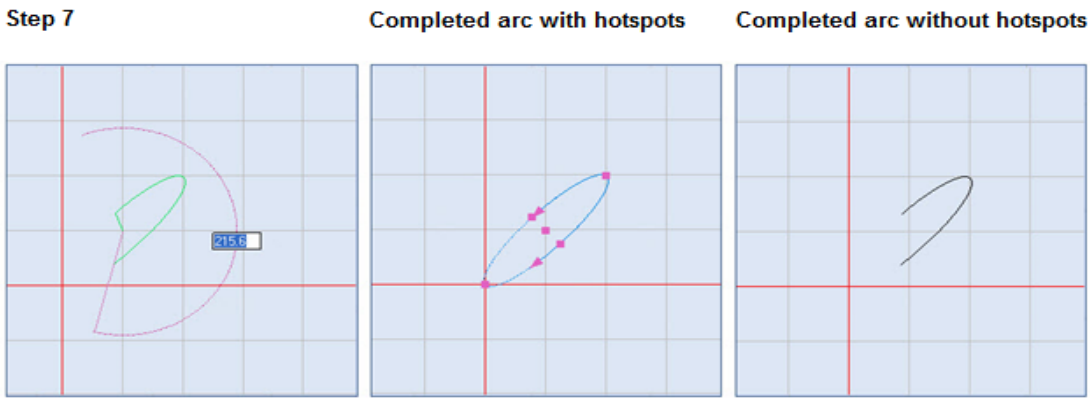


FIGURE 161: THE SWEEP ANGLE AND THE COMPLETED ELLIPTICAL ARC

Center, A, B, Start Angle, Sweep Angle

The **Center, A, B, Start Angle, Sweep Angle** method allows you to draw an elliptical arc by specifying center point; major and minor lengths; and axis, start, and sweep angles of the elliptical arc.

Do the following to draw an ellipse with the **Center, A, B, Start Angle, Sweep Angle** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Elliptical Arc** icon to display the **Insert Elliptical Arc** popup.
2. Select the **Center, A, B, Start Angle, Sweep Angle** option from the **Insert Elliptical Arc** popup.

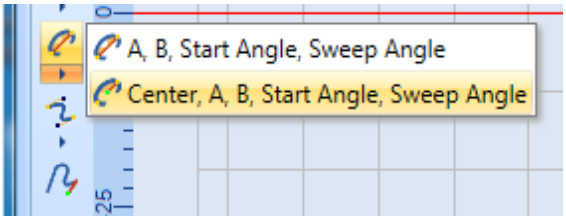


FIGURE 162: THE INSERT ELLIPTICAL ARC POPUP

3. Set the center point of the elliptical arc by clicking the left mouse button anywhere on the Drawing Canvas.
4. Drag the mouse until you reach the desired angle and endpoint of the major axis. Then click the left mouse button.

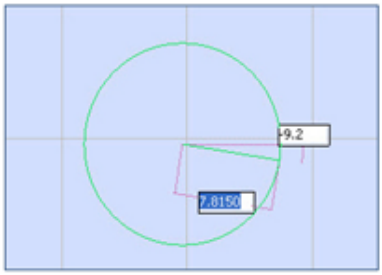


FIGURE 163: DEFINING THE MAJOR AXIS

5. Drag the mouse until you reach the desired endpoint of the minor axis. Then click the left mouse button.
6. Drag the mouse around the center point of the arc until you reach the desired start angle of the elliptical arc. Then click the left mouse button.
7. Drag the mouse around the center point of the arc until you reach the desired sweep angle of the elliptical arc. Then click the left mouse button. This completes the drawing of the elliptical arc.

FIGURE 164: DEFINING THE MINOR AXIS, THE START ANGLE, AND THE SWEEP ANGLE

The following figure shows the completed elliptical arc (with and without hotspots).

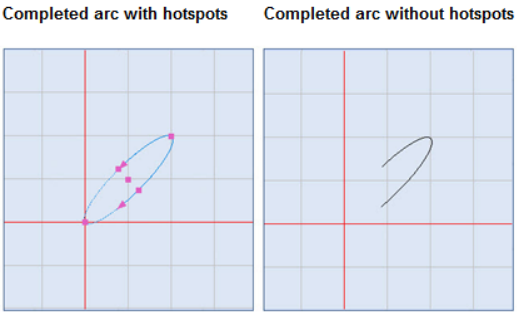


FIGURE 165: THE COMPLETED ELLIPTICAL ARC

Elliptical Arc Properties

When you select an elliptical arc on the Drawing Canvas, its properties will be displayed in the **Properties** tab of the ScanMaster Designer. If needed, you can change the parameter values of the elliptical arc by entering new values in the **Properties** tab.

The elliptical arc properties are the following:

- **X** – The **X** coordinate of the center of the elliptical arc
- **Y** – The **Y** coordinate of the center of the elliptical arc
- **Z –** The **Z** coordinate of the center of the elliptical arc

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Ratio Minor Major** – The ratio of the length of the minor axis to the length of the major axis
- **Axis Angle** – The axis angle of the elliptical arc
- **Start Angle** – The start angle of the elliptical arc
- **Sweep Angle** – The sweep angle of the elliptical arc

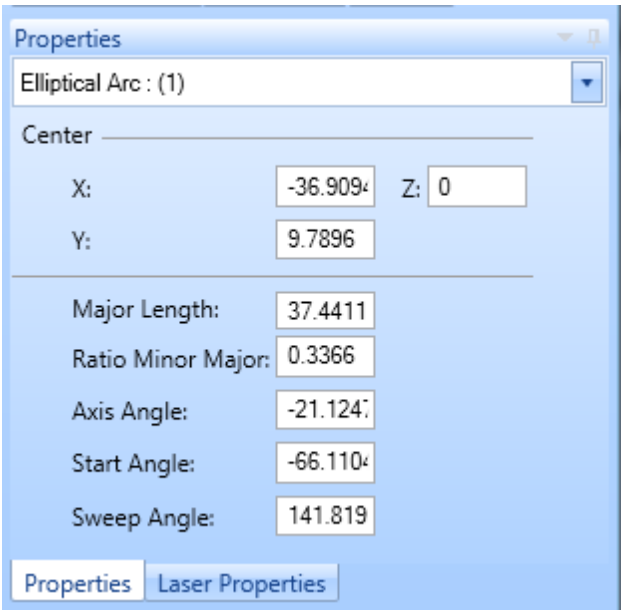


FIGURE 166: ELLIPTICAL ARC PROPERTIES

Changing Elliptical Arc Properties by Moving Hotspots

You can change elliptical arc properties by moving the elliptical arc hotspots as described in the following sections:

- "Moving Hotspots to Change an Elliptical Arc" on page 296 describes how to move elliptical arc hotspots to change the axes and angles that define an elliptical arc.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move an elliptical arc.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of an elliptical arc.

6.3.10 Insert a Bezier Path

The **Insert Bezier Paths** tool can be used to draw a Bezier path (i.e., smooth curves) with the **Bezier Path** option or with the **Freehand** option.

Bezier Path

The **Bezier Path** method allows you to draw a Bezier path by specifying control points.

Do the following to draw a Bezier path with the **Bezier Path** method:

1. On the Drawing Shapes Toolbar, left-click the arrowhead below the **Insert Bezier Path** icon to display the **Insert Bezier Path** popup.

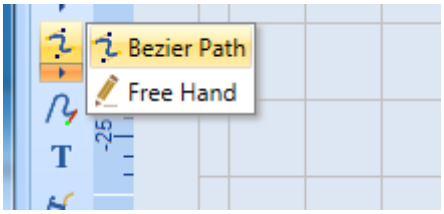


FIGURE 167: THE INSERT BEZIER PATH POPUP

2. Select the **Bezier Path** option from the **Insert Bezier Path** popup.
3. Set the starting point of the Bezier Path by clicking the left mouse button anywhere on the Drawing Canvas. By moving the mouse and left-clicking again, you automatically create a second point linked to the previous one.
4. A path can either be straight or curved. You can make a segment curved by left-clicking its control point and holding down the Shift key while you drag the mouse.
5. You may create as many points as you like, by repeating steps 3 and 4.
6. To end this process, right click at the end point and select **End Bezier Path**.

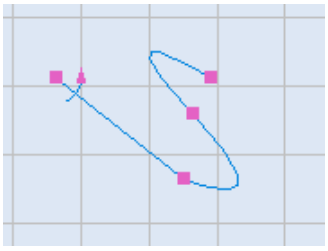


FIGURE 168: BEZIER PATH

Note: A Bezier Path can be either open or closed: "Closed" means that the last point is connected to the starting point. To close an open path, right-click on it and select **Close Bezier Path**.

Free Hand Drawing

The **Free Hand** method allows you to draw a Bezier path by dragging the mouse over the canvas in a continuous motion. With the **Free Hand** method, you do not have to stop at any point to click the left mouse button; the control points are automatically added as you draw.

Do the following to draw a Bezier path with the **Free Hand** method:

1. On the **Drawing Shapes** Toolbar, left-click the arrowhead below the **Insert Bezier Path** icon to display the **Insert Bezier Path** popup.

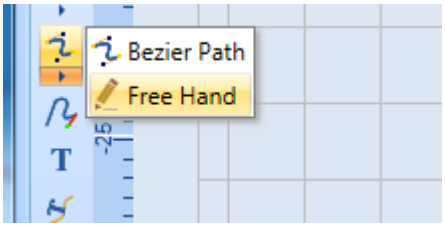


FIGURE 169: THE INSERT BEZIER PATH POPUP

2. Select the **Free Hand** option from the **Insert Bezier Path** popup.
3. Press the left mouse button and hold it down while drawing a Bezier path on the canvas.
4. Release the left mouse button when you have finished drawing the Bezier path. The following dialog box is displayed.

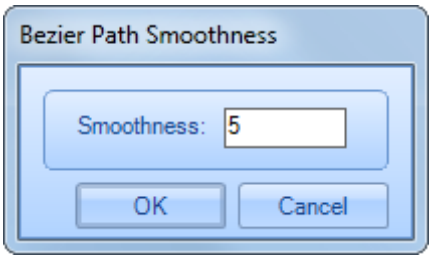


FIGURE 170: BEZIER PATH SMOOTHNESS DIALOG BOX

5. Adjust the smoothness of the shape using the **Smoothness** field on the **Bezier Path Smoothness** dialog. A real time view of the effect of the change of value may be observed without the necessity to commit the **Smoothness** value.

Note: Lowering the **Smoothness** value would result in an uneven surface with jagged-edges, whereas increasing the **Smoothness** value would result in smoother curves.

6. To commit the **Smoothness** value, click the **OK** button.

Bezier Path Controls

Select the **Bezier Path** and right click on a particular control point to access the **Cusp Node** and **Smooth Node** controls.

Cusp Node

Cusp Nodes let you create sharp transitions, such as corners or sharp angles, in a curve object. You can move the control handles in a cusp node independently of one another, changing only the line on one side of the node.

Smooth Node

Smooth Nodes produce smooth transitions between segments. The control handles of a smooth node are always directly opposite one another, but they may be at different distances from the node.

Bezier Path Properties

When you select a Bezier path on the Drawing Canvas, its parameters are displayed on the **Properties**
tab of ScanMaster Designer. You can change the Bezier curve parameters by editing the fields of the **Properties** tab.

The Bezier Path properties are the following:

- **Closed** – Selecting this checkbox will connect the start point and the end point of the Bezier curve, thereby creating a closed contour. Deselecting this checkbox will leave the Bezier curve open.

Note: Closed contours can be filled, if necessary.

- **X** – The **X** coordinate of each control point in the Bezier curve (starting with the first control point in Row 0)
- **Y** – The **Y** coordinate of each control point in the Bezier curve (starting with the first control point in Row 0)

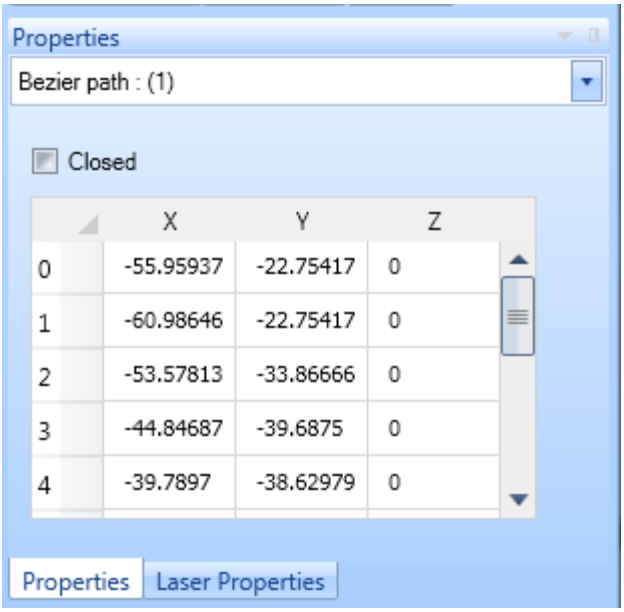


Figure 171: Bezier Path Properties

- **Z** – The **Z** coordinate of each control point in the Bezier curve (starting with the first control point in Row 0)

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

Changing Bezier Path Properties by Moving Hotspots

You can change Bezier Path properties by moving hotspots as described in the following sections:

- "Using Bezier Path Hotspots to Modify Bezier Path Transitions" on page 301 describes how to use Bezier Path hotspots to access Bezier Path controls for modifying Bezier Path transitions.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a Bezier Path.

6.3.11 Insert a Path

The **Insert Path** tool can be used to create complex drawings by combining polylines, arcs, and Bezier paths.

Do the following to insert a path with the **Insert Path** tool:

1. On the **Drawing Shapes** Toolbar, left-click the **Insert Path** icon .
2. Left-click the mouse at the start point for the path.

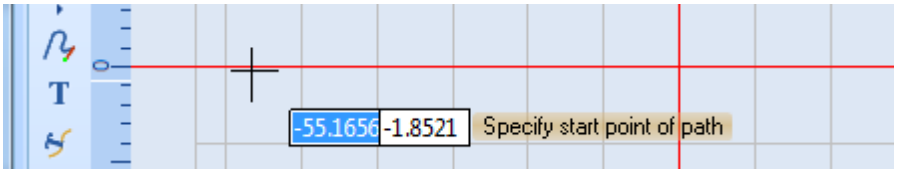


FIGURE 172: SPECIFY THE START POINT OF THE PATH

Now you can draw a polyline by specifying polyline end points. A polyline is always the first subshape in a path.

Draw a Polyline in a Path

Do the following to draw a polyline in a Path:

1. Drag the mouse to the end point of the polyline segment and click the left mouse button.
2. By repeating the preceding step, you can add as many segments as you want to the polyline.
3. When you have finished adding polyline segments, click the right mouse button instead of the left mouse button. This displays the Subshape popup.

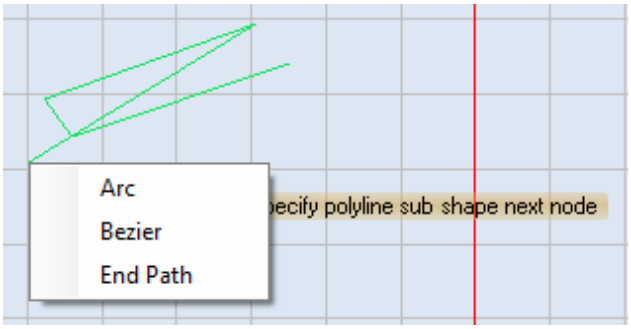


FIGURE 173: THE SUBSHAPE POPUP (ARC AND BEZIER OPTIONS)

4. When you have finished adding polyline segments, click the right mouse button instead of the left mouse button. This displays the **Subshape** popup.
5. Select a subshape option (**Arc** or **Bezier**), or select the **End Path** option from the **Subshape** popup.

Selecting **Arc** or **Bezier** allows you to add an arc or Bezier to the polyline. Refer to the following sections for more information:

- "Draw an Arc" on page 160
- "Draw a Bezier Path" on page 161

Selecting the **End Path** option completes the drawing of the path and exits the **Insert Path** tool.

Draw an Arc in a Path

Do the following to draw an arc:

1. Drag the mouse to the point that you want to specify as the end point of the arc.
2. Left- or right-click the mouse.

If you left-click the mouse, you can add another arc at the end point of the current one.

If you right-click the mouse, the **Subshape** popup is displayed.

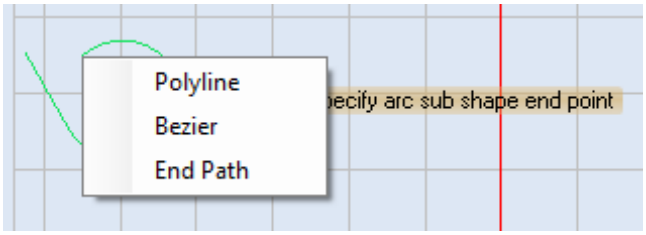


FIGURE 174: THE SUBSHAPE POPUP (POLYLINE AND BEZIER OPTIONS)

Selecting **Polyline** or **Bezier** allows you to add a polyline or Bezier to the arc. You can add another arc subshape, as described in this section, or you can add a Bezier path. Refer to the following sections for more information:

- "Draw a Polyline" on page 159
- "Draw a Bezier Path" on page 161

Selecting the **End Path** option completes the drawing of the path and exits the **Insert Path** tool.

Draw a Bezier Path

Do the following to draw a Bezier path:

1. Drag and left-click the mouse to specify the next major control point of the Bezier path.
2. Repeat the preceding step to create as many major control points as you require for the Bezier path.
3. When you are done adding major control points, right-click the mouse to display the **Subshape** popup.

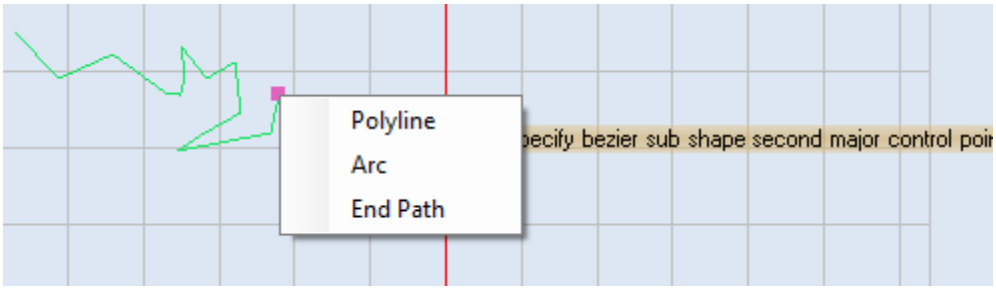


FIGURE 175: DRAWING A BEZIER PATH

Selecting **Polyline** or **Arc** allows you to add a polyline or an arc at the last major endpoint of the Bezier Path. Refer to the following sections for more information:

- "Draw a Polyline" on page 159
- "Draw an Arc" on page 160

Selecting the **End Path** option completes the drawing of the path and exits the **Insert Path** tool.

Note: A path can be either open or closed: “Closed” means that the last point is connected to the starting point. To close an open path, simply right click on it and select **Close Path.**

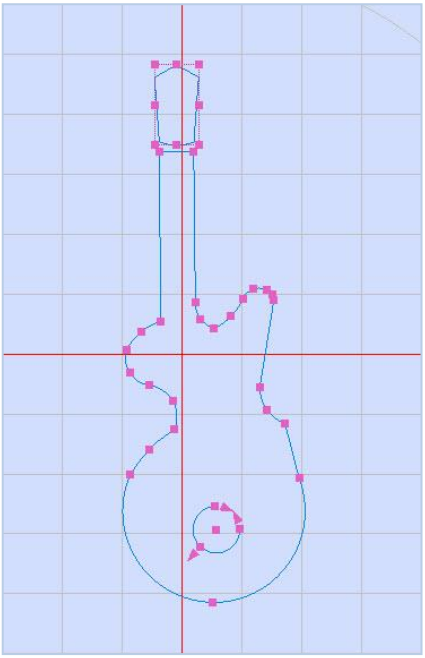


FIGURE 176: A PATH

Path Properties

When you select a path on the Drawing Canvas, its parameters are displayed on the **Properties** tab of ScanMaster Designer. You can change the path parameters by editing the fields of the **Properties** tab.

The path properties are the following:

- **Z-Elevation** – The relative height along the specified upward direction

Note: The **Z-Elevation** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z-Elevation** property is defined in the **Marking Area** tab of the **Project Settings** tab.

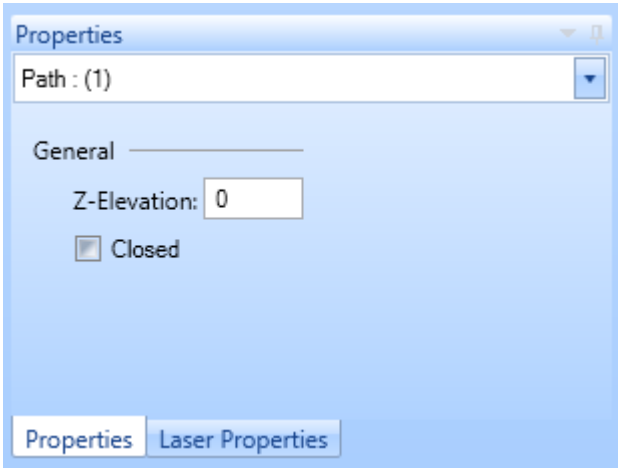


FIGURE 177: PATH PROPERTIES

- **Closed** – If this checkbox is selected, the path is closed (i.e., the end point of the path is connected to the start point of the path). If this checkbox is deselected, the polyline is open; changing this checkbox from selected to deselected will remove the last line segment in the polyline.

Changing Path Properties by Moving Hotspots

A Path can contain arc properties, polyline properties, or Bezier Path properties. Refer to the following sections to change each type of property by moving the applicable hotspots:

- "Moving Arc Hotspots to Change Arc Attributes" on page 286 describes how to change the length and angle of an arc by moving its endpoint hotspots.
- "Moving Polyline Endpoint Hotspots to Change Polyline Endpoints" on page 291 describes how to change the length and angle of a polyline by moving its endpoint hotspots.
- "Using Bezier Path Hotspots to Modify Bezier Path Transitions" on page 301 describes how to use Bezier Path hotspots to access Bezier Path controls for modifying Bezier Path transitions.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a Path.

6.3.12 Insert a Spiral

The **Insert Spiral** tool will draw a spiral based on parameters that you enter in the **Spiral Editor**.

Do the following to draw a spiral with the **Insert Spiral** tool :

1. On the **Drawing Shapes** Toolbar, left-click the **Insert Spiral** icon to display the **Spiral Editor**.

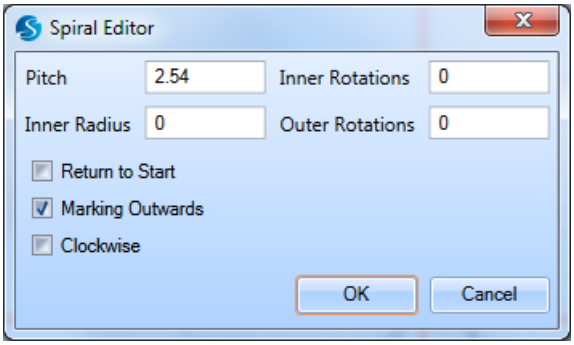


FIGURE 178: THE SPIRAL EDITOR

2. Enter values for the following parameters in the **Spiral Editor**:

   - **Pitch** – The distance between succeeding circles inside the spiral
   - **Inner Radius** – The distance to the innermost point from the center of the spiral
   - **Inner Rotations** – The number of rotations on the inner circle of the spiral
   - **Outer Rotations** – The number of rotations on the outer circle of the spiral
   - **Return to Start** – If this check box is selected, the beam will retrace the mark to the start point.
   - **Marking Outwards** –Defines the start point of the spiral. If this box is selected, marking starts from the center and moves outward. If this box is not selected, marking starts from the outward spiral and moves inward.
   - **Clockwise** – When this checkbox is selected, the direction of marking for the spiral is clockwise. When this checkbox is *not* selected, the direction of marking for the spiral is counterclockwise. (Counterclockwise is the default direction of marking.)

3. Left-click the **OK** button in the **Spiral Editor**.
4. Drag the mouse over the canvas and left-click at the location where you want to place the center of the spiral.
5. Release the left mouse button and drag the mouse to the location that you want to be the outer radius of the spiral. Click the left mouse button at this location to set the outer radius.

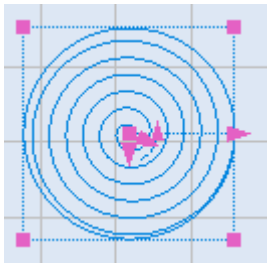


FIGURE 179: A SPIRAL

6. You may also enter coordinates for the center point and outer radius of the spiral in the parameter-entry boxes.

Note: You can add text on a Spiral by using the **Path Text** option.

After drawing the spiral you can adjust certain parameters using the three arrows shown in the spiral.

To adjust the inner radius, move the corresponding arrow in the middle of the spiral. This helps to increase or decrease the distance from the center of the spiral to the innermost point of the spiral. Sample illustrations are shown below.

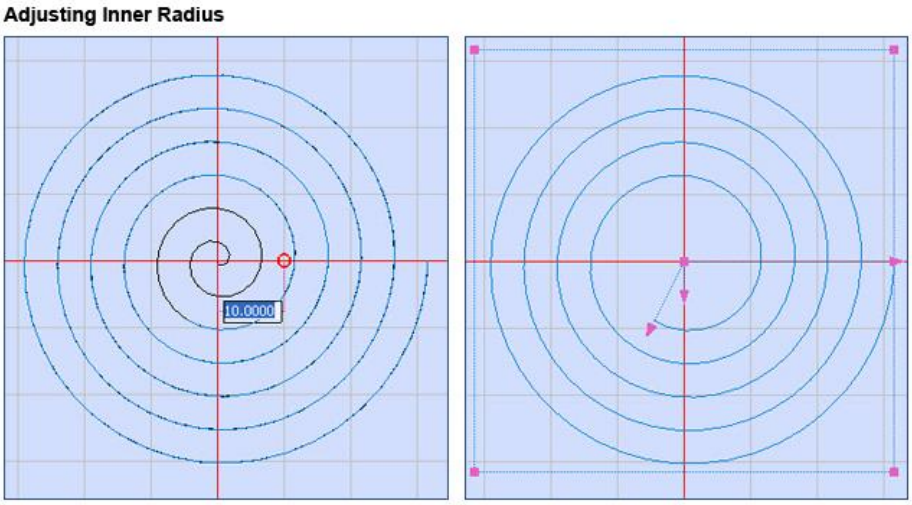


FIGURE 180: SPIRAL EDITOR - INNER RADIUS

To adjust the outer radius, move the corresponding arrow in the middle of the spiral. This helps to increase or decrease the distance from the center of the spiral to the outermost point of the spiral. Sample illustrations are shown below.

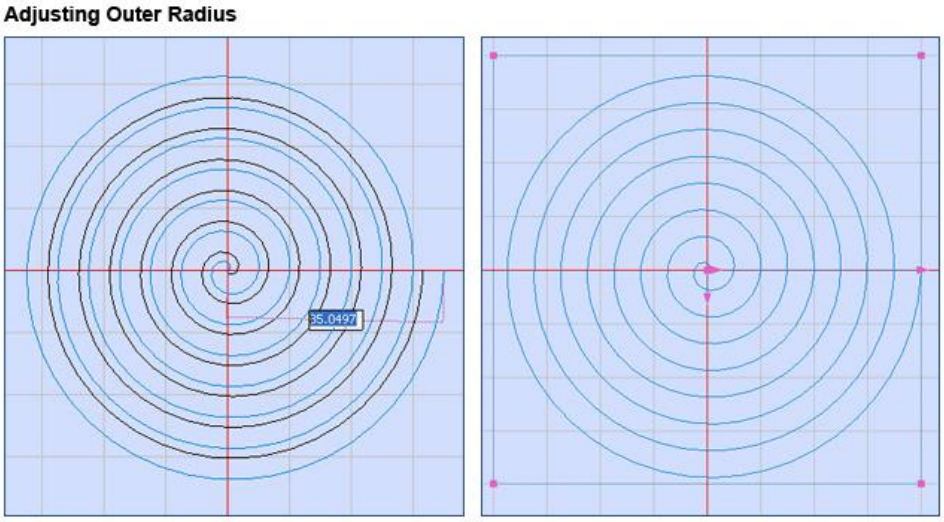


FIGURE 181: SPIRAL EDITOR - OUTER RADIUS

To adjust the pitch, move the corresponding arrow in the middle of the spiral. This helps to increase or decrease the distance between the succeeding circles inside the spiral. Sample illustrations are shown below.

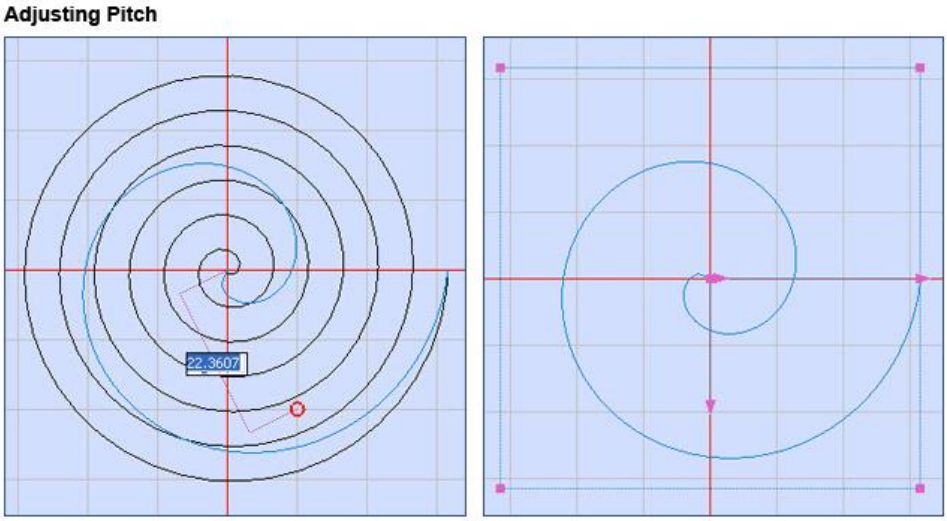


FIGURE 182: SPIRAL EDITOR - ADJUSTING PITCH

Spiral Properties

When you select a spiral on the Drawing Canvas, its parameters are displayed on the **Properties** tab of ScanMaster Designer. You can change the spiral parameters by editing the fields of the **Properties** tab.

The spiral properties are the following:

- **X** – The **X** coordinate of the center point of the spiral
- **Y** – The **Y** coordinate of the center point of the spiral
- **Z** – The **Z** coordinate of the center point of the spiral

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

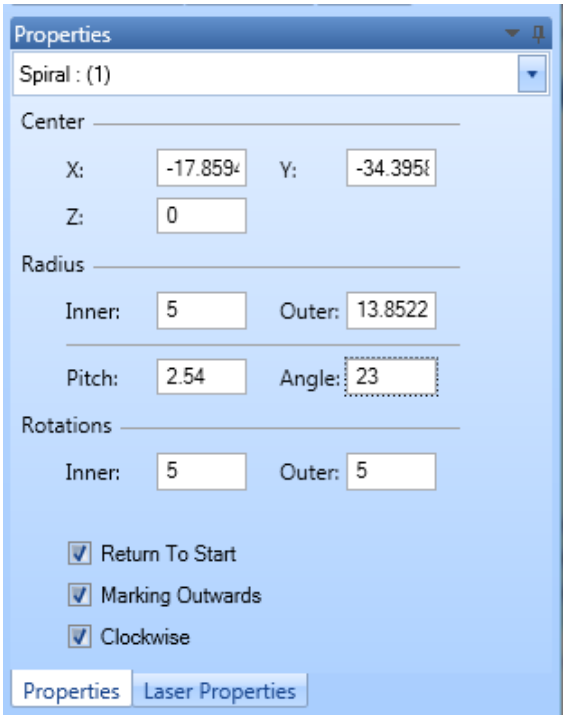


FIGURE 183: SPIRAL PROPERTIES

- **Inner (Radius)** – The distance to the innermost point from the center of the spiral
- **Outer (Radius)** – The distance from the center point of the spiral to the outermost point on the spiral
- **Pitch** – The distance between succeeding circles inside the spiral
- **Angle** – The Angle of Rotation for the spiral
- **Inner (Rotations)** – The number of rotations on the inner circle of the spiral
- **Outer (Rotations)** – The number of rotations on the outer circle of the spiral
- **Return To Start** – If this check box is selected, the beam will retrace the mark to the start point.
- **Marking Outwards** – The start point of the spiral
- **Clockwise** – When this checkbox is selected, the direction of marking for the spiral is clockwise. When this checkbox is not selected, the direction of marking for the spiral is counterclockwise. (Counterclockwise is the default direction of marking.)

Changing Spiral Properties by Moving Hotspots

You can change spiral properties by moving spiral hotspots as described in the following sections:

- "Using Hotspots to Modify a Spiral" on page 305 describes how to resize a spiral, change the inner and outer radii of a spiral, and change the pitch of a spiral by moving spiral hotspots.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move an elliptical arc.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a spiral.
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 describes how to move a spiral.
- "Rotating Shapes" on page 323 describes how to change the angle (of rotation) of a spiral.

6.4 ENTER AND MODIFY TEXT IN A DRAWING

The Insert Text tool can be used to add or modify text in a drawing.

Note: The unit of measurement for text font size is the same as the unit of measurement for geometry functions (millimeters or inches).

6.4.1 Insert Text in a Drawing

Do the following to insert text in a drawing:

1. On the **Drawing Shapes** Toolbar, left-click the **Insert Text** icon T.
2. Place the crosshairs anywhere on the canvas, press and hold the left mouse button, and drag the mouse to make a text box of the desired size. The preview will help you to visualize the dimensions.
3. Once you drag the crosshairs to the desired size, click the left mouse button again. The **Text Editor** is displayed.

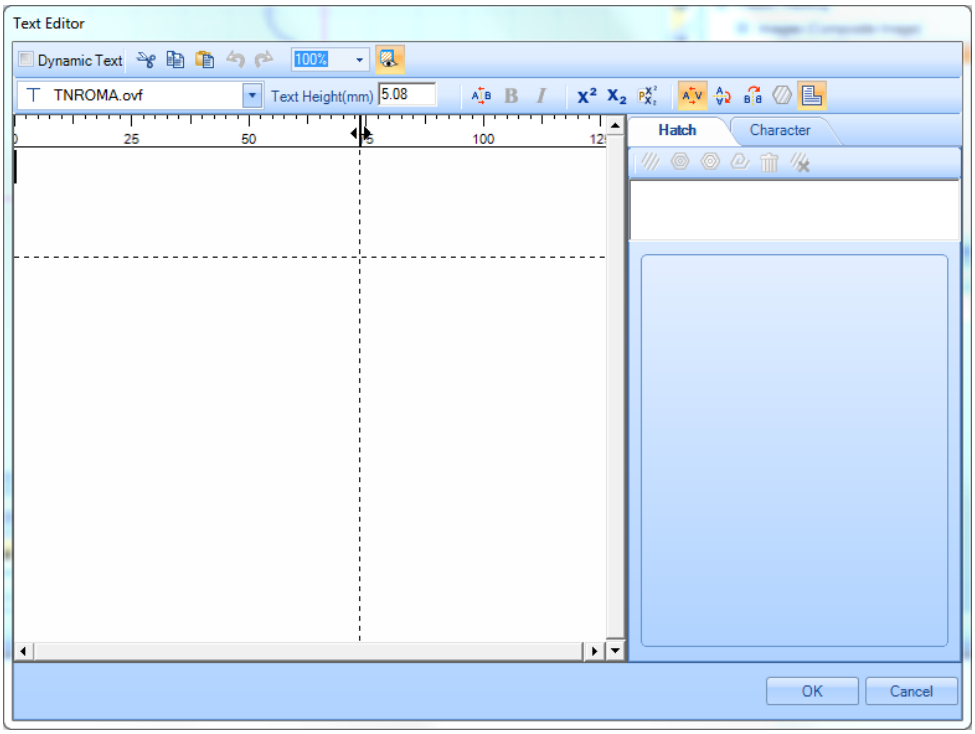


FIGURE 184: TEXT EDITOR

4. You may change the font type and the text height. To change the font type, select a new font type from the **Font Type** dropdown. To change the text height, type the desired text size using the **Text Height** field and press **Enter.**
5. Type the text and click the **OK** button in the **Text Editor**.

Note: If you type a character which is not available with the selected font, it will be represented by a square box. You may choose to ignore this representation but at the time of marking when such a character is encountered at the time of marking, it will stop the marking and display an error message.

6. You can type the text in several lines by pressing the **Enter** key. The following figures contain examples of text typed in several lines.

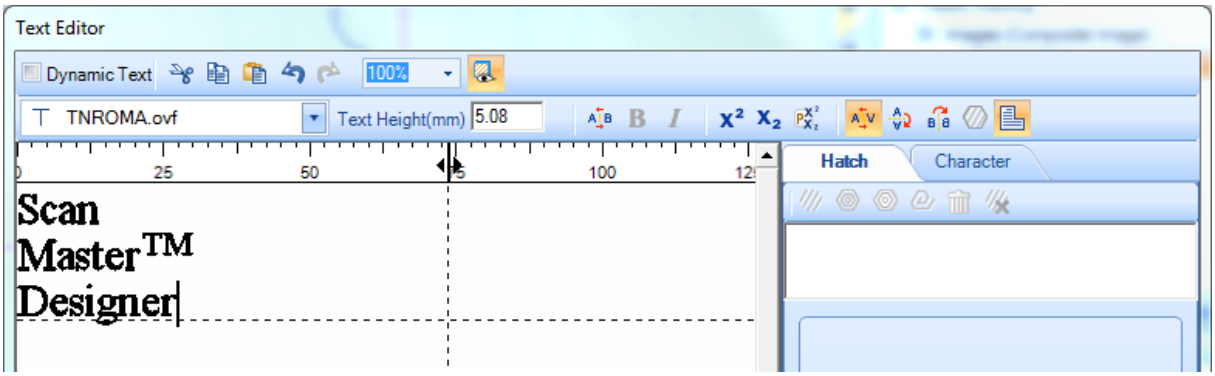


FIGURE 185: THE TEXT EDITOR SHOWING TEXT ACROSS SEVERAL LINES

FIGURE 186: THE CANVAS SHOWING TEXT ACROSS SEVERAL LINES

Text in ScanMaster Designer is treated like every other shape, so it can be rotated, mirrored, exploded, moved, hatched, etc.

To change the size of the entered text

Even after you insert the text in the canvas, you have the option to scale the text to a desired size. Simply select the text and use the hotspots to drag the text to the desired size.

To change the size of the text box

Do the following to change the size of the text box without changing the size of the text that the text box contains:

1. Select the text by left-clicking on it. The hotspots are displayed on the text.
2. Right-click the selected text to display the **Text** Popup.

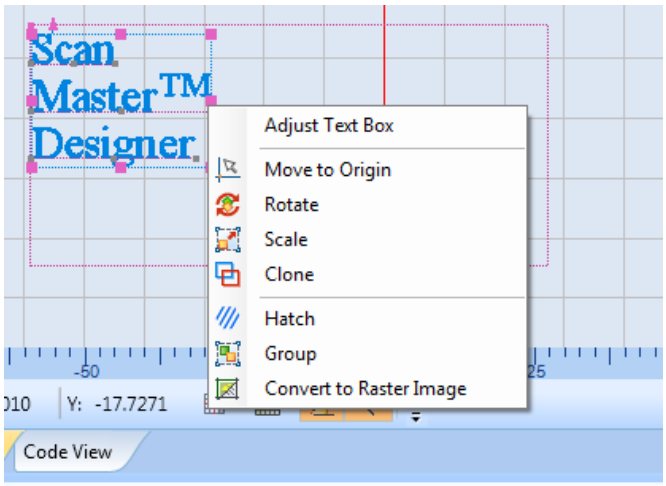


FIGURE 187: THE TEXT POPUP

3. Select the **Adjust Text Box** option from the **Text** Popup. This selects the text box and deselects the text; hotspots will be displayed on the text box.

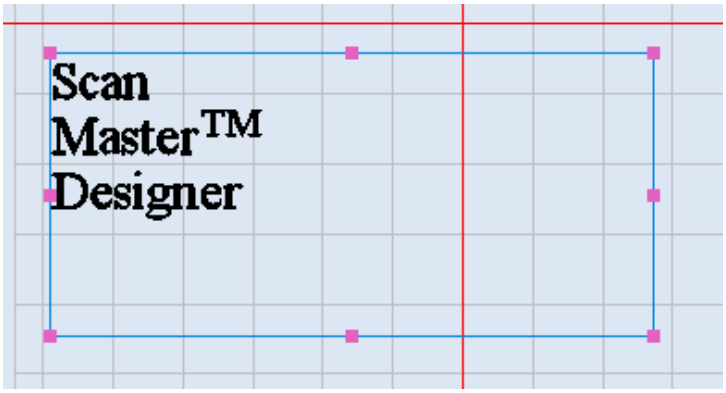


FIGURE 188: THE TEXT BOX WITH HOTSPOTS

4. To change the size of the text box, press and hold the left mouse button on a hotspot and drag the mouse.
5. Click the left mouse button again when the text box is at the desired size.

To edit text

The easiest way to edit text is to use the **Text Editor**. Double-click the left mouse button on the text to open it in the **Text Editor**. Refer to the appropriate subsections of this chapter for more information on using the **Text Editor**.

Text Properties

When you select a block of text on the Drawing Canvas, its parameters are displayed on the **Properties** tab of ScanMaster Designer. You can change the text parameters by editing the fields of the **Properties** tab.

The text properties are the following:

- **X** – The X coordinate of the text point of origin
- **Y** – The Y coordinate of the text point of origin
- **Z –** The Z coordinate of the text point of origin

Note: The Z property is only used for scanning on 3-Axis systems. The range of allowable values for the Z property is defined in the Marking Area tab of the Project Settings tab.

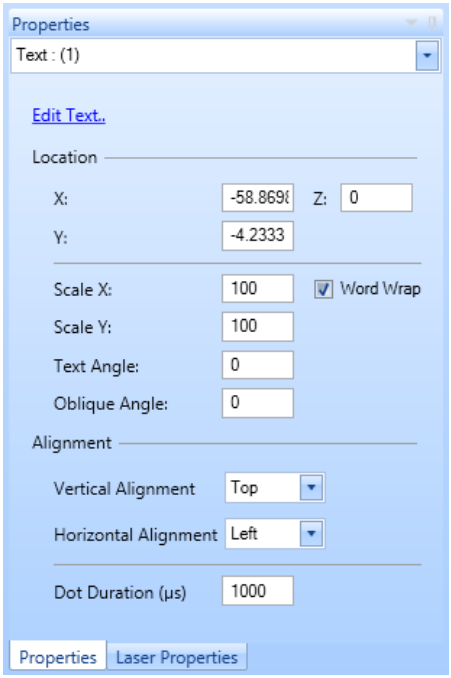


FIGURE 189: TEXT PROPERTIES

- **Scale X** – The X-axis scaling value for the text
- **Scale Y** – The Y-axis scaling value for the text
- **Text Angle** – The angle of the text on the canvas
- **Oblique Angle** – The oblique angle of the text
- **Word Wrap** – Indicates whether word wrap is applied in the text box
- **Vertical Alignment** – The vertical alignment of the text in the text box. The allowable values are **Top**, **Center**, and **Bottom**.
- **Horizontal Alignment** – The vertical alignment of the text in the text box. The allowable values are **Left**, **Center**, and **Right**.
- **Dot Duration** – The length of time (in microseconds) the laser will dwell in this location

Note: Set a value for **Dot Duration** when Dot fonts are being used.

6.4.2 Basic Text Formatting

In ScanMaster Designer, you can use the formatting toolbar in the **Text Editor** to quickly format text.

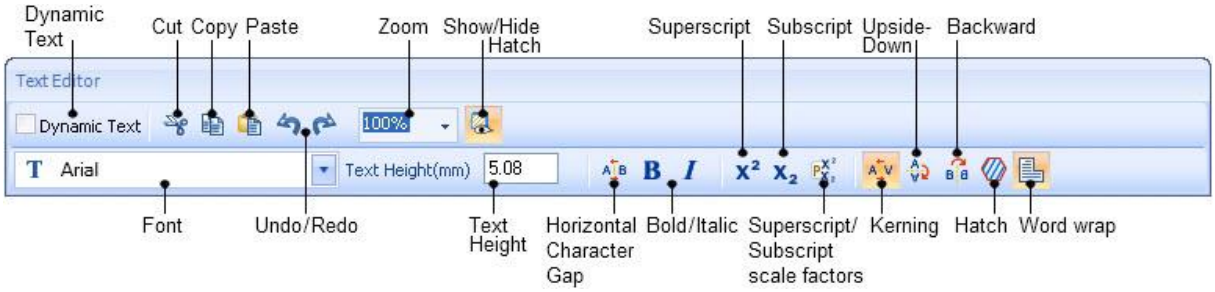


FIGURE 190: FORMATTING TOOLBAR

Refer to the following sections for detailed information on using each tool on the formatting toolbar of the **Text Editor**:

- "Dynamic Text" (on page 174)
- "Cutting Text with the Cut Icon" (on page 182)
- "Copying Text with the Copy Icon" (on page 182)
- "Pasting Text with the Paste Icon" (on page 183)
- "Zooming Text with the Zoom Factor Dropdown" (on page 183)
- "Formatting Text as Superscript with the Superscript Icon" (on page 184)
- "Formatting Text as Subscript with the Subscript Icon" (on page 184)
- "Setting Superscript and Subscript Scale Factors with the Scale Factors Icon" (on page 186)
- "Turning Characters Upside Down with the Upside Down Icon" (on page 188)
- "Reversing Characters with the Backward Icon" (on page 189)
- "Changing the Text Font" (on page 190)
- "Undoing the Last Action with the Undo Icon" (on page 190)
- "Redoing an Undone Action with the Redo Icon" (on page 191)
- "Changing the Text Height" (on page 191)
- "Setting the Horizontal Character Gap with the Character Gap Icon" (on page 191)
- "Making Text Bold" (on page 194)
- "Making Text Italic" (on page 194)
- "Setting Text Kerning" (on page 195)
- "Applying Hatching Patterns to Text" (on page 196)
- "Clearing All Hatching" (on page 204)
- "Showing and Hiding Hatching" (on page 204)

- "Removing Hatching" (on page 206)
- "Toggling the marking of the outer border on hatched text" (on page 207)
- "Applying Word Wrapping to Text" (on page 208)
- "Formatting Tools on the Character Tab" (on page 208)
- "Unicode Support" (on page 214)
- "Inserting Path Text" (on page 217)

6.4.3 Dynamic Text

Use **Dynamic Text** when you need to retrieve text from an external source or if the text needs to be changed in real-time as in serial number marking or time stamps.

Note: Static Text is the default type of text that you would use in ScanMaster Designer. You create Static Text by typing in the **Text Editor**. Static text is used when the text doesn't need to change or load from an external source.

User-Defined Variable

You can define your own dynamic text using two methods.

Method 1:

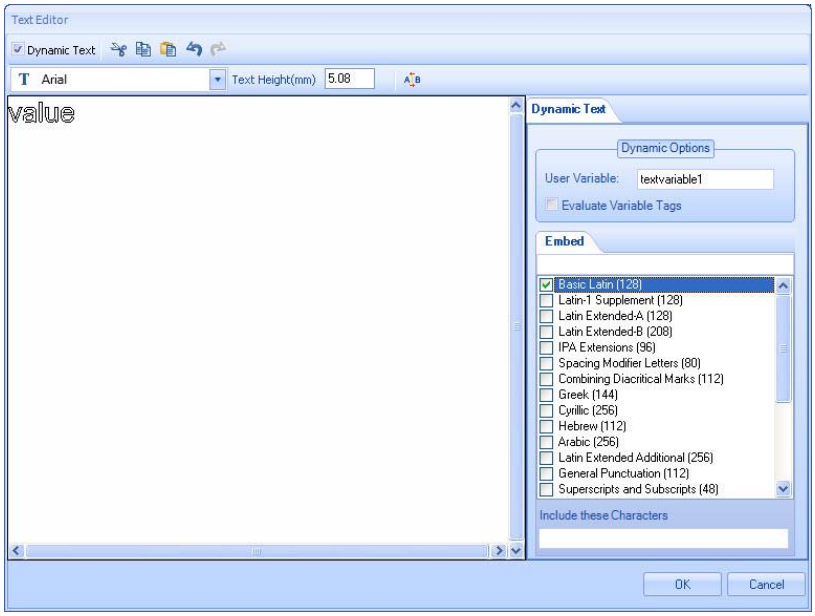


FIGURE 191: DYNAMIC TEXT – METHOD 1

1. Select **Dynamic Text** from the **Text Editor Window**. Once you select Dynamic Text, the available options will be listed on the right of the **Text Editor**.
2. Provide a variable name in the **User Variable** text box in the **Dynamic Text** tab.
3. The Scanning Card does not contain any fonts hence you need to embed the required fonts. Select the Unicode range from the available list in the **Embed** tab.
4. Click **OK**.
5. These variables can be accessed through **Script.** You can write the script to scan text or numbers or a combination of both.

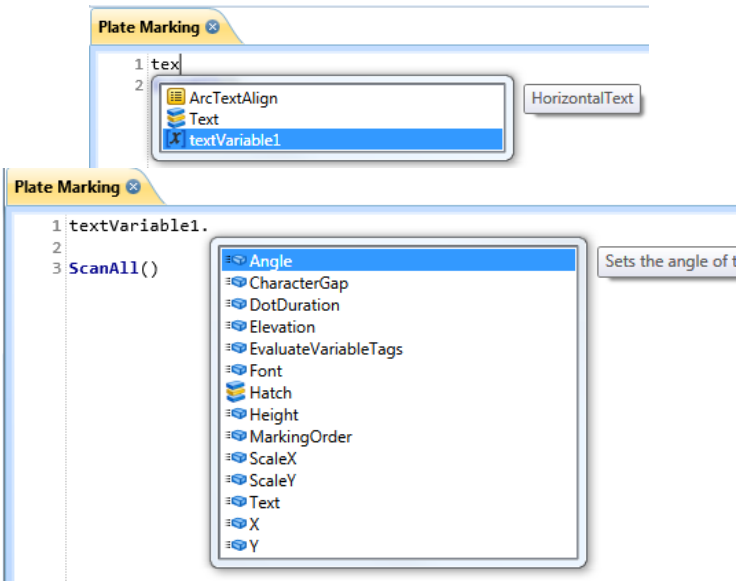


FIGURE 192: ACCESSING VARIABLES THROUGH SCRIPT

Method 2:

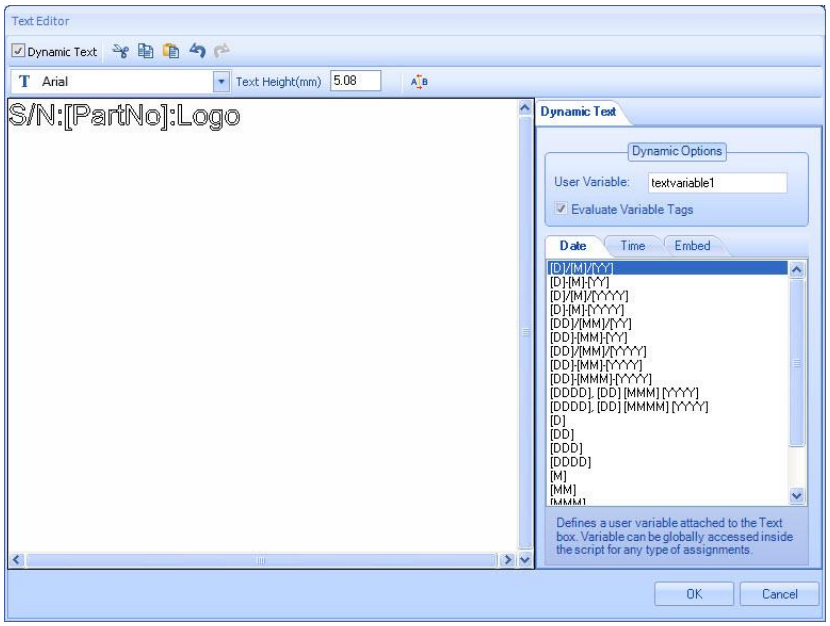


FIGURE 193: DYNAMIC TEXT - METHOD 2

1. Select **Dynamic Text** from the **Text Editor Window**. Once you select Dynamic Text, the available options will be listed on the right of the **Text Editor**.
2. Provide a variable name inside the square brackets (see image above).

3. Select Evaluate Variable Tags box in the Dynamic Text tab
4. Click **OK**.
5. This variable can be accessed through **Script.** You can write the script to scan text or numeric characters, or even a combination of both.

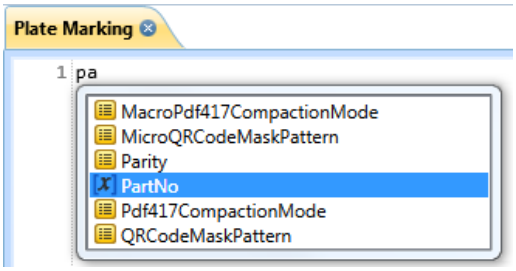


FIGURE 194: ACCESSING VARIABLES THROUGH SCRIPT

Note: Embedding a font requires a considerable amount of space; hence we have given the option to include just the required characters. Copy the characters you wish to include using the **Character Map** option and paste them on the **Include these Characters** box.

Formatted Strings

To create a formatted string dynamically, use the following sequence:

[%[Flags][Width].[Precision]Specifier:VariableName]

Flags

0	Left-pads the number with zeroes (0) instead of spaces, where padding is specified.
+	Forces to precede the result with a plus or minus sign (+ or -) even for positive numbers. By default, only negative numbers are preceded with a - sign.
-	Left-justify within the given field width; Right justification is the default
space	If no sign is going to be written, a blank space is inserted before the value.
#	Used with o, x or X specifiers the value is preceded with 0, 0x or 0X respectively for values other than zero. Used with e, E and f, it forces the written output to contain a decimal point even if no digits would follow. By default, if no digits follow, no decimal point is written. Used with g or G the result is the same as with e or E but trailing zeros are not removed.

Width

number	Minimum number of characters to be printed. If the value to be printed is shorter than this number, the result is padded with blank spaces. The value is not truncated even if the result is larger.
*	The width is not specified in the format string, but as an additional integer value argument preceding the argument that has to be formatted.

Precision

number	For integer specifiers (d, i, o, u, x, X): precision specifies the minimum number of digits to be written. If the value to be written is shorter than this number, the result is padded with leading zeros. The value is not truncated even if the result is longer. A precision of 0 means that no character is written for the value 0. For e, E and f specifiers: this is the number of digits to be printed after the decimal point. For g and G specifiers: This is the maximum number of significant digits to be printed. For s: this is the maximum number of characters to be printed. By default all characters are printed until the ending null character is encountered. For c type: it has no effect. When no precision is specified, the default is 1. If the period is specified without an explicit value for precision, 0 is assumed.
.*	The precision is not specified in the format string, but as an additional integer value argument preceding the argument that has to be formatted.

Specifier

The specifier is the most significant and defines the type and interpretation of the value of the corresponding argument.

Specifier	Description
s	String of characters
c	Character
d	Signed decimal integer
i	Signed integer
f	Decimal floating point
e	Scientific notation (mantissa/exponent) using e character
E	Scientific notation (mantissa/exponent) using E character
g	Use the shorter of %e or %f
G	Use the shorter of %E or %f
u	Unsigned decimal integer
o	Signed octal
x	Unsigned hexadecimal integer
X	Unsigned hexadecimal integer (capital letters)

Example: [%-10.3f:var1]

In the above example's "var1" variable can be accessed from ScanScript.

Note: Before you create a formatted string, make sure that **Evaluate Variable Tags** option is selected. The variable you create through ScanMaster Designer can be accessed from the ScanScript. Formatted strings can also be created using the **String.Format** method in ScanScript.

Date

If you wish to scan the current date, select this option.

1. Click the **Evaluate Variable Tags** check box in the **Dynamic Options** panel to activate.
2. Go to **Date** tab.
3. Select an appropriate format from those predefined and double-click it.
4. Click **OK**.

Release #	Revision
[D]/[M]/[YY]	1/3/10
[D]-[M]-[YY]	1-3-10
[D]/[M]/[YYYY]	1/3/2010
[D]-[M]-[YYYY]	1-3-2010
[DD]/[MM]/[YY]	01/03/10
[DD]-[MM]-[YY]	01-03-10
[DD]/[MM]/[YYYY]	01/03/2010
[DD]-[MM]-[YYYY]	01-03-2010
[DDDD], [DD] [MMM] [YYYY]	Monday, 01 Mar 2010
[DDDD], [DD] [MMMM] [YYYY]	Monday, 01 March 2010
[D]	1
[DD]	01
[DDD]	Mon
[DDDD]	Monday
[M]	3
[MM]	03
[MMM]	Mar
[MMMM]	March
[YY]	10
[YYYY]	2010

FIGURE 195: DATE

Time

If you wish to scan the current time, select this option.

1. Click the **Evaluate Variable Tags** check box in the **Dynamic Options** panel to activate.
2. Go to **Time** tab.
3. Select an appropriate format from the predefined formats and double-click on it.
4. Click **OK**.

Release #	Revision
[hh]:[mm]:[ss]	02:05:08
[hh].[mm].[ss]	02.05.08
[h]:[m]:[s]	2:5:8
[h].[m].[s]	2.5.8
[h]:[m]	2:5
[h].[m]	2.5
[hh]:[mm]	02:05
[hh].[mm]	02.05
[HH]:[mm]:[ss]	14:05:08
[HH].[mm].[ss]	14.05.08
[HH]:[mm]	14:05
[HH].[mm]	14.05
[h]:[m]:[s] [tt]	2:5:8 pm
[hh]:[mm]:[ss] [tt]	02:05:08 pm
[hh]:[mm] [tt]	02:05 pm
[h]	2
[hh]	02
[H]	14
[HH]	14
[m]	5
[mm]	05
[s]	8
[ss]	08
[tt]	Pm

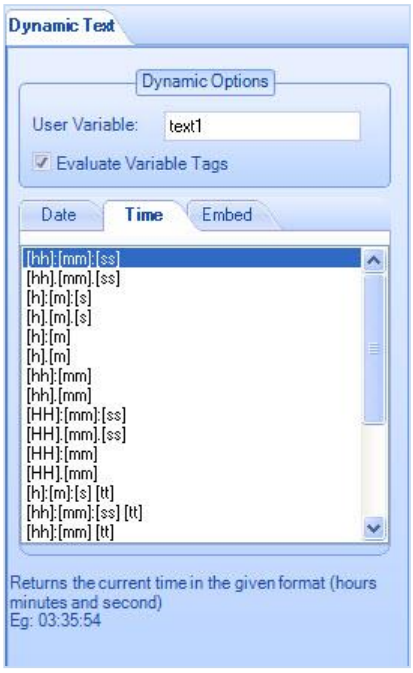


FIGURE 196: TIME

6.4.4 Cutting Text with the Cut Icon

Do the following to cut text:

1. Select the text that you want to cut.
2. Left-click the **Cut** icon in the text formatting toolbar.

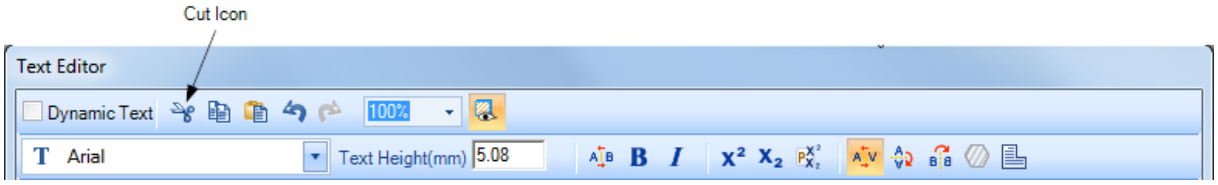


FIGURE 197: THE CUT ICON IN THE TEXT FORMATTING TOOLBAR

Note: You can use the Keyboard Shortcut **CTRL + X** instead of the **Cut** icon .

6.4.5 Copying Text with the Copy Icon

Do the following to copy text:

1. Select the text that you want to copy.
2. Left-click the **Copy** icon in the text formatting toolbar.

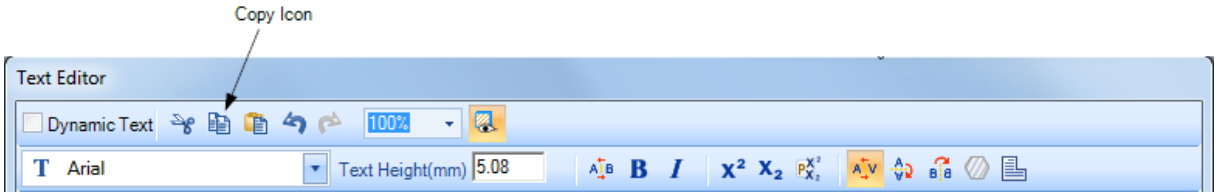


FIGURE 198: THE COPY ICON IN THE TEXT FORMATTING TOOLBAR

Note: You can use the Keyboard Shortcut **CTRL + C** instead of the **Copy** icon .

6.4.6 Pasting Text with the Paste Icon

Do the following to paste text that has been cut or copied:

1. Click the left mouse button at the location where you want to paste the text.
2. Left-click the **Paste** icon in the text formatting toolbar.

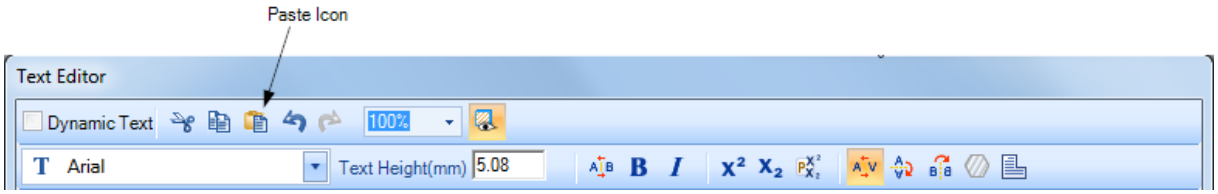


FIGURE 199: THE PASTE ICON IN THE TEXT FORMATTING TOOLBAR

Note: You can use the Keyboard Shortcut **CTRL + V** instead of the **Paste** icon .

Note: You can also *copy* text (to the Windows Clipboard) from a document and paste it in to ScanMaster Designer **Text Editor**.

6.4.7 Zooming Text with the Zoom Factor Dropdown

The Zoom Factor allows you to zoom in or out on the existing text before inserting it on the Drawing Canvas.

Select the desired zoom factor from the **Zoom Factor** drop-down box 100% and the text will be displayed at the selected zoom level.

Note: As an alternative to selecting from the **Zoom Factor dropdown** box, you can type a custom zoom factor in the field that contains the current Zoom Factor.

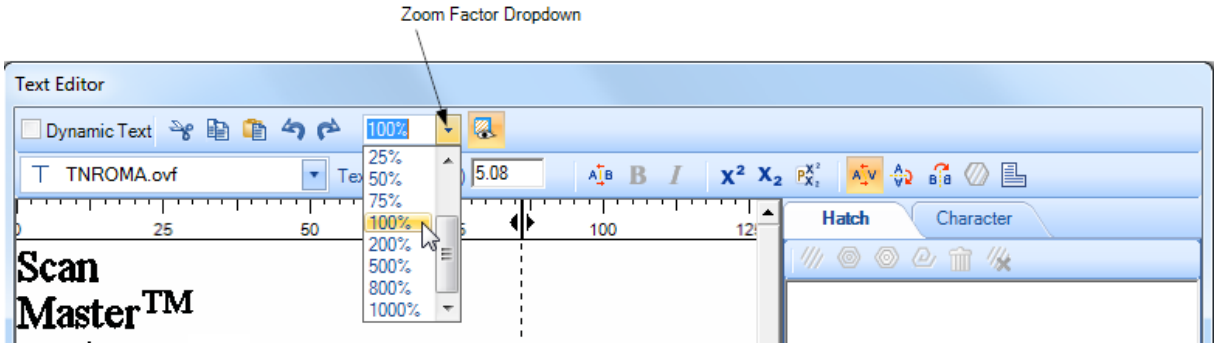


FIGURE 200: THE ZOOM FACTOR DROP-DOWN BOX ON THE TEXT FORMATTING TOOLBAR

6.4.8 Superscript and Subscript

Superscript is text that is positioned slightly higher than the text on the line. Subscript is text that is positioned slightly lower than the text on the line.

For example, the following figure shows the numeral "2" formatted as subscript in "H_2O" and as superscript in "$E=mc^2$".

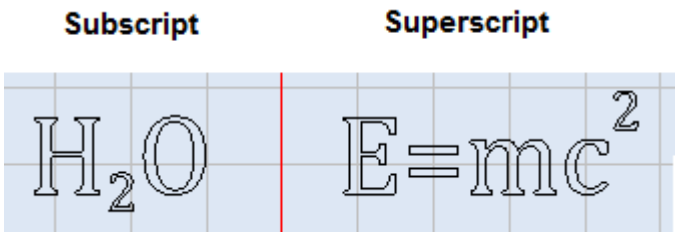


FIGURE 201: SUPERSCRIPT/SUBSCRIPT

Formatting Text as Superscript with the Superscript Icon

Do the following to format text as superscript with the Superscript icon:

1. Select the text that you want to format as superscript.
2. Click on the **Superscript** icon X^2 on the text formatting toolbar.

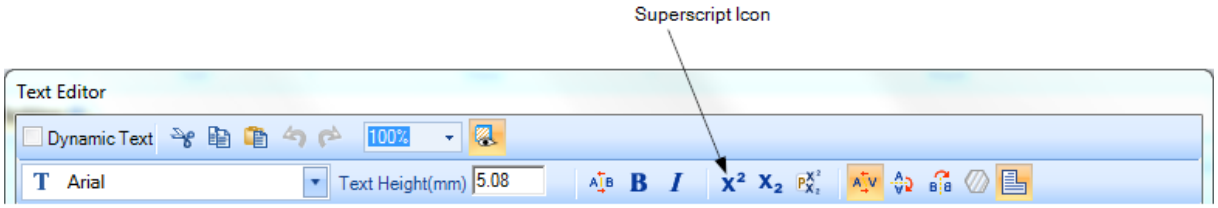


FIGURE 202: THE SUPERSCRIPT ICON AND THE SUBSCRIPT ICON ON THE TEXT FORMATTING TOOLBAR

Formatting Text as Subscript with the Subscript Icon

Do the following to format text as subscript with the **Subscript** icon:

1. Select the text that you want to format as subscript.
2. Click on the **Subscript** icon X_2 on the text formatting toolbar.

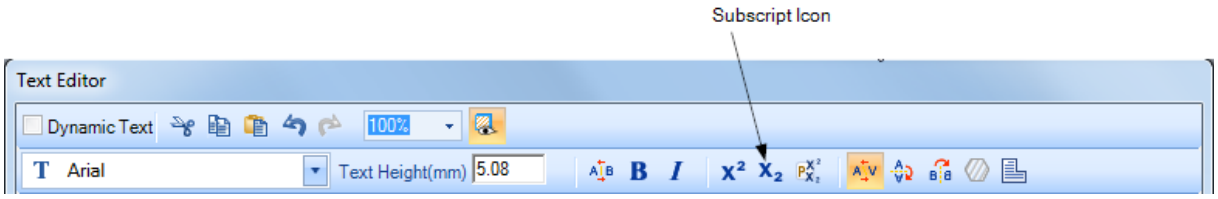


FIGURE 203: THE SUPERSCRIPT ICON AND THE SUBSCRIPT ICON ON THE TEXT FORMATTING TOOLBAR

Setting Superscript and Subscript Scale Factors with the Scale Factors Icon

The superscript and subscript scale factors are used to specify the offsets, and relative font sizes, of superscripts and subscripts.

Do the following to specify the superscript and subscript scale factors:

1. Select the superscript or subscript for which you want to specify scale factors.
2. Left-click the **Superscript/Subscript Scale Factors** icon on the text formatting toolbar.

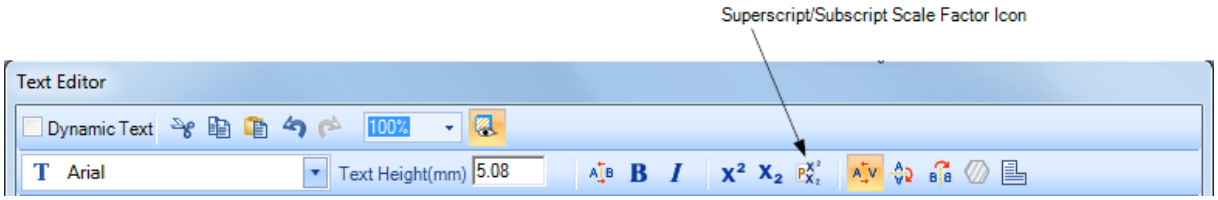


FIGURE 204: THE SUPERSCRIPT/SUBSCRIPT SCALE FACTORS ICON ON THE TEXT FORMATTING TOOLBAR

3. This displays the **Superscript/Subscript** dialog box. In this dialog box, you can modify the scale and offset factors for the selected superscript or subscript.

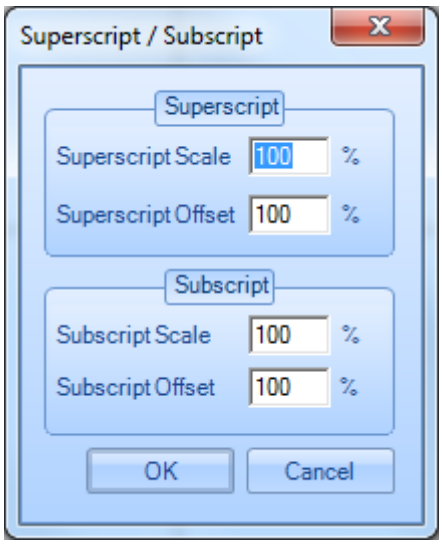


FIGURE 205: THE SUPERSCRIPT/SUBSCRIPT DIALOG BOX

4. Left-click the OK button in the Superscript/Subscript dialog box to apply any changes in scale factors to the selected superscript of subscript.

    - **Superscript Scale** and **Subscript Scale** are the font sizes of superscripts and subscripts relative to the font size of the main text. For example, a **Subscript Scale** of 30 means that the font size subscript is 30% of the font size of the main text.

- **Superscript Offset** and **Subscript Offset** are the ratios of the distances above, or below, the text line of superscripted or subscripted text.

6.4.9 Turning Characters Upside Down with the Upside Down Icon

You can use the **Upside Down** tool to turn characters upside down.

Do the following to turn characters upside down:

1. Select the text or character(s) that you want to turn upside down.
2. Left-click the **Upside Down** icon on the text formatting toolbar.

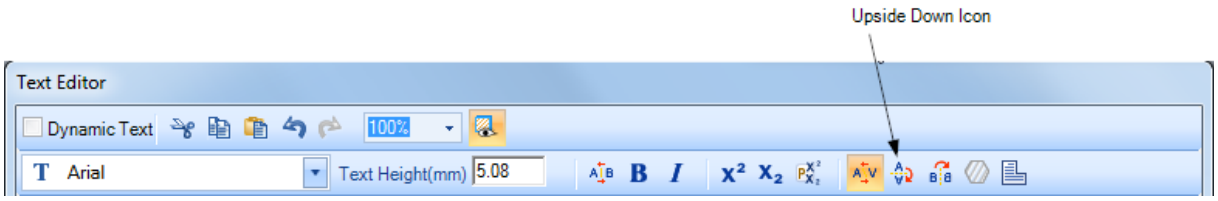


FIGURE 206: THE UPSIDE DOWN ICON ON THE TEXT FORMATTING TOOLBAR

In the following example, the second letter "A" has been turned upside down with the Upside Down tool.

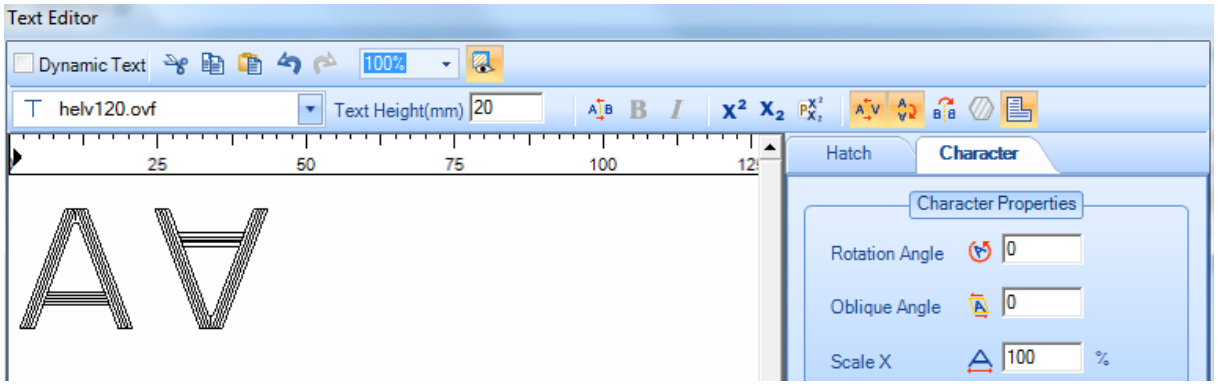


FIGURE 207: UPSIDE DOWN CHARACTER IN THE TEXT EDITOR

6.4.10 Reversing Characters with the Backward Icon

You can use the **Backward** tool to reverse characters.

Do the following to reverse characters:

3. Select the text or character(s) that you want to reverse.
4. Left-click the **Backward** icon on the text formatting toolbar.

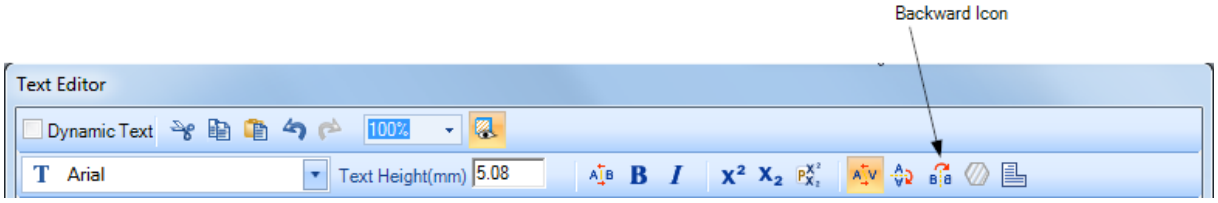


FIGURE 208: THE BACKWARD ICON ON THE TEXT FORMATTING TOOLBAR

In the following example, the first occurrence of the letter "B" has been reversed with the **Backward** tool.

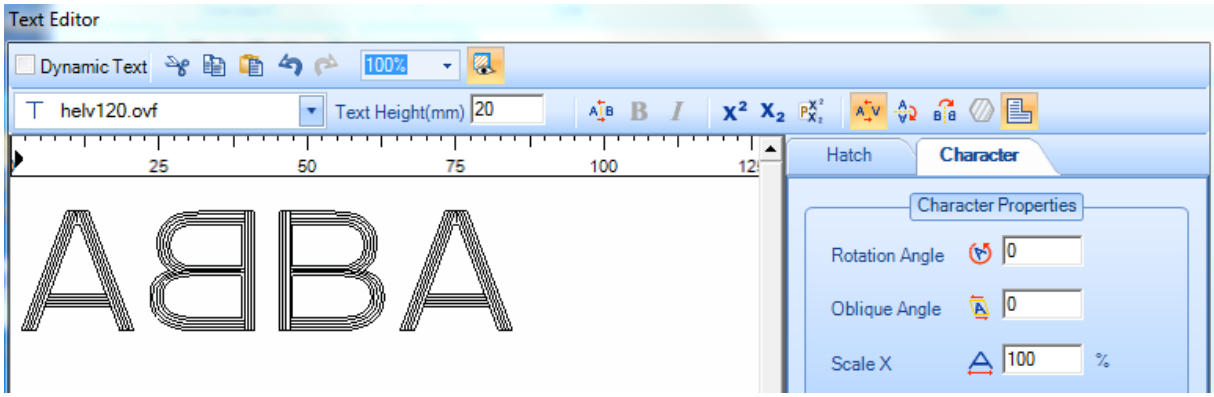


FIGURE 209: REVERSE CHARACTERS IN THE TEXT EDITOR

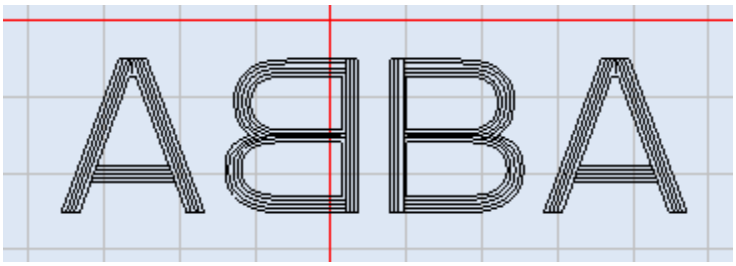


FIGURE 210: REVERSE CHARACTERS ON THE DRAWING CANVAS

6.4.11 Changing the Text Font

You can use the **Font Style** drop-down list to change the font of any selected text. Use the tabs on the left side of the **Font Style** drop-down list to make True Type Fonts® (TTF) or Optimized Vector Fonts (OVF) available for selection.

Do the following to change the text font:

5. Select the text whose font you want to change.
6. Select the new font style from the **Font Style** drop-down list.

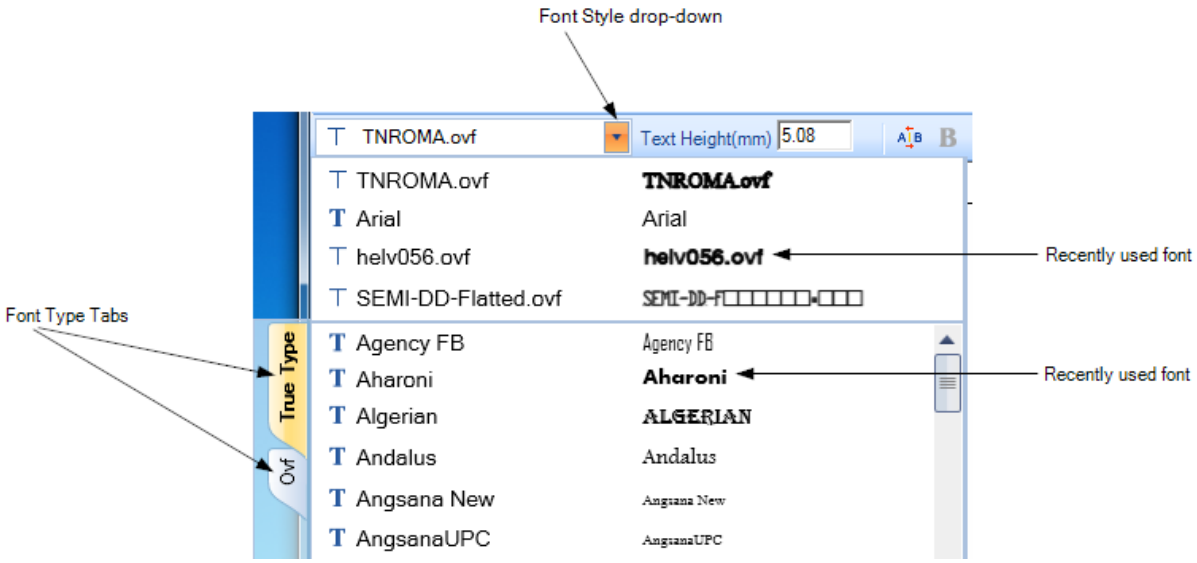


FIGURE 211: FONT STYLING OPTIONS

6.4.12 Undoing the Last Action with the Undo Icon

To undo the last action, left-click the **Undo** icon in the text formatting toolbar.

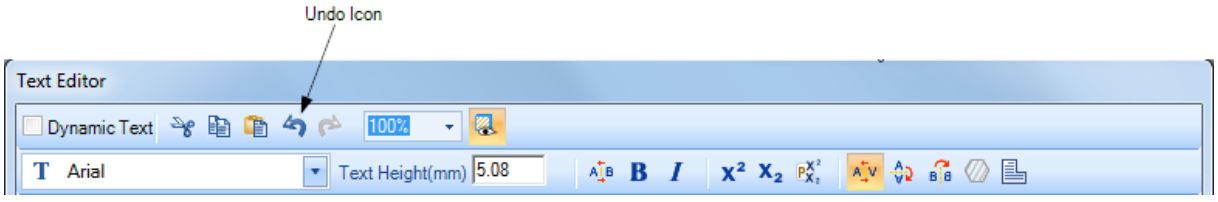


FIGURE 212: THE UNDO ICON IN THE TEXT FORMATTING TOOLBAR

Note: You can use the Keyboard Shortcut **CTRL + Z** instead of the **Undo** icon.

6.4.13 Redoing an Undone Action with the Redo Icon

To redo the last action that you undid, left-click the **Redo** icon in the text formatting toolbar.

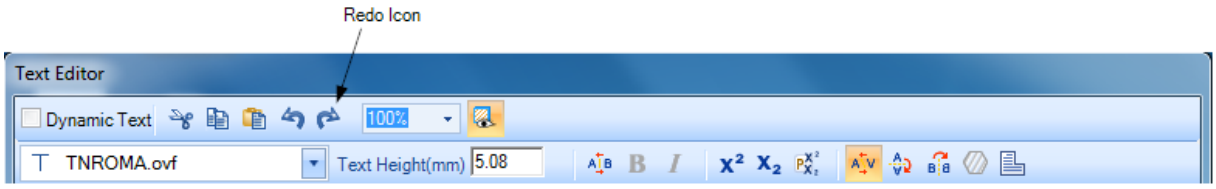


FIGURE 213: THE REDO ICON IN THE TEXT FORMATTING TOOLBAR

Note: You can use the Keyboard Shortcut **CTRL + Y** instead of the **Redo** icon .

6.4.14 Changing the Text Height

Do the following to change the height of text in the **Text Editor**:

1. Select the text whose height you want to change.
2. Type a new text height in the **Text Height** box.

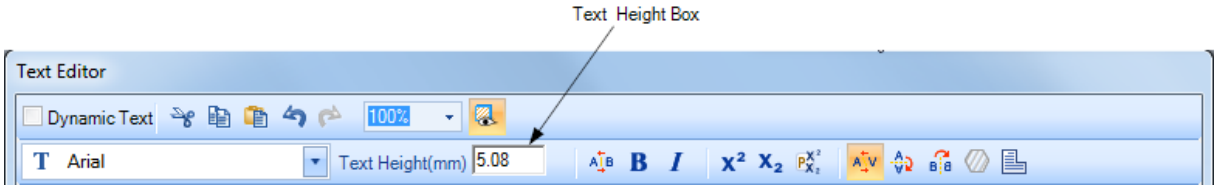


FIGURE 214: CHANGING THE TEXT HEIGHT

3. With the cursor still in the **Text Height** box, press the **Enter** key.

6.4.15 Setting the Horizontal Character Gap with the Character Gap Icon

The **Character Gap** tool allows you to specify spacing between characters.

Do the following to specify spacing between characters:

4. Select the text or character(s) for which you want to apply character spacing.
5. Left-click the **Character Gap** icon on the text formatting toolbar.

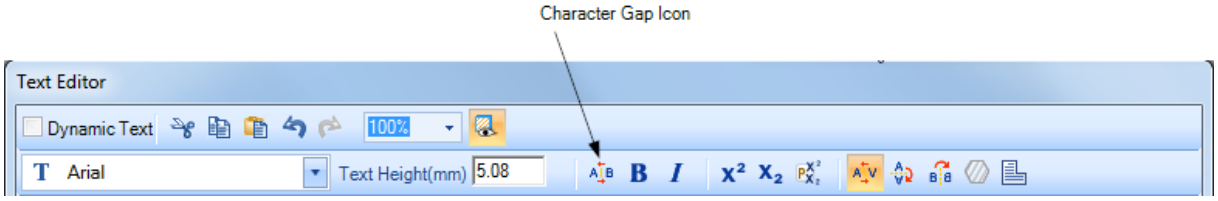


FIGURE 215: THE CHARACTER GAP ICON ON THE TEXT FORMATTING TOOLBAR

6. This displays the **Character Gap** dialog box in which you can enter a new value for the **Character Gap** parameter.

Note: the Character Gap units are the same as the text font-size units (millimeters or inches).

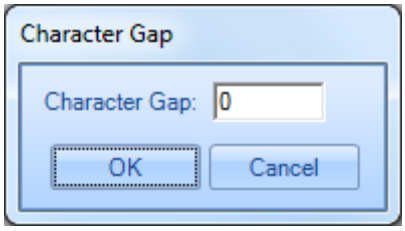


FIGURE 216: THE CHARACTER GAP DIALOG BOX

7. Left-click the **OK** button in the **Character Gap** dialog box to apply any changes you made to the **Character Gap** parameter.

   The following figures show a **Character Gap** setting of 5 for the text "Designer".

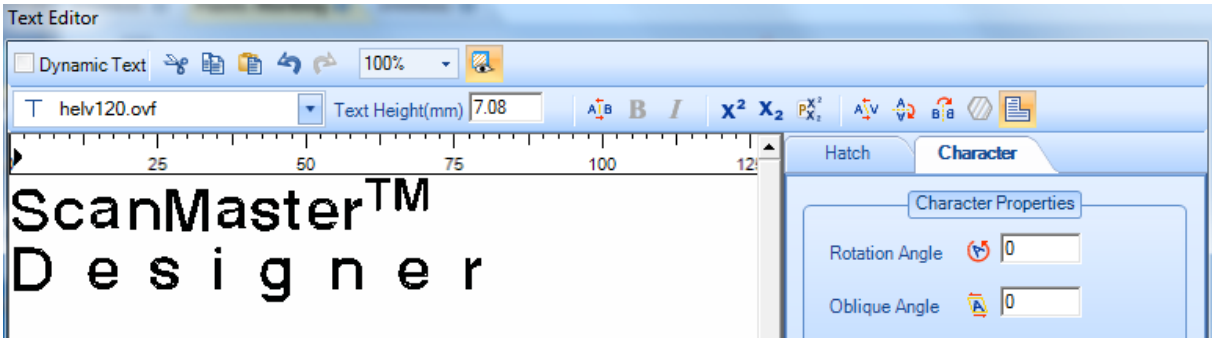


FIGURE 217: HORIZONTAL CHARACTER GAP IN THE TEXT EDITOR

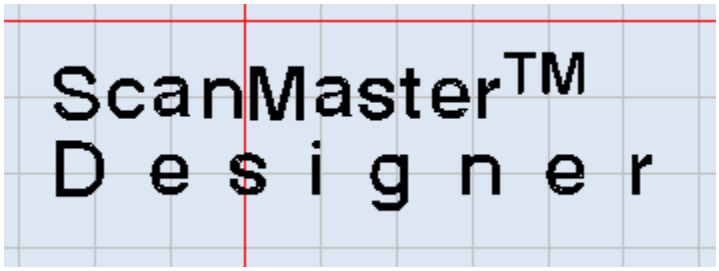


FIGURE 218: HORIZONTAL CHARACTER GAP ON THE DRAWING CANVAS

6.4.16 Making Text Bold

Do the following to make text bold:

1. Select the text that you want to make bold.
2. Left-click the **Bold** icon **B** on the text formatting toolbar.

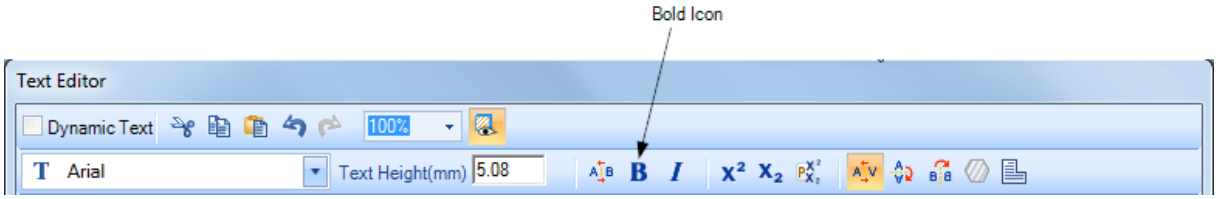


FIGURE 219: THE BOLD ICON IN THE TEXT FORMATTING TOOLBAR

You can use the Keyboard Shortcut **CTRL + B** instead of the **Bold** icon **B**.

To unbold text, select it and left-click the **Bold** icon **B** again. (This only works with TTF fonts.)

6.4.17 Making Text Italic

Do the following to make text italic:

3. Select the text that you want to make italic.
4. Left-click the **Italic** icon ***I*** on the text formatting toolbar.

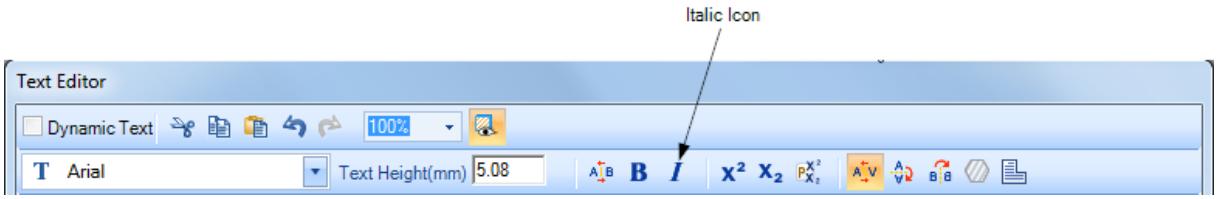


FIGURE 220: THE ITALIC ICON IN THE TEXT FORMATTING TOOLBAR

You can use the Keyboard Shortcut **CTRL + I** instead of the **Italic** icon ***I***.

To de-italicize text, select it and left-click the **Italic** icon ***I*** again. This only works with TTF fonts.

6.4.18 Setting Text Kerning

Certain letters, when placed beside each other, create an awkward space. You can use the **Kerning** tool to increase or reduce that space to make text more readable and more visually appealing.

Do the following to apply kerning to text:

1. Select the text or character(s) to which you want to apply kerning.
2. Left-click the **Kerning** icon on the text formatting toolbar.

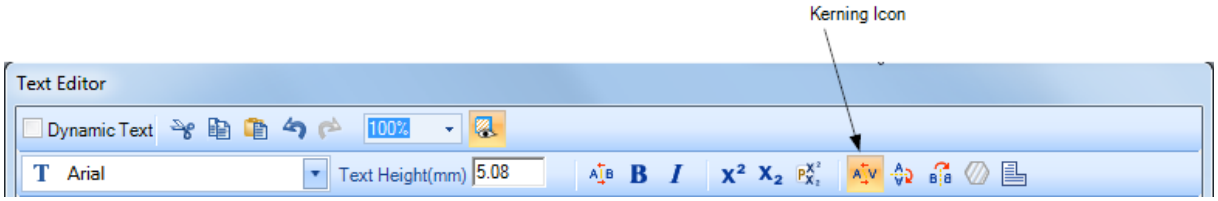


FIGURE 221: THE KERNING ICON ON THE TEXT FORMATTING TOOLBAR

In the following example, Kerning is *not* applied to the letters "AV".

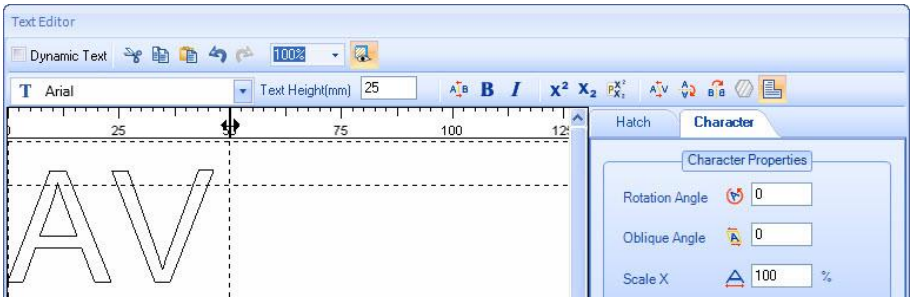


FIGURE 222: KERNING IS NOT APPLIED TO CHARACTERS

In the following example, Kerning *is* applied to the letters "AV".

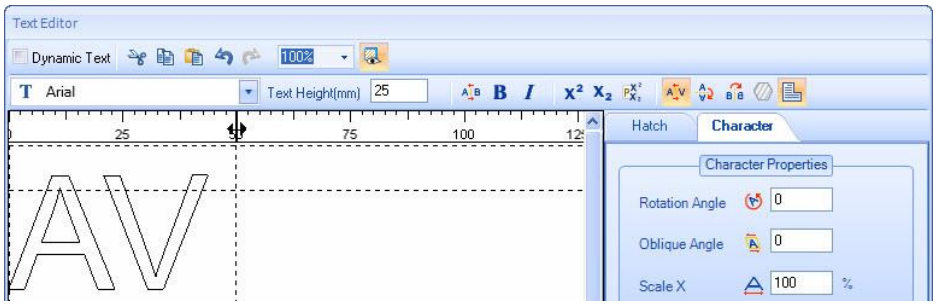


FIGURE 223: KERNING IS APPLIED TO CHARACTERS

Note: By default, Kerning is applied to the text.

6.4.19 Applying Hatching Patterns to Text

Hatching is used to fill **True Type Font®** text with shaded patterns. A pattern is created by straight lines, (line types) that repeat themselves. The selection of hatching patterns will depend on the need and the material used.

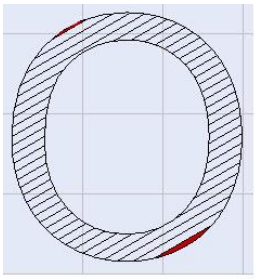
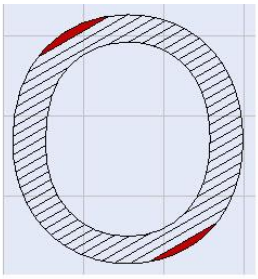
The following hatch patterns are available in the **Text Editor**:

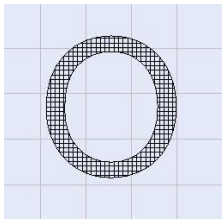
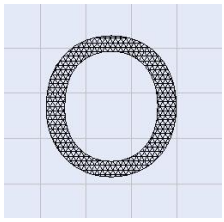
- Line Hatch
- Offset Hatch
- Offset In-Out Hatch
- Helix Hatch

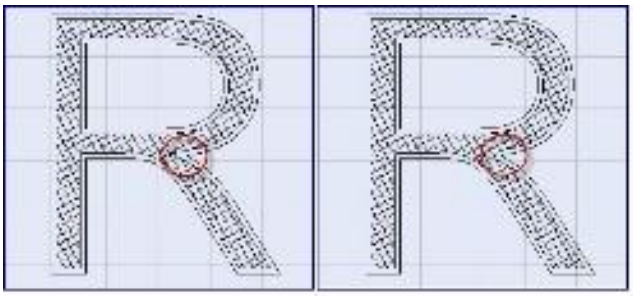
Line Hatch

Do the following to apply a line hatch pattern on text:

1. Select the text to which you want to apply the line hatch pattern.
2. Left-click the **Hatch** tab in the **Text Editor**.
3. Left-click the **Line Hatch** icon on the **Hatch** tab. This previews the hatching in the **Text Editor**.
4. You may change the following properties. Then left-click the **OK** button to exit the **Text Editor** and return to the Drawing Canvas.

Line Spacing	The distance between two adjacent hatch lines
Line Angle	The angle of the hatch lines measured from the positive X axis
Base X, Base Y	At least one of the hatch pattern lines will pass through the specified X or Y coordinate. If the Base X and Base Y coordinates are outside the hatch area, it will not be visible to the user.  Uneven line spacing  Better line spacing after adjusting the Base X value

Style	Specifies the available filling styles of a hatch pattern. The available filling styles are the following: • **Unidirectional** – The filling lines will move from left to right at a zero filling angle. This filing style is suitable for very sensitive material, where a change of marking direction would be detrimental. • **Double fill** – Marking is done in both directions; the return scan also does the marking on the same line. This filing style is not suitable for very sensitive material, where a change of marking direction would be detrimental. • **Serpentine** – The return scan marking is done in a new line, saving cycle time. • **Serpentine Connected** – The Serpentine filling route is connected. This filing style is not suitable for very sensitive material, where a change of marking direction would be detrimental. • **Hatch two times –** This has two Unidirectional fillings set apart by 90 degrees.  • **Hatch three times –** This is an extension of the **Hatch Two Times** filling style. The angles of the internal fillings are set apart by 60 degrees. 
Border Gap	The distance between the Hatch boundary and the Object boundary
Border Gap Direction	**Inward** – Will hatch inward from the boundary. **Outward** – Will hatch outward from the boundary.

Corner Style	Specifies whether corners are Smooth or Sharp. 
With Offset	Selecting this checkbox retains the boundary.

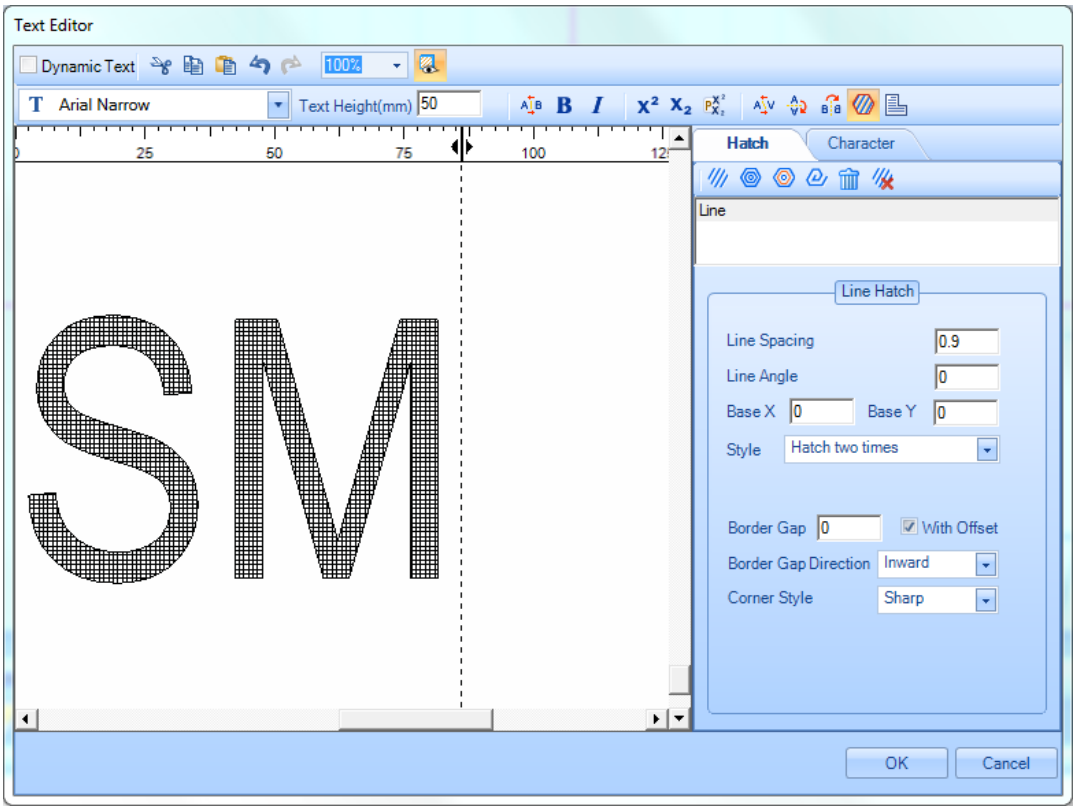


FIGURE 224: LINE HATCH EXAMPLE IN THE TEXT EDITOR

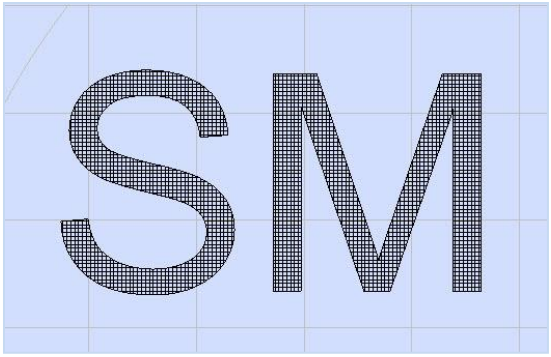
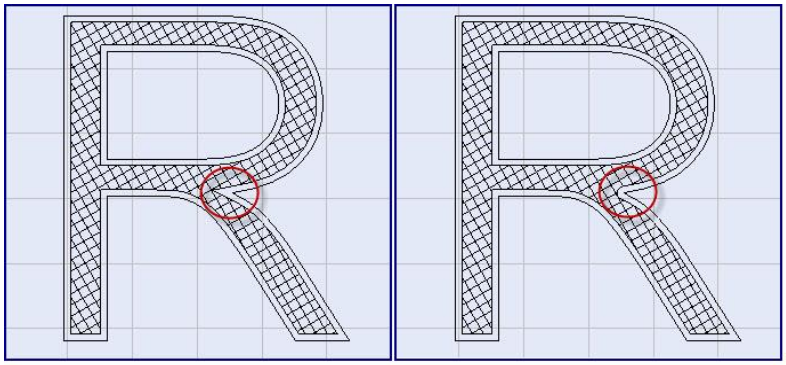


FIGURE 225: LINE HATCH EXAMPLE ON THE DRAWING CANVAS

Offset Hatch

Do the following to apply an offset hatch pattern to text:

1. Select the text to which you want to apply the offset hatch pattern.
2. Left-click the **Hatch** tab in the **Text Editor**.
3. Left-click the **Offset Hatch** icon on the **Hatch** tab. This previews the hatching in the **Text Editor**.
4. You may change the following properties. Then left-click the **OK** button to exit the **Text Editor** and return to the Drawing Canvas.

Offset Gap	The space between offset lines
Offset Direction	This can be either 'Inward to Outward' or 'Outward to Inward'
Corner Style	Specifies whether corners are Smooth or Sharp.  Sharp and Smooth Corner Styles

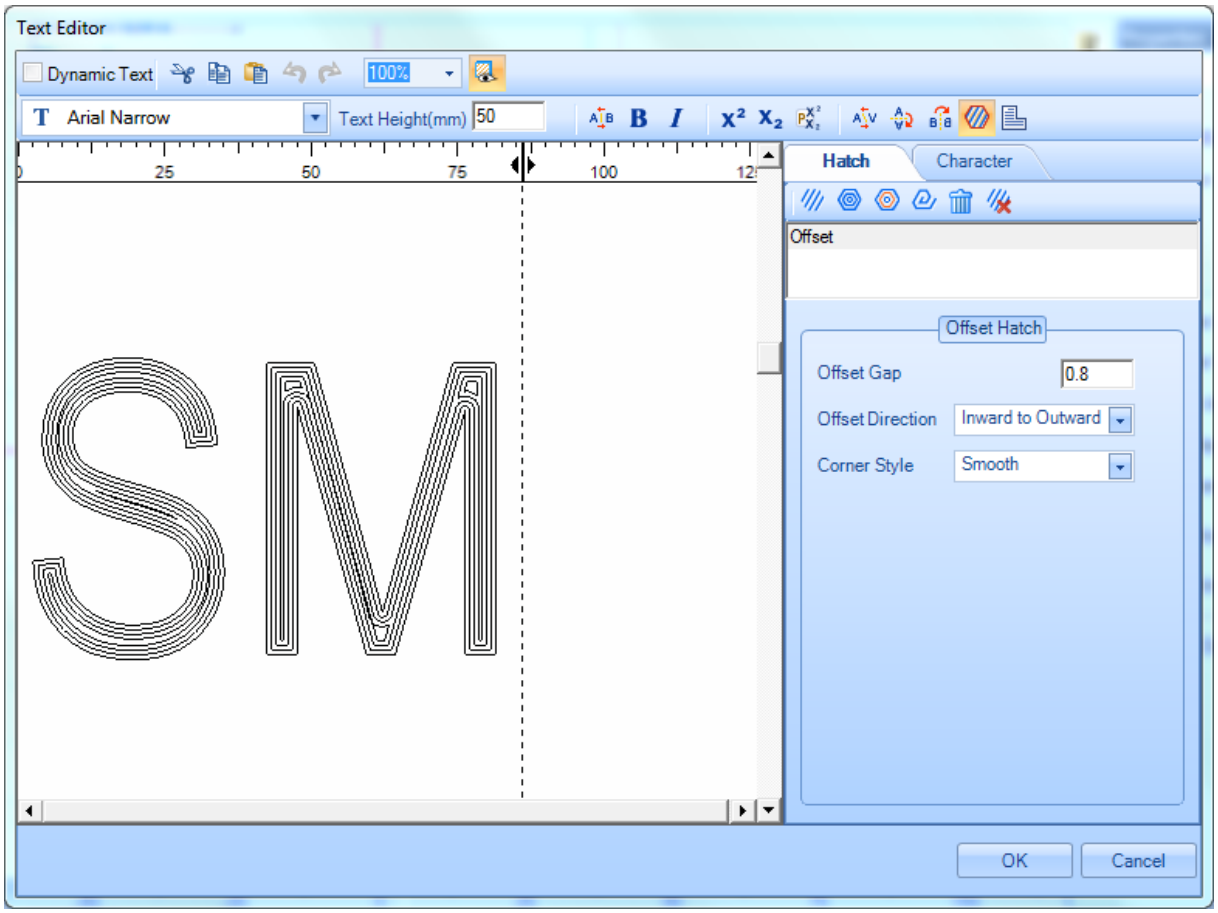


FIGURE 226: OFFSET HATCH EXAMPLE IN THE TEXT EDITOR

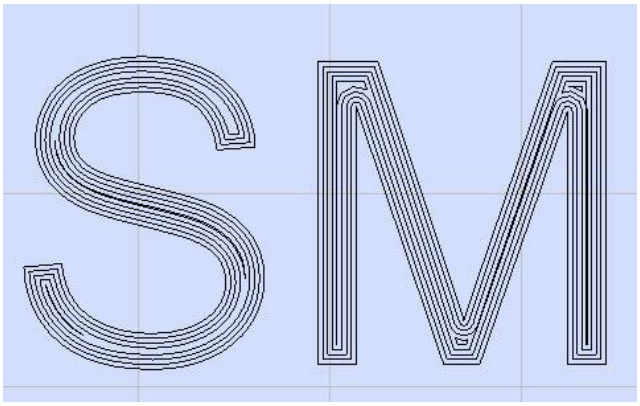
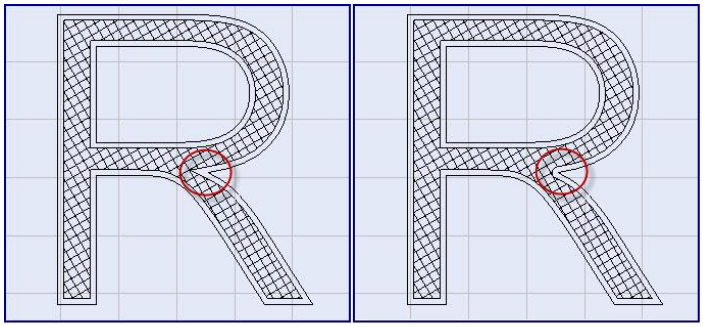


FIGURE 227: OFFSET HATCH EXAMPLE ON THE DRAWING CANVAS

Offset In-Out Hatch

Do the following to apply offset in-out hatch to text:

1. Select the text to which you want to apply the offset in-out hatch pattern.
2. Left-click the **Hatch** tab in the **Text Editor**.
3. Left-click the **Offset In-Out icon** on the **Hatch** tab. This previews the hatching in the **Text Editor**.
4. You may change the following properties. Then left-click the **OK** button to exit the **Text Editor** and return to the Drawing Canvas.

