

# KNK Zing Orbit with Sure Cuts A Lot

August 28, 2017

**You can expect updates to this manual over the next few months**

**Do NOT read this entire manual...** unless you want to.

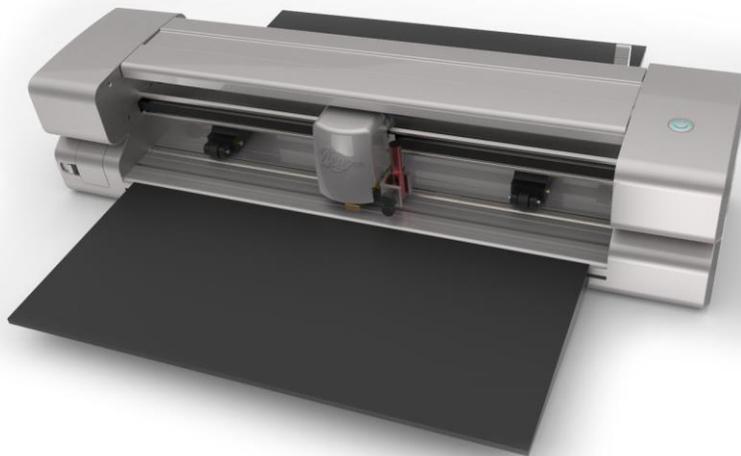
- Chapters 1 and 2 are very important in terms of setting up your Zing Orbit to work with SCAL and learning the ins and outs of cutting.
- Chapters 3 – 10 are specific to SCAL and present every function in the software, many of which you may never need.
- Chapter 11 is for those owners wanting to perform print and cut applications.
- Chapter 12 covers using the Zing Orbit accessory tools.

**It's not practical to print this entire manual because:**

- It's a waste of paper and ink if you only ever need certain sections.
- The live links to videos, blog posts, products, etc will not work.
- This manual will be updated from time to time.
- You cannot search on individual words.

**Also:**

- Having the *Table of Contents* continuously viewable makes navigation easier. It's also useful to know how to search for specific words or terms. Here is a link to a tutorial which covers how to do these two things: [How to Get the Most from your KNK UM.](#)
- Note the green **Video** icons which link to videos related to the section in which they are located. These videos will enhance your learning experience.



# Table of Contents

KNK ZING ORBIT WITH SURE CUTS A LOT .....	1
<b>1. INTRODUCTION AND SETTING UP .....</b>	<b>8</b>
1.01 SUPPORT .....	8
1.02 SAFETY AND WARNINGS .....	8
1.03 WARRANTY .....	9
1.04 UNPACKING .....	9
1.05 CONTENTS .....	9
1.06 PARTS OF THE KNK ZING ORBIT .....	10
<b>Front</b> .....	<b>10</b>
<b>Right Side</b> .....	<b>10</b>
<b>Left Side</b> .....	<b>11</b>
<b>Back</b> .....	<b>11</b>
1.07 ACCESSORIES .....	11
<b>1.07.1 Zing Orbit Blades</b> .....	<b>11</b>
<b>1.07.2 Blade Installation</b> .....	<b>12</b>
1.08 PREPARING AND CARING FOR THE CUTTING MAT .....	13
<b>1.08.1 Tips on Using the Cutting Mat</b> .....	<b>13</b>
<b>1.08.2 Cleaning and Replenishing the Cutting Mat</b> .....	<b>14</b>
1.09 PINCH WHEELS .....	14
1.10 ATTACHING THE FLATBED TABLES .....	15
1.11 REGISTERING AND INSTALLING DRIVERS AND SCAL .....	17
1.12 CONNECTING THE ZING ORBIT TO YOUR COMPUTER .....	17
<b>1.12.1 Connecting to a PC</b> .....	<b>17</b>
<b>1.12.2 Connecting to a Mac</b> .....	<b>22</b>
1.13 VERIFY COMMUNICATION AND TEST DRAW SHAPES .....	24
<b>1.13.1 Setup for Drawing</b> .....	<b>25</b>
<b>1.13.2 Drawing Your First Shape</b> .....	<b>26</b>
1.14 UPDATING FIRMWARE .....	32
1.15 MAINTENANCE .....	33
1.16 OTHER USEFUL TOOLS AND SUPPLIES .....	34
<b>2. ZING ORBIT: CUTTING .....</b>	<b>35</b>
2.01 WHAT YOU NEED TO UNDERSTAND ABOUT CUTTING .....	35
<b>You Have To Make Mistakes</b> .....	<b>35</b>
<b>The Most Common Mistakes Made by New Owners</b> .....	<b>35</b>
<b>Begin with Easy Materials and Easy Shapes</b> .....	<b>35</b>
<b>Record Your Successes</b> .....	<b>35</b>
<b>Use the Correct Blade for the Material You Are Cutting</b> .....	<b>36</b>
<b>Set the Blade Length/Exposure To Match the Material Thickness</b> .....	<b>36</b>
<b>Set the Blade Height Above the Material</b> .....	<b>36</b>
<b>Adjust the Speed, Force, and Number of Passes Based on the Material and Shapes</b> .....	<b>37</b>
<b>Perform Test Cuts!</b> .....	<b>37</b>
<b>Know Where Your Images Will Cut</b> .....	<b>38</b>
<b>Keep the Cutting Mat Clean and Sticky</b> .....	<b>38</b>
<b>Don't Get Frustrated, Get Help!</b> .....	<b>38</b>
2.02 CHOICES BEFORE CUTTING .....	38
<b>2.02.1 Controlling What Shapes Will Cut</b> .....	<b>38</b>
<b>2.02.2 Controlling Where Shapes Will Cut</b> .....	<b>39</b>
<b>2.02.3 Selecting the Tool to be Used for Cutting</b> .....	<b>40</b>
<b>2.02.4 Determining the Cut Settings</b> .....	<b>42</b>
2.03 CUT SETTINGS .....	42
<b>2.03.1 Pressure</b> .....	<b>42</b>
<b>2.03.2 Speed</b> .....	<b>42</b>
<b>2.03.3 Blade Offset</b> .....	<b>42</b>
<b>2.03.4 Multi-Cut</b> .....	<b>43</b>
<b>2.03.5 Overcut</b> .....	<b>43</b>
2.04 PRESETS .....	44
2.05 SET ORIGIN .....	44
2.06 OTHER OUTPUT FUNCTIONS .....	45
2.07 IMPORTANT CHECKLIST BEFORE YOU CUT! .....	45
2.08 RESOLUTION CALIBRATION .....	46

SETTINGS FORM FOR CUTTING MATERIALS.....	49
SUGGESTED CUT SETTINGS FOR VARIOUS MATERIALS ON KNK ZING ORBIT .....	50
<b>3. SCAL: INSTALLATION, PREFERENCES, AND WORKSPACE .....</b>	<b>54</b>
3.01 INSTALLING SCAL .....	54
<b>3.01.1 Selecting and Downloading the Software.....</b>	<b>54</b>
<b>3.01.2 Activating the Software.....</b>	<b>54</b>
<b>3.01.3 Installing the USB Driver .....</b>	<b>56</b>
<b>3.01.4 Installing Your Cutter .....</b>	<b>56</b>
3.02 MAIN SCAL SCREEN .....	57
3.03 LANGUAGE PREFERENCE .....	58
3.04 UNITS PREFERENCE.....	58
3.05 CUSTOMIZING THE CUTTING MAT .....	58
<b>3.05.1 Mat Size .....</b>	<b>58</b>
<b>3.05.2 Mat Orientation.....</b>	<b>59</b>
<b>3.05.3 Mat Grid.....</b>	<b>60</b>
<b>3.05.4 Workspace Alpha.....</b>	<b>61</b>
<b>3.05.5 Rulers .....</b>	<b>62</b>
3.06 CUSTOMIZING THE WORKSPACE.....	62
3.07 SNAP TO.....	64
3.08 OTHER PREFERENCES.....	65
3.09 ZOOMING AND PANNING .....	66
3.10 UNDO/REDO.....	67
<b>3.10.1 Undo.....</b>	<b>67</b>
<b>3.10.2 Redo.....</b>	<b>67</b>
3.11 PAGES.....	67
3.12 HELP RESOURCES.....	68
<b>4. SCAL: HANDLING FILES AND ORGANIZING LAYERS.....</b>	<b>70</b>
4.01 OPENING FILES .....	70
<b>4.01.1 Opening a New File/Project.....</b>	<b>70</b>
<b>4.01.2 Opening an Existing .SCUT File.....</b>	<b>70</b>
4.02 SAVING SCAL FILES.....	71
4.03 USING THE LIBRARY .....	71
<b>4.03.1 Shapes Tab.....</b>	<b>71</b>
<b>4.03.2 Fonts Tab.....</b>	<b>75</b>
<b>4.03.3 Projects Tab.....</b>	<b>76</b>
4.04 LAYERS PANEL.....	77
<b>4.04.1 Introduction to the Layers Panel.....</b>	<b>77</b>
<b>4.04.2 Parts of the Layers Panel .....</b>	<b>78</b>
<b>4.04.3 Creating Folders and Moving Layers.....</b>	<b>81</b>
4.05 THE ESHAPE STORE .....	84
<b>4.05.1 Importing from the eshape Store.....</b>	<b>84</b>
<b>4.05.2 Exporting to the eshape Store.....</b>	<b>86</b>
4.06 IMPORTING OTHER FILE FORMATS.....	88
<b>4.06.1 Importing Vector Files .....</b>	<b>88</b>
<b>4.06.2 Importing Raster Files .....</b>	<b>89</b>
<b>4.06.3 Importing Fonts .....</b>	<b>90</b>
4.07 EXPORTING IN OTHER FILE FORMATS .....	90
<b>4.07.1 Exporting in SVG Format.....</b>	<b>90</b>
<b>4.07.2 Exporting in JPG, PNG, BMP and TIFF Formats.....</b>	<b>91</b>
<b>4.07.3 Exporting in FCM Format .....</b>	<b>92</b>
<b>4.07.4 Exporting in PLT Format.....</b>	<b>92</b>
<b>4.07.5 Exporting to SCAL2.....</b>	<b>93</b>
<b>5. SCAL: MANIPULATING AND COLORING SHAPES .....</b>	<b>94</b>
5.01 SELECTING.....	94
5.02 DELETING .....	96
5.03 MOVING.....	96
5.04 RESIZING, SCALING, AUTOFIT .....	98
<b>5.04.1 Resizing.....</b>	<b>98</b>
<b>5.04.2 Scaling .....</b>	<b>99</b>
<b>5.04.3 Autofit.....</b>	<b>99</b>
5.05 ROTATING.....	100

5.06 SKEWING AND DISTORTING.....	102
<b>5.06.1 Skewing</b> .....	<b>102</b>
<b>5.06.2 Distorting</b> .....	<b>102</b>
5.07 MIRRORING AND FLIPPING .....	103
5.08 LOCKING AND UNLOCKING .....	103
5.09 HIDING AND SHOWING .....	104
5.10 GROUPING AND UNGROUPING.....	105
<b>5.10.1 Group</b> .....	<b>105</b>
<b>5.10.2 Ungroup</b> .....	<b>105</b>
5.11 BREAKING AND MERGING.....	106
<b>5.11.1 Break Apart</b> .....	<b>106</b>
<b>5.11.2 Merge</b> .....	<b>107</b>
5.12 ARRANGING (ORDERING) SHAPES .....	108
5.13 FILL & STROKE: FILL .....	110
<b>5.13.1 No Fill</b> .....	<b>111</b>
<b>5.13.2 Color Fill</b> .....	<b>111</b>
<b>5.13.3 Pattern Fill</b> .....	<b>111</b>
<b>5.13.4 Gradient Fill</b> .....	<b>113</b>
<b>5.13.5 Opacity</b> .....	<b>115</b>
5.14 FILL & STROKE: STROKE.....	116
5.15 DROPPER TOOL .....	120
5.16 CUTTING, COPYING, PASTING, DUPLICATING.....	121
<b>5.16.1 Cutting to the Clipboard</b> .....	<b>121</b>
<b>5.16.2 Copying to the Clipboard</b> .....	<b>121</b>
<b>5.16.3 Pasting from the Clipboard</b> .....	<b>121</b>
<b>5.16.4 Duplicating - Duplicate</b> .....	<b>122</b>
<b>5.16.5 Quick Duplicate</b> .....	<b>122</b>
5.17 ALIGNMENT .....	122
<b>5.17.1 Align to Page</b> .....	<b>123</b>
<b>5.17.2 Align to Selection</b> .....	<b>124</b>
5.18 DISTRIBUTE .....	125
<b>5.18.1 Distribute to Page</b> .....	<b>126</b>
<b>5.18.2 Distribute to Selection</b> .....	<b>127</b>
<b>5.18.3 Distribute to Selection Below</b> .....	<b>129</b>
<b>6. SCAL: WORKING WITH TEXT .....</b>	<b>132</b>
6.01 TEXT OPTIONS.....	132
6.02 SELECTING A FONT.....	132
6.03 ADDING TEXT OPTIONS .....	134
6.04 FOUR MODES OF TEXT .....	134
<b>6.04.1 Type Tool</b> .....	<b>134</b>
<b>6.04.2 Vertical Type Tool</b> .....	<b>135</b>
<b>6.04.3 Type on Path Tool</b> .....	<b>135</b>
<b>6.04.4 Type on Arch Tool</b> .....	<b>135</b>
6.05 TEXT SETTINGS.....	136
6.06 OTHER TEXT EDITING .....	138
6.07 CREATING A CONNECTED LETTER TITLE.....	138
6.08 INCORPORATING SHAPES INTO A TITLE .....	139
6.09 WELDING TITLES IN IMAGINATIVE WAYS .....	140
6.10 STENCILING LETTERS.....	140
6.11 OPEN PATH FONTS (OPF).....	142
6.12 KNOCKOUT .....	142
6.13 TITLE CRAWL.....	144
6.14 OTHER TEXT EFFECTS .....	144
<b>7. SCAL: TRACING AND DRAWING .....</b>	<b>145</b>
7.01 RASTER VERSUS VECTOR.....	145
7.02 FINDING EASY IMAGES TO TRACE .....	146
7.03 TRACE FUNCTION .....	147
<b>7.03.1 Trace Settings</b> .....	<b>147</b>
<b>7.03.2 Monochrome Trace of a Colored Image: Effects of Contrast</b> .....	<b>150</b>
<b>7.03.3 Monochrome Trace of a Silhouette Image: Effects of Smooth</b> .....	<b>152</b>
<b>7.03.4 Monochrome Trace of a Detailed Image: Effects of Detail</b> .....	<b>153</b>
<b>7.03.5 Monochrome Trace of a Coloring Book Image: Single Line Threshold and Blackout</b> .....	<b>153</b>

7.03.6	Monochrome Trace of a PNG File with a Transparent Background .....	154
7.03.7	Color Layers Trace .....	155
7.03.8	Single Color Trace .....	157
7.04	DRAW FUNCTIONS .....	161
7.04.1	The Draw Tool .....	161
7.04.2	Freehand Drawing .....	163
7.04.3	Brush Drawing .....	164
7.05	MANUAL TRACING OF AN IMPORTED IMAGE .....	164
7.05.1	Importing an Image for Manual Tracing .....	164
7.05.2	Manual Tracing Using the Draw Tool .....	165
7.05.3	Editing the Trace .....	166
7.05.4	Copy, Mirror and Weld to Complete Symmetrical Shapes .....	168
8.	SCAL: EDITING .....	169
8.01	SIMPLIFY .....	169
8.02	SPLIT PATH .....	170
8.03	CLOSE PATH .....	172
8.04	JOIN PATHS .....	172
8.05	PATH OFFSET .....	173
8.06	ERASER .....	175
8.07	KNIFE AND CROP .....	176
8.07.1	Using Knife .....	176
8.07.2	Using Crop .....	177
8.08	WHICH CUTTING TOOL TO USE? .....	178
8.09	RULER .....	179
8.10	THE SHAPE TOOL - PATH AND NODE EDITING .....	181
8.10.1	Moving a Path .....	181
8.10.2	Reshaping a Path .....	182
8.10.3	Examples of Smoothing Curves .....	186
8.10.4	Applications for the Shape Tool .....	187
9.	SCAL: DESIGNING .....	188
9.01	WHERE DO I START WITH LEARNING TO DESIGN? .....	188
9.02	PROJECT INFO .....	188
9.03	BASIC SHAPES .....	189
9.03.1	Rectangle .....	189
9.03.2	Rounded Rectangle .....	189
9.03.3	Circle and Oval .....	190
9.03.4	Triangle .....	190
9.03.5	Polygon .....	190
9.03.6	Star .....	190
9.03.7	Spiral .....	191
9.04	SHADOW LAYER .....	192
9.04.1	Shadow Layer Settings .....	192
9.05	BOOLEAN OPERATIONS .....	195
9.05.1	Union .....	195
9.05.2	Intersection .....	196
9.05.3	Exclude .....	197
9.05.4	Front Minus Back .....	198
9.05.5	Back Minus Front .....	198
9.06	DUPLICATE ROTATED .....	199
9.06.1	Duplicate Rotated Settings .....	199
9.06.2	Using Duplicate Rotated to Design a Wreath .....	200
9.06.3	Using Duplicate Rotated to Design a Frame .....	201
9.07	OBJECT ON PATH .....	202
9.07.1	Designing a Scalloped Oval .....	203
9.07.2	Warp a Shape to a Path .....	205
9.07.3	Remaining Settings .....	206
9.08	WRAPPER .....	206
9.09	LATTICE .....	208
9.10	RHINESTONES .....	212
9.10.1	Guidelines for Rhinestone Pattern Design .....	212
9.10.2	Rhinestone Outline .....	212
9.10.3	Rhinestone Fill .....	213
9.10.4	Editing Rhinestone Designs .....	214

9.10.5 Additional Tips on Rhinestone Designing.....	215
9.11 JIGSAW PUZZLE .....	217
9.12 3D ROTATE.....	220
9.13 3D EXTRUDE (SCAL PRO ONLY).....	221
9.14 BARREL DISTORTION .....	222
9.15 BULGE.....	223
9.16 CANNED.....	225
9.17 WAVE.....	226
<b>10. SCAL: OUTPUT .....</b>	<b>228</b>
10.01 THE STYLE PANEL.....	228
10.02 PREVIEW .....	229
10.03 PRINTING.....	230
10.04 WEEDING (SCAL PRO ONLY).....	232
10.05 TILING (SCAL PRO ONLY).....	234
10.06 CUT SETTINGS .....	236
10.06.1 Cut Window Settings .....	236
10.06.2 Cut by Color (SCAL PRO only) .....	240
10.06.3 Tiles (SCAL PRO only).....	245
10.06.4 Extras (SCAL PRO only).....	246
10.07 CONTROLLING WHERE SHAPES WILL CUT .....	248
10.07.1 Overview .....	248
10.07.2 Origin Point.....	249
10.07.3 WYSIWYG.....	251
10.07.4 Center Point.....	254
10.08 PATH DETAILS AND REVERSE PATH.....	255
10.09 LINE FILL .....	256
10.10 PIERCE.....	257
<b>11. ZING ORBIT: PRINT AND CUT .....</b>	<b>259</b>
11.01 WHAT IS A PRINT AND CUT (PNC)? .....	259
11.02 WHAT IS A PNC CALIBRATION? .....	259
11.03 OPTIC EYE CALIBRATION PROCEDURE.....	260
11.03.1 What You Need for Calibrating .....	260
11.03.2 Preparing the Calibration File and Printing.....	260
11.03.3 Preparing the Zing Orbit.....	262
11.03.4 Conducting the Initial Calibration.....	263
11.03.5 Testing the Calibration .....	265
11.03.6 Adjusting the X and Y Values .....	267
11.04 PREPARING AN ACTUAL PRINT AND CUT APPLICATION .....	269
11.05 PRINT AND CUT TIPS .....	270
11.06 SETTING CALIBRATION NUMBERS ON ANOTHER COMPUTER.....	270
11.07 PRINTING A PNC PROJECT FROM OUTSIDE OF SCAL.....	271
<b>12. ZING ORBIT: ACCESSORY TOOLS .....</b>	<b>273</b>
12.01 DRAWING WITH A PEN OR GLUE PEN .....	273
12.01.1 Draw and Cut: When the Pen and Blade Holder Are Aligned.....	274
12.01.2 Draw and Cut: When the Pen and Blade Holder Are Not Aligned.....	276
12.02 EMBOSSING AND SCORING.....	278
General Info on Embossing .....	278
Embossing Paper or Cardstock.....	279
Embossing Leather.....	279
12.03 ENGRAVING .....	280
Project: Engraving a Dog Tag.....	280
12.04 USING THE PUNCH TOOL .....	281
SETTINGS FORM FOR ACCESSORY TOOLS .....	283
SUGGESTED SETTINGS FOR VARIOUS ACCESSORIES <sup>1</sup> .....	284
<b>APPENDIX A SHORTCUTS AND ICONS IN SURE CUTS A LOT.....</b>	<b>285</b>
<b>APPENDIX B TROUBLESHOOTING FAQ'S.....</b>	<b>291</b>
B1 COMMUNICATION ISSUES.....	291
B2 OPERATING ISSUES.....	292
B3 CUTTING/DRAWING ISSUES.....	293

B4 SOFTWARE ISSUES .....	296
<b>APPENDIX C SCAL DETAILS .....</b>	<b>297</b>
C1 SCREENSHOT OF SCAL SCREEN .....	297
C2 BARS .....	297
<b>C2.1 Menu Bar .....</b>	<b>297</b>
<b>C2.2 Toolbar.....</b>	<b>298</b>
<b>C2.3 Pages Bar .....</b>	<b>298</b>
<b>C2.4 Status Bar.....</b>	<b>298</b>
C3 PANELS.....	298
<b>C3.1 Tools Panel.....</b>	<b>298</b>
<b>C3.2 Properties Panel .....</b>	<b>299</b>
C4 PREFERENCES.....	299
<b>C4.1 Preferences: General Tab .....</b>	<b>299</b>
<b>C4.2 Preferences: Edit Tab.....</b>	<b>300</b>
<b>APPENDIX D ADDITIONAL INFORMATION.....</b>	<b>302</b>
D1 GUIDE TO TEST CUTTING <sup>1</sup> .....	302
<b>ACKNOWLEDGEMENTS.....</b>	<b>303</b>

# 1. Introduction and Setting Up

## 1.01 Support

- Thank you for choosing a Klic-N-Kut digital die cutter. Before using a blade in your new cutter, we urge you to read *Chapters 1 and 2* and watch the videos provided via links in these two chapters.
- If you run into difficulties with the operation of your Zing Orbit, turn off the power and look for a solution in this manual. Note that *Appendix B* is a Troubleshooting section. If you continue to have technical questions or issues, please contact your KNK dealer as soon as possible.
- If anything is missing from your order or you have mechanical issues with your Zing Orbit, please contact KNK USA by either:
  - ◇ Calling 800-268-3672
  - ◇ Starting a support ticket at this link: <http://knkusa.com/support-ticket-request/>
- For additional information and support with the Zing Orbit, please check out the following:
  - ◇ Zing Orbit Facebook group: <https://www.facebook.com/groups/KNKZing/>
  - ◇ Zing Yahoo group: [https://groups.yahoo.com/neo/groups/KNK\\_Zing/info](https://groups.yahoo.com/neo/groups/KNK_Zing/info)
  - ◇ All KNK Yahoo group: <https://groups.yahoo.com/neo/groups/Klic-N-Kut/info>
  - ◇ Cutterpunk KNK Support site: <https://cutterpunk.com/zing-orbit/>
  - ◇ For inspiration and tips on cutting specific materials: <http://teamknk.com/>
- For SCAL support, please check the list of resources in Section 3.12.

## 1.02 Safety and Warnings

Please be aware of the following safety guidelines when working with the Zing Orbit:

- **Pinch Points:** Keep hands, long hair, loose clothing, jewelry, etc. away from the moving parts.
- **Risk to Children and Pets:** Please supervise children around the cutter, when it is in use.
- **Movement and Touching:** Do not move the Zing Orbit or touch any circuitry while it is plugged in.
- Additionally:
  - ◇ **ONLY use the included power adaptor.** Attempting to use a different model can result in seriously damaging the Zing Orbit.
  - ◇ DO NOT touch or jam the plotter's track while it is operating. If the cutter is damaged, it is the owner's responsibility.
  - ◇ DO NOT shake the cutter while it is operating.
  - ◇ DO NOT cut any materials that have staples or other embellishments attached.
  - ◇ DO NOT touch the cutter with a magnet. It is safe, however, to cut magnetic materials, such as those used on refrigerators and car exteriors.
  - ◇ DO NOT allow small items to fall into the cutter.
  - ◇ **Transporting:** When transporting the cutter, move the pinch wheel lever into the upward position. Remove the blade from the blade holder and cover the tip with the plastic cap.

### **1.03 Warranty**

- **IMPORTANT!** If your Zing Orbit is damaged during shipment or appears to be defective, then your dealer should be notified as soon as possible. **If damages are reported later than three weeks after delivery**, then it will be the responsibility of the owner to ship the damaged cutter back to KNK USA for repair.
- The one year parts and labor warranty covers manufacturer's defects only and does not include normal wear and tear. If warranty work is required, the owner is responsible for shipping costs to and from KNK USA.
- Zing Orbit owners outside the USA should contact their dealer for procedures regarding warranty work or shipping damage.
- It is also recommended that you **retain the original box with packing materials** in case you ever need to ship your Zing Orbit.

### **1.04 Unpacking**

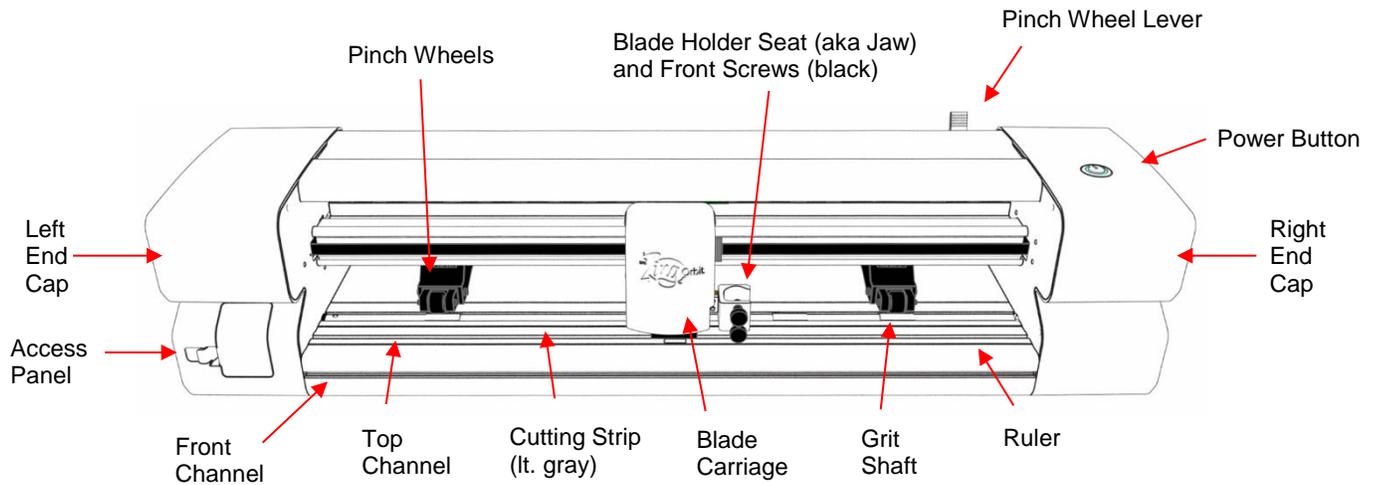
- Verify that you have received all contents. There is a checklist in *Section 1.05*. Please notify your Zing Orbit supplier immediately if anything is missing.
- Remove all foam pieces and other packaging before turning on the Zing Orbit. Currently, the ZO ships with two end cap foam protectors and one small foam piece tucked behind the head. There are also two plastic zip ties that will need to be cut. Be very careful to only cut those ties and not the black cable behind them.
- Because the cutting mat must be folded over to fit into the box, it may have become slightly rounded during shipping. Gently roll the mat in the opposite direction to remove the roundness and place on a flat table to make sure the mat now lies horizontally to the surface. Refer to *Section 1.10* for additional instructions on preparing the mat for use.
- Use the enclosed test pen as you experiment and become familiar with operating the Zing Orbit. Place scrap paper on the mat and simply draw shapes rather than cut them. This will prevent possible damage to the blade, mat, and cutting strip as you learn where shapes will cut and the basic operating procedures.
- Always turn off the Zing Orbit when not in use. Leaving the cutter turned on for extended periods of time can possibly damage the machine.

### **1.05 Contents**

- Your KNK Zing Orbit package comes with the following:
  - ◇ KNK Zing Orbit digital die cutter
  - ◇ [15" x 15" cutting mat](#) (refer to *Section 1.08* for instructions)
  - ◇ [Blade holder](#) (refer to *Section 1.07.2* for instructions)
  - ◇ Two blades: [thin material blade](#) (red cap) and [thick material blade](#) (blue cap)
  - ◇ Two small [springs](#) for the blades
  - ◇ Test pen with extra insert
  - ◇ Calibration pin for print and cut (also with a red cap)
  - ◇ Power cord and AC/DC adaptor
  - ◇ USB Cable
  - ◇ Attachable tables (24" model only) (refer to *Section 1.10* for instructions) Tables for the 15" model can be purchased at [this link](#).

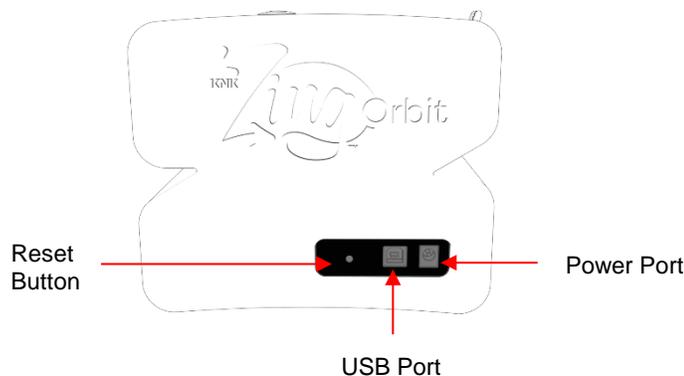
## 1.06 Parts of the KNK Zing Orbit

### Front

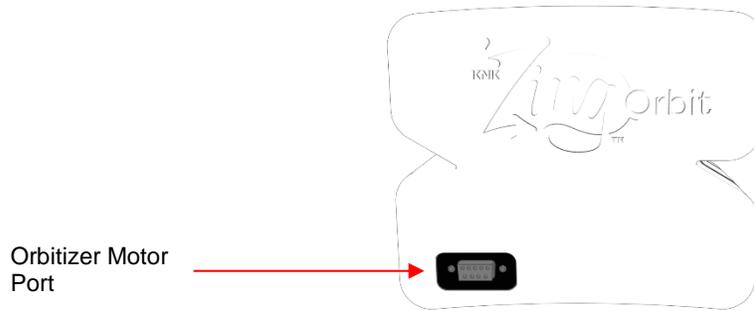


- Access Panel: for attaching accessory tools, such as the optional Orbitizer
- Blade Carriage: moves the Blade Holder Seat left and right
- Blade Holder Seat (Jaw): holds the blade holder, test pen, markers, and other tools
- Cutting Strip: protects blade from cutting metal beneath
- Front Channel with Accessory Nuts: for attaching front table and optional Orbitizer
- Front Screws: secure the blade holder, test pen, markers, and other tools into blade holder seat
- Grit Shafts (4 on 15" ZO; 5 on 24" ZO): move the mat or material in and out of cutter
- Pinch Wheels (3 on 15" ZO; 4 on 24" ZO): grip mat or material so that grit shaft (beneath) will feed mat or material in and out
- Pinch Wheel Lever: lifts pinch wheels up and down for loading of mat or material
- Power Button: turns cutter on or off
- Ruler: for measuring and aligning rolled materials
- Top Channel with Accessory Nuts: For attaching optional Orbitizer

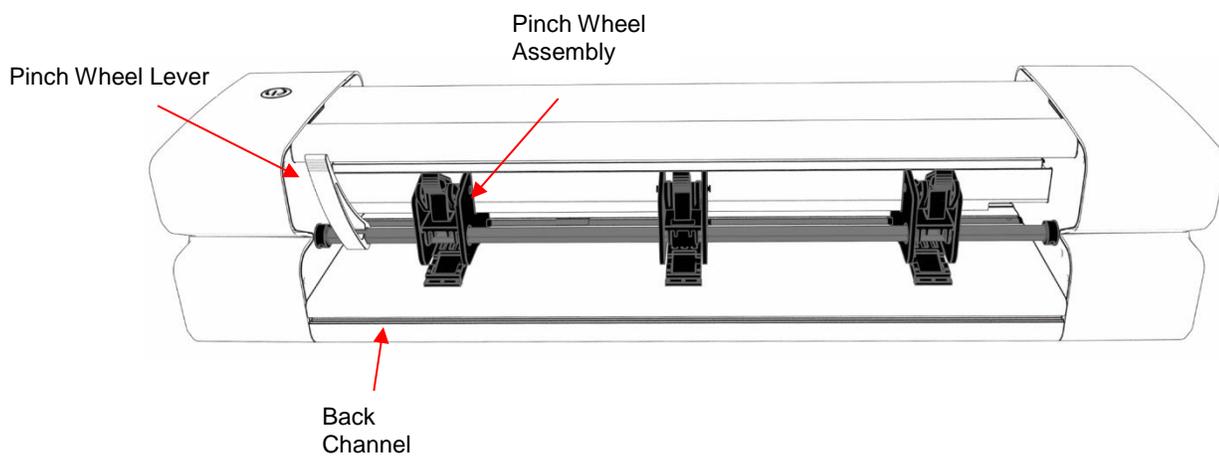
### Right Side



## Left Side



## Back



## 1.07 Accessories

### 1.07.1 Zing Orbit Blades

- There are three kinds of blades that fit inside the KNK Zing Orbit blade holder:



- ◇ The 45 degree [red capped blade](#) is suited for cutting thinner materials such as paper, all cardstock types, iron-on transfer, and vinyl.
- ◇ The 60 degree [blue capped blade](#) is a much longer blade and is well-suited for cutting thicker materials, such as gum paste, craft plastic, craft foam, and rhinestone template material. ***IMPORTANT!*** This blade is extremely thin at the tip and can be chipped if excessive settings are applied.

- ◇ Sold separately is the 30 degree [yellow capped blade](#). It is a wide blade and is well suited for cutting fabric and felt. It has been reported that it also works well with cardstock that has been exposed to humidity.
- ◇ Also included with the blades is an alignment pin used in the initial calibration for print and cut (refer to *Chapter 11*) and is used in the alignment process with tools of different diameters (refer to *Section 12.01.2*). This pin fits into the blade holder:



- Note that the red capped blade and blue capped blade have a cut back on the opposing side of the blade (right side, in the earlier photo). This reduces the blade offset value and allows for better detailed cutting of small shapes.
- There are three blade holders sold for the Zing Orbit: a [red one](#), a [blue one](#), and a [yellow one](#). These three blade holders are identical, other than the color. Thus, any color of blade holder can house any of the three blade types.
- Owners who change materials often find it convenient to have the blade holders assigned to blade types whose caps match the color of the holder itself. In other words, they will only use red capped blades in their red blade holder, blue capped blades in their blue blade holder and yellow capped blades in their yellow blade holder. Again, this is a personal choice. Any of the three blade types can be used in any of the three Zing Orbit blade holders.
- Additionally, there are other tools sold separately, including an [engraving tool](#), [embossing/scoring tool](#), and a [punch/piercing tool](#). Details on these are covered in *Chapter 12*.

### **1.07.2 Blade Installation**

- The blade must be carefully inserted into the blade holder. Do this over a soft surface (e.g. over a hand towel). It's important to protect the fragile blade!
- The little springs that come with the blades are easy to lose, which is another reason to do this over a towel so that a dropped spring doesn't roll off the table
- Remove the bottom cap from the blade holder:



- Stand the blade holder up. Note the little hole inside the center:



- Remove the protective cap from the blade. Place the non-sharp end of the blade into the hole so that the blade is standing vertically. Then slide one of the tiny springs over the blade:



Spring is placed over the blade

- Holding the blade holder in one hand and the cap in another, gently guide the cap over the top of the blade and then begin screwing the cap on. Do NOT try to force it. You may need to wiggle the cap slightly for the cap to catch the threads and screw onto the main part of the blade holder:



IMPORTANT! Do not force the cap. Wiggle gently until the threads catch.

- ◇ Screw the cap tight. Then, as you screw the main part of the blade holder (the top), the blade will begin to show through the hole in the cap. You only need as much blade exposed as is necessary to penetrate the material you are cutting. More blade does NOT result in better cutting. In fact, the opposite is true.

The blade depth should be just a tiny bit longer than the thickness of the material you are cutting.



Turn clockwise to expose more blade. Turn counterclockwise to retract the blade.

- Please read *Chapter 2* before cutting. There are some tips on setting the blade exposure as well as other important information you need to be successful with your cutting.

## **1.08 Preparing and Caring for the Cutting Mat**

Mat too sticky: [Video](#)

Adding more adhesive to a mat: [Video](#)

### **1.08.1 Tips on Using the Cutting Mat**

- Always use a mat to hold the material to be cut unless the material has its own protective backing. For example, vinyl and iron-on transfer both come with a layer that you do not cut. Thus, this backing layer serves as the carrier for cutting. Paper and cardstock do not have a backing, thus they must be cut on the mat.
- **IMPORTANT!** A new mat may be too sticky if you are cutting certain products. This can cause difficulty in removing cut items without tearing. Place an old but clean bath towel over the surface of the mat and press with a brayer or rolling pin. Then pull up. Test the stickiness by pressing the palm of your hand in the middle of the mat and lifting. If the mat remains stuck to your hand, repeat until the mat can still be lifted but will release. It should only take a few pressings to greatly reduce the stickiness, as tiny (too small to be visible) fibers from the towel are added to the surface.
- Do not leave the pinch wheels in a down position when the Zing Orbit isn't in use. This warps the plastic sooner, shortening the useful life of the cutting mat.

- ***IMPORTANT!*** Once a mat begins to warp, the right side can interfere with the movement of the blade when setting an initial origin. Refer to this issue in *Appendix B2* when you notice the right side is beginning to curl up.

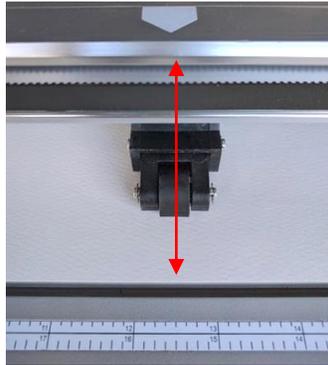
### **1.08.2 Cleaning and Replenishing the Cutting Mat**

- When mats begin to lose their stickiness, they can be washed:
  - ◇ Use a mild dishwashing detergent, warm water, and a soft brush to thoroughly clean the surface. You're not trying to scrub the adhesive but just wet the invisible fibers that have been deposited from your cutting materials and get them released from the glue.
    - Rinse well, shake off excess water, and place sticky side down onto a bath towel.
    - Thoroughly dry the non-sticky side of the mat with another towel.
    - Pull the mat up and the sticky side should now be dry enough for immediate use. Test by making sure the mat will stick to your hand.
- While washing with soap and water should revive the original adhesive, you can add more adhesive if necessary:
  - ◇ Virtually any repositionable adhesive may be used on the cutting mat. Some of the popular choices include: Krylon Easy Tack, Aleene's Tack It Over and Over (view the video at the start of this section), Crafter's Companion Stick and Spray, Zig 2 Way Glue with wide tip, Craft Smart Off 'N On, and Scotch Repositionable Craft Stick.
  - ◇ If you are cutting thicker materials, such as oil board or styrene, then you may want to experiment with a stronger adhesive and use painter's tape to secure the material to the mat. If you are cutting thin paper, then you may want to experiment with a lighter adhesive.
  - ◇ With most repositionable adhesives, you can control the tackiness based on the amount applied. Thus, always add a little bit at a time. As mentioned above, if you add too much, just apply a layer or two of cotton fibers by pressing with a bath towel.
- Other reported methods for cleaning mats:
  - ◇ Use a plastic scraper (an old credit card will suffice) to scrape off any random material pieces remaining on the mat after a cut.
  - ◇ For finer particles of paper or lint, you can use a lint roller. Tear off a sheet and then press down and pull up across the surface of the mat to clean in sections. Baby wipes can accomplish the same task.
  - ◇ To completely remove adhesive from the mat, apply Goo Gone, Duck Adhesive Remover, or Avon's Skin So Soft Bath Oil (thank you, Joyce Wilson) across the surface. Allow a minute to soak in and then scrape off with a sharp metal spatula. Repeat, as necessary until the mat is thoroughly clean and no longer sticky. Wash, dry and then add any repositionable adhesive.
- When necessary, the rubber wheels and the grit shafts may be cleaned with isopropyl alcohol or Un-Du. Apply the cleaner to a clean lint-free rag and rub the entire wheel and/or grit shaft until free of adhesive.

### **1.09 Pinch Wheels**

- The pinch wheels can be raised and lowered using the pinch lever located at the back-right side of the machine. Press down on the lever and the pinch wheels will be raised. Pull the lever up to lower the pinch wheels so that they can grip the mat or the material inserted in the cutter.
- There is also a small black lever on each individual pinch wheel. When the lever is raised, there is less downward pressure exerted. This might be preferable on a pinch wheel that is positioned in the middle of the mat. When the lever is down, more pressure is exerted, and this is recommended for the two outside pinch wheels.

- Note that for a pinch wheel to grip properly, it must be positioned over a grift shaft. To facilitate alignment, note the white arrows positioned along the horizontal bar below the cover. Slide the pinch wheels along the bar, as needed.



Wheels should be centered under white arrows

### **1.10 Attaching the Flatbed Tables**

- The flatbed tables attach to the front and back channels (refer to the *Front* and *Back* diagrams in *Section 1.06*). Here is a photo of a ZO with the tables attached:



Front table attached to the front channel

- Each channel has more than enough nuts to attach the tables using screws that were included with the tables. Note that the [15" tables](#) come with 6 screws and the 24" tables come with 8 screws.



- Start with either table. Using a pencil, pen, or other pointy tool, slide the nuts in the channel so that they will approximately line up with the holes in one of the tables. Note that the wide opening in the table will allow for some leeway in aligning the nuts. Also, note that the middle opening is not use with the 24" tables.



Slide nuts to align with openings in the table

- Once you can visually see all of the nuts through the openings in the table, use the included thumb screws to securely attach the table to the channel:



- ***IMPORTANT!*** The front table can be positioned, as desired. Typically, one might want to center it. However, the back table needs to be attached so that it doesn't interfere with the pinch wheel lever. So, facing the back of the ZO, the table needs to be far enough to the right to allow this lever to be moved to the downward position:



Make sure table doesn't touch pinch wheel lever

- If you are attaching these tables without assistance, it is easier to attach the second table by positioning the ZO at the edge of a work surface with the attached table hanging over the edge. ***Warning:*** please make sure no children or pets are nearby as the cutter could be knocked off the table while in this position!



## **1.11 Registering and Installing Drivers and SCAL**

- The driver can be obtained from this link: <http://www.ftdichip.com/Drivers/D2XX.htm>
- Scroll down to the table and select the driver for your computer's current operating system. Note: if you use Windows, clicking on "*setup executable*" in the rightmost column is the easiest way to get the driver.
- Install the driver before connecting to the KNK Zing Orbit. Once the driver installs, restart your computer.
- To install SCAL, please go through all of *Section 3.01*. Then return here to continue setting up your Zing Orbit.

## **1.12 Connecting the Zing Orbit to Your Computer**

- Place your Zing Orbit on a sturdy horizontal surface. Be sure to allow enough free room in both the front and the back for the mat to extend during cutting.
- Powering On: Connect the power cord to the right side of the cutter and plug into a wall outlet or power strip. Turn on the power using the power button on the top. Press and hold for a second to power on the cutter. The light inside the ZO should now be turned on. After about 20 seconds, you will hear a beep indicating the ZO is now ready to communicate with your computer.
- Powering Off: Press and hold the power button until it beeps and the light shuts off.
- You have three options for connecting the Zing Orbit to your computer: USB, Stand-Alone, or Wi-Fi. Review the information in the following table to understand the differences between these options. If you are unfamiliar with network configurations, USB will be the easiest option.

### Connection Options for the Zing Orbit

<b><u>Option</u></b>	<b><u>USB</u></b>	<b><u>Stand-Alone (Ad Hoc)</u></b>	<b><u>Wireless (Wi-Fi)</u></b>
<u>Description</u>	The ZO is connected to the computer via a USB cable.	The ZO is wirelessly connected to the computer.	The ZO is wirelessly connected to a network router.
<u>Requirements</u>	USB cable (included)		Wireless network router and knowledge of router's IP address and password
<u>Pros</u>	Easiest to install; Simplest and fastest form of communication.	Easy to install; Can be set up anywhere as no router is required; Other computers can cut to the ZO.	ZO can be located anywhere within range of the router; Other computers can cut to the ZO.
<u>Cons</u>	ZO is physically connected to the computer; ZO cannot be accessed by other computers at the same time.	Computer is now connected to the ZO, thus no <u>wireless</u> access to the Internet or to other wireless devices.	Requires more steps to set up; Some routers may require adjustments in order to work with the ZO.

- Note that implementing any of these options does not preclude you from changing to another one, as needed.
- The following sections present what steps are required for each type of connection. If you run into connectivity issues, please contact your KNK dealer first. If your dealer is unavailable, please contact KNK USA for assistance.

### **1.12.1 Connecting to a PC**

### Option 1: USB Connection on a PC

- Connect the USB cable to the right side of the cutter and into an available USB port on your computer. The **Windows Hardware Manager** will identify the USB connection. If the **Hardware Installation** window pops open, accept all defaults. Proceed to *Section 1.13*.

### Option 2: Stand-Alone (Ad Hoc) Connection on a PC

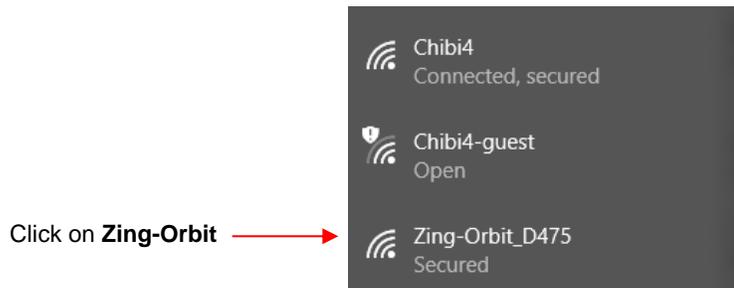
- ***Important!*** While in standalone mode with a wireless computer, you will no longer be connected to your regular network, thus you will not have a connection to the Internet or to other wireless devices, such as a wireless printer. This will also affect access to SCAL's online store and other Internet sites for support.
- Close all unnecessary applications. It is also recommended that you temporarily disable your virus protection software and your firewall.

(1) With the Zing Orbit powered on, open your network menu:

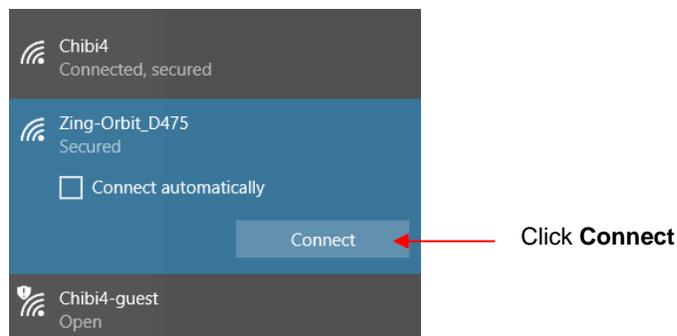
Click on the **Network** icon.  
(usually in lower right corner)



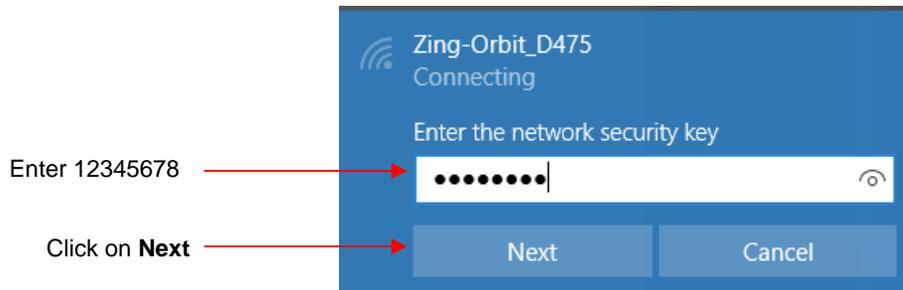
(2) Click on the listing for the Zing Orbit:



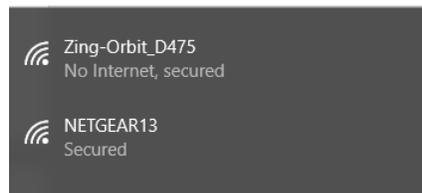
(3) Uncheck the box for **Connect automatically** and click on **Connect**:



(4) A window opens requesting a security key. Enter 12345678 and click on **Next**:



(5) Wait about 30 seconds and then verify that the Zing Orbit appears in your network menu:



- (6) If anything goes awry during this setup, the Zing Orbit can be reset by pressing the small black button on the right side with a pointed object like a pencil or pen nib. A beep will immediately occur. Wait about 20 seconds for a second beep and then proceed with Step (1) again or another form of connection.
- (7) Your computer is now wirelessly connected to the Zing Orbit. The IP Address you'll be using in SCAL is 192.168.16.254. Proceed to *Section 1.13*.

### **Option 3: Wi-Fi Connection on a PC**

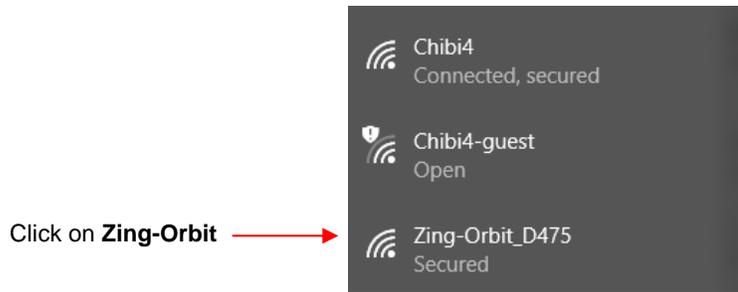
- What you'll need:
  - ◇ Name of your home/office network
  - ◇ The IP address for your router (e.g. 192.168.1.1)
  - ◇ The password for your network
- Carefully complete the following steps. At any point, if you need to start over, skip to *Step (12)* and follow the reset instructions.

(1) With the Zing Orbit powered on, open your network menu:

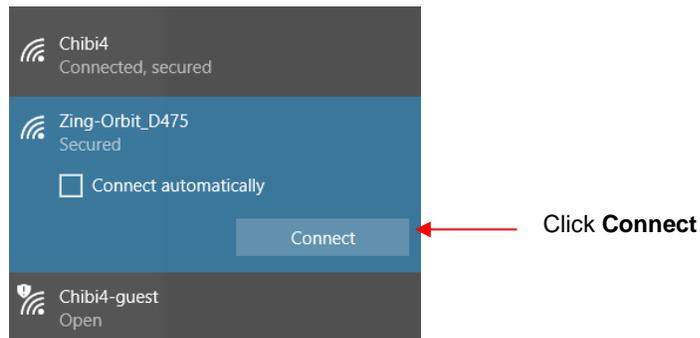
Click on the **Network** icon.  
(usually in lower right corner)



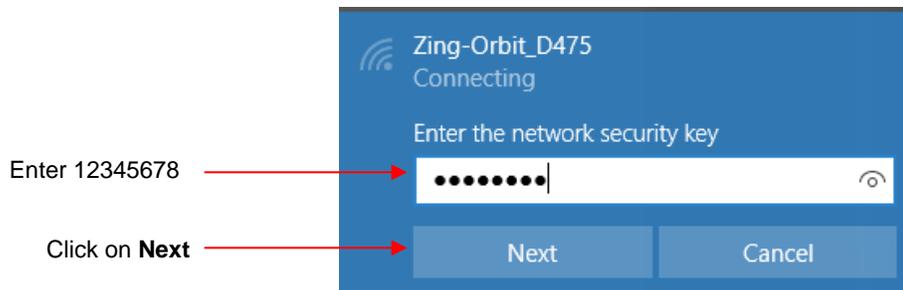
(2) Click on the listing for the Zing Orbit:



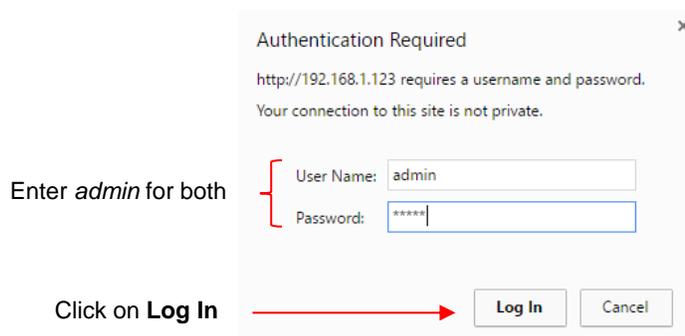
(3) Uncheck the box for **Connect automatically** and click on **Connect**:



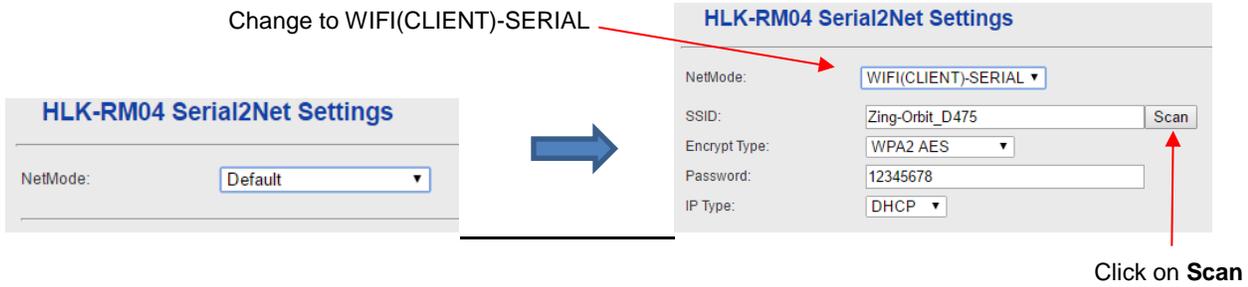
(4) A window opens requesting a security key. Enter 12345678 and click on **Next**:



(5) Wait about 30 seconds. Then open your Internet browser and, in the URL field, type in: 192.168.16.254 and press **Enter**. The following window will open. Enter “admin” for both the **User Name** and **Password**. Then click on **Log In**:

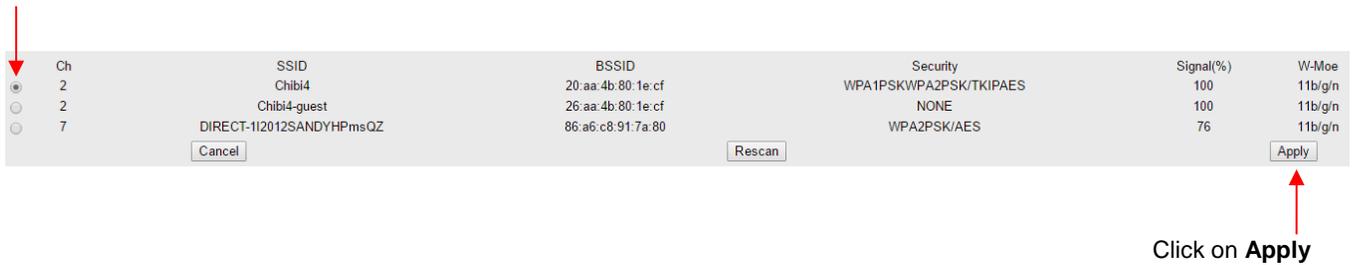


(6) The following window will open. Change **Netmode** as shown and click on **Scan**.

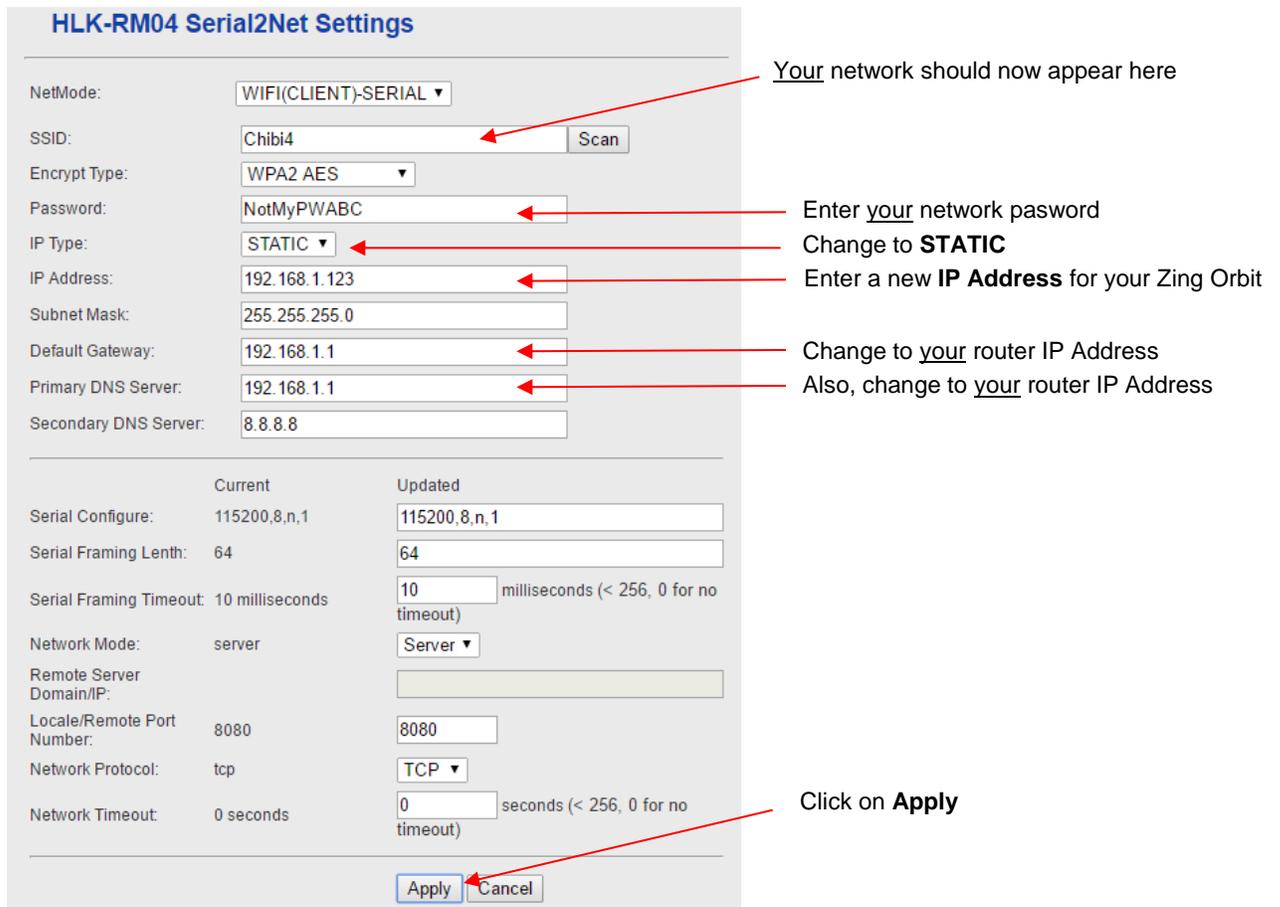


(7) Select your home/office network and click on **Apply**:

Mark the circle next to your network



(8) Enter the password for your network. Select a new **IP address** for your Zing Orbit, preferably one that's outside the range of your other devices. For example, I chose "123" (i.e. 192.168.1.123) so that it would be easy for me to remember. Make the other changes as shown and then click on **Apply**:



- (9) Wait about 30 seconds. A message should pop up saying the connection has been reset. If no message occurs after a minute, proceed with the next step.
- (10) Go to your network menu. Connect to your usual home/office network and verify that your network is working, as normal.
- (11) Verify the new IP address you selected for the Zing Orbit by typing it into your browser. It should now open the same window where you just established these settings. Write down your IP address so that you'll have it handy when you get ready for your first test drawing from SCAL. Proceed to *Section 1.13*.
- (12) If anything goes awry during this setup, the Zing Orbit can be reset by pressing the small black button on the right side with a pointed object like a pencil or pen nib. A beep will immediately occur. Wait about 20 seconds for a second beep and then proceed with Step (1) again or another form of connection.

## 1.12.2 Connecting to a Mac

### Option 1: USB Connection on a Mac

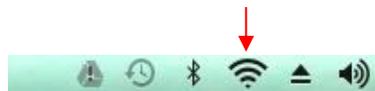
- Connect the USB cable to the right side of the cutter and into an available USB port on your computer. Your Mac should identify the USB connection automatically. Proceed to *Section 1.13*.

### Option 2: Stand-Alone (Ad Hoc) Connection on a PC

- ***Important!*** While in standalone mode with a wireless computer, you will no longer be connected to your regular network, thus you will not have a connection to the Internet or to other wireless devices, such as a wireless printer. This will also affect access to SCAL's online store and other Internet sites for support.

- (1) With the Zing Orbit powered on, open your network menu:

Click on the **Network** icon.  
(usually in upper right corner)



- (2) Click on the listing for the Zing Orbit:



- (3) A window opens requesting a security key. Enter 12345678 and click on **Join**:



(4) Wait about 30 seconds and then verify that the Zing Orbit appears in your network menu:



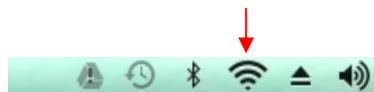
- (5) If anything goes awry during this setup, the Zing Orbit can be reset by pressing the small black button on the right side with a pointed object like a pencil or pen nib. A beep will immediately occur. Wait about 20 seconds for a second beep and then proceed with Step (1) again or another form of connection.
- (6) Your computer is now wirelessly connected to the Zing Orbit. The IP Address you'll be using in SCAL is 192.168.16.254. Proceed to *Section 1.13*.

### **Option 3: Wi-Fi Connection on a Mac**

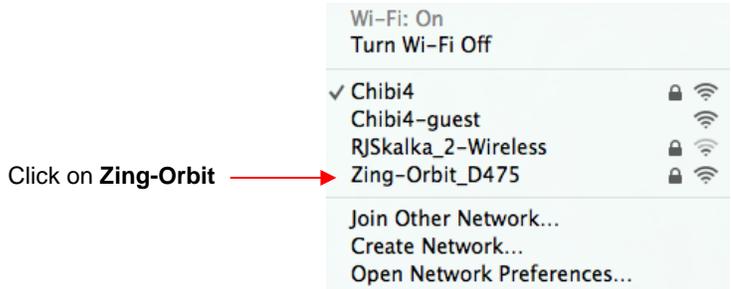
- What you'll need:
  - ◇ Name of your home/office network
  - ◇ The IP address for your router (e.g. 192.168.1.1)
  - ◇ The password for your network
- Carefully complete the following steps. At any point, if you need to start over, skip to *Step (6)* and follow the reset instructions.

(1) With the Zing Orbit powered on, open your network menu:

Click on the **Network** icon.  
(usually in upper right corner)



(2) Click on the listing for the Zing Orbit:



(3) A window opens requesting a security key. Enter 12345678 and click on **Join**:



(4) Wait about 30 seconds. Then open your Internet browser and, in the URL field, type in: 192.168.16.254 and press **Enter**. The following window will open. Enter “admin” for both the **User Name** and **Password**. Then click on **Log In**:



(5) The rest of the setup is identical to that on a PC. Go to Step (6) in *Section 1.12.1 Option 3* and continue from there. Note that in Step (9), you may not receive notification that Setup is complete. After waiting about a minute, proceed with Step (10).

(6) If anything goes awry during this setup, the Zing Orbit can be reset by pressing the small black button on the right side with a pointed object like a pencil or pen nib. A beep will immediately occur. Wait about 20 seconds for a second beep and then proceed with Step (1) again or another form of connection.

### **1.13 Verify Communication and Test Draw Shapes**

- New owners tend to be VERY eager to try out their Zing Orbit. It's important to test your cutter to ensure that data is being sent properly from your computer to the cutter. The following steps will allow you to do some testing with the pen tool. But note that **the following steps are for DRAWING, not cutting**. Before inserting the blade tool into your KNK, please read the following *Sections 1.07.1, 1.07.2, 2.01 and 2.02*.
- It is also very important to understand where shapes will cut based on various available options in SCAL. This is partially addressed in the next section; complete details are covered in *Section 10.07*.

### 1.13.1 Setup for Drawing

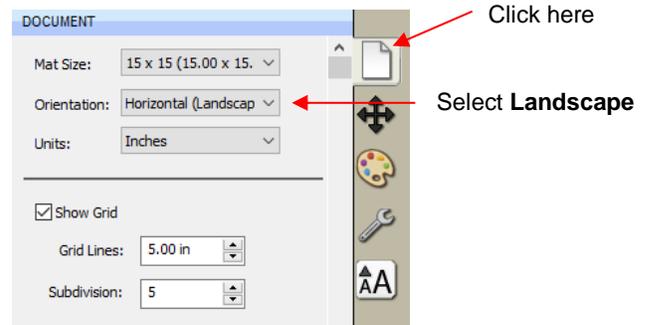
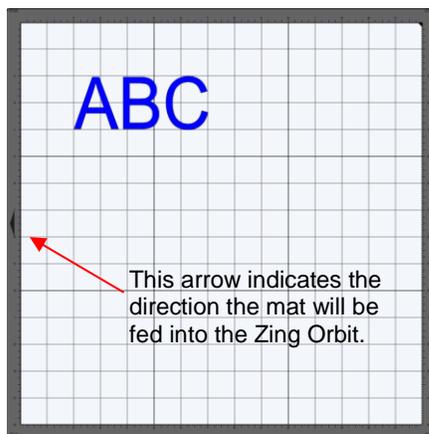
Before setting up a file for testing, if you are new to Sure Cuts A Lot, please watch the following videos:

Workspaces: [Video](#) Virtual Mat Setup: [Video](#) SCAL User Interface: [Video](#)

#### Landscape Versus Portrait: Which do you prefer?

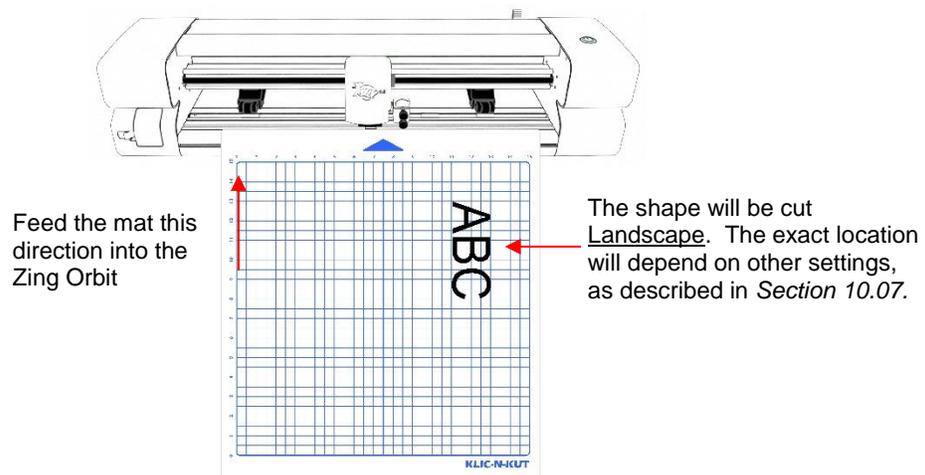
- Based on your own past experience with SCAL or other cutting programs and cutters, you may have a particular mode (landscape or portrait) that you are accustomed to using. There is no right or wrong mode, only the mode that works best for you; the mode that makes the most sense!
- In SCAL, the orientation is set on the **Document Panel**. Other settings on this panel are presented in detail in *Section 3.05*. For now, just note the location of the **Mat Configuration** settings for **Landscape** and **Portrait**:

#### ◇ Landscape Mode

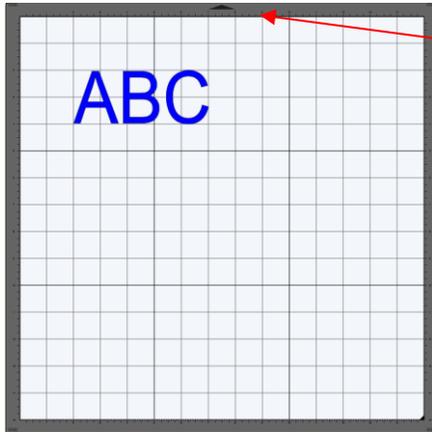


Note: in the screenshot above, a custom mat has been set up in SCAL to match the Zing Orbit mat. To create a mat with these same dimensions, refer back to the video linked at the start of this section or refer to *Section 3.05*.

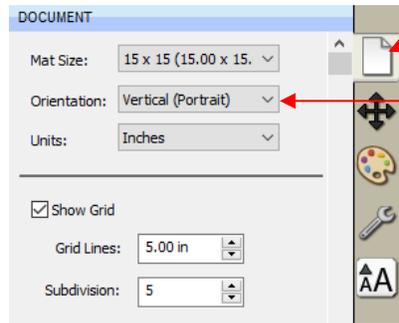
- In **Landscape** mode, the arrow/triangle on the **Cutting Mat** will point to the left. When you draw or cut out the “ABC” shown on a **Landscape Cutting Mat**, it will be drawn or cut top to bottom as you face the Zing Orbit:



◇ Portrait Mode



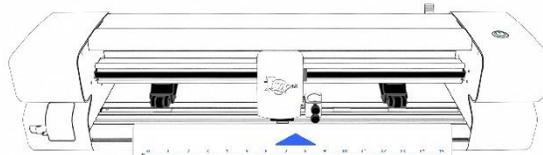
This arrow indicates the direction the mat will be fed into the Zing Orbit.



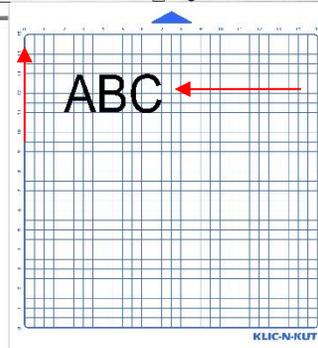
Click here

Select **Portrait**

- In **Portrait** mode, the arrow/triangle on the **Cutting Mat** will point upwards. When you draw or cut out the “ABC” shown on a **Portrait Cutting Mat**, it will be drawn or cut left to right as you face the Zing Orbit:



Feed the mat this direction into the Zing Orbit



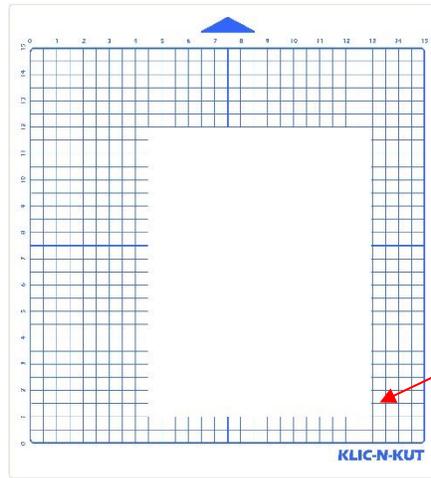
The shape will be cut Portrait. The exact location will depend on other settings, as described in *Section 10.07*.

### 1.13.2 Drawing Your First Shape

- This first test will show you how **Origin Point** mode works. This is a very useful setting because it is easy to know where your shapes will cut on your material, plus it economizes the use of your materials. Instead of cutting shapes where they are located on the **Cutting Mat** in SCAL, the shapes will be moved and aligned to cut where you set the origin on the material, using the blade tip.

- (1) Place an 8.5” x 11” sheet of paper on the mat, using any of the grid lines. Place the paper onto the mat like this:

Feed the mat this direction into the Zing Orbit



Align the paper along one of the grid lines on the cutting mat.

- (2) Before installing the test pen, make sure the pen will write by scribbling on scrap paper. To insert the test pen, push down on the blade holder seat. With the seat all the way down, insert the test pen and tighten the front screws. Then release. This will allow the pen to be slightly above the paper when you insert the mat.

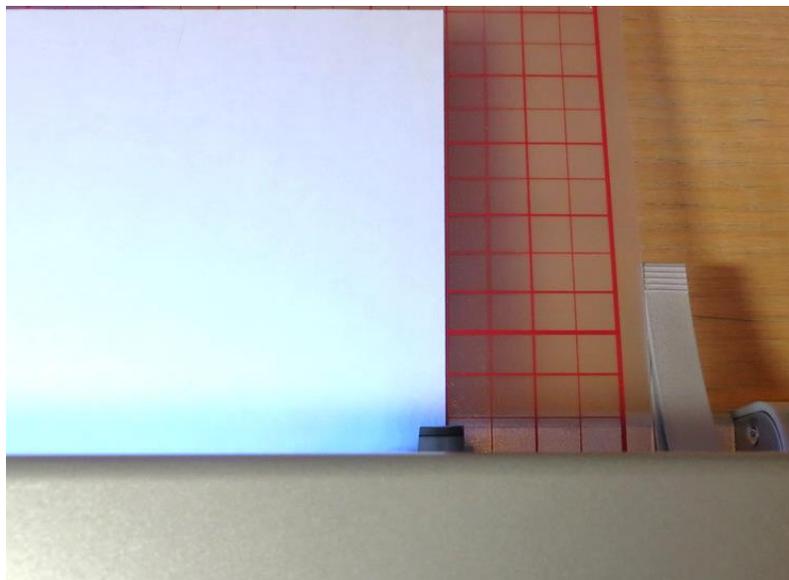


Push the blade holder seat all the way down.

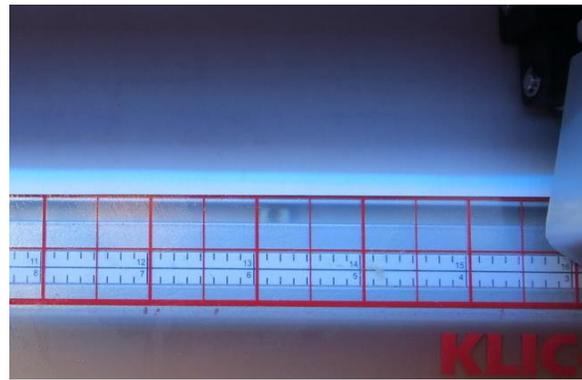


While holding the seat down, insert the test pen and with your other hand tighten the front screws.

- (3) Insert the mat into the cutter. Slide the mat towards the back and align the right side of the mat with the left side of the pinch wheel lever:

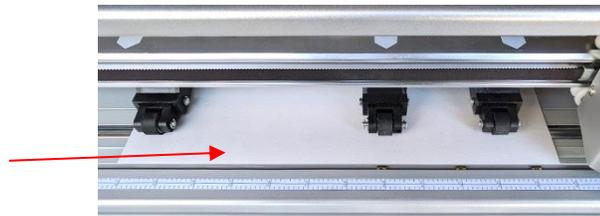


- (4) Use any of the horizontal markings at the front of the Zing Orbit (such as the ruler) to align the mat so that it's straight:

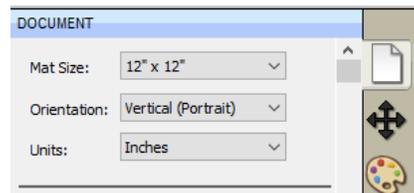
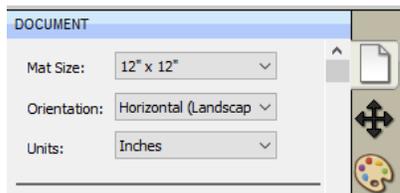


- (5) Lift the pinch lever to drop the pinch wheels onto the cutting mat. Most of the mat and the paper should now be behind the cutter, not in the front:

Only the front part of the mat and material will be in the front of the machine.



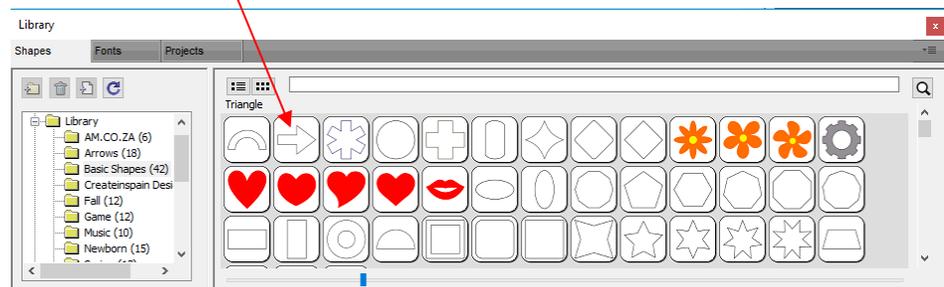
- (6) Select either **Landscape** or **Portrait**, on the **Document Panel**, depending on your personal preference (as described at the beginning of *Section 1.13.1*):



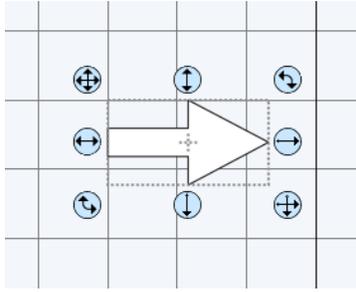
Select your preferred mode: **Landscape** or **Portrait**

- (7) If you closed the **Library** when you opened SCAL, click on this icon  at the top to reopen it. Click on the arrow thumbnail to add that shape to your screen. An arrow will help you better compare where a shape gets drawn versus how you see it on the screen:

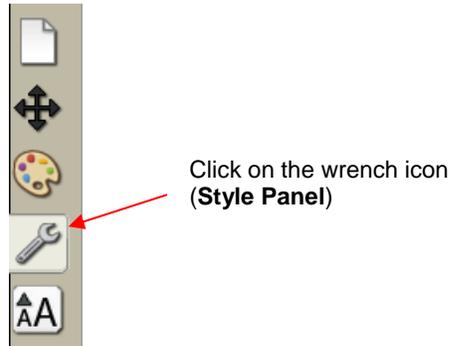
Click on this arrow



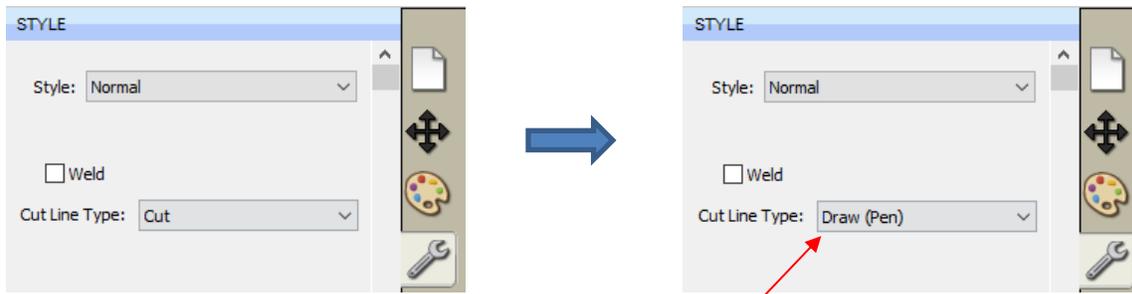
- (8) After clicking the arrow, you should see it on the screen. In this test, it doesn't matter where you place the arrow on the grid, as it will be drawn at the origin you set on the machine.



(9) Because you are drawing and not cutting, you need to assign this shape to be drawn. The default is always cut, unless you make the change. Select the shape on the screen or click on the shape's layer on the **Layers Panel**. Then click on the **Style Panel** icon on the right side of the screen:



(10) Change the **Cut Line Type** to **Draw (Pen)**:

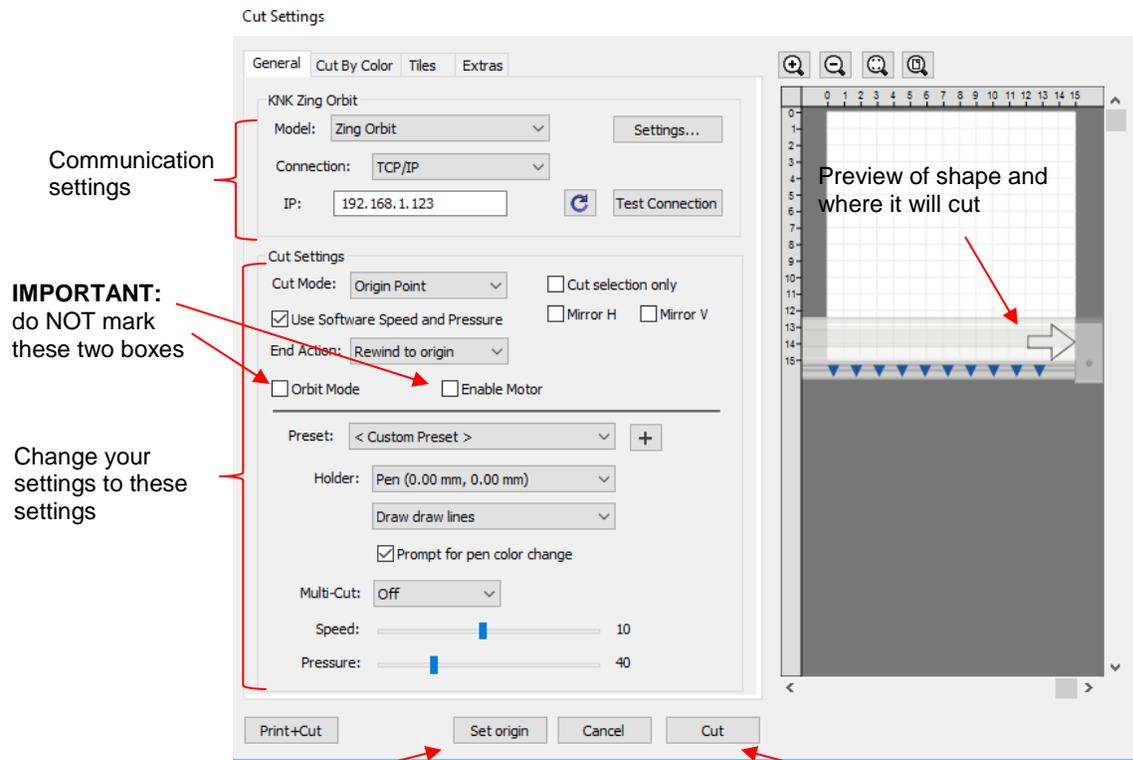


Change to **Draw (Pen)**

(11) In *Section 3.01.4*, you installed the KNK Zing Orbit in SCAL. To now open the **Cut Settings** window, either:

- Go to **Cutter > Cut with KNK Zing Orbit**
- Click on the **Cutter** icon  at the top

(12) The follow window opens:

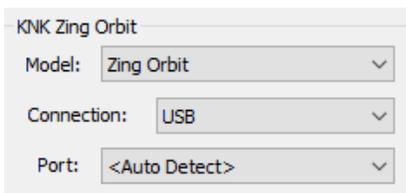


Set the origin on the cutter

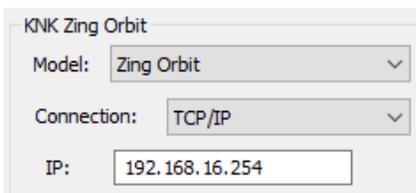
Start the cut

- ◇ **Model:** Should indicate Zing Orbit. If not, then you need to return to **Cutter>My Cutter>Manage Cutters** and add the KNK Zing Orbit to the menu.
- ◇ **Connection,** select **USB** or **TCP/IP** (for Stand-Alone or Wi-Fi). If using USB, leave **Auto-Detect** selected. If using Stand-alone, enter 192.168.16.254 as the IP Address. If using Wi-Fi, enter the IP address you previously chose in *Section 1.12*.

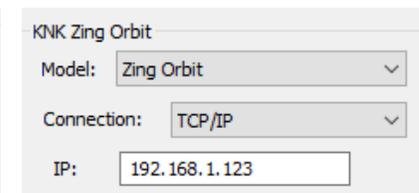
USB:



Stand-alone:

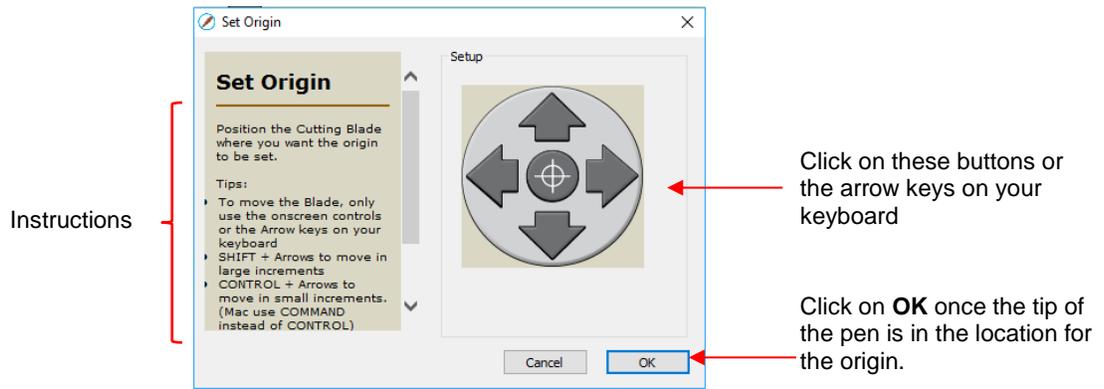


Wi-Fi:

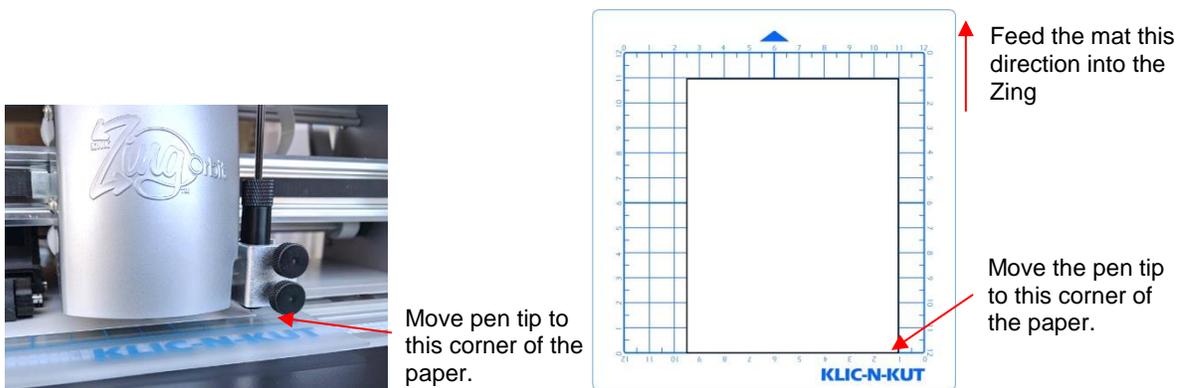


- ◇ Click on **Test Connection** to verify that the head will move a small distance to the left and back again. If the test connection fails, click on the **Reload** icon  and try again. If it still fails after several attempts, refer to **Appendix A**, first question.
- ◇ **Cut Mode:** Set to **Origin Point**. Later you can test **WYSIWG** mode, as well.
- ◇ Change the remaining settings to match the prior screenshot. More details about these settings will be covered in other sections.
- ◇ **IMPORTANT!:** the preview of the arrow will not appear until **Pen** is selected under **Holder**. The default, **Blade**, would have been used if the **Cut Line Type** on the **Style Panel** had been left at the default of **Cut**.

(11) Click on **Set Origin** at the bottom of the **Cut Settings** window. The Zing Orbit fan will turn on and the following window will open:

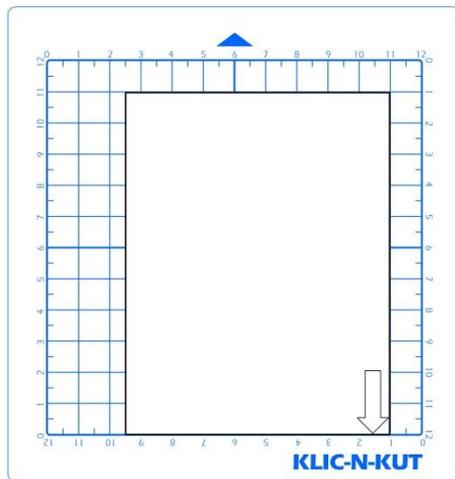


- ◇ Click on the buttons or the arrow keys on your keyboard to move the head left or right and the mat in and out. The goal is to have the tip of the pen close to the lower right corner of the paper:



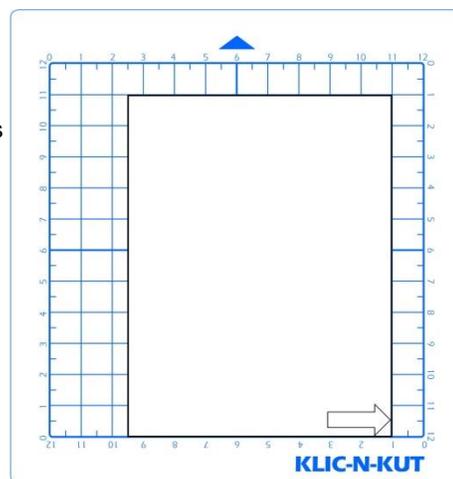
- ◇ Note the following ways to control the increments when setting the origin:
  - **Shift + arrow key:** move in a larger increment
  - **Ctrl + arrow key:** move in a smaller increment (on a Mac: **Command + arrow key**)
  - **Shift + Ctrl + arrow key:** move in the smallest increment possible (on a Mac: **Shift + Command + arrow key**)
- ◇ Once the pen tip is in the lower right corner, you can do any of the following to close the window:
  - Click the middle button  in the window
  - Click on **OK**
  - Press the **Enter** key on your keyboard

(12) Click on the **Cut** button at the bottom of the **Cut Settings** window and the arrow will be drawn to align with the origin you set. After the cut is complete, the cut window will close. Your arrow will be drawn as shown, with the direction related to whether you originally chose **Landscape** or **Portrait** for your **Cutting Mat**:



Landscape Results: The arrow is drawn at the origin and points downwards.

↑  
Feed the mat this direction into the Zing Orbit



Portrait Results: The arrow is drawn at the origin and points to the right.

- (13) To draw again, return to the cut window and choose a different origin. Practice moving the origin to different locations. This is how **Origin Point** mode works.
- (14) If you wish to change to a different shape or add more shapes, remember to change the Cut Line Type to **Draw (Pen)**, as you did in *Step (10)* and change the **Holder** to **Pen** in the **Cut Settings** window. Again, these two changes won't be needed when you are cutting with the blade holder.
- (15) If you want the image to draw where you have it located on the virtual **Cutting Mat** in SCAL, then you need to switch to **WYSIWYG** mode. Set the origin in the lower right corner of the mat's grid and then place the paper in the correct location on the mat to correspond to where the shape is positioned on the **Cutting Mat** in SCAL. Refer to *Section 10.07* for more details on controlling where images will cut.

**IMPORTANT: Please read Section 2.01 before cutting!**

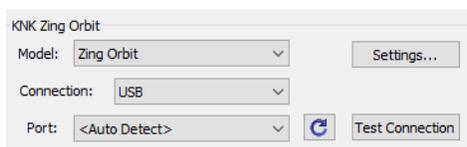
## 1.14 Updating Firmware

Occasionally, there will be firmware updates available for your Zing Orbit. To download and install an update, please use the following instructions:

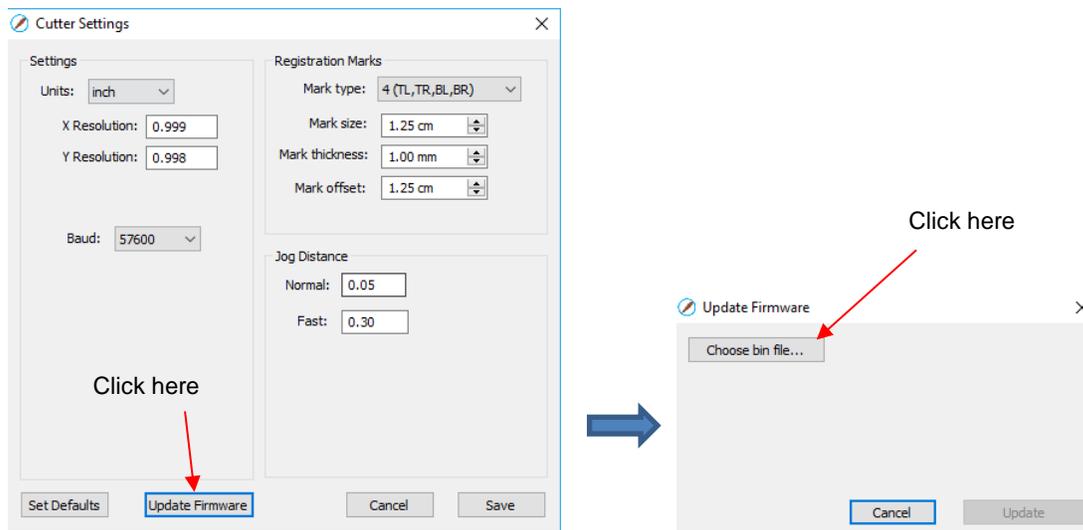
- (1) **IMPORTANT:** You must be using a USB connection between your computer and the Zing Orbit. Thus, if you are currently using Wi-Fi, connect the USB cable that came with your ZO to your computer. If you cannot locate that original USB cable, you can use others, such as those that accompany some printers.
- (2) Download the update file from the following link. If you are unsure what version of firmware you're running, it's okay to go ahead and install the update, even if it's the same one you're already running. Note where this file is being saved on your computer.

<http://www.iloveknk.com/Support/Software/ZO-Firmware-Update/>

- (3) In the cut settings window, make sure the **Connection** reads **USB** and the **Port** is set to **<Auto Detect>**:

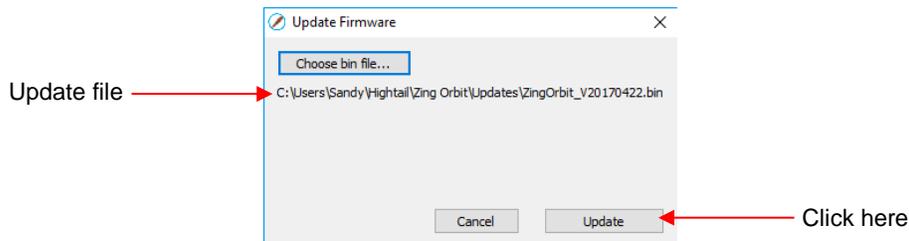


- (4) Click on the **Reload** icon  and then click on the **Test Connection** button. Verify the Zing Orbit is now communicating via the USB cable.
- (5) Click on **Settings** and then click on **Update Firmware** at the bottom of the window.



(6) Browse to locate the update file you downloaded and click on **OK**.

(7) The file location will then appear and you can click on **Update**:



(8) The Zing Orbit's light will switch off, but the power button's light should remain on. Do not press the power button during this update. Wait patiently for the update to occur. You should receive an "Update ok" message.

(9) If the update fails or if the Zing Orbit powers off for more than 15 minutes, press the power button briefly to see if the power will be restored. Repeat the update process after verifying that the USB cable is in place.

## **1.15 Maintenance**

Klic-N-Kut machines do not require any kind of lubrication or routine checks. However, here are a few things to keep in mind for successful operation of your cutter:

- **Keep the pinch wheels clean.** Depending on the adhesive being used on the cutting mat, it's possible for the pinch wheels to become sticky and pick up small pieces of cardstock or other material being cut. This can lead, in some cases, to the mat skewing or ruining materials during subsequent cuts. To clean the pinch wheels, use a lint-free cloth and an adhesive remover such as isopropyl alcohol or Un-Du to clean the pinch wheels thoroughly.
- **Keep the grit shafts clean.** Equally important as the pinch wheels, the grit shafts beneath the cutting mat should also be free of adhesive and tiny bits of material. They can be cleaned the same way as the pinch wheels. Note: Do not pour cleaner onto a grit shaft. Instead, dab some adhesive remover onto the lint-free cloth and then use the damp cloth to clean the shafts. You can also use tweezers to remove any material or adhesive that is stuck to a shaft.
- **Keep the cutting mat clean and sticky.** As mentioned in the *Section 1.06.2*, the cutting mat can be washed with soap and water to remove small invisible pieces of material which are reducing the tackiness of the cutting mat. After drying, you can add more repositionable adhesive, if needed.

- Check your blade holder, as needed. If suddenly you cannot get a clean cut, check the blade holder for any tiny slivers of material that may have been caught up by the blade and fed up inside the blade holder.
- If you move your cutter frequently, it is possible for the optic eye to shift slightly. Periodically, you may want to do a check of the print and cut accuracy to make sure the calibration is still precise. Refer to *Chapter 11*, if you plan to use your Klic-N-Kut for print and cut applications.
- If you cut vinyl or other backed materials regularly, you may need to replace the cutting strip at some point. You will be able to tell based on seeing deep cuts in the strip and an inconsistency in the cutting. Contact KNK USA for information on obtaining a replacement.
- For any other questions or concerns about maintaining your KNK, please post at our user forum: <http://knkusa.com/forums/>

## **1.16 Other Useful Tools and Supplies**

- The following list has items you may or may not need while enjoying your . These are suggestions based on ten years of collecting information from cutter owners:
  - ◇ Brayer or Rolling Pin: (1) to apply lint from a towel onto an overly sticky mat (2) to press materials evenly onto a mat for cutting
  - ◇ Post-It Notes: (1) for setting blade/tool tip height above a material (2) for draw and cut applications
  - ◇ Old Fluffy Bath Towel: (1) to dry a washed mat (2) to apply an invisible layer of lint onto an overly-sticky mat
  - ◇ Dishwashing Soap: (1) to remove visible and invisible fibers, thus renewing the adhesive (2) to clean the mat well before adding more adhesive
  - ◇ Soft Brush: (1) to gently remove waste scraps during the washing of a mat. Refer to *Section 1.08.2*.
  - ◇ Artist Palette Knife: (1) to gently remove cut shapes from a mat (2) to scrape off small waste pieces from a mat
  - ◇ Blue Painter's Tape: (1) to tape around the edges of thicker materials that might slip during cutting
  - ◇ Repositionable Adhesives: (1) to add more adhesive to a cutting mat (most any brand or type can be used, provided it is repositionable). Refer to *Section 1.08.2* for instructions.
  - ◇ Awl or Paper Piercer (or other sharp pointed tool): (1) to pick or lift out a test cut to verify results
  - ◇ Stabilizers: A stabilizer is an adhesive material that is applied to the bottom of the material you are cutting so that cleaner cuts can be achieved. The stabilizer works in one or more of the following ways – (1) provides firmer contact with the cutting mat (2) provides a final layer that does not need to be cut if the stabilizer will be removed after cutting (3) prevent some slightly-elastic materials from being stretched by the blade. Recommended stabilizers for particular materials will be listed in relevant sections of the user manual.

## 2. Zing Orbit: Cutting

### 2.01 What You Need to Understand About Cutting

IMPORTANT: Please read all of 2.01!!!

#### You Have To Make Mistakes

- The key to becoming successful at cutting is to do a lot of it! Those who shy away from using their Zing Orbit will never get to the stage of mastering it. It's very normal for new owners to be intimidated by their cutter, so remember the following key things:
  - ◇ You won't break your new Zing Orbit by cutting paper, vinyl, cardstock, rhinestone rubber, and other easy-to-cut materials. The worst thing that might *possibly* happen is that you'll break a blade. That's it! And the likelihood of even that happening is low.
  - ◇ You need to start cutting so that you'll make a lot of mistakes! We ALL do that. It's in making these mistakes that you start to learn. You realize that those mistakes didn't result in a broken cutter. Plus, you'll stop making the same mistakes as you remember more of the things you need to check before every cut.
  - ◇ As you make fewer mistakes you begin to build confidence and you begin to have more cutting success! From there, you begin to experiment more and produce more. Thus, your best course of action is to just start cutting... a lot! But first, read the rest of this section.

#### The Most Common Mistakes Made by New Owners

- We all make them and we all learn from them. So, please note the following most common mistakes and then finish reading this entire Section 2.01 as the details behind these listed mistakes will be explained:
  - ◇ Too much blade is exposed on the blade holder
  - ◇ The blade tip is too close to the material
  - ◇ Too much pressure is being used for the material being cut
  - ◇ Failure to do a test cut to make sure settings are optimal
  - ◇ Not practicing enough with the test pen and paper to know where shapes will cut (go through *Section 10.07* to fully understand the settings in SCAL).

#### Begin with Easy Materials and Easy Shapes

- You didn't begin your first driving lesson on the freeway. You probably started driving on a farm or in a parking lot. Then you progressed to the neighborhood and other low-traffic streets. Then you began driving on major streets and, finally, the freeway. Think of your cutting in the same way and don't start your first cuts with thick difficult materials or detailed cutting files! Instead, start cutting basic shapes from inexpensive materials or just scraps you have on hand. Work your way up to more difficult cuts after you master the easy ones.

#### Record Your Successes

- As you have successful cuts, take note of the settings you just used, such as **Pressure**, **Speed**, blade type, number of passes, brand of material, etc. There is a blank form at the end of this chapter that you can print and use to record your results. There are also suggested settings for common materials at the end of this chapter. Use these as starting guides but remember that your results may vary based on the many factors which can affect cutting.

## Use the Correct Blade for the Material You Are Cutting

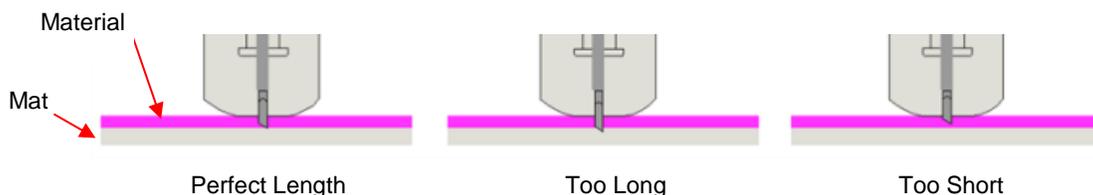
- The Zing Orbit comes with a 45° blade (red cap) and a 60° blade (blue cap). An optional fabric blade (yellow cap) is also sold. Use the following as a guide for choosing the appropriate blade for the material you are cutting:
  - ◇ The 45° blade (red cap) should be used to cut vinyl, paper, most cardstock, thin plastic, iron-on transfer, and vellum.
  - ◇ The 60° blade (blue cap) should be used to cut chipboard, stiffened felt, craft foam, rhinestone rubber, thicker craft plastic, self-adhesive magnet, and Shrinky Dink. ***IMPORTANT!*** This blade is very fragile!
  - ◇ The fabric blade (yellow cap) should be used to cut all fabrics and unstiffened felt.
- Refer back to *Section 1.07.2* for directions on properly installing a blade into the blade holder.

## Set the Blade Length/Exposure To Match the Material Thickness

### Video

(This video was made for the original Zing. The instructions presented also apply to the Zing Orbit.)

- The **Blade Length** (also called **Blade Exposure**) is how much blade is exposed at the bottom of the blade holder. You want this length to match the thickness of the material for optimal cutting. It is controlled by rotating the top of the blade holder. Rotating clockwise extends the blade (longer blade length). Rotating counter-clockwise retracts the blade (shorter blade length).
- When setting the blade length, hold the blade holder up next to the material before pressing the material to the mat, so that you can more accurately set the length to match the thickness of the material. For really thin materials, like vinyl and thin paper, just the very tip of the blade will be protruding from the bottom of the blade holder. In fact, you should just barely be able to feel it with your fingertip and not be able to see it very well, if at all.
- A good way to test your blade length is to fold a piece of the material onto itself and then cut a line into the material by hand, as shown in the video linked in this section. Press firmly but not too hard, as more force will not determine if the blade is set to the right length. If the blade cannot cut through the material, you will need to extend the blade. If the blade cuts through the material and cuts into the next layer, you need to retract the blade. If the blade cuts through the material but does not cut into the layer below, you have the perfect length.
- Having the blade fully extended will never result in better cutting. In fact, it can cause skewing, tearing of the material, damage to the blade, and damage to the mat.
- When conducting a test cut, be sure to check your mat for cut lines after the test. You should be able to set the length to get clean cuts but with only fine lines or no lines in the mat. If you do see deep cut lines in your mat, retract the blade length by turning the top of the blade holder  $\sim\frac{1}{4}$  of a turn counterclockwise. You do not need to remove the blade holder from the Zing Orbit. Repeat your test cut.

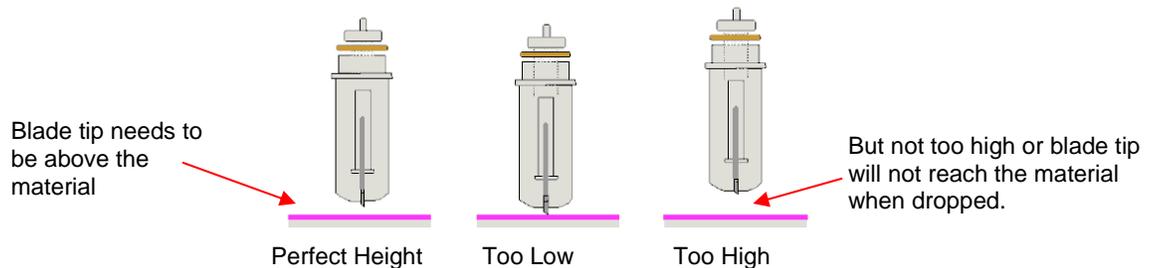


## Set the Blade Height Above the Material

### Video

(This video was made for the original Zing. A slightly different height is recommended for the Zing Orbit as presented below)

- The **Blade Height** is the distance from the tip of the blade to the top of the material you are about to cut. You have control over that height and will need to raise the blade holder up a little higher before locking it into place with the front screws on the blade holder seat.
- Adjust the blade height so that:
  - ◇ The blade tip will not be dragging across the material you are cutting when moving to the point to begin the cut. This will ensure that the dropping of the blade will invoke more downward force... to a point!



- ◇ In *Section 1.13.2*, you were instructed to set the blade tip height by holding down the blade holder seat while inserting the test pen. This needed to be done before inserting the cutting mat. This method works fine for thin materials, such as vinyl, cardstock, cotton fabric, etc, or when cutting without a cutting mat. However, this does not optimize the cutting force on the Zing Orbit and cannot be used when cutting thick materials.
- ◇ The recommended method for getting the same height set from one cut to the next is to use a spacer of some kind:
  - Place the spacer on top of the material you are cutting.
  - Loosen the front screw and insert the blade holder so that the tip of the blade is touching the top of the spacer.
  - Now tighten the front screws carefully making sure you are NOT pushing down on the blade holder seat. Once tight, remove the spacer. You should feel the blade gently scratching the top of the spacer.
  - This distance will provide the blade some “punch room” to give extra force and more consistent cutting of your material.
- ◇ What to use for this spacer?
  - For materials such as cardstock, vinyl, and fabric, use 15 Post-It notes.
  - When cutting chipboard with the red blade, use 15 Post-It notes. When cutting chipboard with the blue blade, only use 10 Post-It notes. ***IMPORTANT!*** The blue blade is a sliver blade which means it cuts thinner on both sides. This makes the tip very fragile!
  - For very thick materials, such as balsa or craft foam, use 10 Post It notes. Otherwise the blade holder ends up mounted too high in the jaw and that can compromise the force, as well.
  - The table at the end of Chapter 2 includes a column for blade height based on the number of Post-It note sheets used by the testers.

### **Adjust the Speed, Force, and Number of Passes Based on the Material and Shapes**

- Using correct cut settings is equally important as the type of blade, blade length, and blade height. Refer to *Section 2.03* for details. Again, some suggested settings are located at the end of this chapter and settings for using the various Zing Orbit accessory tools are located at the end of *Chapter 12*.

### **Perform Test Cuts!**

- Select a shape from the SCAL Library and size it to be around 0.3” – 0.5” (~ 8 mm – 13 mm):

- ◇ I personally like using one of the shapes with an internal circle (such as a flower, the gear or the ring). You can then easily see if the blade is cutting into the mat when you lift out the cut shape.
- ◇ Make sure you can get a very clean cut without deep cuts into the mat before proceeding with your project.
- ◇ When cutting intricate shapes, use a small letter or a shape with lots of sharp turns for testing. For a rhinestone project, use a small portion of your rhinestone pattern as a test.
- There is a flow chart in *Appendix D1* which will help you determine which settings to change when test cutting a material.

### **Know Where Your Images Will Cut**

- Practice with the test pen until you know, with 100% confidence, where your images will be drawn. This is important since you do not want to be guessing when you begin actually cutting with a blade. Refer to *Section 10.07* for details on controlling the locations of your cuts.

### **Keep the Cutting Mat Clean and Sticky**

- Press your materials evenly to the mat. Consider using a brayer both before AND after cutting. Repressing the material after cutting can greatly aid in weeding the cut shapes from the waste.
- When necessary, tape thicker materials to the mat to keep them from slipping during the cut.
- If you cut a range of materials, you might need more than one mat so that you can use stickier mats for certain materials.

### **Don't Get Frustrated, Get Help!**

- Besides having your own Zing Orbit dealer as your first line of contact, there are user forums, message boards, and Yahoo groups where you can post questions and get answers from other users, dealers, and Sure Cuts a Lot experts. Utilize the resources listed in *Section 1.01*.

## **2.02 Choices Before Cutting**

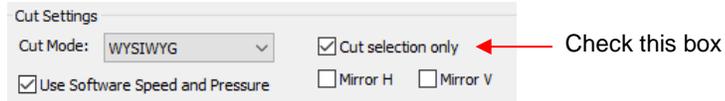
- There are a number of factors under your control for cutting:
  - ◇ What shapes to send to the cutter: *Section 2.02.1*
  - ◇ Where the shapes will be cut from the material: *Section 2.02.2*
  - ◇ What tool(s) will be used for cutting (or drawing, scoring, engraving, etc): *Section 2.02.3*
  - ◇ What settings will be used: *Section 2.02.4*

### **2.02.1 Controlling What Shapes Will Cut**

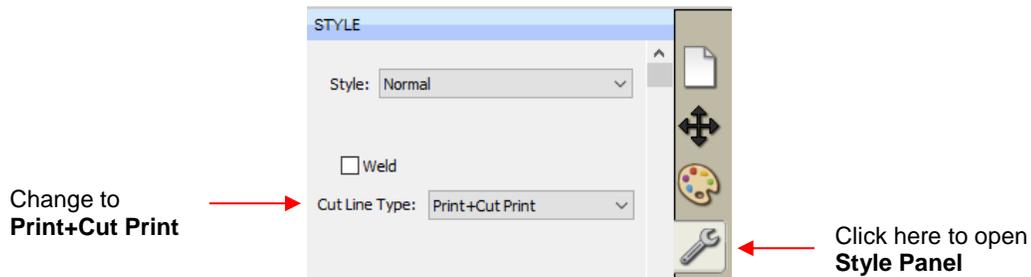
- There are four ways to control whether a shape will be cut or ignored:
  - ◇ Option 1: Show/hide shapes on the **Layers Panel** (refer to *Sections 4.04* and *5.09*) – anything hidden will not be sent to the **Cut Settings** window. By clicking on the left side icon, a layer can be hidden. This is the most common way to control what shapes will cut.



- ◇ **Option 2:** Select/highlight which shapes you want to cut (refer to *Section 5.01*). Then, in the **Cut Settings** window, mark the option for only cutting those that are selected. This is useful if you have shapes you want to cut that are in the same folder with other shapes you do not want to cut. You still have the option to hide those other shapes, as in the prior option, but this could be quicker if there are a lot of shapes to omit:



- ◇ **Option 3:** For shapes you do not wish to cut, change the **Cut Line Type** (on the **Style Panel**) to **Print+Cut Print**. Those shapes can then only be printed and will not be sent to the **Cut Settings** window. This is typically used in **Print and Cut** applications (refer to *Sections 10.01* and *11.04*).

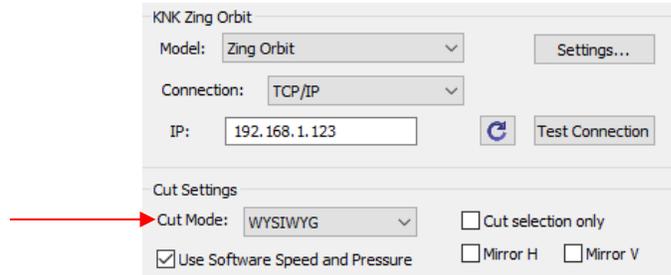


- ◇ **Option 4:** For shapes you do not wish to cut, change the **Cut Line Type** (on the **Style Panel**) to **Draw (Pen)**. Those shapes will not be cut if you then have **Cut cut lines** selected in the **Cut Settings** window (refer to *Section 10.01*).



## 2.02.2 Controlling Where Shapes Will Cut

- In the **Cut Settings** window is a **Cut Mode** option:

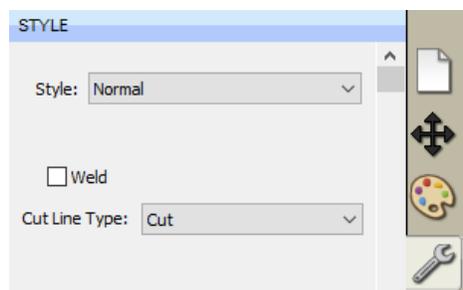


- This was briefly covered in *Section 1.13.2*. **Cut Mode** has three choices:
  - ◇ **WYSIWYG**: Cuts the shapes where they are positioned on the **Cutting Mat**. Refer to *Section 10.07.3*.
  - ◇ **Origin Point**: Moves the shapes to align with the origin you have set based on the blade tip. Refer to *Section 10.07.2*.
  - ◇ **Center Point**: Moves the shapes to center around the origin you have set based on the blade tip. Refer to *Section 10.07.4*.
- A fourth mode is called **Print+Cut** (aka **Print and Cut** or **PNC**):
  - ◇ This is the mode selected when you want to print images on your printer and then have the Zing Orbit cut them out.
  - ◇ Four registration marks are printed, along with your images, from SCAL to your home or office printer. The printout is placed on the cutting mat. The optic eye automatically locates and aligns with each printed mark. The Zing Orbit will then cut out your shapes based on triangulation. This is far more precise than **WYSIWYG** because it takes into account not only any misalignment of your printout on the mat, but also any errors in the printing. Most printers do not print images precisely in the location on the paper as they are located on the screen.
  - ◇ Note that raster images (.JPG, .BMP, .PNG etc.) will need to be traced first so that cut lines are created. Refer to *Section 7.03* for tutorials on how to do the tracing
  - ◇ Access to the **Print+Cut** mode is located in the bottom left corner of the **Cut Settings** window. Refer to *Chapter 11* for complete instructions on calibrating the optic eye and examples of PNC applications.

