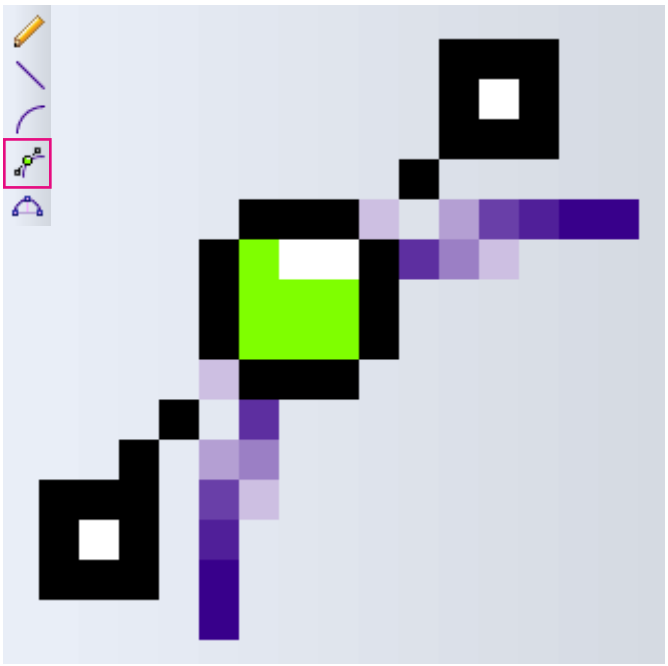
Addendum 18

# The Bezier Tool in Art and Stitch

by

David Smith



## About the Author, David Smith

I'm a Computer Science Major in a university in Seattle. I enjoy exploring the lovely Seattle area and taking in the wonderful sight and sounds of the surrounding nature. Most of all though, I love working with technology and discovering the new advancements that occur.

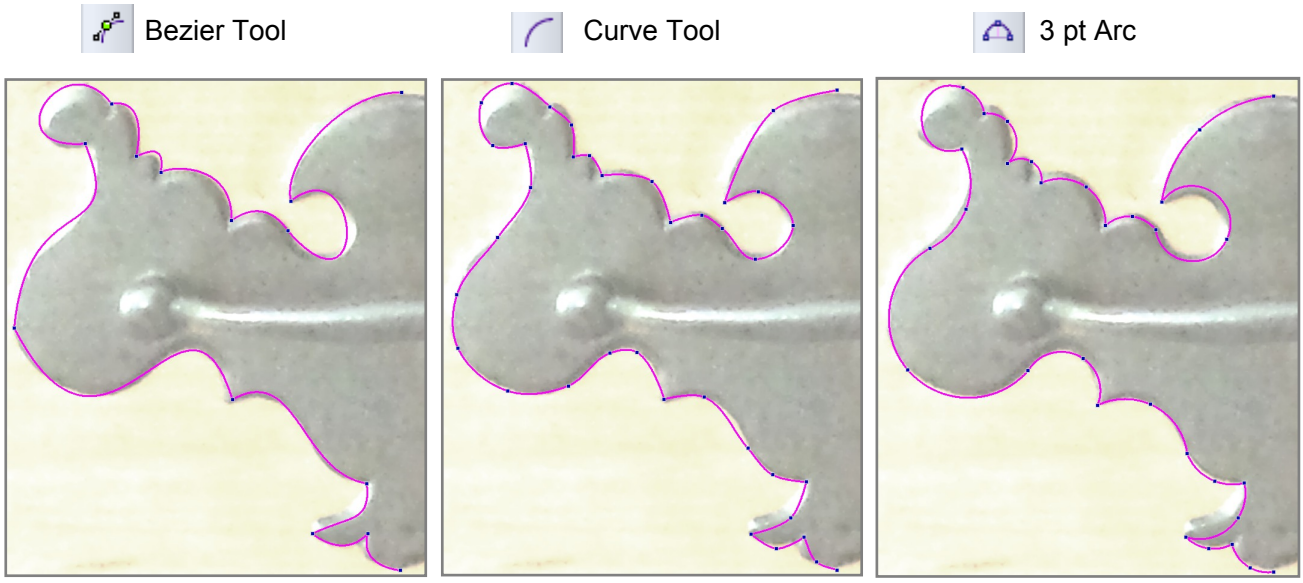
Once I discovered Art and Stitch after seeing my mom, Susan W. Smith (yes, the one in Addendum 7), use the program, I thought it would be interesting to try it out for myself. Familiar with CAD programs, I immediately felt comfortable with digitizing and soon was helping my mom with her classes.

