

The ShopBot Indexer

The ShopBot Indexer is basically a lathe with an extra level of precision built in...you can precisely control the rotation of the headstock and also link it to the motion along the length of the blank and the cutting height above the blank. The ShopBot Indexer Virtual Tool allows you to control these motions from within the ShopBot v3 Control Software. It lets you create several types of turning patterns and generate ShopBot part files that you can either run directly from the Virtual Tool or save to run later on.

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Hardware setup

Control box connections

Your indexer must be connected to the B axis in your control box to use the Indexer Virtual Tool. The indexer for the PRTalpha is different from the one for the PRT. They are not interchangeable.

PRTalpha

The Indexer for a PRTalpha tool comes with its own driver unit box which must be installed inside the control box. It should be configured properly from the factory. If your indexer does not respond to B axis commands, contact ShopBot Technical Support.

PRT

If you are using the Indexer with a PRT tool, you'll need to connect it to the A-axis driver and make a change to some switches on the control board to fool it into thinking that your A-axis is really the B-axis.



Figure 1

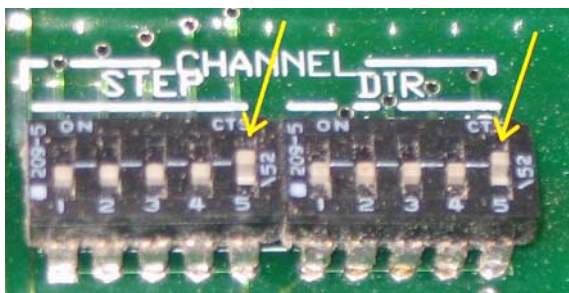


Figure 2

Open the control box. Locate the bank of DIP switches highlighted in the Figure 1 above. All of the switches should be DOWN except for the 2 switches on the right ends (marked 5)

which must be UP as shown in Figure 2. The switches are awfully small so you might need to slide them with the tip of a ballpoint pen.

Z-Zero plate

While the box is open, you probably ought to think about a z-zero plate for the indexer. We suggest attaching a long wire...long enough to reach the control box...to a small piece of aluminum. Mount the aluminum plate to the top of the tailstock with double-stick tape so that the plate is electrically isolated from the tailstock. Connect the wire to the #1 input switch connection in the control box. Once that's done you can button up the box... your work in there is done.

Mounting the track for the Indexer

Mount the track so that it is parallel to either the X or Y axis ... it doesn't matter which one. We can't tell you exactly how to mount it because so much depends on how your table is set up and what you're going to be turning. The most important thing to remember is that you need as much clearance between the center of the tailstock and the ShopBot's carriage above as you have between the center of the tailstock and the aluminum tracks below in order to maximize the diameter of the parts you can turn.. Here are a few things to keep in mind...

- Track MUST be mounted so that the centerline of headstock and centerline of the tailstock line up in all 3 dimensions.
- It is possible to mount the track on the side of table rail parallel to the X-axis.
- The headstock MUST be at the end of the track that is closest to the 0 point of axis to which it is parallel.
- If possible, use your ShopBot and a large flat-bottomed bit to machine the surface groove for mounting the track in. That way you'll know the track is parallel to the motion of the tool.

ShopBot software setup

The ShopBot Indexer is setup in degrees/second not inches/second like the rest of the axes so the unit values and speed settings might seem odd at first.

Type VU to open the dialog box for setting the unit values and look at the values for the B-axis.

If you have a **PRTalpha** tool, the B unit value will be **13.888**.

If you have a **PRT**, the B unit value must be **16**.

Change them if they're not right and then click OK to save the settings.

Now type VS to open the Speed settings dialog box and again check the B-axis settings.

With a **PRTalpha** you can start with a move speed of **720** and Jog speed of **1440**.

This gives the PRTalpha indexer a move speed of 120 rpm and a jog speed of 240 rpm.

With a **PRT** you should start with a Move speed of **180** and Jog speed of **240**.

This gives the PRT indexer a move speed of 30 rpm and a jog speed of 40 rpm.