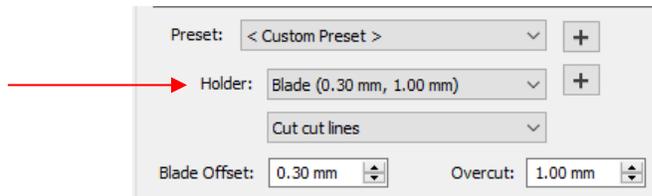
### 2.02.3 Selecting the Tool to be Used for Cutting

#### Blade Holder

- When using the blade holder, you will leave the **Cut Line Type** (on the **Style Panel**) set to **Cut**:



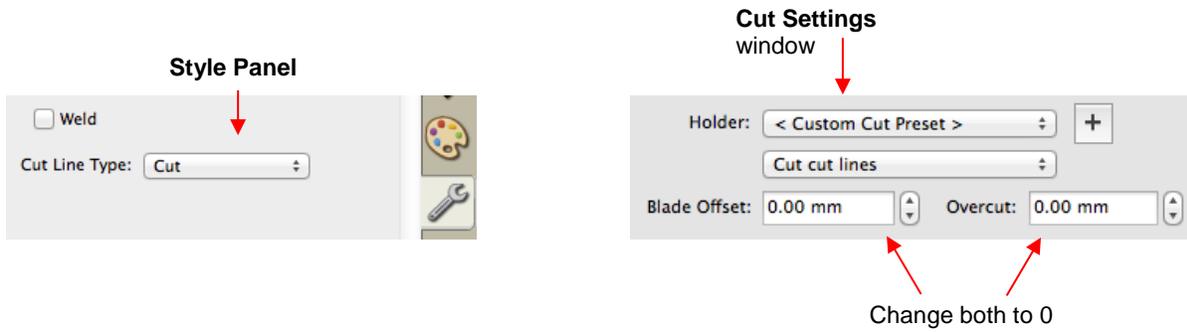
- In the **Cut Settings** window, make sure **Blade** is selected under **Holder**:



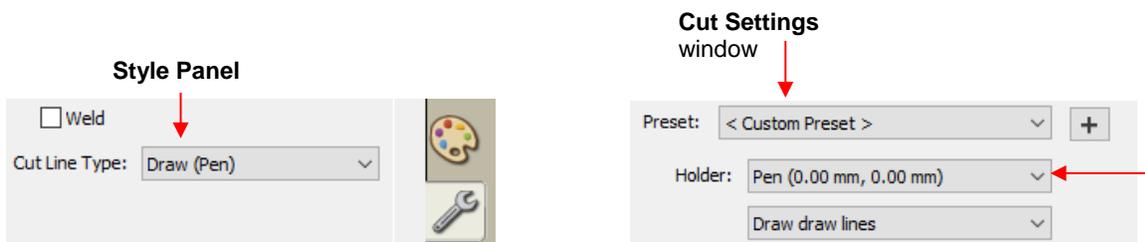
- You have a choice of three blade types to use in your blade holder, as was covered in *Section 2.0.1*. Based on the blade type, you will need to set a **Blade Offset** value for that type of blade (refer to *Section 2.03.9*).

### **Pen (or Engraving Tool, Embossing Tool, Punch/Piercing Tool)**

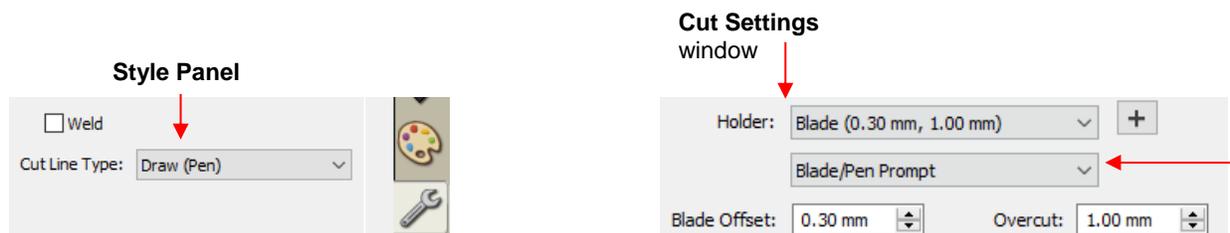
- There are two options for setting up SCAL to either draw with a pen or use one of the accessory tools:
- Option 1: When only using a single pen or tool, you can leave the **Cut Line Type**, on the **Style Panel**, set to **Cut**, as with the blade holder. You will then need to change the **Blade Offset** and **Overcut** to 0:



- Option 2: When only using a single pen or tool, change the **Cut Line Type** on the **Style Panel** to **Draw (Pen)** and then change the **Holder** to **Pen**, just as you did in when you first tested the Zing Orbit (*Section 1.13.2*):



- Option 3: If, however, you are using both the blade holder and a pen (or more than one pen) in your project and wish to change out tools during the process, then you will need to set the **Cut Line Type** to **Draw (Pen)** (for those particular layers). Then, in the **Cut Settings** window, change **Cut cut lines** to **Blade/Pen Prompt**  
**Prompt:**



- When using both the pen and the blade holder, a specific procedure is needed to insure perfect alignment of the two. This is covered in *Section 12.07.2*.

## 2.02.4 Determining the Cut Settings

- In the lower half of the **Cut Settings** window, there are a number of settings which should be understood thoroughly, as you will be checking them before every cut. *Section 2.03* covers each setting in detail.
- **Presets** is a feature that allows you to add your own settings for cutting certain materials or performing certain applications, such as scoring or engraving. Refer to *Section 2.04*.
- The table at the end of this chapter contains recommended settings for your initial test cut. If you cannot find your material in the table, use the flow chart in *Appendix D1* while test cutting your material to determine optimum settings.

## 2.03 Cut Settings

### 2.03.1 Pressure

- The cutting **Pressure** (also called **Force**) ranges from 1 to 160 where the maximum of 160 represents ~1000g of cutting force. If it is set too low, the material cannot be cut. If it is set too high, you will get bad cutting (even incomplete cutting at times) and tearing of the material. Use suggested settings for the material you are cutting and perform small test cuts before cutting your actual project. Make adjustments in order to get a clean test cut before proceeding with your larger cut.
- Dull blades will need more force than new blades, thus anticipate increasing the force over the life of the blade.
- When cutting materials that can use either blade, the 45° blade (red cap) will need a little more force than the 60° blade (blue cap), because of the extra contact with the material being cut and because the 60° blade is cut much thinner, making it a “sliver blade.”
- Recommended settings for a wide range of materials are available in the tables at the end of this chapter and also at the end of chapter 12.

### 2.03.2 Speed

- The speed is how fast the blade travels while it is in the “down” or cutting position. The Zing Orbit has 20 speed settings ranging from “snail’s pace slow” to “insanely fast.”
  - ◇ The settings from 1 through 9 are the slow speeds and should be used when cutting dense difficult materials, such as chipboard, craft plastic, styrene, and balsa.
  - ◇ The settings from 10 through 15 are medium speeds and should be used for easy-to-cut materials, such as cardstock, vinyl, iron-on transfer, and rhinestone template material.
  - ◇ The settings above 15 are the fast speeds and are useful for engraving, embossing, and drawing. You may, however, find that some materials will cut well at the faster speeds.

### 2.03.3 Blade Offset

- **Blade Offset** is the horizontal distance from the center of the blade shaft to the tip of the blade. A pen or engraving tool has an offset of 0 because the tip is centered with the center of the pen/engraving tool shaft. But a blade is different:



- If you set the **Blade Offset** to 0 when cutting with a blade, corners will be rounded. On the other hand, if it is set too high, bubbles will be cut on sharp corners:



Offset is too low:  
corners are rounded



Offset is too high: bubbles  
appear at the corners

- Below are the current **Blade Offset** settings to use for each of the three types of KNK Zing blades:
  - ◇ Red capped blade: 0.3 mm
  - ◇ Blue capped blade: 0.4 mm
  - ◇ Yellow capped blade: 0.75 mm
- Any time you order new blades, check for the recommended **Blade Offset** on the packaging. However, it's not unusual for blades to be slightly off-spec. Based on cutting a rectangle or square, increase or decrease the **Blade Offset** in increments of 0.1 or smaller.

#### **2.03.4 Multi-Cut**

- The **Multi-cut** setting causes each individual path to be cut the set number of passes before the blade moves to the next path to cut. This is better than just repeating the entire cut as each repeated pass is cut with the blade held down throughout the repeated passes, resulting in cleaner cutting.
- In general, when increasing **Multi-Cut**, the **Pressure** setting can be decreased. For example, you may find a cardstock that requires a **Pressure** of 55 to cut in a single pass will only need a **Pressure** of 45 if cutting in two passes.
- **Multicut** is recommended in the following situations:
  - ◇ Cutting thicker denser materials, such as chipboard, where multiple passes allow the blade to progressively "carve" through the material
  - ◇ Cutting of certain fibrous materials, such as fabric, where a second pass will insure that all of the fibers have been cleanly cut.
  - ◇ Cutting intricate or detailed shapes (such as script titles) from certain materials, such as cardstock, where a single pass may leave certain spots not cleanly cut.
  - ◇ Cutting rhinestone template material where a second pass results in much cleaner weeding of the cut circles.

#### **2.03.5 Overcut**

- **Overcut** is related to **Blade Offset** in that it isn't needed when using a pen, embosser, engraver, and so forth, because the tips of those tools are aligned with the center of the tools themselves. However, leaving **Overcut** at 0 when using the blade holder will result in large shapes not quite closing:



Overcut is too low:  
paths do not close

- In some cutting programs, **Overcut** is not a separate setting but rather automatically calculated and applied based on the **Blade Offset** entered. However, in SCAL, you enter an actual **Overcut** setting and should any time a blade is used.

- In general, the blade type doesn't greatly affect the **Overcut** required. Try using 1.00 mm. In the event you cut a large closed shape, like an 8" circle, you may find that you'll need to increase **Overcut** to 2.00 mm.

## 2.04 Presets

- Presets allow you to save your settings for a particular material or blade type. To do this, enter the settings you wish to save. Then click on the "+" to the right of **<Custom Preset>**:

Enter settings and click here:

Select which settings to include:

Enter a name

Click on **OK**

- After clicking on **OK**, the new preset will be found at the bottom of the list.
- In a similar manner, you can also add other **Holders** to your list, which would typically be blades with other **Blade Offset** values. For example:

Enter settings and click here:

Enter a name

Click on **OK**

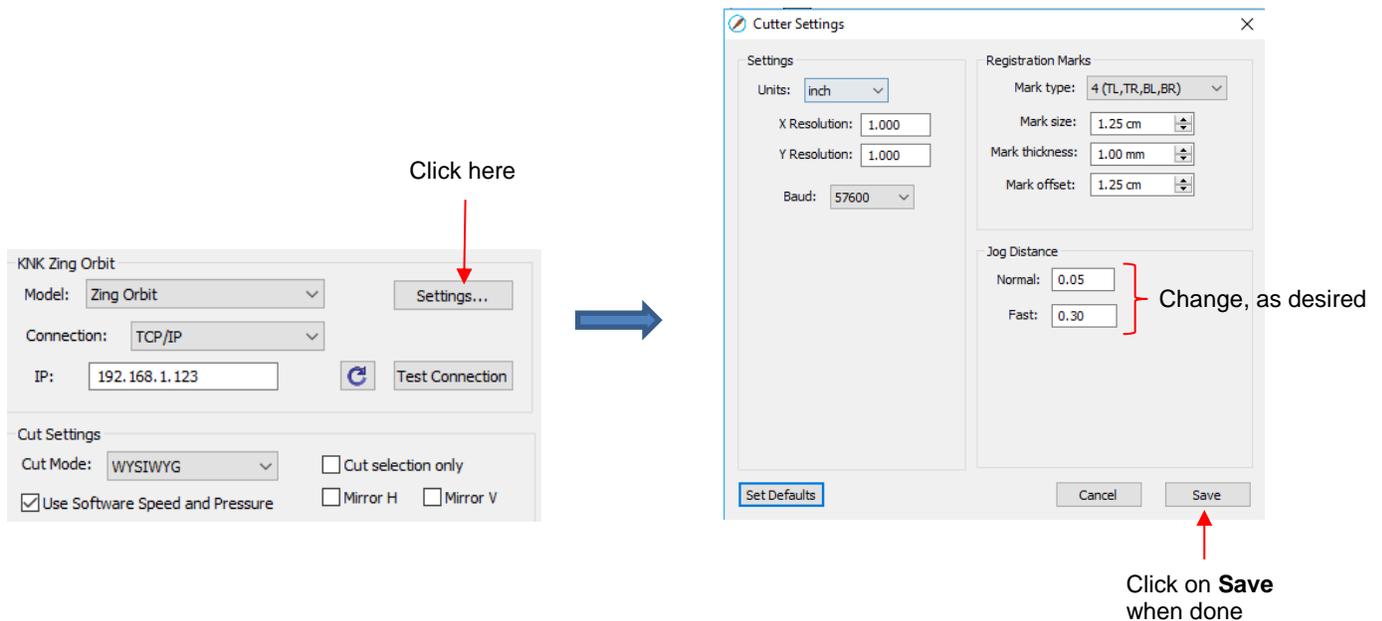
- To delete either type of preset that you personally added, select it from the menu and then a " - " button will appear. Clicking on that button will then remove it from the list:

Click here to delete the *Blue Capped Blade* preset

## 2.05 Set Origin

- Every time you turn on the Zing Orbit, the blade carriage will be moved to the same spot. This is called the **Home Origin**.
  - With rolled materials and no cutting mat, you can always use that spot to start your cuts and never set a new origin. You just need to make sure your material is positioned under the blade.

- ◇ With the cutting mat, however, you cannot move far enough to the right side because of the pinch wheel lever. Thus, you will need to move the head to the left so that the blade tip is over the material on the mat.
- ◇ **Important!** The 15" Zing Orbit is a 15 inch cutter. If you move the head too far to the left to set the origin and your project is wide, you may exceed the left side limit and cutting will stop at that point with no option but to abort. With the mat aligned next to the pinch wheel lever, you can then move the head to the rightmost grid line, set an origin, and still have a 15" cutting range. But beyond that, perhaps not. Thus, when cutting wide projects, it's a good idea to remove the blade holder, after setting the origin, and "cut air" to make sure the cut completes before risking an actual cut.
- The **Set Origin** window allows you to move the blade carriage to a new location and define that location as the new origin for that cut. This was covered in *Section 1.13.2*. As a reminder, when using the buttons in this window or using the keys on your keyboard:
  - ◇ Each click of an arrow moves a specific distance called the **Normal Jog Distance**.
  - ◇ Holding **Shift** with each click of an arrow moves a specific distance called the **Fast Jog Distance**.
  - ◇ Holding **Ctrl** (or, on a Mac, **Command**) with each click of the arrow moves a shorter distance.
  - ◇ Holding **Shift + Ctrl** (or, on a Mac, **Shift + Command**) with each click of an arrow moves the minimum possible distance.
- The **Normal** and **Fast Jog Distance** can be changed under **Cutter>Cutter Settings** or by clicking on the **Settings** button near the top of the **Cut Settings** window. These defaults can be made larger or smaller according to your preference:



## 2.06 Other Output Functions

- There are other functions and features in the **Cut Settings** window. Some of these, such as **Weeding** and **Tiling**, are only present in the PRO version of SCAL. Refer to *Section 10.06* for details on all of the settings.

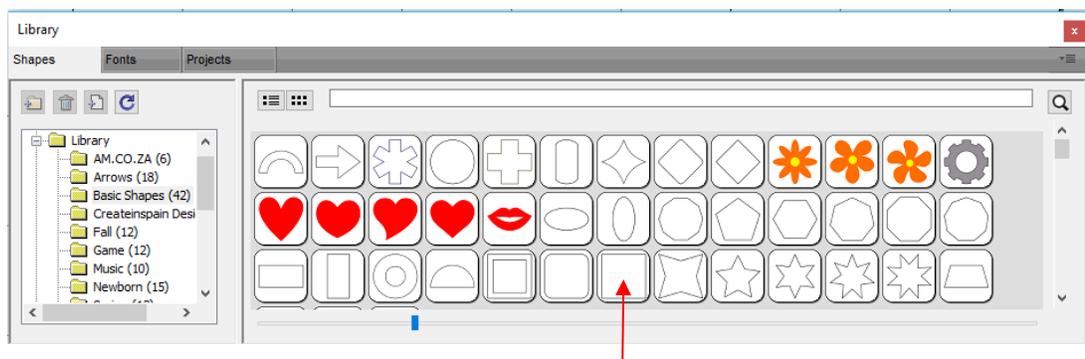
## 2.07 Important Checklist Before You Cut!

- Do you have your material on the mat and the mat inserted into the Zing Orbit? (Note: materials with a backing sheet, such as vinyl and iron-on transfer do not require a mat for cutting)

- Do you have the pinch wheel lever raised (so that the pinch wheels are down)?
- Have you set the blade length based on the thickness of the material you are cutting?
- Do you have the blade holder firmly mounted in the blade holder seat and the blade tip at the correct height above the material?
- Have you set the **Origin** at the bottom right corner of your material (or wherever you need the origin to be)?
- Have you set the **Pressure**? And the **Speed**?
- Have you selected the correct **Offset** for the blade you are using?
- Do you need to turn on **Multi-cut** for this material?
- Have you selected the **Orientation** and **Cut Mode** you wish to use? Do you know, with confidence, where your shapes are going to cut?

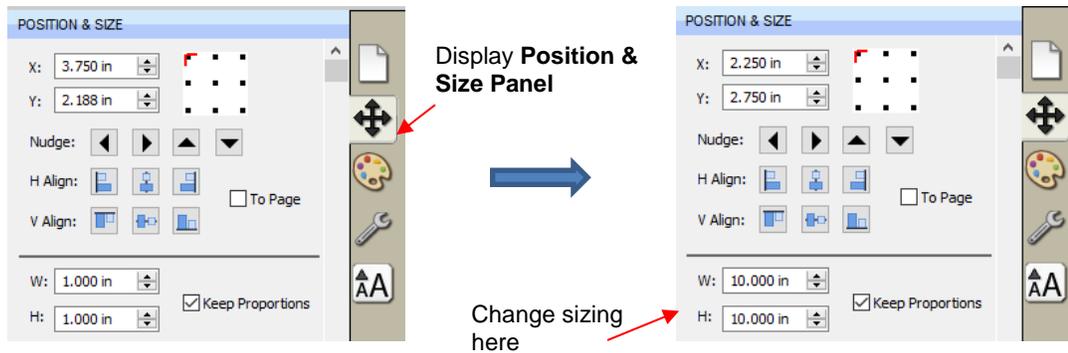
## 2.08 Resolution Calibration

- If you were to cut out any particular shape, for example, a 10" x 10" square, you might find that it actually measures 9-15/16" x 10-1/32". It will be very close to 10" x 10" but perhaps just slightly smaller or larger in either or both dimensions. Now this might be perfectly acceptable for the type of cutting you do. Therefore, it may not even be necessary to do this particular calibration. However, if you do want to make sure your shapes are cut precisely, the following procedure will allow you to calibrate your Zing Orbit.
- ***IMPORTANT:*** This **Resolution** calibration is needed for accuracy in print and cut applications. Therefore, if you plan to do print and cuts, complete this calibration before performing the optic eye calibration in *Chapter 11*.
- Go to the **Library** and select the square shape:



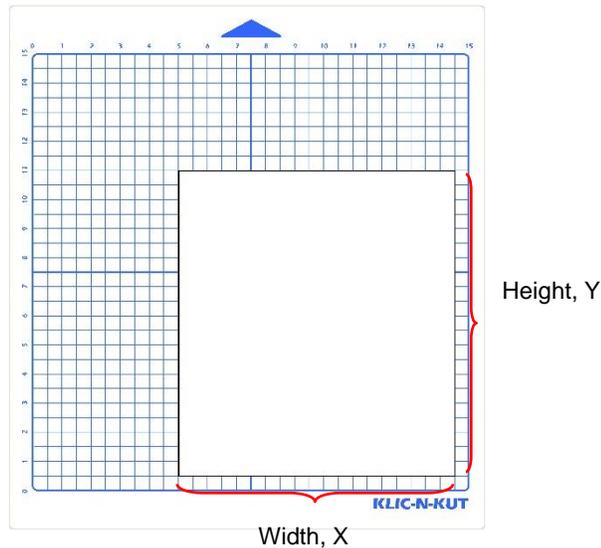
Select this square

- Make sure you have selected the square and not the rounded square to the left of it because you will be measuring this square with a ruler after drawing it.
- To resize the square, select it and then click on the **Position & Size** icon to display that panel. The square will be 1" x 1". Change the size (**W** and **H**) to the largest size that will fit on the paper you have available. It is recommended that at least 10" x 10" (or at least 250 mm x 250 mm) be used:

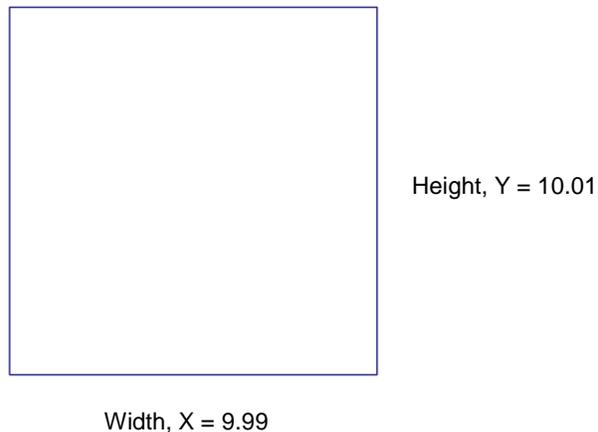


- Draw the square on your paper using the test pen or some other thin line pen. Then carefully measure the **Width** (the left-to-right length that drew) and the **Height** (the top-to-bottom length that drew):

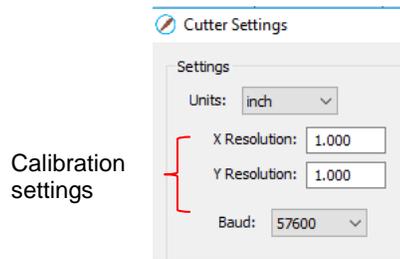
Feed the mat this direction  
into the Zing Orbit



- Because the Zings are so very accurate, only take note if the sides are slightly larger than 10" or slightly smaller than 10" because it will probably be so close that you cannot even measure how much larger or smaller than 10 inches it might be. Instead, let's say the **Height** is just the tiniest bit over 10". Mark that side as being 10.01". Let's say the **Width** is just a tiny bit less than 10." Mark that side as 9.99". Now, if you feel you can measure accurately, with a ruler, then do so. But just estimating should work fine, too. Write those measurements onto your sheet:



- Go to **Cutter>Cutter Settings**. In the top left corner of that window you will see the calibration settings:

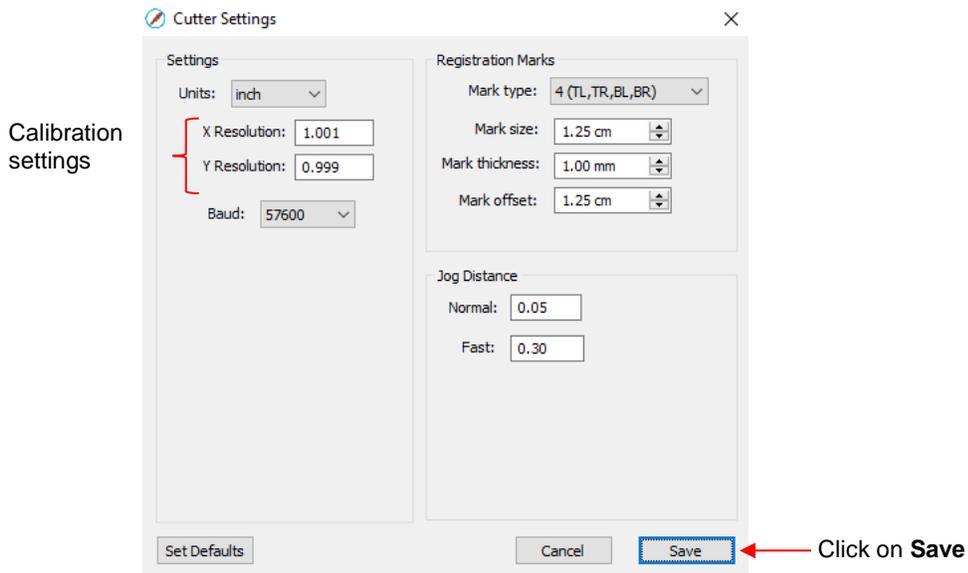


- Use a calculator to calculate the **X Resolution** and **Y Resolution** based on the measurements you obtained versus the size in SCAL. Note that it doesn't matter if you used **Portrait** or **Landscape** mode, the **X Resolution** is based on left-to-right (width) and the **Y Resolution** is based on top-to-bottom (height):

$$\begin{aligned} \text{New X Resolution} &= \text{Current X Resolution multiplied by the desired value divided by the actual value} \\ &= 1.0 * 10 / 9.99 \\ &= 1.001 \end{aligned}$$

$$\begin{aligned} \text{New Y Resolution} &= \text{Current Y Resolution multiplied by the desired value divided by the actual value} \\ &= 1.0 * 10.00 / 10.01 \\ &= 0.999 \end{aligned}$$

- Enter those new values into the **Cutter Settings** window and click on **Save**:



- If, after testing again, you find that the sizing is still slightly off, then just repeat again. Note that in the calculations the second time, instead of using 1.00 for the **Current X Resolution** and/or **Y Resolution**, you will use whatever values you entered into the **Cutter Settings** window prior to drawing the square the second time.



## Suggested Cut Settings for Various Materials on KNK Zing Orbit

**IMPORTANT:** These settings should be used for the initial test cut. Adjustments may be necessary based on the condition of the blade, variations in the material, humidity, condition of the cutting mat, blade tip height\*, etc.

**ALSO IMPORTANT:** Do not use a Blade Tip Height\* greater than 10 with a blue capped blade. It is very fragile!

Material Type	Material Brand/Source	Blade	Multi-Cut	Pressure	Speed	Blade Height	Other Comments
Acetate	5 mil (0.13mm)	R	1	45	15	15	
Acetate	Apollo Inkjet Transparency Film (0.13mm)	R	1	60	15	15	Alt: 2 passes at Pressure = 40
Candle Wax	Rayher: 0.025" (0.6 mm)	B	1	20	10	10	Alt: Paper side up, Pressure 30
Candle Wax	Stockmar: 0.05" (1.2 mm)	B	1	25	10	10	
Cardstock	AC Textured 216gsm, 80lb cover	R	1	60	15	15	Alt: 2 passes at Pressure = 50
Cardstock	Bazzill Linen	R	1	55	15	15	
Cardstock	Carolina C2S Digital 144lb (234gsm)	R	1	75	15	15	
Cardstock	Darice Core'dinations Premium (65lb)	R	1	45	15	15	
Cardstock	Georgia Pacific, 110lb index (199gsm)	R	1	55	15	15	Alt: 2 passes at Pressure = 45
Cardstock	Graphic 45 (0.22mm)	R	1	50	15	15	6x6 Cardstock Pad
Cardstock	Neenah Astrobrights 176gsm	R	1	50	15	15	
Cardstock	Neenah Pastel 176gsm (65lb)	R	1	50	15	15	Alt: 2 passes at Pressure = 40
Cardstock	Recollections 176gsm (65lb)	R	1	50	15	15	
Cardstock	Recollections 176gsm (65lb) Kraft	R	1	55	15	15	
Cardstock	Wassau 176gsm (65 lb)	R	1	50	15	15	Alt: 2 passes at Pressure = 40
Cardstock	Worldwin Colormats (65 lb)	R	1	50	15	15	Alt: 2 passes at Pressure = 40
Cardstock	Worldwin Cutmates	R	1	50	15	15	Alt: 2 passes at Pressure = 40
Cardstock	Worldwin Smooth & Silky	R	1	70	15	15	Alt: 2 passes at Pressure = 60

\*Number of Post-It notes used to set blade tip distance above material.

Material Type	Material Brand/Source	Blade	Multi-Cut	Pressure	Speed	Blade Height	Other Comments
Chipboard	0.022" (0.5 mm)	R	2	100	10	15	Brayer well and tape edges
Chipboard	Cereal box 0.018" (0.4 mm)	R	2	100	10	15	Brayer well and tape edges
Chipboard	KNKUSA 0.03" (0.76mm)	B	2	120	10	10	Brayer well and tape edges
Chipboard	Silhouette .015" (.38mm)	R	1	80	10	10	
Construction Paper	Creablogy - pink	R	1	30	13	15	
Construction Paper	Pacon Tru-Ray - black	R	1	35	13	15	Alt: 2 passes at Pressure = 30
Craft Plastic	0.02" PET-G with blue protection sheets	B	2	130	8	10	Paper layer peeled off. Corners taped to mat
Craft Plastic	Dick Blick; 0.015" (0.38mm)	B	2	110	8	10	Paper layer peeled off. Corners taped to mat
Double Sided Adhesive	Sookwang	R	1	60	15	15	
Fabric - Cork	<a href="http://embroiderygarden.com">embroiderygarden.com</a>	Y	2	50	10	10	Used an extra sticky mat
Fabric - Cotton Batik	with Lite Steam-A-Seam 2	Y	1	65	10	15	Steam-a-Seam2 fused to wrong side, paper removed and sticky side pressed down to mat
Fabric - Cotton Flannel	with Lite Steam-A-Seam 2	Y	2	75	10	15	Steam-a-Seam2 fused to wrong side, paper removed and sticky side pressed down to mat
Fabric - Denim	with Heat n Bond applied	Y	3	115	13	15	Left paper layer on.
Fabric - Quilting Cotton	with Heat n Bond applied	Y	2	65	13	15	
Fabric - Quilting Cotton	with Lite Steam-A-Seam 2	Y	1	80	10	15	Alt: 2 Passes at Pressure = 70; Steam-a-Seam2 fused to wrong side, paper removed and sticky side pressed down to mat
Foam (Fun Foam)	Michael's 0.07" (1.8mm)	B	2	20	12	10	
HTV	refer to Vinyl - Heat Transfer						
Label Sheets: water resistant	Creative Label Concepts	R	1	35	15	15	The pressure is for kiss cutting the labels.
Leather	0.02" Bookbinding quality	R	2	75	13	15	
Leather	~ 0.06"	B	2	100	9	10	
Magnet	0.035" (0.9mm)	B	2	120	10	10	Tape magnet to a sticky mat; may need slower speed for accurate shapes

Material Type	Material Brand/Source	Blade	Multi-Cut	Pressure	Speed	Blade Height	Other Comments
Magnet	Cricut Printable Magnet Sheets (.25mm)	R	1	50	15	15	
Magnet	KNK USA - Printable Magnet Sheets-15 mil (0.4mm)	R	1	70	15	15	Alt 2 passes at Pressure = 50
Mylar	5 mil (0.12mm)	R	1	50	15	15	
Mylar	KNK USA - 10 mil (0.25mm)	R	2	100	10	15	Extra sticky mat; tape corners
Mylar	KNK USA - 7 mil (0.18mm)	R	1	65	15	15	
Paper - Copy Paper	HP Everyday 20lb (75gsm)	R	1	35	15	15	
Paper - Watercolor	Canson 140lb (300g) Cold Press	R	1	100	15	15	
Photo Paper	HP Glossy	R	1	80	15	15	Alt 2 passes at Pressure = 65
Photo Paper	Royal Brites Matte White - 200 gsm	R	1	70	15	15	Alt 2 passes at Pressure = 55
Poster Board	Grocery store 0.013" (0.33mm)	R	1	70	12	15	Alt 2 passes at Pressure = 60
Rhinestone Flock	KNK USA (Rock-It)	R	2	55	15	15	Backing peeled and sticky side pressed to mat
Rhinestone Flock	Sticky Flock	R	2	45	15	15	Backing peeled and sticky side pressed to mat
Rhinestone Rubber	KNK USA (green Hartco)	R	2	60	15	15	Backing peeled and sticky side pressed to mat
Shrink Film	Grafix clear	R	2	80	12	15	
Shrink Film	Grafix Ink Jet white	R	2	120	12	15	
Shrinky Dink	Bright White	R	1	125	12	15	
Shrinky Dink	Frosted Ruff N' Ready	R	1	125	12	15	
Shrinky Dink	Printable Ink Jet white	R	1	125	12	15	
Stencil Blanks (also see Mylar)	Show-Offs 15 mil from Hobby Lobby	R	3	120	10	15	Place side with protection sheet down; tape corners
Styrene	ASI .02" (.47mm)	R	2	120	15	15	
Styrene	Evergreen .02" (.47mm)	R	3	155	10	15	
Styrene	Plastruct .01" (.25mm)	R	1	90	15	15	Alt 2 passes at Pressure = 65

Material Type	Material Brand/Source	Blade	Multi-Cut	Pressure	Speed	Blade Height	Other Comments
Vinyl - Heat Transfer	Cricut Glitter Iron On - White	R	1	30	15	15	Cut on mat
Vinyl - Heat Transfer	Easy Weed - white, navy	R	1	40	12	15	Cut on mat
Vinyl - Heat Transfer	GlitterFlex Ultra - Black	R	1	50	15	15	Cut on mat
Vinyl - Permanent	Expressions Vinyl 51 Series - Black	R	1	20	15	15	Cut on mat
Vinyl - Wall (no mat)	Vinyl - Oracal 631 - yellow	R	1	20	15	15	Not using a mat note lower Blade Height
Vinyl - Wall (no mat)	Vinyl - Oracal 631 - yellow	R	1	25	15	15	Not using a mat
Vinyl - Wall (on mat)	Vinyl - Oracal 631 - yellow	R	1	20	15	15	Cut with vinyl on the mat
Wood Veneer	0.015" (0.4mm) from cardsofwood.com	B	2	100	10	10	Taped to mat, tested both oak and walnut

© 2017 Sandy McCauley, All Rights Reserved

## 3. SCAL: Installation, Preferences, and Workspace

This chapter begins the Sure Cuts a Lot User Manual and is based on version 4.063.

### 3.01 Installing SCAL

#### 3.01.1 Selecting and Downloading the Software

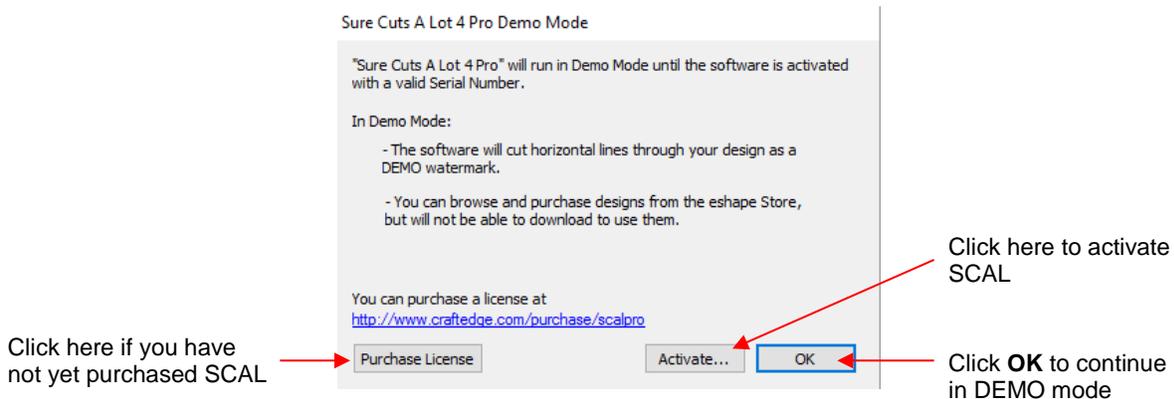
- *Sure Cuts A Lot 4* (SCAL) can be downloaded from the following link. Note that there are four choices - Mac or PC and then regular or PRO:

<http://www.craftedqe.com/download/download.html>

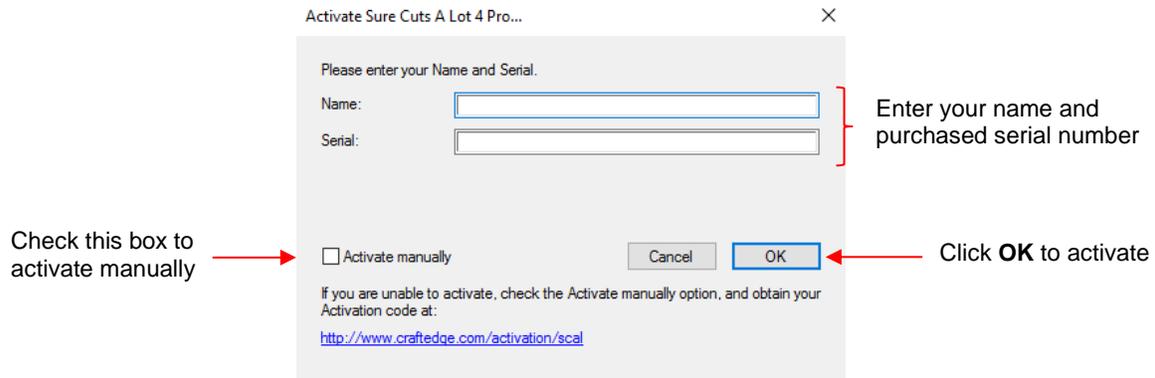
- The additional features in the PRO version are:
  - ◇ Ability to cut longer than 72 inches
  - ◇ Weeding – add weeding boxes and internal lines
  - ◇ Tiling – splitting large designs into sections for cutting
  - ◇ Duplicate cutting – setting up a grid of repeats in the cutting window
  - ◇ Cut by color
  - ◇ End action options – where cutting head moves at the end of a cut
  - ◇ Color layer alignment
  - ◇ 3D extrude
  - ◇ Importing DXF, PLT
- Install the downloaded file and open SCAL. The software will run in DEMO mode until a registration is purchased. This mode will have the following limitations:
  - ◇ When cutting, horizontal lines will be added across the design
  - ◇ Digital shapes from the **eshape Store** cannot be downloaded
  - ◇ Exporting will add a DEMO watermark

#### 3.01.2 Activating the Software

- To convert the DEMO version into a registered version, click on **Activate** when opening the software and seeing this popup screen:

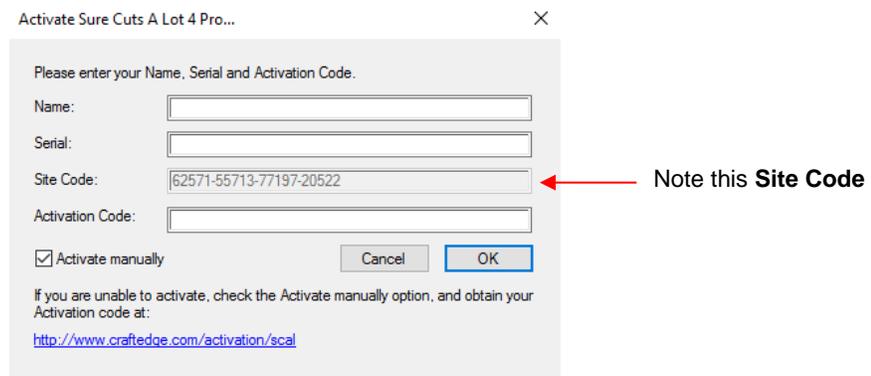


- **IMPORTANT:** Make sure the version of SCAL you installed matches the registration you purchased. You can verify this by going to **Help>About Sure Cuts a Lot**. If the wrong version is installed, uninstall this current version and download the correct one.
- After clicking on **Activate**, enter your name and the **Serial Number** you received after purchasing SCAL:



- If you do not have an Internet connection on this computer or the automatic activation fails, use the **Activate manually** option in the prior screenshot.

◇ The window will then pop up a **Site Code**:



◇ Next, go to the following link:

<http://www.craftedqe.com/activation/scal/>

- Enter your **Name**, **Serial Number** and the **Site Code**. Then click on **Generate Activation Code**:

[Standard Activation Video Tutorial](#)  
[Manual Activation Video Tutorial](#)

Name:  Please enter your full name Enter your name and purchased serial number

Serial:  (example: 12345-12345-12345-12345-12345) What is this?

Site Code:  What is this?

Enter the Site Code

• Click here

- An **Activation Code** will be generated and it can be copied and pasted into the **Activate manually** screen.

- The purchased **Serial Number** can be registered on any two computers you own. If you want to register **SCAL** on a new computer:

- ◇ Go to **Help>Deactivate** on the computer no longer needing SCAL and confirm you wish to deactivate.
- ◇ Go to the new computer and activate SCAL.

- If you need to activate your **Serial Number** on both a PC and a Mac, go to **Help>Support>Technical Support** and click on **Contact Support Team**.

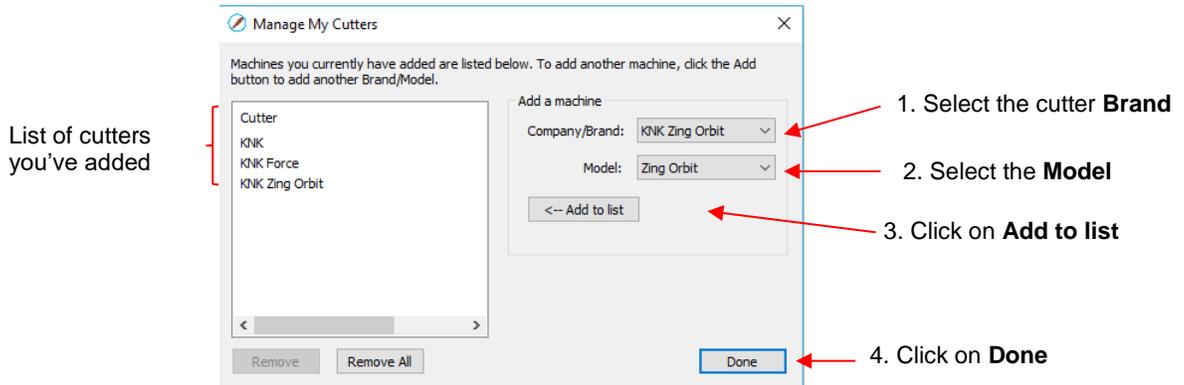
### **3.01.3 Installing the USB Driver**

- If the cutter you are using connects via a USB cable, download and install the correct driver by going to **Help>Install Driver**. If you own a Klic-N-Kut, please go the following link to download the appropriate driver for your model:

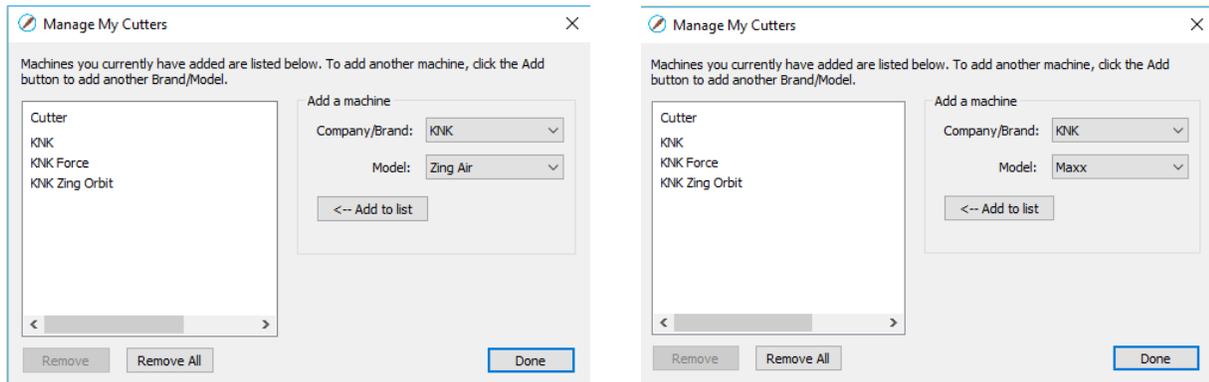
<http://knkusa.com/resources/>

### **3.01.4 Installing Your Cutter**

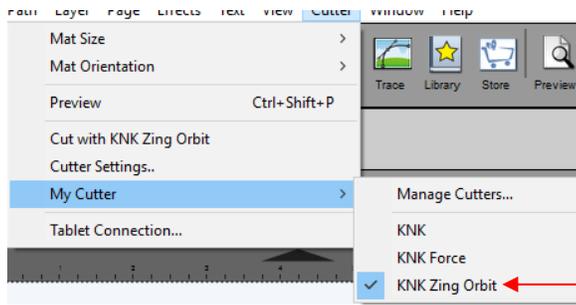
- Go to **Cutter>My Cutter>Manage Cutters** and the following window will open:



- As shown in the prior screenshot, select your cutter **Brand** and **Model** from the drop-down menus. Then click on **Add to list**. The cutter will then be added to the menu on the left side. Add all cutters you plan to use with SCAL.
- Note that with some brands, such as KNK, adding multiple models may not give separate listings. While KNK Force and the KNK Zing Orbit show up separately, selecting both Maxx and Zing Air from the model menu only displays once as KNK. Some models will need to be separately selected later in the **Cut Settings** window.



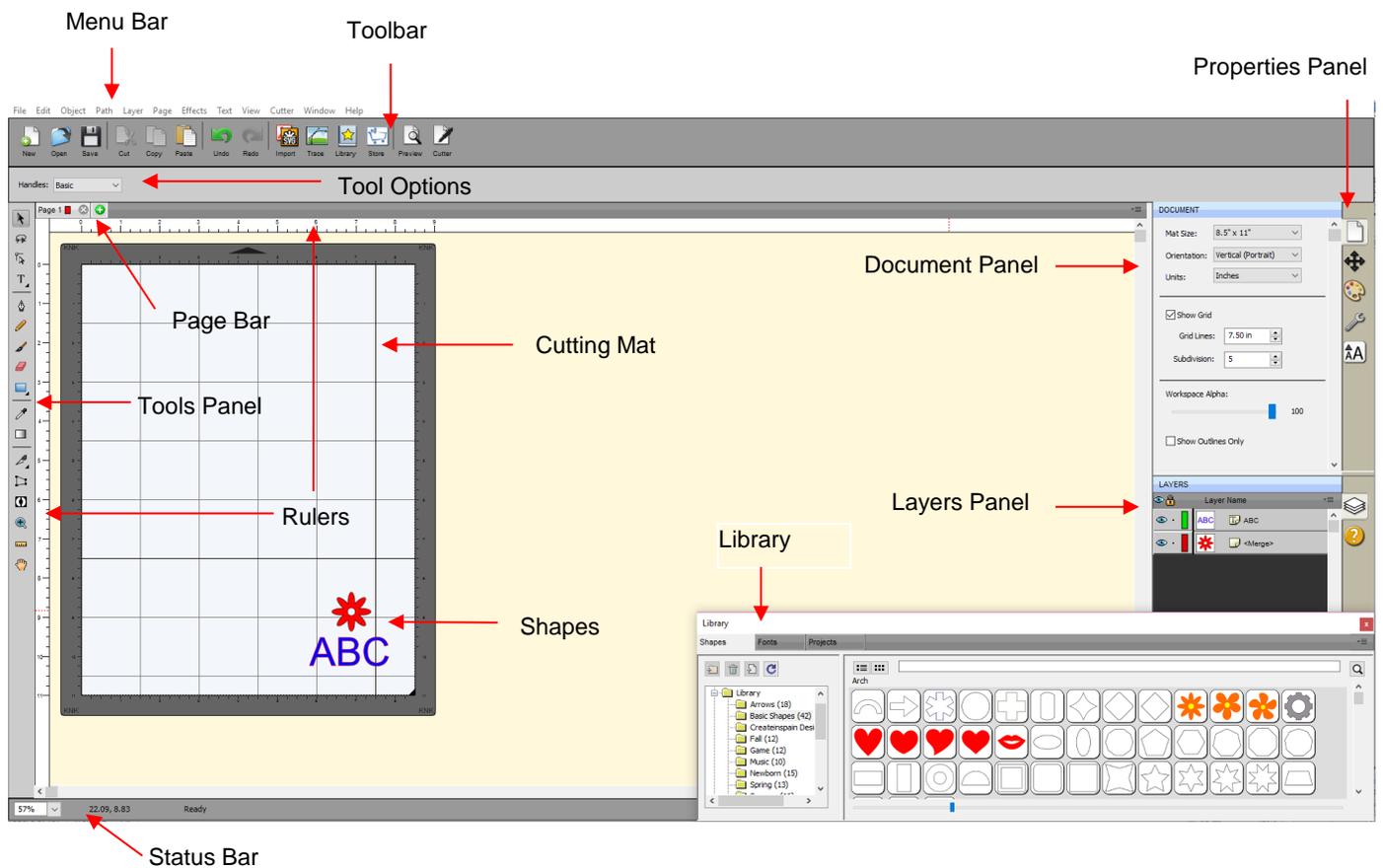
- Click on **Done** to save and close the window. Now, when you are ready to cut, the cutter you use will be selected by going to **Cutter>My Cutter** and picking which cutter you which to use:



Check which cutter to use (select KNK if you have a Zing Air or Maxx Air)

### 3.02 Main SCAL Screen

- Below is a screen shot of the main screen in SCAL identifying various elements. Note the names of the items shown as they will be referenced throughout this user manual:



- Upon opening SCAL, another window will open which accesses SCAL's **eshape Store**. If you elect to no longer have it automatically open, you can also access it by going to **File>eshape Store** or clicking on its



icon on the **Toolbar**. More details are covered in *Section 4.05*.

- Hovering your mouse over most of the screen icons will pop up the icon's name and, in some cases, details about usage.
- In order to better remember where major elements are located, note that the term "bar" is used when components are laid out horizontally (such as the **Toolbar**) and the term "panel" is used when components are laid out vertically (such as the **Tools Panel**).
- Throughout this manual, **Cutting Mat** (capitalized and in bold type) refers to the on-screen simulation of the actual cutting mat, which will be written with lower case, normal type.

- **Shapes** are the objects or images that you will be adding to your projects. They can be created from scratch or imported from other sources, such as the **Library**, your computer, or the **eshape Store**. As you will see throughout sections in this user manual, you have many options and resources available to you.
- This manual also presents information by topics versus location on the screen. If you need to look up all of the functions on one particular element, for example the **Tool Panel**, refer to **Appendices D1-D3**.

### 3.03 Language Preference

- Six other languages, besides English, are available. Go to **Help>Language** to change:



### 3.04 Units Preference

- By default, the unit setting is in inches. To switch to mm or cm, click on the drop-down menu next to **Units** on the **Documents Panel**:



- The units can also be changed in either of the following locations:
  - ◇ Go to **View>Ruler Units**
  - ◇ Right-click on the screen and select **Ruler Units**

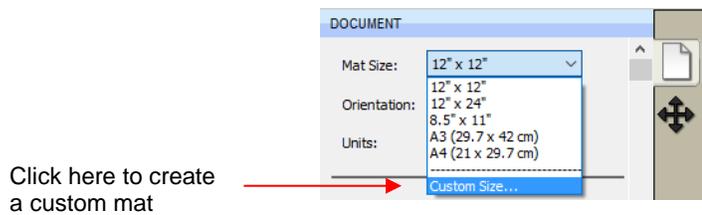
### 3.05 Customizing the Cutting Mat

#### Video

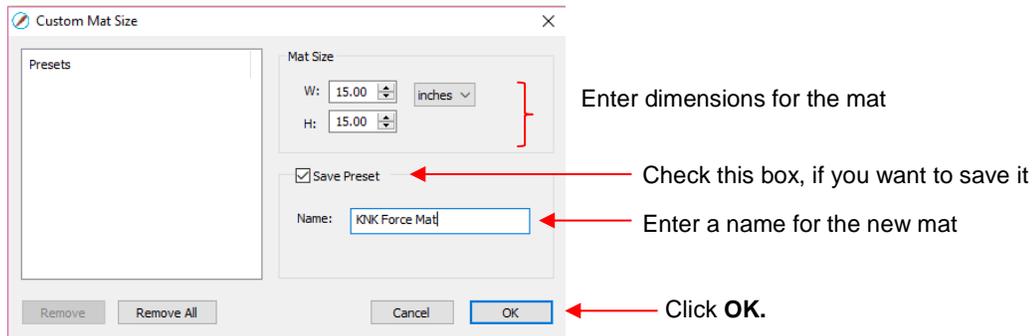
- The **Cutting Mat** serves as a design area for the software as well as to indicate, in some cutting modes, where the shapes will be cut.

#### 3.05.1 Mat Size

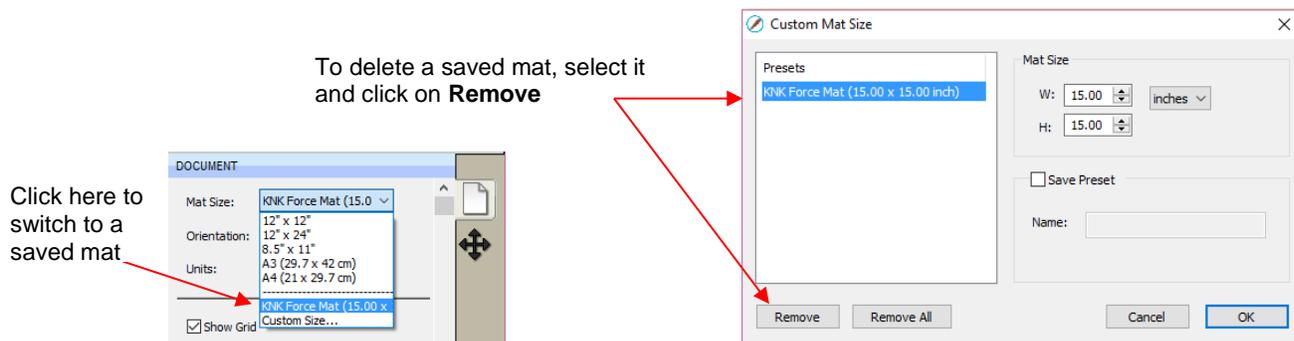
- There are three ways to access the **Cutting Mat** menu:
  - ◇ Click on the drop-down menu next to **Mat Size** on the **Documents Panel**
  - ◇ Right-click on the screen and select **Mat Size**
  - ◇ Go to **Cutter>Mat Size**
- There are five options for setting **Cutting Mat** dimensions under **Mat Size**. There is also the option to create a **Custom Size** for a mat:



- The following window will open where you can enter the dimensions of the mat and provide a name, if you wish to store it for future use:



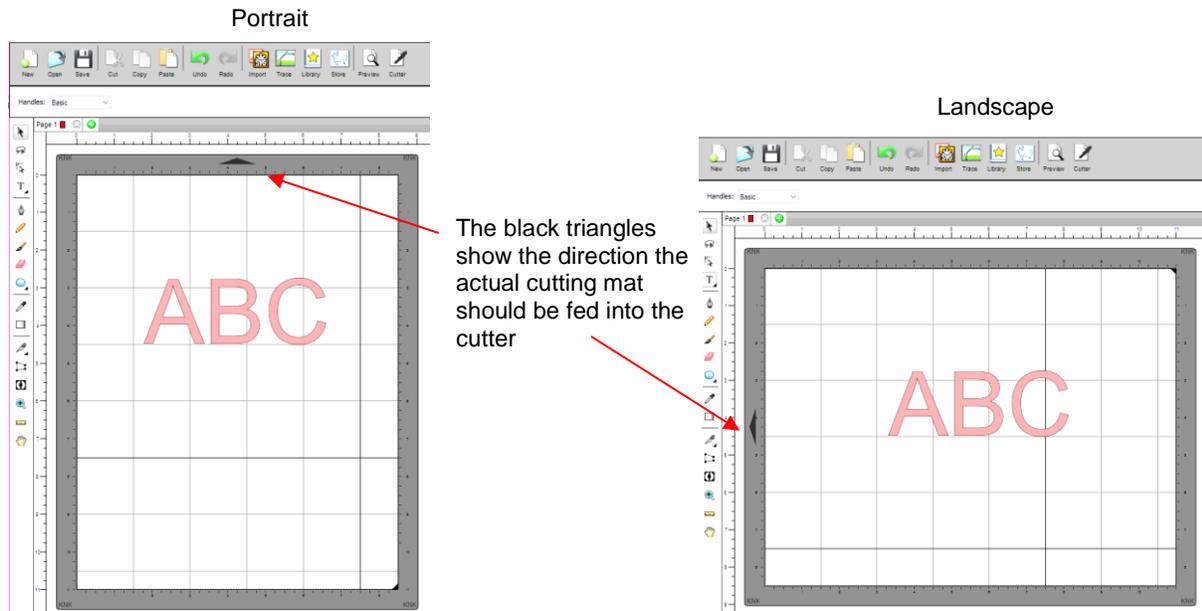
- A saved mat will now appear at the bottom in the **Mat Size** menu and will be listed under **Presets** when you return to the **Custom Mat Size** window:



- To remove a custom **Cutting Mat** from the menu, go back to the **Custom Mat Size** window and select the mat under **Presets**. Click on **Remove**.

### 3.05.2 Mat Orientation

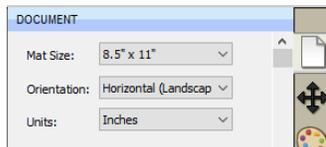
- A **Cutting Mat** can appear in either **Portrait** mode or **Landscape** mode with a triangle indicating the direction the mat will be fed into the cutter. To better illustrate this, a letter-size **Cutting Mat** is selected:



- There are three ways to change the mat orientation:

- ◊ On the **Documents Panel** under **Mat Size**:

Select **Portrait** or **Landscape** here



- ◊ Right-click on the screen and select **Mat Orientation**
- ◊ Go to **Cutter>Mat Orientation**

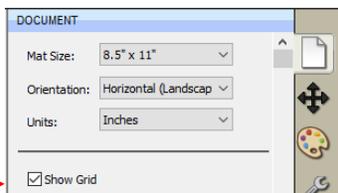
### 3.05.3 Mat Grid

- The mat grid can be toggled on or off by either of these two ways:

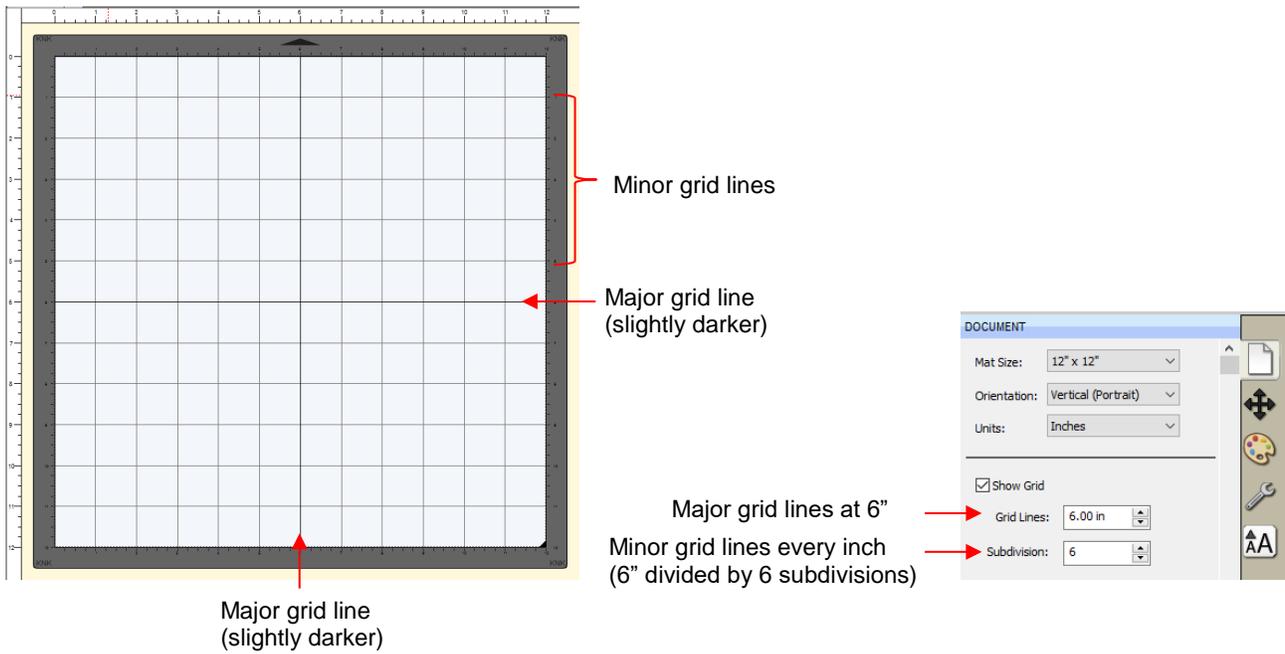
- ◊ Go to **View>Show Grid**

- ◊ Check or uncheck the **Show Grid** box on the **Documents Panel**:

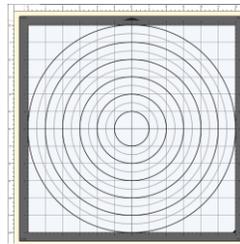
Check or uncheck



- The grid lines can also be customized. For example, with this 12" x 12" mat, major grid lines are set at 6" and then minor grid lines are set at 1" (by specifying 6 **Subdivisions** be used):

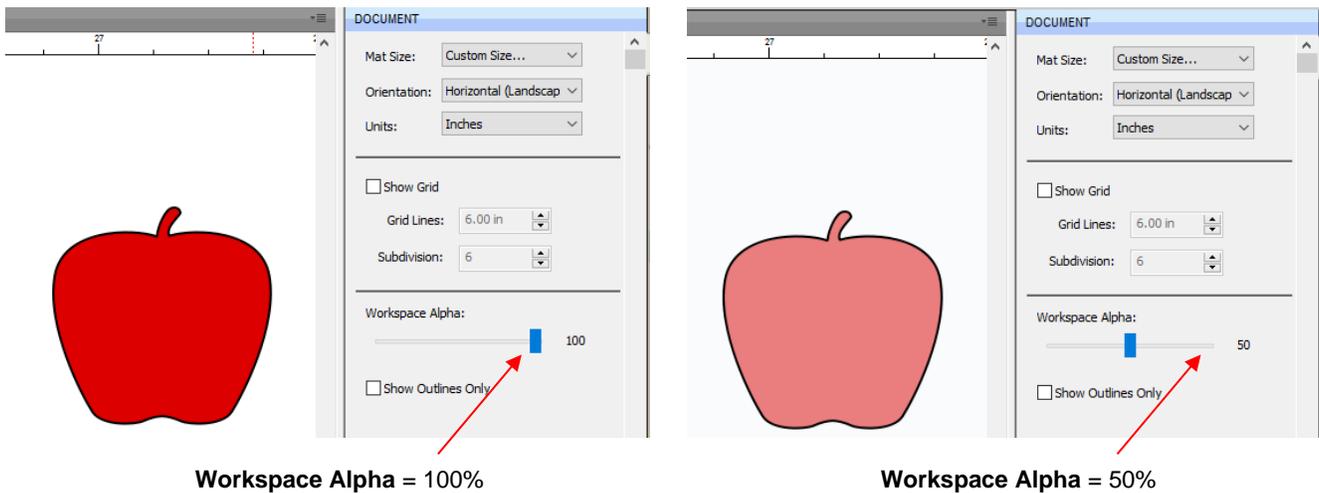


- A final grid option involves circular grid lines which can, as an example, be used for cake design. Go to **View>Show Mat Cake Circles:**



### 3.05.4 Workspace Alpha

- The **Workspace Alpha** setting is located on the **Document Panel** and affects the opacity of filled shapes on the **Cutting Mat**:



**Workspace Alpha = 100%**

**Workspace Alpha = 50%**

- You can also change the opacity of individual shapes versus all shapes. Refer to *Section 5.13.5*.

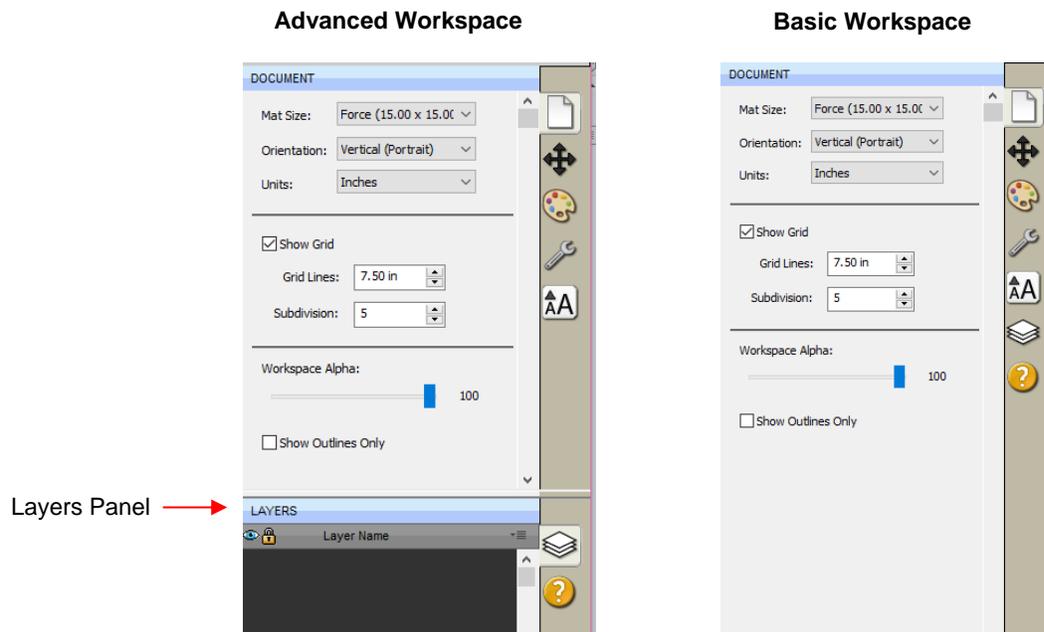
### 3.05.5 Rulers

- The **Rulers** can be toggled on and off by right-clicking on the screen and selecting **Show Rulers**. Note that when hiding the rulers, click again on the screen for it to take effect.
- To change the units displayed on the **Rulers**, refer back to *Section 3.04*.

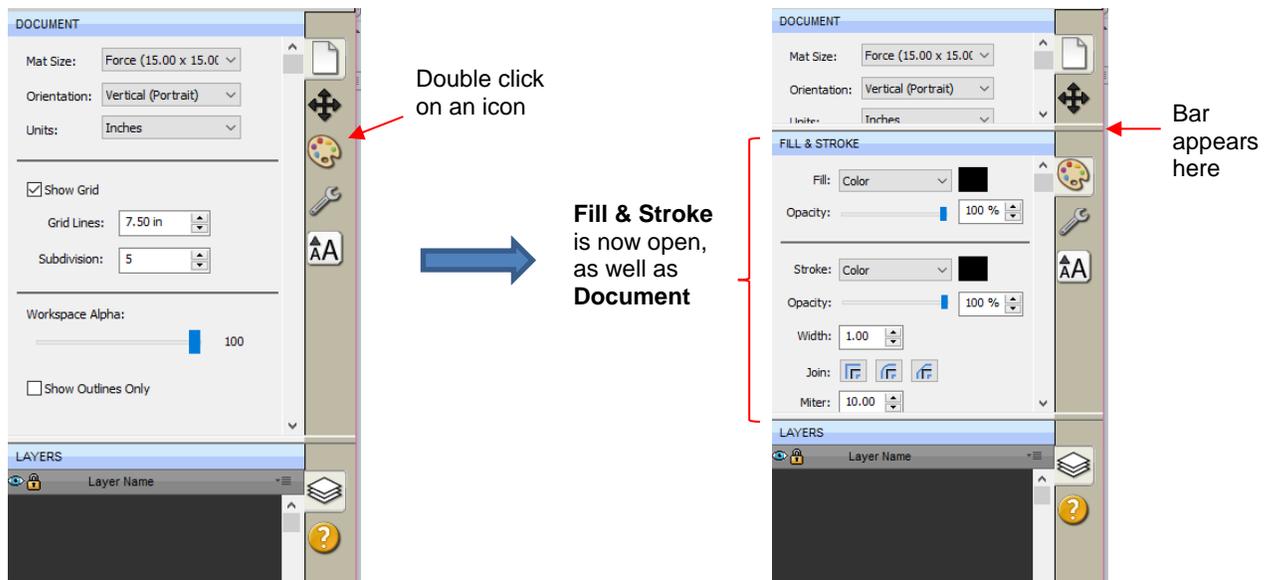
### 3.06 Customizing the Workspace

#### Video

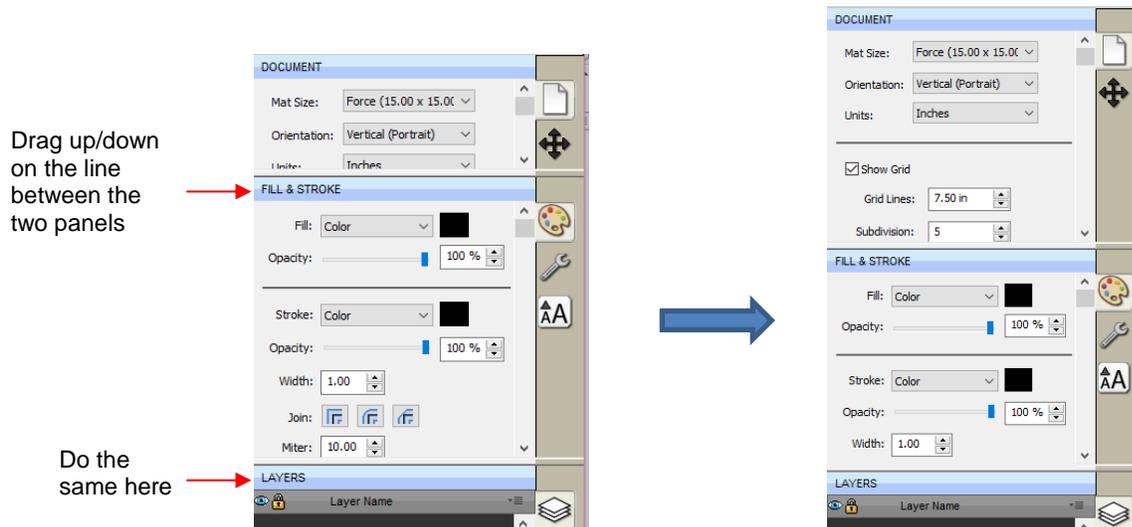
- In SCAL, the **Workspace** refers to the arrangement of windows on the **Properties Panel**. There are two versions already set up: **Basic** and **Advanced**. You can then make changes and name and save others, as desired.
- By default, the **Advanced Workspace** opens. To switch to **Basic**, go to **Window>Workspace>Basic**. The only difference between **Advanced** and **Basic** is the former has the **Layers Panel** open:



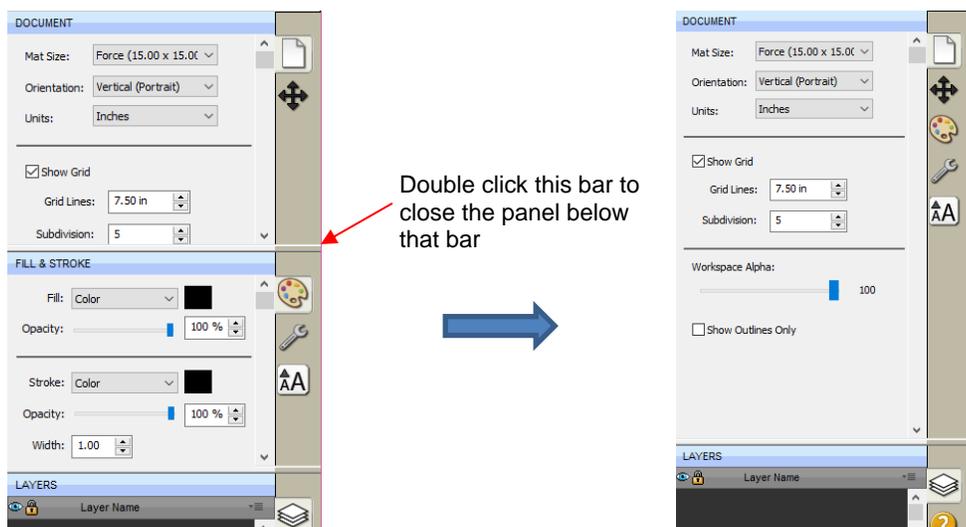
- To switch to other panels, click on the icons along the right side. If there's a particular panel you access often, then you can create a custom workspace. For example, let say you want the **Fill & Stroke Settings** panel to always be open. Double-click that icon and the **Properties Panel** will now have that panel open and separated:



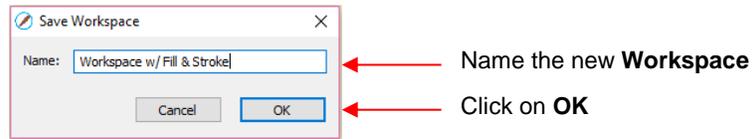
- These separate panels can also be resized by dragging them up or down:



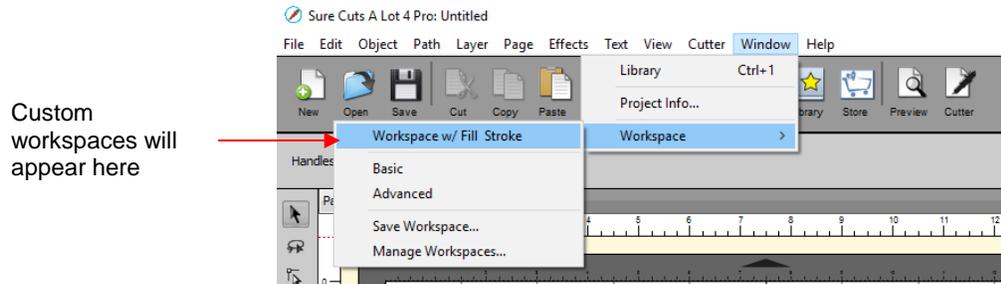
- To close a panel, double-click on the bar on the right side:



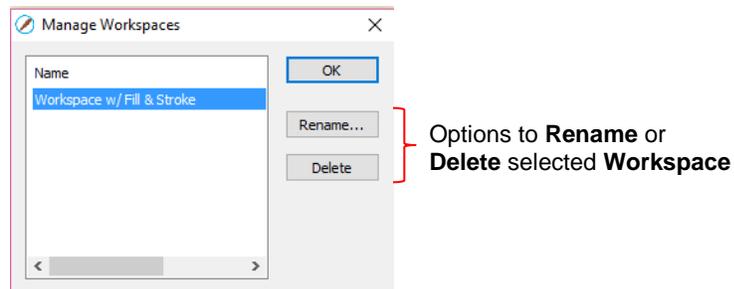
- To save workspace changes, go to **Window>Workspace>Save Workspace**. A window will open and you can name this new configuration:



- When you now go to **Window>Workspace**, the new workspace will appear at the top:



- To rename or delete a custom workspace, go to **Window>Workspace>Manage Workspaces** and a window will open with **Delete** and **Rename** options:

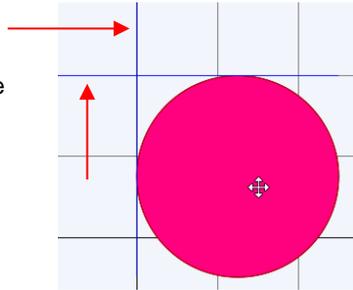


### 3.07 Snap To

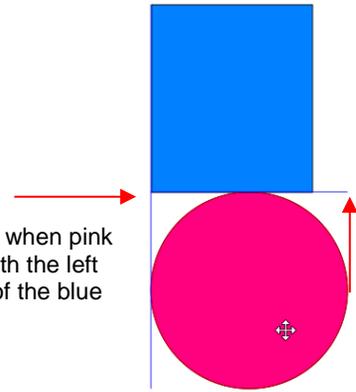
#### Video

- The **Snap To** option allows you to choose how shapes behave as they are being moved. Being able to snap to other objects or to the grid can help align shapes more easily when designing or editing a project.
- To access the **Snap To** options, go to **View>Snap To** and mark your preferences based on the following options:
  - ◇ **Grid:** selected shape will snap to the grid lines
  - ◇ **Objects (Bounds):** selected shape will snap to other shapes' boundaries
  - ◇ **Objects (Centers):** selected shape will snap to other shapes' centers
  - ◇ **Object (Sublayers):** selected shape will also snap to shapes inside other shapes (child shapes)
- When you first access the **Snap To** menu, you will most likely see the last two grayed out. In order to access those options, make sure **Objects (Bounds)** is checked. Then you will be able to go back to the menu and change any of the options.
- When snapping to the grid, the grid can be showing or hidden.
- When a shape snaps to either the grid or to another shape, blue lines appear indicating the shape is aligned at that point. Here are two examples:

Grid lines turn blue when the pink circle snaps to them



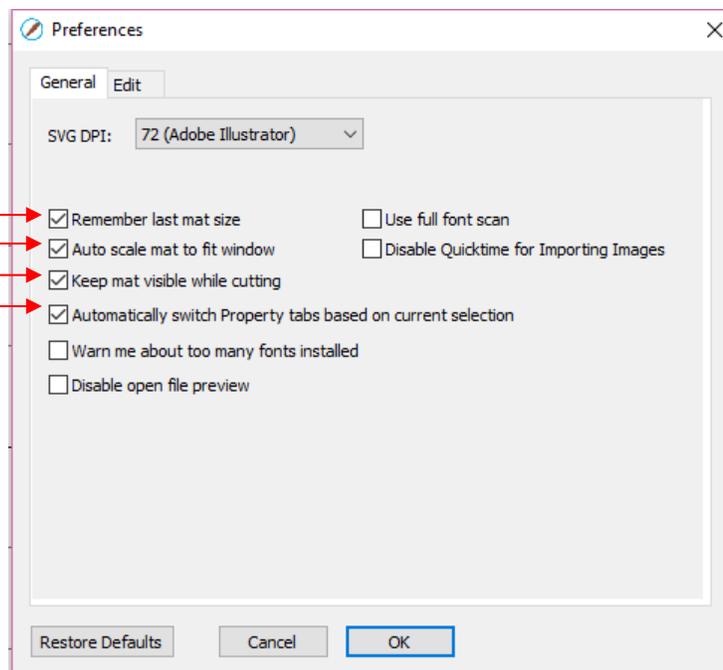
Blue lines appear when pink circle snaps to both the left side and bottom of the blue rectangle



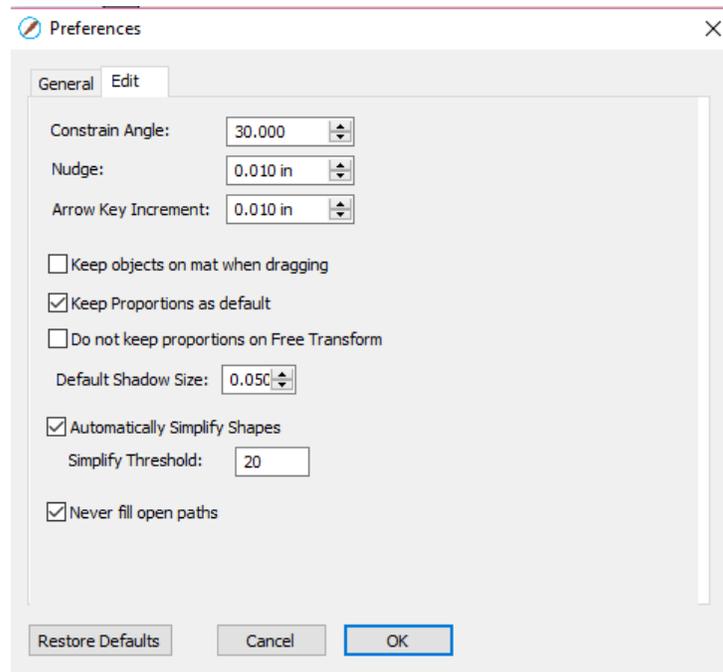
### 3.08 Other Preferences

- Under **Edit>Preferences** (or, on a Mac, press **Command + ,**), you will find a number of other options, some of which you will probably never need to change. Others will be covered in later sections, as they pertain to the function involved.
- For now, note the following preferences that do relate to the material covered so far. These should be self-explanatory based on their names:

Note these options related to the **Cutting Mat** and the **Properties Panel**



- If you click on the **Edit** tab, more preferences are listed. As with the preferences on the **General** tab, most will be covered in later sections of the manual:

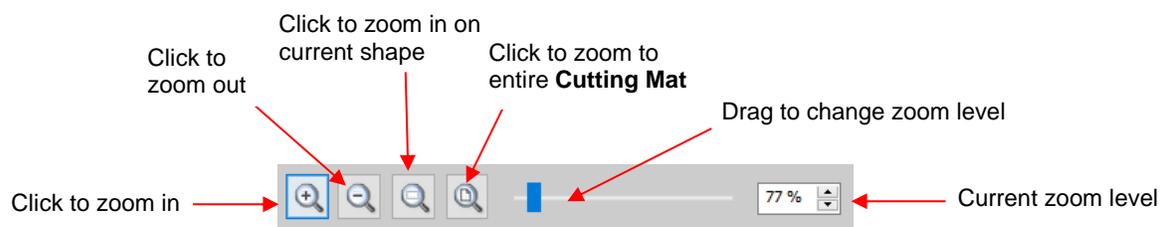


- For more details on these settings, go to *Appendix C4*.

### **3.09 Zooming and Panning**

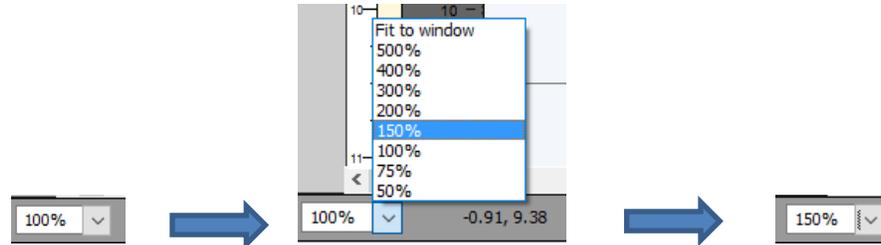
#### **Video**

- Any of the following methods will allow you to zoom in and out:
  - ◇ Hold down the **Alt** key while rolling the mouse wheel
  - ◇ Use the following shortcut keys:
    - ◇ **Ctrl+++...** (hold **Ctrl** key and repeatedly click on **+** key): Zoom in
    - ◇ **Ctrl+---...** (hold **Ctrl** key and repeatedly click on **-** key): Zoom out
    - ◇ **Ctrl+ F**: Zoom to **Cutting Mat**
    - ◇ Right-click on the screen and select **Zoom In** or **Zoom Out**
    - ◇ Click the **Zoom in Tool** icon on the **Tools Panel** . Then use the icons in the **Tool Options** at the top:



- Note that while the **Zoom in Tool** is activated, you can also marquee-select an area of the screen to zoom to that location.
- The zoom tools can also be accessed under the **View** option on the **Menu Bar** at the top:
  - ◇ **Zoom In**
  - ◇ **Zoom Out**

- ◇ **Zoom Selection:** (same as zoom to currently selected shape)
- ◇ **Fit to Window:** (same as zoom to **Cutting Mat**)
- ◇ **Actual Size:** Set zoom at 100%
- Yet another way to change the zoom level is to select from the drop-down menu on the **Status Bar** in the bottom left corner of the screen:



- To move the workspace up and down, roll the mouse wheel.
- To pan the workspace, use either of these methods:
  - ◇ Press and hold the **Spacebar** while dragging the left mouse button
  - ◇ Click the **Hand tool** icon on the **Tools Panel** . Then drag the left mouse button.

### 3.10 Undo/Redo

#### Video

#### 3.10.1 Undo

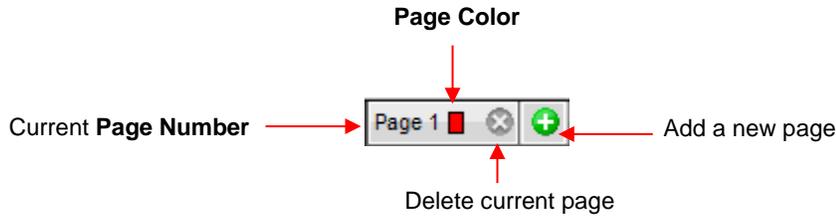
- As with most Windows applications, there is an **Undo** function to reverse the most recent steps performed. You can use any of the following to execute the **Undo** function:
  - ◇ Click on the **Undo** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+Z**
  - ◇ Go to **Edit>Undo**

#### 3.10.2 Redo

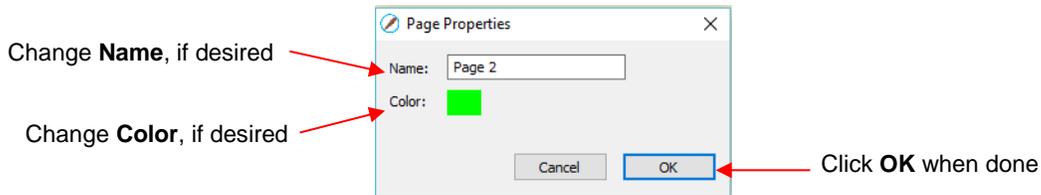
- As with most applications, there is also a **Redo** function in case you **Undo** too many steps or simply change your mind. You can use any of the following to execute the **Redo** function:
  - ◇ Click on the **Redo** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+Shift+Z**
  - ◇ Go to **Edit>Redo**

### 3.11 Pages

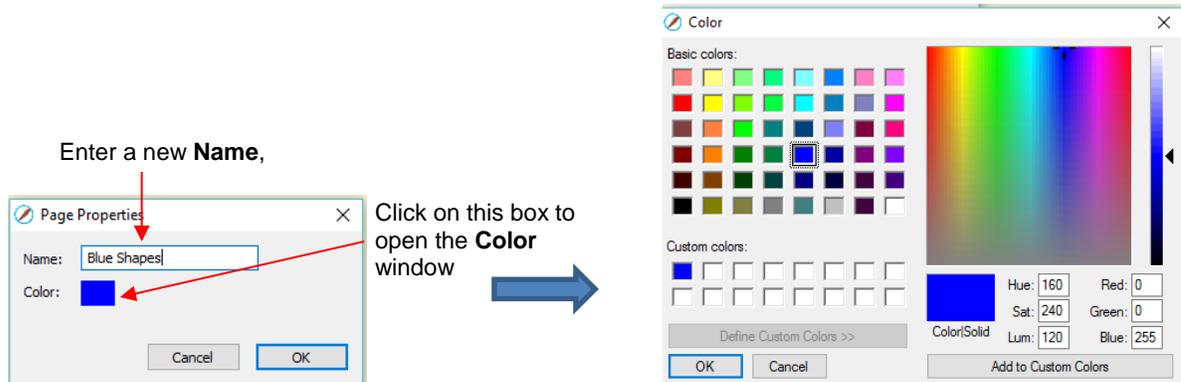
- The **Pages Bar** allows you to add more pages to your current file/project. This can be convenient for organizing projects with many shapes and or layers.
- The **Pages Bar** is located just above the top **Ruler** and displays the current page, a color for quickly identifying pages, and icons for adding and deleting pages:



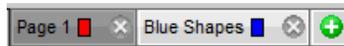
- To add a page, either go to **Page>Add Page** or click the green icon  on the **Pages Bar** itself and the following window will open



- Either accept the default **Page** number as the new **Name** or provide your own. The same with color – you can click on the default color provided and select a new color from the **Color** window that opens. For example, you might want to have all of the blue shapes on their own page:



- After clicking on **OK**, the new page appears on the **Page Bar**:



- If you change your mind and want to edit the **Name** and/or **Color**, either go to **Page>Page Properties** or double-click on the **Page Name** and the same **Page Properties** window will open, allowing you to make changes.
- To switch between pages, click on the **Page** name or go to **Page** on the **Menu Bar** and the menu will have all pages listed.
- To delete a page, make sure it's selected and then either go to **Page>Delete Page** or click on the **Delete Page** icon . A window will open asking for confirmation.

### 3.12 Help Resources

- The following steps within SCAL will take you to help resources (note that some of these will require an Internet connection):
  - ◇ Go to **Help>Help** for access to a user guide

- ◇ Click on the **Help Panel** icon  on the **Properties Panel** to open the user guide to a section based on the currently selected tool
- ◇ Go to **Help>Forums** to access the SCAL user forum
- ◇ Go to **Help>Online Video Tutorials** to access a page with links to both videos and written tutorials
- ◇ Go to **Help>Support>Technical Support** for the following:
  - ◇ Contact the SCAL team
  - ◇ Retrieve your serial code
  - ◇ Download latest updates
  - ◇ Access the forum
  - ◇ Access tutorials
- Other online support groups for SCAL include:
  - ◇ [SCAL Facebook Page](#)
  - ◇ [MTC and SCAL Facebook Group](#)
  - ◇ [SCAL Users Yahoo Group](#)
- An online training program with over 4 hours of videos is available at this link: [Sure Cuts a Lot 4 Beginner Class](#).

## 4. SCAL: Handling Files and Organizing Layers

### 4.01 Opening Files

#### 4.01.1 Opening a New File/Project

- When you launch SCAL, a new blank **Cutting Mat** will appear with a new blank project opened.
- To open a new file (start a new project), any of the following can be used:
  - ◇ Click on the **New Project** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+N**
  - ◇ Go to **File>New Project**
- Note that if any changes have been made to the existing project, a popup window will ask if you wish to save the changes that have been made. Refer to *Section 4.02*.
- If you wish to have more than one file open, you will need to open additional instances of SCAL.

#### 4.01.2 Opening an Existing .SCUT File

- An existing .SCUTx file (where x is blank, 2, 3, or 4 indicating which SCAL version created it) can be opened in SCAL4 using any of the following:
  - ◇ Click on the **Open Project** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+O**
  - ◇ Go to **File>Open Project**
  - ◇ Go to **File>Recent Projects**, if the file is one of the last five you had open in SCAL
  - ◇ Double-click a .SCUTx file in Windows Explorer or attached to an email
  - ◇ Drag and drop a .SCUTx file onto the main screen of SCAL
  - ◇ Import from the **Library** (refer to *Section 4.03.3*)
- In the first three options above, a window will open where you can browse to locate the file you wish to open:

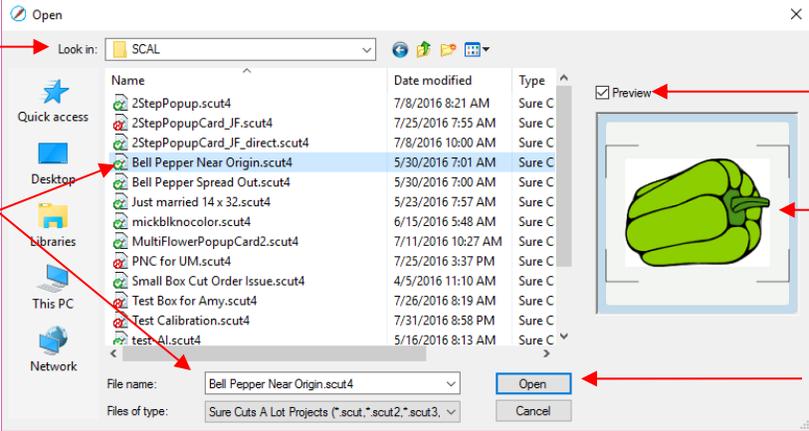
Browse to locate folder

Click on the file and it will appear under **File name:**

Mark this box to display a preview

A preview of the file shape(s) will appear

Click on **Open** and the saved file will open as a new project



Name	Date modified	Type
2StepPopup.scut4	7/8/2016 8:21 AM	Sure C
2StepPopupCard_JF.scut4	7/25/2016 7:55 AM	Sure C
2StepPopupCard_JF_direct.scut4	7/8/2016 10:00 AM	Sure C
Bell Pepper Near Origin.scut4	5/30/2016 7:01 AM	Sure C
Bell Pepper Spread Out.scut4	5/30/2016 7:00 AM	Sure C
Just married 14 x 32.scut4	5/23/2016 7:57 AM	Sure C
mickblknocolor.scut4	6/15/2016 5:48 AM	Sure C
MultiFlowerPopupCard2.scut4	7/11/2016 10:27 AM	Sure C
PNC for UM.scut4	7/25/2016 3:37 PM	Sure C
Small Box Cut Order Issue.scut4	4/5/2016 11:10 AM	Sure C
Test Box for Amy.scut4	7/26/2016 8:19 AM	Sure C
Test Calibration.scut4	7/31/2016 8:58 PM	Sure C
test_A1.scut4	5/16/2016 8:13 AM	Sure C

- In the case of opening a file from Windows Explorer, an email, or using a drag and drop method, the file will automatically open.
- Note that other file formats, besides .SCUT can be imported into SCAL4. Refer to *Section 4.06*.

## 4.02 Saving SCAL Files

- A file can be saved in .SCUT4 format using any of the following:
  - ◇ Click on the **Save Project** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+S** (for save) or **Ctrl+Shift+S** (for save as)
  - ◇ Go to **File>Save Project** or **File>Save Project As**
- If you've made changes and wish to save under a different file name, choose **File>Save As**. Name the file, choose a location, and click on **Save**.
- You can include notes about your file by going to **Window>Project Info**. This can be handy for your own future reference or for others using your files. Refer to *Section 9.02*.
- You can also export files in a host of other formats. Refer to *Section 4.08*.

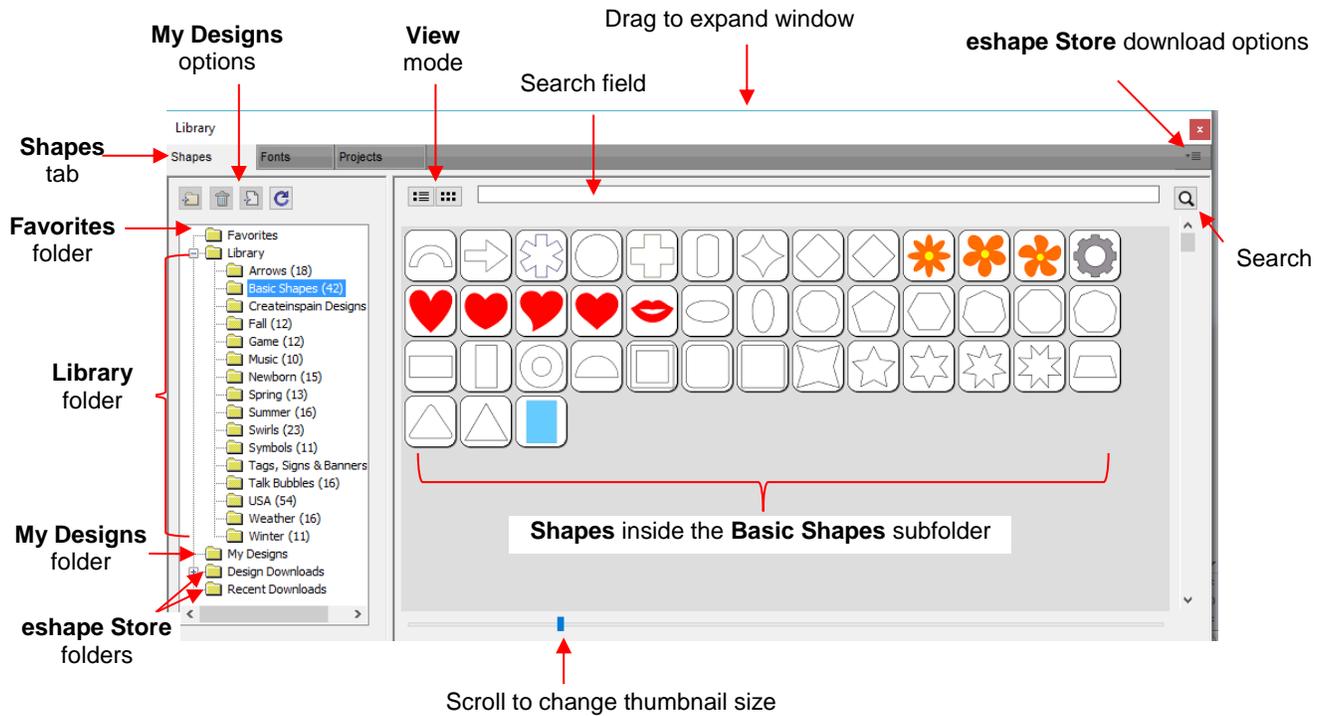
## 4.03 Using the Library

### Video

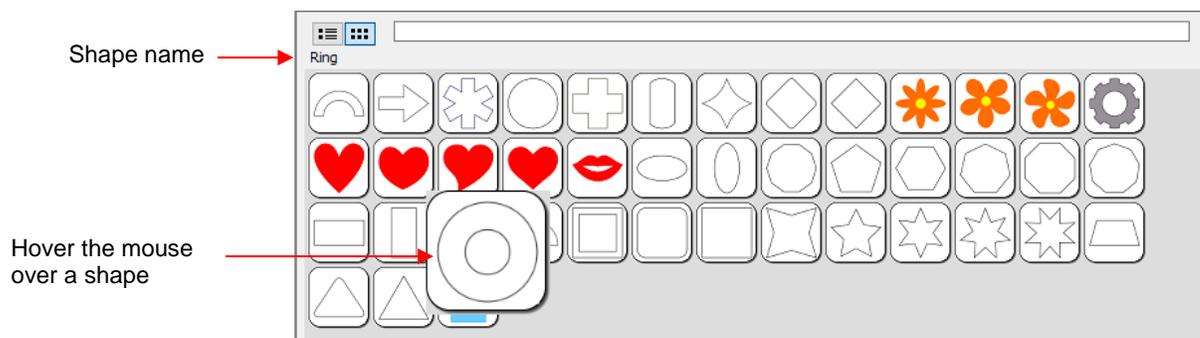
- The SCAL **Library** provides a number of useful functions:
  - ◇ It contains a collection of over 300 pre-installed shapes, organized into 16 subfolders
  - ◇ It displays complete character sets for all fonts currently installed
  - ◇ You can organize your own shapes and projects into separate folders and view thumbnails for selecting
  - ◇ You can assign commonly-used shapes and projects to a **Favorites** folder for quicker access
  - ◇ It provides access to designs and projects downloaded from the **eshape Store**
- The **Library** automatically opens every time you open SCAL. If you've closed it, the **Library** can be reopened by using one of the following:
  - ◇ Click on **Library** icon on the upper **Toolbar** 
  - ◇ Press **Ctrl+1**
  - ◇ Go to **Window>Library**
- The **Library** consists of three tabs: **Shapes**, **Fonts**, and **Projects**. Each is covered in the following subsections:

### 4.03.1 Shapes Tab

- When you first open the **Library**, the **Shapes** tab will be selected.
- In order to see all of the contents under this tab, drag the top of the window upwards until you see the following screenshot. Note the various parts of this window:



- On the left side you will see the **Library** folder which contains the included 300 shapes. The number in parentheses, after each subfolder, indicates how many shapes are assigned to that subfolder. **Basic Shapes**, as an example, has 42 assigned to it.
- Because the **Basic Shapes** subfolder is currently selected, thumbnails for all shapes contained in that subfolder are shown in the larger area on the right side. To add one of these shapes to the **Cutting Mat** either:
  - ◊ Click on the shape and it will be placed in a certain location on the **Cutting Mat**
  - ◊ Drag the shape to a desired location on the **Cutting Mat**
- To change subfolders or folders, click on the folder name on the left side and its contents will then appear on the right.
- A scroll bar at the bottom of the **Library** window can be used to make the thumbnails larger or smaller.
- As you hover over a shape, its thumbnail will get larger and its name will appear near the top:



- You can toggle between the thumbnail view and a list view using these icons at the top   :

Click here to change to list view

Name	Category	Artist	Type	Date
Arch	Shapes	Craft Edge	scal	2016-08-29
Arrow	Shapes	Craft Edge	scal	2016-08-29
Asterix	Shapes	Craft Edge	scal	2016-08-29
Circle	Shapes	Craft Edge	scal	2016-08-29
Cross	Shapes	Craft Edge	scal	2016-08-29
Cylinder	Shapes	Craft Edge	scal	2016-08-29
Diamond 2	Shapes	Craft Edge	scal	2016-08-29
Diamond Rounded	Shapes	Craft Edge	scal	2016-08-29

- A search function enables you to see all of the shapes with a particular word in the name. For example, enter the word leaf and click on the search button:

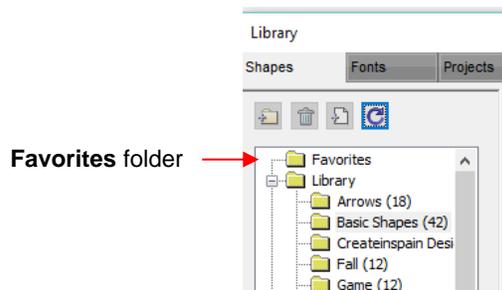
1. Enter search word

2. Click here or press **Enter** key

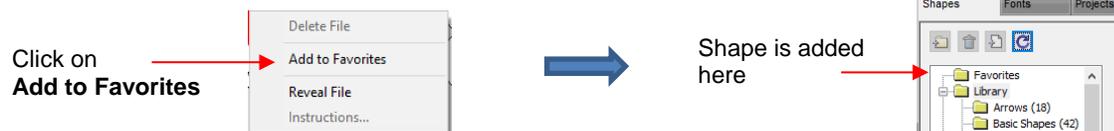
3. All shapes with the search word in their name will appear



- **Favorites:** Above the **Library** folder is a folder called **Favorites:**



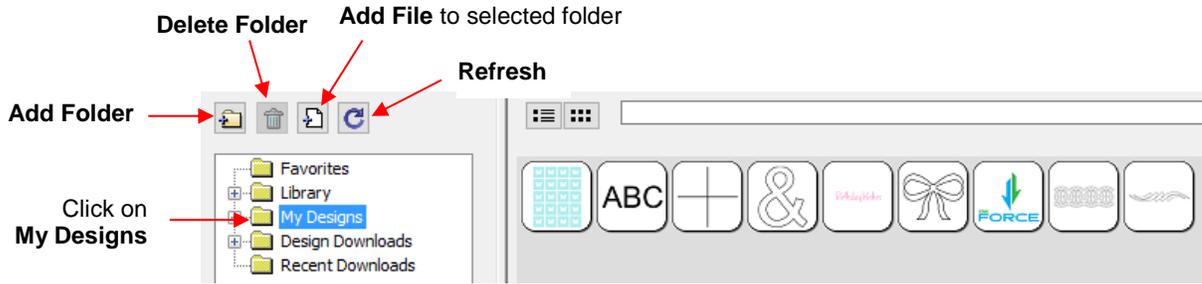
- ◊ The **Favorites** folder is for storing the shapes you access often. Locate the shape you want to add, right-click, and select **Add to Favorites** from the popup menu.



- ◊ This popup menu also has these options:
  - ◊ **Delete File** (only active in the **My Designs** folder)
  - ◊ **Reveal File** – opens the location on your computer where file is stored
  - ◊ **Instructions** – some files from the **eshape Store** may include instructions for the user

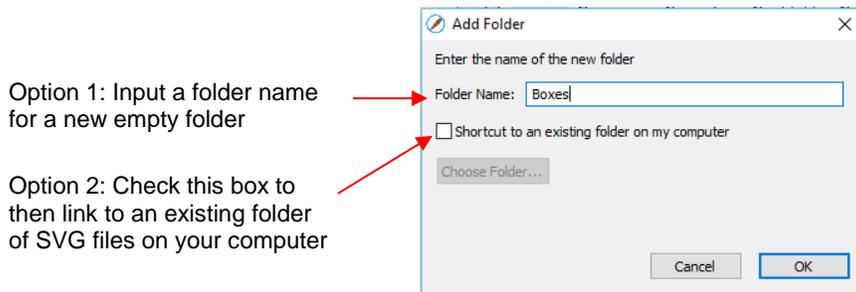
- **My Designs:** This folder is for storing your own SVG files for easy access.

- ◊ Once you click on **My Designs**, the icons above the folder menu will become active:



◇ Add subfolders: The shapes in the above screenshot have been added to **My Designs** but not into subfolders. To create subfolders for additional organizing:

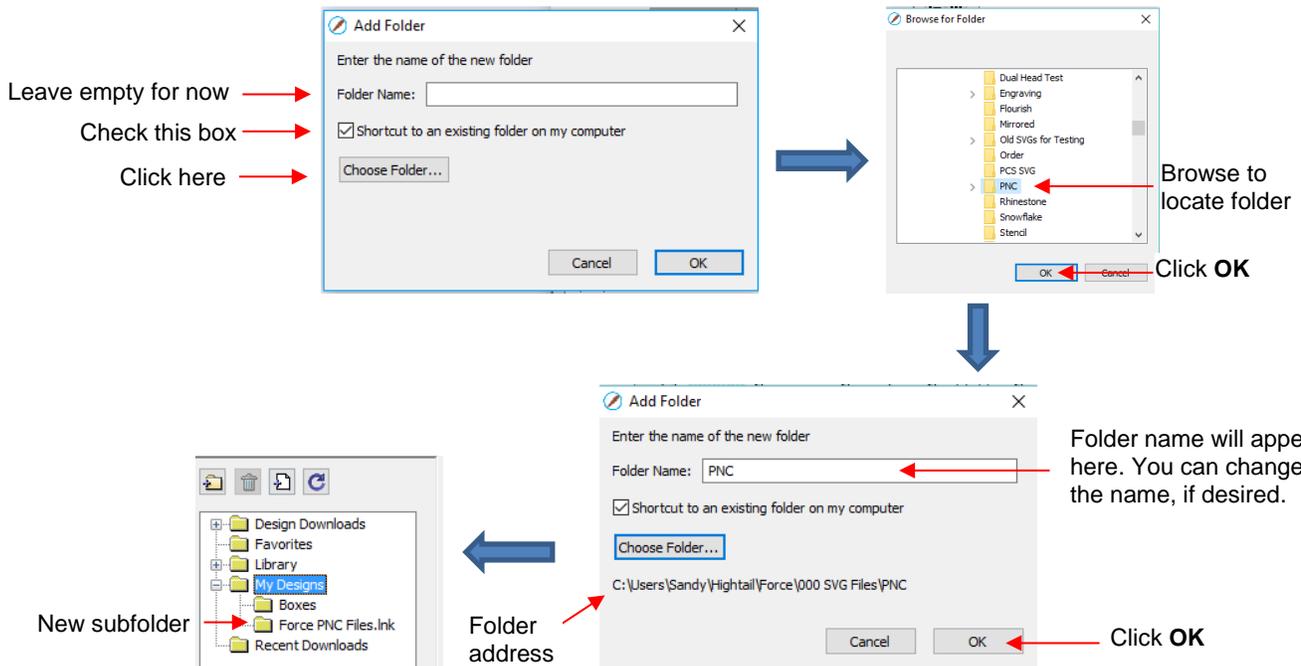
- ◇ Click on the **Add Folder** icon 
- ◇ Right-click on **My Designs** and select **Add Folder** from the popup menu
- ◇ After choosing to add a folder, the following window opens where you have two options:



Option 1: Input a folder name for a new empty folder

Option 2: Check this box to then link to an existing folder of SVG files on your computer

◇ If you select Option 2, the **Choose Folder** button will activate and clicking it will bring up this window where you can browse your computer to locate an existing folder of SVG files:



◇ Note that the **Folder Name** was changed to *Force PNC Files* before clicking on **OK**. The name will have a .lnk extension added indicating that it is linked to another folder on your computer.

◇ To add files to a folder inside **My Designs**:

◇ Select the folder and do either of the following:

(1) Click on the **Add File** icon 

(2) Right-click and select **Add File** from the popup menu

◇ A window will open where you can then browse to find the SVG file to be added. You also have the option of selecting multiple files at once to import into that folder.

◇ To delete a file from a folder, right-click and select **Delete File** from the popup menu.

◇ **IMPORTANT:** Note that deleting the file could also delete it from your computer unless it has been backed up elsewhere.

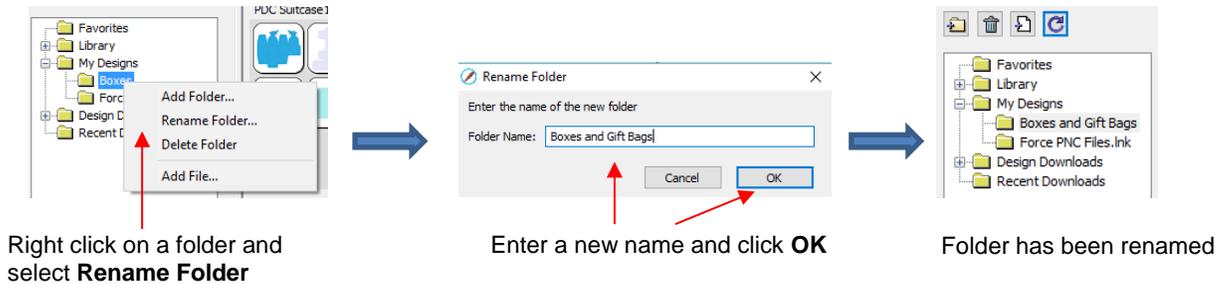
◇ After deleting files, you will need to click on the **Refresh** icon  to update the thumbnail images.

◇ To delete a folder, select it and then do one of the following:

◇ Click on the **Delete Folder** icon 

◇ Right-click and select **Delete Folder** from the popup menu

◇ To rename a folder, right-click and select **Rename Folder** from the popup menu:



- **Design Downloads** and **Recent Downloads:** These two folders, along with the menu icon at the top right  are part of the **eshape Store** functions. These will be covered in *Section 4.05.1*.

### 4.03.2 Fonts Tab

- The **Fonts** tab lists all of the currently installed fonts on your computer. Selecting any font in the list will show the entire character set on the right side of the window. It will also then make it the default font that will be used when adding text with any of the methods available in SCAL. Refer to *Section 6.03*.

**Fonts tab**

Library

Shapes Fonts Projects

Name and Sample of each installed font

Select a font to see its character set

Drag up to expand window

Install a new font for temporary use

Name	Sample
Berlin Sans FB	abcdeABCDE
Berlin Sans FB Demi	abcdeABCDE
Bernard MT Condensed	abcdeABCDE
Bernhard-Fashion	abcdeABCDE
BernhardEFFashion	abcdeABCDE
BernhardModern	abcdeABCDE
BETSY	abcdeABCDE
BILLY	abcdeABCDE
Blackadder ITC	abcdeABCDE
BlackJack	abcdeABCDE
BLAIR	abcdeABCDE
BlippoBlackEF	abcdeABCDE
Block Letters Tryout	abcdeABCDE
Bodoni Bd BT	abcdeABCDE
Bodoni Bk BT	abcdeABCDE

BlackJack

! | | \$ % & ! ( ) \* + / - 0 / 0

1 2 3 4 5 6 7 8 9 : ; < = > ?

A B C D E F G H I J K L M N O

P Q R S T U V W X Y Z ^ - \ a

b c d e f g h i j k l m n o p

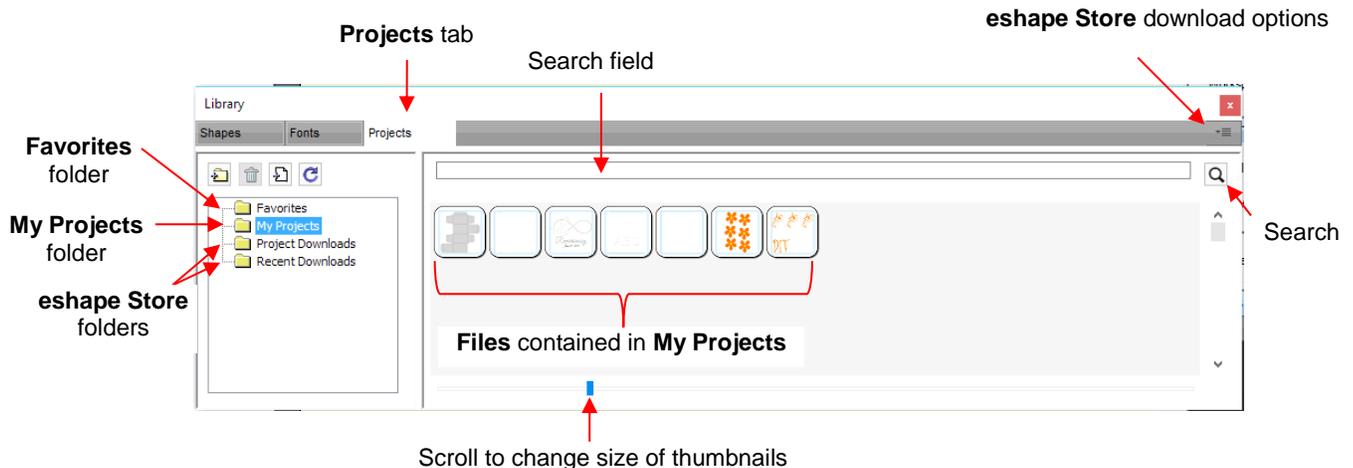
q r s t u v w x y z | ~ i £ ••

© << >> ® ± / >> ÷ à á â ã ä å æ

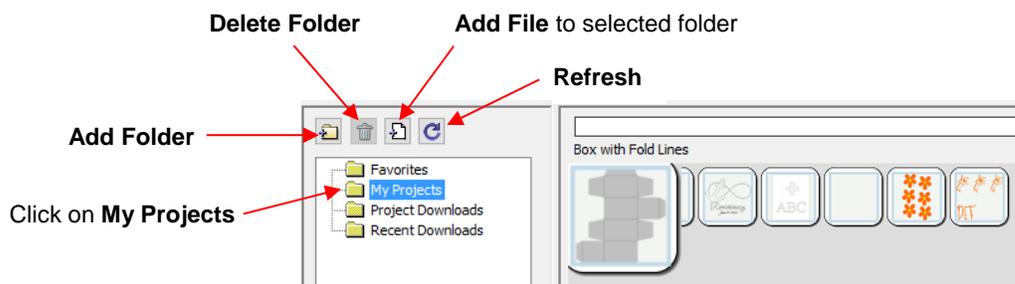
- Scroll the bar at the bottom to change the size of the lettering. To add a character to the **Cutting Mat**, left-click on it. While it is far quicker to type out text using the **Type** tool (again, refer to *Section 6.03*), this window is the best way to add special characters within a font or when using dingbat fonts.
- The menu icon  in the upper right corner can be used to temporarily add a font that's not installed on your computer. Click on it and then browse to the folder containing the font you wish to add. Again, refer to *Section 6.03* regarding temporary font usage.

### 4.03.3 Projects Tab

- The **Projects** tab is similar to the **Shapes** tab. Instead of .SVG files, however, it helps you organize and access your .SCUT files, also referred to as projects.
- As with the **Shapes** tab, there are no default categories or pre-added files. However, you will notice these other similar features:
  - ◇ **Favorites** folder – select any project, right-click, and select **Add to Favorites** from the popup menu
  - ◇ **My Projects** folder – virtually identical to **My Designs** folder (more information follows)
  - ◇ **Search** field and search icon  – for locating files with a particular word in the file name
  - ◇ **Project Downloads** and **Recent Downloads** folders and top right icon  : these pertain to **eshape Store**. Refer to *Section 4.05*.
  - ◇ Scroll bar to change the size of the thumbnails.
  - ◇ Hover over a thumbnail and it will get larger. The project name will appear below the **Search** field.

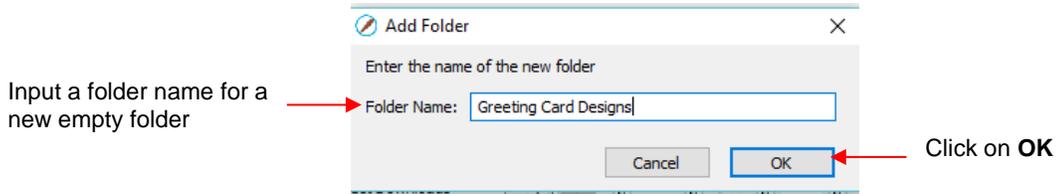


- **My Projects:** This is the main folder where you can organize your own projects for easy access.
  - ◇ Once you click on **My Projects**, the icons above the folder menu will become active:

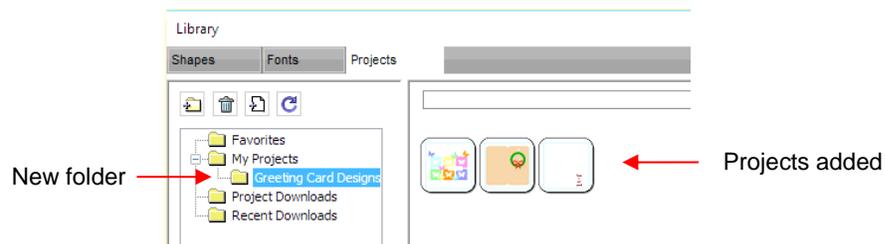


- ◇ **Add subfolders:** The projects in the above screenshot have been added to **My Projects** but are not in subfolders. To create subfolders for additional organizing:

- ◇ Click on the **Add Folder** icon 
- ◇ Right-click on **My Projects** and select **Add Folder** from the popup menu
- ◇ After choosing to add a folder, the following window opens and you can name this folder:



- ◇ To add files to a folder inside **My Designs**,
  - Select the folder and do either of the following:
    - (3) Click on the **Add File** icon 
    - (4) Right-click and select **Add File** from the popup menu
- ◇ A window will open where you can then browse to find the SCUT file to be added. You also have the option of selecting multiple files at once to import into that folder.
- ◇ After adding the files, the thumbnails for those projects will appear when the folder is selected:



- ◇ To delete a file from a folder, right-click and select **Delete File** from the popup menu.
- ◇ ***IMPORTANT:*** Note that deleting the file could also delete it from your computer unless it has been backed up elsewhere.
- ◇ After deleting files, you will need to click on the **Refresh** icon  to update the thumbnail images.
- ◇ To delete a folder, select it and then do one of the following:
  - ◇ Click on the **Delete Folder** icon 
  - ◇ Right-click and select **Delete Folder** from the popup menu
- ◇ To rename a folder, right-click and select **Rename Folder** from the popup menu.