Inward Offset Gap	The gap between the offset lines inside the object boundary
Inward Offset Count	The number of offsets to be filled inside the object boundary
Outward Offset Gap	The gap between offset lines outside the object boundary
Outward Offset Count	The number of offsets to be filled outside of the object boundary
Corner Style	Specifies whether corners are Smooth or Sharp.  Sharp and Smooth Corner Styles

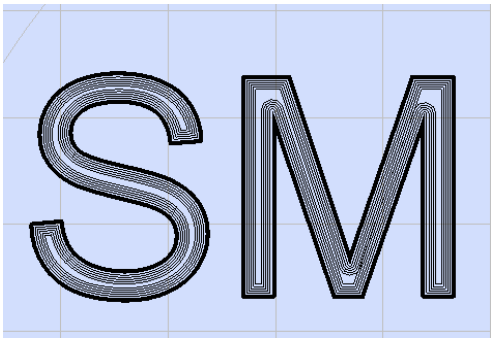
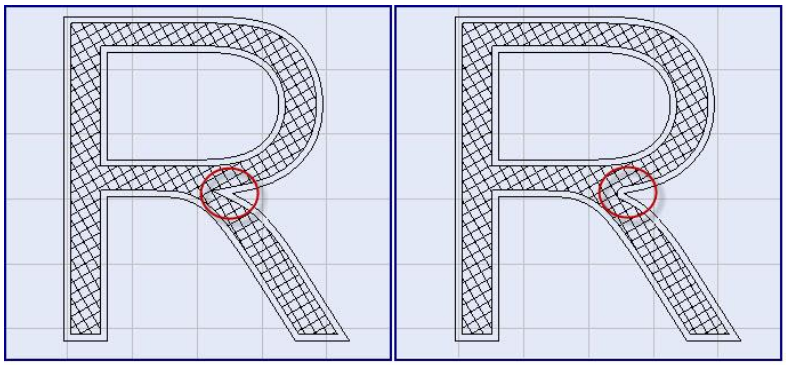


FIGURE 228: OFFSET IN-OUT HATCH EXAMPLE ON THE DRAWING CANVAS

Helix Hatch

Do the following to apply a helix hatch pattern on text:

1. Select the text to which you want to apply the helix hatch pattern.
2. Left-click the **Hatch** tab in the **Text Editor**.
3. Left-click the **Helix Hatch** icon on the **Hatch** tab. This previews the hatching in the **Text Editor**.
4. You may change the following properties. Then left-click the **OK** button to exit the **Text Editor** and return to the Drawing Canvas**.**

Helix Gap	The gap between adjacent hatch lines
Helix Direction	This can be either 'Inward to Outward' or 'Outward to Inward'
Corner Style	Specifies whether corners are Smooth or Sharp.  Sharp and Smooth Corner Styles

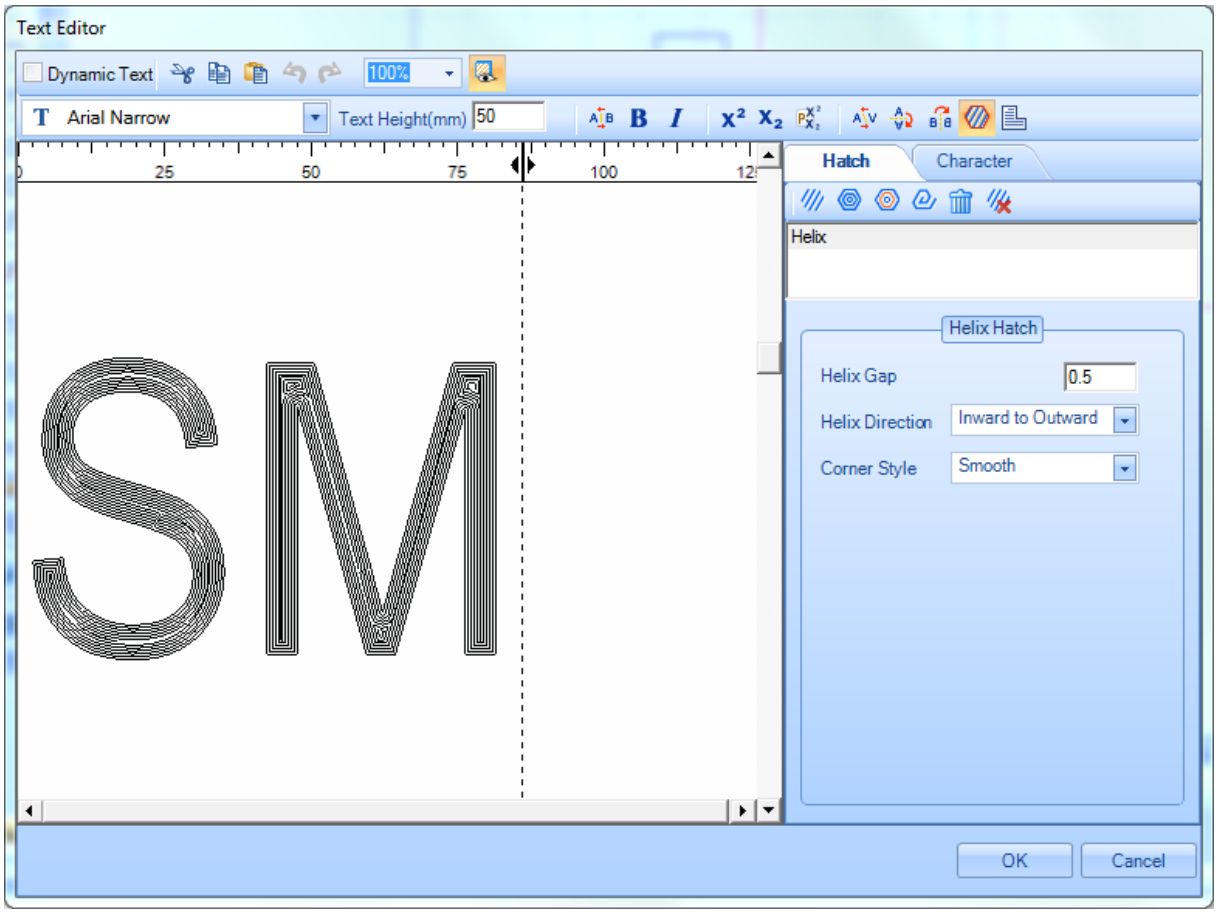


FIGURE 229: HELIX HATCH EXAMPLE IN THE TEXT EDITOR

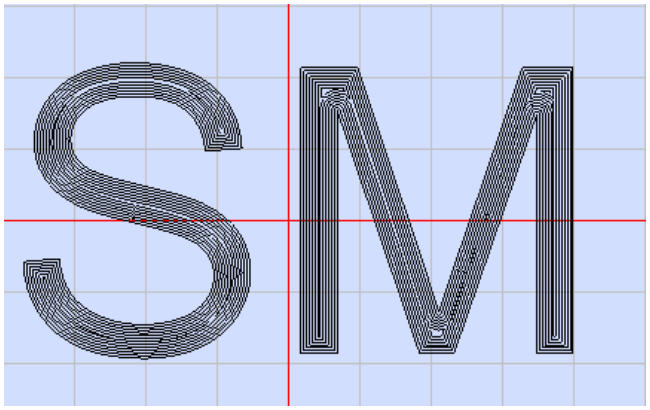


FIGURE 230: HELIX HATCH EXAMPLE ON THE DRAWING CANVAS

Clearing All Hatching

Left-click the **Clear All Hatches** icon to remove the existing hatch pattern from the selected text.

Once a hatch pattern is cleared, it will be removed from the list of applied hatch patterns. This list appears below the **Hatch Icons Toolbar** on the **Hatch** tab.

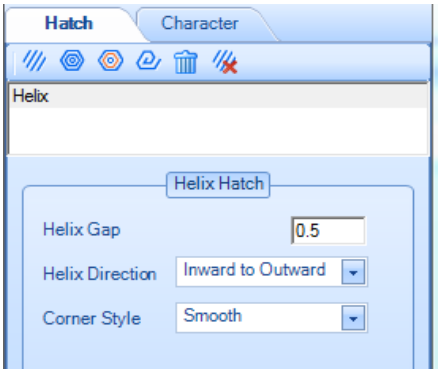


FIGURE 231: THE HATCH ICONS TOOLBAR AND THE LIST OF APPLIED HATCH PATTERNS

Showing and Hiding Hatching

To toggle the display of hatching in the **Text Editor**, left-click the **Show/Hide Hatch** icon on the text formatting toolbar.

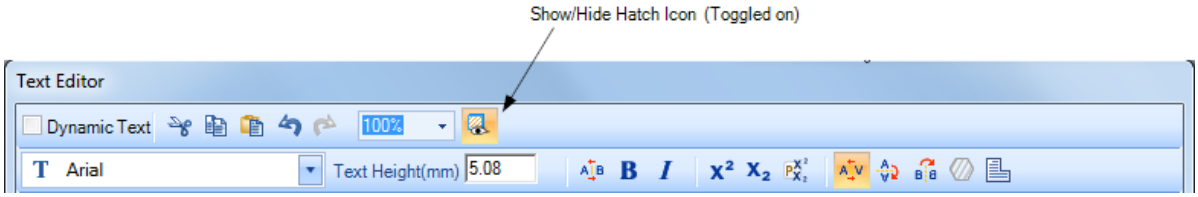


FIGURE 232: THE SHOW/HIDE HATCH ICON (TOGGLED ON) ON THE TEXT FORMATTING TOOLBAR

Note: As shown in the above figure, the display of hatching is toggled on by default. When the display of hatching is toggled *off*, the **Show/Hide Hatch** icon looks like the following: .

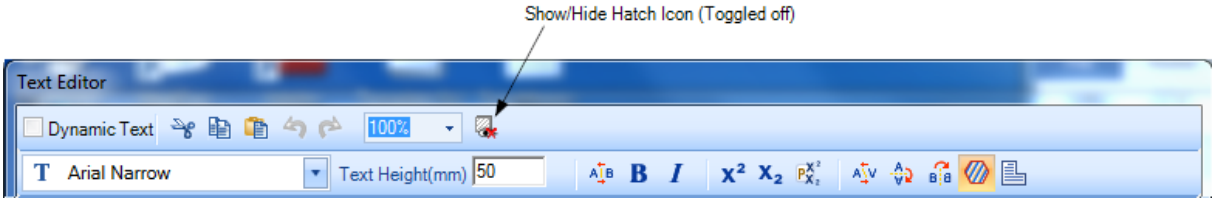


FIGURE 233: THE SHOW/HIDE HATCH ICON (TOGGLED OFF) ON THE TEXT FORMATTING TOOLBAR

The following is an example of text in the **Text Editor** with hatching toggled on.

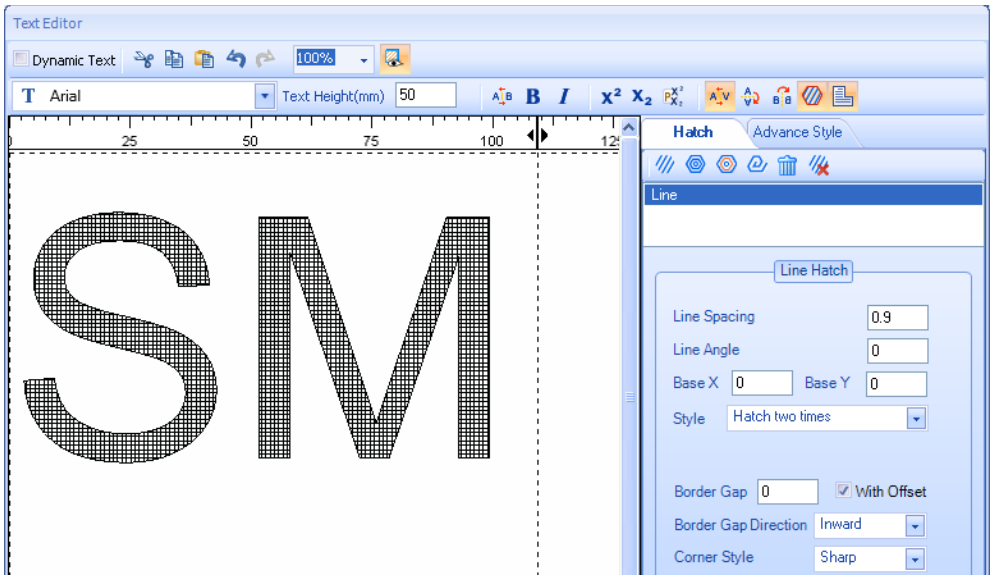


FIGURE 234: SHOW/HIDE HATCH EXAMPLE (TOGGLED ON) IN THE TEXT EDITOR

The following is an example of the same text in the **Text Editor** with hatching toggled off.

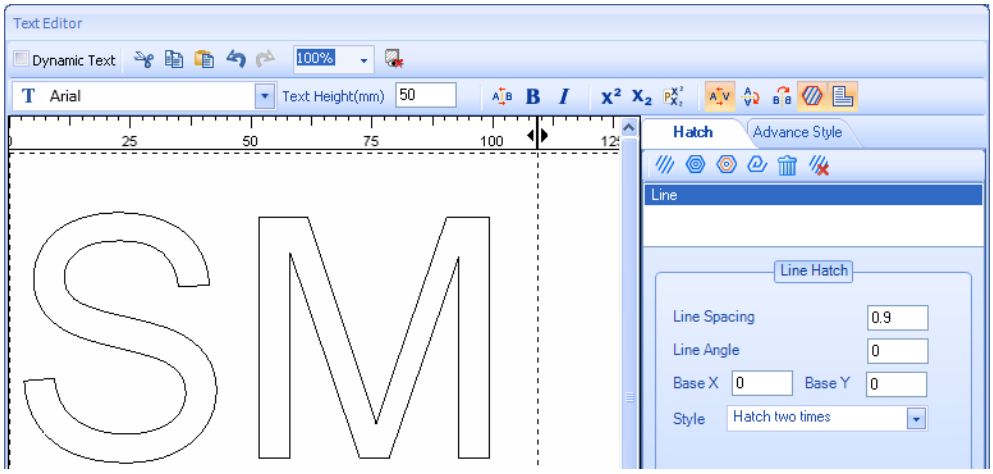


FIGURE 235: SHOW/HIDE HATCH EXAMPLE (TOGGLED OFF) IN THE TEXT EDITOR

Removing Hatching

The **Remove Hatch** tool will remove only the selected hatch pattern from the selected text and from the list of applied patterns on the **Hatch** tab.

Do the following to remove a hatch pattern with the **Remove Hatch** tool:

1. Select the text from which you want to remove the hatch pattern.
2. Select the hatch pattern that you want to delete from the list of applied hatch patterns in the **Hatch** tab.

Note: In the following example, the letter "M" is selected. Also in the following example, the **line** hatch pattern is selected in the list of applied hatch patterns.

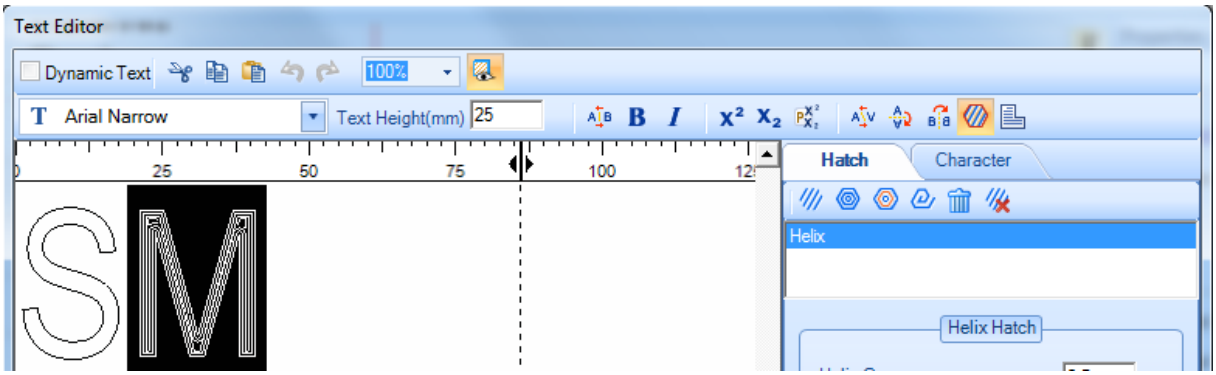


FIGURE 236: THE SELECTED TEXT AND HATCH PATTERN

3. Left-click **Remove Hatch** icon on the **Hatch** tab toolbar.

The selected hatch pattern is removed from the list of applied hatch patterns and from the selected text.

Toggling the marking of the outer border on hatched text

You can use the **Mark Outline** tool to toggle the marking of the outer border on hatched text.

Do the following to toggle the marking of the outer border on hatched text:

1. Select the hatched text for which you want to toggle the marking of the outer border.
2. Left-click the **Mark Outline** icon on the text formatting toolbar.

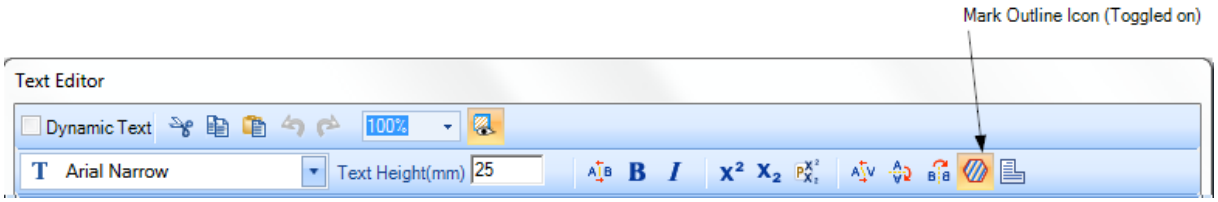


FIGURE 237: THE MARK OUTLINE ICON (TOGGLED ON) ON THE TEXT FORMATTING TOOLBAR

Note: As shown in the above figure, the marking of the outer border is toggled on by default. When the marking of the outer border is toggled *off*, the **Mark Outline** icon looks like the following: .

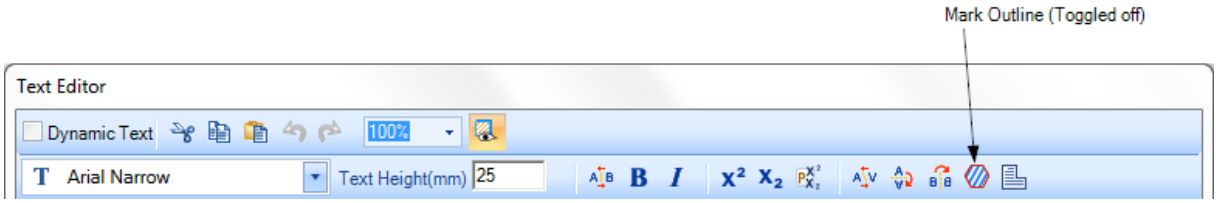


FIGURE 238: THE MARK OUTLINE ICON (TOGGLED OFF) ON THE TEXT FORMATTING TOOLBAR

The following example shows the letter "M" with **Mark Outline** toggled on and off.

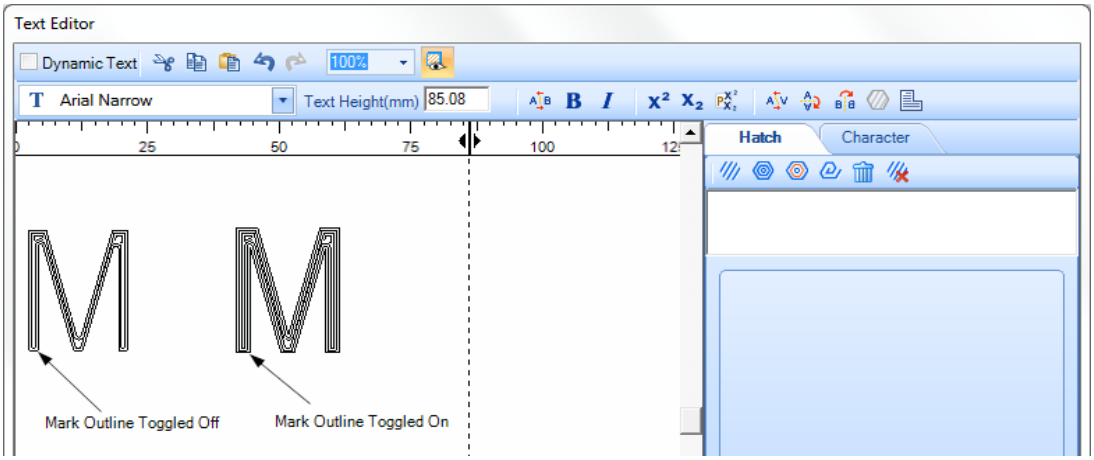


FIGURE 239: MARK OUTLINE TOGGLED ON AND OFF

Applying Word Wrapping to Text

The **Word Wrap** option eliminates the need to scroll horizontally while reading text in the **Text Editor**; in order to fit the text to the specified margins, it breaks a line between words.

To apply the Word Wrap option, left-click the **Word Wrap** icon on the text formatting toolbar.

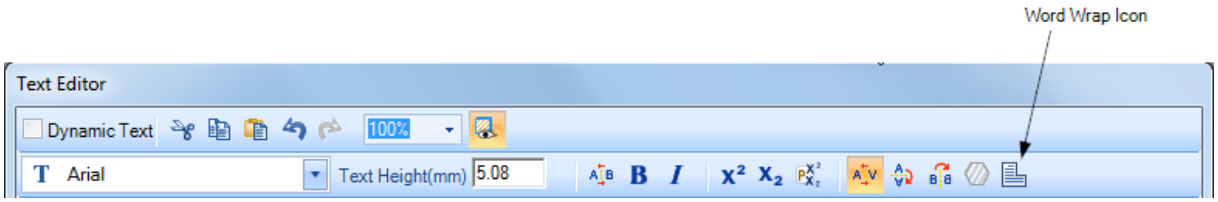


FIGURE 240: THE WORD WRAP ICON IN THE TEXT FORMATTING TOOLBAR

6.4.20 Formatting Tools on the Character Tab

You can use the **Character** tab to specify line spacing and text alignment for all of the text displayed in the **Text Editor** as well as the rotation angle, oblique angle, and horizontal and vertical scale factors for selected characters.

To display the **Character** tab, left-click the **Character** tab heading on the right-hand side of the **Text Editor**.

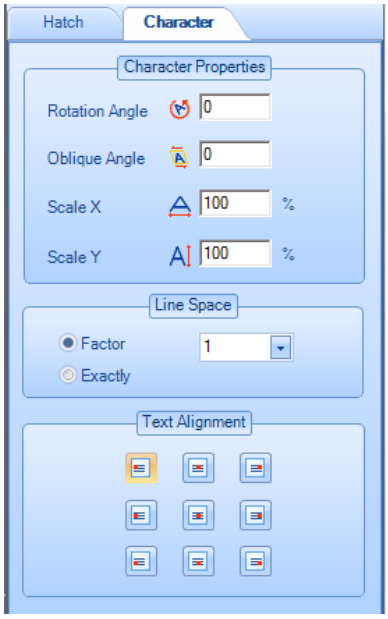


FIGURE 241: THE CHARACTER TAB IN THE TEXT EDITOR

Rotation Angle

The **Rotation Angle** parameter on the Character tab is used to specify the angle that a selected character rotates around its center point. A positive value makes the character rotate in a counterclockwise direction. A negative value makes the characters rotate in a clockwise direction.

Do the following to apply a rotation angle:

1. Select the text or character(s) to which you want to apply a rotation angle.
2. Enter a value in the **Rotation Angle** field and press the **Enter** key.

The following is an example of characters whose rotation angle has been set to 30 degrees.

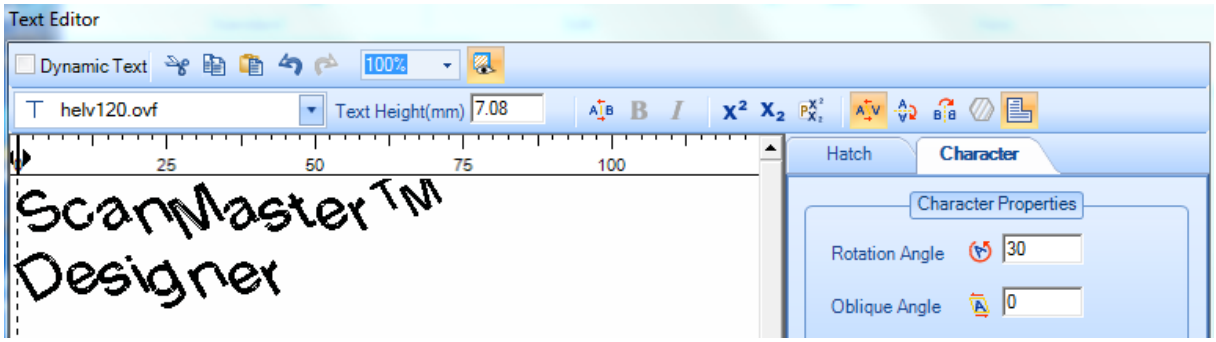


FIGURE 242: ROTATION ANGLE

Oblique Angle

The **Oblique Angle** parameter on the Character tab is used to specify the slant of the selected characters. A positive value makes the characters lean to the right, and a negative value makes the characters lean to the left.

Do the following to apply an oblique angle:

1. Select the text or character(s) to which you want to apply an oblique angle.
2. Enter a value in the **Oblique Angle** field and press the **Enter** key.

Note: This feature is also available in the **Properties** tab. All the characters will be affected when oblique angle is applied through the **Properties** tab.

The following is an example of characters whose oblique angle has been set to 15 degrees.

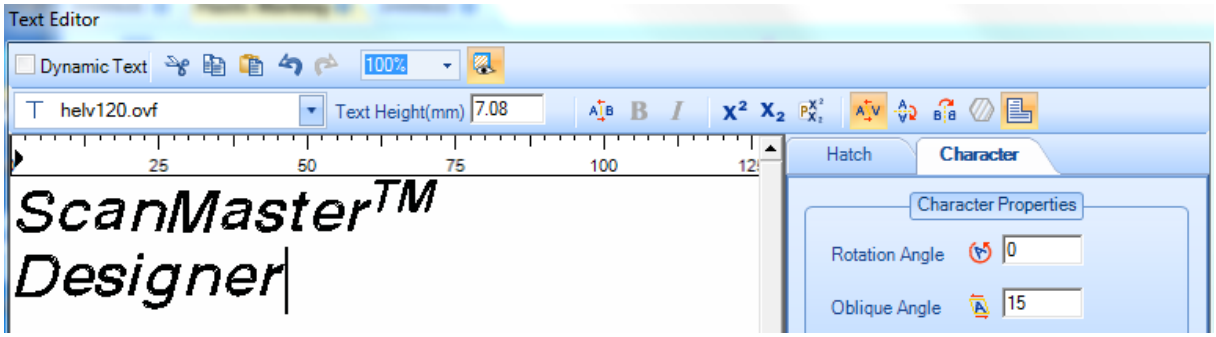


FIGURE 243: OBLIQUE ANGLE

Scale X

The **Scale X** parameter on the **Character** tab is used to increase or decrease the width of the selected character(s). Do the following to increase or decrease the width of the selected character(s) with the **Scale X** tool.

1. Select the text or character(s) whose width you want to increase or decrease.
2. Enter a value in the **Scale X** field and press the **Enter** key.

Note: This feature is also available in the **Properties** tab. All the characters will be affected when **Scale X** is applied through the **Properties** tab.

In the following example, the width of the letter "M" in "ScanMaster" has been increased 180%.

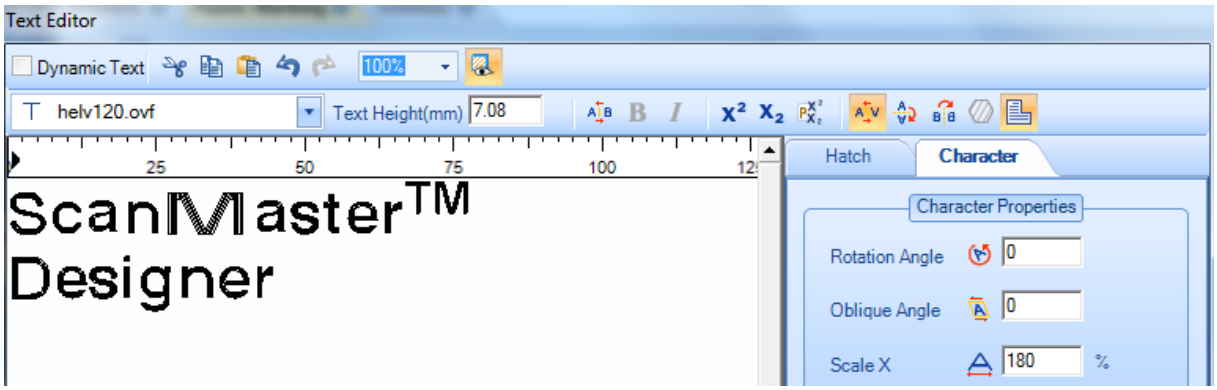


FIGURE 244: SCALE X

Scale Y

The **Scale Y** parameter on the Character tab is used to increase or decrease the height of the selected character(s).

1. Select the text or character(s) whose height you want to increase or decrease.
2. Enter a value in the **Scale Y** field and press the **Enter** key.

Note: This feature is also available in the **Properties** tab**.** All the characters will be affected when **Scale Y** is applied through the **Properties** tab.

In the following example, the height of the letter "M" in "ScanMaster" has been increased 180%.

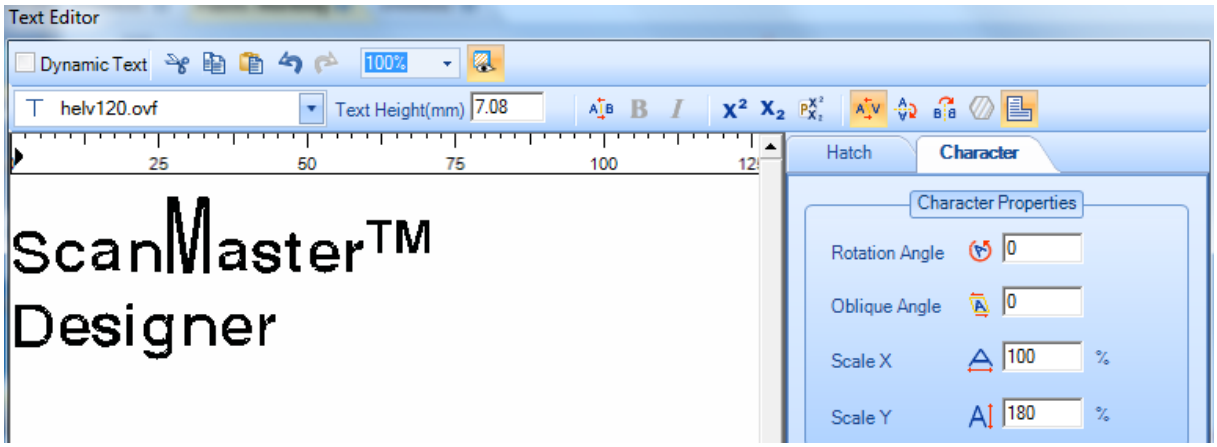


FIGURE 245: SCALE Y

Line Space

Line spacing is the distance from the baseline of one line to the next. You can specify line spacing as an exact value or as a factor of font size.

Specifying Line Spacing as a Factor of Font Size

Select the **Factor** radio button to specify the line spacing as a factor of font size. ScanMaster Designer will calculate the line spacing as the font size multiplied by the value in the text box that appears beside the **Factor** radio button. For example, if the font size is 12 and the value in the text entry box is 2, the line spacing is 24 units.

Note: The line spacing is expressed in the same units as the font size (i.e., points, inches, millimeters, etc.).

You can type the factor directly in the text entry box or select it from the drop-down list by left-clicking the arrowhead icon to the right of the text entry box.

The following figure illustrates line spacing by a factor of 2.

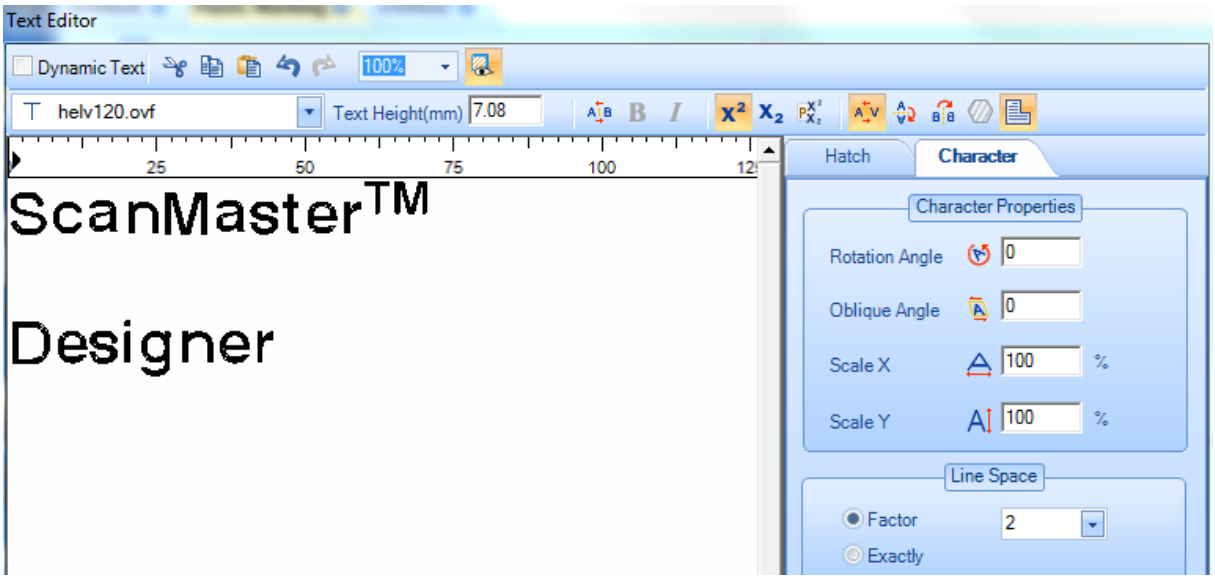


FIGURE 246: LINE SPACING - FACTOR

Specifying Line Spacing as an Exact Value

Select the **Exactly** radio button to specify the line spacing as an exact value expressed in font-size units. You can type this value directly in the text entry box or select it from the drop-down list by left-clicking the arrowhead icon to the right of the text entry box. When you change the size of the font, the line space will still remain the same.

Note: The line spacing is expressed in the same units as the font size (inches or millimeters).

The following figure illustrates line spacing of exactly 25 mm.

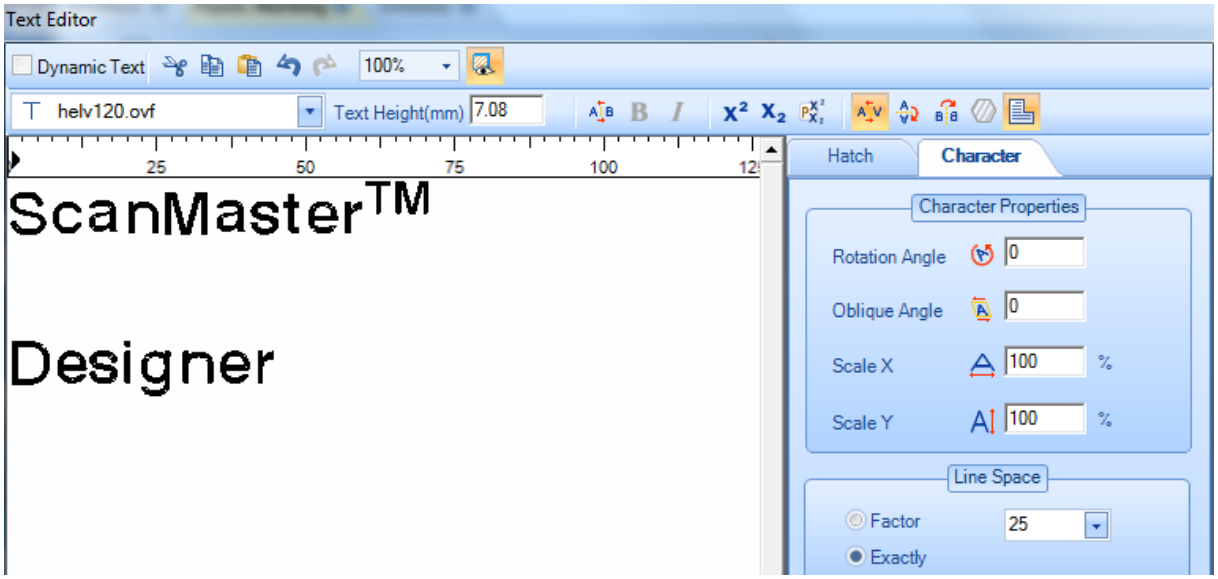


FIGURE 247: LINE SPACING EXACTLY

Text Alignment

The Text Alignment buttons specify the alignment of text in the text box.

To align text, left-click the appropriate Text Alignment button while the text is selected and the cursor is placed in it.

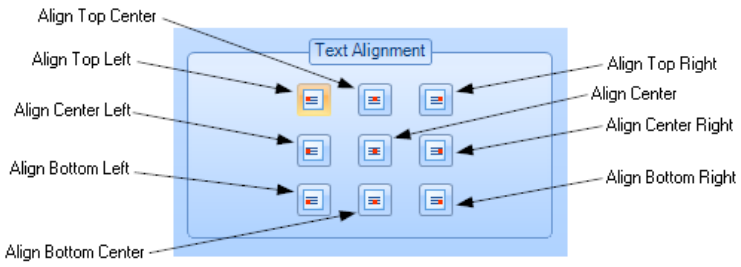


FIGURE 248: THE TEXT ALIGNMENT BUTTONS

6.4.21 Unicode Support

With the support of Unicode, you can enter text in different languages as well as special characters. ScanMaster Designer is Unicode-enabled, thus you can type text in the language that is installed in your machine.

You can enable Unicode by doing any of the following:

- Using the Language Pack
- Using the Alt key
- Using the Windows Character Map
- Using an Input Method Editor

To insert text to the **Text Editor**, use one of the four options described below.

Using the Language Pack

After installing the language pack that you want to use, click the **Language bar** located in the notification area on the right side of the Windows taskbar. Then click to select the language that you want to type.

FIGURE 249: UNICODE SUPPORT –LANGUAGE PACK

The above image shows a list of available input languages, with Chinese being the one that is currently active.

Note: The **Language bar** displays the current language of your system. For example, on a **Chinese (PRC)** system, the **Language bar** displays **CH** and the ToolTip displays "Chinese (PRC)".

Using the Alt key

Windows assigns a numeric code to different accented letters, other foreign characters, and special symbols. The Alt key is used to manually insert these letters and symbols by calling the numeric code assigned to them. Press and hold the Alt key while entering a character code with the keyboard's numeric keypad. For example the code for Japanese Yen (¥) is 0165.

Using an Input Method Editor

IMEs (Input Method Editors) are components that allow you to enter characters in different languages using a standard keyboard.

1. After you install the relevant language pack, click the **Language bar** located in the notification area on the right side of the Windows taskbar, and then click to select the language that you want to type.
2. Type the characters that you want in your ScanMaster Designer **Text Editor**. You may type the characters phonetically or use any other method provided by the IME.

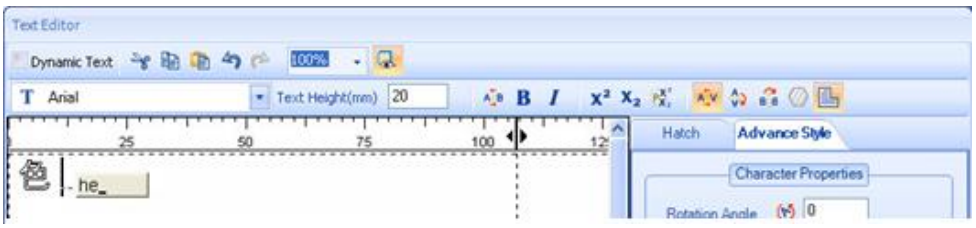


FIGURE 250: INPUT METHOD EDITOR

The above example shows Chinese characters being typed phonetically.

1. If it is the correct character, press the **Space bar** or the **Enter** key to continue.
2. You can switch between the default language (typically English) and the IME language by clicking the IME language button in the status window.

Note: If the **Language Bar** option is not visible in 'Toolbars', then it needs to be enabled through the Control Panel.

Using the Windows Character Map

If you do not have a language keyboard, and still wish to insert text in a different language, you can use the standard Windows® Character Map.

Open the Character Map and select the desired characters. To open the Character Map window select Run on the Windows Start menu and type 'charmap'.

Once you have selected the required characters, click the Copy button. Then go back to the ScanMaster Designer's Text Editor and paste the selected text.

Note: You can follow the same procedure for entering Dynamic Text, but ensure that you embed the relevant font.

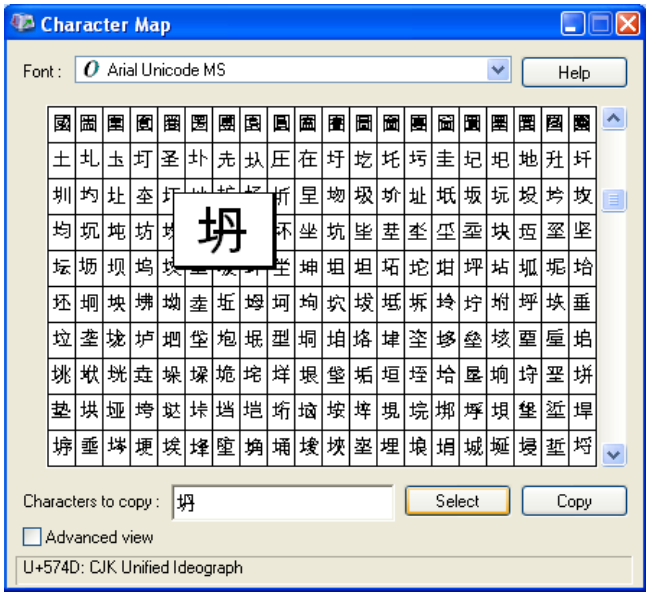


FIGURE 251: CHARACTER MAP

6.4.22 Inserting Path Text

You can use the **Path Text** tool to insert text along the path of a shape. For example, the following figure shows the text "ScanMaster Designer" along the path of a circle.

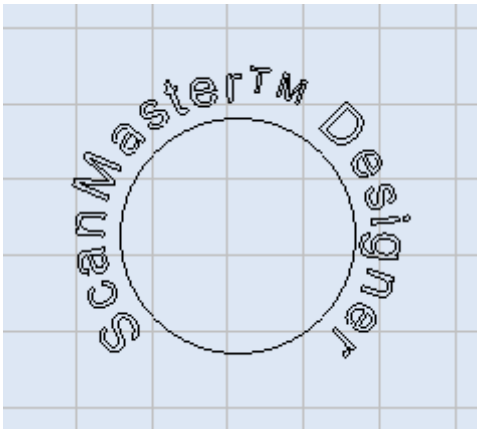


FIGURE 252: TEXT ALONG THE PATH OF A CIRCLE

Do the following to insert text along the path of a shape:

1. Draw the desired shape. (Refer to "Geometric Shapes" on page 119 for descriptions of how to draw shapes.)
2. Left-click the **Path Text** icon icon from the **Drawing Shapes** Toolbar.
3. On the Drawing Canvas, left-click the Shape to which the path text should be attached.
4. When the mouse is over the shape, the shape outline will be highlighted in blue. Select the blue-highlighted shape be left-clicking it. Once you left-click on the shape, the highlighting changes from blue to red.
5. Left-click at the location you want to use as the start point for the text. (You can also type the coordinates in the parameter-entry boxes.)
6. Left-click one of the two arrowheads that appear on the shape to specify the direction for the path text. This displays the **Text Editor**.
7. Type the path text in the **Text Editor**.

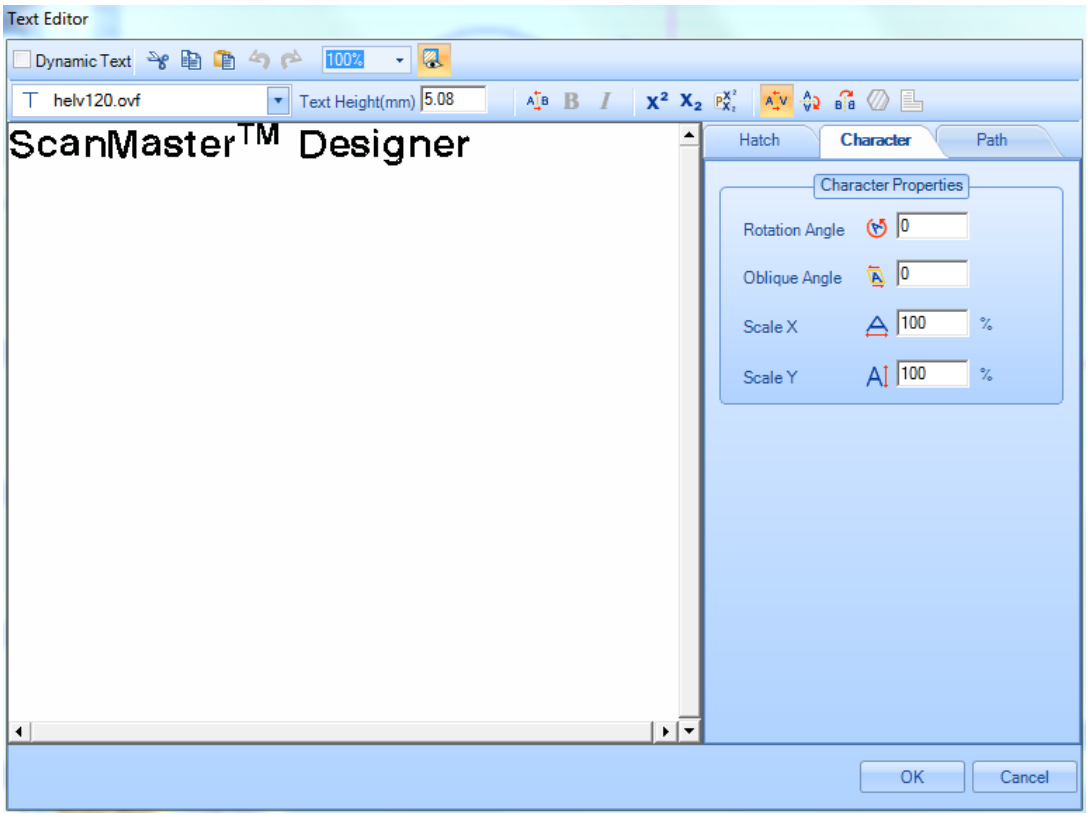


FIGURE 253: PATH TEXT

8. You can edit the path text, or any of its text properties, as described in "Basic Text Formatting" on page 173.
9. Left-click the **OK** button when you have finished typing the path text. The path text is displayed on the selected path.
10. A sample illustration of path text is provided below.

FIGURE 254: PATH TEXT

Note: **Multiline text** is not available with **Path Text**. **Dynamic text** is only available with **Path Text** that is applied to a circular shape.

Path Text Properties

When path text is selected, the **Path Text** Properties window is displayed on the right side of the ScanMaster Designer interface. You can change these properties as desired. The **Path Text** properties apply to the path rather than to the text itself. All of the other properties of path text are set in the Text Editor with the tools described in "Enter and Modify Text in a Drawing" on page 168.

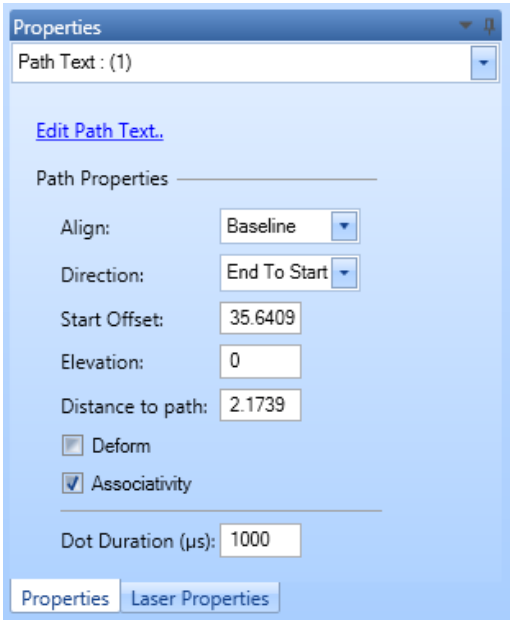


FIGURE 255: PATH TEXT PROPERTIES WINDOW

The **Path Text** properties are described in the following sections.

Align

This property provides you with the following options for aligning text along the path:

- **Ascender** – Aligns the text below the base line.

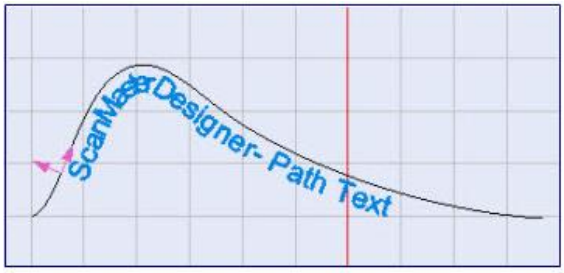


FIGURE 256: ASCENDER OPTION OF THE ALIGN PROPERTY

- **Descender** – Aligns the text above the base line.

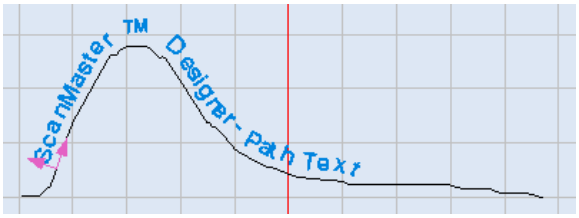


FIGURE 257: DESCENDER OPTION OF THE ALIGN PROPERTY

- **Baseline** – Aligns the text on the base line.

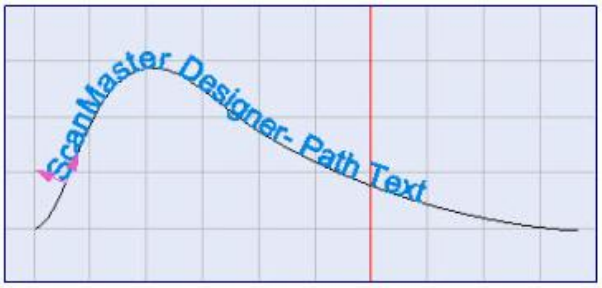


FIGURE 258: BASELINE OPTION OF THE ALIGN PROPERTY

- **Center** – Aligns the center of the text on the base line.

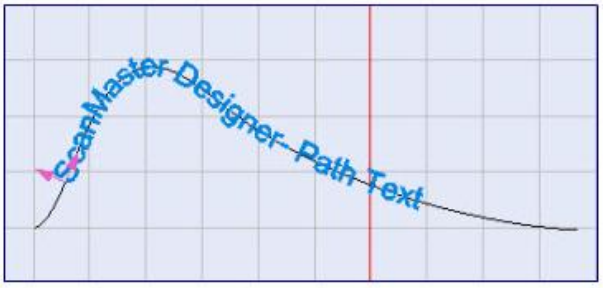


FIGURE 259: CENTER OPTION OF THE ALIGN PROPERTY

Direction

This property provides you with the following options for specifying the direction of the path text:

- **Start to End** – Text is inserted at the start of the path and continues toward the end of the path.

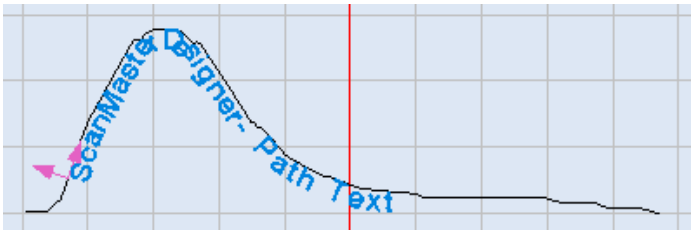


FIGURE 260: THE START TO END OPTION OF THE DIRECTION PROPERTY

- **End to Start** – Text is inserted at the end of the path and continues toward the start of the path.

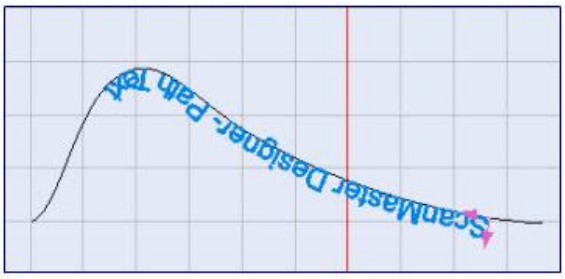


FIGURE 261: THE END TO START OPTION OF THE DIRECTION PROPERTY

Start Offset

This property specifies the distance from point 0 of the start of the path.

Enter a numeric value for Start Offset and press the **Return** key.

You can also change the **Start Offset** value by doing the following:

1. Select the **Start Offset** by left-clicking the arrowhead that points in the text direction. (When selected, the path text is blue-highlighted.)
2. Press and hold down the left mouse button on the blue-highlighted path text.
3. With the left mouse button held down, drag the path text until it is at the desired **Start Offset**.

FIGURE 262: PATH TEXT WITH ZERO AND NON-ZERO START OFFSETS

Elevation

This property specifies the Z-axis elevation of the text string.

To change this property, type a new value in the text-entry box and press the **Return** key.

Note: The **Elevation** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Elevation** property is defined in the **Marking Area** tab of the **Project Settings** tab.

Distance to path

This property specifies the distance from the shape to the path.

To change this property, type a new value in the text-entry box and press the **Return** key.

You can also change the **Distance to path** property by doing the following:

1. Select the text path by left-clicking it. When selected, the path text will turn blue.
2. Press and hold down the arrowhead that is perpendicular to the text direction arrowhead. When the arrowhead is selected, it turns blue as shown in the following figure.

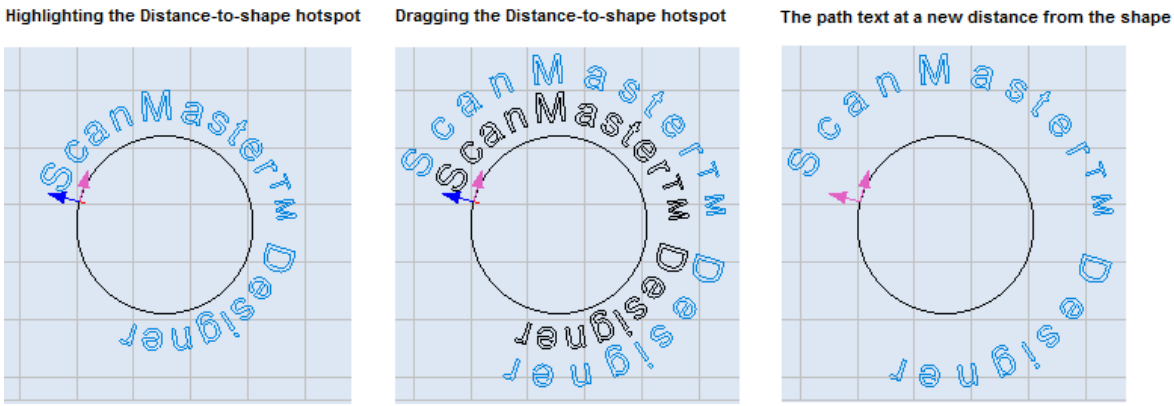


FIGURE 263: SELECTING THE DISTANCE TO PATH PROPERTY

3. With the left mouse button held down, drag the path text until it is at the desired distance from the shape.

Deform

When the **Deform** checkbox is selected, the text will be deformed to follow the path more uniformly.

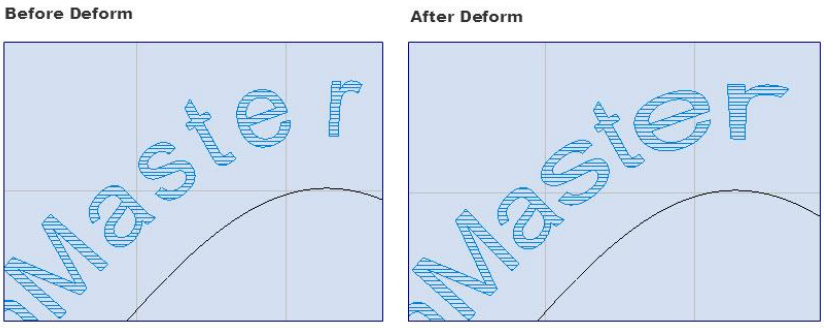


FIGURE 264: THE EFFECTS OF THE DEFORM PROPERTY

Associativity

When the **Associativity** checkbox is selected, the path text will be bound to the shape. This means that when you move the path, the text will move along with it.

With the exception of **Associativity** and **Dot Duration**, the Path Text properties are also displayed on the **Path** tab of the **Text Editor**.

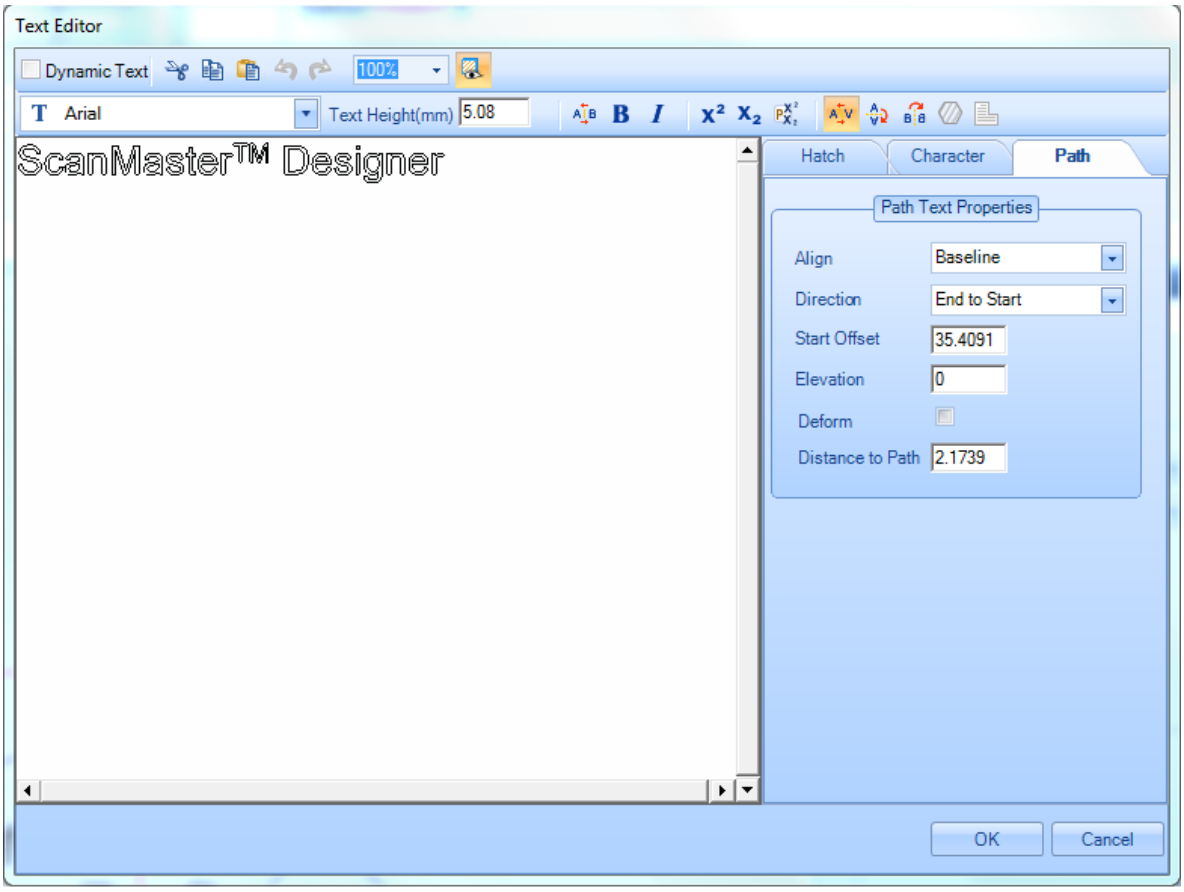


FIGURE 265: TEXT EDITOR WITH THE PATH TAB

6.5 VECTOR IMAGES

ScanMaster Designer allows you to insert a Vector Image from a file (formats **.dxf**, **.ai**, **.plt, .pdf, .nc, .tp, .eps**, and **.hpgl**). The methods for inserting a Vector Image are **Location & Size** and **Absolute Units**. Both methods are described in the following subsections.

Note: **.ai** files should be created in Illustrator, version 5 to 8.

Most of the vector editing software has a feature called '**Convert to Curves**' which converts a complex vector shape in to a collection of primitive shapes. This feature can be used as a workaround to avoid the **pdf** text conversion issues.

6.5.1 Inserting a Vector Image using Location & Size

Do the following to insert a Vector Image using the **Location & Size** method:

1. Click the arrow below the **Insert Vector Shape** button on the **Drawing Shapes** Toolbar and select the **Location & Size** option. This displays the Open Vector Image File dialog box.

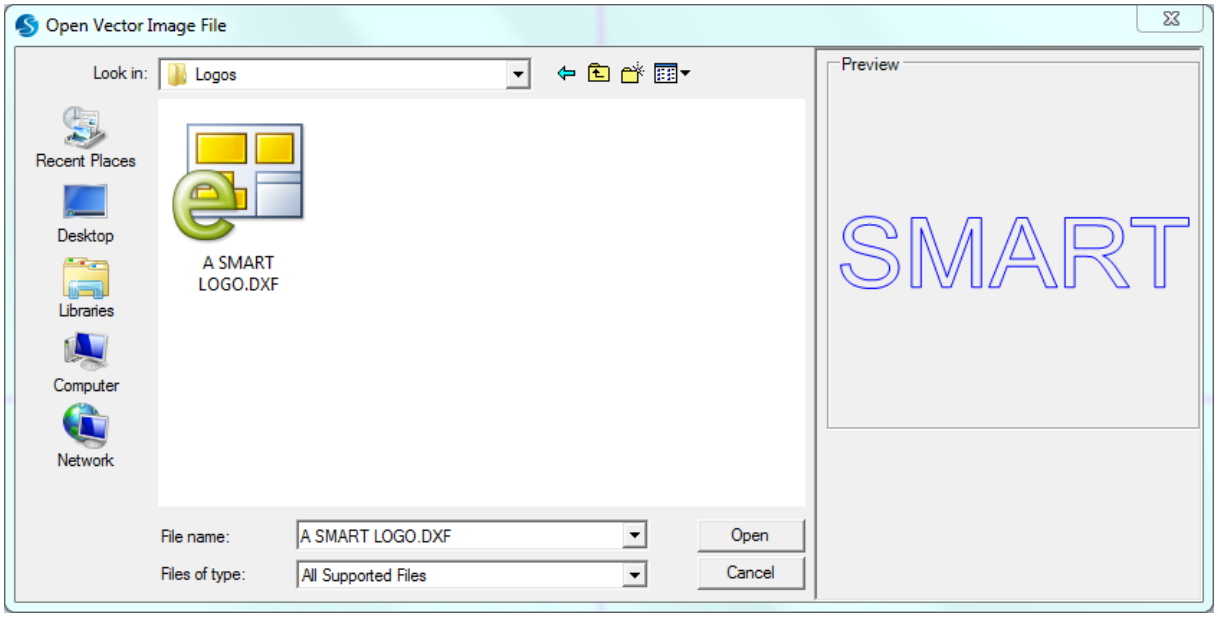


FIGURE 266: THE OPEN VECTOR IMAGE DIALOG BOX

1. Select the vector file to be inserted and click the **Open** button.
2. If the following message dialog appears, click the **OK** button to substitute any missing font(s).

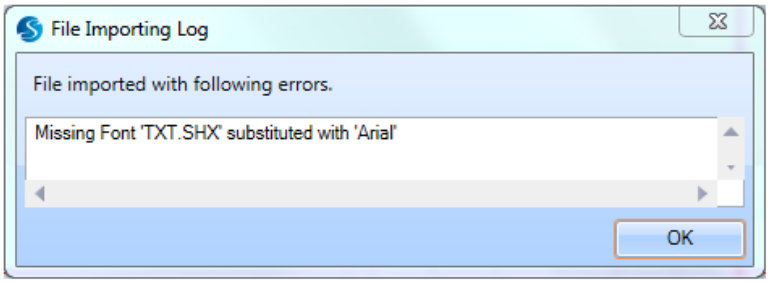


FIGURE 267: THE FILE IMPORTING LOG DIALOG BOX

3. After exiting the above dialog box, press and hold down the left mouse button at a location on the Drawing Canvas.
4. While holding down the left mouse button, drag the mouse in a diagonal direction. This defines the size of the inserted Vector image.

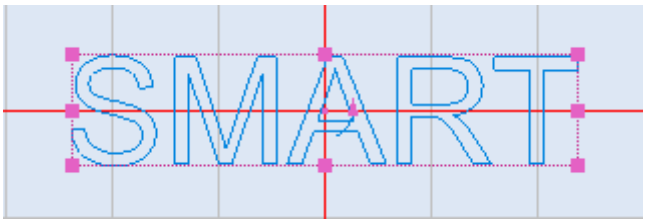


FIGURE 268: AN INSERTED VECTOR IMAGE

5. Release the left mouse button when the inserted Vector image is at the desired size. The image will be displayed with hotspots.

6.5.2 Inserting a Vector Image using Absolute Units

Do the following to insert a Vector Image using the **Absolute Units** method:

1. Click the arrow below the **Insert Vector Shape** button on the **Drawing Shapes** Toolbar and select the **Absolute Units** option. This displays the **Open Vector Image File** dialog box.

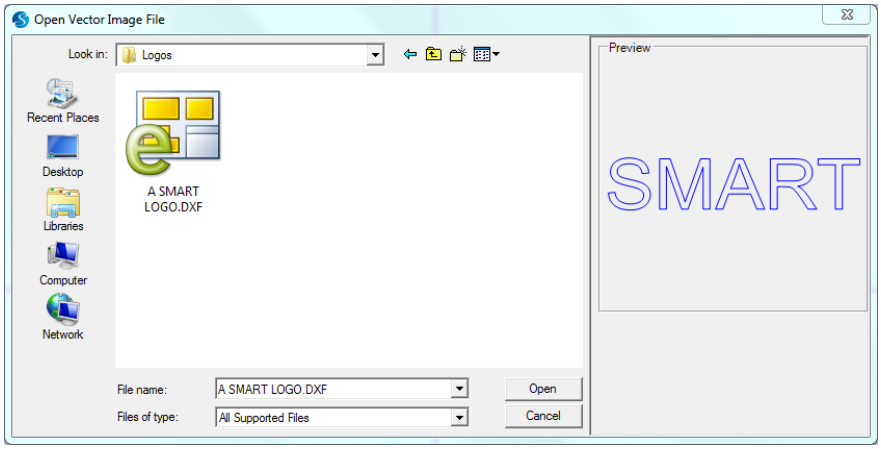


FIGURE 269: THE OPEN VECTOR IMAGE DIALOG BOX

2. Select the vector file to be inserted and click the **Open** button. If the following message dialog appears, click the **OK** button to substitute any missing font(s).

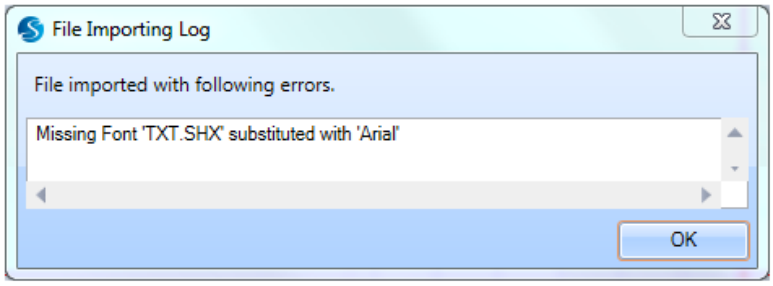


FIGURE 270: THE FILE IMPORTING LOG DIALOG BOX

3. After exiting from the above dialog box, the **Vector Image Properties** window will be displayed in the ScanMaster Designer Interface.

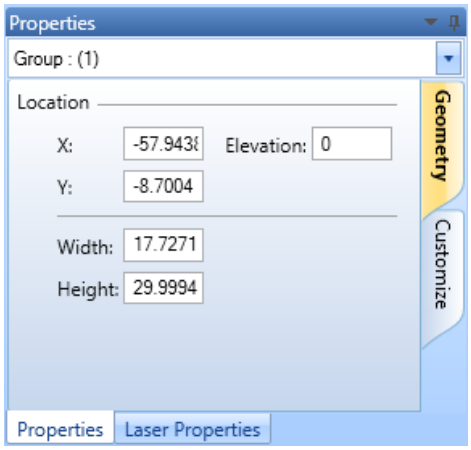


FIGURE 271: THE GROUP SHAPE PROPERTIES WINDOW

4. Enter **X, Y** coordinates and **Elevation** in the appropriate fields of the GroupShape Properties window. (These will be the **X, Y,** and **Z** coordinates of the lower-left corner of the group shape.) After entering each coordinate, press the **Enter** key.

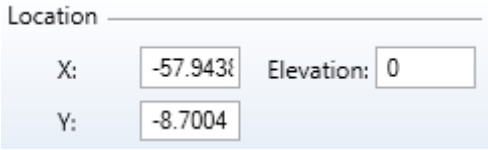


FIGURE 272: THE X, Y COORDINATES AND ELEVATION FIELDS OF THE GROUP SHAPE PROPERTIES WINDOW

Note: The Elevation is only used for scanning on 3-Axis systems. The range of allowable values for the elevation is defined in the **Marking Area** tab of the **Project Settings** tab.

5. Enter the desired width, and height, vector image in the appropriate fields of the Group shape Properties window. After entering each value, press Enter key.

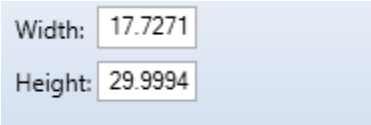


FIGURE 273: THE WIDTH, AND HEIGHT OF THE GROUP SHAPE PROPERTIES WINDOW

The following figure shows an example of a vector image that would be displayed on the Drawing Canvas.

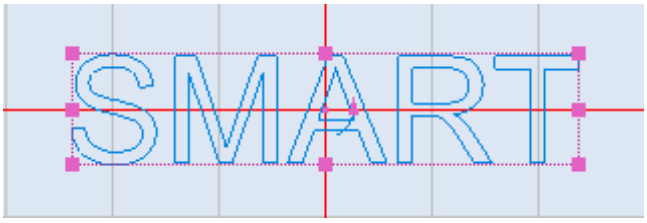


FIGURE 272: AN INSERTED VECTOR IMAGE(BASED ON ABSOLUTE UNITS)

Note: When inserting a vector image, all shapes of the vector image put in to a single group shape and insert to canvas by specifying the group shape behaviour as marking behaviour.

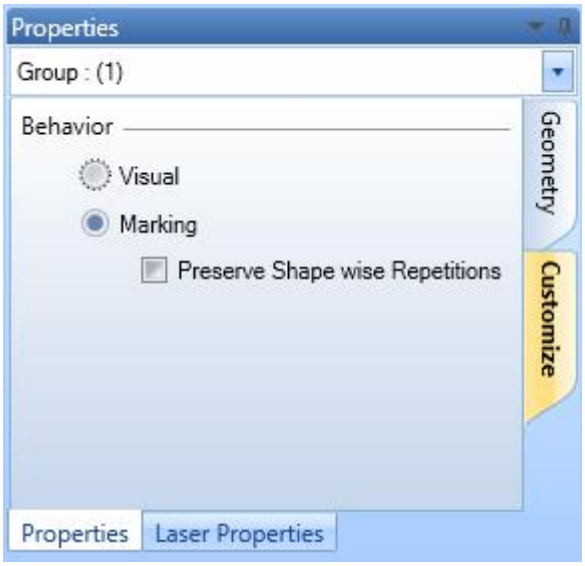


FIGURE 273: THE BEHAVIOUR OF THE GROUP SHAPE PROPERTIES WINDOW

6.6 RASTER IMAGES

A Raster image, or a bitmap image as it is more commonly called, uses a grid of individual pixels where each pixel can be a different color or shade. ScanMaster Designer supports Raster images and provides commands for grayscaling, performing color inversion, adjusting contrast, adjusting brightness, and performing error diffusion on Raster images.

6.6.1 Insert Raster Images

Do the following to insert a Raster image:

1. Left-click the **Insert Raster Image** icon on the **Drawing Shapes** toolbar. This displays the **Open Image File** dialog box.

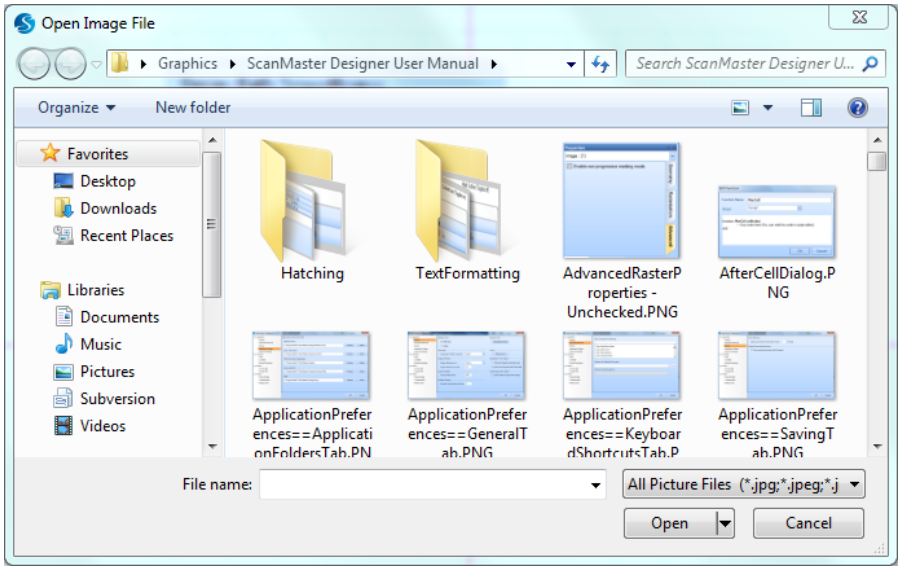


FIGURE 274: THE OPEN IMAGE FILE DIALOG BOX

2. In the **Open Image File** dialog box, select the Raster image file that you want to insert.
3. **Note:** ScanMaster Designer supports the following Raster image file types: Bitmap (***.bmp**), JPEG (***.jpg**), TIFF (***.tiff**), GIF (***.gif**), and PNG (***.png**),
4. Left-click the **Open** button in the **Open Image File** dialog box.
5. Position the cursor on the Drawing Canvas, click the left mouse button, and drag the crosshairs to the desired scale.
6. Click the left mouse button again.

A sample illustration of an inserted Raster image is shown below.

FIGURE 275: EXAMPLE OF AN INSERTED RASTER IMAGE

6.6.2 Image Processing Operations

You can display a popup menu of image processing operations by right-clicking on an inserted Raster image.

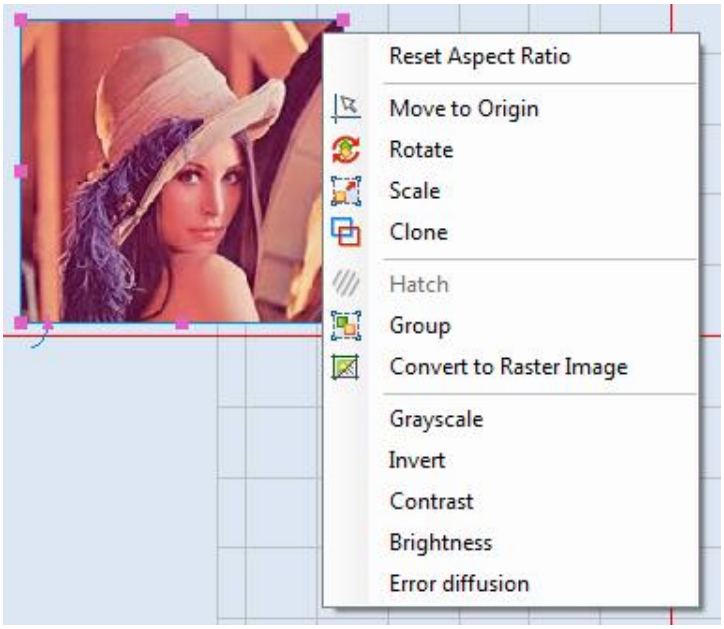


FIGURE 276: IMAGE PROCESSING OPERATIONS POPUP MENU

Grayscale

You can use the **Grayscale** option to represent an image as shades of gray. The shades of gray will vary from Black (0) to White (255).

Do the following to apply grayscale to an image:

1. Select the image to which you want to apply grayscale.
2. Right-click on the image and select Grayscale from the image operations popup menu.

The figure on the right shows an image that has had grayscale applied to it.

FIGURE 277: GRAYSCALE APPLIED TO AN IMAGE

Invert

You can use the **Invert** option to invert the colors of an image. With this command, the brightness value of each pixel of the image is converted to the inverse value on the 256-step (0-255) color-values scale. For example, the pixel in the original image with a value of 5 is changed to 250.

Do the following to invert the colors of an image:

1. Select the image whose colors you want to invert.
2. Right-click on the image and select Invert from the image operations popup menu.

The figure on the right shows an image that has had its colors inverted.

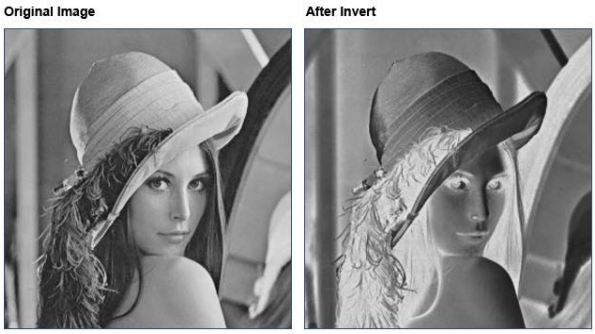


FIGURE 278: AN IMAGE WITH INVERTED COLORS

Contrast

Contrast is the difference between light and dark areas in an image. Contrast adjustment lets you make simple adjustments to the tonal range of an image. This feature is useful to generate a sharper and clearer output if the original image does not have enough color contrast.

Do the following to adjust the contrast of an image:

1. Select the image whose contrast you want to adjust.
2. Right-click on the image and select **Contrast** from the image operations popup menu.

FIGURE 279: THE IMAGE CONTRAST DIALOG BOX

3. To get the necessary contrast, drag the slider to the left or right. The image shows the effect once you click the **OK** button.

The following is an example of an image that has had its contrast adjusted.

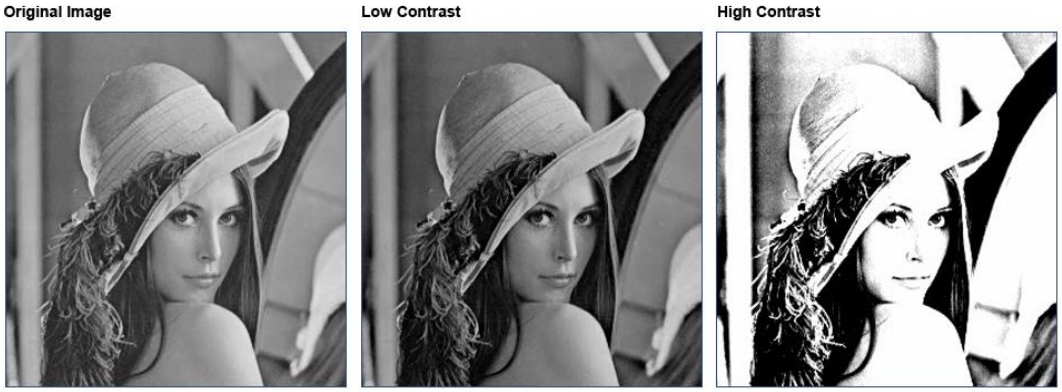


FIGURE 280: AN EXAMPLE OF IMAGE CONTRAST

Brightness

Brightness refers to the overall lightness or darkness of the image: the intensity of a light source.

Do the following to adjust the brightness of an image:

1. Select the image whose brightness you want to adjust.
2. Right-click on the image and select **Brightness** from the image operations popup menu**.** The **Image Brightness** dialog box is displayed.

FIGURE 281: IMAGE BRIGHTNESS DIALOG BOX

3. To get the necessary brightness, move the slider to the left or right. The image shows the effect once you click the **OK** button.

The following is an example of an image that has had its brightness adjusted.

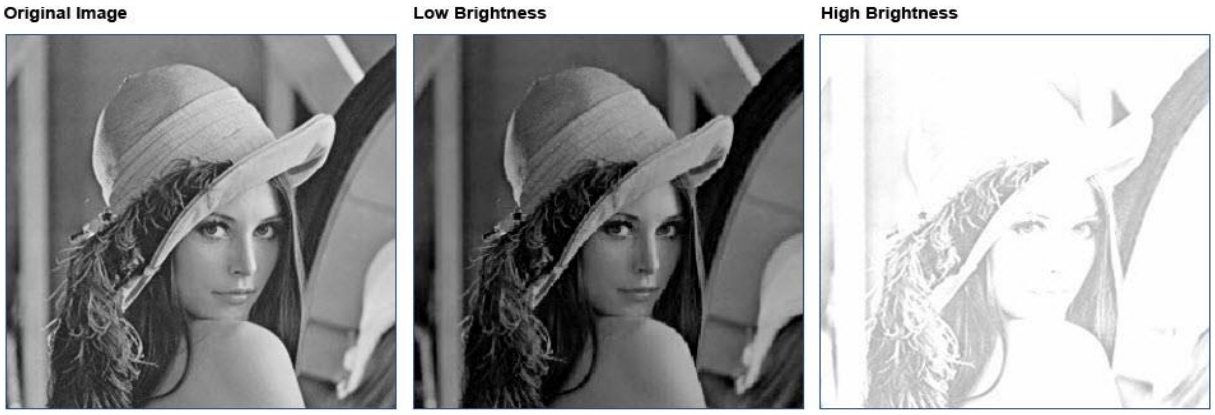


FIGURE 282: IMAGE BRIGHTNESS SAMPLE

Error Diffusion

Error Diffusion is a technique used in Raster Marking to create the illusion of color depth in images with a limited color palette. In a diffused image, colors that are not available in the palette are approximated by a diffusion of colored pixels from within the available palette.

Do the following to apply error diffusion to an image:

1. Select the image to which you want to apply error diffusion.
2. Right-click on the image and select **Error diffusion** from the image operations popup menu**.** The **Error Diffusion** dialog box is displayed.

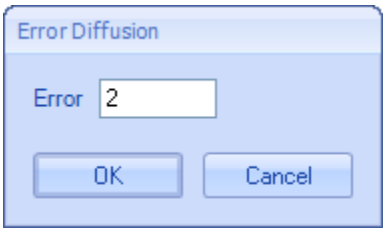


FIGURE 283: ERROR DIFFUSION

3. Enter a necessary error value in the **Error** text box and click the **OK** button.

   The following is an example of an image that has had error diffusion applied to it.

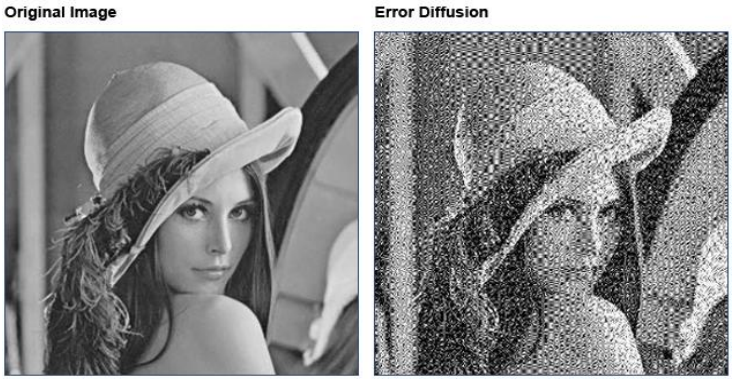


FIGURE 284: ERROR DIFFUSION SAMPLE

Convert to Raster Image

The **Convert to Raster Image** option is used only to convert Vector Images to Raster Images.

Reset Aspect Ratio

Selecting this option will reset the inserted Raster image to its original aspect ratio.

The following figure shows an example of a Raster image before and after its aspect ratio has been reset.

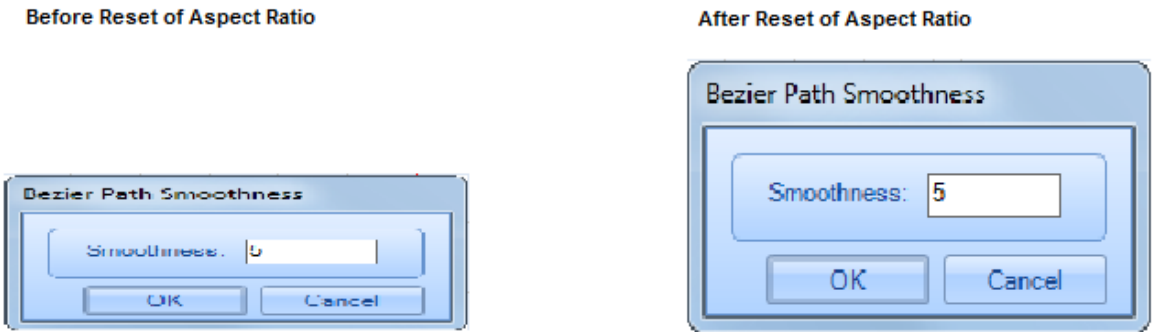


FIGURE 285: RESET ASPECT RATIO

Move to Origin

Selecting this option will move the inserted Raster image so that its center point is at the point of origin (0,0) on the Drawing Canvas.

The following figure shows a Raster image that has been moved to the point of origin (0,0) on the Drawing Canvas.

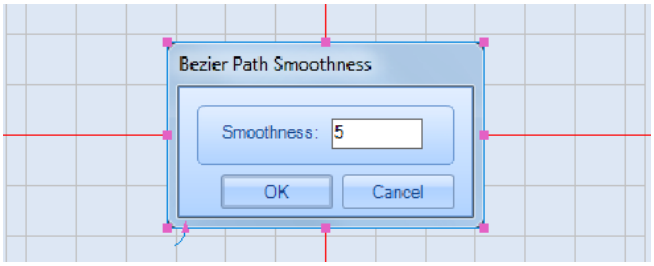


FIGURE 286: RASTER IMAGE MOVED TO THE POINT OF ORIGIN (0,0)

Rotate

Selecting this option allows you to rotate the selected Raster image.

Do the following to rotate the selected Raster image:

1. Right-click on the selected Raster image to display the Raster **image operations popup menu**.

2. Left-click the **Rotate** option on the Raster **image operations popup menu**. This displays the following prompt.

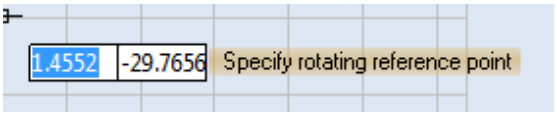


FIGURE 287: SPECIFY THE ROTATING REFERENCE POINT

3. Do one of the following to specify the Rotating Reference Point:

- Left-click a location on the Drawing Canvas or
- Enter coordinates in the coordinate-entry boxes and press the **Return** key.

The prompt for specifying the rotating angle is displayed.

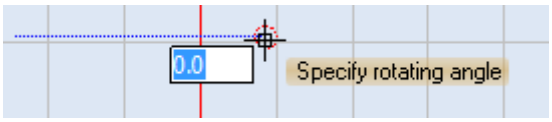


FIGURE 288: SPECIFY THE ROTATING ANGLE

4. Do one of the following to specify the Rotating Angle:

- Drag the mouse and click the left mouse button when you have the desired rotating angle or
- Enter coordinates in the coordinate-entry boxes and press the **Return** key.

Scale

Selecting this option allows you to scale the selected Raster image.

Do the following to scale the selected Raster image:

1. Right-click on the selected Raster image to display the Raster image operations popup menu.
2. Left-click the **Scale** option on the Raster image operations popup menu. The selection hotspots change to scaling hotspots on the Raster image.

Note: As shown in the following figure, there are four scaling hotspots (one at each corner). This contrasts to the selection hotspots, which are eight in number (one at each corner and one at the midpoint of each side).

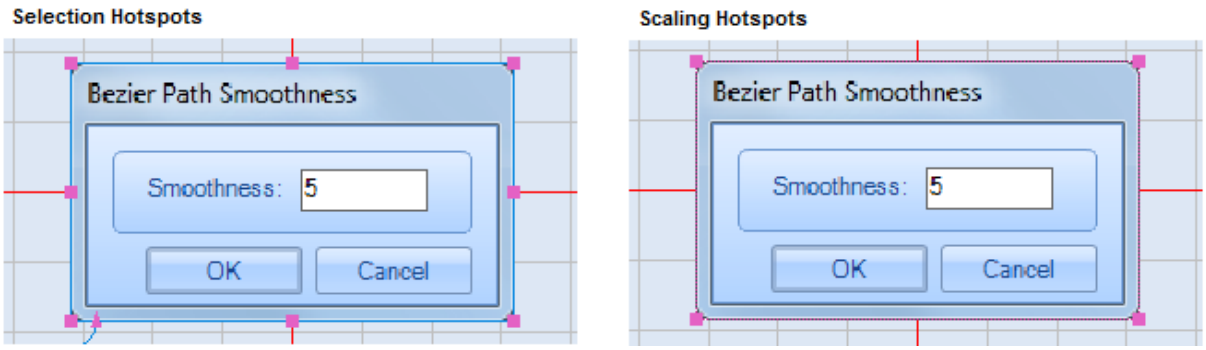


FIGURE 289: SELECTION HOTSPOTS AND SCALING HOTSPOTS

You can now scale the raster image by updating the position of a scaling hotspot (described below) or by entering scaling factors with the **Scale Value** tool (described on page 237).

Update the Position of a Scaling Hotspot

With the scaling hotspots displayed on the Raster image, do the following:

1. Select a scaling hotspot by left-clicking on it. This displays the following prompt.

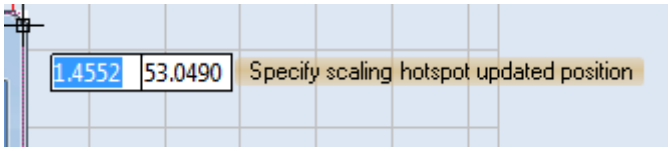


FIGURE 290: SPECIFY THE UPDATED POSITION OF THE SCALING HOTSPOT

2. Do one of the following to specify the updated position of the scaling hotspot:

- Drag the mouse to the new location of the scaling hotspot and click the left mouse button or
- Enter the coordinates in the coordinate-entry boxes and press the **Return** key.

The scaling hotspot is now at its new location and the Raster image has been scaled.

Entering Scaling Factors with the Scale Value Tool

Do the following to scale a Raster image by entering Scaling Factors with the Scale Value Tool:

1. Select a Raster image and click the right mouse button on it. This displays an **image operations popup menu** that contains additional scaling options.

Note: The **Scale Width**, **Scale Height**, and **Scale to Rectangle** options are grayed out for Raster images to prevent non-linear scaling of Raster images.

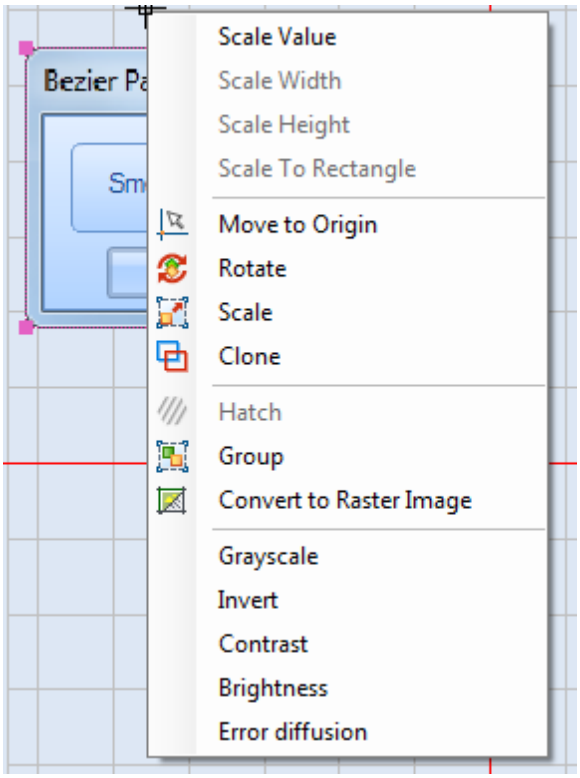


FIGURE 291: THE IMAGE OPERATIONS POPUP MENU WITH ADDITIONAL SCALING OPTIONS

2. Select the **Scale Value** option from the image operations popup menu. This displays the **Scale Factors** Dialog Box**.**
3. You can scale the selected Raster image by entering values in the text entry boxes for **X-Scale Factor, Width,** or **Height**. The scaled Raster image will be previewed when you enter new values in these fields.

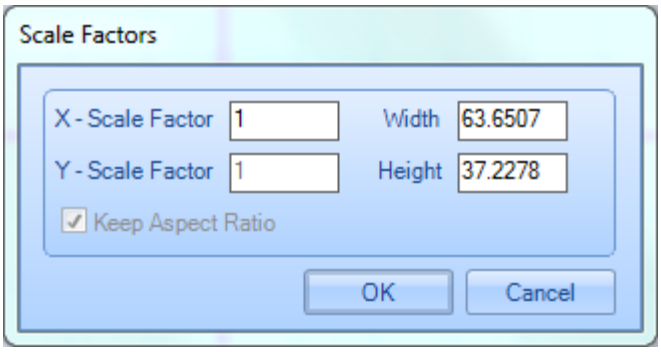


FIGURE 292: THE SCALE FACTORS DIALOG BOX

Note: The **Y-Scale Factor** and **Keep Aspect Ratio** settings are grayed out in the above dialog box to prevent non-linear scaling of Raster images.

4. Click the **OK** button in the **Scale Factors** Dialog Box to save the scaling settings for the Raster image.

Clone

Selecting this option allows you to create a duplicate of the selected Raster image.

The duplicate Raster image will appear on top of the original image with its X and Y coordinates offset by approximately 2.54 grid units. The following figure contains an example of a cloned Raster image.

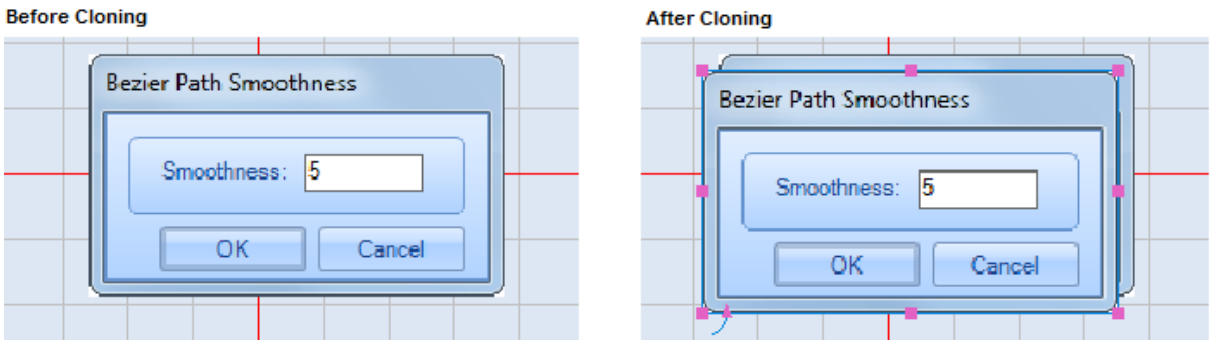


FIGURE 293: A CLONED RASTER IMAGE

Hatch

This option is grayed out when a Raster image is selected. It is only available when text or a geometric shape is selected.

Refer to "Hatching" on page 196 for information on adding hatching to text.

Refer to "Hatch Operations" on page 335 for information on adding hatching to a geometric shape.

Group

You can use this option to group together as one unit any combination of images, shapes, and text on the Drawing Canvas.

Do the following to group together a combination of images, shapes, and text:

1. While holding down the **Shift** key, left-click the images, shapes, and text that you want to group together.
2. Select the **Group** option from the image operations popup menu.

The selected images, shapes, and text entities are now grouped together as a single unit.

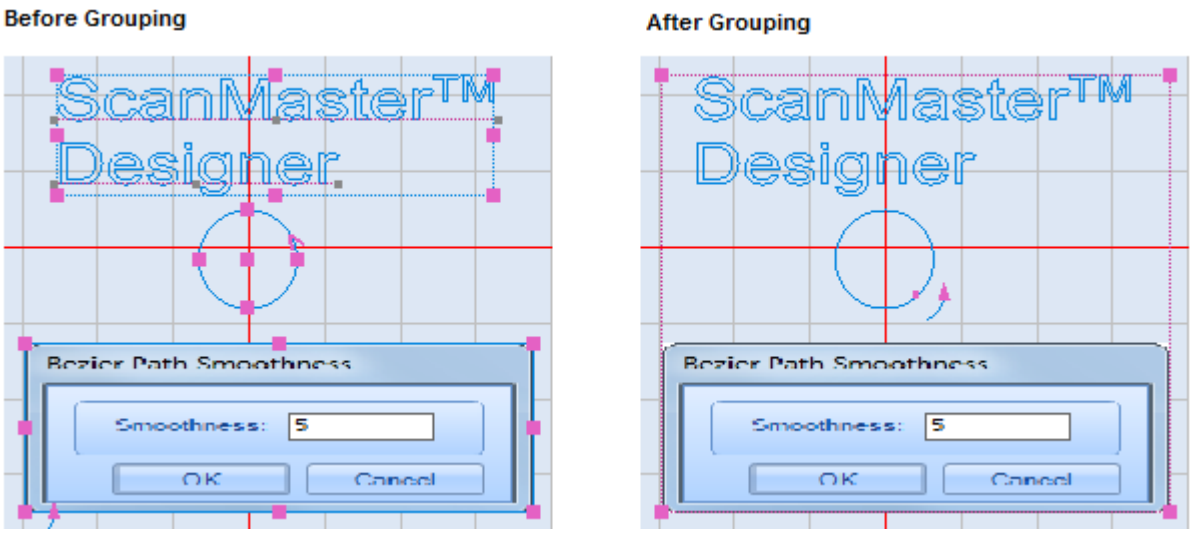


FIGURE 294: GROUPING IMAGES, SHAPES, AND TEXT

Note: You can use the **Ungroup** option of the Image Operations popup menu to make the grouped entities separate again.

Visual Group

No laser properties are assigned to the group shape so the laser properties of individual shapes are used in marking. You can use this behaviour to apply transformation functions to the entire group.

Marking Group

Laser properties are assigned to the group shape.

Preserve Shape wise Repetitions

If this option is active, you can mark the group with shape wise repetitions. That is the shape wise repetitions are applied on with the group wise repetitions.

Ungroup

Select the **Ungroup** option of the **Image Operations** popup menu to break a grouped entity into individual entities (images, shapes, and/or text).

Note: The **Ungroup** option is only available on the Image **Operations** popup menu when a grouped entity is selected.

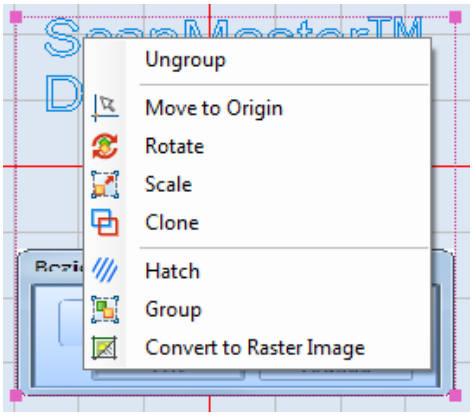


FIGURE 295: THE UNGROUP OPTION

The following figure shows a grouped entity before and after it is ungrouped.

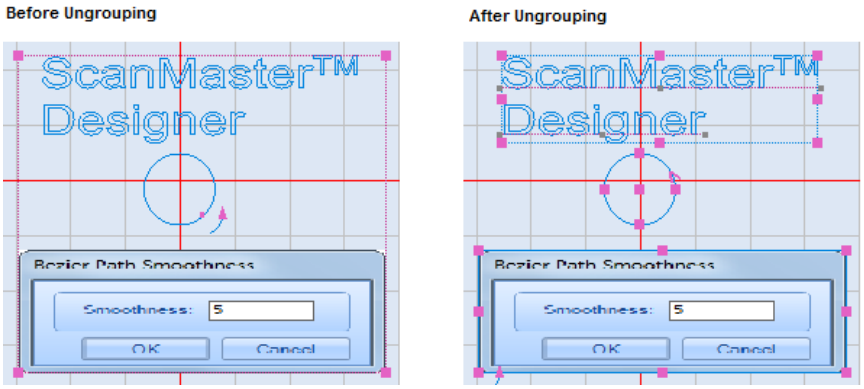


FIGURE 296: UNGROUPING IMAGES, SHAPES, AND TEXT

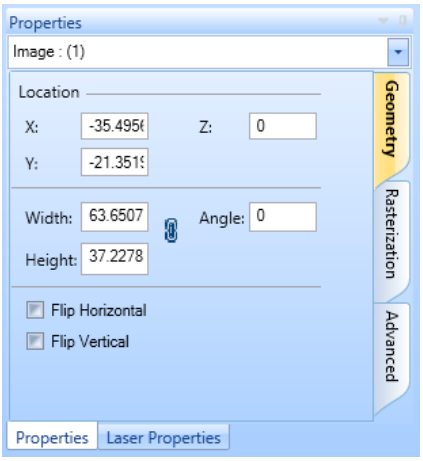
Note: You can use the **Group** option of the image operations popup menu to regroup items after you have performed the **Ungroup** operation on them.

6.6.3 Change image properties

When you select a raster image on the **Drawing Canvas**, the **Properties tab** will display its properties, as illustrated in the following image.

Geometry Properties

The **Geometry** page of the **Properties** tab contains the Geometry properties of the selected Raster image. By default it is the top page of the Properties tab for a Raster image. If another page is currently displayed, you can display the **Geometry** page by left-clicking the **Geometry** link on the **Properties** tab.. You can change the following settings on the **Geometry** page by typing in the applicable text-entry boxes or by left-clicking the applicable check boxes:



X – The **X** coordinate of the lower-left corner of the Raster image

Y – The **Y** coordinate of the lower-left corner of the Raster image

FIGURE 297: THE GEOMETRY PAGE OF THE PROPERTIES TAB

- **Z** – The Z coordinate of the lower-left corner of the Raster image
- **Note:** The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.
- **Width** – The width of the Raster image in the specified units (millimetres or inches)
- **Height** – The height of the Raster image in the specified units (millimetres or inches)
- **Angle** – The rotation angle of the Raster image in the specified angle units (degrees or radians)
- **Flip Horizontal** – Selecting this checkbox reflects the Raster image across the X-axis without changing the original size or location of the image.
- **Flip Vertical** – Selecting this checkbox reflects the Raster image across the Y-axis without changing the original size or location of the image.

Rasterization Properties

The **Rasterization** page of the **Properties** tab contains the rasterization properties of the selected Raster image. You can display the **Rasterization** page by left-clicking the **Rasterization** link on the **Properties** tab.

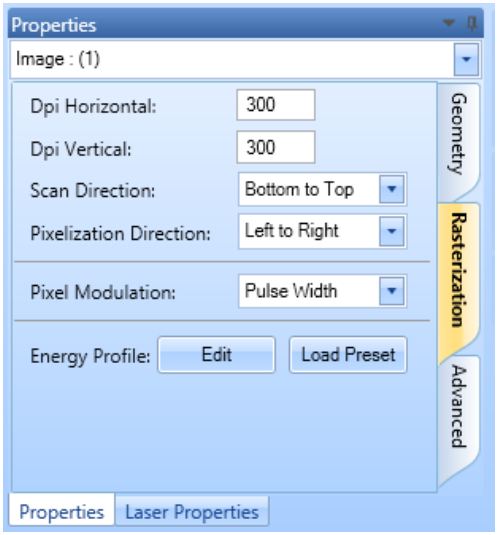


FIGURE 298: THE RASTERIZATION PAGE OF THE PROPERTIES TAB

You can change the following settings on the **Rasterization** page by typing in the applicable text-entry boxes, selecting from the applicable dropdown lists, or by left-clicking the applicable **Edit** or **Load Preset** button:

- **Dpi Horizontal** – The Dots Per Inch (DPI) value for the horizontal dimension of the Raster image. Changing this setting will change the resolution of the image.
- **Dpi Vertical** – The DPI value for the vertical dimension of the Raster image. Changing this setting will change the resolution of the image.
- **Scan Direction** – The scanning direction of the Raster image, which can be any of the following: **Bottom to Top**, **Top to Bottom**, **Left to Right**, or **Right to Left**
- **Pixelization Direction** – The pixeliztion direction of the Raster image, which can be any of the following, depending on the **Scan Direction**: **Right to Left**[1], **Left to Right**[1], **Bottom to Top**[2], **Top to Bottom**[1], or **Serpentine**
- **Pixel Modulation** – The methods of Raster Marking, which can be any of the following: **Pulse Width**, **Power**, **Laser On Time**, or **Jump and Fire**
-

Refer to "Methods of Raster Marking" on page 244 for a detailed description of the four options of the **Pixel Modulation** dropdown. The same section describes additional fields that appear on the **Rasterization** page when **Power**, **Laser On Time**, or **Jump and Fire** is selected from the **Pixel Modulation** dropdown.

- **Energy Profile** – The pixel energy graph that specifies the relationship between the selected method of Raster Marking and the Intensity Levels.

Left-click the **Edit** button to create or edit a pixel energy graph with the **Pixel Energy Profile Editor**. Refer to "Edit Profile" on page 249 for more information.

Left-click the **Load Presets** button to load a previously saved pixel energy graph. Refer to "To load previously saved graphs" on page 255 for more information.

[1] This **Pixelization Direction** can only be selected if the **Scan Direction** is **Bottom to Top** or **Top to Bottom**.
[2] This **Pixelization Direction** can only be selected if the **Scan Direction** is **Left to Right** or **Right to Left**.

Methods of Raster Marking

This section contains detailed descriptions of the four methods of Raster Marking, which are **Pulse Width**, **Power**, **Laser On Time**, **and Jump and Fire**. You can select a method of Raster Marking from the **Pixel Modulation** dropdown list on the Rasterization page (see "Rasterization Properties" on page 242).

Pulse Width

Mode 0 (Pulse Width) raster patterning permits grayscale imaging when the laser supports variable laser pulse power as a function of how long the laser modulation signal remains on or off. In the following illustration, a Q-switched laser fires on each rising edge of the laser modulation signal and “recharges” when the modulation signal is in the low level. The amount of time the modulation level remains in the low level is inversely proportional to the “high” pulse-width, which is proportional to an 8-bit gray-scale pixel value. Since the laser fires at a constant rate, and the start of the galvo position commands and the start of the lasing process are tightly controlled, the pixel positions are accurately placed on the substrate.

This mode is also very useful in a threshold or error-diffusion dithering gray-scale approximation approach. In this case, a low-threshold or “0” pixel value can cause the Pulse Width to be set to zero, thus skipping the firing of the laser at that pixel location. Likewise, a high-threshold or pixel value of “1” can cause the laser to fire at that location.

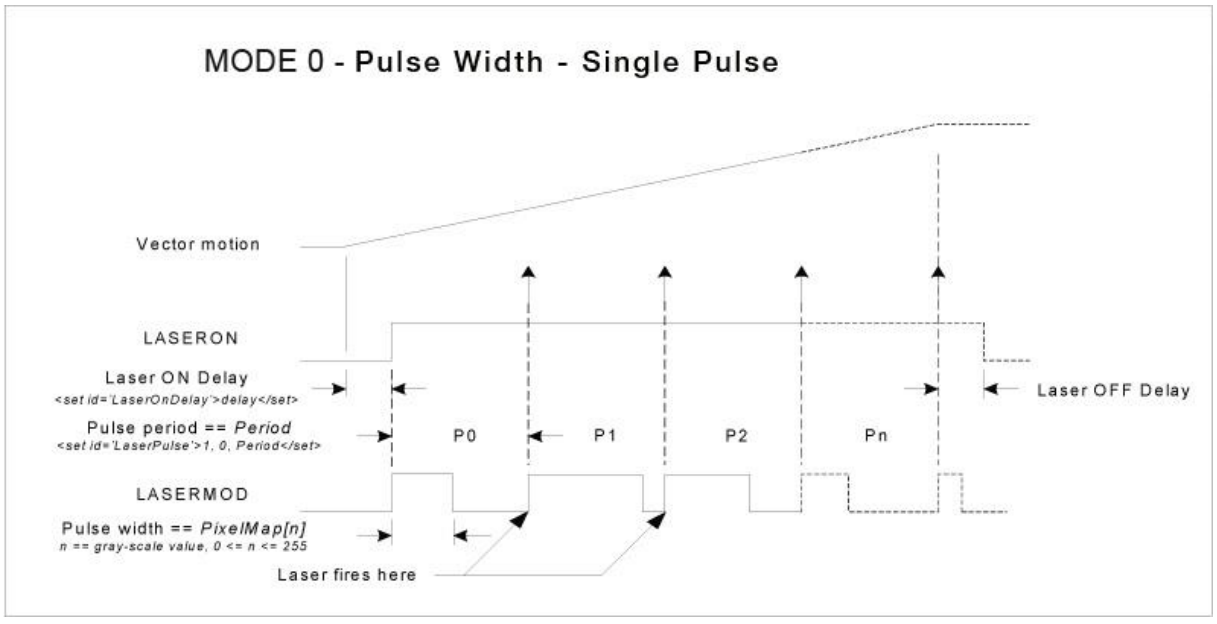


FIGURE 299: THE PULSE WIDTH METHOD OF RASTER MARKING

Power

Mode 1 raster patterning (Power) permits grayscale imaging for lasers that support variable laser pulse power as a function of variable analog or digital laser power control. In the following illustration, the laser power control is set proportional to an 8-bit grayscale value at the beginning of a pixel period, and the laser fires at the end of the period on each rising edge of the laser modulation signal. The pulse width of the laser modulation signal is programmable and stays the same for each pixel in the pixel line. Since the laser fires at a constant rate, and the start of the galvo position commands and the start of the lasing process are tightly controlled, the pixel positions are accurately placed on the substrate.