One of the tools that I've found to be vastly underused is the Bezier tool. It was a tool that I used a lot in animation software and decided that I wanted to show others how versatile and powerful it can be to digitize with the Bezier.

(And the puppy on the right is Obi, our precious yellow lab, with his brother when they were 6 weeks old)

## Advanced Digitizing

When I digitize a pattern, I like to use a variety of different drawing tools. Most people are familiar with and like using the Line, Curve and 3 Point Arc tool types; but a personal favorite of mine is the Bezier. The Bezier tool is a professional vector drawing tool. Although it may seem confusing to learn, the Bezier tool is actually very simple. Once you understand how the Bezier works, you will find that it is quite powerful.
I took a picture of a dresser handle and then digitized half of it with three different types of drawing tools. I spent about 45 seconds to a minute on each to get a general shape, and for the most part, the results look pretty similar.




*Picture of a dresser handle traced with three different drawing tools*

While the digitizing time and resulting look are similar, one thing that is hard to see in the pictures is the number of nodes in each design. The Curve took 38 nodes and the 3 Point Arc took 31, but the Bezier only needed 14 nodes to achieve approximately the same shape! I find the number of nodes is important to consider as the fewer nodes you have, the easier the shape is to manage and keep smooth. Most longarm machines seem to like fewer nodes as well.

Along with fewer nodes, another thing I like about the Bezier tool is that it allows me to see what I'm drawing as I work. When you use the Curve and 3 Point Arc tools, you only see the final result for the shape after you click the last node for a segment. With the Bezier, as soon as I click and hold my mouse, it'll give me a path of where the line will be going which allows me to make my drawing more accurate on the first pass. The Bezier tool is a unique tool that allows you to draw and edit at the same time.

## Properties of the Nodes

The Bezier tool is versatile as it combines different drawing functions together. Depending on how you click each point, you'll get a different node as a result. The next paragraph describes how to draw with the Bezier, but first, here is a short explanation of how the node types are determined. Along with the ability to create smooth curves, the Bezier can also create lines and cusps.

- Line – Clicking points will make Line Nodes (no pulls)
- Curve – Clicking, holding, and dragging the cursor will extend pulls which will make Symmetrical Nodes (2 pulls equal and opposite)
- Cusp – Holding Control and then clicking, holding, and dragging the cursor will make Cusp Nodes (only 1 pull). Note Cusp nodes created like this only have 1 anchor that will control one side of the node.

Because of the flexibility in nodes, the Bezier tool is perfect for drawing patterns of all shapes and sizes, including continuous line patterns.

Tip about the terms used in this addendum:

"Nodes" are also called "Points"

"Pulls" are the same as "Anchors"

## A Quick Bezier Exercise

Instead of me describing about how great the Bezier is, and I could keep writing all day, try it for yourself!

After selecting Bezier Tool from the toolbar, left click and hold where you want the line to start on the Design Page. Click a couple of points which will make line segments.

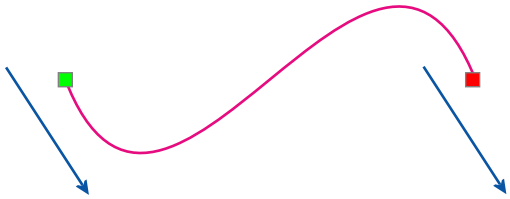
Next, try to create some curves. Click a point and hold the left button. While you are still holding down the button, you are in control of the pulls on the node. As you move the cursor around, you'll see the path of where the line will be when you let go. Adjust the pulls by moving the cursor around until the line looks like what you want and let go of the button. Now place a new point and left click and hold again. You can continue to do this to create a smooth continuous path.

If you come to a segment that looks like a line, you can create a line point by clicking and releasing the mouse without making any pulls. Or, if you have two curves coming together at a sharp point, by pressing and holding the Control key before you click the node; you can make a cusp point. Try experimenting and see what cool shapes you can come up with. Just remember, click and hold.