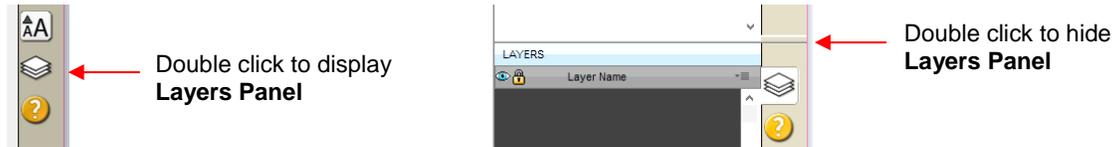
## **4.04 Layers Panel**

Because of the importance of the **Layers Panel** in successfully using SCAL, it is being presented before the other file handling sections.

### **4.04.1 Introduction to the Layers Panel**

- The **Layers Panel** is used for the following:

- ◇ Assigning or grouping shapes into separate layers to better organize a project
- ◇ More easily applying changes to a group of shapes
- ◇ Selecting one shape or a layer of shapes on the screen
- ◇ Controlling what is sent to the cutter or printer
- The **Layers Panel** can be displayed by double-clicking its icon and hidden by double-clicking the small bar just above its icon:



Note that single clicking the icon will hide other panels, allowing the **Layers Panel** to fill the right column.

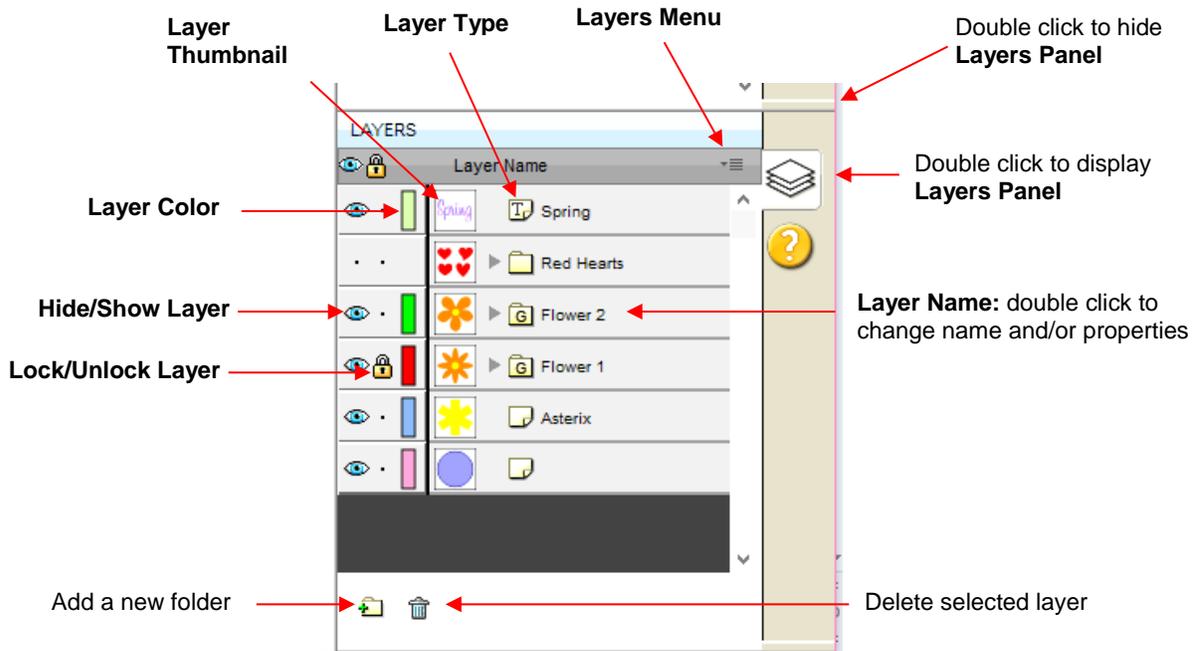
- You do not have to worry about adding shapes to the **Layers Panel**. They will automatically be assigned to new layers as you add them. You will want to learn how to move shapes to new layers or combine shapes into the same layer, depending on the circumstances. This is covered in *Section 4.04.3*.
- Here are a few examples of when shapes need to be on different layers:
  - ◇ Paper piecing or shadowed shape projects where some shapes will be cut from one color and other shapes from another color (or a number of other colors).
  - ◇ Fold-up projects (boxes, envelopes, popup cards, etc.) where the fold lines will need to have different settings and/or different tools used than your cut lines.
  - ◇ Rhinestone template projects where you need to cut two different templates, such as a fill that will be done in one color of rhinestones and an outline in another color.
- Other benefits of assigning shapes to specific layers include:
  - ◇ Ability to select, with one click of the mouse, all shapes assigned to a layer
  - ◇ Ability to hide or lock layers so that the shapes on that layer are not inadvertently selected, moved, resized, etc.
  - ◇ Ability to change the color, line style, and tool choice on all of the shapes assigned to a particular layer.

#### **4.04.2 Parts of the Layers Panel**

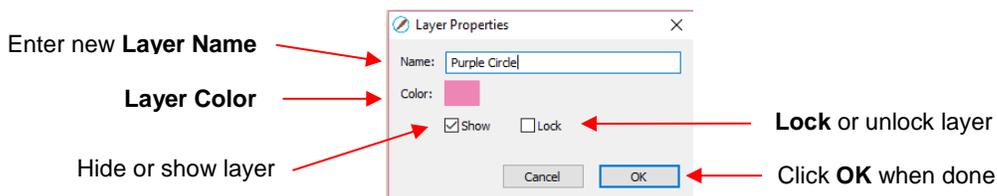
- The next few sections will use the following simple project to illustrate the **Layers Panel**:



- The following screenshot identifies the various icons on the **Layers Panel**:



- **Layer Thumbnail:** Each layer has a thumbnail showing the shapes assigned to that layer. Click on that thumbnail and all shapes on that layer will be selected. If you wish to add the shapes from another layer to the section, hold the **Shift** key and click on the other thumbnail.
- **Layer Type:** To the right of the **Layer Thumbnail** is the **Layer Type**, represented by one of four different icons:
  - ◇  Regular shape
  - ◇  Text shape which is still able to be edited as text, such as changing the font
  - ◇  Regular folder of individual shapes: When the folder is opened, by clicking the gray triangle, the icon changes  and all layers or subfolders within are displayed.
  - ◇  Group folder where one or more of the shapes have been grouped together: When the folder is opened, by clicking the gray triangle, the icon changes  and all layers or subfolders within are displayed.
- **Layer Name:** In the prior **Layers Panel** screenshot, the last layer has no name. To add one, double-click that layer to open the **Layer Properties** window. Here you can change the name of that layer as well as some other settings. Note that the color assignment is for use on the **Layers Panels** only. It doesn't change the color of the shape assigned to that layer:



- Hiding layers, locking layers, and assigning layer colors can also be done on the **Layers Panel**:

- ◇ **Hide/Show Layer:** Click on the eye icon  to hide that layer. The icon will be replaced with a dot as shown for the *Red Hearts* layer and the shapes on that layer will no longer be seen on the **Cutting Mat** and will not be included when printing or cutting the project. Clicking on the dot icon will restore the layer to the **Cutting Mat**:

Layer Hidden: 



Layer Showing: 



- ◇ **Lock/Unlock Layer:** Click on the dot to the right of the eye icon and the layer will become locked , such as shown for the *Flower 1* layer. The shapes on that layer will still be included in printing and in cutting, however cannot be selected on the **Cutting Mat**. This can be useful when shapes should not be inadvertently moved or if you are having problems selecting shapes nearby.

- ◇ **Layer Color:** Click on the current layer color icon  and a **Color** window will open where a different color can be assigned. Again, this is only for making layers easier to distinguish on the **Layers Panel** and doesn't change the **Fill** or **Stroke** color of the shapes themselves.

- **Layers Menu:** At the top of the **Layers Panel** is an icon for the **Layers Menu** . This menu is also available by clicking on **Layer** on the **Menu Bar** at the top of the screen. The following functions are available in this menu:

Self-explanatory { Add Layer Folder, Duplicate Current Layer, Delete Current Layer

Hide, Show or Toggle Show on all layers → Show/Hide >

Lock, Unlock or Toggle Lock on all layers → Lock/Unlock >

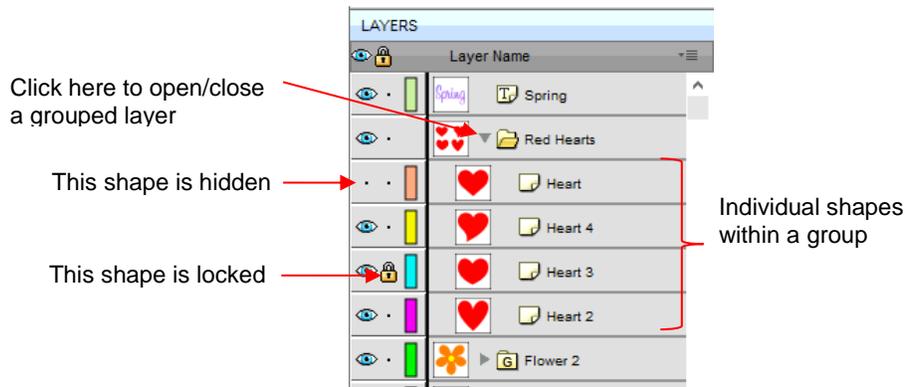
Move layer to another existing page → Send Layer to Page...

Open Layer Properties window → Layer Properties...

Remove Empty Layers ← Delete any layers with no shapes

Arrange > → Move layer position on panel: up or down one level, or to the top or to the bottom.

- Icons for adding a new layer  and deleting a selected layer  are also available at the bottom of the **Layers Panel**.
- Individual shapes within a group folder can also have individual properties changed. For example, let's say you have various shapes grouped together and you want to keep some locked and you want to hide others. Opening the grouped layer displays each thumbnail and the **Show/Hide** and **Lock/Unlock** icons can be individually changed. In this example, some basic shapes have been used for a clearer understanding:



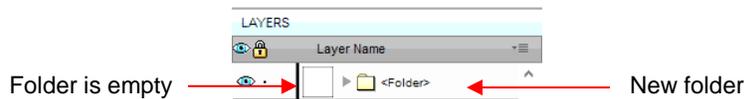
### 4.04.3 Creating Folders and Moving Layers

- As mentioned in *Section 4.04.1*, each new shape added to the **Cutting Mat** will initially be assigned to a new layer. This can quickly clutter the **Layers Panel**. The ability to combine shapes into folders and subfolders helps organize a project and make things easier for printing and/or cutting.

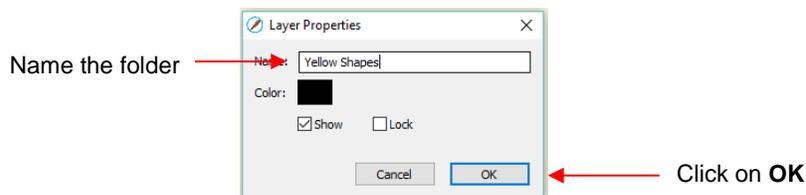
- There are three ways to create a new folder:

- ◇ Click on the **Add layer folder icon**  at the bottom of the **Layers Panel**
- ◇ Click on the **Layers Menu icon**  and select **Add Layer Folder**
- ◇ Go to **Layer>Add Layer Folder**

- When a new folder is added, it will appear at the top and look like this:



- Just as covered in the prior section, if you double-click on this new folder, you can rename it:



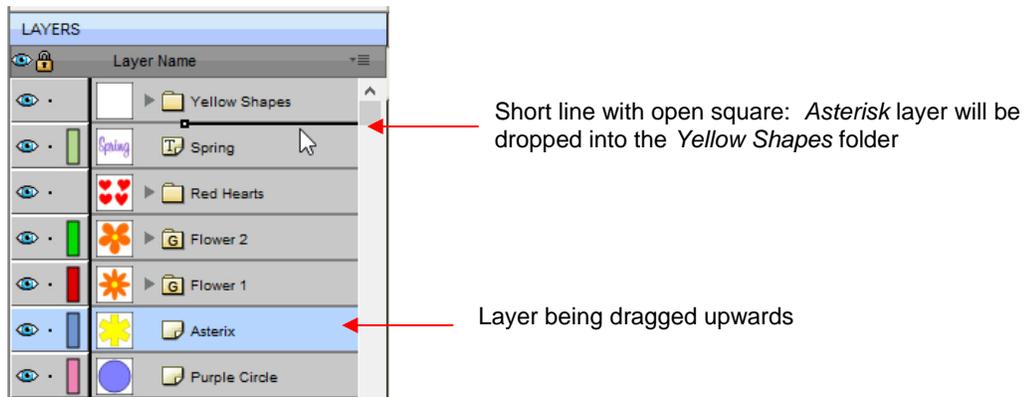
- In the prior section, it was also noted that layers can be re-ordered using the **Arrange** option in the **Layers Panel Options** menu. Alternatively, layers and folders can also be moved directly on the **Layers Panel** by dragging them up or down.

- There are two possible outcomes when dragging layers:

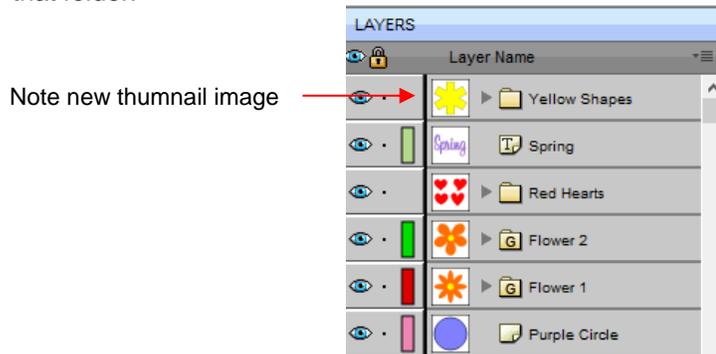
- ◇ The layer is moved to a new location
- ◇ The layer is moved into an existing folder

- The way to control where the layer “lands” is by moving it straight up and down or by dragging a little to the left while moving it up and down.

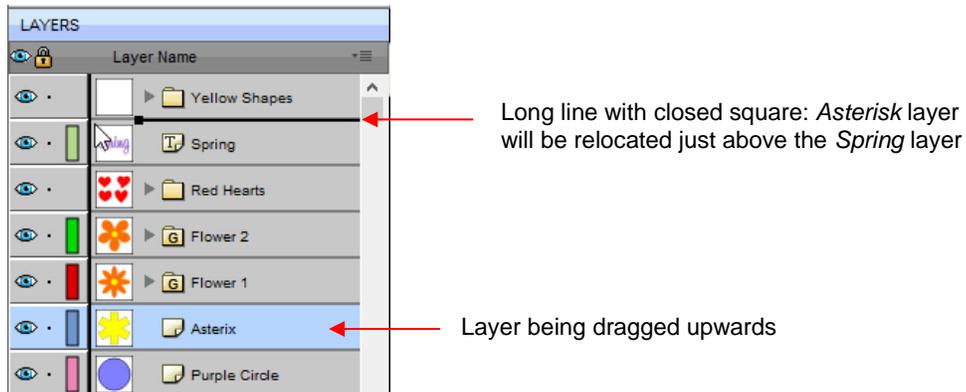
- ◇ If you drag a layer without moving to the left, you will see a short line with an open square. This means it will be added to the folder directly above it:



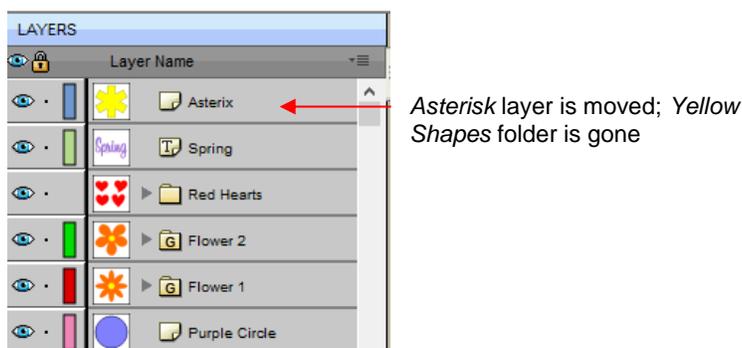
- ◇ Now the *Asterisk* layer is inside of the *Yellow Shapes* folder and can be seen in the thumbnail for that folder:



- ◇ If you drag a layer while moving it to the left, you will see a longer line with a closed black square. This means it will be added directly above that line:

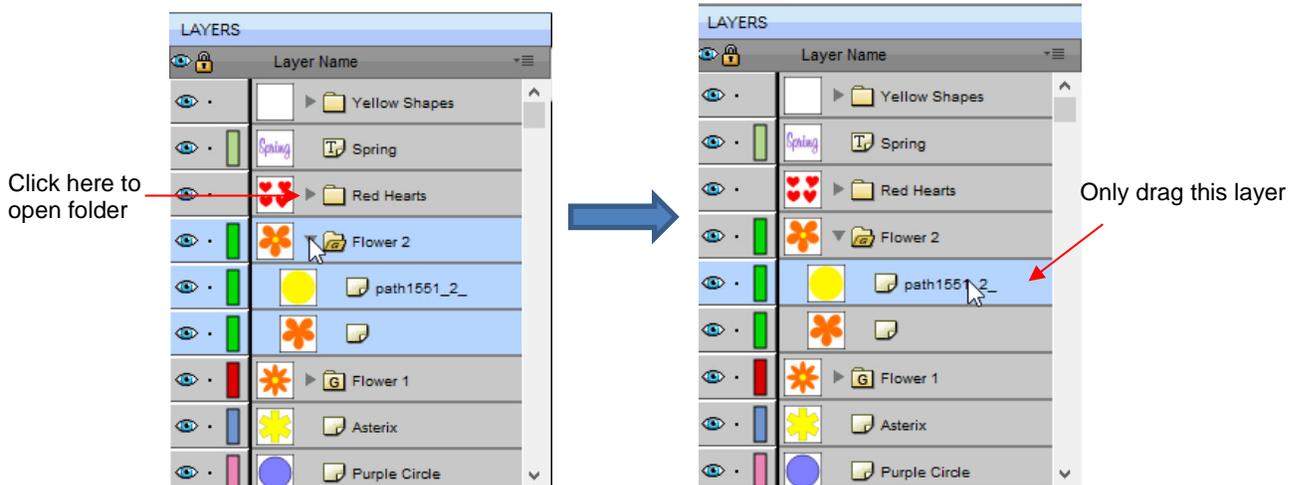


- ◇ **IMPORTANT:** Once you've created a new empty folder, like the *Yellow Shapes* folder, you cannot move that layer or other layers without the empty folder being deleted. So, in the case above, if the *Asterisk* layer had been simply relocated, the *Yellow Shapes* folder would then be gone:

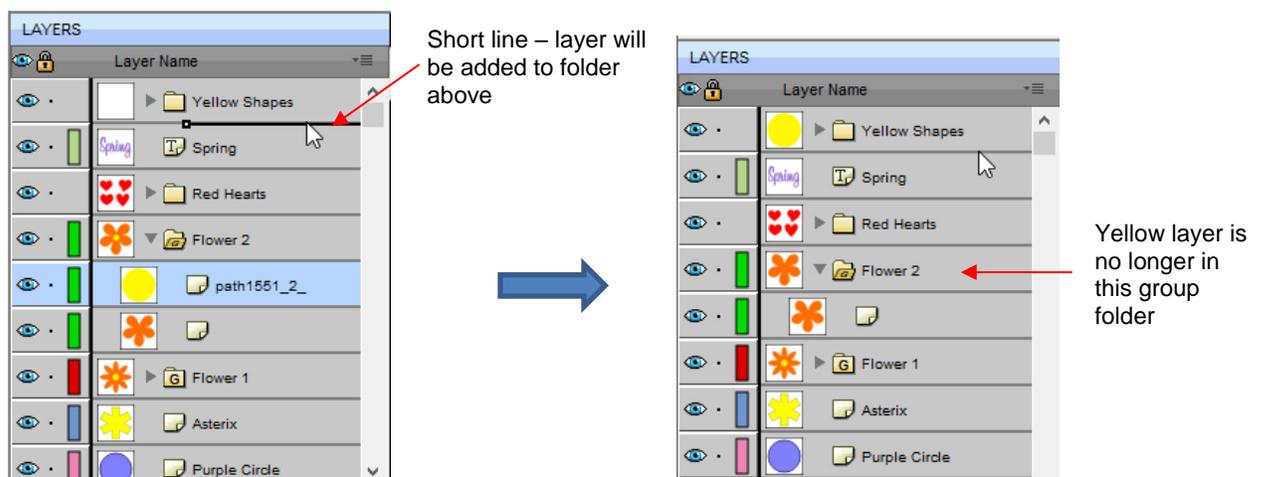


- Layers can also be moved out of an existing folder into other folders. In this example, the yellow centers of the flowers in the layers named *Flower 1* and *Flower 2*, can be similarly dragged and dropped into the *Yellow Shapes* folder:

◇ Open the *Flower 2* group folder and then make sure only the yellow layer is selected:



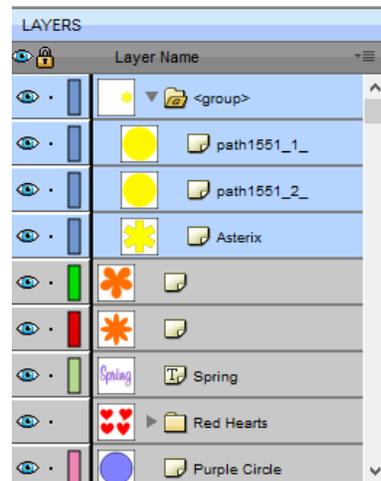
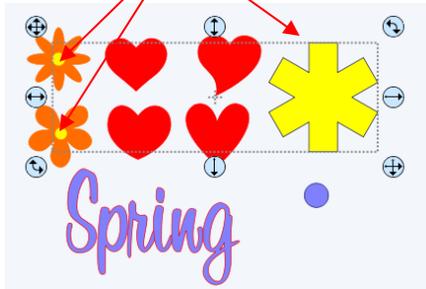
◇ Then drag the yellow layer up to the *Yellow Shapes*, again making sure only a short line is present. The yellow layer is then moved out of the *Flower 2* group:



◇ Repeat for the yellow shape inside the *Flower1* folder.

- Note: This was just one way to achieve this goal. Another way would have been to ungroup the *Flower 1* and *Flower 2* layers. Then to select all of the yellow shapes on the **Cutting Mat** and go to **Object>Group**. A new group folder would be added to the **Layers Panel** with those shapes moved to it. Specific instructions on **Grouping** and **Ungrouping** are covered in *Section 5.10*.

All yellow shapes are selected and **Group** is applied.



New group folder contains these yellow shapes

## 4.05 The eshape Store

### 4.05.1 Importing from the eshape Store

- The **eshape Store** is an online shopping site linked within SCAL. Cutting files and fonts can be purchased through the store and downloaded into SCAL.
- To get started, access the **eshape Store** in any of the following ways:

◇ Click on the **eshape Store** icon on the **Toolbar**



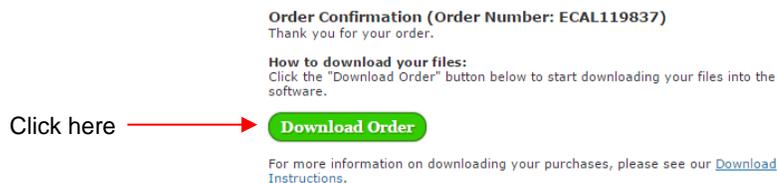
◇ Go to **File>eshape Store**

- The **eshape Store** window will open and you can either sign up for a free account or log in, if you have already registered:

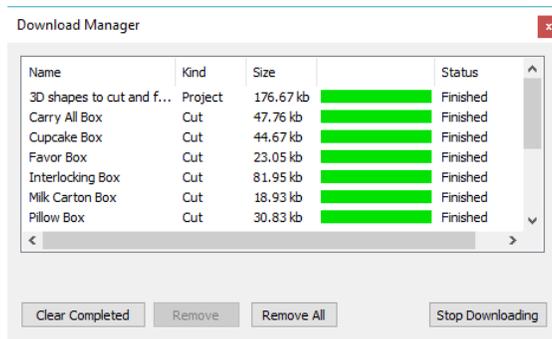


Sign in or Register

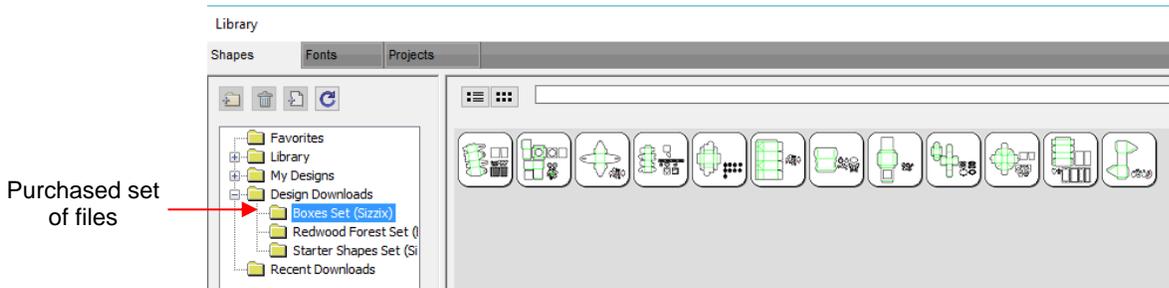
- Next, browse the site to find files of interest. After payment, the following screen shows your order number and a green **Download Order** button can be clicked to download the files you purchased:



- The following **Download Manager** window will open and the files you purchased will begin downloading:



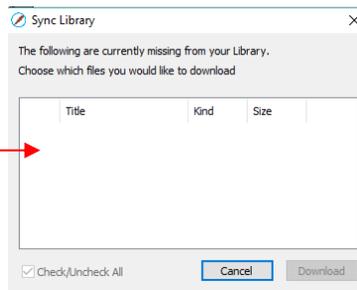
- Now open the **Library** to access the **eshape Store** files. Depending on the file type, the downloaded files will either appear on the **Shapes** tab, under **Design Downloads** or on the **Projects** tab, under **Project Downloads**:



- If you fail to download at the time of the purchase, your downloads can also be accessed in the following ways:

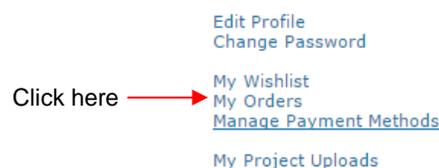
- Go to **File>Sync My Library**  and the following window will open:

If any files still need to be downloaded, they will be listed in this window for selection.

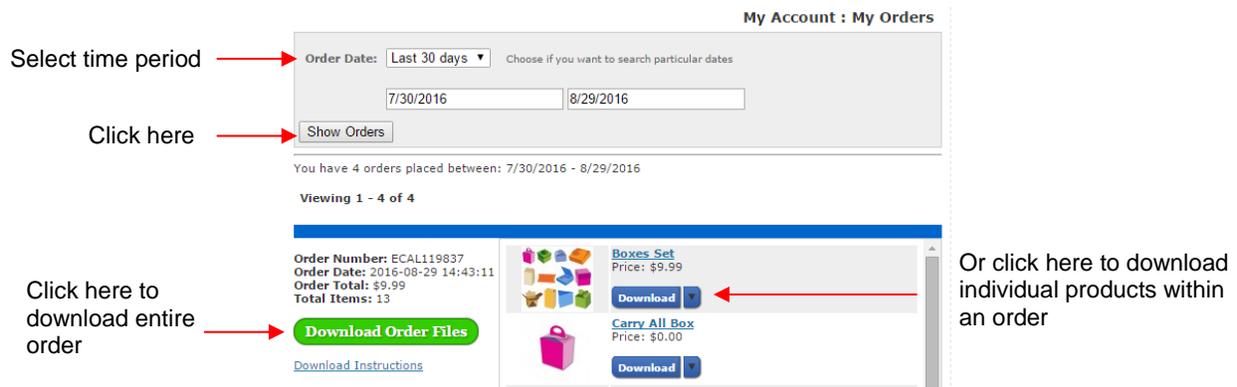


After selecting files, click on the **Download** button.

- Click on the top right icon  in the **Library** window and select **Sync Library**. The same window will open and you can select any files not already downloaded.
- At the **eshape Store**:
- Log in and click on **My Account** at the top.
- Then click on **My Orders**:

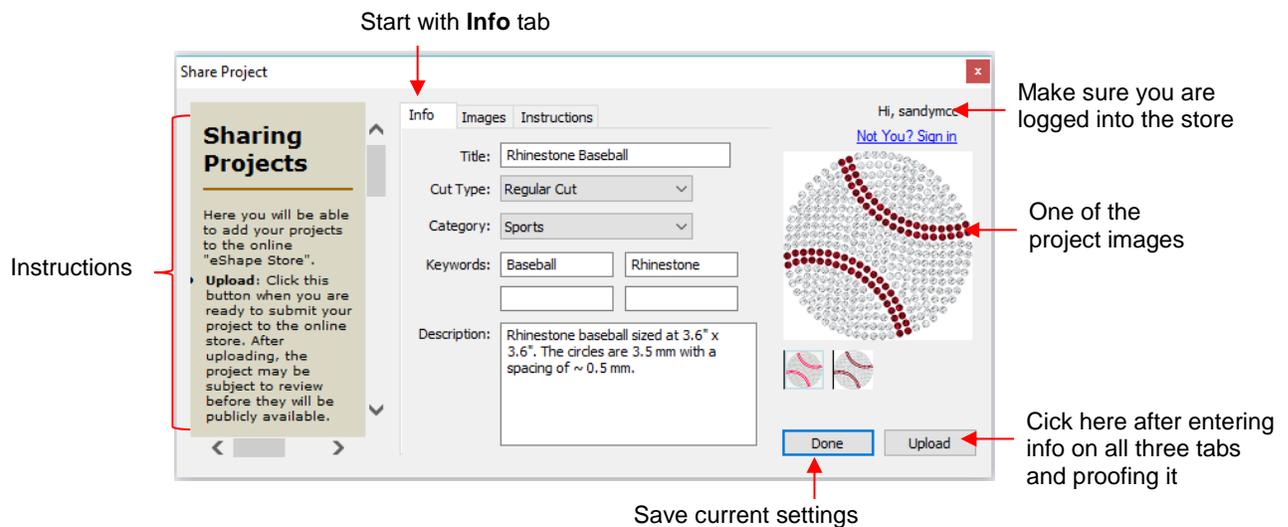


- Select a time period for the order and click on **Show Orders**. Then click on the **Download** icon:



#### 4.05.2 Exporting to the eShape Store

- To freely share your own SCAL creations, go to **File>Share Project**. The following window will open:



- There are instructions on the left-hand side. **Important:** Make sure all of the following settings have been completed before clicking on **Upload**:
  - ◇ **Title:** Provide a descriptive name for your project.
  - ◇ **Cut Type:** Select from the following:
    - ◇ **Regular Cut:** typical cutting projects
    - ◇ **Print2Cut:** print and cut projects
    - ◇ **Doodle:** projects drawn with a pen rather than cut with a blade
  - ◇ **Category:** Select from a long menu of choices. Review carefully to make sure the best choice is selected.
  - ◇ **Keywords:** Enter keywords based on what other SCAL owners might use to locate a file like yours.
  - ◇ **Description:** Enter information about the file that will help an owner know if it's what they might want or need.
- After completing the settings on the **Info** tab, click on the **Images** tab:

Click on **Images** tab

List of image files

**<Required>** is the default image of the project

Option to change to **Show Video**

Click on **Add** to upload another image

An additional image

Click here after entering all of the info and proofing it

- ◇ Additional images can be uploaded, such as the rhinestone simulation version shown. Other examples where more images are appropriate might include final versions of finished greeting cards, fold-up boxes, and detailed paper-piecing projects.
- ◇ **On Click:** the default indicates **Show Image**. For videos, change this to **Show Video** from the menu.
- ◇ If you have a YouTube video associated with your project, choose **YouTube** video and the window changes to include the start of an embedded YouTube video link:

Select **Show Video**

Select **YouTube Video**

Edit this link for your You Tube video

Indicates a video will be linked

- ◇ Alternatively, you can link to an MP4 video located elsewhere:

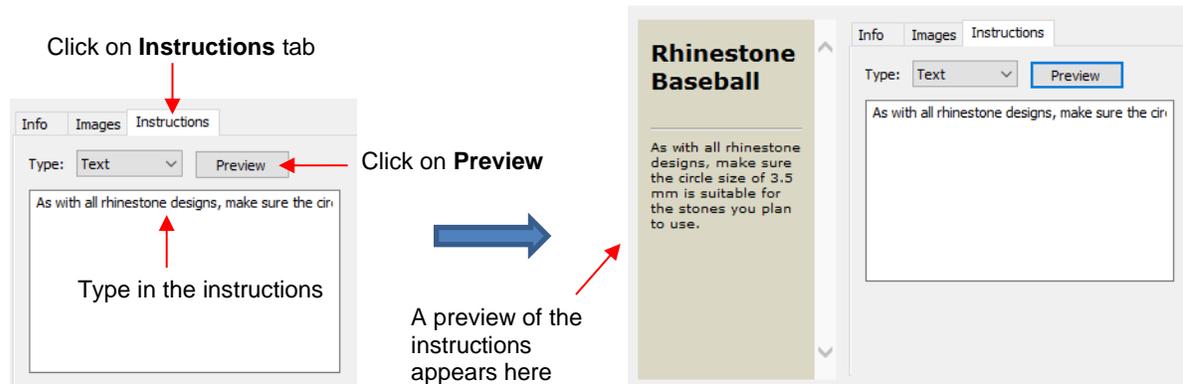
Select **Show Video**

Select **Direct Video Link**

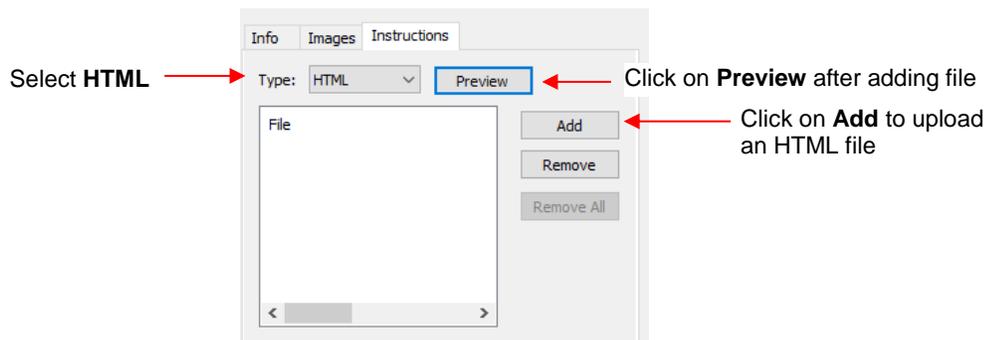
Enter the URL

Enter video dimensions

- Finally, click on the **Instructions** tab and enter any instructions for the project. You have two options:
  - ◇ Type the instructions directly:



- ◇ Import an HTML formatted file by clicking on **Add** and then selecting the file:



- Once the desired choices and information are added for your file, check it all one last time. Then go back to the **Info** tab and click on **Upload**. Note that clicking on **Done** will save this information with your file for uploading at a later time.
- After clicking on **Upload**, a progress window will open indicating your file is being sent to the **eshape Store**. A final **Upload Finished** window will open and notify you that the uploaded file will be reviewed for approval before being available.

## 4.06 Importing Other File Formats

### 4.06.1 Importing Vector Files

- The following vector formats can be imported into SCAL:
  - ◇ SVG: common export format for vector programs, thus popular format used for sharing files on blogs and selling files in online design sites
  - ◇ SCUT4: format used to save projects in SCAL4
  - ◇ SCAL: format used by **eshape Store**
  - ◇ PDF: While a PDF can be created from a raster image, a vector image, or both, only the vector parts of a PDF will import into SCAL.
  - ◇ AI (Adobe Illustrator): common format due to the popularity of Adobe Illustrator
  - ◇ EPS: another common export format for many vector programs
  - ◇ FCM: format used by the Brother ScanNCut machines
  - ◇ GSD: format created by RoboMaster, RoboMaster Pro and Wishblade Advance. This format was used with the Craft Robos, Wishblade, and original Silhouette cutter.
  - ◇ PLT (SCAL PRO version only): developed by HP for their plotters, the PLT file evolved into a standard format used by early vinyl cutters

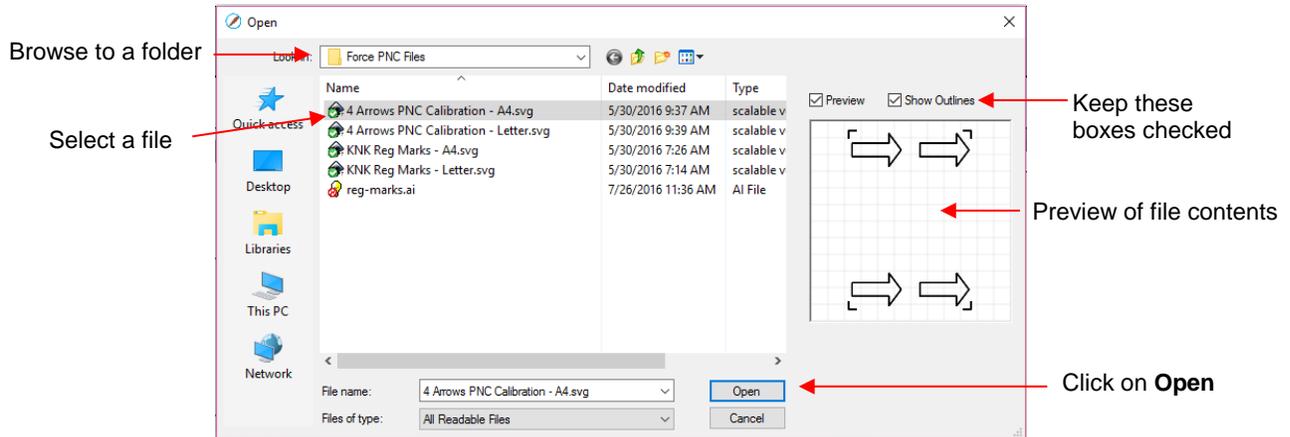
- ◇ DXF (SCAL PRO version only): common format exported by CAD programs
- ◇ WPC: format used in programs developed by Sign Max, which include WinPC Sign, Funtime, Pazzles Inspiration, and Gazelle.

• There are two ways to open the import window:

- ◇ Click on the **Import** icon on the upper **Toolbar**
- ◇ Go to **File>Import**



• Either choice will open the following window where you can browse to locate the file you need. Note there are options to see a **Preview** and **Show Outlines**:



- You can also drag and drop any of the file formats directly onto the SCAL screen to import that file.
- If the file is in SVG format, it can also be imported via the **Library**. Refer to *Section 4.03.1*. Also, SVG files vary in size depending on the program which exported them. Thus, always check the imported size before cutting your project. If you are regularly importing SVG files from one of the following programs: Adobe Illustrator, Inkscape, Corel Draw, or you know the DPI used by the exporting program, you can set it under **Edit>Preferences** (on a Mac, press **Command + ,**) so that you will not need rescale the file:



- PDF files can contain multiple pages. If this is the case with a PDF file you wish to import, note the following:
  - ◇ Use Adobe Reader or some other PDF browser to locate which page you wish to import
  - ◇ After selecting the PDF file to import, a second window will open where you can select which page you want to import. Note that if there are many pages, there will be a delay in opening the **Preview** window and you may wish to uncheck that box.
  - ◇ Only vector shapes in a PDF will be imported. Raster shapes will be ignored.

#### **4.06.2 Importing Raster Files**

- There are several ways to import a raster file (JPG, BMP, GIF, PNG) depending on the intended purpose for that file:
  - ◇ **File>Import**: will import PNG files with a transparent background, simultaneously adding a vector cut line along the transparent border. This is very useful for PNC applications. This is the only raster format that will work using this method.

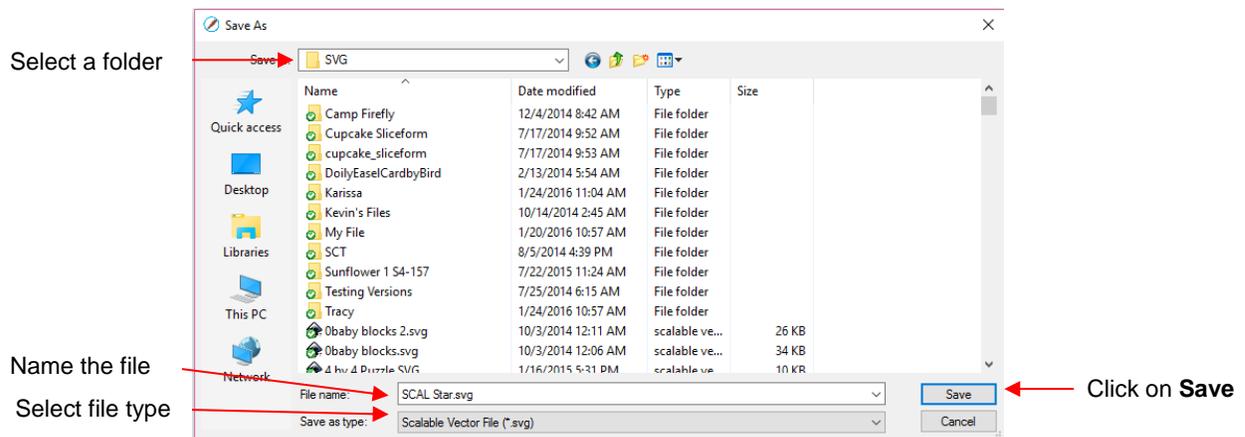
- ◇ **File>Place Image:** will import JPG, BMP, GIF, and PNG files for the purpose of printing or manually tracing in the event the auto-tracing function doesn't adequately perform due to the image quality. It's also another way to load an image for the **Trace Image** window. Refer to *Section 7.03*.
- ◇ **Trace:** will import and auto-trace JPG, BMP, GIF and PNG files. Various options and settings can be applied to obtain the desired results. Refer to *Section 7.03*.

### 4.06.3 Importing Fonts

- SCAL will display and utilize all fonts currently installed on your computer. You can also open non-installed fonts for temporary use. The formats supported include TTF, OTF, and OPF (open path / single line fonts). For more details, refer to *Section 6.02*.

### 4.07 Exporting in Other File Formats

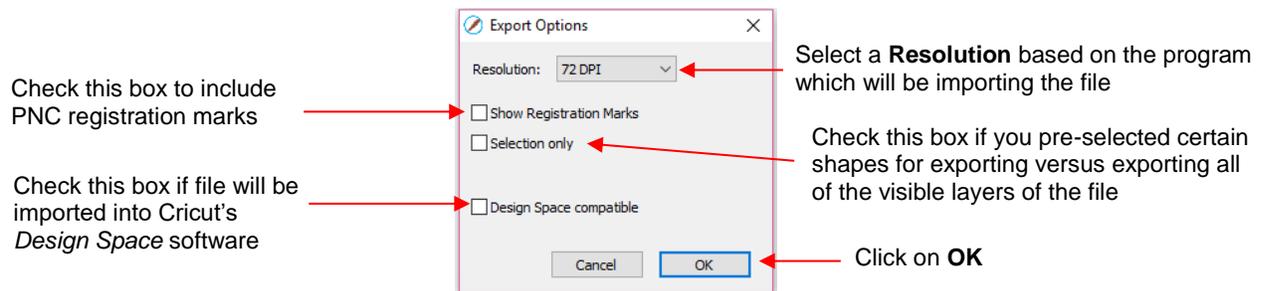
- Besides saving as a .SCUT4 file, you can also export in the following formats: SVG, JPG, BMP, PNG, TIFF, FCM, and PLT. Only SVG, FCM and PLT are vector formats. The others are raster.
- If there are only certain shapes in the file that you want to export, you have two options:
  - ◇ Select those particular shapes before exporting and then mark a box called **Selection only** in the export window.
  - ◇ Place those shapes on one or more separate layers and hide them on the **Layers Panel**. Refer to *Sections 4.04.2 and 5.09*.
- To export a file, use either of the following options:
  - ◇ Go to **File>Export**
  - ◇ Press **Ctrl+Shift+E**
- The following window will open where you can name the file, select the file format, and the location for saving:



- Depending on the type of file selected, an export window will open. The following subsections will cover these types in more detail.

#### 4.07.1 Exporting in SVG Format

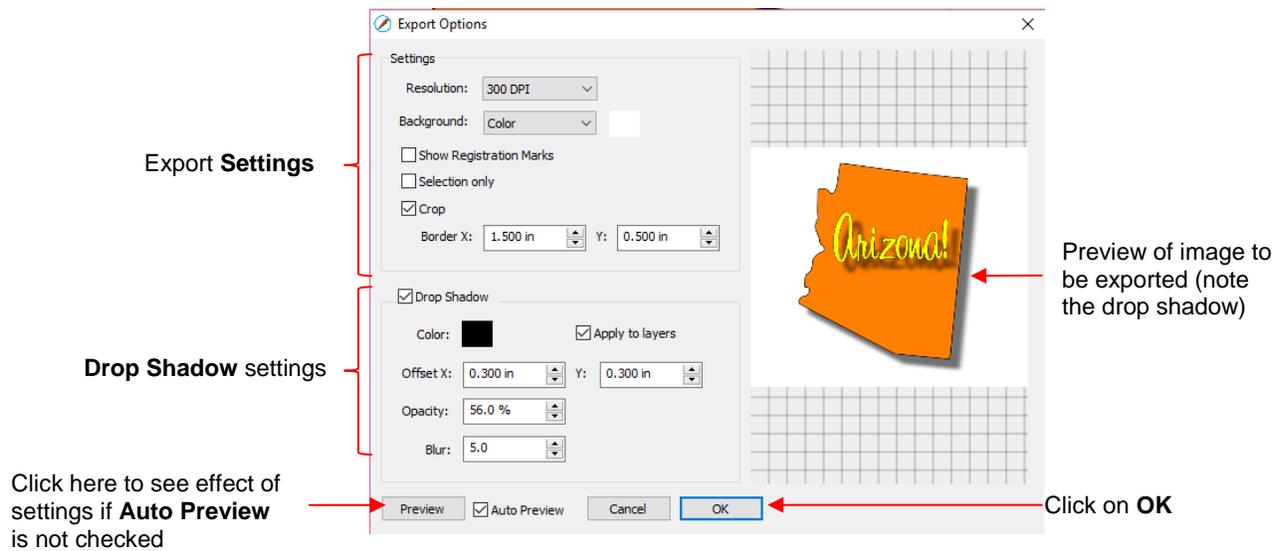
- The **SVG Export Options** are shown in the following screenshot:



- The **Resolution** setting affects the dimensions of the shapes upon importing into another program:
  - ◊ For example, Adobe Illustrator uses 72, Inkscape uses 90, and Corel Draw uses 96. Unless you know the intended program's **DPI**, leave it at 72.
  - ◊ If the project is designed with specific dimensions affecting the final result, such as an envelope for a card, include a separate *Read Me* text file noting the dimensions of the project in SCAL so that the imported SVG can be resized accordingly.
- The **Selection Only** setting was mentioned earlier as the option to mark when specific shapes have been selected for export versus exporting all of the shapes in the file.

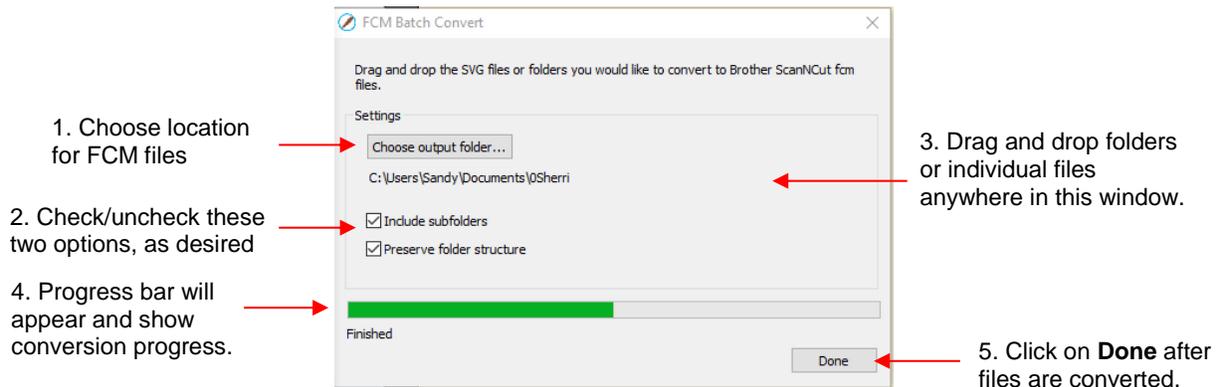
#### **4.07.2 Exporting in JPG, PNG, BMP and TIFF Formats**

- There are various reasons why you might want to export your file as a raster. For example:
  - ◊ The image is going to be posted on a web site or blog
  - ◊ The image will be shared with a friend or a customer
  - ◊ You wish to use the image in a digital scrapbooking program
  - ◊ You want to print a PNC project from a printer without SCAL installed
- If you choose any of the raster export formats, the same window will open offering options for:
  - ◊ **Resolution:** if the image will be printed, you usually choose 200 or 300
  - ◊ **Background:** choose a color or, with PNG export, you can also choose transparent
  - ◊ **Show Registration Marks:** option to print with the registration marks that will be used for a PNC application
    - ◊ **Selection only:** when specific shapes have been selected for export versus exporting all of the shapes in the file
  - ◊ **Crop:** increase or decrease the background border around the exported image
  - ◊ **Drop Shadow:** add a shadow effect to the image
- The following screenshot shows an example of an export in a raster format:



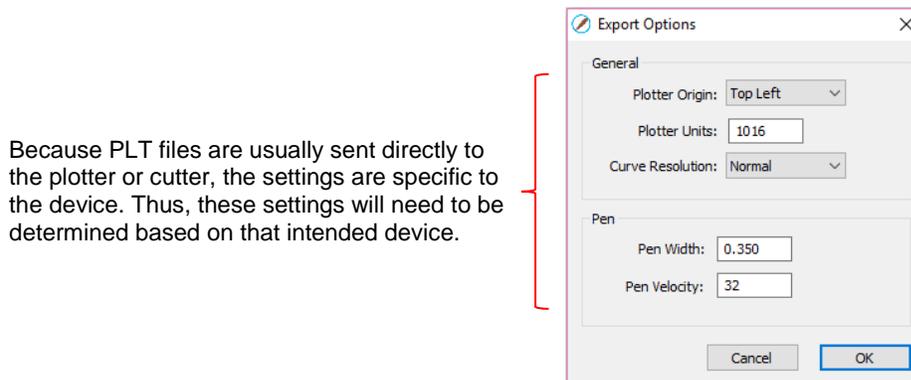
### 4.07.3 Exporting in FCM Format

- The FCM format is used by the Brother ScanNCut models. There is no secondary window with export settings. After clicking on **Save**, the .FCM file will be located in the folder you chose in the **Save As** window.
- There is also a batch SVG-to-FCM converter available in SCAL. Go to **File>FCM Batch Convert** and the following window will open. Note that you have the option to convert entire folders of SVG files at one time:



### 4.07.4 Exporting in PLT Format

- PLT files were originally developed for HP plotters. They are also used by some of the cutters outside of the hobby world. The **Export Options** for PLT are as follows:



#### **4.07.5 Exporting to SCAL2**

- If you still use SCAL2, you can send a file from SCAL4 to SCAL2 by going to **File>Send to> Sure Cuts A Lot 2**. You will need both versions of SCAL open at the time.

## 5. SCAL: Manipulating and Coloring Shapes

This chapter covers all of the ways to modify shapes. Note that while the singular term “shape” will be repeatedly used when describing various functions, it also refers to a selection of shapes. For example, resizing a selection of three shapes uses the same menu functions or mouse movement as a single shape.

### 5.01 Selecting

- To select a shape, make sure the **Selection Tool** is indented on the **Tools Panel** . Then:

- ◇ Click anywhere on the shape (along an edge or inside a closed shape):



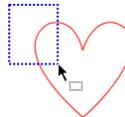
- ◇ Note that the cursor will change once the shape can be selected. For example, when selecting a line, wait for the cursor to change before clicking:



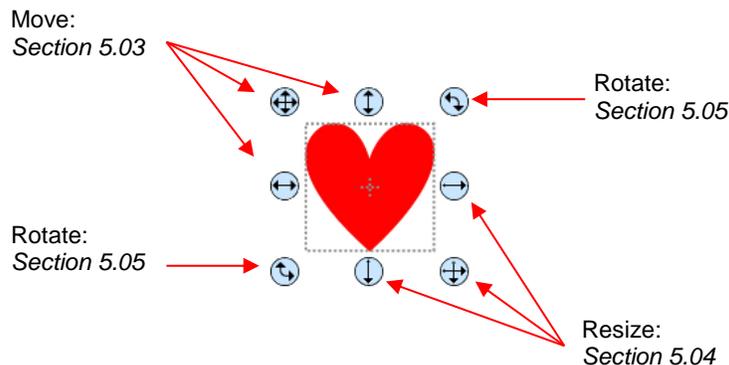
- ◇ Another way to select: drag the mouse to enclose the entire shape (aka marquee-select).



- ◇ And a third way: hold the **Shift** key and marquee-select just a portion of the shape.



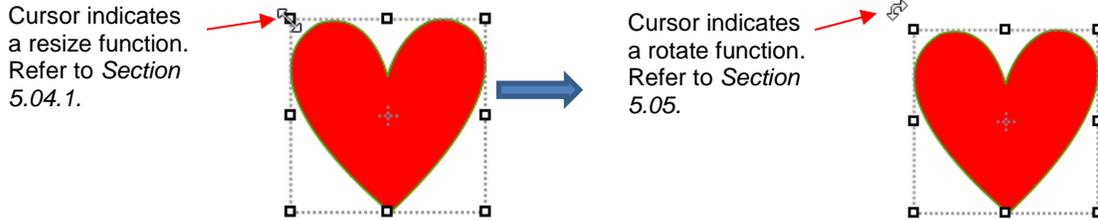
- Once selected, a shape will have 8 handles surrounding it. The functions of these handles are covered in other sections as indicated:



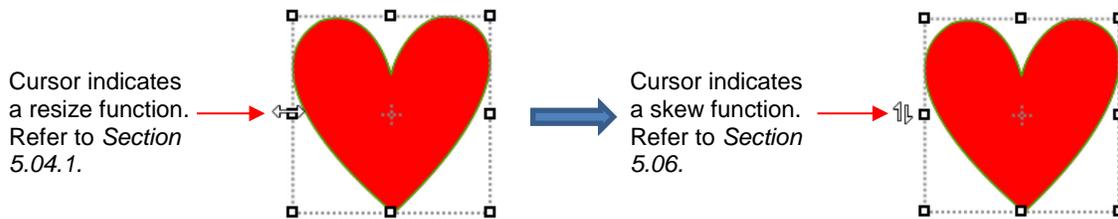
- While in the **Selection Tool** mode, the **Tool Options** bar indicates a setting called **Handles**. The drop-down menu offers another option called **Advanced**:



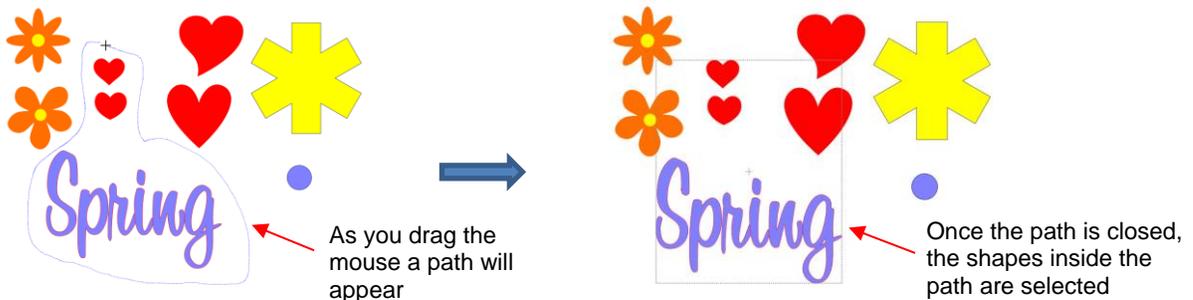
- In **Advanced** mode, a selected shape will appear with six identical handles. However, each handle now has two functions, depending on whether the mouse hovers directly over the handle or is moved slightly away from the handle:



- All four corner handles offer the same resizing and rotating functions. The middle handles along the four sides offer resizing and skewing:



- There are several ways to select more than one shape:
  - ◇ Select the first shape and hold down the **Shift** key while clicking on additional shapes.
  - ◇ Drag the mouse (marquee-select) to encompass the shapes. Always make sure you start clearly outside the boundaries of the images you want to select.
  - ◇ If all of the shapes are on the same layer, click on the thumbnail for that layer. Refer to *Section 4.04.2*.
  - ◇ Use the **Lasso Selection** tool on the **Tools Panel** . Freely drag the mouse around the shapes you want to include in the selection:



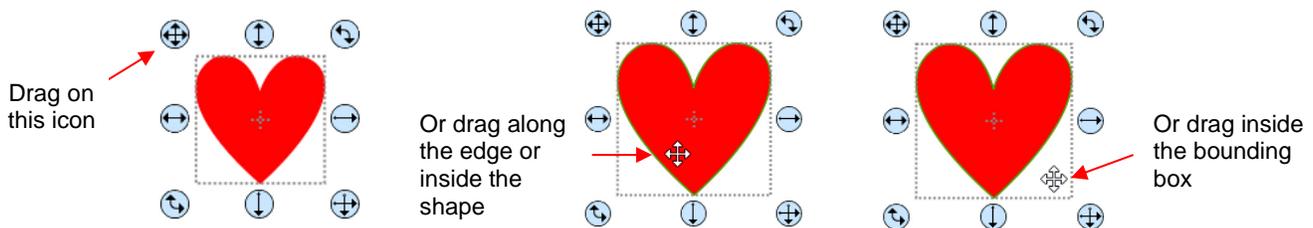
- If you wish to select all of the shapes on the screen, there are several options:
  - ◇ Press **Ctrl+A**
  - ◇ Right-click on the screen and choose **Select All** from the menu
  - ◇ Go to **Edit>Select All**
- To unselect all shapes, use one of the following ways:
  - “Click away” – click anywhere else on the screen and the shapes will be de-selected
  - Press **Ctrl+Shift+A**
    - ◇ Go to **Edit>Deselect All**

## 5.02 Deleting

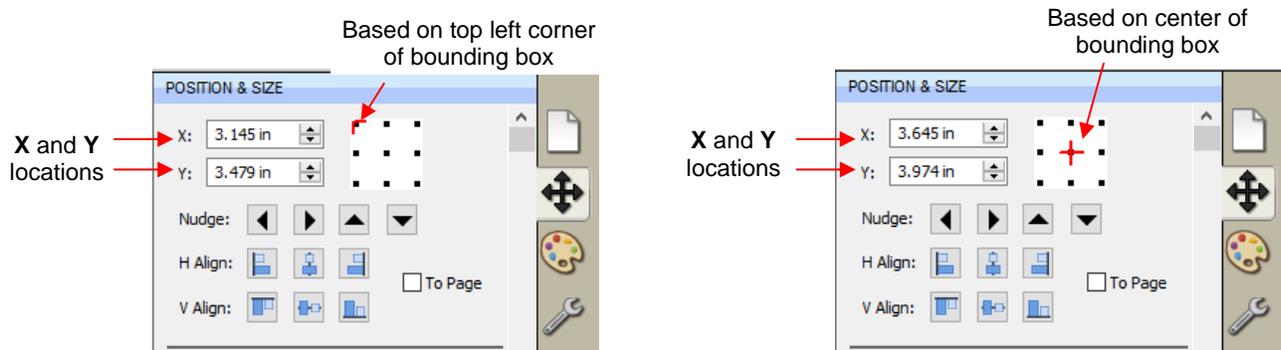
- To delete a selected shape, use any of the following options:
  - ◇ Press the **Delete** key on the keyboard
  - ◇ Right-click on the screen and choose **Delete** from the menu
  - ◇ If the shape is on its own layer, click on the **Delete Layer** icon: 
- To delete all of the shapes in the current project:
  - ◇ Use one of the methods from *Section 5.01* to select all shapes
  - ◇ Then delete using any of the prior options listed for deleting a selected shape
- You can also delete a layer of shapes at one time from the **Layers Panel**. Refer to *Section 4.04.2*.

## 5.03 Moving

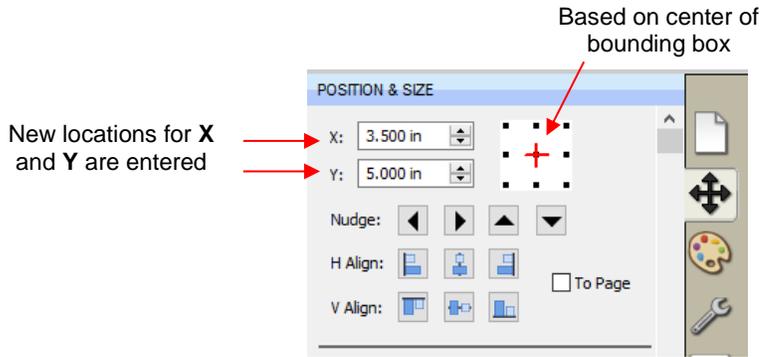
- To move a selected shape, hold down the left mouse button on the upper left corner icon or anywhere within the shape and drag to another location. Note that if you see this cursor , the shape can be moved:



- You can also move a selected shape in small increments by pressing the arrow keys on the keyboard.
- With a shape selected, the **Position & Size Settings on the Properties Panel** indicate the exact location of the bounding box around a selected shape. Note that this location is how far the shape is from the top left corner of the grid on the mat and the red mark indicates which part of the bounding box is being referenced. For example:



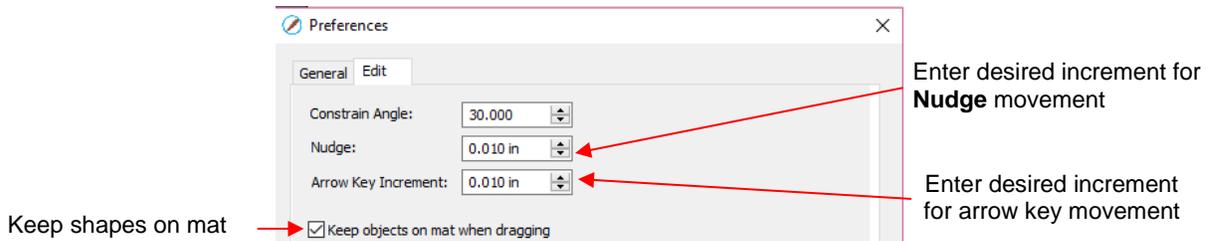
- You can enter new values into either or both of the **X:** and **Y:** windows to move the shape to a new location:



- The **Nudge** icons, which are just below the **X** and **Y** entries, can also be used to move a selected shape. These move in the same increments as the keyboard arrows:



- The increment size for both the keyboard moves and the **Nudge** moves can be changed by going to **Edit>Preferences** and then selecting the **Edit** tab. This window also offers the option to force shapes to remain within the boundaries of the **Cutting Mat** while being moved with the mouse:

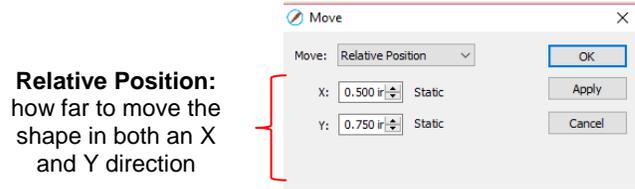


- There is also a **Move** function available which can be accessed these two ways:

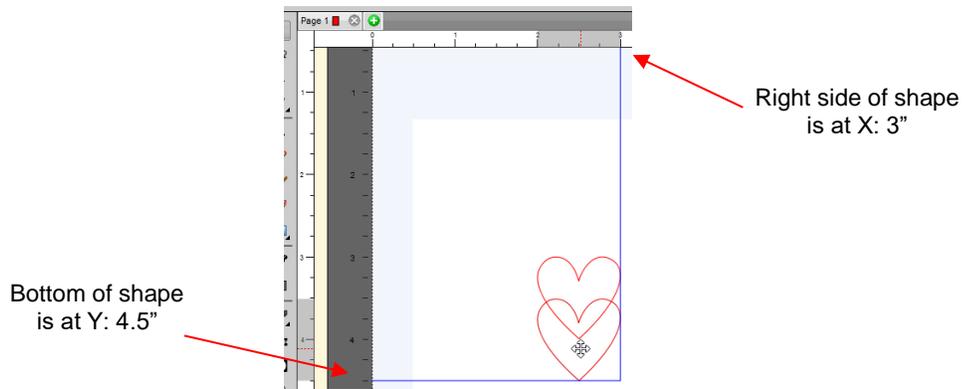
- ◇ Right-click on a selected shape and go to **Transform>Move**
- ◇ Go to **Object>Transform>Move**

- This **Move** windows provides two moving options:

- ◇ Move the shape to a specific position on the **Cutting Mat** (called **Absolute Position**)
- ◇ Move the shape a certain distance from its current location (called **Relative Position**)



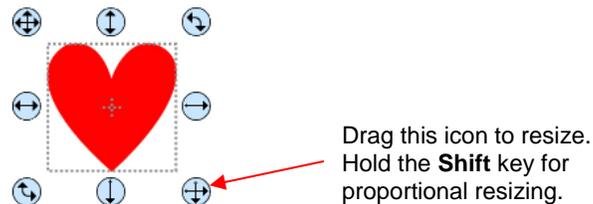
- You can also use the **Rulers** to estimate a new location for moving shapes. Blue lines will appear when the shape is aligned with a major marking, such as shown below:



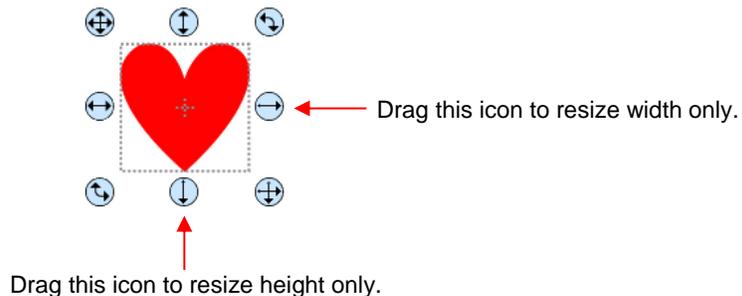
## 5.04 Resizing, Scaling, Autofit

### 5.04.1 Resizing

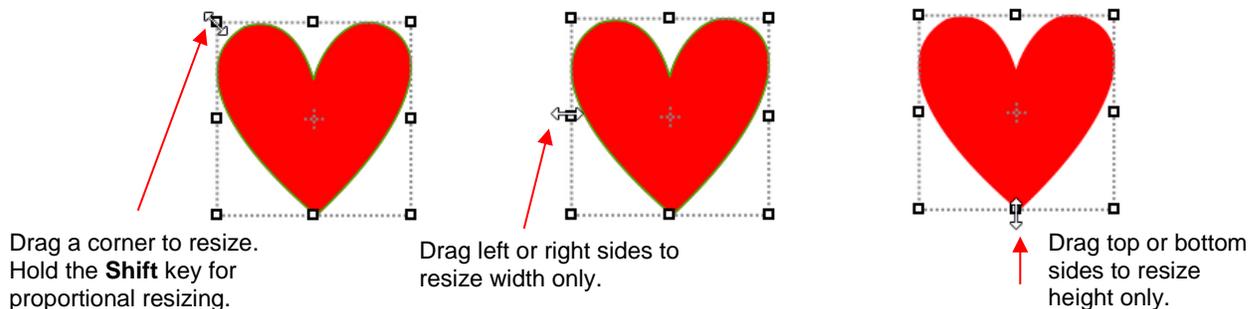
- With the shape selected, use your mouse to drag the lower right corner of the shape to freely resize. If you want to keep the width and height proportional, hold the **Shift** key down before dragging that icon:



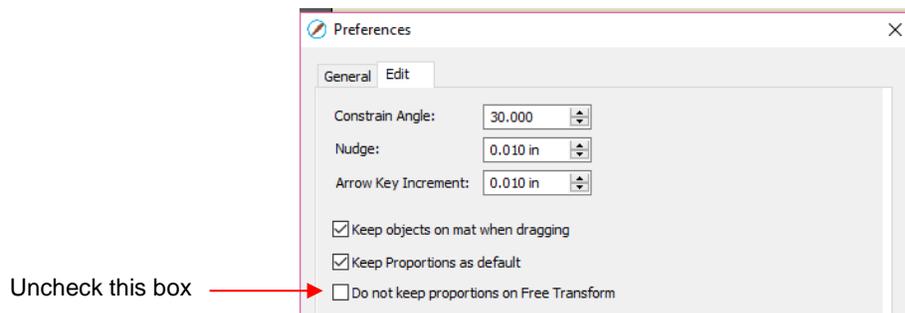
- To resize only the width or the height, drag the middle right or the middle bottom icons, respectively:



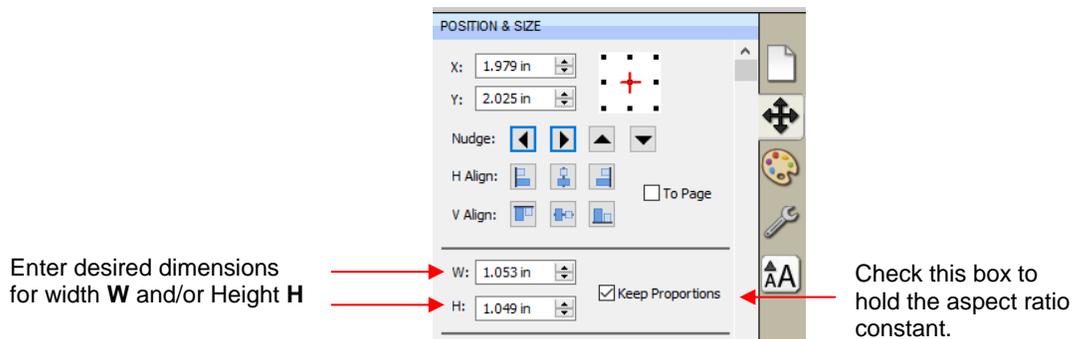
- If the **Handles** are in **Advance** mode, then drag a corner or a side when the cursor is directly over the handle. Again, holding the **Shift** key will resize height and width proportionately:



- If you prefer that proportional sizing be the default, thus not requiring the pressing of the **Shift** key, go to **Edit>Preferences** and click on the **Edit** tab. Uncheck the box shown below:

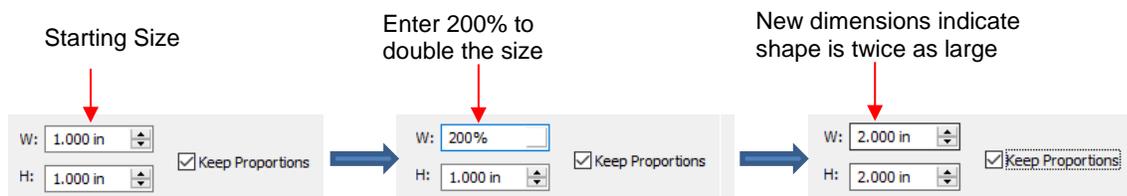


- **Important:** Unchecking this box does not then affect shapes created using the **Shapes** tool on the **Tools Panel**. You will need to hold the **Shift** key to maintain proportions when resizing by dragging the lower right corner.
- If you need to make the shape an exact size, then enter the dimension in the **W** or **H** box on the **Position & Size Panel**. Check the **Keep Proportions** option if you want to hold the aspect ratio constant:



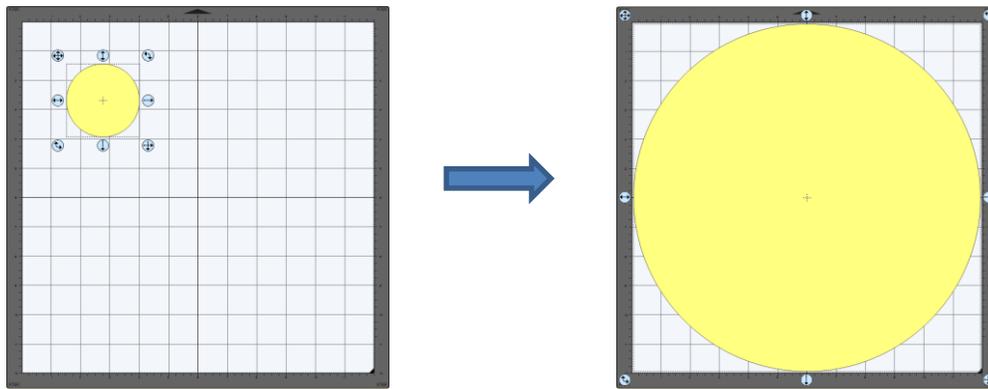
### 5.04.2 Scaling

- The **Scale** function can be accessed using either of these ways:
  - ◊ Right-click the selected shape and go to **Transform>Scale**
  - ◊ Go to **Object>Transform>Scale**
- Percentages can also be used in the dimension settings to scale. For example, if you want to double the size of a shape, you can enter 200%:

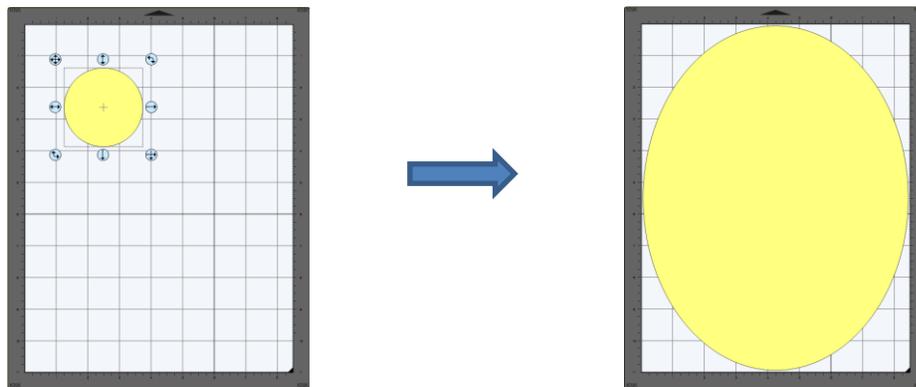


### 5.04.3 Autofit

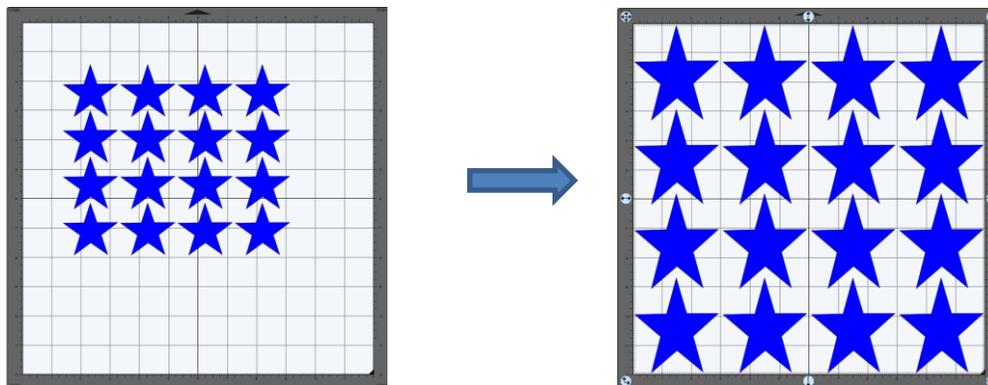
- The **Autofit** function will resize a shape or selection of shapes to fit the boundaries of the **Cutting Mat** with a slight (1/16") margin. It is accessed by going to **Object>Transform>Autofit**.
- Example: Select a circle on a 12" x 12" **Cutting Mat** and go to **Object>Transform>Autofit**:



- ◇ The new size of the circle is 11.875" x 11.875".
- ◇ If the circle is placed on a 15" x 15" mat, then it resizes to 14.85" x 14.875". However, if the circle is placed on letter size mat (8.5" x 11"), then it becomes an oval:

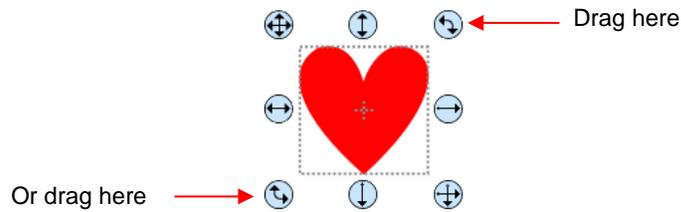


- A practical example might be something like this: You have one 12 x 12 sheet of cardstock and you want to cut out 16 stars for a party decoration and you want those stars as large as possible. Rather than having to "do the math", you can create a grid of stars (refer to *Section 5.16.4*) and then use the **Autofit** function to resize them for the cut:

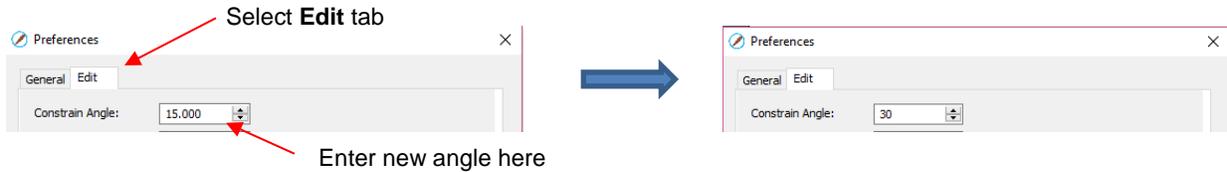


### 5.05 Rotating

- With the **Handles** set to **Basic** mode and the shape selected, dragging the top right icon will freely rotate the shape:



- ◇ Holding the **Shift** key, while rotating, will rotate the shape in 15° increments. However, if you need to rotate in increments other than 15°, go to **Edit>Preferences**, click on the **Edit** tab, and change the **Constrain Angle** to the desired increment (from 1 to 180°). Click on **OK** to save the change:

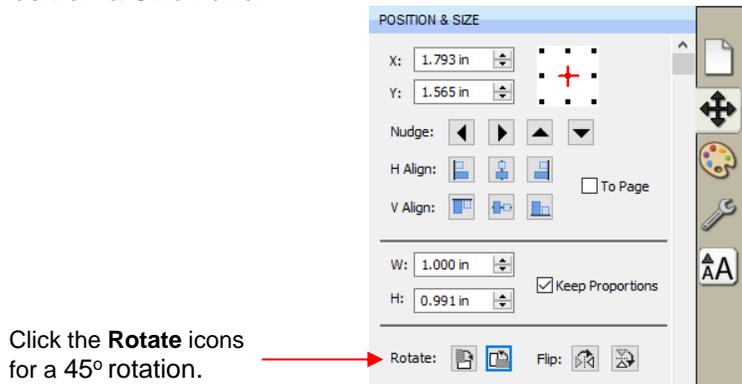


- ◇ The **Status Bar** at the bottom of the screen will indicate the current degree of rotation:



- ◇ Note: the **Status Bar** will continue to show the last degree of rotation until another shape is selected and rotated.

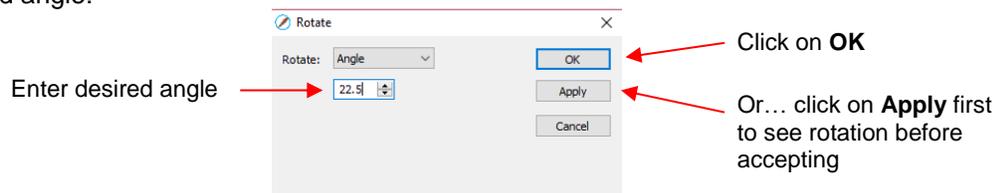
- A selected shape can be rotated exactly 45° clockwise or counter-clockwise, by clicking the **Rotate** icons on the **Position & Size Panel**:



- To rotate a specific angle, open the **Rotate** window in either of two ways:

- ◇ Right-click on a selected shape and go to **Transform>Rotate**
- ◇ Go to **Object>Transform>Rotate**

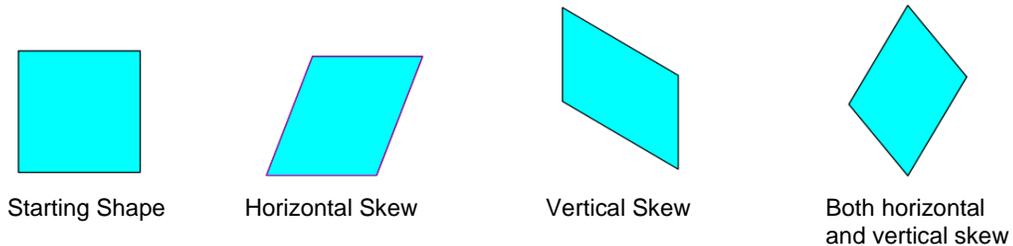
- Enter the desired angle:



## 5.06 Skewing and Distorting

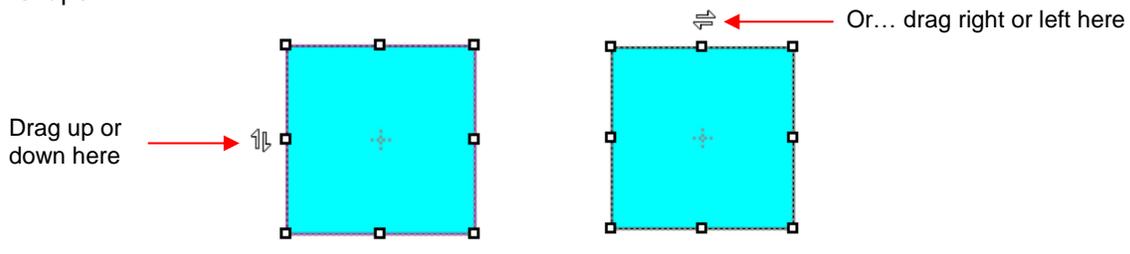
### 5.06.1 Skewing

- Shapes can be skewed either horizontally or vertically:

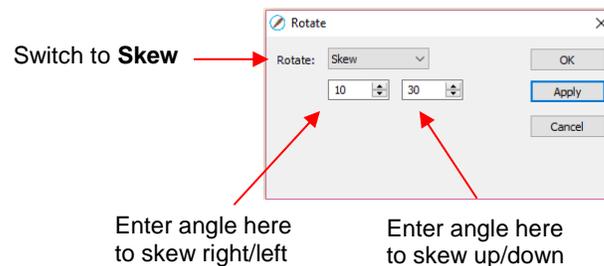


- There are two ways to skew a shape:

- ◇ With the shape selected and **Advanced** selected on the **Tool Options**, rest your mouse slightly outside of a handle in the middle of a side. The skew mode cursor will appear and it can be dragged to skew the shape:

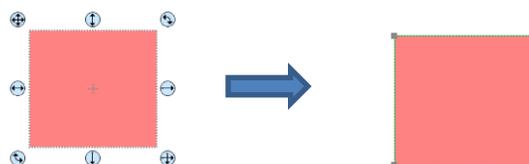


- ◇ With the shape selected, open the **Rotate** window by using one of these two methods:
- ◇ Right-click and select **Transform>Rotate**
- ◇ Go to **Object>Transform>Rotate**
- ◇ Then switch from **Angle** to **Skew** and enter a skew angle:

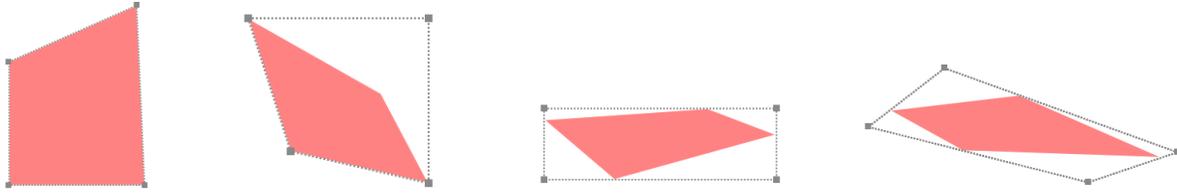


### 5.06.2 Distorting

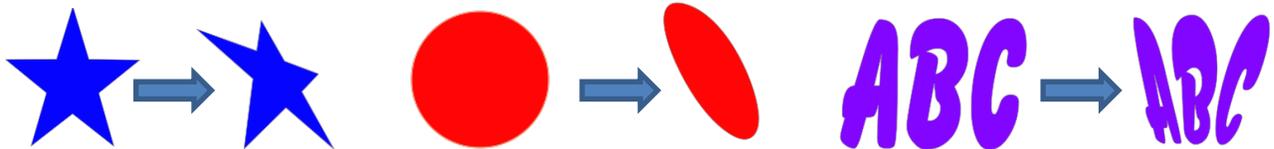
- The **Distort** tool is the 5<sup>th</sup> icon  from the bottom on the **Tools Panel**. Select a shape and then click on the icon. The four corners of the bounding box will display small boxes:



- The shape can now be distorted in countless ways by dragging any of the corners :

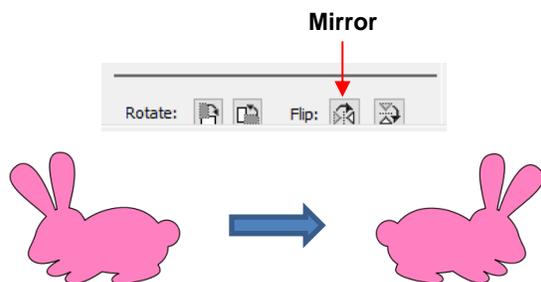


- Of course, the shape doesn't have to be rectangular. The **Distort** tool can be applied to anything:

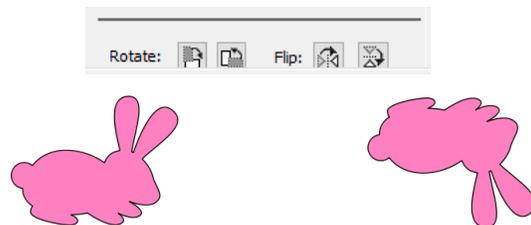


### 5.07 Mirroring and Flipping

- To horizontally mirror a shape, select it and then use one of the following:
  - ◇ Right-click on the screen and select **Transform> Flip Horizontal (Mirror)**
  - ◇ Go to **Object>Transform> Flip Horizontal (Mirror)**
  - ◇ Click on the **Mirror** icon, next to **Flip**, on the **Position & Size Panel**:



- To vertically flip a shape, select it and then use one of the following:
  - ◇ Right-click on the screen and select **Transform> Flip Vertical**
  - ◇ Go to **Object>Transform>Flip Vertical**
  - ◇ Click on the **Flip** icon on the **Position & Size Panel**:



### 5.08 Locking and Unlocking

- Locking a shape is normally done to prevent accidental selection and movement of that shape.

- To lock a selected shape, use any of the following options:
  - ◇ Right-click and select **Lock** from the menu
  - ◇ Go to **Object>Lock**
  - ◇ Press **Ctrl+Alt+L**
  - ◇ Locate the shape on the **Layers Panel** and click on the unlock icon  or double-click and check the **Lock** option.
- To lock all shapes:
  - ◇ Right-click and choose **Select All**, then right-click and choose **Lock**
  - ◇ Click on the **Layers Menu** icon  and select **Lock/Unlock>Lock All Layers**
- To unlock a single shape or a folder of shapes, locate the shape or folder on the **Layers Panel** and click on the **Lock** icon  or double-click and uncheck the **Lock** option.
- To unlock all locked shapes, use any of the following options:
  - ◇ Right-click on a selected unlocked shape and select **Unlock All** from the menu
  - ◇ Go to **Object>Unlock All**
  - ◇ Press **Ctrl+Shift+Alt+L**
  - ◇ Click on the **Layers Menu** icon  and select **Lock/Unlock>Unlock All Layers**
- To toggle the lock/unlock status of all layers on the **Layers Panel**, click on the **Layers Menu** icon  and select **Lock/Unlock>Toggle All Layers**

## **5.09 Hiding and Showing**

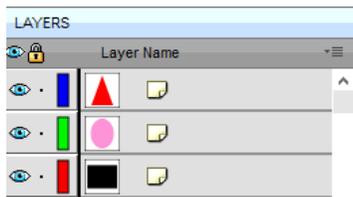
- To hide a selected shape, use either of the following options:
  - ◇ Right-click and select **Hide** from the menu
  - ◇ Go to **Object>Hide**
  - ◇ Locate the shape on the **Layers Panel** and click on the hide icon  or double-click and uncheck the **Show** option.
- To hide all shapes:
  - ◇ Right-click and choose **Select All**, then right-click and choose **Hide**
  - ◇ Click on the **Layers Menu** icon  and select **Show/Hide>Hide All Layers**
- To unhide a single shape or a folder of shapes, locate the shape or folder on the **Layers Panel** and click on the unhide icon  or double-click and check the **Show** option.
- To unhide all hidden shapes, use any of the following options:
  - ◇ Right-click on a selected unhidden shape and select **Show All** from the menu
  - ◇ Go to **Object>Show All**
  - ◇ Select any shape (including a hidden one) on the **Layers Panel**, right-click and select **Show All** from the menu.
  - ◇ Click on the **Layers Menu** icon  and select **Show/Hide>Show All Layers**

- To toggle the hide/unhide status of all layers on the **Layers Panel**, click on the **Layers Menu** icon  and select **Show/Hide>Toggle All Layers**

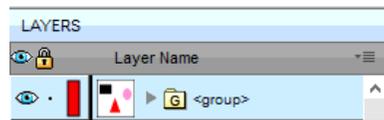
## 5.10 Grouping and Ungrouping

### 5.10.1 Group

- The **Group** function is used to combine shapes into a new folder on the **Layers Panel** so that they can be more easily moved, resized, rotated, etc.
- After selecting two or more shapes, the **Group** function can be applied in any of the following ways:
  - ◇ Right-click and select **Group** from the popup menu
  - ◇ Go to **Object>Group**
  - ◇ Press **Ctrl+G**
- The following example shows three shapes before and after grouping.



Before applying **Group**



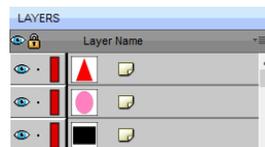
After applying **Group**

### 5.10.2 Ungroup

- The **Ungroup** function is used to separate a grouped layer of shapes into individual layers.
- After selecting a group, the **Ungroup** function can be applied in any of the following ways:
  - ◇ Right-click and select **Ungroup** from the popup menu
  - ◇ Go to **Object>Ungroup**
  - ◇ Press **Ctrl+Shift+G**
- The following screenshot shows the same grouped folder from the prior example both before and after ungrouping:

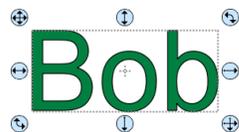


Before applying **Ungroup**



After applying **Ungroup**

- Another example shows what happens when you ungroup a word. The individual letters of the word can now be selected:



Before applying **Ungroup**:  
clicking on any letter selects  
the entire word

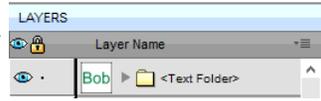
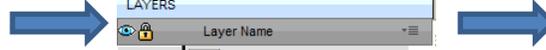


After applying **Ungroup**:  
clicking on any letter  
selects only that letter

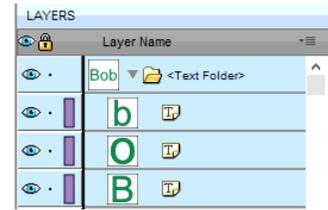
◇ On the **Layers Panel**:



Before applying **Ungroup**:  
Layer has **Text** icon  
indicating a single text shape



After applying **Ungroup**:  
Layer now indicates a folder  
with more than one shape

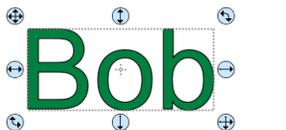


Opening folder shows the three  
letters as individual text shapes

## 5.11 Breaking and Merging

### 5.11.1 Break Apart

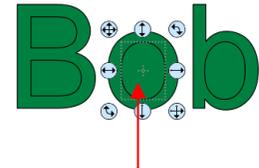
- The **Break Apart** function goes one step further than **Ungrouping**. It is used to separate a combined shape into the individual parts that make up that shape.
- After selecting a combined shape, the **Break Apart** function can be applied in any of the following ways:
  - ◇ Right-click and select **Break Apart** from the popup menu
  - ◇ Go to **Object>Break Apart**
  - ◇ Press **Ctrl+B**
- The following screenshot shows **Break Apart** being applied to the same word “Bob” to separate the internal closed paths (also called child shapes) from the external paths (also called parent shapes):



Before applying **Break Apart**:  
clicking on any letter selects  
the entire word

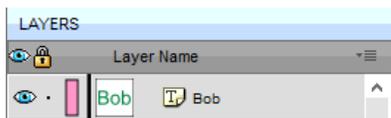


After applying **Break Apart**: child  
shapes fill with color, rather than  
being “holes” inside the letters

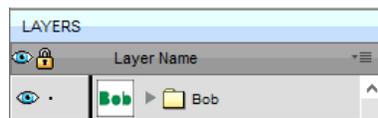


The child shapes can now  
be individually selected

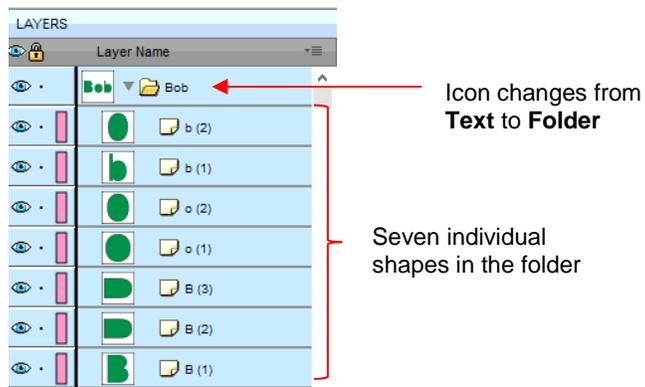
◇ On the **Layers Panel**:



Before applying **Break Apart**



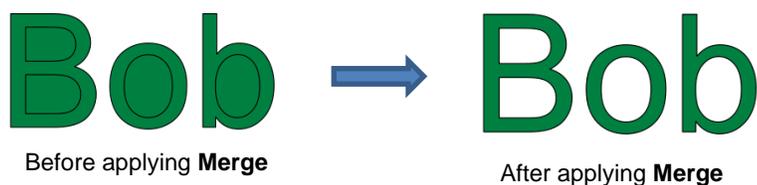
After applying **Break Apart**



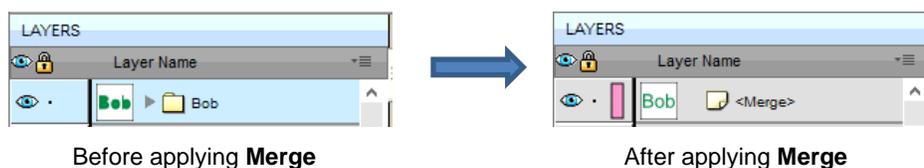
- Once you apply **Break Apart**, you have complete editing control over each individual shape within a design. But be careful! It's also easy to inadvertently move an individual shape (especially the tiny ones) and you can risk messing up the design. Thus, only use **Break Apart** when needed and then, more importantly, know how to rejoin your shapes, which is covered in the next section.

### 5.11.2 Merge

- The **Merge** function is used to combine individual paths, curves, and lines into a single shape. This is basically the opposite function to **Break Apart**.
- After selecting two or more shapes, the **Merge** function can be accessed in either of the following ways:
  - ◇ Go to **Object>Merge**
  - ◇ Press **Ctrl+Shift+B**
- If the **Merge** function is applied to the prior "Bob" example, after having **Break Apart** applied, the word will now become all one shape again. Separated child paths no longer exist and even the individual letters can no longer be selected:



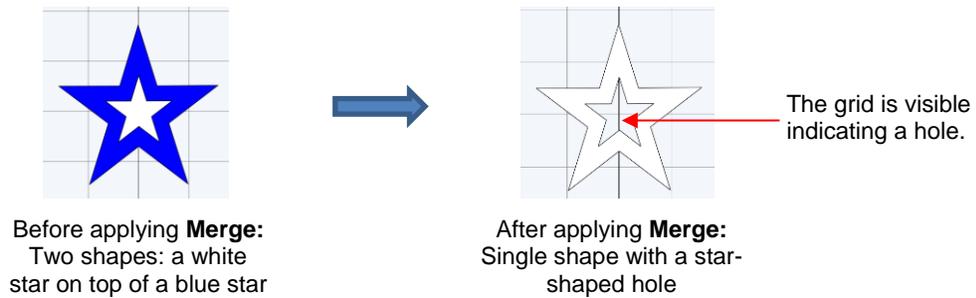
On the **Layers Panel**, this is what will appear:



- Note that if you apply **Merge** to shapes of different colors, they will all become one color because a merged shape is regarded as a single shape, even if the parts being merged do not touch:

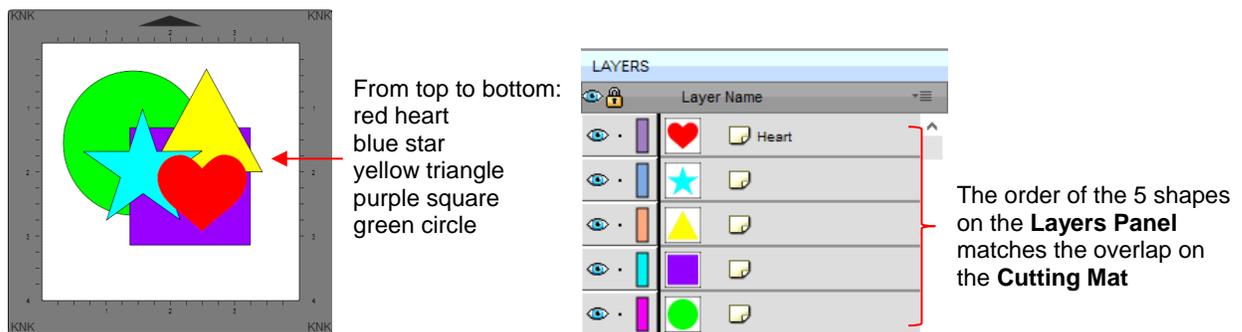


- ◇ A child shape that is merged with a parent shape essentially becomes a hole in that shape. This can be proven by having the grid showing when merging:

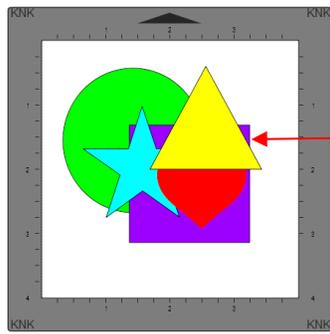


## 5.12 Arranging (Ordering) Shapes

- The shape order affects the visual appearance on the **Cutting Mat**. A shape that is above or on top of another shape will appear above it on the **Layers Panel**.
- The following example shows four overlapping shapes and how they appear on the **Layers Panel**:

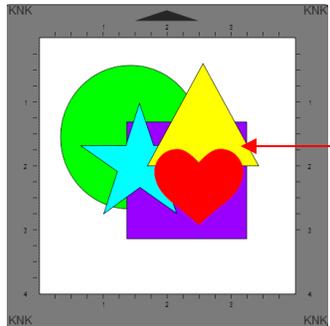
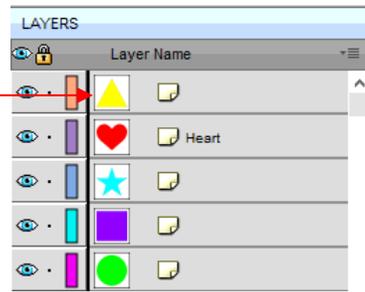


- In *Section 4.04.3*, moving layers was presented and could be used here to change the order of the shapes. However, another way to reorder these shapes is to select one and then access the **Arrange** functions using one of the following:
  - ◇ Go to **Object>Arrange**
  - ◇ Right-click and select **Arrange** from the popup menu
  - ◇ Click on the **Layers Menu** icon  and select **Arrange**
- Four options will then appear:
  - ◇ **Bring to Front** (or **Layer to Top**): Move selection to the very top
  - ◇ **Bring Forward** (or **Raise Layer**): Move selection up one level
  - ◇ **Send Backward** (or **Lower Layer**): Move selection down one level
  - ◇ **Send to Back** (or **Layer to Bottom**): Move selection to the very bottom
- In the above example, the yellow triangle is selected and each option shows what would have changed if it had been applied:



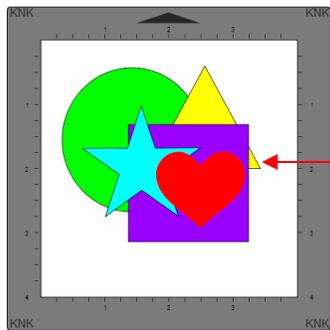
### Bring to Front

Triangle moves to the top



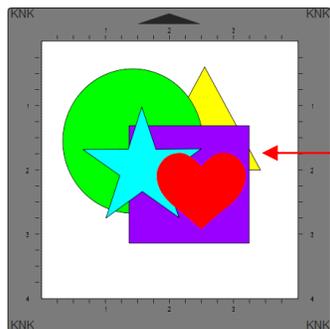
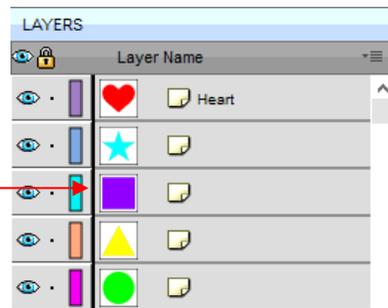
### Bring Forward

Triangle moves above blue star but is still below red heart



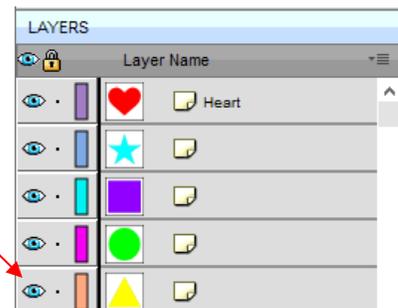
### Send Backward

Triangle moves below purple square but is still above green circle



### Send to Back

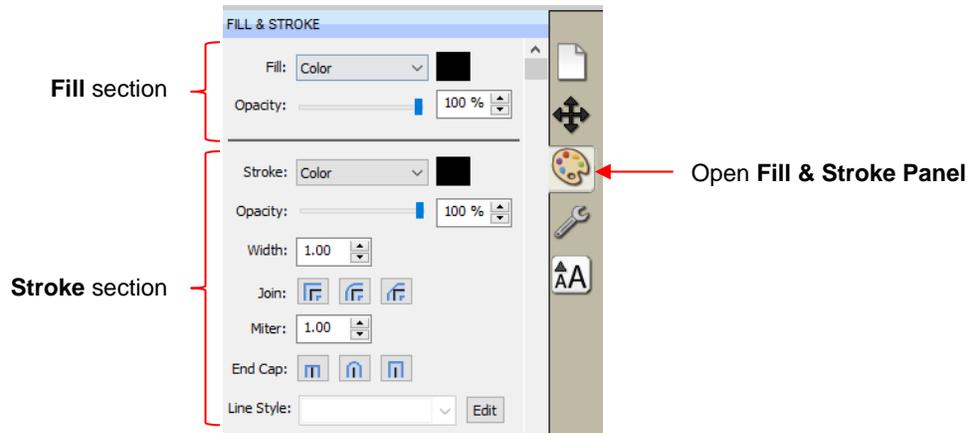
Triangle moves to the bottom



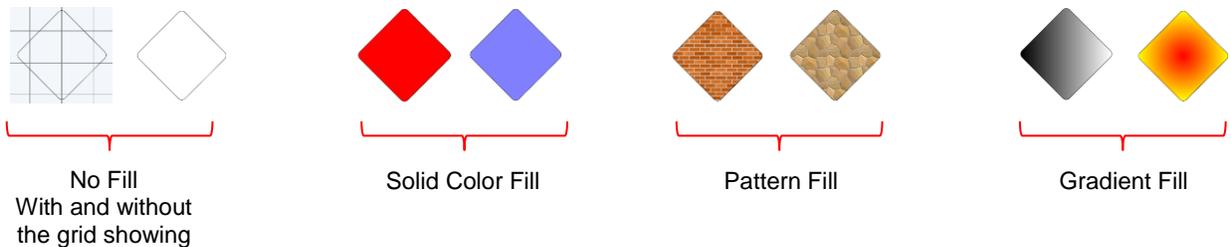
- It is worth noting that if any of the other layers had been locked or hidden, the movement of the triangle would have been the same. In other words, if the red heart had been hidden and/or locked, the triangle would still have ended up above it using **Bring to Front**.
- There are also shortcut keys for these four **Arrange** functions:
  - ◇ Bring to Front - **Ctrl+Shift+Up**
  - ◇ Bring Forward - **Ctrl+Up**
  - ◇ Send Backward - **Ctrl+Shift+Down**
  - ◇ Send to Back - **Ctrl+Shift+Down**

### 5.13 Fill & Stroke: Fill

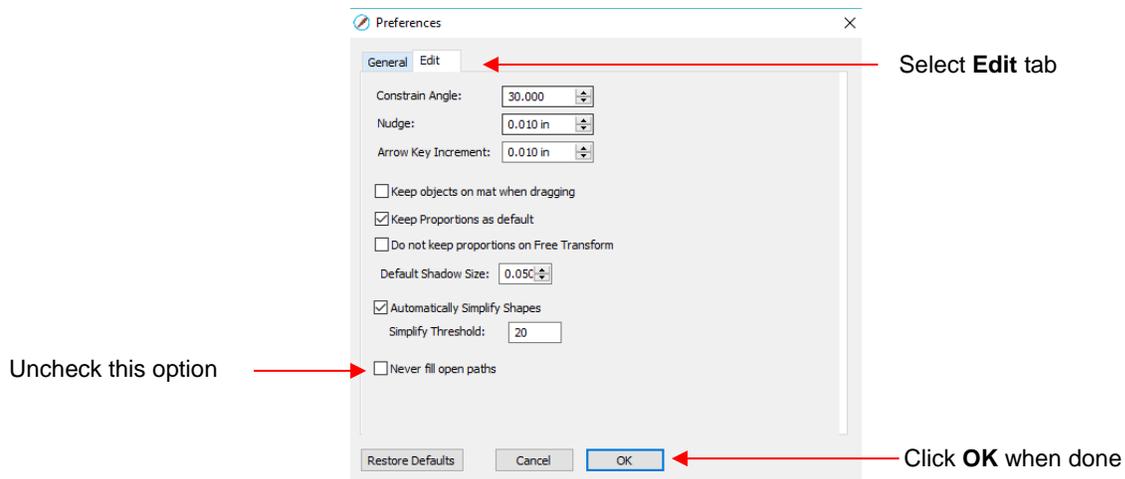
- The **Fill & Stroke Panel** provides options for changing how a shape or open path appears on the screen and, in the case of **Line Style** (solid versus dashed), how it cuts. This can be helpful in designing a project and also in print and cut applications.
- To open this panel, click on the **Fill & Stroke** icon on the **Properties Panel**:



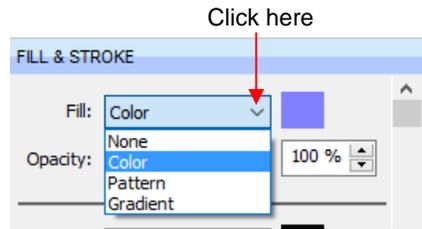
- Shapes can be filled with nothing, a solid color, a pattern or a gradient:



- By default, only closed shapes can display a fill. However, you can opt to have open shapes filled by going to **Edit>Preferences**, clicking on the **Edit** tab, and then unchecking the box next to **Never fill open paths**.



- To select a type of **Fill**, click on the drop-down menu and select from the four options:



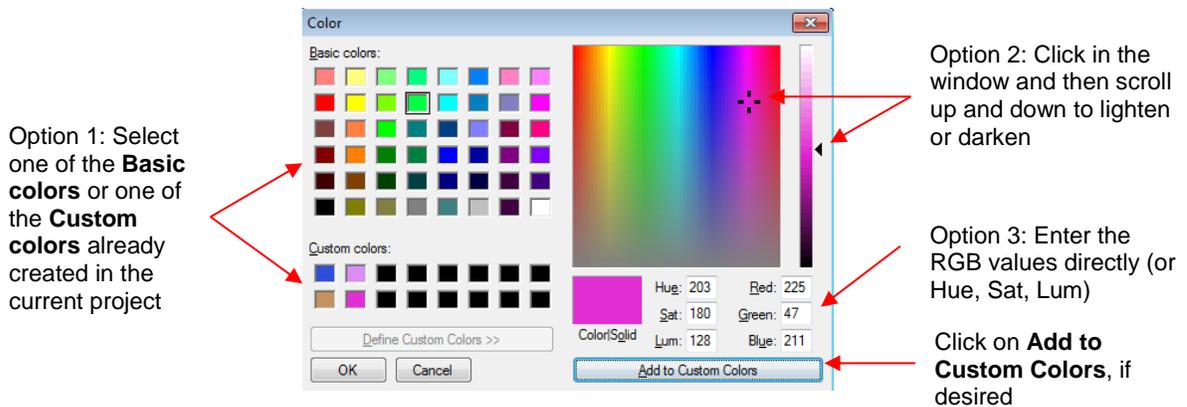
### 5.13.1 No Fill

- From the **Fill** menu, select **None** and shape will be empty. Note that this is not the same as having a white fill. When **None** is selected, the grid will show through the shape if the **Show Grid** option (on the **Document Panel**) is turned on:



### 5.13.2 Color Fill

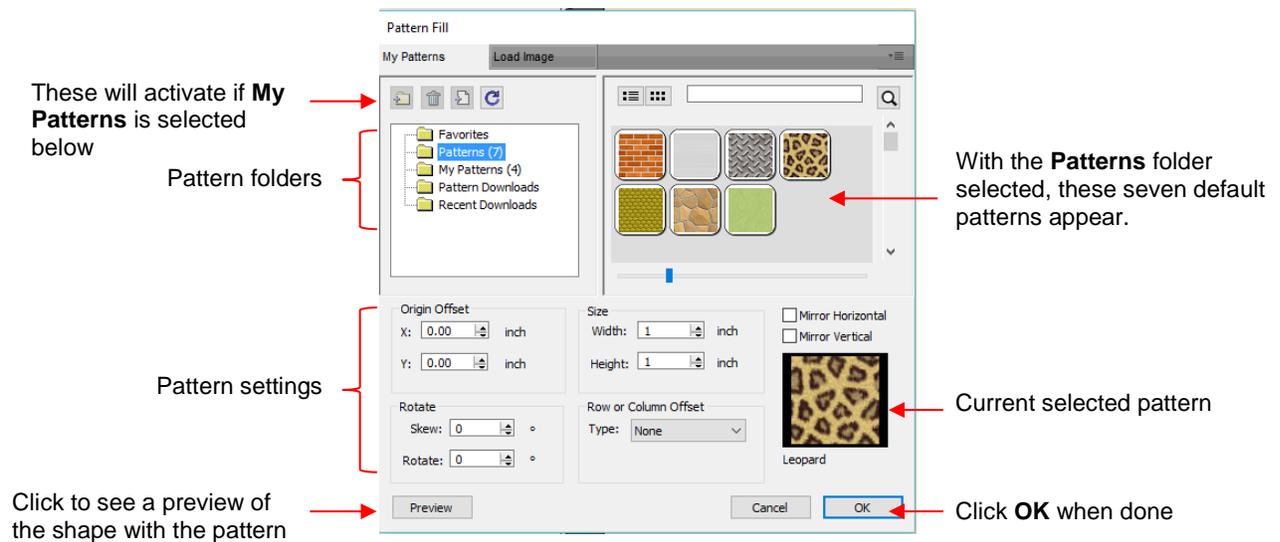
- From the **Fill** menu, select **Color** and then click on the color box to the right to open the following window where you will have the option to select a basic color or create your custom color:



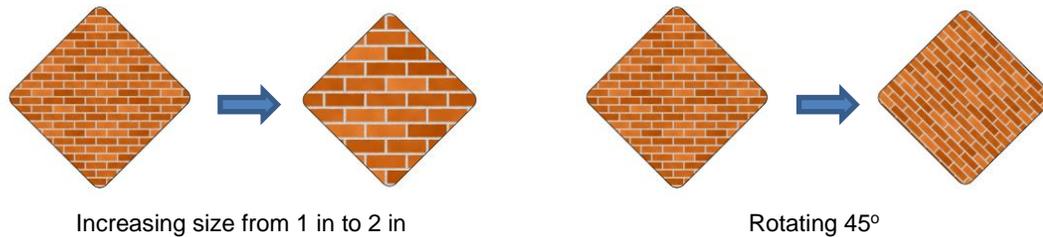
Note that a new **Custom Color** will only be saved and available in the current project.