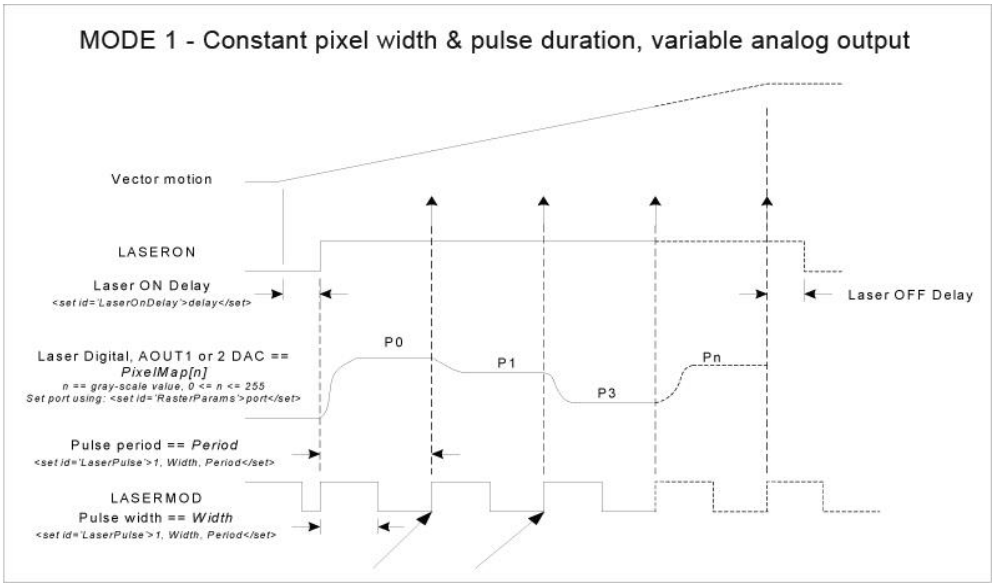


FIGURE 300: THE POWER METHOD OF RASTER MARKING

When you select **Power** from the **Pixel Modulation** dropdown, the **Port** dropdown appears below the **Pixel Modulation** dropdown on the **Rasterization** page. (The **Port** dropdown is yellow-highlighted in the following figure.)

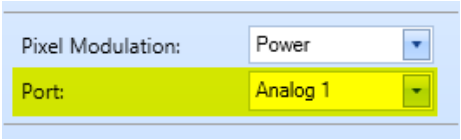


FIGURE 301: THE PORT DROPDOWN ON THE RASTERIZATION PAGE

You can select the port from the **Port** dropdown list. The options of the **Port** dropdown list are **Analog1**, **Analog2**, and **Digital**. The port selection depends on how ScanMaster Designer sends the signal to the laser for setting the laser power. It will either be Analog or Digital.

Laser On Time

Mode 2 (Laser On Time) raster patterning permits Grayscale imaging with most pulsed lasers. Grayscale is achieved by controlling the time that a laser fires at a pixel location. The galvos are instructed to jump to each pixel location and the laser fires for a duration that is proportional to the 8-bit Grayscale pixel value. In the following illustration, the laser modulation characteristics are the same for all pixels on the pixel line, but the laser on time varies.

Since the galvos jump to each pixel location and stops there before firing, the pixel placement is very precise regardless of the scanning direction. Sequences of pixels whose value is zero (no laser on-time required) are automatically concatenated into a single jump to the next pixel.

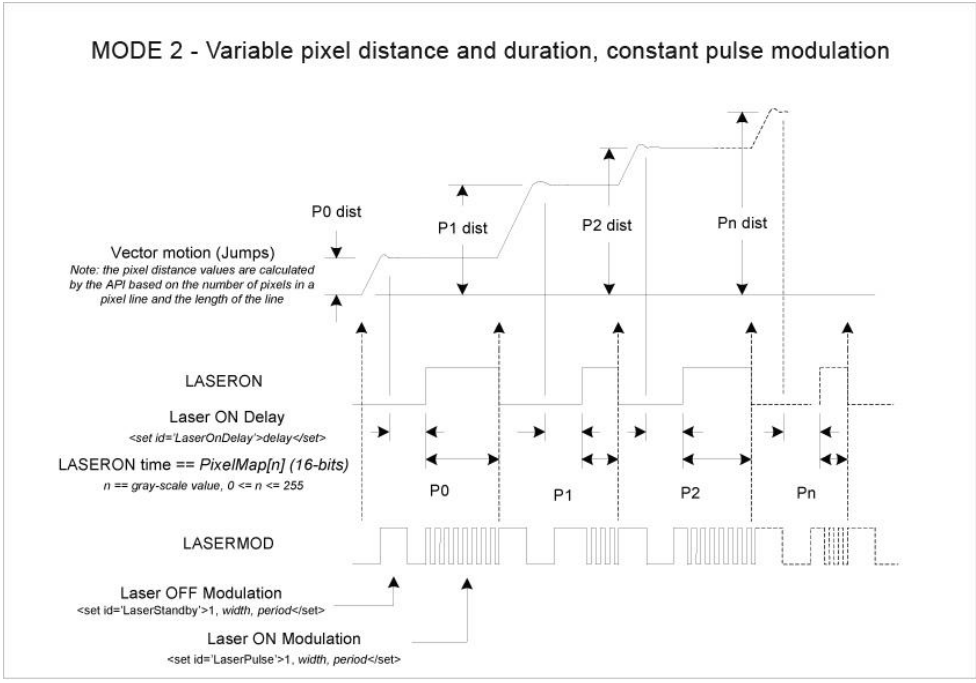


FIGURE 302: THE LASER ON TIME METHOD OF RASTER MARKING

When you select **Laser On Time** from the **Pixel Modulation** dropdown, the **Max Laser On Time** field appears below the **Pixel Modulation** dropdown on the **Rasterization** page. (The **Max Laser On Time** field is yellow-highlighted in the following figure.) You can specify the maximum laser on time in this field.

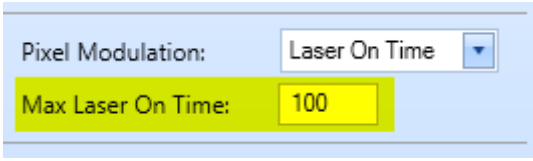


FIGURE 303: THE MAX LASER ON TIME FIELD ON THE RASTERIZATION PAGE

Jump and Fire

Jump and Fire raster patterning permits very accurate grayscale imaging with most CO^2 lasers, and grayscale approximations using pulsed YAG lasers. For CO^2 lasers, grayscale is achieved by controlling the pulse width of the modulation signal when the laser fires at a pixel location. The galvos are instructed to jump to each pixel location, a Laser On Delay time is incurred to let the galvos settle, and then the laser fires for the specified Laser On Time. One or several pulses may be emitted at each pixel depending on the Laser Pulse period specified.

If the Laser Pulse period is set the same as the Laser On Time, a single pulse will be emitted at each pixel. With fast CO^2 lasers this provides variable laser power proportional to the pulse width. For pulsed YAG lasers used to expose single dots per pixel using error diffusion methods, the pulses can be supressed with a pulse-width value of zero, or fired with an appropriate non-zero value.

Since the galvos jump to each pixel location and stop there before firing, the pixel placement is very precise regardless of the scanning direction. Precision can be increased by lengthening the Laser On Delay parameter but at the cost of some speed.

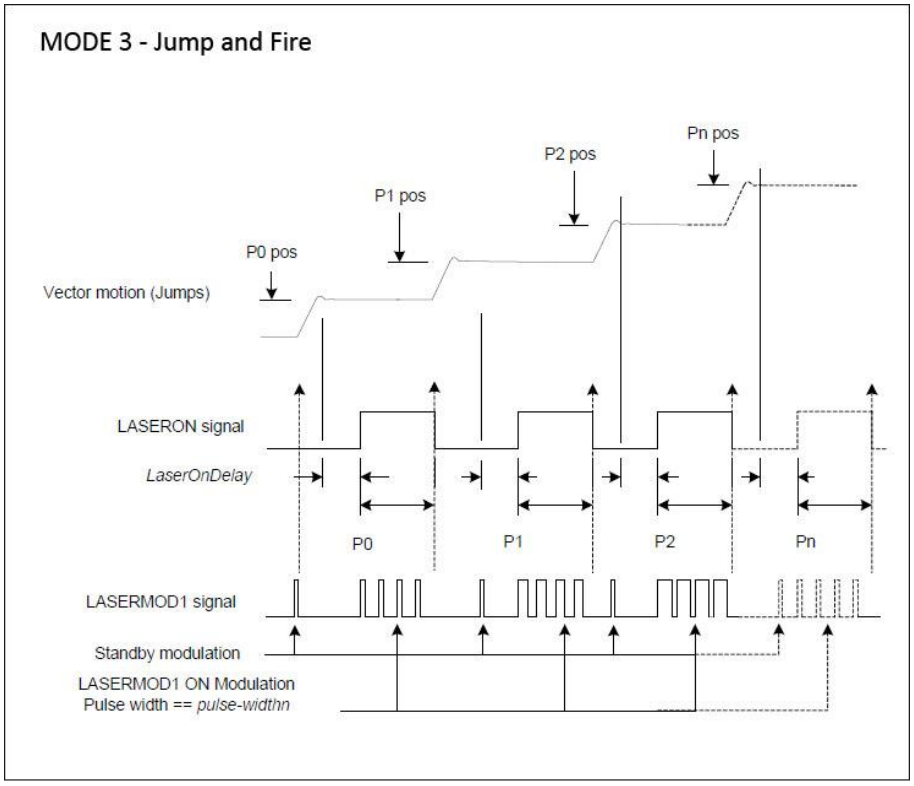


FIGURE 304: THE JUMP AND FIRE METHOD OF RASTER MARKING

When you select **Jump and Fire** from the **Pixel Modulation** dropdown, several parameters appear below the **Pixel Modulation** dropdown on the **Rasterization** page. (These parameters are yellow-highlighted in the following figure.)

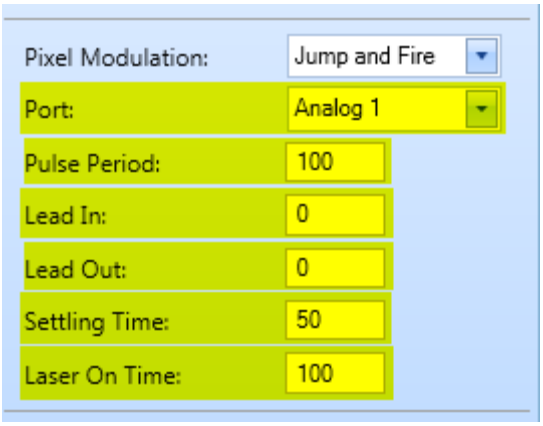


FIGURE 305: THE JUMP AND FIRE PARAMETERS ON THE RASTERIZATION PAGE

You can select the port from the **Port** dropdown list. The options of the **Port** dropdown are **Analog1**, **Analog2**, **Digital**, and **Pulse Width**. The port selection depends on how ScanMaster Designer sends the signal to the laser for setting the laser power. It will either be Analog or Digital.

You can change the following settings by typing new values in the applicable text-entry boxes:

- **Pulse Period** – Elapsed time from the beginning of one pulse to the beginning of the next pulse

Note: The value of **Pulse Period** that is set on the Rasterization page will override the value of **Pulse Period** that is set on the **Laser Properties** tab.

- **Lead In** –The additional pixels concentration during the start of raster scanning time
- **Lead Out** –The additional pixels concentration during the end of raster scanning time
- **Settling Time** – A delay set at the end of a jump
- **Laser On Time** – Time period that a laser is kept on

Edit Profile

Edit Profile in **Image Properties** | **Rasterization** allows you to view/edit the pixel energy graph, which can be saved for future use.

To open the **Pixel Energy Profile Editor**, click **Edit.** There are two modes: **Curve** and **Bars**. The graphs illustrate the relationship between the selected Pixel Modulation parameters and the Intensity Levels. Intensity Levels range from 0 to 255.

Curve Graph

The graphs illustrate the relationship between the selected Pixel Modulation parameters and the Intensity Levels. Intensity Levels range from 0 to 255.

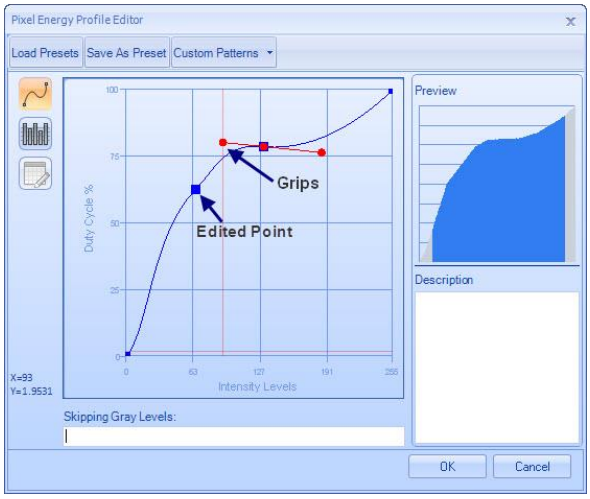


FIGURE 306: PIXEL ENERGY PROFILE EDITOR – CURVE MODE

To edit the graph's **Pixel Energy Profile**:

1. Click wherever you want to edit on the curve and grips will be displayed on it. Wherever you click on the curve will be marked with a blue square.
2. Drag the point, or use grips, to modify the shape until you get the necessary X,Y relationship. The changes will be visible in the **Preview** section.
3. Add a description to the changed graph on the **Description** box.
4. If you already know the Gray levels that you need to bypass you can specify them in the **Skipping Gray Levels** box. You can specify a range (e.g.12-15) or comma-separated individual values (e.g.12, 55).
5. Click **OK**.

Manually Edit the Table

Grayscale is achieved by changing the pulse energy. By using this option you can manually specify energy values for different Gray levels. By default the energy values will be automatically calculated but you can also manually change the energy value as required. An 8 bit raster image can have up to 256 levels of Gray.

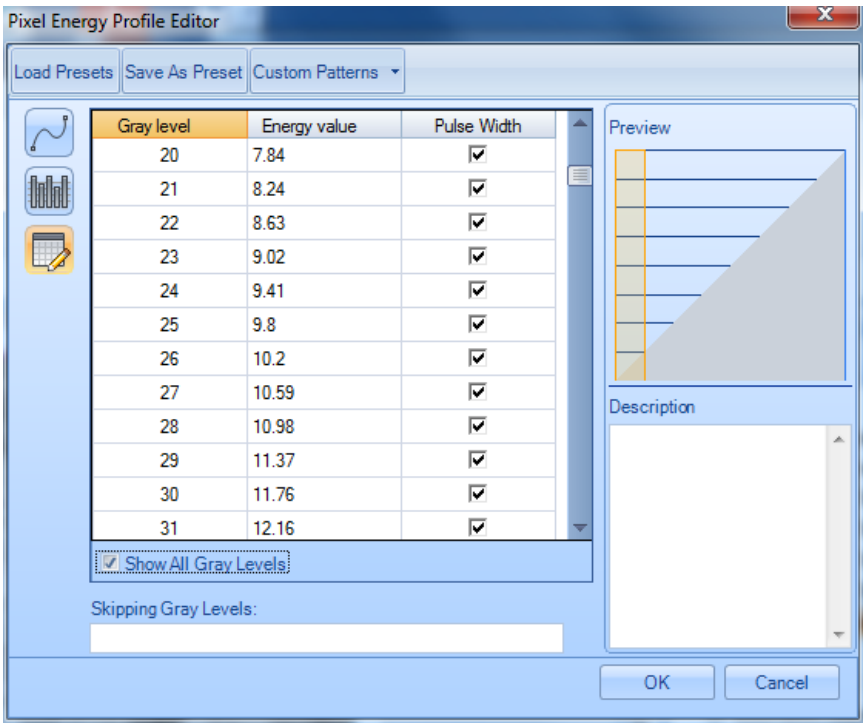


FIGURE 307: MANUALLY EDIT BARS

To edit a particular energy value, click on the relevant **Energy Value** field and type in the desired value. As you enter a value the **Pulse Width** box will change status to 'unchecked'.

When you select **Show All Gray Levels**, the **Gray Level** column will display 0-256 levels of Gray.

Save as Preset

Once you have done the changes to the graph, you can save it for future use.

1. Click **Save As Preset.** The following window will appear.

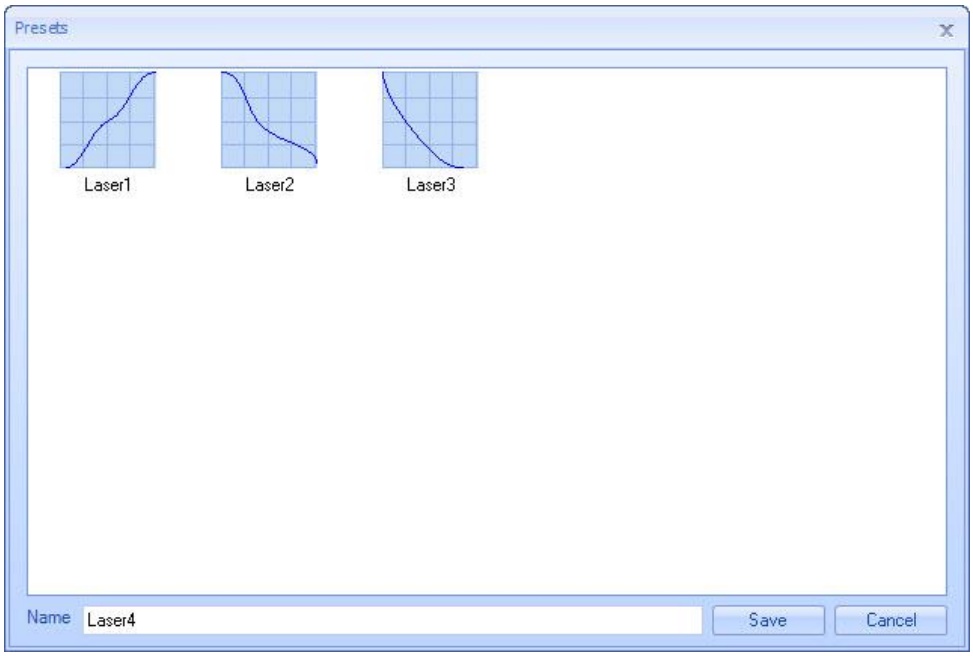


FIGURE 308: SAVE AS PRESETS

2. Give an appropriate name.
3. Click **Save**.

To load previously saved graphs

You can load a previously saved Energy Profile from the **Presets** window. To display the **Presets** window, do one of the following:

- Left-click the **Load Presets** button in the **Pixel Energy Profile Editor** or
- Left-click the **Load Preset** button on the **Rasterization** page of the **Properties** tab for the selected Raster image.

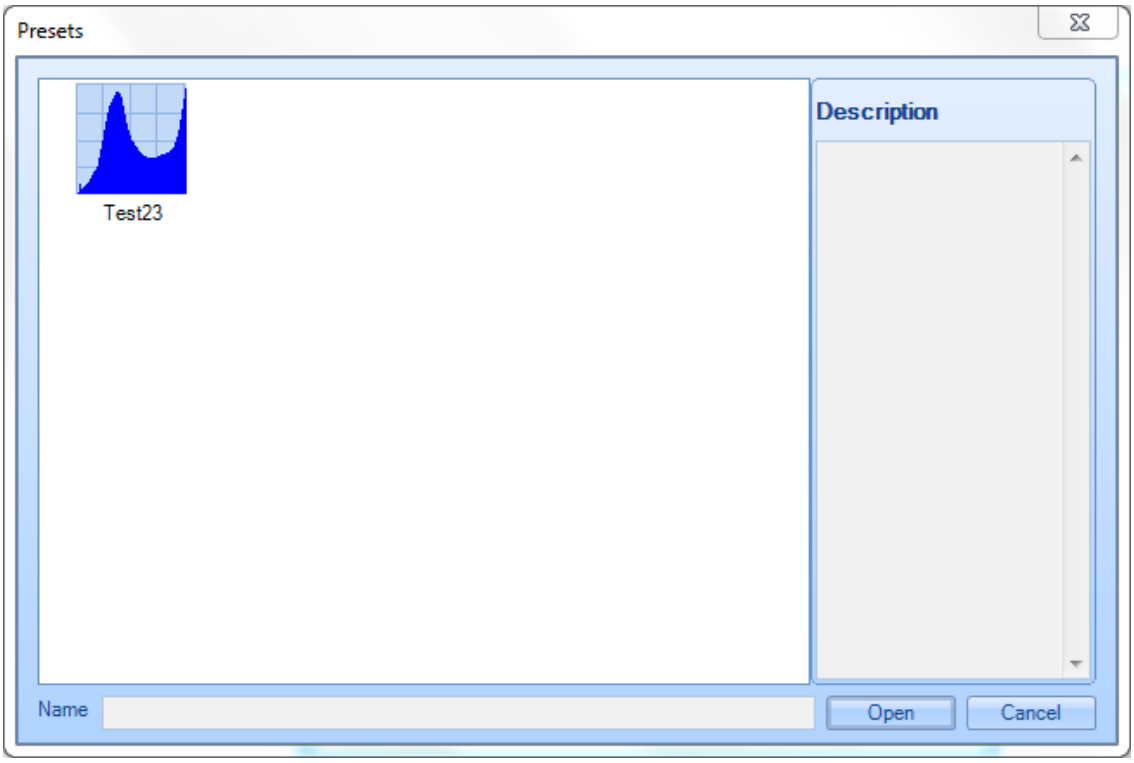


FIGURE 309: THE PRESETS WINDOW

Do the following in the **Presets** window:

1. Left-click the Energy Profile that you want to load. The name of the Energy Profile will appear in the **Name** field of the **Presets** window.
2. Left-click the **Open** button in the **Presets** window.

   This loads the Energy Profile and exits the **Presets** window.

To use Custom Patterns

1. Click **Open** and the graph will be loaded in to the **Pixel Energy Profile Editor**. You can select an appropriate pattern to be applied to the graphs.
2. Click **Custom Patterns** and select the pattern you like.

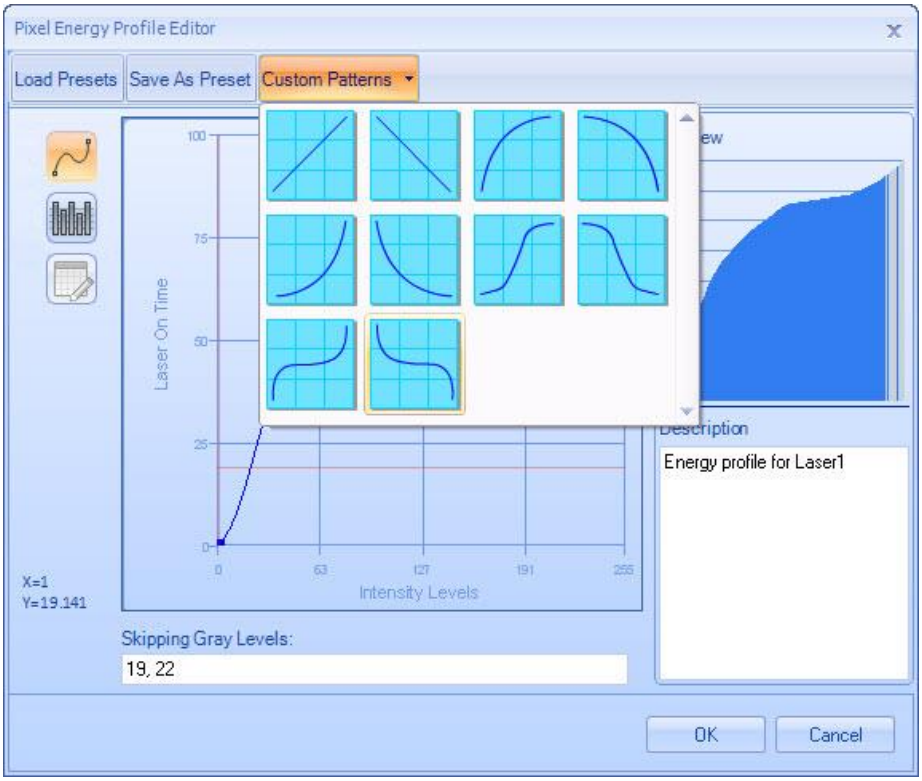


FIGURE 310: CUSTOM PATTERNS

Advanced

When marking a Raster image on a cylindrical surface, the laser beam may go out of focus at the far edges of curvature, hence you need to rotate the marking surface to position the Raster line which needs to be marked directly underneath the marking head.

To synchronize this process you can call a script function which will rotate the surface after each line is marked. The Advanced tab in the Image Properties window allows calling for predefined ScanScript functions before you mark each line in the Raster image.

FIGURE 311: THE ADVANCED TAB

Enable non progressive marking mode

This option is available to offer more flexibility in synchronizing the marking and the rotating of the surface. By selecting this option you can specify how many Raster lines must be marked before a ScanScript function is called. You can specify the number of lines to be marked before calling the function in the Number of Lines box.

In the Function Name box type the function name you wish to execute. This function will be executed before each line in the Raster image is marked.

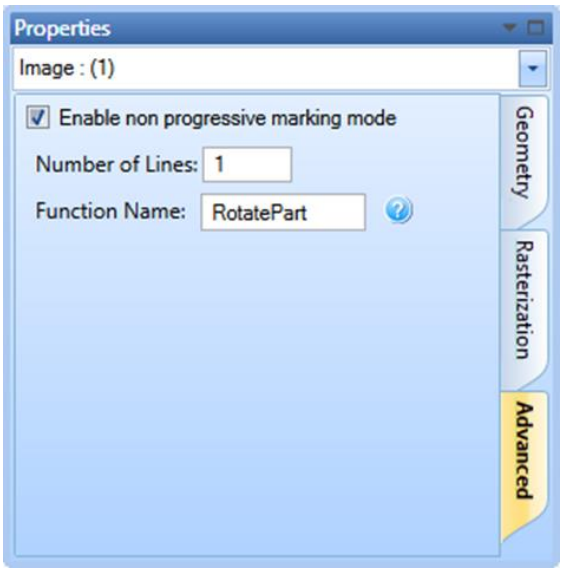


FIGURE 312: ENABLE NON PROGRESSIVE MARKING MODE

6.7 DRILL SHAPES

ScanMaster Designer allows you to import a drill shape from a file. (The allowable NC drill file formats are **.drd**, **.drl**, and **.tap**. The allowable CSV drill file formats are **.csv** and **.txt**.). The methods for importing a drill shape are **Location & Size** and **Absolute Units**. Both methods are described in this section.

6.7.1 Importing a drill shape using Location & Size

Do the following to import a drill shape using the **Location & Size** method:

1. Click the arrow below the **Insert Drill Shape** button on the **Drawing Shapes** Toolbar and select the **Location & Size** option. This displays the **Open Drill File** dialog box.

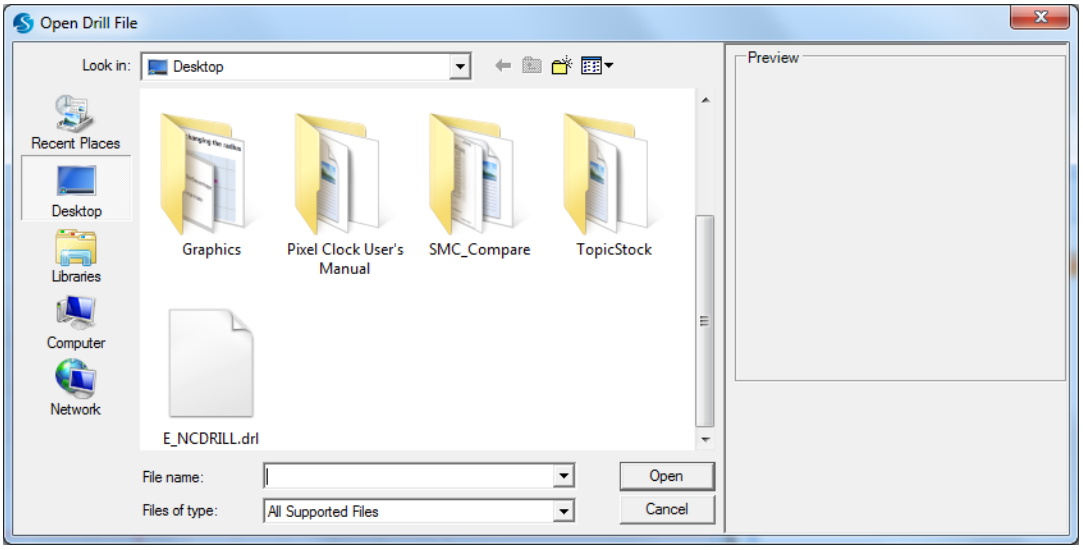


FIGURE 313: THE OPEN DRILL FILE DIALOG BOX

2. Select the drill file to be imported and left-click the Open button. The Drill Shape Location prompt will be displayed as you drag the mouse over the Drawing Canvas.

FIGURE 314: THE DRILL SHAPE LOCATION PROMPT

3. Click the left mouse button at any location on the Drawing Canvas. This location will be a corner of the drill shape. The **Drill Shape Size** prompt is now displayed.

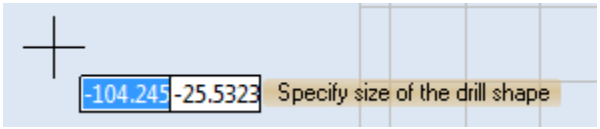


FIGURE 315: THE DRILL SHAPE SIZE PROMPT

4. Drag the mouse until the drill shape is of the desired size. When the drill shape is of the desired size, click the left mouse button. The drill shape will be displayed with hotspots, as shown in the following figure.

Note: You also have the option of entering coordinates in the parameter-entry fields that appear beside the **Drill Shape Location** prompt and the **Drill Shape Size** prompt. The X coordinate is entered on the left side of the parameter-entry field, and the Y coordinate is entered on the right side of the parameter-entry field. Press the **Tab** key to move between the two fields. Press the **Enter** key after you have entered coordinates in both fields.

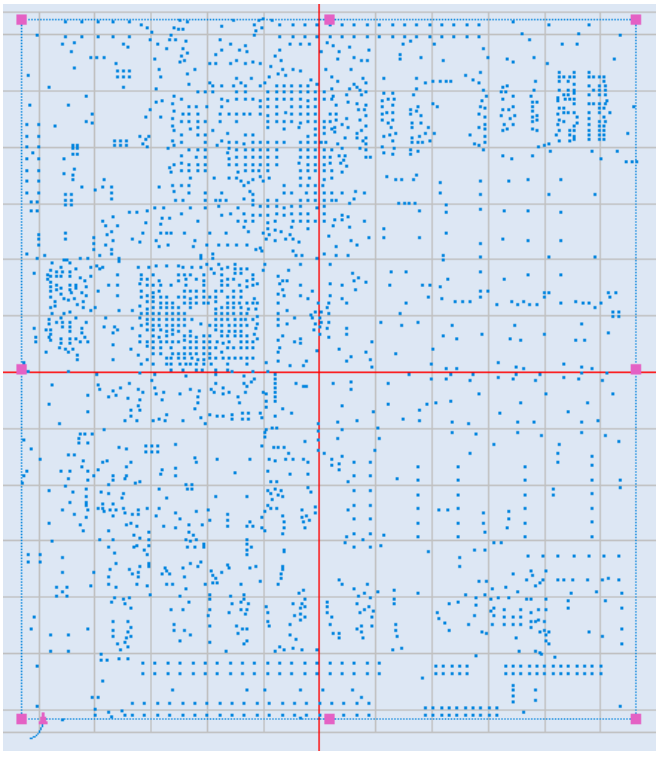


FIGURE 316: THE DRILL SHAPE ON THE DRAWING CANVAS

6.7.2 Importing a drill shape using Absolute Units

Do the following to import a drill shape using the **Absolute Units** method:

1. Click the arrow below the **Insert Drill Shape** button on the **Drawing Shapes** Toolbar and select the **Absolute Units** option. This displays the **Open Drill File** dialog box.

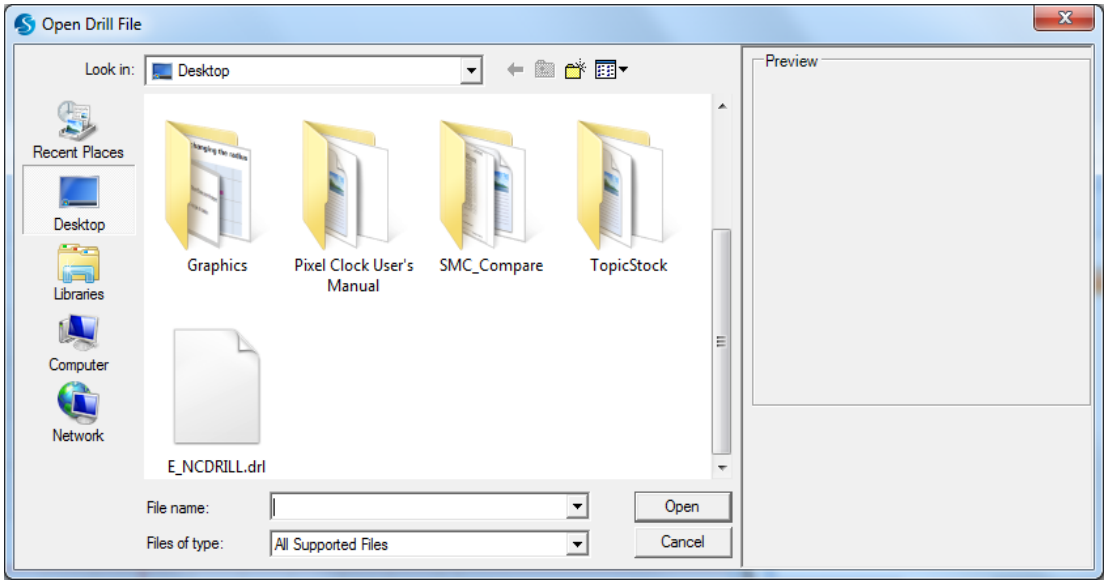


FIGURE 317: THE OPEN DRILL FILE DIALOG BOX

2. Select the drill file to be imported and left-click the **Open** button. The **Drill Shape Properties** window will be displayed in the ScanMaster Designer Interface.

   Note: The following figure shows only the top portion of the **Drill Shape Properties** window. Figure 327 on page 261 shows the entire **Drill Shape Properties** window.

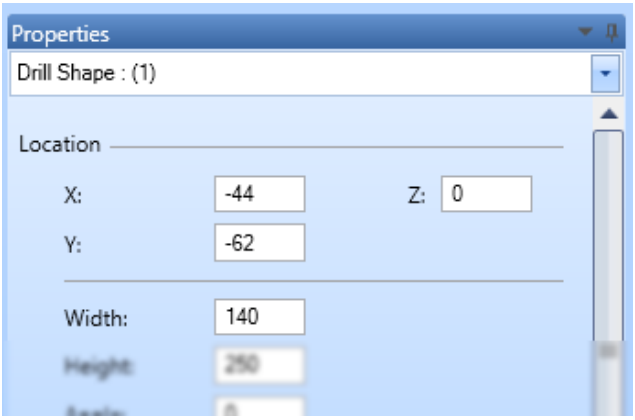


FIGURE 318: DETAIL OF THE DRILL SHAPE PROPERTIES WINDOW

3. Enter X, Y, and Z coordinates in the appropriate fields of the Drill Shape Properties window. (These will be the X, Y, and Z coordinates of the lower-left corner of the drill shape.) After entering each coordinate, press the Enter key.

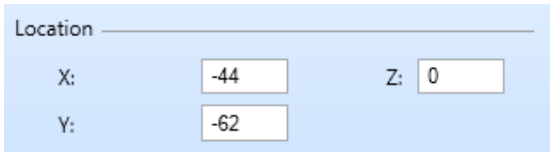


FIGURE 319: THE X, Y, AND Z COORDINATE FIELDS OF THE DRILL SHAPE PROPERTIES WINDOW

Note: The Z coordinate is only used for scanning on 3-Axis systems. The range of allowable values for the Z coordinate is defined in the **Marking Area** tab of the **Project Settings** tab.

4. Enter the desired width, height, and angle of rotation for the drill shape in the appropriate fields of the Drill Shape Properties window. After entering each value, press the Enter key.

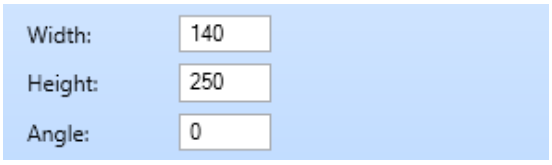


FIGURE 320: THE WIDTH, HEIGHT, AND ANGLE FIELDS OF THE DRILL SHAPE PROPERTIES WINDOW

The following figure shows an example of a drill shape that would be displayed on the Drawing Canvas.

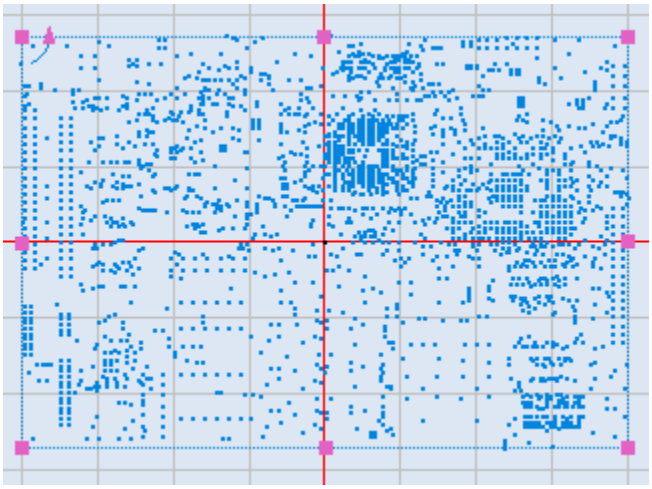


FIGURE 321: DRILL SHAPE EXAMPLE (BASED ON ABSOLUTE UNITS)

5. If desired, select the Flip Horizontal checkbox and/or the Flip Vertical checkbox in the Drill Shape Properties window.

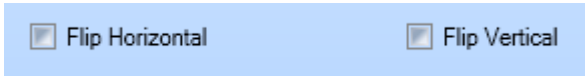


FIGURE 322: FLIP HORIZONTAL AND FLIP VERTICAL

Note: Selecting **Flip Horizontal** flips the drill shape across the X axis without changing the original size or location of the image. Selecting **Flip Vertical** flips the drill shape across the Y axis without changing the original size or location of the image.

6. Select a drill pattern from the pulldown beside the **plus-sign** icon in the **Drill Patterns** section of the **Drill Shape Properties** window. The selected drill pattern will appear in the **Drill Patterns** field, as shown on the right side of the following figure. Refer to "Drill Shape Properties" on page 261 for more information about the drill pattern options.

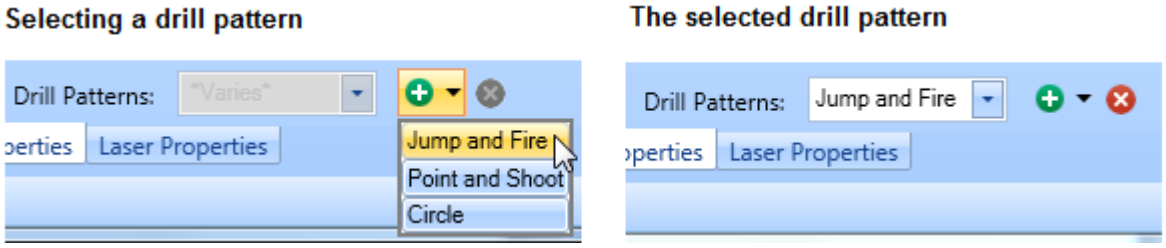


FIGURE 323: SELECTING A DRILL PATTERN

7. Now you can select an execution mode for the drill pattern that you selected in the last step; left-click the Whole Shape radio button or the Point by Point radio button.

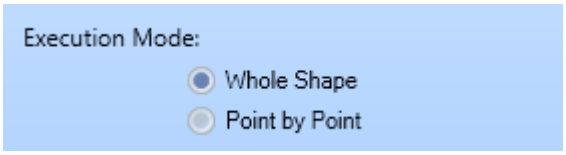


FIGURE 324: THE EXECUTION MODES

Note: You cannot select the **Point by Point** execution mode for the **Jump and Fire** drill pattern. Refer to "Drill Shape Properties" on page 261 for more information on the execution modes.

8. Enter values for the properties that appear below the **Drill Patterns** field. These properties will vary depending on the contents of the **Drill Patterns** field. The following figure shows the properties for each drill pattern type that can be selected for the Drill Patterns field.

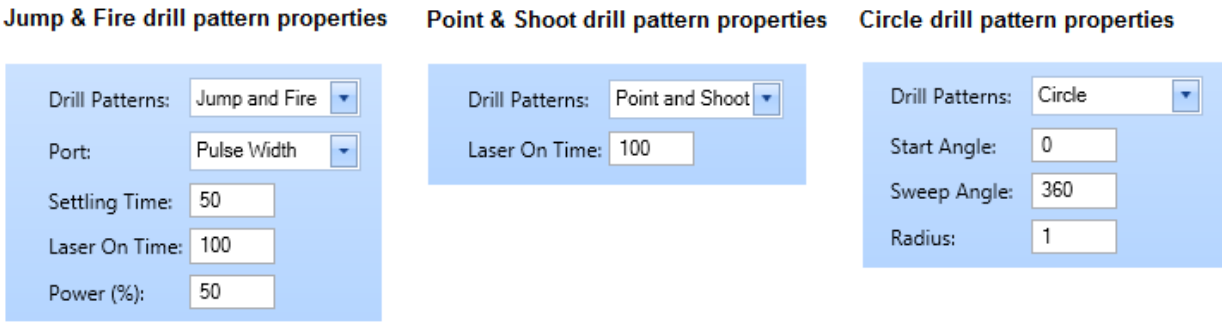


FIGURE 325: THE UNIQUE PROPERTIES OF EACH DRILL PATTERN

9. If desired, deselect the Use Shape Laser Properties checkbox. (The Use Shape Laser Properties checkbox is selected by default.)

FIGURE 326: THE USE SHAPE LASER PROPERTIES CHECKBOX

When the **Use Shape Laser Properties** checkbox is deselected, the contents of the **Laser Properties** window will be displayed at the bottom of the **Drill Shape Properties** window. Refer to "Laser Properties " on page 50 for descriptions of these properties.

6.7.3 Drill Shape Properties

When you select a drill shape on the Drawing Canvas, its properties will be displayed in the **Drill Shape Properties** window of the ScanMaster Designer interface. If needed, you can change the values of properties by entering or selecting new values in the **Drill Shape Properties** window.

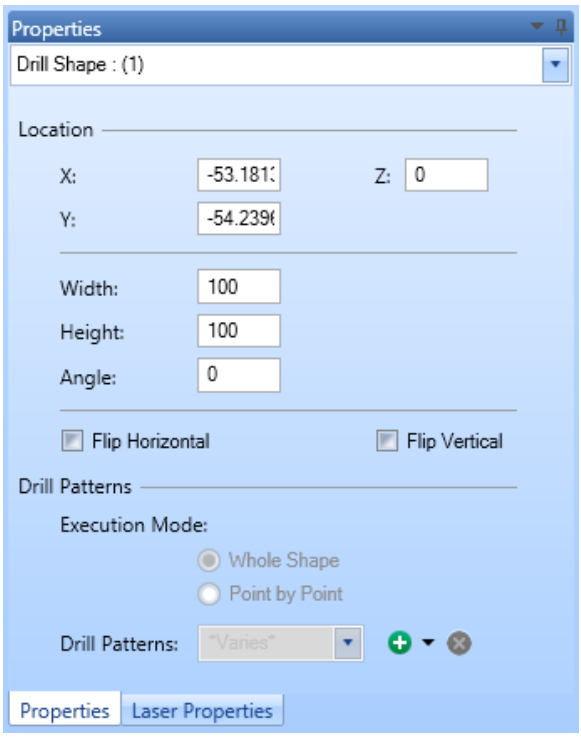


FIGURE 327: THE DRILL SHAPE PROPERTIES WINDOW

Note: A drill pattern has not been selected in the above **Drill Shape Properties** window. When a drill pattern is selected, the **Drill Patterns** section of the above window will contain between one and four additional properties. (The additional properties that the **Drill Patterns** section will contain depend on the drill pattern that is selected.) Refer to the descriptions of the **Drill Patterns** property on page 262 for more information on the additional properties that can appear in the **Drill Patterns** section.

The drill shape properties are the following:

- **X** – The X coordinate of the lower-left corner of the drill shape
- **Y** – The Y coordinate of the lower-left corner of the drill shape
- **Z** – The Z coordinate of the lower-left corner of the drill shape

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

- **Width** – The width of the drill shape
- **Height** – The height of the drill shape
- **Angle** – The angle of rotation of the drill shape
- **Flip Horizontal** – Selecting this checkbox flips the drill shape across the X axis without changing the original size or location of the image.
- **Flip Vertical** – Selecting this checkbox flips the drill shape across the Y axis without changing the original size or location of the image.
- **Whole Shape** – Selecting this option applies the selected drill pattern to the entire drill shape.
- **Point by Point** – Selecting this option applies the selected drill pattern on a point-by-point basis.
- **Drill Patterns** – Specifies the drill pattern for the drill shape. The drill pattern can be selected from the pulldown to the right of the **plus-sign** icon in the **Drill Patterns** section. The allowable values are the following:
    - **Jump and Fire** – The galvos jump to each pixel location with a fixed jump speed and a fixed jump delay.
    - **Point and Shoot** – The galvos jump to each pixel location with unrestricted speed.
    - **Circle** – At each pixel location, the galvo will trepan a circle. This can be selected together with **Jump and Fire** or **Point and Shoot**.

When a drill pattern is selected, additional properties will appear below the Drill Patterns pulldown in the **Drill Shape Properties** window. The properties that display depend on the selected drill pattern type.

The following additional properties are displayed for a **Jump and Fire** drill pattern:

- **Port** – The laser power control port (**Analog1**, **Analog2**, **Digital**, or **Pulse Width**)
- **Settling Time** – Additional waiting time before firing the laser
- **Laser On Time** – How long the laser will fire on each pixel
- **Power (%)** – Laser power percentage

The **Laser On Time** property (described above) is displayed for a **Point and Shoot** drill pattern.

The following additional properties are displayed for a **Circle** drill pattern:

- **Start Angle** – The start angle of the **Circle** drill pattern
- **Sweep Angle** – The sweep angle of the **Circle** drill pattern
- **Radius** – The radius of the **Circle** drill pattern

6.8 BARCODE SHAPES

Barcodes represent numerical and/or alphanumerical characters in a series of bars and spaces that can be read by a barcode reader. ScanMaster Designer supports the following Linear and 2D barcodes:

- Codabar
- Code 11
- Code 128
- Code 2 of 5 interleaved
- Code 39
- Code 93
- DataMatrix
- EAN
- MSI
- UPCA
- UPCE
- QR
- Micro QR Code
- PDF 417
- Macro PDF 417

6.8.1 Insert a Barcode

The **Insert Barcode** tool can be used to insert a barcode on the **Drawing Canvas.**

Do the following to insert a barcode on the **Drawing Canvas**:

1. Left-click the **Insert Barcode** icon on the Drawing toolbar. This displays the **Barcodes** dialog.
2. Select a **Barcode Type** from the list in the **Barcodes** dialog box. The parameters for that **Barcode Type** are displayed in the **Barcodes** dialog box.
3. Change any of the barcode parameters by typing in its text-entry box, selecting (or deselecting) its checkbox, or selecting from its dropdown list.

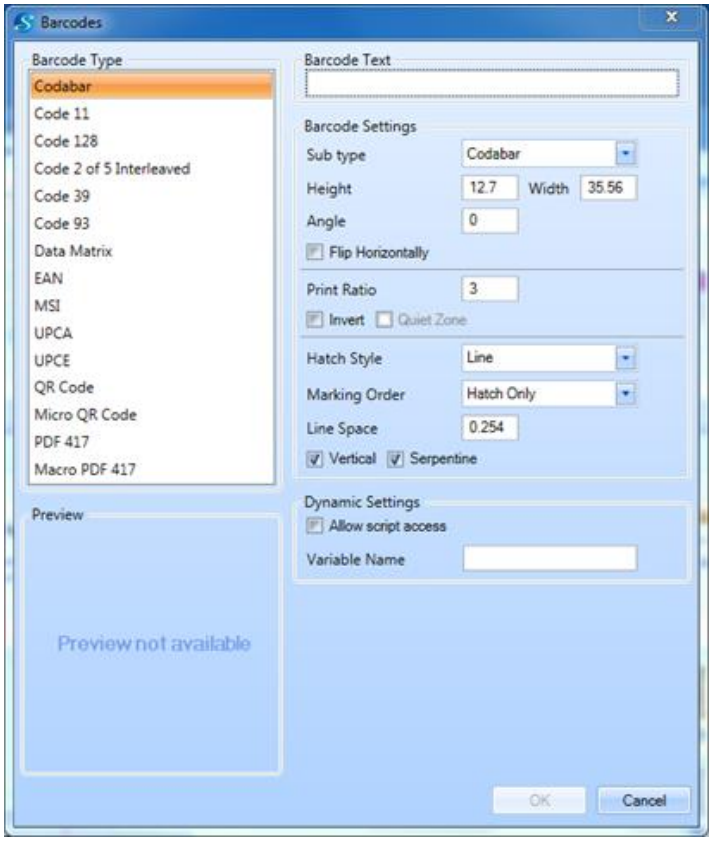


FIGURE 328: THE BARCODES DIALOG BOX

4. To save your changes to barcode parameters, left-click the **OK** button in the **Barcodes** dialog box.

6.8.2 Barcode Parameters

Refer to "Parameters That Are Common Across Barcode Types" (below) for descriptions of the parameters that are included in all Barcode Types.

Refer to "Type-specific Barcode Parameters" on page 266 for descriptions of parameters that are unique to the following Barcode Types: Data Matrix, QR Code, Micro QR Code, PDF 417, and Macro PDF 417.

Parameters That Are Common Across Barcode Types

Except for **Print Ratio**, all of the following parameters are included in each Barcode Type:

- **Barcode Type** – The type of the barcode, which can be any of the following: **Codabar, Code 11, Code 128, Code 2 of 5 interleaved, Code 39, Code 93, DataMatrix, EAN, MSI, UPCA, UPCE, QR, Micro QR Code, PDF 417,** and **Macro PDF 417**
- **Barcode Text** – The text that will be represented by the barcode
- **Sub type** – The Sub Type of the of the selected Barcode Type

Note: The **Sub type** and the **Barcode Type** are identical, except when the Barcode Type is one of the following: **Code 128**, **Code 93**, **EAN**, **UPCA**, and **UPCE**. Refer to the following table for the Sub Types that can be selected for each of these Barcode Types.

Barcode Type	Selectable Sub Types			
Code 128	Code 128	Code 128A	Code 128B	Code 128C
Code 93	Code 93	Code 93 Full ASCII		
EAN	EAN13	EAN13P2	EAN13P5	EAN8
UPCA	UCAP2	UCAP5		EAN8P2, EAN8P5
UPCE	UPCE	UPCEP2	UPCEP5	

- **Height** – The height of the barcode in the applicable units of measurement (millimeters or inches)
- **Width** – The width of the barcode in the applicable units of measurement (millimeters or inches)
- **Angle** – The angle at which the barcode will be marked to the surface (in degrees)
- **Flip Horizontally** – When this checkbox is selected, the barcode is flipped from left to right.
- **Print Ratio** – The ratio between the widths of wide and narrow bars
- **Quiet Zone** – When this checkbox is selected, the Quiet Zone of the barcode is enabled.

Note: Quiet Zone is selected by default when **Invert** is selected. You will have to explicitly deselect **Quiet Zone** if you want to disable it while **Invert** is selected. **Quiet Zone** can only be selected while **Invert** is selected.

- **Invert** – When this checkbox is selected, the positions of the black and white bars are reversed.
- **Hatch Style** – The Hatch Style for the barcode, which can be **Line**, **Helix, Dot, Circle or Circle with Dot.**
- **Marking Order** – The order of marking for the barcode, which can be any of the following: **Hatch Before Outline**, **Hatch Only**, **Outline Before Hatch**, or **Outline Only**
- **Line Space** – The space between hatching lines in the applicable units of measurement (millimeters or inches)
- **Vertical** – Specifies vertical hatch lines for the barcode.
- **Serpentine** – Specifies serpentine hatch lines for the barcode.
- **Allow script access** – When this checkbox is selected, the barcode can be assigned to a variable with the **Variable Name** parameter (see below). Once the variable name is assigned, the barcode can be dynamically accessed from a ScanScript application. At the time of marking, this variable will be retrieved and assigned as the barcode text.

Note: The **Allow script access** checkbox must be selected in order for a value to be entered for the **Variable Name** field.

Type-specific Barcode Parameters

The following table lists the type-specific barcode parameters (i.e., those that are included in some, but not all, Barcode Types).

Barcode Type	Type-specific Parameters					
Data Matrix	Flip Vertically	Data Matrix Size	Data Matrix Format	Auto Expand		
QR Code	Flip Vertically	QR Code Size	QR Code Mode	Mask	Error Correction Level	Auto Expand
Micro QR Code	Flip Vertically	QR Code Size	QR Code Mode	Mask	Auto Expand	
PDF 417	Flip Vertically	Number of Rows	Number of Columns	Compact Mode	Error Correction Level	Auto Expand
Macro PDF 417	Flip Vertically	Number of Rows	Number of Columns	Compact Mode	Error Correction Level	Auto Expand

The following alphabetical list contains a description of each type-specific barcode parameter:

- Auto Expand – When this checkbox is selected, you can enter any number of characters for barcode text.
- Compact Mode – Specifies the compaction mode.
- Data Matrix Format – **The format of the Data Matrix Barcode, which can be any of the following:** Default, Industry, Macro 05, or Macro 06 Data Matrix Size – The two-dimensional size of the Data Matrix Barcode, **which can be any one of the following:** 10x10, 12x12, 14x14, 16x16, 18x18, 20x20, 22x22, 24x24, 26x26, 32x32, 36x36, 40x40, 44x44, 48x48, 52x52, 64x64, 72x72, 80x80, 88x88, 96x96, 104x104, 120x120, 132x132, 144x144, 8x18, 8x32, 12x26, 12x36, 16x36, or 16x48

Note: If the Auto Expand checkbox is selected, any number of characters can be entered for the barcode text, which can potentially override the Data Matrix Size setting.

- Error Correction Level – **The Error Correction Level of a** PDF 417 barcode or a Macro PDF 417 **barcode, which can be any of the following:** Default, Level1, Level2, Level3, Level4, Level5, Level6, Level7, Level8, and Level0
- Flip Vertically – Selecting this checkbox flips the barcode from top to bottom.
- Mask – Specifies the mask pattern.
- Number of Columns – **The number of columns in a** PDF 417 or Macro PDF 417 barcode
- Number of Rows – The number of rows in a PDF 417 or Macro PDF 417 barcode
- QR Code Mode – **The encoding mode of a** QR Code or a Micro QR Code, **which can be any of the following:** Default, Numeric, Alphanumeric, or Byte
- QR Code Size – **The code size of a** QR Code or a Micro QR Code, **which can be any of the following**: 21x21, 25x25, 29x29, 33x33, 37x37, 41x41, 45x45, 49x49, 53x53, 57x57, 61x61, 65x65, 69x69, 73x73, 77x77, 81x81, 85x85, 89x89, 93x93, 97x97, 101x101, 105x105, 109x109, 113x113, 117x117, 121x121, 125x125, 129x129, 133x133, 137x137, 141x141, 145x145, 149x149, 153x153, 157x157, 161x161,165x165, 169x169, 173x173, and 177x177

6.9 BARCODE PROPERTIES

When you select a barcode on the canvas, the barcode properties will be displayed on the Properties tab of the ScanMaster Designer interface. You can change any of the barcode properties by giving them different values in the Properties tab.

Refer to the following sections for the barcode properties of all Barcode Types:

- "Properties of non-Data Matrix, non-QR, and non PDF Barcode Types" on page 268
- "Properties of the Data Matrix Barcode Type" on page 268
- "Properties of QR Barcode Types" on page 270
- "Properties of PDF Barcode Types" on page 271

6.9.1 Properties of non-Data Matrix, non-QR, and non PDF Barcode Types

The following figure shows a Properties tab that contains properties for the non-Data Matrix, non-QR, and non PDF Barcode Types.

Note: The non-Data Matrix, non-QR, and non PDF Barcode Types are Codabar, Code 11, Code 128, Code 2 of 5 Interleaved, Code 39, Code 93, EAN, MSI, UPCA, and UPCE.

With the exception of the Location properties, all of the properties in the above tab are described in "Parameters That Are Common Across Barcode Types" on page 265.

The **X** and **Y** properties are the **X** and **Y** coordinates of the lower-left corner of the barcode. The **Z** property is the **Z** coordinate (elevation) of the barcode.

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

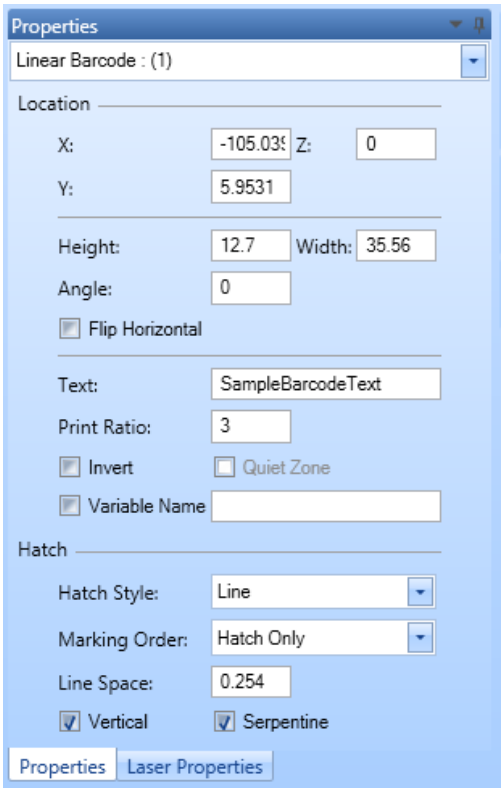


FIGURE 329: THE PROPERTIES TAB FOR NON-DATA MATRIX, NON-QR, AND NON- PDF BARCODE TYPES

6.9.2 Properties of the Data Matrix Barcode Type

The following figure shows the Properties tab for the Data Matrix Barcode Type.

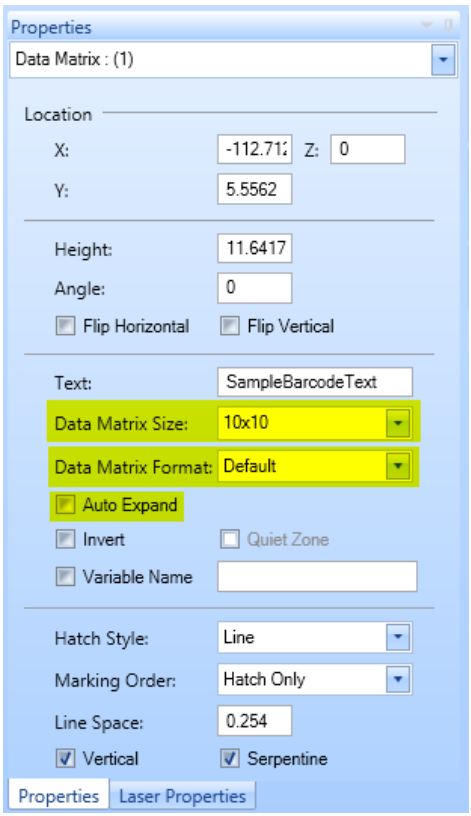


FIGURE 330: THE PROPERTIES TAB FOR THE DATA MATRIX BARCODE TYPES

With the exception of the yellow-highlighted properties—**Data Matrix Size, Data Matrix Format, and Auto Expand**—all of the non-Location properties in the above tab are described in "Parameters That Are Common Across Barcode Types" on page 265.

Note: The yellow highlighting appears in the above figure only for the purpose of illustration; it does not appear in the Properties tab in the actual user interface.

The Data Matrix Size, Data Matrix Format, and **Auto Expand properties** are described in "Type-specific Barcode Parameters" on page 266. Hatch Style can be set to line, helix, dot, circle or circle with dot.

The **X** and **Y** Location properties are the **X** and **Y** coordinates of the lower-left corner of the barcode. The **Z** Location property is the **Z** coordinate (elevation) of the barcode.

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the
Z property is defined in the **Marking Area** tab of the **Project Settings** tab.

6.9.3 Properties of QR Barcode Types

The following figure shows the Properties tab for a QR Barcode Type.

Note: The QR Barcode Type in the following figure is **QR Code**. For the other QR Barcode Type (**Micro QR Code**) the **Properties** tab contains all of the same properties except for **Error Correction Level.**

With the exception of the yellow-highlighted properties—**Flip Vertical, Code Size, Mode, Mask, Error Correction Level, and Auto Expand**—all of the non-Location properties in the above tab are described in "Parameters That Are Common Across Barcode Types" on page 265.

Note: The yellow highlighting appears in the above figure only for the purpose of illustration; it does not appear in the **Properties** tab in the actual user interface.

The Flip Vertical, Code Size, Mode, Mask, Error Correction Level, and **Auto Expand** properties are described in "Type-specific Barcode Parameters" on page 266.

The **X** and **Y** Location properties are the **X** and **Y** coordinates of the lower-left corner of the barcode. The **Z** Location property is the **Z** coordinate (elevation) of the barcode.

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

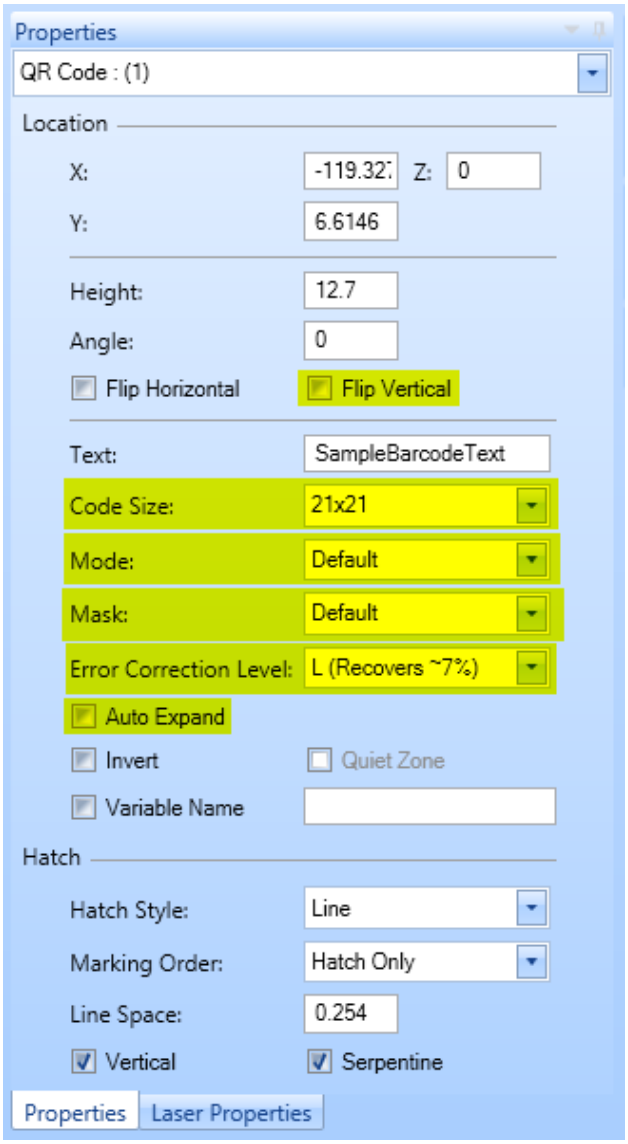


FIGURE 331: THE PROPERTIES TAB FOR A QR BARCODE TYPE

6.9.4 Properties of PDF Barcode Types

The following figure shows a **Properties** tab that contains properties for a **PDF Barcode Types**. The **PDF Barcode Types** are **PDF 417** and **Macro PDF 417.**

The **Flip Vertically, Number of Rows, Number of Columns, Compact Mode, Error Correction Level,** and **Auto Expand** properties are described in "Type-specific Barcode Parameters" on page 266.

With the exception of the yellow-highlighted properties—**Flip Vertically, Number of Rows, Number of Columns, Compact Mode, Error Correction Level,** and **Auto Expand**—all of the non-Location properties PDF Barcodes Types are described in "Parameters That Are Common Across Barcode Types" on page 265.

The **X** and **Y** Location properties are the **X** and **Y** coordinates of the lower-left corner of the barcode. The **Z** Location property is the **Z** coordinate (elevation) of the barcode.

Note: The **Z** property is only used for scanning on 3-Axis systems. The range of allowable values for the **Z** property is defined in the **Marking Area** tab of the **Project Settings** tab.

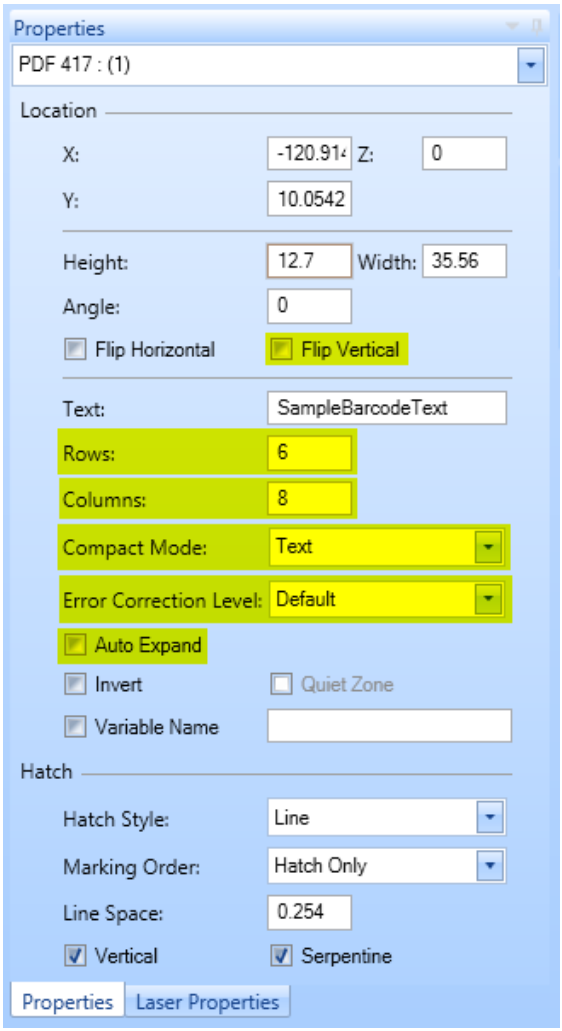


FIGURE 332: THE PROPERTIES TAB FOR A PDF BARCODE TYPE

Human Readable Text Support

The **Human Readable Text** in a barcode is an optional feature that provides a mechanism to verify the content of the barcode visually. In ScanMaster designer **Human Readable Text** facility is available with 1-D barcode types only.

Enable Human Readable Text

Select **Enable Human Readable Text** option from the **Human Readable Text** tab in order to include the **Human Readable Text** with a barcode.

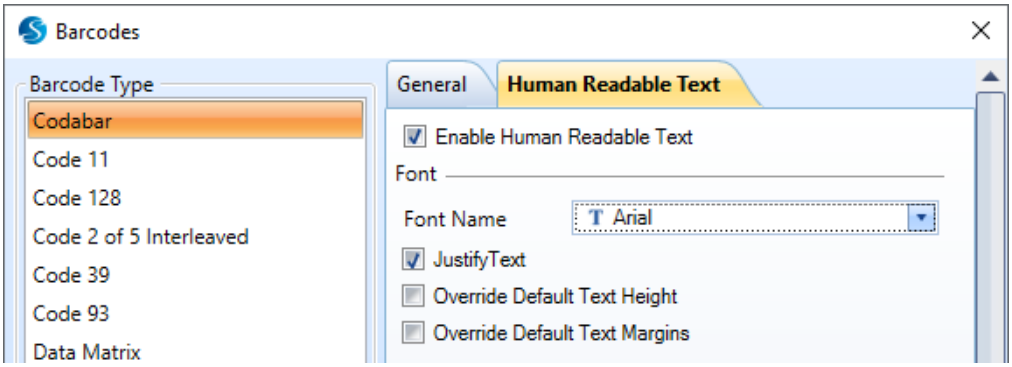


FIGURE 333: HUMAN READABLE TEXT IN BARCODE

Human Readable Text properties

The following properties are available to generate a clearly visible **Human Readable Text** with a barcode.

Modify Font properties

Controls the appearance of the **Human Readable Text.**

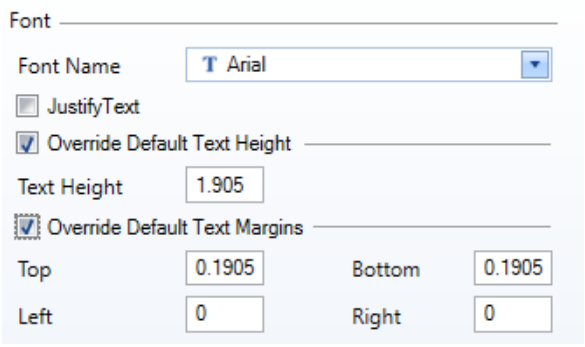


FIGURE 334: HUMAN READABLE TEXT, FONT PROPERTIES

Font Name: Pick a new font for your **Human Readable Text**

Justify Text: Distribute text evenly between the start and end bars of a barcode. The image shows a barcode with (left) and without (right) the justified text.

FIGURE 335: HUMAN READABLE TEXT, JUSTIFY TEXT

Override Default Height: Select this option to modify the default height of the text. The image shows a barcode with (left) and without (right) default text height, overrideOverride Default Height: Select this option to modify the default height of the text. The image shows a barcode with (left) and without (right) default text height, override

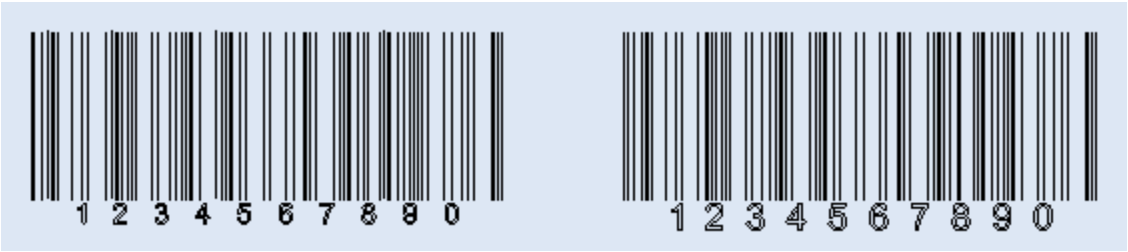


FIGURE 336: HUMAN READABLE TEXT, OVERRIDE DEFAULT HEIGHT

Override Default Margins: Select this option to modify the default margins of the text area. The text area is calculated automatically according to the barcode's height. The following image depicts the concept of the text area and the text margins.

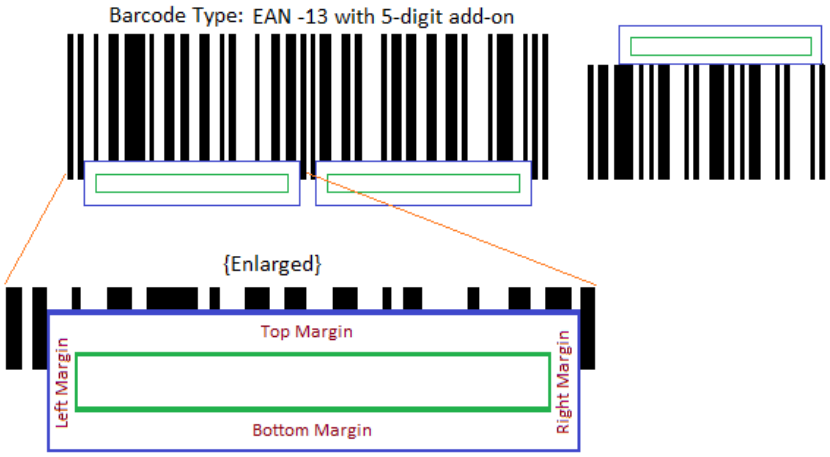


FIGURE 337: HUMAN READABLE TEXT, MARGINS

The sample image shows a barcode with (left) and without (right) the default margins, override.

FIGURE 338: HUMAN READABLE TEXT, MARGINS SAMPLE

Line Hatch properties

Controls the marking quality of the Human Readable Text.

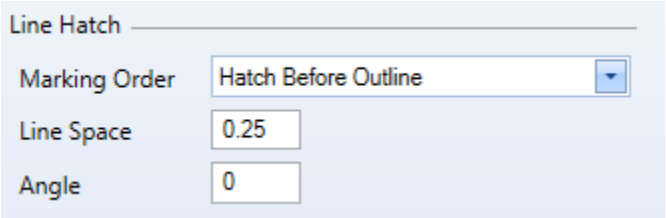


FIGURE 339: HUMAN READABLE TEXT, LINE HATCH PROPERTIES

Marking Order: Choose the marking order of the hatch and the boundary. There are four types of marking orders available to choose from.

- Hatch before Outline: Mark hatch lines first and the text outline next
- Hatch Only: Mark hatch only
- Outline Before Hatch: Mark text outline first and the hatch lines next
- Outline Only: Mark text outline only

Line Space: Specify the line gap of the hatch lines

Angle: Specify the line angle of the hatch lines

Font Embed for Dynamic Barcode

Select sub types of the selected font to embed with a barcode project. Only the selected sub types will be downloaded to the scanning card to use with dynamic barcodes generation.

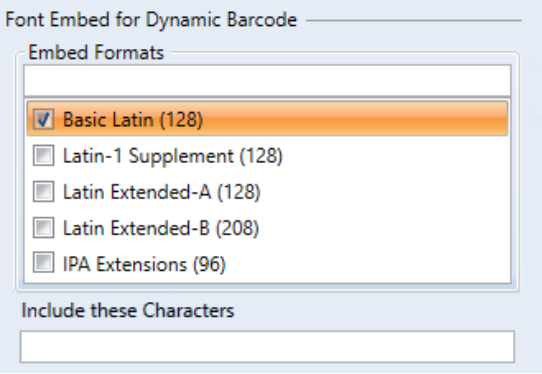


FIGURE 340: HUMAN READABLE TEXT, FONT EMBED

Embed Formats: Select desired subtype(s) of a font. Use the text box on the top to search sub types. The sub type list will get changed according to the search text entered.

Include characters: provide a set of characters to embed with a project.

Serial Number variable integration

Integrates a serial number generation variable to generate barcodes dynamically.

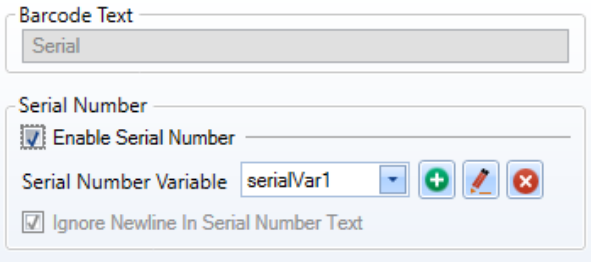


FIGURE 341: HUMAN READABLE TEXT, SERIAL NUMBER

Enable Serial Number: Select this option to configure a serial number variable for a barcode

Serial Number Variable: Select an existing serial number variable

Create a new Serial number variable: Click on the **Add** Button to create a new serial number variable

Edit a Serial number variable: Click on the **Edit** Button to edit the selected serial number variable

Delete a Serial number variable: Click on the **Delete** Button to delete the selected serial number variable

Ignore newline in serial number text: Select this option to ignore new line characters in the serial number variable. Available only for 2-D barcode types.

7 MODIFYING SHAPES

7.1 CHANGING THE VIEW

The **Home | View** panel contains tools for changing the view of the Drawing Canvas. With these tools you can zoom, pan, or rotate the Drawing Canvas. The current zoom factor is displayed in the pulldown box 100% on the Home | View panel.

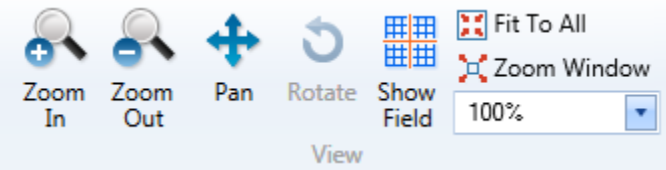


FIGURE 342: VIEW

7.1.1 To Zoom In/Zoom Out

Do the following to zoom in, or zoom out, on the Drawing Canvas:

1. Go to the **Home | View** panel.
2. Left-click the **Zoom In** icon or the **Zoom Out** icon, or select a more exact zoom percentage in the Zoom Factor pulldown box 100%. You can also type a value in the text entry field and press the Enter key.

Note: The exact zoom percentage is always displayed in the Zoom Factor pulldown box.

3. Zoom In increases the magnification level of a drawing on the canvas on every mouse click.
4. Zoom Out reduces the magnification level of a drawing on the canvas on every mouse click.

Note: You can also use the mouse wheel to increase or reduce the magnification level of the canvas.

7.1.2 Pan

Panning allows you to quickly move around the canvas at the current magnification.

Do the following to pan the Drawing Canvas:

1. Go to the **Home | View** panel.
2. Left-click the **Pan** icon .
3. Press the left mouse button over the Drawing Canvas and hold it down while you drag the mouse.
4. When you have dragged the mouse to the desired location, release the left mouse button.

As an alternative to using the **Pan** icon , you can do the following to pan with the middle mouse button:

3. Press the middle mouse button over the Drawing Canvas and hold it down while you drag the mouse.
4. Release the middle mouse button when you have dragged the mouse to the desired location.

Note: The cursor image changes to a hand cursor when panning is activated.

7.1.3 Rotate

Rotating allows you to rotate the viewport in 3-D. This tool is available only in the 3-D canvas.

Do the following to rotate the viewport in 3-D:

5. Go to the **Home | View** panel.
6. Left-click the **Rotate** icon .
7. Press the left mouse button over the 3-D canvas and hold it down while you drag the mouse.
8. Release the left mouse button when the 3-D viewport is at the desired rotation.

7.1.4 Show Field

The **Show Field** tool allows you to view the full marking area of the Drawing Canvas.

Do the following to view the full marking area of the Drawing Canvas:

9. Go to the **Home | View** panel.

10. Left-click the **Show Field** icon .

After you left-click the **Show Field** icon , the full marking area will be displayed with the point of origin for the drawing grid (0,0) at its center. The marking area will be displayed at its default magnification relative to the size of the ScanMaster Designer interface.

7.1.5 Zoom Window

The **Zoom Window** tool offers a quick way to view a selected area of the drawing.

Do the following to view a selected area of the drawing with the **Zoom Window** tool:

1. Go to the **Home | View** panel.
2. Left-Click the **Zoom Window** icon .
3. Press and hold down the left mouse button over a location on the Drawing Canvas.
4. With holding down the left mouse button, drag the mouse to select the entire zoom area.
5. When you have selected the entire zoom area, release the left mouse button. The selected zoom area now fills the entire Drawing Canvas.

7.1.6 Fit To All

The **Fit to All** tool adjusts the viewport to display the entire drawing on the screen. This is useful when the drawing is so large that it cannot be displayed in its entirety at the current zoom level.

To use the **Fit to All** tool, do the following:

1. Go to the **Home | View** panel.
2. Left-click the **Fit to Al**l icon .

7.2 SELECTING SHAPES

You can use any of the following methods to select one or more shapes on the Drawing Canvas:

- **Left-clicking** – selects the shape you left-clicked on. You can select more than one shape by pressing and holding the SHIFT key while you left-click the shapes. Pressing Ctrl+A selects all of the shapes on the Drawing Canvas.
- **Region Selection** – selects the shape(s) that are within a selection window.

To draw a selection window, do the following:

1. Press and hold down the left mouse button over a location on the Drawing Canvas.
2. With the left mouse button still held down, drag the mouse diagonally over the objects that you want to select. Then release the left mouse button.

To select only those shapes that completely fit inside the selection window, start the selection window on the left side of the shapes and drag the mouse to the right; objects that are only partly inside the selection window are not selected.

To select all objects that even partially fit inside the selection window, start the selection window on the right side of the objects and drag the mouse to the left.

Note: When an object is first placed on the canvas, it is automatically selected.

7.2.1 Hotspots on a Selected Shape

When a Shape is selected, it displays hotspots as shown in the following figure.

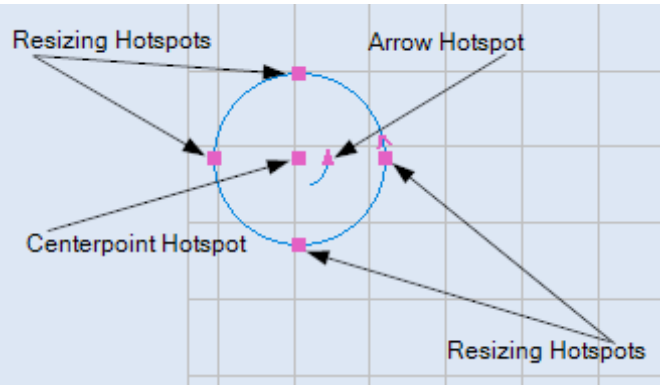


FIGURE 343: HOTSPOTS ON A SELECTED SHAPE

You can use hotspots to change or rotate a selected Shape. Refer to "Hotspot Editing" on page 282 for information on changing selected Shapes by moving hotspots.

7.2.2 Cutting, Copying, and Pasting Selected Shapes

Refer to "Editing Shapes" on page 310 for information on cutting, copying, and pasting selected Shapes.

7.2.3 Moving Selected Shapes

You can move selected Shapes by dragging or nudging or by using the moving tools (i.e., the **Move** and **Move to Origin** on the **Tools|Transform** panel). Refer to "Moving Shapes" on page 312 for information on using these techniques and tools.

7.3 HOTSPOT EDITING

When you select a shape it displays set of hotspots which can be moved to move, rotate, or modify the appearance of the shape. The hotspots shown depend on the shape selected.

Do the following to move a single hotspot on a single Shape:

1. Select the shape.
2. Click on the hotspot which needs to be modified.
3. Drag the mouse to the desired location. You will see a preview of the resultant shape.
4. Click again to accept the result.

Do the following to move a single hotspot on more than one Shape:

1. Select two or more shapes.
2. Press and hold SHIFT key and click on a hotspot to select it (or deselect if already selected).
3. You can repeat the previous step if you need to select or deselect any additional hotspots.
4. Click on any hotspot without holding SHIFT key to begin moving.
5. Move the mouse to the desired location. You will see a preview of the resultant shapes.
6. Click again to accept the result.

The following figures show how a Shape, in this case a rectangle, can be modified by dragging hotspots.

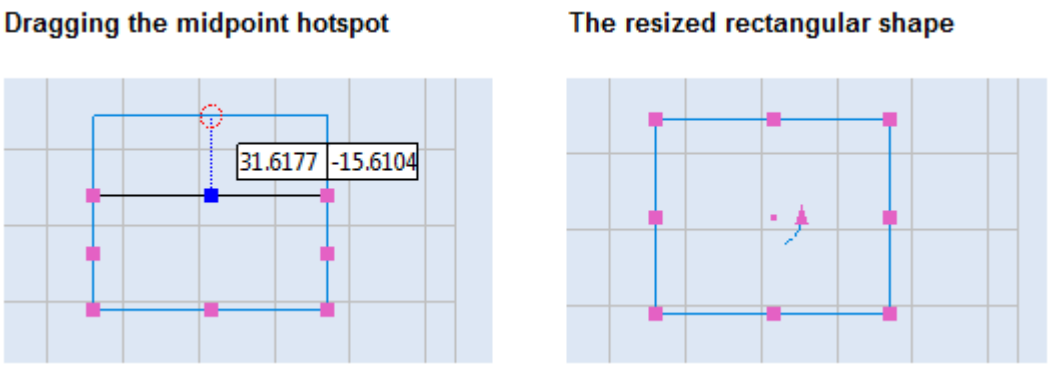


FIGURE 344: MODIFYING A RECTANGLE BY DRAGGING A MIDPOINT HOTSPOT

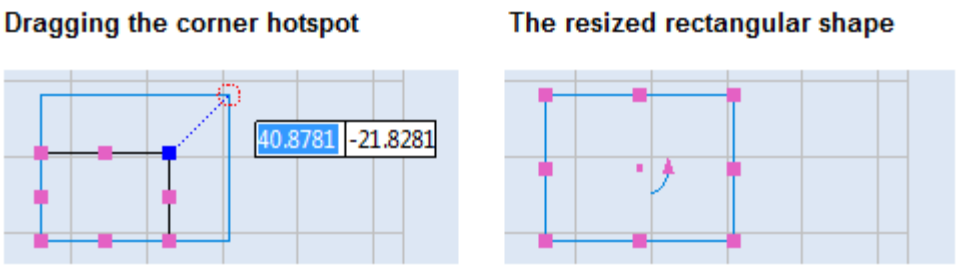


FIGURE 345: MODIFYING A RECTANGLE BY DRAGGING A CORNER HOTSPOT

The rest of this section describes how to modify geometric Shapes, Vector Images, Raster Images, Drill Shapes, and Barcodes by moving their hotspots.

7.4 MOVING THE ENDPOINT HOTSPOTS ON A LINE

This section describes how to change the length and/or angle of a line by moving one of its endpoint hotspots.

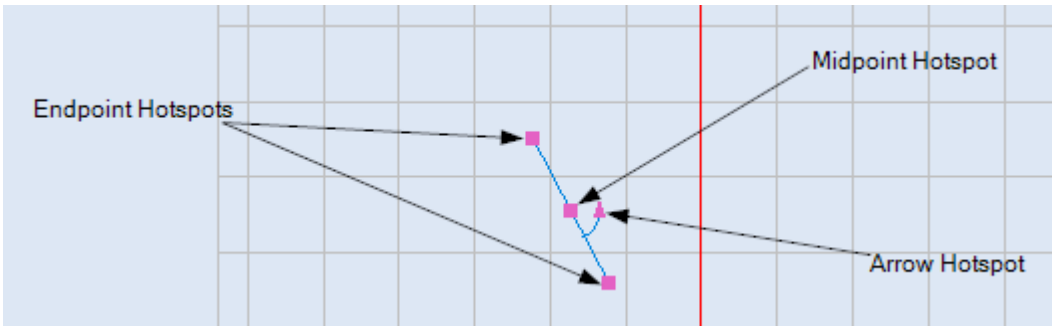


FIGURE 346: LINE HOTSPOTS

Do the following to change the length and/or angle of a line by moving an endpoint hotspot:

1. Select the line and click the left mouse button on one of its endpoint hotspots. The selected endpoint hotspot turns blue.
2. Drag the mouse to the desired location for the line endpoint.
3. When the mouse is at the desired location, click the left mouse button. This is the new location of the endpoint. In the following example, the endpoint is moved from (42.3894, -28.2607) to a new location (47.9849, -33.8561). This changes the length and angle of the line.

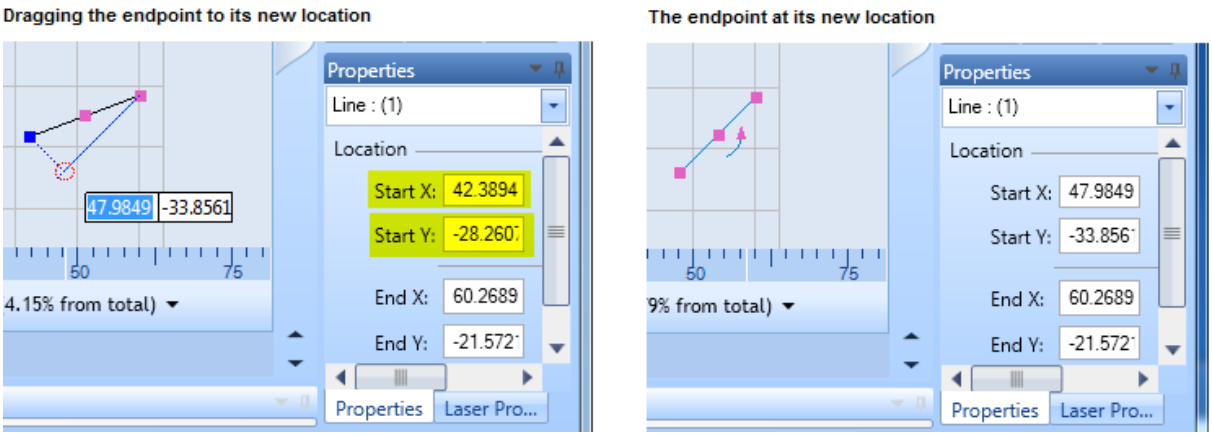


FIGURE 347: MOVING AN ENDPOINT HOTSPOT

You can rotate a line by moving its arrow hotspot. Refer to "Rotating Shapes" on page 323 for more information.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move the line by dragging its midpoint hotspot.

7.4.1 Moving Circle Hotspots to Change the Radius of a Circle

This section describes how to change the radius of a circle by moving one of its resizing hotspots.

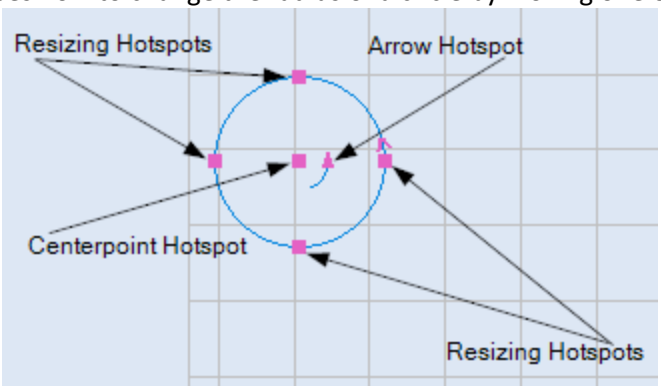


Figure 348: Circle Hotspots

Do the following to change the radius of a circle by moving one of its resizing hotspots:

1. Select the circle and click the left mouse button on one of its resizing hotspots.
2. Drag the mouse to a new location. The radius of the circle is previewed as you drag the mouse.

3. When the circle is at its desired radius, click the left mouse button. The circle is now resized.

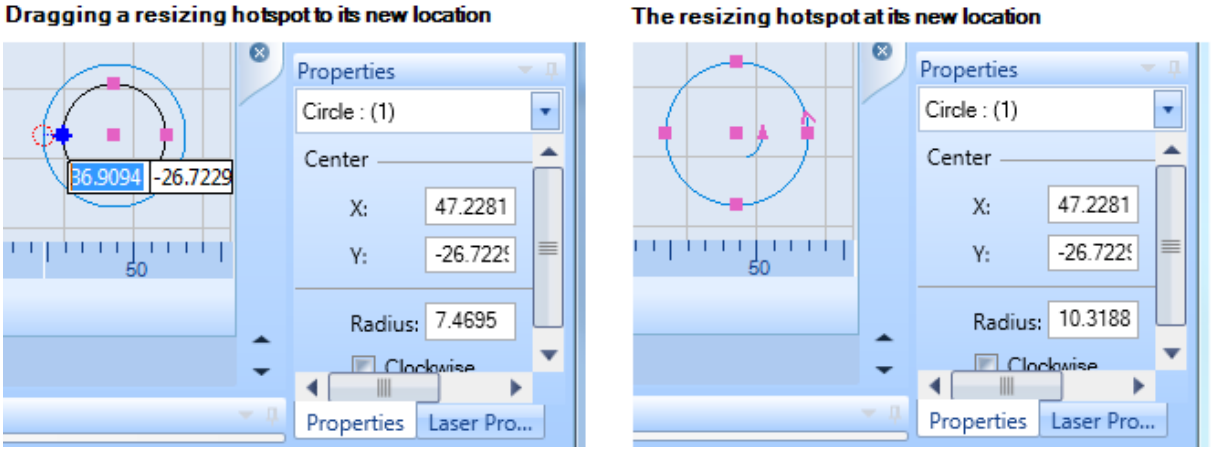


FIGURE 349: CHANGING THE RADIUS OF A CIRCLE

You can rotate a circle by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move a circle by dragging its centerpoint hotspot.

7.4.2 Moving Arc Hotspots to Change Arc Attributes

This section describes how to change all of the attributes of an arc—except the Centerpoint—by moving the arc hotspots.

Note: Moving the centerpoint hotspot moves the location of the arc without changing any of the other attributes of the arc. Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move an arc by dragging its centerpoint hotspot.

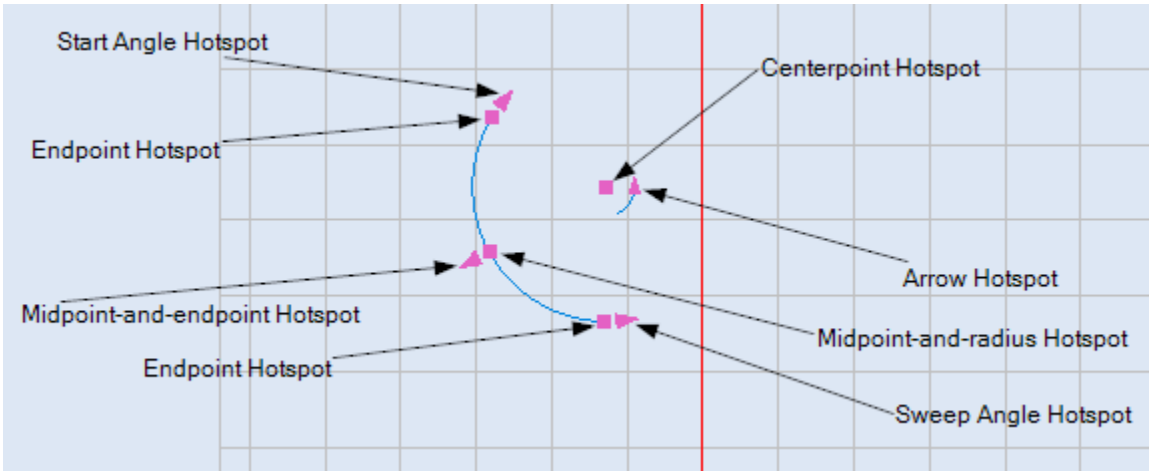


FIGURE 350: ARC HOTSPOTS

Moving an arc hotspot can change several arc attributes in addition to the attribute at the hotspot. Refer to the following subsections for the attributes that are changed by moving specific hotspots on an arc.

You can rotate an arc by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Moving an Endpoint Hotspot on an Arc

Moving the endpoint of an arc changes all of the attributes displayed on the Arc **Properties** tab.

Do the following to move an endpoint hotspot on an arc:

1. Select the arc and place the mouse over one of its endpoint hotspots.
2. Click the left mouse button to select the hotspot. The selected hotspot turns blue.
3. Drag the mouse to a new location. The location of the endpoint is previewed as you drag the mouse.
4. When the endpoint is at the desired location, click the left mouse button again.

As shown in the following figure, all of the attributes on the **Properties** tab change when the location of the midpoint-and-radius hotspot changes.

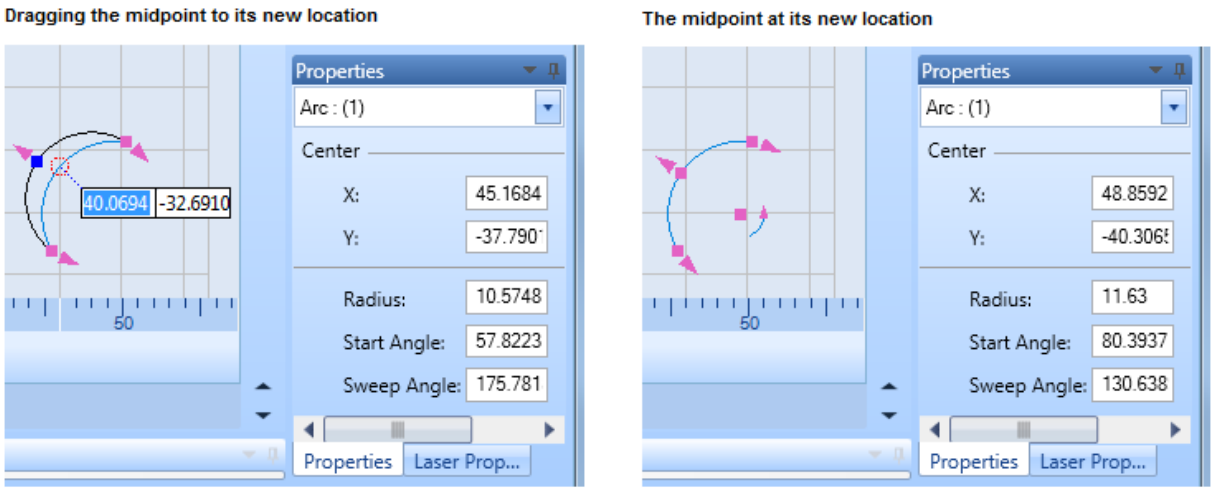


Figure 351: Moving the Midpoint of an Arc

Changing the Start Angle of an Arc

You can use the Arrow hotspot or the Start Angle hotspot to change the Start Angle of an arc.

For more information, refer to "Changing the Start Angle with the Arrow Hotspot" (below) or "Changing the Start Angle with the Start Angle Hotspot" on page 288.

Changing the Start Angle with the Arrow Hotspot

Changing the Start Angle with the Arrow hotspot also changes the endpoints and midpoint of the arc.

Do the following to use the Arrow hotspot to change the Start Angle of an arc:

1. Select the arc and place the mouse over its arrow hotspot.
2. Click the left mouse button to select the arrow hotspot. The arrow hotspot turns blue.
3. Drag the mouse around the centerpoint of the arc.

Note: Dragging the mouse inside the arc will preview the Start Angle in 45-degree increments. Dragging the mouse *outside* the arc will preview the Start Angle in 0.1-degree increments.

4. Click the left mouse button when the Start Angle is as desired.

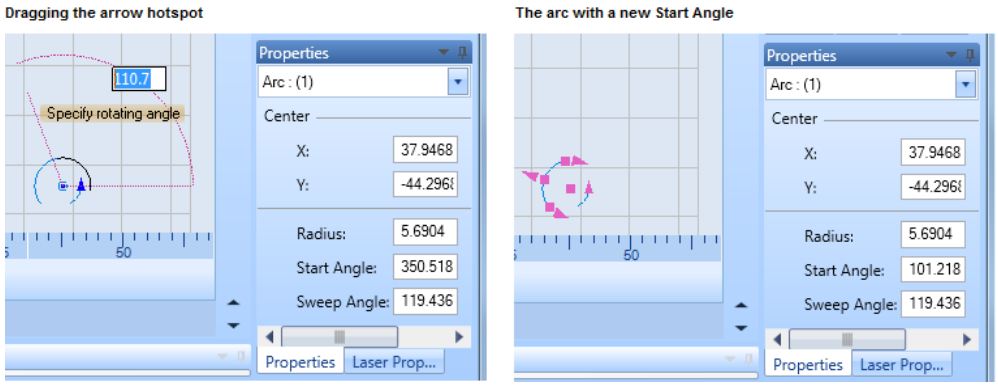


FIGURE 352: USING THE ARROW HOTSPOT TO CHANGE THE START ANGLE OF AN ARC

Changing the Start Angle with the Start Angle Hotspot

You can change the Start Angle of an arc—along with the Sweep Angle and the end point adjacent to the Start Angle hotspot—by rotating the Start Angle hotspot.

Do the following to change the Start Angle of an arc by rotating the Start Angle hotspot:

1. Select the arc and place the mouse over its Start Angle hotspot.
2. Click the left mouse button to select the Start Angle hotspot. The Start Angle hotspot turns blue.
3. Drag the mouse around the centerpoint of the arc.

Note: Dragging the mouse inside the arc will preview the Start Angle in 45-degree increments. Dragging the mouse *outside* the arc will preview the Start Angle in 0.1-degree increments.

4. Click the left mouse button when the Start Angle is as desired.

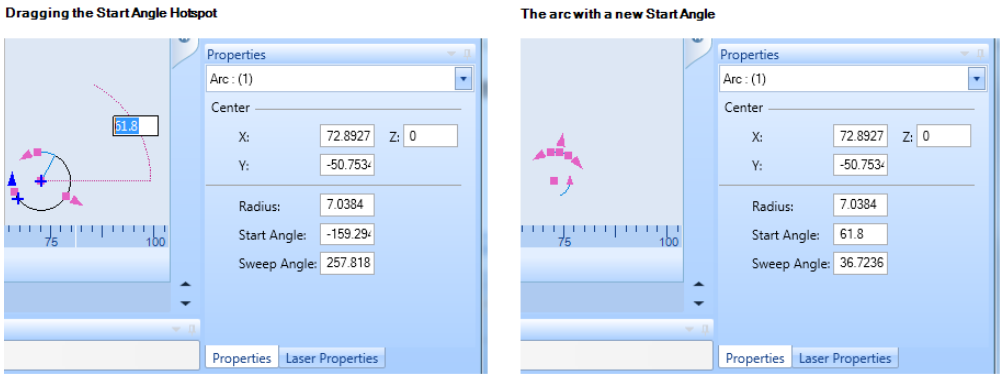


FIGURE 353: USING THE START ANGLE HOTSPOT TO CHANGE THE START ANGLE OF AN ARC

Changing the Sweep Angle of an Arc

You can change the Sweep angle of an arc by rotating its Sweep Angle hotspot. Note that rotating the Sweep Angle hotspot only changes the Sweep angle of an arc and the endpoint adjacent to the Sweep Angle hotspot; it does not change any of the other arc attributes.

Do the following to change the Sweep Angle of an arc by rotating the Sweep Angle hotspot:

1. Select the arc and place the mouse over its Sweep Angle hotspot.
2. Click the left mouse button to select the Sweep Angle hotspot. The Sweep Angle hotspot turns blue.
3. Drag the mouse around the centerpoint of the arc.

Note: Dragging the mouse inside the arc will preview the Sweep Angle in 45-degree increments. Dragging the mouse *outside* the arc will preview the Sweep Angle in 0.1-degree increments.

4. Click the left mouse button when the Sweep Angle is as desired.

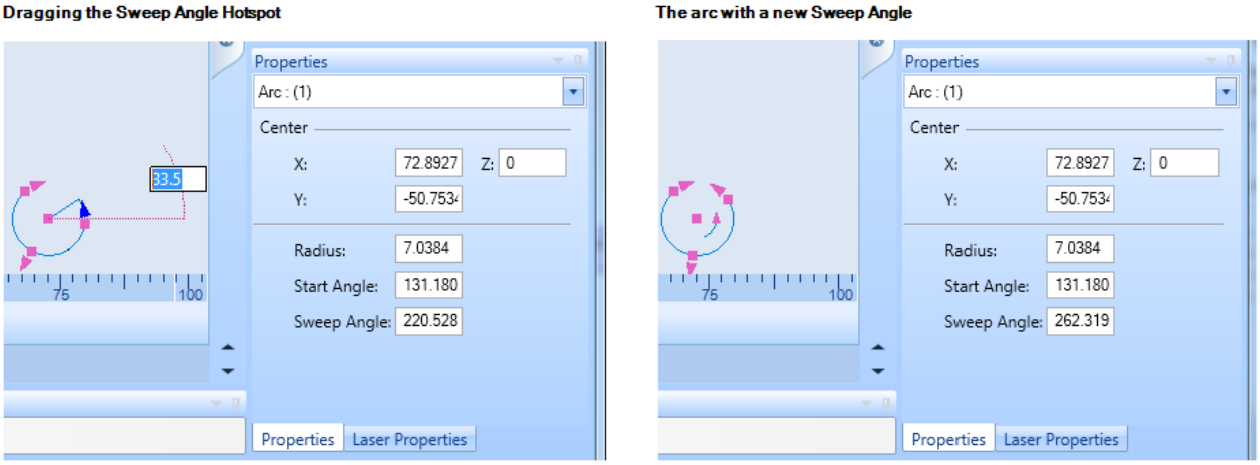


FIGURE 354: CHANGING THE SWEEP ANGLE OF AN ARC

Changing the Radius of an Arc by Moving Hotspots

You can change the radius of an arc by dragging its midpoint-and-endpoint hotspot. Note that dragging the midpoint-and-endpoint hotspot changes the radius and endpoints of an arc but does not change any of the other arc attributes.

Do the following to change the radius of an arc by dragging its midpoint-and-endpoint hotspot:

1. Select the arc and place the mouse over its midpoint-and-endpoint hotspot.
2. Click the left mouse button to select the midpoint-and-endpoint hotspot. The midpoint-and-endpoint hotspot turns blue.
3. Drag the mouse to a new location. The new arc radius will be previewed as you move the mouse.
4. When the arc is at the desired radius, click the left mouse button.

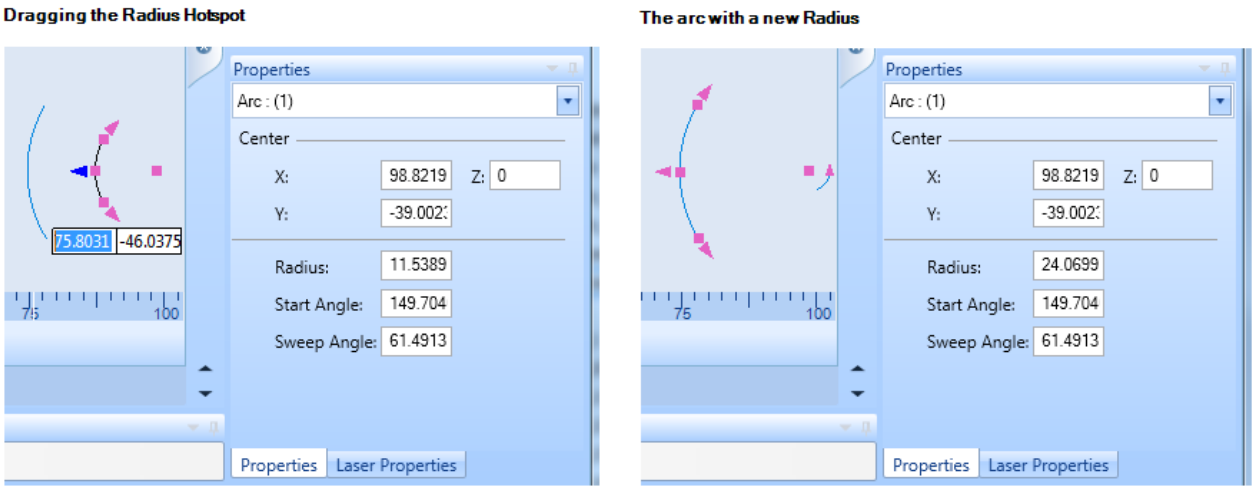


FIGURE 355: CHANGING THE RADIUS OF AN ARC

7.4.3 Moving Polyline Endpoint Hotspots to Change Polyline Endpoints

This section describes how to change polyline endpoints by moving polyline endpoint hotspots.

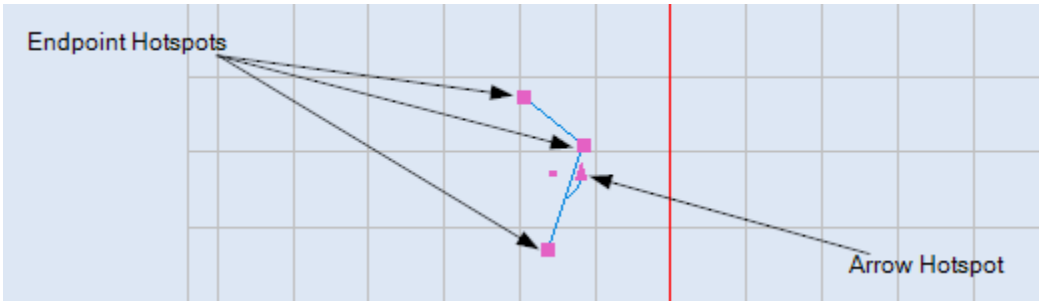


FIGURE 356: POLYLINE HOTSPOTS

You can rotate a polyline by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Do the following to move the endpoint of a polyline segment:

1. Select the polyline and click the left mouse button on one of its endpoint hotspots. The selected endpoint hotspot turns blue.
2. Drag the mouse to the desired location for the polyline endpoint.
3. When the endpoint is at the desired location, click the left mouse button. This is the new location of the endpoint, as shown in the following example.

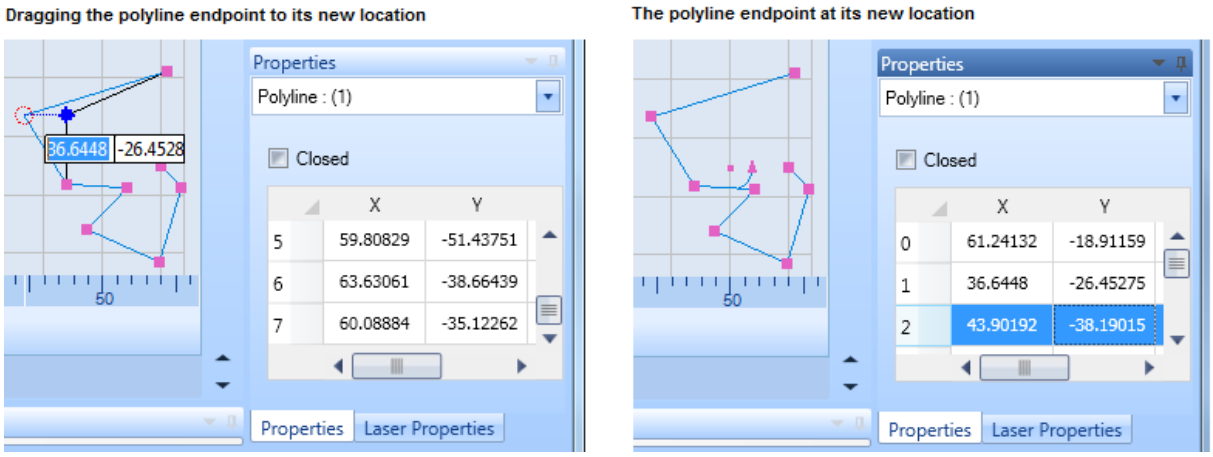


FIGURE 357: MOVING A POLYLINE ENDPOINT BY ITS HOTSPOT

7.4.4 Moving Resizing Hotspots on Rectangular Shapes

This section describes how to resize a rectangular shape by moving its resizing hotspots.