These speeds may seem AWFULLY high but remember that speeds for the indexer are in degrees/sec and NOT inches/sec.

At the time that this was written it is not possible to preview indexer files in a meaningful way. It is best practice to air cut files prior to actual use or test them using a soft and inexpensive material like blue or pink house sheathing foam.

Using the Indexer Virtual Tool

You should keep in mind that

- All files are cut with the bottom of the bit zeroed at the center of the blank. It doesn't matter if it's a ballnose bit., a pointed roundover bit, or any other shape. You still need to zero it at the center of the blank.
- The crosswise axis must be zeroed at the center of the blank. So if you have setup the indexer so that the blank is running parallel to the X axis, the Y axis must be centered in the middle of the blank. If you have proximity switches on your ShopBot, you can create a new version of the XY homing routine to zero your indexer to make the job easy...just change the X and Y axis offsets and then save the file with a new name.

Start the Indexer Virtual Tool by typing TI for Tool Indexer. The first time you run the Indexer virtual tool, you must select whether it is mounted parallel to the X or the Y axis. If you ever move the indexer, you can change that value by clicking on the Tools menu item and selecting Settings.

Choice of Patterns in the Indexer Virtual Tool

1. Turning the blank to a correct size
2. Traditional lathe turning patterns
3. Turn the blank to a profile
4. Cut the blank to a polygon
5. Wrapping text around a blank

1. Turning a blank to the correct size.

The first is also the simplest. Selecting this option will let you input values like the rough size of the blank, the final radius at the starting point, and the final radius at the end point. If you want to turn a simple cylinder, just put the same sizes in for the starting radius and end radius. Turn a taper by inputting different values for the 2 ends.

The stepdown and stepover values determine how much of a "bite" is taken by the bit as it works its way through the file. The stepdown value gives the maximum depth of cut that the bit can take. If the maximum depth is smaller than the difference between the rough diameter and the SMALLER of the starting or ending size, then the file will cut in multiple passes. The stepover value sets how far the bit moves along the blank for each revolution in the final pass. To help speed things up, all roughing passes will be cut at twice the stepover value. Then there will be a final pass at the actual stepover value that you entered in the box.

2. Traditional lathe turning patterns

Much of what you might want to do with your indexer will be traditional lathe turning patterns such as fluting, spirals and barley twists, and rings around the blanks.

As these cuts may be very bit-specific, the file requires you to already have the blank at the correct size...it won't size the blank for you beforehand. If you're starting with a rough blank, just create a sizing file and run it first. Then change to the correct bit for the new pattern and create the lathe patterns.

Vary the pattern by changing the settings for Length and Turns as described.

Rings around the blank

- Set the Length value to 0, the Turns value to 1, and the copies value to 1.

Fluting

- Set the Length value to the length of the flutes, the Turns value to 0, and the Copies value to the number of flutes that you want around the blank.

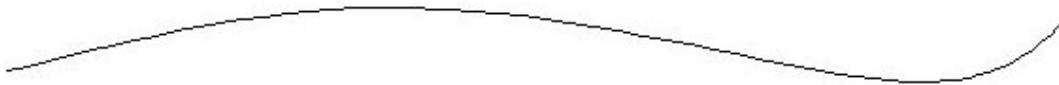
Spirals

- Set the Length to the length of the spiral pattern along the blank, Turns to the number of times the spiral will wrap along the length, and copies to the number of times that pattern is repeated around the blank. If you want the spiral to go the other way around the blank, just enter a negative number for the Turns value.