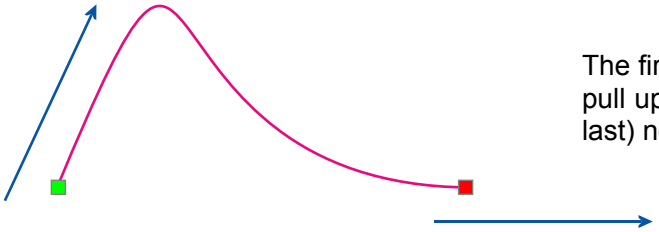
> *The exact location of the pulls doesn't matter, just as long as you can see them so you can come back and edit the line.*
> *As you practice, you'll be able to judge better how far to move the pulls.*

## Bezier Tool Practice

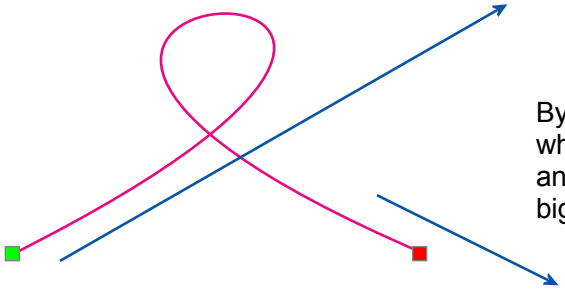
Here are some designs to try to copy as practice. Note the number and placement of the nodes. Fewer the better! Once you feel comfortable, feel free to move on. The arrows represent the direction I move the pulls on the nodes. Turning the Grid on will help. Also try these exercises with Snap to Grid turned on and repeat the same exercise with Snap turned off. As you will see from these examples, the Bezier tool can be a powerful and easy to use tool once you figure out how to use it.



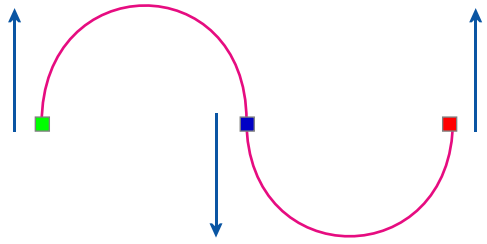
Click and drag downward to the right of the node. For the second (= last) point, the amount you pull in the same direction will cause the curve to change. To keep it symmetrical, pull the second node the same as the first one. Counting grid boxes helps.



The first node will affect the height, so the more you pull up, the higher the wave will be. The second (= last) node will affect the width of the wave.

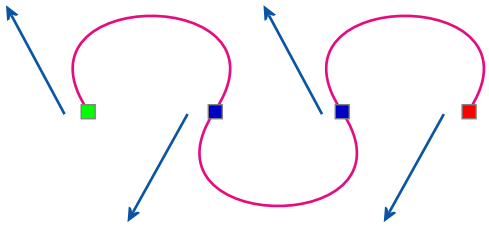


By making the pulls long (dragging much further than where the second point will be clicked), you can turn an arc into a loop. The longer the pulls are, the bigger the loop will become.



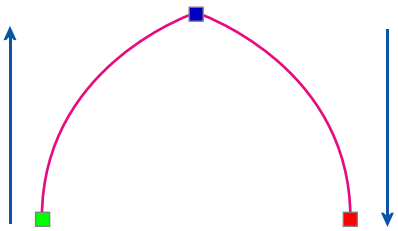
If you take the pulls and alternate the direction of each node, you'll end up with a rounded ellipse that could be used as a chain. Try this with Snap to Grid turned on and count the grid boxes while dragging.

## Bezier Tool Practice - Cont'd



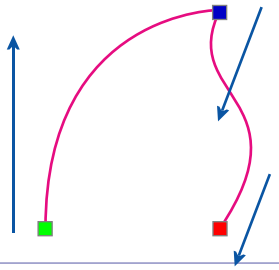
This one is similar to the last example, but instead of having the pulls be vertical, by moving them to the side, you can get a different shaped curve.

With 2 line nodes in the middle, a straight line forms while designing.



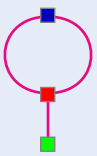
If you only put 1 line node in, you get a cusp point, however, it won't have any pulls.

Ctrl +



By holding control when placing the second point, you can guide the curve after the point by adjusting its pull.