### 5.13.3 Pattern Fill

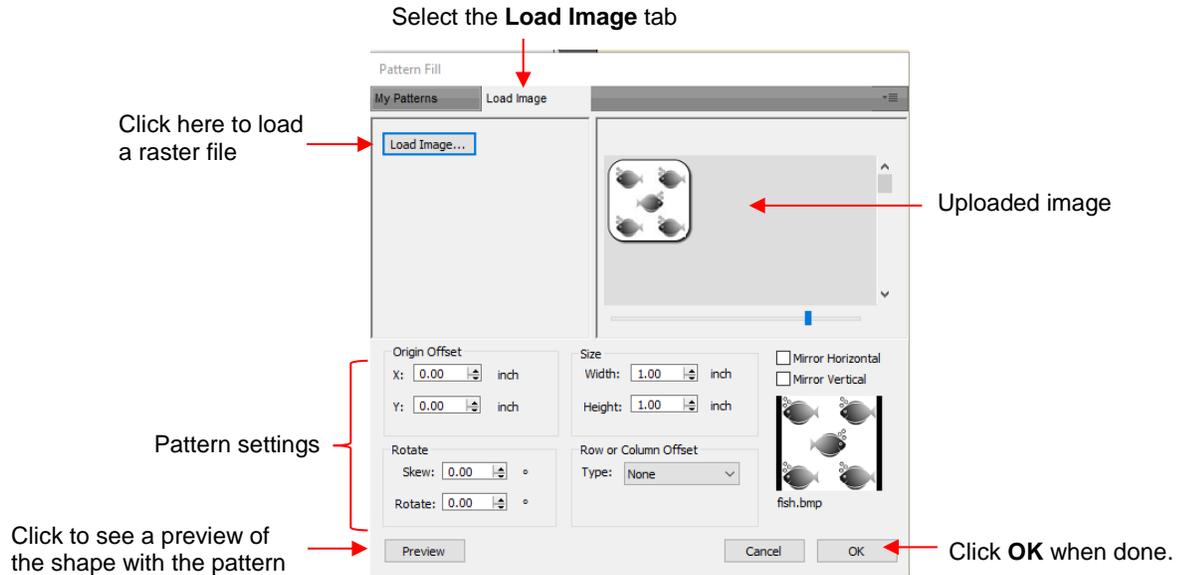
- From the **Fill** menu, select **Pattern** and then click on the color box to the right to open the following window where a pattern can be selected:



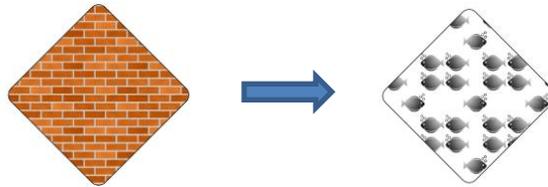
- Many of the functions in the **Pattern Fill** window are identical to those under the **Shapes** tab in the **Library**. Refer to *Section 4.03.1* for directions on searching, adding new folders, adding new files, adding to **Favorites**, etc.
- When adding your own patterns under **My Patterns**, select common raster file formats (e.g. BMP, PNG, JPG).
- The pattern settings can be used to modify how the pattern appears in the filled shape, for example:



- The other tab, **Load image**, can be used to load a raster file to use as a pattern, if you do not wish to save it under **My Patterns**. It has pattern settings, as well:

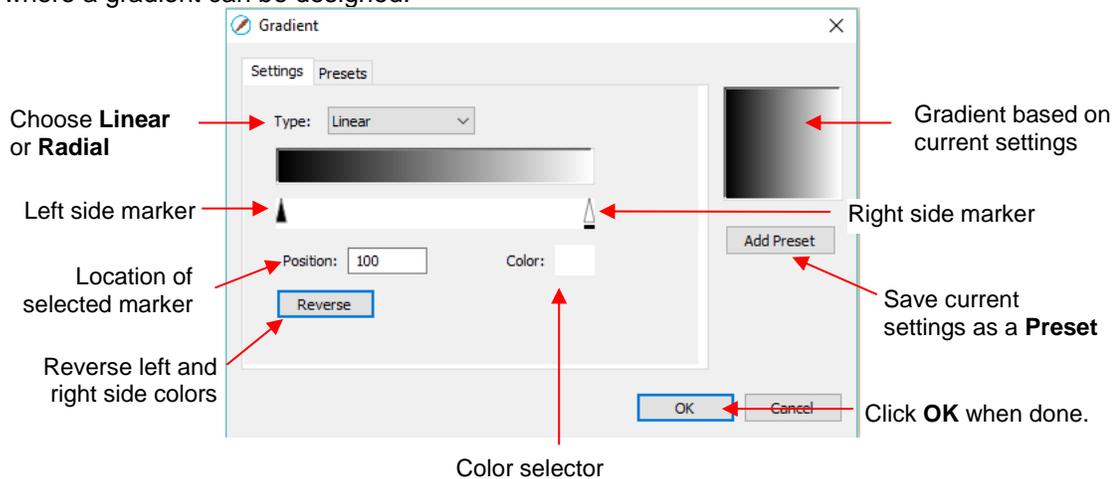


◇ The selected shape now fills with the uploaded image:

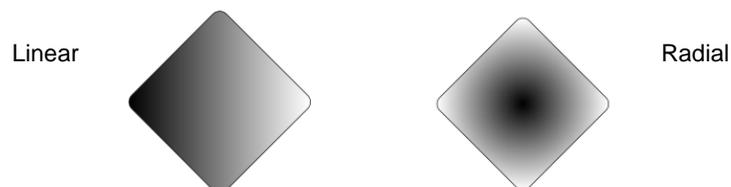


### 5.13.4 Gradient Fill

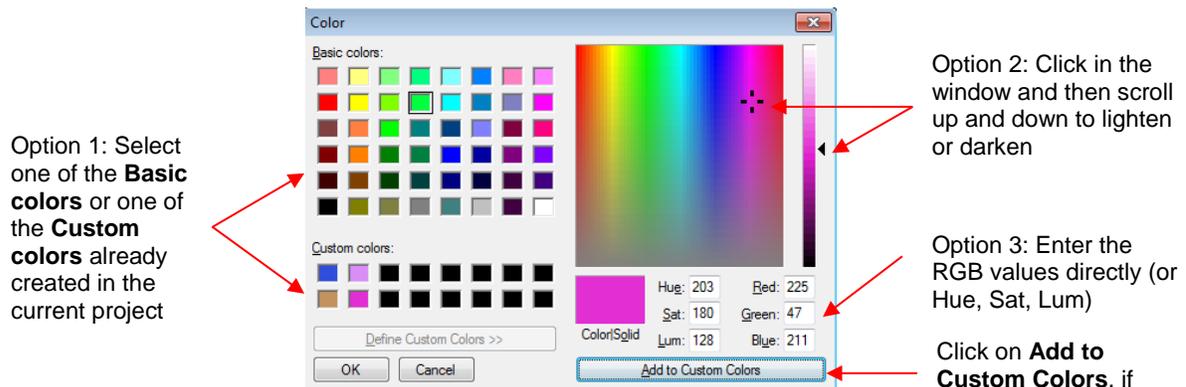
- From the **Fill** menu, select **Gradient** and then click on the color box to the right to open the following window where a gradient can be designed:



- Type:** Choose **Linear** for a left-to-right gradient. Choose **Radial** for a center outwards gradient:

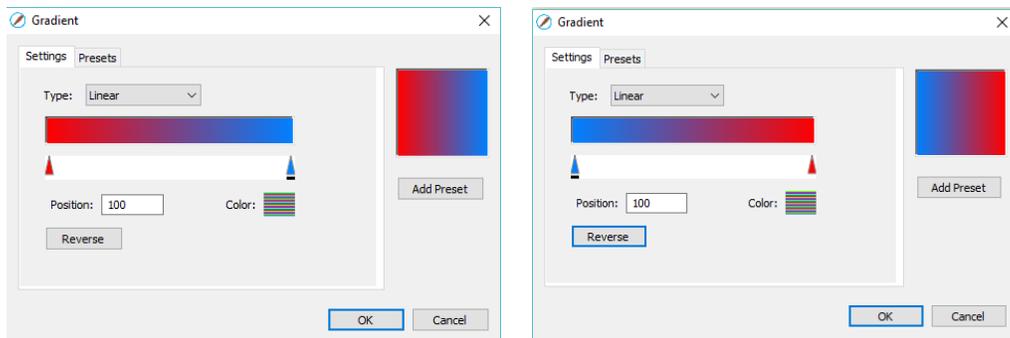


- ◇ To change colors, click on one of the markers, then click on the color selector box and choose a color from the **Color** window. Repeat for the other marker. As with other color selections, you can choose a base color or create a custom color:



Note that a new **Custom Color** will only be saved and available in the current project.

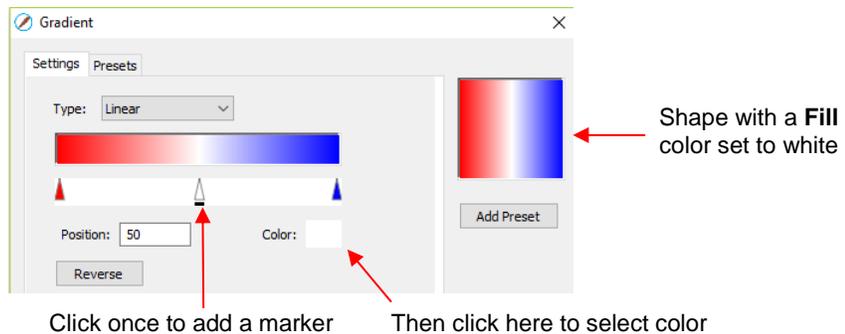
- ◇ After selecting new colors, the thumbnail image will update. Note that clicking on **Reverse** will switch the two chosen colors:



After selecting new colors

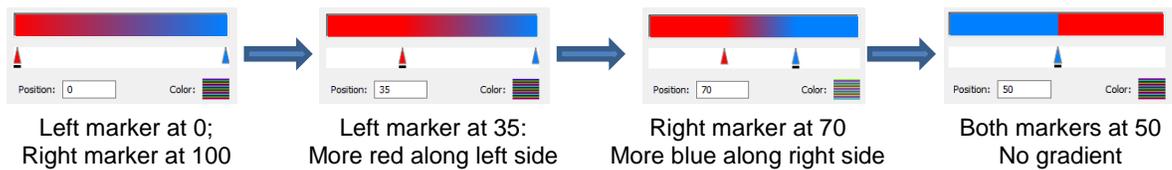
After applying **Reverse**

- ◇ More markers can be added by clicking on the **Position Bar** and then clicking on the **Color** selector. For example, white could have been added to the middle:

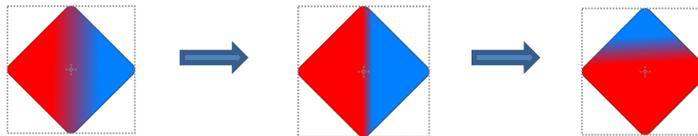


- ◇ If you inadvertently add a marker or decide you don't want one or more of the new ones, drag the marker downward and it will be removed.
- ◇ **Position:** The **Position** value is a location from 0 to 100 and applies to whichever marker is selected. Note the little black line under a selected marker

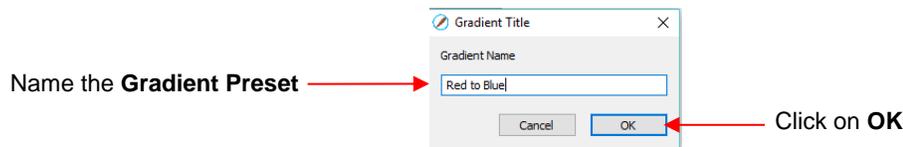
- ◇ Changing the **Position** moves the marker and resets where the gradient begins on that side. You can also manually slide the markers to change the **Position**, as well. Returning to the two-color example:



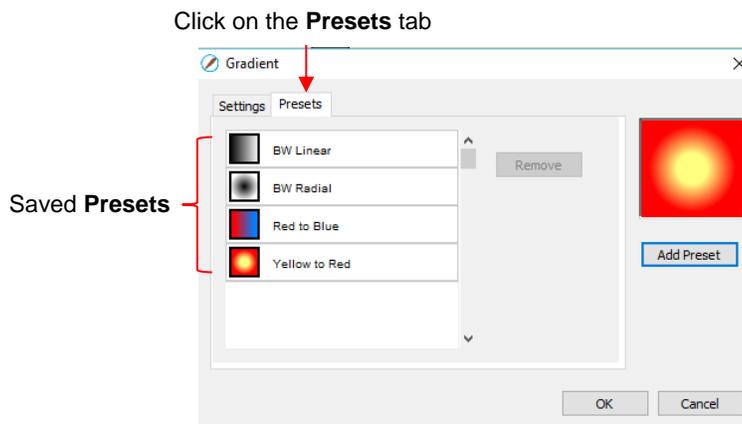
- ◇ The **Position** can also be changed after the shape is filled and the **Gradient** window is closed. On the **Tools Panel** is a **Gradient** tool . After selecting the shape, click on the **Gradient** icon and then drag the mouse across the shape to change the **Positions** and even rotate the gradient:



- ◇ If you want to save a particular gradient for future applications, click on **Add Preset** and a window will open where you can name this **Preset**:

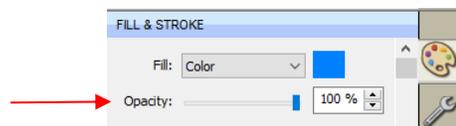


- ◇ To access your saved **Gradient Presets**, click on the **Presets** tab and the menu will appear:



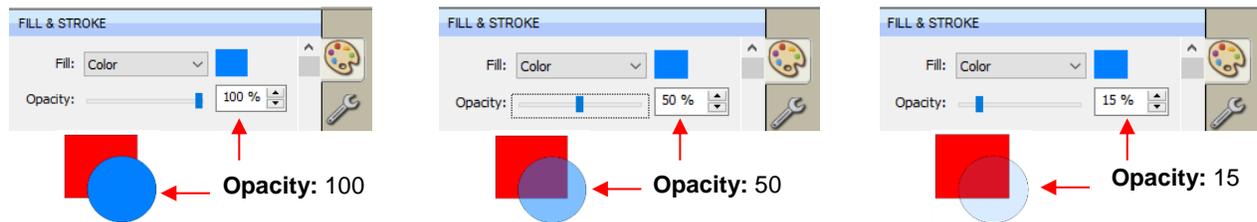
### 5.13.5 Opacity

- Just below the **Fill** setting is **Opacity**:



- Decreasing the **Opacity** setting will make a shape more transparent. This can be used for changing the appearance for printing or for revealing shapes that are completely or just partially hidden by other shapes.

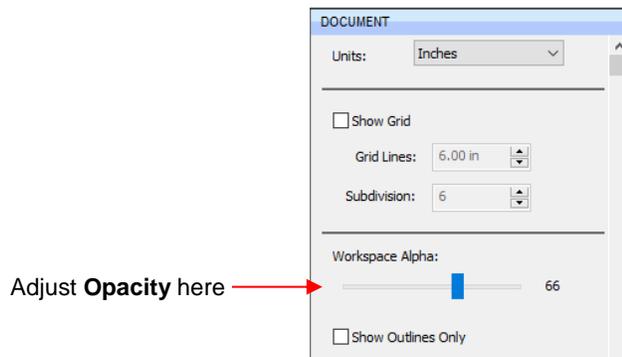
- ◇ In the following example, the **Opacity** is decreased on the blue circle, allowing the blocked portion of the red square to be seen:



- ◇ Lowering the **Opacity** can be applied to shapes filled with **Patterns** and **Gradients**, as well:

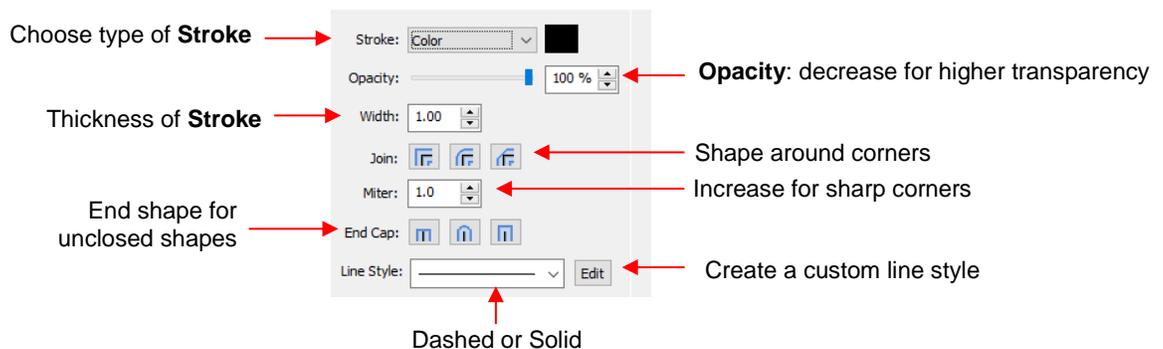


- ◇ If you want to decrease the **Opacity** for all shapes, the **Workspace Alpha** setting on the **Documents Panel** can be reduced from 100% to the desired level:



## 5.14 Fill & Stroke: Stroke

- The **Stroke** settings are located below the **Fill** settings on the **File & Stroke Panel**. Note the following:

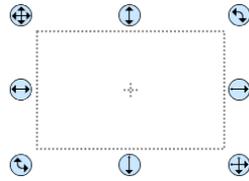


- **Stroke:** All shapes have a **Stroke** assignment using one of the following choices:

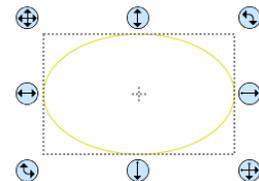
- ◇ **None:** The shape will not have an outline. Note that if you also choose **None** for the **Fill**, then you will not be able to see the shape at all unless you hover the mouse over it:



• **Fill:** Color **Stroke:** None

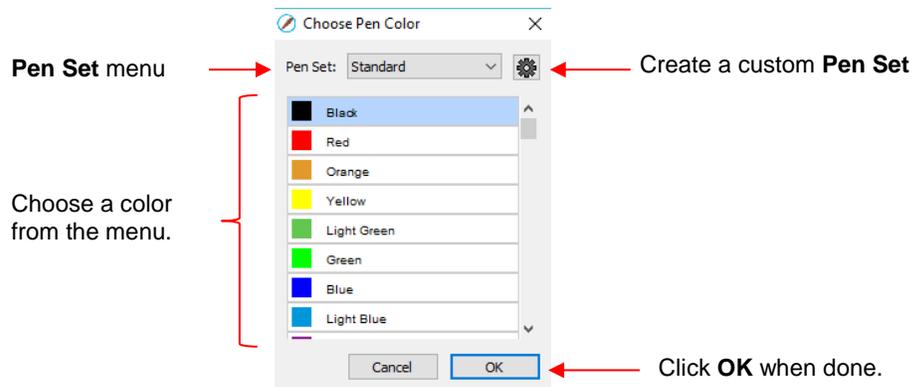


**Fill:** None **Stroke:** None  
Shape is selected

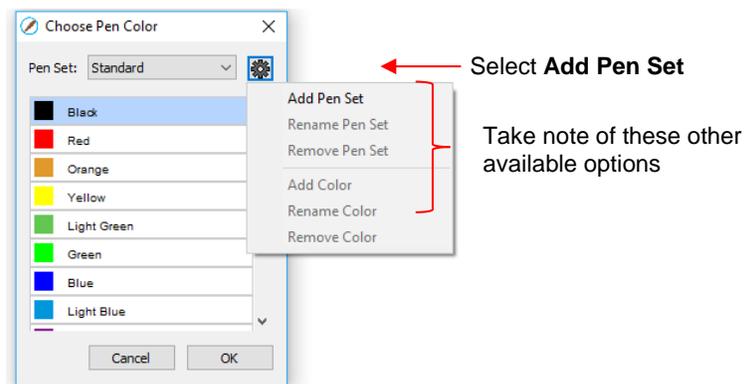


**Fill:** None **Stroke:** None  
Hovering mouse over it

- ◇ **Color:** Once **Color** is selected, click on the box to the right and the **Color** window will open. This is the same window that opened when **Color** was selected under **Fill**. As with other color selections, you can choose a base color or create a custom color.
- ◇ **Pen Color:** Choose this if you are recoloring lines based on selecting actual pens or other tools to switch out during the cut.
- ◇ When you choose **Pen Color** and then click on the box to the right, the **Choose Pen Color** window opens:



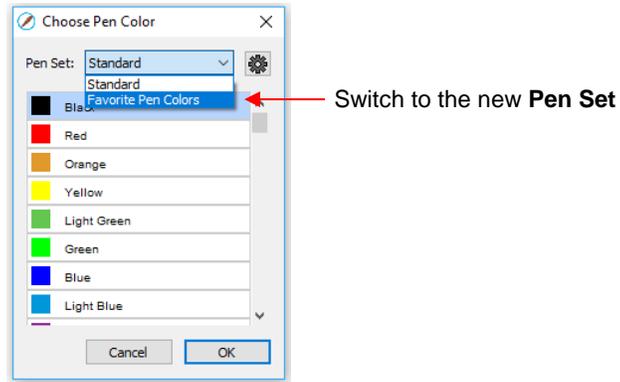
- ◇ Select the desired color from the menu and click **OK**. You also have the option to create your own custom **Pen Set** by clicking on the small icon in the upper right corner . The following menu appears and you can then select **Add Pen Set**:



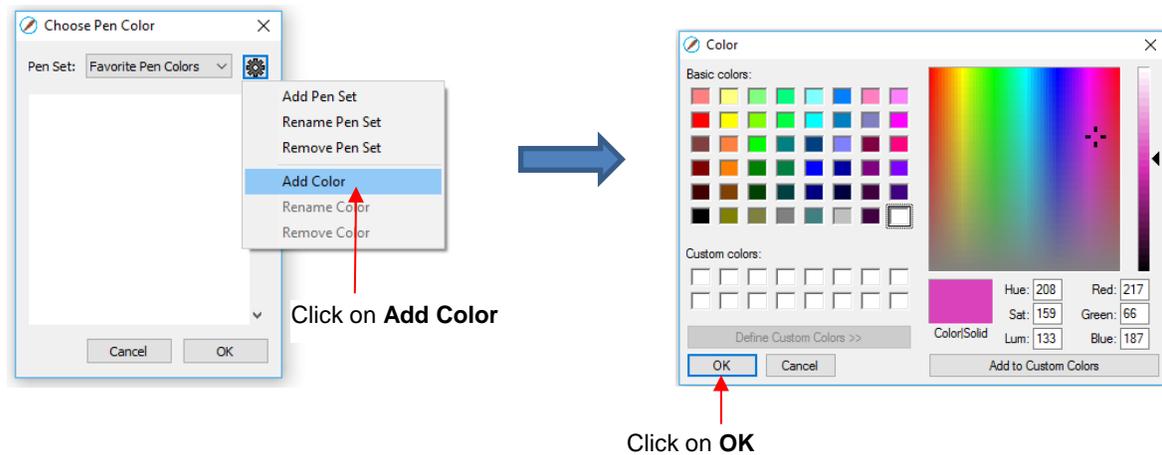
- ◇ Next, name the pen set:



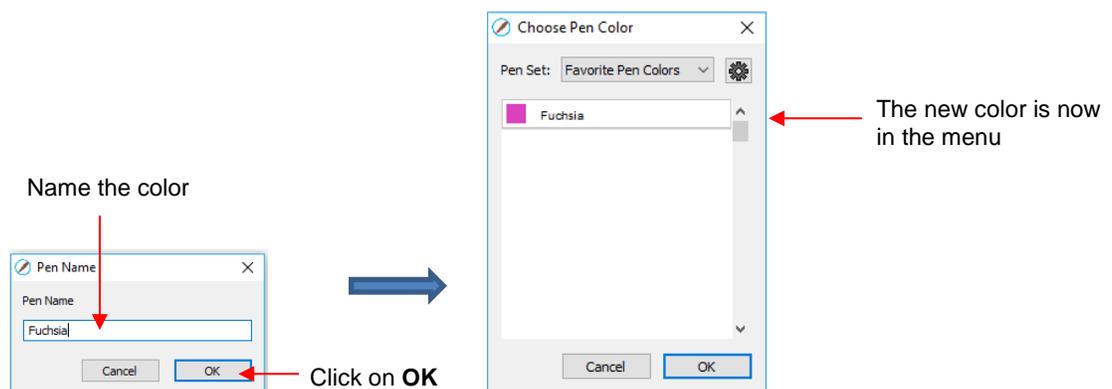
- ◇ In the **Pen Set** menu, you can now select the new **Pen Set Name**:



- ◇ Again, click on the small icon in the upper right corner  and you can begin adding pen colors with their respective RGB color values or just scroll to create colors you like:



- ◇ After clicking on **OK**, you will be prompted to name this color and then it will show up in the menu:



- ◇ In the same menu where you can add new colors, are options to **Remove Color** or **Rename Color**. Before you can use these options, you will need to close and reopen SCAL.

- **Opacity:** Decreasing the **Opacity** setting will make the **Stroke** color more transparent. It's not particularly noticeable until you increase the **Stroke Width**, thus examples will be shown in the next bullet.
- **Width:** Increasing the **Width** will make the **Stroke** thicker. The units are in pixels thus the same values give the same results whether your SCAL **Units** are set to inches, cm, or mm.



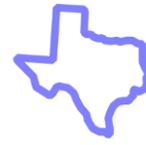
Stroke Width: 1  
Opacity: 100%



Stroke Width: 10  
Opacity: 100%



Stroke Width: 20  
Opacity: 100%



Stroke Width: 20  
Opacity: 50%

- **IMPORTANT:** The **Stroke Width** does not affect how a shape or line is cut or drawn. It's only used for display and printing purposes.

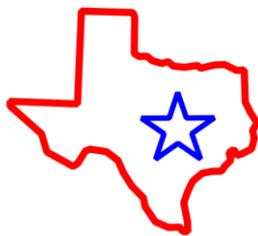
- **Join** consists of three options which affect how sharp corners are handled:

◇ **Miter**  : Corners are sharp but will become beveled at low values of **Mitre**

◇ **Round**  : Corners are rounded off.

◇ **Bevel**  : Corners are clipped at a 45° angle.

- Just as with **Opacity**, there's not a strong visual difference if the **Stroke Width** is small. Thus to illustrate **Join**, a **Stroke Width** of 20 will be used:



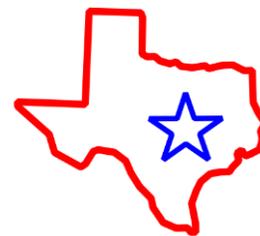
Join: Miter  
Miter: 1.0  
Slightly beveled



Join: Miter  
Miter: 3.5  
Sharp corners



Join: Round



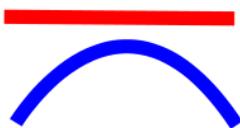
Join: Bevel

- **End Caps:** Unclosed shapes, such as lines and arcs, can have the **Stroke** shape on the ends changed, similar to the **Join** setting. The choices are:

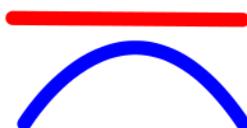
◇ **Butt**  : The end is squared off, aligned with the actual end of the path

◇ **Round**  : The end is rounded.

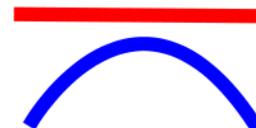
◇ **Square**  : The end is squared off and extends beyond the actual end based on the **Stroke Width**.



End Cap: Butt



End Cap: Round



End Cap: Square

- To better illustrate the difference between **Butt** and **Square**, the original line is shown in a close up:

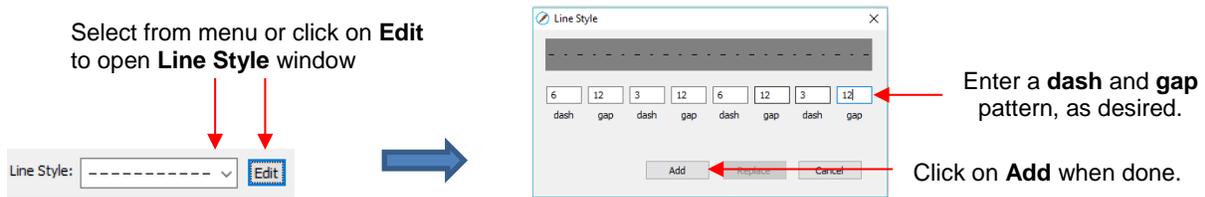


End Cap: Butt – cap ends at the line end



End Cap: Square – cap extends beyond end

- **Line Style:** The **Line Style** can be either solid or dashed. If dashed is selected, then one of the default patterns can be selected or you can specify the dash length and spacing desired by clicking on **Edit**:



- ◇ The **Line Style** selected will be displayed on the screen and will be cut by the cutter. Again, the **Stroke Width**, however, is ignored by the cutter.

### 5.15 Dropper Tool

- Shapes can also have the **Fill**, **Stroke** or both changed based on the settings for another shape. This is accomplished using the **Dropper** tool  on the **Tools Panel**.

- To use this function:

- ◇ Select the shape to be recolored. In this example, it will be a yellow triangle with no **Stroke**:



- ◇ Click on the **Dropper** tool icon and choose a setting from the **Tool Options**:



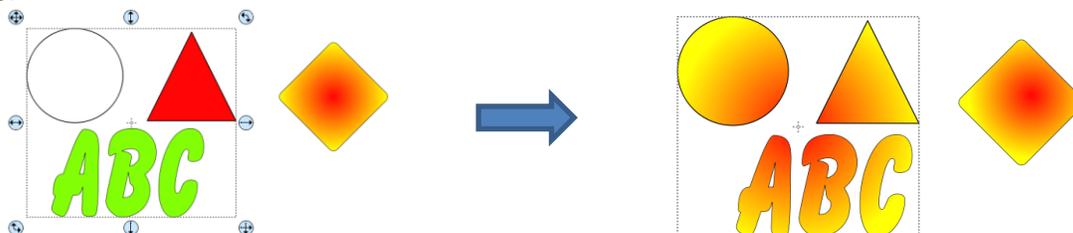
- ◇ Finally, click on the shape that has the color property you wish to use. In this case, it's the red circle with the black **Stroke**. The selected triangle is recolored to match.



Move the mouse over the shape that has the desired color(s)

After clicking on the circle, the triangle **Fill** color is now red and the **Stroke** color is now black

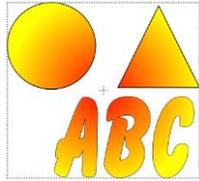
- Note that other properties, such as **Stroke Width** or **Opacity**, will not be copied onto the selected shape. On the other hand, if the **Fill** is a pattern or gradient, it will be copied. You can also fill multiple shapes at once:



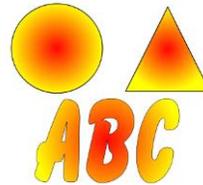
A selection of three shapes will be recolored with the fill gradient in the diamond on the right

All three shapes are filled at once

- Note, however, that the three shapes were treated as one object when filling with the gradient. A different result is obtained if each shape had been filled separately:



All three shapes recolored at once



Shapes recolored individually

## **5.16 Cutting, Copying, Pasting, Duplicating**

### **5.16.1 Cutting to the Clipboard**

- To cut shapes to the clipboard (copy to the clipboard and delete from the **Cutting Mat**), first select the shape or shapes and then use any of the following:
  - ◇ Click on the **Cut** icon located on the upper **Toolbar** 
  - ◇ Right-click on the screen and select **Cut**
  - ◇ Press **Ctrl+X**
  - ◇ Go to **Edit>Cut**

### **5.16.2 Copying to the Clipboard**

- To copy shapes to the clipboard, first select the shape or shapes and then use any of the following:
  - ◇ Click on the **Copy** icon located on the upper **Toolbar** 
  - ◇ Right-click on the screen and select **Copy**
  - ◇ Press **Ctrl+C**
  - ◇ Go to **Edit>Copy**
- To make multiple copies, refer to the **Duplicate** function described later in this section.

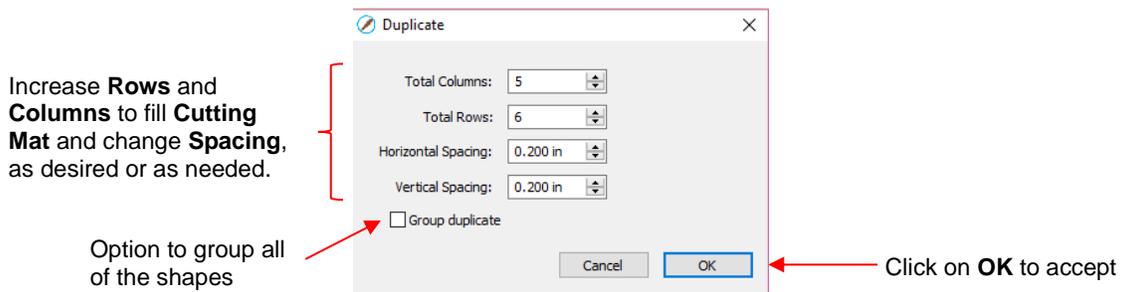
### **5.16.3 Pasting from the Clipboard**

- There are three **Paste** functions in SCAL:
  - ◇ **Paste**: pastes the shape offset slightly (0.25") from the original
  - ◇ **Paste in Place**: pastes the shape in exactly the same location as the original
  - ◇ **Paste (Auto Fill)**: pastes enough copies to auto-fill the **Cutting Mat**
- To **Paste** shapes from the clipboard, use any of the following:
  - ◇ Click on the icon located on the upper **Toolbar** 
  - ◇ Right-click on the screen and select **Paste**
  - ◇ Press **Ctrl+V**
  - ◇ Go to **Edit>Paste**
- To **Paste in Place** shapes from the clipboard, use any of the following:

- ◇ Right-click on the screen and select **Paste in Place** (without any shapes selected)
- ◇ Press **Ctrl+Shift+V**
- ◇ Go to **Edit>Paste in Place**
- To **Paste (Auto Fill)**: use either of the following:
  - ◇ Press **Ctrl+Shift+Alt+V**
  - ◇ Go to **Edit>Paste (Auto Fill)**

#### **5.16.4 Duplicating - Duplicate**

- The **Duplicate** function allows you to make multiple copies of a shape aligned in rows and/or columns, with the spacing you desire. To access **Duplicate**, first select the shape(s) and then use either of the following:
  - ◇ Press **Ctrl+D**
  - ◇ Go to **Object>Duplicate**
- To fill your grid with images, move the selected shape(s) to the top left corner of the gridded part of the **Cutting Mat**. With the shape(s) still selected, use **Ctrl-D** (or **Object>Duplicate**) to open the **Duplicate** window. As you begin clicking on **Total Columns** and **Total Rows**, the mat will fill with the shapes. Change the **Spacing**, as needed, to better fit the duplicates. Click on **OK** to accept:



- To create a single row of repeats, set the **Rows** value to 1. For a single column of repeats, set the **Columns** value to 1. To overlap the repeats, enter a negative number under **Spacing**. Refer to *Section 9.03.1* for a tutorial on how this function can be used to create a border.
- There is also a **Duplicate Rotated** function to arrange the duplicates in a circular formation. Because this is more typically used for design purposes, it is covered in *Section 9.06*.

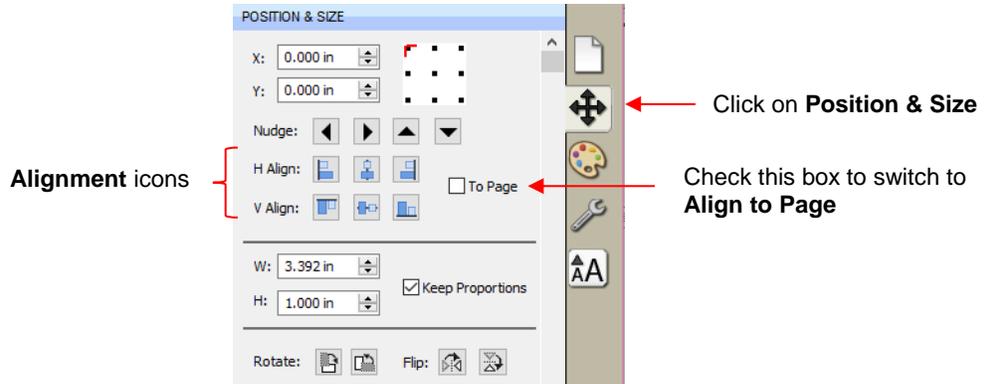
#### **5.16.5 Quick Duplicate**

- A quick way to make a single copy of a shape is to hold the **Alt** key while dragging the shape. The original will be left behind and new copy will be moved with the mouse.
- You can also hold the **Alt** key and left-click on a shape and it will duplicate that shape leaving the copy on top of the original.

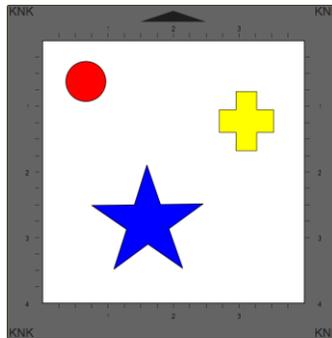
#### **5.17 Alignment**

- There are fourteen functions used to align shapes, seven of them with respect to the **Cutting Mat** (referred to as **Page**) and another seven with respect to one another (referred to as **Selection**). After selecting two or more shapes, these functions can be accessed using either of the following:
  - ◇ Go to **Object>Alignment**

- ◇ Click on an alignment icon from the **Position & Size** window on the **Properties Panel**:



- The following three shapes, in their current relative positions, will be used to illustrate what happens when each alignment function is applied. Note that a small custom mat was created to facilitate screenshots:

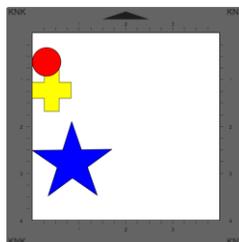


### 5.17.1 Align to Page

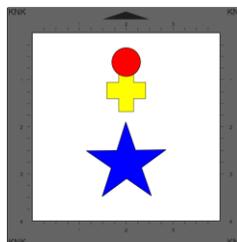
- Make sure the alignment mode is set to **Align to Page**. To do this, either:
  - ◇ Go to **Object>Alignment** and make sure **Align to Page** is checked
  - ◇ Check the **To Page** option on the **Position & Size** panel

- With the shapes selected, the horizontal alignment options are:

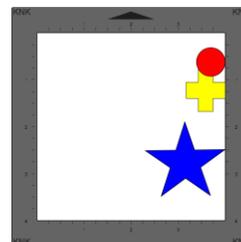
- ◇ **Align Left** aligns shapes along the left side of the **Cutting Mat**. 
- ◇ **Align Horizontal Center** aligns shapes through the center of the **Cutting Mat**. 
- ◇ **Align Right** aligns shapes along the right side of the right side of the **Cutting Mat**. 



Align Left



Align Horizontal Center



Align Right

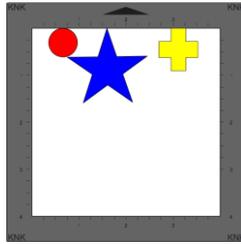
- With the shapes selected, the vertical alignment options are:

- ◇ **Align Top** aligns shapes along the top side of the **Cutting Mat**. 

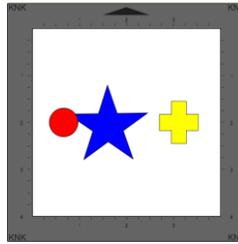
◇ **Align Vertical Center** aligns shapes through the center of the **Cutting Mat**.



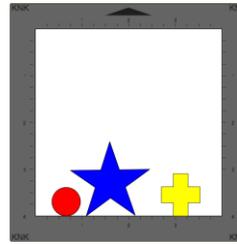
◇ **Align Bottom** aligns shapes along the bottom side of the **Cutting Mat**.



Align Top



Align Vertical Center



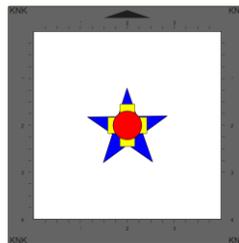
Align Bottom

• To center all three shapes in the middle of the **Cutting Mat**, use either:

◇ A combination of **Align Horizontal Center** and **Align Vertical Center**:



◇ Go to **Object>Alignment>Align Centers**



Align Centers

### 5.17.2 Align to Selection

• First, make sure the alignment mode is set to **Align to Selection**. This is done by either making sure the **To Page** option is not checked on the **Position & Size** panel or by going to **Object>Alignment** and making sure **Align to Selection** is checked.

• With the shapes selected, the horizontal alignment options are:

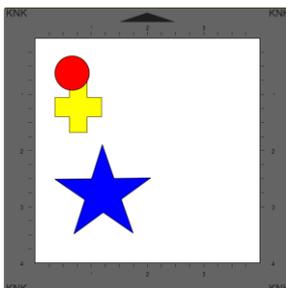
◇ **Align Left** aligns shapes along the left side of the leftmost shape of the group.



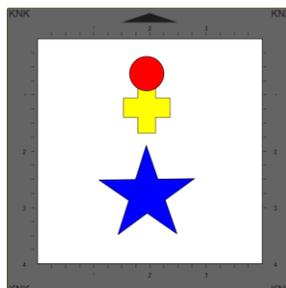
◇ **Align Horizontal Center** aligns shapes to a vertical axis through the center.



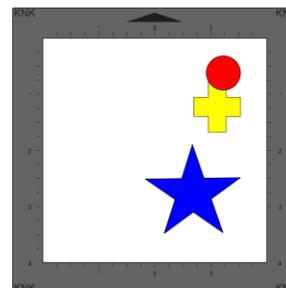
◇ **Align Right** aligns shapes along the right side of the rightmost shape of the group.



Align Left



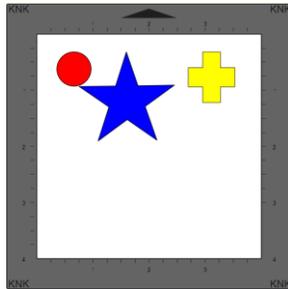
Align Horizontal Center



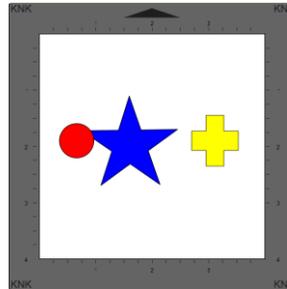
Align Right

- With the shapes selected, the vertical alignment options are:

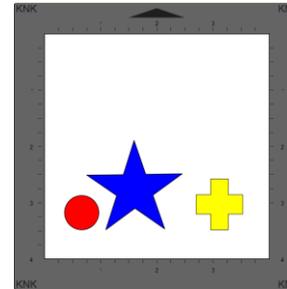
- ◇ **Align Top** aligns shapes along the top side of the uppermost shape of the group.
- ◇ **Align Vertical Center** aligns shapes to a horizontal axis through the center.
- ◇ **Align Bottom** aligns shapes along the bottom side of the bottommost shape of the group.



Align Top



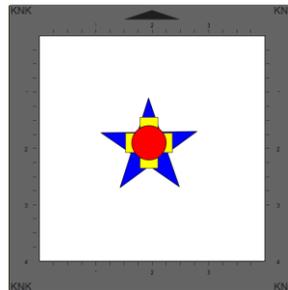
Align Vertical Center



Align Bottom

- To center all three shapes use either:

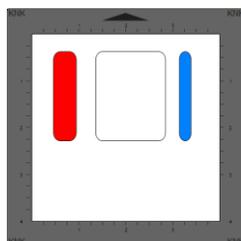
- ◇ A combination of **Align Horizontal Center** and **Align Vertical Center**:
- ◇ Go to **Object>Alignment>Align Centers**



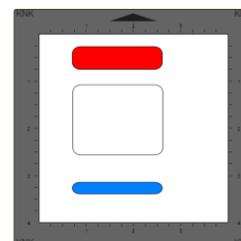
Align Centers

## 5.18 Distribute

- The **Distribute** function rearranges the spacing between shapes. Similar to the **Alignment** function, you can **Distribute to Page (Cutting Mat)** or you can **Distribute to Selection** (selected shapes). There's also a third, called **Distribute to Selection Below**, which distributes based on whatever shape is positioned at the lowest level on the **Layers Panel** and its difference in size relative to the outermost shape in the opposite direction of the distribute option (and yes, this is confusing, but will be explained in *Section 5.18.3*)
- After selecting the shapes, these functions can be accessed by going to **Object>Distribute**.
- The following three shapes, in their current relative positions, will be used to illustrate what happens with each distribute function when **Distribute to Selection** or **Distribute to Page** is applied. Note that a small custom mat was created to facilitate screenshots:



Will be used for horizontal distribute examples

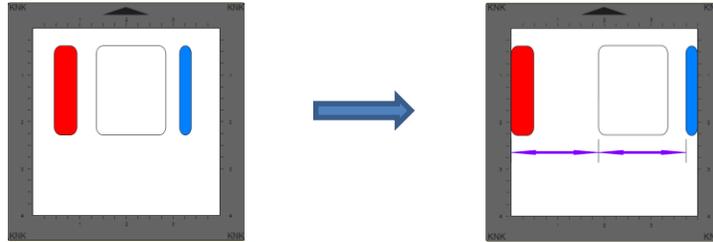


Will be used for vertical distribute examples

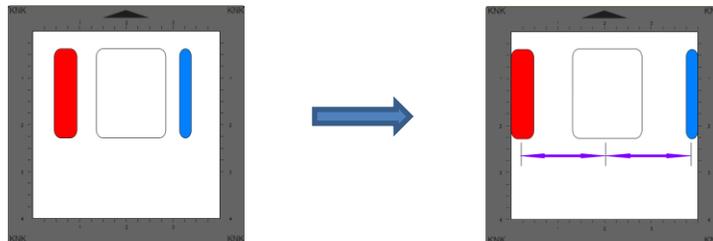
## 5.18.1 Distribute to Page

- Select the shapes and go to **Object>Distribute** and then make sure the **Distribute to Page** option is checked. In this mode, the two outermost shapes will align with the **Cutting Mat** and then other shapes will be evenly spaced from one side of the mat to the other, according to which additional option is chosen. All options, with screenshots, are presented. The purple arrows indicate equal spacing.
- With the shapes selected, the horizontal distribute options are:

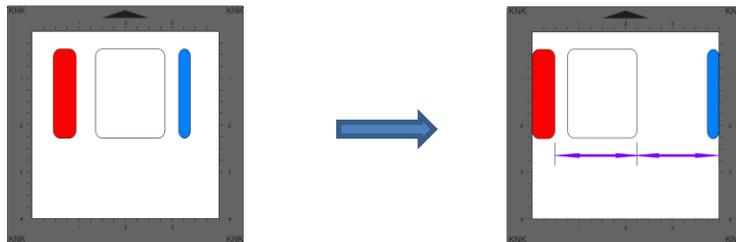
- ◇ **Distribute Left:** spaces shapes so that the left sides of each shape are the same distance apart:



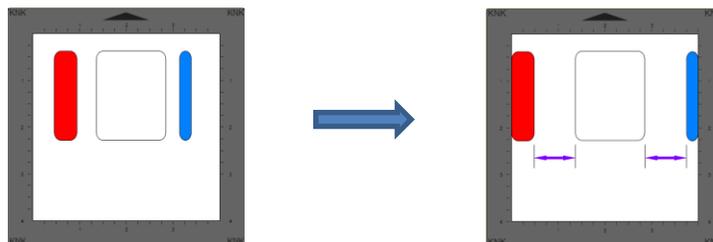
- ◇ **Distribute Center Horizontally:** spaces shapes so that the centers of each shape are the same distance apart:



- ◇ **Distribute Right:** spaces shapes so that the right sides of each shape are the same distance apart:

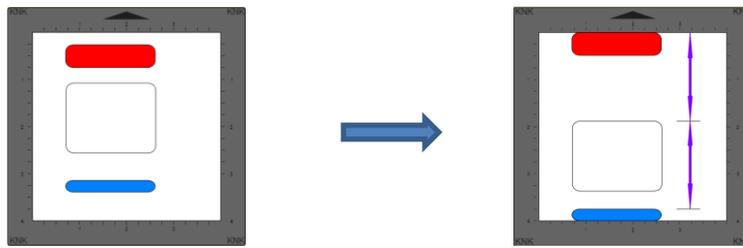


- ◇ **Distribute Space Horizontally:** spaces shapes so that the gaps between the shapes are the same.

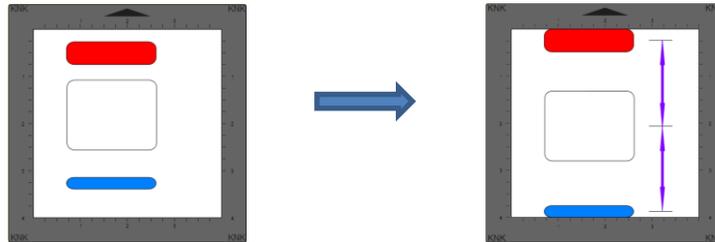


- With the shapes selected, the vertical distribute options are:

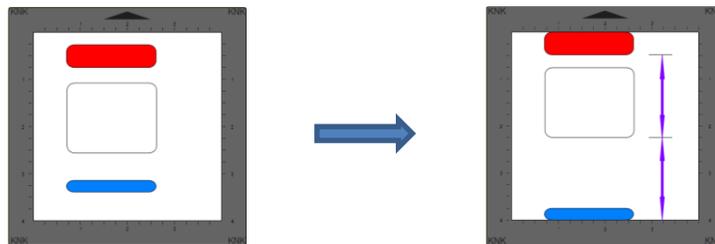
- ◇ **Distribute Top:** spaces shapes so that the top sides of each shape are the same distance apart:



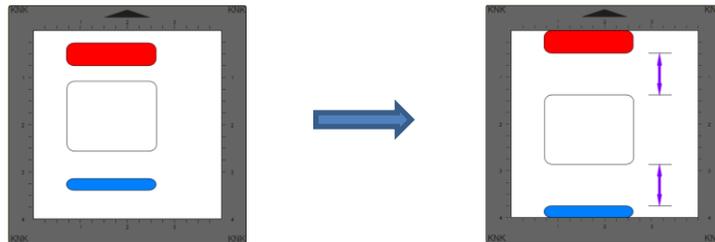
- ◇ **Distribute Center Vertically:** spaces shapes so that the centers of each shape are the same distance apart:



- ◇ **Distribute Bottom:** spaces shapes so that the bottom sides of each shape are the same distance apart:

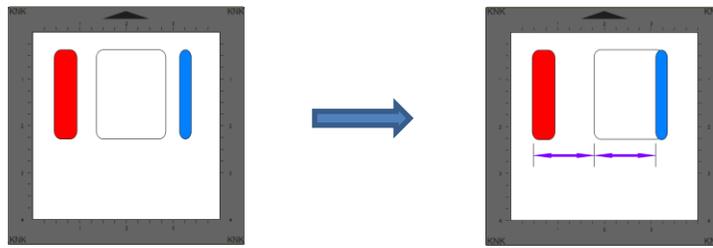


- ◇ **Distribute Space Vertically:** spaces shapes so that the gaps between the shapes are the same.

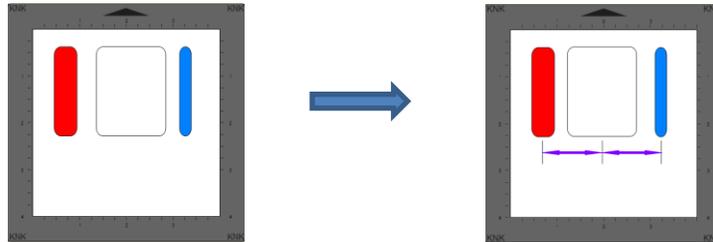


### 5.18.2 Distribute to Selection

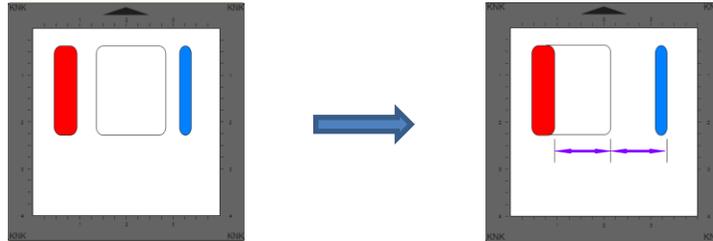
- Select the shapes and go to **Object>Distribute** and then make sure **Distribute to Selection** is checked. In this mode, the two outermost shapes will remain in position and then other shapes will be evenly spaced, according to which additional option is chosen. All options, with screenshots, are presented. Again, the purple arrows indicate equal spacing.
- With the shapes selected, the horizontal distribute options are:
  - ◇ **Distribute Left:** spaces shapes so that the left sides of each shape are the same distance apart:



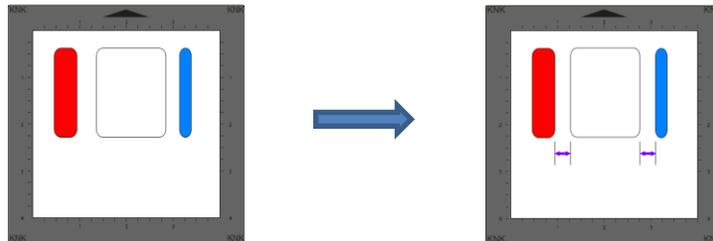
- ◇ **Distribute Center Horizontally:** spaces shapes so that the centers of each shape are the same distance apart:



- ◇ **Distribute Right:** spaces shapes so that the right sides of each shape are the same distance apart:

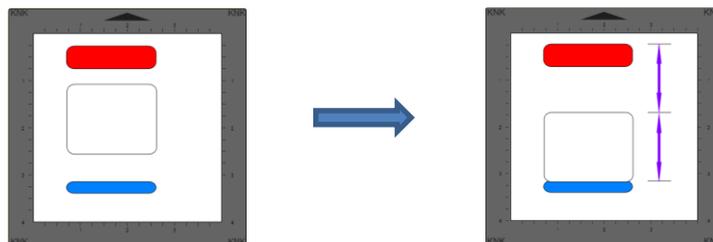


- ◇ **Distribute Space Horizontally:** spaces shapes so that the gaps between the shapes are the same.

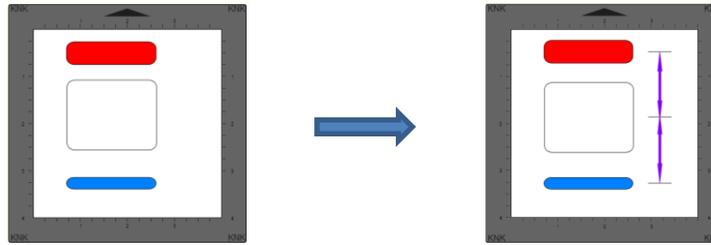


- With the shapes selected, the vertical distribute options are:

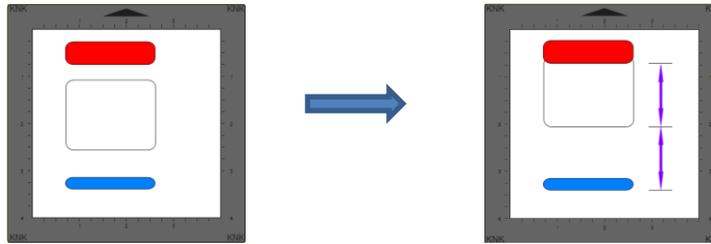
- ◇ **Distribute Top:** spaces shapes so that the top sides of each shape are the same distance apart:



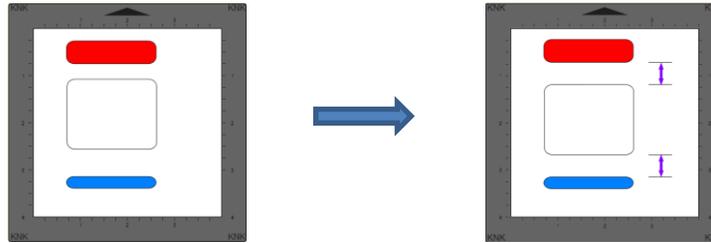
- ◇ **Distribute Center Vertically:** spaces shapes so that the centers of each shape are the same distance apart:



- ◇ **Distribute Bottom:** spaces shapes so that the bottom sides of each shape are the same distance apart:

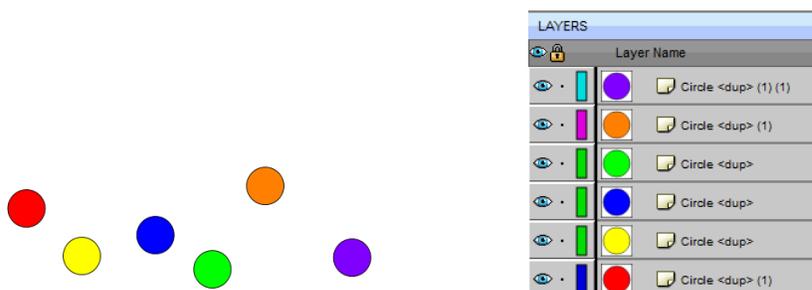


- ◇ **Distribute Space Vertically:** spaces shapes so that the gaps between the shapes are the same.

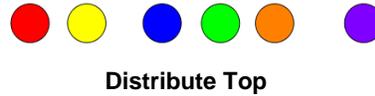
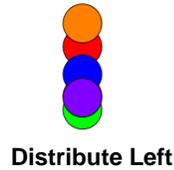


### 5.18.3 Distribute to Selection Below

- This function is, hands down, the strangest function I have encountered in 10 years of writing technical manuals. I have no practical applications to share and the developer hasn't responded to my request for assistance. Thus, I can only explain what happens when you apply it. Maybe one of our readers will figure out a great use for it and share with me so that I can add it to this section.
- Given a selection of shapes, applying one of the **Distribute to Selection Below** options will space the shapes based on the difference in size between the bottommost shape of the selection and then the shape that is the furthest away in the opposite direction to the distribute option.
- As an example, here is a random scattering of 1" circles. The red one is the bottommost of the selection, as shown on the **Layers Panel**:

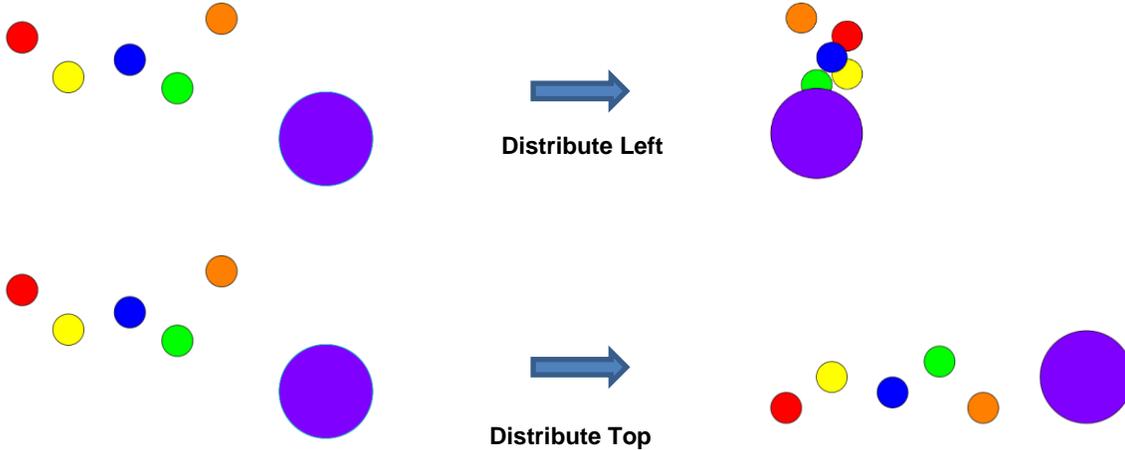


- ◇ Applying **Distribute Left** will move all of the circles to align with the left side of the red one. Applying **Distribute Top** will move all of the circles to align with the top side of the red one. Because the circles are all the same size, there is no spacing applied, only alignment:



- ◇ **Distribute Left:** Note that the up/down **Y** locations remain the same for all of the circles.
- ◇ **Distribute Top:** The left/right **X** locations remain the same for all of the circles.

- Now, let's make the purple circle that's both furthest to the right and furthest towards the bottom equal to 3" in size instead of just 1" and then apply the same **Distribute** options:



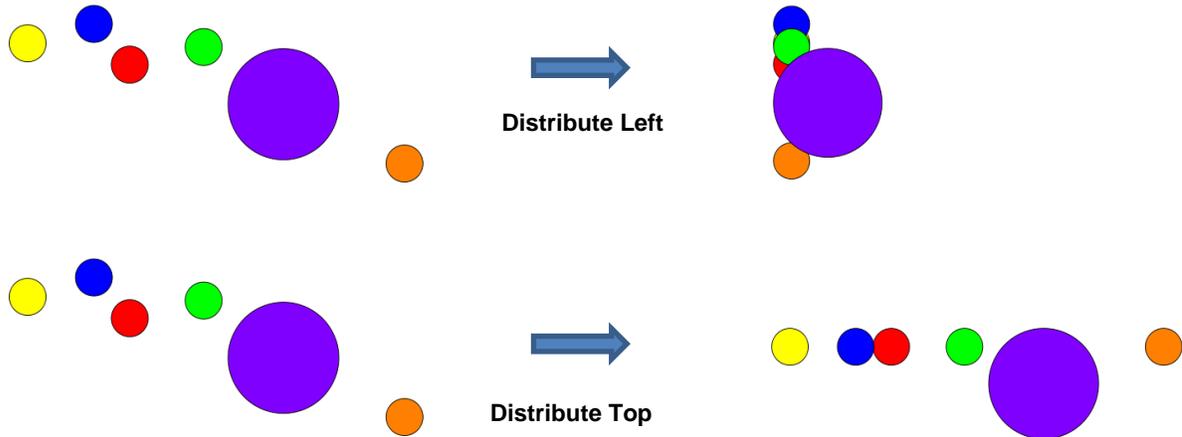
- ◇ **Distribute Left:** The new location for the 3" purple circle is now 2" to the left of the 1" red circle, which was, again, the bottommost shape. The 2" is a result of subtracting 1" from 3". The locations of the other circles are an equal spacing of that 2 inches, however note that one of the circles, the yellow one, is aligned with the red one and starts the distribution:

	Location of Left Side
Red	5"
Yellow	5"
Blue	4.5"
Green	4.0"
Orange	3.5"
Purple	3.0"

- ◇ **Distribute Top:** The same kind of new arrangement happened in this case as well, only in a vertical way. The red circle is still in the same location, but the top of the purple circle is now 2" higher than the red one and the other circles are evenly distributed, with the orange one first aligning with the red one:

	Location of Top Side
Red	3"
Orange	3"
Blue	2.5"
Yellow	2.0"
Green	1.5"
Purple	1.0"

- Now, this distribution happened because the purple circle was both larger than the red one AND it was the outermost circle in both of the opposite directions. In other words, when applying **Distribute Left**, the purple circle was the rightmost shape. When applying **Distribute Top**, the purple circle was the bottommost shape.
- If another one of the 1" circles had been the outermost, then both of those **Distribute** options would have yielded the same alignment when all of the circles were the same size. Note also that the bottommost red circle doesn't have to be on the far left or on the top. It can be located anywhere but the other circles will be moved to align with it:

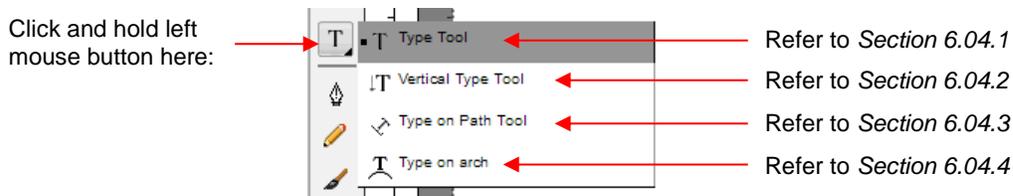


- At this time, no further details will be presented. However, if a practical application comes to light, I will be happy to include it.

## 6. SCAL: Working with Text

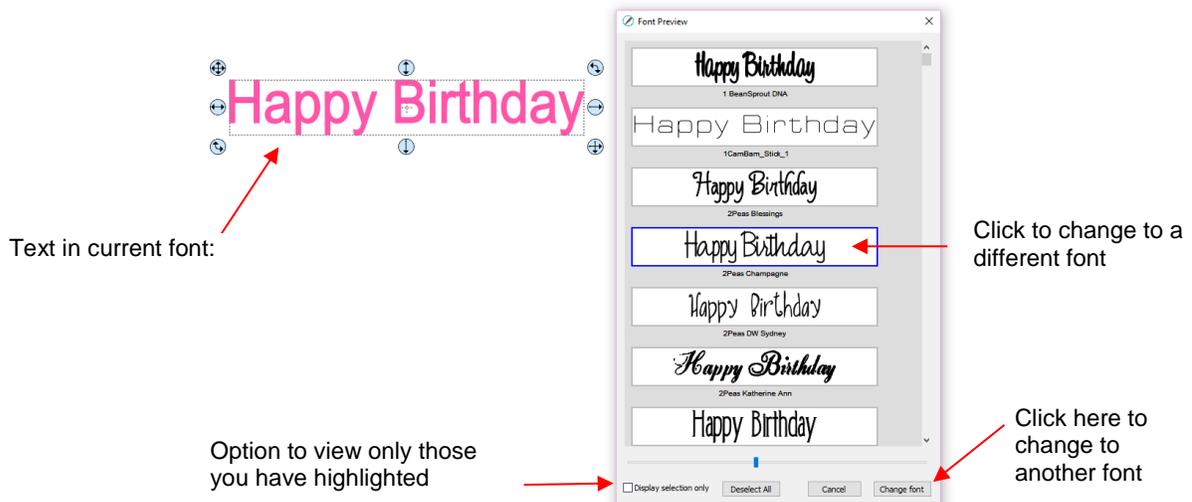
### 6.01 Text Options

- There are four modes for adding text to the **Cutting Mat**:
  - ◇ **Type Tool**: normal left to right typing of text
  - ◇ **Vertical Type Tool**: vertical aligned lettering
  - ◇ **Type on Path Tool**: text is aligned along the path of your choosing
  - ◇ **Type on arch**: text is arranged in a circular pattern
- To select a mode, hold down the mouse button on the **Type Tool** icon  on the **Tools Panel**. The screenshot below indicates where to go for further instructions on using that text mode:



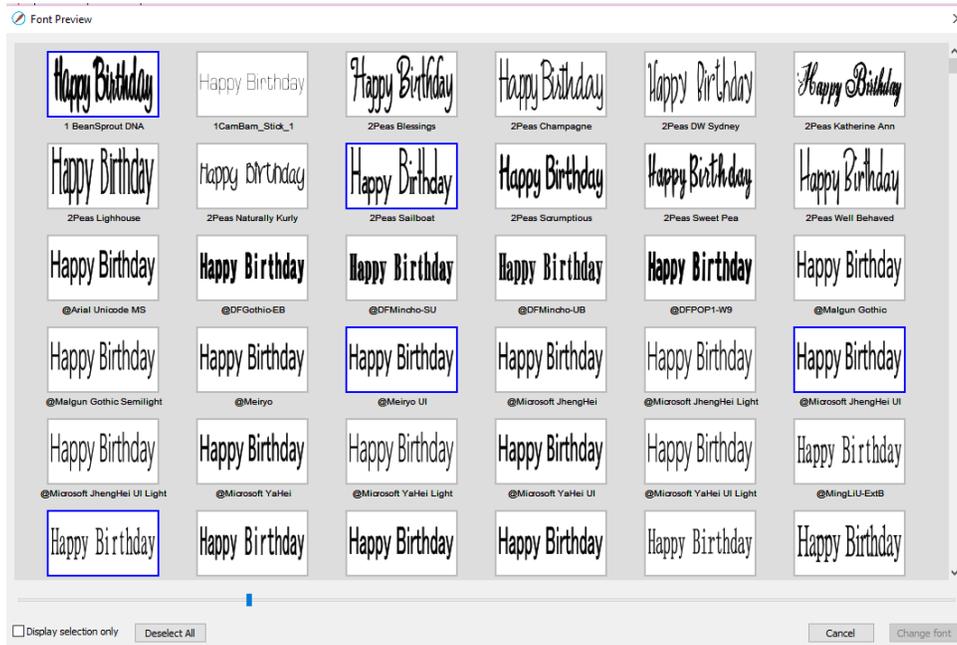
### 6.02 Selecting a Font

- There are three places to select the font:
  - ◇ Click the **Text Settings** icon  on the **Properties Panel** to open the **Text Panel**. Select from the **Font** drop-down menu.
  - ◇ Go to **Text>Font**
  - ◇ Click on the **Fonts** tab in the **Library** (refer to *Section 4.03.2*).
- If you are looking for a particular font in any of those three menus, type the first letter of the font name and you will be taken to the fonts that begin with that letter.
- To view the text you're using in different fonts, first type out the text using the instructions in *Sections 6.03 and 6.04*. Then select the text and go to **Text>Font Preview**. There you can scroll through all of the fonts currently installed in SCAL to view others you might prefer:



- You can expand this window and decrease the size of the fonts by scrolling the size bar to view more samples. Also, you can highlight those of interest and then click **Display selection only** to more easily decide which ones you might like to use:

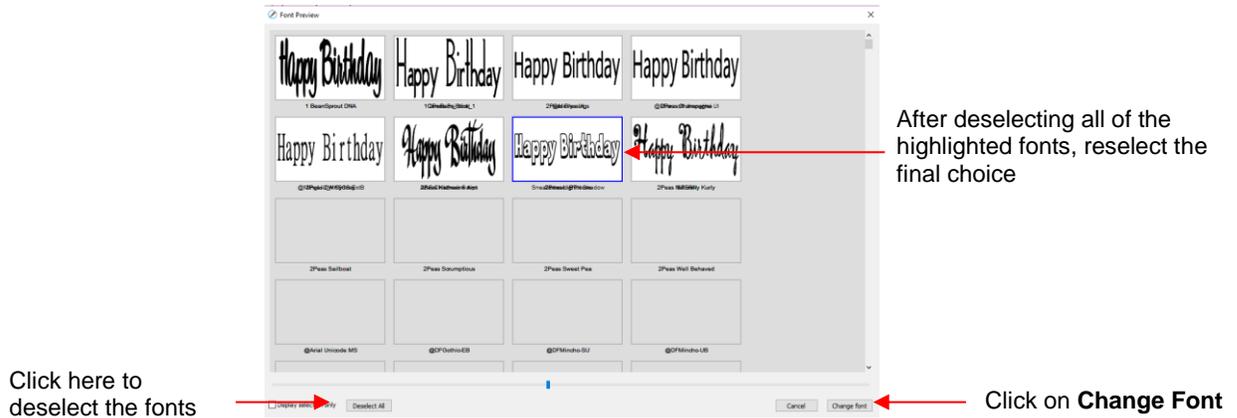
◇ Expand the window and highlight those you want to further compare:



◇ After scrolling through fonts and highlighting only those of further interest, click on **Display selected only**:



◇ To change the original text to one of these choices, click twice on **Deselect All** and then click on your final selected font and click on **Change Font**:

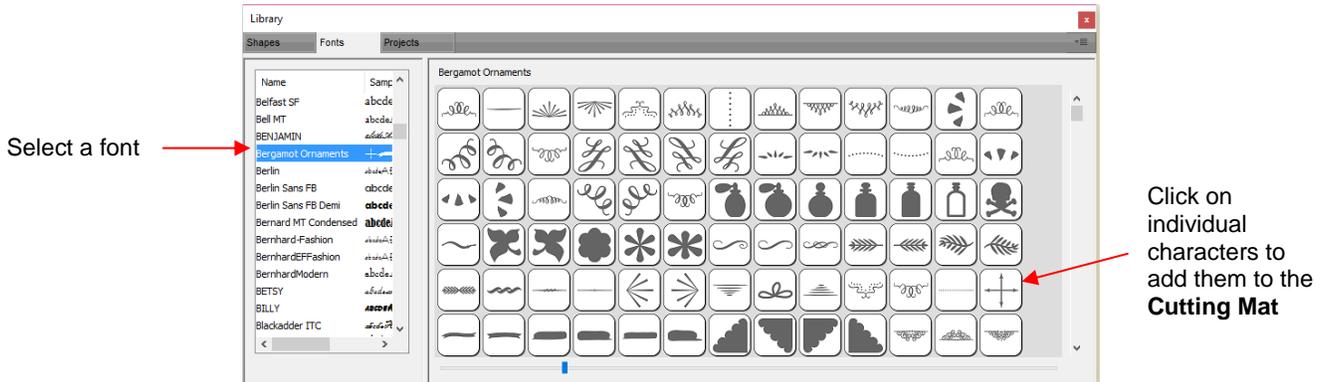


- If you want to load a new font that's not already installed on your computer, go to **Text>Load Font File**. Browse to locate the font file (including .TTF, .OTF, or .OPF) of your choosing and click on **Open**. This font will now be available until SCAL is closed. The **Library** also offers this feature. Refer to *Section 4.06.2*.

- **IMPORTANT:** When you open a font file for temporary use, the text you create needs to be converted before saving the file. Otherwise, it will not be shown in this same font the next time you open that file. Thus, before saving the file, select all of the text and apply one of the following:
  - ◇ Go to **Text>Convert Text to Outlines**
  - ◇ Go to **Path>Object to Path**
  - ◇ Right-click and select **Path>Object to Path**

### 6.03 Adding Text Options

- There are three ways to add text to the **Cutting Mat**:
  - ◇ Click on the **Type Tool** icon  on the **Tools Panel**, click anywhere on the **Cutting Mat**, and begin typing. This is the easiest method when adding ordinary text.
  - ◇ Copy and paste text from another application, such as from Word, Excel, or from an email, onto the **Cutting Mat**. Before pasting, click on the **Type Tool** icon  on the **Tools Panel**
  - ◇ Click on the **Fonts** tab in the **Library** and click on characters shown in the character map. This is the easiest method when using dingbat fonts:



### 6.04 Four Modes of Text

#### 6.04.1 Type Tool

Jay  
McCauley      Max  
McCauley

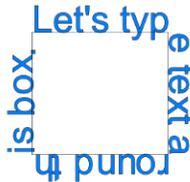
- Hold down the mouse button on the **Type Tool** icon  on the **Tools Panel** and select the top choice: **Type Tool**.
- Click anywhere on the **Cutting Mat** and begin typing. Note that:
  - ◇ Pressing the **Enter** key will move the cursor to a new line and you can continue typing
  - ◇ Clicking elsewhere on the **Cutting Mat** will allow you to begin adding new text at that location
  - ◇ When done, either press the **Esc** key or click on the **Select** icon  on the **Tools Panel**

### 6.04.2 Vertical Type Tool

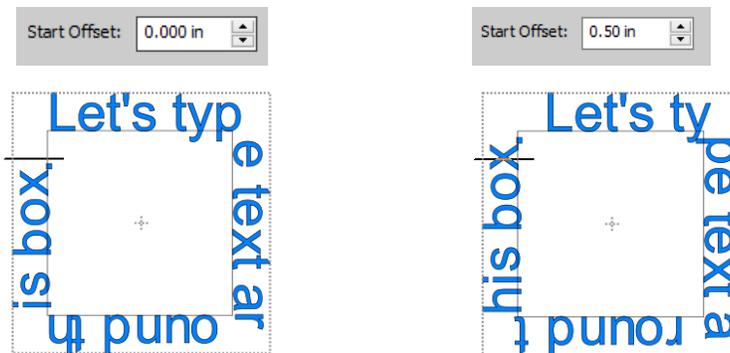


- Hold down the mouse button on the **Type Tool** icon  on the **Tools Panel** and select the second choice: **Vertical Type Tool**.
- Click anywhere on the **Cutting Mat** and begin typing. Note that:
  - ◊ Clicking elsewhere on the **Cutting Mat** will allow you to begin adding new text at that location
  - ◊ When done, either press the **Esc** key or click on the **Select** icon  on the **Tools Panel**

### 6.04.3 Type on Path Tool



- Determine which shape you want to use for the path. In the prior screen shot, a square was used. But it could have been a curve or any other shape.
- Hold down the mouse button on the **Type Tool** icon  on the **Tools Panel** and select the third choice: **Type on Path Tool**.
- Click on the shape and begin typing. In the **Tools Options**, a setting appears which allows you to move the start point for the text further along the path. Otherwise it will start at the leftmost side:



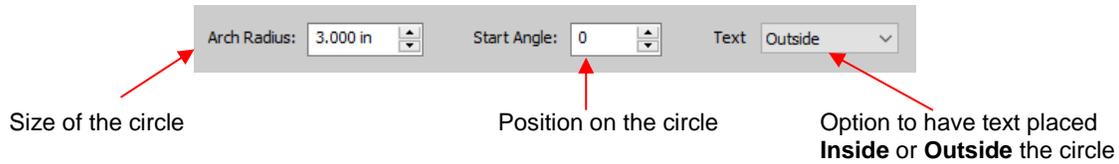
- When done, either press the **Esc** key or click on the **Select** icon  on the **Tools Panel**. Note that if you no longer need the path for your project, hide or delete that layer.

### 6.04.4 Type on Arch Tool



- With this function, text is typed as if it were following an imaginary circle.

- Hold down the mouse button on the **Type Tool** icon  on the **Tools Panel** and select the last choice: **Type on arch**.
- Click anywhere on the **Cutting Mat** and begin typing. In the **Tools Options**, three settings will appear allowing you to customize the results:

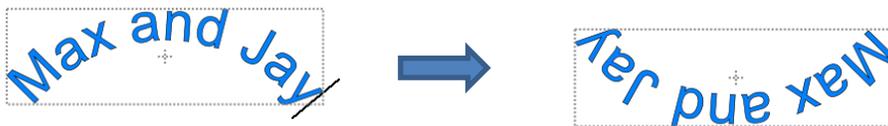


- For example:

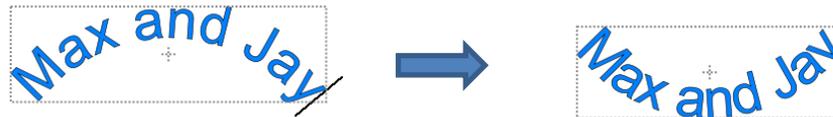
Decreasing the **Arch Radius** from 1.0 to 2.0:



Changing the **Start Angle** from 0 to 180:



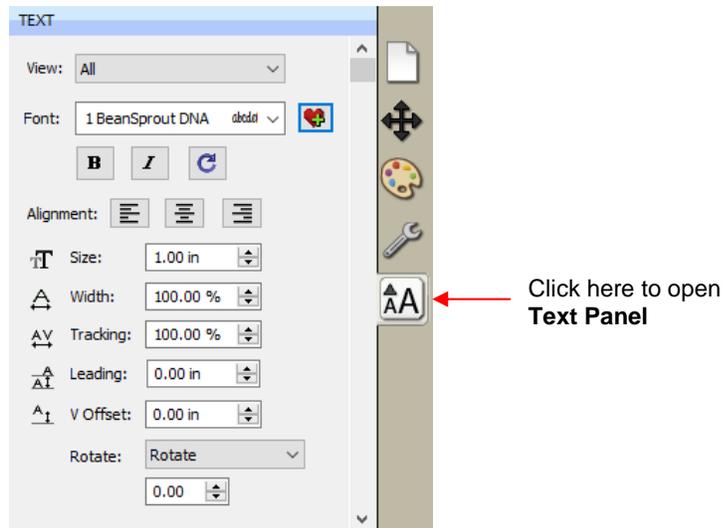
Changing **Text** from **Outside** to **Inside**:



- When done, either press the **Esc** key or click on the **Select** icon  on the **Tools Panel**.

## **6.05 Text Settings**

- The **Text Settings** window offers an array of settings related to the creation and editing of text:
  - ◇ Before typing text, make changes in this window so that they will be in place when text is then typed.
  - ◇ For existing text, drag your mouse to highlight the letters and then change settings to be applied. For example, a different font, different size, wider spacing, etc. (Note that in order to highlight text, you need to first click on the **Type Tool** icon  on the **Tools Panel**.)
- To open, click on the **Text Settings** icon  on the **Properties Panel** to open the **Text Panel**:



- The following is a list of these settings and how to apply them. Note that if the text is already typed, you can highlight all or only a portion of the text for the change.

- ◇ **View:** Controls which fonts show in the menu under **Font**:
- ◇ **All:** Displays all installed fonts plus any that have been temporarily installed during this session of SCAL
- ◇ **Favorites:** Displays all fonts you have assigned as a **Favorite** in the **Library**
- ◇ **This Project:** Displays all fonts currently used since starting this particular project during this session
- ◇ **Font:** Menu of fonts which can be used for new or existing text. Note that you can also add to your **Favorites** list by selecting a font and then clicking on the  icon to the right.



- ◇ **Bold Italic Reload:**
- ◇ **IMPORTANT:** Some fonts will change significantly if the **Bold** option is selected. The same is true of the **Italic** option. Make sure these icons are not indented/blue unless you are confident you want to use either or both of them.
- ◇ **Reload** is only needed if you have separately installed new fonts on your computer since opening the current SCAL session.
- ◇ **Alignment:** Standard text justify options: Left Align, Center Align, and Right Align 
- ◇ **Size:** Approximate height of lettering based on an ascender and descender. For example, if text is set to 1.0 inches, then the height of the word “Baby” would be ~ 1.0.” However, the “B” typed by itself might only be 0.7” in height because there is no descender, such as the letter “y”.
- ◇ **Width:** Increasing the width will widen the letters leaving the height unchanged. Note that letter spacing will not be altered, thus the letters may end up overlapping unless Tracking is increased, as well.
- ◇ **Tracking:** This is the spacing between letters. Increasing will spread letters apart while decreasing will force them closer together and can result in overlapping.
- ◇ **Leading:** Changes the spacing between lines of text
- ◇ **V Offset:** Raises or lowers a line of text or, more commonly, can be used to raise and lower individually selected letters
- ◇ **Rotate:** Rotates a line of text or can be applied to individual letters

## 6.06 Other Text Editing

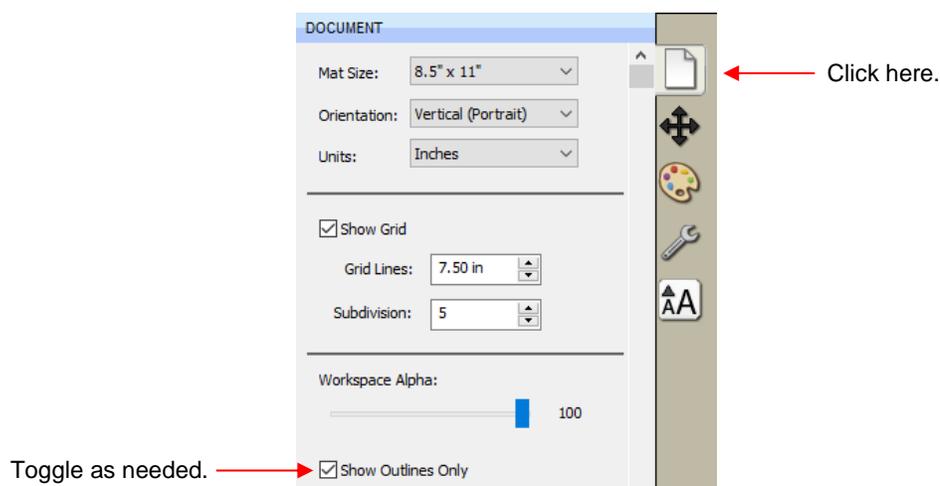
- **Ungroup:** To split a selection of text into individual letters, apply the **Ungroup** function using one of the following ways:
  - ◇ Right-click and select **Ungroup** from the popup menu
  - ◇ Go to **Object>Ungroup**
  - ◇ Apply **Ctrl+Shift+G**
- **Break:** To break a selection of text into individual paths, apply the **Break Apart** function using one of the following ways:
  - ◇ Right-click and select **Break Apart** from the popup menu
  - ◇ Go to **Object>Break Apart**
  - ◇ Apply **Ctrl+B**
- For more information on **Ungroup** and **Break Apart**, refer to *Sections 5.10.2* and *5.11.1*.

## 6.07 Creating a Connected Letter Title

- Using the instructions from *Section 6.04.1*, type the letters of your title:

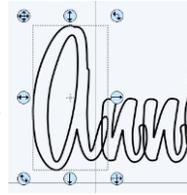
Happy Anniversary

- Because you will be working with the letters individually, select the title and apply **Ungroup** (*Section 6.06*).
- With the letters split, you can select one or more and use the left and right arrow keys to change the spacing between letters, overlapping as desired. It is advisable to zoom in on the text to get a more accurate view of the actual positioning of the letters. You may also want to check the text both with and without **Show Outlines Only** option turned on (which can be changed on the **Document Panel**):

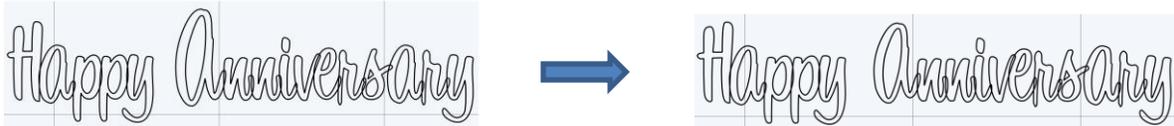


- Also, you should turn off **Snap to Grid** so that you can more freely move letters. This is located under **View>Snap To**.
- Begin overlapping the letters. It's usually advisable to move letters either by using the arrow keys on the keyboard or by using the left center icon:

Drag this icon so that letter can only move horizontally.



- Continue arranging letters as desired. Remember that you can customize freely to get the desired look. For example, in this font called 1 Bean Sprout DNA, the vowels tend to be a bit oversized compared to other characters in the font. Thus, the uppercase “A” can be sized smaller to better match the other letters:



- When you are satisfied with the overlap, select all of the letters and go to **Path>Union**. The overlap will be removed:



- To create an outline/shadow for titles and other shapes or if you need to thicken a font that turns out to be too thin for cutting, refer to *Section 9.04*.

## **6.08 Incorporating Shapes into a Title**

- A quick way to incorporate a shape into a welded title is to use any of thousands of dingbat fonts available from the Internet for free or even check the SCAL **Library** for a shape. In this example, a script font is being used for the title and a turkey, found in the **Library** under the *Fall* folder, will be used for the shape.
- Using the steps in *Section 6.04.1*, create the title:

Happy Thanksgiving

- Select the title and go to **Object>Ungroup**. Then move the “Thanksgiving” part to the right to add some spacing for the turkey. In this example, other parts were also moved so that all letters in “Happy” and all letters in “Thanksgiving” overlap.

Happy Thanksgiving

- In the **Library**, locate the turkey shape and click on it to add to the **Cutting Mat**. Resize and arrange to overlap with the lettering:

Happy  Thanksgiving

- Go to **Path>Union** or press **Ctrl+Shift+U** to remove the overlap:



- Note that dingbat fonts and **Library** shapes are not the only shapes that can be welded to letters. Any shape imported or created within SCAL can be used!

### 6.09 Welding Titles in Imaginative Ways

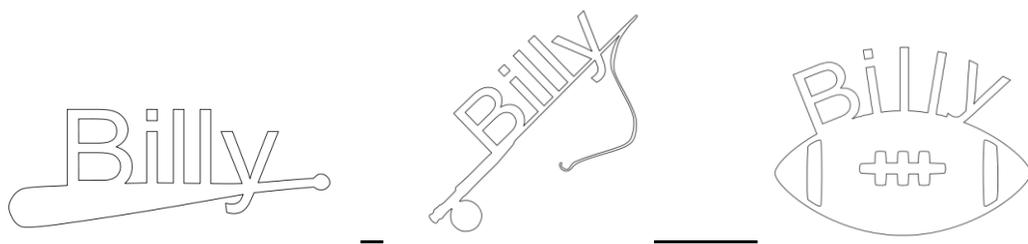
- Some fonts simply do not work well with the traditional overlapping of the letters to be welded into one piece for cutting. For example, let's take an extreme case with Arial font and the name, "Billy". Note what happens when you overlap the letters in this particular font:



- Most crafters will start looking for a different font... one with ligatures (extenders) that easily connect the letters to one another. However, many fonts with ligatures are script fonts and may not convey the desired look. Instead, look for objects that can be used to connect the letters. A basic thin rectangle is an easy solution. Just align it along the bottom of the letters and weld:

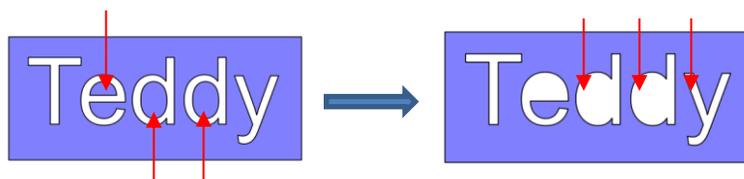


- However, the objects to use as a base do not have to be so basic. Look for objects that will tie into a theme. Here are just a few examples:



### 6.10 Stenciling Letters

- When creating a stencil, you keep the "waste" or "negative" of a cut. When using regular fonts, such as Arial, some of the letters, such as a "B", "a", and "e", will not work because they have interior paths called child shapes. Those child shapes are not connected to the waste portion of the material and will be lost from the stencil as shown below. The red arrows indicate the child shapes inside parent shapes for the letters "B", "a", and "e":

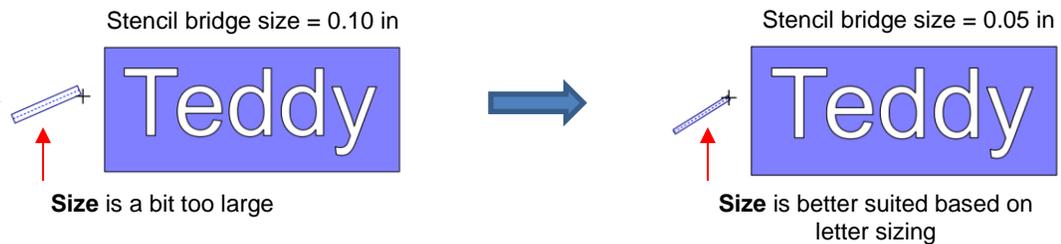


After cutting and lifting the stencil from the mat, the interior parts of the "e" and the "d"s will be cut away.

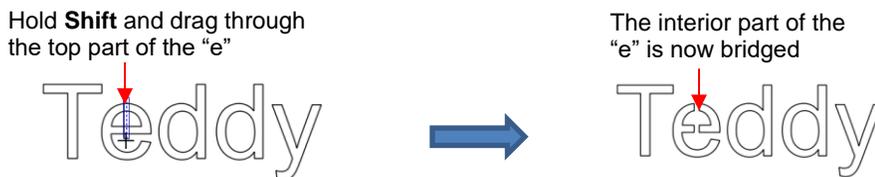
- To avoid this, a procedure called stenciling can be used to connect the area outside of the letters to the child shapes, essentially eliminating them. There is a feature on the **Tools Panel** called the **Stencil Bridge** which can be used to connect the interior parts to the surrounding area.
- Before using this function, select the text and go to **Object>Ungroup**. Failure to do this can cause distortion of other letters as the stencil function is applied. Then click on the **Stencil Bridge** icon .
- Zoom in close on the lettering so that you'll be able to see exactly where you need to connect. Click on the **Stencil Bridge** icon and, in the **Tools Options** at the top, a setting for the width or thickness of the bridge can be set:



- The **Size** you enter will normally relate to the height and style of the lettering you are stenciling. In this example, the name "Teddy" was typed at a height of ~1 inch. The **Stencil bridge size** is set at 0.10, but it could be smaller or larger depending on your personal preference. Before applying, you can drag the mouse in an empty area of the screen to see the size that will be used and adjust accordingly:



- Before applying, hide the outside rectangle, so that it's not affected. You can now drag the mouse across a letter to create a bridge. Hold down the **Shift** key, while dragging, and the bridge will be either perfectly vertical or perfectly horizontal:



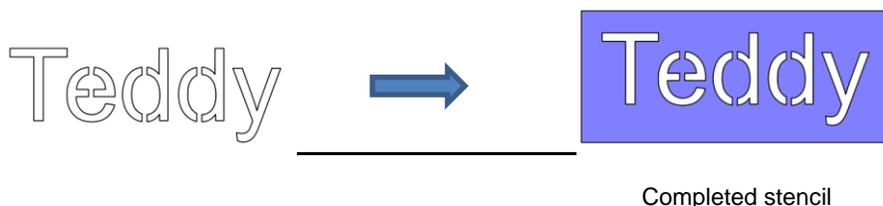
- Repeat the process with the other letters containing child shapes:



- Note that just one part of the letter could have been bridged instead of both the top and the bottom:



- Unhide the rectangle and the stencil is ready to cut:



## 6.11 Open Path Fonts (OPF)

- Besides TTF and OTF, a third type of font, Open Path Font (.OPF) can also be opened in SCAL. This font consists of single lines/curves only. Here's a comparison to help you understand the difference:



TTF version



OPF version of the same font

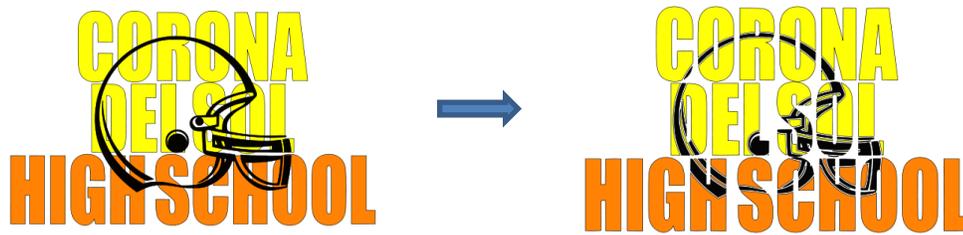
- These fonts are useful when using a pen or engraving tool in your cutter or for designing single line rhinestone titles:



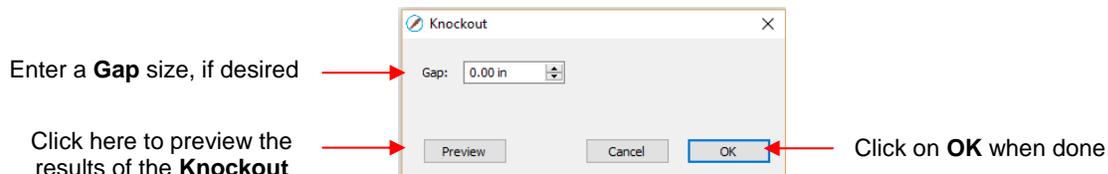
- Currently, this font type only works in a few applications like SCAL and does not install into Windows or on a Mac O/S for use in programs such as Word.
- To try out using Open Path Fonts, there are some free ones to download here:  
<http://www.iloveknk.com/Support/Software/Open-Path-Fonts/>
- Because these are open path, they may not appear on the **Cutting Mat** when you first add them. You will need to select a **Stroke** color on the **Fill & Stroke Panel**. Refer to *Section 5.14*.
- You can purchase Open Path Fonts (also called Thin Fonts) from [www.letteringdelights.com](http://www.letteringdelights.com) and from [www.onlinefonts.com](http://www.onlinefonts.com) to use in SCAL. Note that these also come with the TTF equivalents, which are not actual single lines and curves, but are still very thin.

## 6.12 Knockout

- The **Knockout** function involves overlaying one image on top of another and then merging the two so that the overlap between the two images is, essentially, cut out and replaced with that part of the top image. This is a popular design technique for HTV (heat transfer vinyl) applications so a typical high school design is used as an example:



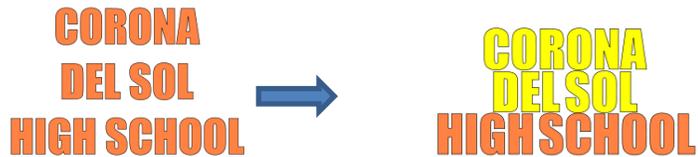
- To open the **Knockout** function window, select two or more shapes and go to **Effects>Knockout**:



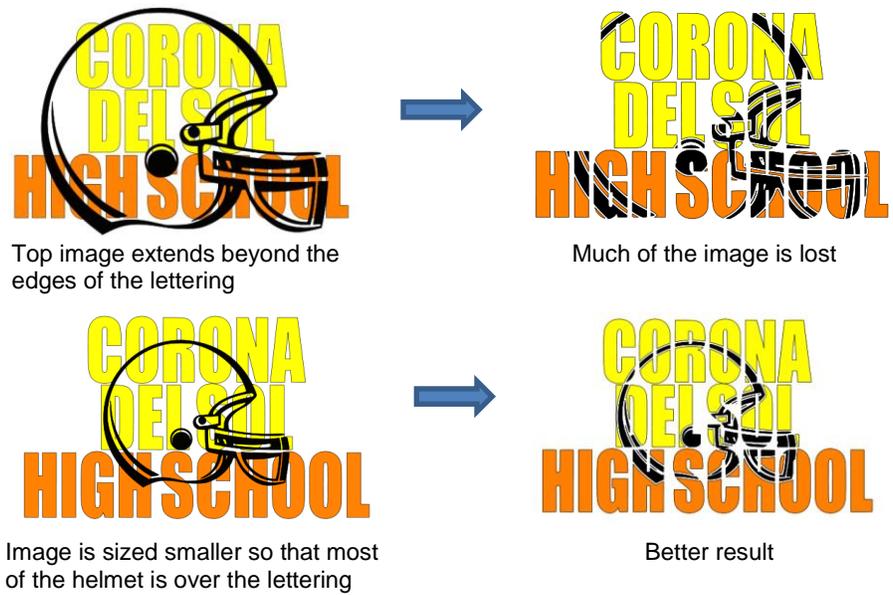
- The **Gap** will create an offset between the top image and the bottom image. This is not only pleasing to the eye but also makes alignment of two layers of HTV easier to manage. Here's an example showing how the gap affects the overall appearance:



- IMPORTANT!** When you click on **Preview**, it will take a few seconds or longer for the image to update. Be patient. Also, in cases where you have multiple images on top, such as the hearts in the prior screenshot, it is recommended that those shapes be joined first using **Object>Merge**.
- When preparing text, you want as little “white space” as possible. Thus, here are some guidelines:
  - ◇ Select a thick dark font. In the examples in this section, *Impact* was used.
  - ◇ After creating the text, move rows of letters together until they almost touch.
  - ◇ Reduce spacing between words, but make sure the text is still readable.
  - ◇ The text does not need to be all one shape. Thus, you can recolor parts of it if you wish.



- When aligning the top image over the lettering, note that anything extending outside of the image or over white areas will be deleted. So size the image accordingly:



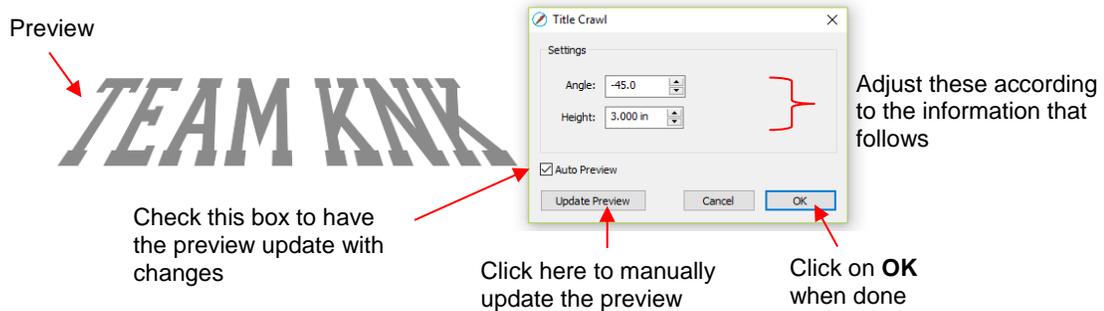
- Note that the **Knockout** function isn't just for text. It can be used on any vector shapes. Because it is so popular with lettering, its presentation in this chapter seemed appropriate.

## 6.13 Title Crawl

- **Title Crawl** distorts text (or any shape) so that it appears to be stretching towards you or away from you:



- To apply **Title Crawl**, select the text and go to **Effects>Title Crawl**. The following window opens:



- ◇ **Angle:** As the **Angle** setting is increased, the top of the title will rotate towards you. Decreasing the **Angle** setting will rotate away:



- ◇ **Height:** This setting works in an opposite manner to how one would expect. Increasing **Height** will make the text less rotated whereas decreasing it will make the text more rotated:



- Multiple lines of text can have **Title Crawl** applied to create the famous Star Wars “in a galaxy far far away” effect:

*Five years ago  
KNK USA selected  
designers to present  
three new projects every  
week to inspire and educate  
customers on using their KNK  
cutters. Visit [www.teamknk.com](http://www.teamknk.com)*

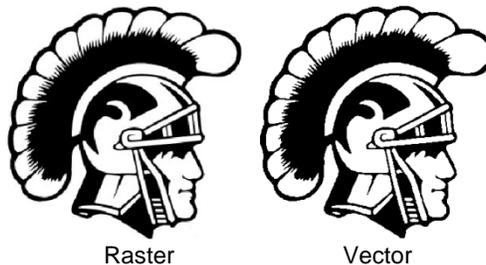
## 6.14 Other Text Effects

SCAL offers many other design functions to customize text for your projects. Refer to *Sections 9.12 – 9.17* for more ideas.

## 7. SCAL: Tracing and Drawing

### 7.01 Raster versus Vector

- All graphics are either raster or vector and there is no third type. While you can often tell by the file format, even that isn't always a good way to know for certain. For example, a PDF file can be made from either raster images or vector images and some PDF's will contain both types.
- You may not be able to tell, at first glance, whether an image is a raster or a vector. For example, this screen shot shows the same image in both formats:



- Most everyone today has a digital camera and, at the very least, has heard the term “mega-pixel.” A pixel is a square that is black, white, or colored. Photographs are made up of millions of these pixels to create the image you see. If you zoom in close enough on any raster image, you can see these tiny pixels. But when you zoom in close on the same area in the vector version, you will instead see lines and curves, not squares/pixels:



- A vector image isn't made up of pixels. Instead, a vector is like a connect-the-dot puzzle in which little dots (called nodes or points) are connected to each another with paths (either straight lines or curves). Digital die cutters need those paths so that they can communicate to the cutter where the blade should travel in order to cut what you want... kind of like a road map. In SCAL, the nodes look like this:



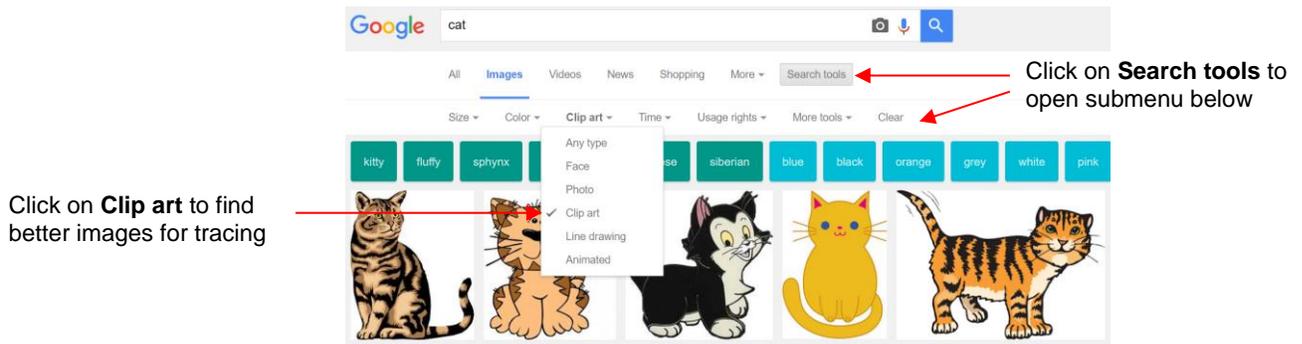
- As mentioned earlier, you can often tell whether a file is a raster or a vector based on the file format. Here are some guidelines:

Raster: BMP, JPG, GIF, PNG    Vector: AI, EPS, DXF, SVG    Either: PDF, sometimes EPS & WMF

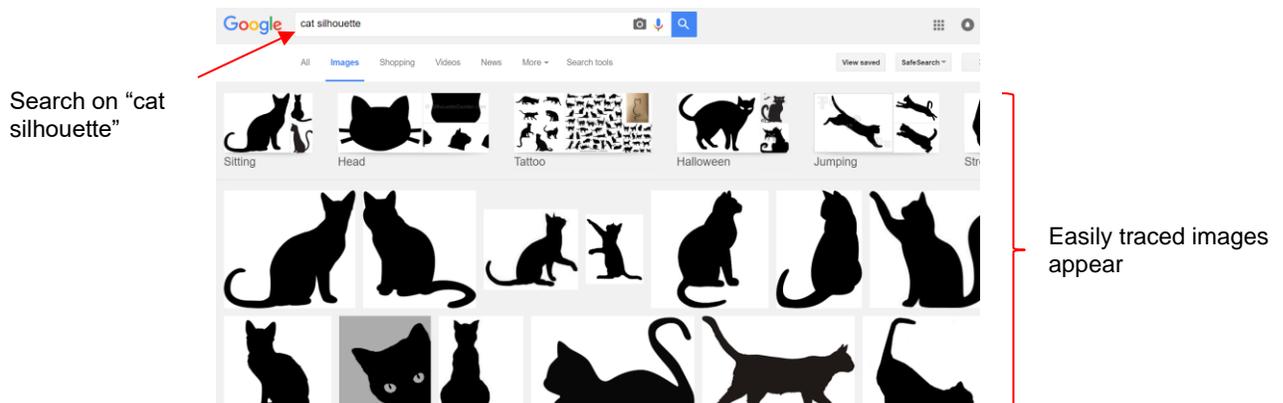
- To convert a raster into a vector, SCAL offers both an automatic and a manual trace function. Because the automatic **Trace** feature in SCAL is so fast and powerful, it is always worth trying it first. The only situation in which it may not be able to provide the results you need are (1) the image is very tiny or has a very poor resolution or (2) the image has poor contrast between one part and the next. For example, imagine a brown dog lying on brown carpet. How would the software know what part is the dog and what part is the carpet? Thus, you may need to manually trace some images, so both functions are covered, in detail, in this chapter.

## 7.02 Finding Easy Images to Trace

- What qualifies as an easy image? The obvious answer is “an image which gives you the results you want!” But those who are new to the vectorizing process do not always realize which images are going to be easy and which ones are not. Note that you shouldn’t be discouraged from trying to trace anything. But when you are learning the process, working with easier images will make the learning stage go smoother. So here are a few guidelines in selecting images:
  - Black and white images are easier to vectorize than colored images
  - Colored images with flat colors are easier to trace than those with variegated colors
  - Large, high resolution images are easier to trace than tiny, low resolution images
  - Images with tiny details will be more difficult to trace than simpler images with fewer details
  - Photographs are usually the most difficult to trace, especially when some of the colors blend (such as the brown dog on the brown carpet, mentioned earlier).
- For your own personal use, there are many images that can be found on the Internet. Use [Google Images](#) to search and find images based on keywords. Google Images also has filters at the top of the window (under **Search Tools**) to limit your search to black and white, as well as to clipart or line drawings. For example, after searching on the word cat, one can limit the images in this way:



- Adding the word “*Silhouette*” in a search, will also produce images that are typically very easy to auto-trace:

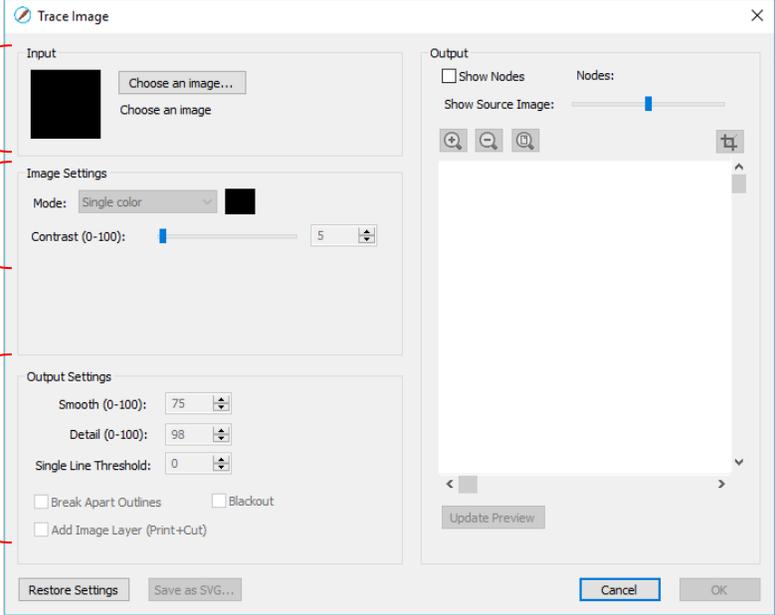


- When you find an image you want to trace, click on it first to bring up a larger version. Then right-click and select **Save image as** from the popup menu. Note: If you use a browser other than Chrome, the popup menu may have slightly different wording for saving a file.
- **IMPORTANT!** Before tracing any Internet images, be sure to check the *Terms of Use* at the site hosting the image.

## 7.03 Trace Function

### 7.03.1 Trace Settings

- To begin the tracing process, open the **Trace Image** window using one of the following ways:
  - Click on the **Trace** icon on the **Toolbar** 
  - Go to **File>Trace Image**
  - Press **Ctrl+Shift+T**
- There are five sections to the **Trace Image** window: **Input**, **Image Settings**, **Output Settings**, **Output**, and then the bottom bar. Note the location of each section and its main purpose. More details about each section follows:



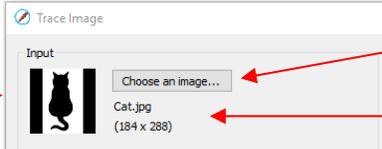
**Input:** import the raster and see details

**Image Settings:** select the type of trace to perform and how much to include

**Output Settings:** control the type of trace lines

**Output:** control how the image appears in this window and preview the trace lines

- Input:**



Thumbnail of imported file →

Click here to import a new raster file

File name and size in pixels

- Alternatively, before opening the **Trace Image** window, you can import the raster file using **File>Place Image**. Then, with the image selected, open the **Trace Image** window and this image will be loaded and ready for changes to trace settings.

- Image Settings:**

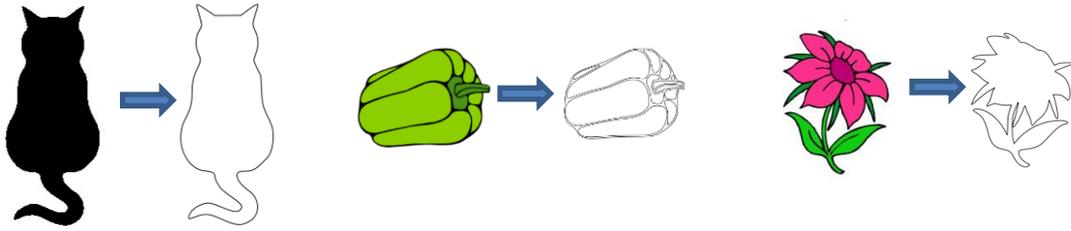
Choose from three modes:  
**Monochrome, Color Layers, or Single Color**



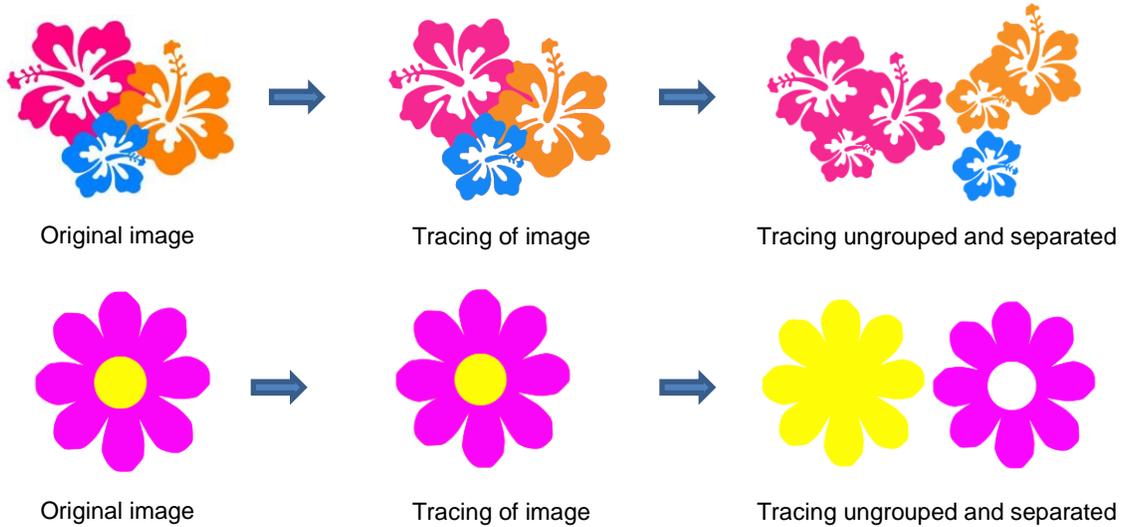
Mark this box if imported file is a PNG with a transparent background

Increase **Contrast**, if needed to control what is included in trace

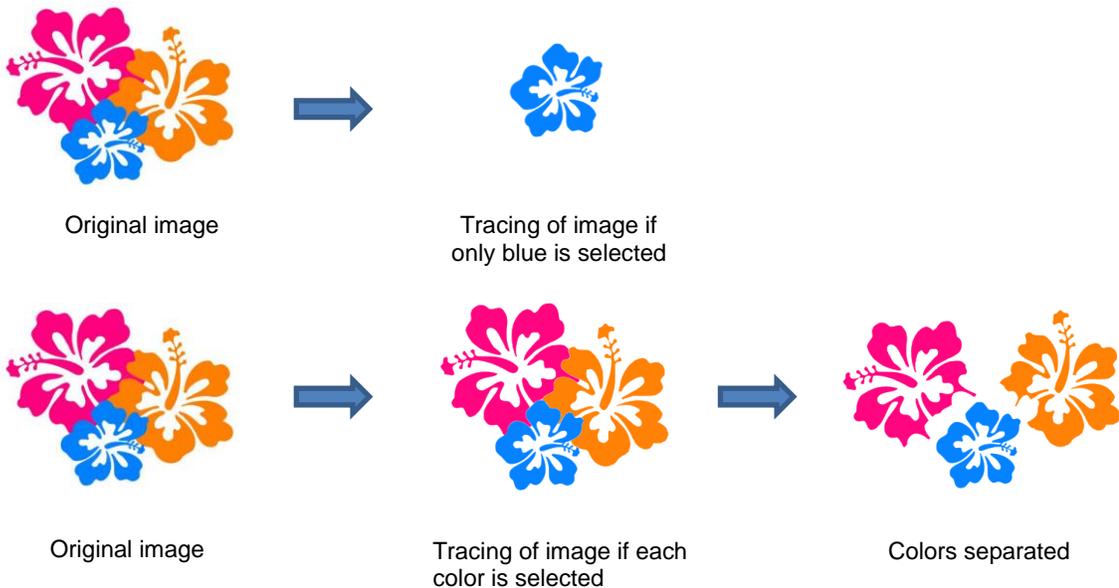
- The **Mode** you choose is determined by the desired outcome / project application, as follows:
- Monochrome:** choose this mode when you only need a black and white trace of the image:

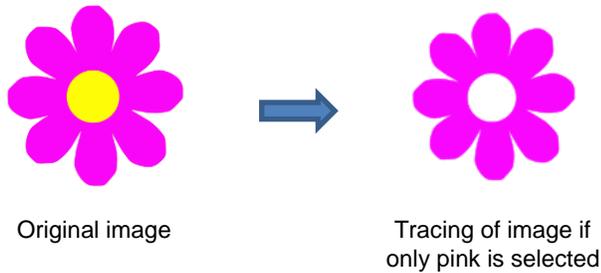


◇ **Color Layers:** choose this mode for multi-color images where you need separate colors, such as for a paper piecing or layered vinyl project and you want underlayers to use for alignment. Two examples follow which illustrate what is produced when **Color Layers** is chosen:



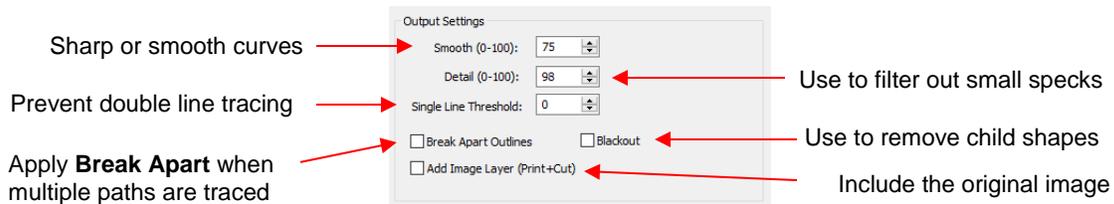
◇ **Single Color:** choose this mode when you want to single out a certain color to be traced or when the multi-color image needs to have colors traced exactly as displayed. This would be a typical choice for an HTV application where you do not want layers of material to overlap. The same examples are used again to demonstrate the difference:





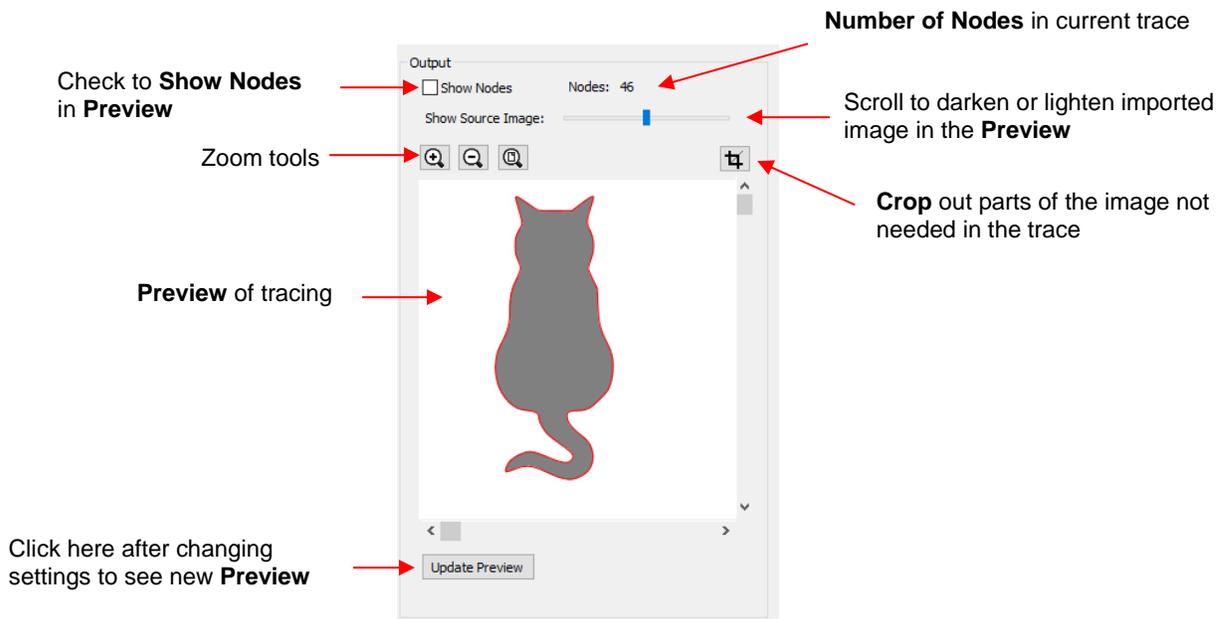
- ◇ Check the **Use Alpha Channel** box if the imported file is a PNG file with a transparent background. The transparent background is easily identified by the trace program requiring very little adjustment to other settings.
- ◇ **Contrast** controls the level of color differentiation included in the trace: lower will include less, higher will include more.