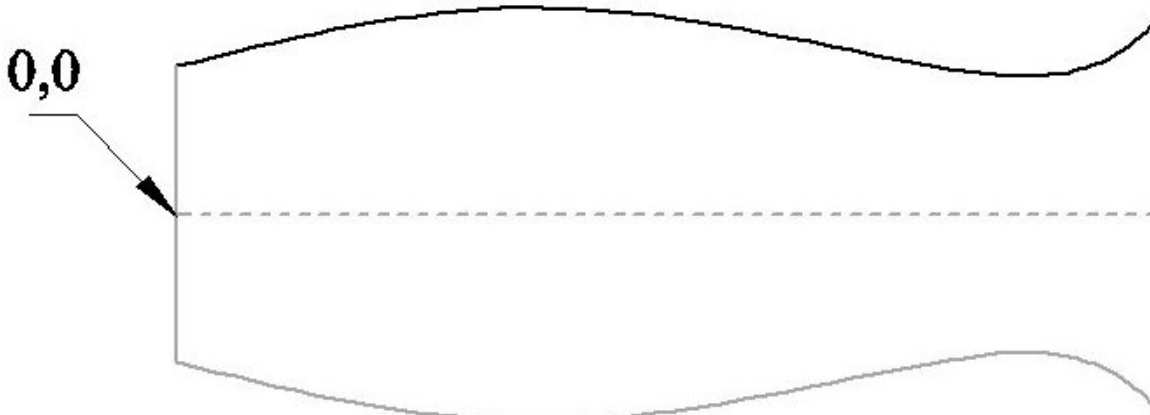
3. Turn the blank to a profile

Let's say you want to turn the outside of a blank to a shape that is revolved around a centerline such a vase shape. The Profile tool is the one that you would select. It uses Part Wizard or ArtCAM to toolpath the profile that you want to turn your blank to and then "virtually" stands that toolpath on edge so that the Y-axis in the drawing becomes the Z-axis on your turning. Toolpath it in Part Wizard with an end mill bit and then cut with a ballnose bit with the same radius.

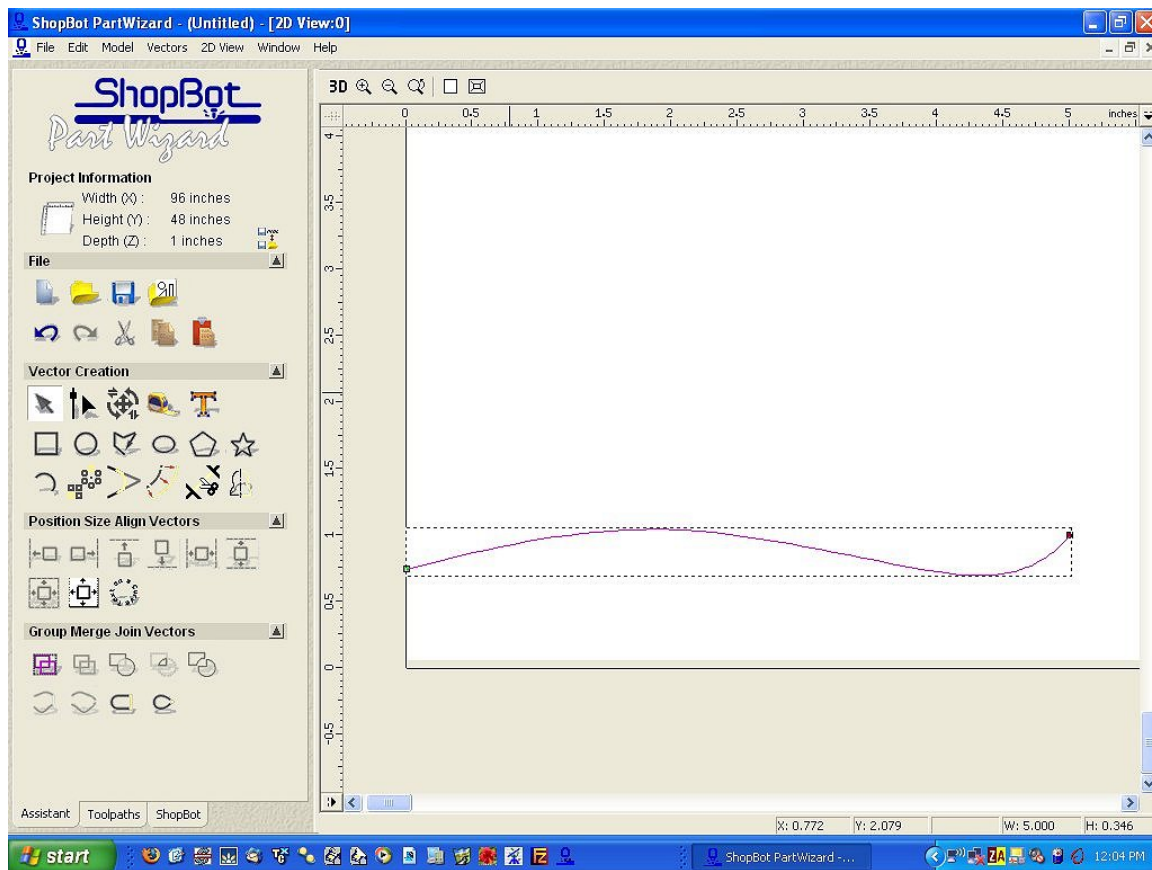
Here are the steps that you would use to create the profile. This example is going to be a vase shape. We will draw the profile in TurboCAD, but a similar shape could be done with arcs in Part Wizard. Here's our profile...