The rectangular shapes include Rectangles, Text Boxes, Raster Images, Vector Images, Drill Shapes, and Barcodes. Except for the location of the arrow hotspot—beside the upper-left corner on a Text Box and beside the lower-left corner on a Raster Image, Vector Image, Drill Shape, or Barcode—the hotspots of all rectangular shapes are located as shown in the following figure. The uses of hotspots are identical across all of the rectangular shapes.

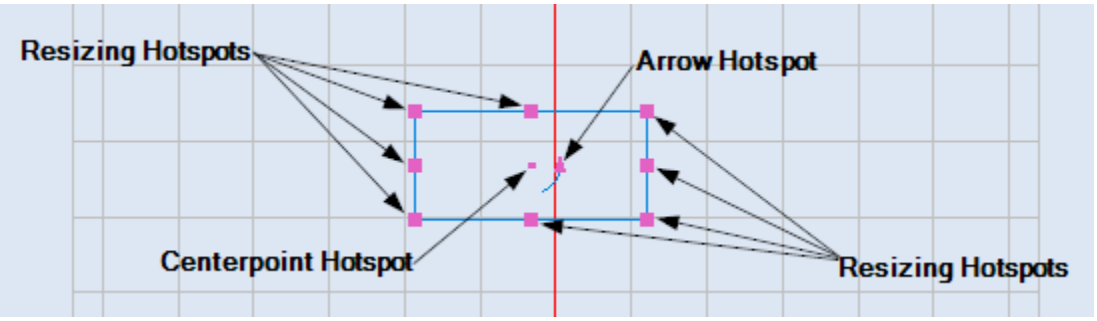


FIGURE 358: RECTANGULAR SHAPE HOTSPOTS

You can rotate a rectangular shape by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

The midpoint resizing hotspots on the top and bottom sides of a rectangular shape are used to resize the shape along the Y Axis, and those on the left and right sides of a rectangular shape are used to resize the shape along the X Axis. The corner resizing hotspots on a rectangular shape are used to resize the shape along the X Axis and the Y Axis (diagonally).

Do the following to resize a rectangular shape by moving one of its resizing hotspots:

1. Select the rectangular shape and click the left mouse button on one of its resizing hotspots. The selected hotspot turns blue.
2. Drag the mouse until the selected hotspot is at the desired location. The resized shape is previewed as you drag the mouse.
3. With the selected hotspot at the desired location, click the left mouse button. This completes the resizing of the rectangular shape.

Figure 344 (below) shows an example of a rectangular shape that has been resized by dragging a midpoint hotspot. Figure 345 (below) shows an example of a rectangular shape that has been resized by dragging a corner hotspot.

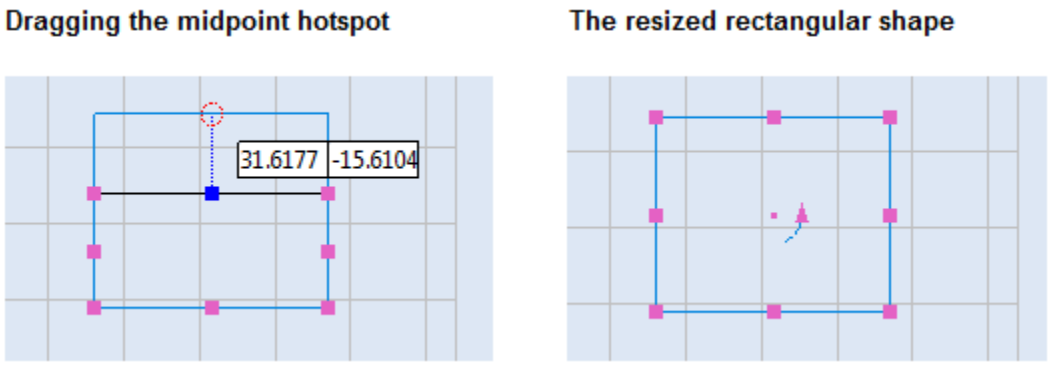


FIGURE 359: RESIZING A RECTANGULAR SHAPE BY DRAGGING A MIDPOINT HOTSPOT

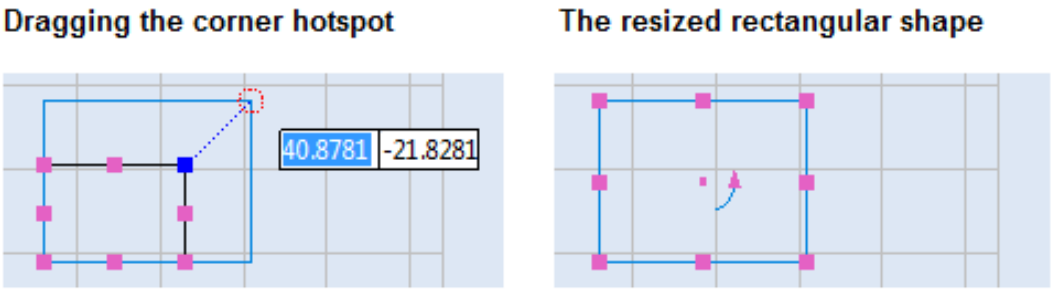


FIGURE 360: RESIZING A RECTANGULAR SHAPE BY DRAGGING A CORNER HOTSPOT

Moving Resizing Hotspots on Symmetric Polygons

This section describes how to resize a symmetric polygon by moving its resizing hotspots.

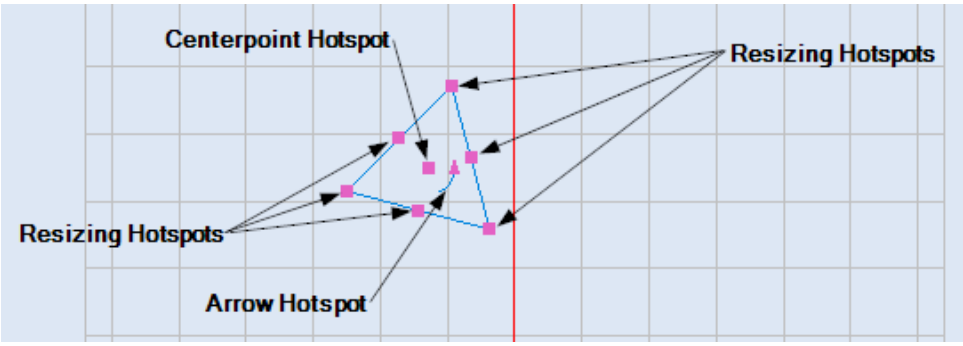


FIGURE 361: SYMMETRIC POLYGON HOTSPOTS

You can rotate a symmetric polygon by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move a symmetric polygon by dragging its centerpoint hotspot.

Do the following to resize a symmetric polygon by moving one of its resizing hotspots:

1. Select the symmetric polygon and click the left mouse button on one of its resizing hotspots. The selected hotspot turns blue.
2. Drag the mouse until the symmetric polygon is of the desired size. The resized polygon is previewed in blue.
3. When the symmetric polygon is of the desired size, click the left mouse button. This completes the resizing of the symmetric polygon.

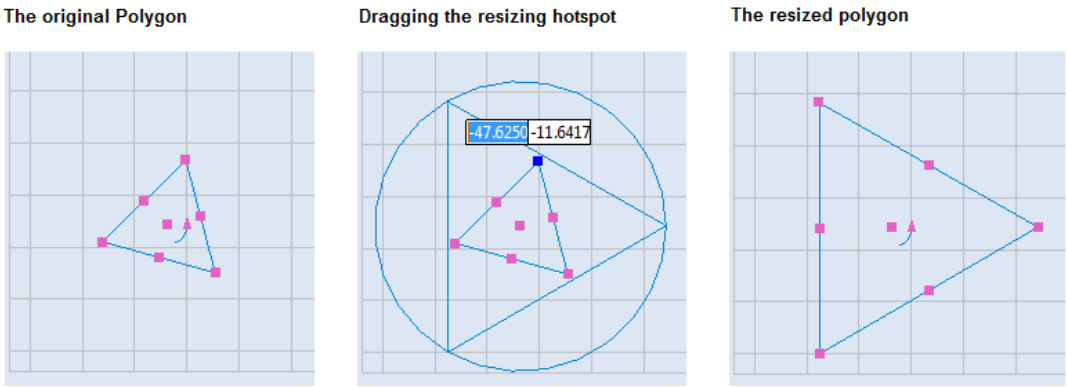


FIGURE 362: RESIZING A SYMMETRIC POLYGON BY MOVING A RESIZING HOTSPOT

7.4.5 Moving Ellipse Hotspots to Change the Length or Width of an Ellipse

This subsection describes how to use resizing hotspots to change the length or the width of an ellipse. The vertex resizing hotspots are used to change the length (major axis), and the co-vertex resizing hotspots are used to change the width (minor axis).

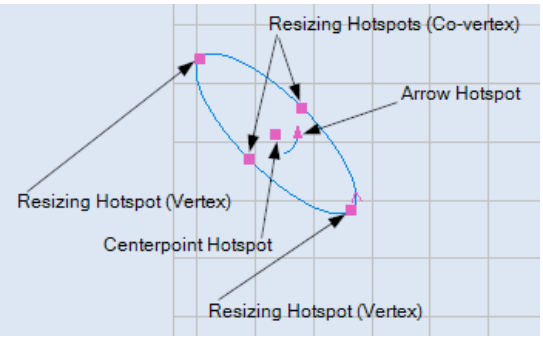


FIGURE 363: ELLIPSE HOTSPOTS

You can rotate an ellipse by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move an ellipse by dragging its centerpoint hotspot.

Do the following to change the length or the width of an ellipse by moving a resizing hotspot:

1. Select the ellipse and place the mouse over one of its resizing hotspots.
2. Click the left mouse button on the resizing hotspot and drag the mouse to a new location. The resized ellipse is previewed on the drawing canvas as shown in the following figures.
3. When the ellipse is at its desired length or width, click the left mouse button again. The resized ellipse is displayed on the drawing canvas.

FIGURE 364: CHANGING THE LENGTH OF AN ELLIPSE BY DRAGGING A RESIZING (VERTEX) HOTSPOT

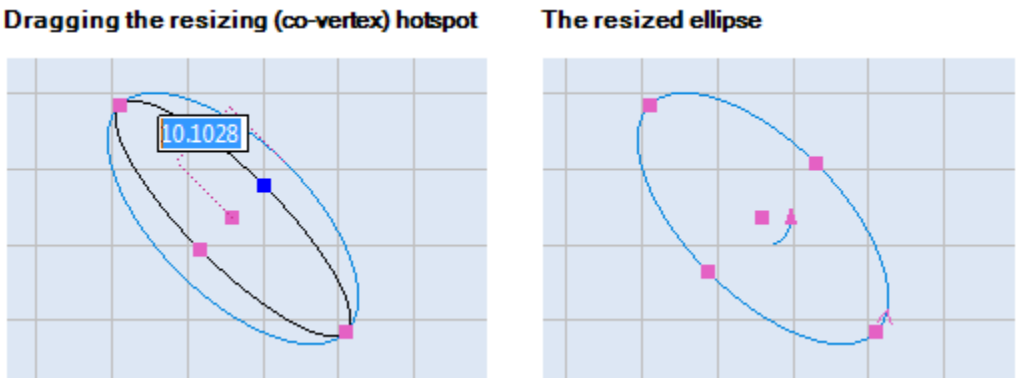


FIGURE 365: CHANGING THE WIDTH OF AN ELLIPSE BY DRAGGING A RESIZING (CO-VERTEX) HOTSPOT

7.4.6 Moving Hotspots to Change an Elliptical Arc

This section describes how move hotspots to change the angles and axes that define an elliptical arc. These hotspots are at each vertex and co-vertex of the arc ellipse and at each endpoint of the elliptical arc. (The hotspots are the endpoints of an elliptical arc are the Start Angle and Sweep Angle hotspots.)

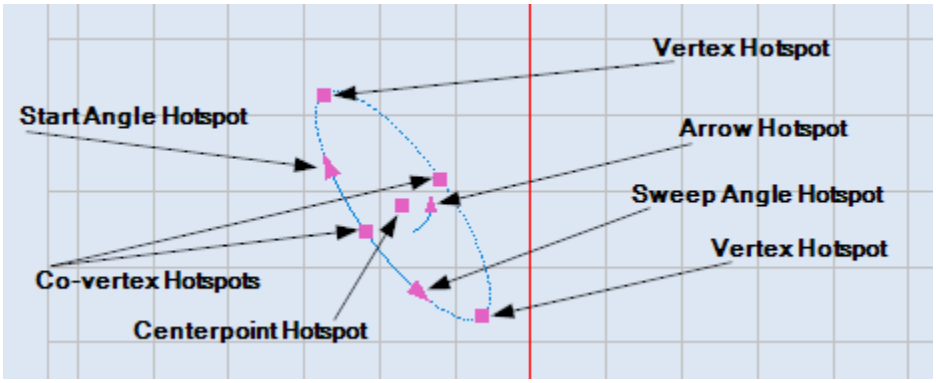


FIGURE 366: ELLIPTICAL ARC HOTSPOTS

You can rotate an elliptical arc by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move an elliptical arc by dragging its centerpoint hotspot.

Using a Vertex Hotspot to Change the Length of the Major Axis

You can move the vertex hotspots to change the length of the major axis of an elliptical arc. The major axis of an elliptical arc specifies the length of the ellipse that defines the arc.

Do the following to change the length of the major axis by moving a vertex hotspot:

1. Select the elliptical arc and place the mouse over one of its Vertex hotspots.
2. Left-click the mouse on the Vertex hotspot to select it. The selected Vertex hotspot turns blue.
3. Drag the mouse until the Vertex hotspot is at its desired location.
4. When the major axis is at the desired length, left-click the mouse again. This changes the length of the major axis and the length of the elliptical arc, as shown in the following figure.

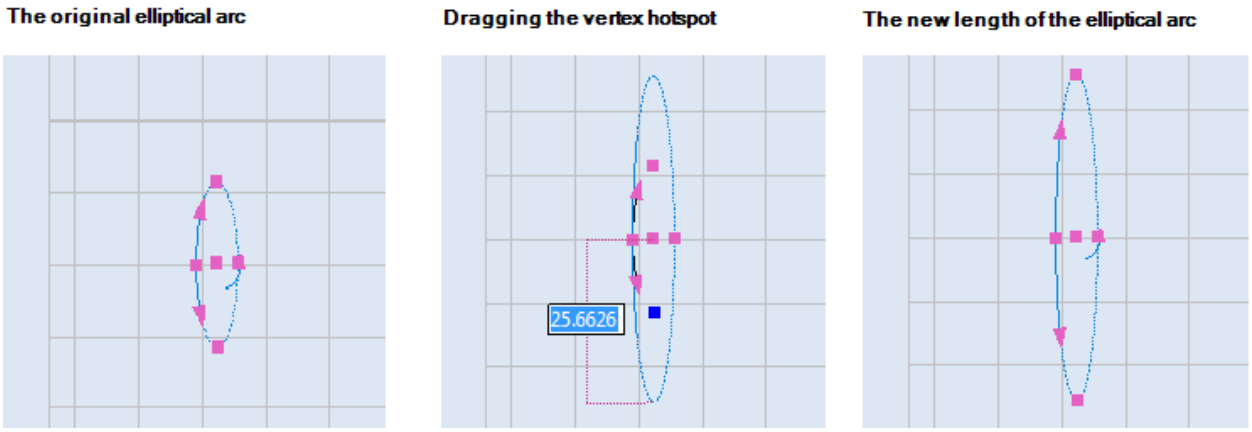


FIGURE 367: CHANGING THE LENGTH OF THE MAJOR AXIS OF AN ELLIPTICAL ARC

Using a Co-vertex Hotspot to Change the Length of the Minor Axis

You can move the Co-vertex hotspots to change the length of the minor axis of an elliptical arc. The minor axis of an elliptical arc defines the Ratio Minor Major of an elliptical arc. Changing the length of the minor axis also moves the elliptical arc in relation to the centerpoint.

Do the following to change the length of the minor axis by moving a Co-vertex hotspot:

1. Select the elliptical arc and place the mouse over one of its Co-vertex hotspots.
2. Left-click the Co-vertex hotspot to select it. The selected Co-vertex hotspot turns blue.
3. Drag the mouse until the Co-vertex hotspot is at the desired location.
4. When the Co-vertex hotspot is at the desired location, click the left mouse button. As shown in the following figure, this changes the length of the minor axis and the location of the elliptical arc in relation to the centerpoint. It also changes the Ratio Minor Major of the elliptical arc.

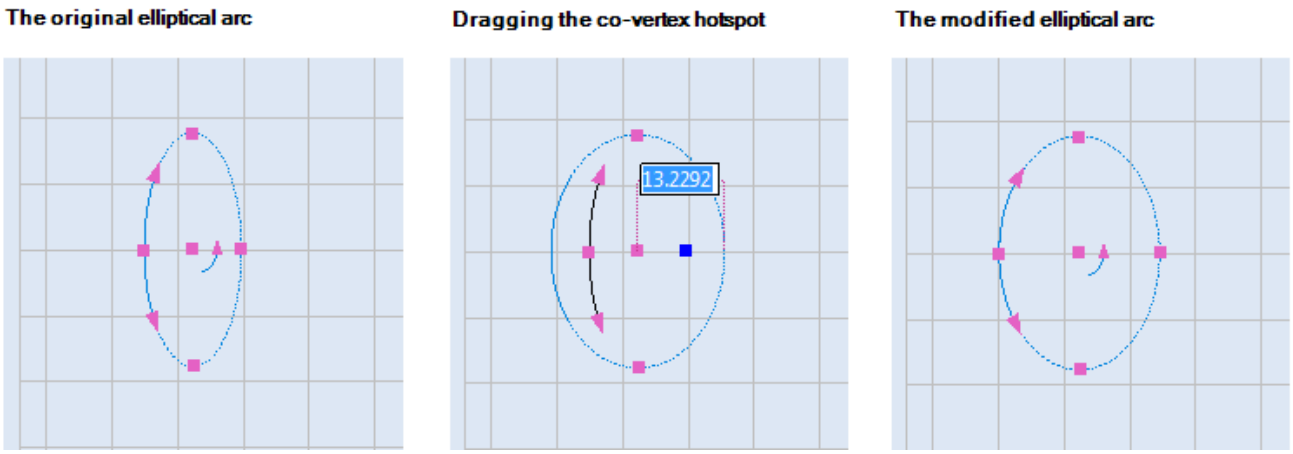


FIGURE 368: CHANGING THE LENGTH OF THE MINOR AXIS OF AN ELLIPTICAL ARC

Using the Sweep Angle Hotspot to Change the Sweep Angle

The Sweep Angle hotspot is used to change the sweep angle of an elliptical arc. Changing the sweep angle also changes the length of the arc by moving the endpoint at the Sweep Angle hotspot.

Note: The Sweep Angle hotspot is specified when the elliptical arc is created.

Do the following to use the Sweep Angle hotspot to change the sweep angle of an elliptical arc:

1. Select the elliptical arc and place the mouse over its Sweep Angle hotspot.
2. Left-click the mouse on the Sweep Angle hotspot and drag the mouse around the centerpoint of the elliptical arc.

Note: Dragging the mouse inside the arc will preview the Sweep Angle in 45-degree increments. Dragging the mouse *outside* the circle will preview the Sweep Angle in 0.1-degree increments.

3. Click the left mouse button when the Sweep Angle is as desired. Note that the length of the elliptical arc has changed; the endpoint at the Sweep Angle hotspot has moved closer to the Co-vertex hotspot. None of the other properties have changed.

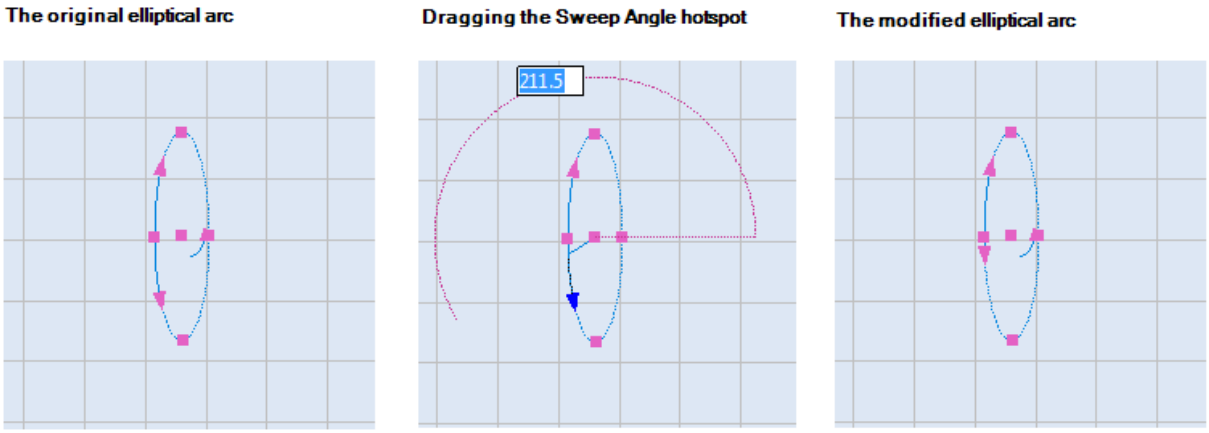


FIGURE 369: CHANGING THE SWEEP ANGLE OF AN ELLIPTICAL

Using the Start Angle Hotspot to Change the Start Angle and the Sweep Angle

The Start Angle hotspot is used to change the start angle and the sweep angle of an elliptical arc. Changing the start angle also changes the length of the arc by moving the endpoint at the Start Angle hotspot.

Note: The Start Angle hotspot is specified when the elliptical arc is created.

Do the following to use the Start Angle hotspot to change the start angle and the sweep angle of an elliptical arc:

1. Select the elliptical arc and place the mouse over its Start Angle hotspot.
2. Left-click the mouse on the Start Angle hotspot and drag the mouse around the centerpoint of the elliptical arc.

Note: Dragging the mouse inside the arc will preview the Start Angle in 45-degree increments. Dragging the mouse *outside* the circle will preview the Start Angle in 0.1-degree increments.

3. Click the left mouse button when the Start Angle is as desired. Note that the length of the elliptical arc has changed; the endpoint at the Start Angle hotspot has moved closer to the Co-vertex hotspot. The sweep angle has also changed, although it was not previewed during the dragging of the Start Angle hotspot.

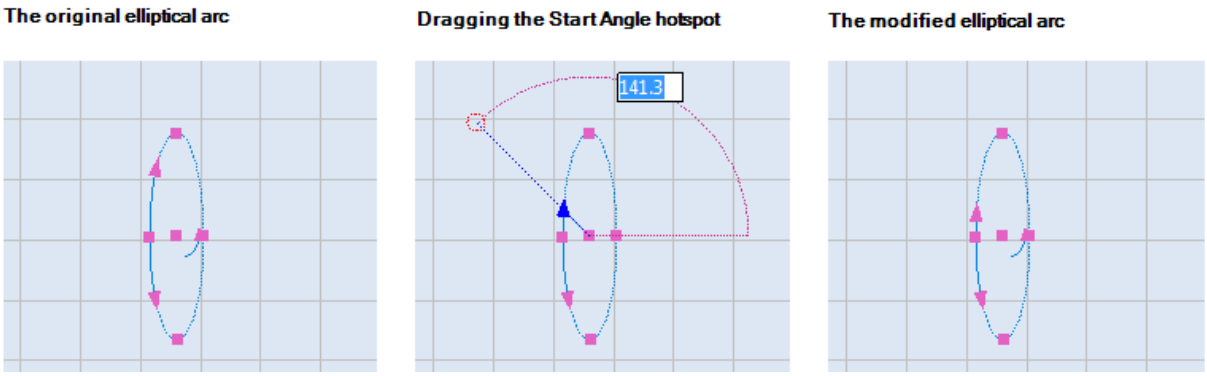


FIGURE 370: CHANGING THE START ANGLE AND THE SWEEP ANGLE OF AN ELLIPTICAL ARC

7.4.7 Using Bezier Path Hotspots to Modify Bezier Path Transitions

This section describes how to use Bezier Path hotspots to access Bezier Path Controls and use those controls to modify Bezier Path transitions. A Bezier Path has a hotspot at the beginning and end of each path segment and an arrow hotspot.

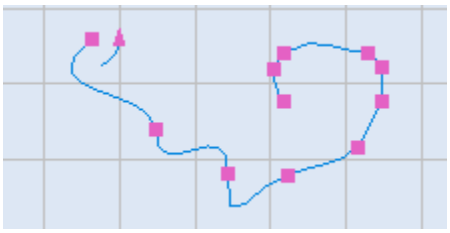


FIGURE 371: BEZIER PATH HOTSPOTS

Do the following to access Bezier Path controls:

1. Select the Bezier Path. This displays the Bezier Path hotspots.

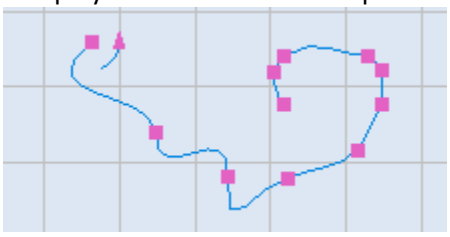


FIGURE 372: THE SELECTED BEZIER PATH

2. Left-click one of the Bezier Path hotspots to display its control handles. (The control handles are shown in blue.)

The following figure shows the control handles that are displayed when you left-click a specified hotspot on the selected Bezier Path.

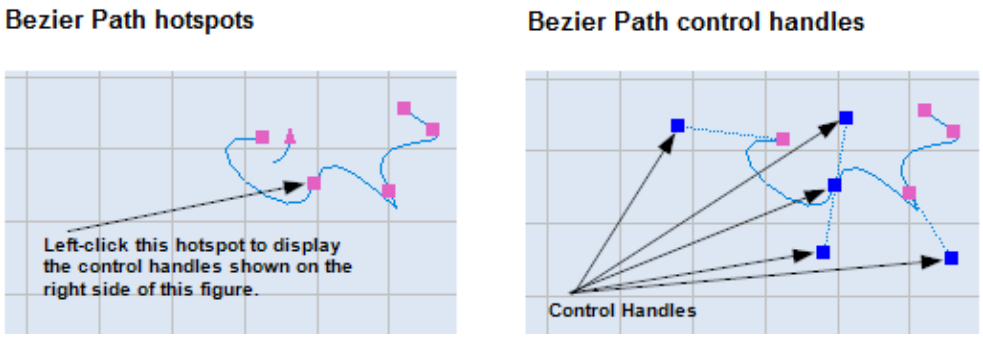


FIGURE 373: BEZIER PATH HOTSPOTS AND CONTROL HANDLES

Now that Bezier Path control handles are displayed, you can use them to modify Bezier Path transitions.

7.4.8 Moving Path Text Hotspots to Change the Path Text Location

This section describes how to move Path Text by moving one of its hotspots. An instance of Path Text has two arrow hotspots, one for changing the start offset of the text path and another for changing the distance of the path text from its associated shape.

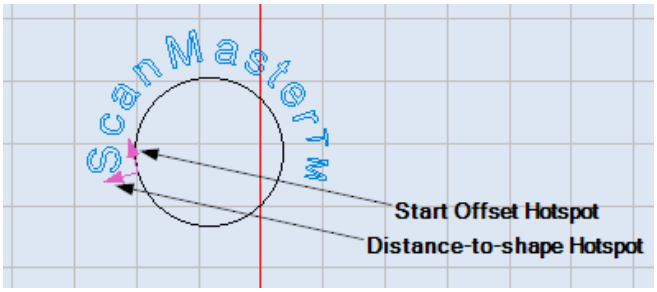


FIGURE 374: PATH TEXT HOTSPOTS

Refer to the following subsection to change the start offset of path text. Refer to "Changing the Path Text Distance" on page 304 to change the distance of the path text from its associated shape.

Changing the Start Offset of Path Text

The start offset is the location on the shape where the path text begins.

Do the following to change the start offset for an instance of Path Text:

1. Select the Path Text.
2. On the start offset hotspot of the path text, press and hold down the left mouse button. The start offset hotspot turns blue.
3. With the left mouse button held down, drag the mouse until the start offset is at its desired location. The path text with its new start offset is previewed in blue.
4. When the path text is at its desired start offset, release the left mouse button. The path text displays with its new start offset.

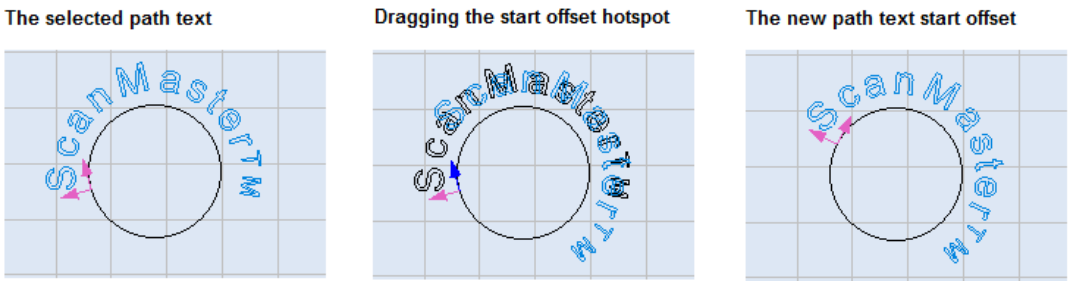


FIGURE 375: CHANGING THE START OFFSET OF PATH TEXT

Changing the Path Text Distance

Do the following to change the distance of path text from its associated shape:

1. Select the path text.
2. On the Distance-to-shape hotspot of the path text, press and hold down the left mouse button. The Distance-to-shape hotspot turns blue.
3. With the left mouse button held down, drag the mouse until the path text is the desired distance from its associated shape. The location of the path text is previewed in blue.
4. When the path text is the desired distance from the shape, release the left mouse button. The path text displays at the new distance from the associated shape.

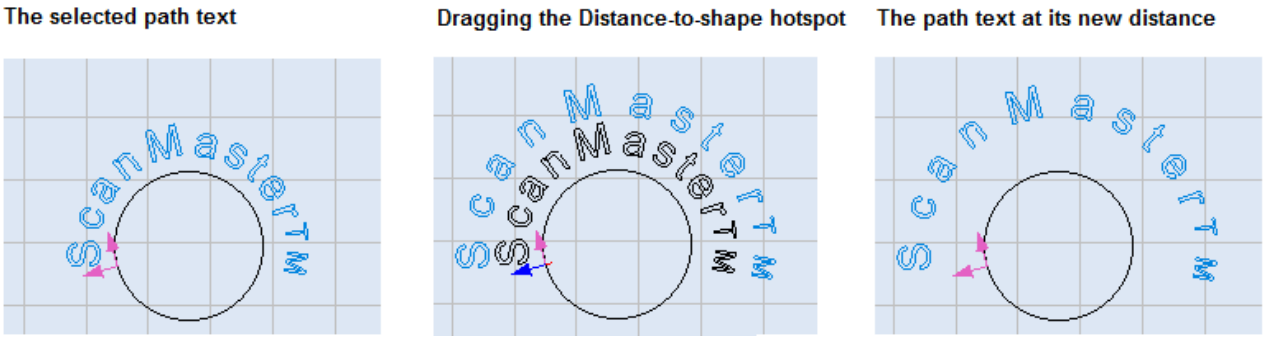


FIGURE 376: CHANGING THE DISTANCE OF PATH TEXT FROM ITS ASSOCIATED SHAPE

7.4.9 Using Hotspots to Modify a Spiral

This section describes how to use the resizing hotspots, the inner and outer radius hotspots, and the pitch hotspot to modify a spiral. The topics covered in this section include resizing a spiral, changing the inner and outer radii of a spiral, and changing the pitch of a spiral.

Note: An example of a selected spiral appears in the figure on the right. The resizing hotspots at the corners of a selection box of a spiral are only visible when the spiral is selected.

You can rotate a spiral by moving its arrow hotspot as described in "Using the arrow hotspot to rotate a Shape" on page 324.

Refer to "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313 to move a spiral by dragging its centerpoint hotspot.

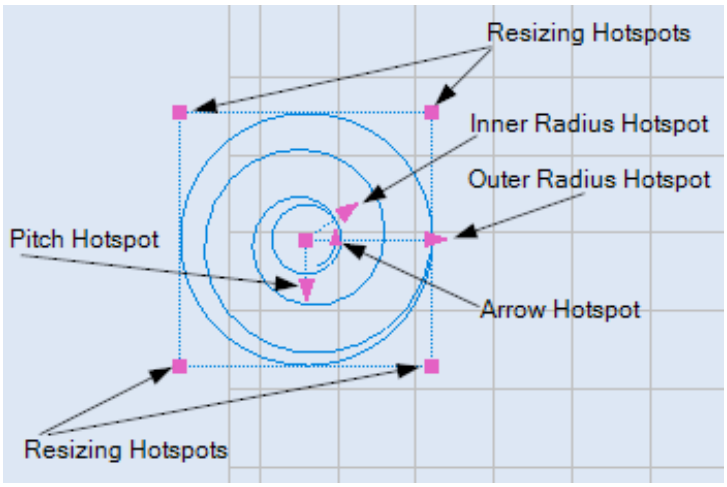


FIGURE 377: SPIRAL HOTSPOTS

Resizing a Spiral with Hotspots

Do the following to resize a spiral with hotspots:

1. Select the spiral and click the left mouse button on one of its resizing hotspots. All of the spiral hotspots will disappear.
2. Drag the mouse until the size of the spiral is as desired. The resized spiral is previewed in blue.
3. When the spiral is at the desired size, click the left mouse again. The resized spiral—along with its hotspots—will be displayed.
4. In the following example, a spiral is resized by dragging the resizing hotspot in the upper-left corner of the selection box.

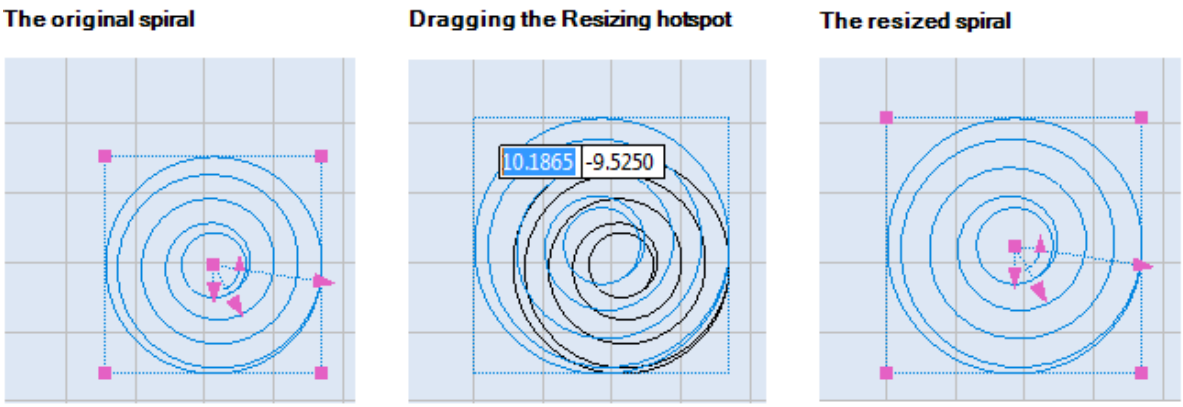


FIGURE 378: RESIZING A SPIRAL WITH HOTSPOTS

Changing the Outer Radius of a Spiral

You can change the outer radius of a spiral by dragging its Outer Radius hotspot. When a spiral is selected, the Outer Radius hotspot displays as an arrowhead on the outer edge of the spiral.

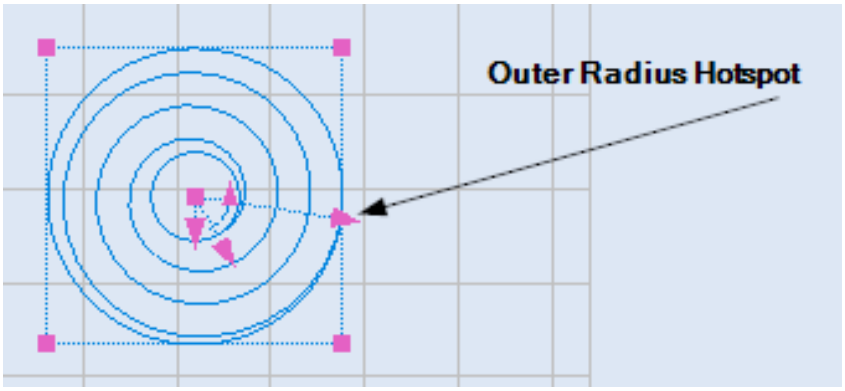


FIGURE 379: THE OUTER RADIUS HOTSPOT

Do the following to change the outer radius of a spiral by moving its Outer Radius hotspot:

1. Select the spiral and click the left mouse button on its Outer Radius hotspot. All of the spiral hotspots will disappear.
2. Drag the mouse until the outer radius of the spiral is as desired.
3. When the outer radius is as desired, click the left mouse button. The spiral will be displayed with its hotspots and new outer radius.

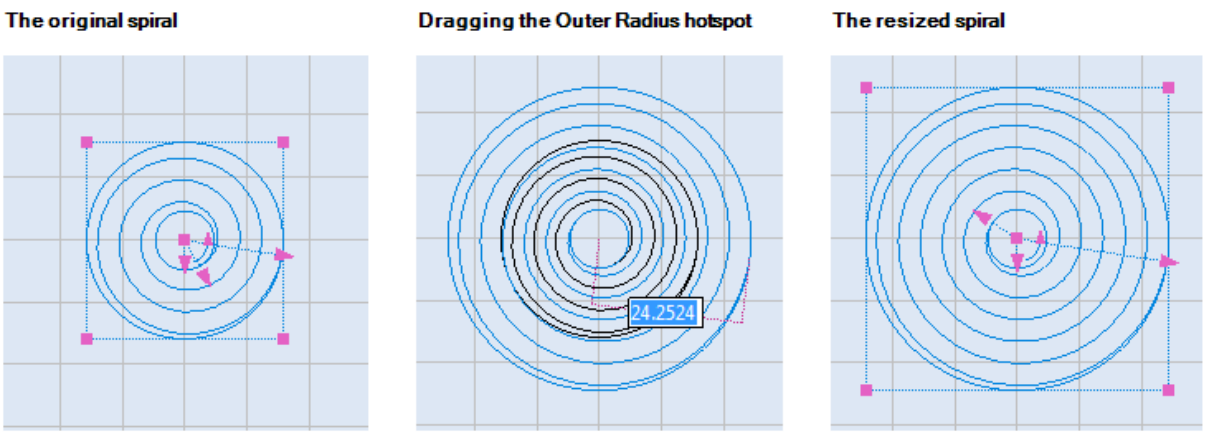


FIGURE 380: CHANGING THE OUTER RADIUS OF A SPIRAL

Changing the Inner Radius of a Spiral

You can change the inner radius of a spiral by dragging its Inner Radius hotspot. On a selected spiral, the Inner Radius hotspot displays as an arrowhead that typically extends farther from the centerpoint than the Pitch hotspot, but not as far from the centerpoint as the Outer Radius hotspot.

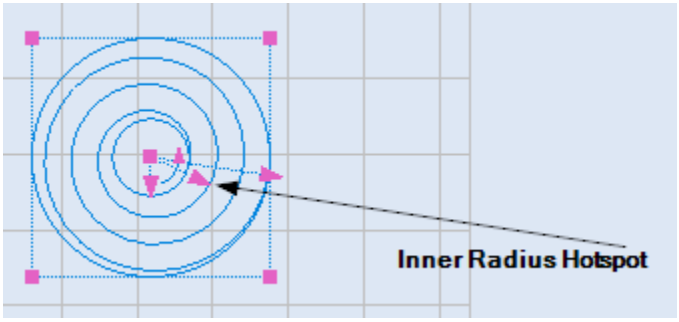


FIGURE 381: THE INNER RADIUS HOTSPOT

Do the following to change the inner radius of a spiral by moving its Inner Radius hotspot:

1. Select the spiral and click the left mouse button on its Inner Radius hotspot. All of the spiral hotspots will disappear.
2. Drag the mouse until the inner radius of the spiral is as desired.
3. When the inner radius is as desired, click the left mouse button. The spiral will be displayed with its hotspots and new inner radius.

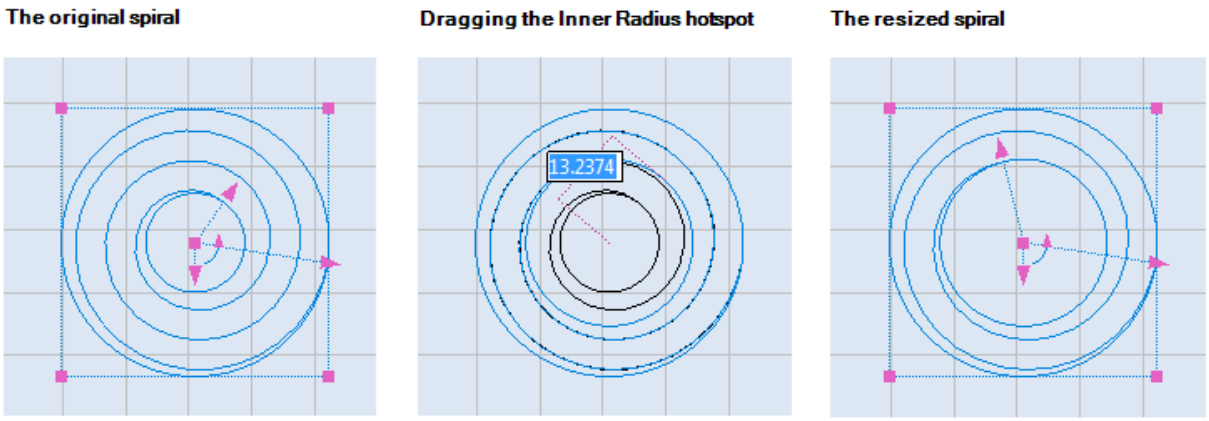


FIGURE 382: CHANGING THE INNER RADIUS OF A SPIRAL

Changing the Pitch of a Spiral

You can change the pitch of a spiral by dragging its Pitch hotspot. On a selected spiral, the Pitch hotspot is an arrowhead that points straight down at six o'clock from the centerpoint of the spiral.

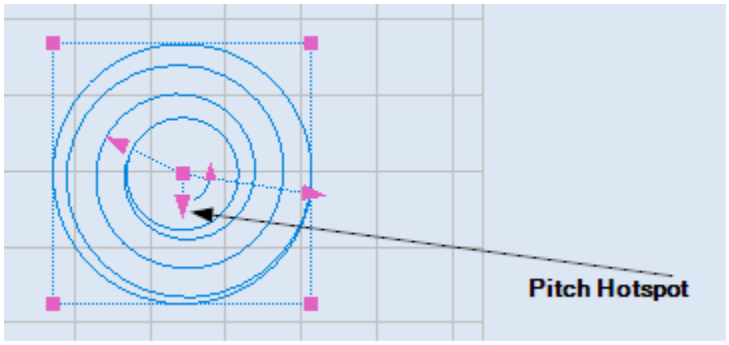


FIGURE 383: THE PITCH HOTSPOT

Do the following to change the pitch of a spiral by moving its Pitch hotspot:

1. Select the spiral and click the left mouse button on its Pitch hotspot. All of the spiral hotspots will disappear.
2. Drag the mouse until the pitch of the spiral is as desired. The pitch is previewed in blue as you drag the mouse.
3. **Note:** Dragging the mouse *away* from the centerpoint will decrease the pitch. Dragging the mouse *toward* the centerpoint will increase the pitch.
4. When the pitch is as desired, click the left mouse button. The spiral will be displayed with its modified pitch.

Note: Changing the pitch of a spiral will not change any spiral properties other than the pitch.

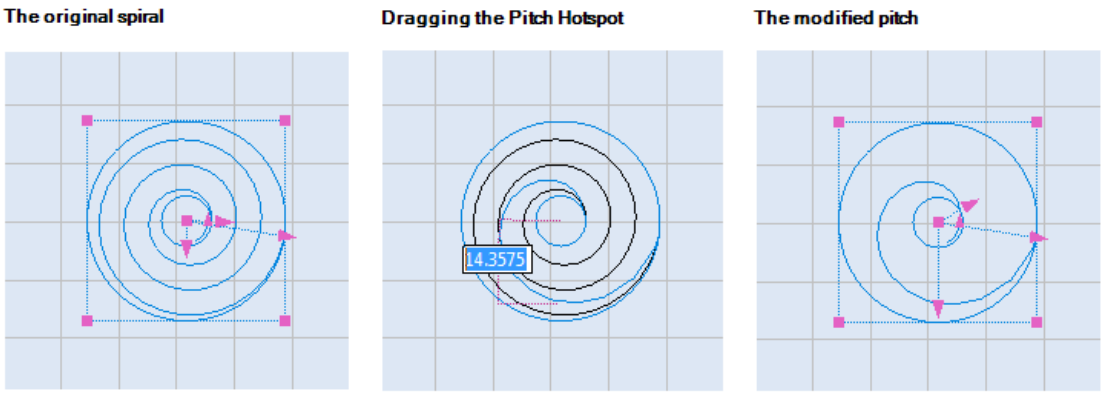


FIGURE 384: CHANGING THE PITCH OF A SPIRAL

7.5 EDITING SHAPES

This section describes how to cut, copy, and paste selected Shapes on the Drawing Canvas in ScanMaster Designer.

7.5.1 Cut

Do the following to cut the selected Shape(s), removing them from the Drawing Canvas and placing them in the clipboard:

1. Select the Shape(s) that you want to cut (see "Selecting Shapes" on page 280).
2. Left-click the **Cut** icon on the **Home | Edit** panel or press **Ctrl + X**.

7.5.2 Copy

Do the following to copy the selected Shape(s) to the clipboard:

1. Select the Shape(s) that you want to copy (see "Selecting Shapes" on page 280).
2. Left-click the **Copy** icon on the **Home | Edit** panel or press **Ctrl + C**.

7.5.3 Paste

Do the following to paste the Shape(s) that were cut or copied into the clipboard:

1. Cut or copy the Shape(s) that you wish to paste.
2. Left-click the **Paste** icon on the **Home | Edit** panel or press **Ctrl + V**.
3. Move the mouse over the Drawing Canvas to the location where you want to paste the Shape(s). (As you move the mouse, the Shape is previewed on the Drawing Canvas.)
4. When you have the Shape(s) at the desired location, click the left mouse button. You can also specify the location by entering the **X** and **Y** coordinates in the parameter-entry boxes.

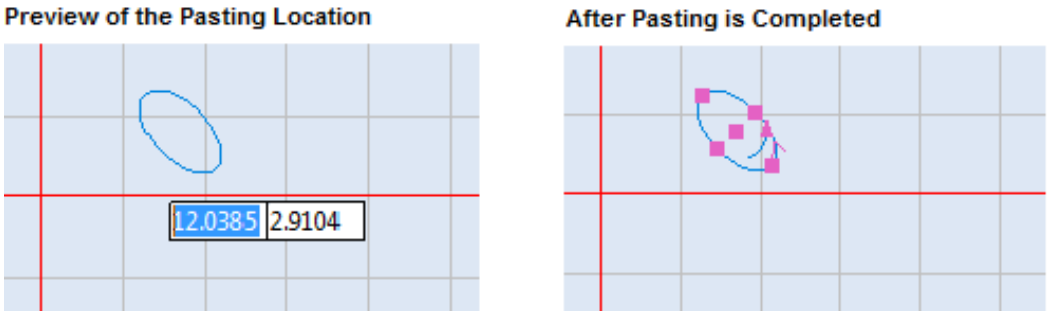


FIGURE 385: PASTING A SHAPE ON THE DRAWING CANVAS

7.6 PASTE ON ABSOLUTE POSITION

Use **Paste on absolute position** to paste the copied or cut Shape on the exact original position.

Do the following to use **Paste on absolute position**:

1. Cut or copy the Shape(s) you wish to paste.
2. Left-click the **Paste** icon on the **Home | Edit** panel or press **Ctrl + V**.
3. Click the right mouse button anywhere on the Drawing Canvas to display the **Paste on absolute position** popup as shown in the following figure.

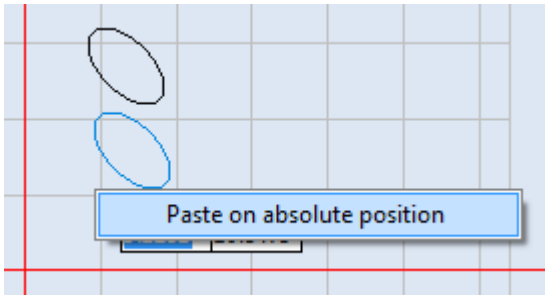


FIGURE 386: PASTE ON ABSOLUTE POSITION

4. Highlight and left-click the **Paste on absolute position** popup.

7.7 MOVING SHAPES

You can move selected Shape(s) on the Drawing Canvas as described in any of the following subsections:

- "Dragging by a non-hotspot area on the shape" (below)
- "Dragging by a centerpoint hotspot or a midpoint hotspot" on page 313
- "Nudging" on page 314
- "Using the Move tool from the Tools | Transform panel" on page 314
- "Move to Origin" on page 314

7.7.1 Dragging by a non-hotspot area on the shape

Any Shape (other than a Dot) can be moved by dragging a non-hotspot area on the Shape. (Refer to "Moving a Dot" on page 120 to move a Dot by dragging the Dot hotspot.)

Do the following to move a Shape by dragging on a non-hotspot area:

1. Select the shape(s) which you want to move.
2. Move the mouse over any part of the Shape geometry (other than a hotspot). This will display the moving cursor .
3. Hold the left mouse button down over the moving cursor and drag the mouse to the desired location. As shown in the following figure, the location of the Shape is previewed in blue.

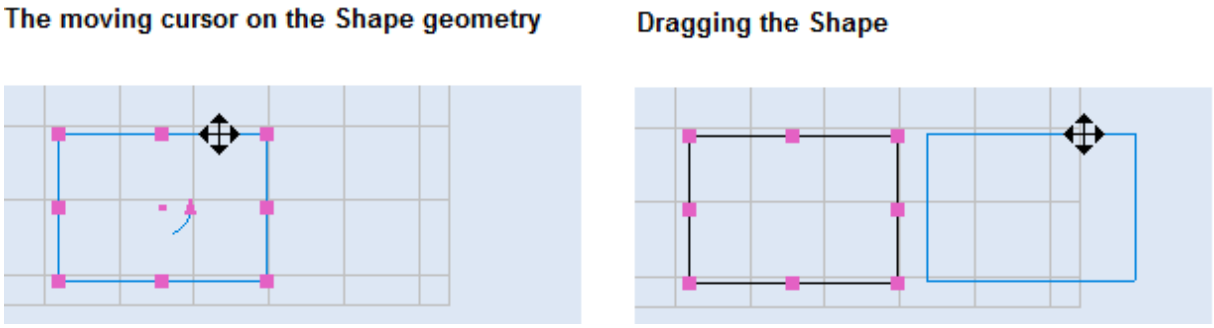


FIGURE 387: DRAGGING A SHAPE BY A NON-HOTSPOT AREA

4. Release the left mouse button to accept the result.

7.7.2 Dragging by a centerpoint hotspot or a midpoint hotspot

Several Shapes can be moved by dragging the centerpoint hotspot or the midpoint hotspot on the Shape. These Shapes include lines, circles, ellipses, arcs, elliptical arcs, symmetric polygons, and spirals.

The following figure shows the midpoint hotspot and centerpoint hotspots on all Shapes that can be moved by dragging either the midpoint hotspot or the centerpoint hotspot.

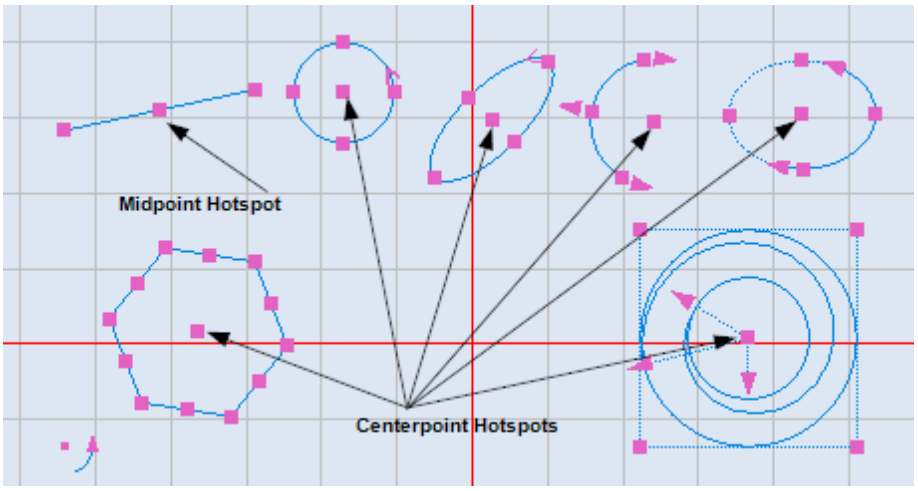


FIGURE 388: MIDPOINT AND CENTERPOINT HOTSPOTS

Note: The Shapes that cannot be moved by dragging a midpoint hotspot or a centerpoint hotspot are Polylines, Rectangles, Bezier Paths, Paths, Text Boxes, Path Texts, Raster Images, Vector Images, Drill Shapes, Grouped Images, and Barcodes.

Do the following to move a Shape by dragging on a midpoint hotspot or a centerpoint hotspot:

1. Select the shape(s) that you want to move.
2. Place the mouse over its midpoint hotspot (for a line) or the centerpoint hotspot.
3. Hold the left mouse button down over the midpoint hotspot or the centerpoint hotspot, and drag the mouse to the desired location. As shown in the following figure, the location of the Shape is previewed in blue.

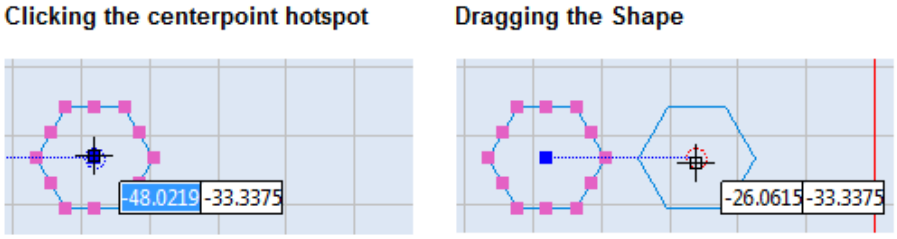


FIGURE 389: DRAGGING A SHAPE BY THE MIDPOINT HOTSPOT OR THE CENTERPOINT HOTSPOT

4. Release the left mouse button to accept the result.

7.7.3 Nudging

You can move selected shapes in small distance steps using the arrow keys on the keyboard. You can increase (or decrease) the distance by pressing and holding the CONTROL (or SHIFT) key while pressing the cursor key.

Do the following to move a Shape by nudging:

1. Select the shape(s) that you want to move
2. Press the arrow key in the direction you want to move the shape.

Note: You can change the nudge distance and the unit in the **Preferences | Canvas (2D)** page. For more information, refer to "Canvas (2D)" on page 99.

7.7.4 Using the Move tool from the Tools | Transform panel

Use this option to precisely move a shape to a new position you specify on the canvas (the end of a line, coordinate point, etc.).

1. Select the shape/s which you want to move.
2. Select Move from the Tools | Transform panel on the Ribbon.
3. Select the base point.
4. Move the object by dragging it to the desired location on the canvas.

7.7.5 Move to Origin

You can use the **Move to Origin** tool to move the selected Shape(s) to the origin (0, 0) of the Drawing Canvas.

Do the following to move the selected Shape(s) to the origin (0, 0) of the Drawing Canvas:

1. Select the Shape(s) that you want to move to the origin.
2. Select Move to Origin from the Tools | Transform panel in the Ribbon or right click on the object and select Move to Origin from the popup menu. The object is moved to the origin location (0, 0) of the Drawing Canvas.

7.8 CLONING SHAPES

Do the following to duplicate shapes on the Drawing Canvas with the Clone option.

1. Select the Shape(s) that you wish to clone.
2. Right-click the selected Shape and select Clone from the popup menu.

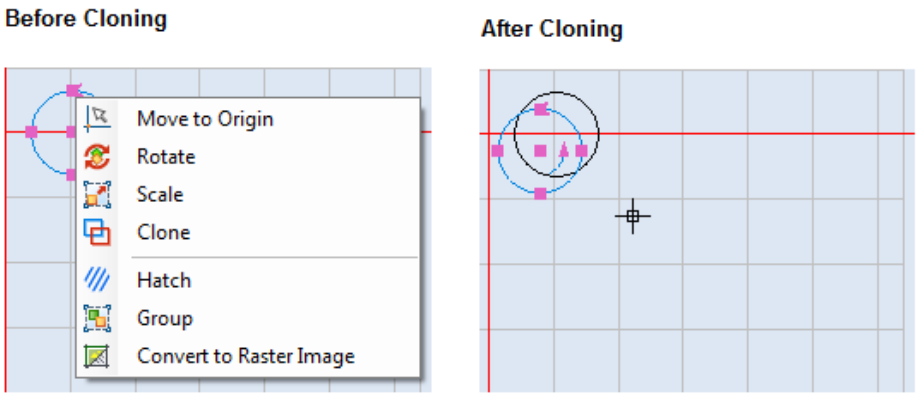


FIGURE 396: CLONING EXAMPLE

7.9 SCALING SHAPES

You can use the scaling features of ScanMaster Designer to scale any Shape on the Drawing Canvas.

Do the following to scale a Shape on the Drawing Canvas:

1. Select the Shape that you want to scale.
2. Right click on the selected Shape and select the Scale option from the popup menu, or select the Scale icon from the Tools | Transform panel in the Ribbon.

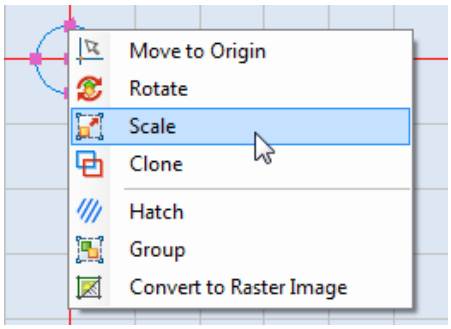


FIGURE 390: SELECTING THE SCALE OPTION FROM THE POPUP MENU

5. A boundary box will appear on the selected shape will appear, left-click a hotspot and drag it to the desired size. You can also enter new coordinates for the hotspot in the coordinate-entry box.

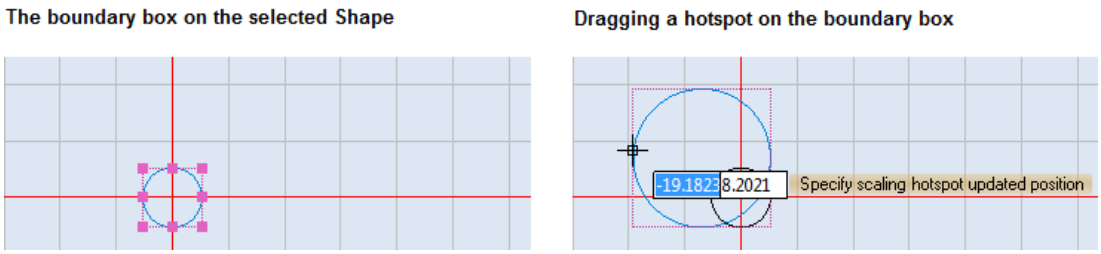


FIGURE 391: DRAGGING A HOTSPOT ON THE BOUNDARY BOX

4. When the selected Shape is at the desired size, click the left mouse button. The scaled Shape will appear without the boundary box.

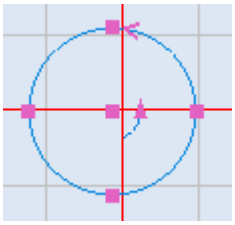


FIGURE 392: A SCALED SHAPE WITHOUT THE BOUNDARY BOX

7.9.1 Scaling with the boundary box popup menu

The boundary box popup menu contains options for scaling the width (X Axis) or height (Y Axis) of the selected Shape and for scaling the selected Shape with a scaling rectangle. To display the boundary box popup menu, right-click on any Shape that has a boundary box. Refer to step 2 of "Scaling Shapes" on page 315 to display a boundary box for a selected Shape.

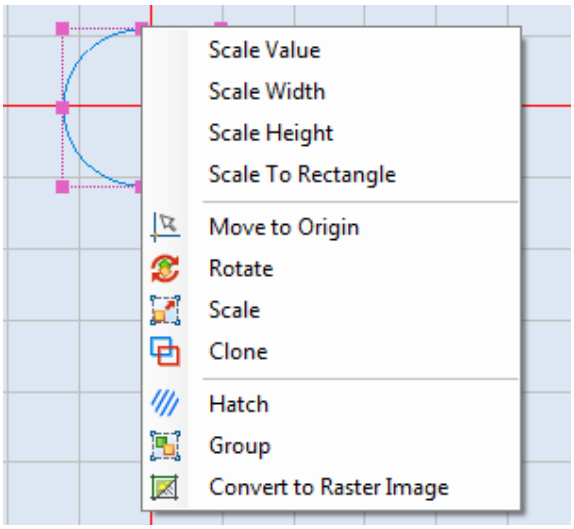


FIGURE 393: THE BOUNDARY BOX POPUP MENU

The following subsections describe how to use the first four options of the boundary box popup menu (**Scale Value**, **Scale Width**, **Scale Height**, and **Scale To Rectangle**).

7.9.2 Scale Value

Select the **Scale Value** option of the boundary box popup menu to display the **Scale Factors** dialog box.

In the **Scale Factors** dialog box you can specify an X- or Y-axis scaling factor, or an explicit width or height, for the selected Shape. The **Scale Factors** dialog box also contains the **Keep Aspect Ratio** check box.

When this check box is selected, the aspect ratios of the selected Shape(s) will be maintained during scaling.

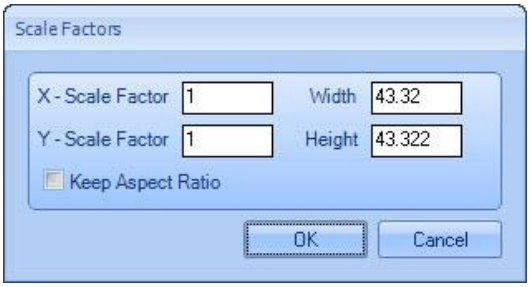


FIGURE 394: SCALE FACTOR

Note: If the selection contains any shape that must maintain its aspect ratio, you will not be able to deselect the **Keep Aspect Ratio** check box.

Left-click the **OK** button to save any changes you made in the **Scale Factors** dialog box.

7.9.3 Scale Width

Do the following to change the width of a Shape with the Scale Width option:

1. Display the boundary box popup menu by right-clicking on any Shape(s) with a boundary box. This displays the boundary box popup menu shown in Figure 393 on page 317.
2. Select **Scale Width** from the boundary box popup menu. This displays the **Specify start point of length** prompt as shown in the following figure.

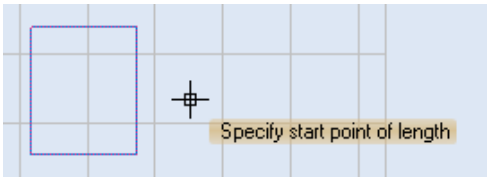


FIGURE 395: SPECIFY START POINT OF LENGTH

3. Left-click the mouse button anywhere on the Drawing Canvas to specify the start point of the new width specification. This displays the **Specify end point of length** prompt as shown in the following figure.

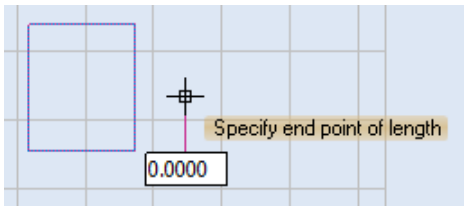


FIGURE 396: SPECIFY END POINT OF LENGTH

4. Drag the crosshairs to the point that you want to specify as the end point of the Shape. As shown in the following figure, the new width of the Shape will be previewed as you drag the crosshairs.

Note: As an alternative to dragging the crosshairs, you can specify the end point of the Shape by typing a new width value in the parameter-entry box and pressing the Enter key.

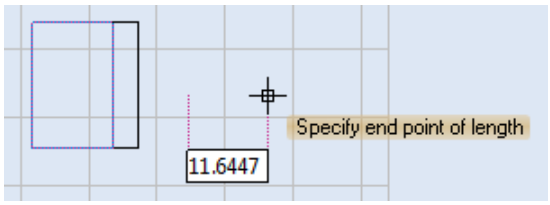


FIGURE 397: DRAGGING THE CROSSHAIRS TO THE NEW END POINT

5. Set the new end point of the Shape by doing one of the following:

- Click the left mouse button (if you have scaled the Shape by dragging the crosshairs) or
- Press the Enter key (if you have scaled the Shape by typing a new value in the parameter-entry box).

This completes the scaling of the Shape. The height of the Shape stays constant.

7.9.4 Scale Height

Do the following to change the height of a Shape with the Scale Height option:

1. Display the boundary box popup menu by right-clicking on any Shape(s) with a boundary box.

   This displays the boundary box popup menu shown in Figure 393 on page 317.

2. Select **Scale Height** from the boundary box popup menu. This displays the **Specify start point of length** prompt as shown in the following figure.

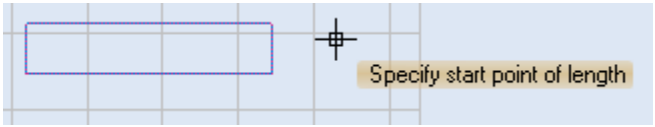


FIGURE 398: SPECIFY START POINT OF LENGTH

3. Left-click the mouse button anywhere on the Drawing Canvas to specify the start point of the new height specification. This displays the **Specify end point of length** prompt as shown in the following figure.

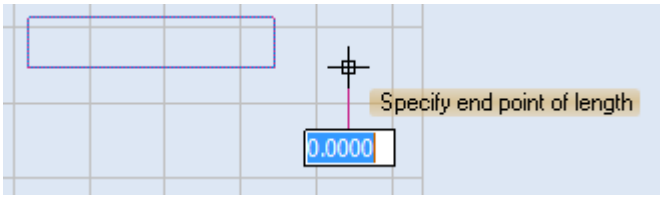


FIGURE 399: SPECIFY END POINT OF LENGTH

4. Drag the crosshairs to the point that you want to specify as the end point of the Shape. As shown in the following figure, the new height of the Shape will be previewed as you drag the crosshairs.

Note: As an alternative to dragging the crosshairs, you can specify the end point of the Shape by typing a new height value in the parameter-entry box and pressing the Enter key.

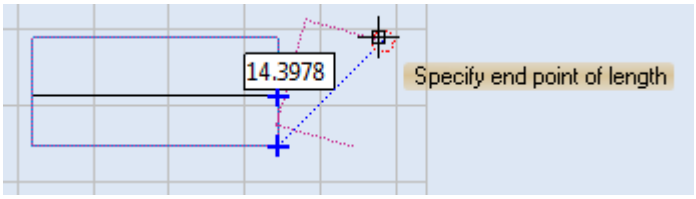


FIGURE 400: DRAGGING THE CROSSHAIRS TO THE NEW END POINT

5. Set the new end point of the Shape by doing one of the following:
    - Click the left mouse button (if you have scaled the Shape by dragging the crosshairs) or
    - Press the Enter key (if you have scaled the Shape by typing a new value in the parameter-entry box).

This completes the scaling of the Shape. The width of the Shape stays constant.

7.9.5 Scale to Rectangle

Do the following to change both the width and the height of a Shape with the **Scale to Rectangle** option:

1. Display the boundary box popup menu by right-clicking on any Shape(s) with a boundary box. This displays the boundary box popup menu shown in Figure 393 on page 317.
2. Select **Scale to Rectangle** from the boundary box popup menu. This displays the **Specify scaling start point of rectangle** prompt as shown in the following figure.

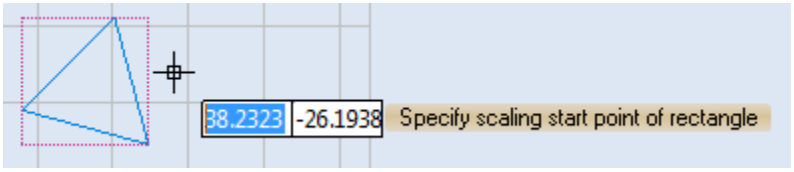


FIGURE 401: SPECIFY SCALING START POINT OF RECTANGLE

3. Left-click the mouse button anywhere on the Drawing Canvas to specify the start point of the scaling rectangle. After specifying this point, the **Specify scaling end point of rectangle** prompt is displayed as shown in the following figure.

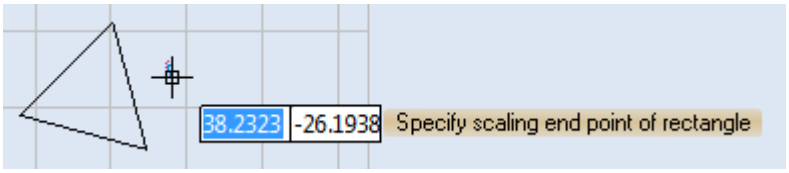


FIGURE 402: SPECIFY SCALING END POINT OF RECTANGLE

4. Drag the crosshairs to the point that you want to specify as the end point of the scaling rectangle. As shown in the following figure, the new width and height of the Shape will be previewed as you drag the crosshairs.

Note: As an alternative to dragging the crosshairs, you can specify the end point of the scaling rectangle by typing coordinates in the parameter-entry box.

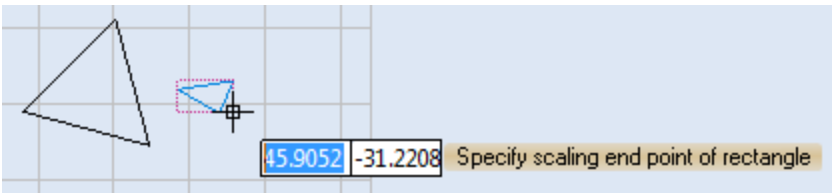


FIGURE 403: DRAGGING THE CROSSHAIRS TO THE NEW END POINT

5. Set the end point of the scaling rectangle by doing one of the following:
    - Click the left mouse button (if you have scaled the Shape by dragging the crosshairs) or
    - Press the Enter key (if you have scaled the Shape by typing a new value in the parameter-entry box).

This completes the scaling of the Shape.

7.10 ROTATING SHAPES

This section describes how to use the **Rotate** tool, or a Shape's arrow hotspot, to rotate a Shape.

Refer to the following subsection ("Using the Rotate tool to rotate a Shape") to rotate a Shape around any selected hotspot on the Shape.

Refer to "Using the arrow hotspot to rotate a Shape" on page 324 to rotate a Shape around the center point of the Shape.

7.10.1 Using the Rotate tool to rotate a Shape

Do the following to rotate a shape around any of its hotspots with the **Rotate** tool:

1. Select the shape that you want to rotate.
2. Right-click on it and select **Rotate** from the Context Menu or select **Rotate** from the Tools | **Transform** panel in the **Ribbon.**
3. Left-click any hotspot on the Shape. This hotspot will be the Control Point around which the Shape is rotated.
4. Drag the mouse around the Control Point to rotate the Shape. As shown in the following figure, the angle of rotation will be previewed as you drag the mouse.

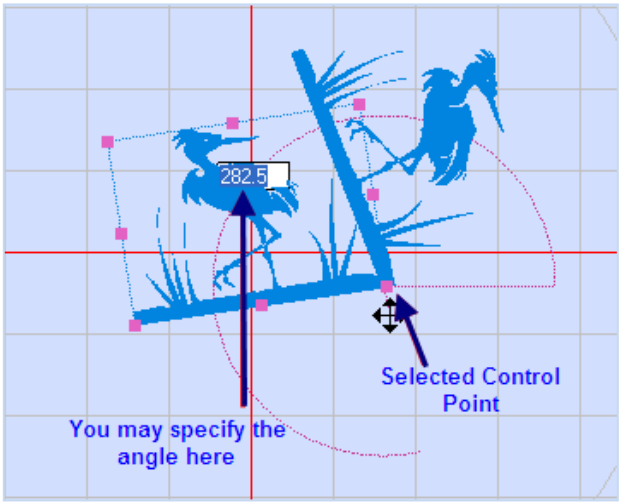


FIGURE 404: ROTATING SHAPES

5. When the Shape is at the desired angle of rotation, click the left mouse button. This completes the rotation of the shape.

1.

Note: As an alternative to dragging the mouse around the Control Point, you may type the angle of rotation in the parameter-entry box that is shown in the above figure. After typing the angle of rotation, press the Enter key to complete the rotation of the Shape.

7.10.2 Using the arrow hotspot to rotate a Shape

Do the following to rotate a shape around its center point with the arrow hotspot:

1. Select the shape that you want to rotate.
2. Left-click the arrow hotspot on the selected Shape.

FIGURE 405: THE ARROW HOTSPOT

3. Drag the mouse around the center point of the Shape. As shown in the following figure, the angle of rotation will be previewed in blue.

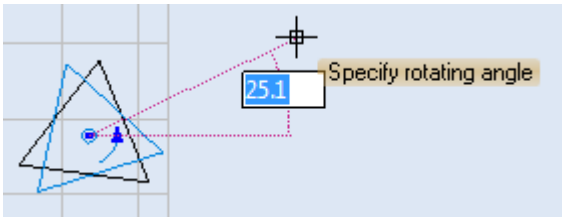


FIGURE 406: THE ARROW HOTSPOT

Note: Dragging the mouse inside the Shape will preview the rotating angle in 45-degree increments. Dragging the mouse *outside* the Shape will preview the rotating angle in 0.1-degree increments.

4. When the Shape is at the desired angle of rotation, click the left mouse button. This completes the rotation of the Shape.

As an alternative to dragging the mouse, you can type the angle of rotation in the parameter-entry box that displays with the **Specify rotating angle** prompt when you left-click the arrow hotspot. Then press the Enter key to save that value as the angle of rotation.

7.11 MIRRORING SHAPES

Mirroring creates a symmetrical mirror image of the selected shape(s).

Do the following to mirror a Shape or Shapes:

1. Select the shape that you want to mirror.
2. Go to **Tools | Transform** and click the **Mirror** button. The **Mirror** dialog box will be displayed.
3. Specify the boundary or the axis to mirror or manually select the mirror lines or the mirror ends.

Note: If you choose **Select Mirror Ends**, specify the first mirror point by placing the crosshairs anywhere on the canvas, then drag the crosshairs to the second point of the mirror line. If you select **Mirror with a Copy**, the original shape will remain in the drawing.

4. Click the **OK** button.
5. You can also click the arrow below the **Mirror** icon and select the desired option. This will be a shortcut for accessing some of the frequently used options available on the Mirror window.

FIGURE 407: THE MIRROR DIALOG BOX

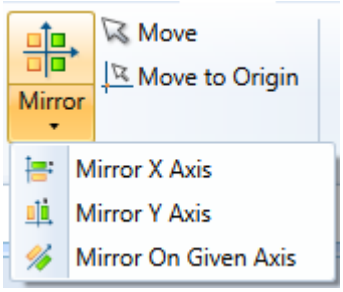


FIGURE 408: MIRROR OPTIONS

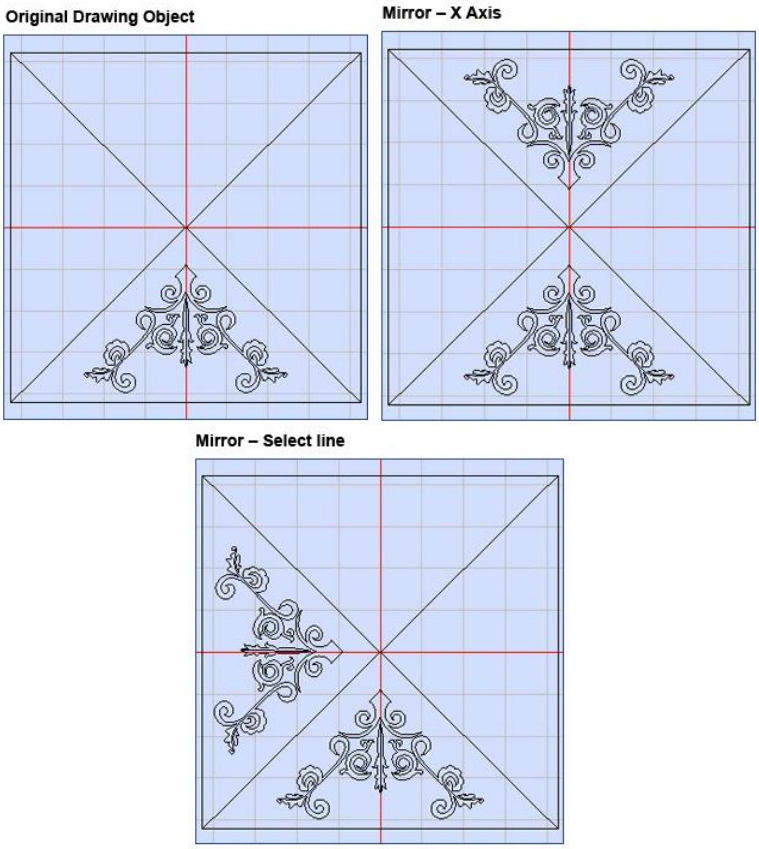


FIGURE 409: MIRROR SAMPLES

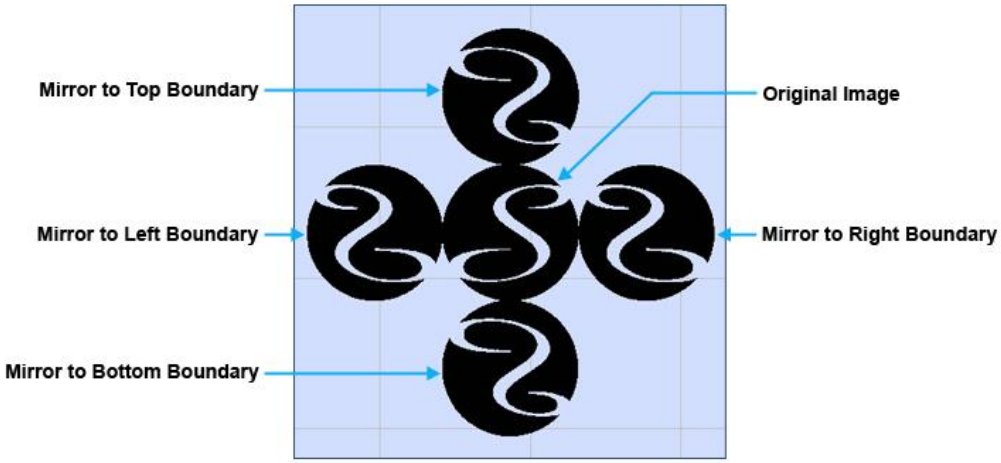


FIGURE 410: MIRROR SAMPLE 2

7.12 ARRANGING SHAPES

The **Arrange** tab on the **Ribbon** provides you with a variety of options for distributing and aligning Shapes on the Drawing Canvas.

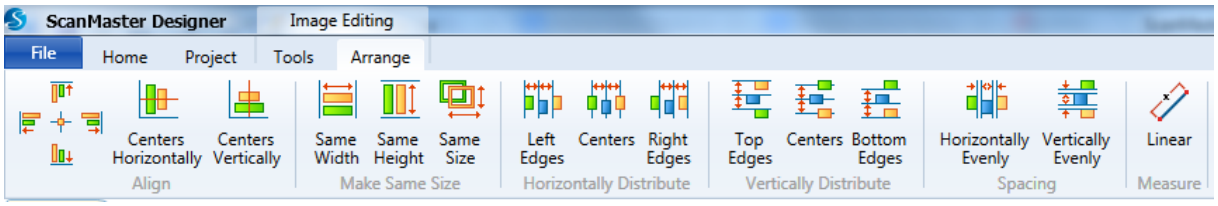


FIGURE 411: THE ARRANGE TAB ON THE RIBBON

7.12.1 The Arrange | Align Panel

The **Arrange | Align** panel provides tools for aligning several Shapes with an initially selected Shape on the Drawing Canvas.

Do the following to align Shapes with the tools on the **Arrange | Align** panel:

1. Left-click on the initial Shape for the alignment operation.
2. Hold down the Shift key and left-click any other Shapes that you want to include in the alignment operation.
3. Left-click an icon in the **Arrange | Align** panel to perform the alignment operation.
4. The following figure shows an example of an alignment operation that was performed with the **Align Left Edges** icon .

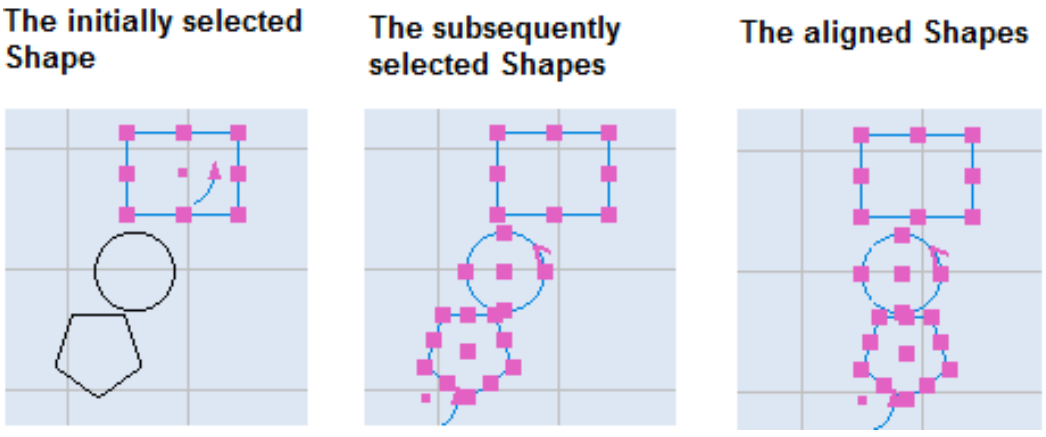


FIGURE 412: EXAMPLE OF AN ALIGNMENT OPERATION

The following table describes all of the tools on the Arrange | Align panel.

Align Left Edges		Aligns the left edge of all other selected shapes with the left edge of the initially selected shape.
Align Right Edges		Aligns the right edge of all other selected shapes with the right edge of the initially selected shape.
Align Bottom Edges		Aligns the bottom edge of all other selected shapes with the bottom edge of the initially selected shape.
Align Top Edges		Aligns the top edge of all other selected shapes with the top edge of the initially selected shape.
Align Centers		Aligns the center of all other selected shapes with the center of the initially selected shape.
Align Centers Horizontally		Aligns shapes horizontally in line with the center of the initially selected shape.
Align Centers Vertically		Aligns shapes vertically in line with the center of the initially selected shape.

7.12.2 The Arrange | Make Same Size Panel

The **Arrange | Make Same Size** panel provides tools for resizing selected Shapes to make them the same height and/or width as the initially selected Shape on the Drawing Canvas.

Do the following to resize selected Shapes with the tools on the **Arrange | Make Same Size** panel:

1. Left-click on the initial Shape for the resizing operation. All of the other Shapes that you select for this operation will be resized with the same height or width—or height *and* width, depending on the operation that you choose—as this Shape.
2. Hold down the Shift key and left-click any other Shapes that you want to include in the resizing operation.
3. Left-click an icon in the **Arrange | Make Same Size** panel to perform the resizing operation.

The following figure shows an example of a resizing operation that was performed with the Make Same Width icon .

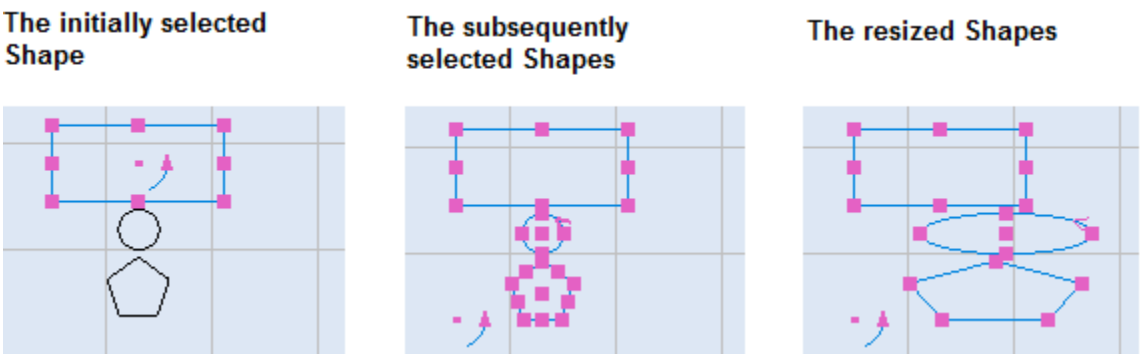


FIGURE 413: EXAMPLE OF A RESIZING OPERATION

The following table describes all of the tools on the Arrange | Make Same Size panel.

Make Same Width		Makes all shapes the same width as the initially selected shape.
Make Same Height		Makes all shapes the same height as the initially selected shape.
Make Same Size		Makes all shapes the same width and height as the initially selected shape.

7.12.3 The Arrange | Vertically Distribute Panel

The **Arrange | Vertically Distribute** panel provides tools for distributing selected Shapes vertically on the Drawing Canvas.

Do the following to distribute selected Shapes vertically with the tools on the **Arrange | Vertically Distribute** panel:

1. Hold down the Shift key and left-click the Shapes that you want to vertically distribute.

Note: You must select at least three Shapes to vertically distribute.

2. Left-click an icon in the **Arrange | Vertically Distribute** panel to perform the vertical distribution operation.
3. The following figure shows an example of a vertical distribution operation that was performed with the **Top Edges** icon .

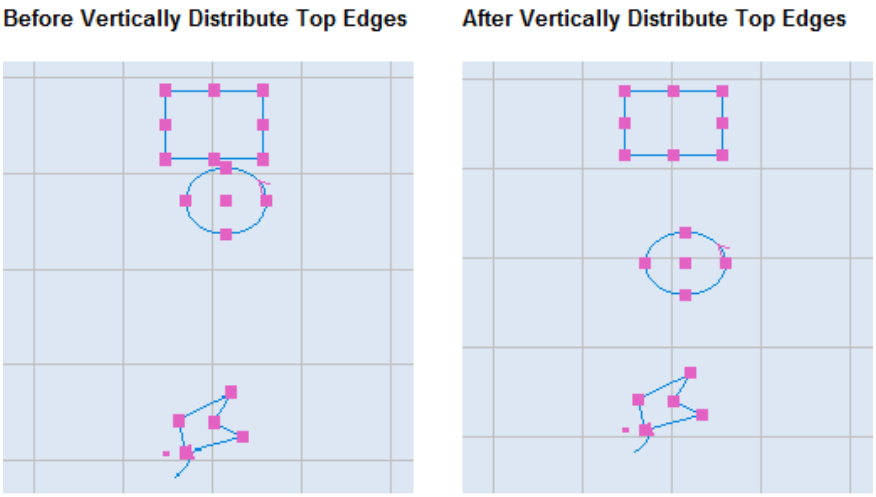


FIGURE 414: EXAMPLE OF A VERTICAL DISTRIBUTION OPERATION

The following table describes all of the tools on the **Arrange | Vertically Distribute** panel.

Top Edges (Vertically)		Evenly distributes the vertical spacing between the top edges of the topmost and bottommost shapes.
Centers (Vertically)		Evenly distributes the vertical spacing between the centers of the topmost and bottommost shapes.
Bottom Edges (Vertically)		Evenly distributes the vertical spacing between the bottom edges of the topmost and the bottommost shapes.

7.12.4 The Arrange | Spacing Panel

The **Arrange | Spacing** panel provides tools for distributing Shapes evenly in a horizontal or vertical direction on the Drawing Canvas.

Note: The results of using the tools on the **Arrange | Spacing** panel will not necessarily be the same as the results of using the tools on the **Arrange | Horizontally Distribute** panel or the **Arrange | Vertically Distribute** panel. This is because the tools on the **Arrange | Spacing** panel distribute an even amount of space between all of the selected Shapes; the tools on the **Arrange | Horizontally Distribute** panel and the **Arrange | Vertically Distribute** panel distribute even amounts of space between the centers, or the top or bottom edges, of selected Shapes.

Do the following to distribute spacing between selected Shapes with the tools on the **Arrange | Spacing** panel:

1. Hold down the Shift key and left-click the Shapes that you want to evenly space.

   Note: You must select at least three Shapes to evenly space.

2. Left-click an icon in the **Arrange | Spacing** panel to perform the spacing operation.

3. The following table describes all of the tools on the **Arrange | Spacing** panel.

Horizontally Evenly		Evenly distributes the horizontal spacing between the leftmost and the rightmost shapes.
Vertically Evenly		Evenly distributes the vertical spacing between the topmost and bottommost shapes.

The following figure shows an example of a horizontal spacing operation that was performed with the Horizontally Evenly icon .

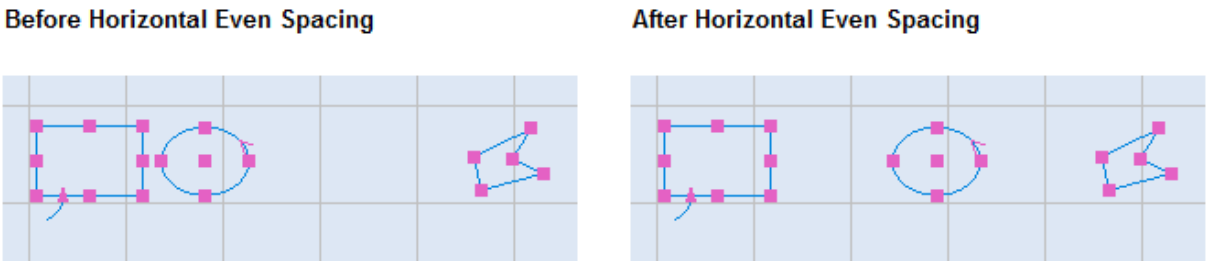


FIGURE 415: EXAMPLE OF A HORIZONTAL SPACING OPERATION

The following figure shows an example of a vertical spacing operation that was performed with the Vertically Evenly icon .

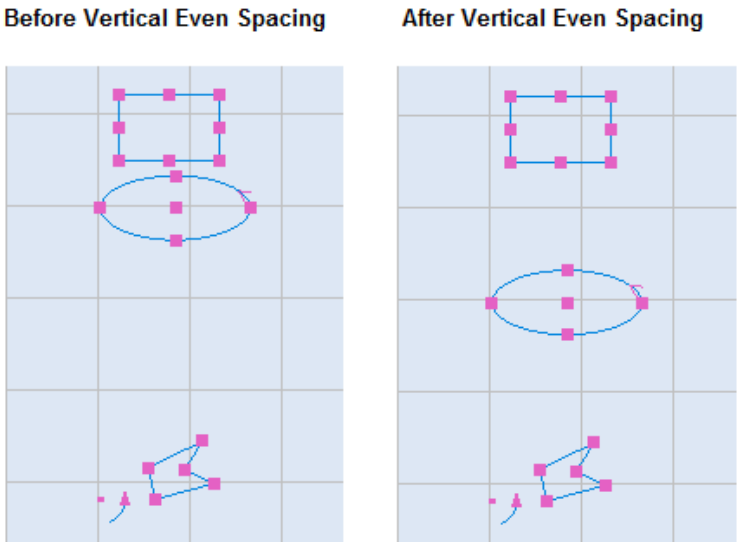


FIGURE 416: EXAMPLE OF A VERTICAL SPACING OPERATION

7.12.5 The Arrange | Measure Panel

Do the following to measure the distance between any two points on the Drawing Canvas by using the **Linear** tool:

1. Left-click the **Linear** icon on the **Arrange | Measure** panel.
2. Left-click the point on the Drawing Canvas where you want to begin the measurement.
3. Drag the mouse to the point where you wish to find the distance and left-click on it.

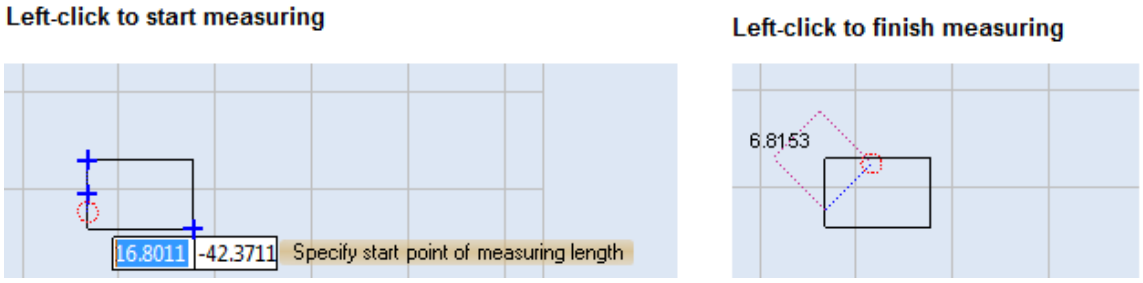


FIGURE 417: LINEAR MEASUREMENT EXAMPLE

7.13 UNDO AND REDO

7.13.1 Undo

Click the **Undo** icon on the **Home | Edit** panel to undo the last action that was performed.

To undo several actions at once, do the following:

4. Click the arrowhead icon beside the **Undo** icon. This displays the **Actions History** list.

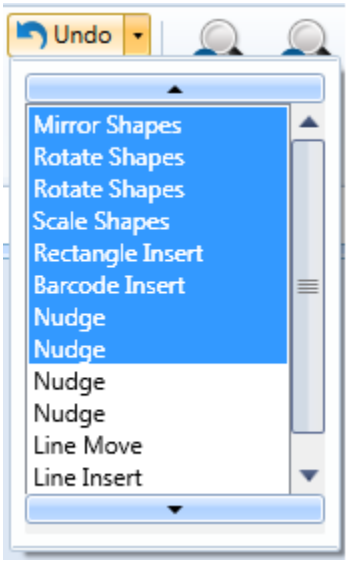


FIGURE 418: THE ACTIONS HISTORY LIST

5. Highlight the range of actions that you want to undo. (**Note:** Dragging the mouse through the **Actions History** list will highlight all of the list items that the mouse passes over.)
6. Click the left mouse button to undo all of the highlighted actions in the **Actions History** list.

   Actions are listed in the order in which they were executed. The most recent action is at the top of the list.

   Pressing the arrowhead icon at the bottom of the Actions History list highlights all the items in the list.

   Pressing the arrowhead icon at the top of the Actions History list removes the highlighting from all the items in the list.

7.13.2 Redo

Click the **Redo** icon on the **Home | Edit** panel to redo the last action that was undone.

To redo several actions at once, do the following:

1. Click the arrowhead icon beside the **Redo** icon. This displays the **Undo History** list.

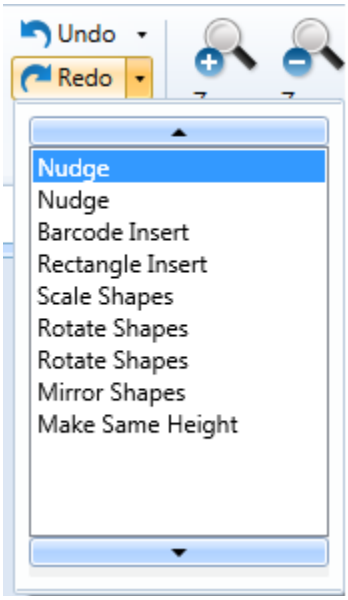


FIGURE 419: THE UNDO HISTORY LIST

2. Highlight the range of actions that you want to redo. (**Note:** Dragging the mouse through the **Actions History** list will highlight all of the list items that the mouse passes over.)
3. Click the left mouse button to redo all of the highlighted actions in the **Undo History** list.

   Actions are listed in the order in which they were undone. The most recently undone action is at the top of the list.

   Pressing the arrowhead icon at the bottom of the Actions History list highlights all the items in the list.

   Pressing the arrowhead icon at the top of the Actions History list removes the highlighting from all the items in the list.\

8 ADVANCED SHAPE OPERATIONS

8.1 HATCH OPERATIONS

Hatching creates contrast or accentuates the inner area of a Shape or text when the Shape or text is laser marked. The hatching operation fills the shape or text with closely spaced parallel lines that have a specified orientation and specified filling patterns. Each pattern and combination of hatching parameters creates different results when applied on various materials. By carefully selecting and fine tuning each parameter, a better result can be obtained.

ScanMaster Designer supports the **Line**, **Offset**, **Offset In Out**, and **Helix** hatching patterns.

8.1.1 Inserting a Hatch Pattern in a Shape

Do the following to insert a Hatch Pattern in a Shape:

1. Select a shape or a logo from the Drawing Canvas.
2. Select a hatch pattern by left-clicking on one of the following icons in the **Tools | Hatch** panel of the **Ribbon**.

FIGURE 420: HATCH PATTERNS

3. Alternatively you can right click on the selected shape or logo and select the **Hatch** option from the popup menu.

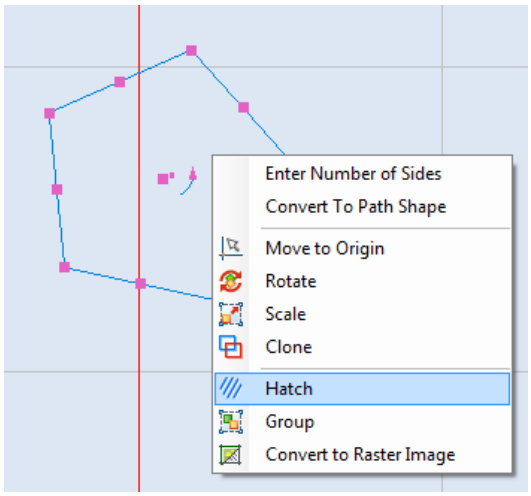


FIGURE 421: THE HATCH OPTION ON THE POPUP MENU

If you selected a hatch pattern from the **Tools | Hatch** panel, the hatch window will be populated with
the default parameters for the selected hatch pattern. The **Hatch** window in Figure 422 (below) contains default parameters for a **Line** hatch pattern.

If you selected the **Hatch** option from the popup menu, the **Hatch** window will not contain any hatch pattern parameters; clicking on one of the hatching pattern icons that appear above the **Patterns** list of the **Hatch** window will select that hatching pattern and populate the **Hatch** window with its default parameters.

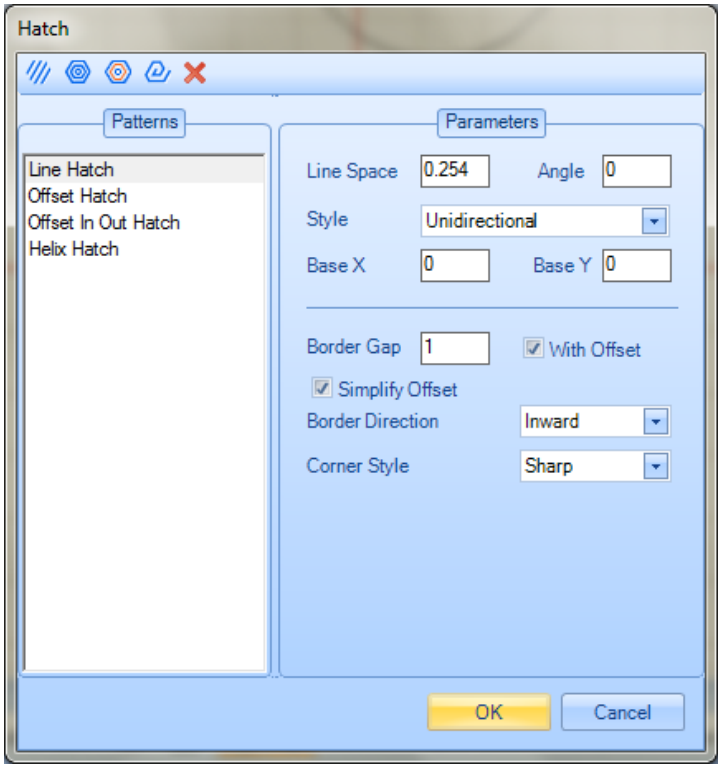


FIGURE 422: HATCH WINDOW

You are allowed to add multiple hatching patterns on to a shape. The **Pattern** list in the **Hatch** window will list the hatching patterns selected for the shape.

Left-click on a pattern in the **Patterns** list to display its parameters in the **Parameters** section of the window. You can change any of the parameters in the window.

Click the **OK** button in the **Hatch** window to apply the hatch patterns and settings to the selected Shape.

Refer to "Hatch Types" on page 339 for descriptions of the parameters included in each hatch type.

8.1.2 Renaming a Hatching Pattern

When you add a hatching pattern to a Shape, it will add a new hatch object to your Shape Tree. The hatching object is tied to the shape or shapes you have selected. It is always a good practice to rename the hatching object name to a more meaning full notation.

To rename a hatching object in the Shape Tree, do the following:

1. Right-click on the name of the hatching object to display the **Rename** prompt, as shown in the following figure.

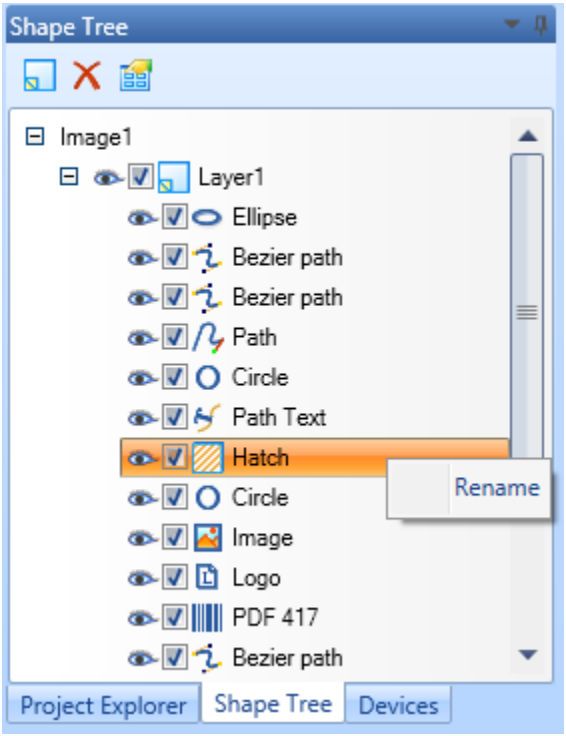


FIGURE 423: DISPLAYING THE RENAME PROMPT IN THE SHAPE TREE

2. Left-click on the **Rename** prompt to display the **Enter new name** dialog box.

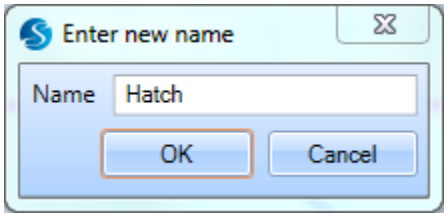


FIGURE 424: ENTERING A NEW NAME FOR A HATCHING PATTERN

3. Type a new name for the hatching pattern in the **Name** field and left-click the **OK** button.

8.1.3 Hatch Types

This section describes the parameters for each hatch type (**Line**, **Offset**, **Offset In Out**, and **Helix**).

Line Hatch

The **Line** hatch type fills a shape with parallel straight hatching lines. To apply a line hatch pattern, select the Line Hatch icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**.

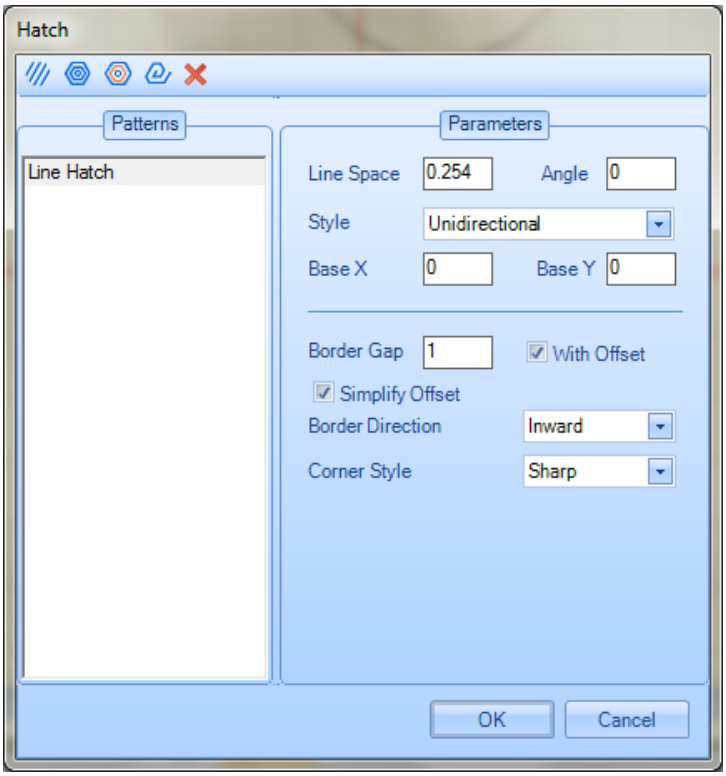


FIGURE 425: LINE HATCH PARAMETERS

You can change any of the Line Hatch parameters in the Parameters section of the **Hatch** window. The Line Hatch parameters are the following:

- **Line Space** – The line gap between two adjacent filling lines in the hatching

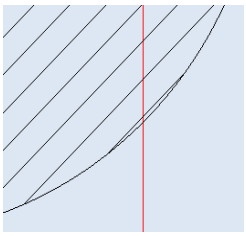
Note: The **Line Space** parameter inherits the measurement units from the Drawing Canvas.

- **Angle** – The angle of the hatching lines with respect to the X Axis of the Drawing Canvas in a counterclockwise direction
- **Style** – The hatching style, which is selectable from the dropdown box and can be any of the following:

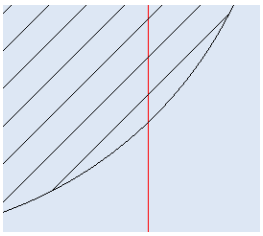
Unidirectional	The laser beam is moved in one direction and jumps back to start the next move. This filing style is suitable for very sensitive materials, where a change of marking direction would be crucial.
Double Fill	Marking is done in both forward and backward strokes. This hatching style creates high thermal effects and is not suitable for soft materials. This hatching style is used mainly for laser engraving.
Serpentine	This hatching style moves the laser beam from the start to the end on a line and then jumps to the next consecutive line end, to make the backward stroke to the start. The cycle continues on each consecutive line and greatly reduces the cycle time of the marking.
Serpentine Connected	If the Serpentine filling route is connected, it is called Serpentine Connected. This hatching style is not suitable for very sensitive material where change of marking direction would be sensitive.
Hatch 2 Times	The hatching is done twice, the second time at 90 degrees to the given line angle.
Hatch 3 Times	The hatching is done three times, the second and third times at a 60 degree offset to the given line angle.

- **Base X** and **Base Y** – The respective X and Y coordinates of a point that at least one of the hatch pattern lines must pass through. The rest of the hatching lines are drawn parallel to the first line in both directions as specified by the line gap parameter. You can shift this point by specifying new **Base X** and **Base Y** values; all of the hatching lines will shift relative to the new **Base X** and **Base Y** values. The following is an example of the effect of changing **Base X** and **Base Y**:

If hatching lines fall closer to the boundary, it can create burned effects on the final marking.



After changing Base X **and** Base Y**, a reasonable margin can be obtained without moving the shape.**

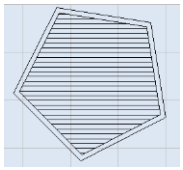


Note: This feature is important when you need to shift the hatching lines (without moving the shape) from a particular feature or a point in a Shape, to avoid undesired marking artifacts. It is also useful when you have multiple hatching lines or asymmetrically placed hatching lines in a Shape.

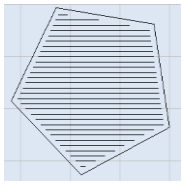
- **Border Gap –** The gap between the boundary of the shape and the hatching fill

- **With Offset** – When this check box is selected, a border is drawn offset to the shape around the hatched area. This option can be used in conjunction with the Border Gap and Border Direction parameters for better laser marking results.

With Offset

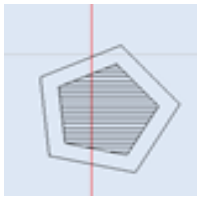


Without Offset

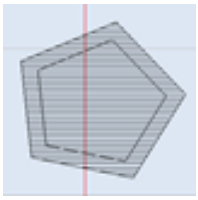


- **Border direction** – The gap between the boundary of the shape and the hatching, which can be inward or outward to the shape. Select the desired direction from the dropdown box.

Inward

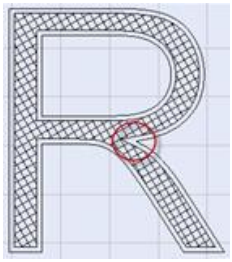


Outward

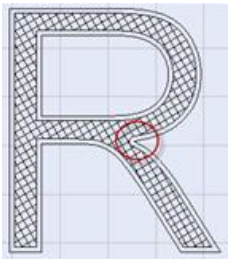


- **Corner Style** – Specified as Sharp or Smooth from the dropdown box. This feature can be used to smooth out unwanted artifacts created by offset hatching when used with a hatching gap. It is most effective when a Shape has an inward edge less than 90 degrees.