- **Output Settings:**

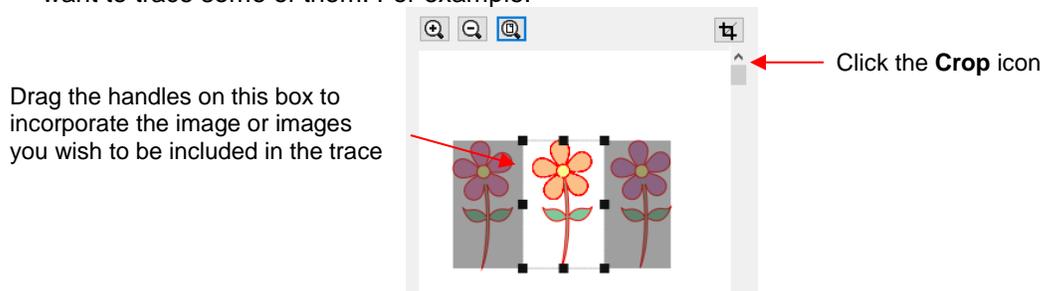


- ◇ **Smooth:** Adjust according to type of image. For example, decrease (make sharper) if tracing a shape with sharp corners like an envelope template. Increase (make smoother) if tracing a shape with soft curves, like a teddy bear. Refer to *Section 7.03.3*.
- ◇ **Detail:** If tiny undesired shapes appear, decrease to filter those shapes out.
- ◇ **Single Line Threshold:** When tracing coloring book images (image with black outlines), use to convert those double lines to single lines.
- ◇ **Break Apart Outlines:** Checking the **Break Apart Outlines** box will save a step if different parts of the tracing need to be edited separately or placed on separate layers.
- ◇ **Blackout:** Check this box so that internal shapes (child shapes) are not included in the tracing.
- ◇ **Add Image Layer:** Check this box if a copy of the imported image will be needed, such as for a print and cut application. The result will be two layers grouped: one will be labeled “Print” and the other layer will be labeled “Cut.”

- **Output:**

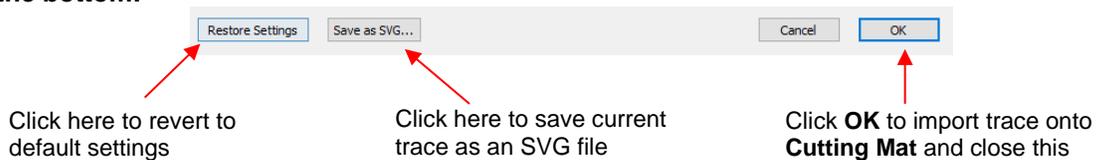


- ◇ None of the settings in the **Output** section affect the final result, with the exception of the **Crop** function. The other settings only affect the **Preview** so adjust as desired.
- ◇ When you click on the **Crop** icon, a rectangle will appear that can be resized to fit around the desired part of the image. This is useful when there are multiple images in a raster file and you only want to trace some of them. For example:



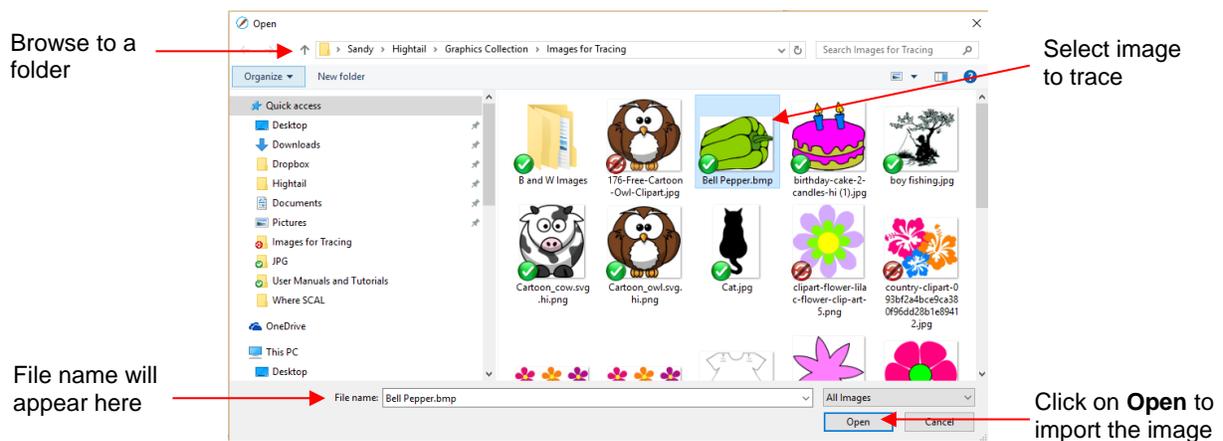
- ◇ Note that the red lines in and around shapes in the **Preview** window indicate the actual trace lines as a result of current settings

- **At the bottom:**

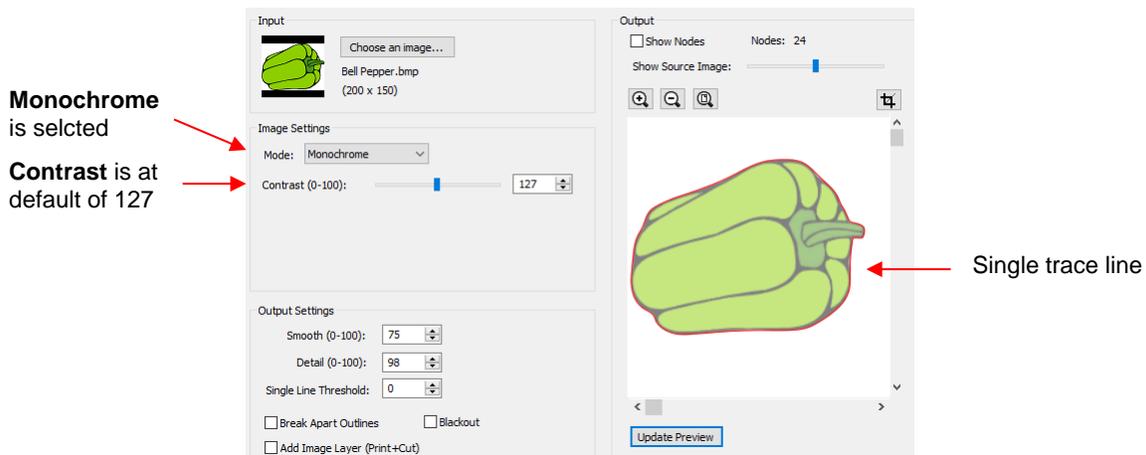


### 7.03.2 Monochrome Trace of a Colored Image: Effects of Contrast

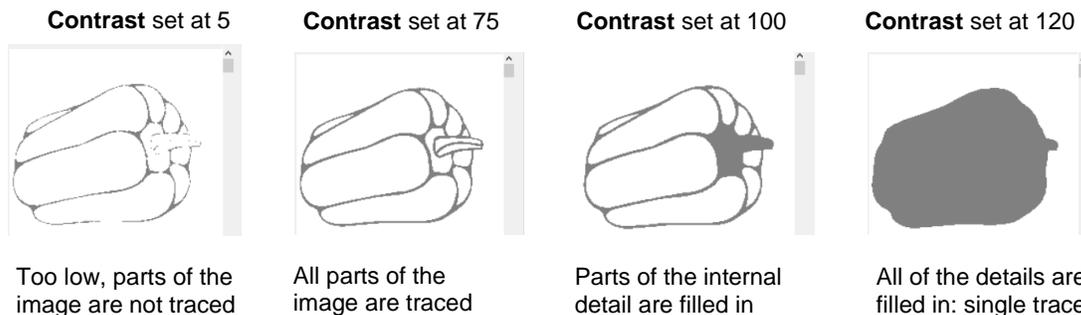
- Start by clicking on **Choose an image** in the **Input** section and then browse to locate the raster file you wish to trace:



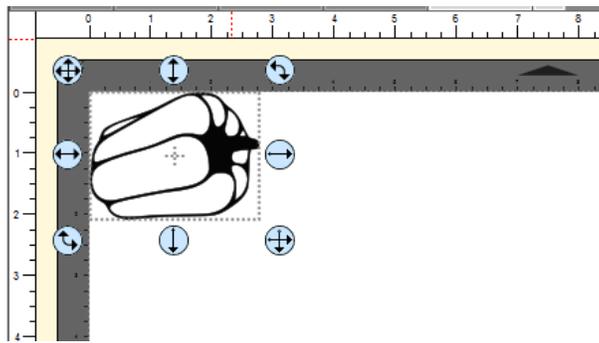
- In this example, a bell pepper image is imported for tracing and the **Preview** indicates a single trace path around the image:



- Let's experiment with the **Contrast** setting to fully understand how it works on an image of this type. Note that as you drag the **Contrast** scroll bar, the original image disappears so that you only see the trace lines:

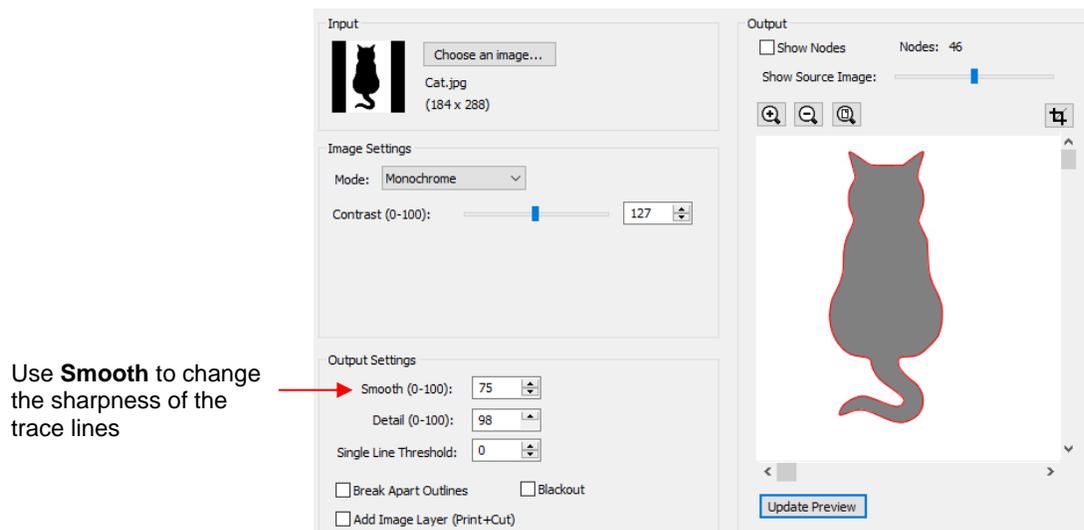


- Thus, for any given image, scroll the **Contrast** setting to see the effects and determine which version best suits your project needs. Once satisfied, click on **OK** and the image will appear in the top left corner of the **Cutting Mat**, ready to be resized and cut out:

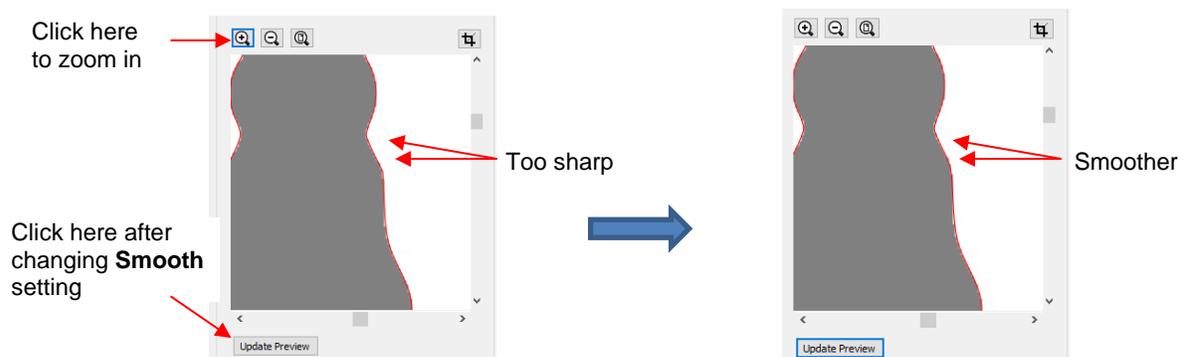


### 7.03.3 Monochrome Trace of a Silhouette Image: Effects of Smooth

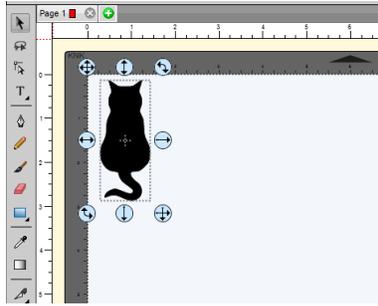
- As mentioned at the end of *Section 7.02*, silhouette images typically offer an easy trace. In this next example a silhouette cat image is imported into the Trace window. Because this is a silhouette image, **Monochrome** mode is chosen and the image appears to have traced very well. However, upon a closer look at the right side of the cat, it appears that the neck area is a bit sharp:



- To soften the outline of the cat, zoom in on that area and then increase the **Smooth** setting until a desired result is obtained. In the following screenshot, the **Smooth** setting is increased from 75 to 85. Remember to click on **Update Preview** after every adjustment to settings:

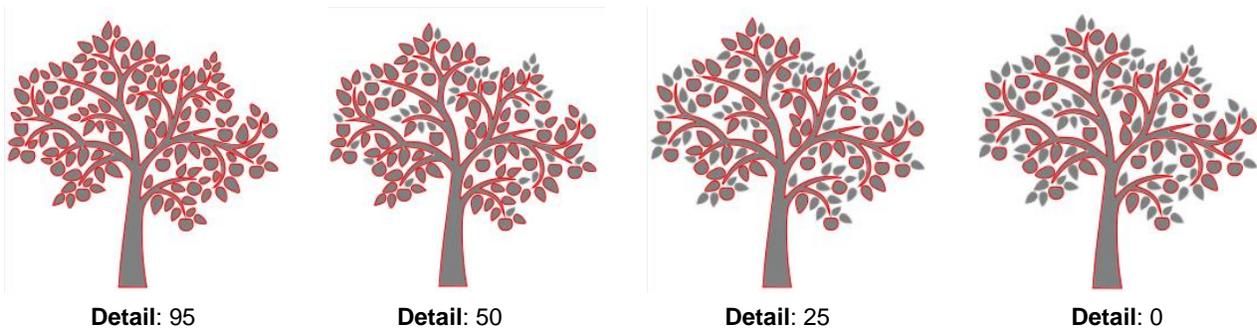


- After clicking on **OK**, the cat shape appears on the **Cutting Mat** and is ready to be sized and cut:



### **7.03.4 Monochrome Trace of a Detailed Image: Effects of Detail**

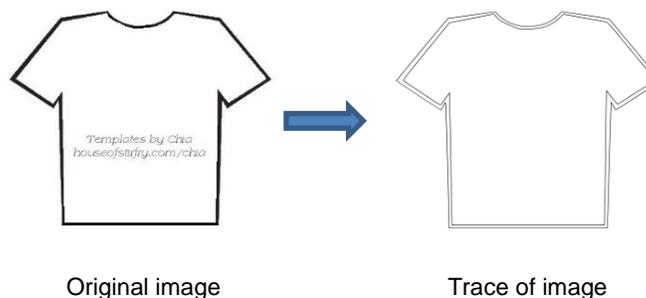
- The **Detail** setting can be used to filter out small shapes. Sometimes these shapes are just random pixels that show up from, say, a dirty scanner bed. Other times they are shapes that make up the design but will be too small to cut and are not needed.
- Before showing examples of the **Detail** effect, note that there will be times when some small shapes might be needed but not all of them. In those situations, it's best to include them and then they can be edited out using other tools in SCAL.
- The following tree image is imported into the **Trace** window. You have decided that not all of the leaves needed. The **Detail** setting can be lowered to filter out some of the smaller ones:



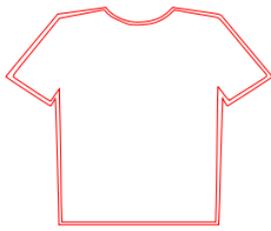
- As shown in the prior screenshot, decreasing **Detail** will remove small shapes. However, even at 0, there are still shapes of a certain size that will be included in the trace. Again, there are editing tools that can be used in case more of the small shapes need to be removed. Refer to *Section 8.06*.

### **7.03.5 Monochrome Trace of a Coloring Book Image: Single Line Threshold and Blackout**

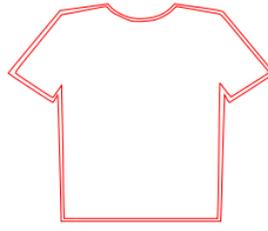
- The **Single Line Threshold** setting is useful when the imported image had a black border around it and you do not want a double line trace. For example, if the following T-shirt image is traced using default settings, two trace lines result: one line is following the outside of the black border while the other line is following the inside of the black border:



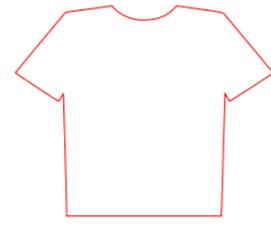
- To have only one trace line, increase the **Single Line Threshold** setting until there is only a single line showing in the **Preview** window:



Single Line Threshold = 0  
double line

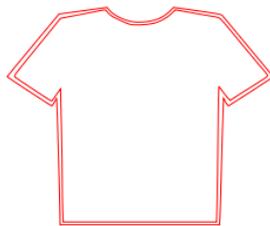


Single Line Threshold = 5  
double line

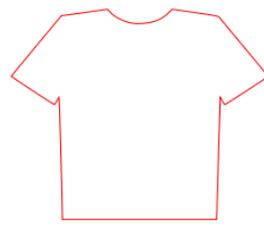


Single Line Threshold = 10  
single line

- Because the T-shirt image is a simple closed shape, the **Blackout** option could have been used instead of **Single Line Threshold**:

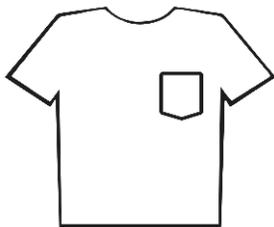


With **Blackout** unchecked

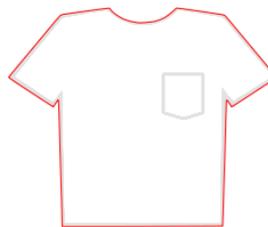


With **Blackout** checked

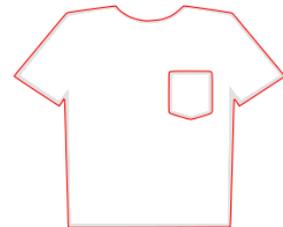
- However, if the T-shirt had internal details, such as a pocket, then **Blackout** could not be used as the entire pocket would have been ignored. In this situation **Single Line Threshold** is the better choice:



Original image



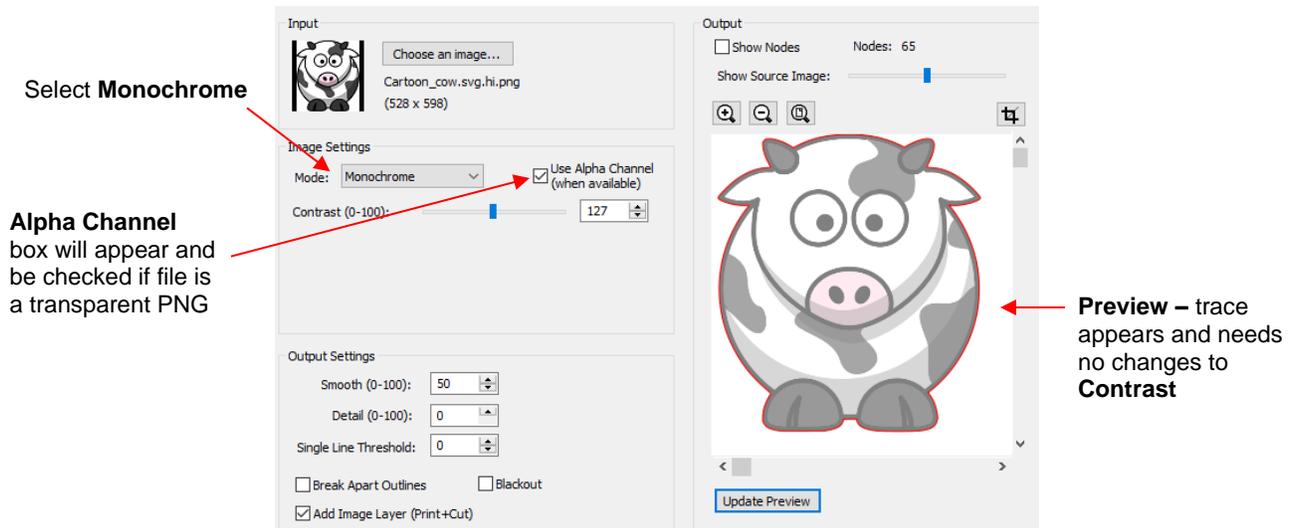
Preview of trace with  
**Blackout** checked



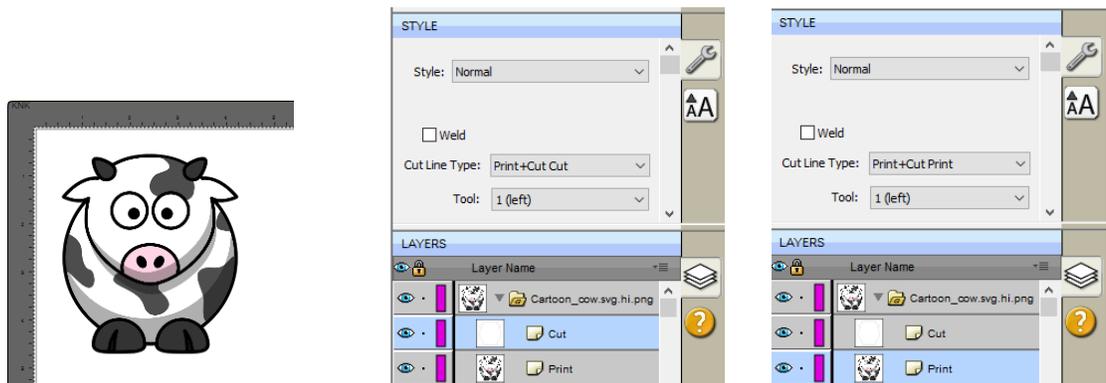
Preview of trace with  
**Single Line Threshold**  
increased

### **7.03.6 Monochrome Trace of a PNG File with a Transparent Background**

- PNG files with a transparent background are the easiest files to trace because the software can readily identify where the invisible background starts and ends. Furthermore, when you load a PNG file into the **Trace** window, an option will pop up if a transparent background is identified:



- Regarding a few of the relevant **Settings**:
  - ◇ **Contrast**: It shouldn't be necessary to adjust this setting because of the transparent background
  - ◇ **Smooth**: In some cases, it might be necessary to decrease **Smooth** to get a tighter fit for a print and cut application. Alternatively, you can also create an **Inset** after the trace, when needed. Refer to the **Inset Offset** option in *Section 8.05*.
  - ◇ **Blackout**: apply if there are internal cut lines that are not needed
  - ◇ **Add Image Layer (Print + Cut)**: Mark this box if you want a second layer with the original image.
- If the **Add Image Layer** option is marked, after clicking on **OK**, the image will appear on the **Cutting Mat** and the **Layers Panel** will indicate which layer is the **Print** and which is the **Cut**. Note that on the **Style Panel**, the **Cut** layer will be designated as **Print+Cut Cut** and the **Print** layer will be designated at **Print+Cut Print**. This means that the **Cut** layer will not be printed and the **Print** layer will not be cut:



- For more information on the **Style Panel**, refer to *Section 10.01*.

### 7.03.7 Color Layers Trace

- As mentioned in *Section 7.03.1*, **Color Layers** might be a good mode to choose for a paper piecing or layered vinyl project if you want underlayers present. In this section, a flower that has two shades of pink and two shades of green is chosen:



- After loading the image and then selecting **Color layers**, the window will update to show new settings:

The screenshot shows the software interface with the following elements and annotations:

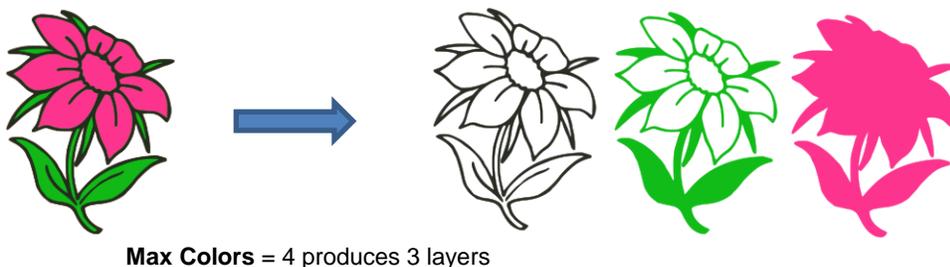
- Input:** Shows the loaded image 'Screen capture.JPG (492 x 647)'.
- Image Settings:**
  - Mode: **Color layers** (selected)
  - Max Colors (2-256): Set to 4.
  - Colors identified: A row of four color swatches (black, green, pink, white).
- Output Settings:**
  - Smooth (0-100): 95
  - Detail (0-100): 0
  - Single Line Threshold: 0
  - Options:  Break Apart Outlines,  Blackout,  Add Image Layer (Print+Cut)
- Output:**
  - Nodes: 968
  - Show Source Image: A slider set to the left.
  - Preview:** A window showing the flower with black cut lines. An arrow points to the left edge of the preview window with the text 'Scroll to the left to better see the cut lines in the Preview'.
  - Update Preview button: An arrow points to the button with the text 'Click here after every change'.

- The **Max Colors** setting shows the current number of identified colors. Below that are icons of these colors. Note that white (or whatever has been used for the background color of the graphic, will also be included in the count. Note: If you do not see those color samples, click on **Color layers** a second time.
- Depending on the image and what you want in your final trace, the **Max Colors** can be increased or decreased. Because this image has two shades of pink and two shades of green, those can be added to the count:

The screenshot shows the software interface with the following elements and annotations:

- Image Settings:**
  - Mode: **Color layers**
  - Max Colors (2-256): Increased to 6.
  - Colors identified: A row of six color swatches (black, green, light green, pink, magenta, white).
- Output Settings:**
  - Smooth (0-100): 95
  - Detail (0-100): 0
- Preview:** A window showing the flower with more detailed cut lines, reflecting the increased number of colors.

- After accepting **OK** in both cases the layers are ungrouped and compared:

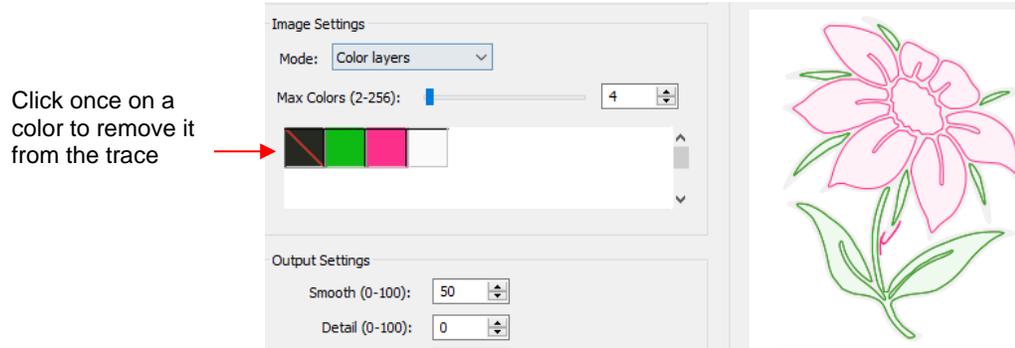


**Max Colors = 4 produces 3 layers**



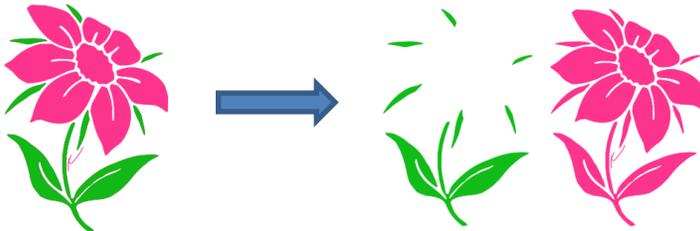
**Max Colors = 6** produces 5 layers

- You can also turn off colors by clicking on them. For example, if you do now want the black background traced:



Click once on a color to remove it from the trace

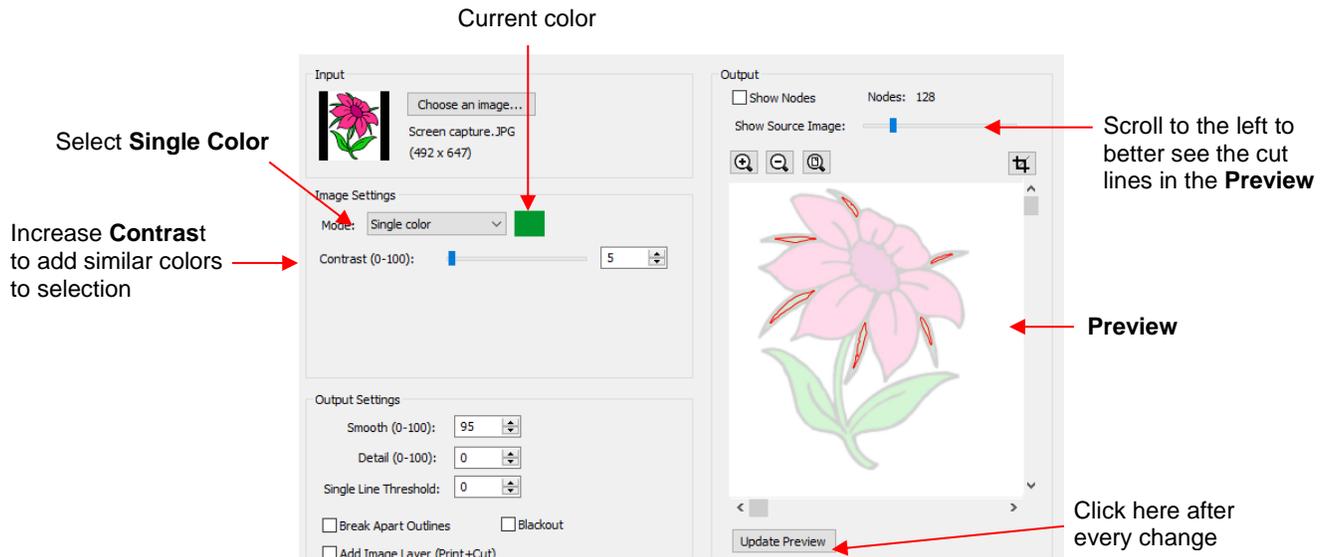
- The result is this:



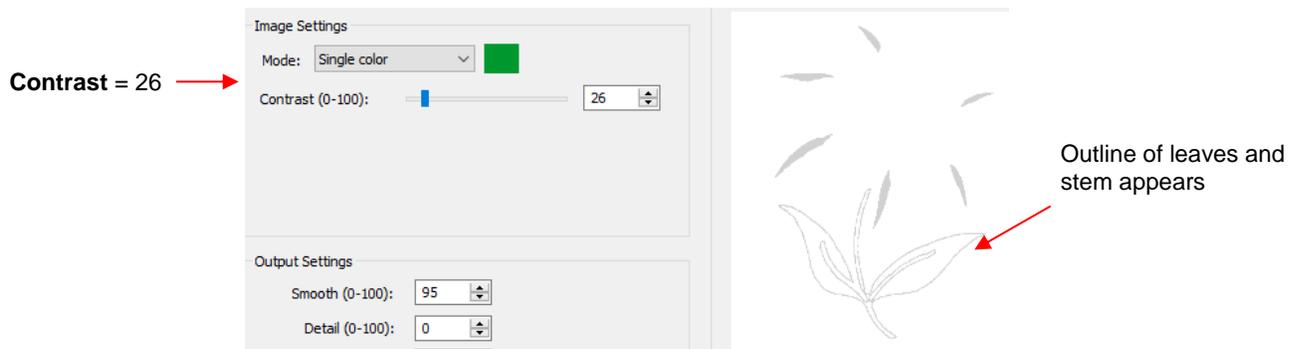
- In simple designs, **Color Layers** can be quick and easy to implement. Realistically, in cases like this image just covered, it might not be easy to layer these detailed cuts perfectly. Thus, the **Single Color** option will more likely be used in most cases.

### **7.03.8 Single Color Trace**

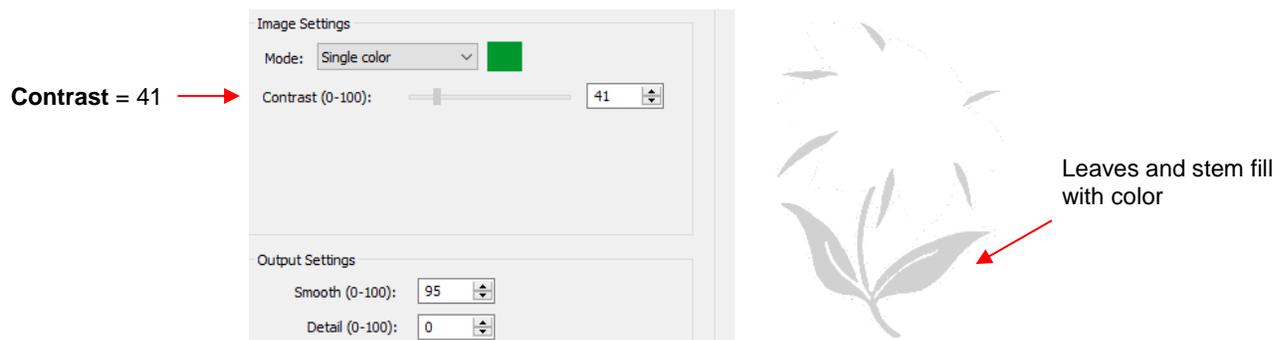
- With the **Single Color** option, each desired color is selected and imported individually. The advantage is that only the visible part of each color is traced. The disadvantage is that you must reload the image for each color desired.
- Again, the same flower image that as used in the prior section will be opened into the **Trace** window. When **Single Color** is selected from the drop-down menu, the window will update to show new settings:



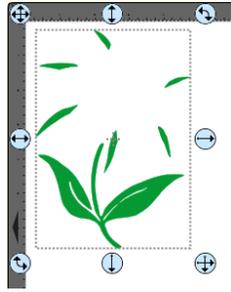
- In the screenshot, the initial color identified was a shade of green. In the **Preview** you can see how many parts of the flower were included as being in the range of that shade.
- If you want to add more of the green parts of the flower, then increase the **Contrast**. As you hold down the left mouse button and scroll, the image will turn gray so that you can more clearly see what is being added.
  - ◇ With a **Contrast** of 26, the outline of the flower stem and leaf appear:



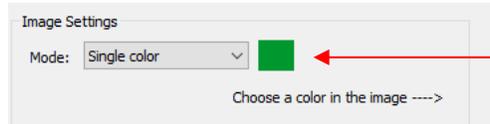
- ◇ With a **Contrast** of 41, the leaves and stem fill:



- Once you are satisfied, click on **OK** to import that green layer onto the **Cutter Mat**:

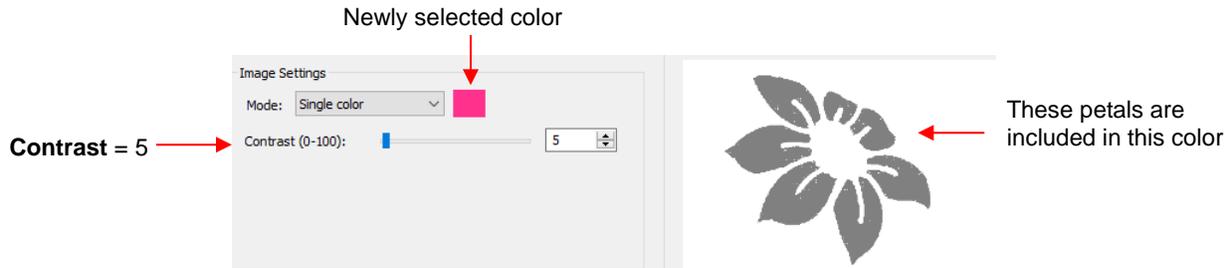


- Now, reopen the **Trace** window, reload the same image and then click on the color box next to **Single Color**. A message will popup indicating you are to click on another color on the **Preview**:



Click on this box

- One of the petals is clicked and the color box turns to that color. The **Preview** shows how much of the image is now included at the current **Contrast** of 5:



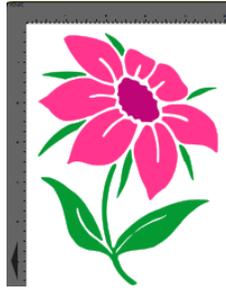
- The process is then repeated whereby the **Contrast** is increased. At a value of 30 more of the same petals are filled out, thus it is recommended to always tweak the **Contrast** some:



- If the **Contrast** is increased even higher, the center part of the flower gets added. Just as in the case of using **Color Layers**, this is optional.

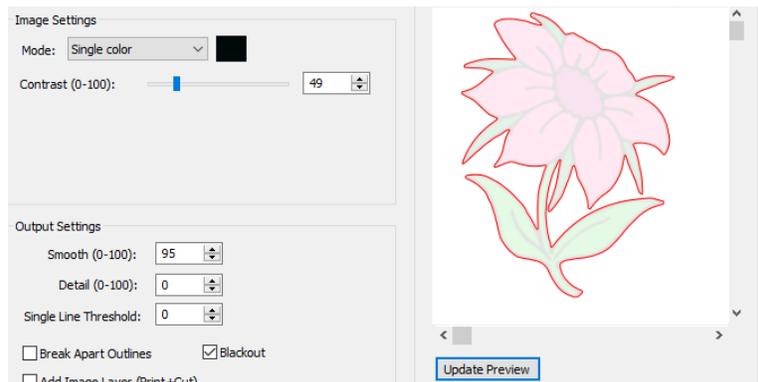


- After deciding on the **Contrast** for pink, click on **OK**. Now, let's assume that you did the petals and center in two parts and you are now at this point:

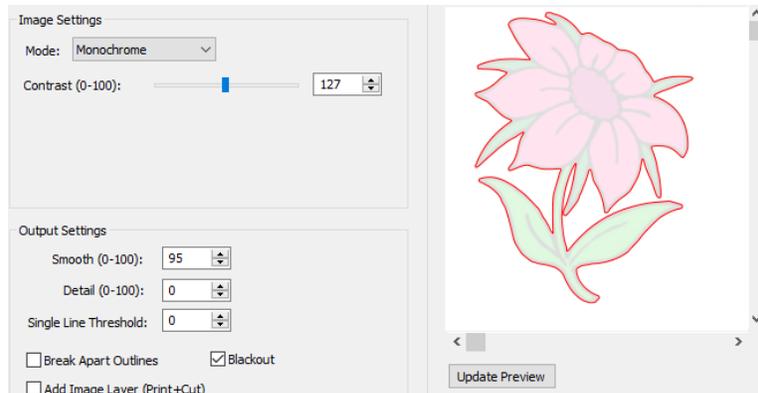


- You now have several options for completing the trace which involves adding a final outline/shadow layer to the flower:

- ◇ Continue to use **Single Color**, click on the part of the image that is black, mark the **Blackout** option:



- ◇ Switch to **Monochrome** mode, mark the **Blackout** option:



- ◇ Forgo using the **Trace** window. Select the layers traced so far and use the **Shadow Layer** function to add a black outline. Details of this procedure are covered in *Section 9.04*.

- The final results, using the three options, are virtually identical:



## 7.04 Draw Functions

### 7.04.1 The Draw Tool

- The **Draw Tool** is accessed by clicking on the 5<sup>th</sup> icon  on the **Tools Panel**. This tool is used to draw straight lines and Bézier curves. It can be a bit tricky to master but just like with many good things- practice makes perfect!

#### Drawing Straight Lines

- To draw a single straight line, use your mouse to click once where you want to start the line and click again where you want to end the line. Then immediately press **Esc** or the **Enter** key:



Left click once to begin.



Move cursor to where you want to finish the line.



To stop drawing, press **Esc** or the **Enter** key

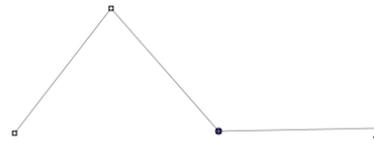
- If you wish to continue drawing a connecting straight line path, keep left-clicking each time you need to change directions. Each click produces a node:



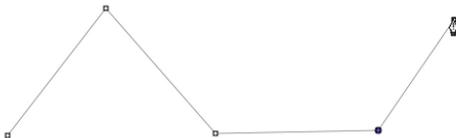
Left click to start and left click at a 2<sup>nd</sup> location



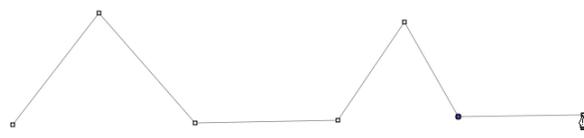
Move to a 3<sup>rd</sup> location and left click again.



Move to a 4<sup>th</sup> location and left click again.

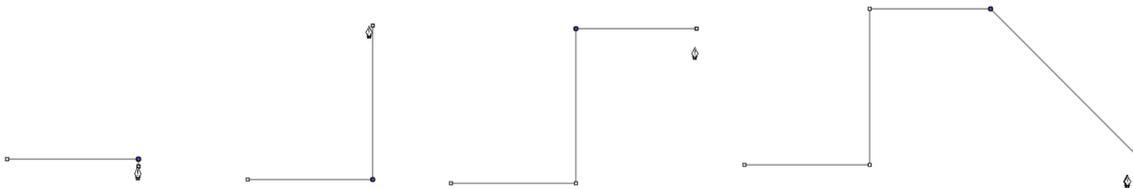


Move to a 5<sup>th</sup> location and left click again.

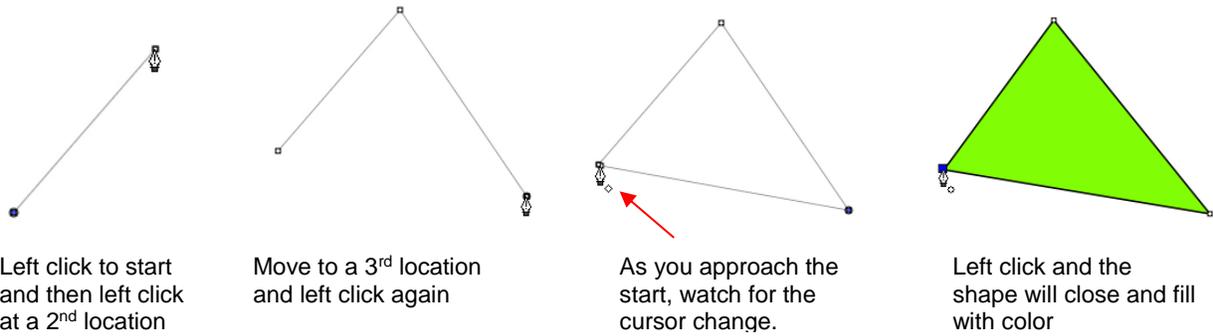


Continue clicking until you are ready to end. Click **Esc** or the press the **Enter** key.

- If you want to draw perfectly vertical lines, perfectly horizontal lines, or lines at a 45° angle, hold the **Shift** key while clicking:

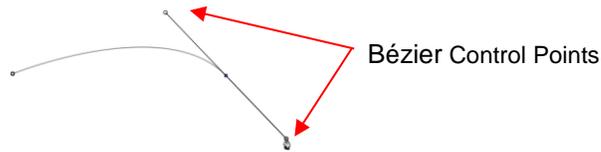


- Note that if you are on a Mac and you draw a 45° diagonal, you need to release the **Shift** key before clicking.
- If are drawing a closed path then, just as the mouse cursor approaches the starting node, a small diamond will appear next to the cursor and you can click one last time to end the process. The shape will automatically join the first and last nodes and fill with color, provided a **Fill** color is assigned:

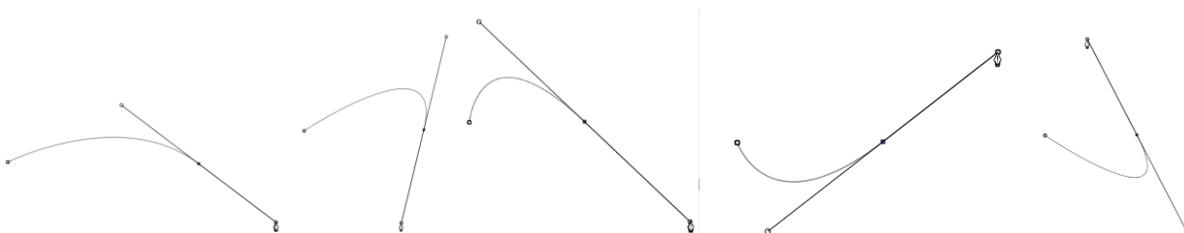


## Drawing Bézier Curves

- Drawing curves is a bit more difficult. The key is to take it one step at a time, practice the technique a lot, and remember that you can later correct your curves using the **Shape Tool** (refer to *Section 8.10*).
- To draw a curve, use your mouse to left-click once where you want to begin the curve. Then, instead of left-clicking, hold the left mouse button down and begin dragging the mouse. Continue holding the left button and notice a second line appears with two circles at either end. These are called Bézier control points:



- As you drag the mouse, you'll see that you have full control over how long this line will be, as well as where the control points are positioned. Remember to just keep pressing the left mouse button. Experiment with longer and shorter control lines, as well as rotating the line to bend the curve in a range of different ways:



- When you are satisfied with the curve, you have two choices at this point:
  - ◇ Release the left mouse button, move the mouse to a new spot, left-click, and you'll begin creating a new curve connected to the prior curve:

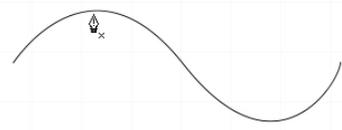


- ◇ Release the left mouse button and press the **Esc** key or press the **Enter** key to stop the drawing process:

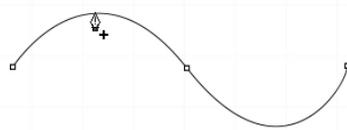


## Adding and Deleting Nodes

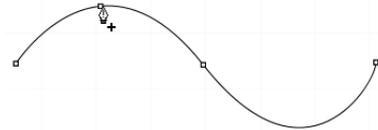
- Zoom in on the curve, select it, and then click on the **Draw Tool** icon.
- To add a node, move the cursor next to the path and watch for the cursor to change. With the cursor right on the path, left-click to add a node:



Note the cursor has a small x next to it as it approaches the curve

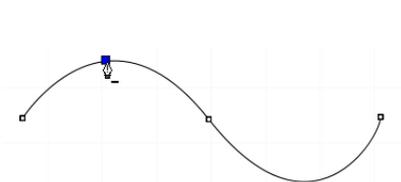


After cursor changes, left click once and a node is added

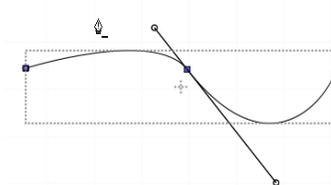


New node has been added

- To delete a node, move the cursor over an existing node until the cursor changes and you can see the node turn blue. Left-click once to delete that node:



Once the cursor changes and the node turns blue, left click



The node is deleted and the curve will change accordingly

## 7.04.2 Freehand Drawing

- The **Freehand** tool is accessed by clicking on the 6<sup>th</sup> icon  on the **Tools Panel**. This tool is used to freely draw thin lines with your mouse or, better yet, a graphics tablet.
- In the **Tool Options**, there is a setting called **Freehand smoothing**. Increase that setting if you want the software to reduce “shakiness” as much as possible:



- The two extremes for the **Freehand smoothing** setting clearly demonstrate the difference:

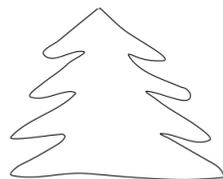


smoothing: 0



smoothing: 100

- When drawing closed shapes, the shape will remain an open path regardless of how precise you attempt to be in returning to the start. To close the shape, select it and go to **Path>Close Path**:



Freehand tree



After applying **Path>Close Path** and selecting a **Fill color**

### 7.04.3 Brush Drawing

- The **Brush** tool is accessed by clicking on the 7<sup>th</sup> icon  on the **Tools Panel**. It is used to freehand draw thick lines. As with the **Freehand** tool, using a stylus with a graphics tablet will provide the most control.
- In the **Tool Options** is a **Size** setting for the thickness of the **Brush** tool:



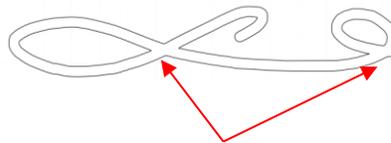
- Select the **Size** you desire and freehand draw:



- One fun application is to use the **Brush** tool to easily add circles to a design. Select the **Size** and then just left-click without dragging the mouse. For example, the tree drawn with the **Freehand** tool in the prior section is now decorated:



- Note that if a path drawn with **the Brush** tool crosses itself, the overlap will be removed:



Overlaps automatically removed

### 7.05 Manual Tracing of an Imported Image

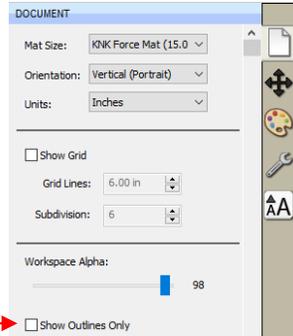
- Sometimes the quality of an image will fail to yield a good autotrace. It could be that the image is too small or too detailed. If the image is important to you, then manually tracing offers another option for conversion to a vector cut line.
- The easiest way to manually trace a raster graphic is using the **Draw Tool** presented in **Section 7.04.1**. However, instead of trying to create the Bézier curves as you go, it's faster and easier to simply and quickly click, click, click around the image placing a node wherever the path changes directions. Then you can go back and manually move nodes and drag curves to fit the original image. This process is presented in the next few subsections.

#### 7.05.1 Importing an Image for Manual Tracing

- Since you won't be trying to autotrace the raster image, use **File>Place Image** to import it onto the **Cutting Mat**. In this tutorial, the dress image from this web site will be used:

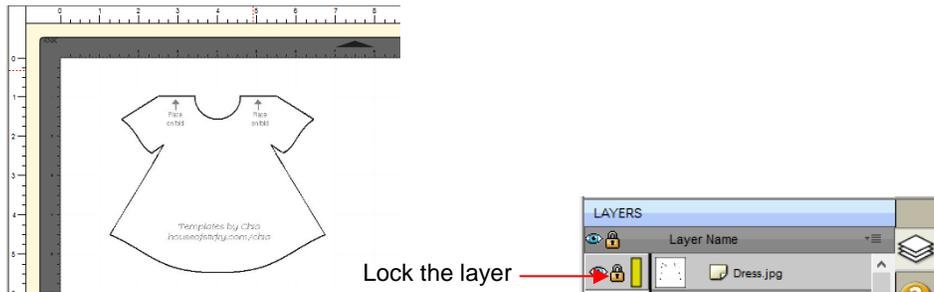
<http://houseofstirfy.com chia/templates/dress01.html>

- While this dress could easily be autotraced, it provides a great example of how the **Draw Tool** can be used to fit a shape such as this. So, it will be used for the manual tracing example.
- In order to see the image, make sure **Show Outlines Only** is not checked on the **Document Panel**:



Uncheck this option →

- To avoid inadvertently selecting the image while tracing, lock that layer on the **Layers Bar**:



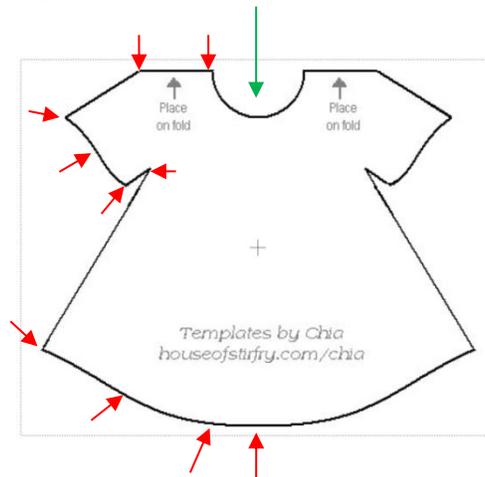
Lock the layer →

### 7.05.2 Manual Tracing Using the Draw Tool

- Make sure you have read *Section 7.04.1* to learn how to comfortably and successfully use the **Draw Tool**.
- Now, the best method for tracing a symmetrical image is to only trace one half. Then you can make a copy of it, mirror the copy, and weld the two together to create a perfectly symmetrical shape. This is what will be done in this case because the dress is symmetrical.
- Before beginning the trace, visually note how many changes in curves and straight lines exist. This will help you understand where to click as you work around the image. But don't overthink it. Remember that you can add nodes, delete nodes and move nodes during the editing process:

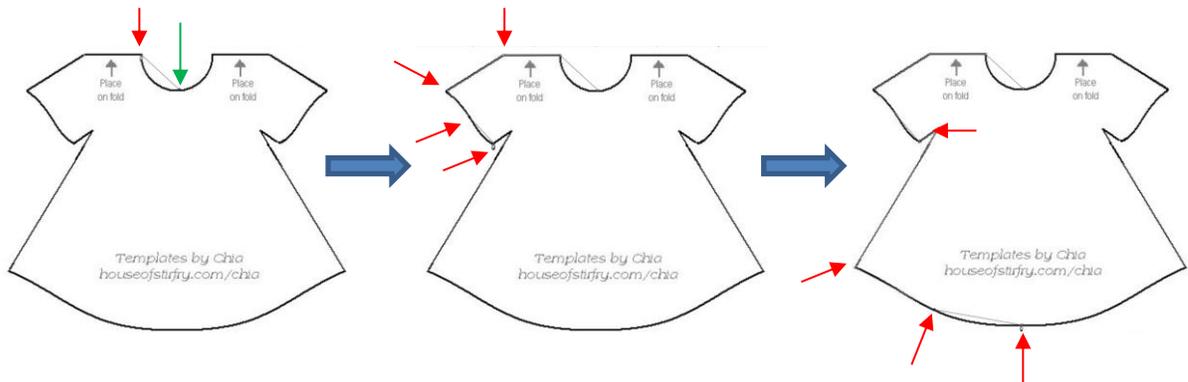
Trace will begin and end at the middle of the neckline, moving counter-clockwise around the dress.

Red arrows indicate where a change in direction or curvature occurs

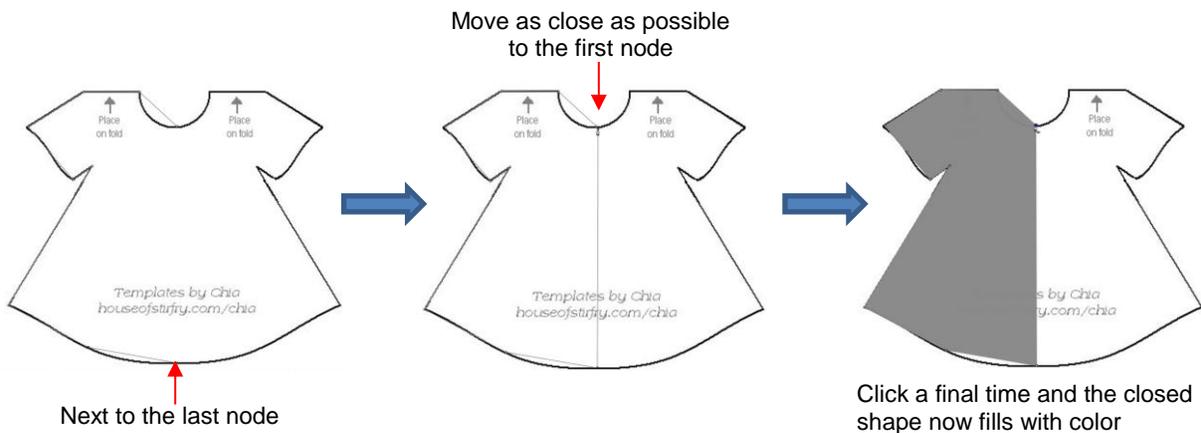


- The process is as follows:

- ◇ Zoom in as close as possible, but make sure the entire image can still be seen. Click on the **Draw Tool** icon.
- ◇ Left-click once in the middle of the neckline (see green arrow below). Then click at each point where the curve changes. A series of straight line segments will be made, one right after another:

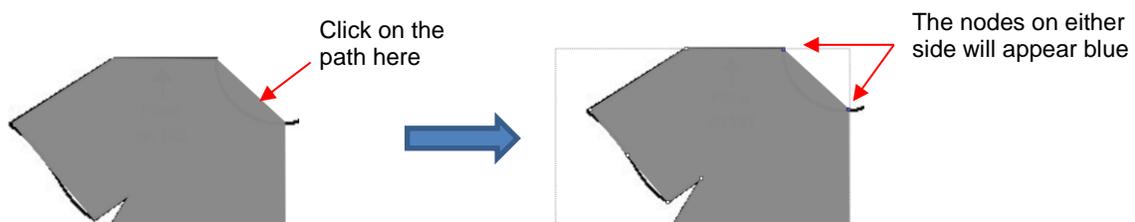


- ◇ Once you've reached the next to the last node, click as close as possible on the first node and the shape will close and fill with color (based on the color currently assigned on the **Fill & Stroke Panel**):

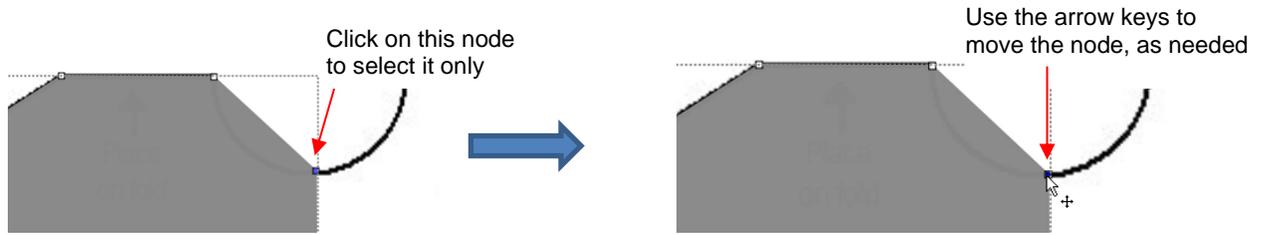


### **7.05.3 Editing the Trace**

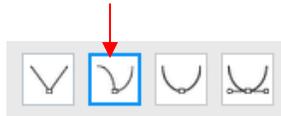
- The next step is to move nodes and convert any straight lines into curves, as needed. This is done using the **Shape Tool**  which is the 3<sup>rd</sup> icon on the **Tools Panel**. Note that more details about using the **Shape Tool** will be presented in *Section 8.10*. For now, only a portion of this function's capability is needed.
- Using the **Shape Tool** will take a bit of patience and attention. But following the steps exactly as presented should yield successful results:
  - ◇ With the **Shape Tool** selected, click on the neckline path. The two nodes on either side will be blue:



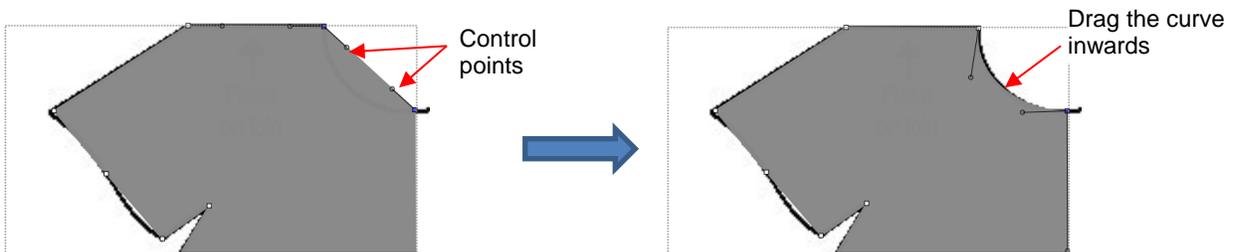
- ◇ If you need to move either node, click on the node to be moved and the other node will turn white. Be very precise in clicking as it is easy to miss the node. If that happens, you will need to click the path again to show the nodes.
- ◇ Once you have the single node highlighted in blue, you can now move the blue node by using the arrow keys on your keyboard:



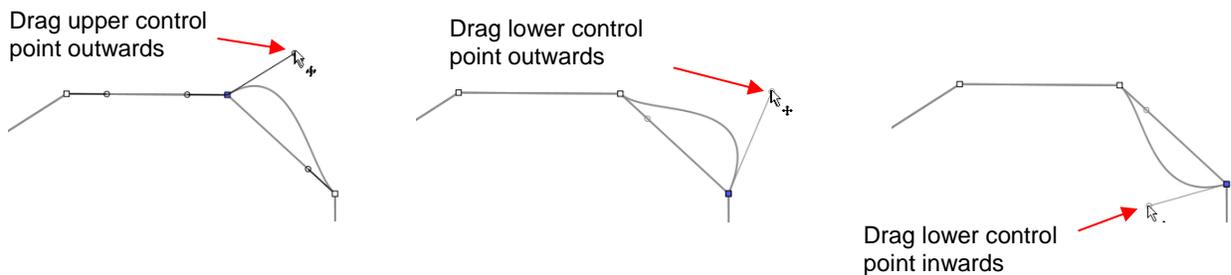
- ◇ Next, click on the second icon on the **Tool Options**:



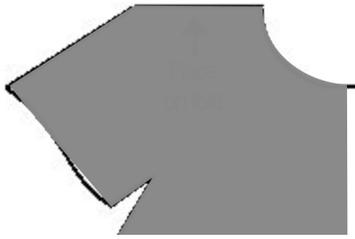
- ◇ Then click again on the neckline path and you will see Bézier control points. This means you can now drag the middle of the path inwards to form the neckline:



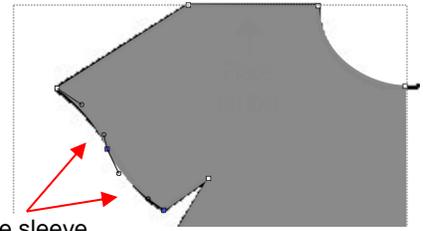
- ◇ Alternatively, the Bézier control points can also be dragged. This is useful if the curve isn't symmetrical. Here are a few examples of how that curve could be altered:



- ◇ Just like with nodes, when selecting a Bézier control point, you need to click precisely on the little circle. If you inadvertently see all of the nodes disappear, just click on the path again.
- ◇ Once the neckline is curved, go over to the sleeve and repeat the process for both parts of the sleeve since one side curves inwards and the other side curves outwards. Again, click on the path, click on the 2<sup>nd</sup> icon on the **Tool Options** , click on the path again and then drag the curve:



Before editing



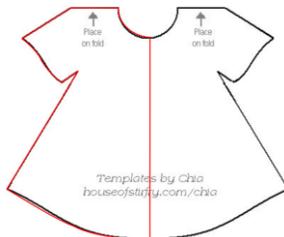
Both parts of the sleeve are reshaped

- ◇ Repeat on the bottom of the dress. The shape you traced should now fit the original image. If it's not a perfect fit, don't worry about it! No one will ever know. ☺

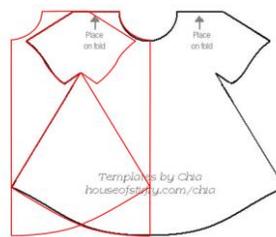


#### 7.05.4 Copy, Mirror and Weld to Complete Symmetrical Shapes

- The final step to complete the dress involves making a mirror image copy and then welding it to the original.
  - ◇ Select the dress and do a **Copy** and **Paste** or you can hold the **Alt** key and click once on the dress to make a copy of the image on top of the original.
  - ◇ With the image still selected, click the **Mirror** icon  on the **Position & Size Panel**.
  - ◇ Move the copy to the right until it slightly overlaps the original. In the following screenshots, **Fill** has been turned off and a thick red **Stroke** applied to better illustrate:



Original trace

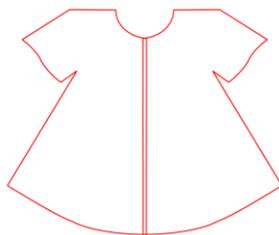


Copy made and Mirror applied

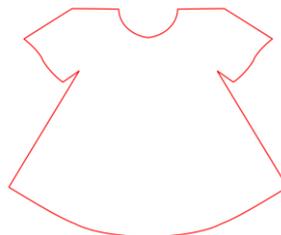


Copy is moved to the right side

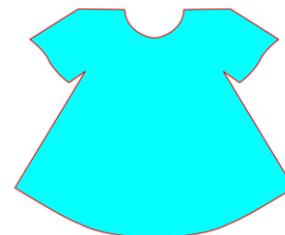
- The original image is no longer needed. The trace and the copy are welded using **Path>Union**. Fill is then applied to complete the trace:



Imported raster is removed



Apply **Path>Union**



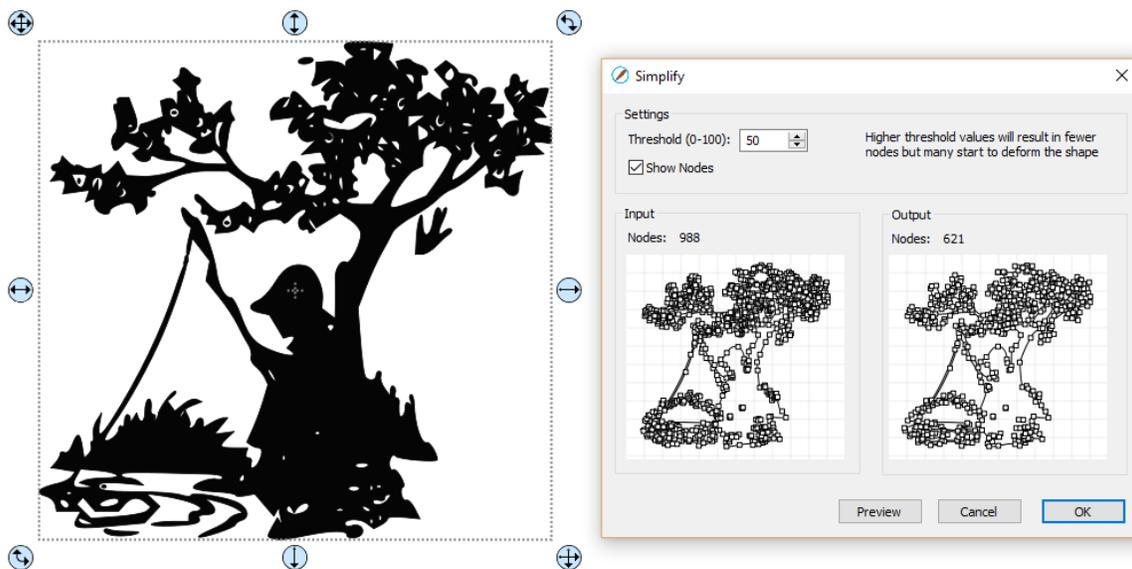
Turn on **Fill** and select a new color

## 8. SCAL: Editing

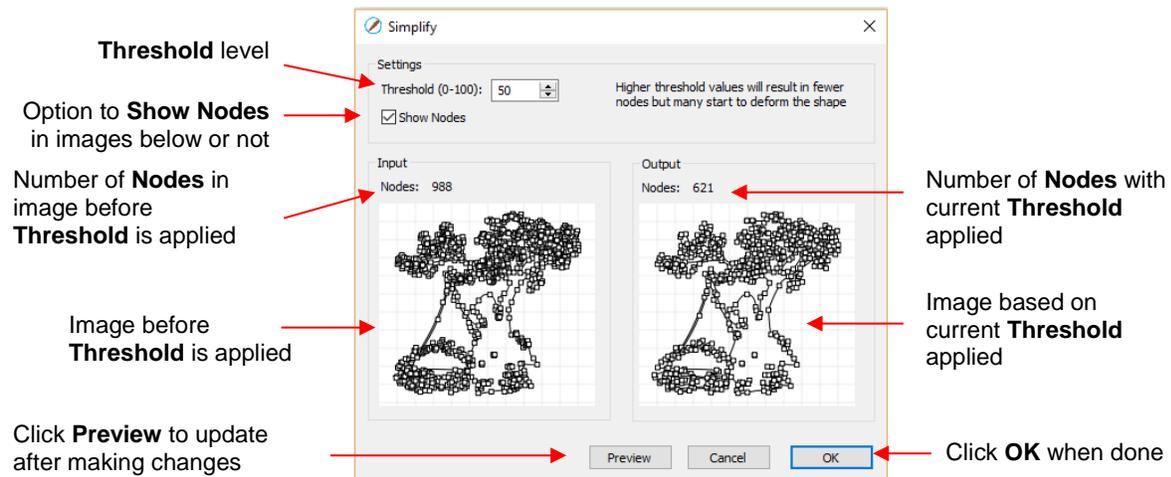
This chapter covers functions that are used to modify shapes in SCAL as well as prepare shapes for cutting. For functions used in designing, refer to *Chapter 9*.

### 8.01 Simplify

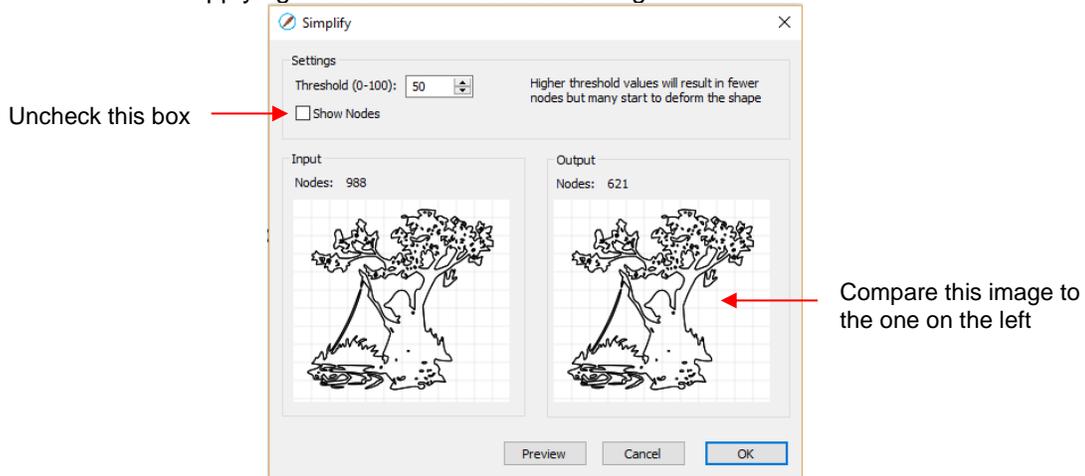
- The purpose of the **Simplify** function is to reduce the number of nodes. This can be important when cutting small vector shapes in which clustering of nodes in tight locations can sometimes lead to poor cutting.
- There are two ways to open the **Simplify** window after selecting a shape:
  - ◇ Right-click and select **Path>Simplify**
  - ◇ Go to **Path>Simplify**



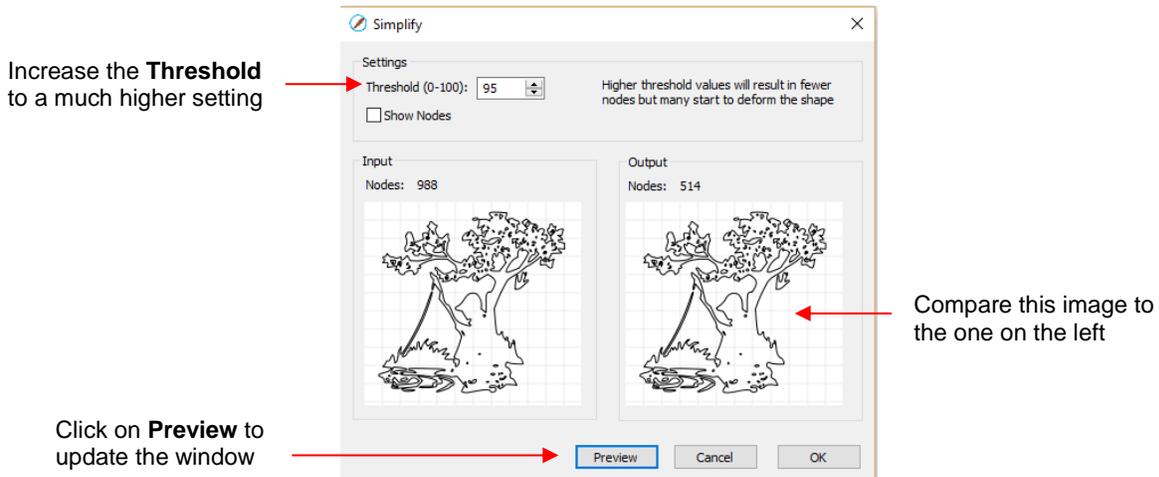
- The **Simplify** window shows the nodes of the selected image in two side-by-side windows: an **Input** and an **Output**, along with the number of **Nodes** in each one. That count is based on the current **Threshold** setting:



- To see the effect of **Threshold**, uncheck the **Show Nodes** box. Make sure the shapes haven't become distorted as a result of applying the current **Threshold** setting:



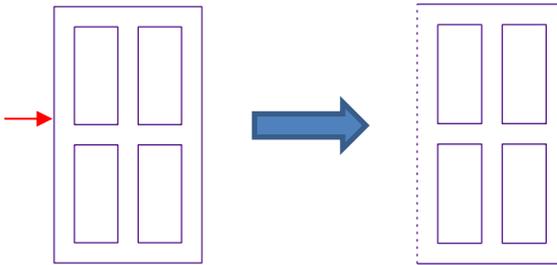
- Try increasing the **Threshold** setting to reduce more nodes. In general, you should be able to use a high Threshold without compromising the image:



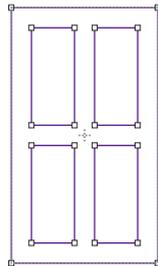
## 8.02 Split Path

- The **Split Path** function allows you to delete the path between any two adjacent nodes. First you must select two nodes using the **Shape Tool**  on the **Tools Panel**. Then you can access **Split Path** using either of the following:
  - ◇ Right-click and select **Path>Split Path**
  - ◇ Go to **Path>Split Path**
- The following door shape will be used as an example to show the steps. The goal is to change the left side of the door from a solid cut line to a dashed cut line:

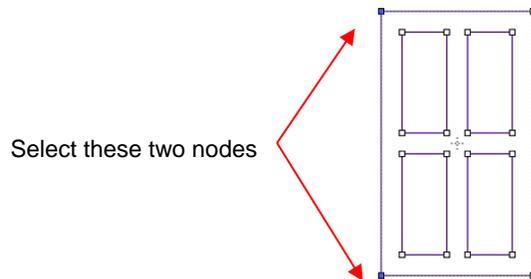
The left side of this paneled door will be separated and made dashed so that the door can be folded to open instead of being cut out



- ◇ Select the shape and click on the **Shape Tool** icon  on the **Tools Panel**. The nodes will appear on the shape:

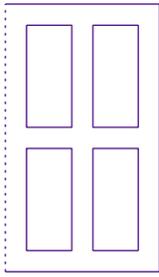


- ◇ Drag your mouse to marquee-select the two nodes on the left side of the window:

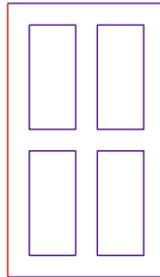


- ◇ Break that path by going to **Path>Split Path**. Then click on the **Select** icon . Now you can separately select that left side line and change to a dashed cut on the **Fill & Stroke Panel**:

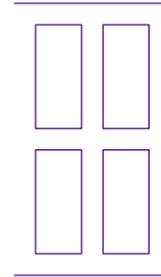
- ◇ The left side of the window will now cut dashed. Alternatively, the left side could have been left solid and scored with an embosser in the cutter or the left side could have been deleted and the fold made by hand:



Left side will cut dashed



Left side will be scored separately



Left side won't cut at all

### 8.03 Close Path

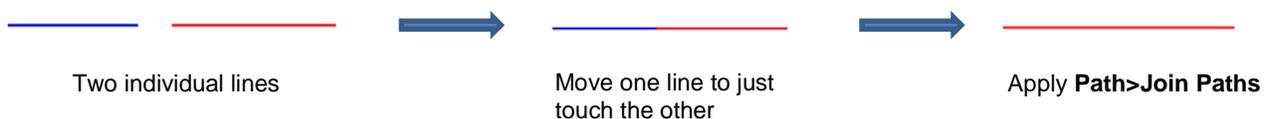
- The **Close Path** function can be applied to any open shape, other than a straight line, to join the start and ending nodes with a straight line:



- To apply **Close Path**, select an open shape and use either of the following:
  - ◇ Go to **Path>Close Path**
  - ◇ Right-click and select **Path>Close Path**
- The path will then fill with whatever **Fill** property is currently assigned to that shape.

### 8.04 Join Paths

- Join Paths** will connect two nodes from two different open paths if those nodes are in very close proximity to one another.
- To access **Join Paths**, select the two open shapes and go to **Path>Join Paths**:

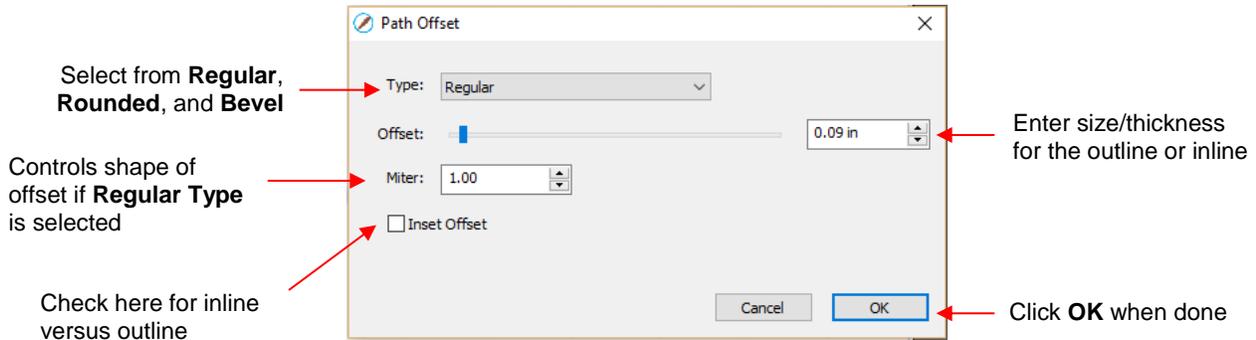


- If you are joining several lines at once, such as these four lines to create a box, then all four lines can be selected at one time and be joined. However, for the new shape to be an actual closed shape, you must then apply **Path>Close Path**:

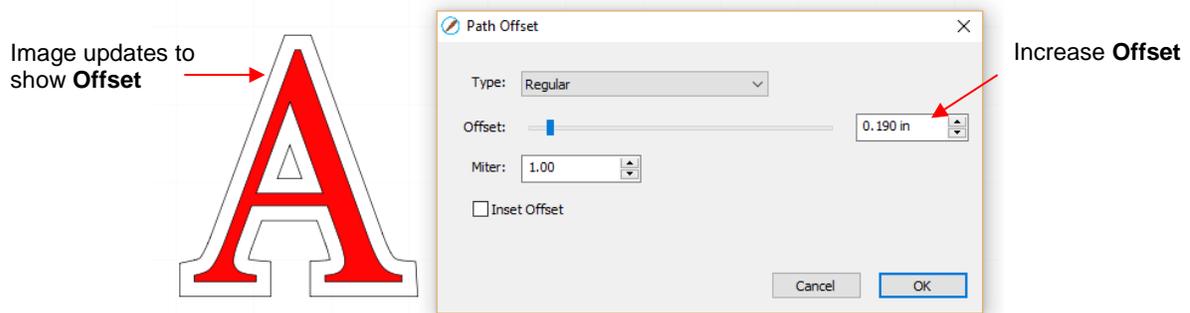


## 8.05 Path Offset

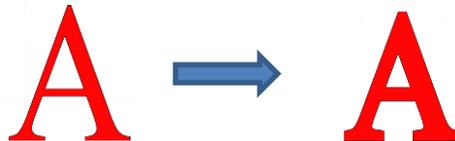
- **Path Offset** creates an outline or inline of a shape and will delete the original upon clicking on **OK**. Note that if you want the original, either make a backup copy or use the **Shadow Layer** function presented in *Section 9.04*.
- To access **Path Offset**, select the shape and go to **Path>Path Offset**:



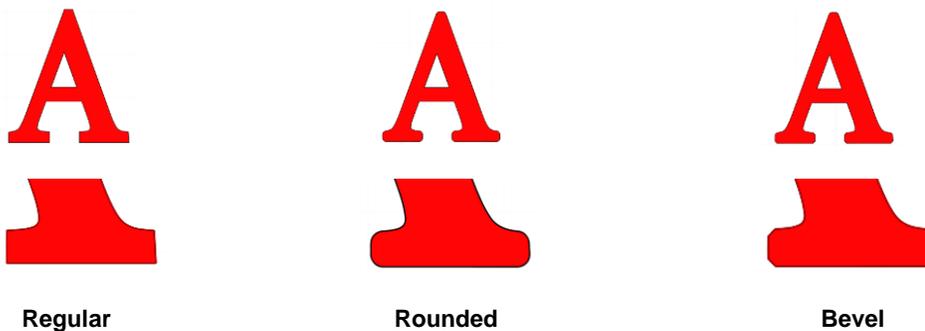
- As you increase the **Offset**, you will begin to see the outline form on your selected shape:



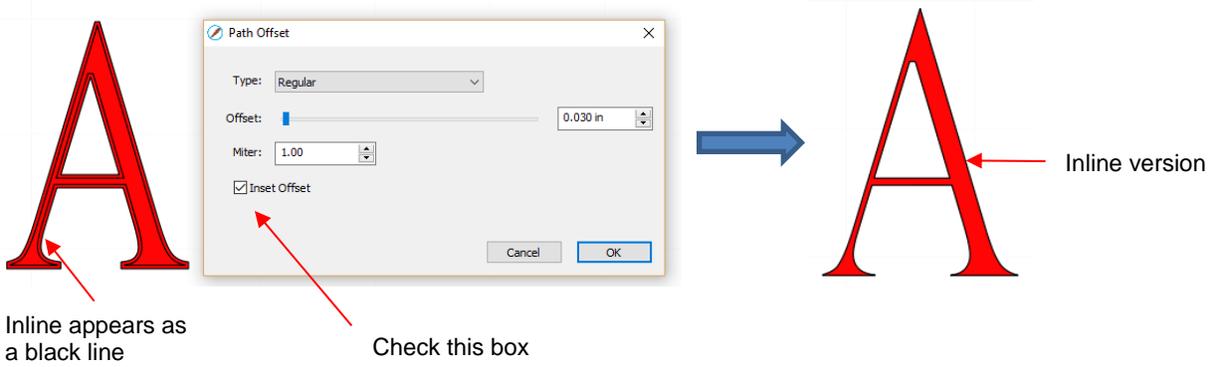
- After clicking on **OK**, the **Offset** will fill with the same color and the original will be deleted:



- **Type** controls the style or shape of the offset at the corners. There are three choices:



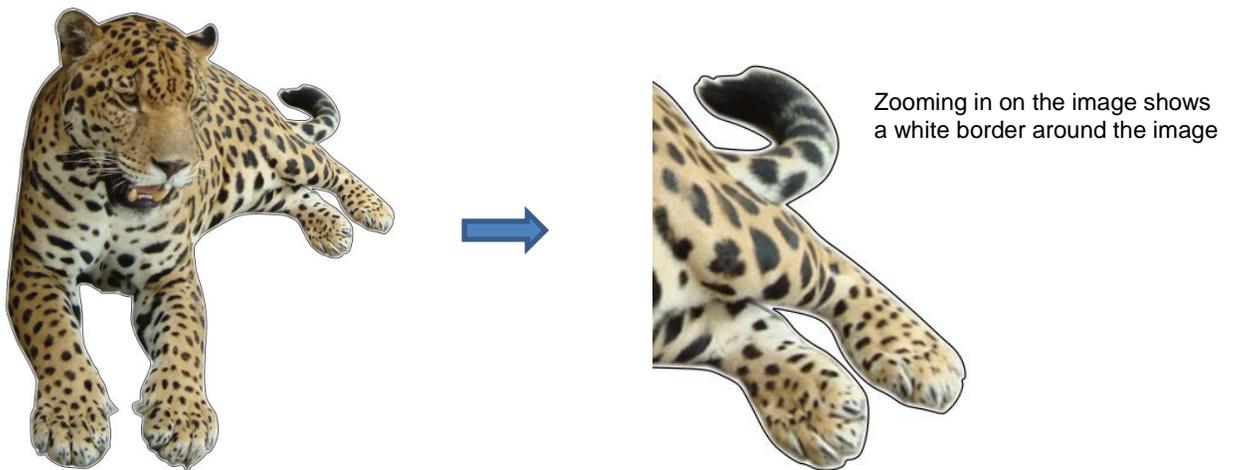
- Note that the first choice, **Regular**, also has a **Miter** setting which should work in the same way as **Miter** affects the **Stroke** (refer to *Section 5.14*). However, at this time, it appears that the **Miter** setting is not working.
- Checking the **Inset Offset** box creates an inline instead of an outline:



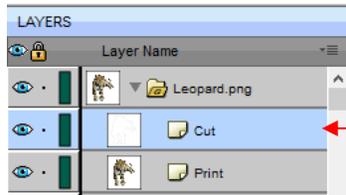
- A practical example of using **Path Offset** is when you have a font that is too thin to cut at the size you need. Applying a very small **Offset** can make the difference in whether or not text can be cut at certain small sizes. In the case below, the 1" lettering was offset by only 0.005":



- A second practical example showing the use of **Inset Offset**, is the following print and cut application. A PNG with a transparent background was traced using the **Trace** function. However, based on the location of the cut line, relative to the printed image, there will be small amount of white surrounding the image:

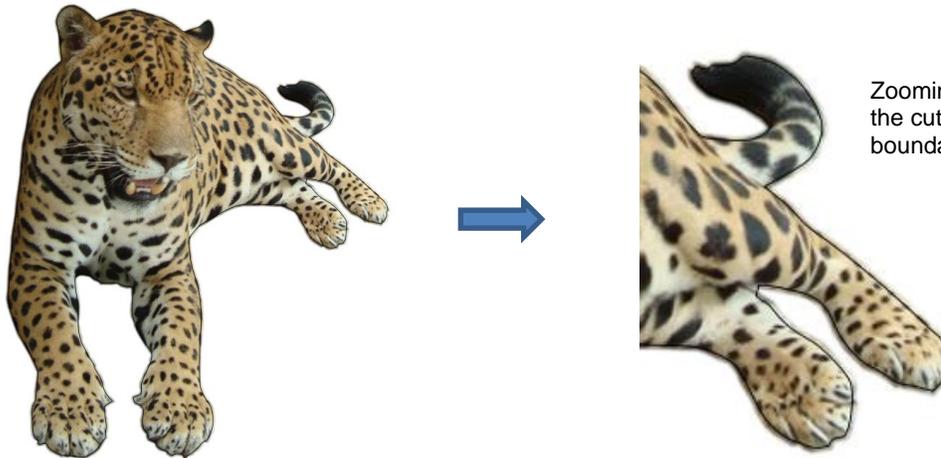


◇ Select the **Cut** layer only on the **Layers Panel**:



Select the **Cut** layer only

- ◇ Open the **Path Offset** window. Set the **Offset** to a small size, such as 0.03". Be sure to mark the box for **Inset Offset**. The result is a cut line which will eliminate that white border around the image:



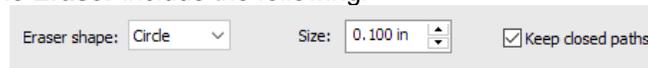
Zooming in on the image shows the cut line is now inside the boundaries of the printed image

## 8.06 Eraser

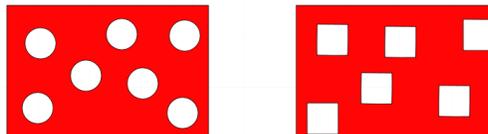
- The **Eraser** is the 8<sup>th</sup> icon  on the **Tools Panel**. Use this tool to erase parts of a shape by dragging your mouse across the shape:



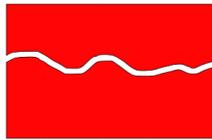
- The **Tool Options** for the **Eraser** include the following:



- ◇ **Eraser Shape:** Choose either **Circle** or **Square**:



- ◇ **Size:** select a thickness for the erasure. Scroll up and down or enter a specific size.
- ◇ **Keep closed paths:** Mark this option if you bisect a shape and you want the two resulting shapes to be closed. Otherwise you end up with two opens shapes:



Keep closed paths checked



Keep closed paths unchecked



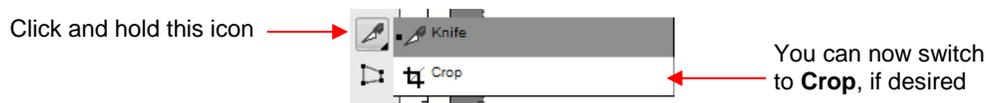
Keep closed paths checked



Keep closed paths unchecked

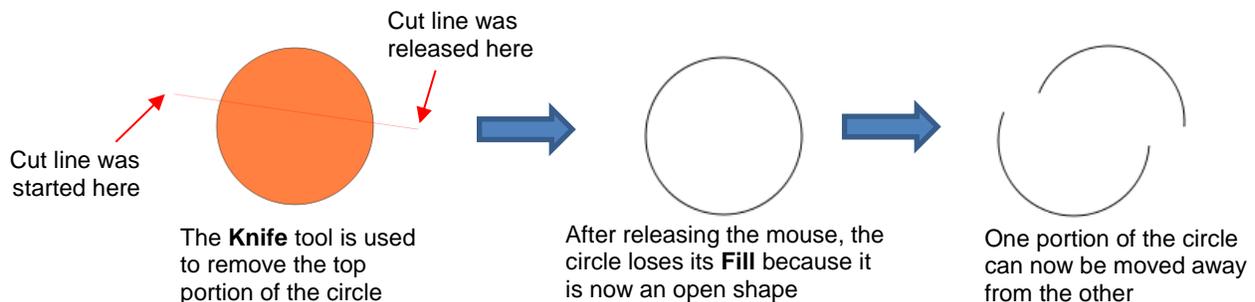
## 8.07 Knife and Crop

- The **Knife** tool can be accessed by clicking this icon  on the **Tools Panel**. Note the tiny triangle in the icon, indicating there are other options available. The **Crop** tool  can be accessed by holding down the left mouse button on this icon and then selecting **Crop** from the popup menu.

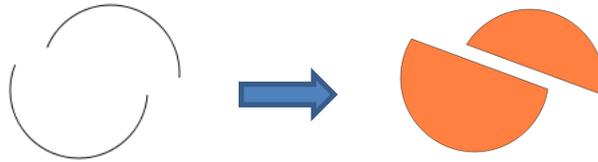


### 8.07.1 Using Knife

- The **Knife** tool always makes a straight line cut. Starting outside the shape, click and hold the left mouse button and drag across the shape at the desired location for the cut. When you release the mouse button the cut will be applied and one shape can be moved away from the other:

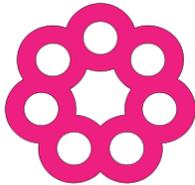


- There are four ways to control the angle of the cut:
  - ◇ Click and hold the left mouse button – you can freely drag the red cut line to cut at any angle (as shown in the screenshot)
  - ◇ Hold the **Shift** key and click and hold the left mouse button and drag left or right: the red cut line will be perfectly horizontal
  - ◇ Hold the **Shift** key and click and hold the left mouse button and drag up or down: the red cut line will be perfectly vertical
  - ◇ Hold the **Shift** key and click and hold the left mouse button and drag diagonally: the red cut line will be at exactly 45°
- If you wish to close the cut shapes, select them and either:
  - ◇ Go to **Path>Close Path**
  - ◇ Right-click and select **Path>Close Path**

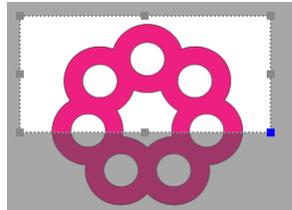


### 8.07.2 Using Crop

- With the **Crop** tool, you drag the mouse to marquee-select an area to be retained. Then you press the **Enter** key to complete the crop. Everything outside of the selected area will be deleted:



The top part of this shape will be cropped

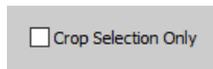


Marquee-select the area to be retained



After pressing the **Enter** key

- There are two options when using the **Crop** tool based on a setting on the **Options Bar**:

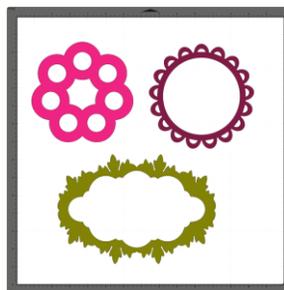


**IMPORTANT:** If left unchecked, only the marquee-selected part of the shape will be retained. The rest of that shape and every other shape on the page will be deleted, even those that might be hidden or locked!

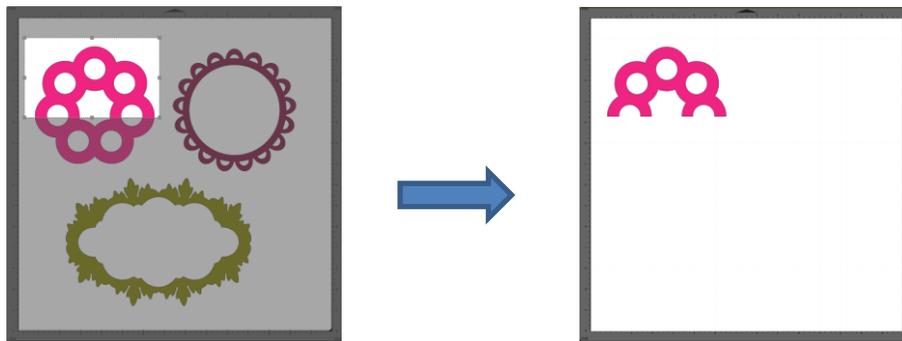


If checked, the marquee-selected part of the selected shape will be retained, as well as all other shapes on the page.

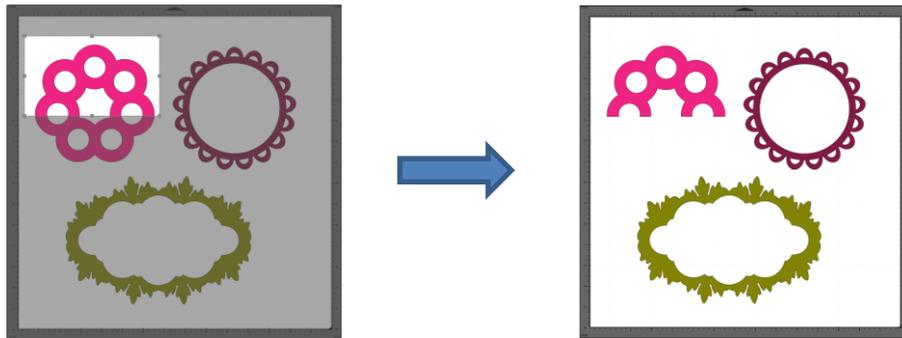
- Here is an example to show what would happen in both cases. The file has three shapes and the top right shape will be cropped just as in the prior screenshot:



- ◇ With the **Crop Selection Only** box **not** checked, the other shapes are deleted as well as the lower half of the pink doily:



- ◇ With the **Crop Selection Only** box checked, the shape is selected first and then only the bottom half is deleted:



### 8.08 Which Cutting Tool to Use?

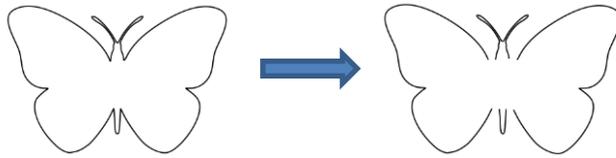
- Having so many cutting functions to use can make it difficult to know which one to use in a particular instance. Experience will be your best guide, as well as testing them out. But a summary of the functions is presented in this section and this may prove to be helpful when selecting which tool to try first.
- The following table summarizes the capabilities of the various options for cutting shapes. Note that **Boolean Join** has also been added but isn't covered until *Section 9.05* because it is more often used for designing than for editing.

	Can make straight line cuts	Can force horizontal, vertical cuts	Can force diagonal cuts	Can do freehand cuts	Can change thickness of the cut	Can cut using square or circle shapes	Can cut using any shape	Can cut with open shapes remaining	Can cut with closed shapes remaining
Eraser				✓	✓	✓		✓	✓
Knife	✓	✓	✓					✓	
Crop	✓	✓			✓				✓
Split								✓	
Boolean Join	✓	✓	✓		✓	✓	✓		✓

- Here are a few samples to show which functions would be the best choices for making the cut:

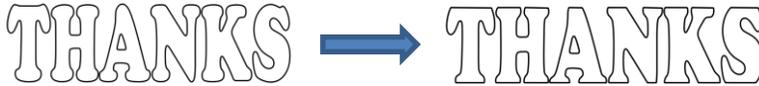


**Knife**  
or  
**Split:**



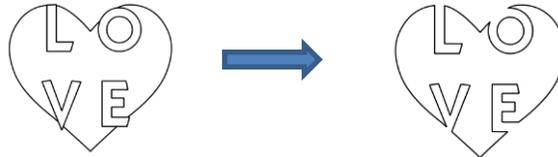
Cut up the butterfly without closing the shapes. Used for projects where the shapes are folded along one side instead of cut out

**Crop**



Slice off the top and bottom of a word. Used for a popup card.

**Boolean**  
**Join:**

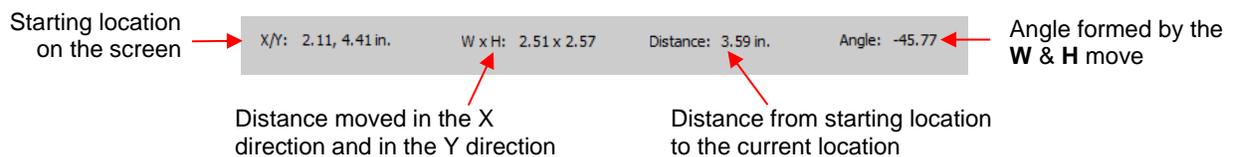


Cut a shape with any other shape or shapes

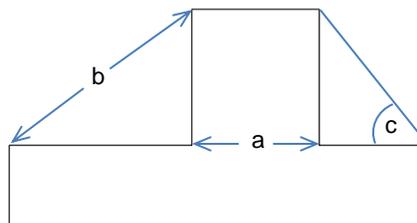
- **Knife** and **Split** have the same effect. **Split** is a bit more limiting because there needs to be nodes present in the location where the cut will occur. It might be useful if you are already in the **Shape Tool** mode where you can then select the nodes and apply the **Split**. Otherwise, **Knife** is probably the easier tool to use.

## 8.09 Ruler

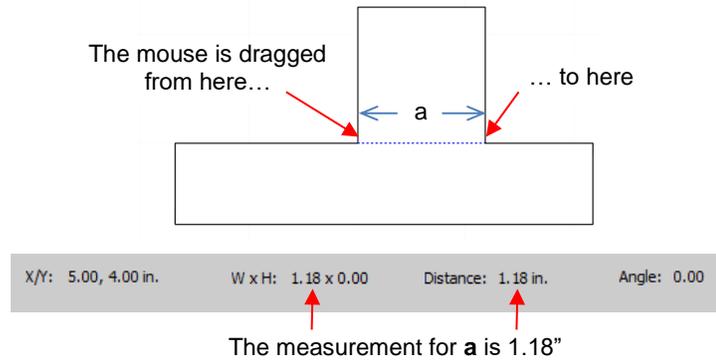
- The **Ruler** function allows you to measure the distance and angle between any two points on the screen. It is accessed by clicking on the second icon from the bottom  on the **Tools Panel**.
- No shapes need to be preselected. Just hold down left mouse button at any location and then drag the mouse to a new location. The **Tool Options** provide the following information:



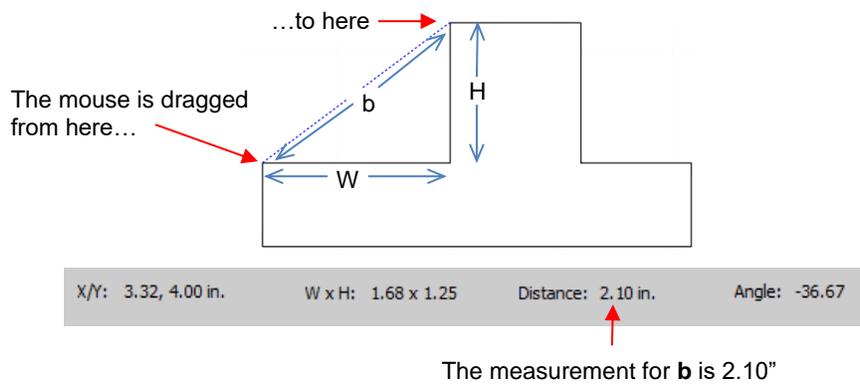
- To better illustrate these variables, the following shape will be used and the various measurements will be determined using the **Ruler**:



- ◇ **X/Y:** This is the starting position on the screen and will match the X/Y grid location on the **Cutting Mat**. You can extend beyond the boundaries of the mat, if needed.
- ◇ **W x H:** Indicates how far the mouse has been dragged away from the starting point. Note that as the mouse is dragged, a blue dotted line will appear. In this example, when measuring for the distance “a”, the **H** should be zero since it’s a vertical measurement only. In fact, making sure **H** is 0 is one way to make sure the **W** is the correct measurement needed:

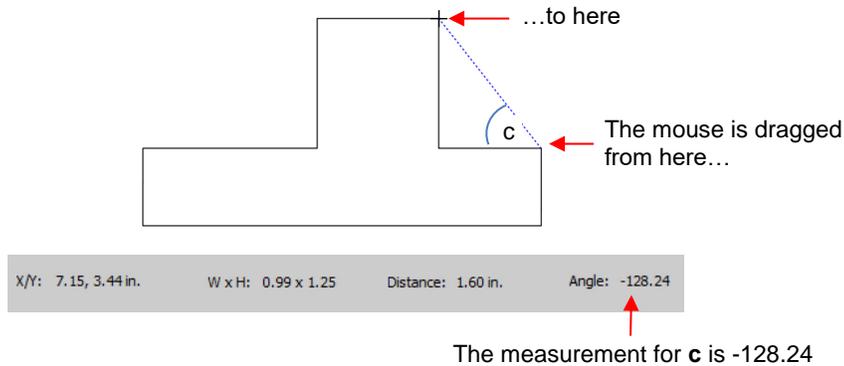


◇ **Distance:** This is the actual measurement between the starting location and the ending location. In the prior measurement, **W** is the same as **Distance** because the measurement was a horizontal one. But measuring the length of "**b**" is not:

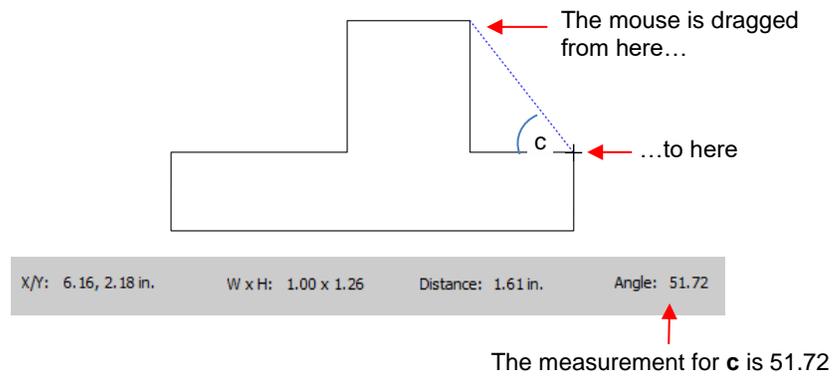


◇ **Angle:** This is the angle of the **Distance** line relative to the X axis.

- In the first measurement of "**a**", the angle was 0 because it was a horizontal line. On the other hand if the mouse had been dragged from the right side to the left side instead of the other way around, the angle would have read 180.
- If the measurement had been vertical, then the **Angle** would have read 90 if measured from the top to the bottom. It would have read -90 if measured from the bottom to the top.
- In the example being used, the angle "**c**" is measured to be -128.24:



- Obviously, "**c**" is an acute angle so -128.24 doesn't represent the actual angle shown in the screenshot. To get the true value, you subtract -128.24 from 180 (degrees in a straight line) to get 51.76 degrees.
- However, the other way to get "**c**" without having to do a calculation is to drag from the other direction:

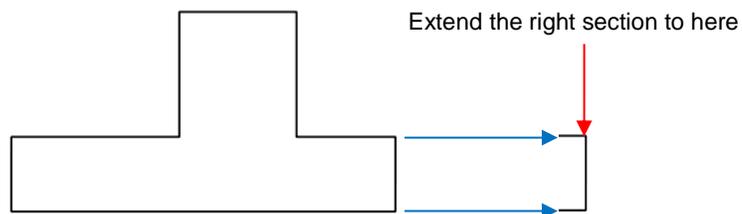


## 8.10 The Shape Tool - Path and Node Editing

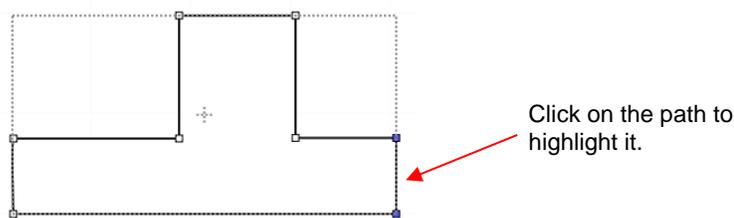
- Path editing involves moving paths as well as reshaping them. This topic was first introduced in *Section 7.05* where you were shown how to draw with the **Draw Tool** and then curve a straight line path. If you haven't read *Section 7.05*, please do so before proceeding with the rest of this section.
- To use the **Shape Tool**, click on the third icon  on the **Tools Panel** and then click on a shape. You should see the nodes which currently define that shape. If you do not see any nodes, then most likely you have clicked on a group of shapes. Go to **Object>Ungroup** and then try again.
- Path editing involves dragging path or dragging **Bezier** control points to reshape them. Node editing involves moving nodes and changing the type of node to then form desired curves.
- The most likely mistake you'll make while learning path and node editing is failing to zoom in close enough so that you can click precisely on paths and nodes. Keep that in mind while experimenting.

### 8.10.1 Moving a Path

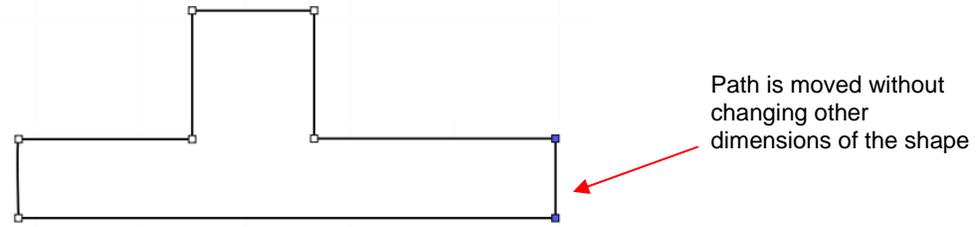
- Sometimes a path needs to be extended without resizing the rest of the shape. For example: let's say you need to extend the right section of this shape by a few inches:



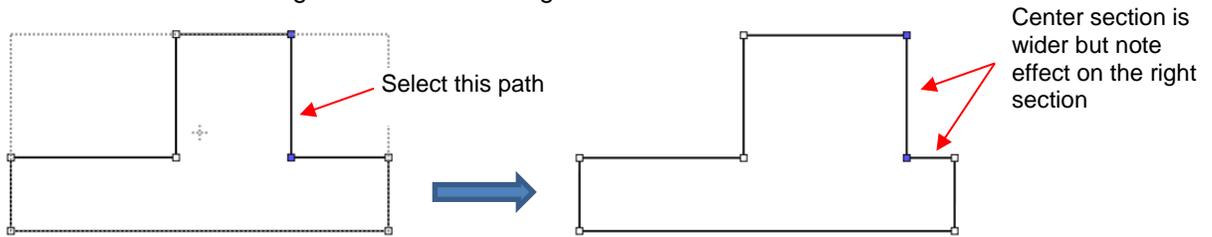
- ◇ Select the **Shape Tool**  on the **Tools Panel** and then click on that path:



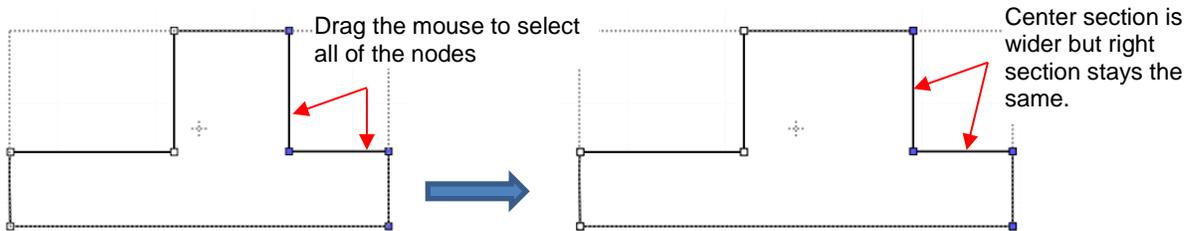
- ◇ You can now use the arrow keys on your keyboard to move that path. Holding the **Shift** key while clicking on an arrow key will move it in larger increments:



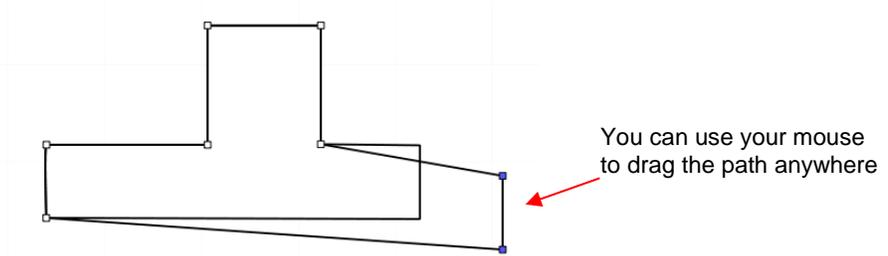
- ◇ If instead, the center section had been widened by selecting the path on its right side, then that would have resulted in shortening the section to the right of it:



- ◇ Thus, to maintain the dimensions of the right section, both paths need to be moved at the same time. To do this, marquee-select the nodes as shown and then move with the keyboard arrow:



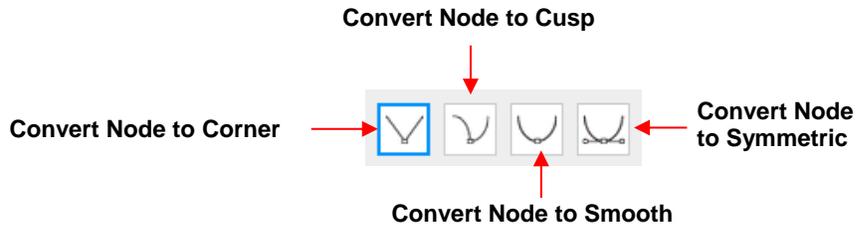
- If the shape is made up of straight line segments, versus curves, you can also drag the segments with your mouse instead of using the keyboard arrows. Note that it can be a bit tricky getting the cursor in the perfect spot to start dragging. However, you won't have the same control if you wish to keep the paths perfectly horizontal or vertical:



- Some practical examples of moving paths include resizing boxes and envelopes where you need the overall dimensions of the final project to be different but you do not want to change the size/thickness of the flaps.

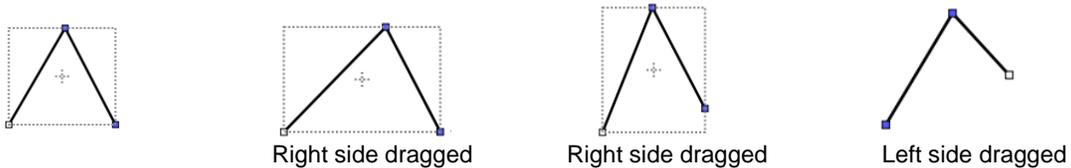
### 8.10.2 Reshaping a Path

- With the **Shape Tool** selected, you'll observe four icons in the **Tool Options**. The purpose of each option is to convert one or more selected nodes to that type of node:

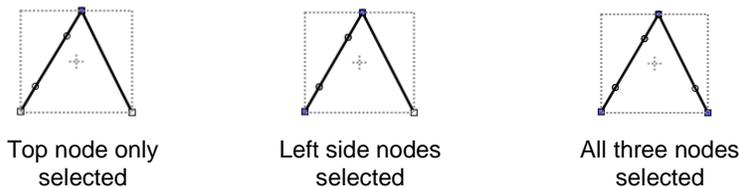


- One or more nodes are highlighted and then the appropriate icon selected. These same four functions can also be accessed by right-clicking and selecting **Path>Convert Node to**.
- To illustrate each one of these options, a simple path with a sharp corner will be used. This shape is already in **Corner Node** mode. To change to a different mode (in the examples that follow the first one), the top node is selected and then the option is clicked from the **Tool Options** or using the right-click and **Path>Convert Node to** menu option.

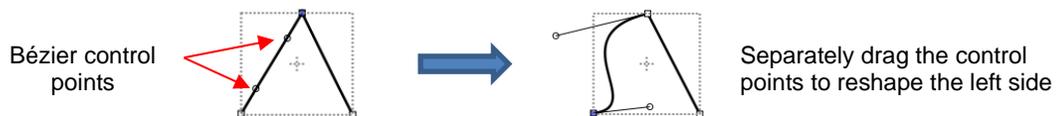
- ◇  **Corner Nodes:** These are the nodes that make up straight-line shapes such as rectangles, squares, triangles, stars, etc. Once selected, the shape will appear as below and either path can be moved as was demonstrated in the prior *Section 8.10.1*.