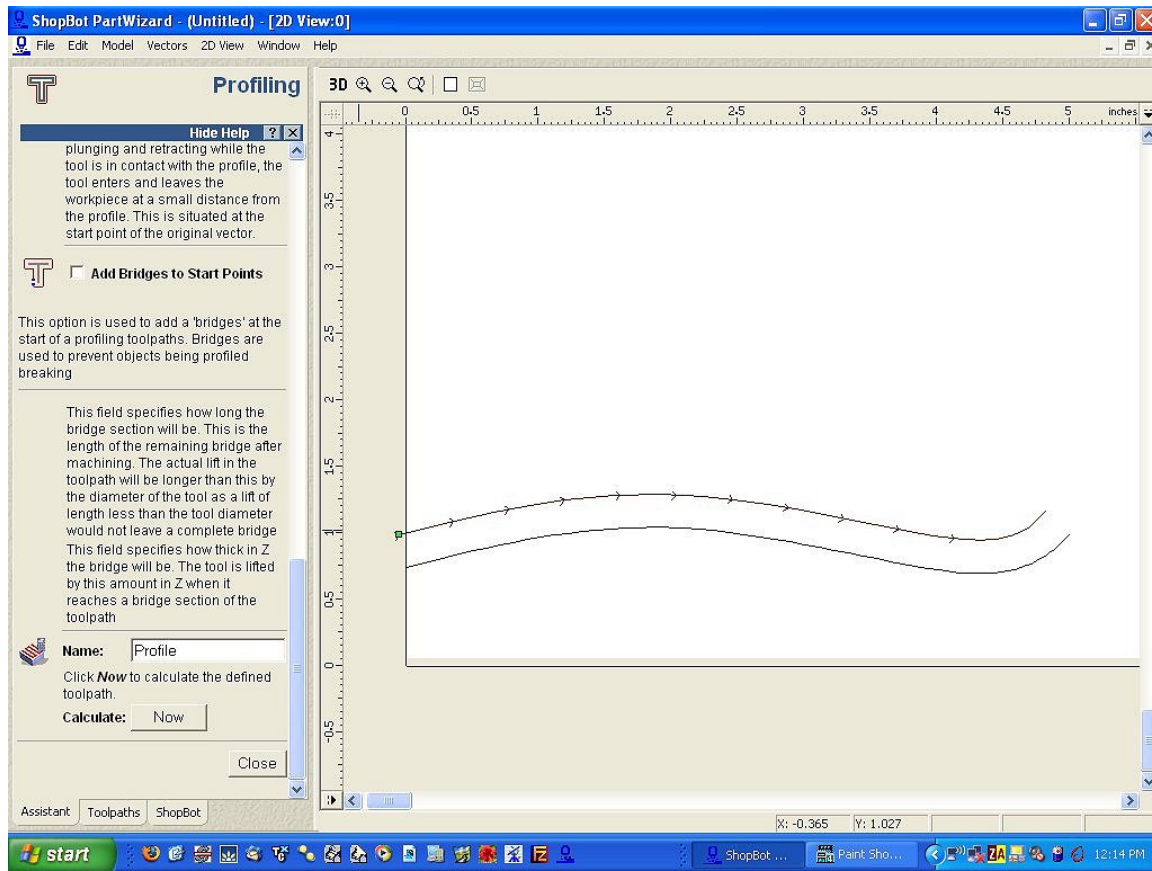
and the picture below is the shape of the finished turning. The black line is our profile and the gray lines represent the center line of the blank and the ends of the turning...you DON'T need (or want) to draw them but it helps to see how everything goes together.