*Challenge: Try making this "lollipop" with only 4 nodes. Hints: Ctrl+Click and drag the second point. End node is on top of a middle node.*



# Digitizing a Pattern with the Bezier Tool

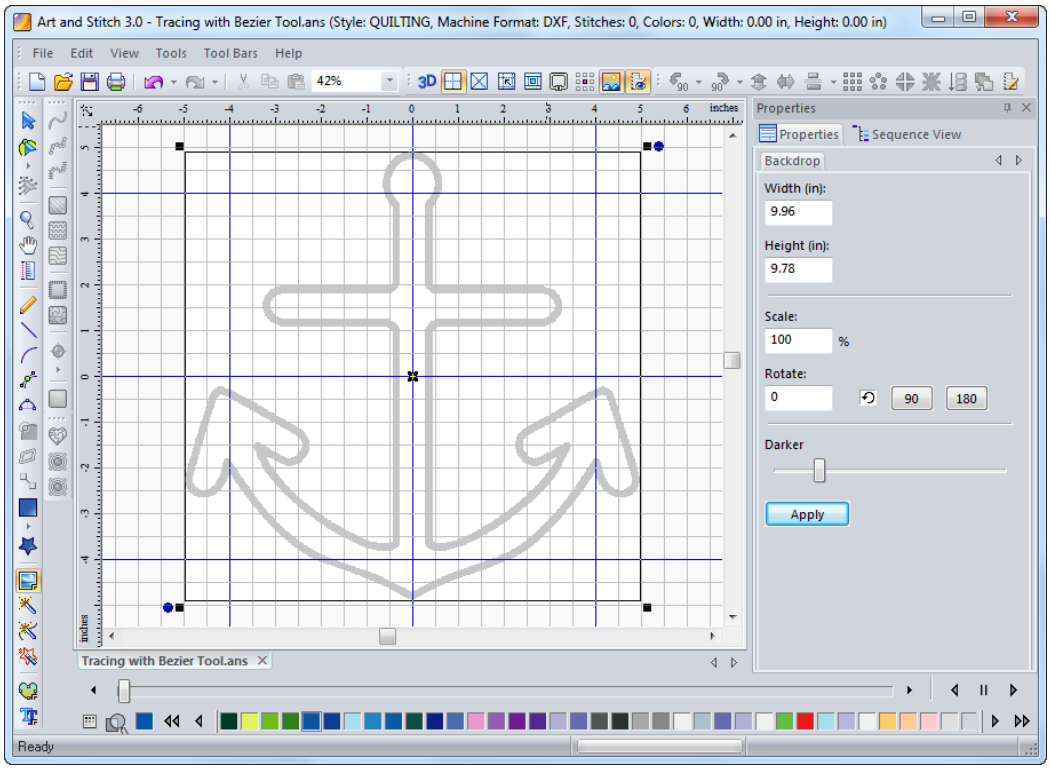
Now that you've had some practice using the Bezier tool, let's try to trace a pattern. For this example, I found a copyright free image of an anchor. I took a picture of the image with my phone and then uploaded the picture to my computer. It is included in the Atrt and Stitch Backdrops folder so that you can follow this exercise.
In Art and Stitch, take the Backdrop Tool, navigate to the Art and Stitc Backdrops folder in My Documents and open the picture of the anchor: "21 Anchor.png".

## Backdrop Tips

When I bring in an image as a backdrop, there are 3 things that I like to check before starting.

- Rotating the image so that it lines up on the grid. It's much easier to digitize when you can snap to the grid to get straight boundaries. In my case, I lined up the center of the anchor bottom with a vertical grid line.
- Check the image size. If it's too small when you expand the pattern, any imperfections will show, but if it's too big, small details will get lost when you shrink it down. I make my patterns slightly bigger than what I expect I will use, but I watch to make sure that segments of the design aren't too small that they will disappear.
- Adjust the slider to make the edges of the backdrop image just visible but the rest of the picture faded away. When you adjust the Dark/Light slider bar, be careful that you don't lose any of the design, it's better to make it a little darker if part of the pattern you need is too light to see.