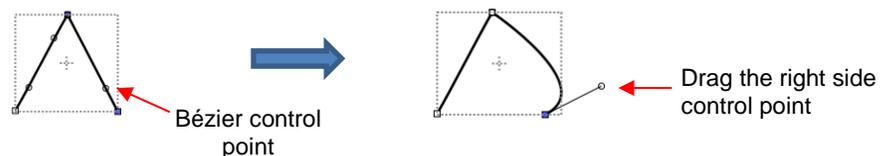
- ◇  **Cusp Nodes:** In this mode the Bézier control points appear and can be moved independently. First note how the paths appear when in this mode, depending on how many of the adjacent nodes are selected:



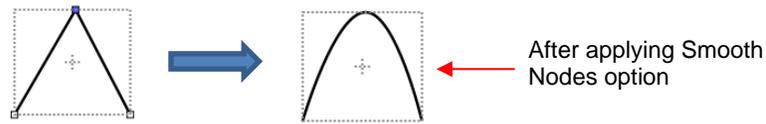
- The dots along the path are Bézier control points which are not linked to one another. You can freely drag either or both to create curves:



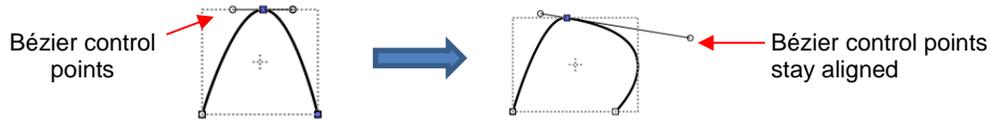
- In the case where there is a single Bézier control point on the right side, you can again drag the control point to create a curve:



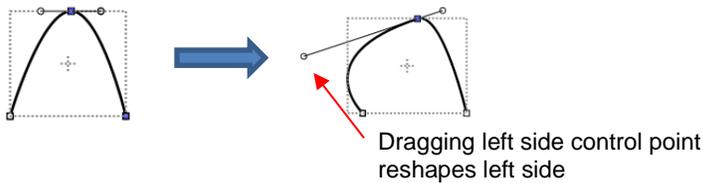
- ◇  **Smooth Nodes:** In this mode the Bézier control points always stay in a straight line. Notice that when you convert to **Smooth Nodes**, the shape immediately forms a curve:



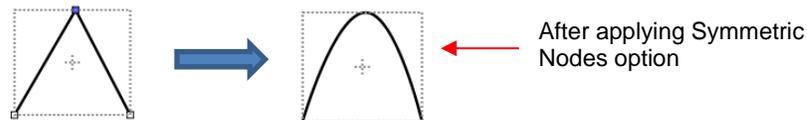
- When the newly formed shape is selected again, the Bézier control points appear in a straight line. If you move one, the other will move as well, in order to maintain that straight line:



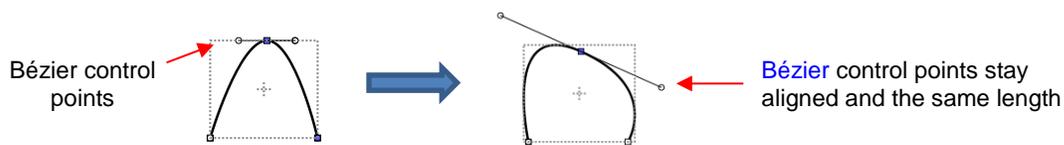
- The left side Bézier control point controls the curve on the left side. Thus, if it had been moved instead this would have resulted:



- ◇  **Symmetric Nodes:** In this mode the Bézier control points not only stay in a straight line, they also stay the same length. As with **Smooth Nodes**, when you convert to **Symmetric Nodes**, the shape immediately forms a curve:

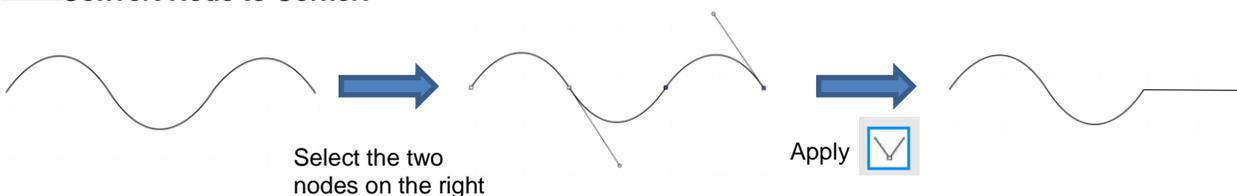


- When the newly formed shape is selected again, the Bézier control points appear in a straight line and the image appears the same as with **Smooth Node** status. However, when you now move one control point, the other will not only maintain that straight line, but also the same length. And the curves on both sides of the selected node will change:



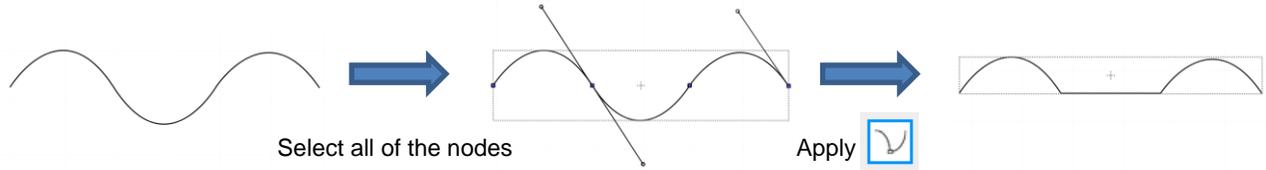
- To further illustrate these options, marquee-select a group of nodes to select more than one path and then click on whichever option you want to apply. The following examples show what occurs when the first two options are applied to curves and the last two options are applied to straight lines:

 **Convert Node to Corner:**

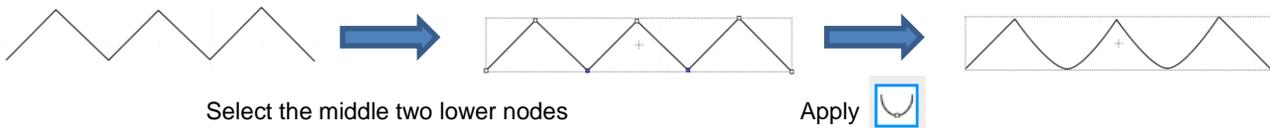




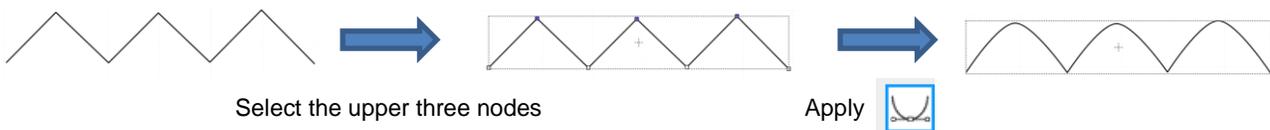
### Convert Node to Cusp:



### Convert Node to Smooth:

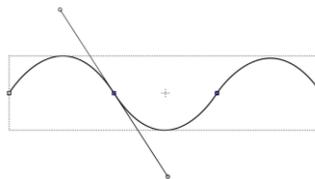


### Convert Node to Symmetric:

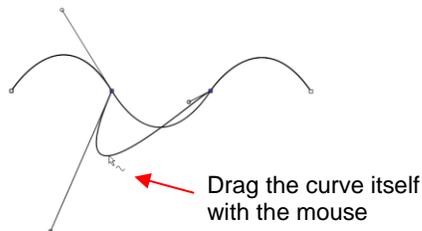


- As was shown in *Section 7.05.3*, you can also drag the path itself to reshape it, if one of the nodes has been converted to **Cusp**, **Smooth**, or **Symmetric**. For example:

- ◇ The following curve has the lower path selected and the option marked:

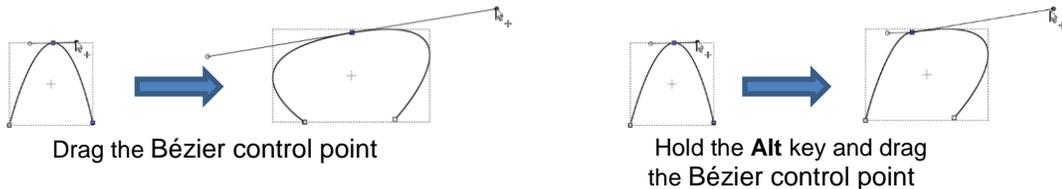


- ◇ The path can now be dragged with the mouse:



- You will recall that when a node is in either **Smooth** or **Symmetric** mode, adjusting one Bézier control point will automatically affect the other one and the curves on either side will change. To avoid this, hold the **Alt** key while dragging the control point and the other control point will remain in place:

- ◇ For example, with the following **Smooth** node shape, the same change is made with and without holding the **Alt** key during the adjustment:

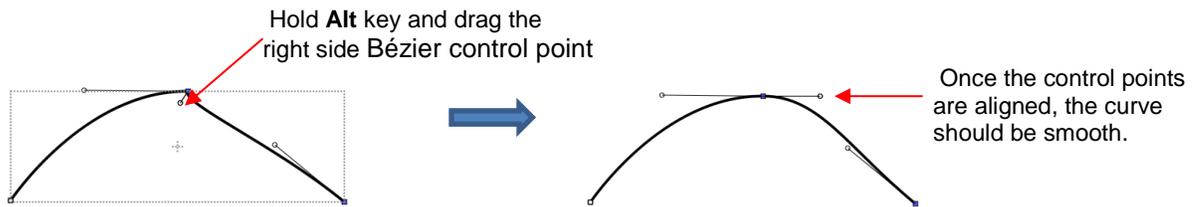


### 8.10.3 Examples of Smoothing Curves

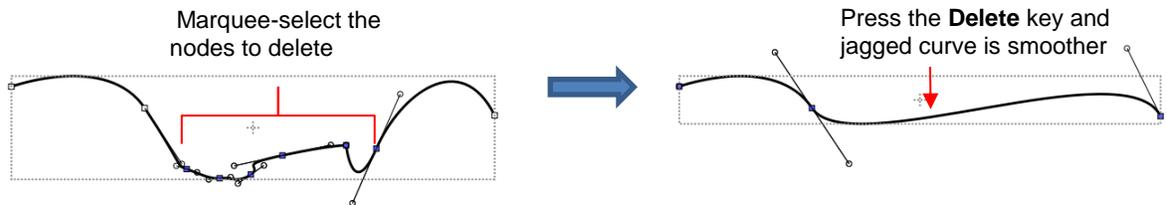
- The last method shown in the prior section can be used to correct kinks in what should be a smooth curve.
  - ◇ For example, let's say you want to make the following shape have a nice smooth curve:



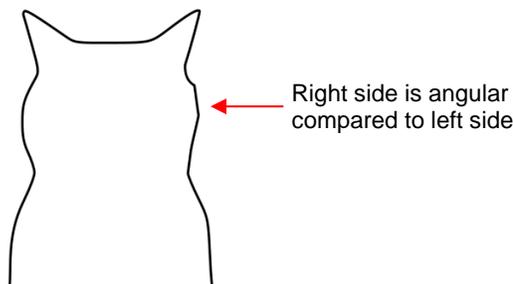
- ◇ Using the **Shape Tool**, click on the curve to reveal the node. Then click on the third icon , if needed, so that option will be highlighted. Hold the **Alt** key and drag the Bezier control point that's closest to the curve needing adjustment until the two control points are in a straight line:



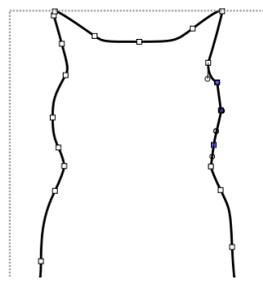
- In *Section 7.04.1*, you were shown how to add or delete nodes while in the **Draw Tool**  mode. Any time you want to add nodes to an existing path, you will need to be in this mode. However, you can delete nodes while in the **Shape Tool** mode. Select a node or marquee-select a group of nodes and press the **Delete** key on your keyboard:



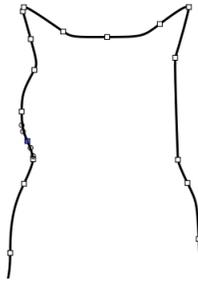
- Based on such a drastic change, it's worth noting that deleting smaller numbers of nodes at a time is usually advisable to avoid losing the original structure of the shape.
  - ◇ As a practical example, here is a traced image of a cat. Note the right side of the cat's head is not smooth and rounded like the left side:



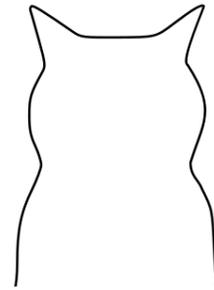
- Using the **Shape Tool**, the nodes causing the angular shape are marquee-selected and deleted. Then the path is reshaped:



**Shape Tool** shows nodes causing angular shape



After deleting the nodes, the right side is flat



After reshaping the line into a curve

### 8.10.4 Applications for the Shape Tool

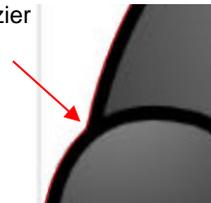
- It's not always obvious when the **Shape Tool** might be needed. Here are a few examples to keep in mind:
  - ◇ Editing of pixel traced images: Sometimes a pixel trace will appear to be perfect until, for example, you use it for a print and cut and discover that some of the paths are slightly outside the printed areas of the original image:



Trace line doesn't follow shape here.



A node can be added or the Bezier curve can be reshaped.



- ◇ Manual tracing: As shown in *Section 7.05*, one of the quickest ways to manually trace a raster image is to use the **Draw Tool** and simply click/click/click around the image and then use the **Shape Tool** to create curves and move nodes to more closely align with the original image.
- ◇ Improving a cut: If you have problems with a particular location on a cut shape, examine the nodes in that location. You may find a cluster of nodes or a sharp cusp. Delete those excess nodes, reform the path, and then retest the cut.
- ◇ Modifying poorly designed files: Sometimes you will pick up free files that don't quite cut the way you expected. Examples are often fold-up templates where corners and fold lines do not quite meet. Having the ability to move paths and nodes can correct these kinds of files and provide cleaner and more professional end products.

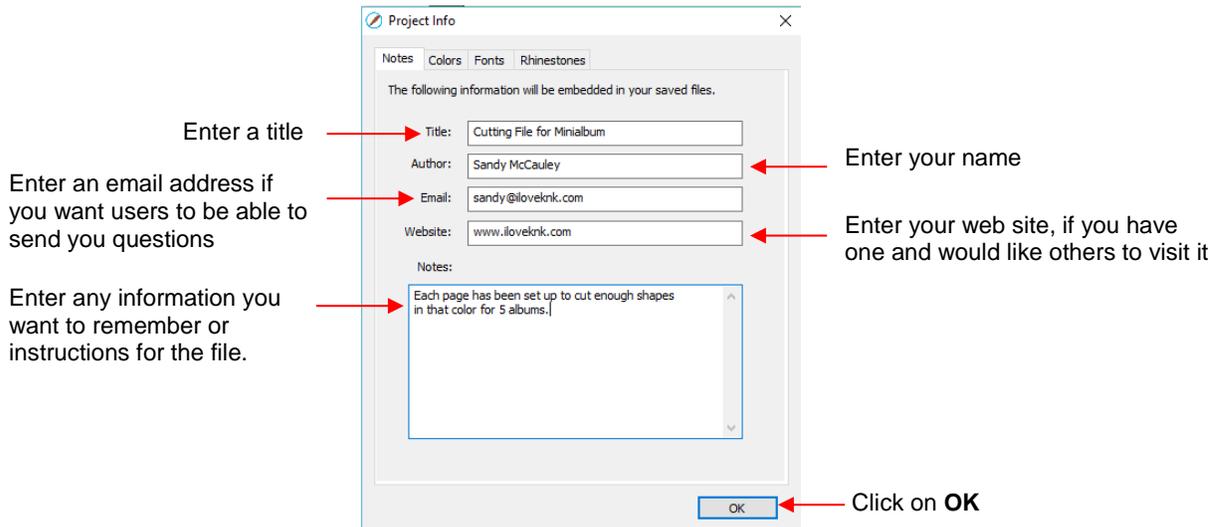
## 9. SCAL: Designing

### 9.01 Where Do I Start with Learning to Design?

- SCAL offers some excellent easy-to-use designing tools to assist you in creating whatever you can imagine! The best way to learn these tools is to focus on only one at a time and play with settings! You aren't going to break anything in the software by experimenting and you never know what you might discover!

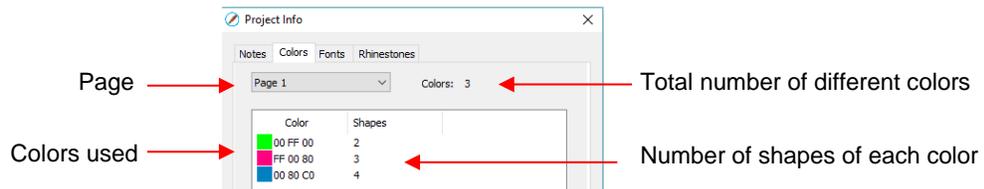
### 9.02 Project Info

- Before getting started on the fun and amazing design capability of SCAL, it's worth noting a feature that allows you to add your name and some other details to your file. This can save you time later when you're not remembering some of the original details and also help others with whom you share your files. Using this feature is, of course, entirely optional.
- To open the **Project Info** window, go to **Window>Project Info**. The following example shows some of the optional information you can add in this window that will be saved with your actual project:

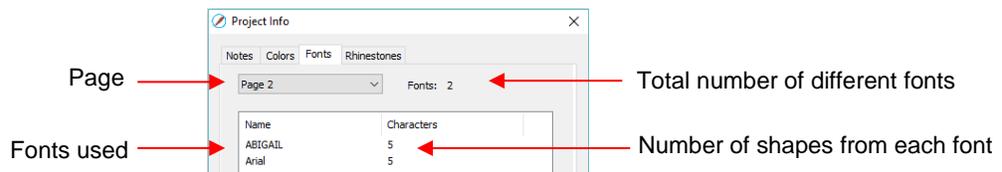


- Note the other tabs in this window: **Colors**, **Fonts**, and **Rhinestones**. These do not require your input. Instead, they automatically track, by **Page**, those elements that are currently present in the file. For example:

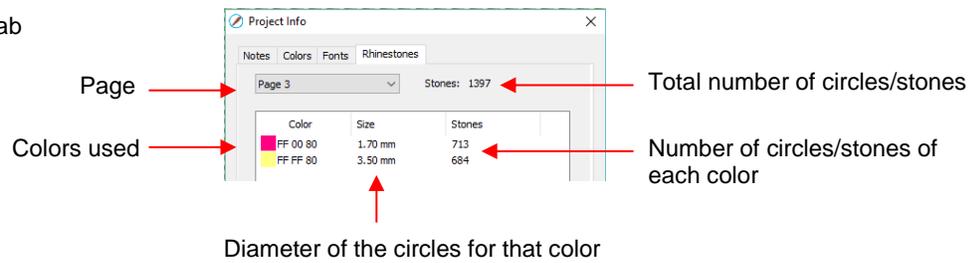
#### Colors Tab



#### Fonts Tab



## Rhinestones Tab



- Note: When changing tabs, such as from **Colors** to **Fonts**, always take note of the **Page** number. It will not automatically update to the page you were just checking. Thus, if you are on *Page 2* when on the **Colors** tab, you may discover you're on *Page 1* on the **Fonts** tab. Simply change to the page you need from the dropdown menu.

## 9.03 Basic Shapes

- The **Tools Panel** has access to the following basic shapes: **Rectangle**, **Rounded Rectangle**, **Circle**, **Triangle**, **Polygon**, **Star**, and **Spiral**. Some of these have customizing functions which will appear on the **Tool Options** bar and will be detailed in the following subsections.
- To access these various shapes, hold down the left mouse button on the **Rectangle** icon  on the **Tools Panel** and then select the desired shape from the popup menu.
- Once a different shape is selected, that shape's icon will then replace the **Rectangle** icon.

### 9.03.1 Rectangle

- After selecting the **Rectangle** shape, drag the left mouse button to form a rectangle.
- Holding the **Shift** key while dragging the mouse will constrict the proportions, resulting in a square:



Freely dragging mouse



Holding **Shift** key

### 9.03.2 Rounded Rectangle

- After selecting the **Rounded Rectangle** shape, drag the left mouse button to form a rectangle with rounded corners.
- Holding the **Shift** key while dragging the mouse will constrict the proportions, resulting in a rounded square:

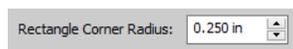


Freely dragging mouse



Holding **Shift** key

- In the **Tool Options**, a setting will appear. This can be used to control the roundness of the corners:





Radius: 0.10



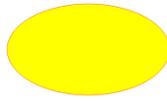
Radius: 0.25



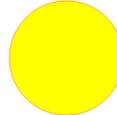
Radius: 0.75

### 9.03.3 Circle and Oval

- After selecting the **Circle** shape, drag the left mouse button to form an oval.
- Holding the **Shift** key while dragging the mouse will constrict the proportions, resulting in a circle:



Freely dragging mouse



Holding **Shift** key

### 9.03.4 Triangle

- After selecting the **Triangle** shape, drag the left mouse button to form a triangle.
- Holding the **Shift** key while dragging the mouse will constrict the proportions, resulting in an equilateral triangle:



Freely dragging mouse



Holding **Shift** key

### 9.03.5 Polygon

- After selecting the **Polygon** shape, drag the left mouse button to form a polygon:



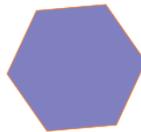
- In the **Tool Options**, a **Polygon corners** setting will appear:



- This can be used to change the number of sides on the polygon. For example:



Polygon corners: 3



Polygon corners: 6



Polygon corners: 10

### 9.03.6 Star

- After selecting the **Star** shape, drag the left mouse button to form a star:



- In the **Tool Options**, two settings will appear:



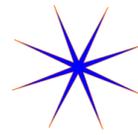
- The **Star points** setting can be used to change the number of points on the star. The **Inner radius** setting can be used to change the angle of the inner points:



5 Points  
Radius: 38%



4 Points,  
Radius: 47%



8 Points  
Radius: 10%

### 9.03.7 Spiral

- After selecting the **Spiral** shape, drag the left mouse button to form a spiral:



- In the **Tool Options**, four settings will appear:



- The functions of these settings are:

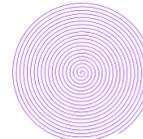
◇ **Turns:** Number of rotations around the center:



Turns: 3



Turns: 6



Turns: 20

◇ **Divergence:** Tightness of the spiral: larger = looser; smaller = tighter:



Divergence: 1



Divergence: 3



Divergence: 0.5

◇ **Inner Radius:** Starting point of the spiral



Inner Radius: 0



Inner Radius: 0.2



Inner Radius: 0.5

◇ **Clockwise:** Whether spiral rotates clockwise or counter-clockwise from center:



Clockwise: checked



Clockwise: not checked

### 9.04 Shadow Layer

- The **Shadow Layer** function allows you to create an outline or an inline of any shape including, of course, text. After selecting a shape, you can access the function in either of two ways:
  - ◇ Go to **Effects>Shadow Layer (Contour Cut)**
  - ◇ Right-click and select **Appearance>Add Shadow Layer**
- The following window will open:

#### 9.04.1 Shadow Layer Settings

- **Size** changes the thickness of the shadow layer. You can either scroll the **Size** bar or type in a size in the input window to the right.
- **Color** refers to the color of the shadow. Clicking on the color box opens the standard color window where a new color can be selected.
- As an example, a Times New Roman upper case A is used. After increasing the **Size** and changing the **Color** to blue, the following result is obtained:

◇ The **Layers Panel** shows the addition of a new **Shadow Layer**:



- **Type** controls the style or shape of the shadow at the corners. There are three choices:



Shadow



Shadow (Rounded)



Shadow (Straight)

- ◊ Note that the first choice, **Shadow**, also has a **Miter** setting which should work in the same way as **Miter** affects the **Stroke** (refer to *Section 5.14*). However, at this time, it appears that the **Miter** setting is not working.

- **Inset Shadow** is the opposite of **Shadow** – instead of creating a contour that is larger than the original shape, a contour is created that is smaller and fits inside the original shape.

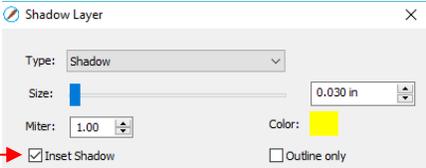
- ◊ For example, let's say you are going to create a two-color vinyl sign that says "For Sale":

**For Sale**

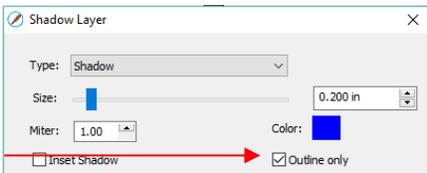
- ◊ If a normal **Shadow** is used to create the second layer, the letters will automatically be welded because of their proximity to one another. This may not be suitable for your application:

**For Sale**

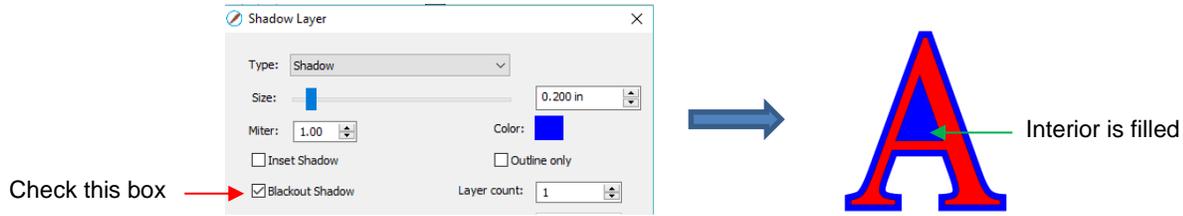
- ◊ Instead, create an **Inset Shadow** by checking the **Inset Shadow** option:

Check this box →  →  Result

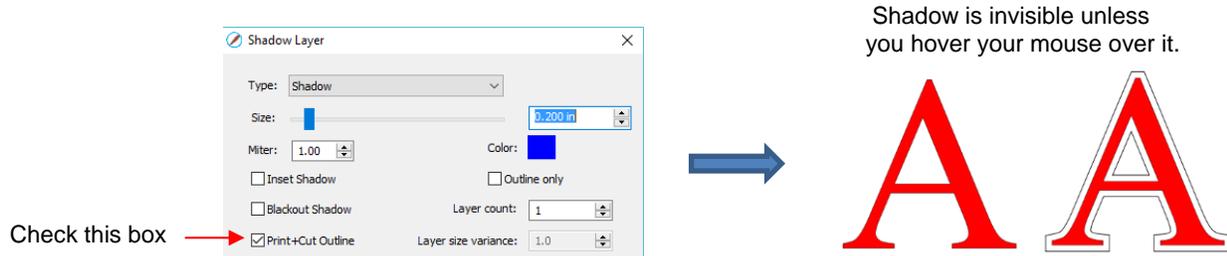
- **Outline only** can be checked to set the **Fill** on the shadow to **None**. The **Stroke** color will be whatever is set in **Color**:

Check this box →  →  ← **Shadow has no Fill**

- **Blackout Shadow** can be used to remove any interior shadow lines, leaving only a single outset:



- **Print +Cut Outline** creates a shadow with a **Fill** and **Stroke** both set to **None**. The shadow will be invisible unless you hover the mouse over the shadow:



◇ Two print and cut examples for this function are:

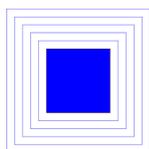
- To add a contour cut around a printed shape
- To cut just inside the boundaries of a printed image (in this case you also use the **Inset Shadow** option)

- **Layer** settings: There are three additional settings in the **Shadow Layer** window used to create multiple shadows on a shape:

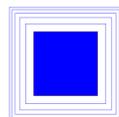
◇ **Layer count:** Total number of shadow layers to be created

◇ **Layer size variance:** If left at 1.0, the increasing thickness of each layer will be based on the original **Size** of the first shadow. If less than 1, the increasing thickness of each layer will be progressively less than the prior, based on the variance. If greater than 1, the increasing thickness of each layer will be progressively larger based on the variance.

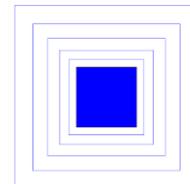
- For example, a square is used where the original shadow **Size** is 0.25 and the **Layer count** is set to 5. Outline only mode is also chosen so that the individual layers are easier to see. Note the different results when **Layer size variance** is set 1, 0.75 and 1.25:



Variance: 1.0

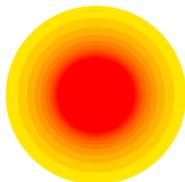


Variance: 0.75



Variance: 1.25

◇ **End color:** If the **End color** is chosen to be different from the original **Color**, a gradual transition between the two colors will be created. This can be used to create some beautiful designs for a print and cut:

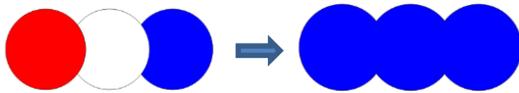


## 9.05 Boolean Operations

- Under **Path** on the **Menu Bar**, there are five Boolean operations that are very useful when designing cutting files. This section illustrates how each works and provides a practical example for each one.

### 9.05.1 Union

- The **Union** operation, also commonly called welding, removes the overlap between two or more selected shapes. The color of the new shape will be that of the bottom-most shape:

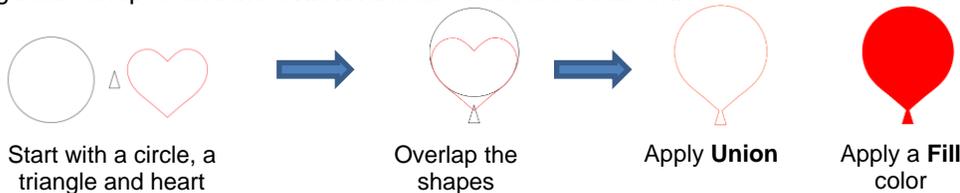


With a **Fill** color: before and after **Union**



With no **Fill**: before and after **Union**

- To apply this operation, select two or more shapes and use one of the following:
  - ◇ Go to **Path>Union**
  - ◇ Press **Alt+U**
  - ◇ Right-click and select **Path>Union**
- *Sections 6.07 – 6.09* showed several examples of the **Union** operation applied to text. Here's an example using basic shapes and the **Union** function to create a balloon:



Start with a circle, a triangle and heart

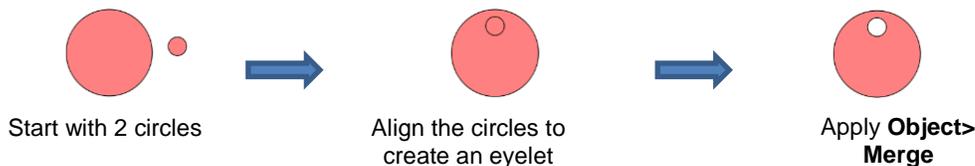
Overlap the shapes

Apply **Union**

Apply a **Fill** color

- In this next example, a scalloped border will be designed:

- ◇ Start with two circles that will be used to create an eyelet circle:

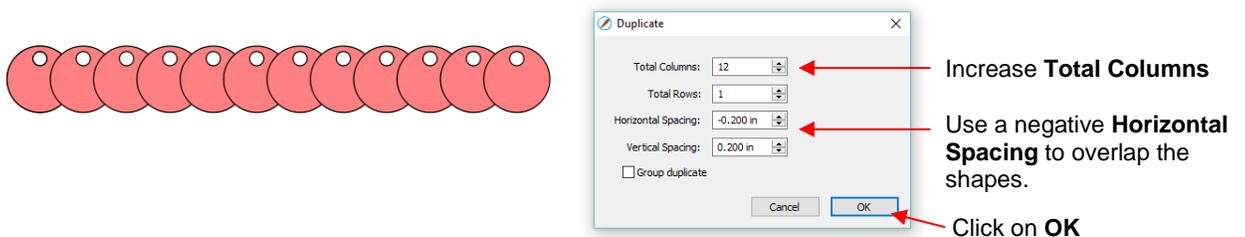


Start with 2 circles

Align the circles to create an eyelet

Apply **Object>Merge**

- ◇ Select this new shape and use **Object>Duplicate** to open the **Duplicate** window:

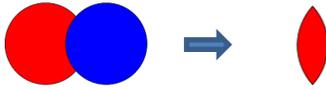


- ◇ Add a long rectangle and align with the pattern of circles. Apply the **Union** function:

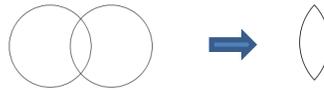


## 9.05.2 Intersection

- The **Intersection** operation is the opposite of the **Union** operation. Instead of removing overlap, the overlap is what remains. The color of the new shape will be that of the bottom shape:



With a **Fill** color: before and after **Intersection**

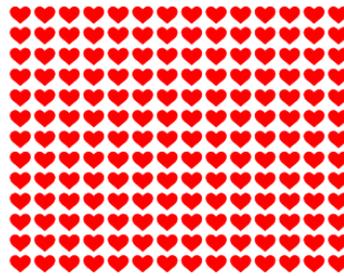


With no **Fill**: before and after **Intersection**

- To apply this operation, select two shapes and use one of the following:
  - ◇ Go to **Path>Intersection**
  - ◇ Right-click and select **Path>Intersection**
- One example involves filling a shape with a pattern:
  - ◇ This pattern was designed by using the **Duplicate** function to create a grid of hearts. Then, by applying **Object>Merge** on the hearts, it is now a single shape:

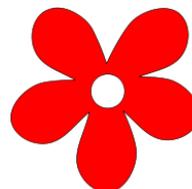


A heart from the **Library's Basic Shapes** folder



After using **Duplicate** and then **Merge**

- ◇ Arrange the shape to be filled (in this case, a flower) over the pattern. Also, set aside a copy of the flower shape to use later as a border.



- ◇ Select the pattern and flower and apply **Path>Intersection**:

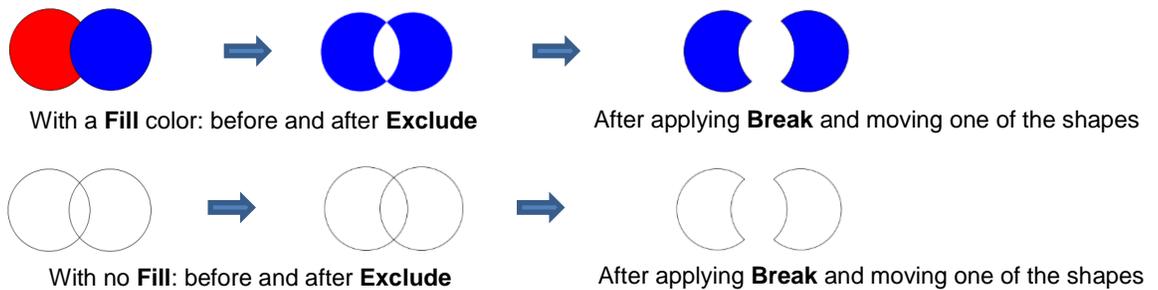


- ◇ Recolor the spare flower white with a red **Stroke**. Then center the pattern with the spare flower. Perfect for a print and cut!



### 9.05.3 Exclude

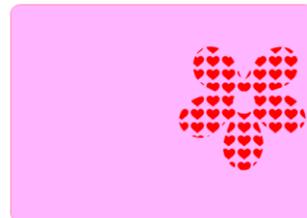
- The **Exclude** operation subtracts the intersection of two shapes from both of the shapes. The color of the new shapes will be that of the upper shape.



- To apply this operation, select two shapes and use one of the following:
  - ◇ Go to **Path>Exclude**
  - ◇ Right-click and select **Path>Exclude**
- After applying, use **Path>Break** if you need to move one shape away from the other.
- An example involves using the heart-filled flower from the prior section as a cut design on the front of a greeting card:
  - ◇ Start with a rounded rectangle as the card base (refer to *Section 9.03.2*):



- ◇ Add the pattern from *Section 9.05.2*, without the spare flower shape. Arrange the pattern so that it will cut from the front of the card:

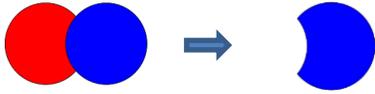


- ◇ Select the card and pattern and apply **Path>Exclude**:



## 9.05.4 Front Minus Back

- The **Front Minus Back** operation subtracts the intersection of two shapes from the front (or upper) shape, leaving only that front shape:



With a **Fill** color: before and after **Front Minus Back**



With no **Fill**: before and after **Front Minus Back**

- To apply this operation, select two shapes and use one of the following:
  - ◇ Go to **Path>Front Minus Back**
  - ◇ Right-click and select **Front Minus Back**
- An example involves adding the word HELLO to the card designed in *Section 9.05.3*.
  - ◇ Select a font and type out the letters. Add a rectangle so that the tops and the bottom of the letters will just overlap:



- ◇ Select the rectangle and the lettering and apply **Path>Front Minus Back**:



or if filled with color for this screenshot:

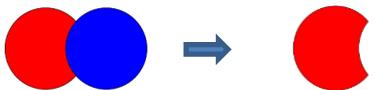


- ◇ Arrange the greeting on the front of the card designed in *Section 9.05.3*. Select both and apply either **Object>Merge** or **Path>Exclude** so that all internal shapes are cut before the outside card base:



## 9.05.5 Back Minus Front

- The **Back Minus Front** operation is the opposite of **Front Minus Back**. It subtracts the intersection of two shapes from the back (or bottom) shape, leaving only that back shape:



With a **Fill** color: before and after **Back Minus Front**



With no **Fill**: before and after **Back Minus Front**

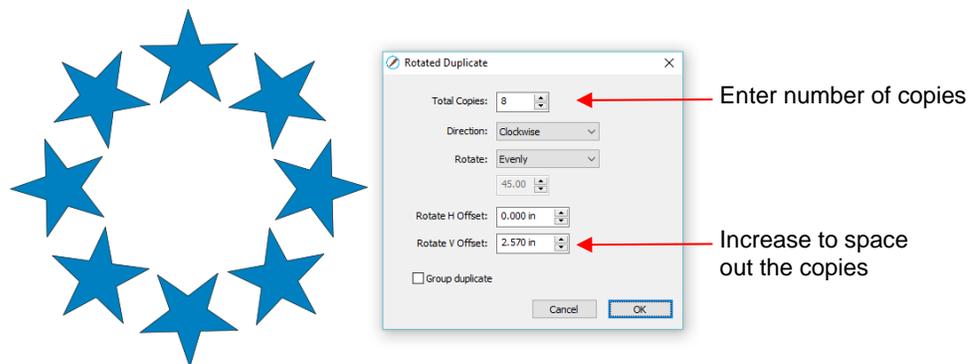
- To apply this operation, select two shapes and use one of the following:
  - ◇ Go to **Path>Back Minus Front**
  - ◇ Right-click and select **Back Minus Front**
- Any examples for **Back Minus Front** are essentially the same as for **Front Minus Back**. When choosing which to use, just check the screen and think about which one you need to remain. Alternatively, just try one and if it's the wrong choice, use **Undo** to back up and then pick the other. 😊

## 9.06 Duplicate Rotated

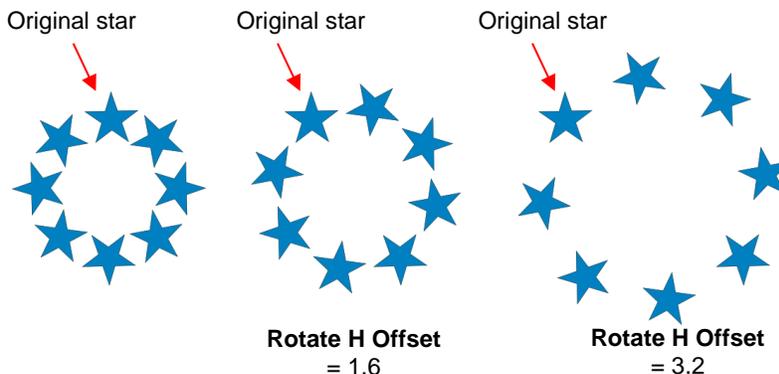
### Video

#### 9.06.1 Duplicate Rotated Settings

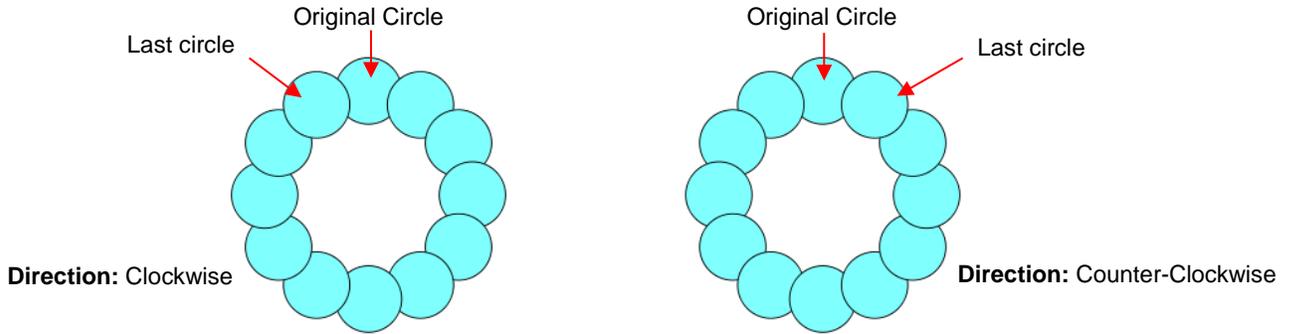
- The **Duplicate Rotated** function allows you to make duplicates arranged in a circle or partial circle pattern.
- To access **Duplicate Rotated**, first select the shape(s) and then use either of the following:
  - ◇ Go to **Object>Duplicate Rotated**
  - ◇ Press **Ctrl+Shift+D**
- To illustrate how this works, start with a small shape. Select it and then activate the **Duplicate Rotated** function using either of the methods just mentioned. The following window opens:



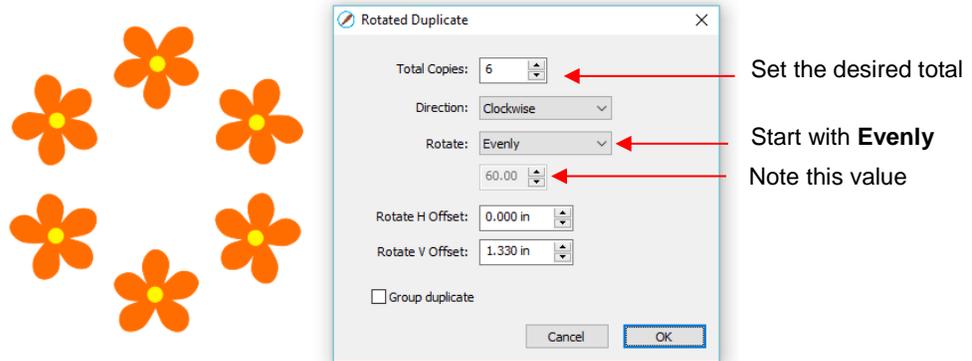
- ◇ Start by increasing the number of copies. If the shapes are overlapping too much, increase **Rotate V Offset** which is the distance from the center. Increasing the **Rotate H Offset** setting shifts the center of rotation toward the right:



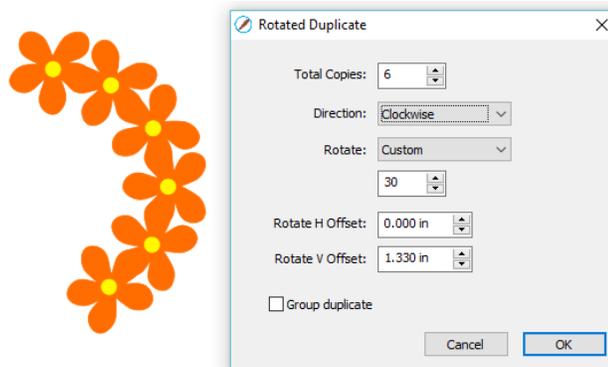
- Because the stars must spread out in order to keep the original in its same position, one can then decrease the **Rotate V Offset** at the same time as increasing the **Rotate H Offset**, if you need to spread the shapes but keep the design in the current display area of SCAL.
- The **Direction** setting changes the order of the duplicates around the circle.
  - ◇ With clockwise selected, the order of the shapes follows a clockwise progression so that the last copy is just to the left of the original at the top. You can visually see that circle is on top. The opposite is true if counter-clockwise is selected.



- Does it matter which **Direction** is used? Most likely, only if you need it for display purposes.
- **Rotate** has two options: **Evenly** and **Custom**. With **Evenly** selected, the copies are distributed evenly in a full 360° circle. But let's say you want a semi-circle of shapes:
  - ◇ First, create a circle pattern using the desired number of shapes. Note that the greyed out box below **Rotate** is changing as you add more shapes:



- ◇ Change the **Rotate** to **Custom** and then, because you want a semi-circle of shapes, divide that value by 2. Thus, in this example, it will be changed to 30:



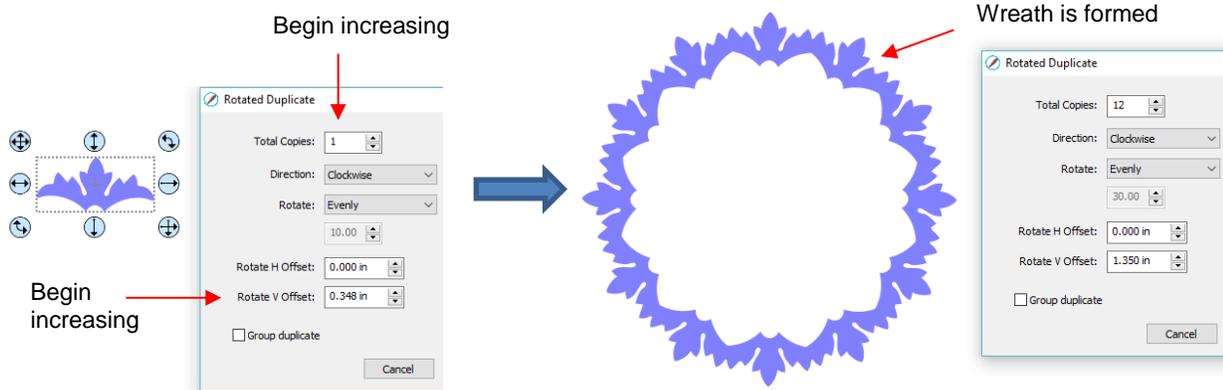
- ◇ If you want the shapes to be grouped, mark the **Group duplicate** box. Otherwise leave it unchecked.

### 9.06.2 Using Duplicate Rotated to Design a Wreath

- Begin with a desired shape. In this example, a shape from the **Library's Swirls** folder will be used.



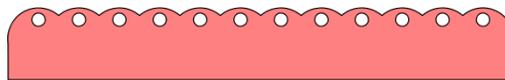
- Select and go to **Object>Duplicate Rotated**. Begin increasing **Total Copies** and the **Rotate V Offset** until a desired overlapping pattern is obtained:



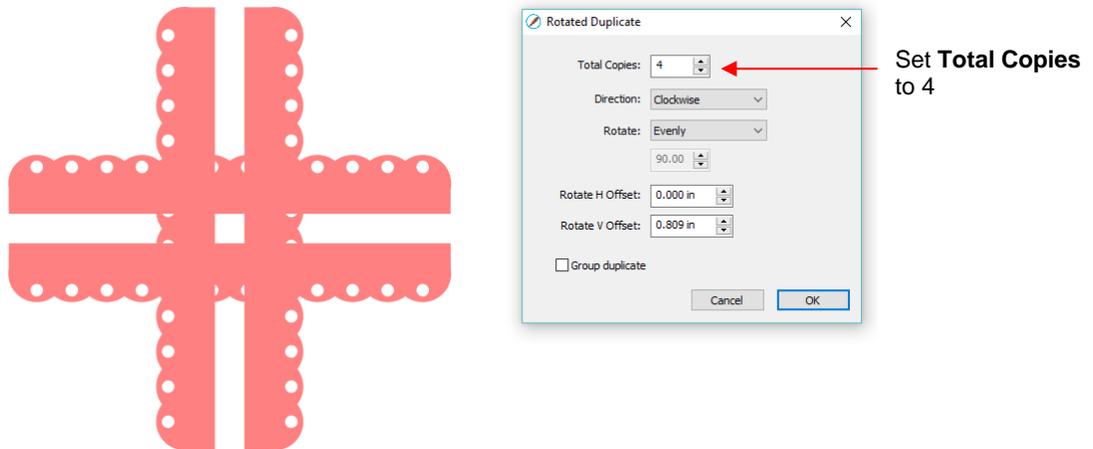
- After creating the pattern, go to **Path>Union** to remove the overlap and the shape is ready to cut.

### 9.06.3 Using Duplicate Rotated to Design a Frame

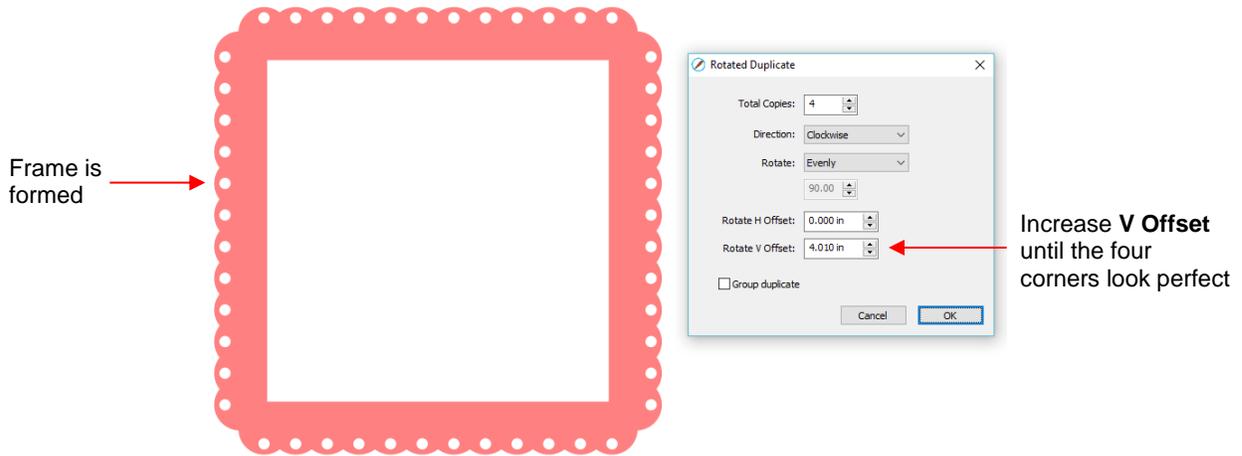
- In *Section 9.05.1*, the **Duplicate** and **Union** functions were used to create this scalloped border:



- Select the shape, go to **Object>Duplicate Rotated** and enter 4 for **Total Copies**:



- Begin increasing the **Offsets** until the four corners overlap evenly:



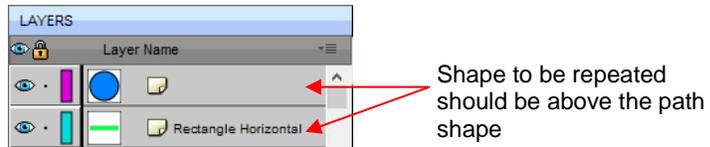
- Click on **OK** and then apply **Path>Union**.

### 9.07 Object on Path

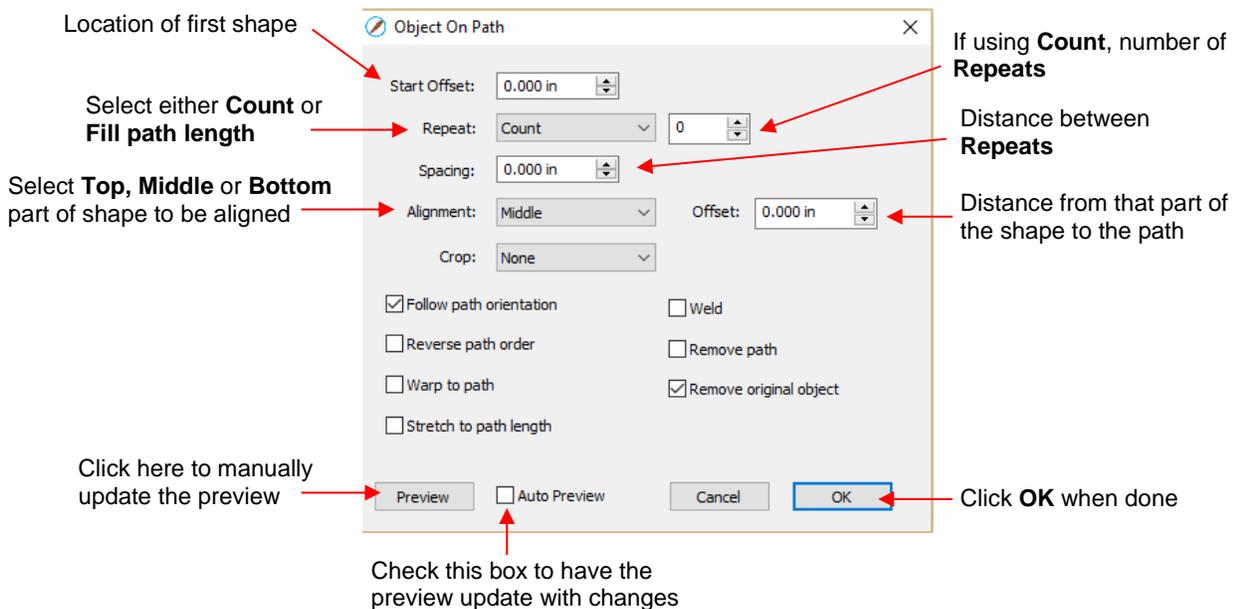
- The **Object on Path** function can be used to align repeats of a shape along the path of another shape:



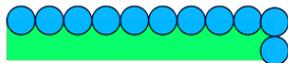
- **IMPORTANT:** Before applying the function, check the **Layers Panel** to make sure the shape to be repeated is on a higher layer than the path:



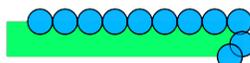
- To open the **Object on Path** window, select both the path and the shape to be repeated and go to **Effects>Object on Path**. Because there are so many settings in this window, only about half will be explained at this point:



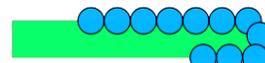
- ◇ **Start Offset:** This is the distance from the left side of the path to the location of the first shape:



Start Offset = 0

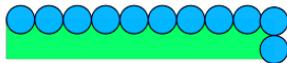


Start Offset = 0.5"

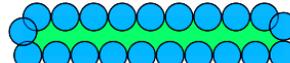


Start Offset = 1.5"

- ◇ **Repeat:** Choose **Count** if you want to specify how many copies to place along the path. Choose **Fill Path length** if you want the program to automatically fill in the number of repeats that will fill the path using the **spacing** you enter:

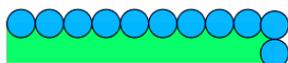


Repeats: Count 10

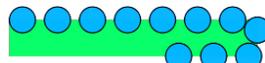


Repeats: Fill path length

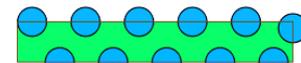
- ◇ **Spacing:** Enter the desired spacing between repeats. This only applies when **Repeats** is set to **Count**:



Spacing = 0

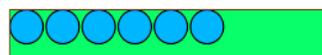


Spacing = 0.2"

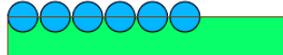


Spacing = 0.5"

- ◇ **Alignment:** This refers to the object being repeated. Choose **Top** to have the top of the shape aligned along the path. Choose **Bottom** to have the bottom of the shape aligned along the path. Choose **Middle** to have the center of the shape aligned along the path:



Alignment: Top

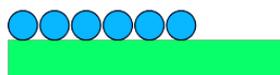


Alignment: Middle

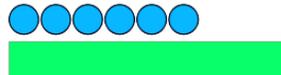


Alignment: Bottom

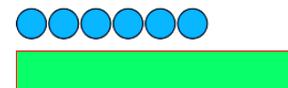
- ◇ **Offset:** This is how far off you want the alignment to be. For example, if you chose **Bottom** for **Alignment** and then 0.15" or 0.25" for **Offset**, then the top of the shapes will be 0.15" or 0.25" above the path:



Offset = 0



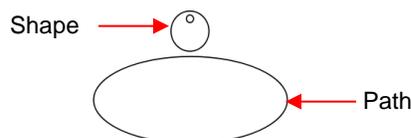
Offset = 0.15"



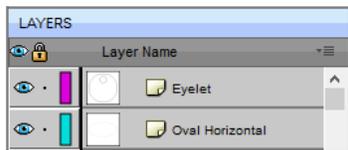
Offset = 0.25"

### 9.07.1 Designing a Scalloped Oval

- Import an oval and two circles from the **Library's Basic Shapes** and resize based on the following example. After arranging the smaller circle near the top of the larger circle, join the two using **Object>Merge** to create an eyelet circle:

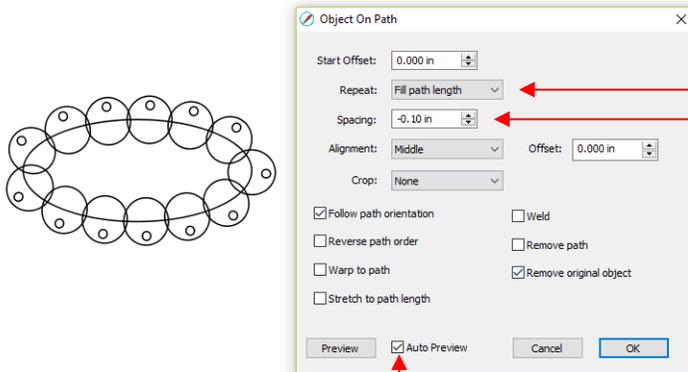


- Before using the **Object on Path** function, make sure the eyelet shape is above the oval path on the **Layers Panel**:



Shape to be repeated should be above the path shape

- Select the shapes and open the **Object on Path** window using **Effects>Object on Path**. The first thing is to mark the **Auto Preview** option so that all changes will be immediately reflected. Then choose **Fill path length** so the shapes will be distributed over the entire path. Set the **Spacing** to a negative number so that the shapes will overlap:

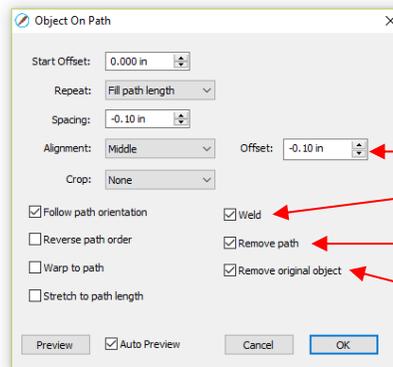
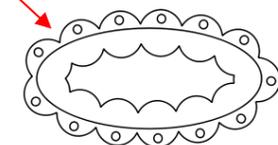


Note the settings used to fill the path and overlap the shapes

Mark this first

- Next the **Offset** is decreased to soften the scallop. Also a few new settings are noted as shown and described below:

Lowering the **Offset** makes the scallop less acute



Lower the **Offset**

Removes overlap

Removes original path

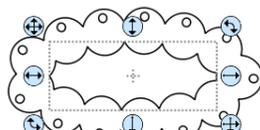
Removes original shape

- ◇ **Weld:** Mark this box if you want the shapes welded together, as shown in the screenshot.
- ◇ **Remove path:** Choose if you will no longer need the path shape (in this case, the oval)
- ◇ **Remove original object:** Choose if you will no longer need the original shape (in this case, the eyelet circle)

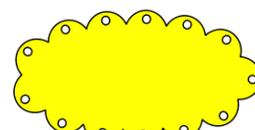
- Click on **OK** and the scalloped oval is mostly complete. To remove the internal scallop, apply **Object>Break Apart**. Carefully select the internal scallop shape and delete. Then marquee-select the remaining scallop border with eyelet circles and apply **Object>Merge**:



After clicking on **OK**



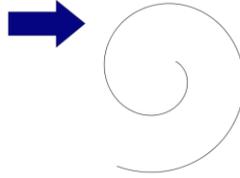
After applying **Break Apart**, select inner scallop



After deleting inner scallop, apply **Merge** and a **Fill**

## 9.07.2 Warp a Shape to a Path

- The **Object on Path** function can also be used to stretch a shape to fit a path. For example, let's start with an arrow (from the **Library's Arrows**) and a spiral (refer to *Section 9.03.7*):



- Verify that the arrow is above the spiral on the **Layers Panel**. Then select both and go to **Effects>Object on Path**. Note that since there is only one shape involved, **Repeat** is left at **Count** and set to 0:

Repeat is set to **Count** but the number of repeats is set at 0

Original arrow appears positioned at start of spiral

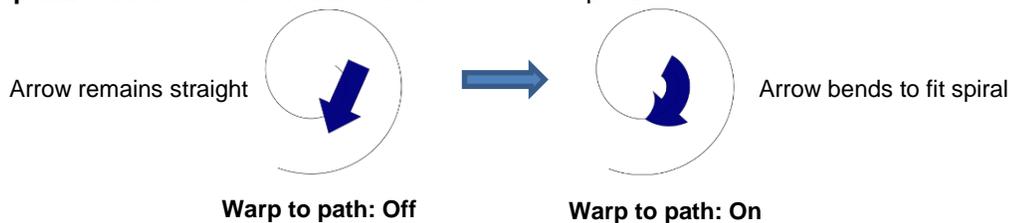
Mark this first

- Next, two new settings are applied:

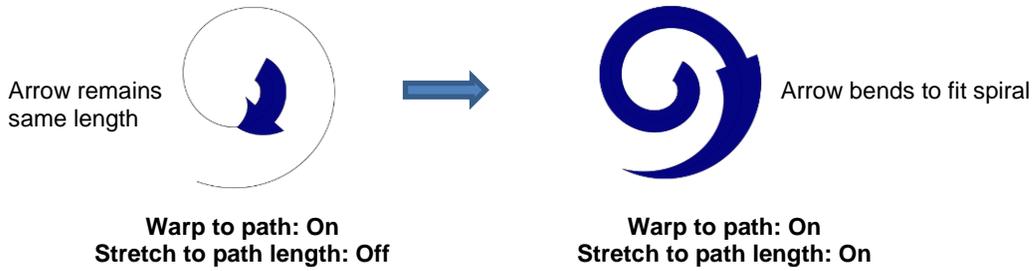
Mark these two options

Arrow is now curved and stretched to fit the spiral

- ◇ **Warp to path:** causes the arrow to bend/curve to fit the spiral:



- ◇ **Stretch to path length:** causes the arrow to be elongated so that it starts and ends at the same locations as the spiral:

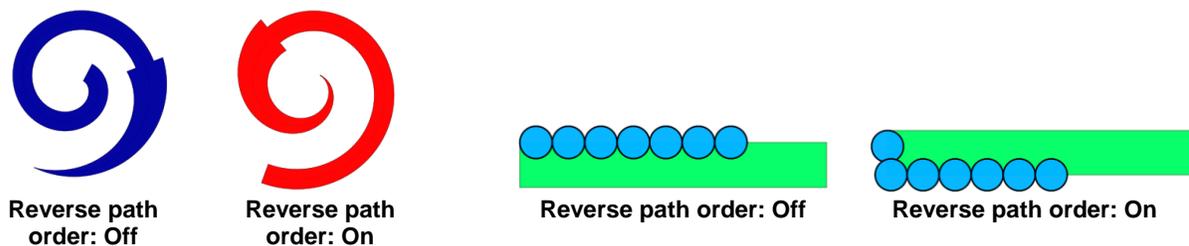


### 9.07.3 Remaining Settings

- The two remaining settings in the **Object On Path** window are:
  - ◇ **Follow path orientation:** With this setting turned on, the repeats will rotate so that they stay aligned with the path. With the setting turned off, the shapes never rotate:



- ◇ **Reverse path order:** Changes the direction the shapes are applied. With **Reverse path order** turned off, the shapes are applied clockwise around the path. With **Reverse path order** selected, the shapes are applied counter-clockwise:



### 9.08 Wrapper

- The **Wrapper** feature can be used for shaping designs to fit around conical shapes in which the top is a different diameter than the bottom. Some typical applications include tumblers and cupcake wrappers.
- This function can be accessed by selecting one or more shapes and going to **Effects>Wrapper**. For this example, the following design was created with the intention of having it applied to a small cup:



- Select the design and go to **Effects>Wrapper**. The following window will open:

Enter **Top** and **Bottom Diameters**, as well as the **Height** of the **Tumbler**, along the actual surface.

**Add Template** will create the cut line for the tumbler

**Y Offset** will move the design higher or lower on the template

Resize the design using **X Scale** and **Y Scale**

Click here to see latest changes before accepting

**X Offset** will move the design left or right on the template.

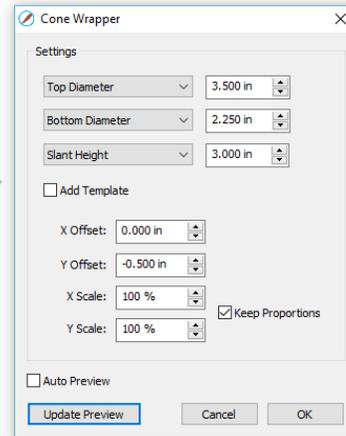
Check this box to have **Y Scale** change automatically with a change to **X Scale** and vice versa.

Click **OK** when done

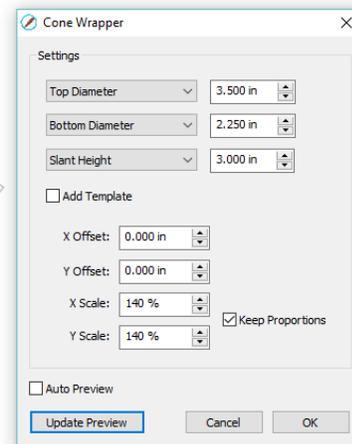
- ◇ Measure the cup: top diameter, bottom diameter and along the side from bottom to top. Enter those as shown in the screenshot. Alternatively, you can measure the radius or the circumference, as well as use the vertical height versus the horizontal height. These other choices are in the drop-down menus.
- ◇ Once these measurements are entered, click on **Update Preview** to see how the design will fit on the cup. Note that design will be displayed in outline mode while working in this window:



- ◇ The template is the outside pattern based on the cup's dimensions. If you plan to cut that template, then check the box next to **Add Template**. Otherwise, it won't be on the **Cutting Mat** after you click on **OK**.
- ◇ Adjust the **X Offset** and/or **Y Offset** to move the design, if needed. For example, making **Y Offset** negative moves the design higher up on the template:



- ◇ Adjust the **X Scale** and/or **Y Scale** to resize the design, if needed. If you want to scale proportionately, mark the **Keep Proportions** box:



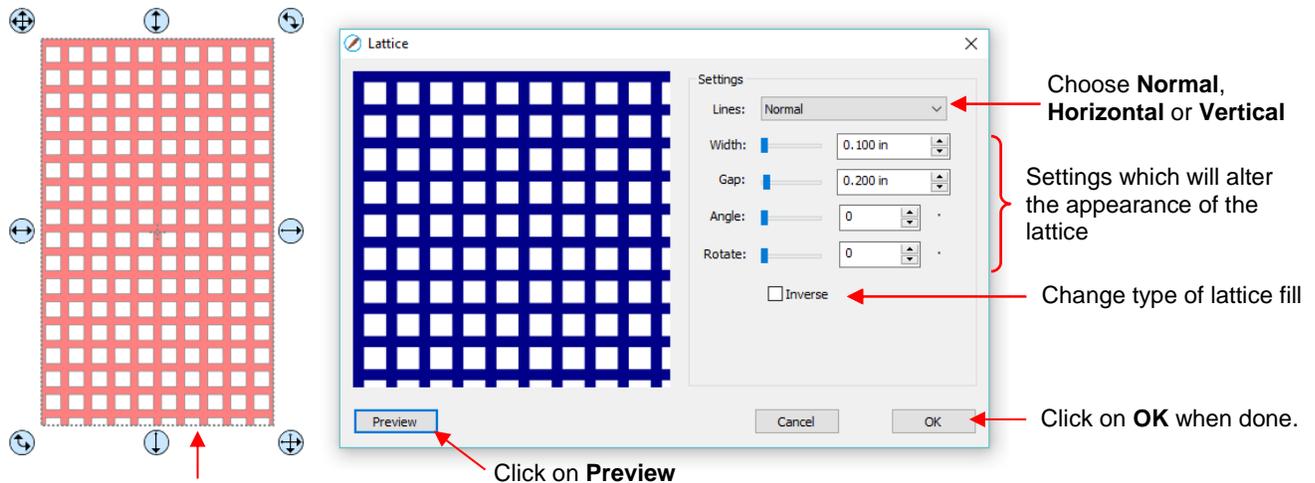
- ◇ Remember to click on **Update Preview** after each change in the settings. **Auto Preview** doesn't currently work.

- After clicking on **OK**, the fill color returns to the design and the project is ready for completion:



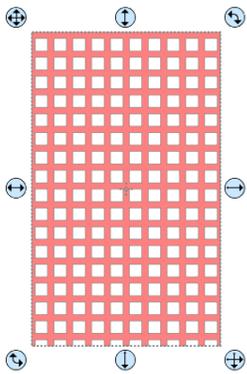
## 9.09 Lattice

- The **Lattice** feature can be used to create a lattice design within a shape or as part of the shape itself. To access this feature, select one or more shapes and then use either of the following:
  - ◇ Go to **Effects>Lattice**
  - ◇ Right-click and select **Appearance>Lattice**
- In this example, a rectangle is used to show the effects of the settings in the **Lattice** window:

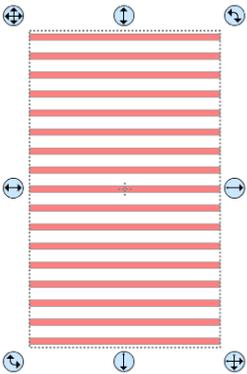


After clicking on **Preview**, selected shape will display lattice based on current settings

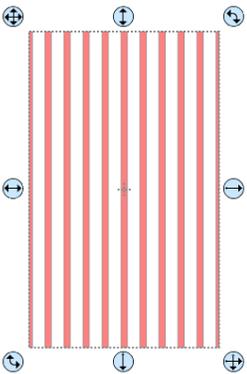
◇ **Lines:** Besides the traditional criss-cross pattern, you can also choose to only have horizontal lines or only have vertical lines:



**Lines:** Normal

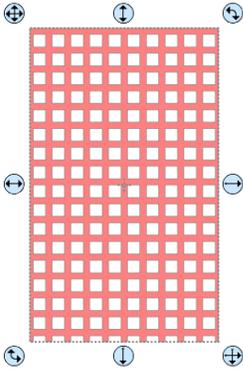


**Lines:** Horizontal Only

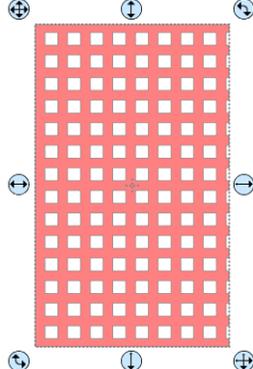


**Lines:** Vertical Only

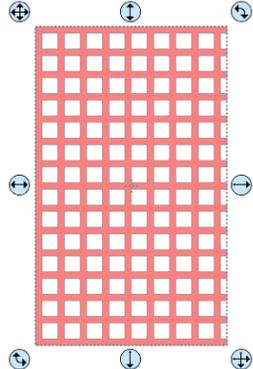
◇ Change **Width** and **Gap** to produce desired appearance. Remember that if the lattice pattern is too small, it might be difficult to cut:



**Width:** 0.1 in  
**Gap:** 0.2 in

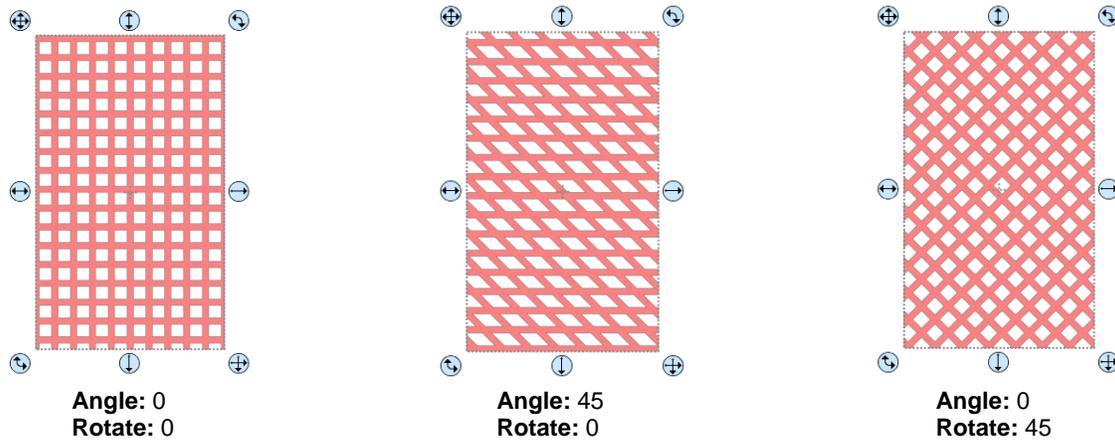


**Width:** 0.15 in  
**Gap:** 0.2 in

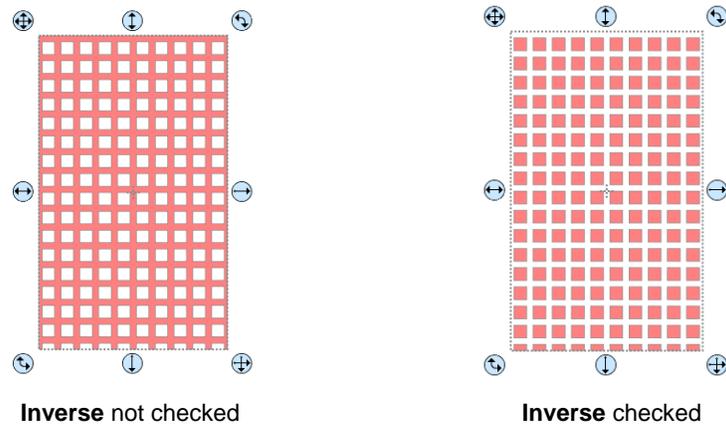


**Width:** 0.1 in  
**Gap:** 0.25 in

◇ The **Angle** setting will skew the lattice shape while the **Rotate** setting will simply rotate the overall pattern:

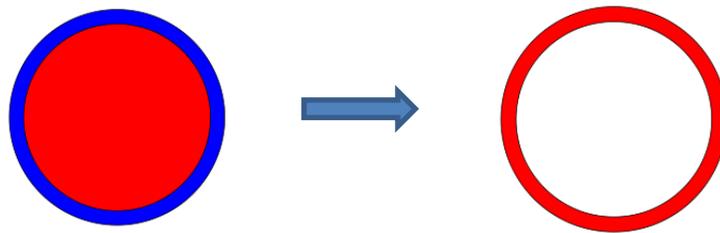


◇ **Inverse** is used to create a kind of negative lattice and an example will follow later in this section:

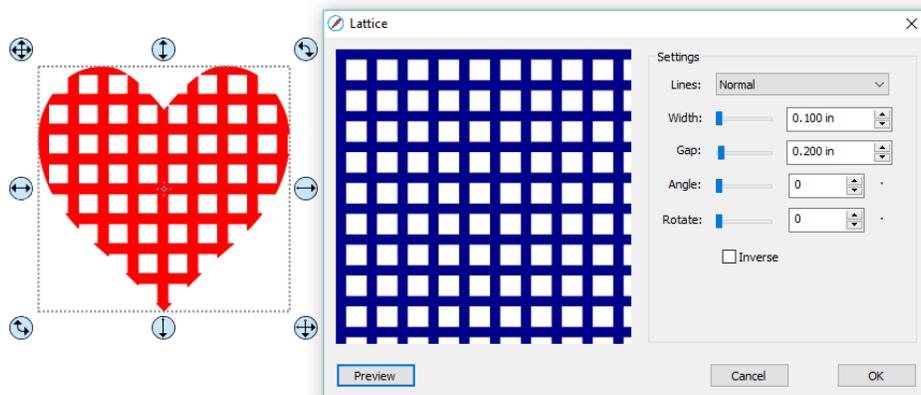


- An example of when **Inverse** would not be checked is when you want to attach/weld a latticed shape to something else. In the following example, a latticed heart is attached to the center of a ring:

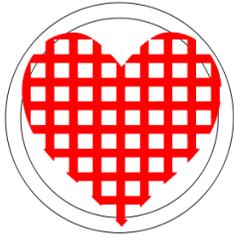
◇ A ring is created by applying **Object>Merge** to two centered circles:



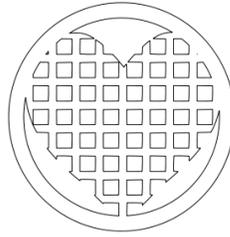
◇ Select a heart shape from the **Library** and apply **Effects>Lattice**:



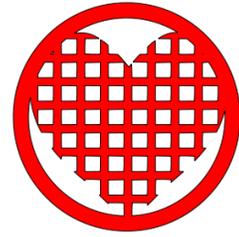
◇ Align the latticed heart in the center of the ring and weld using **Path>Union**:



Remove **Fill** from ring to make overlap easier to see



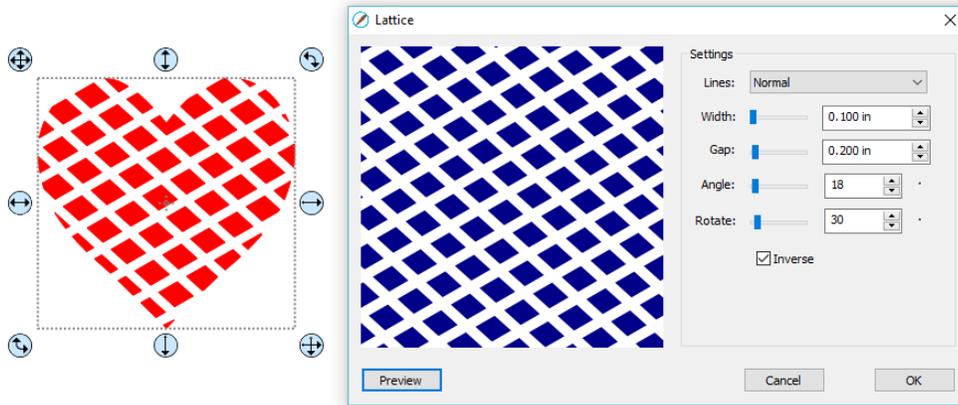
After applying **Path>Union**



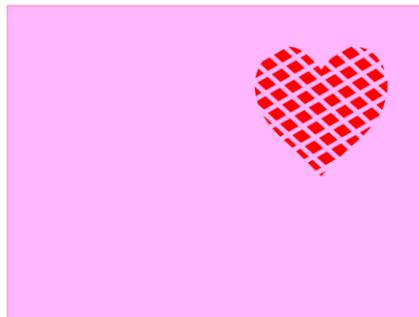
Set **Fill** to red again

- An example of when **Inverse** would be checked is when you want a lattice aperture cut from the front of a greeting card:

◇ Using the same heart as above, make sure **Inverse** is selected:



◇ Arrange the latticed heart over a base greeting card:



◇ Select all and go to **Object>Merge**. The card is complete:



- If you have a shape that has the **Lattice** effect applied and want to remove it (even after the file has been saved and re-opened), select the shape and go to **Object>Remove Effects**.

## **9.10 Rhinestones**

- SCAL's **Rhinestones** feature provides both outlining and horizontal fill of shapes with the size of circles needed for your rhinestones and the desired spacing. After selecting a shape, the feature can be accessed in either of the following ways:
  - ◇ Go to **Effects>Rhinestones**
  - ◇ Right-click and select **Appearance>Rhinestones**

### **9.10.1 Guidelines for Rhinestone Pattern Design**

- There are some very specific guidelines to follow when designing a rhinestone pattern:
  - ◇ In general, you want to size the shape before applying the rhinestone circles. If you later want to resize the design, SCAL does have the ability to regenerate the rhinestone pattern, maintaining the original selected stone size and spacing. But in order to have a good sense of how the design is going to appear on your garment and to make sure lettering is readable, you want to design close to the target size.
  - ◇ **IMPORTANT:** Always make a backup copy of your design before entering the **Rhinestone** window because the original design will be replaced with the new rhinestone pattern. You might later want to use that same original design but apply a different size rhinestone or create a shadow layer from it, or some other change.
  - ◇ The circle size selected will need to be larger than the stone size you purchase. As a general rule, select a size three numbers larger than your stones. Thus, if you purchased SS10 stones, then in the rhinestone design window, you would select SS13 stones. This larger size will allow the SS10 stones to more easily brush into the holes, saving a lot of time and tedium.
  - ◇ When selecting a font to use, be leery of "fancy fonts." You want the lettering to be readable after it is converted to circles. When in doubt, have someone who doesn't know the words you've typed attempt to read the rhinestone design on your monitor. If they cannot decipher your words, then try a more basic font.

### **9.10.2 Rhinestone Outline**

- In this example, the initials from a high school will be outlined. As mentioned previously, the first step is to size the width and height of the design. Make sure there is enough space between the letters so that the circles will not overlap. Also, you may want to resize the lettering vertically, leaving the width the same. This will better fill a T-shirt, allow more circles to be applied, and can improve the readability of the design:



- To apply a rhinestone outline, first make a backup copy of the shape. Then select the shape and go to **Effects>Rhinestones**:

Select a **Stone Size** several numbers larger than your rhinestones

**Stone Size** will update based on what you select in upper window or you can enter a size directly

Select a spacing for the design: usually between 0.5 and 1.0 mm.

Click on **Preview** to see effects of settings

Select the shape of the stones to be used

Option to **Fill** shape versus outline

Number of stones based on current settings (must click on **Preview** first)

Click on **OK** when done.

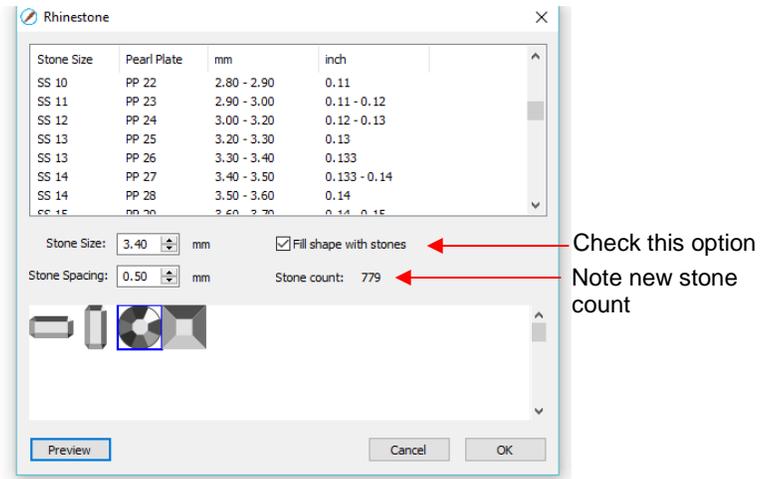
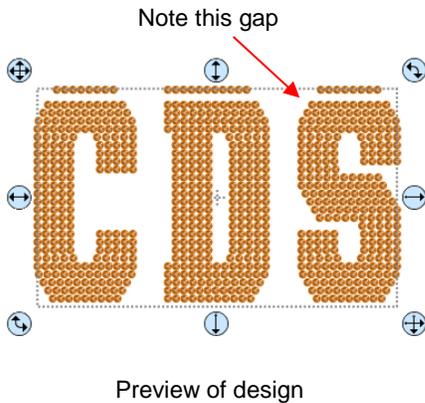
- After inputting the initial settings, click on **Preview** and your selected design will be outlined with simulated stones:

Preview of design

- During the editing process, the simulation will be lost. If you want to restore it, record your current settings now before clicking on **OK**. For guidelines on editing, refer to *Section 9.10.4*.

### 9.10.3 Rhinestone Fill

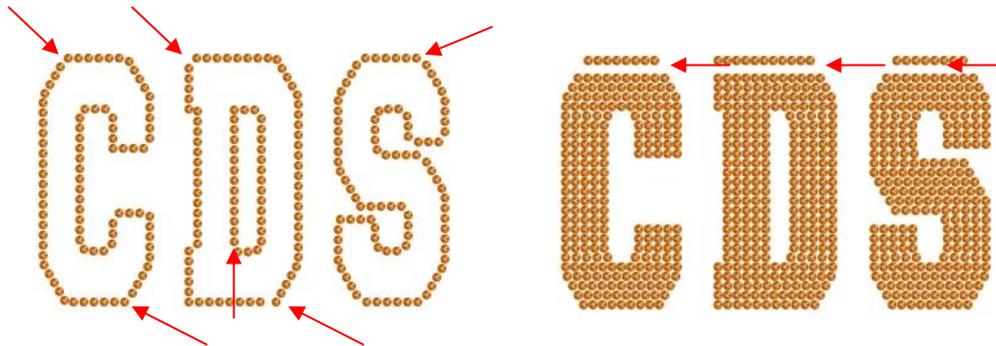
- Another option in the **Rhinestone** window is **Fill shape with stones**. Instead of outlining the shape, the image will be filled with circles in horizontal rows. In our prior example, the same letters will now appear like this:



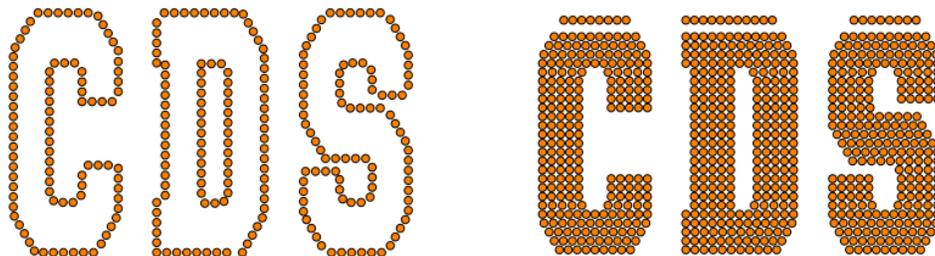
- The gap in the design is one of the inconsistencies that will sometimes occur with automatic fill algorithms. Thus, all rhinestone designs will need some editing as covered in *Section 9.10.4*. If you wish to restore the simulation after editing, be sure to record the settings you used before clicking on OK.
- Also, note the increase in the number of stones as a result of switching to a line fill. Rhinestones are typically sold by the gross and 1 gross equals ~ 144 stones. Thus, this design would require over 5 gross of stones compared to just under 2 gross for the outline version.

#### 9.10.4 Editing Rhinestone Designs

- Before editing, make a backup of the design created by the **Rhinestone** function. As was mentioned earlier you can resize rhinestone designs but if certain editing has occurred, you might or might not get the results you want after editing.
- Rhinestone designs typically will need “tweaking” which involves adding, deleting, moving, or re-spacing circles. Looking at the two designs created in the prior two subsections reveals some needed edits as indicated by the red arrows:



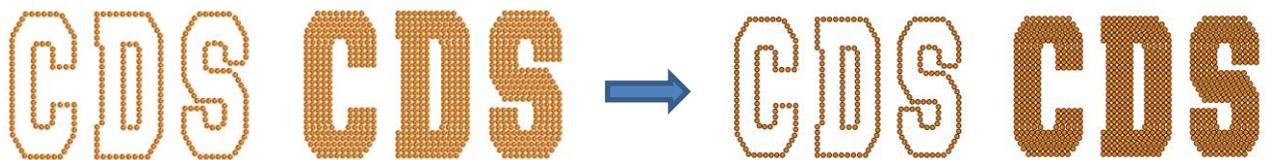
- The first step is to break the design so that individual circles can be moved. Select the pattern and apply **Object>Break Apart** or **Ctrl-B**. The simulation will vanish but this will be remedied:



- To restore the simulation, select the design and reopen the **Rhinestone** window. Enter the same original settings just used, including selecting the same stone again. Click on **OK** and the simulation will return. But you will now be able to individually select stones and move them or delete them.
- The following list shows the most common functions applied when editing rhinestone designs:
  - ◇ Use the **Zoom** functions (*Section 3.09*) to move in close for easier selection of individual or small groups of circles
  - ◇ Use the **Lasso Selection** tool  (*Section 5.01*) to more easily select a group of circles
  - ◇ To quickly add a circle, select one and then hold the **Alt** key while dragging a copy to its new location
  - ◇ To delete multiple circles, hold the **Delete** key while clicking on individual circles
  - ◇ Use the arrow keys on your keyboard to move a circle or row of circles in smaller increments. It's advisable to change the increment to 0.01" (0.25 mm) by going to **Edit>Preferences** (or, on a Mac, press **Command + ,**). Then click on the **Edit** tab and change the **Arrow Key Increment**, as shown here:

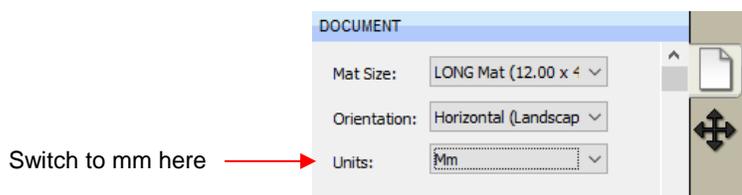


- ◇ To realign a row or column of circles, use the alignment functions covered in *Section 5.17.2*
- ◇ To respace a row or column of circles, use the spacing functions covered in *Section 5.18.2*
- Sometimes the circles you want to re-space equally may fall closer to a 45° angle versus vertically or horizontally. Select your entire design and rotate until the line of circles is closer to vertical or horizontal. Re-space the circles and then rotate back into place.
- After editing the design, you may wish to group the design to avoid inadvertently moving one or more stones out of place. To do that select the design and go to **Object>Group** or apply **Ctrl+G**.
- If you have a shape that has a **Rhinestone** effect applied and want to remove it (even after the file has been saved and re-opened), select the shape and go to **Object>Remove Effects**.



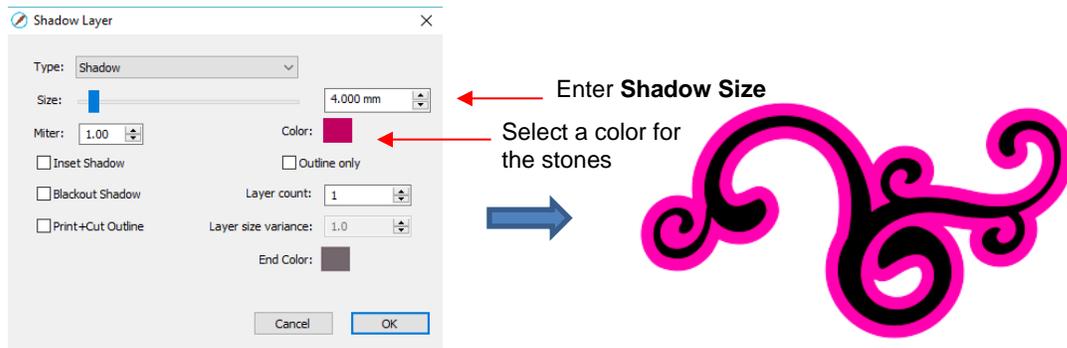
### 9.10.5 Additional Tips on Rhinestone Designing

- If you want to outline your design, then create the outline first using the **Shadow Layer** function (*Section 9.04*). Choose a **Shadow Size** at least the size of the circles plus the spacing. Otherwise, the stones will overlap. Since rhinestone design programs work in metric, it's easier if you temporarily change the units in SCAL to mm. This setting is on the **Document Panel**:

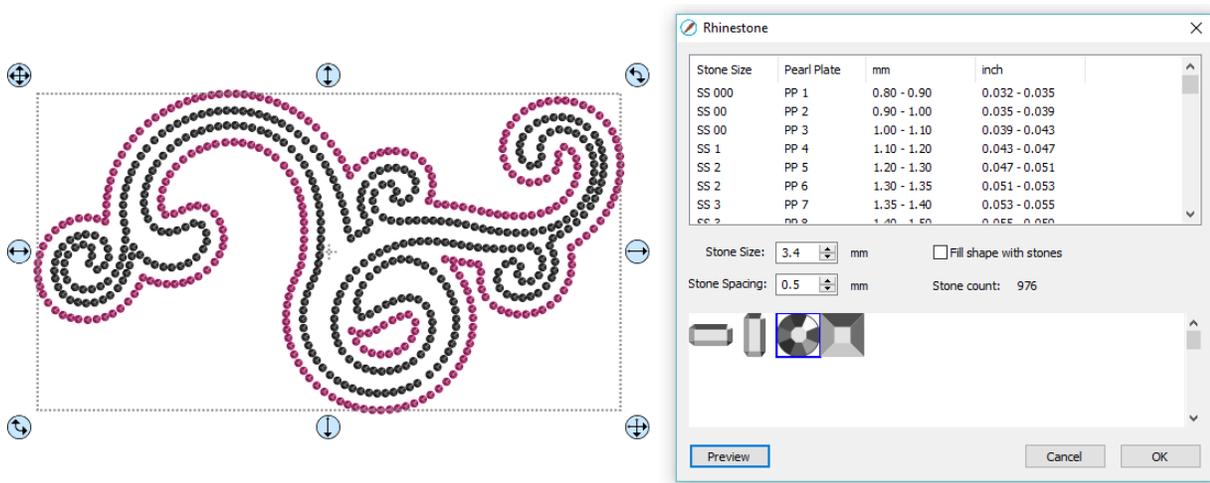


- For the following example, a swirl design from the **Library** is added to the **Cutting Mat** and sized for a T-shirt. The same settings for SS 10 stones will be used - the circles will be 3.4 mm in diameter and the

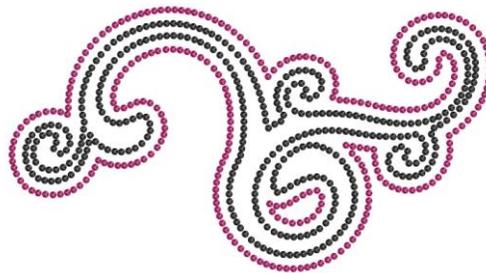
spacing will be 0.5 mm. Thus, the **Shadow Size** needs to be at least 3.9 mm. So, just to be safe, a **Shadow Size** of 4.0 mm will be entered:



- Next, select the design and the shadow and make a backup copy. Then go to the **Rhinestone** window. Since the same settings will be used for both the original design and the outline, both can have the rhinestone effect applied in the same step:

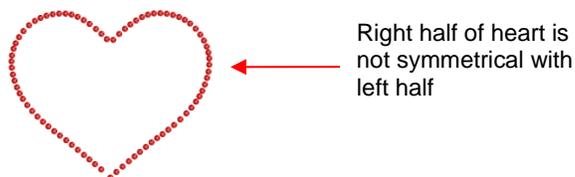


- After some minor tweaking the design is complete and ready to cut:



- With symmetrical rhinestone designs, consider using the following process to perfect your design:

◇ This heart outline is clearly not symmetrical:



- ◇ Apply **Object>Break Apart** to the design. Then decide which half is closer to perfect and delete the other half. Then tweak the remaining half:



**Break Apart** is applied

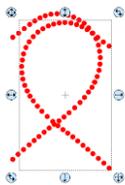


Left side deleted



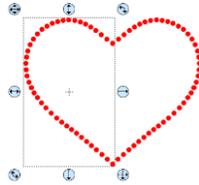
Right side tweaked

◇ Select the tweaked design and then perform the following steps shown:



Perform a **Copy** and **Paste** and then apply

**Flip Horizontal**



With the copy selected, move into place overlapping the repeated top and bottom stones.



Delete the top and bottom circles since there are identical copies on top of one another



Re-apply the simulation, if desired.

- A final tip: If you plan to do a lot of rhinestone applications, create and cut a template with small patterns (~15 – 20 circles) in different sizes so that you can test brush your rhinestones to find out the optimum size to use when designing. A difference of just 0.1 or 0.2 mm can affect how easily the stones will brush into a pattern right side up. If the size is too small, the stone will tend to not fall in. If the size is too large, then the ones that land right side up will tend to get flipped over by the brush. Also, stones can vary slightly in size from one manufacturer to the next and also from one color to the next. Further, the size of the cut holes can vary slightly from one template material to the next.

## 9.11 Jigsaw Puzzle

- The **Jigsaw Puzzle** feature will generate a rectangular jigsaw pattern with a number of options from which to choose. To open the window, go to **Effects>Puzzle Generator**:

Enter desired **Width** and **Height** (can be changed later, if needed)

Roundness of the 4 corners

Enter desired **Columns** and **Rows**

**Variance**: select randomly

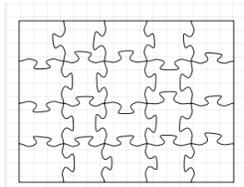
Click here to see a preview based on current settings.

Preview based on current settings

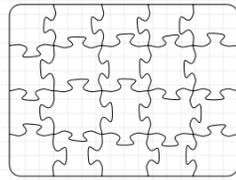
Click on **OK** when done

- **Width and Height**: If you plan to apply this puzzle over a specific image, you may want to choose dimensions that correspond to your image. For example, let's assume you have a photo that is 5" x 3.75" and plan to make a print and cut jigsaw puzzle. Enter those dimensions into the **Puzzle Generator**, as shown in the prior screenshot.

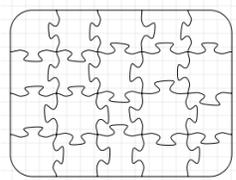
- **Corner Radius:** With a setting of 0, the corners of the rectangle are 90°. If you want rounded corners, increase this setting:



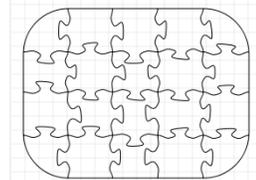
Corner Radius = 0



Corner Radius = 0.25

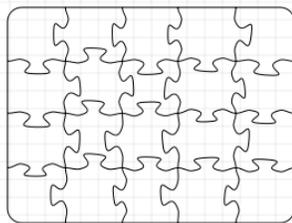


Corner Radius = 0.5

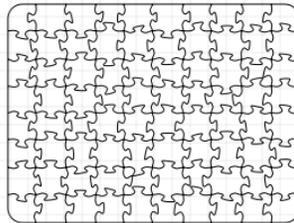


Corner Radius = 1.0

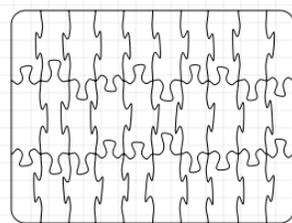
- **Columns and Rows:** To keep the shapes from becoming too distorted, make the number of **Columns** and **Rows** similar to the dimensions. If you want more pieces, then increase the number of **Columns** and **Rows** proportionately. For example, instead of having 5 **Columns** and 4 **Rows**, double the number to 10 **Columns** and 8 **Rows**. But don't use, for example, 10 **Columns** and 3 **Rows** with these dimensions:



5 Columns, 4 Rows

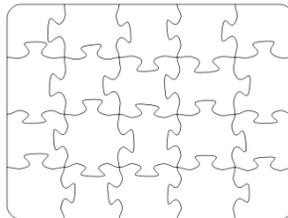


10 Columns, 8 Rows



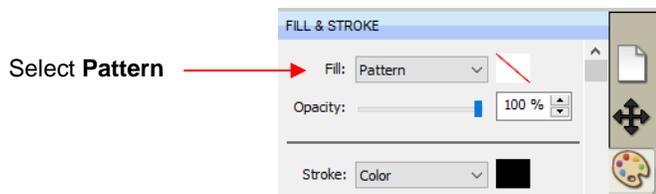
10 Columns, 3 Rows

- **Variance:** This setting can be used to make sure one puzzle is not identical to the next, if all other settings are the same.
- When you are satisfied with the appearance of your puzzle pieces, click on **OK** and the puzzle will be on the **Cutting Mat**:

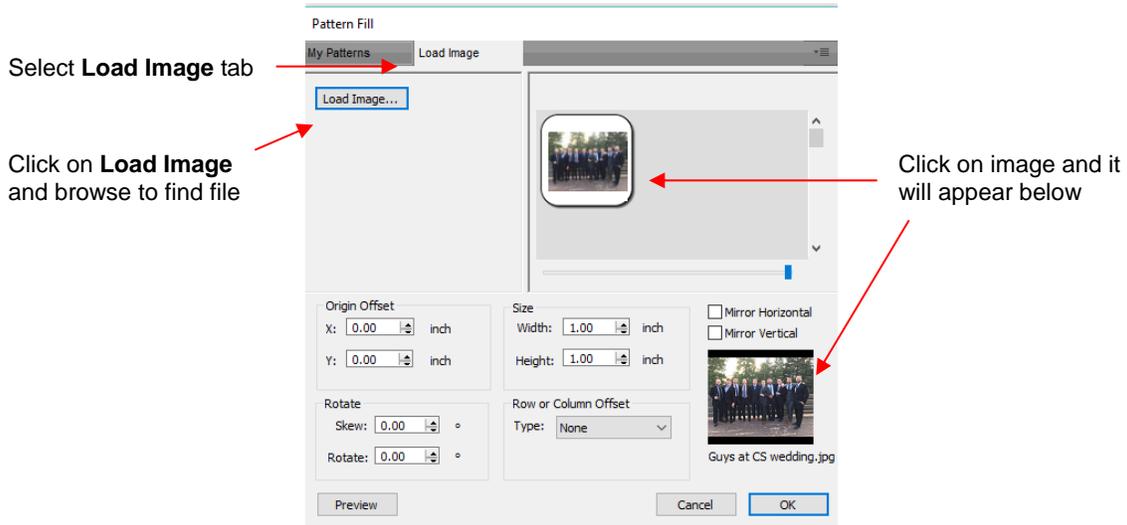


- For a print and cut application:

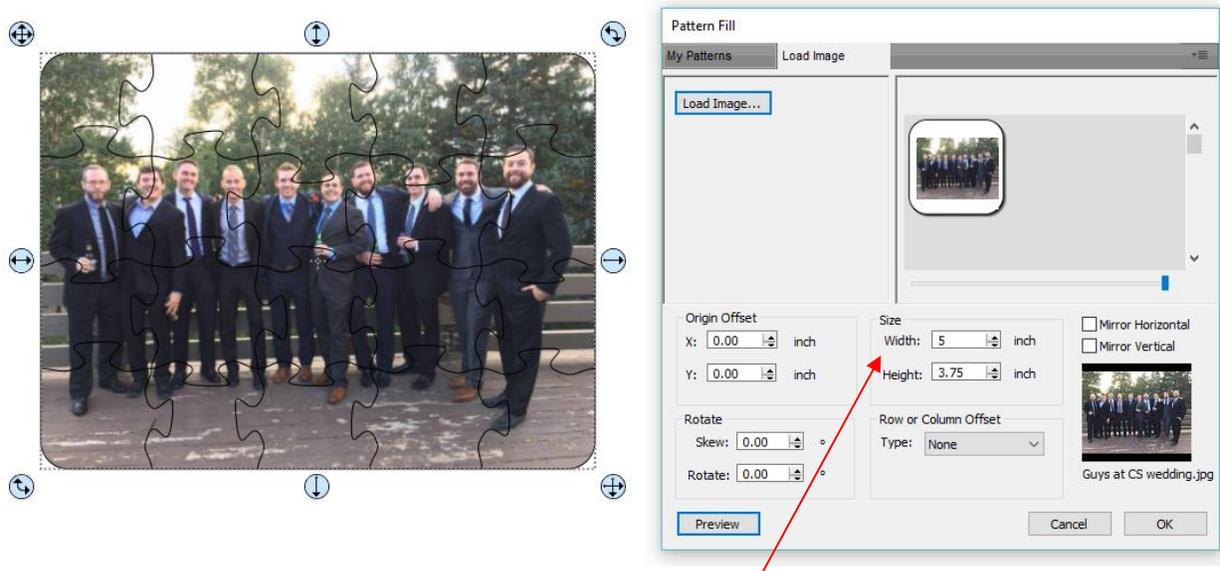
- ◇ Select the shape and, on the **Fill & Stroke Panel**, select **Pattern** from the **Fill** menu:



- ◇ The **Pattern Fill** window will open. Click on the **Load Image** tab and then click on the **Load Image** button to browse and find the image you want to use. It will then appear on the right side and can be selected:



- ◇ Enter the same **Size (Width and Height)** used when the jigsaw pattern was created and then click on **Preview**:



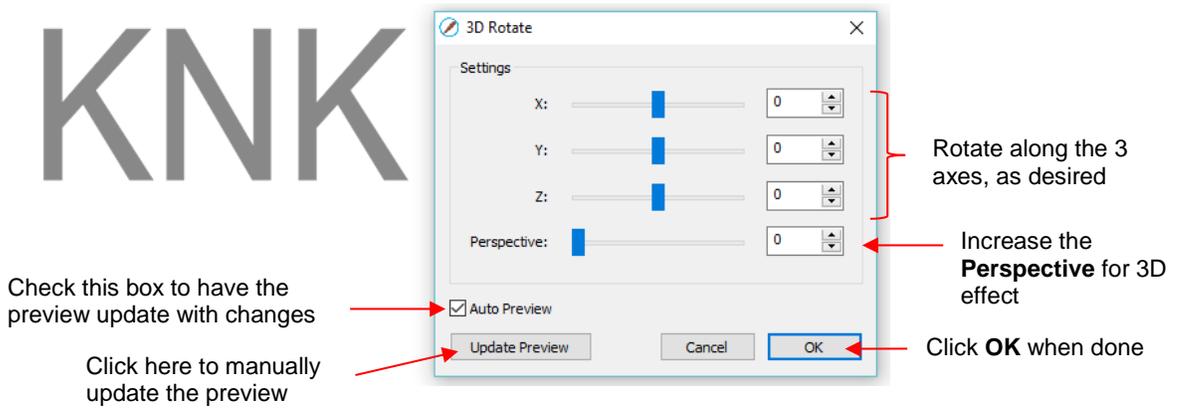
Enter same dimensions as were used in the **Generate Puzzle** window

- ◇ Click on **OK** and the jigsaw puzzle is ready for a print and cut application:

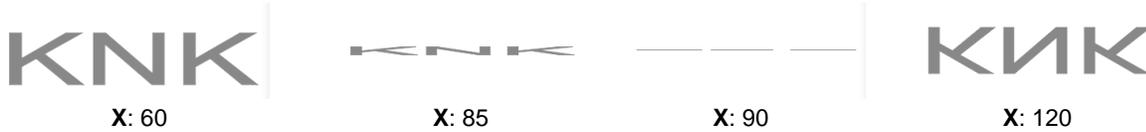


## 9.12 3D Rotate

- The **3D Rotate** function is used to rotate a shape along the X, Y, and/or Z axis. To access this function, select a shape and go to **Effects>3D Rotate**. In the example, text will be used to show the effects of the settings:



### ◇ X Axis Rotation:



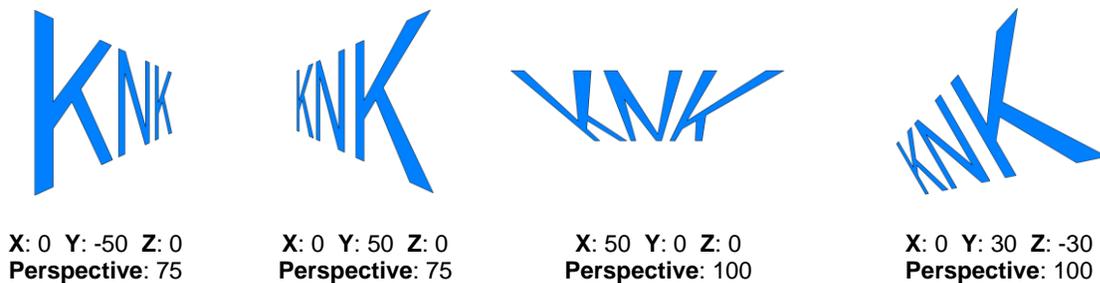
### ◇ Y Axis Rotation:



### ◇ Z Axis Rotation:



- ◇ **Perspective:** This is where the fun begins. Combining this setting with another rotation provides the 3D illusion. Here are examples:



### 9.13 3D Extrude (SCAL PRO only)

- The **3D Extrude** is used to create a cast or 3D shadow. To access this function, select a shape and go to **Effects>3D Extrude**. In the following example, text will be used to show the effects of the settings:

Change X and/or Y Offset

Option to have original cut out from Extrude layer

Option to use Perspective

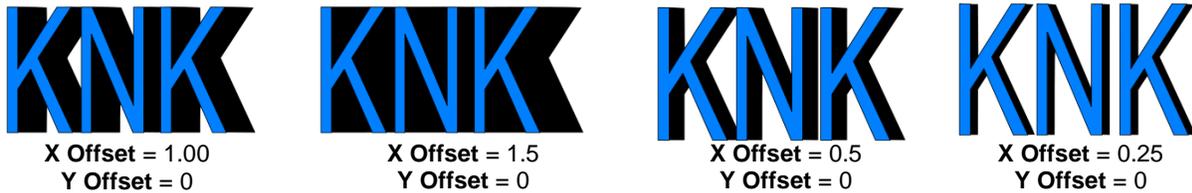
Enter the thickness of the Perspective

Click here to manually update the preview

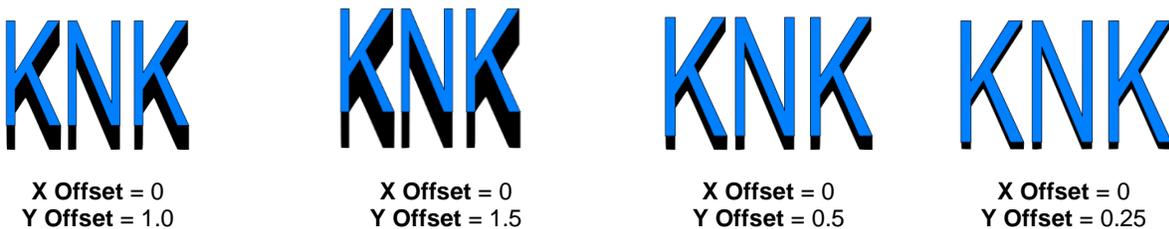
Check this box to have the preview update with changes

Click OK when done

- ◇ **X Offset:** Increasing X Offset will extend the shadow to the right while decreasing it will retract the shadow towards the left. Note that Y Offset has been set to 0:



- ◇ **Y Offset:** Increasing Y Offset will extend the shadow downwards while decreasing it will retract the shadow towards the top. Note that X Offset has been set to 0:



- ◇ **Depth:** Adds the actual 3D effect by increasing the extension of the shadow:



- ◇ **Use Perspective** provides a vanishing point effect:



Use Perspective: Off



Use Perspective: On

◇ **Remove Foreground:**

- With this option off, when you separate the shape from the shadow, you see that the shadow is filled beneath the original. In other words, in a paper piecing or layered vinyl project, the original shape would need to be aligned over the top of the 3D shadow:

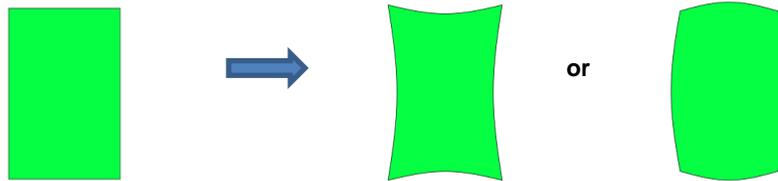


- With **Remove Forgrounds** checked, the original shape will be cut away from the shadow. This would be the typical choice when layering HTV where some kinds cannot be pressed on top of each other (such as glitter HTV):



### 9.14 Barrel Distortion

- The **Barrel Distortion** feature will warp a shape by narrowing or thickening the middle part of the shape:



- In the following example, text will again be used to show the effects of the settings. To open the **Barrel Distortion** window, select the text and go to **Effects>Barrel Distortion**:

Increase or decrease to apply the **Barrel Distortion**

Check this box to have the preview update with changes

Click here to manually update the preview

Click **OK** when done

- As you increase the **Threshold**, you will see a narrowing of the shape in the middle:



- As you decrease the **Threshold**, you will see a thickening of the shape in the middle:

LUCY

Threshold = -10

LUCY

Threshold = -20

LUCY

Threshold = -40

## 9.15 Bulge

- The **Bulge** feature allows you to apply various expanding or shrinking distortions to a shape. These distortions can be applied to the top side of the shape, the bottom side, or both. They can be applied to the left side, the right side, or both. And the distortions can be expanding on both sides, shrinking on both sides, or a combination.
- To open the **Bulge** window, select the shape and go to **Effects>Bulge**:

Choose from **Separately**, **Together**, or **Opposite**

Increase to round up, decrease to curve down

Add more customization to the effect of the bulge

Same settings as above, but applied to the **Left** and **Right** sides instead of **Top** and **Bottom**

Check this box to have the preview update with changes

Click here to manually update the preview

Click **OK** when done

- In the top portion of the window are settings for applying **Bulge** to the top or bottom of a shape. The **Top/Bottom** setting allows you to choose if you want to apply the settings in one of three ways:

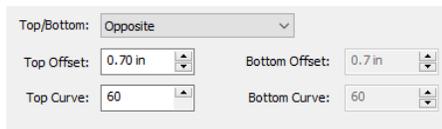
- ◇ **Separately:** The **Offset** and **Curve** settings can be different for the top versus the bottom

LUCY

- ◇ **Together:** The **Offset** and **Curve** settings will be applied equally to both the top and the bottom. In this case the **Bottom Offset** and **Bottom Curve** settings will be grayed out.

LUCY

- ◇ **Opposite:** The **Offset** and **Curve** settings will be applied opposite to one another on the top and the bottom. In this case, the **Bottom Offset** and **Bottom Curve** settings will again be grayed out.

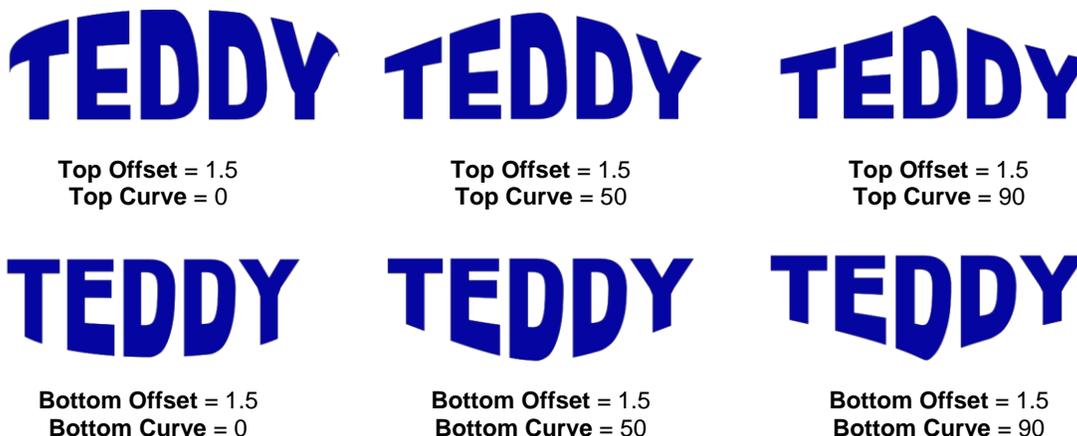


LUCY

- The **Top Offset** rounds the top side of the shape up or down depending on whether a positive or negative value is applied. The **Bottom Offset** does the same, but applies it to the bottom side of the shape:



- The **Top Curve** setting will alter the roundness of the **Top Offset** to add even more customization to the **Bulge** effect. Likewise, the **Bottom Curve** setting does the same to the **Bottom Offset**:



- The **Left/Right** settings all work in the same manner, except they affect the shape horizontally versus vertically. Here are some examples similar to the prior **Top/Bottom** ones:

◇ **Left/Right:** choose from **Separately**, **Together**, or **Opposite**:



◇ Effect of **Left Offset** and **Right Offset**:



- ◇ Effect of **Left Curve** and **Right Curve**:

**LEO**

Left Offset = 1.0  
Left Curve = 50

**LEO**

Left Offset = 1.0  
Left Curve = 90

**LEO**

Right Offset = 1.0  
Right Curve = 75

- ◇ Or just have some fun with it:

**FINN**

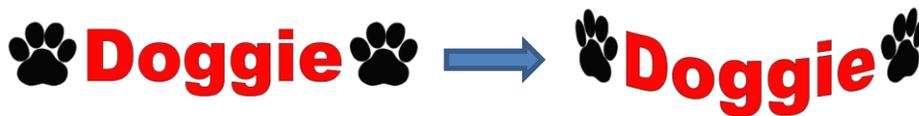
**FINN**

**FINN**

**FINN**

### 9.16 Canned

- The **Canned** effect will curve lettering as if it were wrapped around a cylinder (can) and viewed at an angle:



- To open the **Canned** window, select the shape and go to **Effects>Canned**:

- Decreasing the **Angle** setting (i.e. making the setting more negative) will increase the perspective and cause a greater roundness to the lettering.



- Increasing the **Angle** has the opposite effect. At an **Angle** of 0, the lettering is horizontal. A positive **Angle** setting results in curving the lettering in the other direction:



Angle = 0



Angle = 45



Angle = 90

- The **Diameter** of the cylinder can be increased or decreased, as well. A larger **Diameter**, applied at the same **Angle**, will lessen the roundness, while a smaller **Diameter** will increase it.