Sharp



Smooth



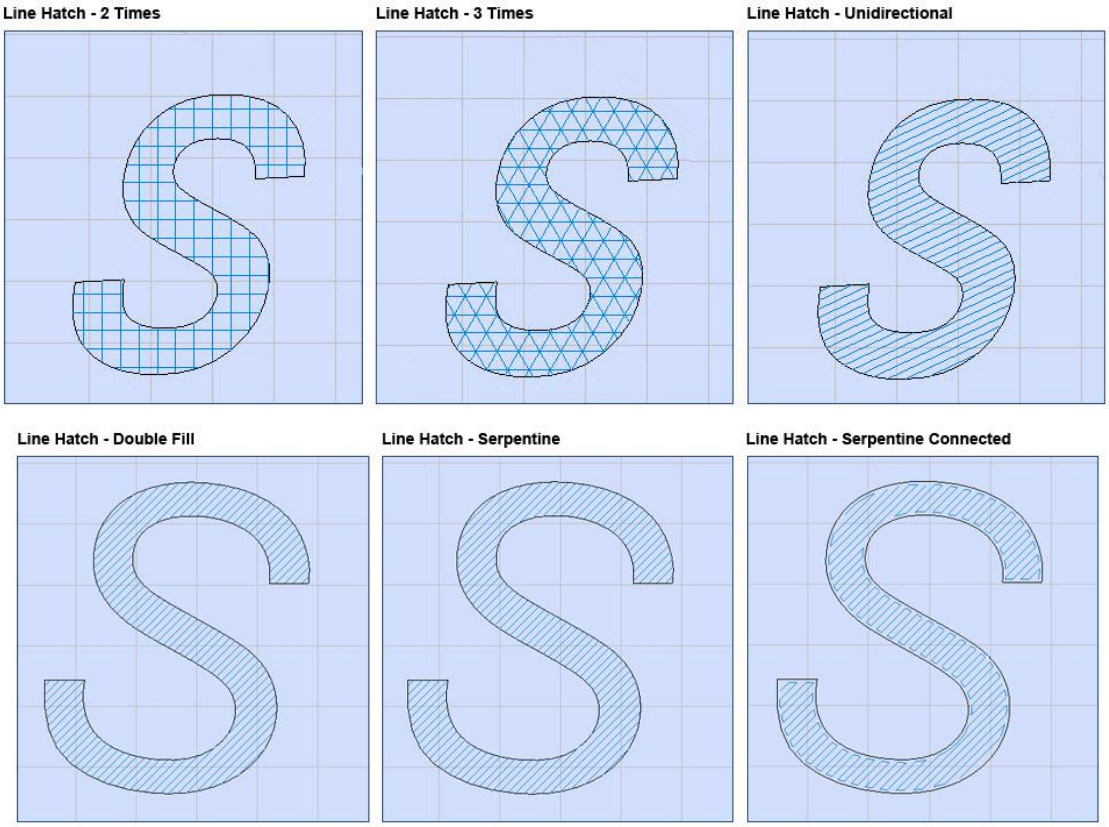


FIGURE 426: LINE HATCH SAMPLES

- **Simplify Offset** - Use Simplify Offset to reduce the points in a polyline by removing small fluctuations or bends from it while preserving its essential shape. This option is enable when the border gap is not equal to zero

Offset Hatch

The **Offset** hatch type fills a Shape with a consecutive set of closed paths, which are offset to the boundary of the Shape. The offset is a defined gap, and the hatching works inward or outward, creating multiple consecutive closed paths until the Shape is filled. To apply an offset hatch pattern, select the **Offset Hatch** icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**.

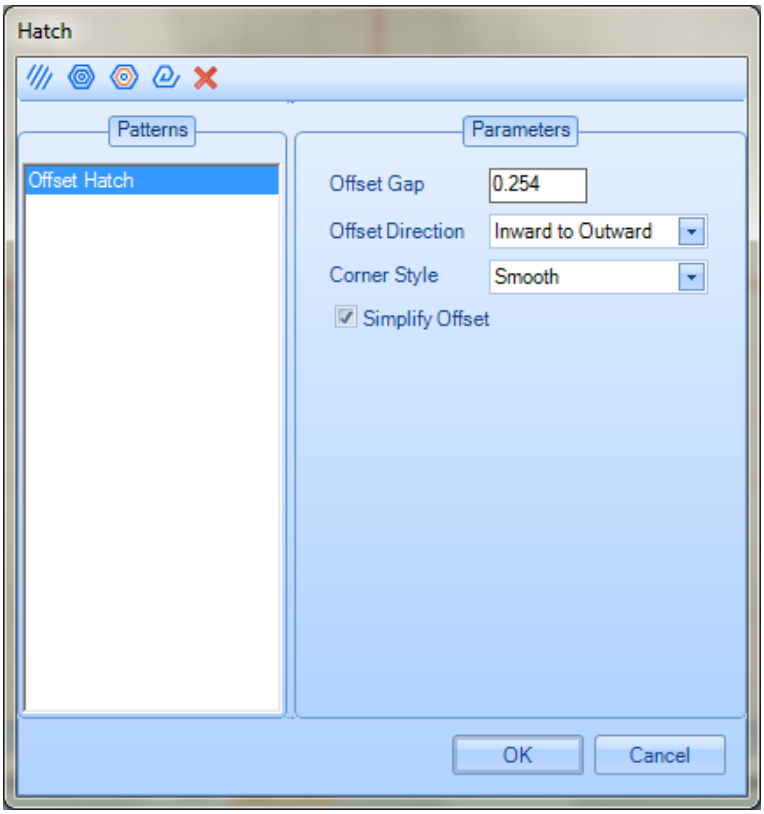


FIGURE 427: OFFSET HATCH PARAMETERS

You can change any of the Offset Hatch parameters listed in the **Parameters** section of the **Hatch** window. The Offset Hatch parameters are the following:

- **Offset Gap** – The gap between hatching strokes.
- **Offset Direction** – The direction in which the hatching will be done during laser marking. This value can be either of the following, selected from the dropdown list:

➢ **Outward to Inward** – The laser will stroke the innermost path first and works towards the outermost path, one path at a time.

- **Corner Style** – Specified as Sharp or Smooth from the dropdown box. This feature can be used to smooth out unwanted artifacts created by offset hatching. It is most effective when a Shape has an inward edge less than 90 degrees.
- **Simplify Offset** - Use Simplify Offset to reduce the points in a polyline by removing small fluctuations or bends from it while preserving its essential shape.

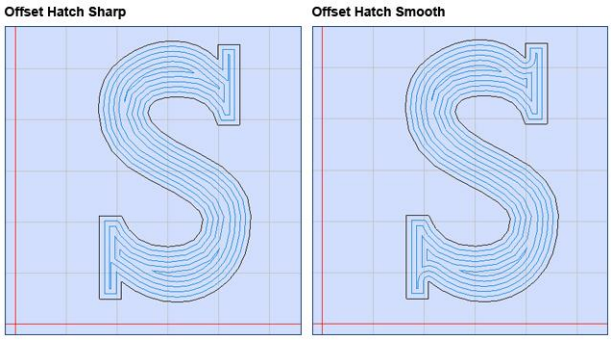


FIGURE 428: OFFSET HATCH EXAMPLES

Offset In Out Hatch

The **Offset In Out** hatch type fills a Shape with a consecutive set of closed paths, which are offset to the boundary of the Shape in both the inward and outward directions. To apply an **Offset In Out** hatch pattern, select the **Offset In Out** icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**.

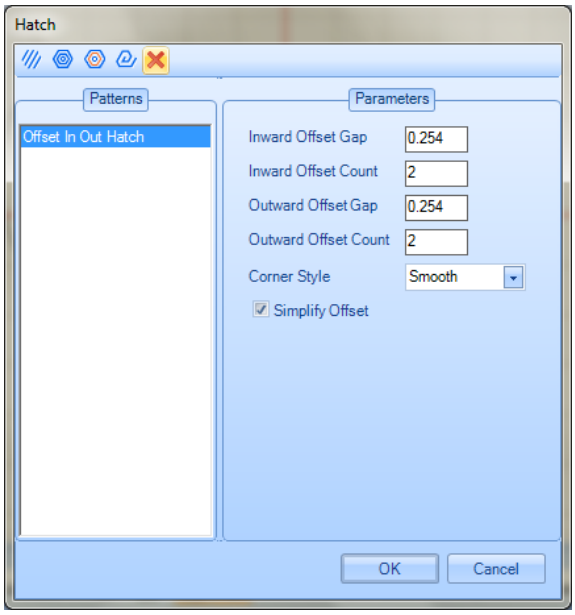


FIGURE 429: OFFSET IN OUT HATCH PARAMETERS

- **Inward Offset Gap –** The gap between the border of the object and the hatch lines that are inside the shape

- **Inward Offset Count –** The number of hatch lines inside the object
- **Outward Offset Gap** – The gap between the border of the object and the hatch lines that are on the outside of the Shape
- **Outward Offset Count** – The number of hatch lines outside of the Shape
- **Corner Style** – Specified as Sharp or Smooth from the dropdown box. This feature can be used to smooth out unwanted artifacts created by offset hatching. It is most effective when a Shape has an inward edge less than 90 degrees.
- **Simplify Offset** - Use Simplify Offset to reduce the points in a polyline by removing small fluctuations or bends from it while preserving its essential shape.

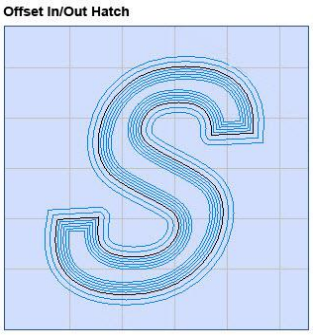


FIGURE 430: OFFSET IN OUT HATCH

Helix Hatch

The **Helix** hatch type fills a Shape with a spiral pattern. This hatching pattern saves cycle time by reducing the number of unwanted jumps in the laser marking process. To apply a **Helix** hatch pattern, select the **Helix** icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**.

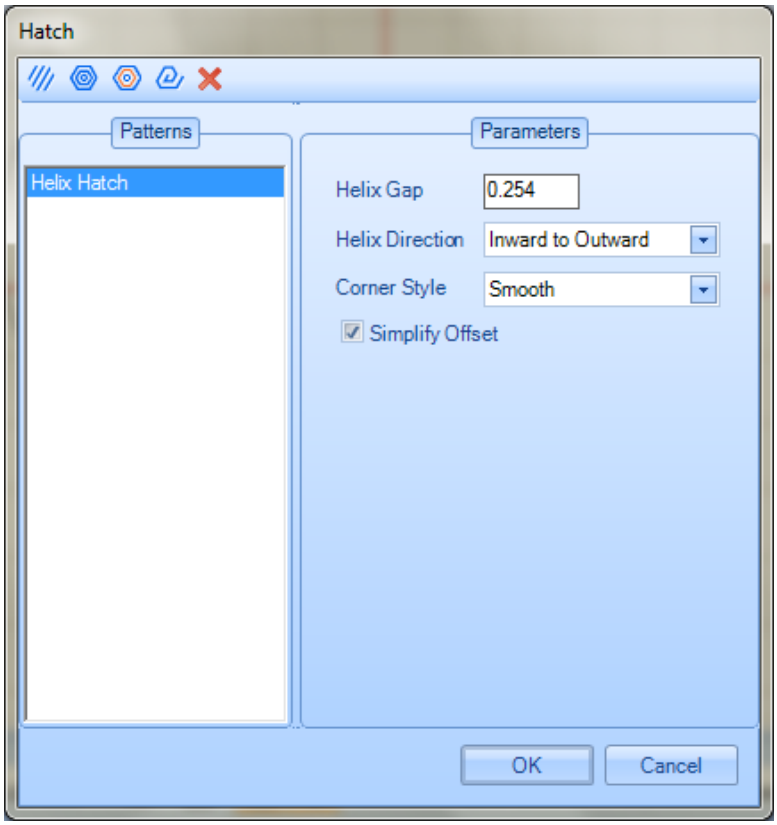


FIGURE 431: HELIX HATCH WINDOW

You can change any of the Helix Hatch parameters listed in the **Parameters** section of the **Hatch** window. The Helix Hatch parameters are the following:

- **Helix Gap** – The gap between hatching strokes
- **Helix Direction** – The direction in which the hatching will be done during laser marking. This value can be either of the following, selected from the dropdown list:
- **Inward to Outward** – The laser will stroke from the inner end of the helix and move outward.
- **Outward to Inward** – The laser will stroke from the outer end of the helix and move inward.
- **Corner Style** – Specified as Sharp or Smooth from the dropdown box. This feature can be used to smooth out unwanted artifacts created by offset hatching. It is most effective when a Shape has an inward edge less than 90 degrees.
- **Simplify Offset** - Use Simplify Offset to reduce the points in a polyline by removing small fluctuations or bends from it while preserving its essential shape.

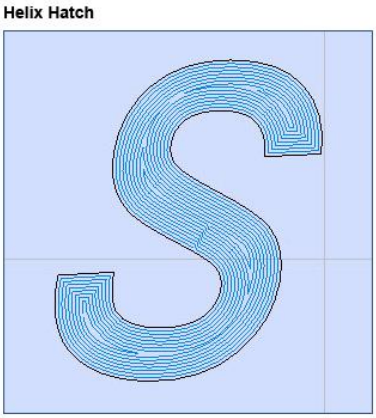


FIGURE 432: HELIX HATCH EXAMPLES

8.1.4 Filling multiple shapes with hatching

You are allowed to select multiple shapes and apply a hatching pattern. You can select multiple shapes by using various selection techniques that are available (see "Selecting Shapes" on page 280 for descriptions of various ways to select Shapes).

1. Select the shapes which need to be filled with hatching patterns.
2. To apply a hatching pattern, select a hatching icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**. (Refer to "Inserting a Hatch Pattern in a Shape" on page 335 for details on how to select a hatching icon from the **Hatch** window or from the **Tools | Hatch** panel of the **Ribbon**.)

You can also fill multiple Shapes by grouping them together. To group Shapes, select them and left-click the **Group** icon on the **Tools | Modify** panel of the **Ribbon**.

8.1.5 Edit Hatch Parameters

Do the following to edit the hatch parameters for any hatched **Shape** in your **Project:**

1. Select the hatching in a hatched **Shape**. You can do this in the **Shape Tree** or on the **Drawing Canvas**.

    - **On the Shape Tree:** Left-click the hatching item, which will become blue-highlighted on the Drawing Canvas as shown in Figure 433 (below).
    - **On the Drawing Canvas:** Left-click the hatching in the Shape.
    - You must be careful to left-click only the hatching, not the Shape itself. If you left-click the Shape itself, it will be selected and display hotspots—as shown on the rectangle in Figure 433 (below)—but the Shape hatching will not be selected.
      To ensure that you select the Shape's hatching, left-click as near the Shape's center as possible; avoid clicking on the outline of the Shape.

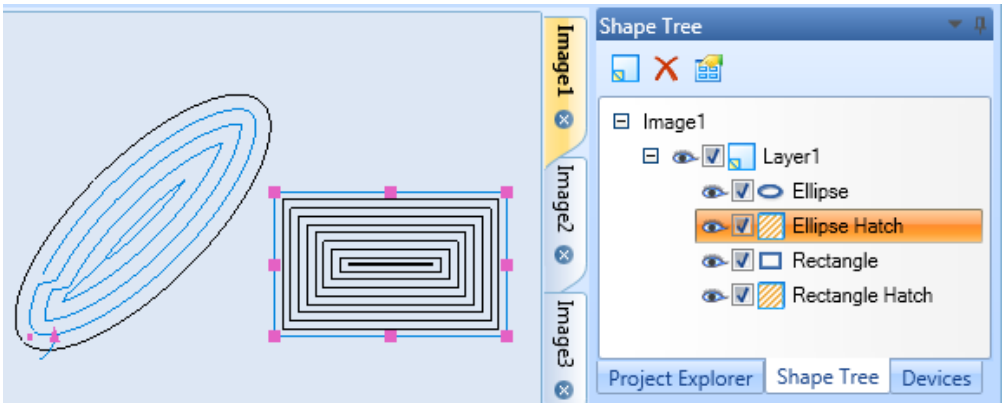


FIGURE 433: SELECTING SHAPE HATCHING

2. Right click on the selected Shape hatching and select **Edit Hatch** from the displayed popup menu.

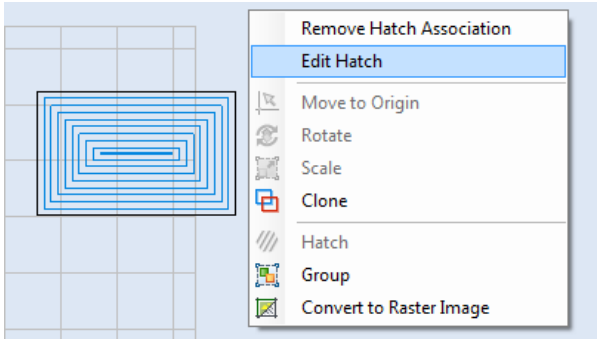


FIGURE 434: THE EDIT HATCH OPTION

3. The **Hatch** window is displayed. Do the necessary parameter modifications to and click **OK**.

Note: Selecting **Hatch** menu item from the popup menu or clicking on the toolbar buttons, will always add a new Hatch to your Shapes tree. To edit the associated hatch, first select the hatch object and choose edit.

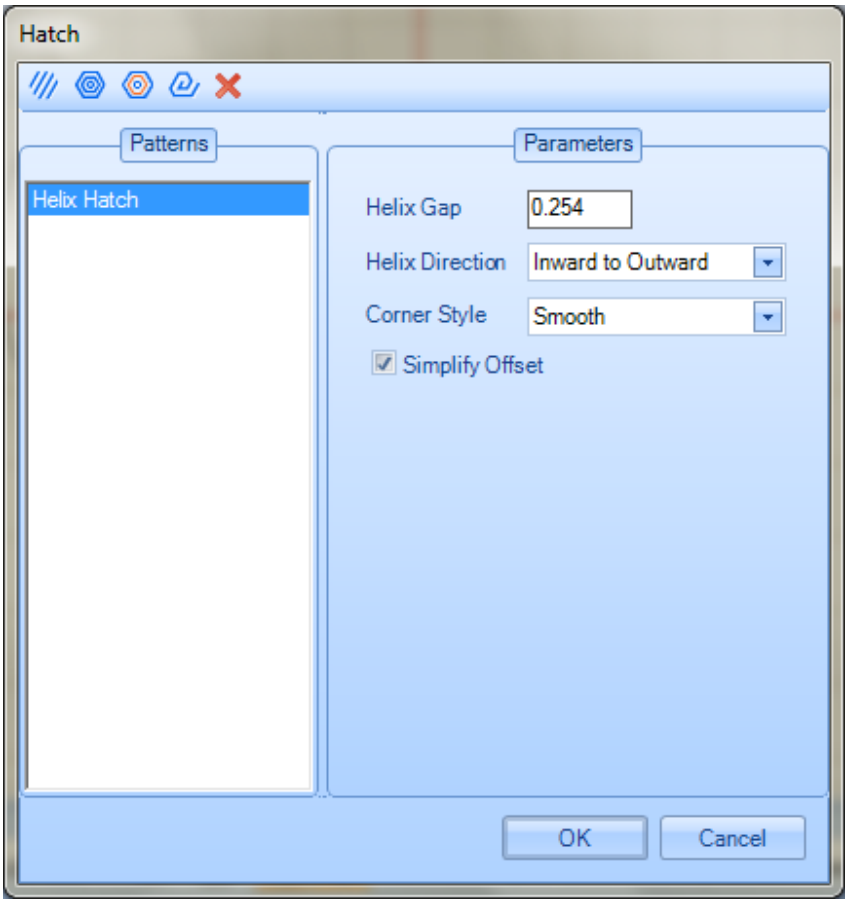


FIGURE 435: THE HATCH WINDOW

You can also use the **Properties** tab to edit the hatch parameters. Select the hatch object and the **Properties** window will list all the associated hatching patterns available.

If the Shape multiple hatch patterns associated with it, use the dropdown box in the **Properties** tab to choose between the desired hatch patterns.

Note: After editing a text field in the Properties tab, you must press the Enter key to make the change take effect.

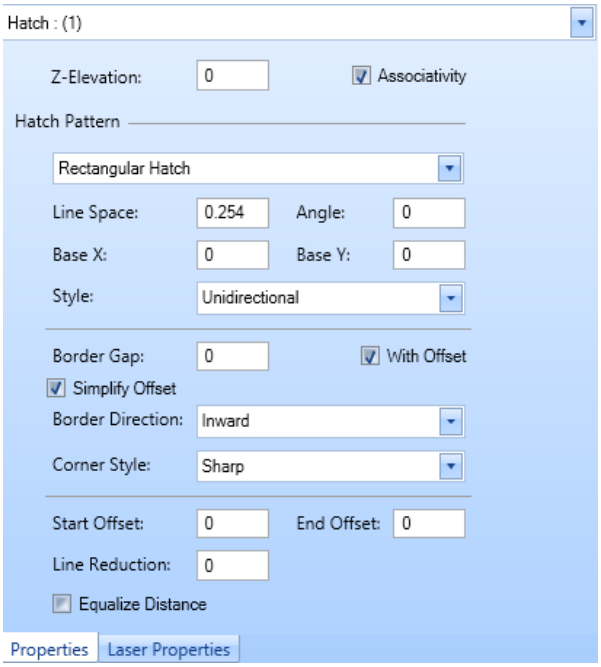


FIGURE 436: THE PROPERTIES WINDOW FOR HATCHING

8.1.6 Remove Hatch Association

Typically a hatching pattern is bound to the boundary of a Shape or vector image. Whenever you move the Shape or vector image, the hatching pattern will move with it. When you remove the hatch association,
the hatching pattern and the boundary of the shape will be detached; you will be able to move the selected hatching pattern away from the Shape.
Do the following to remove the hatch association from a Shape:

4. Left-click the hatching pattern to select it. The selected hatching pattern will be blue-highlighted.

Note: Be sure to select only the hatching pattern in the Shape or vector image. (Refer to "Edit Hatch Parameters" on page 347 for details on how to select only the hatching pattern without inadvertently selecting the Shape itself.)

5. Right-click on the selected hatch area and select Remove Hatch Association from the popup menu. This completes the removal of the hatch association.

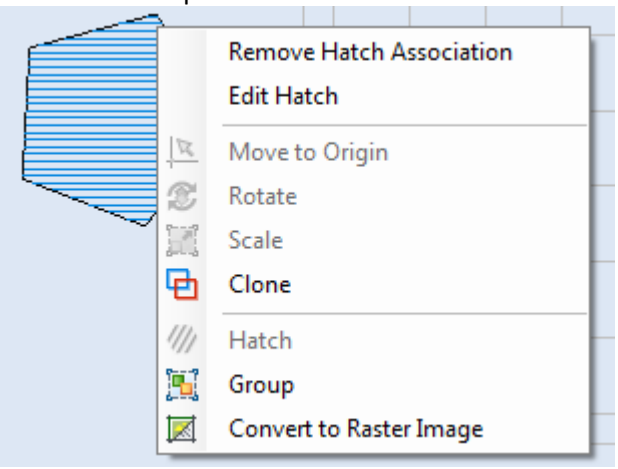


FIGURE 437: REMOVE HATCH ASSOCIATION

8.1.7 Deleting a hatching pattern from a Shape

Do the following to delete a hatching pattern from a Shape:

6. Left-click the hatching pattern to select it. The selected hatching pattern will be blue-highlighted.
7. **Note:** Be sure to select only the hatching pattern in the Shape or vector image. (Refer to "Edit Hatch Parameters" on page 348 for details on how to select only the hatching pattern without inadvertently selecting the Shape itself.)
8. Press the **Delete** key on your computer keyboard. This completes the deletion of the hatching pattern.

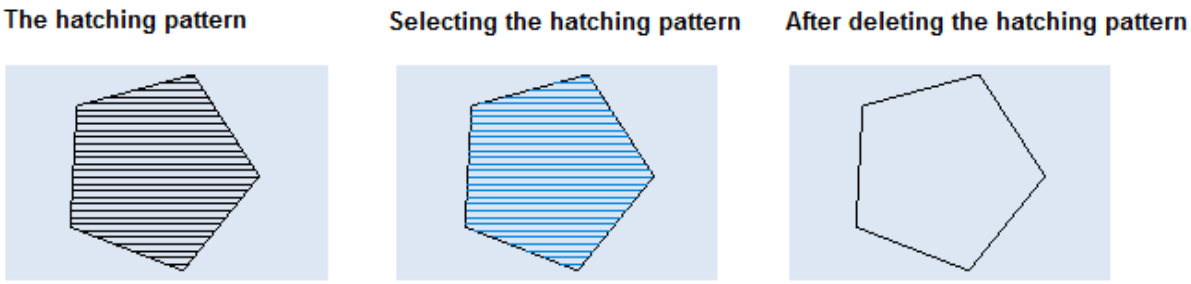


FIGURE 438: DELETING A HATCHING PATTERN

8.2 ARRAY OPERATIONS

The array operation allows you to replicate a shape, or replicate a set of shapes, into an ordered arrangement. This feature is important when you have ordered repetitive shapes for laser marking (e.g., marking a liner scale or the dial of an instrument).

You can use the **Tools | Array** panel in ScanMaster Designer to create Rectangular Arrays and Polar Arrays.

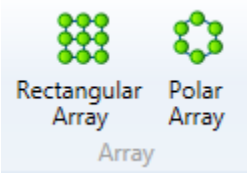


FIGURE 439: THE TOOLS | ARRAY PANEL

8.2.1 Rectangular Array

A Rectangular Array consists of copies of a selected shape in rows and columns at a specified spacing.

Do the following to create a Rectangular Array:

1. Select the desired shape on the Drawing Canvas and left-click the **Rectangular Array** icon in the **Tools | Array** panel. This displays the **Rectangular Array** dialog box.

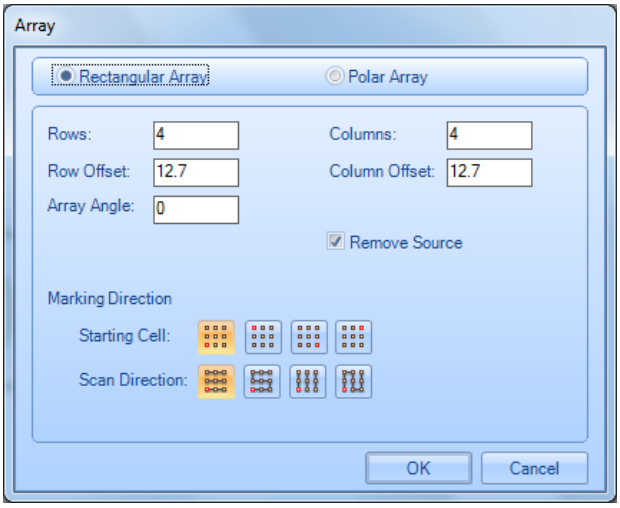


FIGURE 440: RECTANGULAR ARRAY DIALOG BOX

2. Specify the number of rows and columns in the **Rows** and **Columns** boxes.
3. Enter row and column offsets in the **Row Offset** and **Column Offset** boxes.
4. Enter an angle of rotation for the array in the **Array Angle** box.
5. Select the **Remove Source** check box to remove the Shape that was used to create the array from the Drawing Canvas. (Deselecting the **Remove Source** check box will keep this Shape on the Drawing Canvas.)
6. Click a **Starting Cell** button and a **Scan Direction** button in the **Marking Direction** section to specify the direction in which the array objects should be marked:
    - **Starting cell** – Specifies the cell by which the marking is initiated. The available options are **Bottom-left**, **Top-left**, **Bottom-right**, and **Top-right**.

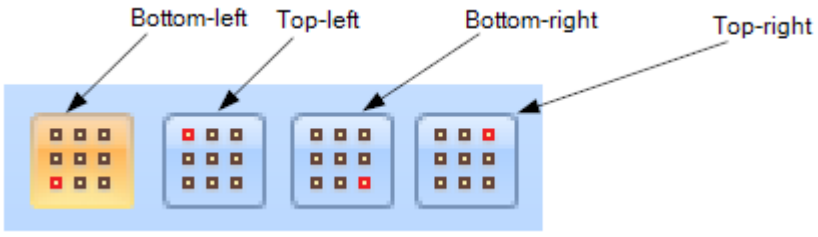


FIGURE 441: THE STARTING CELL BUTTONS

- **Scan Direction** – Specifies the direction by which the array objects are marked. The available options are **Horizontal Zig-Zag**, **Horizontal serpentine**, **Vertical Zig-Zag**, and **Vertical serpentine**.

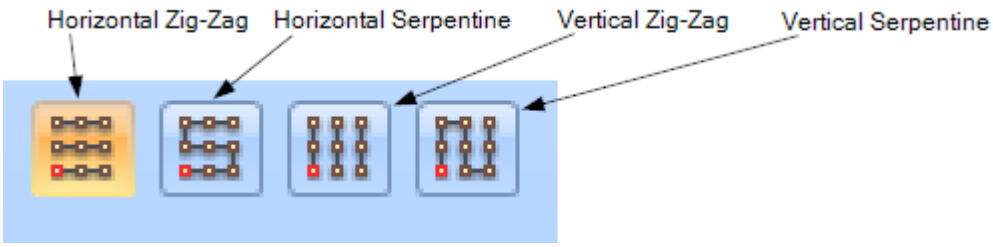


FIGURE 442: THE STARTING CELL BUTTONS

7. Click the **OK** button in the **Array** window to create the Rectangular Array.

Example of a Rectangular Array

This section contains an example of a Rectangular Array that was created by copying the following Shape.

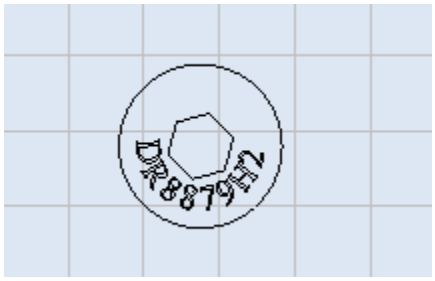
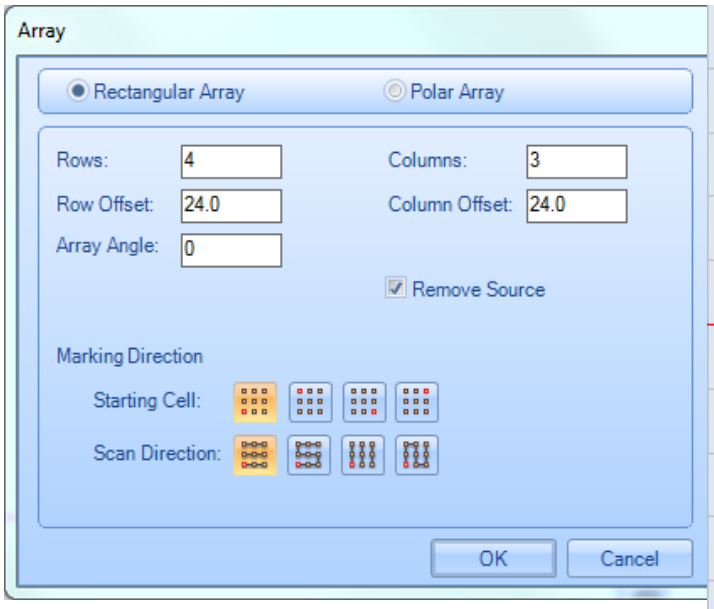


FIGURE 443: THE COPIED SHAPE

The following figure contains a **Rectangular Array** window with values for creating a Rectangular Array, along with the Rectangular Array that is created from those values.

The Rectangular Array Window



The Rectangular Array

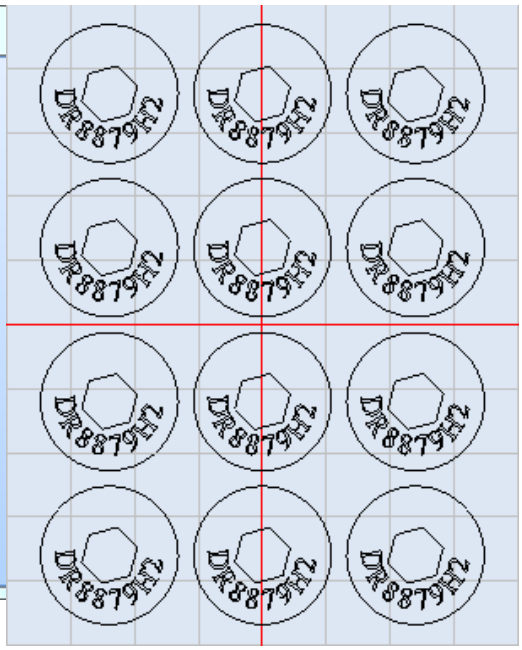


FIGURE 444: RECTANGULAR ARRAY

Modifying the Rectangular Array using hotspots

When a Rectangular Array is selected, it displays hotspots as shown in the following figure. You can use hotspots to add or remove row and columns, change the column or row offsets, or change the angle of rotation of a Rectangular Array.

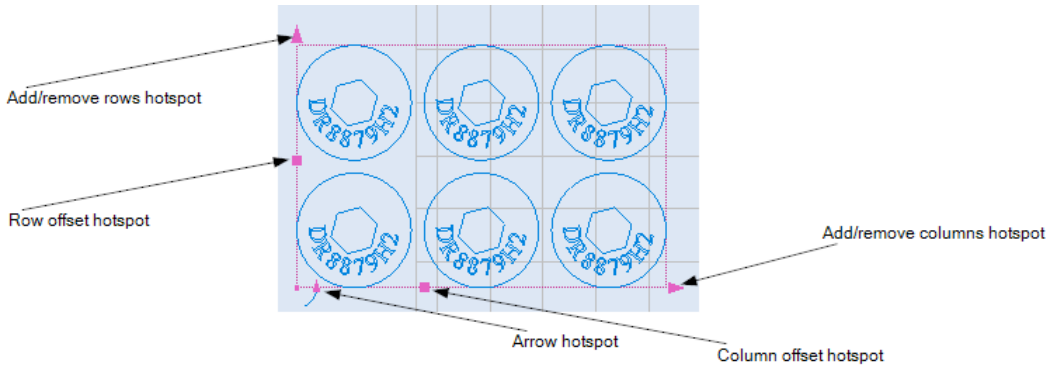


FIGURE 445: RECTANGULAR ARRAY HOTSPOTS

Using hotspots to add or remove array rows and columns

Do the following to add or remove a row or column by dragging a hotspot:

1. Left-click the **Add/remove columns** hotspot or the **Add/remove rows** hotspot in the Rectangular Array. The selected hotspot turns blue, as shown in
2.
3.

4. Figure 446 (below).
5. If you selected the **Add/remove rows** hotspot, drag the mouse up (to add rows) or down (to remove rows). If you selected the **Add/remove columns** hotspot, drag the mouse to the right (to add columns) or to the left (to remove columns).
6. Added rows or columns will be previewed in blue as you drag the mouse. Removed rows or columns will be previewed in black as you drag the mouse.
7. Click the left mouse button to finish adding or removing rows or columns.

The following figure contains an example of dragging the **Add/remove columns** hotspot to remove a column.

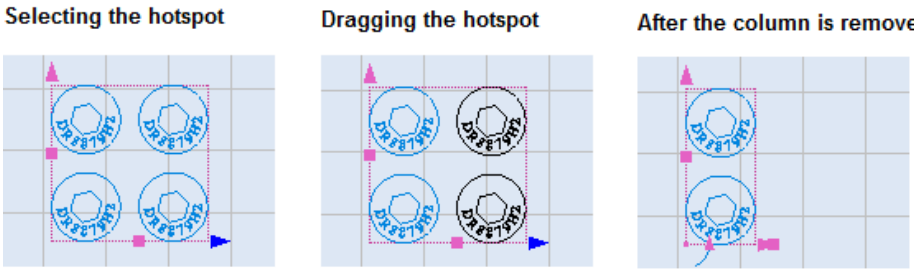


FIGURE 446: REMOVING A COLUMN FROM A RECTANGULAR ARRAY

Using hotspots to change row or column offsets

Do the following to change row or column offsets by dragging a hotspot:

8. Left-click the **Column offset** hotspot or the **Row offset** hotspot in the Rectangular Array. The selected hotspot turns blue, as shown in the following figure.
9. If you selected the **Row offset** hotspot, drag the mouse up (to increase the row offset) or down (to decrease the row offset). Changes to the row offset will be previewed in blue as you drag the mouse.
10. If you selected the **Column offset** hotspot, drag the mouse to the right (to increase the column offset) or to the left (to decrease the column offset). Changes to the column offset will be previewed in blue as you drag the mouse.
11. Click the left mouse button when the row or column offset is as you want it.
12. The following figure contains an example of dragging the **Row offset** hotspot to change the row offset of a Rectangular Array.

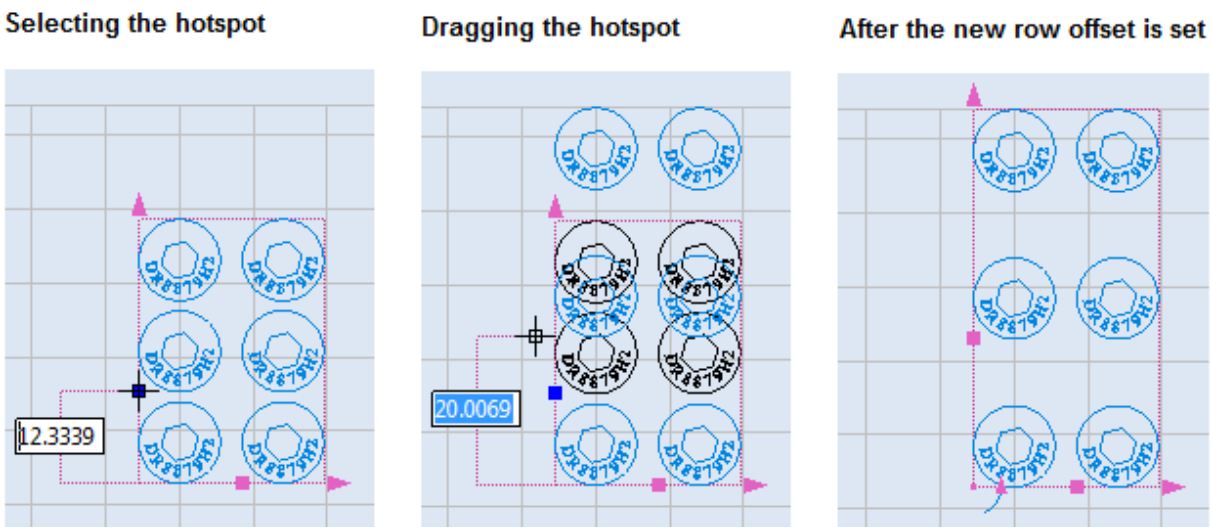


FIGURE 447: CHANGING THE ROW OFFSET OF A RECTANGULAR ARRAY

Using the Arrow hotspot to change the angle of rotation of a Rectangular Array

Every Rectangular Array has an Arrow hotspot. You can use the Arrow hotspot to change the angle of rotation for a Rectangular Array. Refer to "Using the arrow hotspot to rotate a Shape" on page 324 for more information.

8.2.2 Polar Array

A Polar Array consists of copies of a selected shape in a circular pattern or an arc pattern, based on a given center point.

Creating a Polar Array

Do the following to create a Polar Array:

1. Select the desired shape on the Drawing Canvas and left-click the **Polar Array** icon button in the **Tools | Array** panel. This displays the **Polar Array** dialog box.

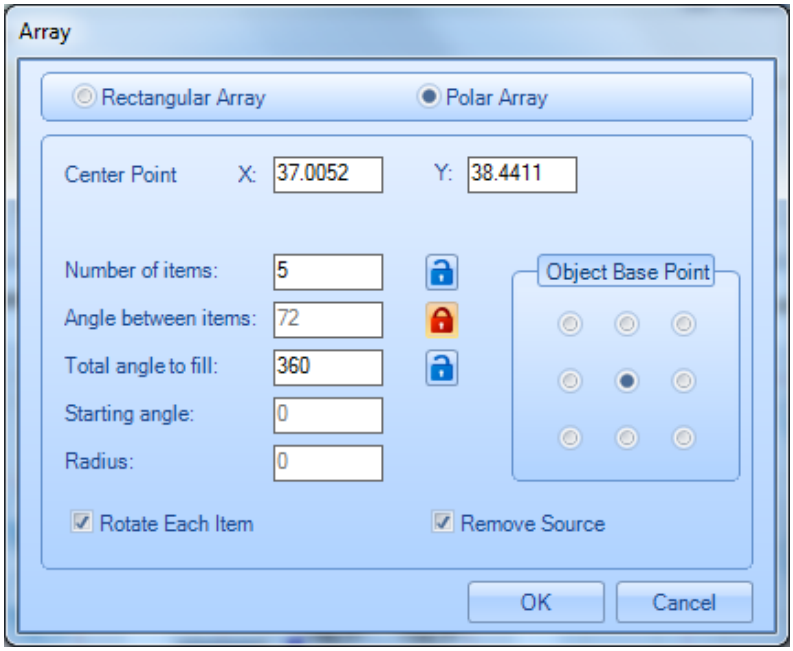


FIGURE 448: POLAR ARRAY DIALOG BOX

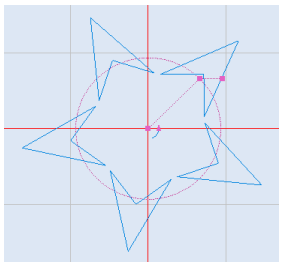
2. In the **X** and **Y** fields, enter the X and Y coordinates of the center points for the Polar Array.
3. Unlock any two of the following parameters:
    - **Number of items** – the number of elements in the array
    - **Angle between items** – the angle between each array element
    - **Total angle to fill** – the angle that should be swept by the array elements

Only two of the above parameters can be unlocked at any given time. If a parameter is "locked", you can change its state to "unlocked" by left-clicking on its **Locked** icon. If a parameter is "unlocked", you can change its state to "locked" by left-clicking on its **Unlocked** icon.

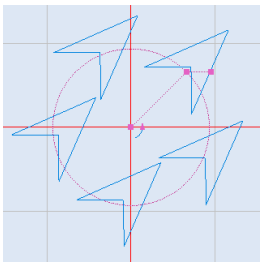
4. Select an Object Base Point by left-clicking a radio button in the **Object Base Point** area of the **Polar Array** dialog box.
5. **Note:** The circle or arc that defines the Polar Array passes through the Object Base Point on each array element. In addition, the Object Base Point is a dual-purpose hotspot: it can be dragged to change the radius of the Polar Array, or it can serve as the axis of rotation for array elements. (Refer to "Changing the radius of a Polar Array" on page 375 to change the radius of the Polar Array by dragging the Object Base Point hotspot. Refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363 to rotate array elements around the Object Base Point hotspot.)

6. Select or deselect the **Rotate Each Item** check box. When this check box is selected, each array element will be rotated with respect to its position in the Polar Array. When this check box is
   not selected, array elements will retain the same orientation as the Shape that was selected as
   the original array element.

With Rotate Each Item selected



With Rotate Each Item *deselected*



7. Select or deselect the **Remove Source** check box. When this check box is selected, the original Shape will be removed from the Drawing Canvas.

Example of a Polar Array

This section contains an example of a Polar Array that was created by copying the following Shape.

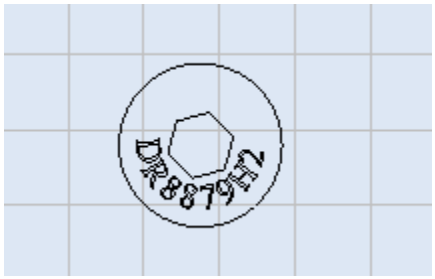
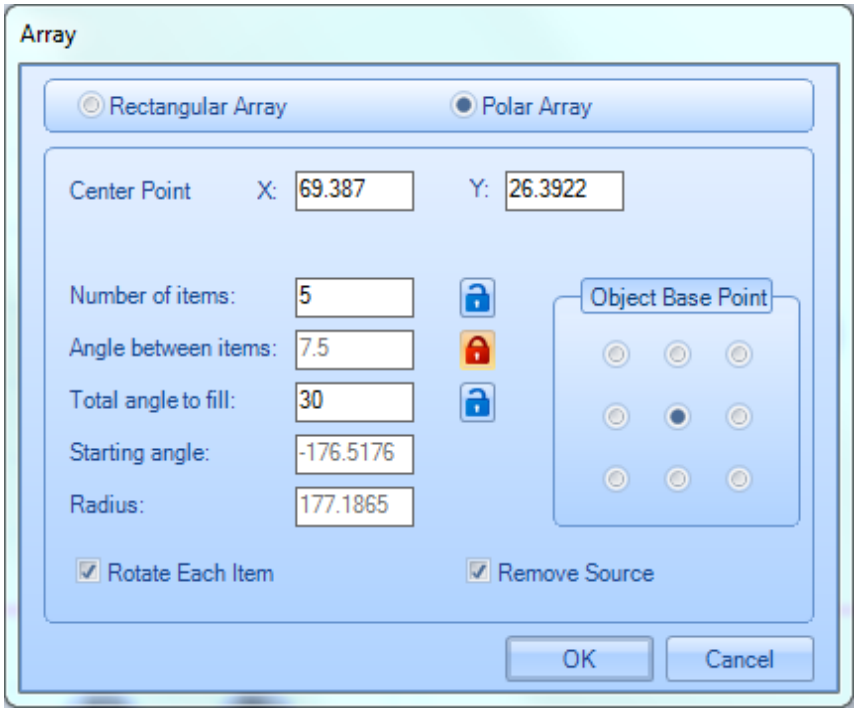


FIGURE 449: THE COPIED SHAPE

The following figure contains a **Polar Array** window with values for creating a Polar Array, along with the Polar Array that is created from those values.

The Polar Array Window



The Polar Array

FIGURE 450: POLAR ARRAY EXAMPLE

Modifying the Polar Array using hotspots

When a Polar Array is selected, it displays hotspots as shown in the following figure. You can use hotspots to move a Polar Array, change its radius, or change the angle of rotation for the entire array or its array elements.

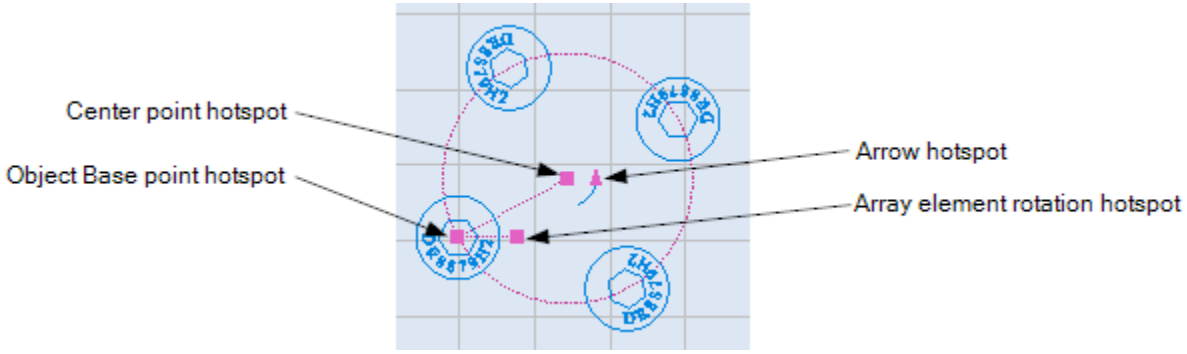


FIGURE 451: POLAR ARRAY HOTSPOTS

Dragging the center point hotspot to move a Polar Array

Do the following to move a Polar Array by dragging its center point hotspot:

1. Select the Polar Array and left-click its center point hotspot. The center point hotspot will turn blue.
2. Drag the mouse to a new location on the Drawing Canvas. The movement of the Polar Array will be previewed in blue as you drag the mouse.
3. When the Polar Array is at the desired location, click the left mouse button. The following figure shows an example of a Polar Array that has been moved by dragging its center point hotspot.

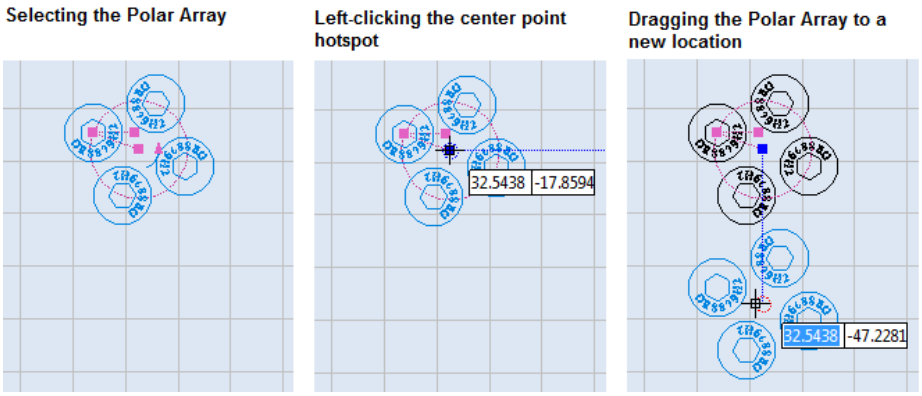


FIGURE 452: MOVING A POLAR ARRAY BY DRAGGING ITS CENTER POINT HOTSPOT

Rotating array elements by dragging the array element rotation hotspot

You can rotate the array elements in a Polar Array by dragging the array element hotspot. When array elements are rotated by this method, the Object Base Point is the axis of rotation. The Object Base Point is specified by clicking a radio button in the **Object Base Point** group when the Polar Array is created (see "Creating a Polar Array" on page 358).

Do the following to rotate array elements by dragging the array element rotation hotspot around its Object Base point:

1. Select the Polar Array and left-click its array element rotation hotspot. The array element rotation hotspot will turn blue.
2. Drag the mouse around the Object Base point hotspot. Changes to the rotation of all array elements will occur simultaneously and will be previewed in blue.
3. When the angle of rotation is as desired, click the left mouse button. The following figure shows array elements being rotated by dragging the array element rotation hotspot around the Object Base Point. In the following example, the Object Base Point is the center point of the array element.

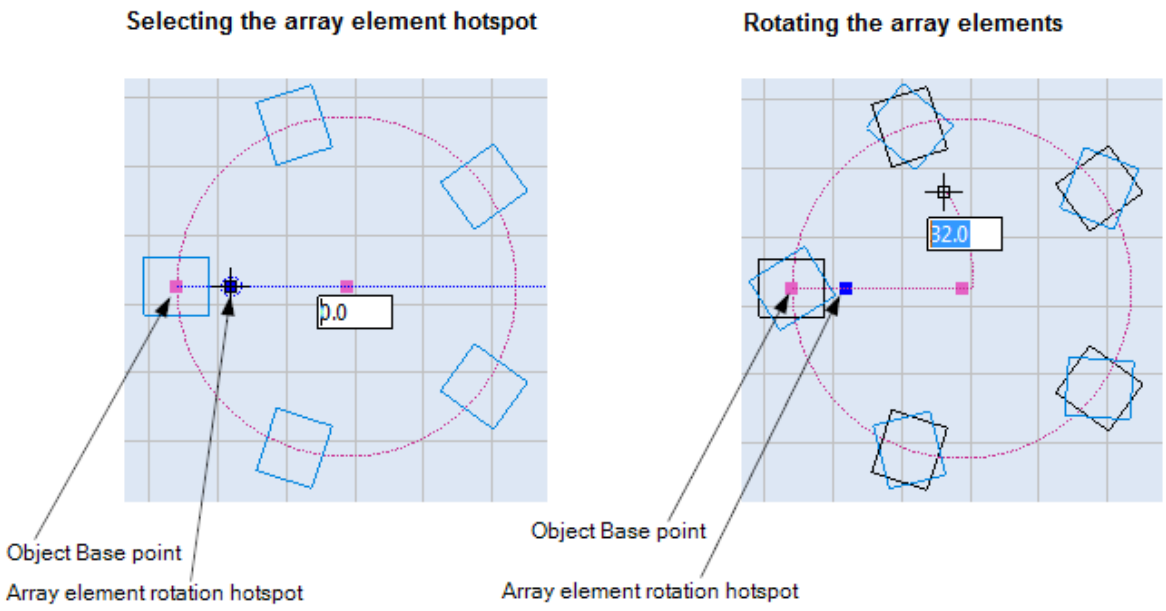


FIGURE 453: ROTATING ARRAY ELEMENTS BY DRAGGING THE ARRAY ELEMENT ROTATION HOTSPOT

The following subsections contain examples of array element rotation for every Object Base Point that can be selected from the **Object Base Point** group of the **Polar Array** dialog box.

Rotating around the center of an array element

Select the **Center point** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point at the center of the array element.

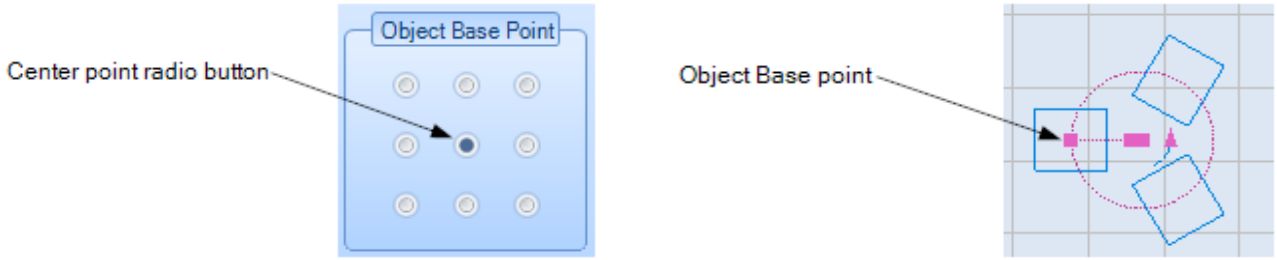


FIGURE 454: PLACING THE OBJECT BASE POINT IN THE CENTER OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the center of the array element. Figure 456 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

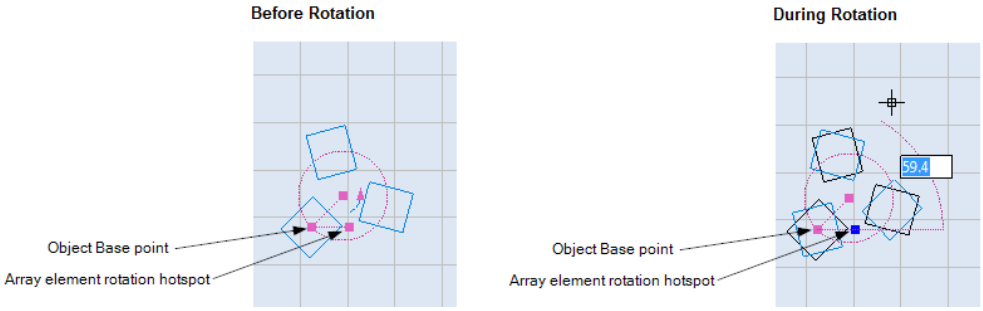


FIGURE 455: ROTATING ARRAY ELEMENTS AROUND THE CENTER POINT

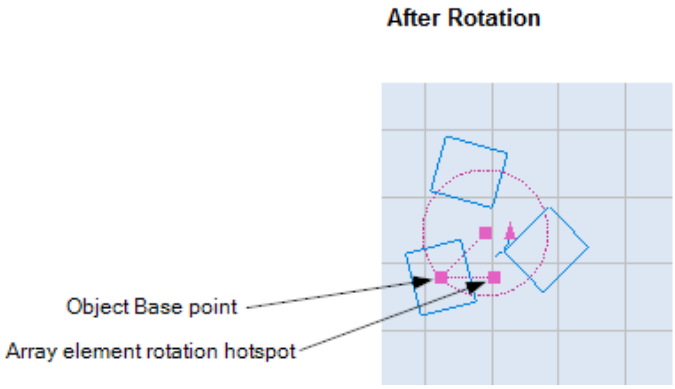


FIGURE 456: ARRAY ELEMENTS AFTER ROTATING AROUND THE CENTER POINT

Rotating around the upper-left corner of an array element

Select the **Upper-left** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point in the upper-left corner of the array element.

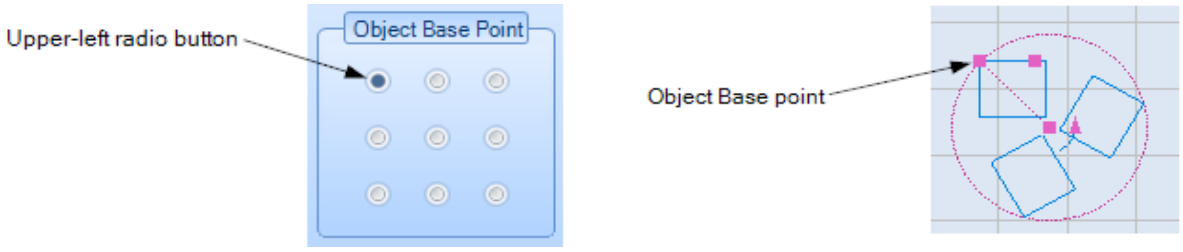


FIGURE 457: PLACING THE OBJECT BASE POINT IN THE UPPER-LEFT CORNER OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the upper-left corner of the array element.

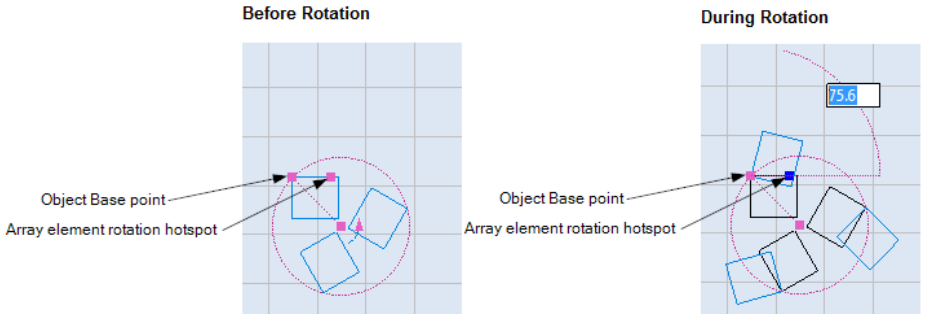


Figure 459 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

FIGURE 458: ROTATING ARRAY ELEMENTS AROUND THE UPPER-LEFT CORNER

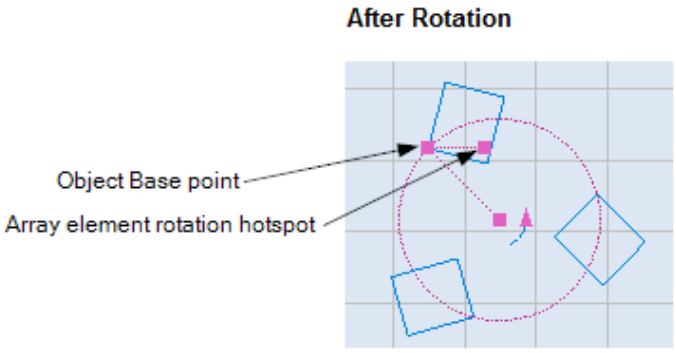


FIGURE 459: ARRAY ELEMENTS AFTER ROTATING AROUND THE UPPER-LEFT CORNER

Rotating around the top-side midpoint of an array element

Select the Top-Middle radio button in the Object Base Point group of the Polar Array dialog box to place the Object Base point at the top-side midpoint of the array element.

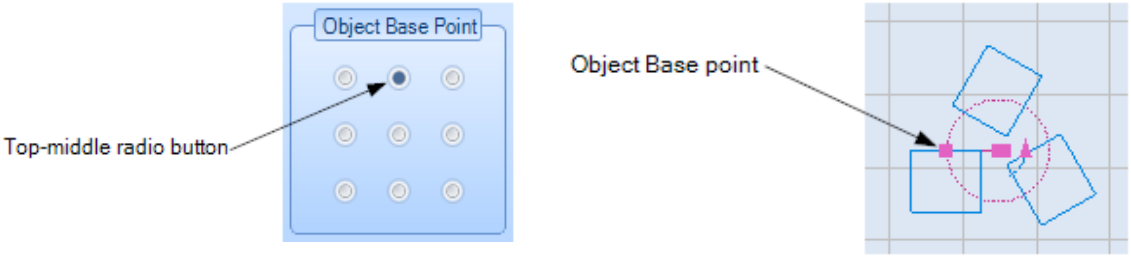


FIGURE 460: PLACING THE OBJECT BASE POINT AT THE TOP-SIDE MIDPOINT OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the top-side midpoint of the array element.

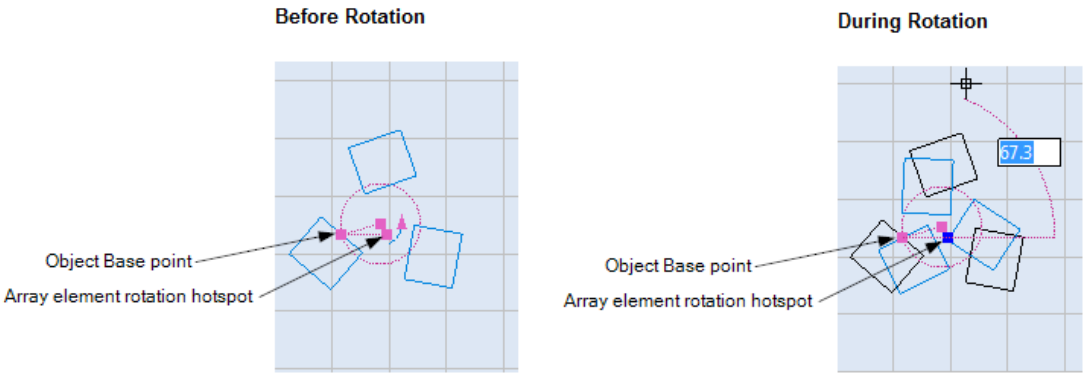


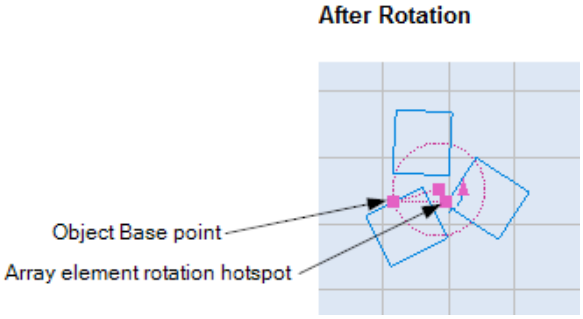
Figure 462 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

FIGURE 461: ROTATING ARRAY ELEMENTS AROUND THE TOP-SIDE MIDPOINT

FIGURE 462: ARRAY ELEMENTS AFTER ROTATING AROUND THE TOP-SIDE MIDPOINT

Rotating around the upper-right corner of an array element

Select the **Upper-right Object Base Point** radio button in the **Array** dialog box to place the Object Base point in the upper-right corner of the array element.



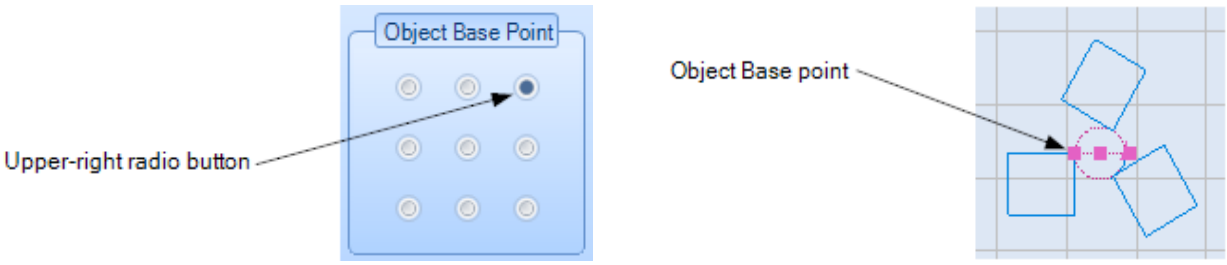


FIGURE 463: PLACING THE OBJECT BASE POINT AT THE UPPER-RIGHT CORNER OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the upper-right corner of the array element. Figure 465 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

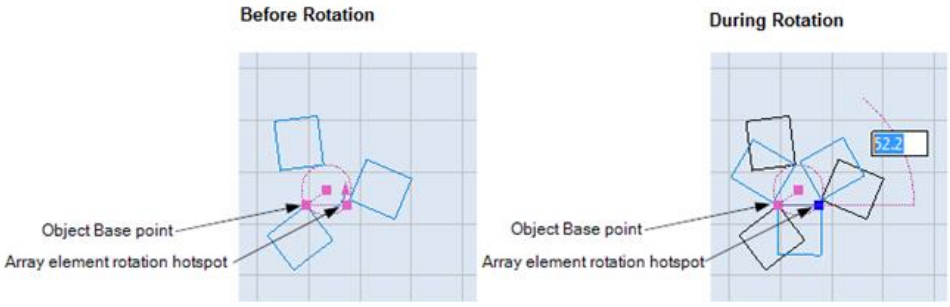


FIGURE 464: ROTATING ARRAY ELEMENTS AROUND THE UPPER-RIGHT CORNER

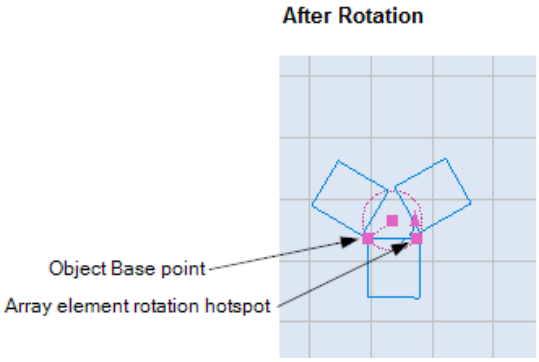


FIGURE 465: ARRAY ELEMENTS AFTER ROTATING AROUND THE UPPER-RIGHT CORNER

Rotating around the right-side midpoint of an array element

Select the **Right-side** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point at the right-side midpoint of the array element.

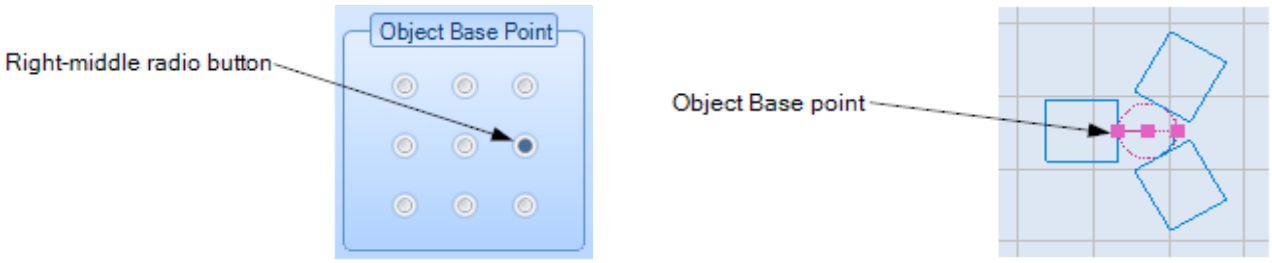


FIGURE 466: PLACING THE OBJECT BASE POINT AT THE RIGHT-SIDE MIDPOINT OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the right-side midpoint of the array element.

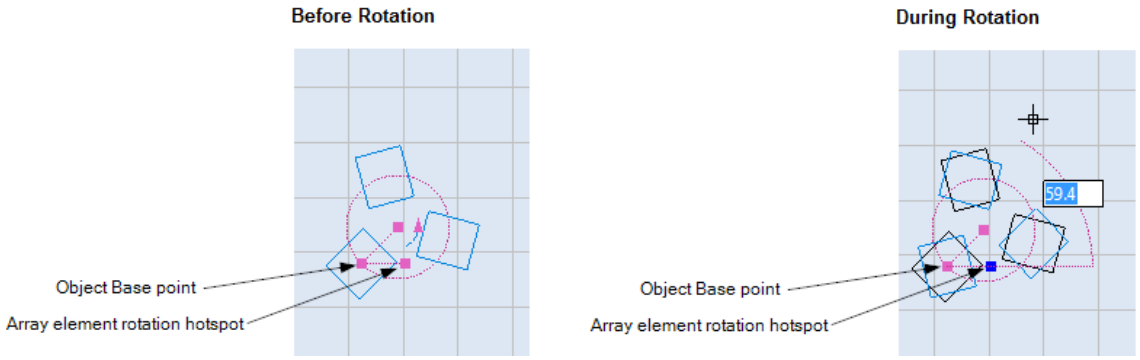


Figure 468 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

Figure 467: Rotating array elements around the right-side midpoint

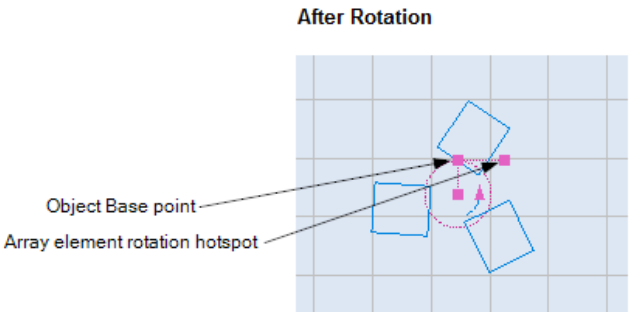


FIGURE 468: ARRAY ELEMENTS AFTER ROTATING AROUND THE RIGHT-SIDE MIDPOINT

Rotating around the lower-right corner of an array element

Selecting the **Lower-right** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point in the lower-right corner of the array element

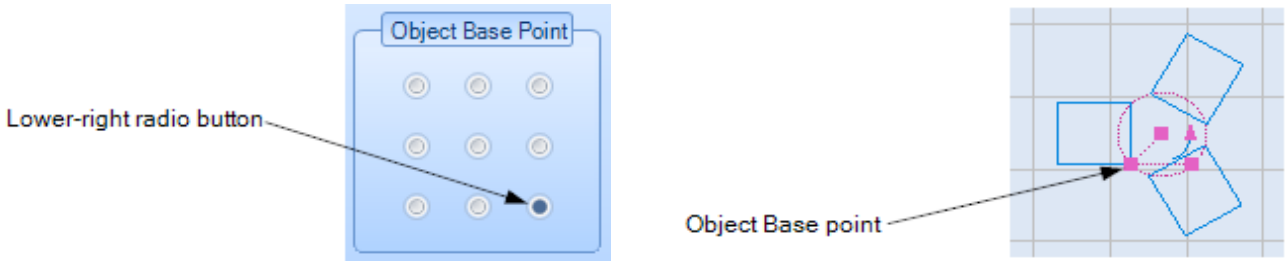


FIGURE 469: PLACING THE OBJECT BASE POINT IN THE LOWER-RIGHT CORNER OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the lower-right corner of the array element. Figure 471 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

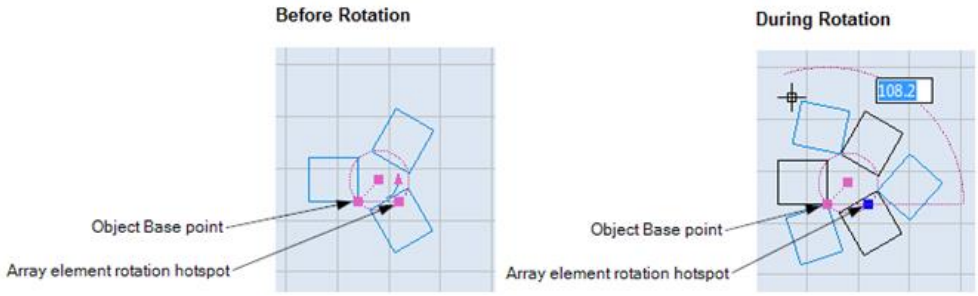


FIGURE 470: ROTATING ARRAY ELEMENTS AROUND THE LOWER-RIGHT CORNER

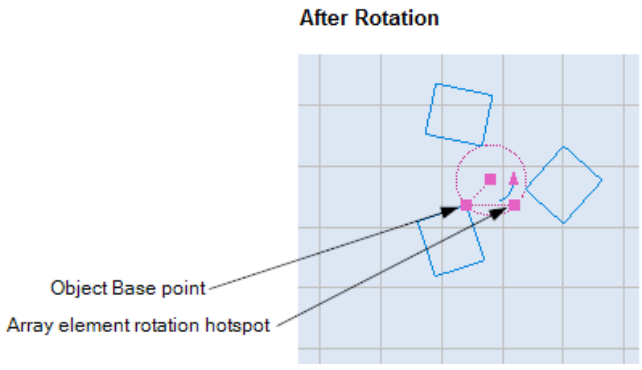


FIGURE 471: ARRAY ELEMENTS AFTER ROTATING AROUND THE LOWER-RIGHT CORNER

Rotating around the bottom-side midpoint of an array element

Select the **Bottom-Middle** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point at the bottom-side midpoint of the array element.

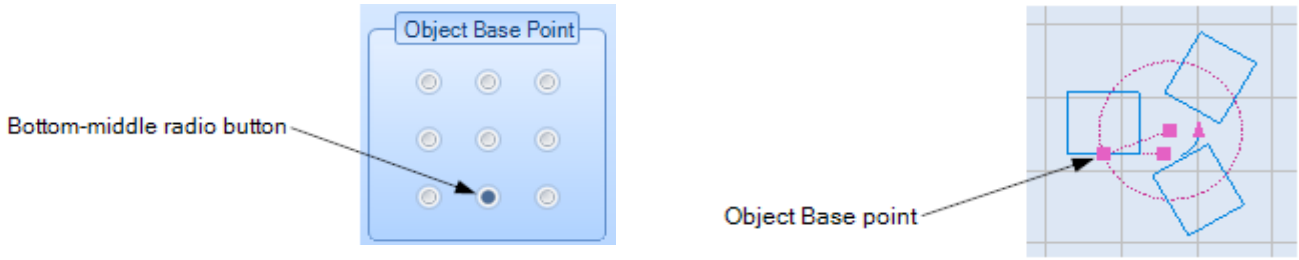


FIGURE 472: PLACING THE OBJECT BASE POINT AT THE BOTTOM-SIDE MIDPOINT OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the bottom-side midpoint of the array element. Figure 474 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

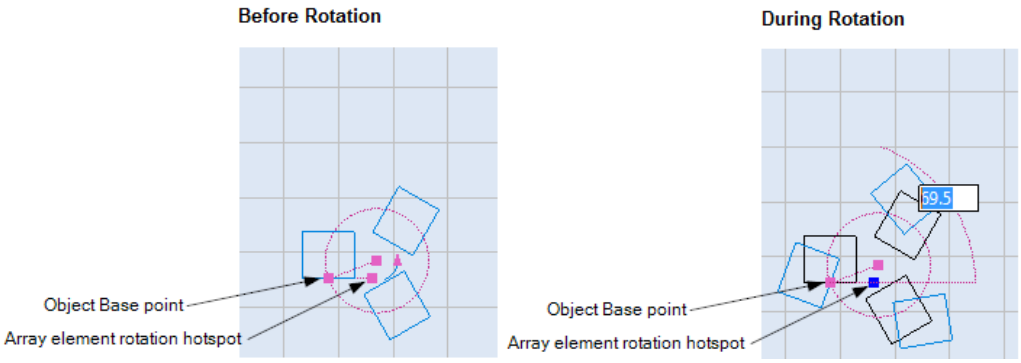


FIGURE 473: ROTATING ARRAY ELEMENTS AROUND THE BOTTOM-SIDE MIDPOINT

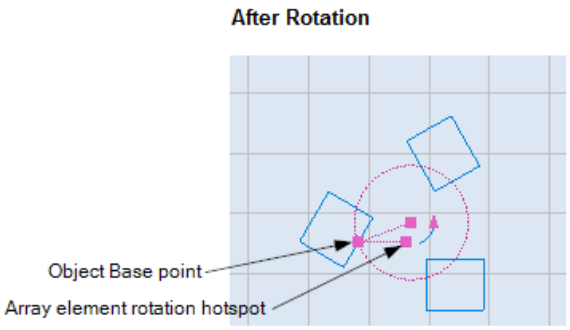


FIGURE 474: ARRAY ELEMENTS AFTER ROTATING AROUND THE BOTTOM-SIDE MIDPOINT

Rotating around the lower-left corner of an array element

Select the **Lower-left** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point in the lower-left corner of the array element.

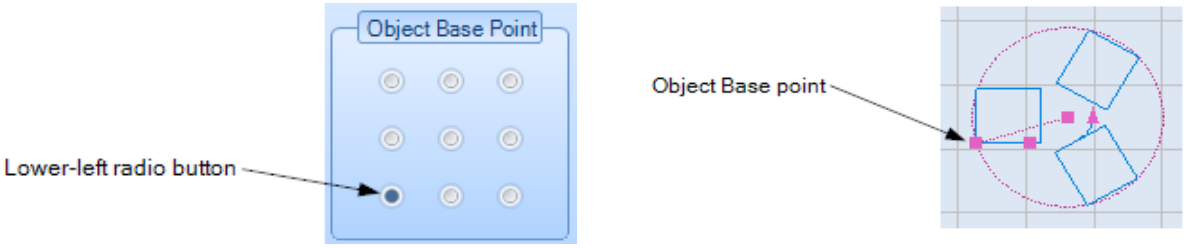


FIGURE 475: PLACING THE OBJECT BASE POINT AT THE LOWER-LEFT CORNER OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the lower-left corner of the array element.

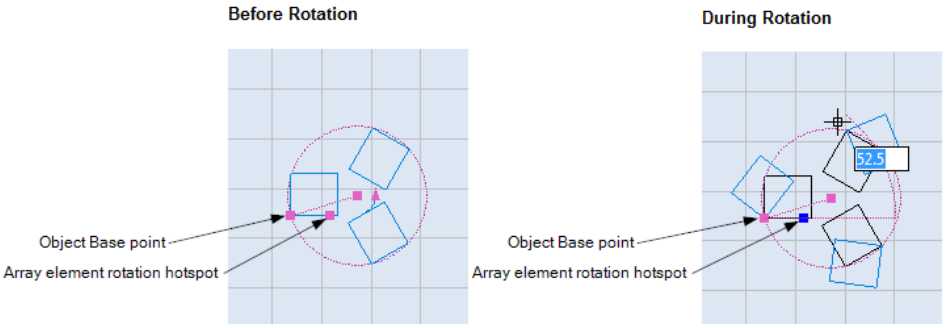


Figure 477 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

FIGURE 476: ROTATING ARRAY ELEMENTS AROUND THE LOWER-LEFT CORNER

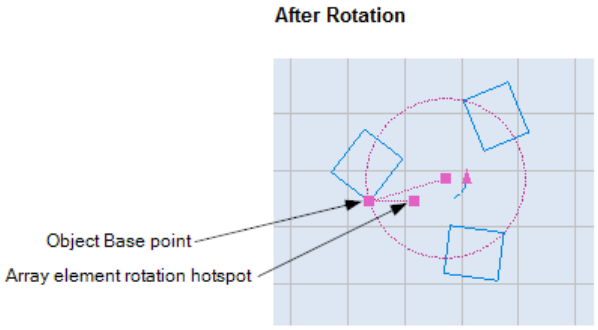


FIGURE 477: ARRAY ELEMENTS AFTER ROTATING AROUND THE LOWER-LEFT CORNER

Rotating around the left-side midpoint of an array element

Select the **Left-Middle** radio button in the **Object Base Point** group of the **Polar Array** dialog box to place the Object Base point at the left-side midpoint of the array element.

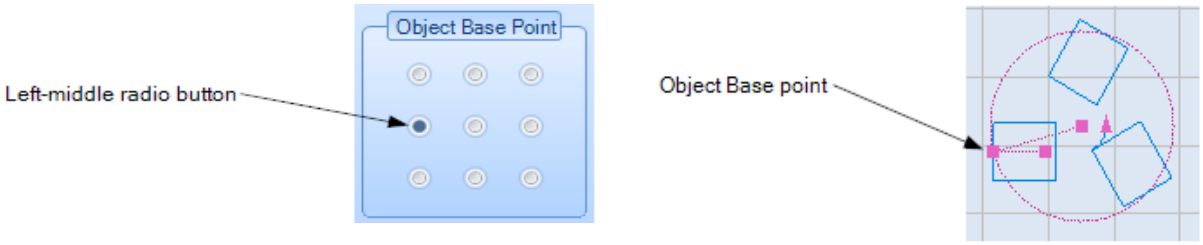


FIGURE 478: PLACING THE OBJECT BASE POINT AT THE LEFT-SIDE MIDPOINT OF THE ARRAY ELEMENT

The following figure shows array elements before and during rotation. In the following figure, the Object Base point (i.e., axis of rotation) is the left-side midpoint of the array element.

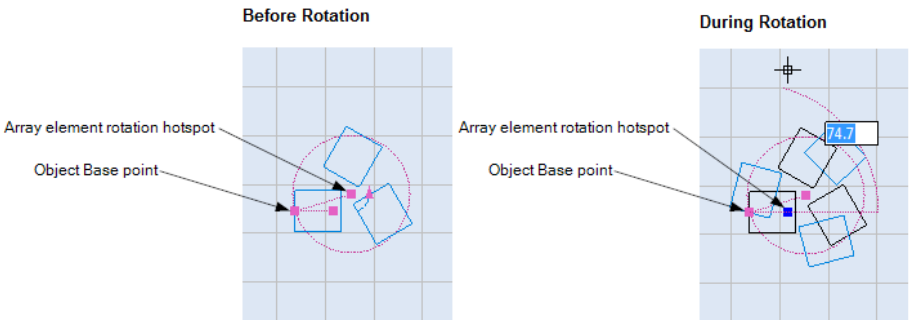


Figure 480 (below) shows the same array elements after the rotation is done. (For a full description of how to rotate array

elements, refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363.)

FIGURE 479: ROTATING ARRAY ELEMENTS AROUND THE LEFT-SIDE MIDPOINT

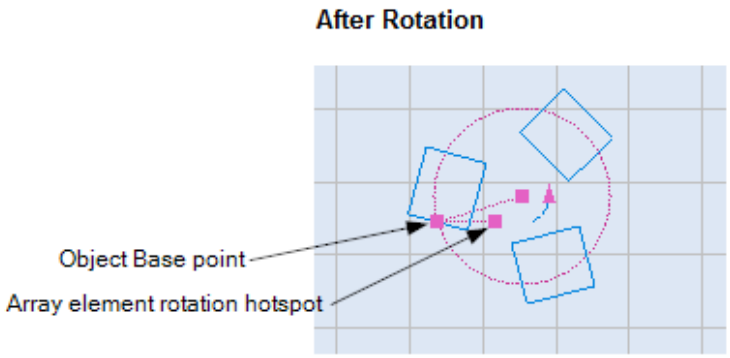


FIGURE 480: ARRAY ELEMENTS AFTER ROTATING AROUND THE LEFT-SIDE MIDPOINT

Changing the angle of rotation of the entire Polar Array

This subsection describes how to change the angle of rotation for an entire Polar Array. It is also possible to change the angle of rotation for the array elements. Refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363 to change the angle of rotation for array elements.

Note: Changing the angle of rotation of the entire Polar Array does not change the angle of rotation for the array elements.

Do the following to change the angle of rotation for the entire Polar Array by dragging the Arrow hotspot:

1. Select the Polar Array and left-click its Object Base point hotspot. As shown in the following figure, the Object Base point hotspot will turn blue.
2. Drag the mouse around the center point of the Polar Array. Changes to the angle of rotation for all of the array elements will be highlighted in blue.

3. When the angle of rotation is as desired, click the left mouse button. The following figure shows an example of how the angle of rotation of array elements can be changed by dragging the array element rotation hotspot.

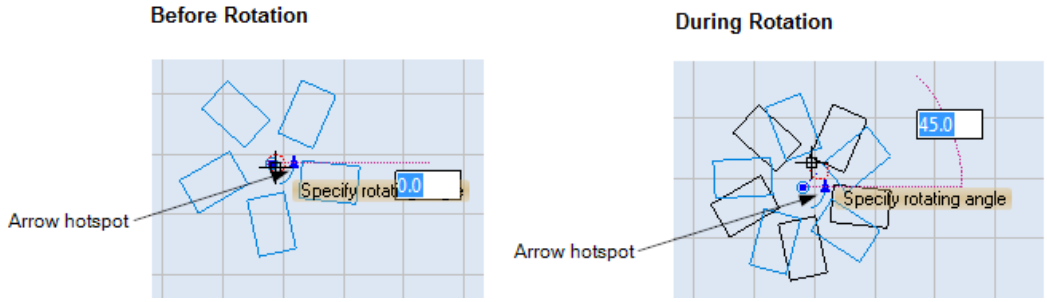


FIGURE 481: THE POLAR ARRAY BEFORE AND DURING ROTATION

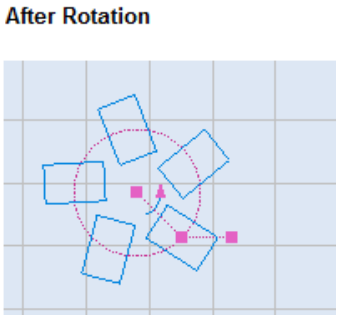


FIGURE 482: THE POLAR ARRAY AFTER ROTATION

Changing the radius of a Polar Array

Do the following to change the radius of a Polar Array by dragging the Object Base point hotspot:

4. Select the Polar Array and left-click its Object Base point hotspot. As shown in Figure 483 (below) the Object Base point hotspot will turn blue.
5. **Note:** The Object Base point hotspot can be at any of nine locations on an array element. In the following figure, the Object Base point hotspot is at the center of the array element. Refer to "Rotating array elements by dragging the array element rotation hotspot" on page 363 for other places where the Object Base point can be located.
6. Drag the mouse until the radius of the Polar Array is as desired. Changes to the radius of the Polar Array will be highlighted in blue, as shown in the following figure.
7. **Note:** Dragging the Object Base point hotspot may change the angle of rotation, as well as the radius, of the Polar Array. You can reset the angle of rotation of the Polar Array by typing a new value in the **Angle of rotation** field, which is shown in Figure 483 (below).

8. When the radius and angle of rotation of the Polar Array are as desired, click the left mouse button.

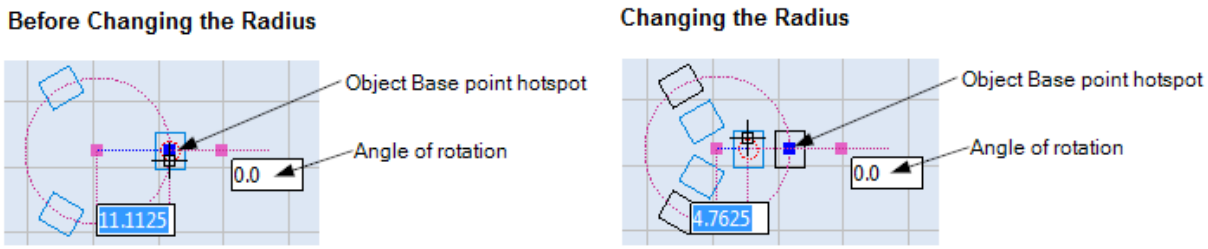


FIGURE 483: THE POLAR ARRAY BEFORE AND DURING THE CHANGING OF THE RADIUS

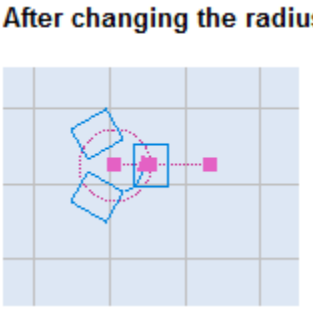


FIGURE 484: THE POLAR ARRAY AFTER THE RADIUS IS CHANGED

8.3 MODIFYING OPERATIONS

Tools | Modify panel allows you to modify objects in the Drawing Canvas. The following commands are available for modifying shapes:

0. Trim
1. Explode
2. Extend
3. Group
4. Divide
5. Fillet
6. Break
7. Chamfer
8. Join

8.3.1 Trim and extend shapes

Trim

Normal Mode

The **Normal Mode** in the **Trimming** feature is used to remove a selected part from a given drawing or parts by individual selection of the parts to be removed.

1. Select the boundary shape. You can select more than one shape by pressing the **Shift** key.

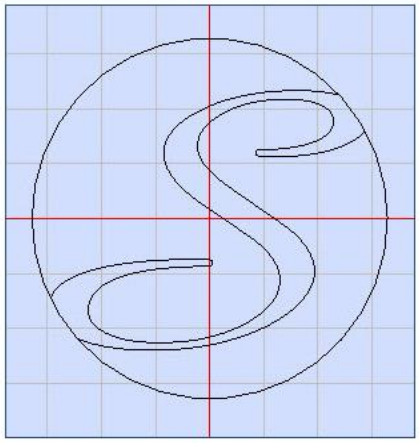


FIGURE 485: BEFORE TRIMMING

2. Click the **Trim** button on the **Tools | Modify** panel.
3. Select the section which needs to be removed.

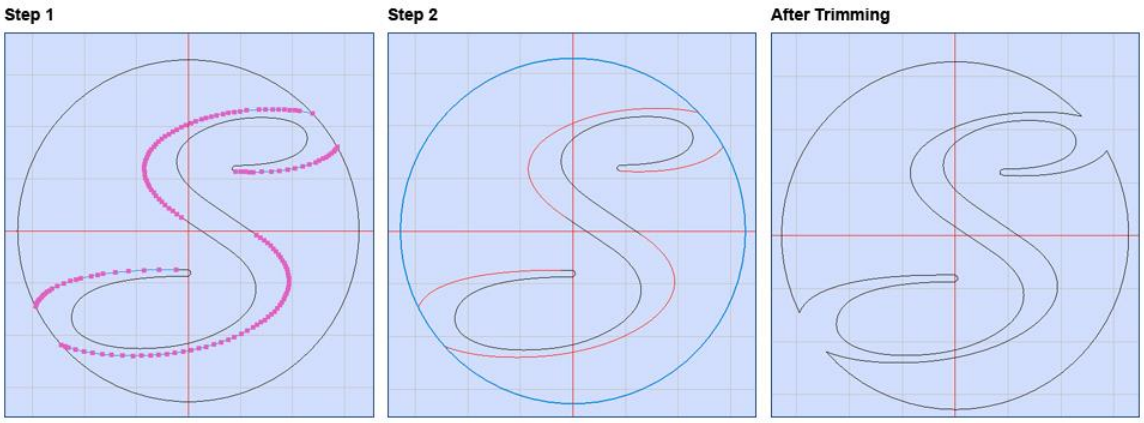


FIGURE 486: TRIMMING USING NORMAL MODE

Fence Mode

The **Fence Mode** in the **Trim** feature is used to trim multiple shapes using a multi-selection technique, as against specifying the shapes to be trimmed individually in **Normal Mode**.

1. Select the boundary shapes. You can select more than one shape by pressing the **Shift** key.
2. Click the **Trim** button on the **Tools | Modify** panel.
3. Right-click and select **Fence Mode** from the context menu.
4. Select the shapes that need to be removed by left clicking and drawing a line to touch the sections to be trimmed.
5. Press Enter to confirm trimming.

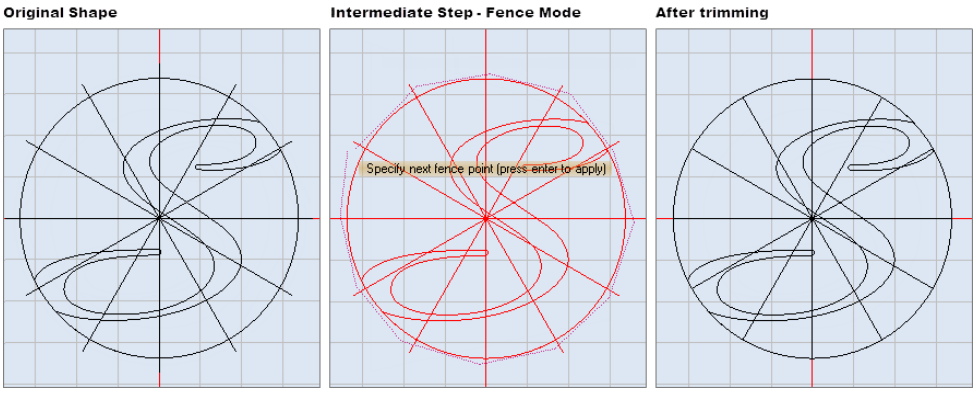


FIGURE 487: TRIMMING USING FENCE MODE

Extend

The Extend commands, allow you to extend a shape or a part of a shape to touch another entity in a drawing.

1. Select the boundary shape.
2. Click the Extend button on the **Tools | Modify** panel.
3. Select shape to extend.

Sample illustrations of how the **Extend** command works are shown below:

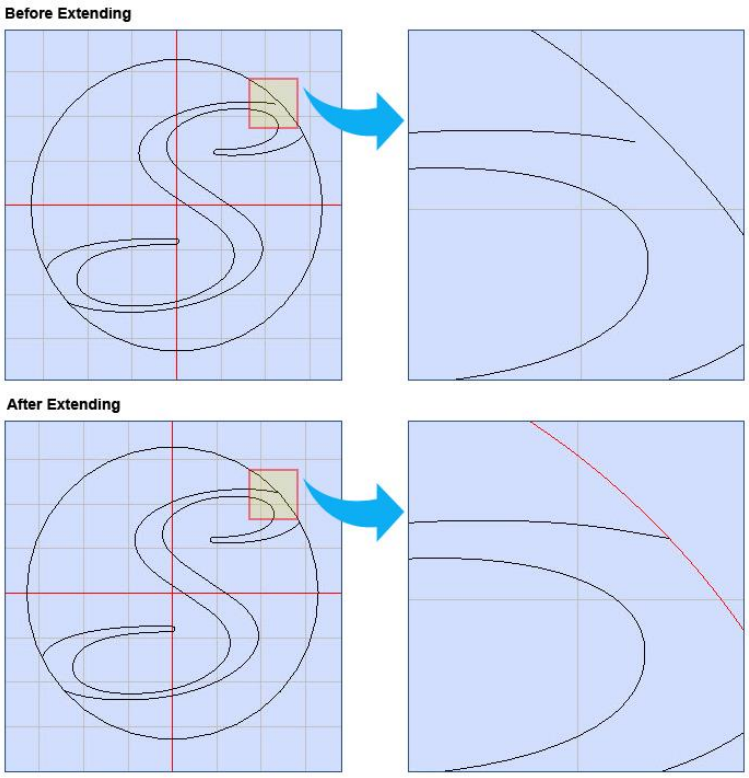


FIGURE 488: EXTEND

8.3.2 Join, break and divide

Join

This option allows you to join any shapes that have a gap in between them by using any of the following styles: **Extend** or **Trim, Shift One End** or **Insert Lines**.

Do the following to join two objects:

4. Select the shapes you wish to join.

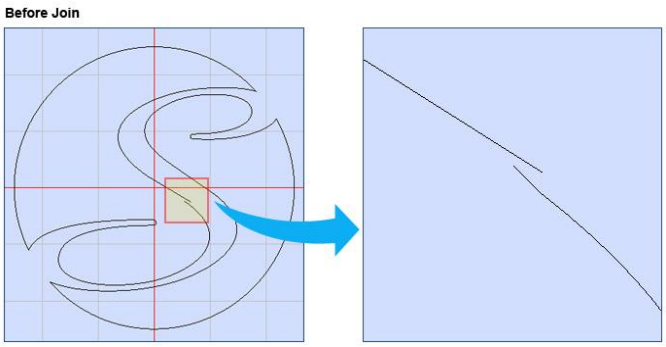


FIGURE 489: BEFORE JOINING

5. Left-click the **Join** icon on the **Tools | Modify** panel. The **Join** window will appear.

FIGURE 490: JOIN DIALOG

6. Specify the tolerance of the gap.
7. Select the method of connecting the shapes.
8. Click **OK**.

Note: Once shapes are joined, you can right click on that shape and select Open Polyline. This will remove the line which connects the start and end points.

The following illustrations depict how shapes are joined.

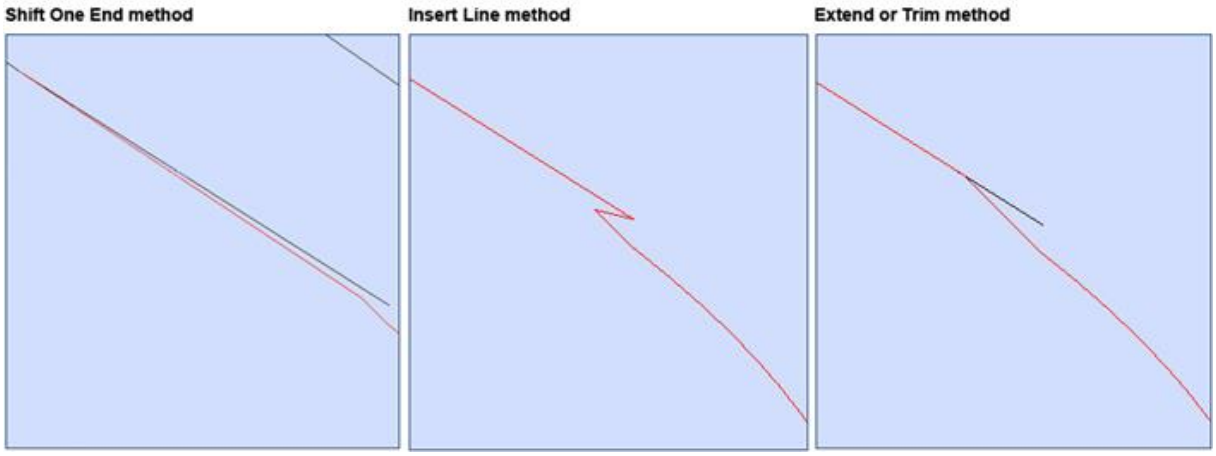


FIGURE 491: JOIN SAMPLES

Break

The **Break** command can be used to split a shape into two or multiple parts.

1. Select the shape you wish to split.
2. Select **Break** from the **Tools | Modify** panel.
3. Select the first break point by clicking somewhere on the shape. Next, select the second break point.

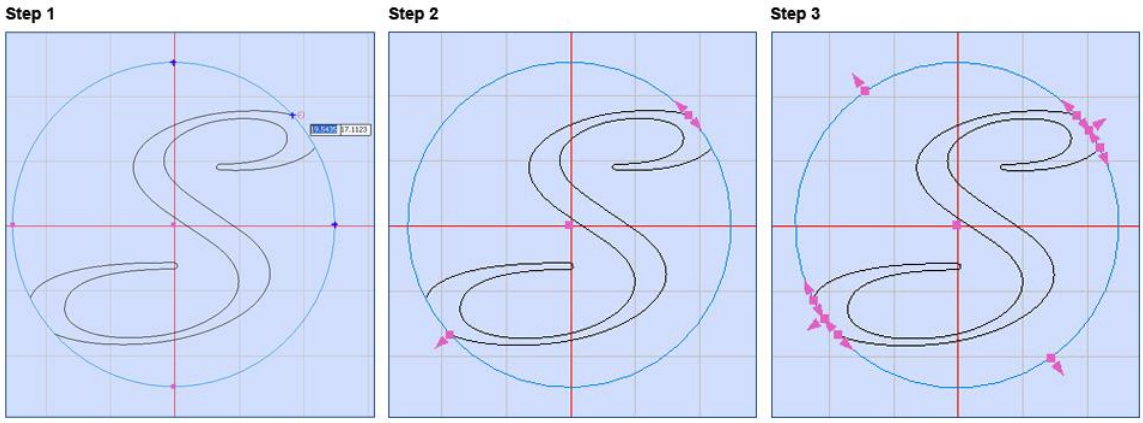


FIGURE 492: BREAK SAMPLES

4. Now you may remove or move the object in between the first and the second break points.

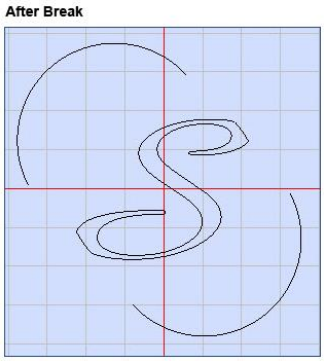


FIGURE 493: AFTER BREAK

Divide

This feature of ScanMaster Designer allows you to divide a particular entity into two or more separate entities.

1. Select the shape you wish to divide.

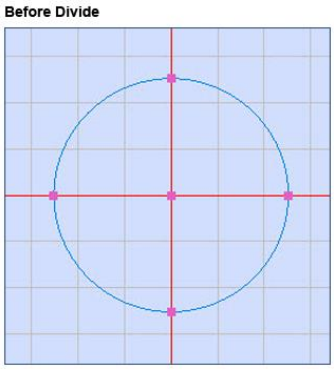


FIGURE 494: BEFORE DIVIDING

2. Select **Divide** from the **Tools | Modify** panel. The following window is opened.

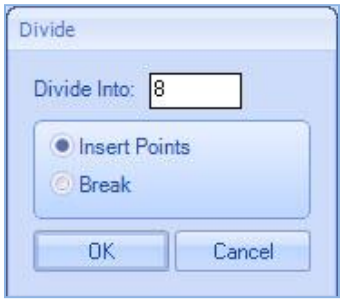


FIGURE 495: DIVIDE DIALOG

3. Enter the number of dividing points using the **Divide Into** field.
4. Select the appropriate action: **Insert Points** or **Break**.
5. Click the **OK** button.

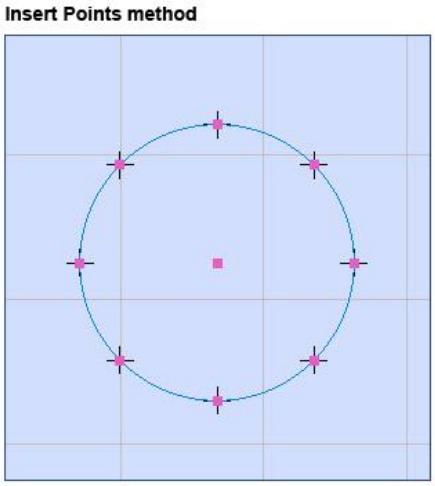


FIGURE 496: INSERT POINTS

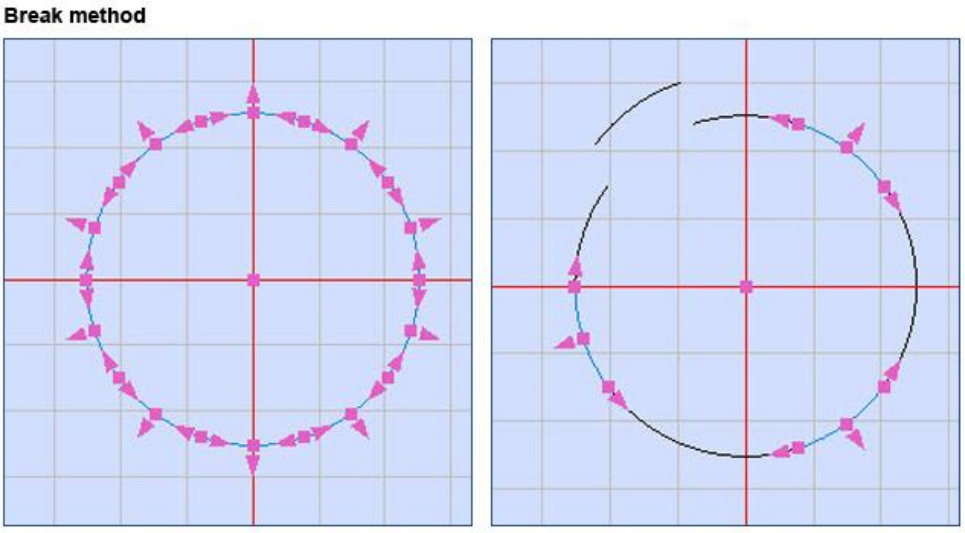


FIGURE 497: BREAK

8.3.3 Explode shapes

This option will break a shape in to its primitive form. It is highly useful for modifying an individual shape.

1. Select the shapes you want to Explode.
2. Click Explode from the Tools | Modify panel.

The shape will be exploded to its primitive shapes. For example, if you explode a rectangle, it will be broken down in to four separate lines.

Sample illustrations are as below:

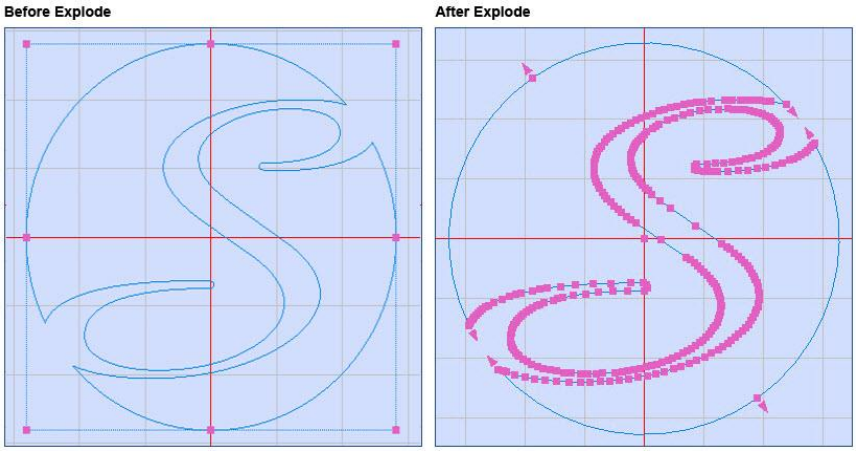


FIGURE 498: EXPLODE

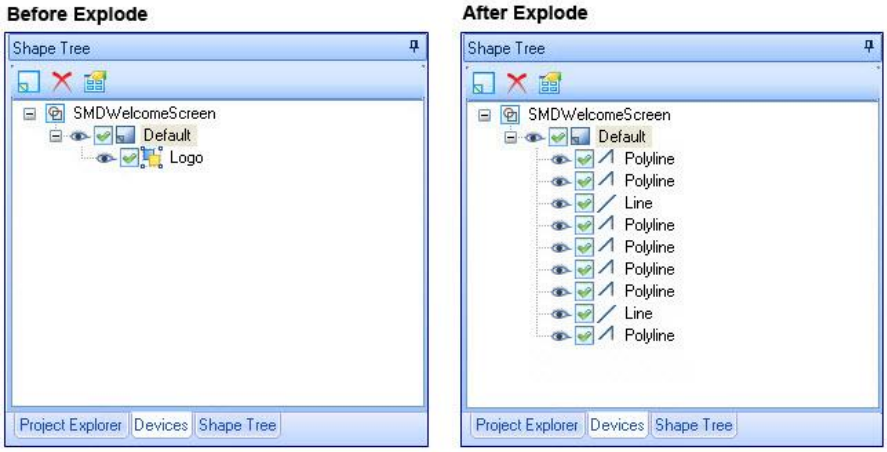


FIGURE 499: SHAPE TREE - BEFORE/AFTER EXPLODE

8.3.4 Group and ungroup Shapes

Group

You can manipulate multiple Shapes by grouping them into a single Shape.

Do the following to group multiple Shapes into a single Shape:

1. Select the Shapes that you want to group by doing one of the following:
   - Hold down the Shift key while left-clicking on the Shapes or
   - Hold down the left mouse button and drag the crosshairs over the Shapes.
2. Right-click on the selected shapes and select **Group** from the context menu, or click the **Group** icon on the **Tools | Modify** panel of the **Ribbon**.

The following figure shows an example of selected Shapes that are grouped into a single Shape.

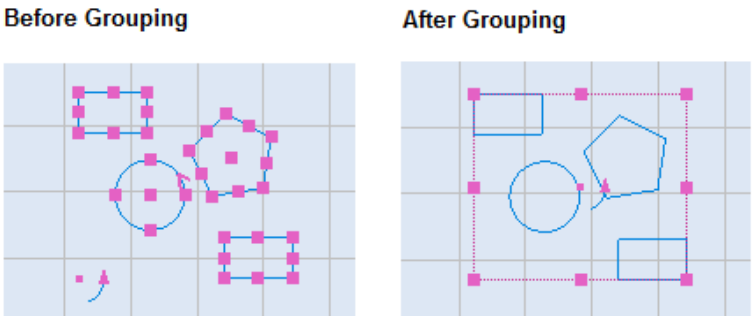


FIGURE 500: A GROUPING EXAMPLE

The following figure shows the **Shape Tree** for four Shapes (a circle, two rectangles, and a symmetric polygon) before and after grouping.

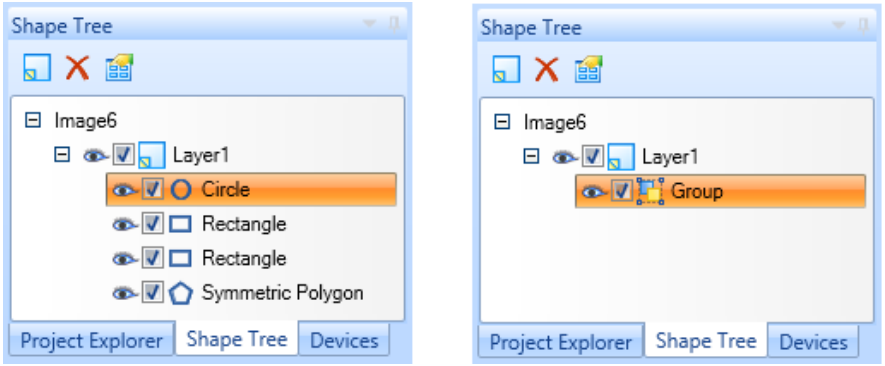


FIGURE 501: THE SHAPE TREE BEFORE AND AFTER GROUPING

Note: Grouping is disabled for all dynamic shapes and text.