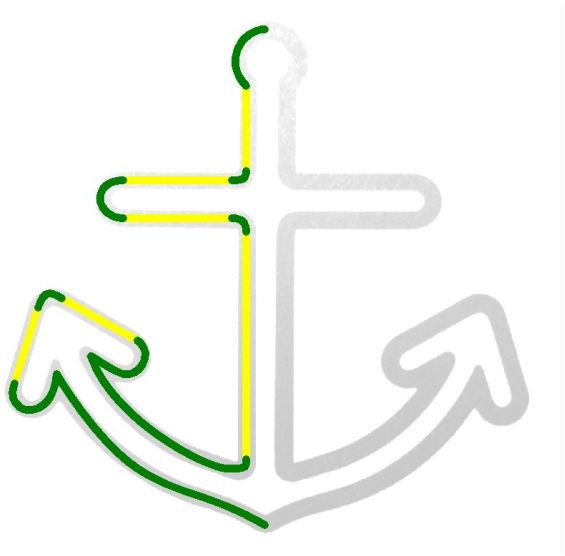
Once the background looks good, click Apply and you're ready to go.



## Digitizing a Pattern with the Bezier Tool - Cont'd

### Tracing the Design

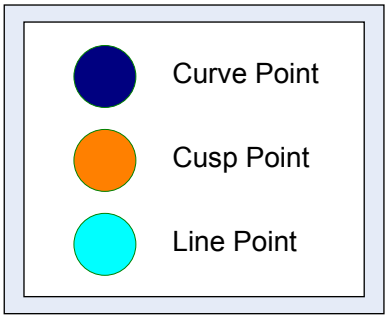
Now that the backdrop that I want to trace is loaded and ready to go, I could start clicking out the design. It'll work and the design will be created, but I find it better to take a moment to think about how to trace the pattern. I do it mentally, but some might find it easier to draw out a path (and then you don't have to worry about forgetting it either). In my case, the GREEN lines are where the curves will be and the YELLOW lines are the straight lines



Differentiating the line types is important, since for each, the nodes will be different. This is where you should recall from the introduction what the nodes will be for each line type. Since the line end nodes will be different than the curve nodes, we'll have to take precaution when switching types while digitizing the pattern.

We'll explore in detail the drawing of each of the different types of segments next. The section overview images show where I'd place each point for the segment. The color of the point shows what type of node it should be as shown in the key to the right.

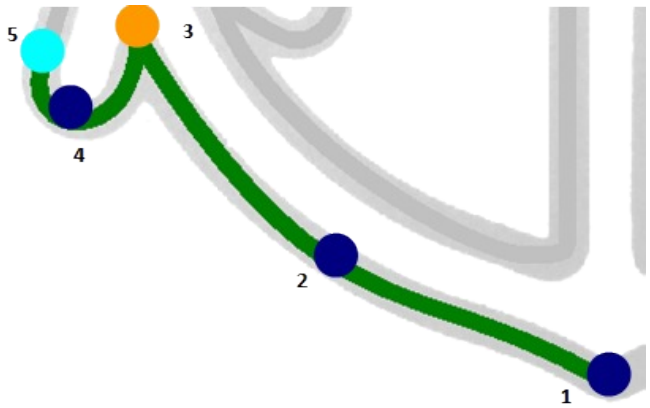
One last thing to remember is that the pattern can be traced in one continuous path with the Bezier tool; there is no need to switch tools or stop and start again.

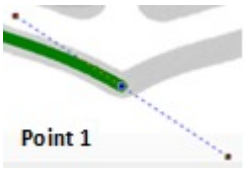


## Digitizing a Pattern with the Bezier Tool - Cont'd

### Curve Section with Cusp

The first section of the pattern is a curve, so the starting point **(Point 1)** will be a curve node. When you determine the starting location, click and hold, dragging out the pull in the direction you want the curve to go. The length of pull is hard to determine, but a good starting point is making it about one third of the length of the curve you are drawing.



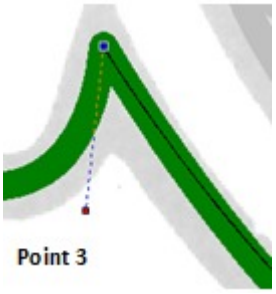




It doesn't have to be perfect, once you finish, you can always come back and edit the pull with the Reshape tool.