Angle = -30  
Diameter = 5.0



Angle = -30  
Diameter = 7.5



Angle = -30  
Diameter = 3.5

### 9.17 Wave

- The **Wave** function will transform any shape into a wave:



- To open the **Wave** window, select a shape and go to **Effects>Wave**:

Changes the number of peaks → Cycles: 0.1

Changes the height of the peaks → Amplitude: 0.2

Check this box to have the preview update with changes →  Auto Preview

Click here to manually update the preview → Update Preview

Click **OK** when done → OK

- Increasing **Cycles** adds more peaks along the shape:



Cycles = 0.5



Cycles = 1.0



Cycles = 2.0

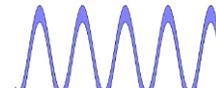
- Increasing **Amplitude** make the peaks higher:



Cycles = 1.0  
Amplitude = 0.2



Cycles = 1.0  
Amplitude = 0.5



Cycles = 1.0  
Amplitude = 1.0

- The **Wave** function can be used on text to achieve this effect:

Twinkle Twinkle Little Star

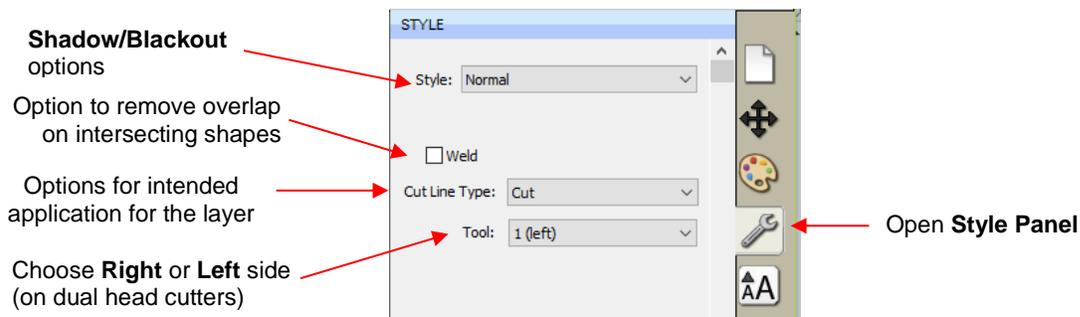


Twinkle Twinkle Little Star

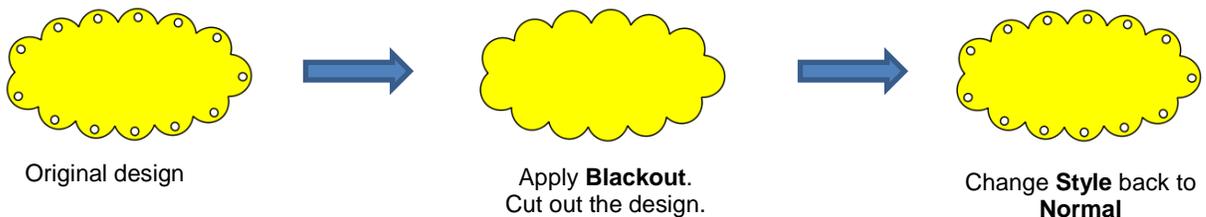
## 10. SCAL: Output

### 10.01 The Style Panel

- The **Style Panel** has various settings that are typically, but not necessarily, applied for the purpose of cutting and printing:
  - ◇ Set a contour cut (**Shadow**)
  - ◇ Remove any interior shapes (**Blackout**)
  - ◇ Apply a weld (**Union**) on any overlapping shapes (only applied during printing and/or cutting)
  - ◇ Assign an intended use for the layer (**called Cut Line Type**)
  - ◇ Assign a layer to a particular tool (for cutters with more than one head)
- To open this panel, click on the **Style** icon on the **Properties Panel**:

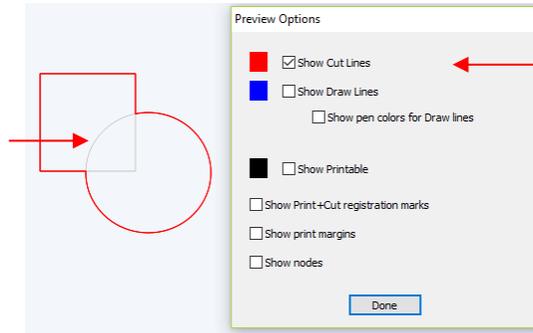


- **Style:** In this menu are various combinations of **Shadow** and **Blackout** applications. Refer to *Section 9.04* for instructions and examples. Note, however, that if you later change your mind and you haven't applied any subsequent changes (such as those in the **Path** menu), then re-selecting **Normal** from the **Style** drop-down menu will restore the original style.
  - ◇ For example, let's say you've applied **Blackout** to a shape and then cut it out. You can now select that same shape and return the style to **Normal**:



- **Weld:** This option applies the **Union** function (refer to *Section 9.05.1*) to any overlapping shapes.
  - ◇ Note that if the shapes are on different layers, the **Weld** option needs to be marked on each layer.
  - ◇ As mentioned before, settings in the **Style** window do not become permanent changes to the shapes on the **Cutting Mat**. However, you can verify the **Weld** effect by clicking on the **Preview** icon  on the **Toolbar** (for more details on **Preview**, refer to *Section 10.02*):

With **Weld** assigned to an overlapping square and circle, the shapes are welded for cutting

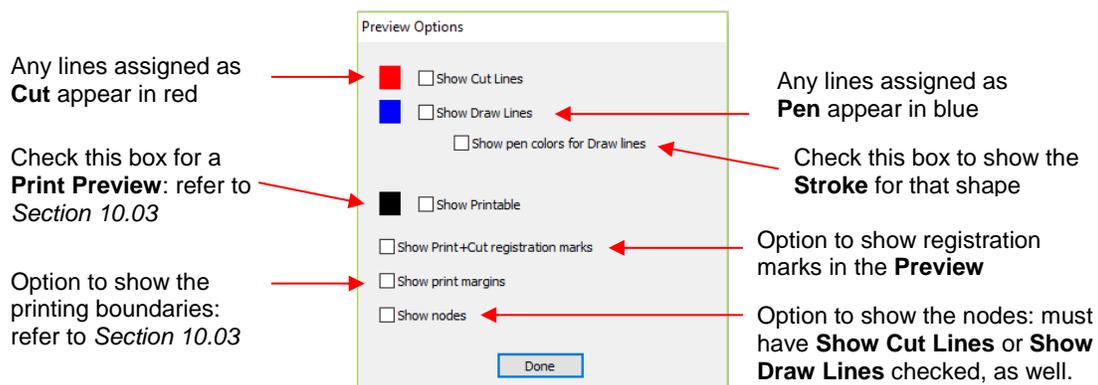


Red lines in the **Preview** window show what will actually cut.

- **Cut Line Type:** There are five options in this menu:
  - ◇ **Cut:** choose this option for regular cutting. Because this is the default, you don't normally need to select it.
  - ◇ **Pen:** choose this option when using a pen, embosser, engraver, glue pen, rotary tool or other device that doesn't require a blade offset
  - ◇ **Print+Cut Cut:** in print and cut applications, choose this option for the layer that will be cut
  - ◇ **Print+Cut Print:** in print and cut applications, choose this option for the layer that will be printed only. It will not appear in the cut window.
  - ◇ **Color layer alignment** (Pro version only): in applications such as vinyl where several layers will be cut from different colors and aligned, choose this option for the layer that has registration shapes that need to be cut from every color along with that color's shapes. These registration shapes can then be used to layer the colors perfectly. Refer to last part of *Section 10.06.2*.
- **Tool:** for cutters with more than one head, such as the KNK Force, choose if the layer should be executed by the left side or by the right side.

## 10.02 Preview

- To see what your cutter will cut or what your printer will print, click on the **Preview** icon  on the **Toolbar**. The following window will open. Note that settings applied on the **Style Panel** are reflected in the **Preview** window:



- The following example shows what would be seen in the **Preview** window compared to how it appears on the **Cutting Mat**:

On the **Cutting Mat**:

The rounded rectangle is assigned to **Cut** on the **Style Panel**



The text is assigned to **Pen** on the **Style Panel**

In the **Preview Options** window:

Red and blue lines indicate **Cut** and **Pen** assignments

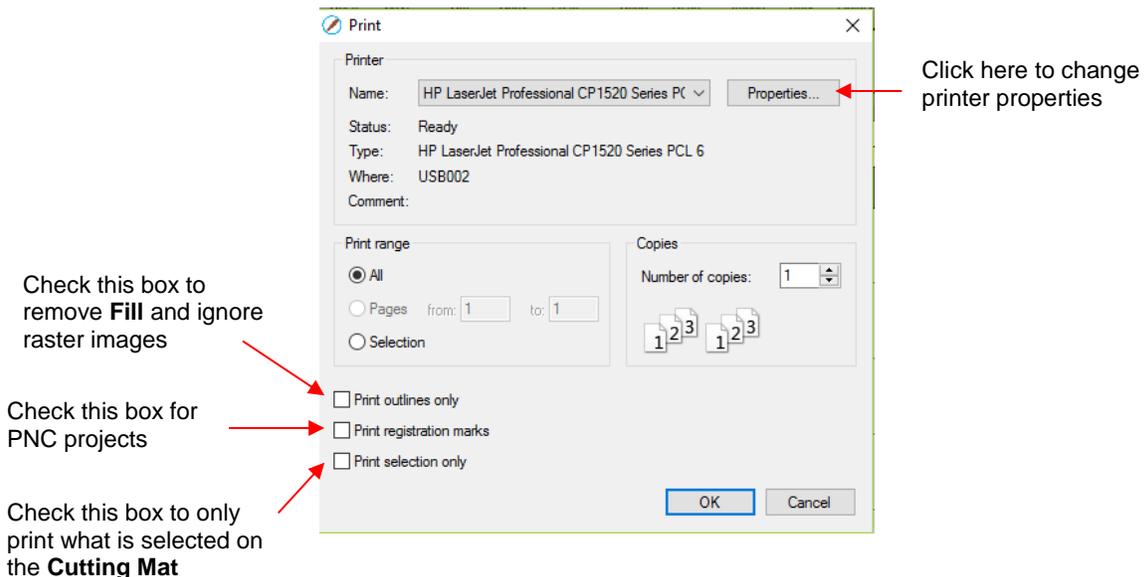


Show **Cut Lines** and **Show Draw Lines** are both checked

- **NOTE:** If you have not yet set up a cutter (refer to *Section 3.01.4*), then registration marks will not appear in the preview window and will not be sent to the printer.

### 10.03 Printing

- To print from SCAL, go to **File>Print** or press **Ctrl+P**. The following window will open:



Check this box to remove **Fill** and ignore raster images

Check this box for PNC projects

Check this box to only print what is selected on the **Cutting Mat**

Click here to change printer properties

- To set up printer settings, click on the **Properties** button. (Note that you can also access your printer's properties by going to **File>Print Setup** and clicking on **Properties**.) The window which opens should be familiar to you and will not be covered in this user manual.
- **Print outlines only:** Only vector shapes will be printed. Imported raster images (.JPG, .PNG, .BMP, etc.) will not appear. If you've applied a **Fill** to shapes including colors, gradients, or patterns, then those will not appear either.

- **Print registration marks:** If your application is a print and cut, then you will want to check this option. Refer to *Chapter 11* for details on PNC calibration and how to set the properties for the registration marks. Also note that if you have not yet set up a cutter (refer to *Section 3.01.4*), then registration marks will not be sent to the printer.
- **Print selection only:** This is one way to control what is printed. You will need to select the shapes to be printed prior to entering the **Print** window. Alternatively, you can hide layers on the **Layers Panel** that you do not want printed.
- If your **Cutting Mat** is larger than the printout dimensions, then make sure the shapes are located in the upper left portion of the **Cutting Mat** or else any shapes outside of the printout boundary will be omitted or cut off. To verify, click on the **Preview** icon  on the **Toolbar** and select **Show Print Margins**.

◇ For example, let's say you have a PNC application and your shapes are arranged like this on a 12" x 12" **Cutting Mat**:



◇ When you click on the **Preview** icon and mark **Show print margins**, you can see that a portion of the cow will not be printed:

This part of the cow will not be printed

This border indicates the printer's current settings for size and orientation

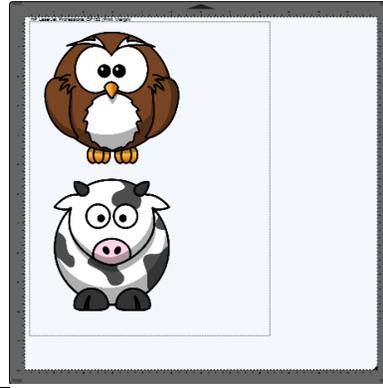
Check this box so that the original graphic appears

Check this box to see the boundaries of the printer

◇ You have two choices. You can either switch to **Landscape** printing under **File>Print Setup** or you can move the shape on the right to be below the left shape:



Option 1: Switch to **Landscape** under **File>Print Setup**



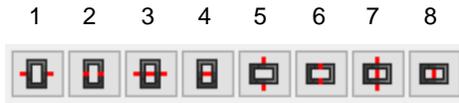
Option 2: Rearrange the shapes

### 10.04 Weeding (SCAL PRO only)

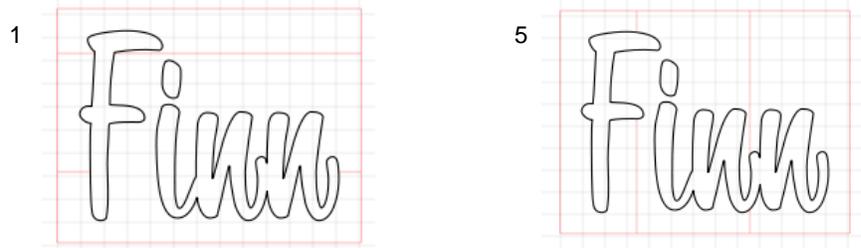
- Weeding is an important function for those who do vinyl applications. When removing the waste vinyl from around the cut shapes, it's very helpful to have extra cut lines. This way you don't end up trying to weed out large pieces at one time.
- To set up a weed, select the shapes and go to **Effects>Weeding**. The following window will open:

- ◇ **Border Offset:** Increase or decrease to set the spacing between the shapes and the outside weeding rectangle. The red line represents that outer cut. For example:

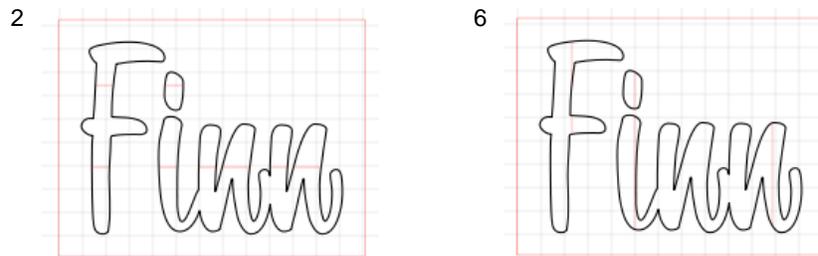
- ◇ **Border Options:** These icons can be used to add additional cut lines inside the outer weed border. Each icon in the following screenshot indicates where the lines will be added but a description and example are also shown. Note that once you select an option, you can click at the desired location on the preview image to add the cut line or lines:



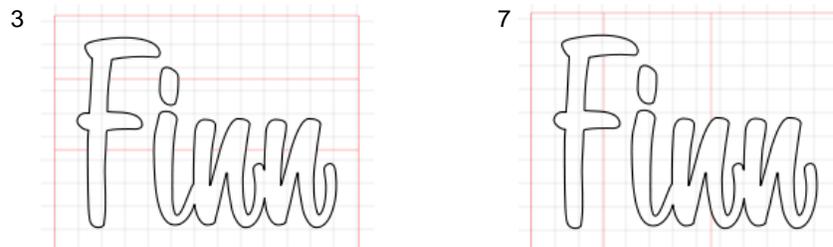
- 1 or 5: Add horizontal or vertical weed cuts between shapes and outer weed border



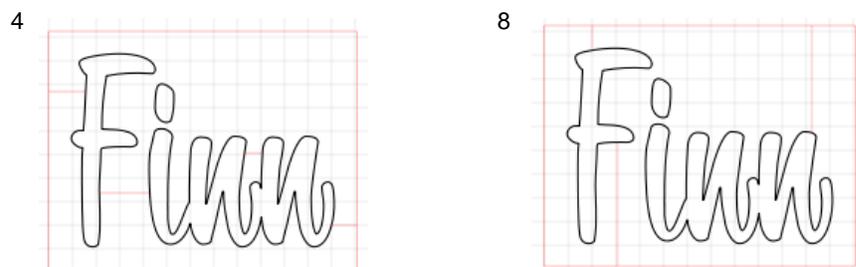
- 2 or 6: Add horizontal or vertical weed cuts inside the shapes (this is used for applications such as glass etching where the outside “waste vinyl” is actually kept and the shapes themselves are weeded out)



- 3 or 7: Add horizontal or vertical weed cuts in between shapes and outer weed border and also inside and between shapes

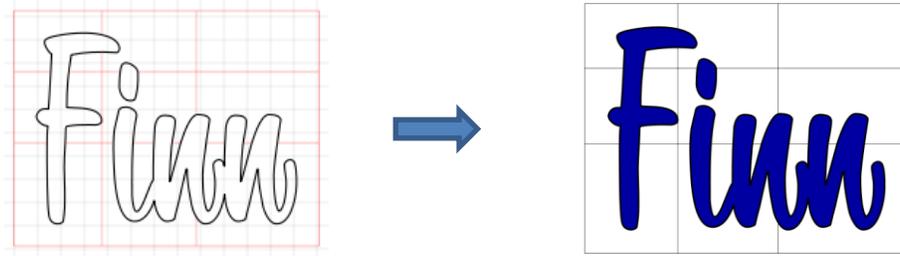


- 4 or 8: Add horizontal or vertical weed cuts anywhere you like

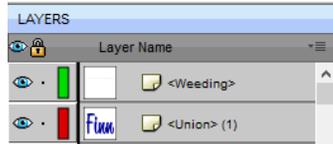


- ◇ **Reset:** At any point, you can click on **Reset** to remove any of the internal cut lines and begin again.

- Once you are satisfied with the weeding line, click on **OK**:



- On the **Layers Panel** you will observe a new layer called *Weeding*:



### 10.05 Tiling (SCAL PRO only)

- The **Tiling** function is used to split large designs into rectangular sections for cutting.
- In the following example, a design that is 40" wide and 36" tall cannot be cut on a cutter that only has a maximum 15" cutting range (such as the KNK Zing Orbit):



- To open the **Tiling** window, select the shape and go to **Effects>Tiling**:

Manually add tile lines

**Column settings**

**Row settings**

**Instructions**

Delete individual tile lines

Preview based on current settings

Reset to clear settings

Click OK when done

◇ **Columns and Rows:** Under both of these you have the following choices:

- **Evenly spaced:** Enter a number and that many columns (or rows) are created, all the same width. For example, you could enter 3 columns and 2 rows:

Select **Evenly spaced** and then 3 **Columns** and 2 **Rows**

Preview shows the project evenly split into 3 columns and 2 rows

- **Fixed width:** Enter a specific width for the columns. This is probably the most useful choice since you should know the dimensions of the material being used. For example, if you have 12" wide vinyl, then you will probably want the columns to be no wider than ~ 11" or, possibly, 11.5". Also, let's say your vinyl is in 24" long pieces:

Select **Fixed width**- 11" wide **Columns** and 23" long **Rows**

The design is 40" wide and 36" tall.

After creating three 11" wide columns, the remaining 7" in width is on the right side.

After creating one 23" row, the remaining 13" in height is at the bottom.

- **Custom:** Because the tiling line can sometimes fall into undesirable spots resulting in, for example, slivers or extremely tiny shapes of vinyl, using **Custom** is another option. With it selected, you can then use the icons above the preview to add cut lines wherever you like:

Add a horizontal tile line →

← Add a vertical line inside of a tile

Add a horizontal line inside of a tile

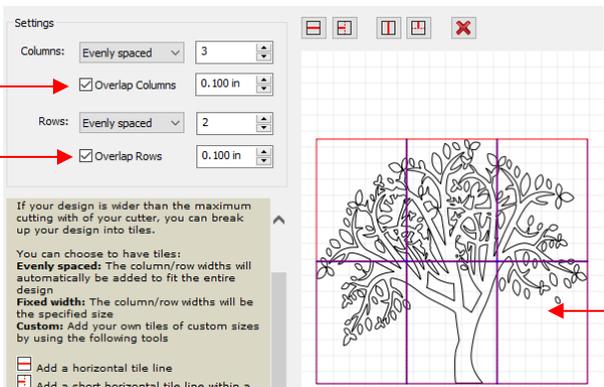
Add a vertical tile line

Select **Custom**

Custom lines are added.

- ◇ To delete any of the lines, click on the **Delete** icon  and then click on the line inside the **Preview** window.
- ◇ **Overlap Columns** and **Overlap Rows**: If you want an overlap created so that each tile slightly overlaps with an adjacent one, check the box and then enter the desired overlap:

Check **Overlap Columns** and/or **Overlap Rows** and enter the desired overlap size



Purple lines indicate an overlap is applied

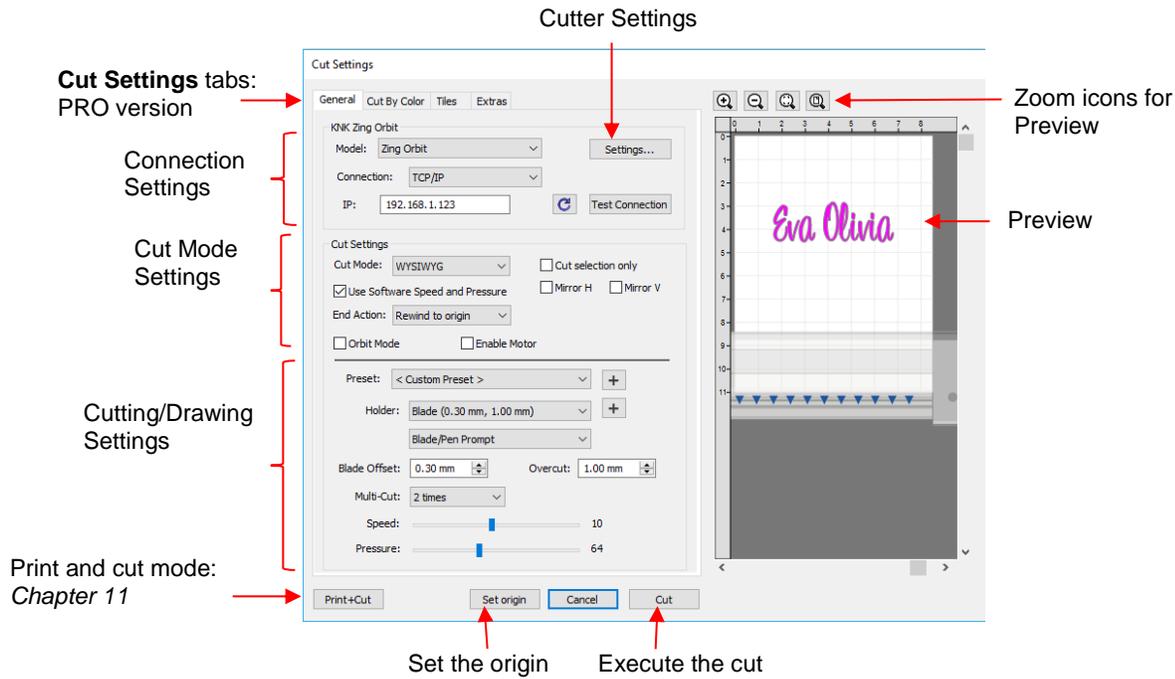
- After clicking on **OK**, you won't observe any changes on the **Cutting Mat** or on the **Layers Panel**. The results of the **Tiling** process will apply once you enter the cutting window. Refer to *Section 10.06.3*.

## 10.06 Cut Settings

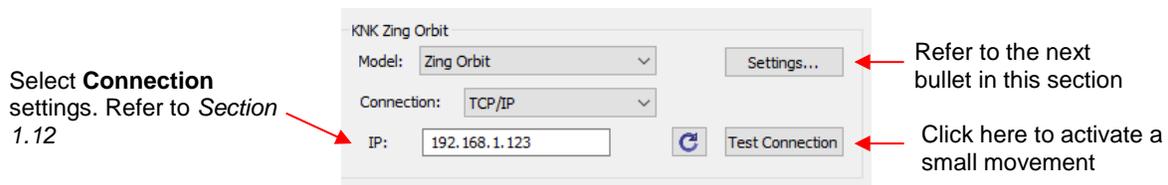
The cut settings vary from one cutter to the next based on the manufacturer of that cutter and the built-in functionality. For this reason, the information presented here will only apply to the brand and model of cutter presented in Chapters 1 and 2.

### 10.06.1 Cut Window Settings

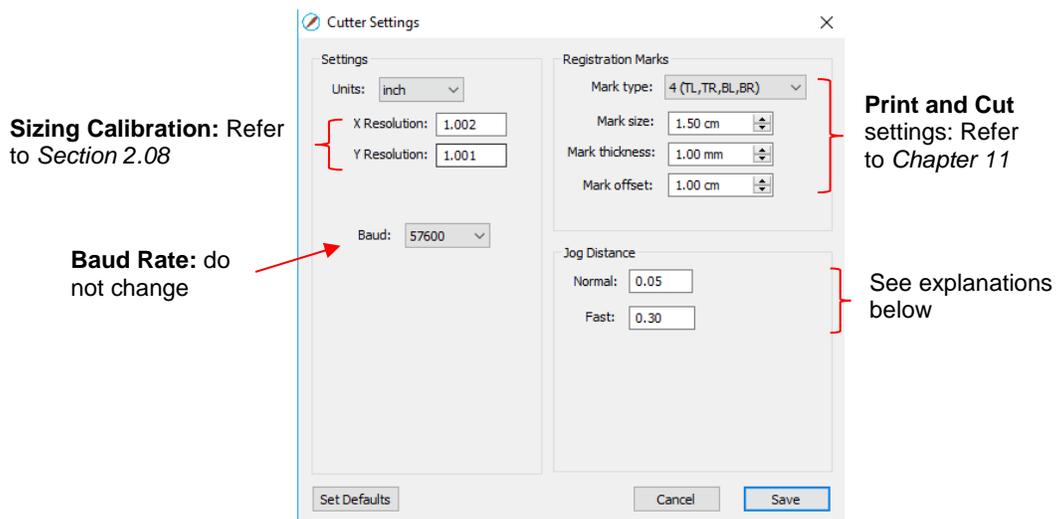
- When you are ready to execute a cut (or draw), the cut window can be opened using either of the following:
  - ◇ Click on the **Cutter** icon  on the **Toolbar**
  - ◇ Go to **Cutter>Cut With KNK Zing Orbit**
- The following window will open:



- ◇ **Cut Settings** tabs: The regular version of SCAL will only have the **General** tab. The PRO version has three additional tabs; **Cut by Color** (refer to *Section 10.06.2*), **Tiles** (refer to *Section 10.06.3*) and **Extras** (refer to *Section 10.06.4*).
- ◇ **Connection Settings**: Choose the model of cutter being used and the connection settings. For the Zing Orbit choose either **USB** or **TCP/IP** (Wi-Fi).



- ◇ **Cutter Settings**, which can also be accessed by going to **Cutter>Cutter Settings**, opens a new window with additional settings relevant to that model. For the KNK Zing Orbit:



- **Jog Distance**: The following settings apply when setting the origin:
  - **Normal**: the distance the head or mat moves with each arrow key increment
  - **Fast**: the distance the head or mat moves while holding **Shift** with each arrow key increment

◇ **Cut Mode Settings:** Refer to *Section 10.07* which covers controlling where shapes will cut.

Choose **WYSIWYG**, **Origin Point**, or **Center Point** (refer to *Section 10.07*)

Check if only selected shapes should be cut

Check either or both if you wish to have shapes mirrored before cutting

PRO version: enter where head should go at end of cut

- **Cut Mode:** Refer to *Section 10.07* which covers controlling where shapes will cut.
- **End Action** (PRO version only): controls what happens at the conclusion of the cut. There are three choices:

- **Rewind to origin:** default setting in which the head returns to the origin set before the cut began
- **Advance Amount:** when this option is selected, the head moves to the end of the cut, over to the right side, and then advances the mat or rolled material forward based on a value you enter into a new window:

Select **Advance Amount** and a new input pops up

Enter distance to advance

- **Do Nothing:** the head stops at the location where it finished cutting
- **Cut selection only:** If you have pre-selected which shapes you want to cut, then mark this box.
- **Mirror H** and **Mirror V:** Options to check if you want the shapes mirrored for cutting. This is very handy when cutting HTV or embossing. In both cases, you will be flipping over the material once the cutting or embossing is complete.

◇ **Cutting/Drawing Settings:** As mentioned earlier, this section will vary considerably from one brand/model of cutter to the next:

Select a **Preset** of suggested settings

Select type of tool

Change settings, as needed

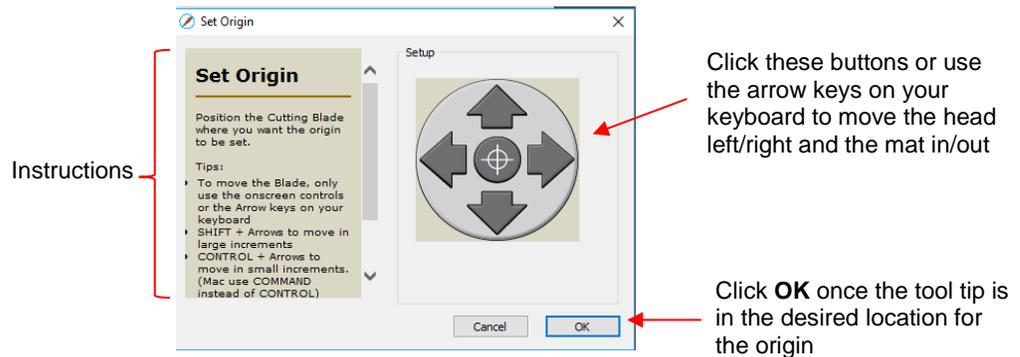
Add a new **Preset**

Add a new tool

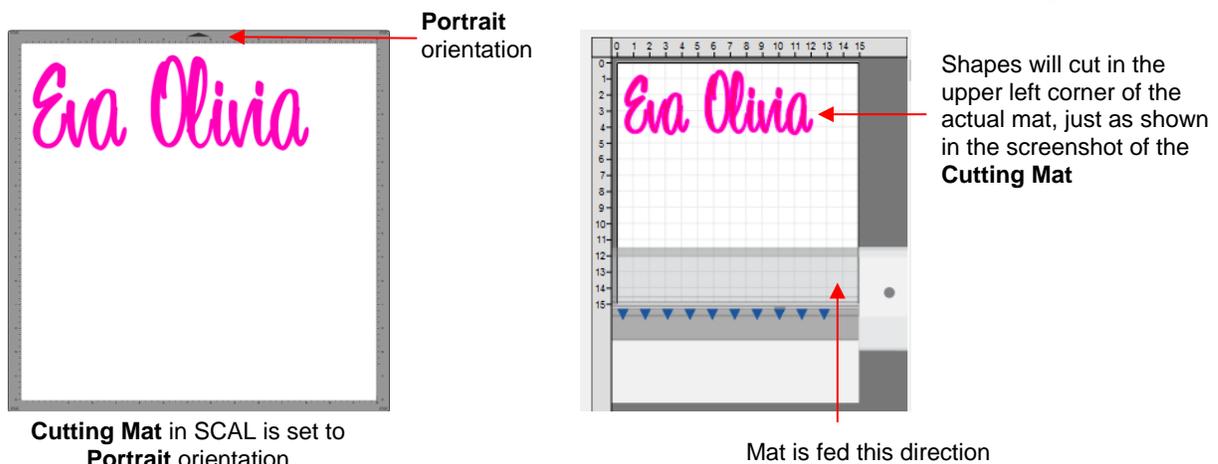
Type of action

- **Preset** is a customizable menu where you can store settings for a particular material or application. Refer to *Section 2.04* for directions.
- **Holder** has choices for **Blade** or **Pen**. Like **Preset**, you can enter your own menu choices, such as other blades. Again, refer to *Section 2.04*.
- If you select **Pen** under **Holder**, then **Draw draw lines** is typically selected. There is also a **Prompt for pen color change option**. Marking that will cause the cutter to pause after each pen color is executed so that a different pen or tool can be mounted:

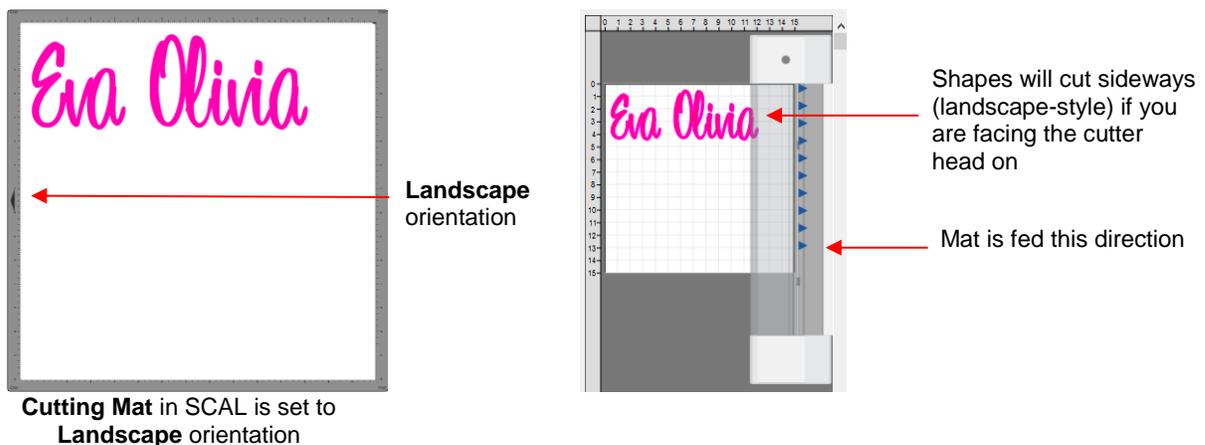
- ◇ **Print+Cut:** Clicking on this button opens the **Print and Cut** window. Refer to *Chapter 11* for detailed instructions on calibrating the optic eye and performing print and cut applications.
- ◇ **Set Origin:** Click on this button to set the origin for cutting. The following window will open:



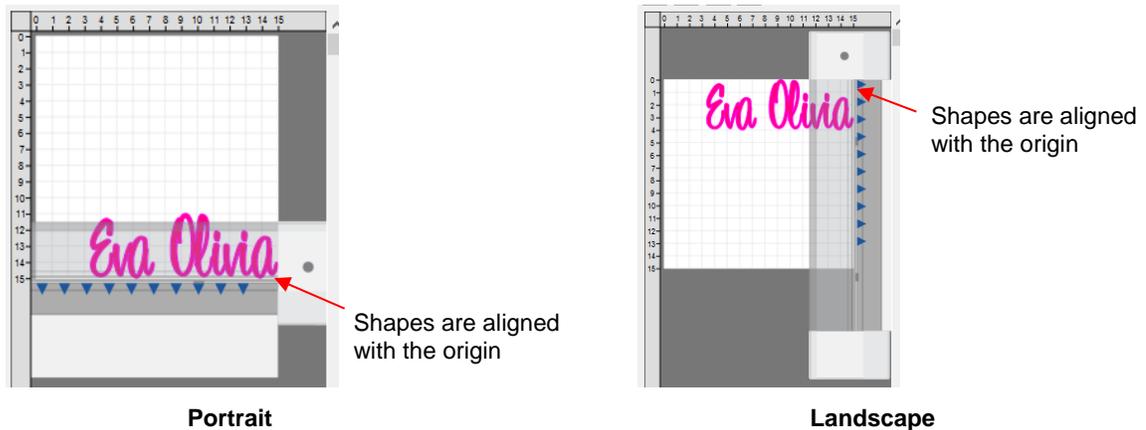
- In general, you always set the origin in the lower right corner of the material as was presented in *Chapter 1*.
- ◇ **Preview:** The preview displays the shapes that will cut and their orientation plus location based on other settings.
  - For example, with a **Portrait** orientation and **WYSIWYG** cut mode, the **Preview** indicates the shapes will cut exactly in the same location and orientation as you see on the **Cutting Mat**:



- Using the same **WYSIWYG** cutting mode, but having the **Cutting Mat** orientation set as **Landscape**, the **Preview** changes indicating the shapes will be cut in a landscape position:



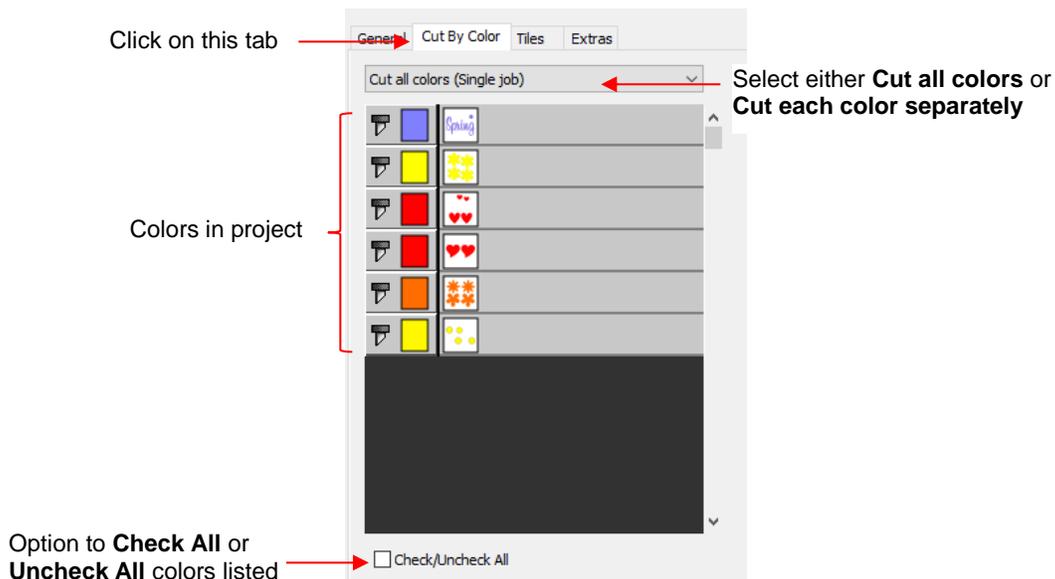
- In **Origin Point** mode, it doesn't matter where the shapes are located on the **Cutting Mat**, they will cut so as to align with the origin set:



- Additional details on controlling where shapes are cut are presented in *Section 10.07*.

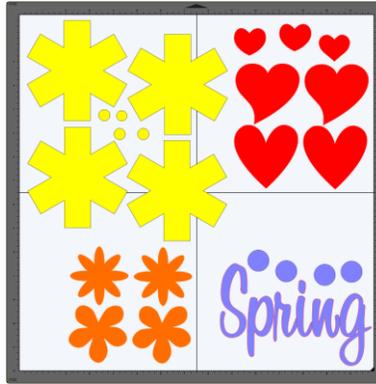
### **10.06.2 Cut by Color (SCAL PRO only)**

- The **Cut by Color** function offers two capabilities:
  - ◇ Turn on and off colors to be cut without the need of hiding layers on the **Layers Panel** or pre-selecting shapes to cut. In fact, you don't even need to ungroup mixed-color groups.
  - ◇ Cut all of the colors at once or have the cutter pause between colors, thus permitting the change out of materials
- To access **Cut by Color**, click on the **Cut by Color** tab in the **Cut Settings** window:



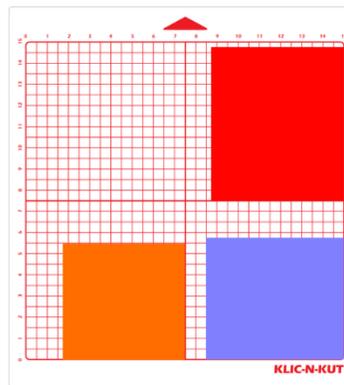
- **Cut all colors (Single job):** In this mode all of the colors marked in this window will be cut at one time.
  - ◇ As an example, here are some shapes laid out on the **Cutting Mat**. Note how the grid is set to divide the mat into four quadrants:

The shapes of each colors have been arranged into quadrants on the **Cutting Mat**



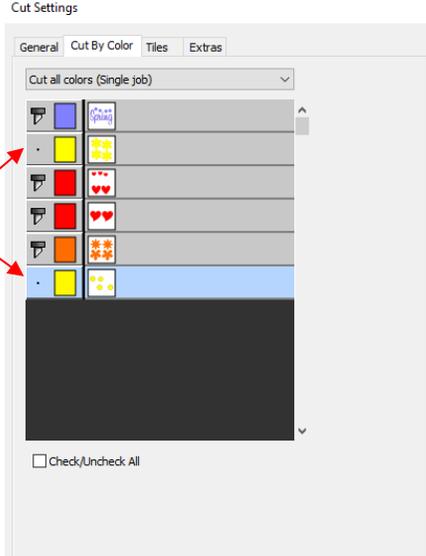
The **Cutting Mat** is divided into quadrants for easier placement of the scraps onto the actual cutting mat

- ◇ Let's say you also have scraps you want to use, however the yellow scrap you plan to use won't fit onto the mat with the other scraps. So, you want to cut lilac, red, and orange first. You place those colors into quadrants on the mat that match the layout on the **Cutting Mat** in SCAL:

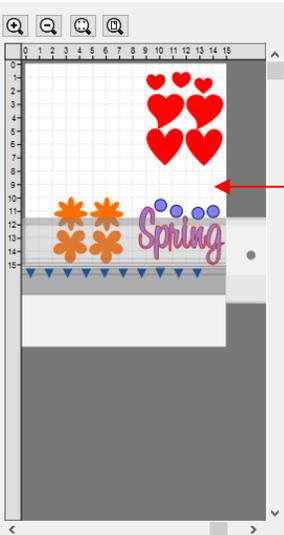


- ◇ In the **Cut Settings**, make sure **WYSIWYG** mode is selected and you have the other settings selected. Then select the **Cut by Colors** tab and click on the blade icon  next to the yellow shapes to hide those from cutting:

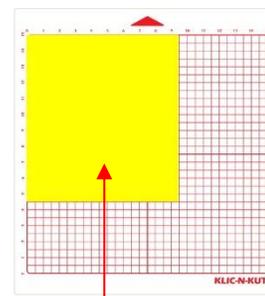
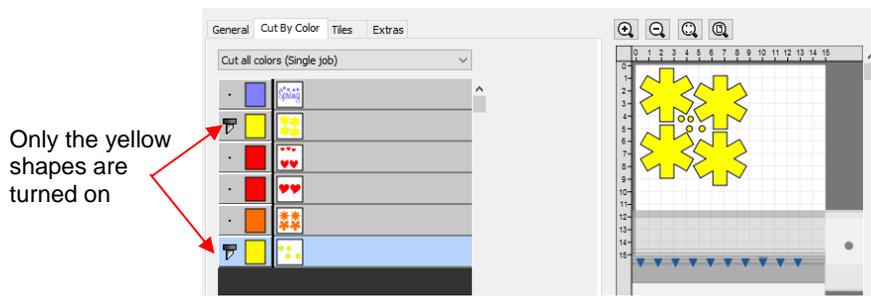
The yellow shapes are turned off



The **Preview** shows where the shapes will cut and shows that the yellow ones are excluded



- ◇ The cut is executed and the red, orange, and lilac shapes are cut. Then the same procedure can be used for the remaining yellow shapes:

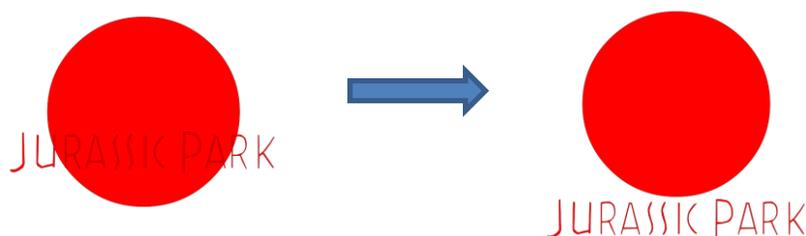


The yellow scrap is placed in the upper left corner of the mat to match the **Preview** window

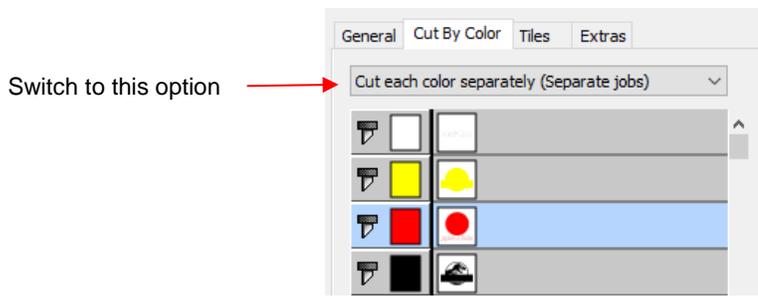
- **Cut each color separately (Separate jobs):** In this mode you can also turn or off colors for cutting. However, SCAL will prompt for each color before executing the cut.
  - ◇ As an example, here is a layered design to be cut from vinyl:



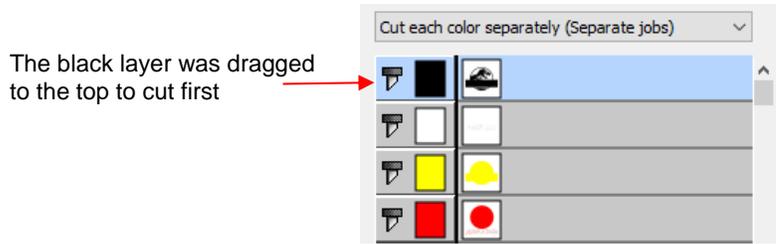
- ◇ Choosing the option to **Cut each color separately** is logical because:
  - The shapes are arranged on top of one another
  - The size is so large that the individual colors cannot be placed on the cutting mat to cut all at one time
- ◇ However, before sending the project to the cutter, take note of any colors that might have shapes that need to be moved. In this example, the thin red lettering “Jurassic Park” would cut through the background red circle, hence it needs to be moved away:



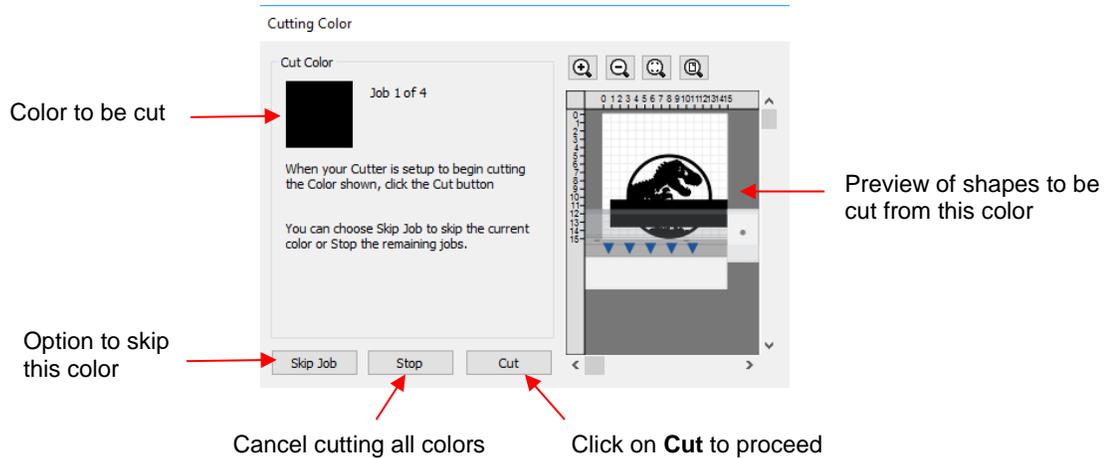
- ◇ In the **Cut Settings, Origin Point** should be chosen so that each color is moved to align with the origin and, thus, the material loaded each time in the same location. In the **Cut by Color** tab, the **Cut each color separately** option is chosen:



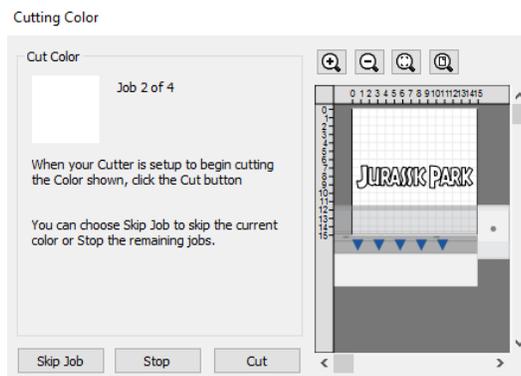
- ◇ Note that you can change the cut order by dragging the colors up or down the menu. For example, let say you already have black vinyl loaded into the cutter and the origin set to cut:



- ◇ Upon selecting **Cut**, the following window opens:



- ◇ If you decide not to cut this color, click on **Skip Job** and the next color in the menu will be selected. If you clicked on **Cut**, then the black shapes are cut out and then this same next color window will open:

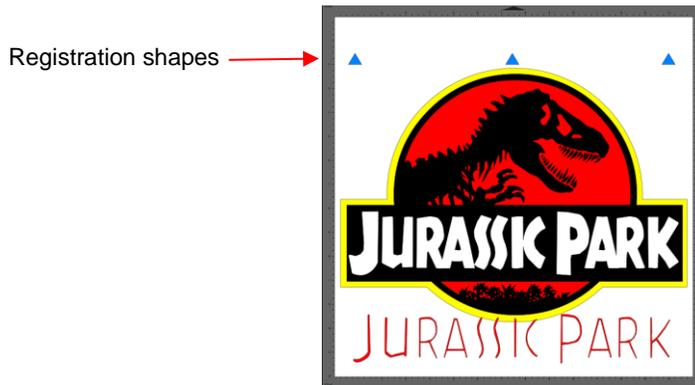


- ◇ And the process continues until all colors have been cut.

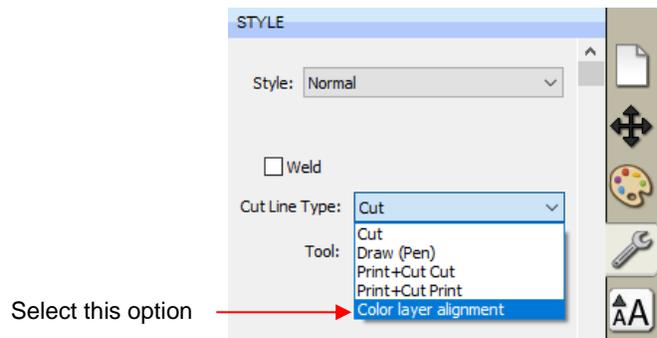
- In *Section 10.01*, **Color Layer Alignment** was mentioned as one of the options under **Cut Line Type** on the **Style Panel**. In applications, such as the one just presented, it can be tricky aligning the various colors after

cutting. To make the job easier, small registration shapes can be added to the design and cut with every color so that they can then be lined up when layering color.

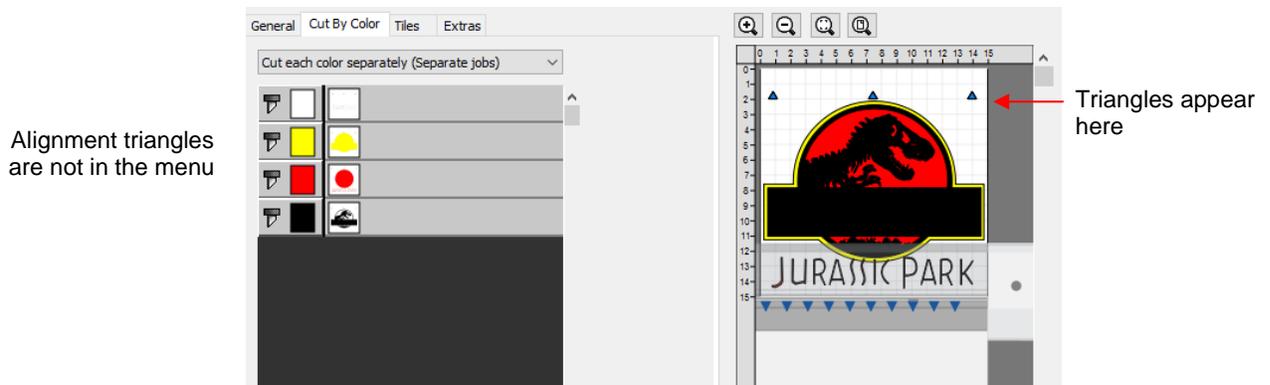
- ◇ In the *Jurassic Park* example, three small triangles are added and grouped to be on the same layer:



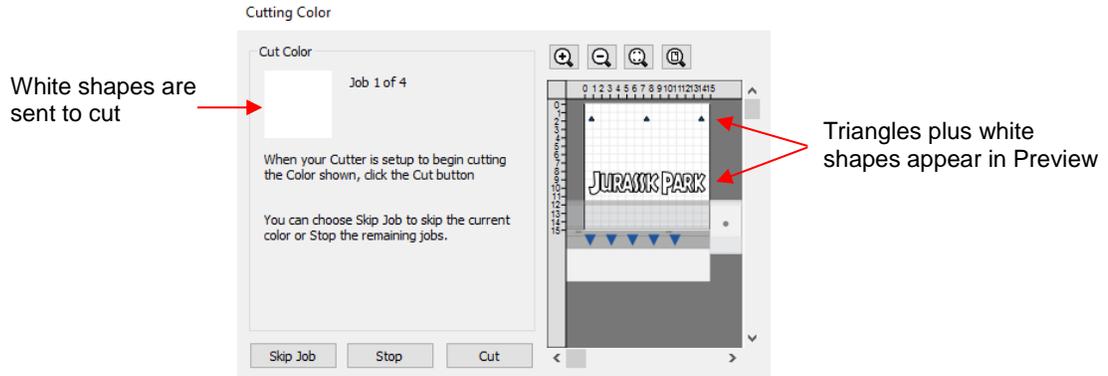
- ◇ The layer is selected and the **Cut Line Type** for this layer is changed to **Color Layer Alignment**:



- ◇ When the **Cut by Color** tab is then selected, the registration triangles are not in the menu however they do appear in the **Preview**:

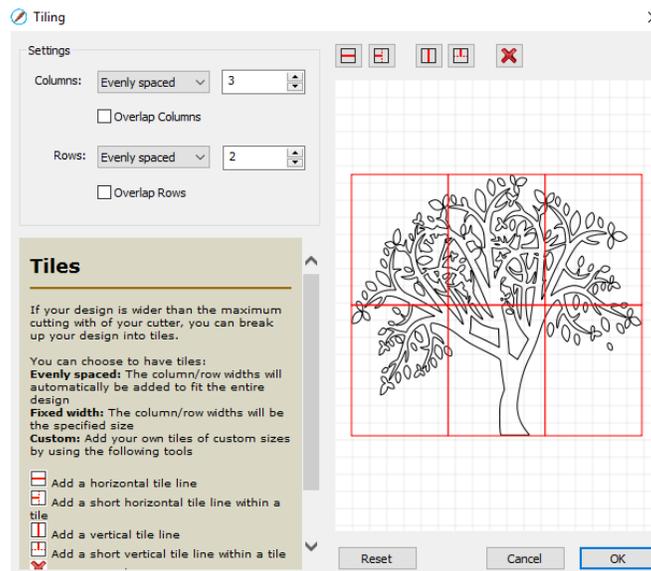


- ◇ Then, as each color window opens, the triangles will appear in the **Preview** for that color:

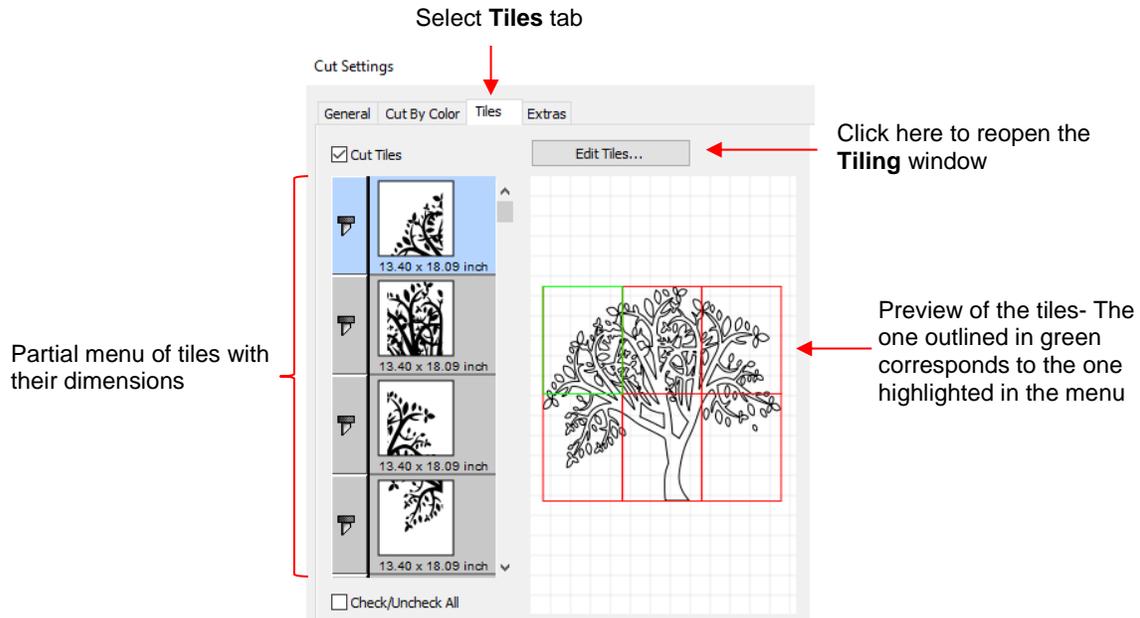


### 10.06.3 Tiles (SCAL PRO only)

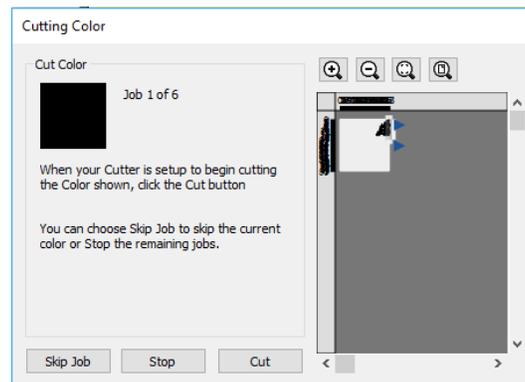
- In *Section 10.05*, you were shown how to use the **Tiling** function to split a design that is too large to cut based on the limits of your cutter:



- After clicking on **OK**, but before sending the design to cut, make the Cutting Mat dimensions fit the design. If any of the design extends beyond the boundaries of grid, those tiles will not cut.
- Open the **Cut Settings** window, click on the **Tiles** tab and check the box next to **Cut Tiles** to then open a menu showing the individual Tiles with additional options:



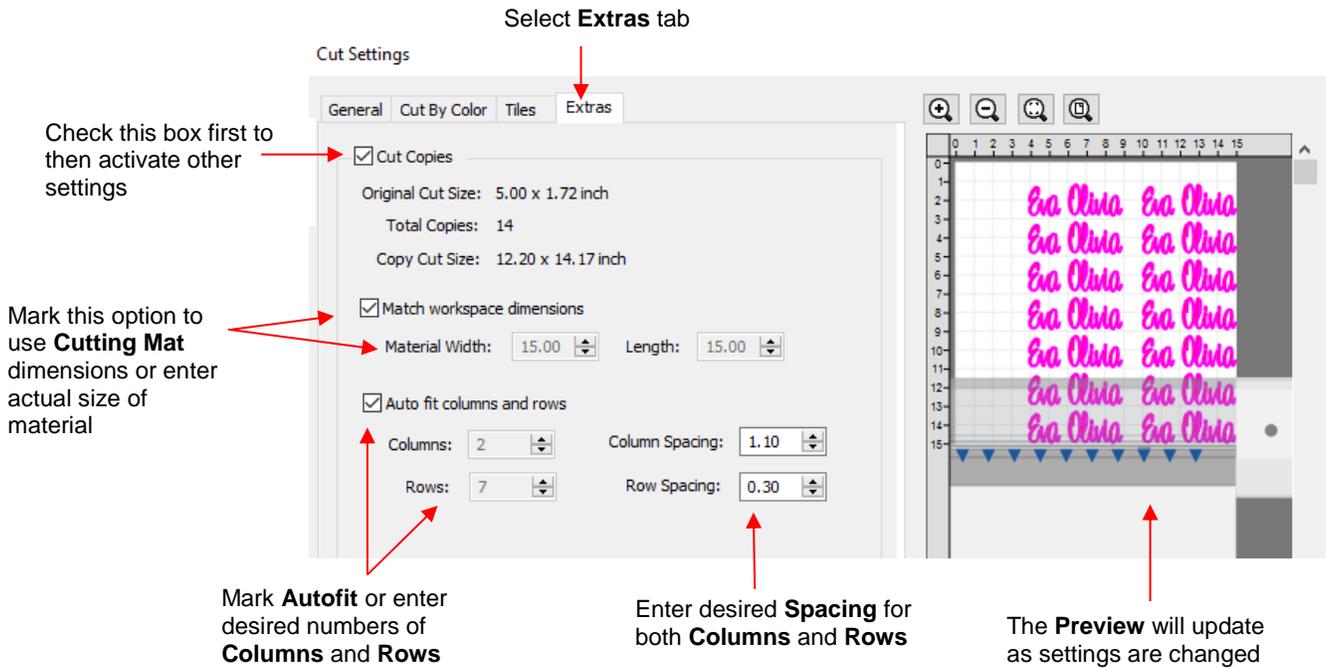
- ◇ **Cut Tiles:** Mark this option first so that the menu and preview appears.
  - ◇ **Edit Tiles:** clicking this button will take you back to **Effects>Tiling** in case you need to edit the settings.
  - ◇ As with **Cut by Color**, clicking on the blade icon  next to any tile will prevent that tile from cutting. You can also drag tiles up or down in the menu to change the cutting order.
- After you click on **Cut**, be patient. It can take a minute or more for a large and/or detailed design to be processed by the software. Eventually, a window will open showing the first tile to be cut:



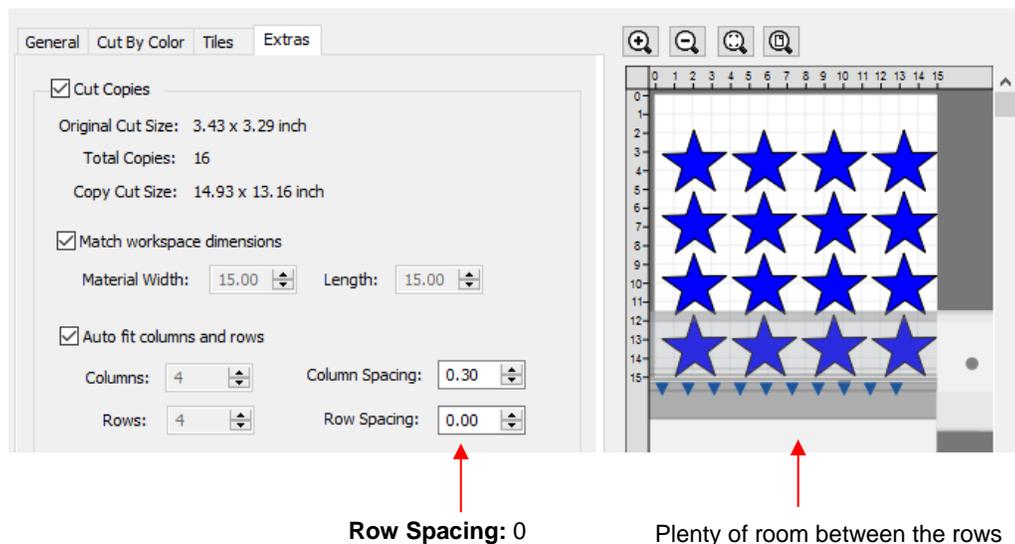
- ◇ Just as with **Cut by Color**, you can
  - Click on **Cut** to proceed with cutting that tile. After it is cut the next tile will be selected.
  - Click on **Skip Job** to skip cutting that tile and bring up the next tile
  - Click on **Stop** to cancel all cutting.

#### **10.06.4 Extras (SCAL PRO only)**

- The **Extras** feature allows you to duplicate shapes for cutting, without having to set it up on the **Cutting Mat**. To use this feature, click on the **Extras** tab in the **Cut Settings** window:



- ◇ **Cut Copies:** Mark this option first so that other settings become editable
- ◇ **Match workspace dimensions:** If your material is the same size as the **Cutting Mat**, then mark this option. Otherwise, enter the **Width** and **Length** of the material to be used. Pay attention to the **Preview** window to make sure you have the orientation correct to match how the material is placed on the cutting mat.
- ◇ **Auto fit columns and rows:** Mark this option if you want as many duplicates as possible cut from the material. Otherwise, enter the desired number of **Columns** and **Rows** to match the number of copies needed.
- ◇ **Spacing:** Adjust the spacing as desired. In general, shapes can be quite close together when cutting from thinner materials, such as vinyl and cardstock. In some cases, such as with a star, you can even use 0 for the **Row Spacing**, since the bottom of the shape is not close to the top of the shape in the row below it:

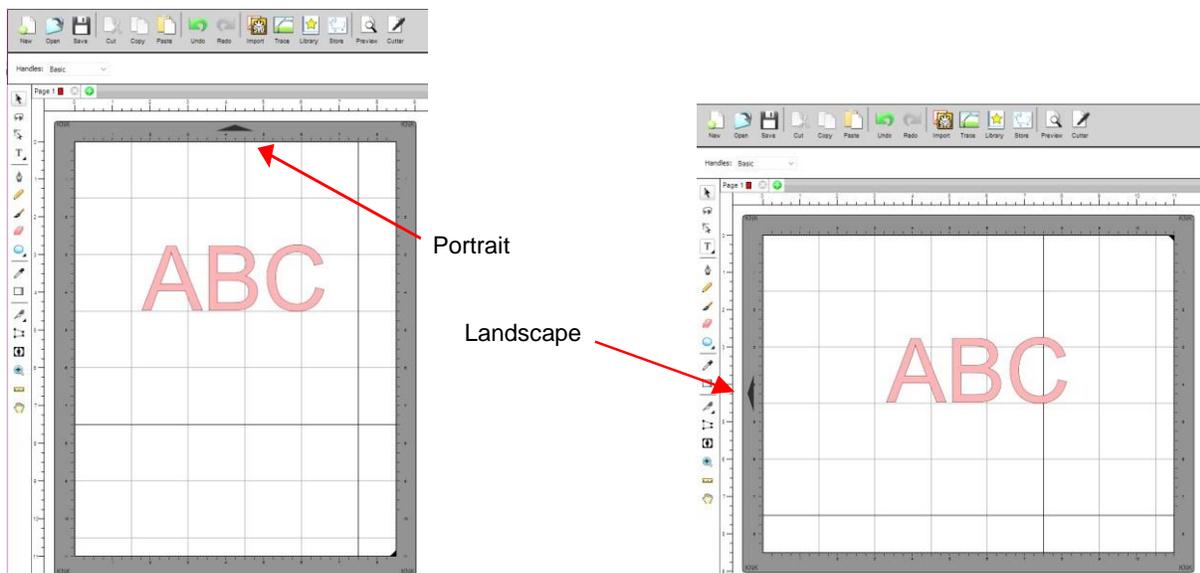
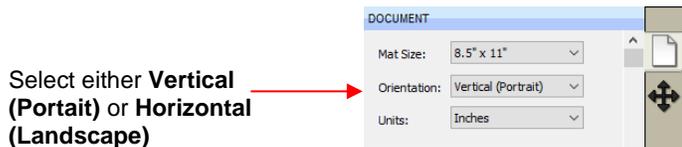


- Make sure you have all of the cut settings made under the **General** tab of the **Cut Settings** window. Once you click on **Cut**, all of the duplicates will be cut out and it appears that using **Cancel**, in the current version of SCAL, will not abort the cut.

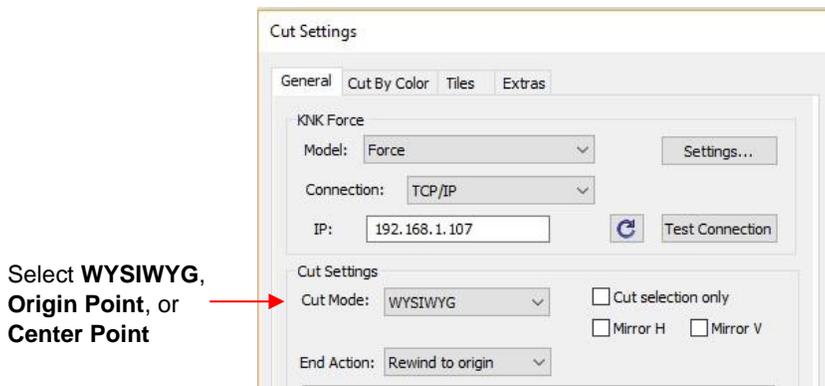
## **10.07 Controlling Where Shapes Will Cut**

### **10.07.1 Overview**

- There are two **Orientations** for cutting:
  - ◇ **Portrait** – Shapes will cut in the same orientation you see on the **Cutting Mat**
  - ◇ **Landscape** – Shapes will cut 90° clockwise to the orientation you see on the **Cutting Mat**
- There are 4 available **Cut Modes** when cutting to the KNK Zing Orbit:
  - ◇ **WYSIWYG** – Shapes will cut relative to their position on the virtual Cutting Mat
  - ◇ **Origin Point** – Shapes will cut to align with the origin set before cutting
  - ◇ **Center Point** – Shapes will cut to center around the origin set before cutting
  - ◇ **Print and Cut** – Shapes will cut based on manual or automatic alignment with printed registration marks (refer to *Chapter 11*)
- The **Orientation** is set on the **Document Panel**:

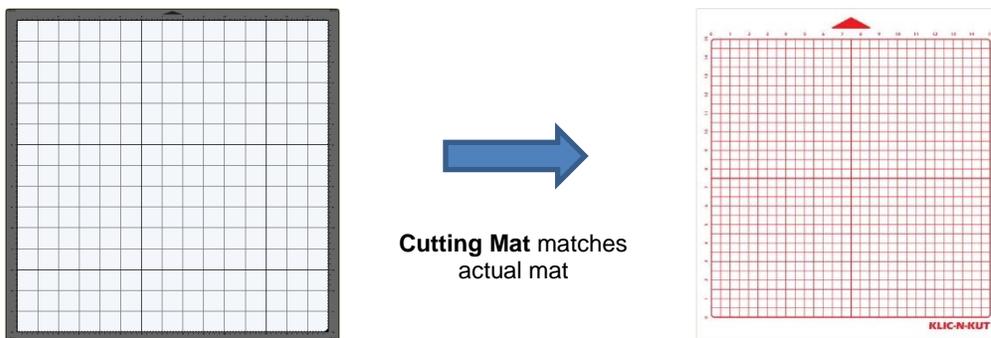


- The choice between **Portrait** and **Landscape** is a personal one – use whichever one makes the most sense to you. For long projects, such as for large vinyl cuts, **Landscape** is usually chosen because the project displays better on the computer monitor. However, you still have the option to use **Portrait**, if desired.
- The **Cut Mode** is set in the **Cut Settings** window:

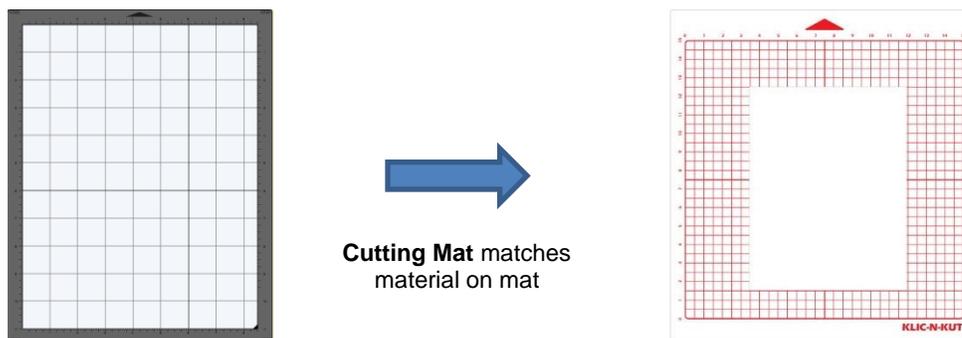


- **IMPORTANT:** All three **Cut Modes** are based on setting an XY origin on the cutter. On the Zing Orbit, this origin is set by moving the blade tip to a chosen location on the mat grid or on the material, depending on the application or your preference.
- The following sections show where shapes will cut based on the possible combinations of **Cut Mode** and **Orientation**. Note that with **WYSIWYG** mode, there will be two options and the one that makes the most sense to you, is the one to use:

◇ **Cutting Mat Method:** The virtual **Cutting Mat** is the same dimensions as the actual cutting mat:



◇ **Material Method:** Create a custom virtual **Cutting Mat** that matches the dimension of the material to be cut:



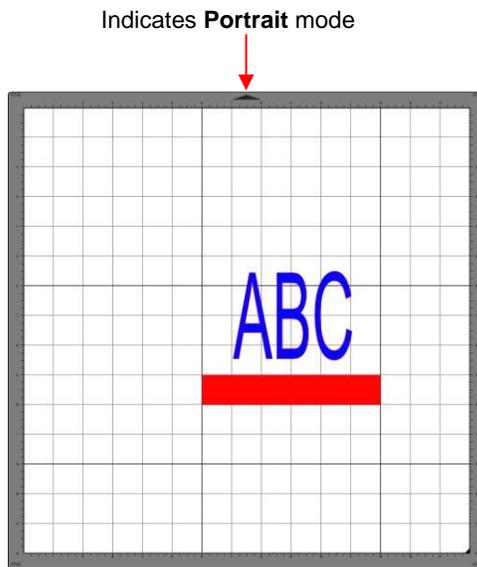
- The best way to learn how these settings affect where shapes cut is to recreate what you see in these screen shots and test them out with the test pen and paper. Eventually, it will all make sense to you and, of course, there's help available if you need it.

### 10.07.2 Origin Point

- This is the mode recommended for most applications as it economizes the use of your cutting materials.

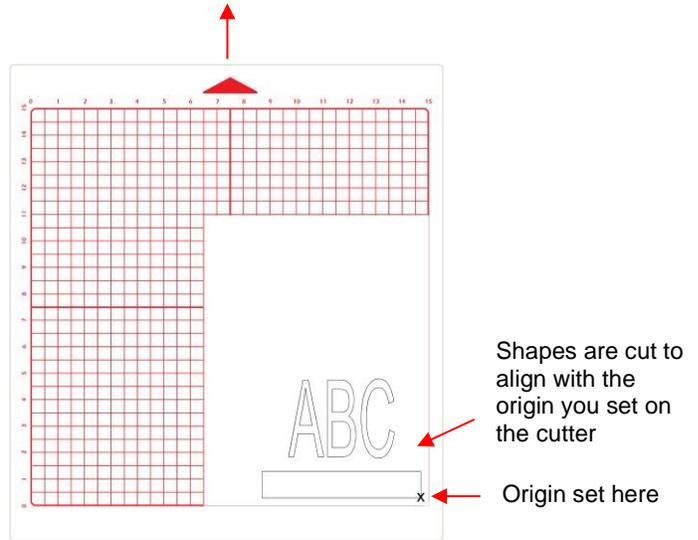
- Shapes can be located anywhere on the virtual **Cutting Mat**. The shapes will be moved and aligned to cut with the origin you set on the material. As mentioned earlier, the origin is set using the position of the blade tip and is typically set just inside the lower right corner of the material being cut.
- When more than one shape will be cut, the shape closest to the origin will be cut at the origin and any other shapes will be cut the distance and direction from that shape as positioned on the screen. The following figures show examples of where images will cut. Use the arrow on the **Cutting Mat** as a guide to the direction to insert the actual mat or material into your cutter.

◇ **Origin Point – Portrait Mode**



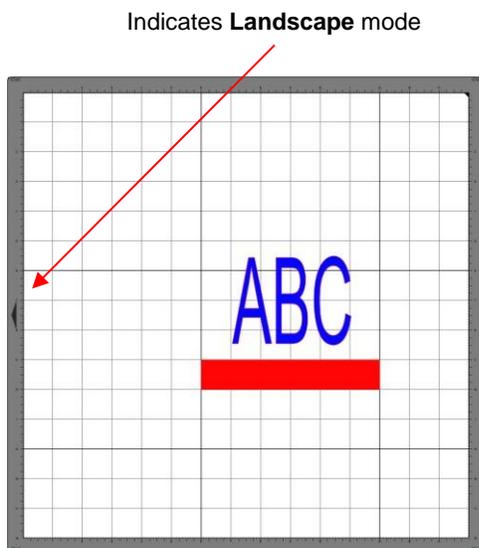
Location of shapes in SCAL

Feed the mat this direction into the cutter



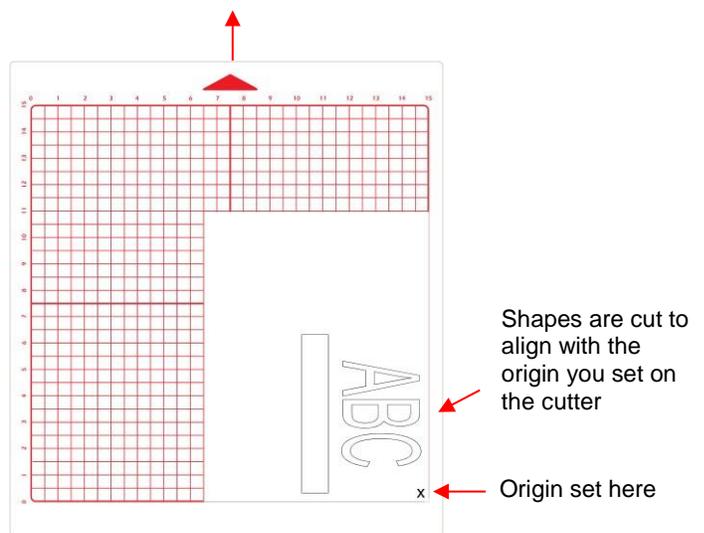
Where shapes will draw or cut on the material

◇ **Origin Point – Landscape Mode**



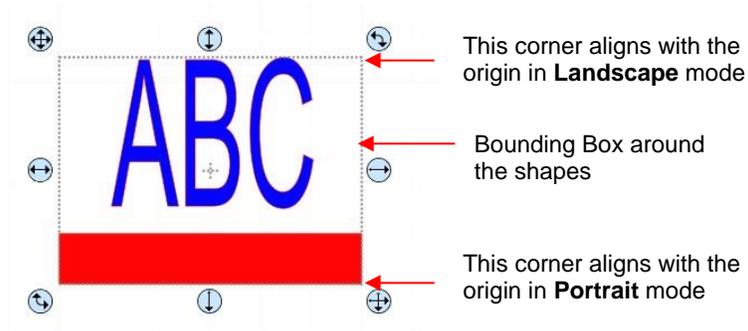
Location of shapes in SCAL

Feed the mat this direction into the cutter

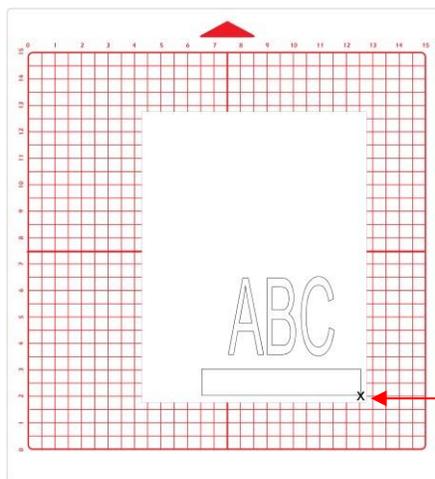


Where shapes will draw or cut on the material

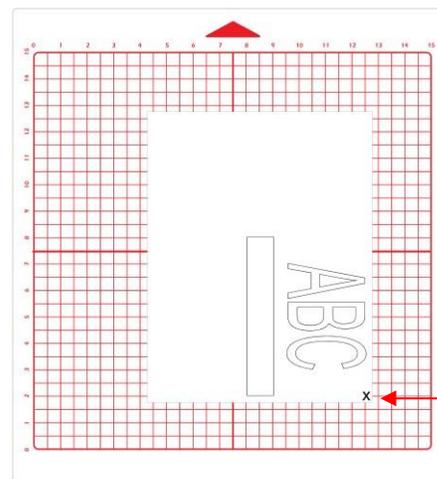
- Note that the alignment is based on the bounding box around the shapes:



- Also, note that the material can be located anywhere on the cutting mat because you are setting the origin on the material itself. It is usually advisable to set that origin just a little ways inside the corner of the material so that you do not inadvertently cut off the edge.



**Portrait mode**

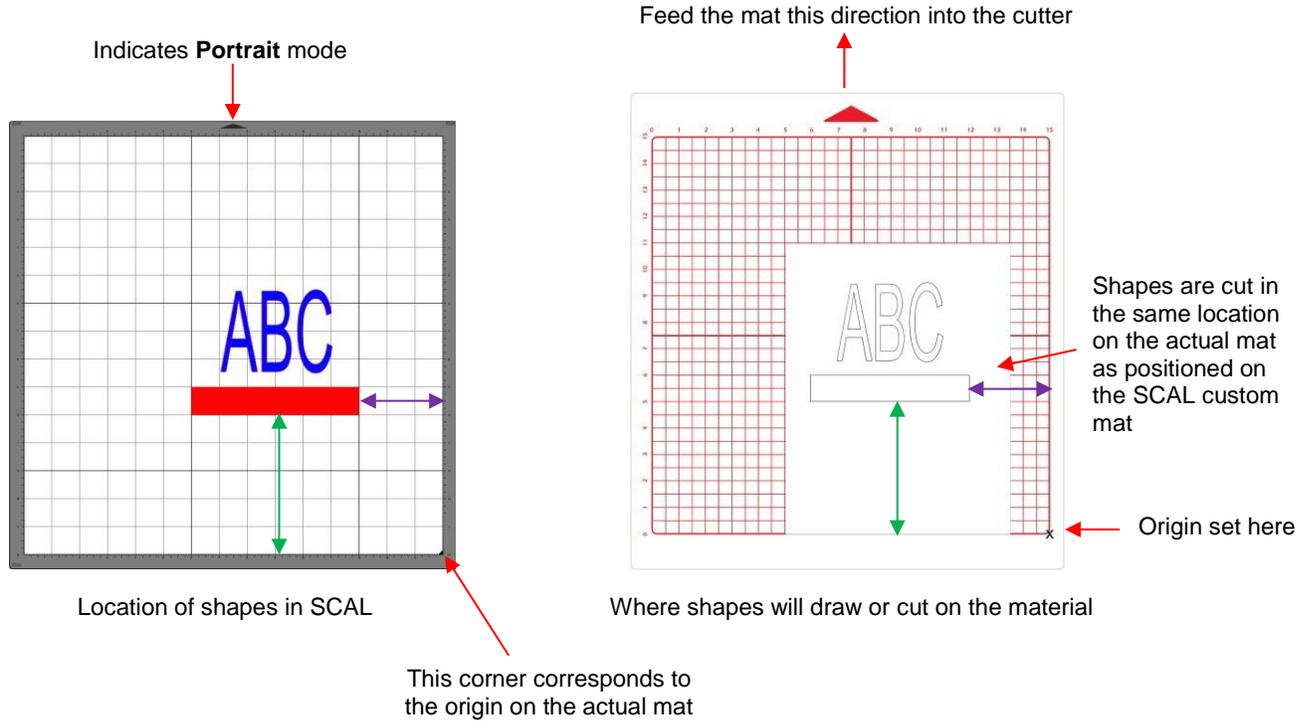


**Landscape mode**

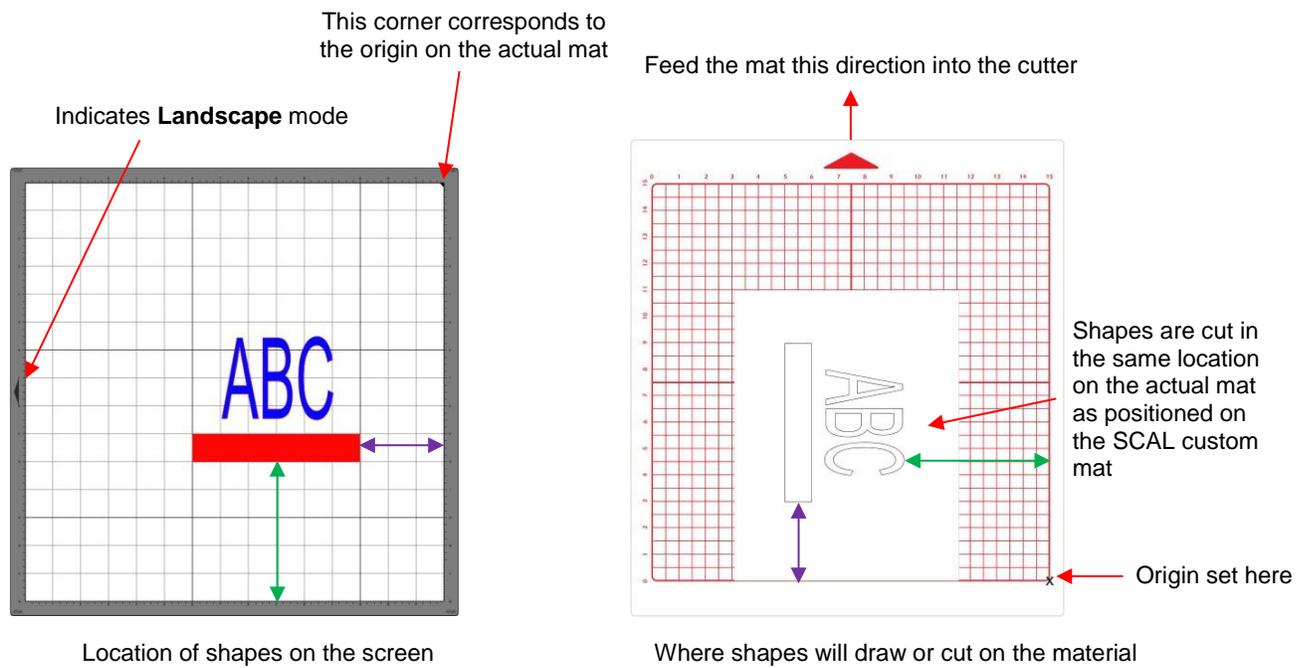
### **10.07.3 WYSIWYG**

- This is the mode recommended when you need to cut shapes in a very specific location relative to the onscreen **Cutting Mat** or when you are utilizing multiple tools in applications such as draw and cut or emboss and cut.
- Shapes are cut based on where they are located on the virtual **Cutting Mat**. There are two methods used:
  - ◇ **Cutting Mat Method:** The virtual **Cutting Mat** dimensions should match those of the grid on the actual cutting mat. The origin is set in the exact lower right corner of the mat's grid. The material needs to be placed on the cutting mat so that it covers the area where the shapes will be cut.
  - ◇ **Material Method:** The virtual **Cutting Mat** dimensions should match those of the material being placed on the actual cutting mat. The origin is set in the lower right corner of the material regardless of where the material is placed on the mat. In the example later on, the material is assumed to be letter size (8.5" x 11").
- In the following diagrams the purple and green arrows are used to indicate the equivalent distances between the shapes and the origin on the virtual **Cutting Mat** and on the actual mat.

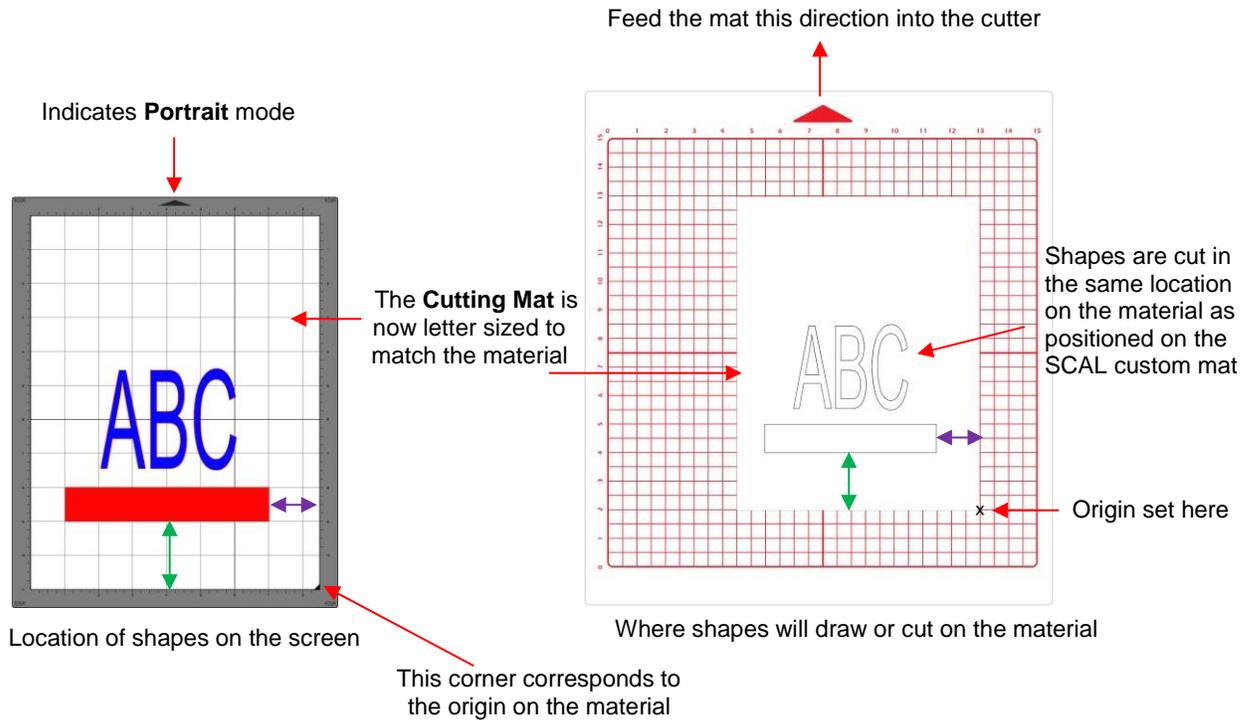
◇ **WYSIWYG – Portrait – Cutting Mat Method**



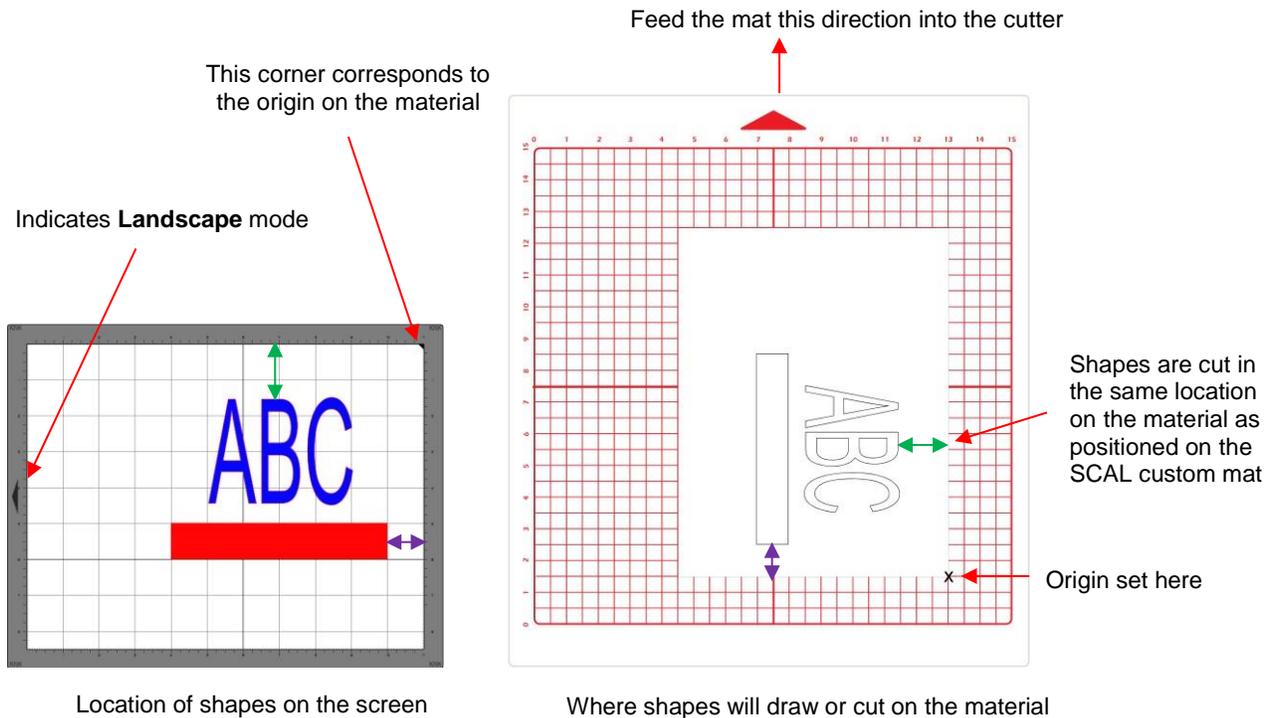
◇ **WYSIWYG – Landscape – Cutting Mat Method**



◇ **WYSIWYG – Portrait – Material Method**



◇ **WYSIWYG – Landscape – Material Method**

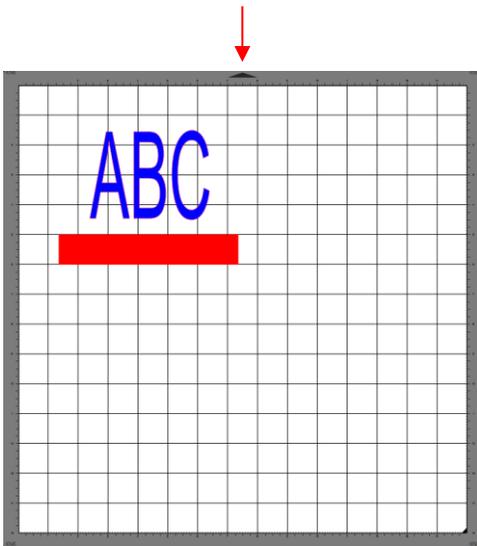


### 10.07.4 Center Point

- This is a mode not available with most other cutters in SCAL. It was needed for use with the Orbitizer but can also have other useful applications, such as cutting a shape from the center front of a greeting card.
- Shapes can be located anywhere on the virtual **Cutting Mat**. The shapes will be moved and centered around the origin you set on the material. While in the other two cut modes, the origin is typically set just inside the lower right corner of the mat or material, with **Center Point** mode, you want to set the origin in the center of the material or mat:

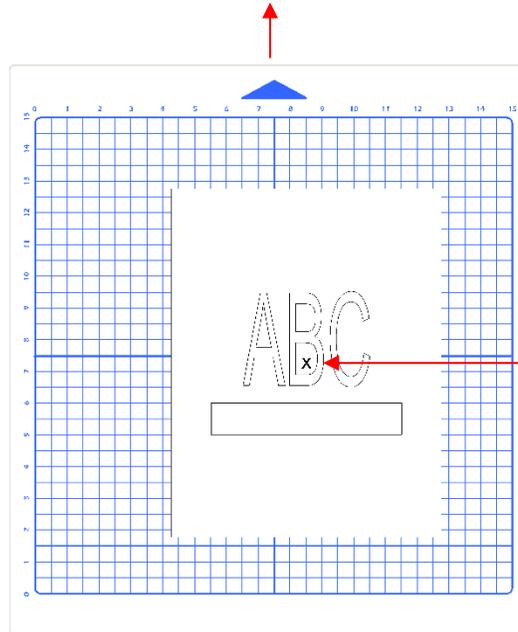
#### ◇ Center Point - Portrait

Indicates **Portrait** mode



Location of shapes in SCAL

Feed the mat this direction into the cutter



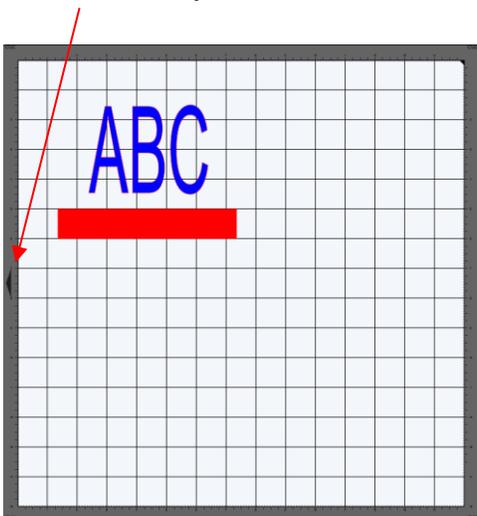
Origin set here

Shapes are centered around the origin you set on the material

Where shapes will draw or cut on the material

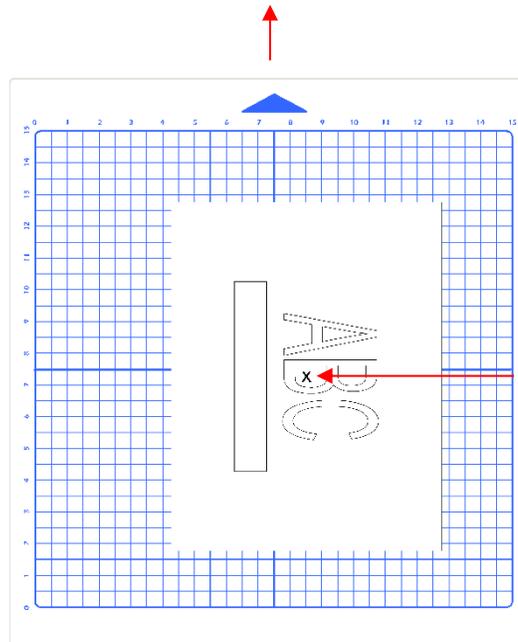
#### ◇ Center Point – Landscape Mode

Indicates **Landscape** mode



Location of shapes in SCAL

Feed the mat this direction into the cutter

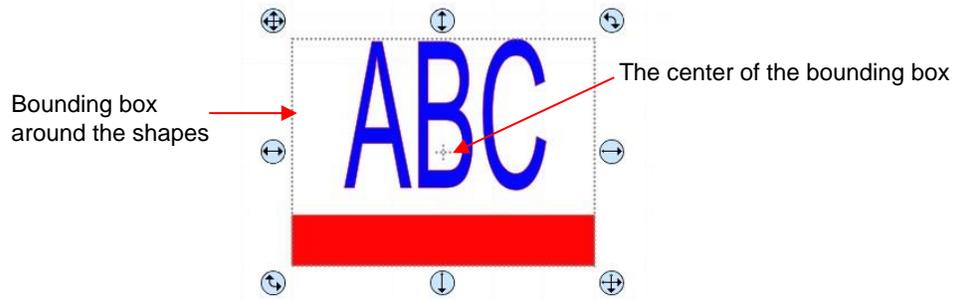


Origin set here

Shapes are centered around the origin you set on the material

Where shapes will draw or cut on the material

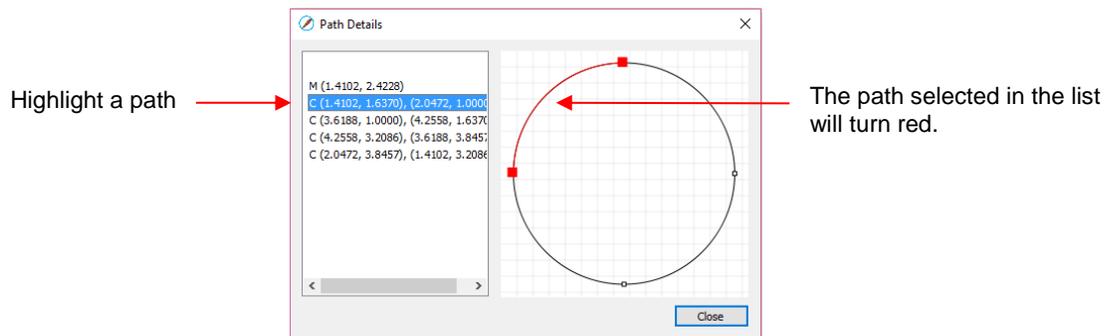
- ◇ Note that the alignment is based on the center of the bounding box around the shapes:



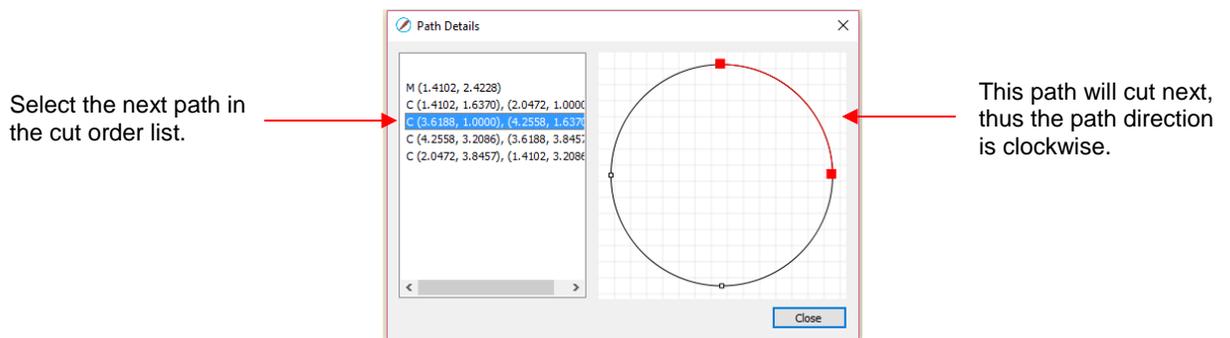
- ◇ Also, note that the material can be located anywhere on the cutting mat because you are setting the origin on the material itself. If you need the centering to be perfect:
  - Measure the material with a ruler to determine the center and mark the center with a pencil dot
  - Use the alignment pin in the blade holder to set the origin. It is far easier to see the tip of the pin than the tip of the blade.

## 10.08 Path Details and Reverse Path

- Sometimes a cutting issue can be resolved by reversing the direction of a cut. In SCAL, the cut direction (clockwise versus counterclockwise) can be checked using the following steps:
  - ◇ Select the shape, right-click and select **Path>Path Details**.
  - ◇ A window will open. On the left side is a list of the paths in the order they will cut. Click on any path in the list and that path will turn red:



- ◇ Select the next path in the list and you will then be able to determine the direction of the cut:

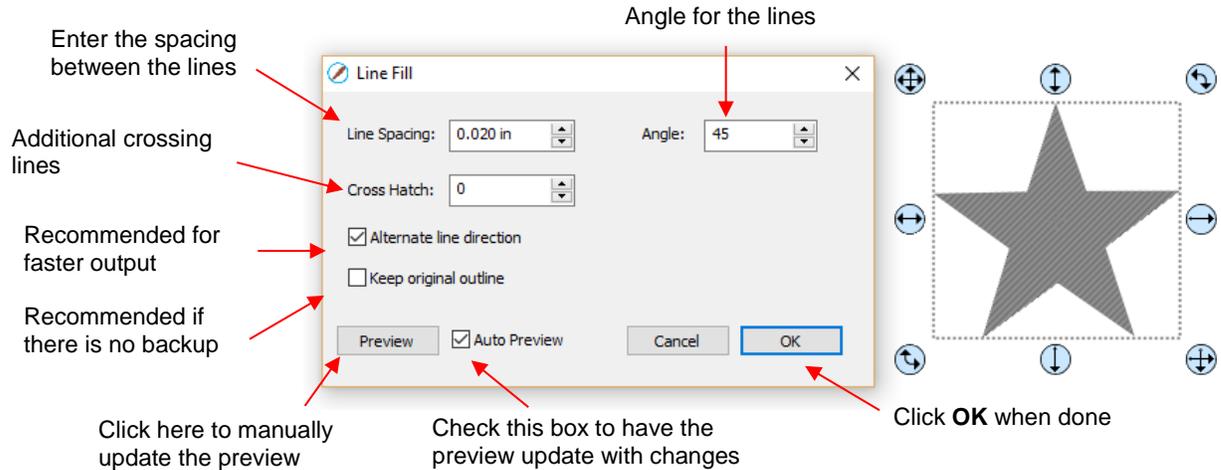


- To reverse the direction of a path, use either of the following after selecting the shape:
  - ◇ Right-click and select **Path>Reverse Path**

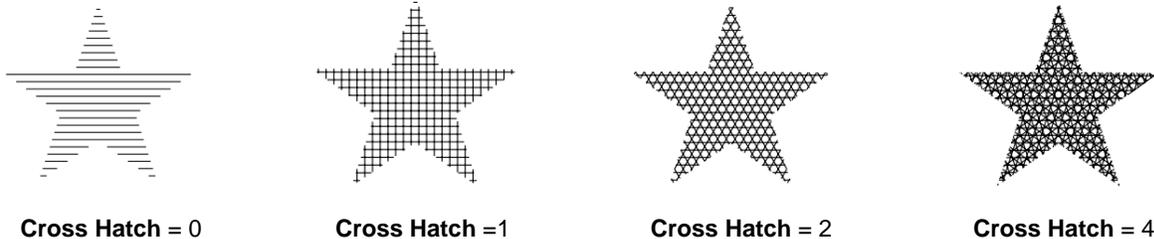
◇ Go to **Path>Reverse Path**

## 10.09 Line Fill

- The **Line Fill** function creates a line or hatch fill pattern, typically used for engraving with an engraving tool. It can also be used for coloring in shapes with a pen or embossing some materials with an embosser.
- To access this function, select a shape and go to **Effects>Line Fill**:



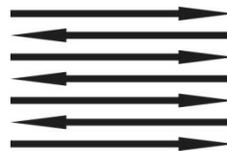
- ◇ **Line Spacing:** This is selected based on the width of the line produced by the tool to be used. If it's too small to accurately measure, use 0.02" or 0.5 mm for a small test shape and then adjust, as needed, to fit the tool and application.
- ◇ **Angle:** Choose an angle for the **Line Fill**. An **Angle** of 0 results in horizontal lines and an **Angle** of 90 results in vertical lines. Note the diagonal pattern in the prior screenshot using an **Angle** of 45.
- ◇ **Cross Hatch:** Increasing **Cross Hatch** adds additional intersecting lines to the pattern which can result in a more complete fill but will take longer to engrave or draw:



- ◇ **Alternate Line Direction:** This controls whether the tool always returns to the same side before dropping down to engrave or draw. In some applications, it may need to be unchecked to provide a more even appearance, however it will take much longer to execute:



**Alternate Line Direction: not marked**  
Tool only travels in one direction



**Alternate Line Direction: marked**  
Tool travels in both directions

- ◇ **Keep Original Outline:** Usually a good idea in case you want to revise your pattern later on. Also, when working with lettering, having the outline improves readability:

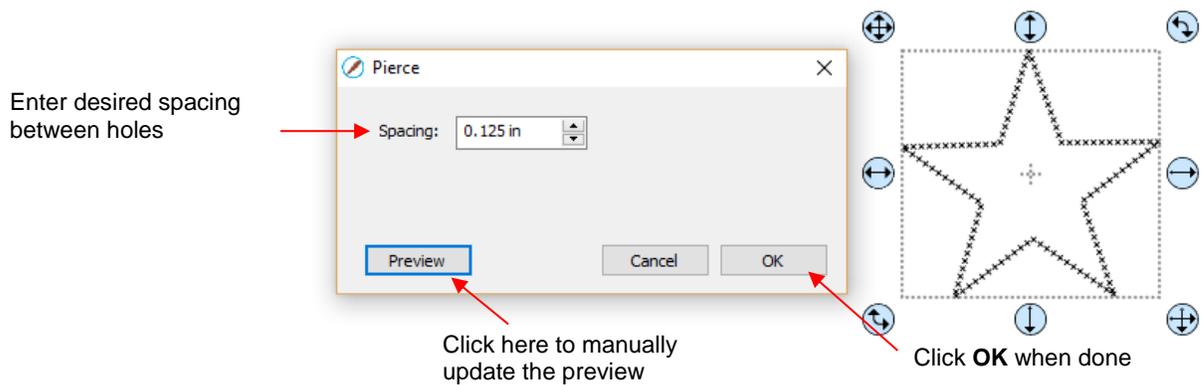
ASU

ASU

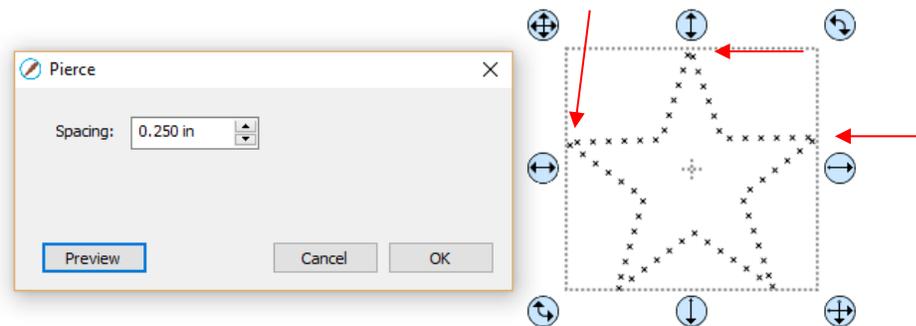
- For more information on using an engraver, refer to *Section 12.09*.

### 10.10 Pierce

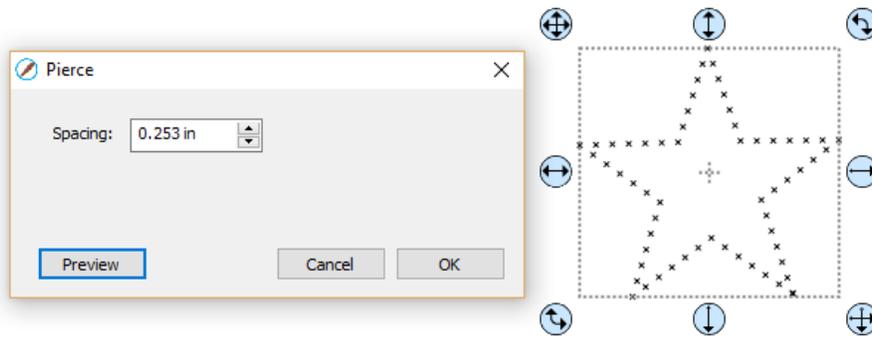
- The **Pierce** function creates holes for punch tools. This can be used to create pergamano designs and paper embroidery patterns.
- To access this function, select a shape and go to **Effects>Pierce**:



- Note that even though you see “X” shapes on the screen, the cutter head will be making downward punch movements.
- At this time, there is no editing available for a pattern created using the **Pierce** function. If you find that your design has holes that are not evenly spaced, try altering the spacing by tiny increments and clicking on **Preview**.
- ◇ For example, the star shape used above shows uneven spacing when a value of 0.25” is entered. Note how the star has holes too close to one another at the upper points:



- ◇ Gradually increasing the **Spacing** didn't immediately result in an acceptable pattern until 0.253” was entered. Then the pattern looked even:



- If you have a shape that has the **Pierce** effect applied and want to remove it (even after the file has been saved and re-opened), select the shape and go to **Object>Remove Effects**.
- If you are unable to get an even pattern, then try using the **Rhinestone** effect instead. Refer to *Section 9.10* and enter the smallest rhinestone circle size available: SS000.
- For more information on using a punch tool, refer to *Section 12.10*.

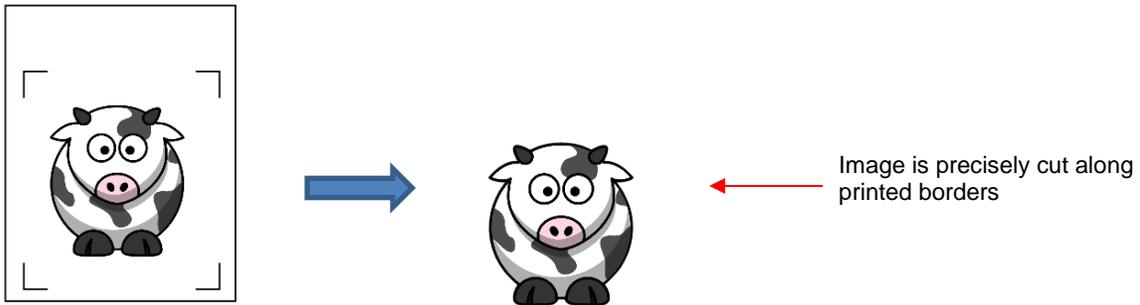
## 11. Zing Orbit: Print And Cut

### Video

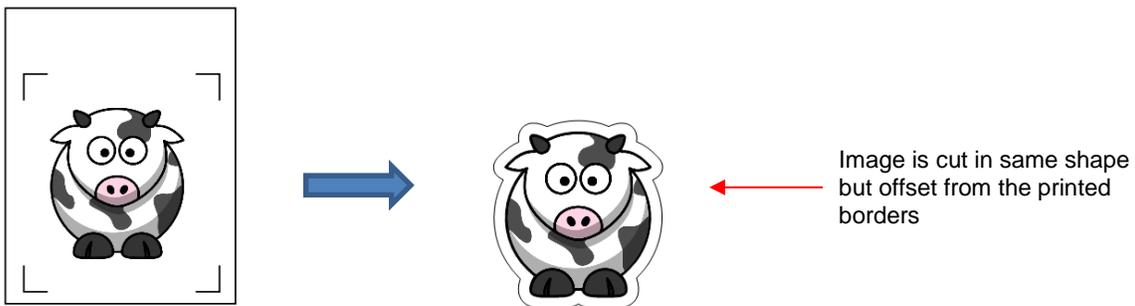
#### 11.01 What Is a Print and Cut (PNC)?

- The print and cut process involves printing an image from SCAL to any printer you own and then, with the aid of the Zing Orbit's optic eye, having the image or images cut out with perfect precision. Below are three typical kinds of print and cut applications but there can be other kinds.

- ◇ Cuts along the actual borders of the printed image(s):



- ◇ Cuts outside of the borders but follows the shape(s) of the printed image(s):



- ◇ Cuts follow a different shape from that of the printed image(s):



#### 11.02 What is a PNC Calibration?

- In order to get precise PNC results, you must calibrate the optic eye. This is nothing more than letting the ZO know how far away the optic eye light is located relative to the tip of the blade. Because the optic eye is manually installed inside the blade carriage, the distance from the optic eye light to the tip of the blade will vary from one KNK to the next. Also, you will want to use the same blade holder with all of your PNC applications, as the distance can also change with larger or smaller diameter holders.

- This calibration only needs to be done one time for a given blade holder. If you have travelled with your ZO or it's been bumped fairly hard, you might want to run a test to make sure your calibration hasn't changed. It's also recommended that you check your calibration after any updates are installed.
- The process involves:
  - ◇ Printing some test sheets. It is recommended that arrows be used so that you can be sure the printout is in the correct orientation on the cutting mat as it is on the screen.
  - ◇ Performing an initial alignment with the calibration pin that came with your ZO.
  - ◇ Performing the auto-registration detection and cutting on one of the test sheets.
  - ◇ Adjusting offset values to tweak the calibration and repeating the auto-registration detection and cut. You SHOULD be able to get perfect PNC's so several adjustments will be in order.

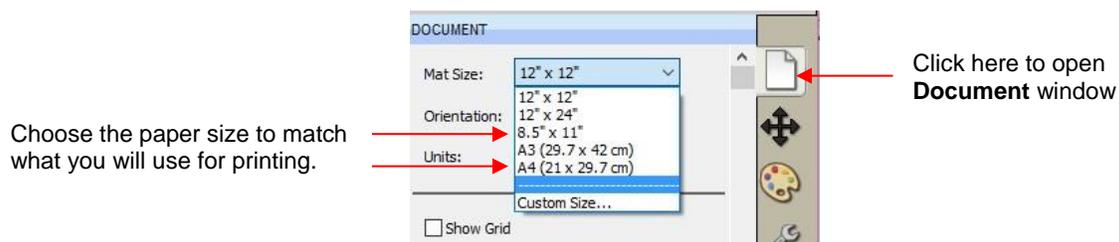
## **11.03 Optic Eye Calibration Procedure**

### **11.03.1 What You Need for Calibrating**

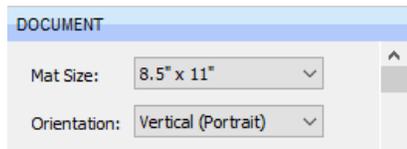
- You need to be well rested! You don't want to start learning the PNC process when you are tired, stressed, or in a hurry. Mastering a PNC comes when you have the time to repeat it about 4 times in a row. At that point, you will not only have repeated the process enough times to feel very comfortable with the order of the steps, but you'll have your calibration perfected and then be ready to do future PNC's quickly and with ease.
- It is recommended that the **Resolution/Sizing Calibration** presented in *Section 2.08* be performed before proceeding with the optic eye calibration.
- Next, you will need the following items:
  - ◇ Printer
  - ◇ Blade holder (you cannot do this calibration with the test pen; it must be the same blade holder you'll be using for your PNC applications)
  - ◇ Red capped blade
  - ◇ Alignment pin that came with your Zing Orbit
  - ◇ Copy/printer paper in either Letter size (8.5" x 11") or A4 (21 x 29.7 cm)
- ***Important!*** In order to facilitate the calibration process, please follow all instructions exactly. Later, after calibration, you can change up settings to suit your needs. Also, if you use a second computer, you must follow the steps in *Section 11.06* to update that computer correctly with your calibration.