Ungroup

A grouped Shape can be ungrouped so that it once again consists of individual Shapes.

Do the following to ungroup a Shape:

1. Select the Shape that you want to ungroup by left-clicking on it or by holding down the left mouse button and dragging the crosshairs over it.
2. Right-click on the selected shapes and select **Ungroup** from the context menu.

The following figure shows an example of a selected grouped Shape before and after it has been ungrouped.

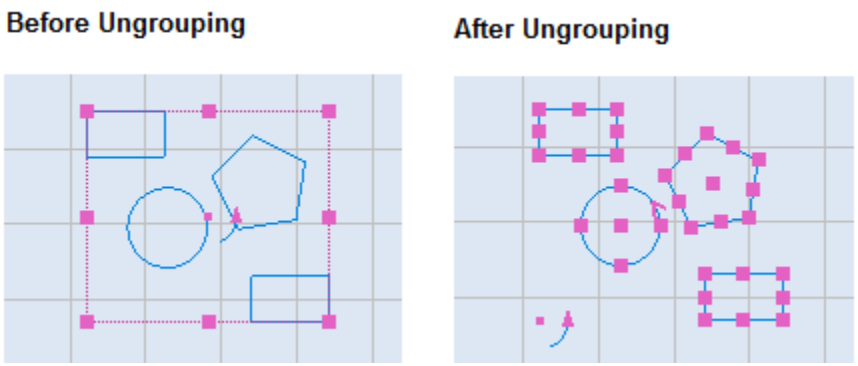


FIGURE 502: A GROUPING EXAMPLE

The following figure shows the **Shape Tree** for four Shapes (a circle, two rectangles, and a symmetric polygon) before and after ungrouping.

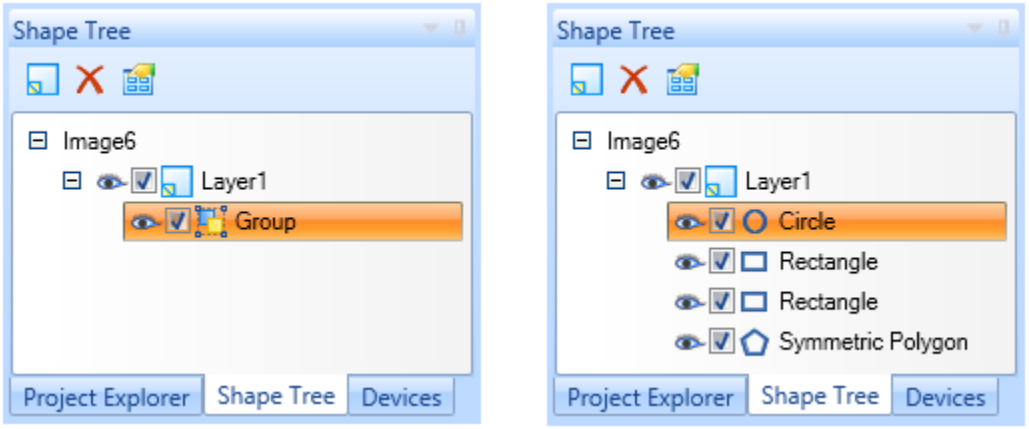


FIGURE 503: THE SHAPE TREE BEFORE AND AFTER UNGROUPING

8.3.5 Fillet or chamfer shapes

Fillet

A fillet connects two lines with an arc that is tangent and has a specified radius.

Do the following to connect two lines with a fillet:

1. Select the **Fillet** icon from the **Tools | Modify** panel of the **Ribbon**.
2. Left-click on the first line that you want to fillet. Then left-click on the second line that you want to fillet. The following figure shows two adjoining lines being left-clicked.

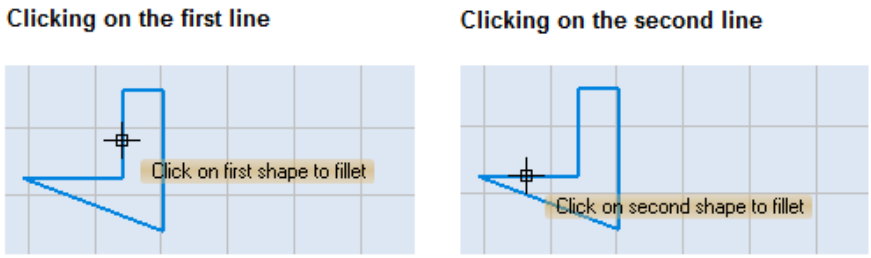


FIGURE 504: CLICKING ON THE LINES TO FILLET

3. Drag the mouse until the fillet radius is as desired. (The fillet radius is previewed as you drag the mouse.)

Note: As an alternative to dragging the mouse, you can type a value for the fillet radius in the parameter-entry box.

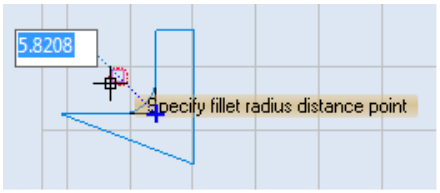


FIGURE 505: SPECIFYING THE FILLET RADIUS

4. When the fillet radius is as desired, click the left mouse button to insert the fillet.

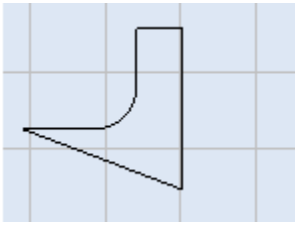


FIGURE 506: THE FINISHED FILLET

Note: If you set the fillet radius to 0, filleted objects are trimmed or extended until they intersect, but no arc is created. After filleting the original lines will be deleted. **Fillet cannot be applied to path shapes.**

Chamfer

A chamfer connects two lines to meet in a flattened or bevelled corner.

Do the following to connect two lines with a chamfer:

1. Select the **Chamfer** icon from the **Tools | Modify** panel of the **Ribbon**.
2. Left-click on the first line that you want to chamfer. Then left-click on the second line that you want to chamfer. The following figure shows two adjoining lines being left-clicked.

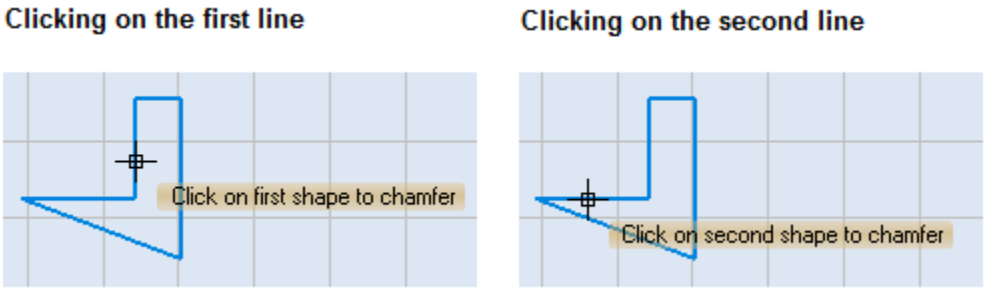


FIGURE 507: CLICKING ON THE LINES TO CHAMFER

3. Drag the mouse until the chamfer distance is as desired. (The chamfer distance is previewed as you drag the mouse.)

Note: As an alternative to dragging the mouse, you can type a value for the chamfer distance for each line in the applicable parameter-entry box.

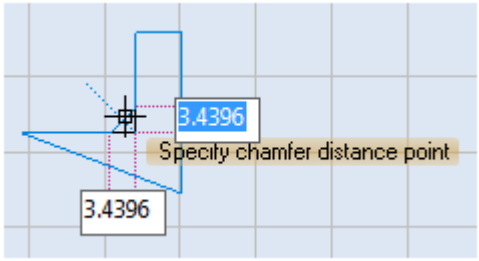


FIGURE 508: SPECIFYING THE CHAMFER DISTANCE

When the chamfer distance is as desired, click the left mouse button to insert the chamfer.

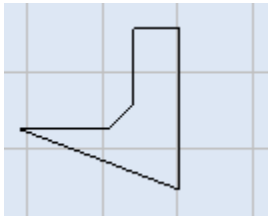


FIGURE 509: THE FINISHED CHAMFER

Note: After the **Chamfer** operation is performed, the original lines will be deleted. Chamfers cannot be applied to path shapes.

8.3.6 Bridging Shapes

A bridge creates a gap of a specified distance between two shapes.

1. Select the **Bridge** command from the **Tools | Modify** panel
2. Select the two shapes which the gap needs to be created in between
3. Specify the **Bridge Gap** for the two lines, in the editable field which appears on the canvas and press the Enter key or drag the crosshairs to the desired gap left click.

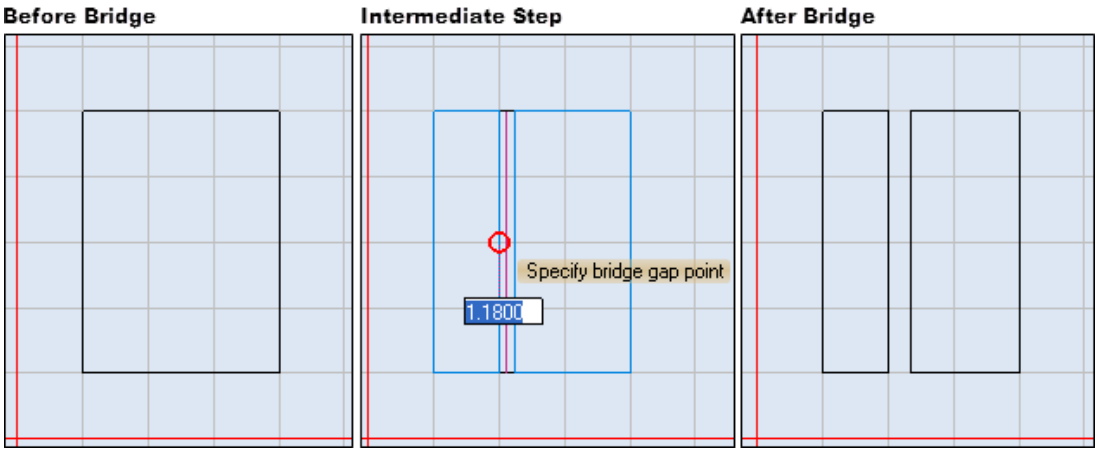


FIGURE 510: BRIDGE

8.4 OPTIMIZE OPERATIONS

The **Tools | Optimize** panel contains tools for showing laser jumps, changing the starting point and/or direction of marking, optimizing marking, and simplifying polylines.

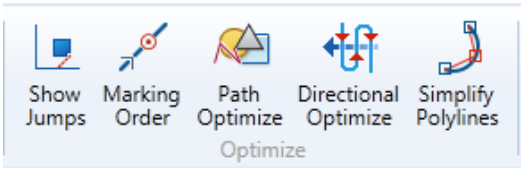


FIGURE 511: OPTIMIZE

Refer to the following sections to use the tools on the **Tools | Optimize** panel:

- "Show Jumps" (below)
- "Marking Order" on page 392
- "Path Optimize" on page 395
- “Directional Optimize” on page 394
- "Simplify Polylines" on page 365

8.4.1 Show Jumps

The **Show Jumps** command graphically represents the trajectory between shapes when the laser if off. It will map the beam movements starting from the origin (0,0) on the Drawing Canvas.

To toggle tracing the laser jumps, click **Show Jumps** on the **Tools | Optimize** panel of the **Ribbon**.

The following figure shows the laser jumps from the origin (0,0) on the Drawing Canvas to the text "ScanMaster Designer".

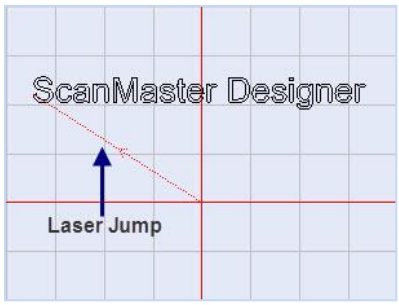


FIGURE 512: EXAMPLE OF THE SHOW JUMPS COMMAND

8.4.2 Marking Order

The **Marking Order** command will give a visual representation of the order in which a Shape will be marked.

Note: The **Marking Order** command is not applicable to text, logos, barcodes, images, or spirals.

Do the following to view the marking order of a Shape:

1. Select the Shape whose marking order you want to view.
2. Left-click the **Marking Order** icon on the **Tools | Optimize** panel of the **Ribbon**. The marking direction will be indicated by red arrows, and the starting point will be in a red circle.

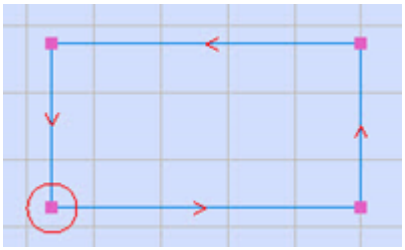


FIGURE 513: MARKING ORDER

Select the starting point of marking

DO THE FOLLOWING TO SELECT THE STARTING POINT FOR MARKING A SHAPE:

1. Select the Shape and left-click the **Marking Order** icon on the **Tools | Optimize** panel of the **Ribbon**.
2. Place the mouse cursor on one of the hotspots of the Shape and click the right mouse button. This displays the **Marking Order** context menu, as shown in the following figure.

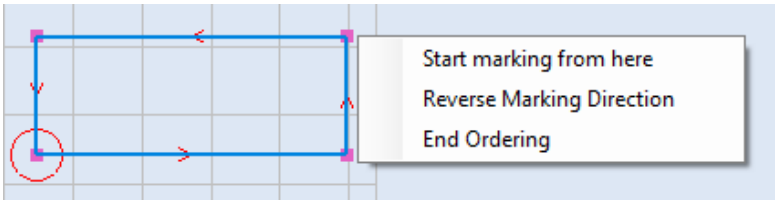


FIGURE 514: THE MARKING ORDER CONTEXT MENU

3. Select Start marking from here from the Marking Order context menu.
4. A red circle appears on the selected hotspot, indicating the new starting point of marking.

Note: This menu option (**Start marking from here**) will only be available for closed Shapes such as circles, rectangles, and polygons. It will be disabled for such Shapes as Arcs, open Bezier Paths, and open polylines.

Reverse the marking direction

Do the following to reverse the marking direction for a Shape:

1. Select the Shape and left-click the **Marking Order** icon on the **Tools | Optimize** panel of the **Ribbon**.
2. Right-click on the Shape to display the **Marking Order** context menu, as shown in the following figure.

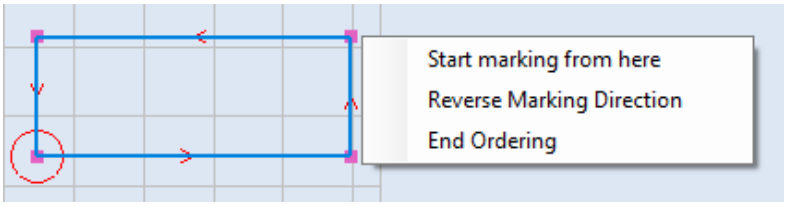


FIGURE 515: THE MARKING ORDER CONTEXT MENU

3. Select **Reverse Marking Direction** from the Marking Order context menu. This reverses the marking order for the Shape, as shown in the following figure. (Note that the arrowheads in the following figure are pointing in the opposite direction of the arrowheads in the above figure.)

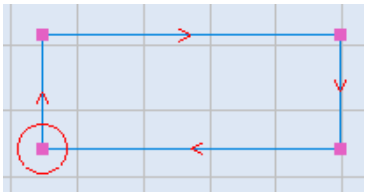


FIGURE 516: REVERSED MARKING DIRECTION

To end ordering

Do the following to turn off the display of the marking order:

1. Right-click on the Shape to display the **Marking Order** context menu, as shown in the following figure.

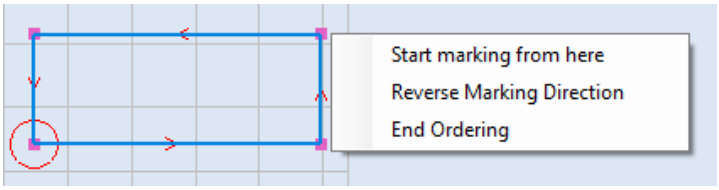


FIGURE 517: THE MARKING ORDER CONTEXT MENU

2. Select **End Ordering** from the Marking Order context menu. This removes the display of the marking order from the Shape.

8.4.3 Path Optimize

When multiple shapes are placed on the Drawing Canvas, you can use the **Path Optimize** tool to optimize their marking order. This reduces the cycle times, thereby reducing the number of vector moves performed by the scan head.

Do the following to optimize the marking order of shapes on the Drawing Canvas:

1. Toggle on the tracing of laser jumps.

   Note: Left-clicking the Show Jumps icon on the Tools | Optimize panel of the Ribbon to toggle on the tracing of laser jumps.

2. The tracing of laser jumps has been toggled on for the figure on the right.

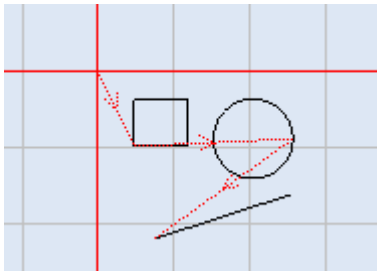


FIGURE 518: THE TRACING OF LASER JUMPS

3. Select the Shapes that you want to optimize.

4. Left-click the **Path Optimize** icon on the **Tools | Optimize** panel of the **Ribbon**. This displays the dialog box shown on the right.

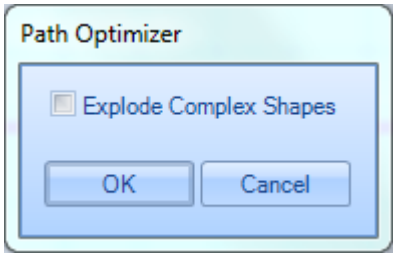


FIGURE 519: THE PATH OPTIMIZER DIALOG BOX

5. Left-click the **Explode Complex Shapes** check box if you want to explode complex Shapes in the optimized path. Refer to "Explode shapes" on page 384 for more information about exploded complex Shapes.

6. Click the **OK** button in the **Path Optimizer** dialog box. This executes path optimization for the selected Shapes.

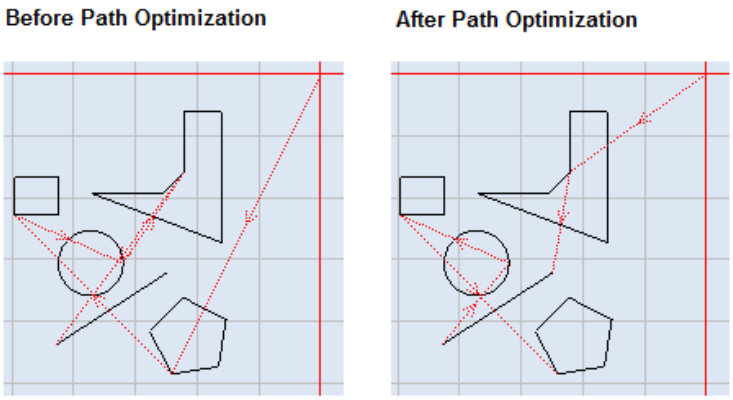


FIGURE 520: PATH OPTIMIZATION EXAMPLE

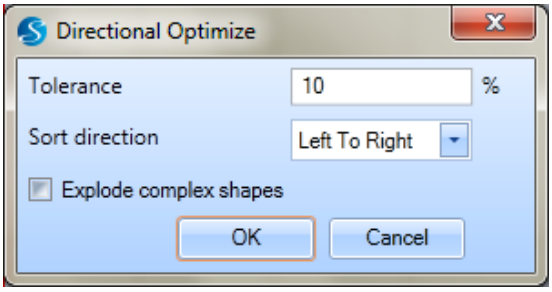
You can change the marking order of the shapes manually, by dragging and placing the shapes in the preferred order in the **Shape Tree** window. By using the **Show Jumps** option you can see the marking order and the vector jumps.

8.4.4 Directional Optimize

When multiple shapes are placed on the canvas and if you want to specify the marking direction (i.e. which shapes should be marked first) you can optimize the marking order by decreasing the number of vector moves performed by the scan head.

To optimize the marking order of shapes placed on the canvas with the given direction,

1. select the shapes you want to optimize
2. Click **Directional Optimize** on the **Tools|Optimize** . The **Directional Optimize** dialog will be displayed.



3. Set the value of **Tolerance**
4. **Sort direction** can be Left to Right, Right to Left, Top to Bottom or Bottom to Top.
5. **Explode complex shapes option** can be used to decrease the number of vector moves.
6. Click '**OK**'

The following figure presents an example.

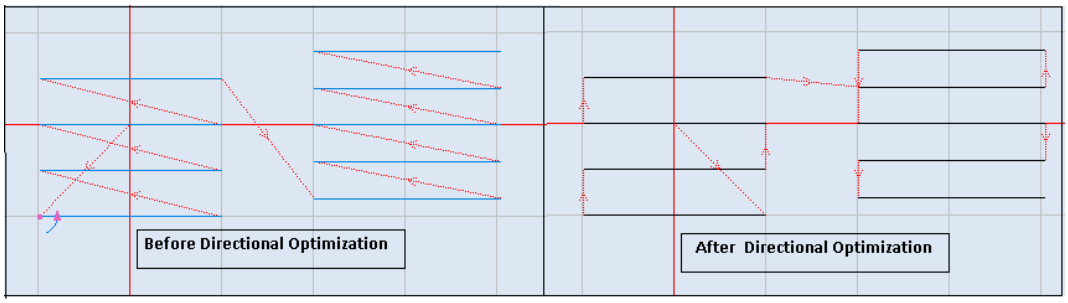


FIGURE 521: DIRECTIONAL OPTIMIZATION EXAMPLE

8.4.5 Simplify Polylines

Simplify Polyline will manipulate a curve's vertices to meet smoothness and/or other constraints of a specific design criteria. To get a quality output you need to add more vertices to a Polyline. You can add/remove point to a polyline, by following these steps:

1. Select the **Polyline** which requires simplify.
2. Click **Simplify Polyline** on **Tools | Optimize** panel. The **Simplify Polyline** window will be displayed.

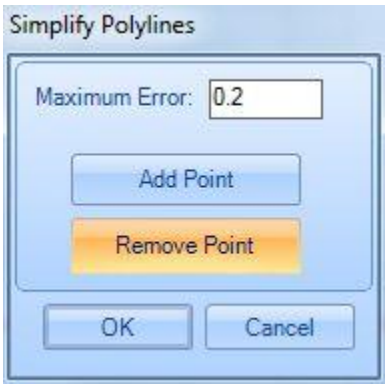


FIGURE 522: THE SIMPLIFY POLYLINES WINDOW

3. Specify the **Maximum Error**.
4. Click **Add Point**. The preview of the line, after adding smoothing is shown in a red line.
5. **Note:** If you wish to add the point which was removed previously, click **Add Point** and specify the required **Maximum Error**. You will not be able to add a smoothness, which was removed after you click **OK**.
6. Click the **OK** button.

Before and after images of simplified shapes are shown below.

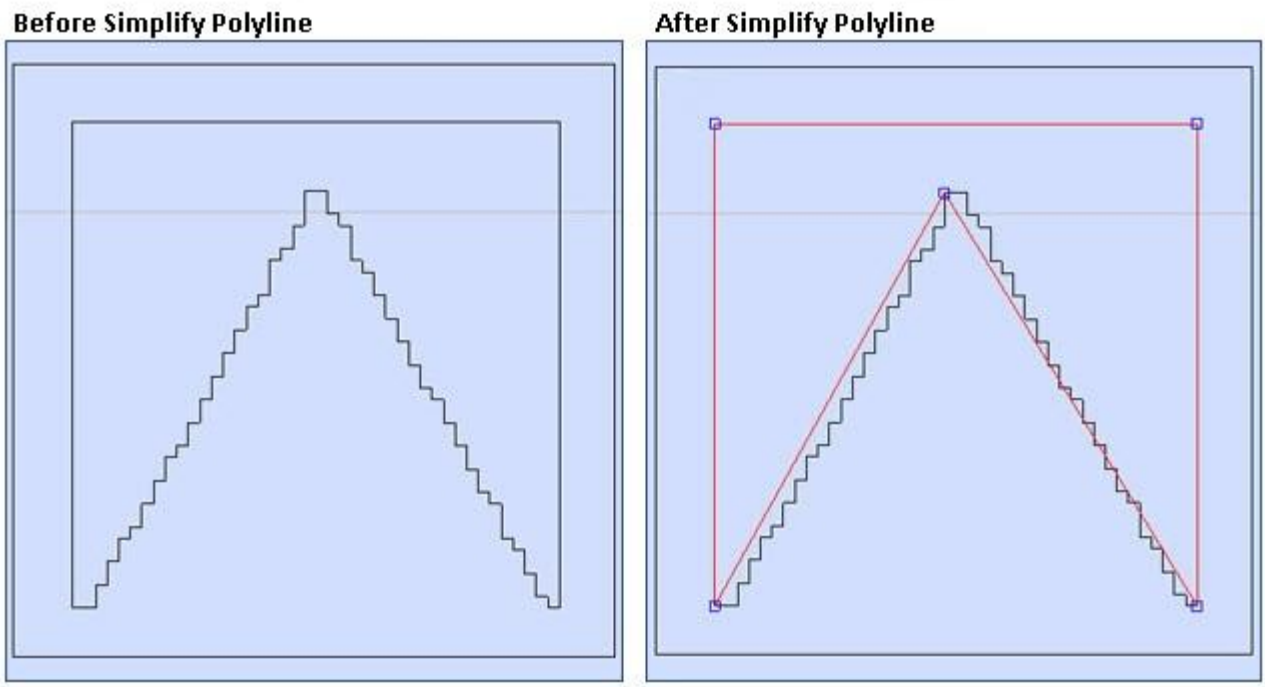


FIGURE 523: MANIPULATED POLYLINES

8.5 QUALITY OPERATIONS

The **Tools | Quality** panel contains tools for cutter compensation, removal of overlaps, and controlling the marking quality of curve Shapes.

FIGURE 524: THE QUALITY GROUP

- "Cutter Compensation" (below)
- "Remove Overlaps" on page 402
- "Marking Quality" on page 403

8.5.1 Cutter Compensation

Cutter compensation is the compensation of laser beam width, which can be useful in cutting applications. You can apply cutter compensation to a Shape with the Cutter Compensation tool.

Do the following to apply cutter compensation to a Shape or Shapes:

1. Select the shape(s) to which you want to apply cutter compensation.
2. Left-click the **Simplify Polyline** icon on **Tools | Quality** panel of the **Ribbon**. The **Cutter Compensation** dialog box will be displayed.

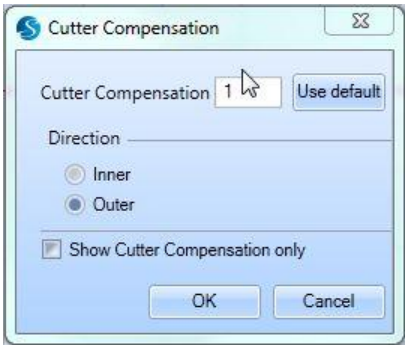


FIGURE 525: CUTTER COMPENSATION

3. Change the **Cutter Compensation** value to suit the width of the laser beam.

Note: You can set the default laser beam width as the cutter compensation value by clicking the **Use Default** button. The default laser beam width is specified in the **Beam width** field of the Laser Preference tab (**File | Preferences | Hardware | Laser**).

4. Left-click on one of the following radio buttons to specify the direction of cutter compensation for the selected Shape(s):
5. **Inner** – Cutter compensation will be applied inside the selected Shape(s).
6. **Outer** – Cutter compensation will be applied outside the selected Shape(s).
7. If you want to see only the cutter compensated result(s), rather than the cutter compensated result(s) and the original Shape(s), select the **Show Cutter Compensation only** check box.

Note: You can select each shape and change Cutter Compensation without quitting the operation. However, the changes will be applied only when you click **OK** button.

8. Click the **OK** button.

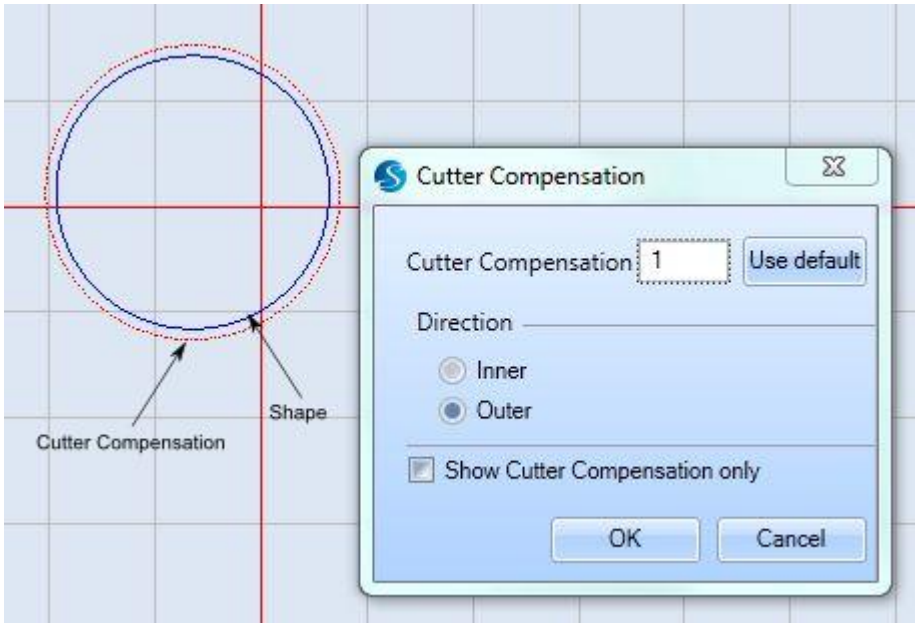


FIGURE 526: APPLYING CUTTER COMPENSATION

8.5.2 Remove Overlaps

Overlapping shapes can cause laser over-burning in sensitive materials. The **Remove Overlaps** command removes overlapping lines.

Do the following to remove overlapping areas in an image:

1. Select the Shape(s) that overlap.
2. Click **Remove Overlaps** on the **Tools | Quality** panel of the **Ribbon**. The **Remove Overlaps** dialog box is displayed.

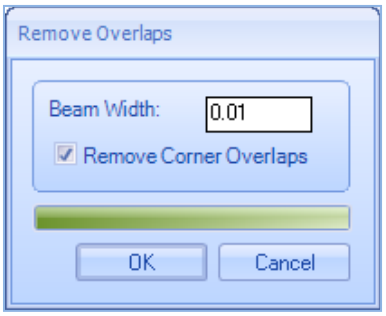


FIGURE 527: REMOVE OVERLAPS

3. Specify a value for the **Beam Width**.
4. The **Remove Corner Overlaps** check box (selected by default) causes the removal of corners that overlap in Shapes such as Rectangles, Polygons, Triangles, etc. You can deselect this check box if you do not want the corners removed from these Shapes.
5. Click the **OK** button.

The following figure contains examples of overlap removal.

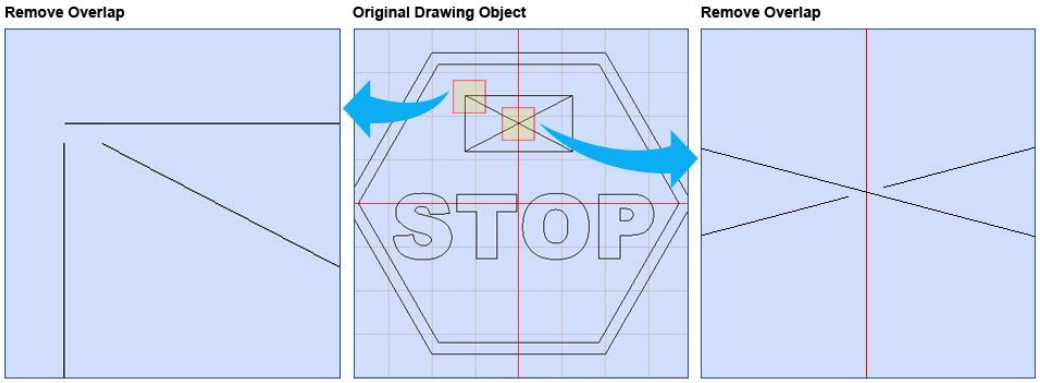


FIGURE 528: REMOVE OVERLAP SAMPLE

8.5.3 Marking Quality

The marking quality of curve Shapes (circles, ellipses and arcs) can be controlled by using the **Marking Quality** tool.

Do the following to control the marking quality of a curve Shape (or curve Shapes):

1. Select the Shape(s) whose marking quality you want to control.
2. Left-click the **Marking Quality** icon on the **Tools | Quality** panel of the **Ribbon**. The **Marking Quality** dialog box is displayed.

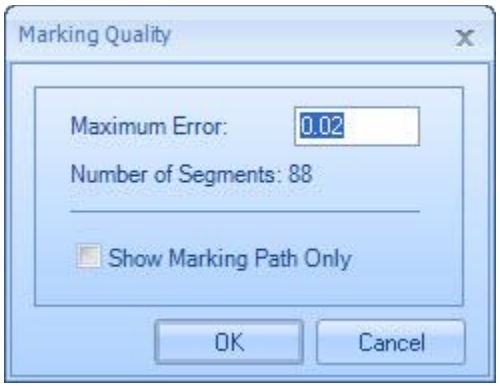


FIGURE 529: THE MARKING QUALITY DIALOG BOX

3. Change the **Maximum Error** value to suit the desired level of quality.
4. Select the **Show Marking Path Only** checkbox to hide the Shape outline(s) until you click the **OK** button in the next step.
5. Click the **OK** button.

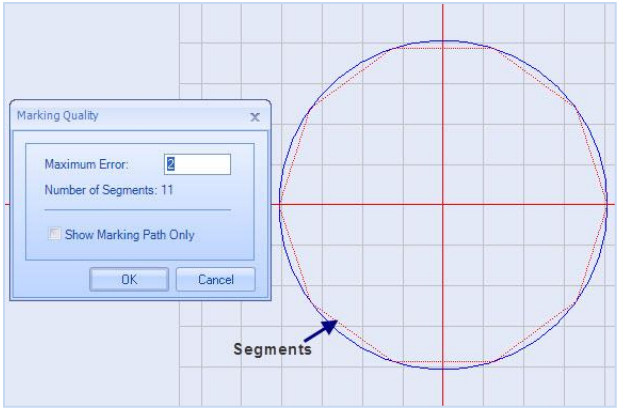


FIGURE 530: MARKING QUALITY EXAMPLE

8.5.4 Inserting Basic 3D Shapes

The ScanMaster™ Designer software comprises four basic 3D shapes including **Box**, **Cylinder Cone** and **Sphere**. You can access these shapes in the **Basic** panel of the **Modeling** tab. Each shape can be inserted on to the drawing canvas by specifying the relevant geometrical parameters.

9 PROCESS AUTOMATION

9.1 TILING

Tiling is a technique that can be used to mark objects that are larger than the laser marking area. This technique is also useful in marking objects that extend outside the focusing depth of the scanning system (i.e., marking on a cylindrical surface). In tiling, the workspace is split into cells based on specified cell population options. The dimensions of a cell should be within the boundary of the marking area. The cells are scanned individually by means of movement of the marking bed so that the collection of cells represents the original workspace.

The following sections describe how to initialize a tiling grid and how to modify tiling grid cells and tiling grid properties:

- "Initializing the Tiling Grid" (below)
- " Initializing a LinearCell Grid Type

9.1.1 Initializing the Tiling Grid

In order to use tiling, you must first initialize a tiling grid. The tiling grid provides guidelines for dividing the image into tiles.

Do the following to initialize a tiling grid:

1. Left-click the **Tiling** icon button located in the **Project | Automation** panel of the **Ribbon**. The following dialog box is displayed.

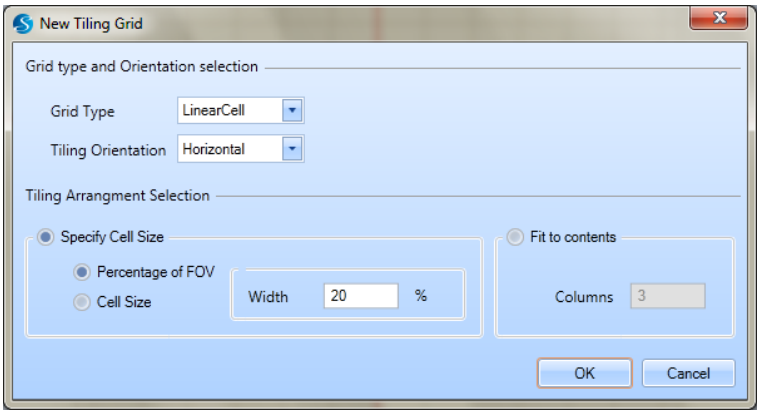


FIGURE 531: THE NEW TILING GRID DIALOG BOX

2. Select one of the following from the **Grid Type** dropdown list:

   - **LinearCell** – specifies that the image will be divided by a grid (the tiling grid) which consists of rectangular cells. The height or width of the cells can be changed (depending on the Tiling Orientation of the grid). However, the shape of the cells must be rectangular.
   - **RectangularCell** – specifies that the image will be divided by a grid (the tiling grid) which consists of rectangular cells. The height and width of the cells can be changed, but the shape of the cells must be rectangular.
   - **Mosaic** – specifies that the size, shape, and location of the tiling cells can be changed as required for marking optimization.

The following figure shows examples of linear, rectangular, and mosaic grid cells.

Note: Linear cells and rectangular cells are identical in appearance.

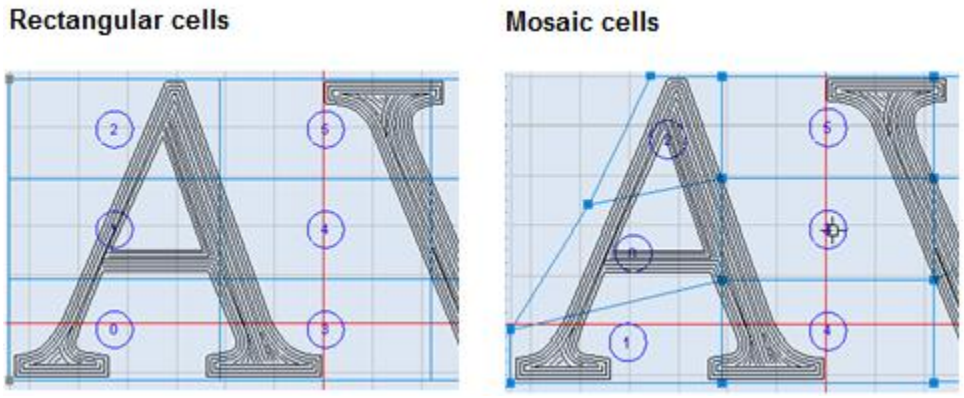


FIGURE 532: EXAMPLES OF RECTANGULAR CELLS AND MOSAIC CELLS

3. If the **Grid Type** is **LinearCell**, select one of the following from the **Tiling Orientation** dropdown list:

    - **Vertical** – specifies that the tiling will be done vertically as shown in the example on the left side of Figure 533 (below). (Note that the cells in the example are in vertical sequences.)
    - **Horizontal** – specifies that the tiling will be done horizontally as shown in the example on the right side of Figure 533 (below). (Note that the cells in the example are in horizontal sequences.)

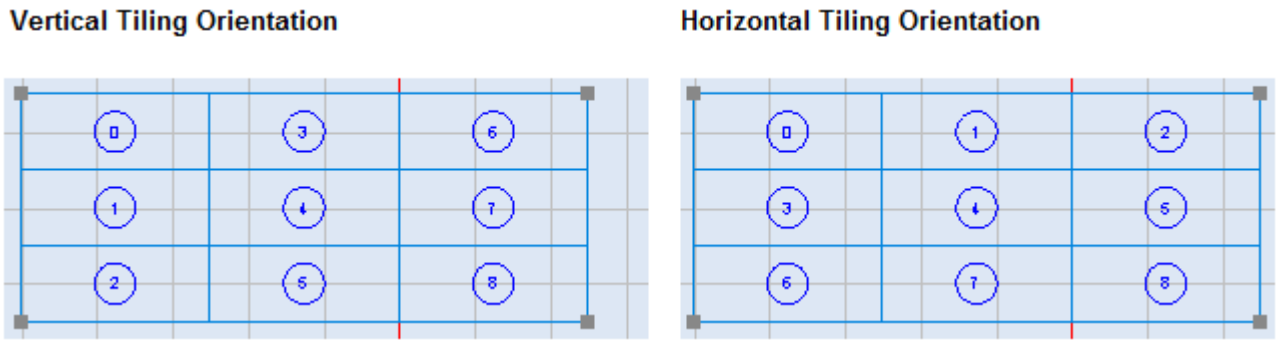


FIGURE 533: EXAMPLES OF THE VERTICAL AND HORIZONTAL TILING ORIENTATION

If you selected **LinearCell** from the **Grid Type** dropdown list, refer to "If you selected Mosaic or **RectangularCell** from the **Grid Type** dropdown list, refer to "**Error! Reference source not found.**" on page **Error! Bookmark not defined.**.

Initializing a LinearCell Grid Type" on page 407.

If you selected **Mosaic** or **RectangularCell** from the **Grid Type** dropdown list, refer to "**Error! Reference source not found.**" on page **Error! Bookmark not defined.**.

Initializing a LinearCell Grid Type

Do the following to complete the initialization of the grid if you selected **LinearCell** from the **Grid Type** dropdown list:

1. Left-click the **Specify Cell Size** radio button or the **Fit to contents** radio button in the **New Tiling Grid** dialog box. This selects the tiling population area.

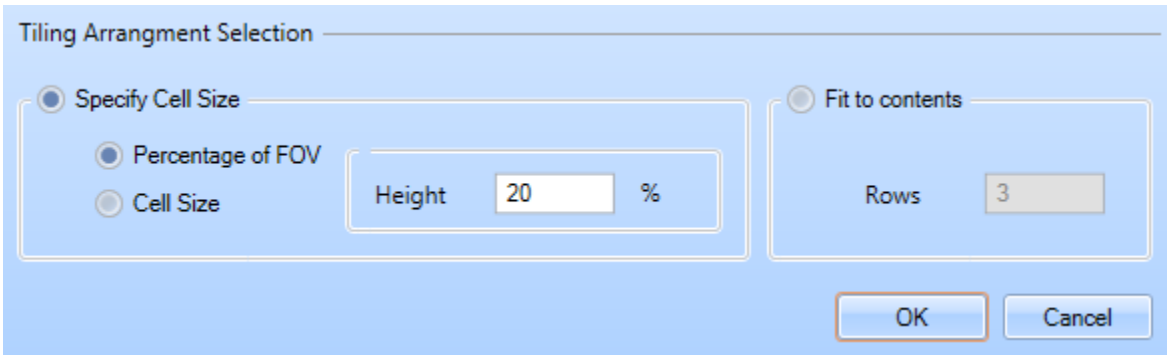


FIGURE 534: SPECIFY CELL SIZE OR FIT TO CONTENTS (LINEAR TILING ORIENTATION)

- **Specify Cell Size** – specifies that the grid will be created with cells of a specified size.
- **Fit to contents** – specifies that the grid will coincide with the bounding box of the image which is to be tiled.

2. If you selected **Specify Cell Size**, do the following:

   a. Left-click one of the following radio buttons:

- **Percentage of FOV** – specifies that the cell size will be a percentage of the Field of View (FOV).
- **Cell Size** – specifies that the cells will be of a specified size.

   b. Enter the cell height or width in the text entry field of the Specify Cell Size area.

Note: Whether you enter the height or width depends on the **Tiling Orientation**. If the **Tiling Orientation** is **Vertical**, you will enter the height. If the **Tiling Orientation** is **Horizontal**, you will enter the width. Also note that you will enter the height or width as a percentage if **Percentage of FOV** is selected and as an explicit value if **Cell Size** is selected.

3. If you selected **Fit to contents**, enter a value for **Rows** or **Columns** in the text entry field of the **Fit to contents** area.

4. **Note:** If the **Tiling Orientation** is **Vertical**, you will enter a value for **Rows**. If the **Tiling Orientation** is **Horizontal**, you will enter a value for **Columns**.

5. Left-click the **OK** button in the **New Tiling Grid** dialog box. This creates the tiling grid.

Initializing a Mosaic or RectangularCell Grid Type

Do the following to complete the initialization of the grid if you selected **Mosaic or RectangularCell** from the **Grid Type** dropdown list:

1. Left-click the Specify Cell Size radio button or the Fit to contents radio button in the New Tiling Grid dialog box. This selects the tiling population area.

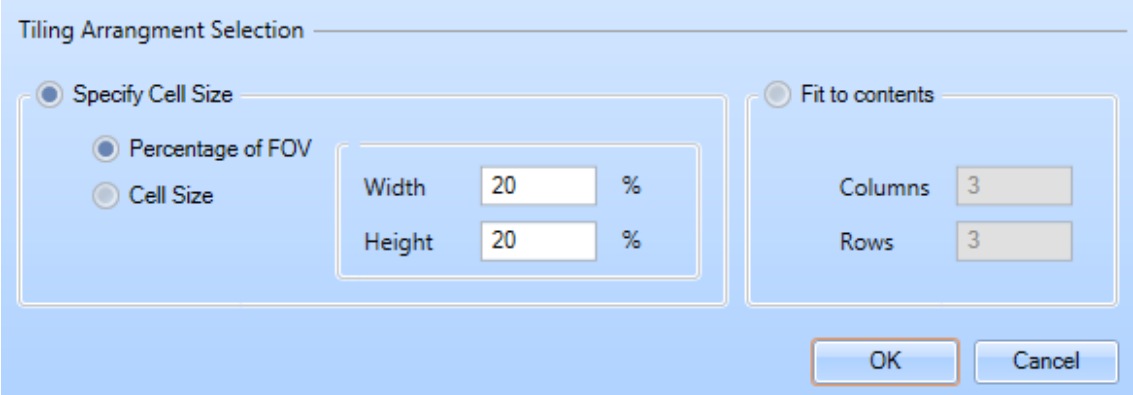


FIGURE 535: SPECIFY CELL SIZE OR FIT TO CONTENTS (RECTANGULAR OR MOSAIC TILING ORIENTATION)

- **Specify Cell Size** – specifies that the grid will be created with cells of a specified size.
- **Fit to contents** – specifies that the grid will coincide with the bounding box of the image which is to be tiled.

2. If you selected **Specify Cell Size**, do the following:

   a. Left-click one of the following radio buttons:

- Percentage of FOV – specifies that the cell size will be a percentage of the Field of View (FOV).
- Cell Size – specifies that the cells will be of a specified size.

   b. Enter the cell width and height in the appropriate fields of the Specify Cell Size area.

Note: You will enter the height and width as a percentage if **Percentage of FOV** is selected and as an explicit value if **Cell Size** is selected.

3. If you selected **Fit to contents**, enter a value for **Rows** or **Columns** in the text entry field of the **Fit to contents** area.

4. Left-click the **OK** button in the **New Tiling Grid** dialog box. This creates the tiling grid.

Note: The following figure contains the Drawing Canvas and the **Grid Properties** window.

Tiling Grid Properties

By default the **Grid Properties** window of the **Tiling View** tab appears on the left side of the Drawing Canvas when a tiling grid is displayed. For all tiling grids, the **Grid Properties** window contains settings that define the grid location, X-Y table offsets, and scan order.

For rectangular tiling grids, the **Grid Properties** window also contains the coordinates of all column and row borders in the grid, as shown in Figure 537 on page 412.

For linear tiling grids with a **Vertical** Tiling Orientation, the **Grid Properties** window also contains the coordinates of all row borders in the grid (see the example on the left side of the following figure).

For linear tiling grids with a **Horizontal** Tiling Orientation, the **Grid Properties** window also contains the coordinates of all column borders in the grid (see the example on the right side of the following figure).

Linear Grid Properties Window

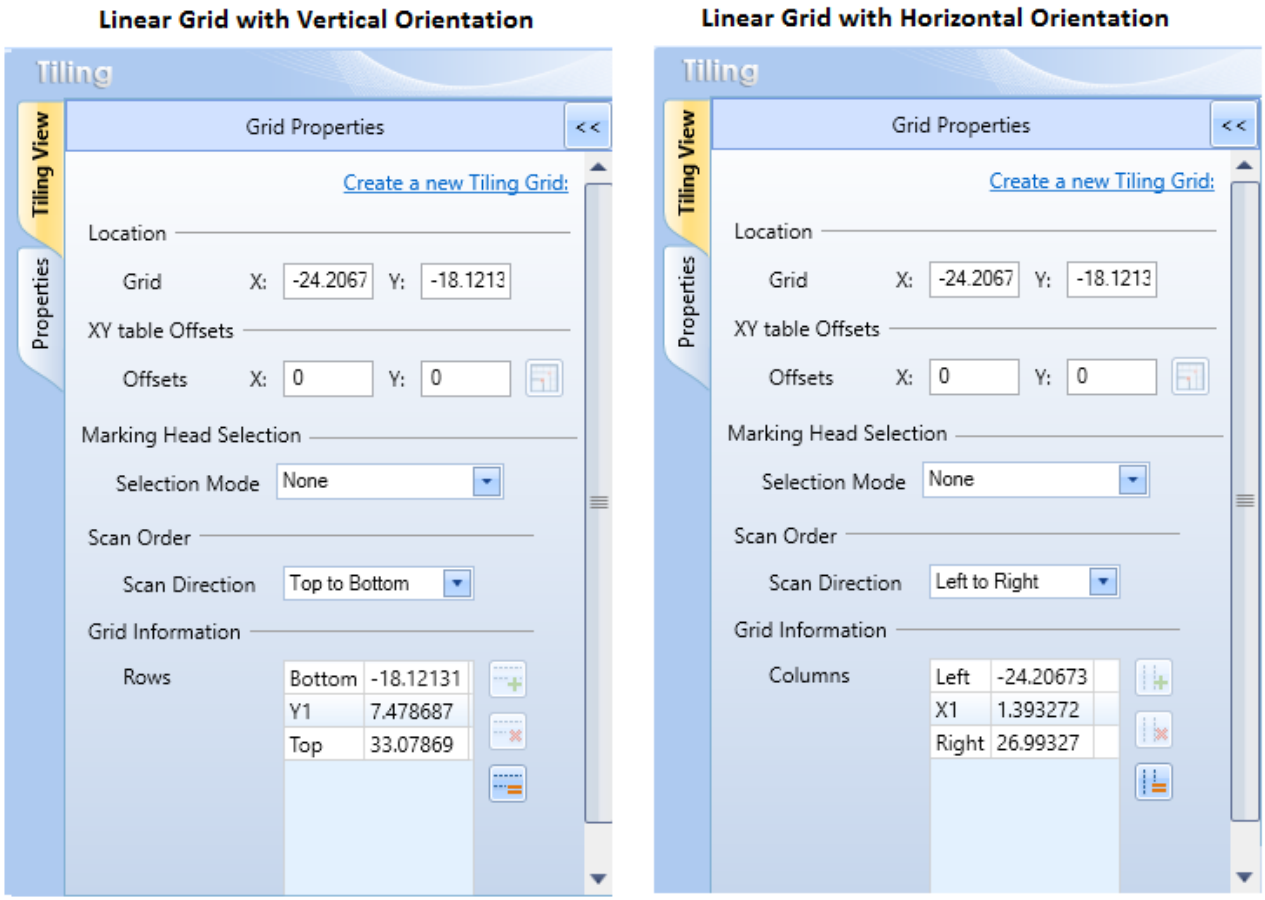


FIGURE 536: THE GRID PROPERTIES WINDOWS FOR LINEAR TILING GRIDS

Rectangular and Mosaic Grid Properties Window

Rectangular Grid Properties **Mosaic Grid Properties**

FIGURE 537: THE GRID PROPERTIES WINDOWS FOR RECTANGULAR AND MOSAIC TILING GRIDS

The **Properties** tab contains settings for the images, scripts, optimization level, and X-Y table of the tiling grid. Refer to "The Properties Tab" on page 437 for an illustration of the **Properties** tab and for more information on the settings that it contains.

You can toggle the display of the **Grid Properties** window and the **Properties** tab by left-clicking the **Tiling View** link and the **Properties** link.

The following sections describe the settings in the **Grid Properties** window (and how to change those settings).

Tiling grid location

The location of the tiling grid is shown as X and Y coordinates in the Location section of the Grid Properties window. These coordinates are for the lower-left corner of the tiling grid on the Drawing Canvas.

FIGURE 538: THE LOCATION COORDINATES OF THE TILING GRID

You can change the location of the tiling grid by entering new values in the above **X** and **Y** fields and pressing the Enter key.

Dragging a linear or rectangular tiling grid to a new location

You can do the following to drag a linear or rectangular tiling grid to a new location on the Drawing Canvas:

1. Place the crosshairs over one of the corner hotspots on the tiling grid to display the moving cursor .
2. Press and hold down the left mouse button and drag the tiling grid to a new location.

Dragging a mosaic tiling grid to a new location

You can do the following to drag a mosaic tiling grid to a new location on the Drawing Canvas:

1. Press and hold down the left mouse button over the centerpoint of the mosaic tiling grid. The moving cursor will be displayed.

Note: If a mosaic tiling grid has an even number of columns, its centerpoint will be a hotspot. If it has an odd number of columns, its centerpoint is marked by a crosshairs icon .

2. Drag the tiling grid to a new location.

X-Y table movement values

The **X-Y** table movement values are shown in the **XY table Offsets** section of the **Grid Properties** window.

You can click the **X-Y table Offsets** icon to populate the **X** and **Y** fields of this section with the current values for **X-Y** table positioning.

FIGURE 539: THE XY TABLE MOVEMENT VALUES

The scan order

The **Scan Order** section of the **Grid Properties** window contains the **Scan Direction** property for all tiling grids and the **Starting Cell** property for rectangular and mosaic tiling grids.

The **Starting Cell** property identifies the tiling cell from which scanning begins, and the **Scan Direction** property specifies the direction in which scanning proceeds.

Scan order settings for rectangular and mosaic grids

The following figure shows the **Scan Order** settings for rectangular and mosaic tiling grids.

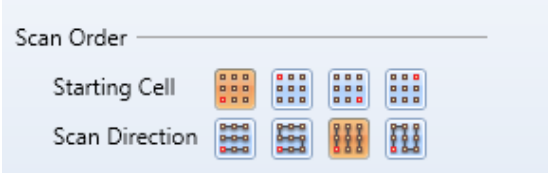


FIGURE 540: THE SCAN ORDER BUTTONS

Note: In the above figure, the default **Starting Cell** and the default **Scan Direction** are selected.

The Starting Cell property for rectangular and mosaic tiling grids

The **Starting Cell** buttons are displayed in the **Grid Properties** window for rectangular and mosaic tiling grids. You can select the Starting Cell option by left-clicking one of the **Starting Cell** buttons. The following figure shows the Starting Cell option for each button.

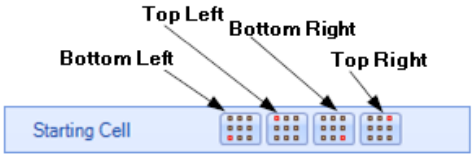


FIGURE 541: THE STARTING CELL BUTTONS

The following figure illustrates the four Starting Cell options. For each option, the Starting Cell is highlighted in **red**.

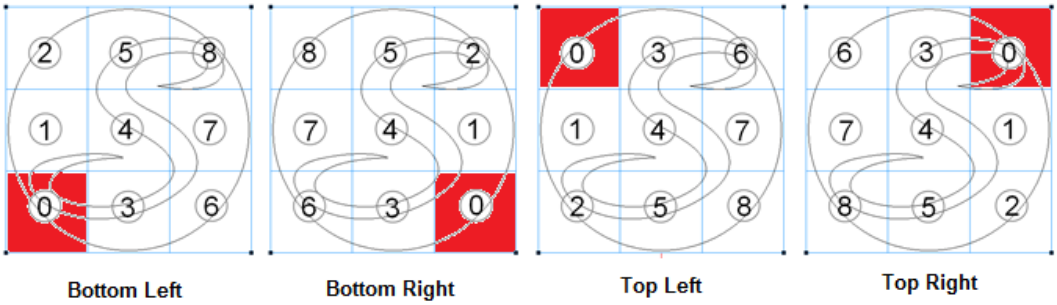


FIGURE 542: THE FOUR STARTING CELL OPTIONS

Note: The **Scan Direction** option for the above examples has been set to **Vertical**.

As an alternative to using the **Starting Cell** buttons, you can do the following to select the Starting Cell option from the context menu:

1. Right-click any cell in the tiling grid to display the top level of the context menu.
2. Select **Cell Scan>Starting from** and a Starting Cell option from the context menu.

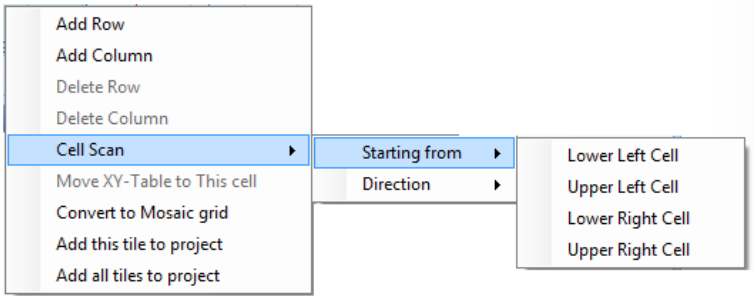


FIGURE 543: SELECTING A STARTING CELL OPTION FROM THE CONTEXT MENU

The Scan Direction option for rectangular and mosaic tiling grids

The Scan Direction buttons are displayed in the **Grid Properties** window for rectangular and mosaic tiling grids. You can select the Scan Direction option by left-clicking one of the **Scan Direction** buttons. The following figure shows the Scan Direction option for each button.

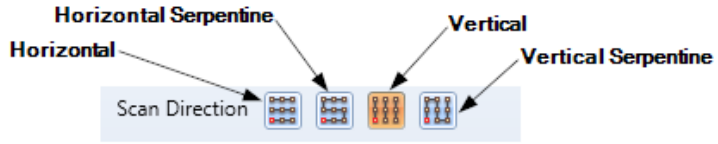


FIGURE 544: THE SCAN DIRECTION BUTTONS

The following figure illustrates the four Scan Direction options.

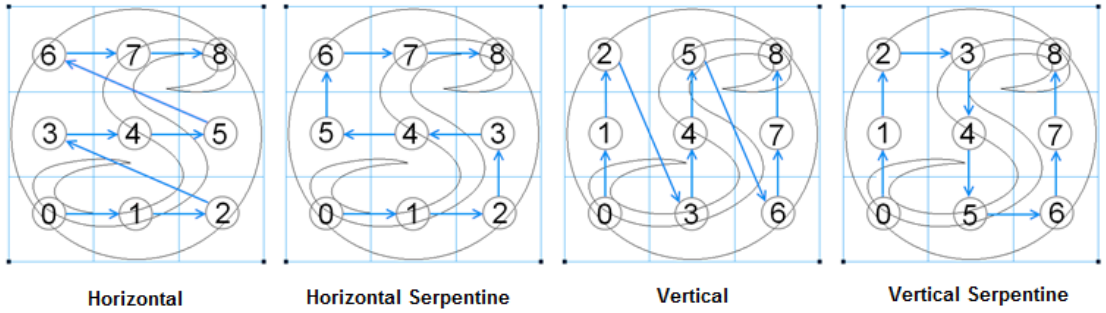


FIGURE 545: THE FOUR SCAN DIRECTION OPTIONS

Note: The **Starting Cell** option for the above examples has been set to **Bottom Left**.

As an alternative to using the **Scan Direction** buttons, you can do the following to select the Scan Direction option from the context menu:

1. Right-click any cell in the tiling grid to display the top level of the context menu.
2. Select **Cell Scan>Direction** and a Scan Direction option from the context menu.

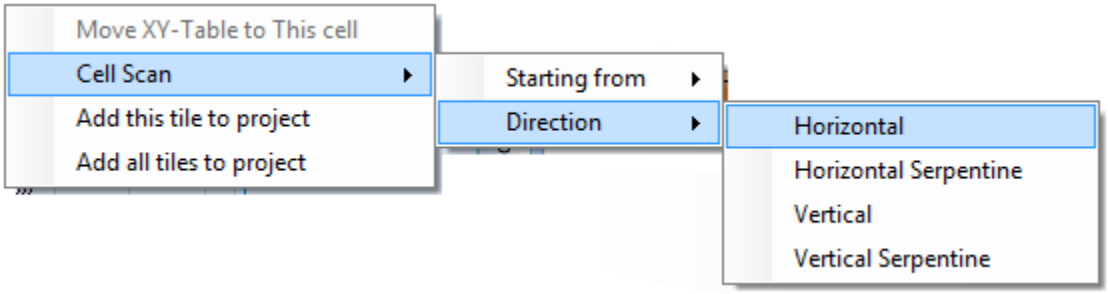


FIGURE 546: SELECTING A SCAN DIRECTION OPTION FROM THE CONTEXT MENU

The Scan Direction setting for linear tiling grids

The **Scan Direction** property is the only scan order setting that is available for linear tiling grids. This property is selected from the **Scan Direction** dropdown list, which is shown in the following figure.

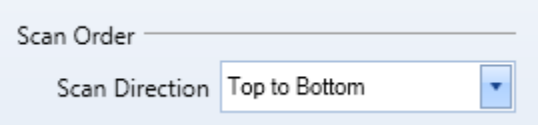


FIGURE 547: THE SCAN DIRECTION DROPDOWN LIST

The Scan Direction settings that can be selected depend on whether the **Tiling Orientation** of the selected grid is **Vertical** or **Horizontal**.

Scan Direction options for grids with a Vertical Tiling Orientation

The **Top to Bottom** option specifies that tiling will start at the top of the grid and proceed to the bottom of the grid as shown in Figure 549 (below). Tiling begins with the cell in the upper-left corner of the grid. As each column is completed, tiling will resume at the top of the next column.

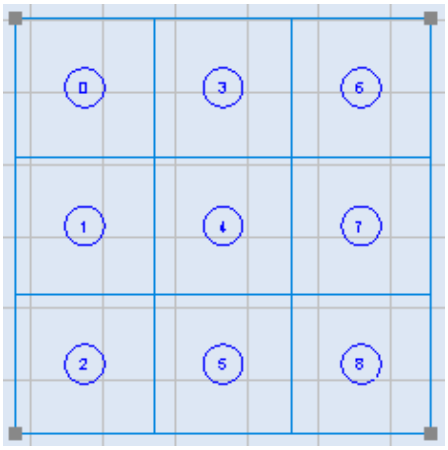


FIGURE 548: THE TOP TO BOTTOM SCAN DIRECTION OPTION

The **Bottom to Top** option specifies that tiling will start at the bottom of the grid and proceed to the top of the grid as shown on the right side of Figure 549 (below). Tiling begins with the cell in the lower-left corner of the grid. As each column is completed, tiling will resume at the bottom of the next column.

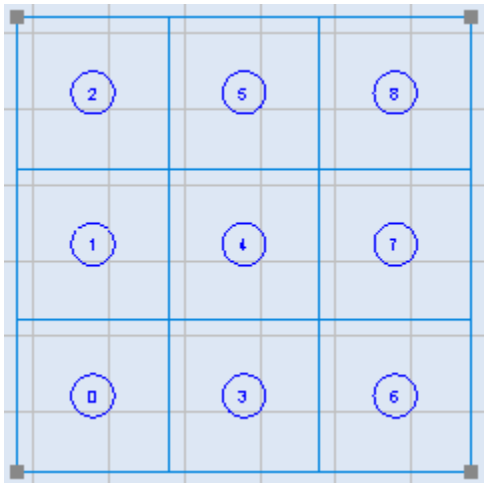


FIGURE 549: THE BOTTOM TO TOP SCAN DIRECTION OPTION

Scan Direction options for grids with a Horizontal Tiling Orientation

The **Left to Right** option specifies that tiling will start with the cell in the lower-left corner of the grid and proceed to the rightmost cell in the row as shown in Figure 550 (below). As each row is completed, tiling will resume with the leftmost cell in the next row.

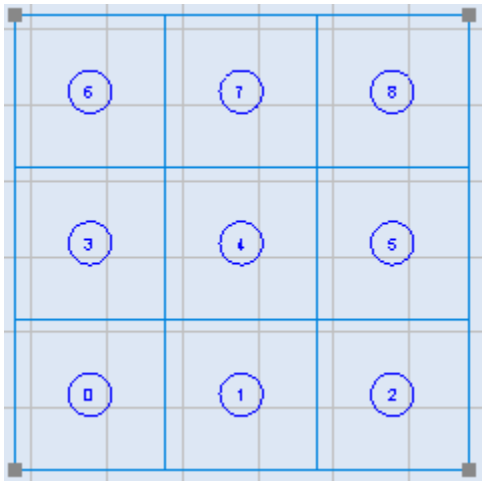


FIGURE 550: THE LEFT TO RIGHT SCAN DIRECTION OPTION

The **Right to Left** option specifies that tiling will start with the cell in the upper-right corner of the grid and proceed to the leftmost cell in the row as shown in Figure 551 (below). As each row is completed, tiling will resume with the rightmost cell in the next row.

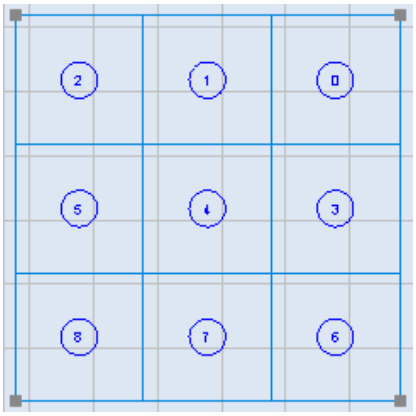


FIGURE 551: THE RIGHT TO LEFT SCAN DIRECTION OPTION

Grid Information

The **Grid Information** section displays only in the **Grid Properties** window of linear and rectangular tiling grids.

Grid Information for linear tiling grids

For linear tiling grids with a vertical tiling orientation, the **Grid Information** section shows the **Y**-axis coordinate of the bottom border of each tiling-grid row.

For linear tiling grids with a horizontal tiling orientation, the **Grid Information** section shows the **X**-axis coordinate of the left border of each tiling grid column.

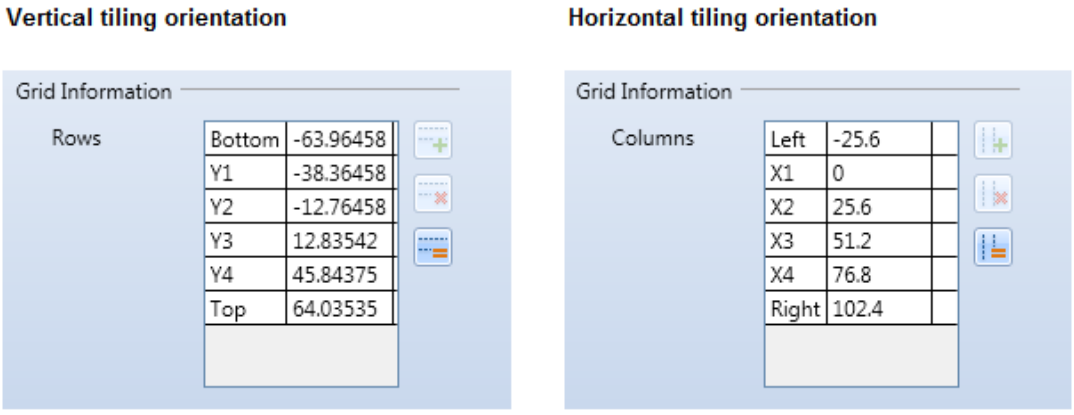


FIGURE 552: THE GRID INFORMATION SECTION FOR LINEAR TILING GRIDS

You can change these coordinates by entering new values in the **Column** and **Row** fields. In addition, the **Grid Information** section contains tools for adding and deleting columns and rows and for making column widths and row heights equal.

Grid Information for rectangular tiling grids

The **Grid Information** section for a rectangular tiling grid includes **Columns** fields and **Rows** fields. Each field in the **Columns** area contains the X-axis coordinate of the left border of each tiling grid column.
Each field in the **Rows** area contains the Y-axis coordinate of the bottom border of each tiling-grid row.

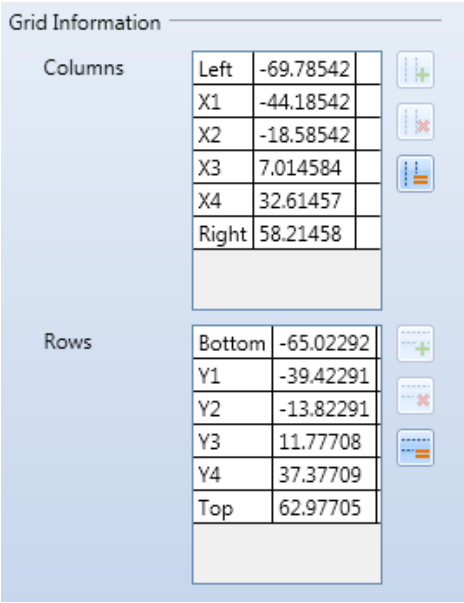


FIGURE 553: THE GRID INFORMATION SECTION FOR RECTANGULAR TILING GRIDS

Resizing columns and rows in rectangular and linear tiling grids

Both columns and rows can be resized in a rectangular tiling grid. One or the other (columns or rows) can be resized in a linear tiling grid. If a linear tiling grid has a horizontal tiling orientation, its columns can be resized. If a linear tiling grid has a vertical tiling orientation, its rows can be resized.

Resizing columns or rows by entering Column or Row coordinates

The following section describes how to resize columns and rows by entering values in the

Do the following to resize a column or row by entering a coordinate:

1. Enter a new coordinate value for the column or row border in the appropriate field of the **Grid Information** section.

2. Press the **Enter** key. The column or row is resized with the specified border at the X- or Y-coordinate location that you entered in the previous step.

The following figure shows the effect of resizing a row by entering a new value (-15.0000) as the Y-axis coordinate of the top border of a rectangular tiling grid.

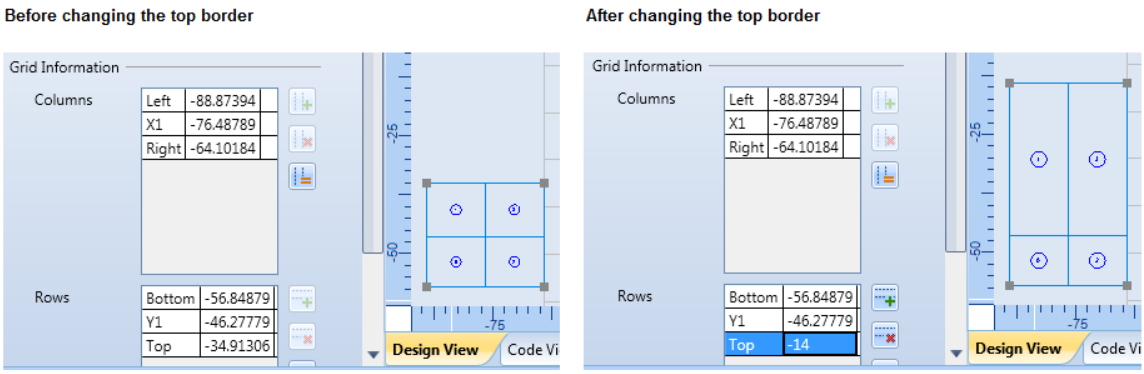


FIGURE 554: EXAMPLE OF RESIZING COLUMNS AND ROWS

Resizing columns or rows by selecting and dragging a cell border

Do the following to resize a column or row by selecting and dragging a cell border:

1. Place the crosshairs over a row or column border to display the double-arrowhead cursor, as shown in the following figure.
2. Hold down the left mouse button and drag the mouse to a new location.

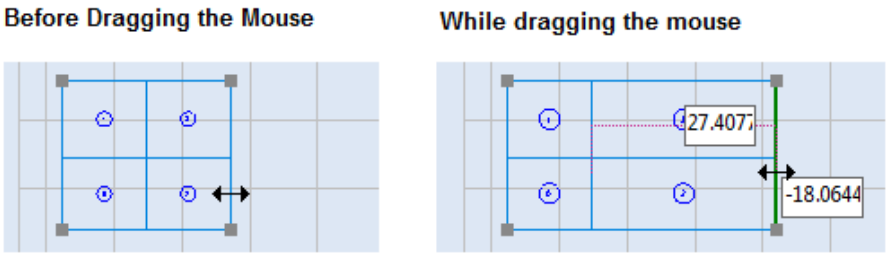


FIGURE 555: DRAGGING A CELL BORDER

3. When the column or row is at its desired size, release the left mouse button.

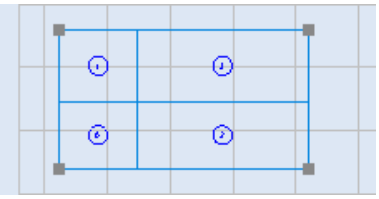


FIGURE 556: THE RESIZED CELL

Adding and deleting columns

You can use the **Add Column** button to add a column to the tiling grid and the **Delete Column** button to delete a column from the tiling grid.

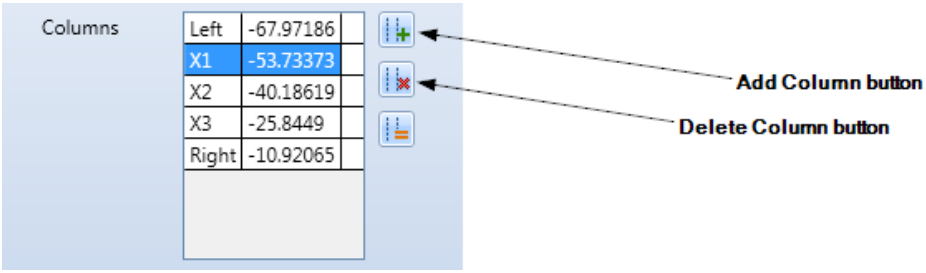


FIGURE 557: THE ADD COLUMN BUTTON AND THE DELETE COLUMN BUTTON

Adding a column

Do the following to add a column to a tiling grid:

1. Select the column position where the new column will be added by left-clicking in one of the Columns fields of the Grid Information section. In the following example, the leftmost column position is selected.

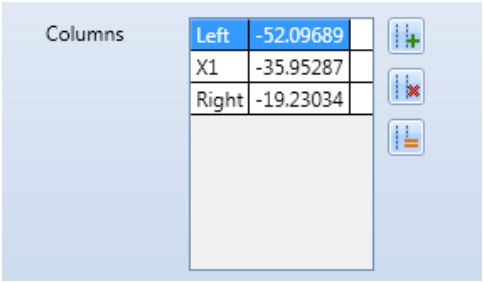


FIGURE 558: THE SELECTED COLUMN POSITION

2. Left-click the **Add Column** button to add a column at the selected column position. The new column is half the width of the column that you selected in the previous step. (The selected column is effectively split in half to create the new column.)

The following tiling grid shows the effect of adding a column at the column position selected in the above figure.

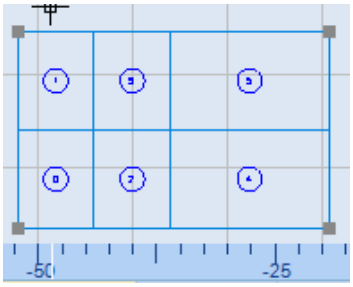


FIGURE 559: THE ADDED COLUMN

As an alternative to using the **Add Column** button, you can use the context menu to add a column to the tiling grid.

Do the following to use the context menu to add a column to the tiling grid:

1. Right-click on a column in the tiling grid. This displays the tiling grid context menu.

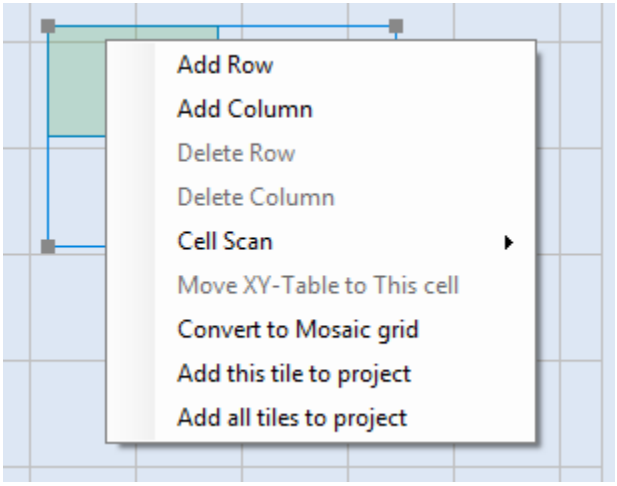


FIGURE 560: THE TILING GRID CONTEXT MENU

2. Select **Add Column** from the tiling grid context menu. This adds a new column at column position you right-clicked in the previous step.

Deleting a column

Do the following to delete a column from a tiling grid:

1. Select the column that you want to delete by left-clicking in the appropriate Columns field of the Grid Information section. In the example on the right, the leftmost column is selected.

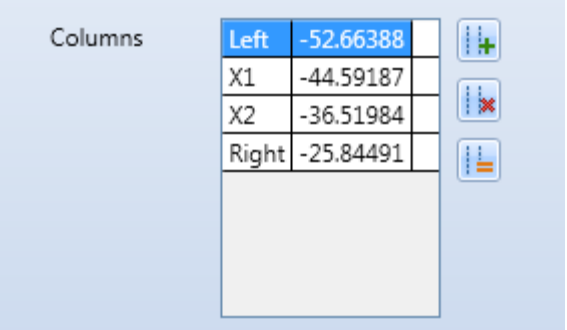


FIGURE 561: THE SELECTED COLUMN

2. Left-click the **Remove Column** button to delete the selected column. The following tiling grid shows the effect of deleting the column selected in the above figure; the column at X-axis position -52.66388 has been deleted.

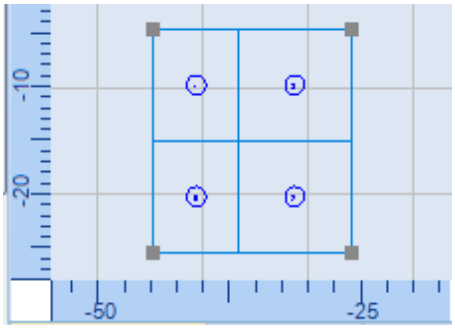


FIGURE 562: AFTER DELETING THE COLUMN

As an alternative to using the **Remove Column** button, you can use the context menu to delete a column from the tiling grid.

Do the following to use the context menu to delete a column from the tiling grid:

1. Right-click on a column that you want to delete. This displays the tiling grid context menu.

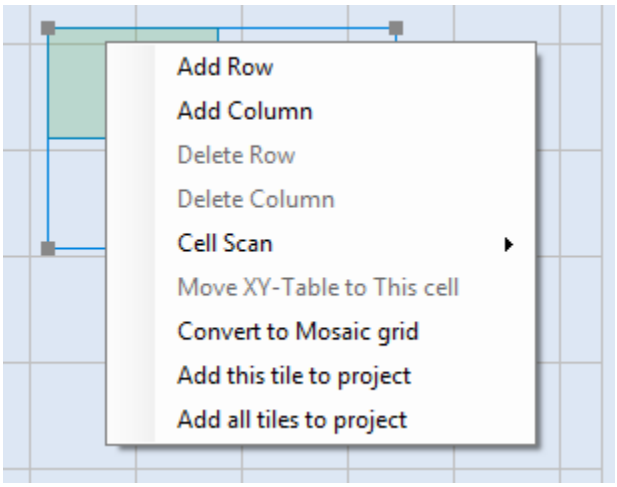


FIGURE 563: THE TILING GRID CONTEXT MENU

2. Select **Delete Column** from the tiling grid context menu. This deletes the column that you right-clicked in the previous step.

Making column widths equal

You can use the Distribute Columns Equally button in to make all of the columns in a tiling grid have an equal width.

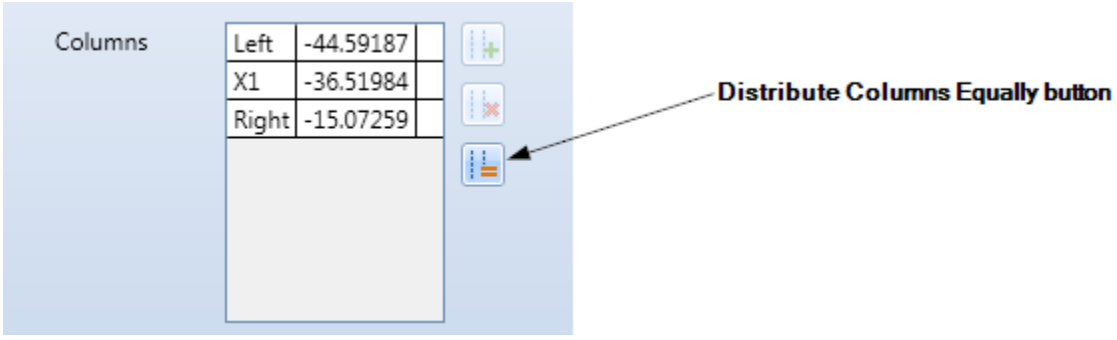


FIGURE 564: THE DISTRIBUTE COLUMNS EQUALLY BUTTON

Do the following to make all of the columns in a tiling grid have an equal width:

1. Left-click the **Distribute Columns Equally** button . This displays the **Use Equal Column Width** dialog box.

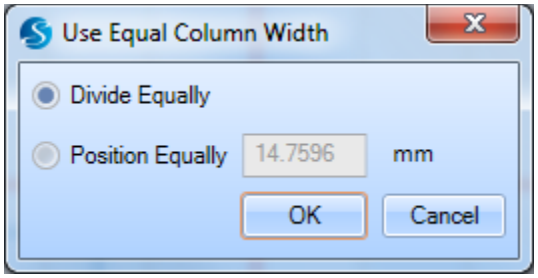


FIGURE 565: THE USE EQUAL COLUMN WIDTH DIALOG BOX

2. Left-click one of the following radio buttons:
    - **Divide Equally** – The columns will be of equal width, and the leftmost boundary and rightmost boundary of the grid will remain fixed.
    - **Position Equally** – The columns will be spaced with the specified distance between each consecutive cell. If you select this option, you must specify a distance value in the text entry field.
3. Left-click the **OK** button. The column widths in the tiling grid will become equal.

Adding and deleting rows

You can use the **Add Row** button to add a row to the tiling grid and the **Remove Row** button to delete a row from the tiling grid.

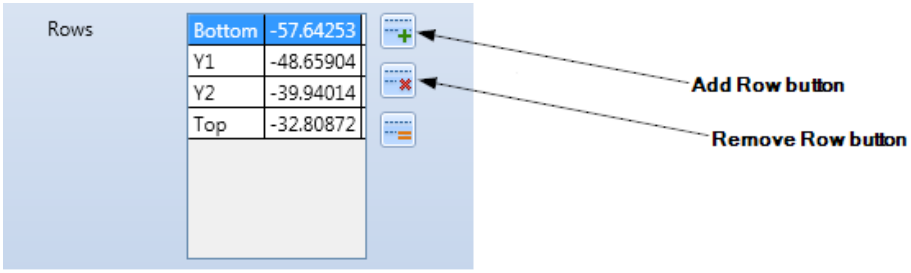


FIGURE 566: THE ADD ROW BUTTON AND THE REMOVE ROW BUTTON

Adding a row

Do the following to add a row to a tiling grid:

1. Select the row position where the new row will be added by left-clicking in one of the Rows fields of the Grid Information section. In the figure on the right, the bottom row is selected.

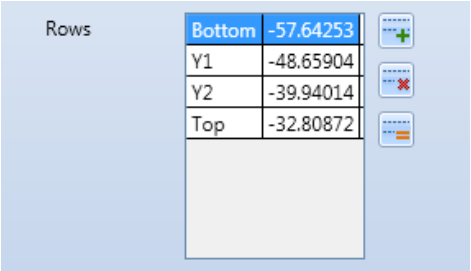


FIGURE 567: THE SELECTED ROW POSITION

2. Left-click the **Add Row** button to add a row at the selected row position. The new row is half the height of the row that you selected in the previous step. (The selected row is effectively split in half to create the new row.)

The following tiling grid shows the effect of adding a row at the row position selected in the above figure.

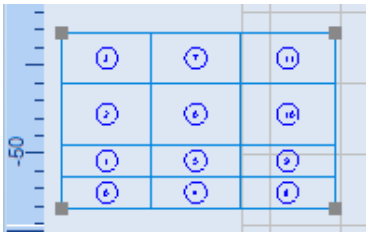


FIGURE 568: THE ADDED ROW

As an alternative to using the Add Row button, you can use the context menu to add a row to the tiling grid.

Do the following to use the context menu to add a row to the tiling grid:

1. Right-click on a row in the tiling grid. This displays the tiling grid context menu.

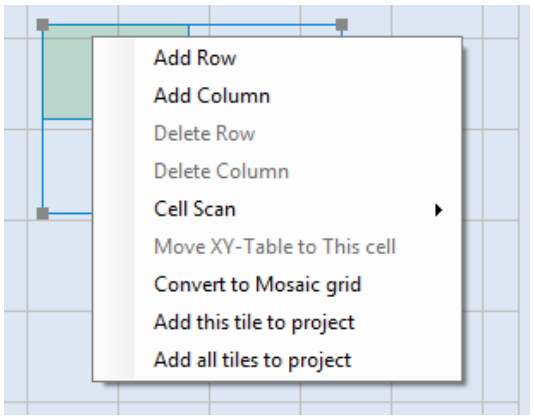


FIGURE 569: THE TILING GRID CONTEXT MENU

2. Select **Add Row** from the tiling grid context menu. This adds a new row at the row position you right-clicked in the previous step.

Deleting a row

Do the following to delete a row from a tiling grid:

1. Select the row that you want to delete by left-clicking in the appropriate Rows field of the Grid Information section. In the figure on the right, the bottom row is selected.

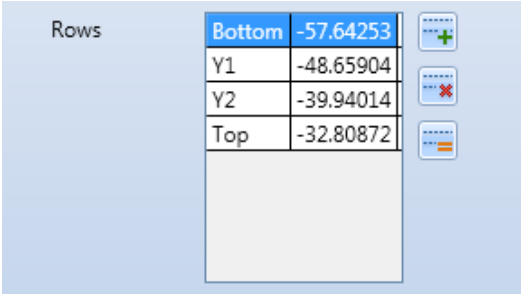


FIGURE 570: THE SELECTED ROW POSITION

2. Left-click the **Remove Row** button to delete the selected row. The following tiling grid shows the effect of deleting the row selected in the above figure; the row at Y-axis position -57.64253 has been deleted.

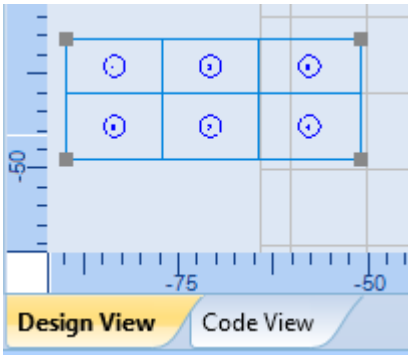


FIGURE 571: AFTER DELETING THE ROW

As an alternative to using the **Remove Row** button, you can use the context menu to delete a row from the tiling grid.

Do the following to use the context menu to delete a row from the tiling grid:

1. Right-click on a row that you want to delete. This displays the tiling grid context menu.

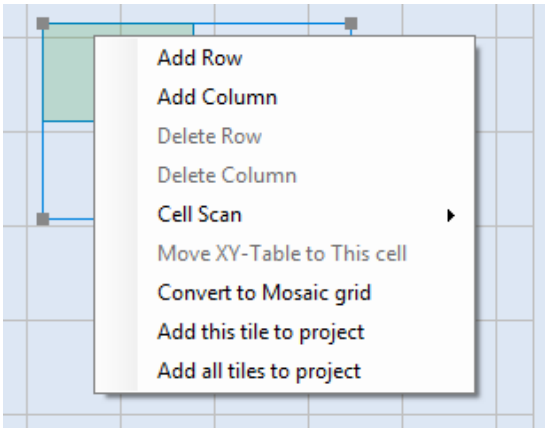


FIGURE 572: THE TILING GRID CONTEXT MENU

2. Select **Delete Row** from the tiling grid context menu. This deletes the row that you right-clicked in the previous step.

Making row heights equal

You can use the **Distribute Rows Equally** button in to make all of the rows in a tiling grid have an equal height.

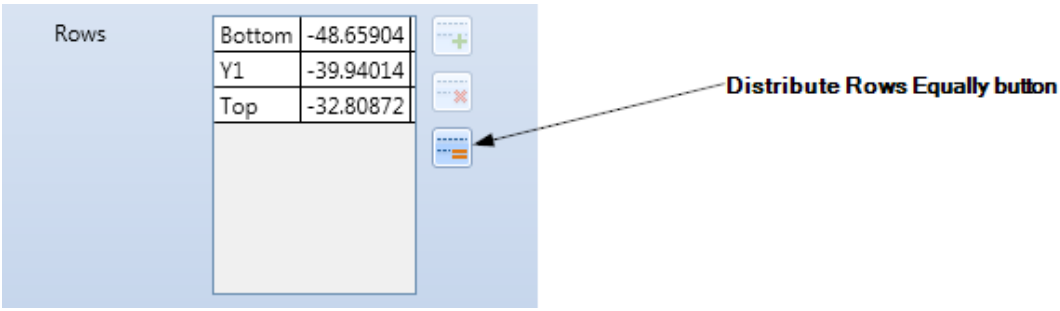


FIGURE 573: THE DISTRIBUTE ROWS EQUALLY BUTTON

Do the following to make all of the rows in a tiling grid have an equal height:

1. Left-click the **Distribute Rows Equally** button . This displays the **Use Equal Row Height** dialog box.

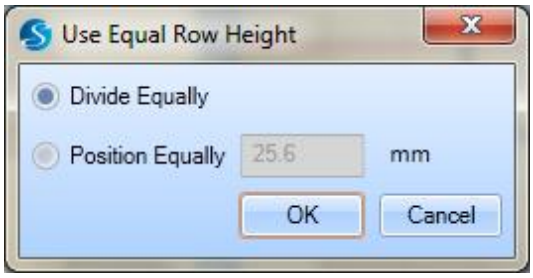


FIGURE 574: THE USE EQUAL ROW HEIGHT DIALOG BOX

1. Left-click one of the following radio buttons:
    - **Divide Equally** – The rows will be of equal height, and the top and bottom boundaries of the tiling grid will remain fixed.
    - **Position Equally** – The rows will be spaced with the specified distance between each consecutive cell. If you select this option, you must specify a distance value in the text entry field.
2. Left-click the **OK** button. The row heights in the tiling grid will become equal.

Swapping cell locations

You can swap locations in a tiling grid by dragging a cell to a new location.

Do the following to swap cell locations in a tiling grid:

1. Place the crosshairs over the tiling cell number in the tiling cell. The crosshairs icon changes to the fist icon.
2. Press and hold down the left mouse button over the tiling cell number.
3. With the left mouse button held down, drag the cell to a new location in the tiling grid. Then release the left mouse button. The cells swap locations as shown in the following figure.

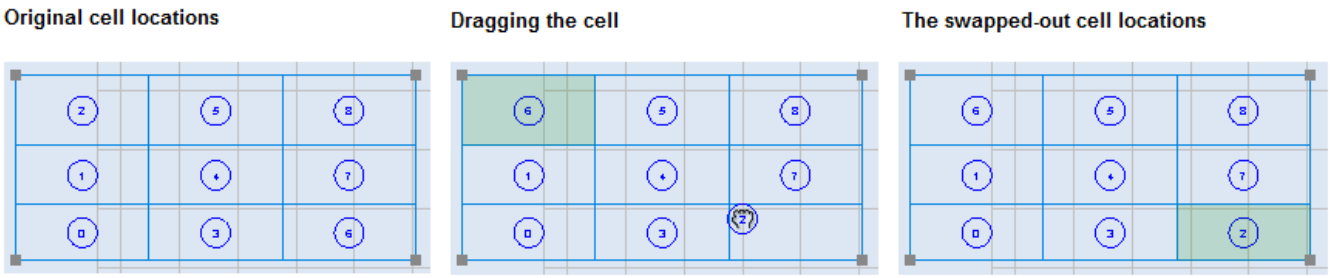


FIGURE 575: CELL LOCATION SWAPPING

Converting a Linear or Rectangular tiling grid to a Mosaic tiling grid

You can use the **Convert to Mosaic grid** option of the tiling grid context menu to convert a Linear or Rectangular grid to a Mosaic grid. When a grid is converted to Mosaic, all of the Mosaic cell operations can be performed on it. (Refer to "Mosaic cell operations" on page 433 for information about Mosaic cell operations.)

Note: After a grid has been converted to Mosaic, it cannot be converted back to Linear or Rectangular.

Do the following to convert a Linear or Rectangular grid to Mosaic:

1. Right-click on a Linear or Rectangular tiling grid. This displays the tiling grid context menu.

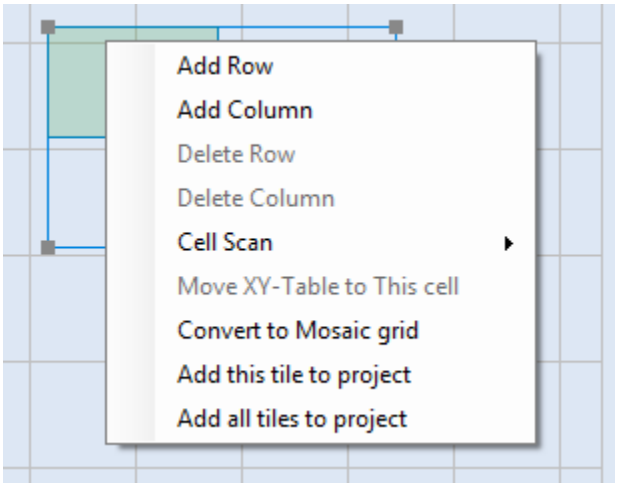


FIGURE 576: THE TILING GRID CONTEXT MENU

2. Select **Convert to Mosaic grid** from the tiling grid context menu. The selected grid is immediately converted to a Mosaic tiling grid.

Isolating tiles

You can isolate an individual tile, or all tiles within a tiling grid, as images within a project. A new image (or images) will be created containing a copy of the selected tile or tiles. This is useful if you need to isolate a particular segment of the object for additional processing or manipulation.

Do the following to isolate tiles as images within a project:

1. Right-click on a tile in the tiling grid. This highlights the tile and displays the tiling grid context menu.

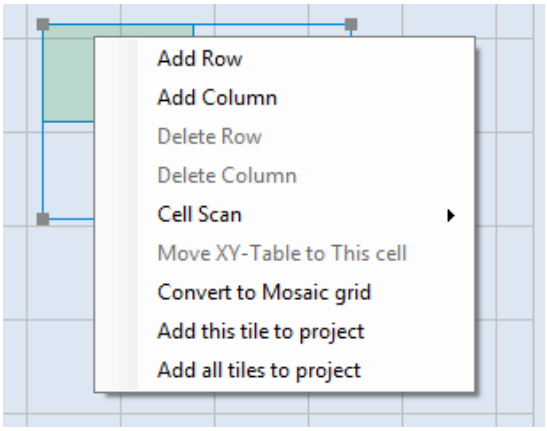


FIGURE 577: THE TILING GRID CONTEXT MENU

2. Select one of the following options from the tiling grid context menu:

    - **Add this tile to project** – Isolates the selected tile into a separate image within the **Project Explorer** (i.e. a new image is created containing a copy of the selected tile's contents).
    - **Add all tiles to project** – Isolates all of the tiles in the selected tiling grid as a series of images within the **Project Explorer** (i.e., new images are created, consisting of copies of all of the contents of the selected tiling grid). The newly created images correspond to the total number of tiles in the grid.

This displays the **Tile adding options** dialog box.

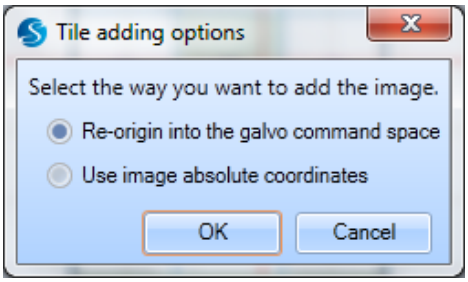


FIGURE 578: THE TILE ADDING OPTIONS DIALOG BOX

3. Left-click one of the following radio buttons in the **Tile adding options** dialog box:

    - **Re-origin into the galvo command space** – The tile(s) will be centered around the origin of the new image(s).
    - **Use image absolute coordinates** – The tile(s) will be placed in the new image using the absolute coordinates of the tile(s) within the source tiling grid.

4. Left-click the **OK** button in the **Tile adding options** dialog box. The new images will appear in the **Images (Composite Image)** folder as shown in the following figure.

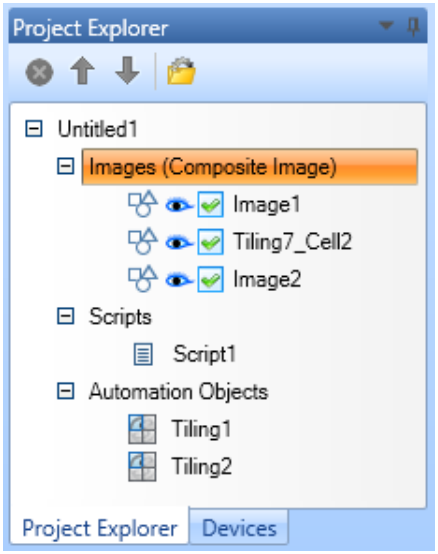


FIGURE 579: NEW IMAGES IN THE PROJECT EXPLORER

Mosaic cell operations

Mosaic tiling grids support several operations that are not available on Rectangular tiling grids. These include changing cell shapes and sizes and adding an extra hotspot on cell boundaries. The Mosaic-specific cell operations are useful when marking quality and efficiency can be improved by merging cells and changing cell shapes.

Changing the sizes and shapes of Mosaic cells

The operations for changing the sizes and shapes of Mosaic cells include **Join Vertex**, **Delete Line**, and dragging the hotspots on the tiling grid.

The Join Vertex operation

The **Join Vertex** operation is used to join cell vertices. This operation divides the original cell into two separate cells to add a new cell to the tiling grid.

Do the following to join cell vertices:

1. Left-click on the hotspot for one of the vertices that you want to join.
2. Click the right mouse button to display the Mosaic tiling grid context menu.

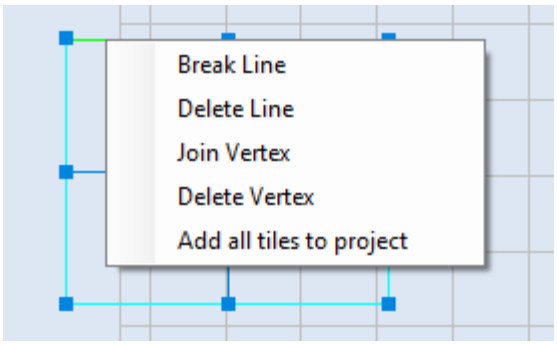


FIGURE 580: THE MOSAIC TILING GRID CONTEXT MENU WITH JOIN VERTEX

3. Select the **Join Vertex** option from the Mosaic tiling grid context menu.
4. Left-click the corresponding hotspot to join to the first vertex.

Note: It is not possible to join two vertices such that the new cell boundary would cross an existing cell boundary.

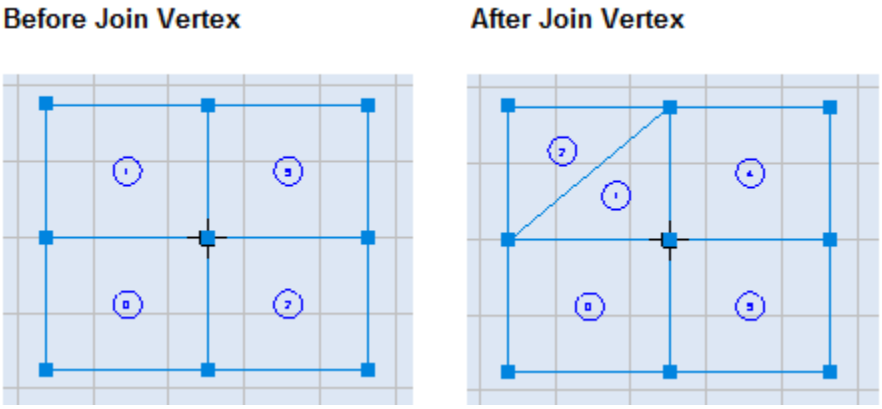


FIGURE 581: JOIN VERTEX EXAMPLE

The Delete Line operation

The **Delete Line** operation is used to remove a cell boundary, which merges the adjacent cell with the one whose boundary has been removed.

Do the following to remove a cell boundary:

1. Left-click on the cell boundary that you want to remove. All of the cell boundary lines will be highlighted.
2. Click the right mouse button to display the Mosaic tiling grid context menu.

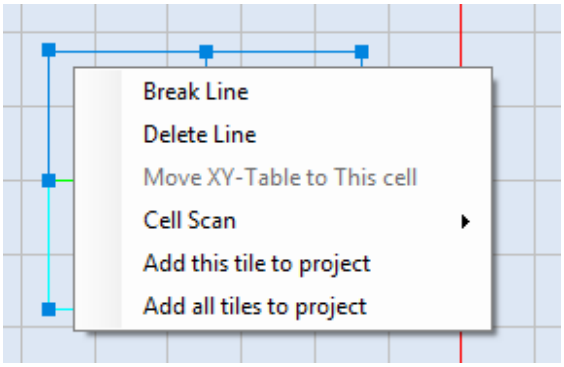


FIGURE 582: THE MOSAIC TILING GRID CONTEXT MENU

3. Select the **Delete Line** option from the Mosaic tiling grid context menu. The selected cell boundary is removed.

Note: It is not possible to delete a boundary line of the grid.

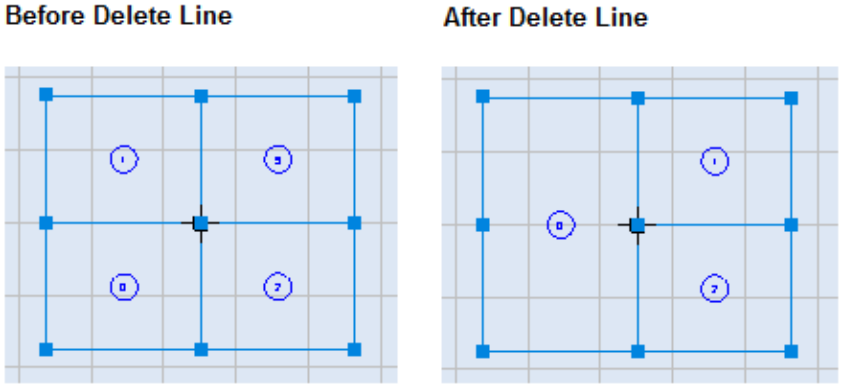


FIGURE 583: DELETE LINE EXAMPLE

Dragging the hotspots on a tiling grid

The hotspots on a Mosaic tiling grid can be dragged to change the size and shape of a cell.

Do the following to change the size and shape of a cell by dragging a hotspot:

1. Press the left mouse button, and hold it down, over a hotspot on a Mosaic tiling grid.
2. With the left mouse button held down, drag the mouse to a new location. The size and shape of the tiling cell is previewed as you drag the mouse.
3. When the size and shape of the cell is as desired, release and click the left mouse button.

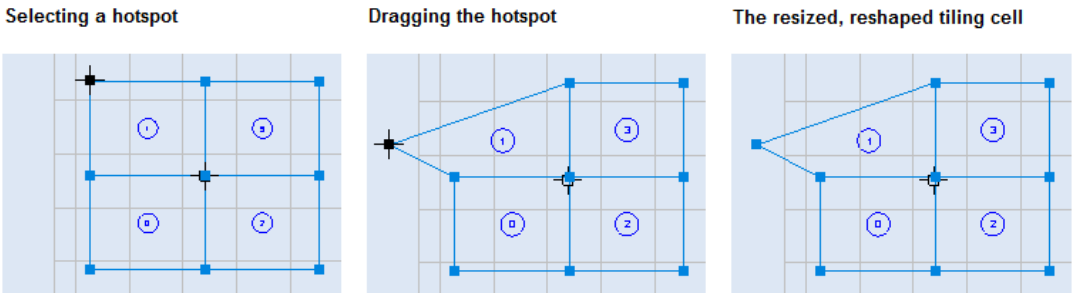


FIGURE 584: DELETE LINE EXAMPLE

Adding an extra hotspot to a cell boundary line

The Break Line operation is used to add an extra hotspot at the midpoint of a cell boundary line.

Do the following to add an extra hotspot at the midpoint of a cell boundary line:

1. Left-click on the cell boundary line to which you want to add an extra hotspot. All of the cell boundary lines will be highlighted.
2. Click the right mouse button to display the Mosaic tiling grid context menu.

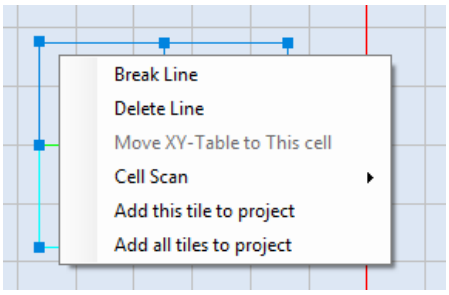


FIGURE 585: THE MOSAIC TILING GRID CONTEXT MENU

3. Select the Break Line option from the Mosaic tiling grid context menu. The extra hotspot appears at the midpoint of the cell boundary line.

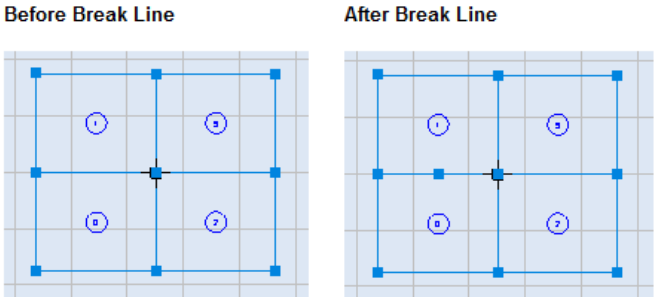


FIGURE 586: BREAK LINE EXAMPLE

9.1.2 The Properties Tab

The **Properties** tab contains settings for the images, scripts, optimization level, and X-Y table of the tiling grid. Refer to the following sections for information on changing these settings.

You can display the **Properties** tab by left-clicking the **Properties** link, which appears on the left side of the screen in the following figure.

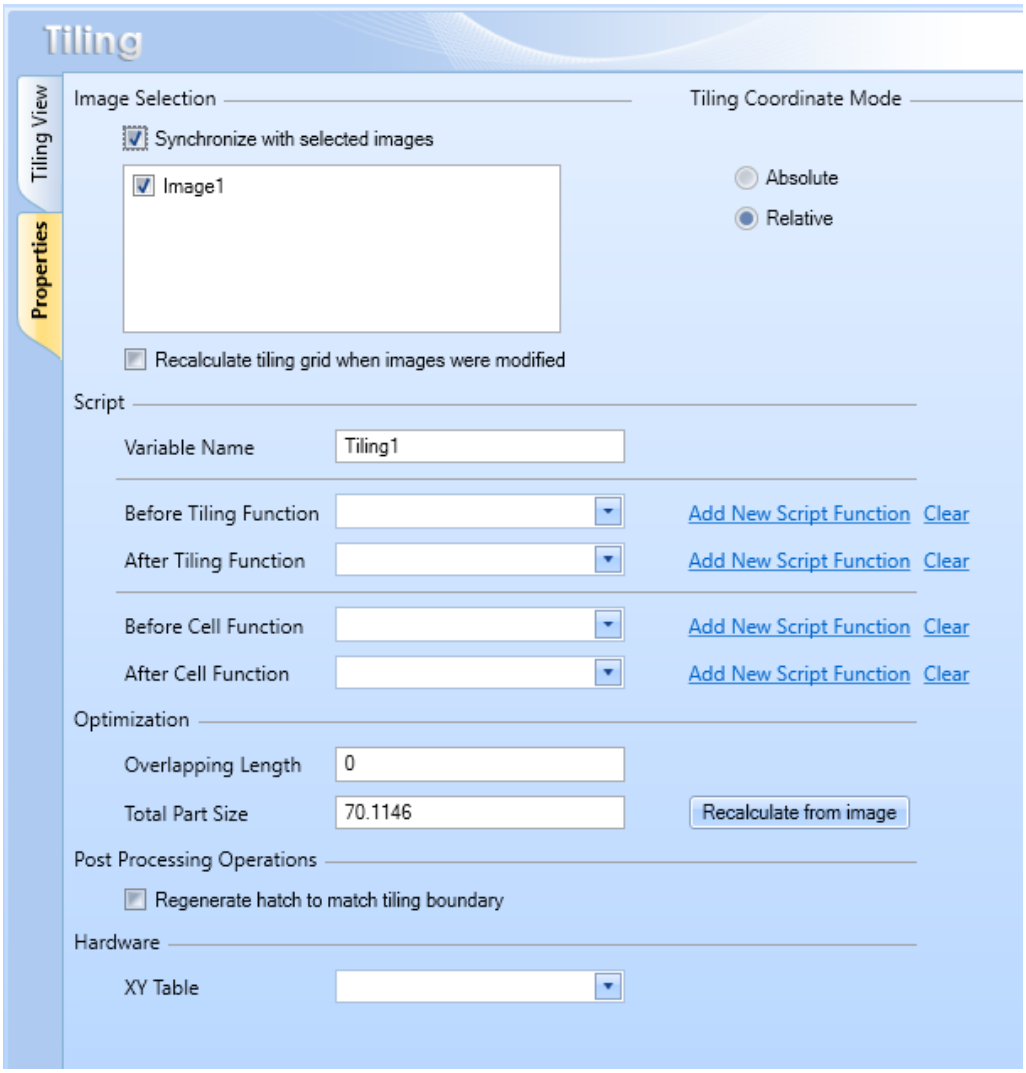


FIGURE 587: THE PROPERTIES TAB

Image Selection

The Image Selection list contains an entry for each image in the Project. To include an image in the current tiling grid, select the checkbox beside the image name. In the following figure, all three images are selected. This means that Image1, Image2, and Image3 will be included in the tiling grid.