Next we'll open Part Wizard (or ArtCAM) and import our drawing using the "Import Vectors" button. Select the profile and make sure it starts cutting at the left end...that's the end that you want the green dot to be at. Your Part Wizard screen should look like this...



Select the Toolpath tab and the Profile button. You want the toolpath to be ABOVE the profile so select the "inside" option at the top and then choose a shallow final depth so that the file doesn't try to cut in multiple passes. Now select an end mill with the same radius as the ballnose bit that you'll be cutting with and create your tool path. If everything goes well your screen should look like this, with the toolpath above the profile and cutting from left to right ...



Save the toolpath using the inch or mm post, NOT the arc one. We suggest saving the profile in your "C:\program files\ShopBot\virtual tools\indexer\profiles" folder to make it easy to find, but you can put it anywhere you want..

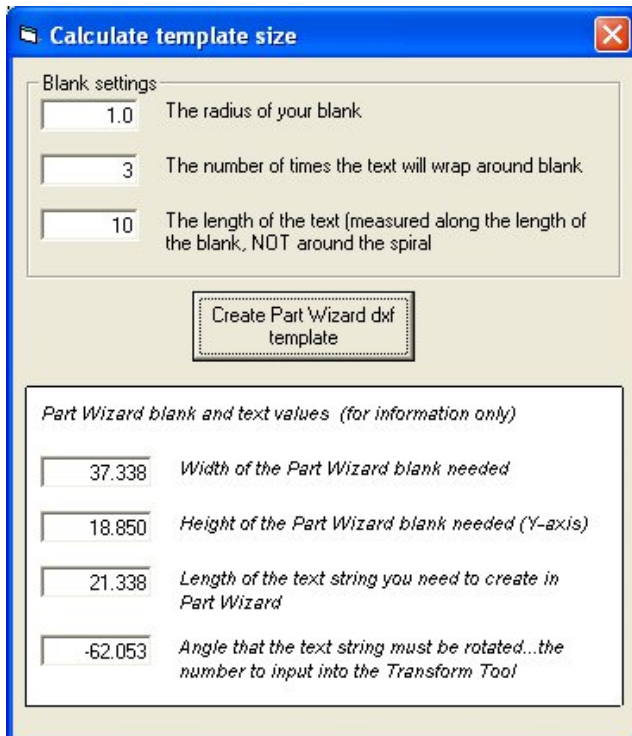
4. Cut a blank to a polygon

Use this option to cut faces on the blank so that it becomes a polygon. The settings are pretty self-explanatory...the only thing you need to remember is that the sizes are measured from the center of the blank to the center of the face, not to the corner of the faces. The file will cut in multiple passes if the stepdown setting is small enough just as it does in the blank sizing routine.