### **11.03.2 Preparing the Calibration File and Printing**

- (1) It is strongly recommended that you set the dimensions to match the paper size you'll be using for the calibration. Working closer to the origin reduces unnecessary movement that can introduce factors which may affect accuracy. In the **Document** window, open the **Mat Size** dropdown menu and select either 8.5" x 11" or A4 (21 x 29.7cm):

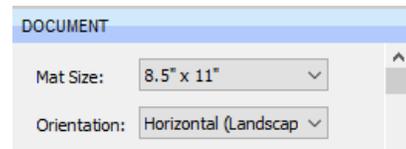


- (2) For **Orientation**, you may work in either **Vertical (Portrait)** mode or **Horizontal (Landscape)** mode, whichever one you're most accustomed to using:



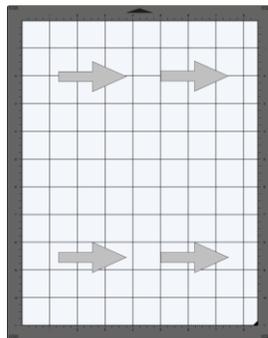
Portrait Orientation

Or



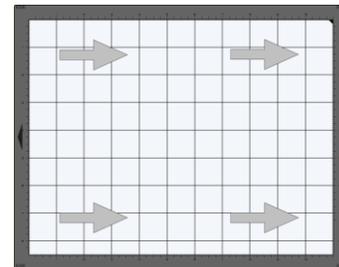
Landscape Orientation

- (3) Open the **Library**  and select the right facing arrow inside the **Basic Shapes** folder. It's recommended that you have several arrows spread out on the **Cutting Mat** as shown below. They do not have to be perfectly aligned with one another. However, do allow a margin of about  $\frac{3}{4}$  inch (2 cm) from the edge of the mat. Later it will be shown how to make this allowance less stringent.



Portrait Orientation

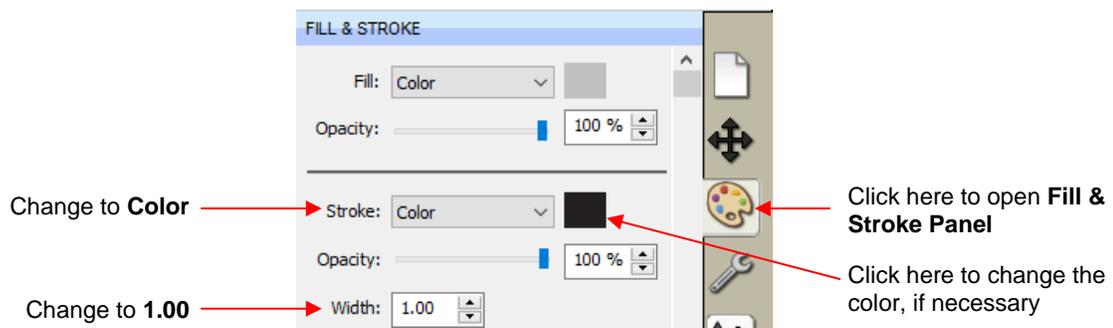
Or



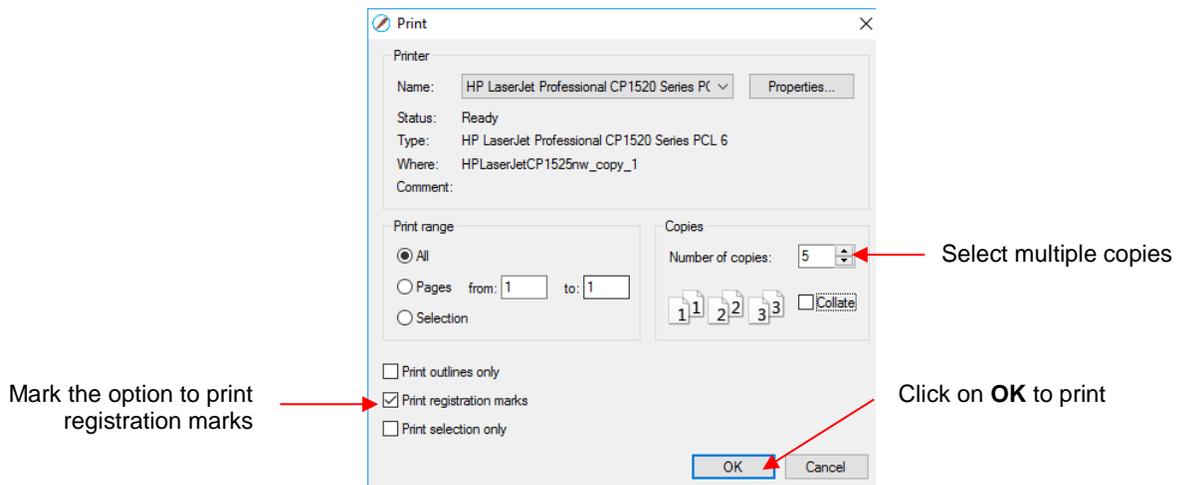
Landscape Orientation

- (4) It is also recommended that the arrows be outlined for printing as shown above. This will make it easier to see if the cut lines are above or below the printed lines. To add an outline to a shape, select that layer and

click on the **Fill & Stroke** icon  on the **Document Panel**. Change the **Stroke** from **None** to **Color** and then click on the box to the right of that to open a color selection menu.



- (5) Go to **File>Print** and mark the box next to **Print Registration Marks** and then set the **Copies** to ~ 4 or 5. Click on **OK** to print the calibration test sheets. Note that on some printers, you may need to switch to **Landscape** mode (under **Properties**) if using the **Landscape Orientation** in SCAL.

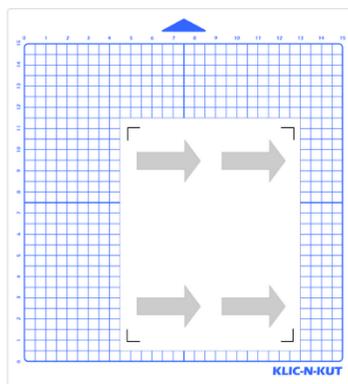


### 11.03.3 Preparing the Zing Orbit

- (1) Replace the blade in the blade holder with the alignment pin. It's not necessary to use the tiny spring with this pin.
- (2) Extend the exposure to the maximum so that most of the pin is sticking out of the cap:

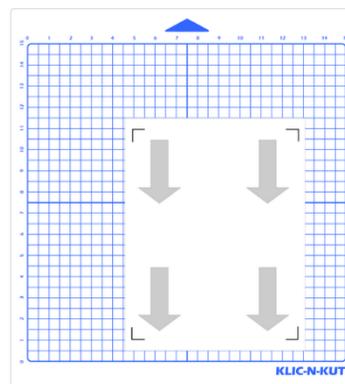


- (3) Place one of the printouts onto the mat using the following guidelines:
  - ◇ The arrows should point to the right (if using **Portrait** mode) or pointing down (if using **Landscape** mode).
  - ◇ Place the printout towards the center of the mat versus along the far-right side. If the pinch wheels are too close to the reg marks, it can cause the optic eye to fail.
  - ◇ Align the printout along grid lines so that it's straight. If you take note of which gridmark is being used, it will make things faster with subsequent tests.
  - ◇ Make sure the printout is smoothly pressed to the mat. If there are any wrinkles in the paper, auto-detection of the registration marks might fail.



Portrait

or



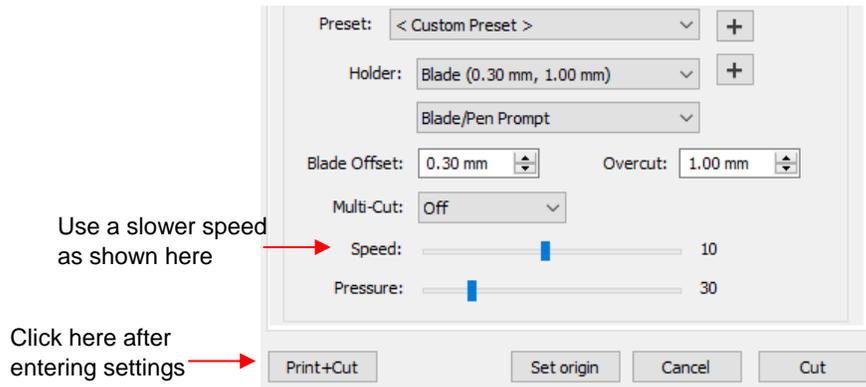
Landscape

- (4) Insert the mat into the cutter, aligning one of the grid lines with the ruler or some other horizontal line visible through the mat. This also is important in getting the optic eye to move to within a short distance of each mark for proper detection.
- (5) Insert the blade holder into the blade holder seat so that the tip of the pin will be above the paper.

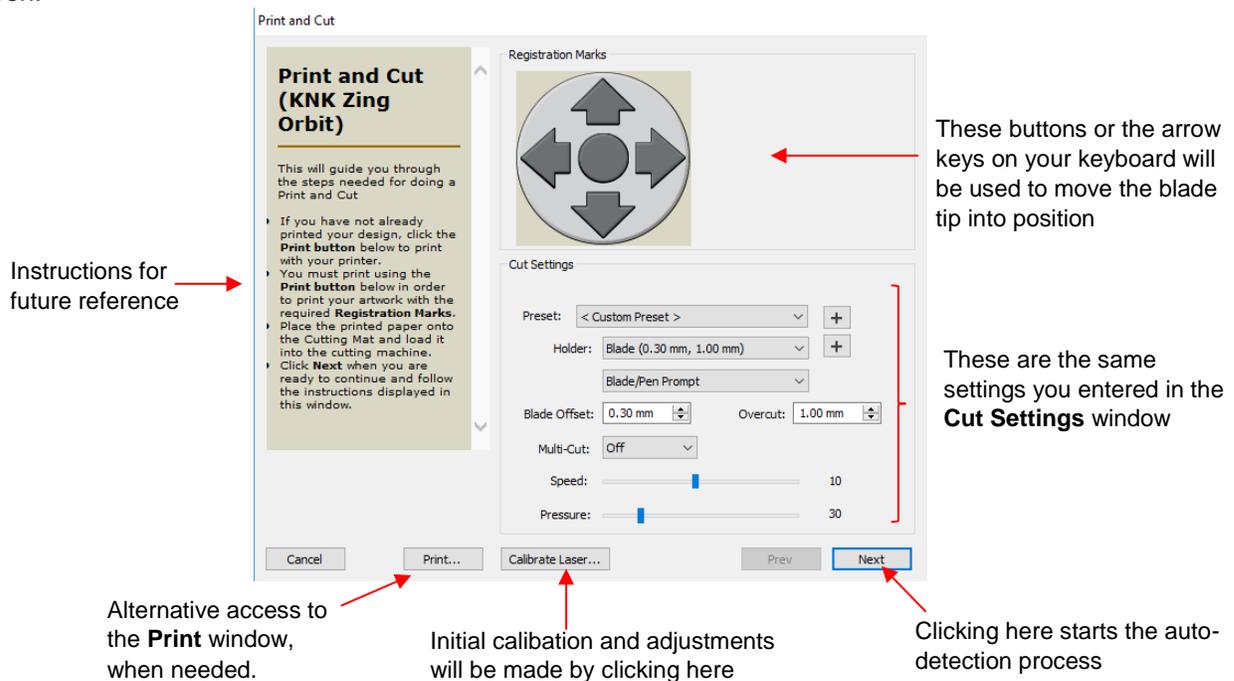
### 11.03.4 Conducting the Initial Calibration

The following procedure should only ever be conducted one time. Repeating this process does not improve the accuracy of your calibration.

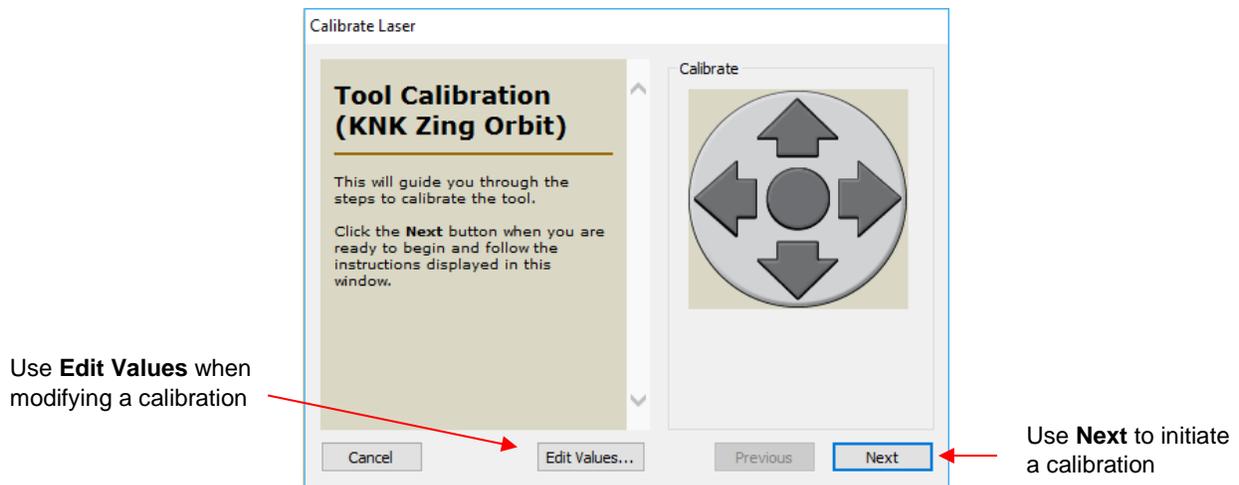
- (1) Click on the **Cutter** icon to open the cut window.
- (2) Enter the settings in the following screenshot. If you know you need a higher or lower **Pressure** for the paper you're cutting, use that pressure instead:



- (3) At the bottom of the **Cut Settings** window, click on **Print+Cut**. The following **Print and Cut** window will open:

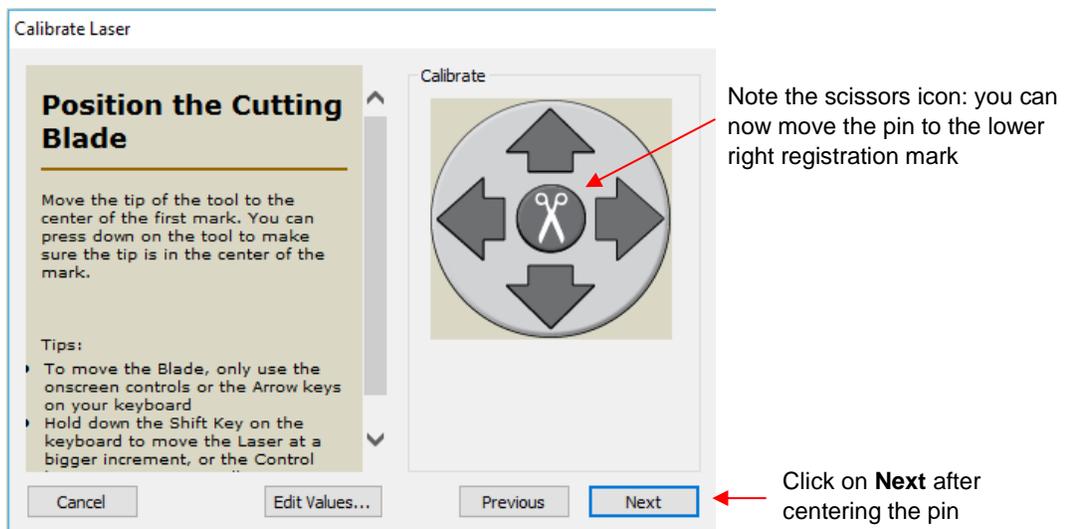


- (4) Click on **Calibrate Laser**. The following window will open:

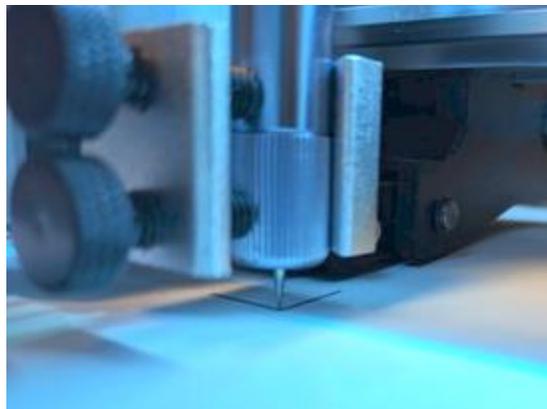


(5) Note these two options in this window:

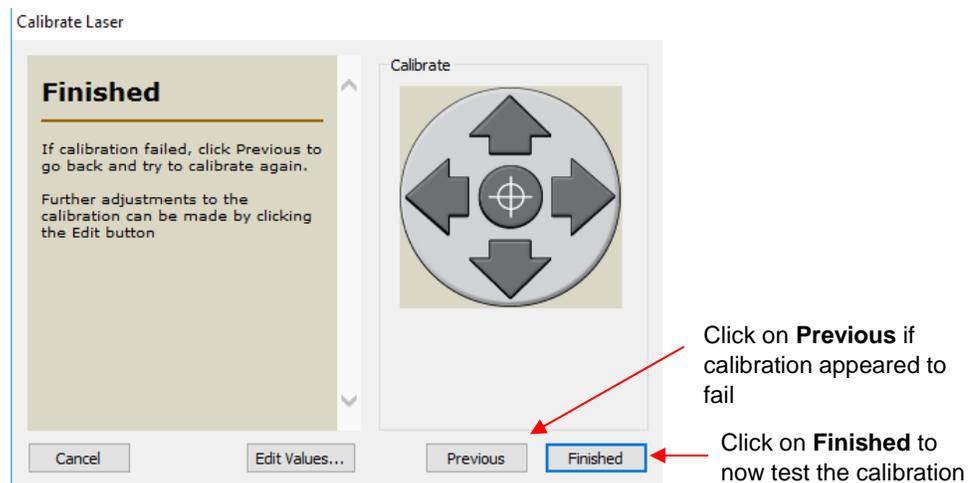
- ◇ **Edit Values:** This is the option you will use later when tweaking the calibration
- ◇ **Next:** This is the option for initially calibrating the optic eye. Click on it now and the window will update. Note that the instructions have updated and there is now a scissors icon in the middle of the arrow buttons. At this point, you can use those buttons to move the head:



(6) Use the arrows in that window or the arrow keys on your keyboard to move the head over to the lower right registration mark. The goal is to have the tip of the alignment pin directly centered in the corner of that mark. Push down on the blade holder, as needed, so you can carefully look at the tip's location relative to that corner:



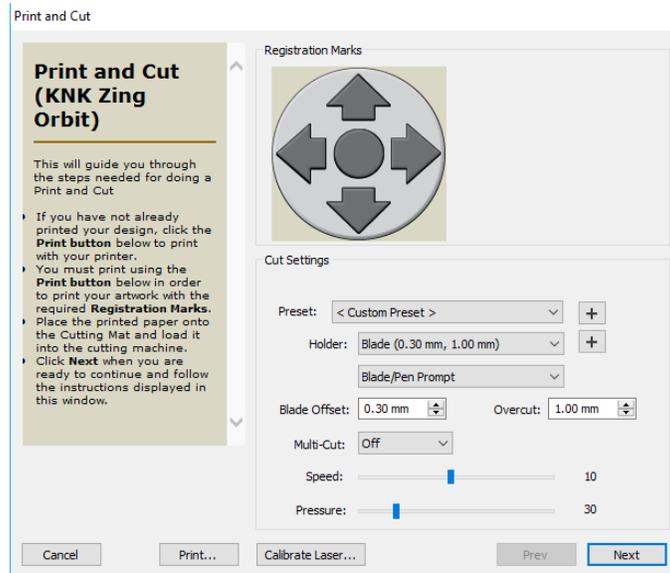
- (7) Just like when setting the origin, you can control the distance moved with each arrow click using these keys:
- ◇ Holding the **Shift** key will increase the size of the increment
  - ◇ Holding the **Ctrl** key (**Command** key on the Mac) decreases the size of the increment
  - ◇ Holding both the **Shift** key and **Control** key (Mac: **Command** key) minimizes the size of the increment.
- (8) Once the pin appears to be dead center over that corner, click on **Next** and the optic eye will begin reading that single registration mark:
- ◇ If the optic eye is properly detecting the registration mark, the optic eye will read both horizontally and vertically along that mark several times.
  - ◇ If the optic eye fails to read the mark, the optic eye will only attempt to read it once or twice and will stop.
- (9) The following window will then open:



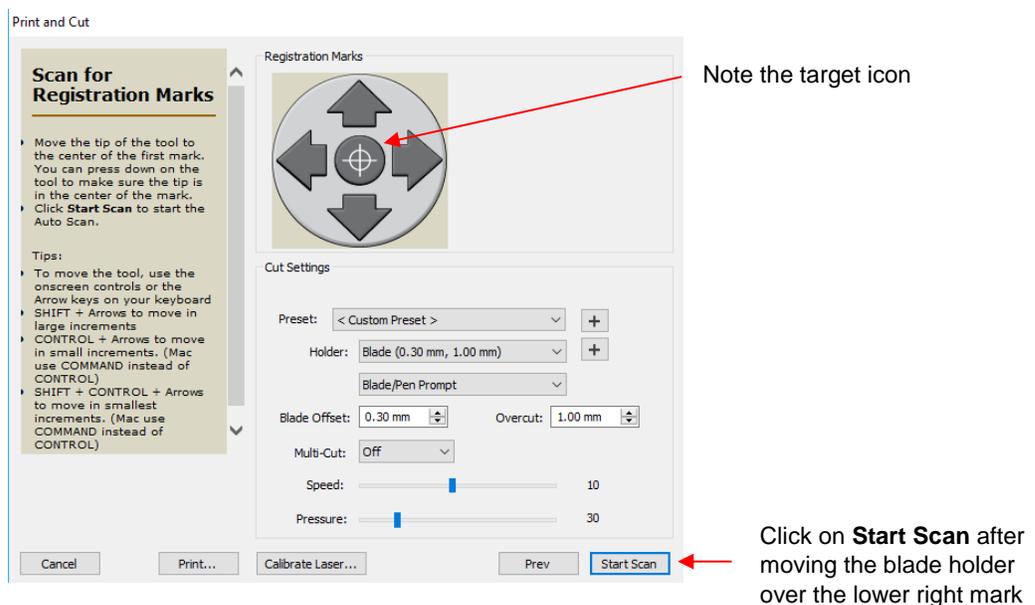
- (10) Click on **Finished** to have the calibration stored and to return to the **Print and Cut** window. If the optic eye did not read the mark multiple times, click on **Previous** to repeat the process. If it continues to fail, please go to *Appendix B2* for information on optic eye failures.

### 11.03.5 Testing the Calibration

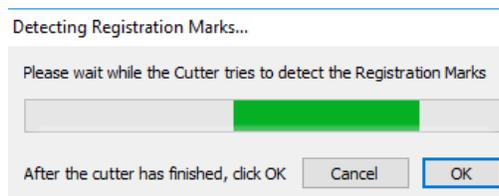
- (1) After completing the initial calibration, a test of this calibration should be performed to see how much adjustment will be needed. At this point you should be back in the **Print and Cut** window. Again, verify your cut settings are correct:



(2) Click on **Next** and a target icon will appear in the center of the arrow buttons:



- (3) Move the blade holder to the left until you can comfortably remove it from the seat and switch out the pin for the blade.
- (4) Again, position the blade holder over the lower right registration mark corner. You do not have to be as accurate as during the calibration.
- (5) Click on **Start Scan** and the automatic detection of the registration marks will be carried out. There are two possible outcomes:
  - ◇ All of the registration marks are successfully read. After the blade holder returns to the first mark and reads it a second time, the following window will still be open. At this point, click on **OK** and then click on **Cut**. Note that you can also just press the **Enter** key twice on your keyboard:



- ◇ If the registration fails at any point, the detection will stop at that spot. The same window as above will still be active. However, you will need to click on **Cancel** to return to the **Print and Cut** window and move the head to the lower right registration mark again. The most common reasons why the process failed are:
  - The blade tip wasn't close enough to the corner of the lower right mark
  - The printout is not smoothly pressed to the mat
  - The mat is warped
- ◇ Other causes for a failed reading are covered in *Appendix B2*.

### 11.03.6 Adjusting the X and Y Values

- (1) After the print and cut is completed, examine how the cut lines are located relative to the printed lines. Are they above or below? Are they too far right or too far left? Only focus on horizontal and vertical lines for now, not the diagonal cuts.
- (2) Also, examine the four arrows. If you see a difference in how the four cut out, focus on the lower right one for now. After the calibration is complete, if you still see an inconsistency, then refer to the checklist later in this section.
- (3) To open the **Calibrate Values** window, go to the **Print and Cut** window, click on **Calibrate Laser** and then **Edit Values**:

Click the arrow buttons to move the cut line in the direction needed for the next test

Click on **Apply** to update the current calibration

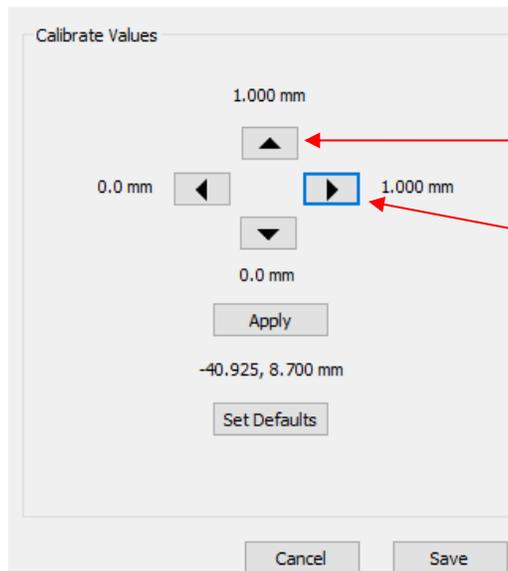
Current calibration

Reset the calibration determined with the alignment pin

Click on **Save** to have the current calibration used in the next test.

- (4) This window provides an easy way to adjust your calibrations. Before making any changes, write down the current calibration onto your first printout. In the above example, you would write down -40.925 and 8.700 and also write down the number 1 to indicate it was your first test. You might also want to write the number 1 on one of the cut arrows in case it gets separated from the printout. In other words, it's highly recommended you keep each test, for reference, until you have a perfect calibration.

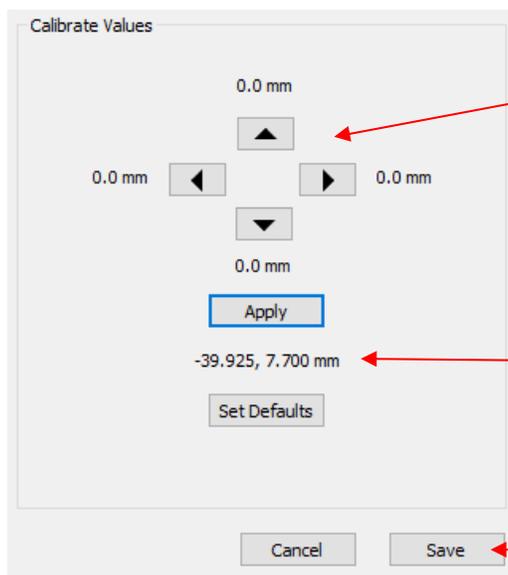
- (5) Each click on a button will move the next cut by 0.025 mm in that direction. Note that 0.025 mm is extremely small, so when you perform your second calibration, you will want to use a much larger value. Typically, moving at least 1 mm in each direction needed is recommended. Even if you overshoot, it will help you determine how far back you'll need to move for the 3<sup>rd</sup> test.
- (6) Thus, note the direction you need to move and click the appropriate button 40 times in that direction. Let say, in the prior example, the cut line needed to move up and to the right. The **Edit Values** window would then look this before clicking on **Apply**:



Click 40 times so that cut line will move up by 1 mm

Click 40 times so that cut line will move right by 1 mm

- (7) After clicking on **Apply** the current calibration numbers will update and you can write these on your 2<sup>nd</sup> printout before testing (or wait until after the cut):



Offset values reset to 0

New calibration numbers to test

Click on **Save**

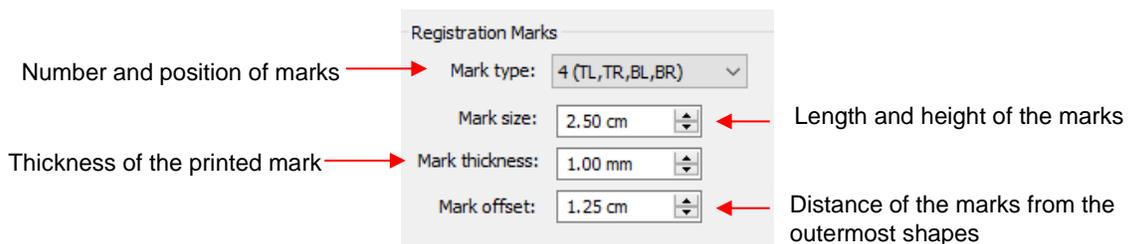
**IMPORTANT REMINDER:** At this point you want to be careful NOT to repeat the single calibration procedure you used in *Section 11.03.4*. It will do nothing to improve your calibration but rather set you back to “ground zero.” Thus, avoid clicking on the **Calibrate Laser** button except for the purpose of going to the **Edit Values** window. When you click on **Save** in the **Edit Values** window, you will then be at the correct window to follow this next step:

- (8) On your next test, if you place the printout along the same grid line, you should be able to insert the mat with the lower right registration mark corner approximately centered under the blade holder. Then just press **Enter** twice and the next scan will begin. Otherwise, just press **Enter** once and then move the head to that mark and press **Enter** to scan.

- (9) Note again what direction to move the cut lines based on the horizontal and vertical lines of the arrow. If you still need to move further in the same direction as before, increase again by 1 mm (40 clicks) or if the cut is very close now to the printed line, use only 0.5 mm (20 clicks). If you have overshoot the line, then use 0.5 mm (or 20 clicks) in the opposite direction.
- (10) Continue this process, gradually decreasing the distance being moved until the cut is virtually perfect. If you still see some error on the diagonal, then closely examine the printout to see if it's not still off by a hairline in one or the other direction. Use only 1 or 2 clicks (0.025 mm or 0.05 mm) to achieve a calibration to your satisfaction. Then write down that final calibration in your little black book!
- If you find that one or two arrows are perfect but the others are off:
  - ◇ Check the **Cut Speed** setting. Too high of a speed can cause inaccuracies.
  - ◇ Make sure the pinch wheels are still centered under the white arrows.
  - ◇ Make sure the bottom of the mat, the pinch wheels, and the grit shafts are clean.
  - ◇ Make sure nothing is interfering with the smooth traveling of the mat.
  - ◇ Make sure the blade isn't cutting too deeply into the mat. Lessen the blade exposure by retracting it a tiny bit back into blade holder.

### 11.04 Preparing an Actual Print and Cut Application

- Here are the typical steps when preparing a PNC application:
  - ◇ Prepare the image that will be printed which can be either or both of the following:
    - An imported raster image such as a JPG or PNG which will need tracing (refer to *Section 7.03*)
    - A vector image (either imported or designed in SCAL) that will be printed but not cut
  - ◇ Make sure shapes that will only be printed are on a different layer than the shapes that will be cut.
  - ◇ For each layer, open the **Style Panel** (refer to *Section 10.01*). Under **Cut Line Type** choose:
    - **Print+Cut Cut**: for a layer that will be cut
    - **Print+Cut Print**: for a layer that will be printed
  - ◇ Print the project, making sure to mark the option to **Print registration marks**. You can print a project using either **File>Print** or by clicking the **Print** button in the **Print and Cut** window.
  - ◇ If needed, perform a test cut so that you know the best settings to use. This test cut can often be performed on the printout itself if there is room in waste area of the project.
  - ◇ Perform the cutting process, selecting **Print+Cut** from the **Cut Settings** window and following the instructions.
- You have some control over the size and location of the registration marks. Under **Cutter>Cutter Settings**, the upper right section of that window shows the default settings for creating registration marks:



- ◇ **Mark type:** The Zing Orbit's optic eye uses four marks, thus this option will always remain the same.
- ◇ **Mark size:** In order for the optic eye to locate the locations of the marks, the size needs to remain fairly large. You can try reducing to a smaller size but the optic eye might then fail.

- ◇ **Mark thickness:** Testing has shown that the lower limit is about 0.75 mm. Thinner than that and the optic eye will fail to see the mark.
- ◇ **Mark offset:** This is the distance from the registration marks to the bounding box around the shapes to be cut. This can be reduced if you need more space on your printout for your images. Note, however, that if you have images too close to the registration marks, then the scanning process can fail.

### **11.05 Print and Cut Tips**

- When tracing imported images, the trace lines will not necessarily be perfectly aligned with the image. This can result in tiny bits of white appearing in certain spots, suggesting the PNC wasn't accurate. Zoom in on the image so that you can see the trace line following the outline of the image. Look at the same spots where the cut didn't follow the image perfectly. This could be the cause of the inaccurate PNC. There are three ways of handling this situation:
  - ◇ Retrace the imported image, using a lower **Contrast** and/or **Smooth** setting to get a tighter fit of the trace line to the original graphic (refer to *Section 7.03*).
  - ◇ Use **Path Editing** to move the trace lines to more closely fit the original graphic (refer to *Section 8.10.2*).
  - ◇ Create an inset line to use for cutting instead of the original trace line (refer to *Section 8.05*).
- If a PNC is not precise and the cause is not the alignment of the trace lines, then try slowing down the speed. If the mat is moving numerous times, in and out of the cutter, a slight shifting can occur, especially at high speeds. On the Zing Orbit, use a speed of 10 or lower.
- Remember that the calibration of the **Optic Eye** is specific to the blade holder type being used. Thus, if you change brands, the optic eye calibration will need to be modified.
- If your test arrow is cutting perfectly, thus indicating you have the correct calibration, but your next print and cut is way off, then perhaps your situation is something outside of the ordinary. Get help at one of the recommended online support groups listed in on the first page of this manual.
- If the optic eye is failing to read the reg marks more than one out of ten times, refer to *Appendix B2* for things to check.

### **11.06 Setting Calibration Numbers on Another Computer**

- If you have another computer you wish to use with your Zing Orbit for PNC applications, there are a few things to keep in mind:
  - ◇ The current calibration numbers are stored both in SCAL and on the Zing Orbit itself. Whenever you send a PNC to the Zing Orbit, it will update and use the calibration numbers from the installation of SCAL on that computer.
  - ◇ Whenever the **Edit Values** window in SCAL is opened, whatever calibration numbers are showing will be immediately transmitted to the Zing Orbit. Even if you click on **Cancel**, those numbers have already been transmitted. This can result in losing your "successful calibration" if you have not recorded it in your little black book.
  - ◇ When you make a change in the **Edit Values** window and you **Apply** and **Save**, the Zing Orbit's values are not updated until either (a) you reopen that **Edit Values** window OR (b) you proceed with an actual PNC process.
- Use the following steps to enter your numbers into a second computer:
  - (1) Turn on the Zing Orbit and make sure communication is established.
  - (2) ***IMPORTANT:*** Do not open the **Edit Values** window on the second computer until you locate your "perfect calibration." In *Step 10* of *Section 11.03.6*, you were advised to write down those numbers. If you neglected to do that, then again, do NOT open the **Edit Values** window on the second computer. Instead, proceed to the following step. If you do have your numbers already recorded, go to *Step (4)*.

- (3) Find the calibration numbers from the first computer by opening the **Edit Values** window on that computer. Carefully write down those numbers and then close that window. Close out of the PNC window.
- (4) On the second computer, open the **Edit Values** window. Remember that at this point, the ZO will now update with whatever correct calibration appears in that window.
- (5) Click on the arrow buttons and click on **Apply** until the same calibration appears as the one you have written down.
- (6) Click on **Save**.
- (7) Either open that window again or perform a PNC using this second computer. The latter is a better idea so that it can be verified that the Zing Orbit has correctly updated.

### 11.07 Printing a PNC Project from Outside of SCAL

- Sometimes users prefer to print their designs from other applications, such as Adobe Illustrator or Photoshop. The following procedure cover this process somewhat generically. If you have problems, do not hesitate to post in one of the forums or groups mentioned in *Section 1.01*.
  - (1) Open the file in the alternative program. To make things easier, make sure the document size matches that which will be used for printing.
  - (2) If the program is a raster designing program, such as Photoshop, export the file as PNG. If the program is a vector designing program, such as Illustrator, export the file as AI. For vectors, only export the cut lines.
  - (3) In SCAL, set the document/cutting mat dimensions to also match that which will be used for printing.
  - (4) If the file to be imported is PNG, then import and trace the design. It is not necessary to also include the original image. You only need the vector trace line. If the file to be imported is AI, then import as you would any other vector file.
  - (5) Save this file so that it can later be used for cutting.
  - (6) For PC owners: Go to **File>Print** and mark the option for **Print registration marks**. For printer, select **Microsoft Print to PDF**. (If you have an older version of Windows, you may need to download and install a PDF printer. There are free ones like Cute PDF.) Click on OK. Name the file and note where it is being saved.

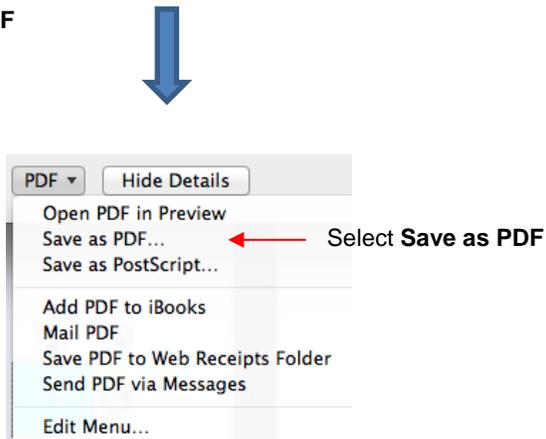
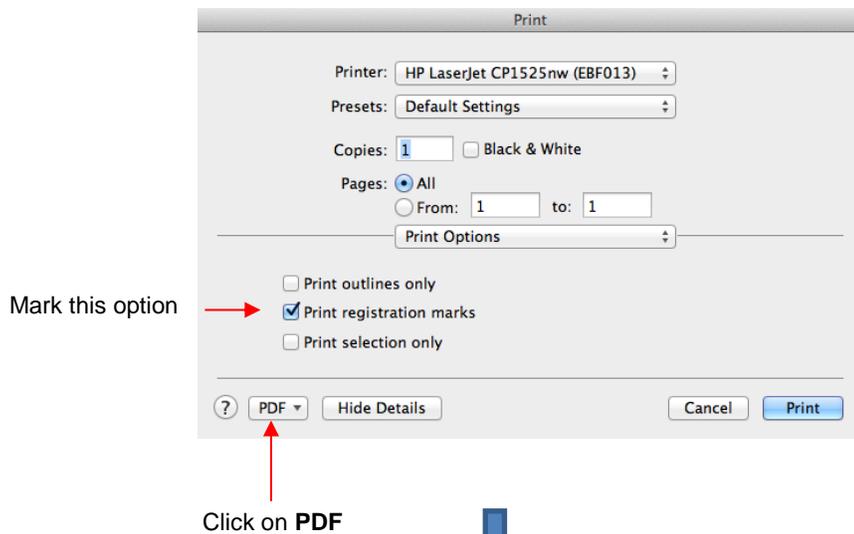
Select a PDF printer option →

Mark this option →

Click on **OK**

**IMPORTANT:** If a cutter has not yet been set up in SCAL, reg marks will not be printed. Thus, make sure you have gone through Section 3.01.4 before doing this step.

For Mac owners: Go to **File>Print** and mark the option for **Print registration marks**. Click on the **PDF** button in the lower left corner and select



- (7) In the design software, import the PDF file. Make sure the imported cut lines are properly aligned with the shapes to be printed so that the registration marks will print in the correct location. This is where having the document sizes match should allow for easy placement. But you may want to do a complete test print and cut on copy paper before printing on expensive materials.
- (8) Before printing the design, make sure the registration marks show but the cut lines do not. Change layer position or delete cut lines shapes, as needed. In some cases, it might be best to go back to SCAL, change the **Fill** to white and the **Stroke** to **None** so that the images will be properly hidden from printing.
- (9) Print the design. Then place the printout onto your cutting mat and proceed, from SCAL with the cutting process under **Print+Cut**. Remember that it's very important to maintain alignment so do not alter the shapes to be cut or the **Mark Offset** setting under **Cutter>Cutter Settings**.

## 12. Zing Orbit: Accessory Tools

### 12.01 Drawing with a Pen or Glue Pen

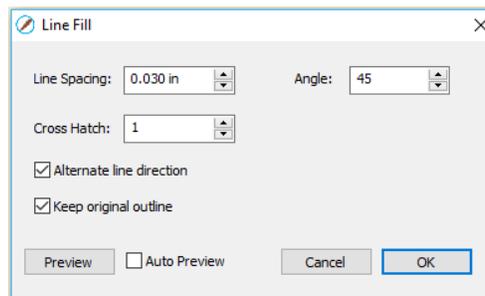
- With the Zing Orbit, you can draw with any pen, pencil, marker, or glue pen that can be securely gripped by the blade holder seat. However, if you were to draw and then cut, it is unlikely that the two will be aligned because of the difference in diameter between the pen and the blade holder.

Desired outcome:  
outside cut circle is  
aligned with pen  
drawn circle



Most likely outcome:  
outside cut circle is NOT  
aligned with pen drawn  
circle

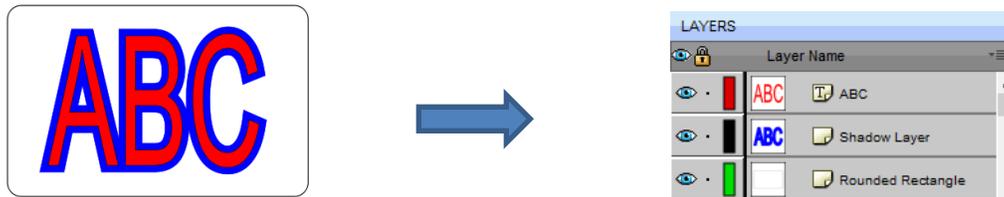
- If your pen and blade holder have the exact same diameter, then refer to *Section 12.07.1* for instructions on doing a draw and cut. If, more likely, your pen is a different diameter than your blade holder, then refer to *Section 12.07.2* on how to do a draw and cut with corrected alignment. But first, continue reading the remainder of this section for tips on drawing.
- If you wish to fill in a drawn shape, refer back to *Section 10.09* which covers how to add a **Line Fill** pattern to a shape. Here are some suggestions on settings to use in the **Line Fill** window:



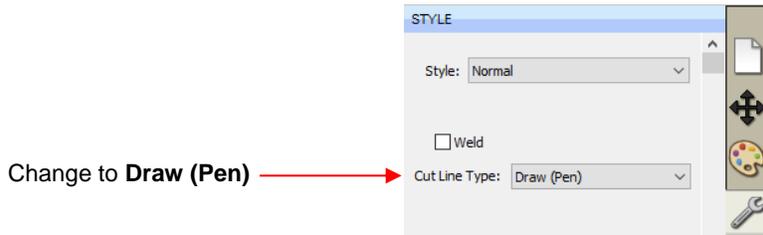
- ◇ To fully color in a shape, measure the width of the pen stroke and then use a slightly smaller width in the **Line Fill** window. For example, a Sharpie Fine Point pen is ~ 1 mm or 0.04" thick. So, for the **Line Spacing** setting, use 0.9 mm or 0.03".
  - ◇ Adding a **Cross Hatch** will insure a more complete fill, although it will add to the time it takes to color in the shape.
  - ◇ Checking the option for **Keep original outline** will better define the shape. Although, in some cases, you might want to outline the shape in a different color, thus you would leave this unchecked and have the outline repeated on a different layer with a different pen color assigned.
- Do not have the pen positioned too low in the blade holder seat or the tip of the pen could drag across the paper when moving from one shape to the next. Thus, use the same 20 Post It note method as with the blade holder.
  - Make sure your shapes will not be drawn where any of the pinch wheels travel over the material. Otherwise, the ink or glue could smear.
  - The Sakura Quickie glue pens work well in the Zing Orbit. They will fit directly into the blade holder seat.
  - Open path fonts work well for drawing as they provide single drawn lines and curves versus an outline form that usually then requires a fill. Refer to *Section 6.11*.

### 12.01.1 Draw and Cut: When the Pen and Blade Holder Are Aligned

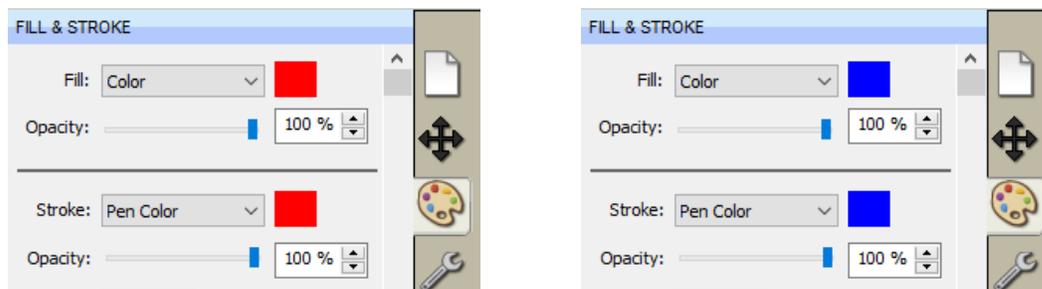
- Although it is unlikely your pen will be identical in diameter to the blade holder, there are plans to come out with a Zing Orbit pen holder that will auto-center a pen and the following procedure can then be used.
  - Before using the following method, test the alignment by sending the same shape to draw first and then cut, making sure the alignment is satisfactory for your planned project. If it's not, then refer to *Section 12.07.2*.
- (1) Make sure the shapes to be drawn are on different layers than the shapes to be cut. For example, let's say you were going to draw the ABC and its shadow in two different colors (red and blue), followed by cutting out a rounded rectangle around the letters:



- (2) Open the **Style Panel** and select the two layer(s) to be drawn (*ABC* and *Shadow Layer*) and change **Cut Line Type** to **Draw (Pen)**:

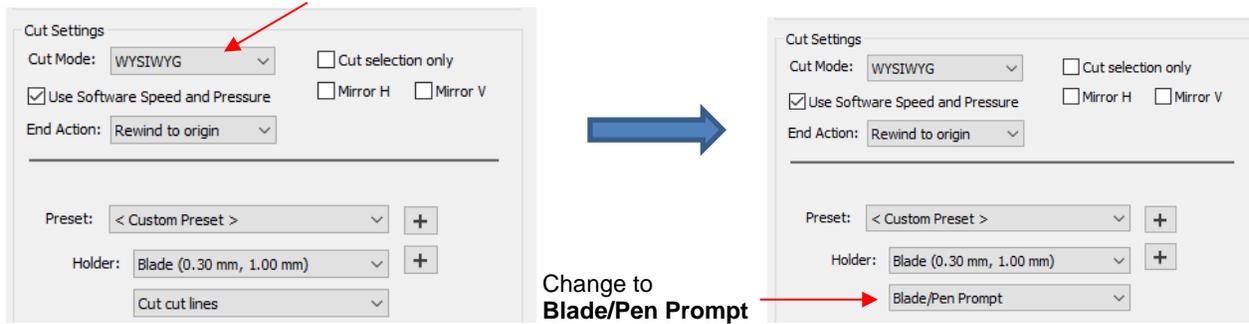


- ◇ Open the **Fill & Stroke Panel** and assigned a different **Stroke** color to those two layers :

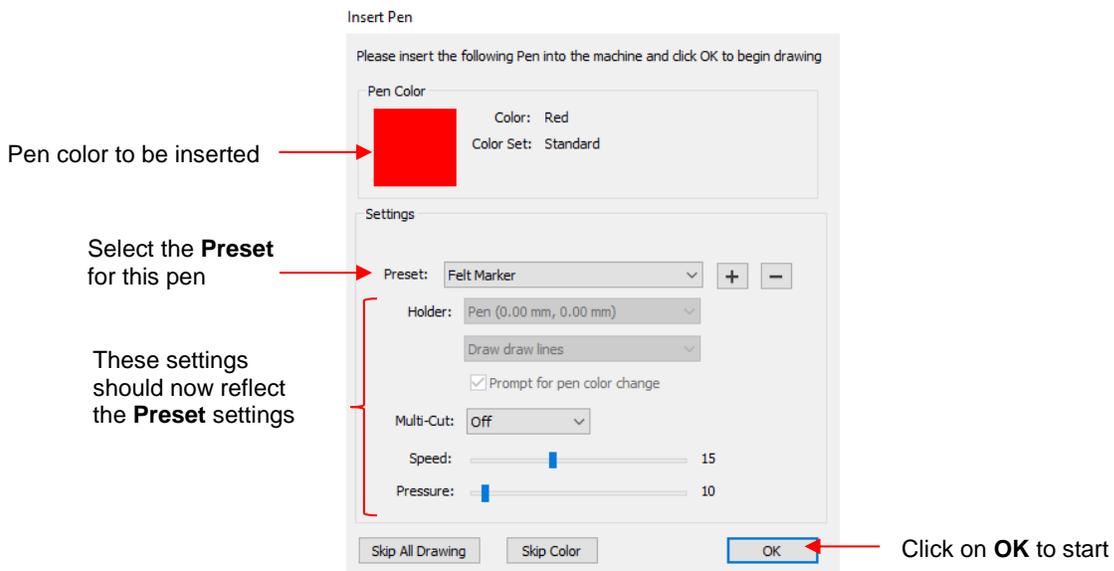


- In the **Cut Settings** window, make sure **Cut Mode** is set to **WYSIWYG**. Then, change **Cut cut lines** to **Blade/Pen Prompt**:

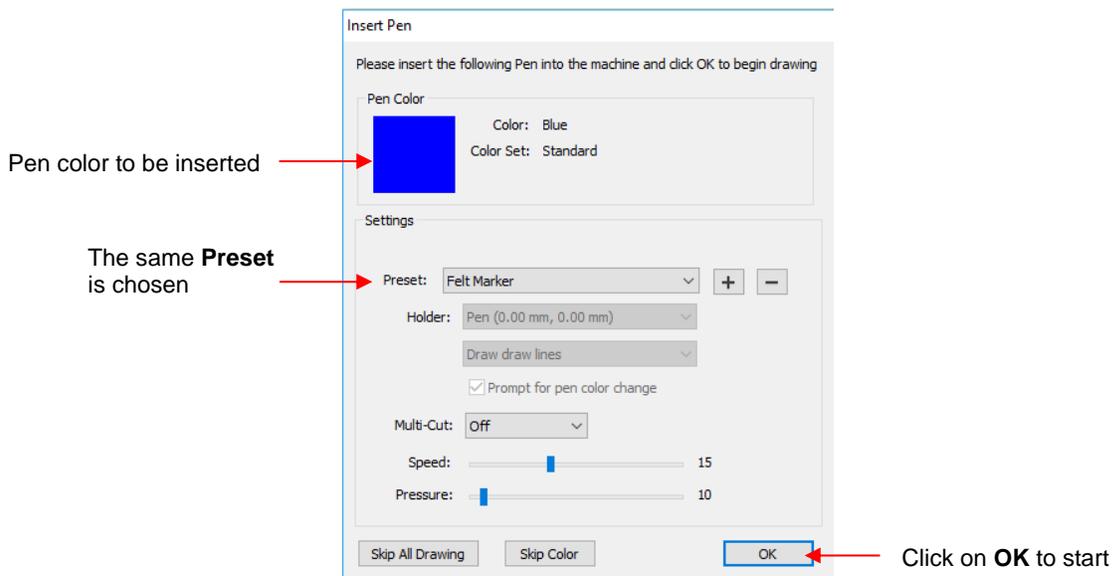
Change to **WYSIWYG**



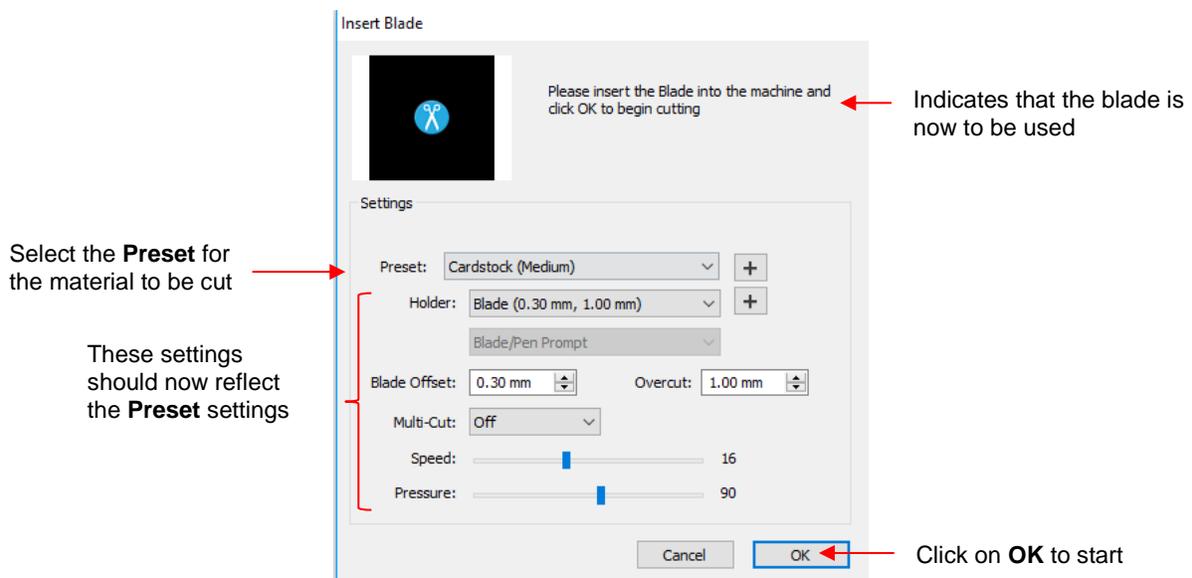
- Before you begin, make sure you know the settings you'll need for each pen and for the blade. Because of a current bug in SCAL, you will need to set up **Presets** for these various combinations of settings so that the preset can be selected at each tool prompt. Refer back to *Section 2.04* for directions on how to create presets.
- Set the origin and then click on **Cut**. A window will pop open prompting you to use the first pen color. From the dropdown menu, choose the needed preset:



- The settings should change to reflect those used for the **Preset** you choose. Click on **OK** to start the drawing of that selected color using those settings.
- After the shapes are drawn, the next prompt will be for the blue shapes. Change out the pen and, again, choose the desired **Preset** and click on **OK**.



- Finally, the prompt for cutting will open. Switch out the pen for the blade holder and choose the **Preset** for the material you are cutting. Then click on **OK**.



- After cutting, you will be returned to the main window in SCAL

### **12.01.2 Draw and Cut: When the Pen and Blade Holder Are Not Aligned**

- If you plan to use two tools with different diameters, then you will face an alignment problem. In the following example, two glasses and an inner circle will be drawn with a silver gel pen and then the outside circle cut out.



- Because the gel pen is thin, it sits further back in the blade holder seat than the blade holder. With no adjustments made, the resulting drawn image and cut circle are out of alignment:

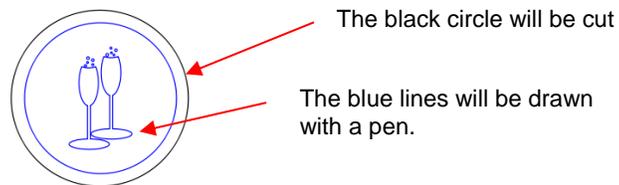


- Fortunately, there is a straight-forward method one can use to compensate for tools with different diameters. It involves drawing first and then, before switching tools, making a small mark on paper so that the same origin can again be set with the other tool. Here are the steps:

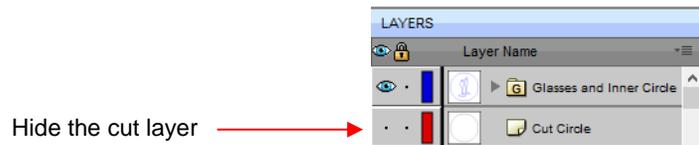
(1) You will need the following items besides your material and cutting mat:

- ◇ The pen you wish to use for drawing
- ◇ Your blade holder and appropriate blade
- ◇ Alignment pin that came with your Zing Orbit
- ◇ Post it note (or small piece of paper and some tape) (Note: you will not need this if it is okay to add a pen mark on your material.)

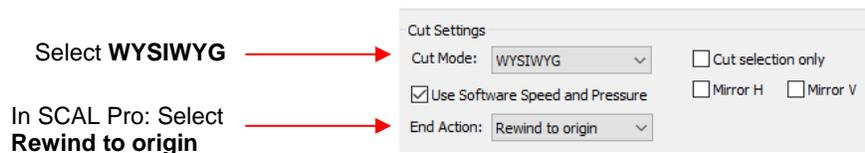
(2) The following screenshot shows the image to be drawn and cut:



(3) Verify that the layers for drawing and cutting are on separate layers on the **Layers Panel**. Also, hide the layer that will be cut (in this case, the *Cut Circle* layer):



(4) Open the **Cut Settings** window and verify that the **Cut Mode** is set to **WYSIWYG**. If you are using SCAL Pro, then make sure **End Action** is set to **Rewind to Origin**:

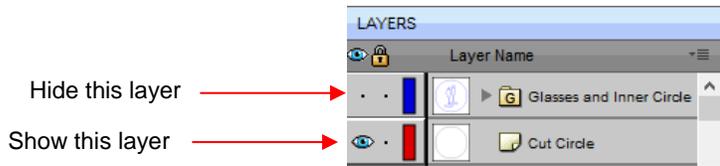


(5) To save time, the layer to be drawn was left with the **Cut Line Type** set to **Cut**. Doing this means you only need to change both the **Blade Offset** and **Overcut** to 0. Enter the other settings required for drawing with the pen you chose.

(6) Set the origin. Click on **Cut** to have the shapes drawn.

(7) **Important!** After the drawing is completed, do NOT move the mat. Do NOT turn off the Zing Orbit.

(8) On the **Layers Panel**, hide the layer that was drawn and unhide/show the layer to be cut:



- (9) At this point, you will push down on the pen so that it will leave a mark indicating the origin that was just used for drawing. If this will ruin your project or if the origin is over the mat area itself, then place a Post-It note or tape down a scrap of paper under the pen nib and then push down to leave a small dot of ink.
- (10) Open the **Cut Settings** window again. Click on **Set Origin** and the head will move to the far right. The goal now is to bring the head back over the origin mark. Remember these shortcut keys to control the movement:
- ◇ Holding the **Shift** key will increase the size of the increment
  - ◇ Holding the **Ctrl** key (**Command** key on the Mac) decreases the size of the increment
  - ◇ Holding both the **Shift** key and **Control** key (Mac: **Command** key) minimizes the size of the increment.
- (11) Once the pen is close to the mark again, remove the pen from the blade holder seat. Insert the alignment pin into the blade holder (no spring is needed) and then mount the blade holder. Continue setting the origin until the tip of the alignment pin is dead center with the dot made by your pen. Click on **OK** to close the **Origin** window. You can now remove the small piece of paper if you used one.
- (12) Enter the settings needed for cutting and make sure the **Blade Offset** and **Overcut** are back to the values you used. Click on **Cut**. The end results should be a near-perfect alignment:



## **12.02 Embossing and Scoring**

### **General Info on Embossing**

- The [Zing Embossing Tool](#) has two different sized embossing heads. The smaller one is recommended when scoring cardstock for fold-up projects, such as pop-up cards, gift bags, and small boxes. Either head can be used for embossing shapes.
- When the project involves both embossing/scoring and cutting, you will need to use **WYSIWYG** for the cut mode so that the shapes will be aligned. Also, set **Blade Offset** and **Overcut** to 0.
- When embossing cardstock, it is recommended that a soft material be placed beneath the paper or cardstock to allow a deeper impression to be made. One excellent material to use is non-slip shelf liner. Other materials which can be used include rhinestone rubber, craft foam, and felt. Make sure the material is well adhered to the mat (tape it down, if necessary). Then tape your paper or cardstock to the top of this material.
- When scoring, the paper or cardstock can be applied directly to the mat, just as you do for cutting. This makes it much simpler when you need to score and then immediately cut.
- Make sure you do some tests first to get the best settings for the scoring or embossing you need. For scoring cardstock, this typically involves a higher force (~160) and two or three passes. Refer to the

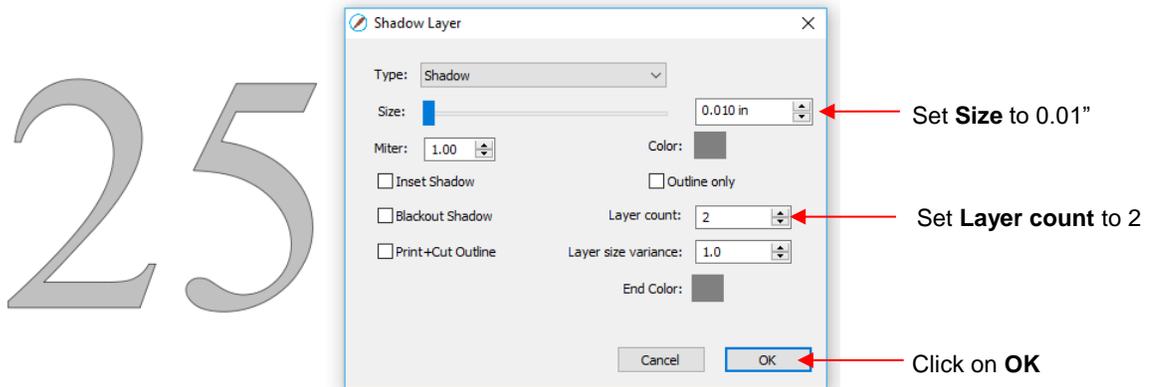
*Suggested Settings* table at the end of this chapter. If you have a soft material beneath your paper/cardstock, then a lower force will be used, but you may still need several passes. Also, to get more force applied, raise the tool in the blade holder seat the same way you do with the blade holder.

### **Embossing Paper or Cardstock**

- When embossing paper or cardstock, it is recommended that you use the **Shadow Layer** effect to create several very small outlines at a thickness of, say, 0.01" (0.25 mm). These tiny offset lines will then produce a slightly thicker overall outline of your shapes. This works better than fill embossing which can stress the cardstock and cause wrinkling. Here are the steps:
  - ◇ Create the shape you wish to emboss. In this example, the number 25 is used:

25

- ◇ Select the shape and go to Effects>**Shadow Layer** function and perform the following:



- ◇ Now you have three versions of the shape, each one slightly offset from the other. Thus, when using the embossing tool, you will have a thicker outline made of this shape.

### **Embossing Leather**

Thank you to Lidia Pallo for providing the following information on embossing leather on a Zing. Note that this same method would apply to other KNK cutters.

- Use craft-store tooling leather - the kind that comes in ~ 8" X 11" sheets and is about 2-3mm thick. These can usually be found at the major craft stores.
- Once you are ready to emboss, use a spray bottle of water to saturate the leather piece. This is key because if you try to emboss over it without "getting it ready first" the leather will retain very little of the embossing. Saturating it with water preps the surface. Spray the entire surface two or three times while waiting in between for it to soak in (it doesn't take long). If, after drying, the leather becomes cracked-looking then it's possible you over-saturated it and it became distorted in the drying process.
- You do not want the rollers to travel over the leather. Thus, arrange the leather on the mat just as one would do when using a glue pen or certain inks that might smear.
- The small end of the embossing tool should be used. Insert with the tip of the embosser just above the leather surface. Refer to the settings table at the end of this chapter for recommended settings.

- To finish off the leather piece you can do a number of things, like dyeing it, staining it, or doing any additional hand-tooling. Tandy Leather has a lot of video tutorials on Youtube for just about any project. One can also apply a gloss coat to make it shiny. To ensure the leather is well taken care of and lasts, you can also use leather conditioner.

### 12.03 Engraving

Engraving Precut Items: **Video**

- The [Zing Engraving Tool](#) can be used to engrave vellum, foils, acrylic, and most metals, including trophy labels, dog tags, and jewelry charms.
- The same basic guidelines apply to engraving as in embossing and scoring:
  - ◇ You will probably need to use **WYSIWYG** mode
  - ◇ You will need to set **Blade Offset** and **Overcut** to 0
  - ◇ You will probably need to use multiple passes to get the desired results.
- On softer metals, you may not want the engraving tip too far above the metal as it can leave pock marks when it drops to start engraving. If possible, test on scraps first.
- Refer to the *Suggested Settings* table at the end of this chapter for **Pressure** and **Speed** settings on various materials. Note that you can engrave on materials that cannot be cut on the Zing Orbit, such as jewelry charms, dog tags, and trophy plates.
- To design an engraving fill pattern, use the **Line Fill** function. Refer to *Section 10.09*. Also, open path fonts should work well for engraving. They contain single path lines and curves versus outlines and are usually more desirable when engraving letters. Refer to *Section 6.11*.

### Project: Engraving a Dog Tag

- When engraving items that are already cut (such as the items listed previously), it can sometimes be tricky getting the perfect alignment you need. Here's a method that works well (thank you to Michelle Hessler for posting this technique):
  - ◇ Carefully measure the dimensions of the item. For example, if it is a circular dog tag, then measure the diameter. Recreate the shape in SCAL and size it to be the same. In the follow example, the diameter of the dog tag is 1-1/8", so a circle of the same size is drawn:



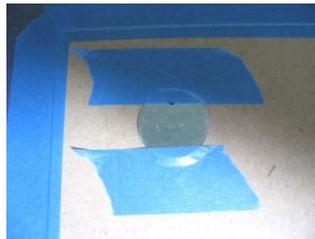
- ◇ Because this shape will be cut from another material to use in the alignment process, the shape is resized to be a tiny bit larger. For a circle, you can simply resize it in the **Position & Size Panel**. If the shape is non-symmetrical, then use the **Shadow Layer** effect with a shadow **Size** of about 0.04".
- ◇ Next the desired lettering and/or shapes are added. In this case, the dog's name and a phone number with "Please Call" are chosen. Because there is also a hole near the top of this dog tag, a 1/4" high square is added just to show the top limit of where the lettering could be located. This is deleted as soon as the lettering is added and positioned:



- The lettering is placed on one layer in SCAL while the circle is placed on a different layer.  
***IMPORTANT:*** Make sure the location of the cut circle will be far enough from the origin that you will be able to remove it easily. You won't be able to move the mat after cutting this circle and before engraving the tag.
- A sheet of thin chipboard is placed on the cutting mat. Using **WYSIWYG** cut mode, the circle is sent to cut:



- After the hole is cut in the chipboard, the mat is left in place in the Zing Orbit! This is important. The cut circle is removed and the actual dog tag is placed inside the cut hole. Tape is used to secure the tag:



- The blade holder is replaced with the Zing engraving tool. The settings are changed for engraving metal. The letter is engraved in the same location on the tag as was designed on the **Cutting Mat**:



## **12.04 Using the Punch Tool**

- The [Zing Punch Tool](#) can be used for creating decorative designs (such as pergamano and other parchment arts) or for creating small holes for paper embroidery.
- To protect the mat and the thin punch, it is recommended that a thick soft cushion, such as Fun Foam be applied between the paper/cardstock and the cutting mat.
- To avoid the possibility of breaking the tip, do not insert the punch tool until after the blade holder seat is over the foam. Also, if you need to reset the origin, remove the punch tool. Again, it is very easy to break the punch.
- As with embossing and scoring, treat the punch tool as a pen, making sure Blade Offset and Overcut are set to 0.
- Refer to the *Suggested Settings* table at the end of this chapter or force and speed settings on various materials.

- To design a punch pattern, use the **Pierce** function (*Section 10.10*) or use the **Rhinestone** function with the minimum size circle (*Section 9.10*).
- As with the other tools, testing is necessary to get the perfect settings for the particular material you are punching. Don't forget to set the punch tip height higher, just as you do with the blade holder, in order to get more force applied.



## Suggested Settings for Various Accessories<sup>1</sup>

Make sure **Blade Offset** and **Overcut** are set to 0; test with a small shape first; mirror shapes for embossing; Tool Height is based on number of Post-It notes used when inserting tool above material.

Application/Material	Tool Used	MultiCut	Pressure	Speed	Tool Height	Surface	Other Comments
Drawing on Cardstock	Sharpie: ultra fine tip	1	25	18	10	mat	
Drawing on Cardstock	Test pen	1	35	18	15	mat	
Drawing with Glue	Quickie Glue Pen	2	40	10	15	mat	
Embossing - Georgia Pacific 110# index (199gsm)	Embosser - small end	3	15	18	10	Fun foam taped to mat	Used a shadow layer of 0.01" (0.25mm) to increase thickness
Engraving Acrylic	Engraver	2	120	15	20	mat	Used a Line Fill of 0.01" (0.25mm)
Engraving Aluminum (36 gauge)	Engraver	1	15	18	10	mat	Used a Line Fill of 0.01" (0.25mm)
Engraving Dog Tag (Al)	Engraver	3	65 - 85	10	5	mat	Used a Line Fill of 0.005" (0.13 mm)
Punching Cardstock	Punch/Piercer	1 or 2	70	10	10	Fun foam taped to mat	Be very careful as the punch tool can easily break
Scoring Cardstock - Georgia Pacific 110# index	Embosser - small end	2	160	10	25	mat	

<sup>1</sup>© 2017 Sandy McCauley, All Rights Reserved

## Appendix A Shortcuts and Icons in Sure Cuts a Lot

**Shortcut**

**Icon**

**Description**

**Menu (m:) and/or Icon (i:) Location**

### Main Screen and Project Functions

Ctrl+N		Open a new file/project	m:File>New Project i:Toolbar
Ctrl+O		Open an existing .scut file/project	m:File>Open Project i:Toolbar
Ctrl+S		Save a file/project	m:File>Save Project i:Toolbar
Ctrl+Shift+S		Save file/project in new location	m:File>Save Project As
Ctrl+P		Print	m:File>Print
Ctrl+Z		Undo last action	m>Edit>Undo i:Toolbar
Ctrl+Shift+Z		Redo last action	m>Edit>Redo i:Toolbar
		Open Document Panel	i:Properties Panel
Right click>Mat Size		Change the size of the Cutting Mat	m:Cutter>Mat Size
Right click>Mat Orientation		Toggle between Landscape and Portrait	m:Cutter>Mat Orientation
Right click>Show Rulers		Toggles Rulers on and off	
Right click>Ruler Units		Set units for software: in, cm, mm	m:View>Ruler Units
Alt+F4		Close SCAL	m:File>Exit

### Zooming and Panning Tools

Click icon and drag mouse		Zoom in on selected area	i:Tools Panel
Ctrl+ +++ (or right click>Zoom In)		Zoom in	m:View>Zoom In i:Tools Panel>Tool Options
Ctrl+ --- (or right click>Zoom Out)		Zoom out	m:View>Zoom Out i:Tools Panel>Tool Options
		Zoom to selected shape	m:View>Zoom Selection i:Tools Panel>Tool Options
Ctrl+F		Zoom so cutting mat fits in window	m:View>Fit to Window i:Tools Panel>Tool Options
Alt+roll mouse wheel		Zoom in and out, centered on middle of cutting mat	
Spacebar+drag left mouse button		Pan workspace	i:Tools Panel

### Help

		Open Hints window	i:Properties Panel
F1		Open Help window	m:Help>Help

<u>Shortcut</u>	<u>Icon</u>	<u>Description</u>	<u>Menu (m:) and/or Icon (i:) Location</u>
<b>Importing and Exporting</b>			
Ctrl+Shift+I		Import a file	m:File>Import i:Toolbar
Ctrl+Shift+E		Export a file (save in a different format)	m:File>Export
Ctrl+Shift+T		Open Trace Image window	m:File>Trace Image i:Toolbar
Ctrl+1		Open the Library window	m:Window>Library i:Toolbar
		Open the eshape store window	m:File>eshape Store i:Toolbar

### Selecting and Moving Shapes

Click on shape		Left click on shape to select it	i:Tools Panel
Shift + click on shape		Add additional shapes to selection	
Freely drag mouse around shapes		Lasso select shapes	i:Tools Panel
Ctrl+A (or right click>Select All)		Select all shapes	m>Edit>Select All
Ctrl+Shift+A		Deselect all shapes	m>Edit>Deselect All
Right click>Transform>Move		Move a shape to a new location	

### Duplicating Shapes

Alt + drag shape		Creates a duplicate of the shape being dragged	
Alt + click on shape		Creates a duplicate of shape on top of original	
Ctrl+C (or right click>Copy)		Copy to clipboard	m>Edit>Copy i:Toolbar
Ctrl+V (or right click>Paste)		Paste from clipboard	m>Edit>Paste i:Toolbar
Ctrl+Shift+V (or right click>Paste in Place)		Paste in place from clipboard (on top of original)	m>Edit>Paste in Place
Ctrl+Alt+Shift+V		Fill the grid with selection from clipboard	m>Edit>Paste (Auto Fill)
Ctrl+D		Create duplicate copies of selected shape (s)	m:Object>Duplicate
Ctrl+Shift+D		Create duplicate copies in a circular formation	m:Object>Duplicate Rotated

### Cutting/Deleting Shapes

Ctrl+X (or right click>Cut)		Cut to clipboard	m:Cut to clipboard
Del (or right click>Delete)		Delete selected shape(s)	
Hold Del and click on one shape at a time		Deletes each shape as it is left clicked	

**Shortcut****Icon****Description****Menu (m:) and/or Icon (i:) Location****Text and Font Icons**

		Open Text Panel	i:Properties Panel
		Bold	i:Text Panel
		Italic	i:Text Panel
		Reload installed fonts list	i:Text Panel
		Add font to Favorites	i:Text Panel
		Type text	i:Tools Panel
		Connect interior shapes to the outside	i:Tools Panel

**Library**

Ctrl+1		Open the Library window	m:Window>Library i:Toolbar
		Add folder	i:Library>Shapes tab i:Library>Project tab
		Delete folder	i:Library>Shapes tab i:Library>Project tab
		Add file to selected folder	i:Library>Shapes tab i:Library>Project tab
		Refresh	i:Library>Shapes tab i:Library>Project tab
		Change to List View	i:Library>Shapes tab i:Library>Project tab
		Change to Thumbnail View	i:Library>Shapes tab i:Library>Project tab
		Search on keyword	i:Library>Shapes tab i:Library>Project tab
		Sync with eStore or access Download Manager	i:Library>Shapes tab i:Library>Project tab
		Temporarily open a font	i:Library>Fonts tab

**Manipulating and Coloring Shapes**

		Open Position & Size Panel	i:Properties Panel
Right click>Transform>Scale		Resize a selected shape	
Right click>Transform>Rotate		Rotate a selected shape	i:Position & Size Panel
Right click>Transform>Flip Horizontal		Mirror/Horizontally flip a selected shape	i:Position & Size Panel
Right click>Transform>Flip Vertical		Vertically flip a selected shape	i:Position & Size Panel
Ctrl+Shift+Up (or right click>Arrange>Bring to Front)		Bring selected shape to top	m:Object>Arrange>Bring to Front

<u>Shortcut</u>	<u>Icon</u>	<u>Description</u>	<u>Menu (m:) and/or Icon (i:) Location</u>
<b>Manipulating and Coloring Shapes (continued)</b>			
Ctrl+Up (or right click>Arrange>Bring Forward)		Bring selected shape up one level	m:Object>Arrange>Bring Forward
Ctrl+Down (or right click>Arrange>Send Backward)		Send selected shape down one level	m:Object>Arrange>Send Backward
Ctrl+Shift+Down (or right click>Arrange>Send to Back)		Send selected shape to the bottom	m:Object>Arrange>Send to Back
Ctrl+Alt+L (or right click>Lock)		Lock selected shape	m:Object>Lock
Ctrl+Alt+Shift+L (or right click>Unlock All)		Unlock all shapes	m:Object>Unlock All
Right click>Hide		Hide select shape	m:Object>Hide
Right click>Show All		Show all shapes	m:Object>Show All
Ctrl+G (or right click>Group)		Group selected shapes	m:Object>Group
Ctrl+Shift+G (or right click>Ungroup)		Ungroup selected shapes	m:Object>Ungroup
Ctrl+B (or right click>Break Apart)		Break a shape into all of its individual paths	m:Object>Break Apart
Ctrl+Shift+B		Join selected shapes into a single shape	m:Object>Merge
		Open Fill & Stroke Panel	i:Properties Panel
		Copy a Fill and/or Stroke color from one shape to another	i:Tools Panel
		Edit a gradient start and end points	i:Tools Panel
		Distort a shape	i:Tools Panel

### Layers Panel

		Open the Layers Panel	i:Properties Panel
Right click>Hide		Hide a layer	m:Object>Hide i:Layers Panel
		Show a layer	i:Layers Panel
Click icon + Show/Hide>Hide All Layers		Hide all layers	m:Layer>Show/Hide>Hide All Layers i:Layers Panel
Right click>Show All (or click icon + Show/Hide>Show All Layers)		Show all layers	m:Layer>Show/Hide>Show All Layers i:Layers Panel
Ctrl+Alt+L (or right click>Lock)		Lock a layer	m:Object>Lock i:Layers Panel
		Unlock a layer	i:Layers Panel
		Lock all layers	m:Layer>Lock/Unlock>Lock All Layers i:Layers Panel
Ctrl+Alt+Shift+L (or right click>Unlock All)		Unlock all layers	m:Layer>Lock/Unlock>Unlock All Layers i:Layers Panel

<b>Shortcut</b>	<b>Icon</b>	<b>Description</b>	<b>Menu (m:) and/or Icon (i:) Location</b>
<b>Layers Panel (continued)</b>			
Right click>Delete		Delete the selected layer	m:Layer>Delete Current Layer i:Layers Panel
		Create a new layer	m:Layer>Add Layer Folder i:Layers Panel
		Open Layer Options Menu	i:Layers Panel

### Designing Tools

Alt+U (or right click>Path>Union)		Weld selected shapes to remove overlap	m:Path>Union
Right click>Path>Intersection		Apply the Boolean Join intersection to two shapes	m:Path>Intersection
Right click>Path>Exclude		Apply the Boolean Join exclude to two shapes	m:Path>Exclude
Right click>Path>Front Minus Back		Apply the Boolean Join front minus back to two shapes	m:Path>Front Minus Back
Right click>Path>Back Minus Front		Apply the Boolean Join back minus front to two shapes	m:Path>Back Minus Front
		Draw straight lines and Bézier curves	i:Tools Panel
		Freehand draw thin lines	i:Tools Panel
		Freehand draw thick lines	i:Tools Panel
		Draw basic shapes: rectangle, rounded rectangle, circle, triangle, polygon, star, spiral	i:Tools Panel
		Measure distances and angles on screen	i:Tools Panel
Right click>Appearance>Add Shadow Layer		Add an outline or inline to a selected shape	m:Effects>Shadow Layer
Right click>Appearance>Lattice		Create a lattice design in a selected shape	m:Effects>Lattice
Right click>Appearance>Rhinstones		Create a rhinestone outline or fill on a selected shape	m:Effects>Rhinstones

### Editing Tools

		Move or reshape a path or move and edit nodes	i:Tools Panel
		Erase parts of a shape	i:Tools Panel
		Make thin, straight-line cuts through a shape	i:Tools Panel
		Drag the mouse to marquee-select an area to be retained	i:Tools Panel
Alt + drag Bezier control point		Only reshape the current path and not adjoining path	i:Tools Panel
Right click>Path>Simplify		Reduce the number of nodes in the selected shape	m:Path>Simplify
Right click>Path>Split Path		Break the path between the two selected nodes	m:Path>Split Path i:Tools Panel

<b>Shortcut</b>	<b>Icon</b>	<b>Description</b>	<b>Menu (m:) and/or Icon (i:) Location</b>
<b>Editing Tools (continued)</b>			
Right click>Path>Reverse Path		Reverses the direction the path will cut	m:Path>Reverse Path
Right click>Path>Object to Path		Remove the text, rhinestone or lattice status	m:Path>Object to Path
Right click>Path>Close Path		Close shape by adding a straight line between the start and ending nodes	m:Path>Close Path
Right click>Path>Convert Node to Corner		Convert current selected node to corner	i:Tools Panel>Tool Options
Right click>Path>Convert Node to Cusp		Convert current selected node to cusp	i:Tools Panel>Tool Options
Right click>Path>Convert Node to Smooth		Convert current selected node to smooth	i:Tools Panel>Tool Options
Right click>Path>Convert Node to Symmetric		Convert current selected node to symmetric	i:Tools Panel>Tool Options
Right click>Path>Path Details		Show path to be travelled when shape cuts	

### Output

		Open controller window for current default cutter	m:Cutter>Cut with (name of cutter) i:Toolbar
Ctrl+Shift+P		Show preview of cut shapes	m:Cutter>Preview i:Toolbar
Ctrl+P		Open print window	m:File>Print
		Open Style Panel	i:Properties Panel

## Appendix B Troubleshooting FAQ's

### B1 Communication Issues

*When setting up Wi-Fi, I inadvertently typed in a non-valid IP address!*

- With the ZO powered on, use a pen or pencil to push the little black reset button on the right side of the cutter. You will hear it beep after a bit and you can begin the Wi-Fi set up from *Step (1)*.
- 

*In the last step of the Wi-Fi setup, I never receive the message about the connection being reset.*

- For some reason, some computers or the browsers being used never show that message. Proceed as if everything is okay.
- 

*I cannot get the settings to work when setting up Wi-Fi. Sometimes I can't even get the Scan part to bring up the list of networks.*

- Make sure you have turned off any anti-virus or firewall programs. Then try again. Once you have it working, you can then resume those security programs.
  - Some routers have security settings that may need adjustment within the router's control panel. Unfortunately, with so many makes and models of routers, there's no "generic solution." Perhaps an Internet search on your particular router might provide a solution. Otherwise, you have the USB and stand-alone options to use.
- 

*After completing the Wi-Fi setup, the Zing Orbit is no longer listed in my menu of network connections.*

- That's correct. The Zing Orbit is now a device connected to your network just like other wireless devices such as a printer, phone or tablet. It's no longer an available network itself.
- 

*I had to push the Power button to cancel a cut. Now my Zing Orbit is no longer responding when I click on **Cut**.*

- In the **Cut Settings** window, check the setting for **Connection**. For example, it may have reset to **USB** whereas you had your ZO setup wirelessly and need **TCP/IP** selected.
- 

*My initial testing went fine but now I cannot get my shapes to draw with the test pen. Nothing happens when I click on **Cut**.*

- First check to see if there's a preview of your image on the right side of the **Cut Settings** window:
  - ◇ If there's no image, then check to see if you have **Pen** selected under **Holder** in the **Cut Settings** window. If you do, then go back to the main window, select any layers you wish to draw and, on the **Style Panel**, change the **Cut Line Type** to **Draw (Pen)**.
  - ◇ If the image is showing, check your **Connection** settings.

---

## **B2 Operating Issues**

*My mat is rotating when the Zing Orbit starts to cut!*

- Both pinch wheels need to be gripping the mat. Move the mat either left or right so that it is under two outer pinch wheels.
  - Make sure you are not trying to force the blade to cut too deeply and/or too quickly through a thick/dense material like chipboard or craft plastic. Slow the speed, decrease the pressure, and add more passes.
- 

*I hear a terrible stuttering sound when trying to cut chipboard!*

- That can be a symptom of forcing the blade to cut too deeply and/or too quickly through the chipboard. Slow the speed, decrease the pressure, and add more passes.
- 

*When I try to set a new origin, the blade is catching on the right edge of the mat as it moves to the left.*

- Your mat has probably become warped due to the tight gripping of the pinch wheels. You have several options:
    - ◇ Rotate the mat 90 degrees and continue using the mat. However, you will need to move your material away from the warped areas, thus using only the middle of the mat.
    - ◇ Completely strip the adhesive from the mat, flip it over, and apply adhesive to the back side of the mat. Instructions on stripping a mat are presented in *Section 1.08.2*.
    - ◇ Obtain a mat guide which will secure the right side of the cutting mat. Refer to *Section D2*.
    - ◇ Replace the mat with a new one. Here is a link to KNK mats that will work in the Zing Orbit: <http://knkusa.com/product-category/accessories/zing-orbit-accessories/>
- 

*I'm trying to do a PNC application and the optic eye can't even read the first registration mark.*

- Are the registration marks printed dark with no streaking or missing ink?
- Is the project printed on a white non-transparent material? While other light colors can be used, it could be that the mark isn't dark enough to be identified. You can try gluing white paper over the corners where the reg marks will be printed.
- Is the project printed on a very shiny material, such as white shrink film or vinyl? This can result in too much light being reflected. Try placing a single layer of Scotch tape across the registration marks.
- Did you make changes to the reg mark settings under **Cutter>Cutter Settings**? Lowering the **Mark Size**, **Thickness**, and/or **Offset** can make the identification more difficult.
- Is the reg mark too close to the edge of the printout? The optic eye might be picking up a grid line on the cutting mat instead. You can try adding strips of paper around the printout to mask those marks.
- Is the printout close to the right side of the mat? Any bowing of the cutting mat can cause issues with the marks being read. Move the printout to the middle of the mat.

---

*I'm trying to do a PNC application. The first mark is read successfully, but the optic eye will fail at one of the marks after this.*

- Review the possibilities in the prior question regarding a failure at the first mark. Some of these may not be causing a problem at the first mark but could be in play with others.
  - Is the printout smoothly and completely pressed onto the mat?
  - Is the printout aligned along grid lines on the mat?
  - Is the mat inserted into the ZO so that the horizontal grid lines align with “something horizontal” on the cutter, such as the cutting strip, the ruler, or the top channel.
  - Was the project printed outside of SCAL? Using another program for printing may result in the registration marks not printing in the same location where SCAL expects to find them during the PNC process. Refer to *Section 11.07*.
- 

### **B3 Cutting/Drawing Issues**

*I am getting large lines sliced through all of my cuts.*

- Your Sure Cuts a Lot software is still in trial mode. You need to register your copy of SCAL. Refer to *Section 3.01.2*.
- 

*My shapes are drawing (cutting) off the material. What am I doing wrong?*

- When setting the origin, make sure you are using the tip of the blade as the reference point.
  - Check whether your **Cutting Mat** is in **Portrait** or **Landscape** mode. This will change whether your image appears the same way you see it on the screen or rotated 90 degrees relative to the screen.
  - Check which **Cut Mode** is set in the Cut Settings window.
  - Details on these various settings are covered in *Section 10.07*.
- 

*My shapes do not match what is shown on the screen. They are width looks correct but they are too short.*

- Go the **Cut Settings** window and make sure that **Orbit mode** is not checked. This mode is only for use with the Orbitizer accessory.
- 

*When drawing with the test pen, I have extra lines being drawn.*

- Make sure you raise the pen in the blade holder seat on the Zing Orbit before tightening the front screw. The blade holder seat needs to be able to drop the pen down when it reaches the spot to draw the shape. Otherwise, the pen tip will be dragging across the paper from the origin to where the shape will begin to be drawn and then back to the origin at the end of the “cut”.
  - Make sure you have registered your copy of SCAL. Watermark lines are made in the trial version.
-

*I'm drawing with the test pen and there are bubbles at the corners.*

- For perfect corners when using a test pen turn off **Blade Offset** (set to 0) since you do not need an offset for pens (or other tools like embossers and engravers). Refer to *Section 2.03.4*.
- 

*My cut started out fine but by the end of the cut, it's not cutting through the material.*

- Make sure the blade holder housing doesn't have any bits of material inside of it.
  - Make sure at least one of the front screws is tight so that the blade holder isn't slipping upwards during the cut.
  - Make sure the cutting mat is clean and sticky and the material is pressed down completely, so that the material remains stabilized during the cut.
  - Make sure the blade isn't cutting too deep into the mat. This can sometimes cause the material to be pulled up and away from the mat as the blade releases from the plastic it is cutting.
- 

*My cut is clean in some places but not in others. Why am I not getting consistent cutting?*

- Try raising the blade holder in the blade holder seat (~0.1" or ~ 2.5 mm). If the blade is too close to the material, not enough force is being applied. Refer to *Section 2.01, Set the Blade Height Above the Material*.
  - Make sure your material is pressed firmly onto a clean and sticky mat (assuming you are cutting a material such as paper or cardstock).
  - Your material may require two passes. If a material is not homogenous or if it is heavily textured or sometimes intricate shapes do better with two passes.
  - Also, if the material has been exposed to humidity, then it will become difficult to cut in one pass. You can dry paper and cardstock using a blow dryer or in an oven. Refer to *Section 12.01 Selecting Cardstock*.
- 

*I have the outside edges of my chipboard completely taped but I'm not getting clean cuts, even after lots of passes.*

- Taping the edges prevents shifting of the chipboard but it's not enough for stabilizing. You need to thoroughly press the entire surface of the material onto a clean and sticky mat. Using a brayer is recommended.
- 

*I am getting a lot of tearing in my cuts.*

- A number of things can cause tearing so work through this check list:
  - ◇ Too much blade is exposed. If you see cut lines in your mat or the backing sheet, shorten the blade exposure. You should only be cutting through the material itself.
  - ◇ The blade is chipped. Try a different blade.
  - ◇ The paper is not adhered well to the mat. Make sure the mat is clean, sticky, and the paper is pressed smoothly and evenly on the surface.
  - ◇ You may be using too much cutting force. Try reducing it and doing test cuts.
  - ◇ You may have too many nodes in the shape. Refer to *Section 8.01*.

- ◇ The material itself may be subject to tearing, especially on intricate cuts. Also, if the cardstock has been exposed to humidity, then the moisture in the material can make it difficult to cut cleanly. You can dry paper and cardstock using a blow dryer or in an oven. Refer to *Section 12.01 Selecting Cardstock*.
- 

*My shapes are not completely cutting out. They are still attached to the waste part of the material.*

- Make sure you have set an appropriate **Overcut** setting.
  - Make sure the mat is not skewing during the cut. This can happen if even one of the pinch wheels is no longer centered under a white arrow. It can also happen if the speed and/or pressure is set too high.
- 

*My cardstock is not cutting all the way through. I have the blade all the way out and using the maximum force.*

- Please refer to *Section 2.01*. It's important to only have as much blade exposed as is necessary to penetrate the cardstock. You may also need to raise the blade tip height. Reduce your force back to suggested values for the material you are cutting and do a test cut.
  - Do not use more pressure than is needed. If the cardstock is cutting through about 90% of the cut, then turn on **Multi-Cut**. Some cardstocks do better with a second pass at a lower force.
- 

*Some of my shapes are cut and some are barely scratched. I also have some random long cuts.*

- Chances are the head is getting stuck in the down position. This can happen when the blade holder is loaded too high in the cutter initially and too much downward thrust can cause the holder to get stuck in the downward position. Try using 5 fewer Post It notes when installing the holder. For example, if you were using 20 Post It notes, try 15 instead. If you are already only using 5 Post It notes, then start a support ticket with KNK USA.
- 

*The Zing Orbit stopped during a cut.*

- If the Zing Orbit stops with the head over on the left side of the cutter, you have most likely exceeded the 15" cutting range. Several things to consider:
    - ◇ Check the width (**W**) of your project (or the height **H** if in **Landscape** mode). It cannot exceed 15".
    - ◇ Check how far you are moving the head to the left when setting the origin. If your project is 14" and you moved the head more than 1" to the left, you will send the cut out of range and the Zing Orbit will stop.
    - ◇ If you are working in **WYSIWYG** mode, move your shapes towards the bottom right of the **Cutting Mat** when working in **Portrait** mode or towards the top right when working in **Landscape** mode. This will then locate your cuts closer to the origin and reduce the likelihood of sending them outside of the 15" cutting range.
  - If the Zing Orbit stops and the head is not located near the left side:
    - ◇ Make sure it's not a communication issue.
    - ◇ You may have exceeded a buffer limit. Try reducing the number of nodes: Refer to *Section 8.01*.
-

## **B4 Software Issues**

*I noticed that some of the settings I see in the screenshots in this manual are not in my version.*

- As long as you are staying up to date with SCAL releases, then these are most likely settings only available in the Pro version of SCAL.
- 

*The **Shapes** tab in the Library doesn't show any shapes. Do I need to install them separately? I'm on a Mac.*

- This occurs when the user has dragged the Sure Cuts A Lot program to the desktop. It needs to remain in the Applications folder.
- 

*I set the **Cut Line Type** to **Draw (Pen)** but my shapes are not being drawn. Nothing is happening.*

- In the **Cut Settings** window, you need to change the **Holder** setting to **Pen**.
- 

*I installed some fonts inside of SCAL but they are no longer there!*

- SCAL allows you to open a font for temporary use but once you close SCAL, it is uninstalled. That's why you also need to convert any text that was created with that font before saving your file. Refer back to Section 6.02 for more details.
- 

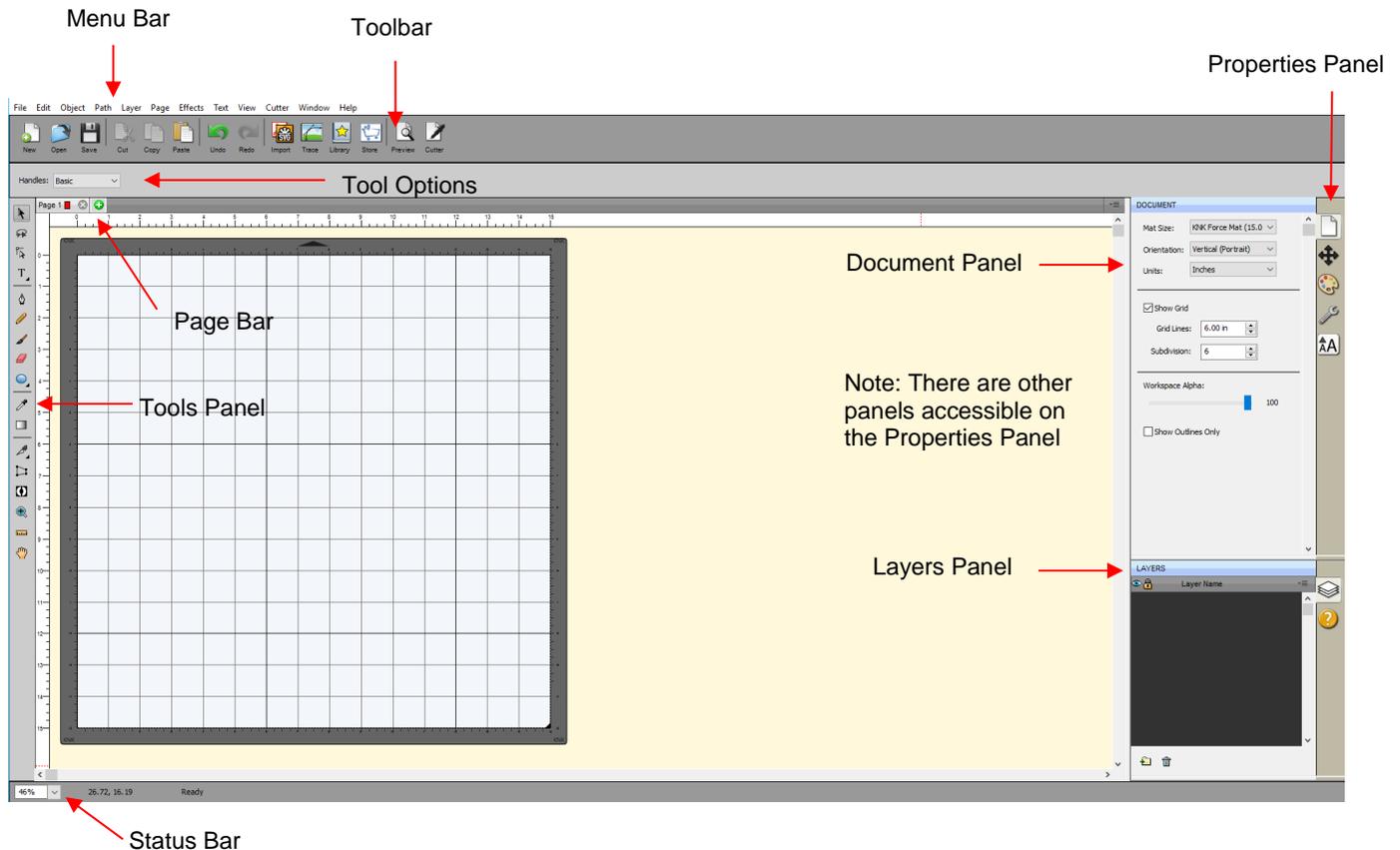
*I'm trying to use the **Pattern Fill** feature to fill some shapes with a digital scrapbooking paper file. The pattern doesn't look right.*

- Most digital scrapbooking papers are designed for 12" x 12" printing. Thus, in the **Pattern Fill** window, set the **Width** and **Height** equal to 12 inches.
-

## Appendix C SCAL Details

### C1 Screenshot of SCAL Screen

Below is a screen shot of the main screen in SCAL identifying ONLY **Bars** and **Panels**.



### C2 Bars

- The bars in SCAL have components positioned left to right. The following sections present the four bars and where to find more information for each item on that bar.

#### C2.1 Menu Bar

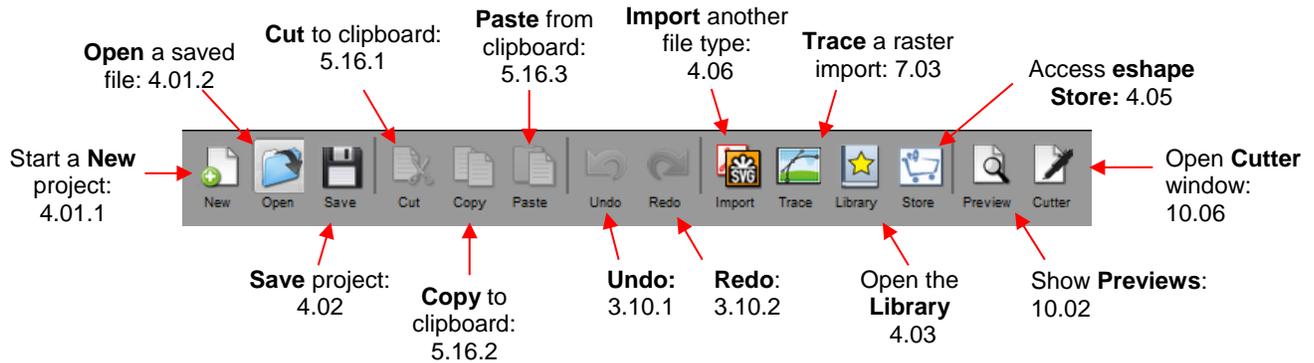
- Like most computer applications, the **Menu Bar** is located at the top of the screen and provides access to most of the functions in the software.

File Edit Object Path Layer Page Effects Text View Cutter Window Help

- Throughout the user manual, a reference such as this: Go to **Path>Simplify** refers to using the **Menu Bar** to access a function. In this case, you would click **Path** on the **Menu Bar** and then click on **Simplify** in the submenu that appears.
- Because there are dozens of submenu options, each one isn't listed with a reference. Instead, it is recommended that you use a search function to locate any given listing within the user manual.

## C2.2 Toolbar

- The **Toolbar** is located at the top of the screen, just below the **Menu Bar**.



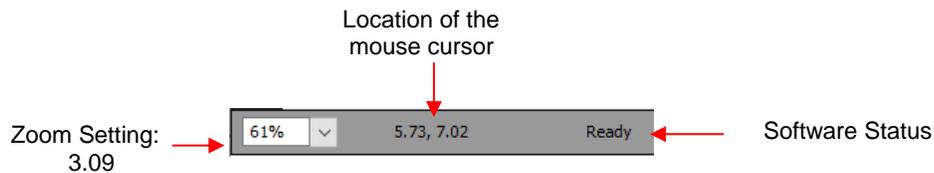
## C2.3 Pages Bar

- All information on the **Pages Bar** is presented in *Section 3.11*.



## C2.4 Status Bar

- The **Status Bar** is located at the bottom of the screen:



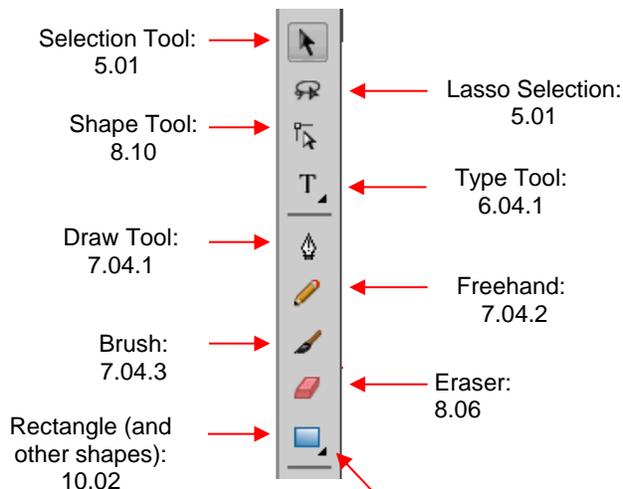
## C3 Panels

- The panels in SCAL have components positioned top to bottom. The following sections present the four bars and where to find more information for each item on that bar.

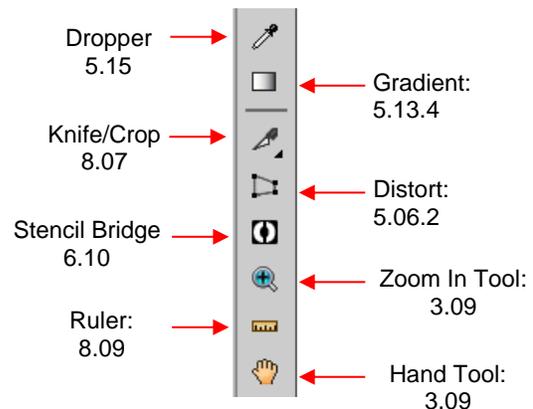
### C3.1 Tools Panel

- The **Tools Panel** is located along the left side of the screen:

#### Upper part



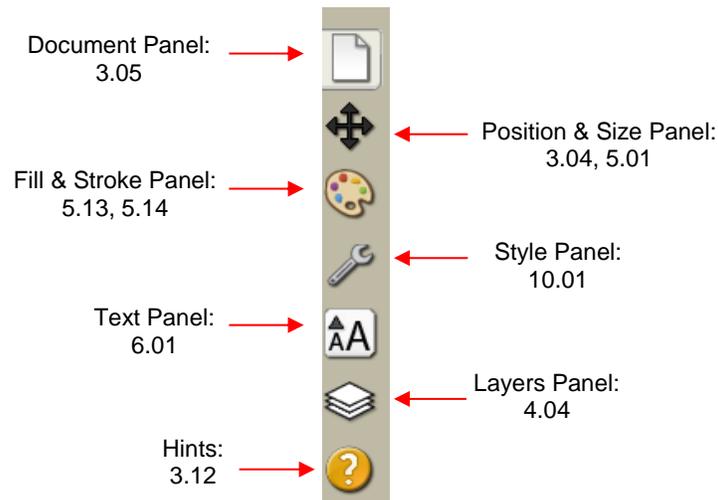
#### Lower part



Note: Icons with a small black arrow have more options when left mouse button is held down

## C3.2 Properties Panel

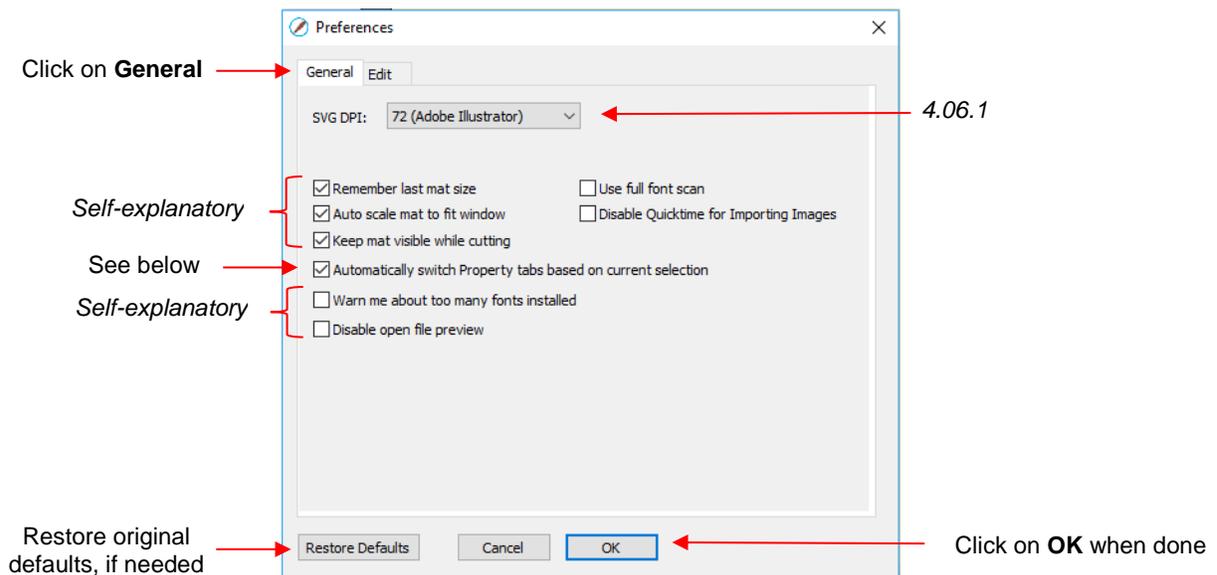
- The **Properties Panel** is located on the right side of the screen and contains 6 subpanels and a Hints access:



## C4 Preferences

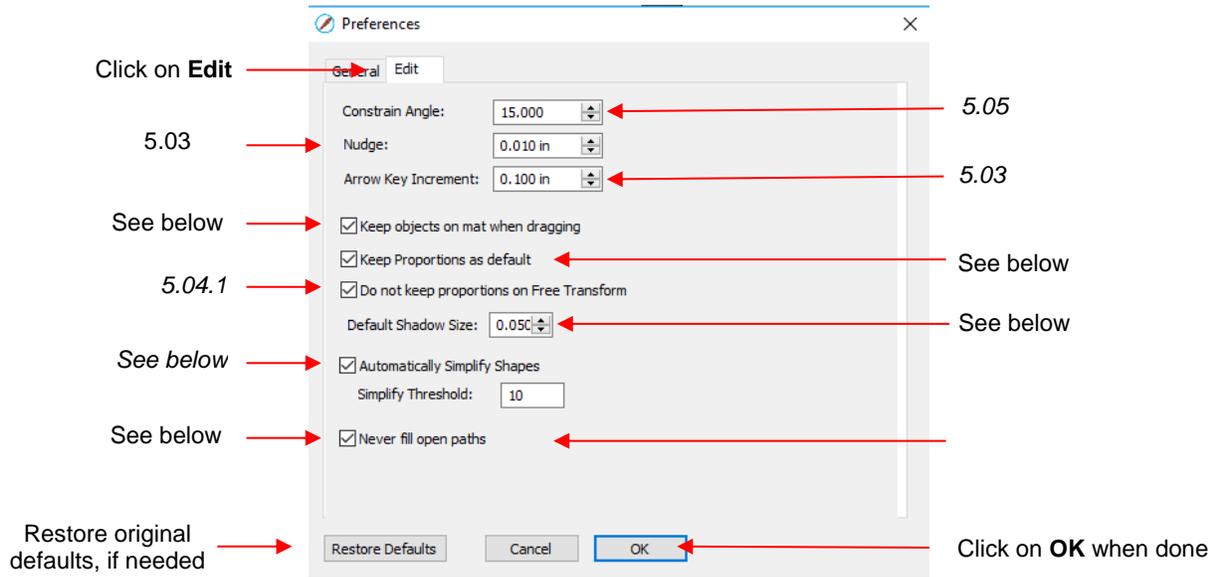
- The following preferences can be found under **Edit>Preferences** (or, on a Mac, press **Command + ,**). If the preference was already presented in other sections, it is noted in the screen shots. For those not previously mentioned, details are presented if they are considered important.

### C4.1 Preferences: General Tab

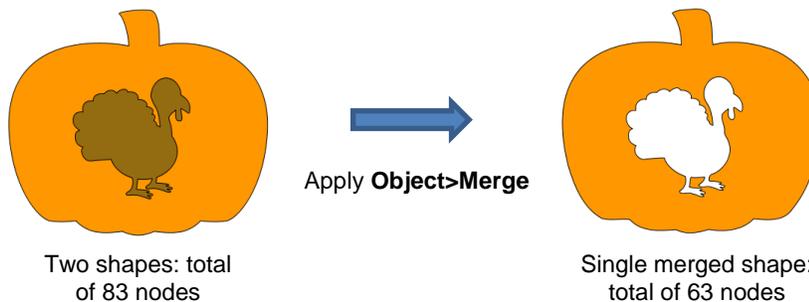


- Automatically switch Property tabs based on current selection:** with this option turned on, the **Properties Subpanel** related to the task at hand will open. For example, when you select a shape, the **Position & Size Panel** will open. When you click on the **Type Tool**, the **Text Panel** will open.

## C4.2 Preferences: Edit Tab



- **Keep objects on mat when dragging:** With this option checked, you cannot drag shapes beyond the outside borders of the **Cutting Mat**. You can, however, move them beyond the **Cutting Mat** by entering the desired **X, Y** location on the **Position & Size Panel**.
- **Keep Proportions as default:** With this option checked, the **Keep Proportions** setting on the **Position & Size Panel** will automatically be checked when you launch SCAL and will remain checked until you uncheck it. If you choose to uncheck this option, you will need to relaunch SCAL and the **Keep Proportions** setting will be unchecked.
- **Default Shadow Size:** This affects the initial **Size** shown under **Effects>Shadow Layer**.
- **Automatically Simplify Shapes:** With this option checked, nodes will be reduced after certain functions are applied. For example, the following two shapes (pumpkin and turkey) have a total of 83 nodes. If you select them and apply **Object>Merge** so that the inside turkey will cut before the outside pumpkin, the total number of nodes is reduced to 63 because of the **Automatically Simplify Shapes** option being checked.

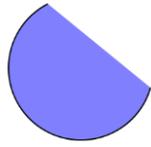


- **Never fill open paths:** Unlike most other vector programs, SCAL offers the ability to fill open shapes by applying an invisible straight line to close the shape. By unchecking this option and selecting a **Fill Color**, **Pattern**, or **Gradient**, the open shapes on your **Cutting Mat** will contain that **Fill**.

◇ For example, here is a circle with a section cut off. The option to **Never fill open paths** is still checked:



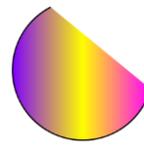
◇ The **Never fill open paths** is now unchecked and various **Fills** options applied:



**Fill: Color**



**Fill: Pattern**



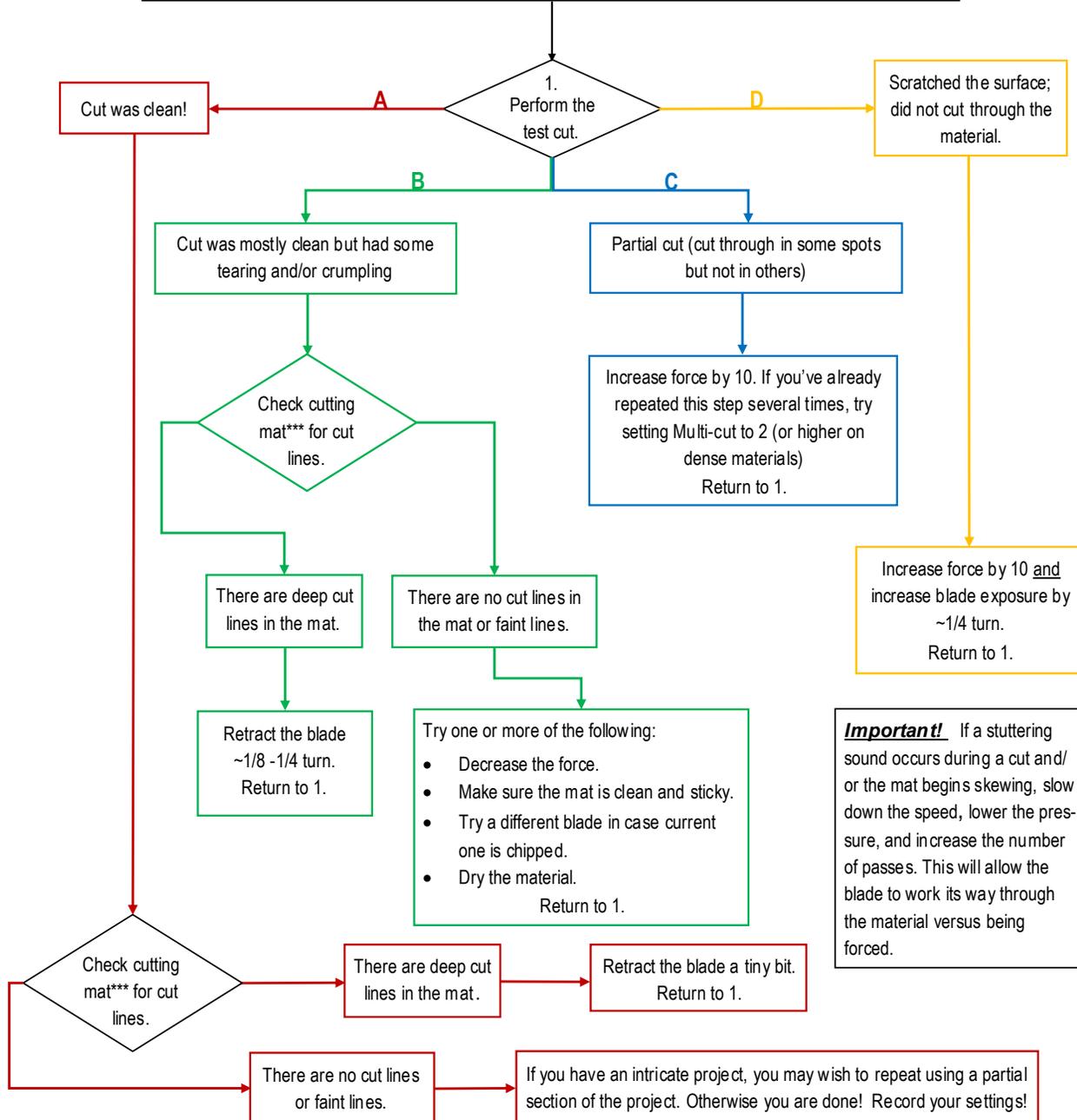
**Fill: Gradient**

- ◇ Note that even though the shape appears to be closed, it is not. If you were to cut this shape, it would still be attached to the outside material.

## Appendix D Additional Information

### D1 Guide to Test Cutting<sup>1</sup>

- Create a small shape or use a shape from the SCAL Library.
- Start with conservative settings. Refer to a similar material in the *Suggested Cut Settings Table*.
- Use Origin Point mode and set origin in the lower right corner of the material.
- Set the Blade Tip Height above the material based on a similar material in the Suggest Settings Table.
- After each test, slide the mat forward so that the next test will be directly above the prior one.



## **ACKNOWLEDGEMENTS**

Please send an email to [sandy@iloveknk.com](mailto:sandy@iloveknk.com) if any errors are found in this manual or if you have suggestions for additions or changes.

Thank you to Sharon Serguta for proof-reading.

Thank you to the following people for their technical contributions:

Darrel Farris: <http://cutterpunk.com/> and <https://www.youtube.com/c/CutterPunkCrafts>

Robert Fenn: <http://www.kutnkraft.co.uk/>

Judy Keating

Ron Smith: <http://knkusa.com/>

Chad Youngblut: <http://knkusa.com/>

Butch Zaborniak

Thank you to Brandon Kuroda, owner of [Craft Edge](#), for responding so promptly to our requests for changes in *Sure Cuts A Lot*.

And a really big thank-you to my family and friends for their patience and their support of my Klic-N-Kut passion!

Sandy McCauley: <http://www.iloveknk.com/>