To *exclude* an image from the current tiling grid, deselect the checkbox beside the image name.

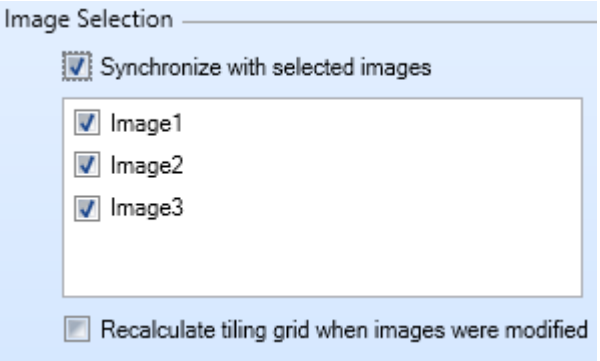


FIGURE 588: THE IMAGE SELECTION LIST ON THE PROPERTIES TAB

User can use the ScanMaster image editor to edit and change the images after adding them to the tiling object. Just select the **Synchronize with selected images** checkbox above the image list, to tell the tiling object to synchronize with any changes committed to the images if they were modified. By default, the check box will be selected, and the images are allowed to edit in the ScanMaster image editor only.

User may deselect the checkbox to modify the image contents in the tiling grid itself. Once unselected, a separate tab will be introduced to edit each individual cells in the tiling grid. Refer **Edit Cells in the tiling grid** section to know more about how to edit the cell contents in the tiling grid.

Below the **Image Selection** list is a checkbox labelled **Recalculate tiling grid when Images were modified**. When this checkbox is selected, any changes to the selected images will cause the tiling grid to recalculate again. The recalculation will be done according to the tiling grid parameters. To disable the behaviour, deselect the check box.

Tiling Mode

Select one of the following Tiling Mode radio buttons to specify how the coordinates of the artwork are passed marking:

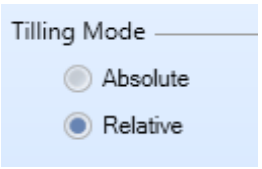


FIGURE 589: THE TILING MODE RADIO BUTTONS

- **Absolute** – specifies to keep the original coordinates of the cell content as it is when prepare cells for marking.
- **Relative** – specifies to re-position coordinates of the cell content with respect to the centroid of the cell when prepare cells for marking

Script Configuration

The **Script** section located under the **Properties** tab of the tiling object may be used to configure the tiling object instance identification name, the pre-execution functions (before-cell and before-tiling), and the post-execution functions (after-cell and after-tiling).

Before- and after-cell functions are executed before and after each cell in the tiling grid is scanned. Before- and after-tiling functions are executed before and after the grid is tiled.

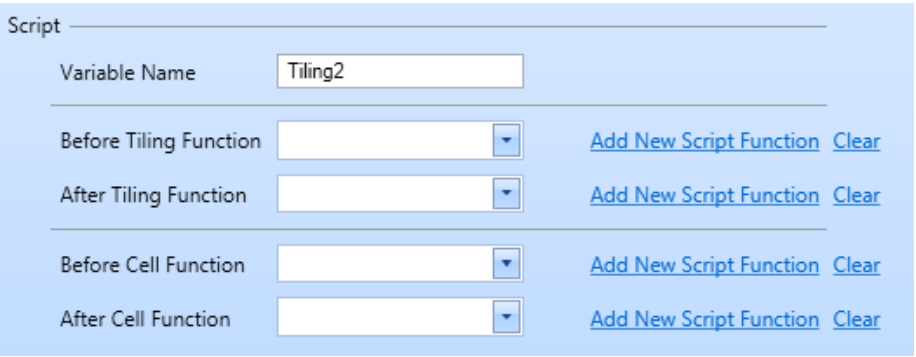


FIGURE 590: THE SCRIPT SECTION OF THE PROPERTIES TAB

Changing the variable name

The **Variable Name** field contains the scripting object name, which may be used to identify the scripting object within the Before-tiling Function, After-tiling Function, Before-cell Function, or After-cell Function.

To change the variable name, enter a new name in the Variable Name field.

FIGURE 591: THE VARIABLE NAME FIELD

In order to run the tiling project, you must replace the **ScanAll()** function with a function call to start the tiling project. This function call must be in the following format:

<ScriptVariableName>.Start()
where `<ScriptVariableName>` is the scripting object name in the Variable Name field
This function call should be placed after the before- and after-tiling functions.

Selecting or creating a pre-execution ScanScript function

You can select an existing before-cell function or before-tiling function by selecting it from the respective **Before Cell Function** or **Before Tiling Function** dropdown list. In addition, you have the option of creating a new before-cell or before-tiling function.

Do the following to create a new before-cell or before-tiling function:

1. Select the Add link beside the appropriate dropdown (Before Tiling Function or Before Cell Function).

   This displays the Edit Function dialog box as shown in Figure 593 (below).

FIGURE 592: CREATING THE BEFORE-CELL OR BEFORE-TILING FUNCTION

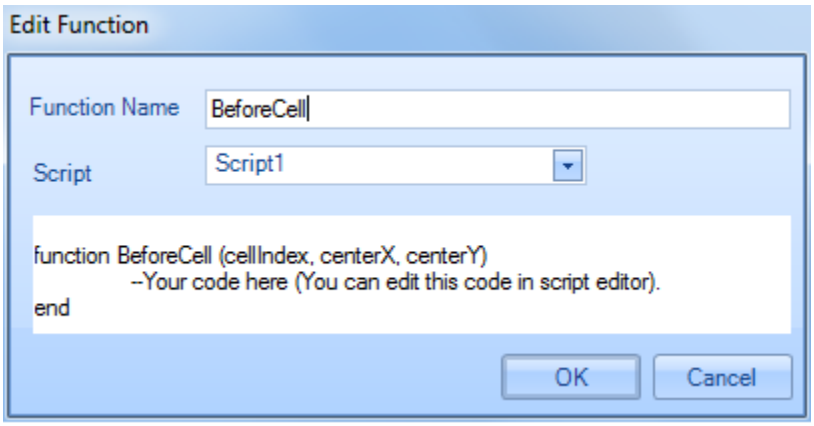


FIGURE 593: THE EDIT FUNCTION DIALOG BOX

2. Enter the name of the function in the **Function Name** field.
3. Select the script file to which the function is to be added to using the **Script** pulldown list and click the **OK** button.

Note: The coding for the function can be edited using the **Script editor**. Refer to "To start scripting" on page 532 for more information.

Selecting or creating a post-execution ScanScript function

You can select an existing after-cell function or after-tiling function by selecting it from the respective **After Cell Function** or **After Tiling Function** dropdown list. In addition, you have the option of creating a new after-cell or after-tiling function.

Do the following to create a new after-cell or after-tiling function:

1. Select the **Add** link beside the appropriate dropdown (**After Tiling Function** or **After Cell Function**).

FIGURE 594: CREATING THE AFTER-CELL OR AFTER-TILING FUNCTION

2. This displays the **Edit Function** dialog box.

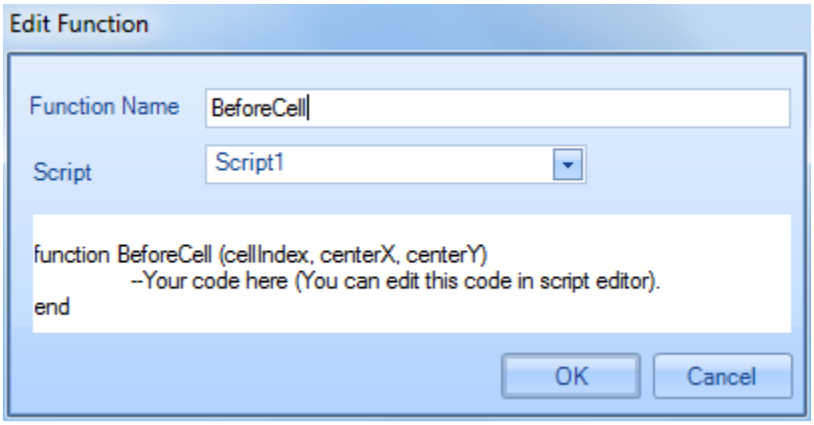


FIGURE 595: THE EDIT FUNCTION DIALOG BOX

3. Enter the name of the function in the **Function Name** field.
4. Select the script file to which the function is to be added using the **Script** pulldown list and click the **OK** button.

Note: The coding for the function can be edited using the **Script editor**. Refer to "To start scripting" on page 487 for more information.

Clearing the pre- or post-execution ScanScript function

You can clear the contents of any of the pre- or post-execution ScanScript function fields by left-clicking the **Clear** link to the far right of the applicable field. When one of these fields is cleared, the applicable pre- or post-execution function will not be executed.

Optimization

The **Optimization** section of the **Properties** tab contains the **Overlapping Length** field and the **Total Part Size** field.

Overlapping Length

You can specify the marking overlap for adjacent cells by entering a numeric value in the Overlapping Length field. The marking overlap value is in the default units (millimeters or inches).

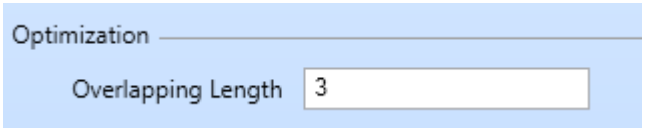


FIGURE 596: OVERLAPPING LENGTH

Note: The value entered in the **Overlapping Length** field would be applied equally to both adjacent tiles such that half of the value is applied to each tile.

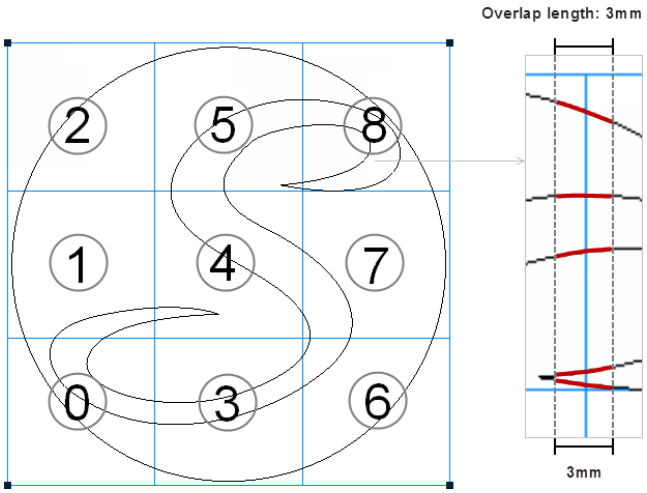


FIGURE 597: OVERLAPPING LENGTH APPLICATION

Total Part Size

The description of the **Total Part Size** field is the size of the overall image. If the cell arrange mode is horizontal the default value of the total part size will be set to the width of the bounding box. If the cell arrange mode is vertical the default value of the total part size will be set to the height of the bounding box.

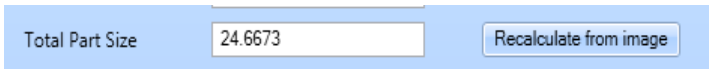


FIGURE 598: TOTAL PART SIZE

Note: The value entered in the Total part size would be used in the before and after tiling functions as an input parameter.

Recalculate from image

You can set a value to the total part size. You can set the total part size to the default value using the Recalculate from image button.

Hardware

The **Hardware** section of the **Properties** tab of the tiling automation object allows you to select an X-Y table from the pulldown list.

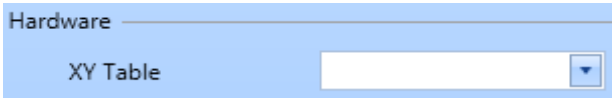


FIGURE 599: HARDWARE

9.1.3 Edit Cells in the tiling grid

There are two methods to edit individual cells in a tiling grid.

1. Un Select the Synchronize with selected images checkbox in the Tiling Properties tab. A separate Cell View tab will be added to the tiling window.

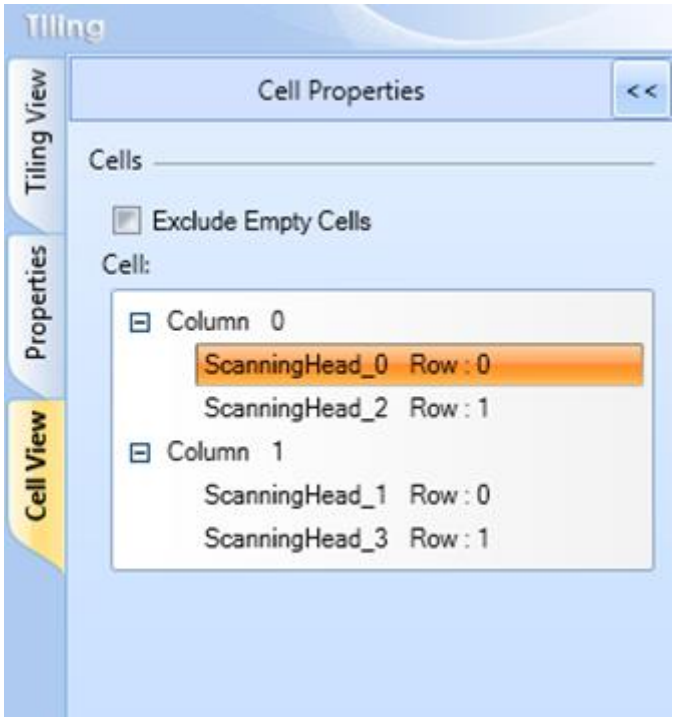


FIGURE 600: CELL PROPERTIES WINDOW

2. Select a cell in the tiling grid and right click on it. On the context menu click on **Edit Cell** menu item.

If the tiling object is synchronized with the images, a dialog box will pop up to notify the user. Press Yes to continue with Cell edit

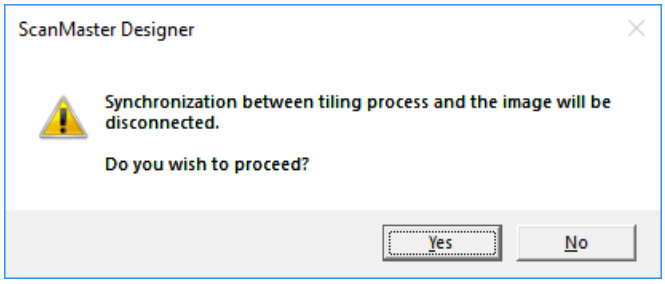


FIGURE 601: SYNCHRONIZE WITH SELECTED IMAGES WARNING

Now a new tab called **cell view** will be attached to the tiling window, you can choose and edit individual cells in the tiling object. It is possible to edit both geometric and laser properties of the individual shapes with the property grid. However, the general shape editing canvas operations are not allowed in this mode.

Use the Exclude Empty Cells checkbox to remove cells without any shape from the cell list.

The cell list will show all the cells that are available for editing. The cells are ordered in column-wise and row-wise in an ascending order. The names of the cell entries in the list are created by appending the row number to the friendly name of the marking head assigned to the cell.

Ex: The selected entry in the

Figure 600, refers to the first cell in the first row of the tiling object. The friendly name of the assigned marking head is ScanningHead_0.

The selected cell in the Cell list will be drawn in the Cell editing canvas for editing. Also, the shapes in the current editing cell will be displayed in the shape tree.

Editing shape Properties

Select a shape in the cell by clicking on it in the cell editing canvas or selecting the shape from the shape tree.

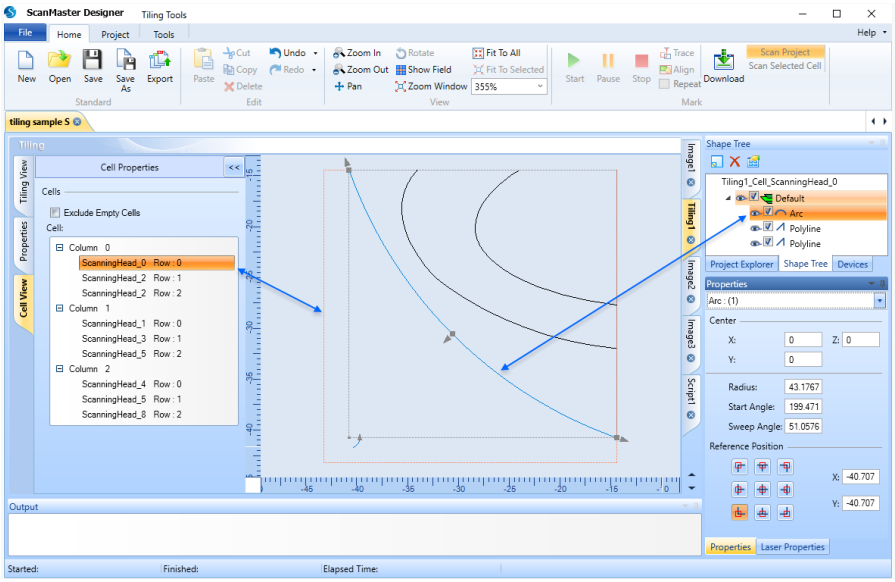


FIGURE 602: EDIT SHAPE PROPERTIES

The properties of the shape will be displayed in the Property grid. Both Laser properties and geometric properties are allowed to edit, using the property windows.

Refer to the Properties Window for more information

9.1.4 Code View

The **Code View** of the tilling project contains the **ScanScript** code which implements the tilling object. You can change this code to modify the behavior of the tiling object.

The **Scanscript** code includes the placement information of the cells and execution sequencing instructions.

Do the following to display to the **Code View**:

1. Select the corresponding tiling object under the **Automation Objects** node in the **Project Explorer**.
2. Select the **Code View** tab from the tab selection strip, which is shown at the bottom edge of the Drawing Canvas.

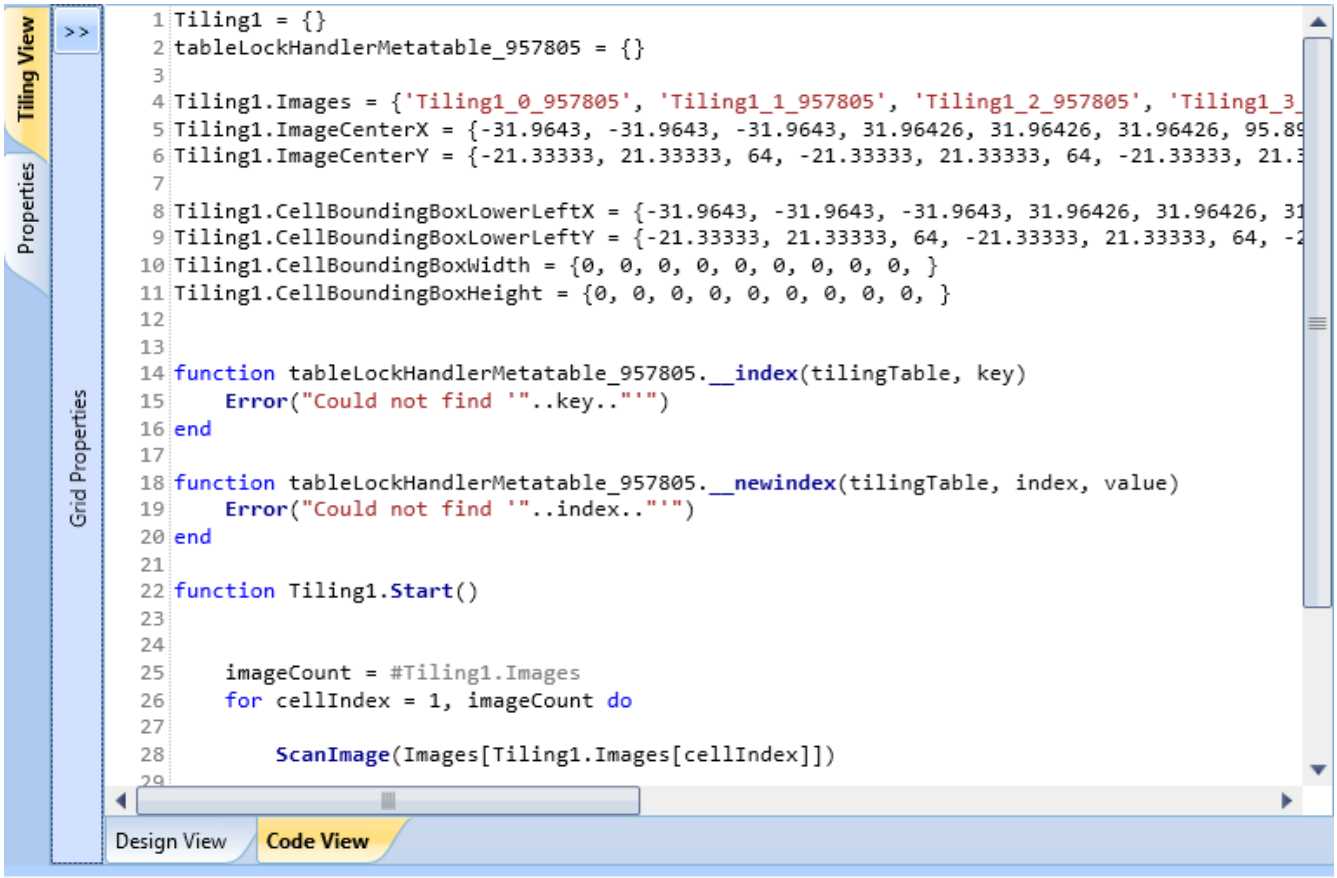


FIGURE 603: CODE VIEW OF THE TILLING VIEW

9.2 TRAY MARKING

Tray Marking is typically used for laser marking plurality of items (such as Integrated Circuits) carried on trays with repetitive, accurate positioning. A typical marking may contain unique identifiers, such as serial numbers, manufacturers name or logo, barcodes, batch numbers and date codes. The Tray option arranges shapes in an Array of Rows and Columns for marking, where the cells in the rows/columns are identical and are in a fixed geometric position.

ScanMaster Designer allows marking even very small character sizes still ensuring the best quality and repeatability.

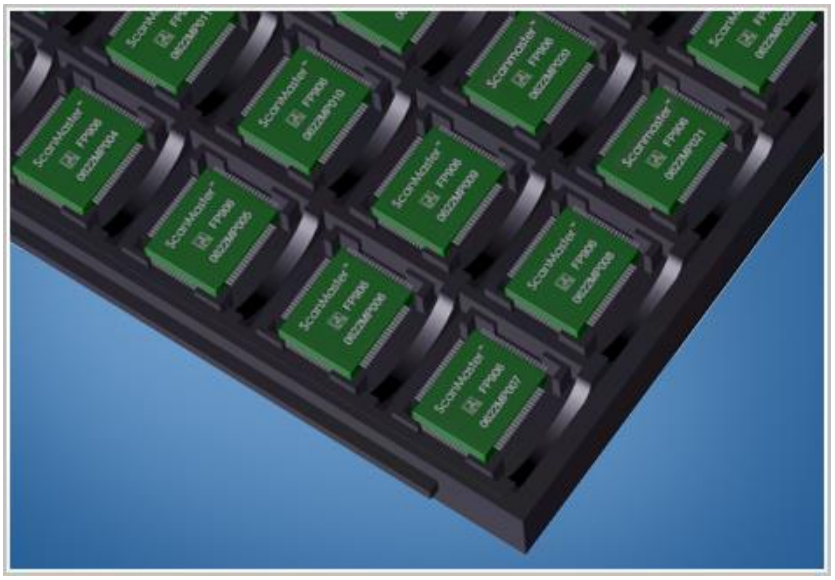


FIGURE 604: THE TRAY

A Tray Marking object can be initiated in ScanMaster" Designer by using the T**ray Marking** option located under the **Automation Group on the Project** tab.

The features of Tray Marking in ScanMaster Designer include the following:

- Initializing the Tray Grid
- Tray Properties
- Tray View
- Cell View
- Scanning Options
- Align and Trace options

9.2.1 Initializing the Tray Grid

Do the following to initialize a tray grid:

1. Left-click the **Tray** icon located in the **Project | Automation** panel of the **Ribbon**. This creates a tray with default values of tray properties. The **Tray Marking Properties** window is displayed as shown in Figure 605 (below).
2. You can change any of the properties of the tray grid as described in "Tray Properties" on page 450.

Note: You can view the tray grid itself by left-clicking on the **Tray View** link on the left side of the **Tray Marking Properties** window.

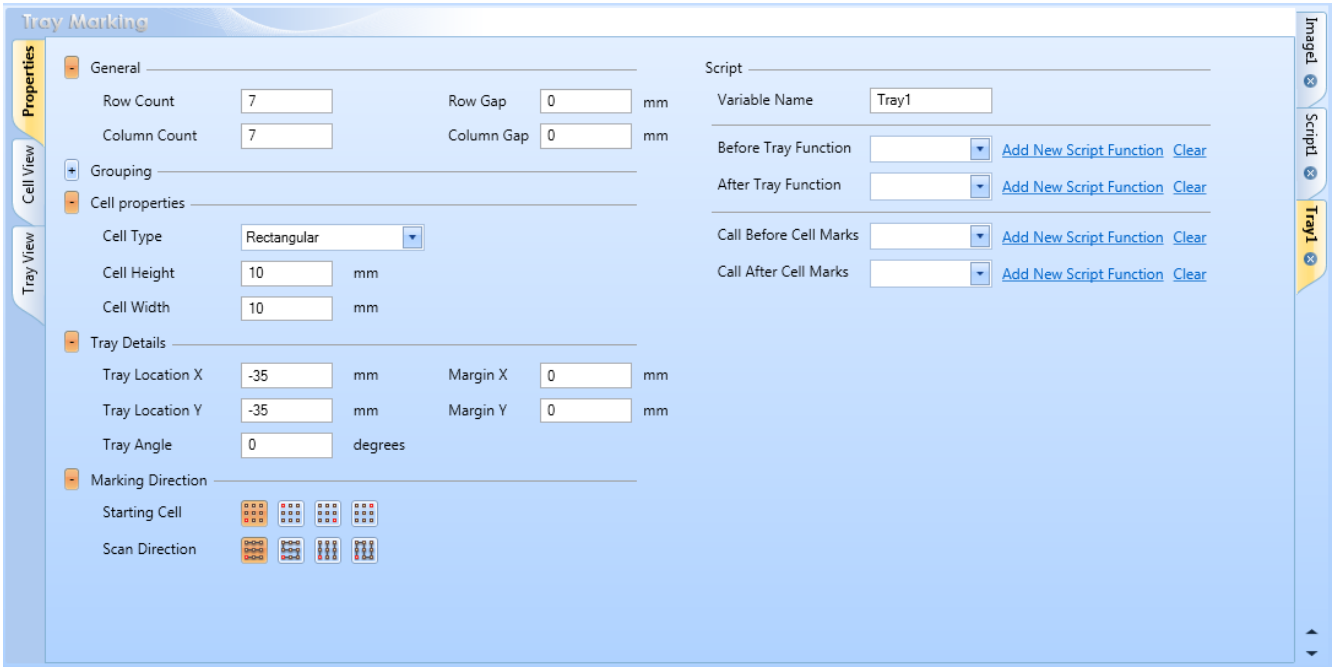


FIGURE 605: TRAY MARKING PROPERTIES

Tray Properties

The **Properties** tab of the **Tray Marking** page contains all of the properties of the tray grid. Refer to the following subsections for a description of each tray property and instructions on how to change each tray property.

General

The **General** section of the **Properties** tab specifies the number of rows and columns in a tray grid, as well as the gaps between those rows and columns.

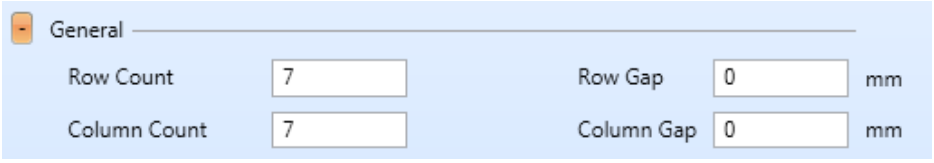


FIGURE 606: TRAY PROPERTIES – GENERAL

Parameter	Description
Row Count	The number of rows in the tray grid; you can change this value by entering a new number in the text-entry field.
Column Count	The number of columns in the tray grid; you can change this value by entering a new number in the text-entry field.
Row Gap	The spacing between each grid row; you can change this value by entering a new number in the text-entry field.
Column Gap	The spacing between each grid column; you can change this value by entering a new number in the text-entry field.

Grouping

The **Grouping** section of the **Properties** tab can be used to create groups of cells within a tray grid.

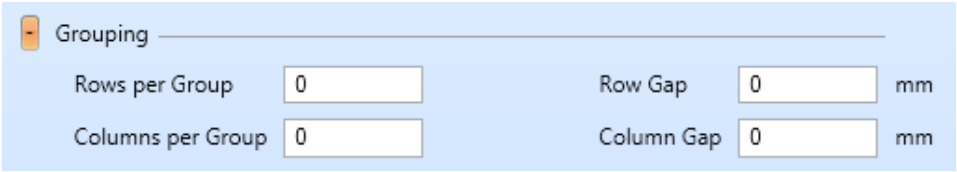


FIGURE 607: TRAY PROPERTIES – GROUPING

Parameter	Description
Rows per group	The number of rows in a group; you can change this value by entering a new number in the text-entry field.
Columns per group	The number of columns in a group; you can change this value by entering a new number in the text-entry field.

Row Gap	The row spacing between each group; you can change this value by entering a new number in the text-entry field.
Column Gap	The column spacing between each group; you can change this value by entering a new number in the text-entry field.

The following sample image is an illustration of 3x3 groups with a gap of 1.5 units:

FIGURE 608: GROUPS

Note: Groups will be formed left to right and bottom to top.

Cell Properties

The **Cell Properties** section of the **Properties** tab contains the settings for **Cell Type**, **Cell Height**, and Cell Width.

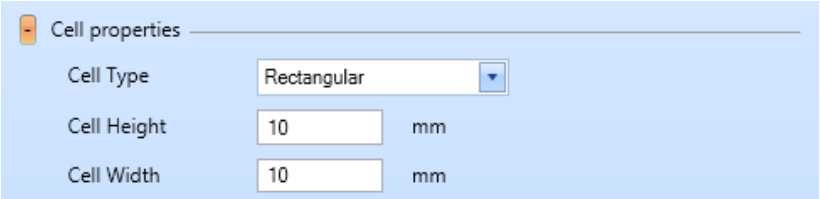


FIGURE 609: TRAY PROPERTIES – CELLS

Parameter	Description
Cell Type	Defines the type of the tray cell, which can be **Rectangular** or **Circular**. You can select either type from the **Cell Type** dropdown list.
Cell Height	The height of a Rectangular cell; you can change this value by entering a new number in the text-entry field.
Cell Width	The width of a Rectangular cell; you can change this value by entering a new number in the text-entry field.
Cell Radius	The radius of a Circular cell; you can change this value by entering a new number in the text-entry field.

Tray Details

The **Tray Details** section of the **Properties** tab contains settings for the location and angle of the tray grid on the Drawing Canvas and settings for the offsets between the tray boundary and the tray grid.

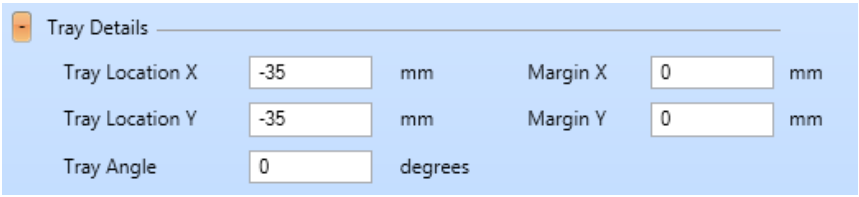


FIGURE 610: TRAY PROPERTIES - TRAY DETAILS

Parameter	Description
Tray Location X	The X-axis coordinate of the tray location on the Drawing Canvas; you can change this value by entering a new number in the text-entry field.
Tray Location Y	The Y-axis coordinate of the tray location on the Drawing Canvas; you can change this value by entering a new number in the text-entry field.
Tray Angle	The angle at which the tray is placed on the Drawing Canvas. A sample image is shown below. You can change this value by entering a new number in the text-entry field.
Margin X	The amount of offset between the tray boundary and the tray grid along the X axis; you can change this value by entering a new number in the text-entry field. This setting is illustrated in the following figure.
Margin Y	The amount of offset between the tray boundary and the tray grid along the X axis; you can change this value by entering a new number in the text-entry field. This setting is illustrated in the following figure.

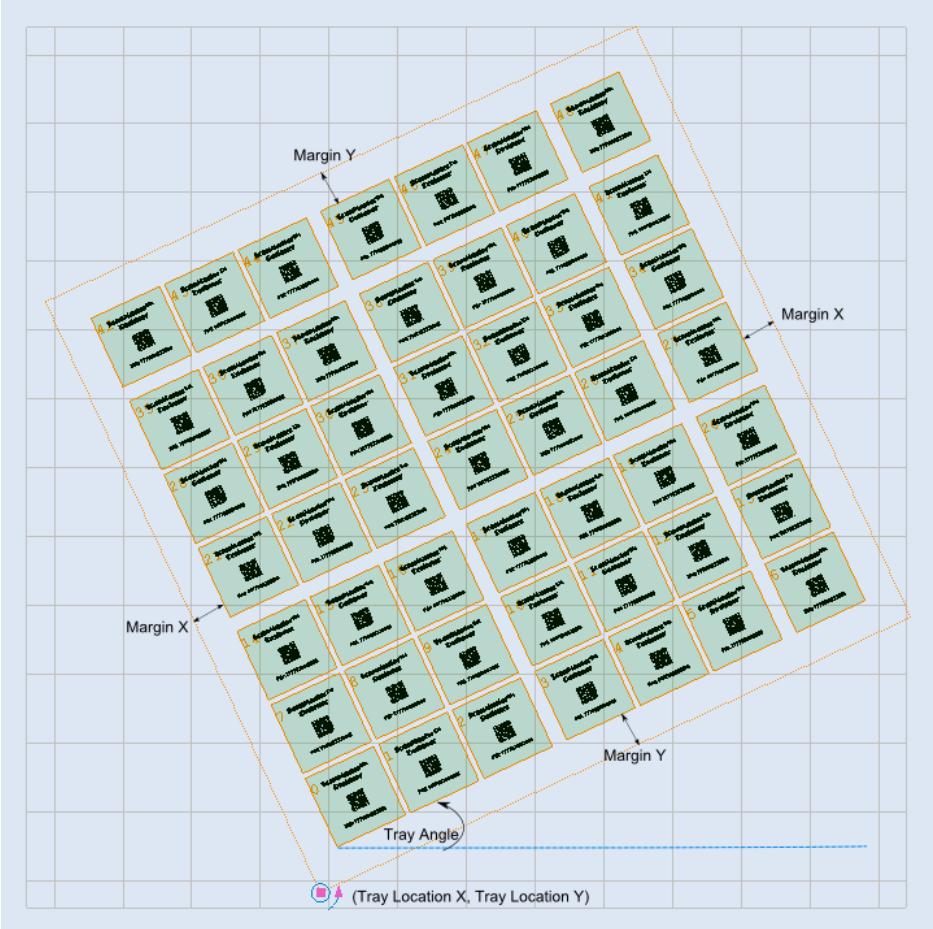


FIGURE 611: TRAY ANGLE, MARGIN X AND MARGIN Y

Marking Direction

The **Marking Direction** section of the **Properties** tab is used to specify the Starting Cell option and the Scan Direction option for the tray grid. The former is the tray cell from which scanning begins, and the latter is the direction in which scanning proceeds.

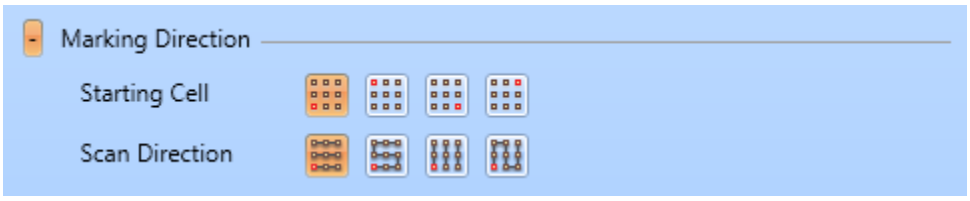


FIGURE 612: THE MARKING DIRECTION BUTTONS

Note: In the above figure, the default **Starting Cell** and the default **Scan Direction** are selected.

The Starting Cell Option

You can select the Starting Cell option by left-clicking one of the **Starting Cell** buttons. The following figure shows the Starting Cell option for each button.

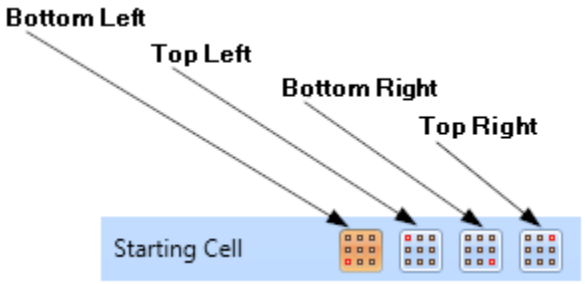


FIGURE 613: THE STARTING CELL BUTTONS

The following figure illustrates the four Starting Cell options. For each option, the Starting Cell is highlighted in **red**.

Note: The Scan Direction option for the examples below have been set to **Unidirectional** and the Cell Type has been set to **Rectangular**.

FIGURE 614: THE FOUR STARTING CELL OPTIONS

The Scan Direction Option

You can select the Scan Direction option by left-clicking one of the **Scan Direction** buttons. The following figure shows the Scan Direction option for each button.

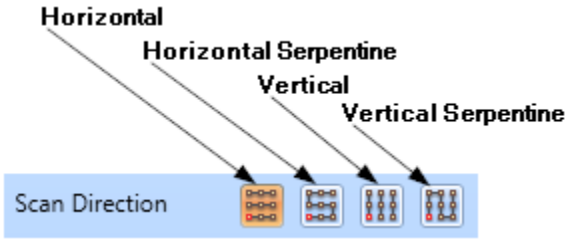


FIGURE 615: THE SCAN DIRECTION BUTTONS

The following figure illustrates the four Scan Direction options.

Note: The Starting Cell option for the examples below has been set to **Bottom Left**, and the Cell Type has been set to **Rectangular**.

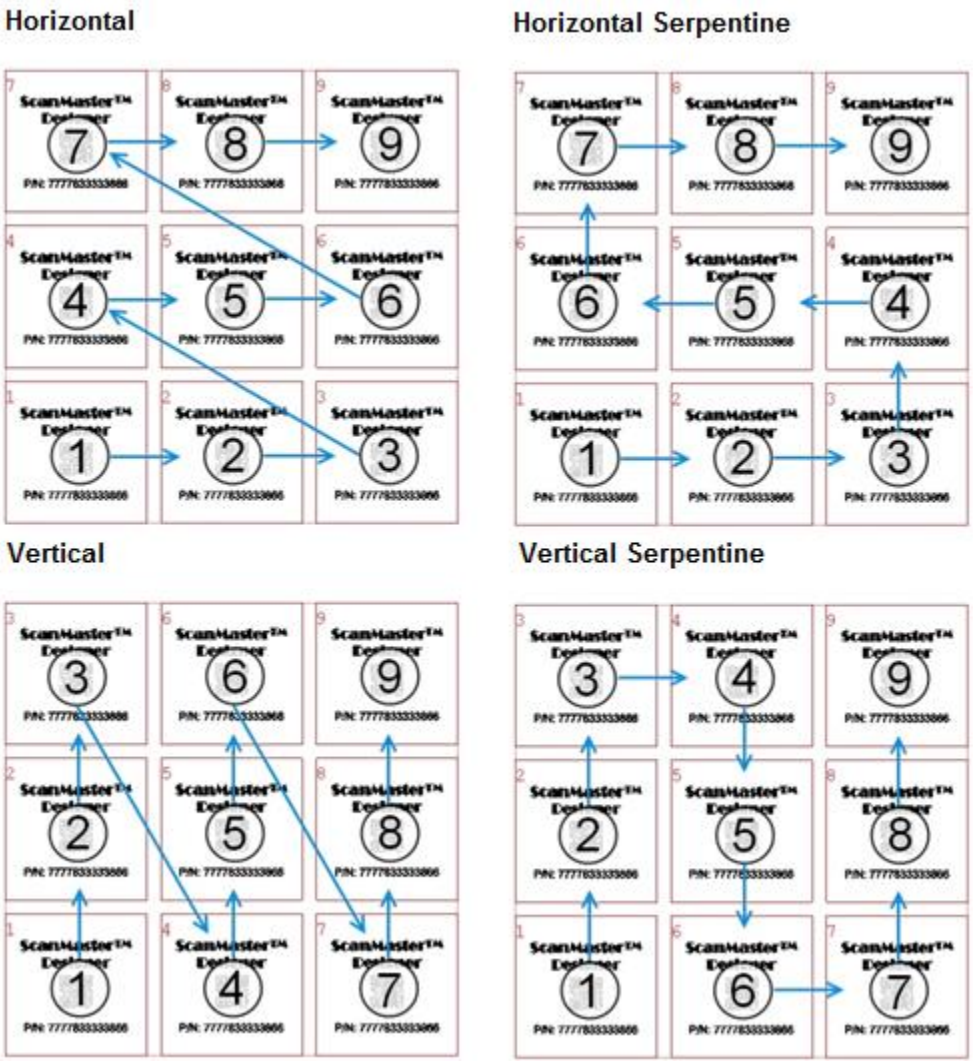


FIGURE 616: THE FOUR SCAN DIRECTION OPTIONS

Script

The **Script** section of the **Properties** tab of the Tray Marking object may be used to configure the tray object instance identification name, the pre-execution (Before-cell and Before-tray) script and post-execution (After-cell and After-tray) script. Scripts are executed to extend the capabilities of the Tray object to fulfil additional automation requirements. Before- and after-cell functions are executed before and after each cell in the tray grid is scanned. Before- and after-tray functions are executed before and after the tray grid is scanned.

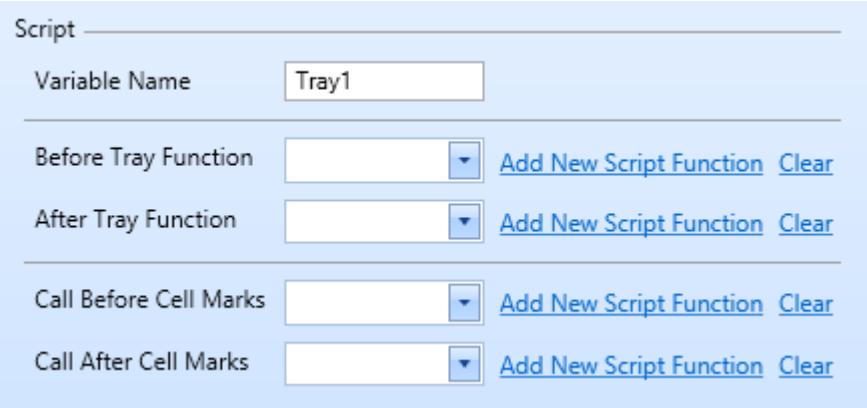


FIGURE 617: SCAN DIRECTION OPTIONS

Variable Name

The **Variable Name** field contains the name of the Tray object. The Tray object is referred in the ScanScript code by this name. The **Project Explorer** also lists the Tray object by this name.

Do the following to change the **Variable Name**:

1. Select the **Properties** tab within the Tray Marking object.
2. Enter the name of the Tray object in the **Variable Name** field.

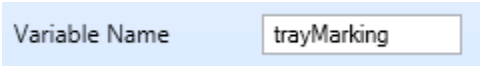


FIGURE 618: VARIABLE NAME

Selecting or creating pre-execution ScanScript function

You can select an existing before-cell function or before-tray function by selecting it from the respective **Before Cell Function** or **Before Tray Function** dropdown list. In addition, you have the option of creating a new before-cell or before-tray function.

Do the following to create a new before-cell or before-tray function:

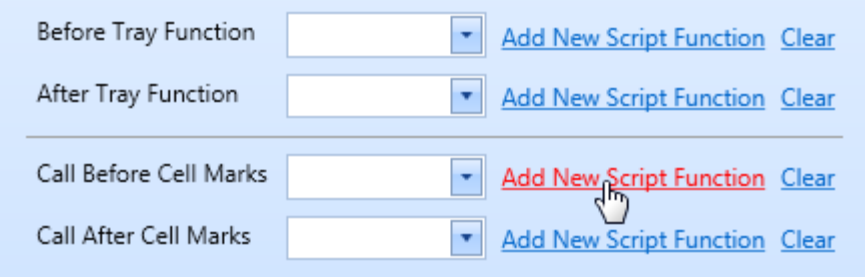


FIGURE 619: CREATING THE BEFORE-CELL OR BEFORE-TRAY FUNCTION

1. Click the **Properties** tab of the tray marking automation object.
2. Left-click the **Add New Script Function** link to the right of the **Call Before Cell Marks** dropdown list. The **Edit Function** dialog box will be displayed.

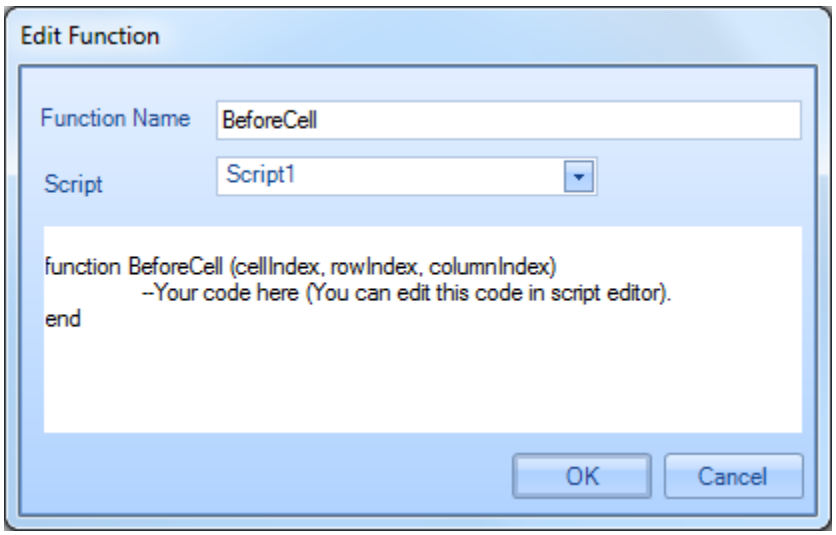


FIGURE 620: THE EDIT FUNCTION DIALOG BOX

3. Enter the name of the new function in the **Function Name** field.
4. Using the **Script** dropdown list, select the script file to which the function is to be added. Then left-click the **OK** button.

To remove the Before-cell or Before-tray function that is currently listed at the top of the (**Call Before Cell Marks or Before Tray Function** respectively) dropdown list, press the **Clear** link.

Note: The coding for the function can be edited using the **Script editor**. Refer to "To start scripting" on page 528 for more information.

Selecting or creating a post-execution ScanScript function

You can select an existing after-cell function or after-tray function by selecting it from the respective **After Cell Function** or **After Tray Function** dropdown list. In addition, you have the option of creating a new after-cell or after-tray function.

Do the following to create a new after-cell or after-tray function:

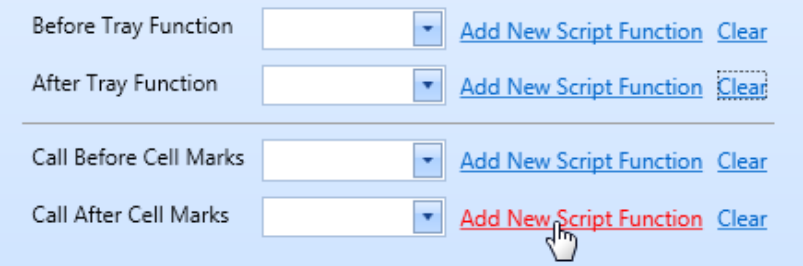


FIGURE 621: CREATING THE AFTER-CELL OR AFTER-TRAY FUNCTION

1. Click the **Properties** tab of the tray marking automation object.
2. Left-click the **Add New Script Function** link to the right of the **Call After Cell Marks or After Tray Function** dropdown list. The **Edit Function** dialog box will be displayed.

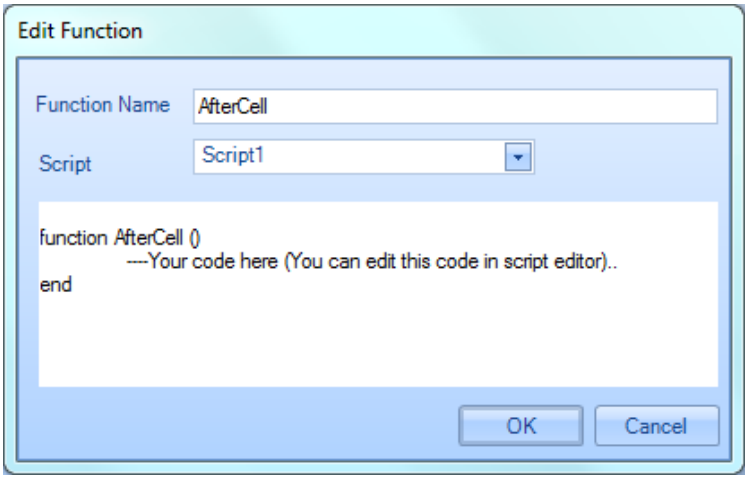


FIGURE 622: THE EDIT FUNCTION DIALOG BOX

3. Enter the name of the new function in the **Function Name** field.
4. Using the **Script** dropdown list, select the script file to which the function is to be added. Then left-click the **OK** button.

To remove the After-cell function or After-tray Function that is currently listed at the top of the (**Call After Cell Marks or After Cell Function** respectively) dropdown list, press the **Clear** link.

Note: The coding for the function can be edited using the **Script editor**. Refer to "To start scripting" on page 528 for more information.

Cell View

The **Cell View** tab provides the ability to edit the tray object at the cell level. In the **Cell View** tab, the dimensions, relative placement, and recipe composition of the cell can be adjusted.

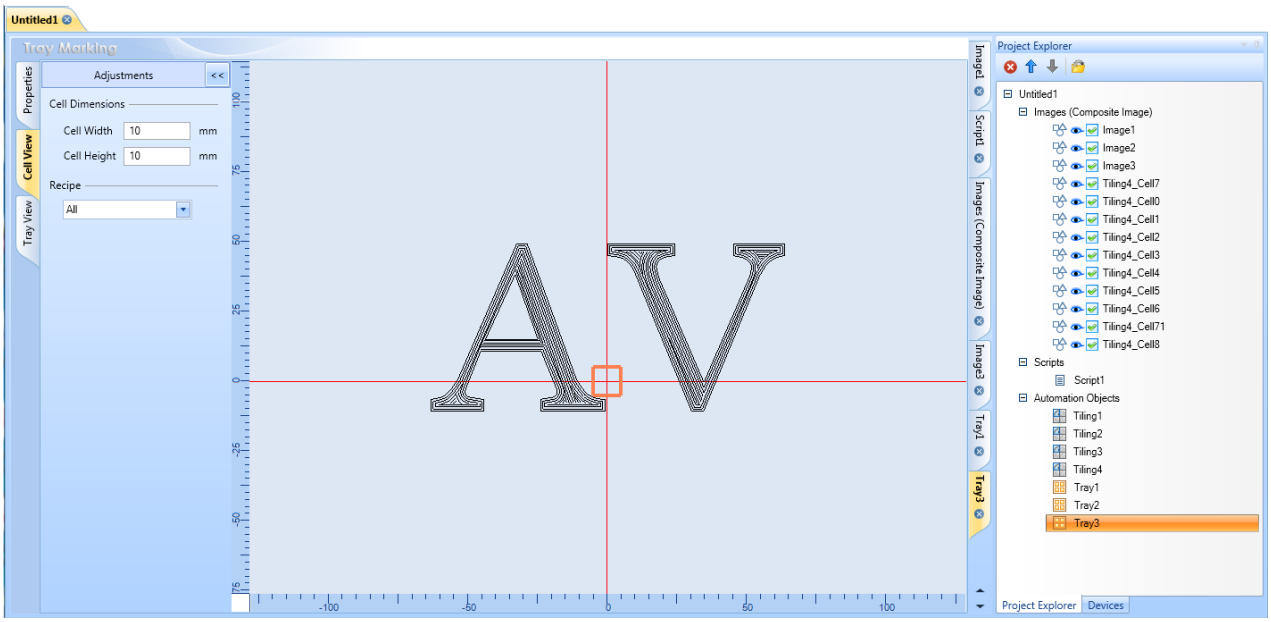


FIGURE 623: CELL VIEW

Cell Dimensions

The fields in the **Cell Dimensions** section can be used to adjust the dimensions and recipe composition of the cell.

The following figure shows the **Cell Dimensions** section for both Cell Types (**Rectangular** and **Circular**).

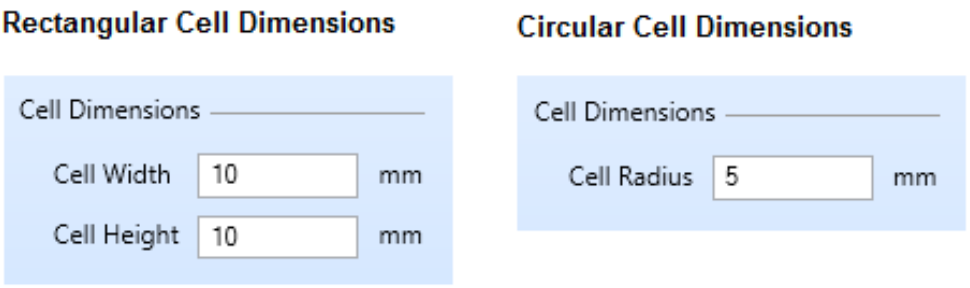


FIGURE 624: CELL DIMENSIONS FOR RECTANGULAR AND CIRCULAR CELLS

Parameter	Description
Cell Width	The width of a Rectangular cell; you can change this value by entering a new number in the text-entry field.
Cell Height	The height of a Rectangular cell; you can change this value by entering a new number in the text-entry field.
Cell Radius	The radius of a Circular cell; you can change this value by entering a new number in the text-entry field.

Recipe

The **Recipe** dropdown list could be used to view cells with various image compositions, which were defined with the **Selected Image** property in the tray view. The dropdown list contains all the combinations of the image compositions made in the **Selected Image** property and can be applied to any of the combinations of the cell to view it and adjust the cell visually.

Note: The **Recipe** drop-down list provides options for selection and editing of image compositions based on the applied marking images for different cells. The available recipe configuration options in the **Recipe** dropdown list will reflect the image variances (image compositions of cells) within the tray grid. For more information, see "Selected Images" on page 469.

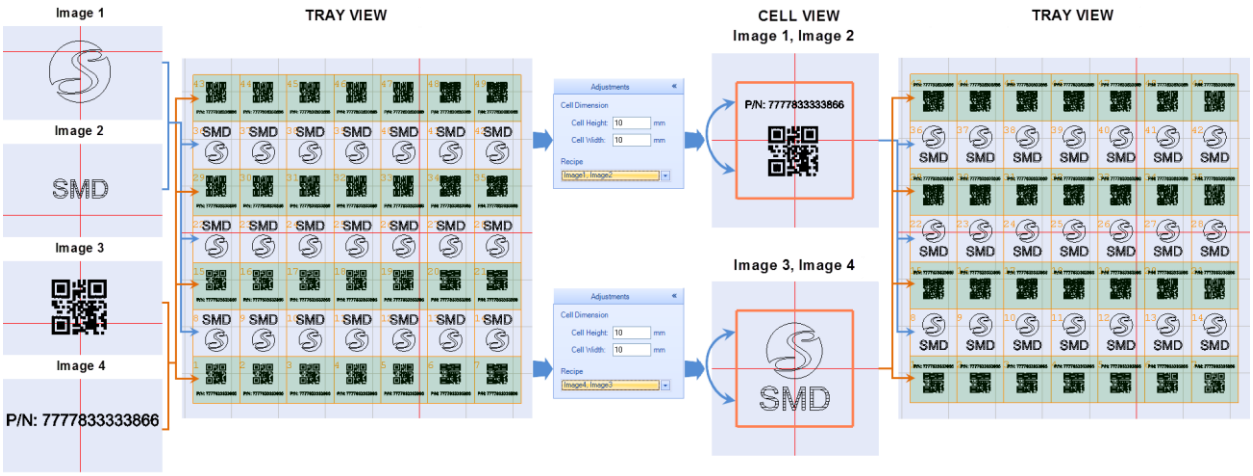


FIGURE 625: RECIPE COMPOSITION

Parameter	Description
Tray Location X	The X-axis coordinate of the lower-left corner of the tray grid; you can change this value by entering a new number in the text-entry field.
Tray Location Y	The Y-axis coordinate of the lower-left corner of the tray grid; you can change this value by entering a new number in the text-entry field.
Tray Angle	The angle at which the tray is placed; you can change this value by entering a new number in the text-entry field. An example of an adjusted tray angle is shown in the following figure.

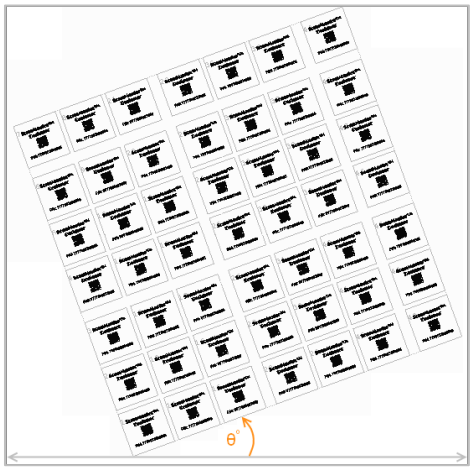


FIGURE 626: TRAY ANGLE

Selection

The **Selection** section of the **Tray View** tab contains the **Selection Mode** dropdown list. The Selection Mode allows you to specify an individual cell, or a group of cells, for marking.

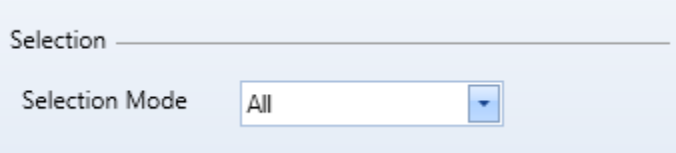
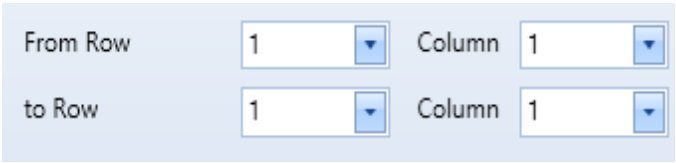
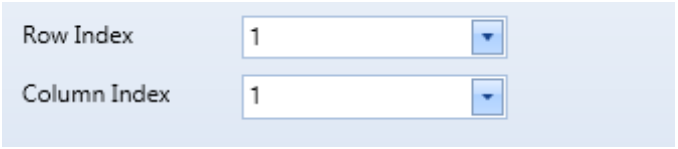


FIGURE 627: SELECTION SECTION

Selection option	Description
All	Performs marking on all of the cells in the tray. When this option is selected, all of the cells in the tray grid will be highlighted.
Even Columns	Performs marking on all of the even-numbered columns in the tray. When this option is selected, all of the even-numbered columns in the tray grid will be highlighted.
Even Rows	Performs marking on all of the even-numbered rows in the tray. When this option is selected, all of the even-numbered rows in the tray grid will be highlighted.
Odd Columns	Performs marking on all of the odd-numbered columns in the tray. When this option is selected, all of the odd-numbered columns in the tray grid will be highlighted.
Odd Rows	Performs marking on all of the odd-numbered rows in the tray. When this option is selected, all of the odd-numbered rows in the tray grid will be highlighted.
Rectangular Region	Performs marking on all of the cells in a specified rectangular region of the tray. When this option is selected, the following dropdown lists will appear in the **Selection** section of the **Adjustments** window.  • **From Row** – Select the starting row position of the rectangular region from this dropdown list. Select the starting *column* position of the rectangular region from the accompanying **Column** dropdown list. • **To Row** – Select the ending row position of the rectangular region from this dropdown list. Select the ending *column* position of the rectangular region from the accompanying **Column** dropdown list. The specified rectangular region will be highlighted in the tray grid.

Selection option	Description
Single Cell	Performs marking on one specified cell in the tray. When this option is selected, the following dropdown lists will appear in the **Selection** section of the **Adjustments** window.  • **Row Index** – Select the row position of the specified cell from this dropdown list. • **Column Index** – Select the column position of the specified cell from this dropdown list. **Note:** As an alternative to selecting the row index and the column index from the dropdown lists, you can left-click a specific cell in the tray grid. The specified cell will be highlighted in the tray grid.
Specific Column	Performs marking on a specified column in the tray. When this option is selected, the following dropdown list will appear in the **Selection** section of the **Adjustments** window. Select the column to be marked from the **Column Index** dropdown list. The selected column will be highlighted in the tray grid.
Specific Row	Performs marking on a specified row in the tray. When this option is selected, the following dropdown list will appear in the **Selection** section of the **Adjustments** window. Select the column to be marked from the **Row Index** dropdown list. The selected row will be highlighted in the tray grid.

Selection Mode Examples – All, Even Columns, and Even Rows

In the following figure, the highlighted cells are the ones that would be selected under the specified Selection Mode (**All**, **Even Columns**, or **Even Rows**).

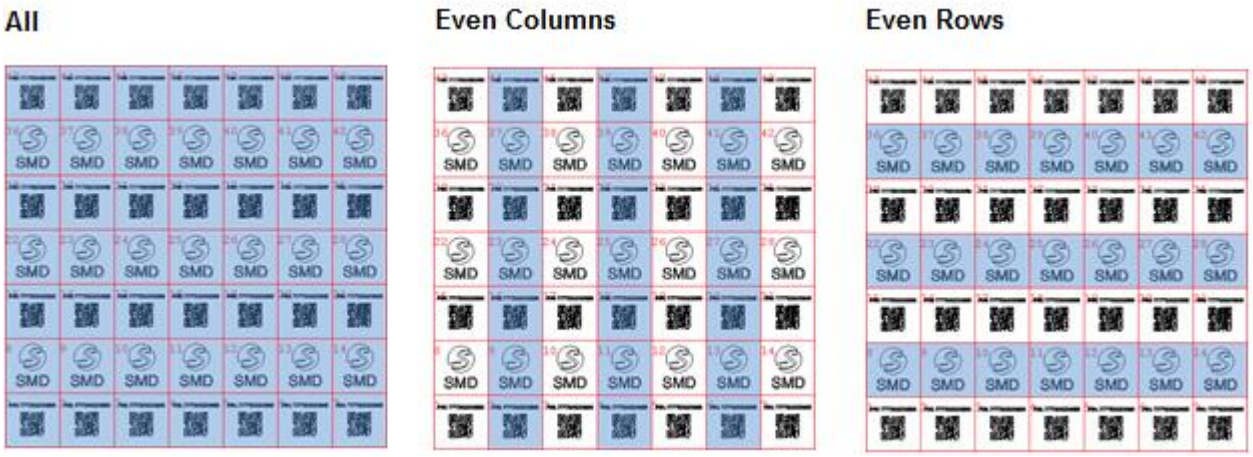


FIGURE 628: SELECTION MODE EXAMPLES – ALL, EVEN COLUMNS, AND EVEN ROWS

Selection Mode Examples – Odd Columns, Odd Rows, and Rectangular Region

In the following figure, the highlighted cells are the ones that would be selected under the specified Selection Mode (**Odd Columns**, **Odd Rows**, or **Rectangular Region**).

Note: In the **Rectangular Region** example, the **From Row** and **Column** are 3 and 2 respectively and the **To Row** and **Column** are 6 and 5 respectively.

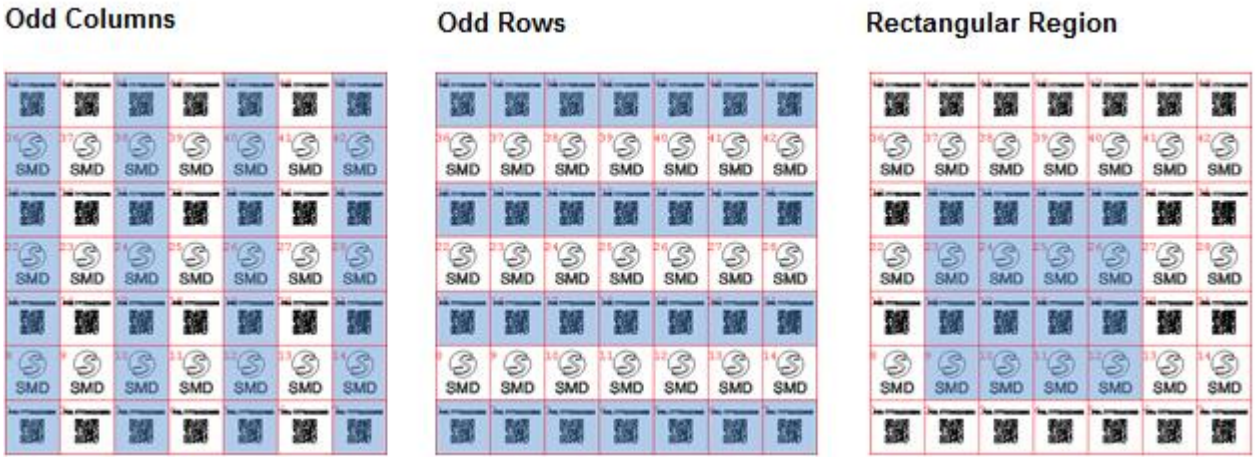


FIGURE 629: SELECTION MODE EXAMPLES – ODD COLUMNS, ODD ROWS, AND RECTANGULAR REGION

Selection Mode Examples – Single Cell, Specific Column, and Specific Row

In the following figure, the highlighted cells are the ones that would be selected under the specified Selection Mode (**Single Cell**, **Specific Column**, or **Specific Row**).

For the **Single Cell** example in the following figure, a **Row Index** of 5 and a **Column Index** of 2 were specified.

For the **Specific Column** example in the following figure, a **Column Index** of 2 was specified.

For the **Specific Row** example in the following figure, a **Row Index** of 5 was specified.

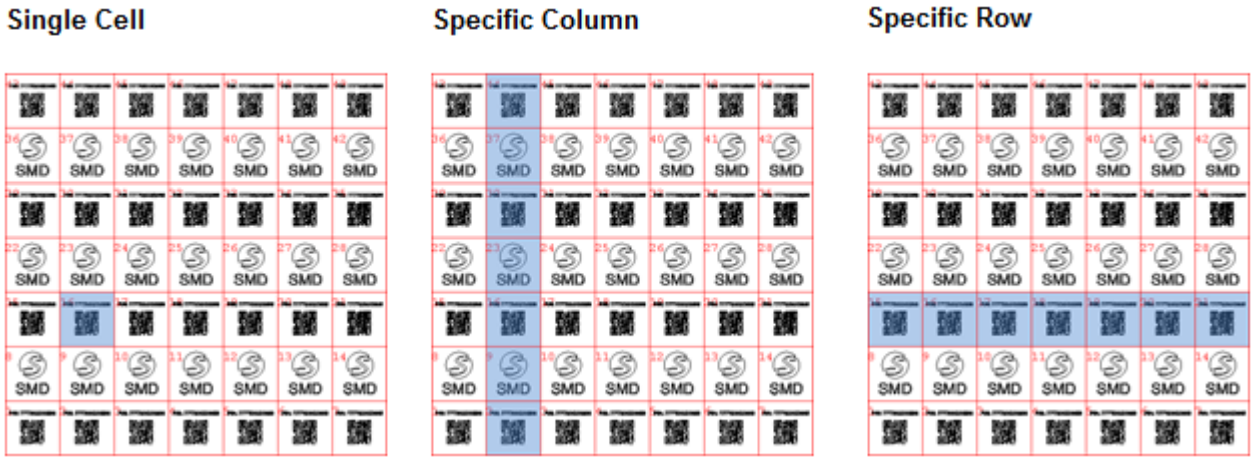


FIGURE 630: SELECTION MODE EXAMPLES – SINGLE CELL, SPECIFIC COLUMN, AND SPECIFIC ROW

Parameters

The **Parameters** section of the **Tray View** tab contains settings that specify cell positioning (offset) and angle with respect to the tray's current location. In addition, the **Parameters** section contains a setting for enabling and disabling marking of the selected cell(s).

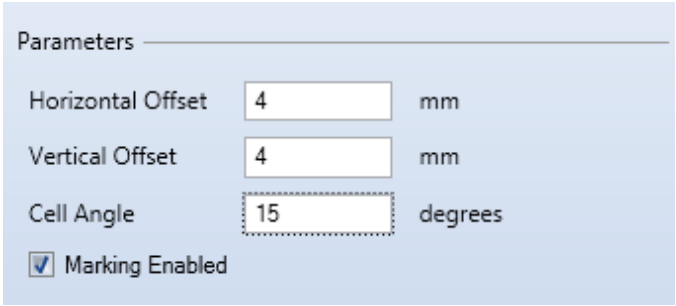
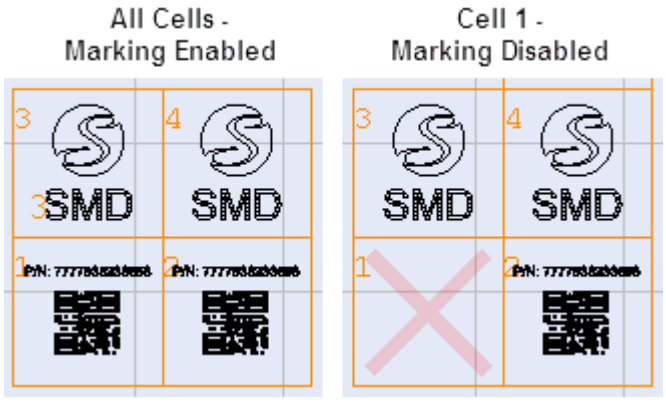


FIGURE 631: PARAMETERS SECTION

Before you specify a value for any of the settings in the **Parameters** section, you must select the cell(s) to which those values will apply. To select a single cell, left-click that cell in the tray grid. To select multiple cells, hold down the **Shift** key while you left-click the cells in the tray grid.

Parameter	Description
Horizontal Offset	The horizontal positioning of the selected cell(s) with respect to the tray's current position; you can change this value by entering a new number in the text-entry field and pressing the **Enter** key.
Vertical Offset	The vertical positioning of the selected cell(s) with respect to the tray's current position; you can change this value by entering a new number in the text-entry field and pressing the **Enter** key.
Cell Angle	The rotation angle for the selected cell(s); you can change this value by entering a new number in the text-entry field and pressing the **Enter** key.
Marking Enabled	When this box is checked, the selected cells are enabled for marking. When this box is *not* checked, the selected cells are disabled for marking. Cells are enabled for marking by default. If a cell is disabled for marking, a red **X** appears in the cell. 

Note: Irrespective of the current location of the cell(s), the offset (**Horizontal Offset** or **Vertical Offset**) would be applied with respect to the original cell location within the tray. The original cell location within the tray is always a **Horizontal Offset** of 0 and a **Vertical Offset** of 0.

Selected Images

The **Selected Images** section of the **Tray View** tab contains the names of all of the 2D images in the current Porject. You can include any combination of these images in any cell(s) of the tray grid.

Do the following to set the contents of cells:

1. Using the **Selection Mode** drop-down list, select the cells for which you want to set the contents.
2. Uncheck (or check) the relevant image checkbox(es) in the **Selected Images** section.

The following figure shows how cell contents can be affected by different combinations of Selection Modes and Selected Images.

In the tray grid on the left side of the figure, the Selection Mode is **All** and the Selected Images are **Image 1** and **Image 2**; every cell in the tray grid contains **Image 1** and **Image 2**.

In the tray grid on the top-right of the figure, the Selection Mode is **Odd Rows** and the Selected Image is **Image 1**; the cells in each odd-numbered row contain **Image 1**.

In the tray grid on the top-right of the figure, the Selection Mode is **Even Rows** and the Selected Image is **Image 2**; the cells in each even-numbered row contain **Image 2**.

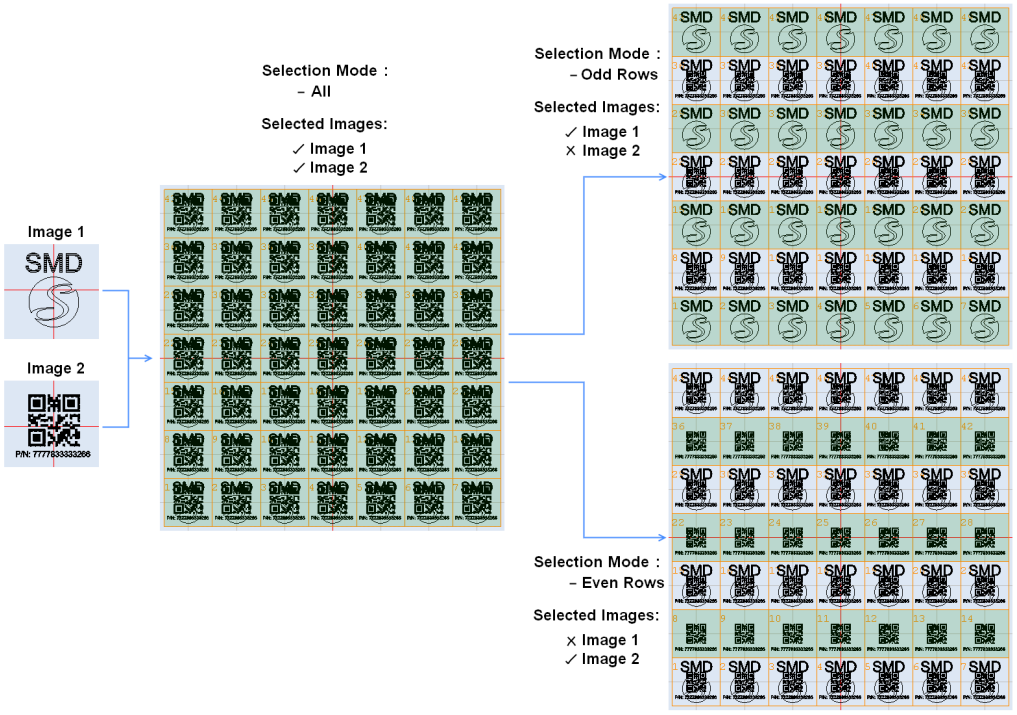


FIGURE 632: SELECTED IMAGES

9.2.2 Scanning Options

ScanMaster Designer contains several tools for tray marking. These tools are enabled when a Tray Automation Object is selected. The tools for tray marking are in the **Home | Mark** panel of the **Ribbon**.

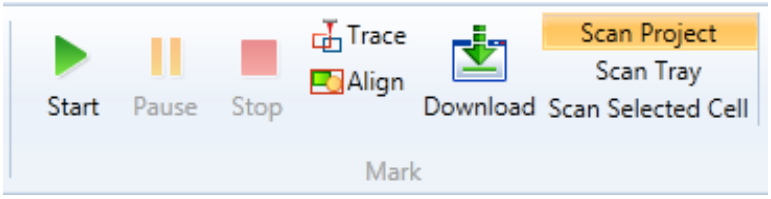


FIGURE 633: THE HOME | MARK GROUP

Scanning Option	Description
Scan Project	Scans the entire ScanMaster Designer project images including any script files and automation objects that the project contains
Scan Tray	Scans only the active Tray Automation object within the ScanMaster project
Scan Selected Cell	Scans only the selected cell(s) of the Tray Automation object grid

9.2.3 Aligning and Tracing Options

Align

The **Align** option helps to align the bounding box of the Tray object on the actual workpiece with the help of the guide laser.

Scanning Option	Description
Scan Project	Projects the merged bounding box of all the objects in the project, including images, script outputs.
Scan Tray	Projects the bounding box of the active Tray.
Scan Selected Cell	Projects the bounding box of the selected cell(s) of the Tray Marking Automation Object grid.

Trace

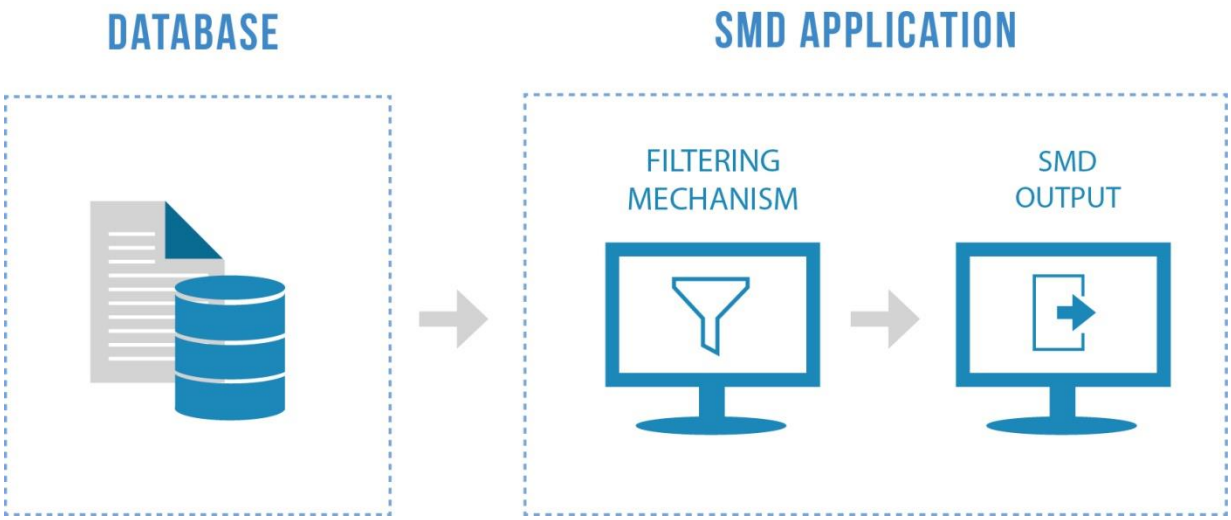
The **Trace** option projects a marking simulation of the specified marking object, where this could be used to determine the actual output of the marking job, based on the specified parameters and settings.

Scanning Option	Description
Scan Project	Projects an outline of the images including any script files and automation objects that the project contains.
Scan Tray	Projects and outline of only the active Tray Automation object within the ScanMaster project.
Scan Selected Cell	Projects an outline of only the selected cell(s) of the Tray Automation object grid.

9.3 DATABASE CONNECTIVITY

Database Connectivity is useful when it is necessary to retrieve data from external database files. Typical applications for database connectivity include the reading of serial numbers for production unit identification and the reading of barcode information or batch number identification codes. Additionally, positioning mechanisms enable the precise arrangement of the marking objects as required.

Database Connectivity helps you to automate your repetitious marking, while still maintaining the highest levels of quality.



Database Connectivity is implemented for the currently active Project. To implement Database Connectivity for a Project, you must open the Project and initialize database connectivity for it. Refer to "Initializing the Database Connectivity instance" on page 473 for information on how to do this.

After you have initialized database connectivity, you can build and manage database queries. Database queries can be used for data filtration, for retrieving data from the database, and for inserting, updating, and deleting data in the database. Refer to "Query Management" on page 481 for more information on these operations.

ScanScript Assistant can be used to display a real-time log of a server communicating between the scan card and a database. For more information, refer to "ScanScript Assistant" on page 487.

9.3.1 Initializing the Database Connectivity instance

In order to use Database Connectivity, a Database Connectivity instance must be initialized for the current Project.

Do the following to initialize a Database Connectivity instance for the current Project:

3. Left-click the **Database Connectivity** icon in the **Project | Automation** panel of the **Ribbon**. This will add a new instance of the Database Connectivity automation object to the current project, and the **Database Connectivity Properties** window will be displayed.

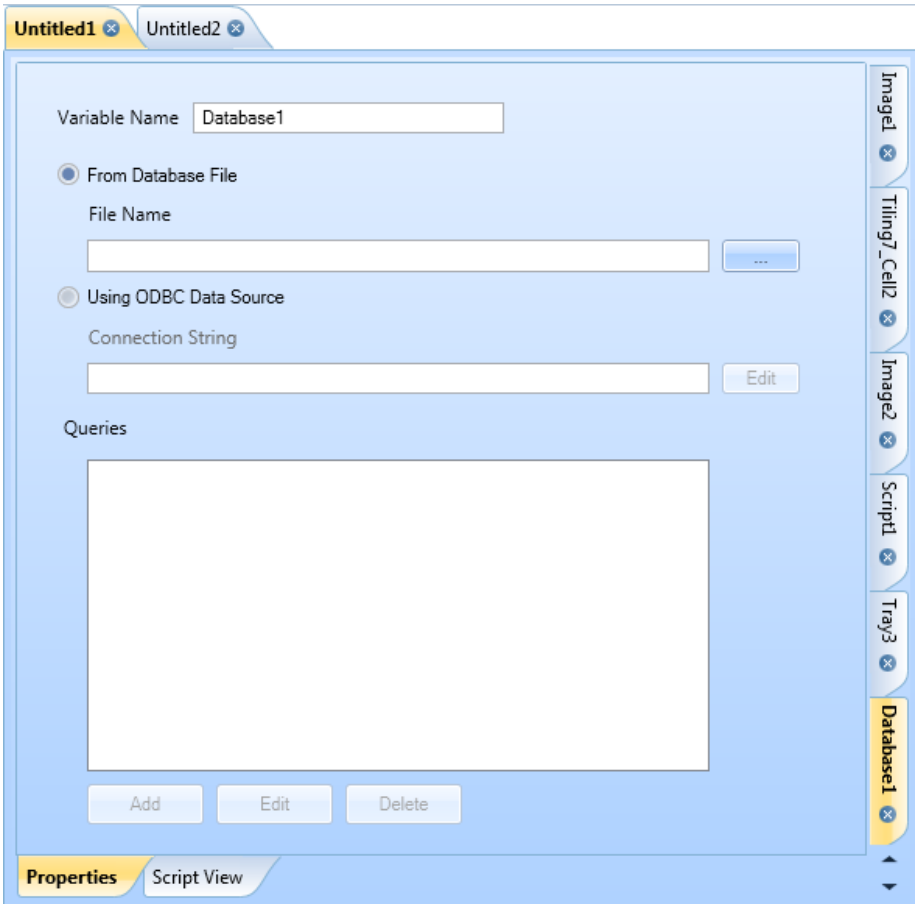


FIGURE 634: DATABASE CONNECTIVITY PROPERTIES WINDOW

4. Enter a name for the Database Connectivity object in the **Variable Name** field. The ScanScript code will refer to the Database Connectivity object by this name. The **Project Explorer** will list the Database Connectivity object by this name.

5. Left-click one of the following radio buttons to specify the source of the database:
    - **From Database File** – The source of the database is a local database file of any supported file type. Refer to "From Database File" on page 474 for more information about selecting a database file and the supported file types.
    - **Using ODBC Data Source** – The source of the database is a Microsoft OLEDB® Provider object. A Connection String must be entered for the Microsoft OLEDB® Provider object. Refer to "Using ODBC Data Sources" on page 474 for more information about entering the Connection String.

This completes the initialization of the Database Connectivity instance. Now you can add queries to the Database Connectivity object. Refer to "Defining (Adding) Queries" on page 481 for information on how to do this.

From Database File

When **From Database File** is selected, the database file can be any locally stored Microsoft Access® Database or any locally stored Microsoft Excel® Spreadsheet.

If this option is selected, you must select the database file by left-clicking on the **Browse** button and browsing to the desired file. The full path of the file will appear in the **File Name** field.

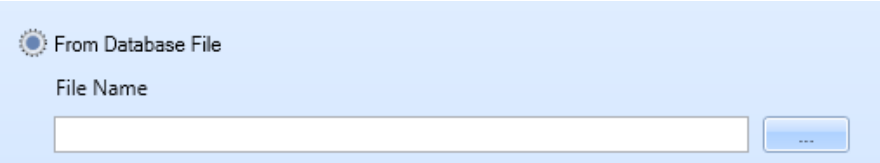


FIGURE 635: DATABASE FILE SELECTION

Note: Microsoft Access® Database files have filename suffixes of **.mdb** or **.accdb**. Microsoft Excel® Spreadsheet files have filename suffixes of **.xls** or **.xlsx**.

Using ODBC Data Sources

When **Using ODBC Data Sources** is selected, the database file must be a Microsoft OLEDB® Provider object.

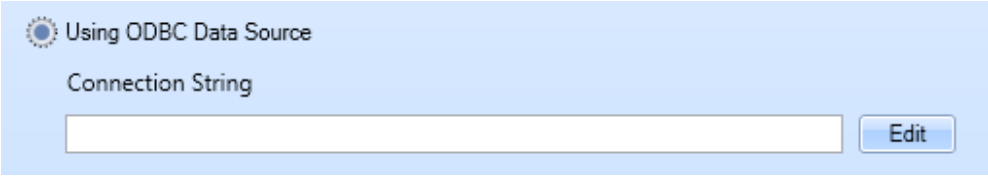
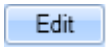


FIGURE 636: USING ODBC DATA SOURCE

If this option is selected, you must enter Data Source information and Login information for the Microsoft OLEDB® Provider object.

Do the following to add Data Source information and Login information for the Microsoft OLEDB® Provider object:

6. Left-click the Edit button 

beside the **Connection String** field in the **Database Connectivity Properties** window. The **Add Connection** dialog box is displayed.

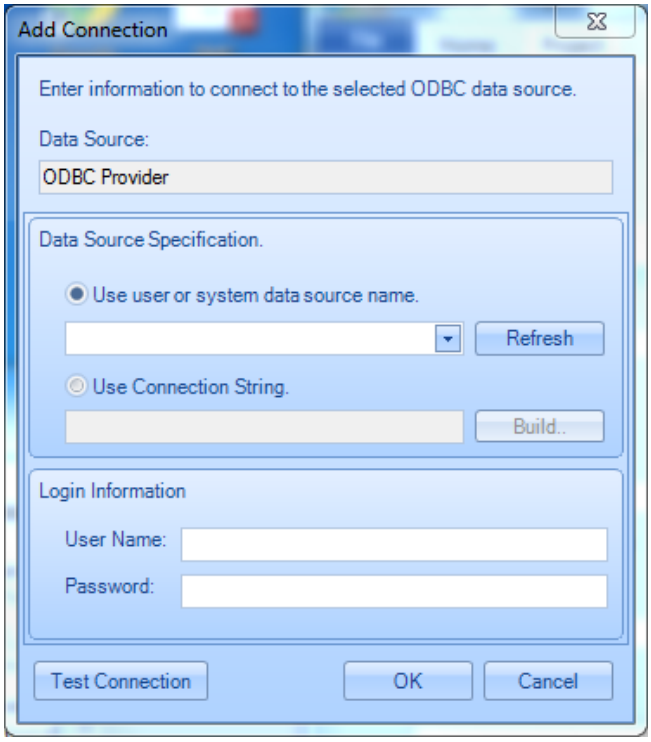


FIGURE 637: ADD CONNECTION WINDOW

7. Enter the Data Source information in the **Data Source** field.
8. Left-click one of the following radio buttons to select a Data Source Specification:
    - **Use user or system data source name** – A predefined data source name will be used as the Data Source Specification. The predefined data source name is selectable from the dropdown list that appears below this radio button. Left-click the **Refresh** button (to update the dropdown list). Then select a predefined data source name from the dropdown list. Refer to "Predefined data source names" on page 477 for more information about this option.

- **Use Connection String** – This option allows you to custom-build a Connection String to use as a Data Source specification. After you select this radio button, left-click the **Build** button to display the **Select Data Source** dialog box. You can use the **Select Data Source** dialog box to custom-build a Connection String. Refer to "Custom-building a connection string" on page 478 for more information.

9. If login credentials are required for database access, enter them in the following fields of the **Login Information** section:
    - **User Name** – The user name that must be entered for database access
    - **Password** – The password that must be entered for database access
10. Left-click the **Test Connection** button to verify your connection to the data source. If the connection is successful, the following message is displayed.

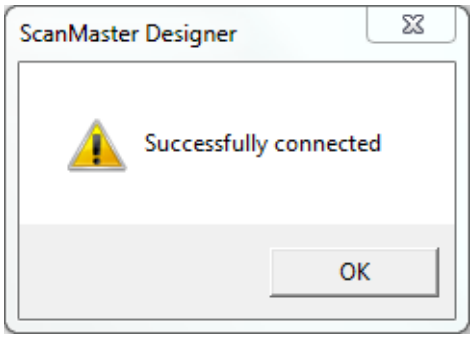


FIGURE 638: SUCCESSFULLY CONNECTED MESSAGE DIALOG

11. Click the **OK** button in the **Add Connection** dialog box. This completes the creation of the Connection String for the ODBC data source. This Connection String is now displayed in the **Connection String** field of the **Database Connectivity Properties** window.

Now you can add queries to Database Connectivity instance as described in "Defining (Adding) Queries" on page 481.

Predefined data source names

The predefined data source names appear in the dropdown list in the **Data Source Specification** section of the **Add Connection** dialog box.

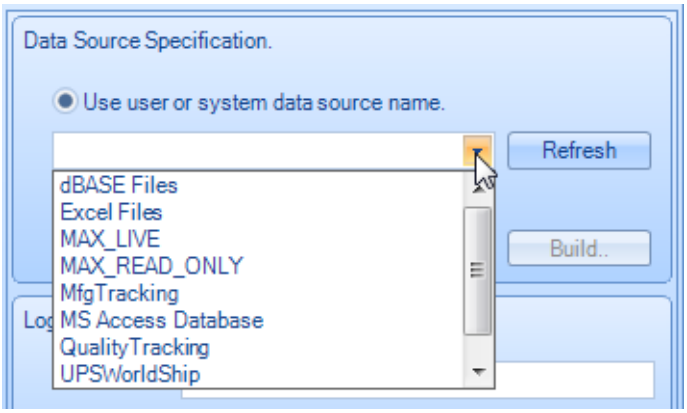


FIGURE 639: DROPDOWN LIST OF PREDEFINED DATA SOURCE NAMES

When a predefined data source name is selected from the dropdown list, the Connection String for that data source name is populated into the field below the **Use Connection String** radio button. In the following example, the Connection String for **dBase Files** has been populated into this field.

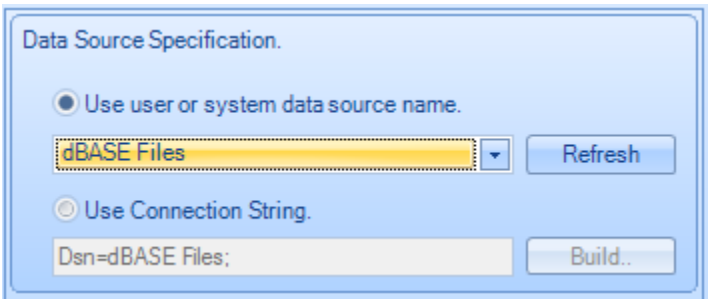


FIGURE 640: CONNECTION STRING FOR A PREDEFINED DATA SOURCE NAME

You can create a predefined data source name with the **Machine Data Source** tab of the **Select Data Source** dialog box. Refer to "Creating a predefined data source name" on page 479 for how to use the **Machine Data Source** tab for this purpose. When you create a predefined data source name, it is added to the dropdown list of predefined data source names (see the example of this dropdown list in Figure 639 on page 477).

Custom-building a connection string

You can custom-build a Connection String to use as the Data Source Specification for a Database Connectivity object. To custom-build a Connection String, left-click the **Build** button in the **Add Connection** dialog box as described in "Using ODBC Data Sources" on page 474. Left-clicking the **Build** button displays the **Select Data Source** dialog box.

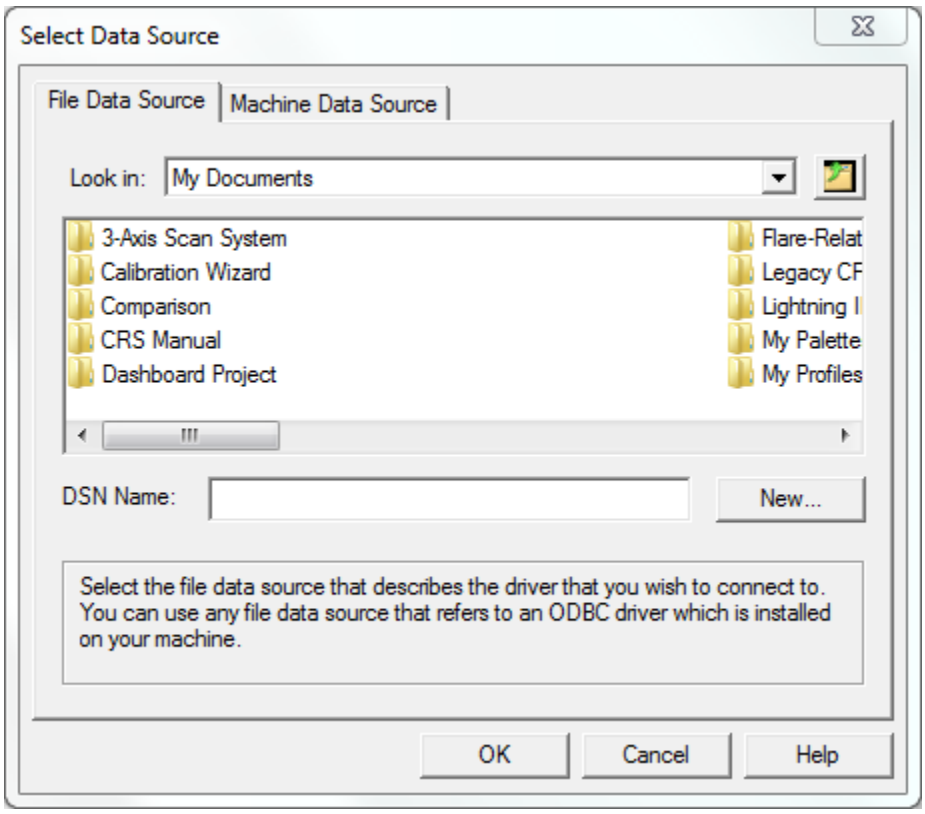


FIGURE 641: SELECT DATA SOURCE DIALOG BOX

Creating a predefined data source name

Do the following to create a predefined data source name in the **Select Data Source** dialog box:

12. Left-click on the **Machine Data Source** link. This displays the **Machine Data Source** tab.

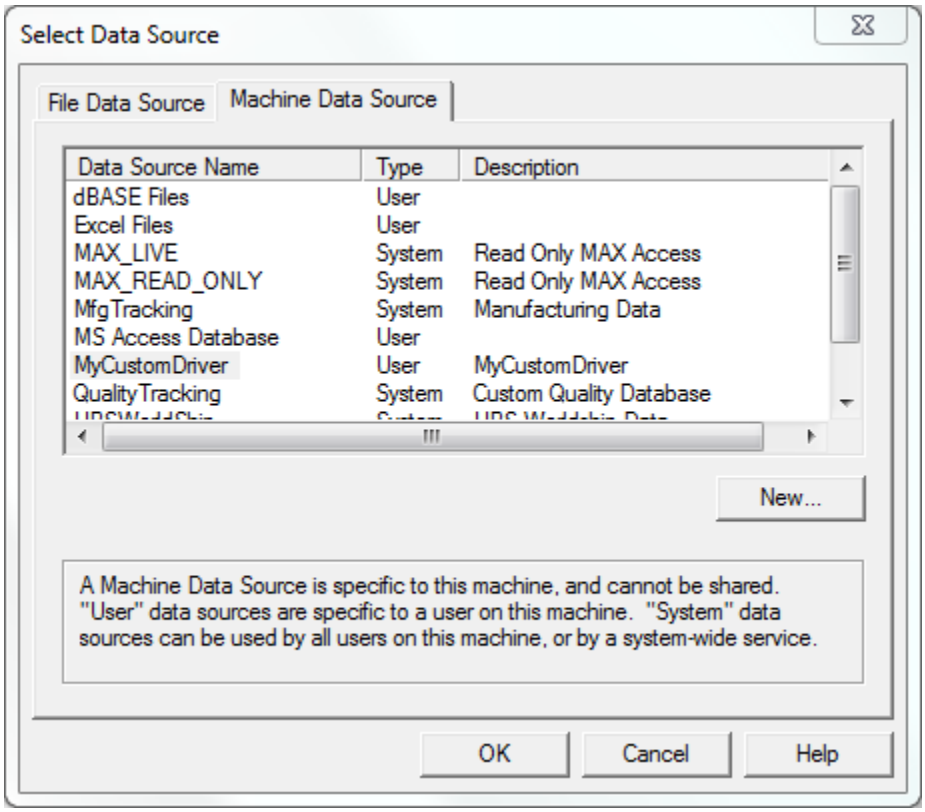


FIGURE 642: THE MACHINE DATA SOURCE TAB

13. Left-click the **New…** button on the **Machine Data Source** tab. This opens the **Create New Data Source** Wizard.
14. Left-click one of the following radio buttons in first screen of the **Create New Data Source** Wizard:
    - **User Data source (Applies to this machine only)** – Creates a data source that is specific to this machine and visible only to you.
    - **System Data source (Applies to this machine only)** – Creates a data source that is specific to this machine and usable to any user who logs on to this machine.

15. Left-click the **Next >** button. This displays a list of drivers.

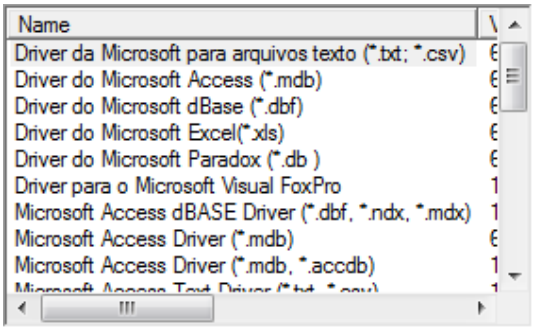


FIGURE 643: LIST OF DRIVERS

16. Select the driver for which you want to set up the data source. Then left-click the **Next >** button. This displays the final screen of the **Create New Data Source** Wizard.

17. Left-click the **Finish** button to create the data source and exit the Wizard. If you are prompted for more information, supply it in the subsequent screen(s) and click the **OK** button. This redisplays the **Machine Data Source** tab of the **Select Data Source** dialog box.

The newly created data source is highlighted in the list of data sources

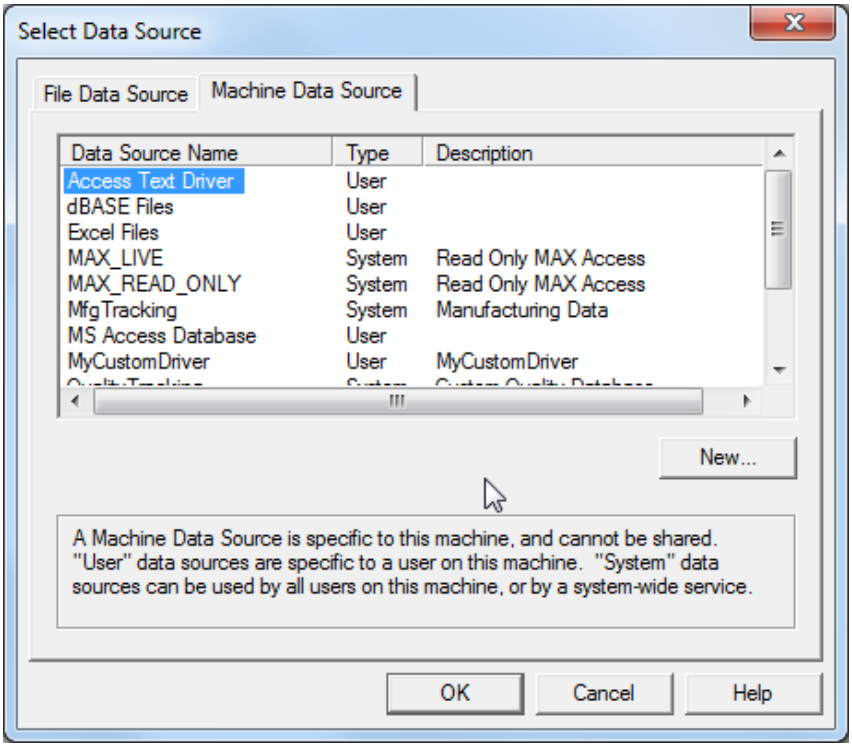


FIGURE 644: LIST OF DATA SOURCES

9.3.2 Query Management

The **Queries** section of the **Database Connectivity** window allows you to build queries to create instances of data filtration. Additionally, it can be used to edit and delete existing queries.

Defining (Adding) Queries

You can add a query to any Database Connectivity object for which a data source has been configured.

Do the following to add a query to a Database Connectivity object:

18. Left-click the Database Connectivity object in the **Automation Objects** tree of the **Project Explorer**. This displays the **Database Connectivity Properties** window for the object.

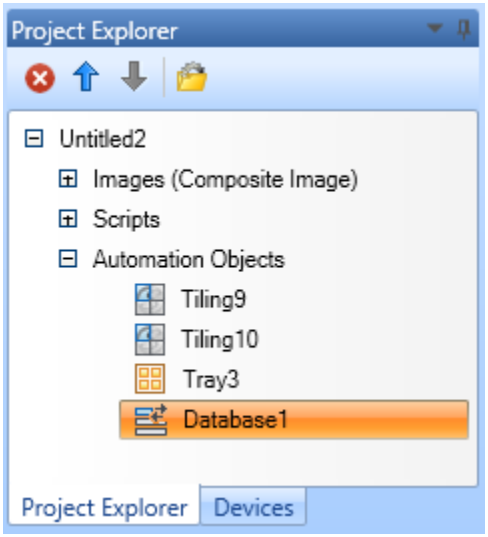


FIGURE 645: DATABASE CONNECTIVITY OBJECT ON THE PROJECT EXPLORER

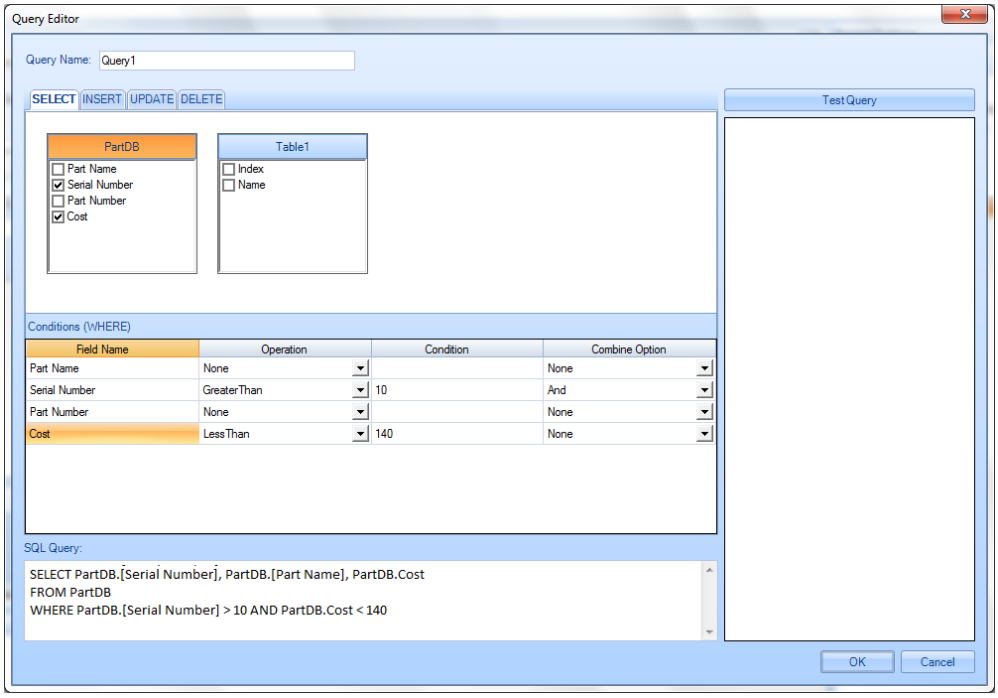


FIGURE 646: SQL SELECT QUERY

The Query Editor window consists of following fields:

- **Database Tables and Fields selection** – This control shows the tables and fields which are embedded in to the database. User can select which Tables and/or Fields are required to be updated with the query by checking the check boxes in front of them.
- **Conditions (WHERE) panel** – Provide support to build a complete SQL query by specifying the type of the query, Operations, Condition and the Combine options.
- **SQL Query panel** – The SQL Query panel shows the generated SQL query. The query can be edited by the user.
- **Test query** – By pressing **Test Query**, the query will be applied to the database. If the query returns any result, they will be listed in the results field below.

Do the following to create a query:

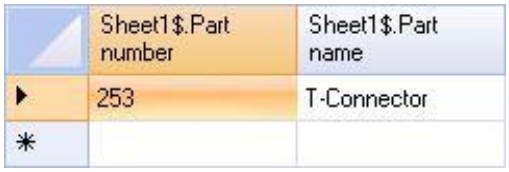
1. Enter the name of the query under the **Query Name** field. The Name of the query is used in the ScanScript to execute the query.
2. Specify the SQL operation by selecting the relevant tab (e.g., if the query is to retrieve data from the table(s), select **Select**; if data is to be inserted into the table, select **Insert**).

Retrieving data from the Database

Data could be retrieved from the database by means of executing a Select statement.

1. Select the **Select** tab in the **Query Editor**.
2. Select the fields required to be retrieved by checking the relevant checkboxes under each worksheet/table.
3. Construct the data searching rule by specifying Condition and Operations fields.
4. If more than one rule is to be combined, use the **Combine Option** dropdown list to specify a combining option for the current rule and then continue constructing the next rule. The former rule will be combined with the latter one using the combine options defined.
5. The constructed SQL query will be shown at the **SQL Query** panel, and can be edited manually.

6. To check if the SQL query has been constructed properly and yields the required result(s), the query could be tested using the **Test Query** tab. Once the **Test Query** button is clicked, the query would be executed and the results displayed.

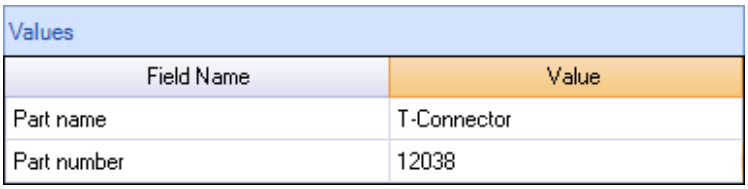


	Sheet1$.Part number	Sheet1$.Part name
▶	253	T-Connector
*		

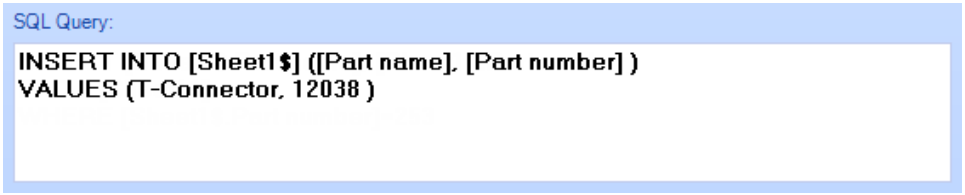
Inserting data to the Database

Data could be inserted to the database by means of executing an Insert statement.

1. Select the **Insert** tab in the **Query Editor**.
2. Select the fields required to be inserted by checking the relevant checkboxes under each worksheet/table.
3. Enter the values to be inserted using the relevant field under the **Value** column in the **Values** panel.



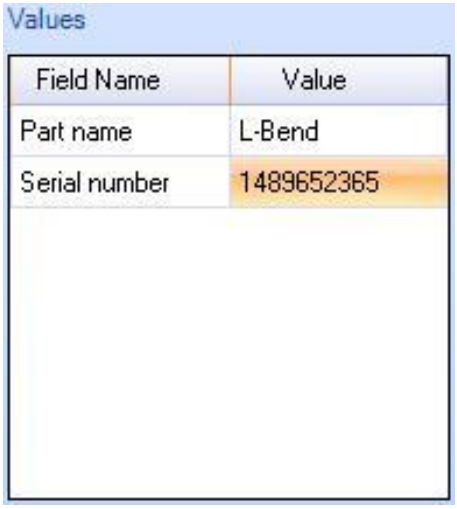
Alternatively, the SQL Query may be edited manually using the **SQL Query** panel.