The next point **(Point 2)** will also be a curve point. The location of it doesn't have to be exact, but should be in a spot were it'll complete the next section of the curve. As you move the pull for the point, watch to see how the first section of the curve will match the drawing. If you don't like where it is, press the BACKSPACE button and replace the point in a new location.

*If when moving a pull, it doesn't follow the background drawing, you can quickly change the point by pressing BACKSPACE to remove the point and then clicking in a better spot.*

As **Point 3** will be a cusp point, make sure to hold down the CONTROL button before clicking down the point.
Holding down CONTROL will make the node into a cusp point. Once you click, and remember to hold down the button, let go of CONTROL and move the pull where you want it to go.




**Point 4** will be another curve point around the bottom of the arrow.

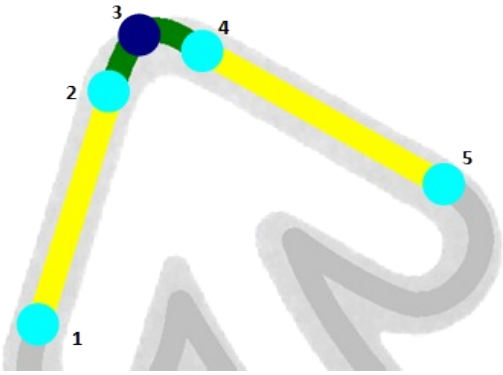
And finally, the last point **(Point 5)** will be a simple line point made by clicking (without holding)

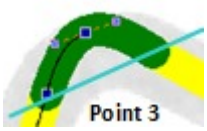
## Digitizing a Pattern with the Bezier Tool - Cont'd

### Line Section with a Curve

This is a pretty straight forward section.
**Point 1** is same point as point 5 from the previous section.

The next node **(Point 2)** will be a line point as well, creating the first line segment.



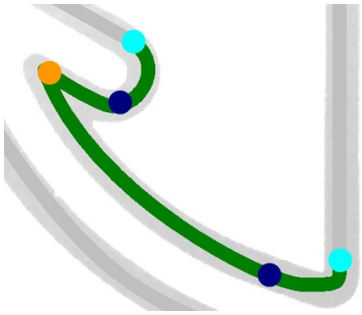

**Point 3** is what will give the rounded corner its shape. Pick the midpoint of the curve and try to get the pulls to line up parallel with points 2 and 4. By making the pulls parallel, the point will become the tip of the curve and keep the shape symmetrical between the line points.

**Point 4** is a line point that will finish off the rounded corner and be the starting point for the next line segment.

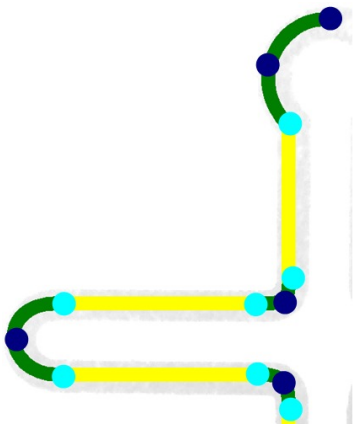
The final node **(Point 5)** will finish the line segment and be the starting point for the next curved section.

### Continuing the Path

Now that the first two sections are done, it's time to continue on with pattern. The nice thing is that the rest of the anchor follows the same pattern as these 2 sections. The next curved section will look something like this:



After that segment, all that is left is some straight lines mixed in with some rounded corners. All that is needed is to click for each line point and put in a curved point at the middle of each rounded section. This is how I placed the points for the rest of the pattern.



## Digitizing a Pattern with the Bezier Tool - Cont'd

### Finishing the Pattern

Once finished tracing half of the anchor, it's time to make a copy for the opposite side. Before you do that, make sure that you perfect the lines with the Reshape tool where needed.
Then copy, mirror and align: the easiest way is to select the pattern in the Sequence View panel and do a Magic Square. This will copy, paste and mirror the pattern and all that is needed is to select and delete the bottom two copies.

To connect the two remaining sections, take the Reshape tool and click in the last point at the top of the first section and hold the mouse down, then press and hold letter T on your keyboard and move the mouse a tiny bit. Once you see the points of the copy blinking, release the mouse and then release the T-key of your keyboard. The two sections are connected into one pattern. The anchor is complete!