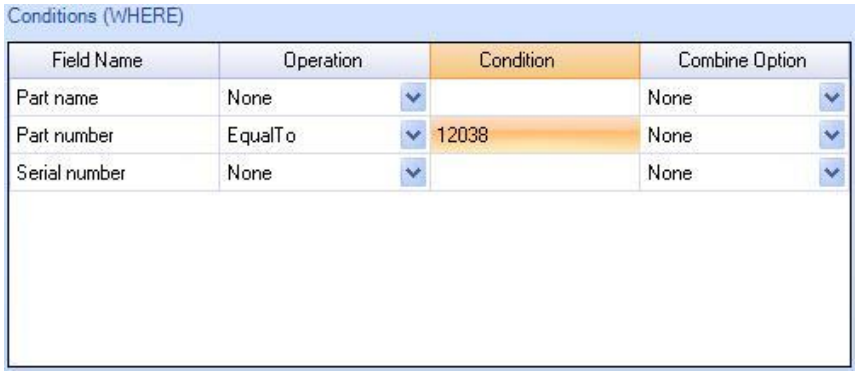
Updating data in the Database

Data in the database could be updated by means of executing an Update statement.

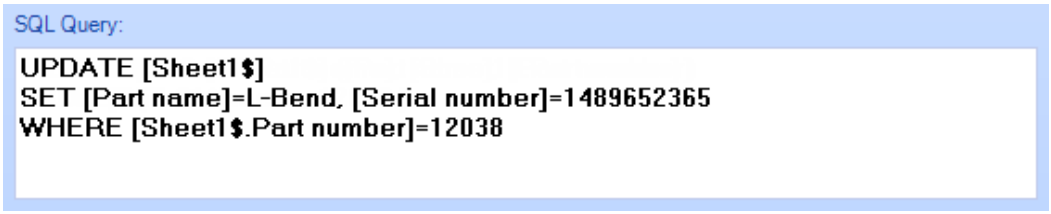
1. Select the **Update** tab in the **Query Editor**.
2. Select the fields required to be updated by checking the relevant checkboxes under each worksheet/table.
3. Enter the field values to be updated with, next to its corresponding field name(s) using the relevant field(s) under the **Value** column in the **Values** panel.



4. Specify the update condition(s) using the fields in the **Conditions (where)** panel.



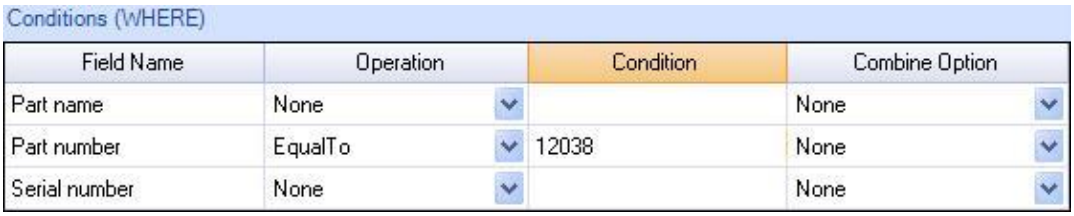
Alternatively, the SQL Query may be edited manually using the **SQL Query** panel.



- Deleting data from the Database

Data could be deleted from the database by means of executing a **Delete** statement.

1. Select the **Delete** tab in the **Query Editor**.
2. Select the worksheet/table to be worked upon using by checking the relevant checkbox corresponding to each worksheet/table.
3. Construct the condition(s) by which data is to be deleted using the **Conditions (where)** panel.



Alternatively, the SQL Query may be edited manually using the **SQL Query** panel.

Editing Queries

Queries which have been created could be modified as required. To do this,

1. Select the query to be edited using the **Query Builder** panel of the **Database Connectivity** object.
2. Click the **Edit** button.
3. Modify the query as required using the **Query Editor** window.
4. Click **OK** to confirm the changes.

Deleting Queries

Queries which have been created could be deleted as required.

Do the following to delete a query:

1. Select the query to the deleted using the Query Builder panel of the Database Connectivity object.
2. Click the Delete button.

9.4 SCANSCRIPT ASSISTANT

The Scan**Script Assistant** tool located in the **Automation** group on the **Project** tab displays a real-time logger that represents a server communicating between the scan card and the database.

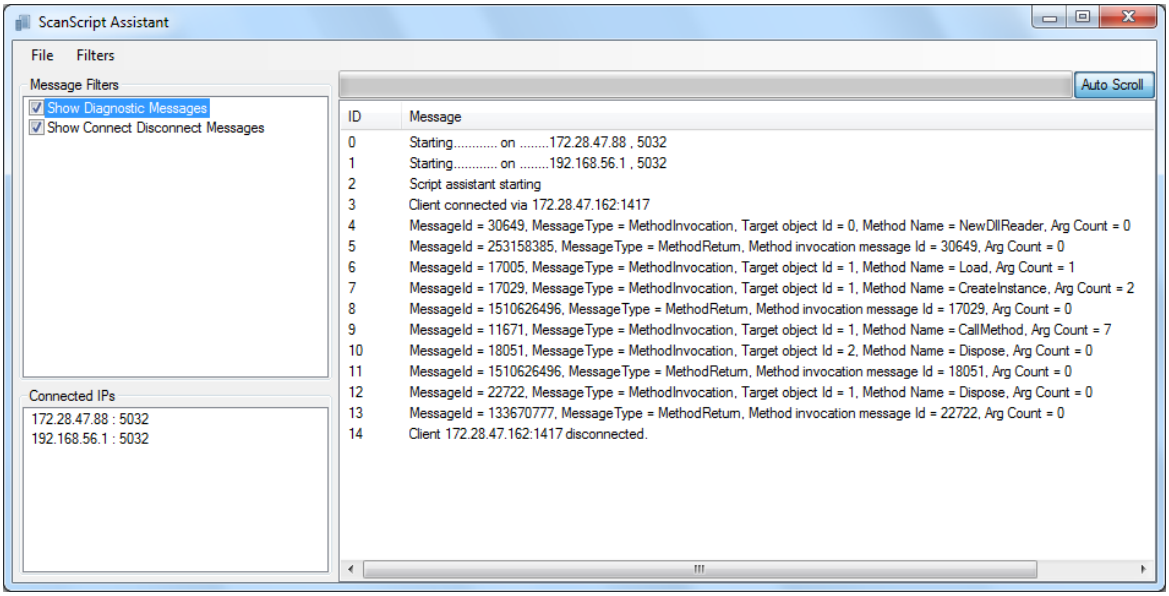


FIGURE 647: SCANSCRIPT ASSISTANT

9.5 DLL AUTOMATION

Dynamic Link Library automation (Dll Automation) is a technique which is used to retrieve public properties and functionalities from a **.net** dll. Here, a particular dll file can be loaded into ScanMaster Designer and then the public members (constructors, methods, and properties) can be selected. Then those selected members can be accessed and invoked in ScanScript.

Dll automation is possible in ScanMaster Designer by means of the **Dll** option located in the **Project |Automation** panel.

Components of Dll automation in ScanMaster Designer include the following:

- Initializing the Dll Automation Object
- Member Selection
- Edit Selected Members
- Auto Generated Script

9.5.1 Initializing the Dll Automation Object

Dll automation is possible in ScanMaster Designer by means of the **Dll** option located in the **Project |Automation** panel.

1. Click the **Dll** option located in the **Project |Automation** panel.
2. This will display a dialog box which allows a user to select a **dll** file as shown below.

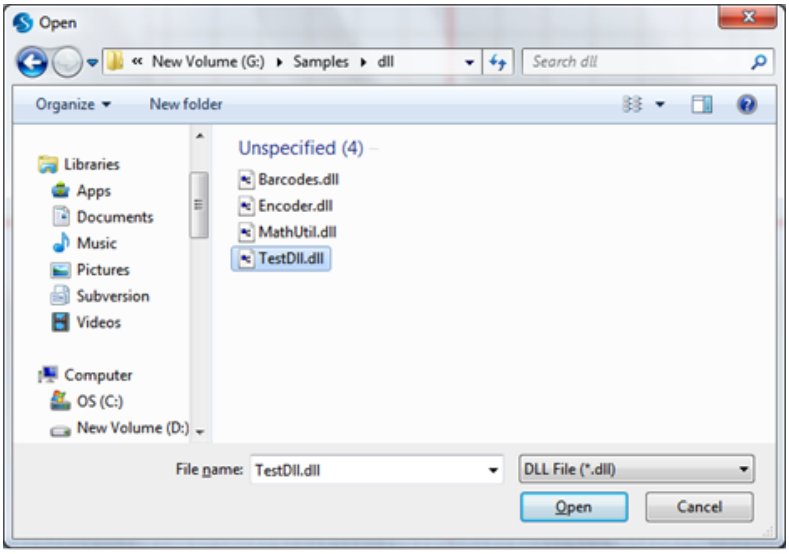


FIGURE 648: SELECTING A DLL FILE

3. This will add a new instance of the Dll automation object to the current project, and the following window will be displayed.

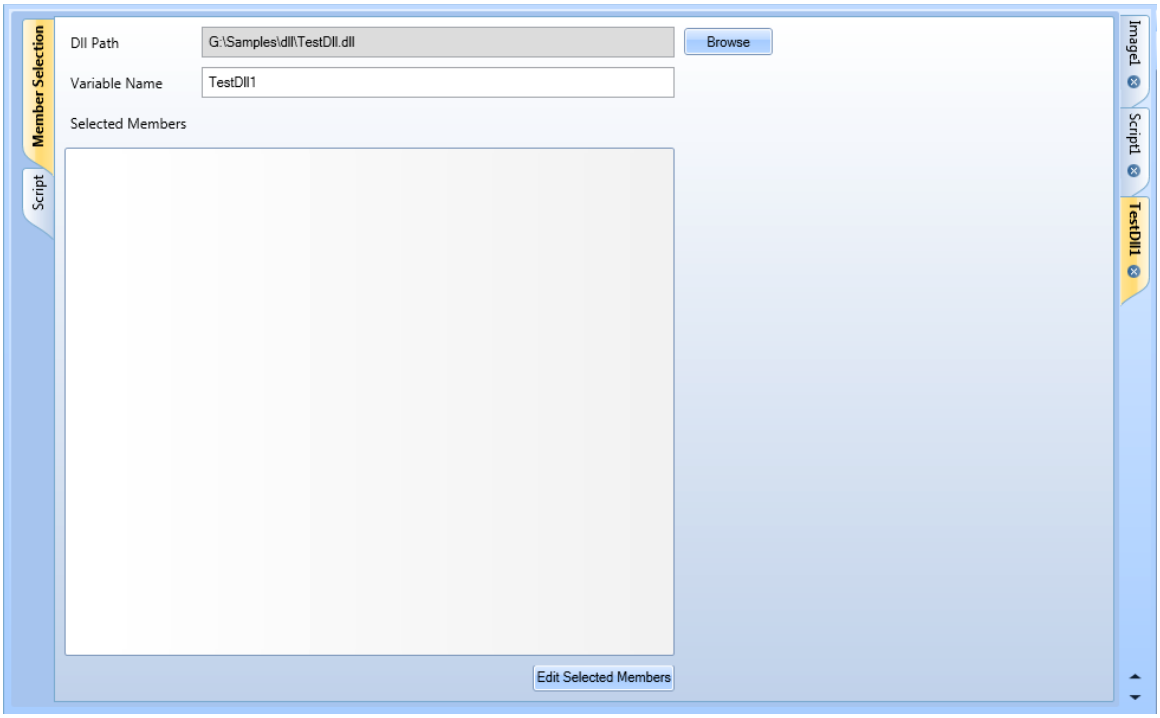


FIGURE 649: THE MEMBER SELECTION SCREEN

Note: When a dll is modified, the Script Assistance needs to restart in order to see new changes in the dll.

9.5.2 Member Selection

The Member selection window provides the important information which is required to define the dll object. This information includes the following:

- **Dll Path** – This displays the dll path of the selected dll file. You can change the dll file path using the **Browse** button.

- **Variable Name** – This displays the variable name of the automation object. The script refers to the dll object by this name.

Selected Members

On this screen all of the selected members (constructors, methods and properties) are displayed. Members can be selected by clicking **Edit Selected Members** button.

The selected members of the dll will be listed in this field. The members include constructors, properties, and methods. Only the selected members can be used in the ScanMaster Designer project to extend its functionalities.

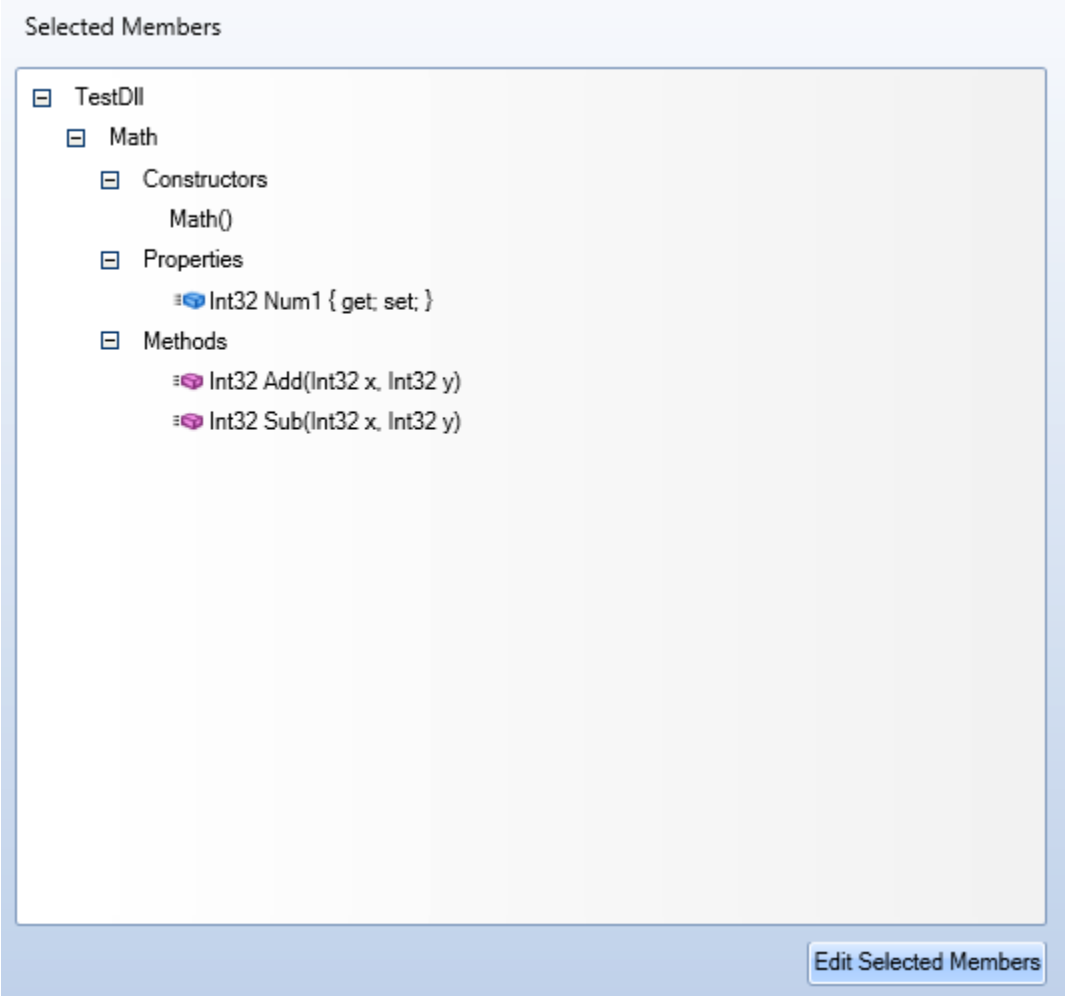


FIGURE 650: THE SELECTED MEMBERS SCREEN

9.5.3 Edit Selected Members

Members of the loaded .net dll file can be selected as required. To select members, do the following:

1. Select the **Member Selection** tab.
2. Click the **Edit Selected Members** button, which is located bottom of the tab. The **Edit Selected Members** window would be displayed.

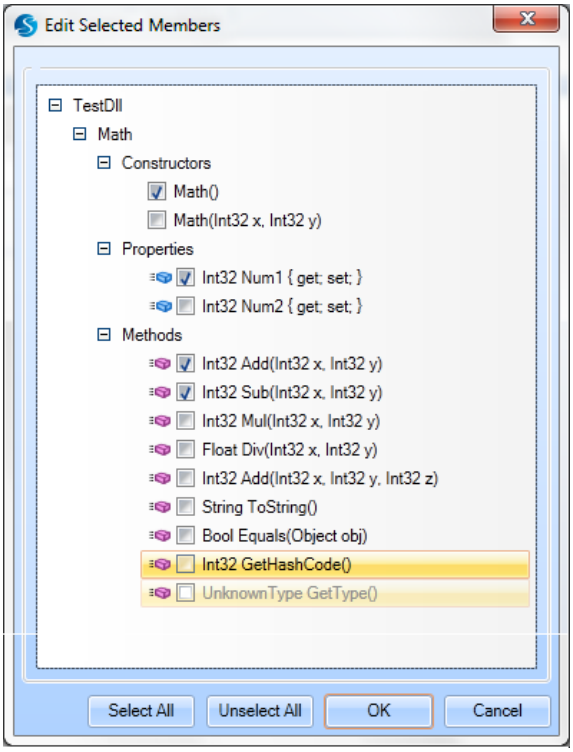


FIGURE 651: THE EDIT SELECTED MEMBERS WINDOW

Note: Non-static members are disabled for selecting until at least one constructor is selected.

3. Select the required members and click the **OK** button. The selected members are displayed under **Selected Members** in the **Members Selection** tab.
4. Click the OK button to return from the dialog and continue using the selected members in the project.
    - To select all members of the dll, click the **Select All** button at the bottom of the dialog.
    - Click the **Unselect All** button to unselect all of the already selected members.

9.5.4 Auto Generated Script

The ScanScript implementation corresponding to the selected members will be automatically implemented once the required members are selected. This code can be seen by clicking the Script tab.

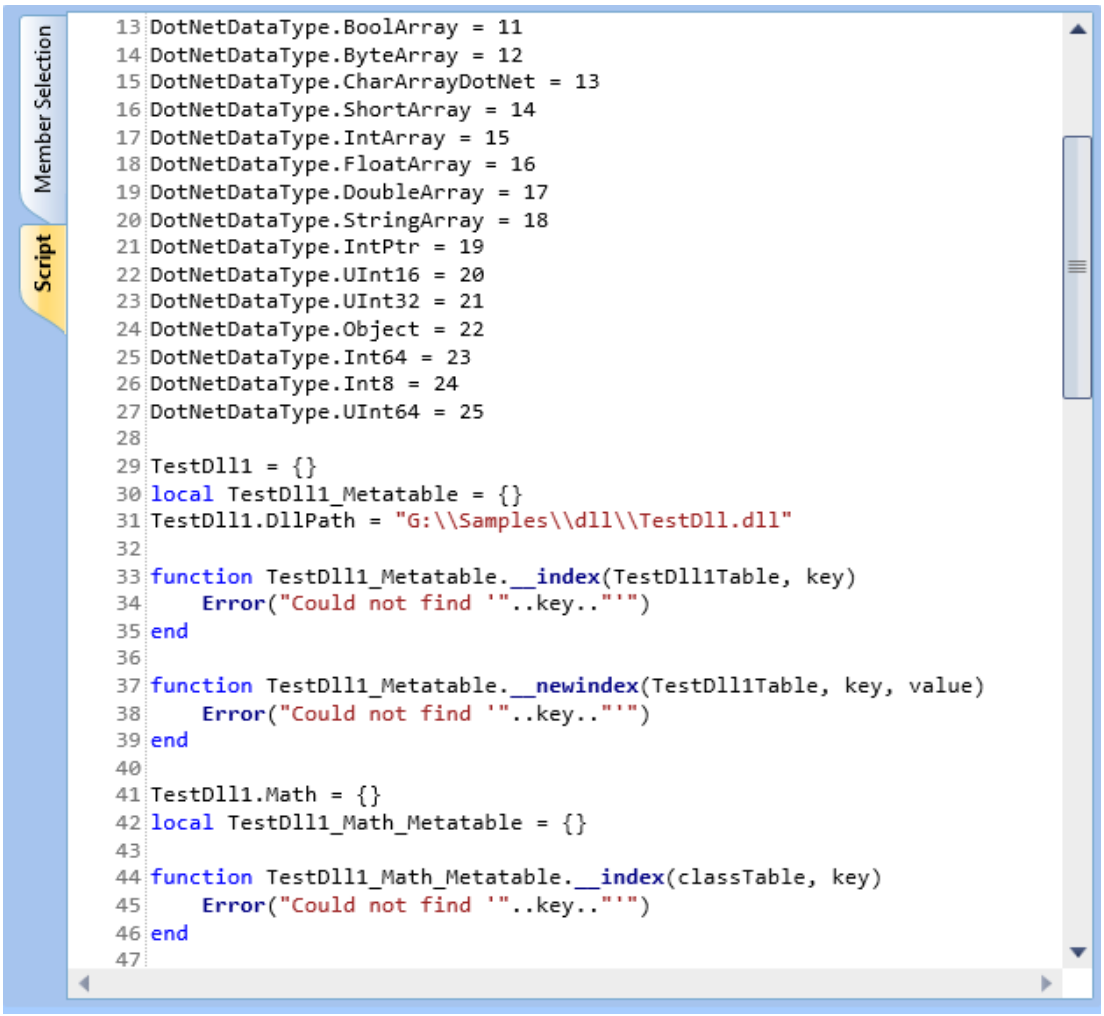


FIGURE 652: THE SCRIPT TAB

You can further modify the script to extend the behavior of the code as required.

10 HARDWARE-RELATED OPERATIONS

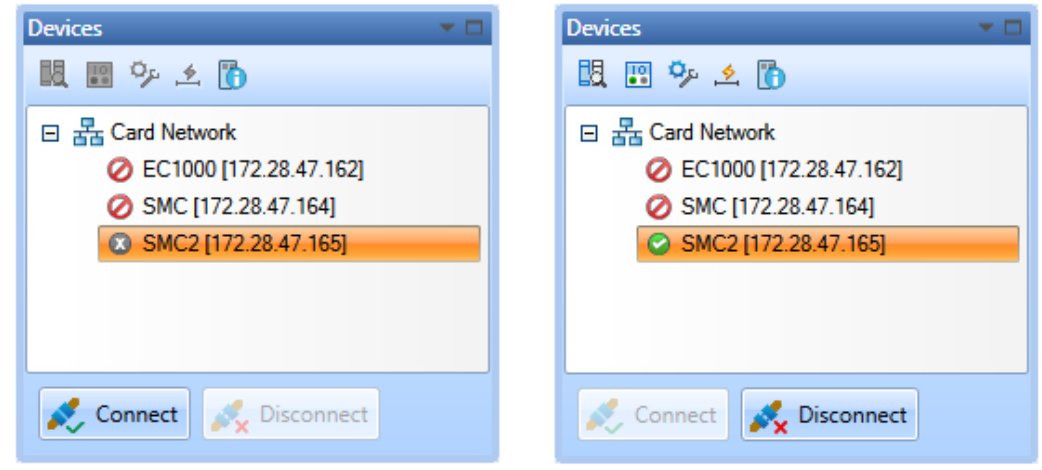
10.1 CONNECTING TO DEVICES

The Devices section is located to the right of the ScanMaster Designer window. Available devices are automatically made visible on the Devices tab. ScanMaster Designer currently supports only the SMC type of scan controllerLightningII.

Connect to a particular card

1. Navigate to the **Devices** tab. All the cards available on the network will be listed.
2. Select the necessary card.
3. Click **Connect** .

Note: When you are connected to a particular controller card, the **Connect** button will be disabled and the laser marking buttons on the **Home | Mark** panel will be enabled.



Before connecting to the card After connecting to the card

FIGURE 653: CONNECTING TO A CARD

Disconnect from a card

1. Select the card you wish to disconnect.
2. Click **Disconnect** .

10.2 LASER MARKING OPERATIONS

The scanning-related controls of the ScanMaster Designer are in the **Home | Mark** panel. These controls will be activated only when the computer is connected to a scanning card.

The following figure illustrates how the **Home | Mark** panel will look once connected to a device:

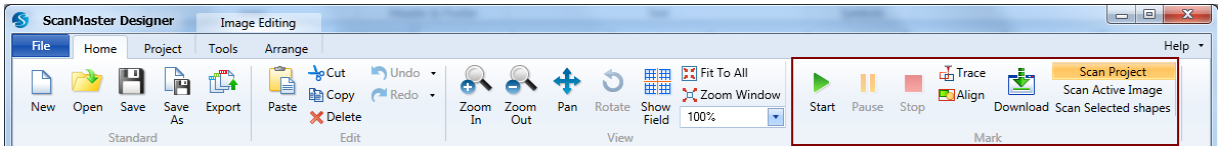


FIGURE 654: MARKING OPERATIONS

Scan Project

Runs ScanMaster Designer jobs in their entirety (including the ScanScript code).

Scan Active Image

Scans all of the shapes in the selected image.

Scan Selected Shapes

Scans only the shapes that you select in the selected image.

Note: You cannot scan shapes in the Composite Image.

10.2.1 Start, pause, stop marking

Start

Click **Start** to activate the marking process.

When marking is in progress, the **Devices** panel will look like the following.

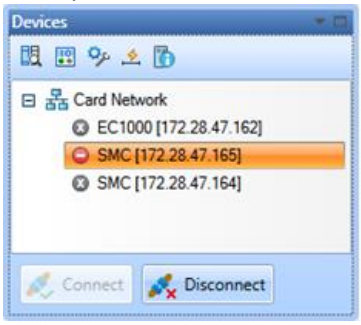


FIGURE 655: START MARKING

Pause

Click **Pause** to pause the marking process.

Stop

Click **Stop** to terminate the marking process.

10.2.2 Trace shapes before marking

Trace

This command will trace the outline of the shape(s) with the guide laser. This gives you an idea as to how the laser moves during the actual marking. The current marking will be simulated according to the set **Speed** and **Count** in **Preferences| Laser|Align/Trace** Options.

Click **Trace** to start the tracing process.

Align

Align helps to indicate the borders (bounding box) of the current marking objects according to the set **Speed** and **Count** in **Preferences|Laser| Align/Trace** Options**.** This will help you to identify the general area of the actual marking. The guide laser moves along the bounding box without actually marking, so you will be able to align the marking surface accordingly.

Note: A bounding box is the maximum extent of a two-dimensional box containing all the current marking objects.

Click **Align** on the **Home | Mark** Panel.

When the **Aligning** operation is in progress the Device panel will appear as follows:

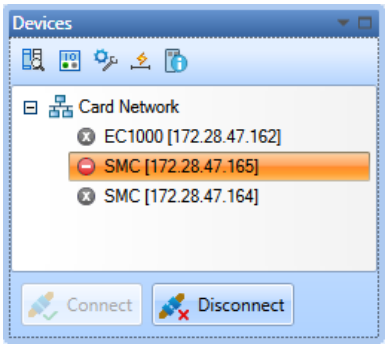


FIGURE 656: ALIGN PART

10.3 WORKING WITH JOBS

Operations related to jobs include the following:

- Downloading Scanning Jobs
- Copying and pasting job profiles
- Managing jobs

10.3.1 Downloading Scanning Jobs

The **Download** command in ScanMaster Designer allows users to download scanning jobs to a flash memory on the scanning card or to a USB memory in order to work without a host machine. You could connect the USB memory on the scanning card and work on laser scanning or simply copy the data to the internal flash memory in the card.

To download scanning jobs

1. Go to **Home | Mark** panel.
2. Click **Download** . The following window will appear.

FIGURE 657: DOWNLOAD JOB

3. You can download the job to a scanning card or save it to the disk.
4. If you select **Download to Selected Card** you can save the jobs on a USB/Flash drive. However you will not be able to select **Download to Selected Card** until you connect to a card.
5. If you select **Save to Disk**, the jobs can be saved independently from a scanning device.
6. Type a file name or the file path in the corresponding field.
7. Click **OK** to save files in the **.lsj** file format.

Managing jobs

The **Manage Jobs** window allows you to view, rename and delete scanning jobs which are stored on the scanning card.

1. Connect to a scanning card.
2. Right click on the scanning card and select **Manage Jobs**.

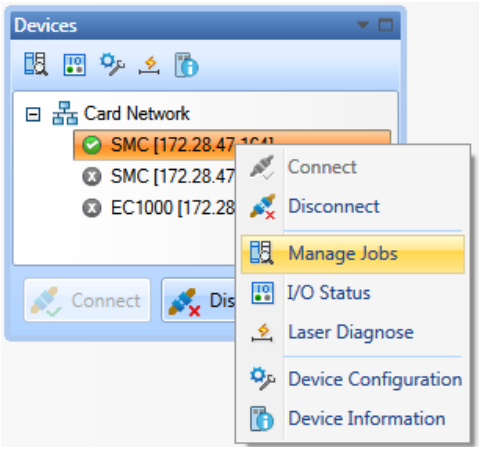


FIGURE 658: MANAGE JOBS

View scanning jobs

To view available scanning jobs, right click on the connected network card on **Devices** panel.

1. Select Manage Jobs. The **Manage Jobs** window is displayed.

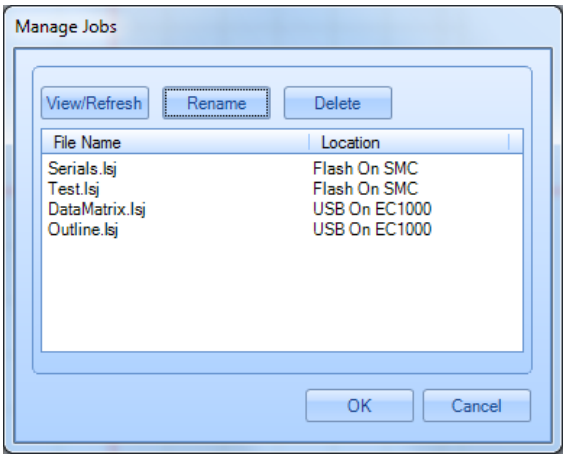


FIGURE 659: VIEW SCANNING JOBS

2. Click **View/Refresh** to view the scanning jobs which are stored in the card's memory.

Rename scanning jobs

1. Select the relevant name using the **File Name column** of the **Manage Jobs** window.
2. Click **Rename**. A dialog box will appear; enter the new name for the file and click **OK**.

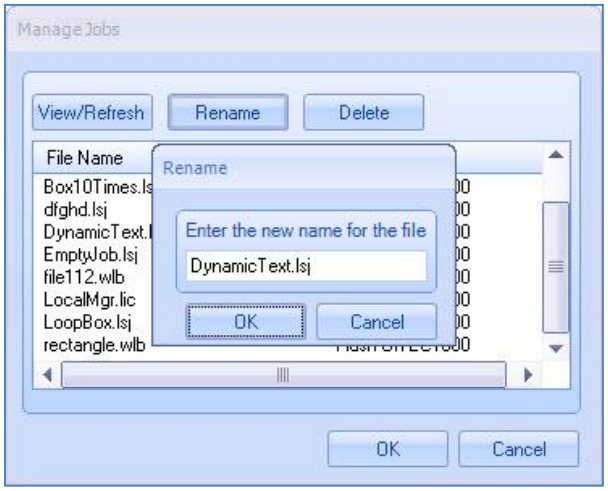


FIGURE 660: RENAME JOBS

3. Click the **OK** button on the **Manage Jobs** window.

Deleting Scanning Jobs

1. Select the relevant **File Name** on the **Manage Jobs** window.
2. Click **Delete.**
3. A confirmation message will be displayed.
4. Click **Yes** to delete the selected file.

10.4 IO BITS MONITOR

Right-click the Network Card and select **I/O Status**. The **I/O Bits Monitoring** window is a graphical representation which displays all the Input and Output pins along with their status.

FIGURE 661: THE IO BITS MONITORING WINDOW

10.5 CONFIGURING DEVICES

You can change the configuration of each device using the Device Configuration Editor.

1. Right-click on the device to configure.
2. Click Device Configuration.

Each device type has different type of editor depending on its available configurations.

10.6 SMC DEVICE CONFIGURATION EDITOR

The SMC Device Configuration Editor allows setting configuration settings for the following:

- Administration Configuration
- Controller Configuration
- Correction Tables
- Laser Configuration
- Lens Configuration
- Performance Adjustments
- User Configuration
- Interlock Configuration

In addition to that SMC allows setting configuration for the followings:

- Scanner parameters
- ScanPack Parameters

These settings control various aspects of the Laser, Correction Tables, Galvos, etc. Proper settings will enable smooth functioning of the Laser and the Software.

Administration Configuration

Administration Configuration data defines the base behaviour of the module. Most of the items defined here are used to configure the network parameters and diagnostic tracing of the server software.

Header	Data	Description
Job data channel settings	Port	The TCP/IP port number used to pass job and fixed data to and from the controller
	Control File	File name of the controller configuration data
	Log File	Path to a logging file for Data Channel transactions. Used only for system debugging.
	Enable Stream To File	If True, streaming job data is sent to the <LogFile>. Used only for system debugging.
	Stream File	Name of a file that will capture data streamed to the device. Used only for system debugging.
Priority data channel settings	Port	The TCP/IP port number used to pass priority command data to the controller
	Log File	Path to a logging file for Priority Channel transactions. Used only for system debugging.

Header	Data	Description
Event channel settings	Port	The TCP/IP port number used to pass event data from the controller back to the host
	Log File	Path to a logging file for Event Channel transactions. Used only for system debugging
Heartbeat channel settings	Port	The TCP/IP port number used to pass heart-beat information between the controller and the host
	Log File	Path to a logging file for heart beat Channel transactions. Used only for system debugging.
Broadcast channel settings	Address	IP address used for broadcast messages
	Port	The port number used for broadcast messages
	SysInfoData broadcast period	Broadcast period for the SysInfoData packet (sec)
	StatInfoData broadcast period	Broadcast period for the StatInfoData packet (sec)
Miscellaneous settings	Friendly Name	The friendly name given this controller
	Head Serial Number	Serial number of the head assigned by the OEM
	Local Mode	The controller is to operate in local stand-alone mode on power-up. Pendant interactions are required to enable network operations.
	Break OK	Reserved for future use.
	Client	Selects the primary interface for accepting control information. Valid clients are: • LANStream: LAN based streaming job control • Pendant: Pendant based local control • LAN: LAN based remote control • RS232: RS232 based remote control
	Pendant	*Reserved for future use.*
	Pendant Port	Selects the COM port used for the pendant
	Pendant Port Speed	Baud-rate for the pendant COM port
	API Port	Selects the COM port used for remote API access
	API Port Speed	Baud-rate for the API COM port
	Motion Port	(Future) Selects the COM port used for external motion control access
	Motion Port Speed	(Future) Baud-rate for the motion control COM port
	Laser Port	(Future) Selects the COM port used for laser communication

Header	Data	Description
	Laser Port Speed	(Future) Baud-rate for the laser COM port
	User	Password for accessing user-level pendant functions. Six numeric characters only.
	Admin	Password for accessing administrator-level pendant functions. Six numeric characters only.
	Logging Level	Level of transaction logging to perform. Used only for system debugging.
Network settings (Available only in SMC)	IP Mode	Whether the IP address is a static or auto detect (D
	IP Address	IP address to use if IP Mode is static
	IP Subnet	IP subnet mask to use if IP Mode is static
	IP Gateway	IP address to use if IP Mode is static
	IP Timeout	Timeout for receiving auto detect address
	IP Retries	Number of times to retry to gain an auto detect IP address
	IP Try Again	Time to wait(seconds) before retrying auto detect

Controller Configuration

The Controller Configuration file is the master control file for defining the start-up configuration of the controller. It contains pointers to other configuration files that deal with specific elements of the system, such as laser timing, correction tables, lens identification, and user adjustments. The file names referenced in the table are **XML** file names with the **.xml** extension suppressed.

Header	Data	Description
Configuration file redirection	CorrFile1	The name of correction table 1 file
	CorrFile2	The name of correction table 2 file
	CorrFile3	The name of correction table 3 file
	CorrFile4	The name of correction table 4 file
	Lens File	The name of the lens configuration file
	Laser File	The name of the laser configuration file
	User File	The name of the user configuration file
	Performance File	The name of the performance adjustments file

Header	Data	Description
	Scanner File	The name of the Scanner configuration file
	ScanPack File	The name of the ScanPack configuration file
Jobs	Startup Job	The job file to start when the controller boot up
Galvo control configuration	X, Y Servo Enable Polarity	The polarity of the X,Y Servo Enable signal
	Z Servo Enable Polarity	The polarity of the Z Servo Enable signal
	X, Y Servo Ready Polarity	The polarity of the X,Y Servo Ready signal
	Z Servo Ready Polarity	The polarity of the Z Servo Ready signal
	Enable X,Y Servos	Enable/disable X,Y servos
	Enable Z Servo	Enable/disable Z servo
	Enable X, Y Not Ready Exception	Enable/disable X, Y servos not ready exceptions
	Enable Z Not Ready Exception	Enable/disable Z servo not ready exceptions
	X Y Voltage range	The output voltage range of the X and Y DACs
	Z Voltage range	The output voltage range of the Z DAC
	XY2 Status Timing	Not implemented
	XY2-100 Addressing mode	"Normal" for 16 bits; "Enhanced" for 20 bits
	Laser Pipeline Delay	The time in laser timing ticks that all laser signals are delayed relative to micro-vector generation. This is used to compensate for the inherent delay in servo modules from when a command is applied to when the galvos actually respond.
	RTC coordinate system orientation compatible	Enables compatibility with RTC coordinate system orientation
	Enable Interlocks	Enables interlock triggering mechanism

Header	Data	Description
Interlock configuration	Assert when no Current	Determines whether to assert the interlock when the current flow is available or not. This is configurable for each individual interlock
	Assert when no Current	Determines whether to generate exception. This is configurable for each individual interlock
Mark-on-the-fly configuration	System is MOTF capable	System is Mark On The Fly (MOTF) capable (true)
	MOTF digital gain factor	MOTF digital gain factor. Used as a fine-tuning scalar adjustment of MotfEncoderCal.
	MOTF Calibration factor	MOTF calibration factor. Relates the encoder counts to laser positioning bits (bits/count)
	Motf Mode	MOTF operational mode 0 - Use encoder 1 - Simulate encoder
	Motf Direction	MOTF orientation and direction in degrees 0 - left to right in the X axis 90 - bottom to top in the Y axis 180 - right to left in the X axis 270 - Top to bottom in the Y axis
	Enable Galvo command range check mode	Enabled galvo command range checking
	Port	Digital port to set the command range check value
	Value	The command range check value
SMC (Available only in SMC)	Command Generation Mode	Whether to use traditional Jump/Mark/Delay mode of command generation or ScanPack mode of command generation
	Micro stepping mode	Stepper motor control mode
	ISR Gen mode	ISR Generation mode
	Initial X	Initial X-axis position at startup
	Initial Y	Initial Y-axis position at startup
	Initial Z	Initial Z-axis position at startup

Correction Tables

Header	Data	Description
Correction table data	x-axis	X-Axis Correction Data 4225 values defining the x-axis correction starting in the lowest negative coordinate (lower left Cartesian quadrant) to the highest positive coordinate (upper right Cartesian quadrant).
	y-axis	Y-Axis Correction Data 4225 values defining the Y-axis correction starting in the lowest negative coordinate (lower left Cartesian quadrant) to the highest positive coordinate (upper right Cartesian quadrant).
	z-axis	Z-Axis Correction Data 4225 values defining the Z-axis correction starting in the lowest negative coordinate (lower left Cartesian quadrant) to the highest positive coordinate (upper right Cartesian quadrant).
	Control File	File name of the controller configuration data
	Log File	Path to a logging file for Data Channel transactions. Used only for system debugging.
Scale Factors	Scale X	Calibration factor in X direction (bits/mm)
	Scale Y	Calibration factor in Y direction (bits/mm)
	Scale Z	Calibration factor in Z direction (bits/mm)

Laser Configuration

Header	Data	Description
General	Laser Name	The name of the laser
	Laser Type	Application definable value to identify a laser type

Header	Data	Description
	Fixed Frequency only	Laser is only capable of a fixed frequency setting (true), or capable of variable frequency settings (false)
	Fixed pulse width only	Laser is only capable of a fixed pulse width setting (true), or capable of variable pulse width settings (false)
	Fixed output power	Laser is only capable of a fixed output power setting (true), or capable of variable output power settings (false)
	Use watts to measure power	Laser power units are in Watts (true), or % duty-cycle (false)
	Pulse width range	pulse width range supported by the laser (µsec)
	Binary value range	Binary value range for lasers with digital power control
	Can control power externally	Laser power is controllable via an external knob
	Can use external power control	Application is configured to use external power control (true)
	Has visible pointer	Laser has a visible pointer integrated into it (true)
	Duty cycle range	Duty cycle range of the laser pulses (%)
	Pulse Frequency range	Pulse frequency range sustainable by the laser (KHz)
	Wattage range	Wattage range producible by the laser
	Analog power voltage range	Analog power level voltage range sustainable by the laser. The SMC is capable of 0-10 Volts output.
	Interlock Handler file	The name of a file on the host platform that contains instructions on how to clear an interlock break
	LASERON1 polarity	Polarity of Laser on 1 signal

Header	Data	Description
Laser Mode Configuration	LASERON2 polarity	Polarity of Laser on 2 signal
	LASERMOD1 polarity	Polarity of Laser Modulation 1 signal
	LASERMOD2 polarity	Polarity of Laser Modulation 2 signal
	LASERFPK polarity	Polarity of Laser First Pulse Kill signal
	LASERENABLE polarity	Polarity of Laser Enable signal
	LSRPWRDOUT polarity	Polarity of Laser Power Digital Out signal
	LASERON1 configuration	The behaviour of the Laser On 1 signal
	LASERON2 configuration	The behaviour of the Laser On 2 signal
	Laser Power port mode	The mode of power setting
	Laser Power Port	The port to deliver power
	Laser Modulation Type	Specifies whether galvo motions are synchronized to the pulse stream or not.
Modulation control	Laser Timing	The number of 20ns intervals that make up a laser timing "tick"
	Laser Enable Delay	The time require for enabling the laser prior to actual use (µsec). Set the time that the signal LASERENABLE is asserted prior to a marking operation.
	Laser Enable Timeout	The time that the signal LASERENABLE will remain asserted after a marking operation. If a subsequent marking operation is started prior to the expiration of this time, then LASERENABLE will remain asserted and the marking operation will begin immediately without the cost of another LsrEnaDel.

Header	Data	Description
	Laser Modulation Delay	The time from the assertion of LASERON to the emission of laser pulses.
	Laser FPK pulse position	The time between the assertion of the LASERFPK signal and the generation of LASERMOD pulses (µsec)
	Laser FPK pulse width	The width of the LASERFPK pulse (µsec)
	Laser 1 standby period	The width of the LASERMOD1 pulses during standby (µsec)
	Laser 1 pulse width	The frequency of the LASERMOD1 pulses during standby (KHz)
	Laser 2 standby period	The width of the LASERMOD2 pulses during standby (µsec)
	Laser 2 standby pulse width	(Future) The frequency of the LASERMOD2 pulses during standby (KHz). Currently TickleFreq1 and TickleFreq2 must be set equal to each other
Power control	Laser Power Delay	The time required after laser power is changed until the laser power has settled (µsec). Used when constructing jobs that manipulates the laser power.
Initial Default Values	Analog Port One	Specifies initial value of Analog Port One.
	Analog Port Two	Specifies initial value of Analog Port Two.
	Digital Port	Specifies initial value of the Digital Port.

Header	Data	Description
Miscellaneous	Laser Power Correction Table Values	A list of laser power linearization values. Laser power has a logical range of 0-255 and as a power change is requested, the logical power value is used to index this table and the selected entry is used as the actual "corrected" value.
	Laser requires Initialization	(Future) Laser requires explicit initialization via serial communication (true)
	Initialization Type	(Future) Laser communications type: 0 = RS-232 Serial, 1 = Ethernet
	Initialization string delimiter character	(Future) Delimiter character separating command and argument tokens in the InitString
	Initialization string line Termination	(Future) Line termination character used by the laser command interpreter
	Initialization String	(Future) A list of initialization strings to be sent to the laser. The list may be arbitrarily long
	De-initialization String	(Future) A list of de-initialization strings to be sent to the laser. The list may be arbitrarily long

Lens Configuration

Header	Data	Description
For convenience of host application user parameter initialization	Lens Name	Used by the head integrator to identify the lens model
	Can be calibrated	Used by an application to indicate that this lens can be calibrated.
	X Scale Factor	Scale factor relating the X galvo command signals to the distance travelled by the laser (bits/mm)
	Y Scale Factor	Scale factor relating the X galvo command signals to the distance travelled by the laser (bits/mm)
	Z Scale Factor	Scale factor relating the X galvo command signals to the distance travelled by the laser (bits/mm)
	Z Mode	Specifies the Z axis operational mode
	Focal Length	Focal length of the lens (mm)
	Aperture	Laser beam diameter entering the lens (mm)
Correction table:	X Offset	X axis offset to be applied to correction table 1 (bits)
	Y Offset	Y axis offset to be applied to correction table 1 (bits)
	X Gain	X axis gain to be applied to correction table 1
	Y Gain	Y axis gain to be applied to correction table 1
	Rotation	Field rotation to be applied to correction table 1 (degrees)

Performance Adjustments

Header	Data	Description
Adjustments made to system parameters at run-time	Laser Power	Scale factor to be applied to the laser power value specified in the job.
	Secondary scale factor	Secondary scale factor to be applied to the laser power value specified in the job.

Header	Data	Description
	Pulse Width	Scale factor to be applied to the laser pulse width specified in the job.
	Period	Scale factor to be applied to the laser pulse period specified in the job
	Mark Speed	Scale factor to be applied to the Mark Speed specified in the job
	Offset Unit Type	The unit of offset values
	X Offset	Offset to be applied to all X coordinates
	Y Offset	Offset to be applied to all Y coordinates
	Z Offset	Offset to be applied to all Z coordinates
General purpose user variables	UserVar1	General purpose user variable
	UserVar2	General purpose user variable
	UserVar3	General purpose user variable
	UserVar4	General purpose user variable
	UserVar5	General purpose user variable
	UserVar6	General purpose user variable
Global adjustment to all correction tables	Offset Unit type	The unit of offset values
	X Offset	Offset to be applied to all X-Axis coordinates (bits)
	Y Offset	Offset to be applied to all Y-Axis coordinates (bits)
	X Gain	Gain factor to be applied to all X-axis coordinates
	Y Gain	Gain factor to be applied to all Y-axis coordinates
	Rotation	Rotation transformation to be applied to the X-Y field

10.6.1 User Configuration

Interlock Configuration

The interlock system is a safety feature where breaks in the interlock connectivity can be conditioned to shut down the laser and galvo motions, and generate an exception event to the host application to notify it that the break occurred.

When a conditioned interlock trips, or any other hardware-detectable exception condition occurs, the marking engine controller immediately stops processing the vector stream, turns off the laser, and stops the galvo motion. It then sends an exception event message to the host application and enters a state where it will not execute any more instructions until a Priority Abort:Job message is received. The Abort message reinitializes the marking engine and prepares it for a new job. If an exception occurs, the job cannot be restarted from where is left off.

Scanner Configuration

Scanner configuration is available only for SMC. These settings are determined by Novanta and should not be adjusted without guidance from technical support.

Header	Data	Description
General (All parameters are defined for each axis X, Y, and Z)	Command Gain	Specifies the servo's command gain.
	Accel FF	Specifies the servo's acceleration feed forward value.
	Bandwidth	Specifies the bandwidth of the servo.
	Damping	Specifies the damping of the servo.
	Filter Time	Specifies delay imposed on the command signal by the filter(s) in the servo.
	Integrator Bandwidth	Specifies the error integrator bandwidth.
	Max. Acceleration	Specifies the maximum allowable rotational acceleration.

Header	Data	Description
	Max Velocity	Specifies the maximum allowable rotational velocity.
	Position FF	Specifies the servo's position feed forward value.
	Velocity FF	Specifies the servo's velocity feed forward value.

ScanPack Configuration

ScanPack configuration is available only for SMC.

Header	Data	Description
General Laser Parameters	Rise Time	Time in seconds for the laser to emit energy after corresponding gate edge
	Fall Time	Time in seconds for the laser to stop emitting energy after the corresponding gate edge
Laser Off Parameters	Frequency	Pulse width modulation frequency
	Pulse Width	Pulse width when laser is "off". Usually set to zero, short pulses required to "tickle" certain models of CO_2 lasers.
	Laser Power	Pump power level
Point Laser Parameters	Laser Power	Pump power level
	Count	Number of pulses to fire on each point
	Pulse Width	Time in seconds for each pulse
	Laser Off Time	Time in seconds to wait between pulses
Vector Laser Parameters	Laser Power	Pump power level

Header	Data	Description
	Frequency	Pulse width modulation frequency
	Pulse Width	Time in seconds for each pulse
	Mark Speed	Speed of laser when marking a vector
Point Parameters	Mode	Specifies the control mode as one of the following: • **structured** - where the controller limits speed and acceleration • **unstructured** - where the user is responsible for controlling the speed and acceleration
	Link Rate	Link Rate specifies the maximum speed the focal point moves when the laser is off (similar to Jump Speed in traditional scan control). The value is specified as a percentage of the maximum velocity the mirrors can achieve. Recommended values:50%-90%
	Link Error	Allowable error which is still considered “In Position”. Recommended value: 0 mm
	Link Settle Time Constants	Allowable time to settle as a multiple of the servo’s settle time. Recommended values: 2 to 4
	Acknowledge Type	Not implemented

Header	Data	Description
	Acknowledge Event	Not implemented
	Laser On Adjust	Time in seconds to adjust laser firing from the calculated time. Used to accommodate lasers that take time to emit energy after the laser gate edge.
Vector Parameters	End Mark Speed Ratio	Ratio of the speed at the ends of each vector to the mid mark speed. 100% means the entire vector is marked at the same speed. 0% means marking starts from a dead stop, and accelerates up to mid mark speed.
	Mid Mark Speed	Mark speed is provided for script-generated vectors and is overridden by user settings for GUI-based vectors.
	Break Angle	The angle between contiguous vectors below which max radial error is ignored and servo dynamics smooth the transition. Often useful for vectorized fonts, where curves are approximated by polylines with small angle changes.
	Acceleration	Rate of acceleration from end to mid mark speed
	Max Radial Error	Allowable deviation from commanded trajectory, above which “Skywriting” is activated

Header	Data	Description
	Vertex Settle Time Constants	This parameter is used for script-generated vectors when Skywriting is not active, and is overridden by the Polyline Delay settings for GUI-based vectors.
	Link Rate	Link Rate specifies the maximum speed the mirrors should travel during the jumps (similar to Jump Speed in traditional scan control). The value is specified as a percentage of the maximum velocity the mirrors can achieve. Recommended values:50%-90%
	Link Settle Time Constants	Allowable time to settle as a multiple of the servo's settle time. Recommended values: 2 to 4
	Max Acceleration Ratio	Allowable acceleration as a percentage of the servo's acceleration limit. Recommended values: 50%-100%
	Acknowledge Type	Not implemented
	Acknowledge Event	Not implemented
	Laser On Adjust	Time in seconds for the laser to emit energy after corresponding gate edge

Header	Data	Description
	Laser Off Adjust	Time in seconds for the laser to emit energy after corresponding gate edge
	Mode	Specifies control mode for command generation.
	Mark Speed	Mark speed is provided for script-generated circles and is overridden by user settings for GUI-based circles
	Link Rate	Link Rate is a measure of how fast the mirrors should travel during the jumps (similar to Jump Speed in traditional scan control). The value is specified as a percentage of the maximum velocity the mirrors can achieve.
Circle Parameters	Link Error	Allowable error which is still considered “In Position”. Recommended value: 0 mm
	Delta Z	Change in Z axis for each full rotation of the circle. Used for helical drilling.
	Max Acceleration ratio	Allowable acceleration as a percentage of the servo’s acceleration limit. Recommended values: 50%-100%
	Max Frequency Ratio	Used to slow down circle mark speed as we approach servo resonances when drawing extremely small circles. Recommended values: 50 - 100%

Header	Data	Description
	Repetitions per circle	Number of times to mark each circle.
	Circle Link Rate	Maximum rate to jump between concentric circles
	Circle Settle Time Constants	Number of time constants to allow for settling at the beginning of the *n*th circle, where *n*>1. Recommended values: 2 to 4
	Link Settle Time Constants	Allowable time to settle after the initial link to one or more concentric circles as a multiple of the servo's settle time. Recommended values: 2 to 4
	Acknowledge Type	Not implemented
	Acknowledge Event	Not implemented
	Inner Radius	Radius of smallest circle to be marked at this point. Set equal to Outer Radius to mark a single circle.
	Outer Radius	Default radius of a script-generated circle that is overridden by user settings for GUI-based circles
	Pitch	Difference in radius between concentric circles
	Start Angle	The starting angle of the first circle relative to positive X axis and increasing CCW.

Header	Data	Description
	FRevePerCircle	Portion of the circle. Can be a non-integer (>1) or a fraction (representing a circular arc)
	Mode	Allows users to mark arcs instead of full circles.
	Inner Radius	Default Inner radius of a script-generated spiral that is overridden by user settings for GUI-based spirals
	Outer Radius	Default outer radius of a script-generated spiral that is overridden by user settings for GUI-based spirals
Spiral Parameters	Start Angle	The starting angle of the spiral relative to positive X axis and increasing CCW.
	Spiral Direction	The direction of the Spiral's turns – CW or CCW
	NumStarts	Specifies the number of "arms" the spiral has.
	Pitch	Default pitch of a script-generated spiral that is overridden by user settings for GUI-based spirals
	Mark Speed	Mark speed is provided for script-generated spiral and is overridden by user settings for GUI-based spirals
	Max Acceleration ratio	Allowable acceleration as a percentage of the servo's acceleration limit. Recommended values: 50%-100%
	Max Frequency ratio	Used to slow down spiral mark speed as we approach servo resonances when approaching the spiral center. Recommended values: 50 - 100%

Header	Data	Description
	Link Rate	Link Rate is a measure of how fast the mirrors should travel during the jumps (similar to Jump Speed in traditional scan control). The value is specified as a percentage of the maximum velocity the mirrors can achieve. Recommended values:50%-90%
	Link Error	Allowable error which is still considered “In Position”. Recommended value: 0 mm
	Link Settle Time Constants	Allowable time to settle as a multiple of the servo’s settle time. Recommended values: 2 to 4
	Acknowledge Type	Not implemented
	Acknowledge Event	Not implemented

10.7 LASER DIAGNOSTICS

Laser Diagnostics window allows you to manually fire the laser using the ScanMaster Designer interface.

To use the **Laser Diagnostic** option, right-click on the card and select **Laser Diagnostics**. The **Laser Diagnostics** window appears.

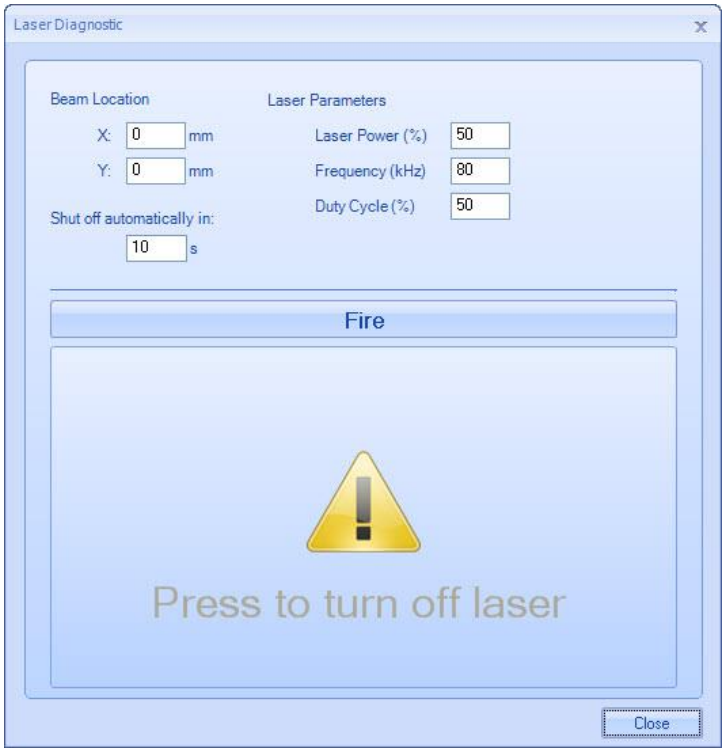


FIGURE 662: LASER DIAGNOSTICS – LASER OFF

The **Laser Diagnostics** window allows you to set the following parameters:

X	The X coordinate of the beam position in the current unit of measurement
Y	The Y coordinate of the beam position in the current unit of measurement
Laser Power	The power at which the laser will fire
Frequency	The frequency of the laser modulation signal, in KHz
Duty Cycle	The portion of the modulation cycle that the laser will be on
Fire	Turns the laser on.
Press to turn off the laser	Turns the laser off. When you move the cursor over this button its color will change to Yellow. Clicking the Close button will also result in turning the laser off.

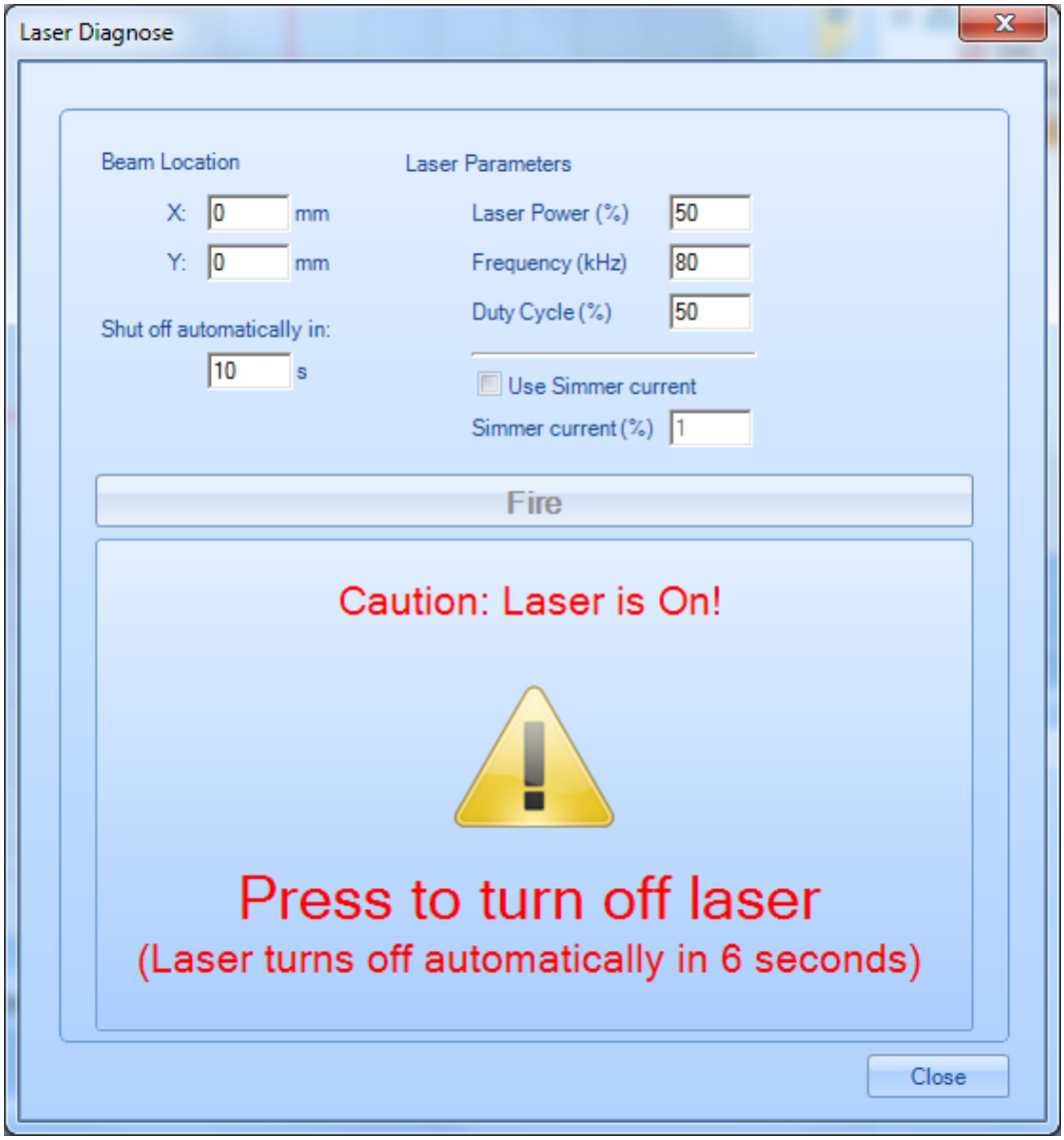


FIGURE 663: LASER DIAGNOSTICS - LASER OFF

Shut off automatically in - The elapsed time to automatically turn off the laser

Press to turn off the laser - Turns the laser off. When you move the cursor over this button, its color will change to yellow. Clicking the **Close** button will also result in turning the laser off.

11 HOW TO SCRIPT IN SCANSCRIPT

11.1 ABOUT LANGUAGE CONSTRUCT

Equals "="

This is used as an assignment operator to give a value to a variable. When a variable is declared, a memory space is reserved for it. Such a space is empty, until you fill it with a value.

Variables

Variables are placeholders for values. Names (also called identifiers) can be any string of letters, digits, and underscores, not beginning with a digit, and cannot contain empty spaces.

The following *keywords* are reserved and cannot be used as names:

```
and       elseif    function    nil       return     while
break     end       if          not       then
do        false     in          or        true
else      for       local       repeat    until
```

The following strings are also reserved and cannot be used in names:

```
+     -     *     /     %     ^     #
==    ~=    <=    >=    <>     =
(     )     {     }     [     ]
;     :     ,     .     ..
```

To use a variable in ScanScript, type an appropriate name and assign a value.

Variable Types

ScanScript is a dynamically typed language, hence the variable type depends on the value assigned to it. All variables in ScanScript are global unless explicitly declared as **local**. Local variables can be defined by using the keyword **local** in front of the variable name.

Function

A function, or a subprogram, is a complete and independent program, which is used (or invoked) by the main program or other subprograms. A subprogram receives values called arguments from a calling program, performs calculations and returns the results to the calling program.

```
function FunctionName (arguments)
    return (value)
end
```

11.2 CONTROL STRUCTURES

Conditional statements allow you to control the flow of execution of a script or one of its sections. The conditional statements perform comparisons and act depending on the outcome of such comparisons.

if

An "if" statement expects a Boolean condition and evaluates it. If the condition is true, the statements following the "then" are executed.

```
if (condition) then
<Statements>
elseif (condition)then
<Statements>
else
<Statements>
end
```

while

A while Loop allows code to be executed repeatedly based on a given condition. The while construct consists of a block of code and a condition. The condition is evaluated, and if the condition is true, the code within the block is executed. This repeats until the condition becomes false.

```
while(condition)do
<Statements>
```

```
end
```

for

The "for" loop is a programming statement that allows a command to be executed a predefined number of times.

```
for index = start index, end index <, step> do
<Statements>
end
```

repeat

A **repeat...until** loop executes the code until the control condition is False.

```
repeat
  <loop body>
until <termination condition>
```

This sequence executes the loop body, then tests some condition to see if the loop should be repeated. If the Boolean expression evaluates to false, the loop repeats; otherwise the loop terminates. The two things to note about the **repeat..until** loop is that the termination test appears at the end of the loop and—as a direct consequence of this—the loop body executes at least once.

11.2.1 Operators

Relational Operators

The relational operators in ScanScript are the following.

Operator	Usage
==	Indicates whether the value of the left operand is equal to the value of the right operand.
~=	Indicates whether the value of the left operand is not equal to the value of the right operand.
<	Indicates whether the value of the left operand is less than the value of the right operand.
>	Indicates whether the value of the left operand is greater than the value of the right operand.
<=	Indicates whether the value of the left operand is less than or equal to the value of the right operand.
>=	Indicates whether the value of the left operand is greater than or equal to the value of the right operand.

These operators always result in false or true.

Each of these six relational operators takes two operands. These two operands must both be *arithmetic* or both should be strings.

Arithmetic Operators

All the basic arithmetic operations can be carried out in ScanScript. Here are the most common arithmetic operators:

Operator	Usage
+	Addition operator (also used for String concatenation)
-	Subtraction operator
*****	Multiplication operator
/	Division operator
%	Remainder operator

Coercion

ScanScript automatically converts all strings to numbers before subjecting them to an arithmetic operation and converts any numbers to strings where strings are expected.

Logical Operators

Logical operators are mainly used to control the program flow. The logical operators in ScanScript are **and**, **or**, and **not.**

- **not** always returns false or true
- The conjunction operator **and** returns its first argument if this value is false or nil; otherwise, **and** returns its second argument

Concatenation

The string concatenation operator is denoted by two dots (".."). If both operands are strings or numbers, then they are converted to strings.

Precedence

Operator precedence in ScanScript follows the table below, from the highest to the lowest priority. You can use parentheses to change the precedence of an expression.

Operator
^
not # - (unary)
* / %

+ -
..
<><= >= ~= ==
and
or

Associativity

For operators with equivalent "precedence" or "priority" (such as “+” and “-“), the order for calculating an expression is based on “Operator Associativity”.

For example, the subtraction operator (-) is said to be "left associative", meaning multiple subtraction operations will be carried from left to right. This is why the expression 8 - 3 - 2 is calculated as (8 - 3) - 2, giving 3, and not as 8 - (3 - 2), giving 7.

Note: The concatenation (" . . ") and exponentiation ("^") operators are right associative. All other binary operators are left associative.

11.3 SCANSCRIPT COMMANDS

ScanScript contains the following libraries:

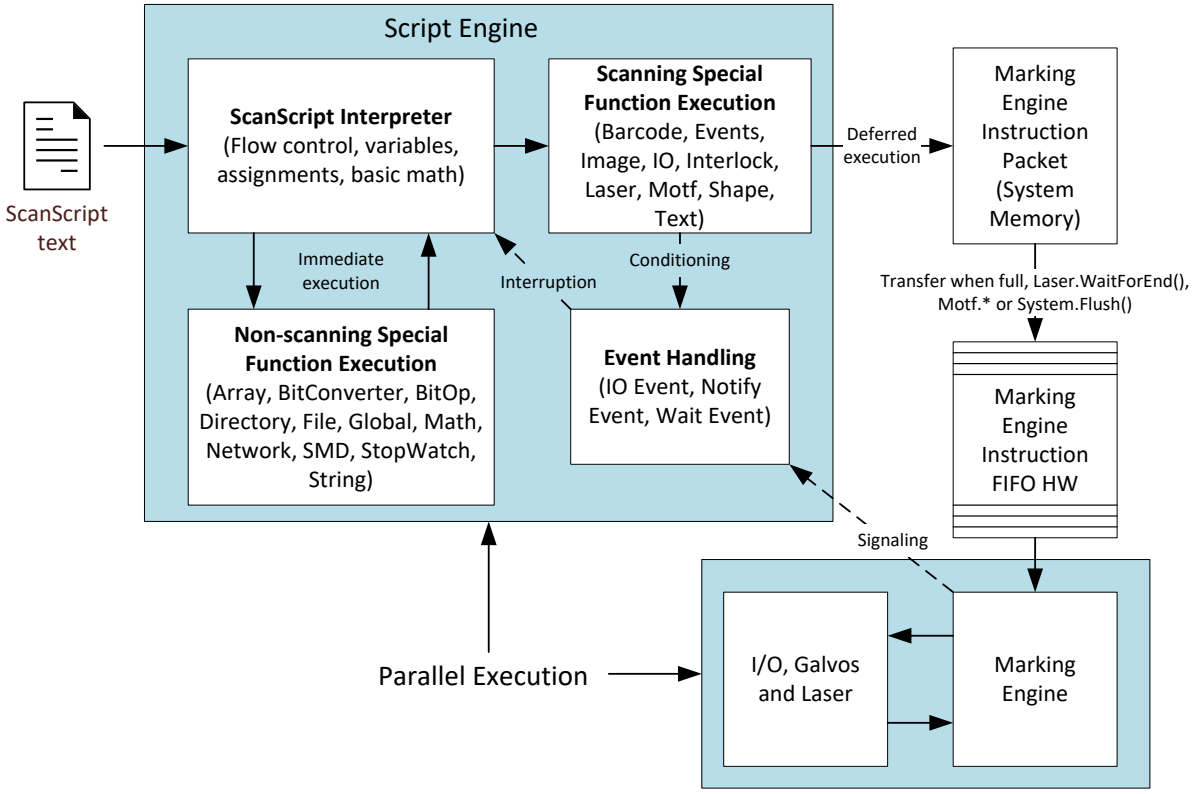
Array	Allows you to create different types of Arrays.
Barcodes	Creates linear and 2D Barcodes.
BitConverter	Converts base data types to an array of bytes.
BitOp	A bitwise operation works on one or more bit patterns or binary numerals at the level of their individual bits.
Control Structures	Contains conditional statements that can be used in ScanScript.
Directory	Contains commands to create and manipulate directories.
Events	This Library contains methods related to IO Events.
File	Contains basic File operation commands.
Global Functions	Contains a set of built-in functions that are available in any part of a ScanScript file. Global Functions cover a variety of common programming tasks such as DateTime, ScanImage, etc.
Image	Provides commands to scan text and shapes such as Arcs, Circles, Polylines, Barcodes, etc. It also provides commands to transform the shapes.
Interlocks	The interlock system is a safety feature where breaks in the interlock connectivity can be conditioned to shut down the laser and galvo motions, and generate an exception event to the host application to notify it that the break occurred. When a conditioned interlock trips or any other hardware-detectable exception condition occurs, the marking engine controller immediately stops processing the vector stream, turns off the laser, and stops the galvo motion. It then sends an exception event message to the host application and enters a state where it will not execute any more instructions until a Priority Abort:Job message is received. The Abort message reinitializes the marking engine and prepares it for a new job. If an exception occurs, the job cannot be restarted from where it was left off.
I/O	Provides commands related to Input and Output operations.
Laser	Provides commands related to Laser marking.
Math	Contains methods for performing some of the most popular numeric operations.
Motf (Mark-on-the-fly)	Provides commands related to "Mark on the fly" operations.
Network	Provides commands related to TCP communication.
Shapes	Creates a shape.
SMD	These methods work jointly with the ScanMaster Designer application. Using these methods, you can create input and message boxes as well as clear the output window in ScanMaster Designer.
StopWatch	This command behaves like a typical Stop Watch, where you can record the time of a certain operation.
String	Provides commands related to String data type operations.
System	Provides system-related commands.
Text	Provides commands related to Horizontal and Arc text.

A typical job in ScanMaster Designer consists of two entities: The **Script** and the **Image**. ScanScript is used to provide conditional execution and generalized control flow (e.g., if...else, looping), some level of modularity, variable creation and evaluation, and other desirable features.

Using the above libraries and their methods you can create and execute any laser scanning job.

11.4 SCANSCRIPT EXECUTION MODEL

The execution model of ScanScript on the SMC controller needs to be understood in order to understand the behaviour of a script at run-time. These controller platforms use multi-processing techniques to achieve high performance marking with sophisticated flow control. This structure is shown in the diagram below.



In reality, there are two parallel processes in action: one that is interpreting ScanScript (the Script Engine), and one that is executing the marking-related instructions (the Marking Engine).

The job of the ScanScript interpreter is to process and dispatch instructions for the Marking Engine, and to perform computational, flow control, reporting, and other miscellaneous tasks. Some statements in a ScanScript script are executed immediately, and some are deferred for execution by the Marking Engine. Commands that create and dispatch work for the Marking Engine and doing the other tasks can be freely interleaved in the flow of the script.

Because of the parallelism in the system design, what looks like a linear time sequence of operations may in reality not be time linear. For instance, in the ScanScript sequence:

```
--Initialize a loop counter
Number = 0
--Halt the instruction execution until the Start input pin trigger level is Rising
Io.WaitForIo(Pin.Din.Start, Trigger.Edge.Rising, 0, 100)
--Reset the galvo tracking of the Motf motion
Motf.ResetTracking()
--Wait for 10000 encoder counts

Motf.WaitForCount(10000)

--Increment the loop counter
Number = Number + 1

--Send all marking information from the SMD canvas

ScanAll()
--Do any number of additional instructions
…
 --Pause the script here to wait for the Marking to complete
Laser.WaitForEnd()
```

The Number = 0 assignment is performed immediately and the Io.* and Motf.* instructions are dispatched to the Marking Engine FIFO in order. If the Io.**WaitForIo**() is the next instruction to be executed by the Marking Engine, the engine will suspend processing until the signal changes state. The other Motf instructions will stay in the instruction FIFO until the Io.**WaitForIo**() releases. In the mean-time, the Script Engine continues to process the statement to increment the "Number" and all instructions after that. It will not wait at all for the marking operations to actually occur.

As a script is interpreted, instructions may be immediately queued for Marking Engine execution (like most of the Motf instructions), or may be batched together into a larger packet of work (like a sequence of ScanImage functions). The function System.**Flush**() pushes all batched instructions into the Marking Engine queue for execution and may be used at any time if job start latency is an issue. Normally it is not needed. If the flow of the script needs to be synchronized with the actual marking operations, the Laser.**WaitForEnd**() function can be used as shown above. The "Event" functions also facilitate Script Engine and Marking Engine synchronization.

11.5 TO START SCRIPTING

To access the script window you must first create a new project. Click **New** on the **Home** tab to create a new project. Next, click on the **Script** tab on the right side of the canvas.

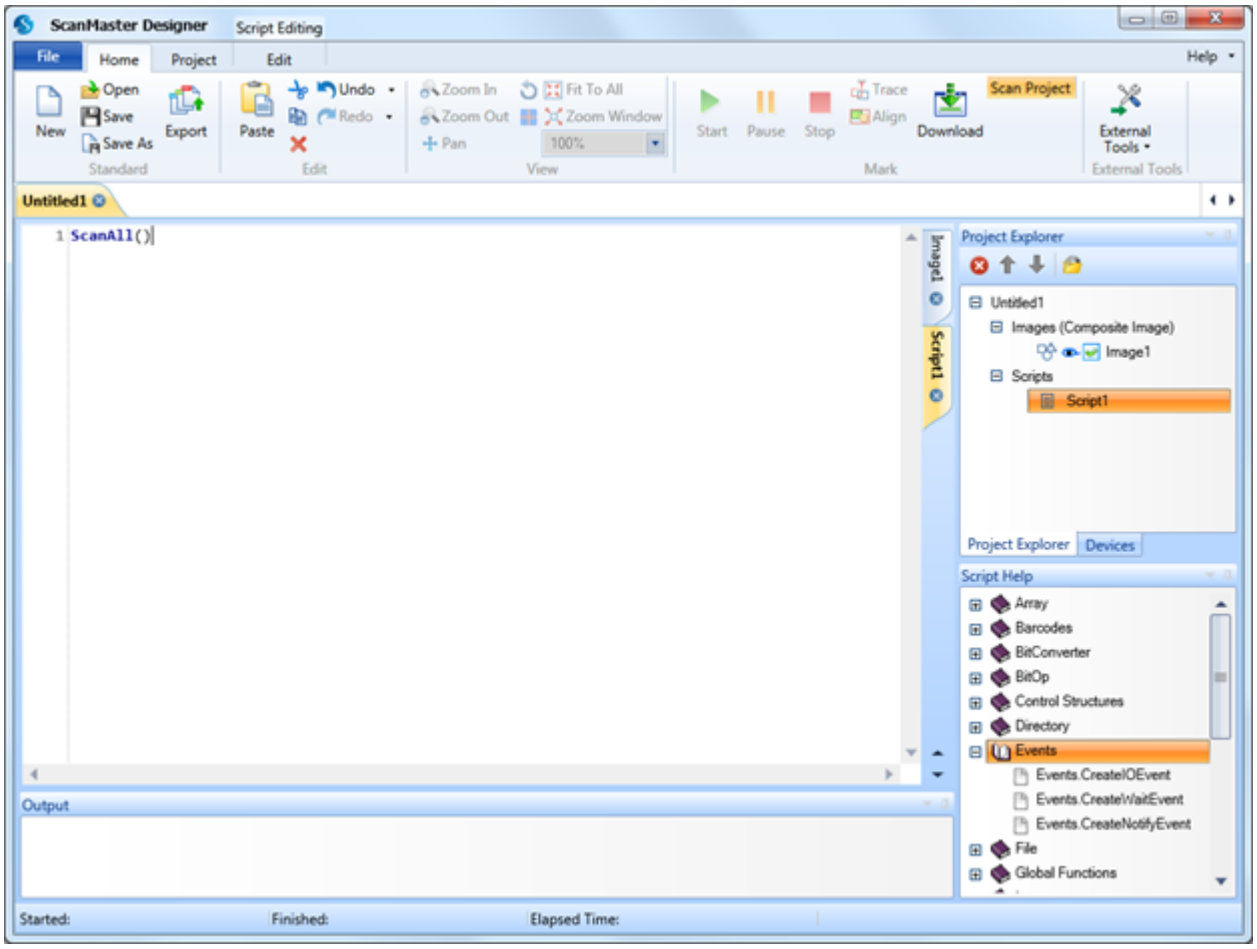


FIGURE 664: CLICKING NEW ON THE HOME TAB

Do the following to enter a command:

1. In the **script window** click where the command is to begin, type a particular command. When you type the first letter a drop down menu with a list of commands will appear.
2. Select a command from the list and press **Enter**.

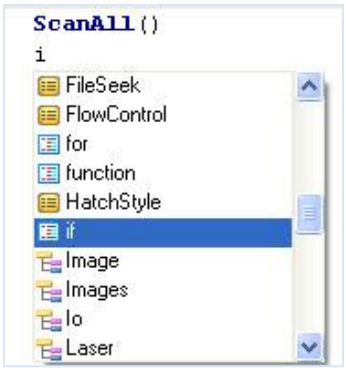


FIGURE 665: DROPDOWN MENU WITH A LIST OF COMMANDS

3. To access properties of a method, type "."(dot) operator. Once again a drop down menu with a list of properties will appear.
4. Select the desired property and press **Enter**.

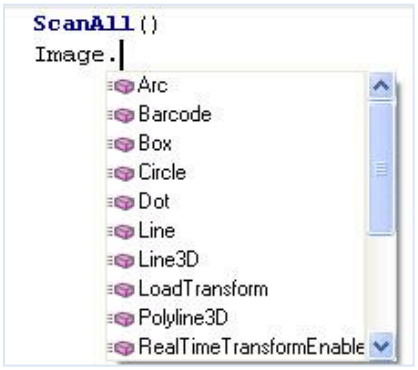


FIGURE 666: DROPDOWN MENU WITH A LIST OF PROPERTIES

11.5.1 Methods

Most libraries have a certain collection of things they can do. Different libraries can do different things, for example the Image library contains methods such as **Arc**, **Barcode**, **Line**, **Text**, **Rotate**, **Move**, **Scale**, etc. These methods will allow you to draw any shape as well as manipulate it.

A typical ScanScript program might look like the following:

```
--This program will mark a rectangle and a circle, with different power
levels.

SetUnits(Units.Inches)      --Inch mode is selected
Laser.JumpSpeed = 300       --Laser Parameter settings
```

```
Laser.MarkSpeed = 150
Laser.JumpDelay = 150       --Delay settings
Laser.MarkDelay = 200

Laser.Power = 50            --Set Laser power to 50%
Image.Box(0, 0, 1, 2, 0)    --Scan a rectangle with a width and height of 1
                            and 2 with a power level of 50%
Laser.Power = 20            --Set Laser power to 20%
Image.Circle(0, 0, 2)       --Scan a circle by applying a 20% power level.
```

The following example demonstrates the use of global settings. In any marking job, the first step is to set the units and laser parameters.

```
--This program demonstrates how the global settings of a laser work. The
User can change the parameters and observe the marking quality of a
rectangle. This program will also display the Marking time.

SetUnits(Units.Inches)   --Set the units as inches
-----------------Laser Delay control Settings-------------------
Laser.LaserOffDelay = 0  --Delay in time before the laser is turned off
                         --Delay in time before the laser is turned on when
Laser.LaserOnDelay = 0   marking relative to micro-vector generation. A
                         negative value means that LaserOn is asserted
                         before micro-vectoring begins.
Laser.LaserPipelineDelay --Set the time that all laser signals are time
= 3200                   shifted relative to the issuance of galvo position
                         commands.
-----------------Laser Motion Delay Setting--------------
Laser.JumpDelay = 60     --Set the delay in time at the end of a laser jump
Laser.MarkDelay = 60     --Set the delay in time at the end of a series of
                         marks
Laser.PolyDelay = 0      --Set the delay in time at the junction of two
                         marks
Laser.VariPolyDelayFlag  --Variable polygon delay disabled. (true =
= false                  enabled, false = disabled)
----------------Laser Marking Settings------------------
Laser.Frequency = 6      --Set Laser Modulation frequency
Laser.JumpSpeed = 250    --Set laser jump speed in inch/sec
Laser.MarkSpeed = 150    --Set Laser Marking speed in inch/sec
Laser.Dutycycle1 = 0     --Set channel 1 duty cycle as a percentage
Stopwatch.Start()        --Start the timer
Image.Box(0, 0, 1, 1, 0) --Draw a box with a width and height of 1 inch
```

```
Laser.WaitForEnd()          --Blocks the script execution until the device
                            finishes processing instructions in the buffer.
Report(Stopwatch.Time()) --Display the time
```

12 EXTENDING SCANSCRIPT CAPABILITIES THROUGH THE SCANMASTER DESIGNER EXTENTIONS FRAMEWORK

12.1 EXTENTION FOLDER

Extensions are always compiled as Dynamic Link Libraries (DLLs). They allow various program functions, such as communication with external devices, complex mathematical functions, computational-intensive applications that are working in a separate host computer, any desired low level of functionality, and other functionalities that are not available with ScanMaster Designer. These extensions can be written in any **.Net language.**

You must create an Extension folder in the Installation directory, for example, **\Program Files\Novanta\ScanMaster\Installation\Extensions** and copy all the extension DLL's to that folder.

The **ISmdExtension** interface must be implemented to interface with ScanMaster Designer.

The following is a sample extension DLL:

```
--This a sample extension DLL. This program will read the "snFile.txt"
that is stored in the Installation folder, line by line.

using System;
using System.Collections.Generic;
using System.IO;
using System.Windows.Forms;

using ScanMaster.Extender;

namespace SMDPluging
{
  public class SMDTextFileReaderPlugging : ISmdExtension
  {
   RunningJobContext runningJobContext;
```

```
    StreamReader streamReader;
    Timer offsetErrorMonitoringTimer;

   public SMDTextFileReaderPlugging()
   {
      //MessageBox.Show("SMDTextFileReaderPlugging ctor...");
   }

  public void JobStarting(RunningJobContext runningJobContext)
  {
   //MessageBox.Show("JobStarting method called..");
   string path = Path.Combine(Application.StartupPath, "snFile.txt");
   if (File.Exists(path))
   {
     streamReader = new StreamReader(path);
   }
   this.runningJobContext = runningJobContext;
   runningJobContext.CommandReceived += new
EventHandler<ScriptCommandReceivedEventArgs>(runningJobContext_CommandRece
ived);
   runningJobContext.JobFinished += new
EventHandler(runningJobContext_JobFinished);

   offsetErrorMonitoringTimer = new Timer();
   offsetErrorMonitoringTimer.Interval = 1000;
   offsetErrorMonitoringTimer.Tick += new
EventHandler(offsetErrorMonitoringTimer_Tick);
   offsetErrorMonitoringTimer.Start();
  }

  void offsetErrorMonitoringTimer_Tick(object sender, EventArgs e)
  {
    string[] result = new string[1];
    result[0] = ConveyerBeltVisionSystem.GetXOffsetError().ToString();
    if (runningJobContext != null)
    {
      runningJobContext.SendCommand("VS_GetXOffset", result);
     }
}

   void runningJobContext_JobFinished(object sender, EventArgs e)
```

```
    {
      //MessageBox.Show("runningJobContext_JobFinished EVENT");
      if (streamReader != null)
      {
        streamReader.Close();
        streamReader.Dispose();
        streamReader = null;
      }

     if (offsetErrorMonitoringTimer != null)
     {
       offsetErrorMonitoringTimer.Stop();
       offsetErrorMonitoringTimer.Dispose();
       offsetErrorMonitoringTimer = null;
     }
   }

void runningJobContext_CommandReceived(object sender,
ScriptCommandReceivedEventArgs e)
    {
      //MessageBox.Show("runningJobContext_CommandReceived EVENT with
command =" + e.Command);
      if (e.Command == "SN_ReadLine")
      {
        string line = "ErrorOccured";
        if (streamReader != null)
        {
         if (!streamReader.EndOfStream)
         {
          line = streamReader.ReadLine();
         }
         else
         {
          line = "EndOfFile";
          if (offsetErrorMonitoringTimer != null)
          {
           offsetErrorMonitoringTimer.Stop();
          }
        }
      }
```

```
     string[] result = new string[1];
     result[0] = line;
     if (runningJobContext != null)
     {
        runningJobContext.SendCommand("SN_ReadLine", result);
     }
    }
   }
}

   public class ConveyerBeltVisionSystem
   {
     // objects on the conveyor belt are supposed to be aligned with x=0
axis
     // but due to placement errors the object may have some offsets,
     // the following function gets how much it has been deviated from the
axis
     public static float GetXOffsetError()
     {
      // since this is just an example to simulate a practical scenario
      // a random number generator is used to produce an offset error
      Random rand = new Random();
      int randNumber = rand.Next(-1000, 1000);
      return (float)randNumber / 500;
     }

     public static float GetYOffsetError()
     {
        return 0;
     }
    }
   }
```

12.1.1 Sample Script

```
--This program will demonstrate ScanMaster extension support.

SetUnits(Units.Millimeters)
myText = Text.Horizontal()
myText.X = 5
myText.Y = 0
myText.Elevation = 0
myText.Height = 3
myText.Font = "Arial"
myText.Angle = 0
locationY = 0
locationX = 5

function XOffsetvalueRecived(xOffsetError)
   locationX = locationX + xOffsetError
   Report(xOffsetError)                                    --used for
                                                           debugging purpose
end

System.ReceiveCommandAsync("VS_GetXOffset", "XOffsetvalueRecived") line =
""


while (not(line == "EndOfFile" or line == "ErrorOccured")) do

   System.SendCommand("SN_ReadLine")                       --Send Command
   line = System.ReceiveCommand("SN_ReadLine")             --Get results
   if (line ~= "EndOfFile") then

     Report(line)                                          --used for
                                                           debugging purpose
     myText.Text = line
     locationY = locationY + 5
     myText.X = locationX
     myText.Y = locationY
     Image.Text(myText)
     Sleep(500)
   end
end
```

12.1.2 Contents of snFile.txt:

S/N: QQ194204601
S/N: QQ194204602
S/N: QQ194204603
S/N: QQ194204604
S/N: QQ194204605
S/N: QQ194204606
S/N: QQ194204607
S/N: QQ194204608
S/N: QQ194204609
S/N: QQ194204610
S/N: QQ194204611

12.2 SEND AND RECEIVE ARGUMENTS TO THE SCANMASTER API

System.SendCommand can be used to send arguments to the ScanMaster API, and **System.ReceiveCommand** can be used to receive arguments from the ScanMaster API.

12.2.1 System.SendCommand

Sends the command and the arguments to the ScanMaster API.

Syntax

```
System.SendCommand (string command [, string arg1, string arg2,...])
```

command	Type: string The command that is passed to the API
arg1	Type: string Arguments related to the command
arg2	Type: string Arguments related to the command

12.2.2 System.ReceiveCommand

Waits until the given command is received from the ScanMaster API and returns the relevant arguments.

Syntax

arg1 = System.ReceiveCommand(string command)

command	Type: string The command that is passed to the API

```
--This program demonstrates the usage of System.SendCommand and
System.ReceiveCommand method
Laser.JumpSpeed = 250 --Laser Parameter settings
Laser.MarkSpeed = 150
Laser.JumpDelay = 150 --Delays settings
Laser.MarkDelay = 200
myText = Text.Horizontal() --Creates a horizontal text string
myText.X = 0
myText.Y = 0
myText.Elevation = 0
myText.Height = 0.1
myText.Font = "Arial"
myText.Angle = 0
function MarkText(text)
  myText.Text = text
  Image.Text(myText)
end
function OnReceiveText(text)
  MarkText(text)
end
  System.SendCommand("GetNextText")--Send the "GetNextText" string command
to ScanMaster API
  --Following command will block the execution of the code until the
command is received from the API
textRecived = System.ReceiveCommand("GetNextText")--Received command string
is assign to "textRecived" variable
MarkText(textRecived) --MarkText function calling
--This command does not block the execution and need to set a call back
method to execute when the result is available
System.ReceiveCommandAsync("GetNextText", "OnReceiveText" ) --Once the
"GetNextText" command is received from ScanMaster API, the event handler is
called with the argument
  for i = 1, 1000 do -- To wait the script running
  Sleep(200)
end
```

```
--This program demonstrates the usage of System.SendCommand and
System.ReceiveCommand method
Laser.JumpSpeed = 250 --Laser Parameter settings
Laser.MarkSpeed = 150
Laser.JumpDelay = 150 --Delays settings
Laser.MarkDelay = 200
myText = Text.Horizontal() --Creates a horizontal text string
myText.X = 0
myText.Y = 0
myText.Elevation = 0
myText.Height = 0.1
myText.Font = "Arial"
myText.Angle = 0
    function MarkText(text)
     myText.Text = text
     Image.Text(myText)
    end
    function OnReceiveText(text)
     MarkText(text)
    end
     System.SendCommand("GetNextText")--Send the "GetNextText" string command to
    ScanMaster API
     --Following command will block the execution of the code until the command is received from
    the API
    textRecived = System.ReceiveCommand("GetNextText")--Received command string is assign to
    "textRecived" variable
    MarkText(textRecived) --MarkText function calling
    --This command does not block the execution and need to set a call back method to execute
    when the result is available
    System.ReceiveCommandAsync("GetNextText", "OnReceiveText" ) --Once the "GetNextText"
    command is received from ScanMaster API, the event handler is called with the argument
     for i = 1, 1000 do -- To wait the script running
     Sleep(200)
    end
```

13 APPENDIX

13.1 SNAP COMMANDS

The **Snap** commands make it easier to draw and modify shapes on the canvas. The following **Snap** commands are available:

- Snap to Angle
- Snap to Grid
- Snap to Objects

13.1.1 Snap to Angle

This feature, allows you to draw a shape to a predetermined angle increment. It will snap to a specified angle, relative to the last point in steps of 45 degrees.

- To enable this option click **Angle** on the **Snap** panel at the bottom of the Drawing Canvas.
- Select a point on the drawing or on the grid which you wish to snap to an angle.

The specified angles are shown in blue dashed line with respect to the horizontal or vertical axes. Sample illustrations are as follows.

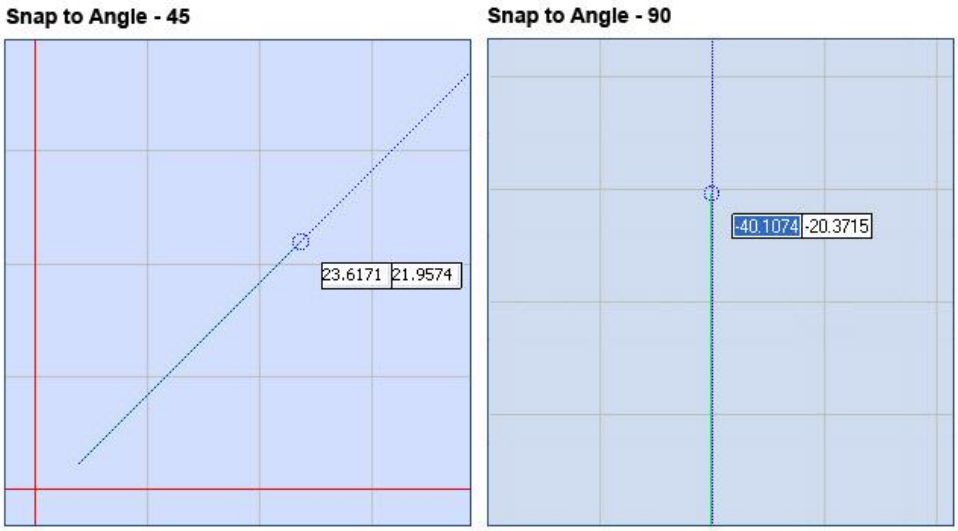


FIGURE 667: SNAP TO ANGLE

13.1.2 Snap to Grid

This function allows you to perfectly align shapes along the grid points. It is useful when you want to position shapes or objects to the closest intersection of the grid.

1. Click **Grid** on the **Snap** panel, to enable snapping to grid.
2. Select the shape from the Drawing Shapes Toolbar.
3. If you move the cursor over a snap location (grid point), the node will be highlighted with a red circle with corresponding X, Y coordinates.
4. Click on the node to snap to the indicated point, your cursor automatically locks onto the snap location you selected.

The shape is snapped to the grid points, and it is indicated with a red circle as shown in the following image.

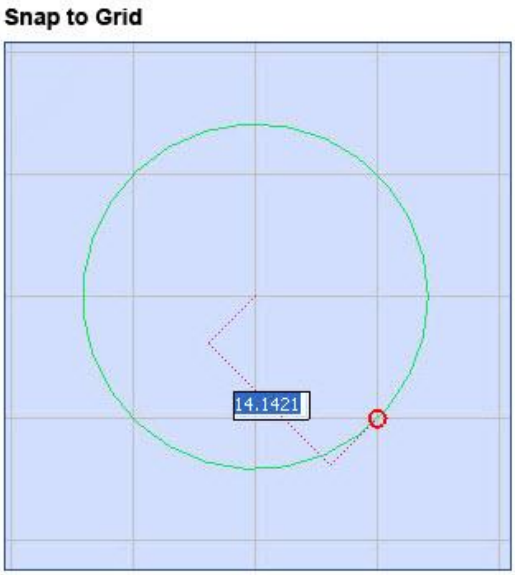


FIGURE 668: SNAP TO GRID

Note: **Enforce** will enforce Snap to grid behavior. The shape will be drawn using only the grid points, with no possibility to make them snap between the grid points. Select the **Enforce** box to enable this option.

13.1.3 Snap to Objects

You may use **Snap to Objects** to specify precise locations on objects. For example you can use the **Snap to Objects** command to insert a **dot** to the center of a **circle**.

The following object snap methods are available in ScanMaster Designer software:

- End Points
- Mid Points
- Center
- Nodes
- Tracking
- Quadrants
- Intersection
- Extension

Go to **Snap** panel and click **Object** to enable this function.

End Points

This function helps you to snap a shape to the end nodes of another shape.

1. Click **Snap to Object** from the **Snap** panel.
2. Select **End Points** from the **Object button drop down** panel.
3. Select the shape you wish to draw.
4. If you move the cursor over a snap location (end point) on a shape, the end nodes will be highlighted with a blue square with corresponding X, Y coordinates.
5. Click on the node to snap to the indicated point, your cursor automatically locks onto the snap location you selected.

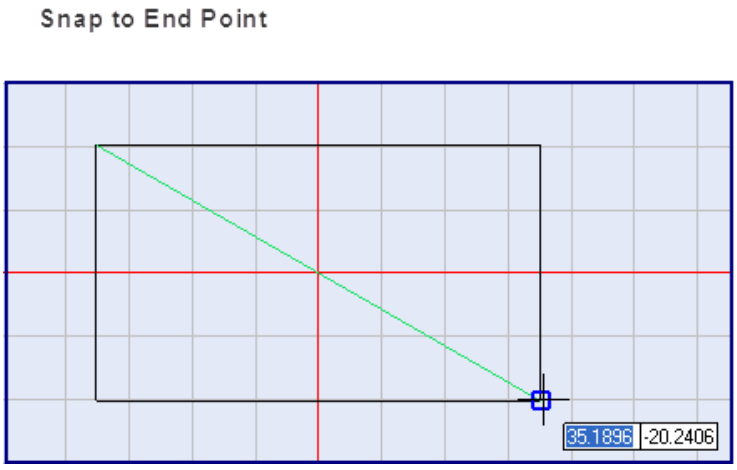


FIGURE 669: SNAP TO END POINT

Mid Points

Snapping to midpoints of straight line segments on shapes is possible with this option.

1. Click **Snap to Object** from the **Snap** panel.
2. Click **Mid Points** .
3. Select the shape you wish to draw.
4. If you move the cursor over a snap location (mid point) on a shape, the mid nodes will be highlighted with a blue triangle with corresponding X, Y coordinates.
5. Click on the node to snap to the indicated point, your cursor automatically locks onto the snap location you selected.

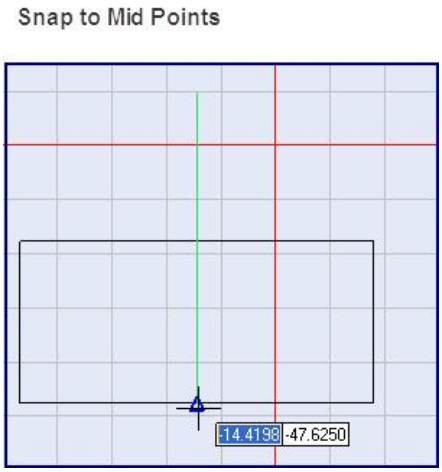


FIGURE 670: SNAP TO MID POINTS

Center

Snapping to the center of an arc, circle, ellipse, or polygon is possible with this option.

1. Click Snap to **Object** from the **Snap** panel.
2. Click **Center** and select the object you wish to snap.
3. Select the shape you wish to draw.
4. If you move the cursor over a snap location (center point) on a shape, the center node will be highlighted with a blue circle with corresponding X, Y coordinates.

5. Click on the node to snap to the indicated point, your cursor automatically locks onto the snap location you selected.

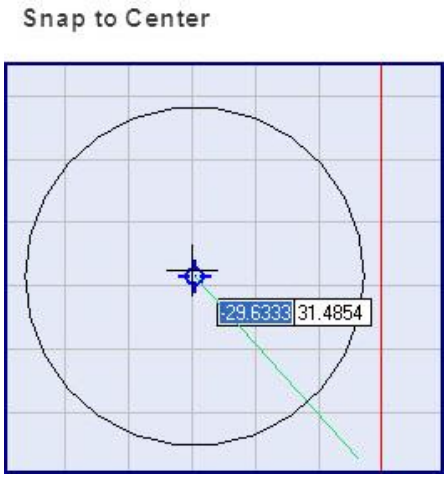


FIGURE 671: SNAP TO CENTER

Nodes

This function allows you to snap to nodes on the canvas.

1. To enable this option click **Nodes** on the **Snap** panel.
2. Select a shape you wish to use for snapping from the Drawing Shapes toolbar.
3. Move the mouse pointer over the places where you find points, and the points are snapped with a blue square.

A sample illustration is as below.

FIGURE 672: SNAP TO NODES

Tracking

This function is available to track along alignment paths that are based on object snap points.

1. To enable this option, click **Tracking** on the **Snap** panel.
2. Select a shape you wish to use for snapping from the Drawing Shapes Toolbar.
3. Hover over the shape to acquire points which are displayed with a small plus sign (+).
4. To deselect the tracked points, go over the tracked point again.

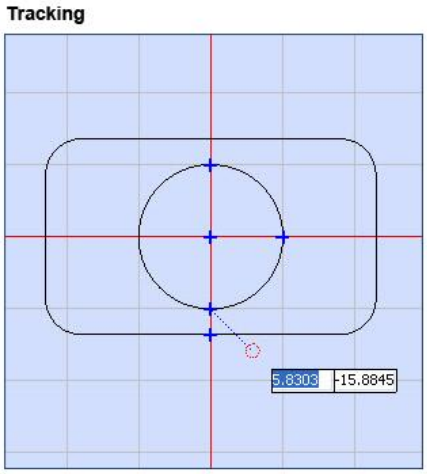


FIGURE 673: TRACKING

Quadrants

This function snaps to the four quadrant points of a circle. On a typical Circle, Quadrant points are located at 0°, 90°, 180°, and 270°.

1. To enable this option click **Quadrants** on the **Snap** panel.
2. Select the shape you wish to use for snapping from the Drawing Shapes Toolbar.
3. Hover over the circle path to snap to the quadrants of the circle/arc.

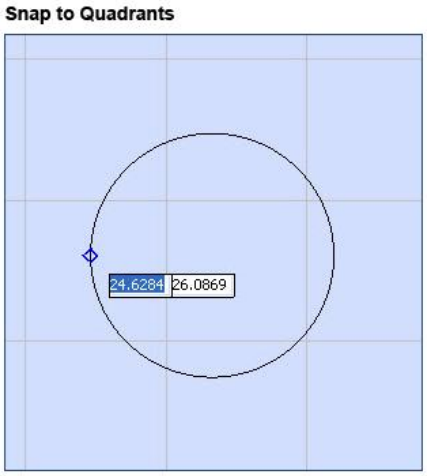


FIGURE 674: SNAP TO QUADRANTS

Intersection

This function helps to select the exact point at which two shapes cross.

1. Click **Intersection** button from the **Object** category on the Snap panel.
2. Mark the shape/s of which the intersections need to be identified using any of the snapping objects. Marked shapes will be indicated by a blue color plus "+" sign.
3. Select the shape you wish to use for snapping from the Drawing Shapes toolbar and hover the cursor over the shapes you marked earlier.

It will select the exact point at which two shapes cross and the intersection point will be highlighted with a red dashed circle.

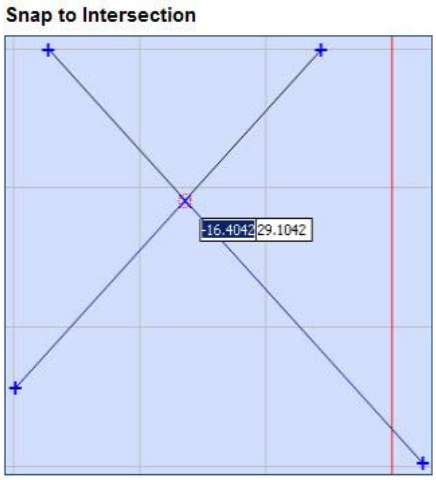


FIGURE 675: SNAP TO INTERSECTION

Extension

This command enables you to select a point along the same orientation of the existing line and extend it.

1. Select the line which you wish to extend.
2. Click **Extension** on the **Snap** panel.
3. Next click on an end point and drag the cursor to the desired length. The extension is shown with a red dashed line.

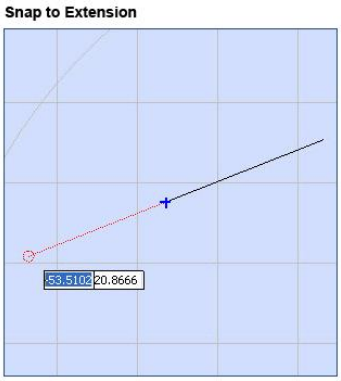


FIGURE 676: SNAP TO EXTENSION

13.2 SCANMASTER DESIGNER SHORTCUT KEYS

Shortcut key combination	Function
Ctrl + A	Select all
F1	Help
Ctrl + N	Opens a new project
Ctrl + O	Opens existing projects
Ctrl + C	Copy
Ctrl + X	Cut
Ctrl + V	Paste
Ctrl + S	Save
Ctrl + Z	Undo
Ctrl + Y	Redo
Ctrl + B	Bold
Ctrl + I	Italic
Shift + Home	Highlights from current position to beginning of line
Shift + End	Highlights from current position to end of line
Alt + F4	Close the application
Shift + select shapes	Select multiple shapes
Shift + Left click on hot spot	Select multiple hotspots to edit
Arrow keys	Nudge shapes
Ctrl+ Arrow keys	Nudge shapes in large increments
Shift + Arrow keys	Nudge shapes in small increments
Ctrl + Tab	Switches between currently open projects

Home	Positions cursor at beginning of current line in the Text Editor
End	Positions cursor at end of current line in the Text Editor

14 INDEX

Add a Layer, 46
Add a New Image, 41
Add existing image, 42
Administration Configuration, 497
Advanced Text Formatting
  Advanced Styles, 207
Align, 35, 326
  Bottom Edges, 35
  Centers, 35
  Centers Horizontally, 35
  Centers Vertically, 35
  Left Edges, 35
  Right Edges, 35
  Top Edges, 35
Aligning and Distributing Shapes, 326
Arc, 132
  3 Point, 135
  Center Start Sweep Angle, 134
  Properties, 136
  Start Center Sweep Angle, 133
  Start End Center, 132
Arrange, 326
Array, 351
Barcodes, 262
Basic Text Formatting, 172
Bezier Path
  Bezier Path, 154
Bezier Path, 154
Bezier Path
  Properties, 156
Bold, 193
Change image properties, 240
Changing Layer Properties, 47
Changing the view, 276
Circle, 126
  2 Point, 126
  3 Point, 127
  Center & Diameter, 129
  Center and Radius, 128
  Properties, 131
  Tangent Radius, 130
Closing a Project, 113
Controller Configuration, 499
Copy, 181
Copy and paste Profiles, 63
Correction Tables, 502
Create a new drawing, 109
Customize the Quick Access Toolbar, 26
Cut, 181
Cut, Copy and Paste, 309
Date, 179
Delays, 52
Deleting Scanning Jobs, 495
Designer Start Button], 25
Devices, 65
  Connect, 65, 489
  Disconnect, 65, 490
Distribute
  Bottom Edges Vertically, 36
  Centers Horizontally, 36
  Centers Vertically, 36
  Left Edges Horizontally, 36
  Right Edges Horizontally, 36
  Top Edges Vertically, 36, 329, 330
Dot, 119
  Properties, 121
Downloading Scanning Jobs, 493
Drill Shape, 254
  Properties, 260
Dynamic Text, 173

Ellipse, 146
Properties, 149
Elliptical Arc, 150
A,B,Start Angle,Sweep Angle, 150
Center,A,B,Start Angle,Sweep Angle, 151
Properties, 153
end ordering, 391
Export, 45
Fit to All, 279
Hatching, 172, 195, 334
Apply a hatch pattern, 334
Edit hatch parameters, 347
Remove Hatch Association, 350
Helix Hatch, 344
Home, 28
Horizontal Character Gap, 190
Horizontally Distribute, 36
Horizontally Evenly, 30, 31, 37
Human Readable Text Support, 271
Image, 227
Image Processing, 228
Brightness, 231
Contrast, 230
Error Diffusion, 232
Grayscale, 228
Invert, 229
Image Properties
Geometry, 240
Rasterization, 241
Edit Profile, 248
Pixel Modulation, 243
Import image file, 42
Inserting Basic 3D Shapes, **401**
Installation
Enclosed Scanning Systems, 276
Italic, 193
Kerning, 194
Laser Configuration, 502
Laser marking
Stop, 492
Laser Marking
Pause, 492
Start, 491
Trace, 492
Laser Properties, 50
Layers, 46
Lens Configuration, 507
Line, 122
2 points, 122
Length& Angle, 123
Properties, 125
Line Hatch, 195, 338
Load a Profile, 59
Managing jobs, 494
marking order, 389
Mirror, 324
Move, 281, 311
Moving shapes, 281, 311
Offset Hatch, 198, 342
Offset In-Out, 200, 343
Optimize, 388
Pan, 276, 277
Paste, 181
Path, 158
Properties, 161
Path Text, 173, 216
Properties, 218
Performance Adjustments, 507
Polar Array, 357
Polyline, 137
Points, 137
Properties, 139
Segment Length Angle, 138
Polyline Smoothing, 395
Preferences, 78
General, 78, 83, 84, 85, 86, 87, 92
Profiles, 58
Project Explorer, 41
Quick Access Toolbar, 26
Rectangle, 141
Rectangular Array, 351
Redo, 190
Remove a Layer, 46
Remove Overlaps, 399
Rename an Image, 44
Rename scanning jobs, 495

Renaming a Layer, 47
Reverse Characters, 188
Reverse Marking Direction, 390
Rotate, 322
Same, 36, 327
  Height, 36, 328
  Size, 36, 328
  Width, 36, 328
Save a Profile, 61
Saving a drawing, 115
Scan Active Image, 491
Scan Project, 491
Scan Selected Shapes, 491
Shape Properties, 49
Shape Tree, 46
Show Jumps, 388
Spiral, 162
  Properties, 165
Subscript, 172, 185
Superscript;, 185
Surface Marking, **520**
Symmetric Polygon, 143
Text Hatch
  Clear All Hatches, 203
  Remove Hatch, 205
Text Hatching
  Show Hatch, 203
Text Height, 190
The Drawing Canvas, 38
Time, 180
To add images to a project, 109
Tools, 32
Undo, 189, 332, 333
Undo and Redo, 332
Unicode, 213
Upside Down Character, 187
Vector Image, 223
Vertically Evenly, 37
View scanning jobs, 494
Word Wrap, 207
Zoom, 172, 182
Zoom Commands, 276
Zoom In/ Zoom Out, 276
Zoom Window, 279

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Engineered by Cambridge Technology, part of Novanta

Novanta Headquarters, Bedford, USA

Phone: +1-781-266-5700

Email: photonics@novanta.com

Website: novantaphotonics.com

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