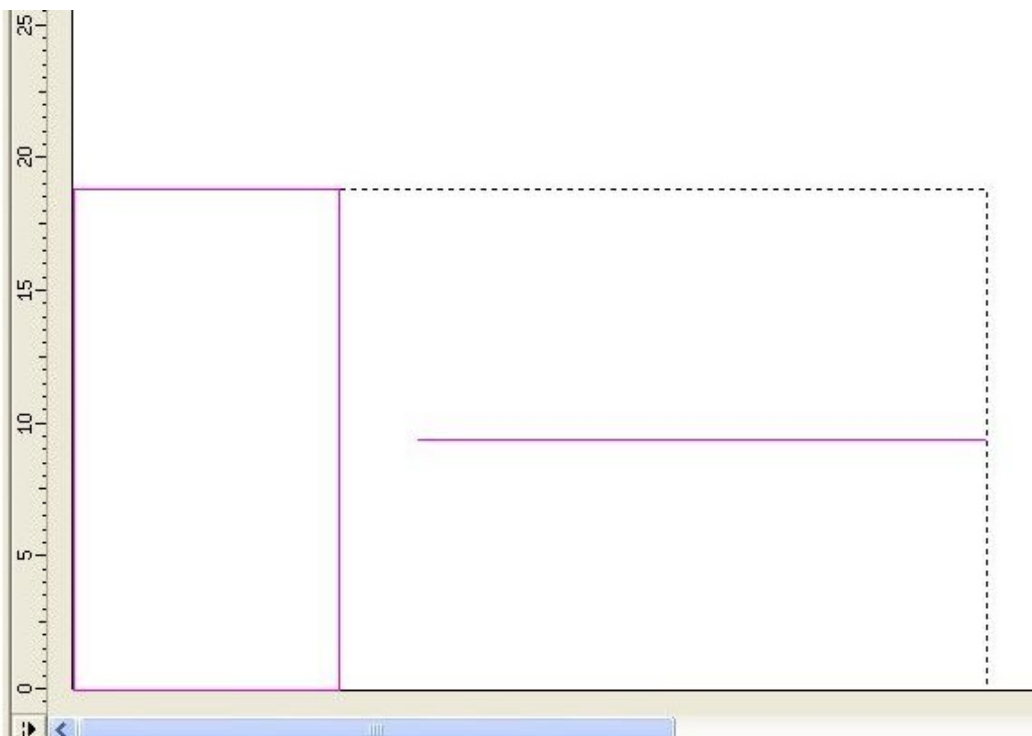
5. Wrapping text around the blank

This file layout is the most complicated. It uses Part Wizard to create the cutting file, and as in the traditional turning patterns, your blank has to be turned to the correct size before you can wrap text around it.

First, create a dxf template that you can use in Part Wizard to create the text file. Click the "Tools" menu item and then "Wrapper". Fill in the blank and text settings in the top panel and the click the "Make dxf template" button. The values in the bottom white panel will give you settings that you'll need in Part Wizard so write them down on a piece of paper.



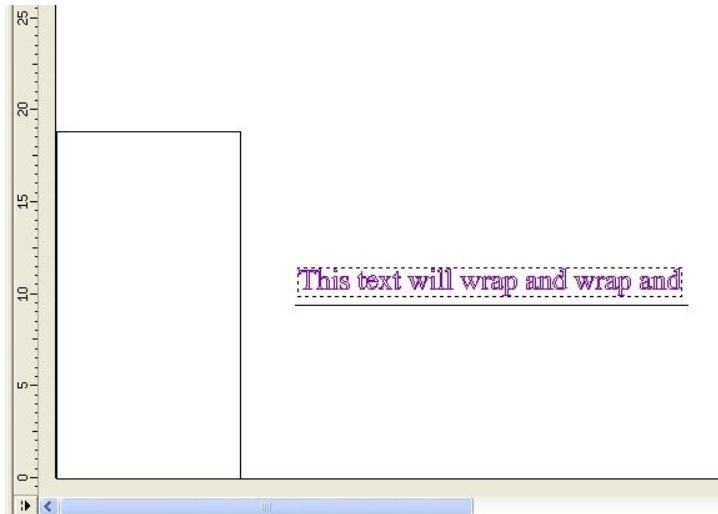
Now, open Part Wizard and create a new blank. The size of blank can be as big as you want but should be AT LEAST as tall as the height value from the Wrapper and twice as wide as that value as well. Make sure z-zero is set for the material surface and that the blank thickness is equal to the radius of your blank.



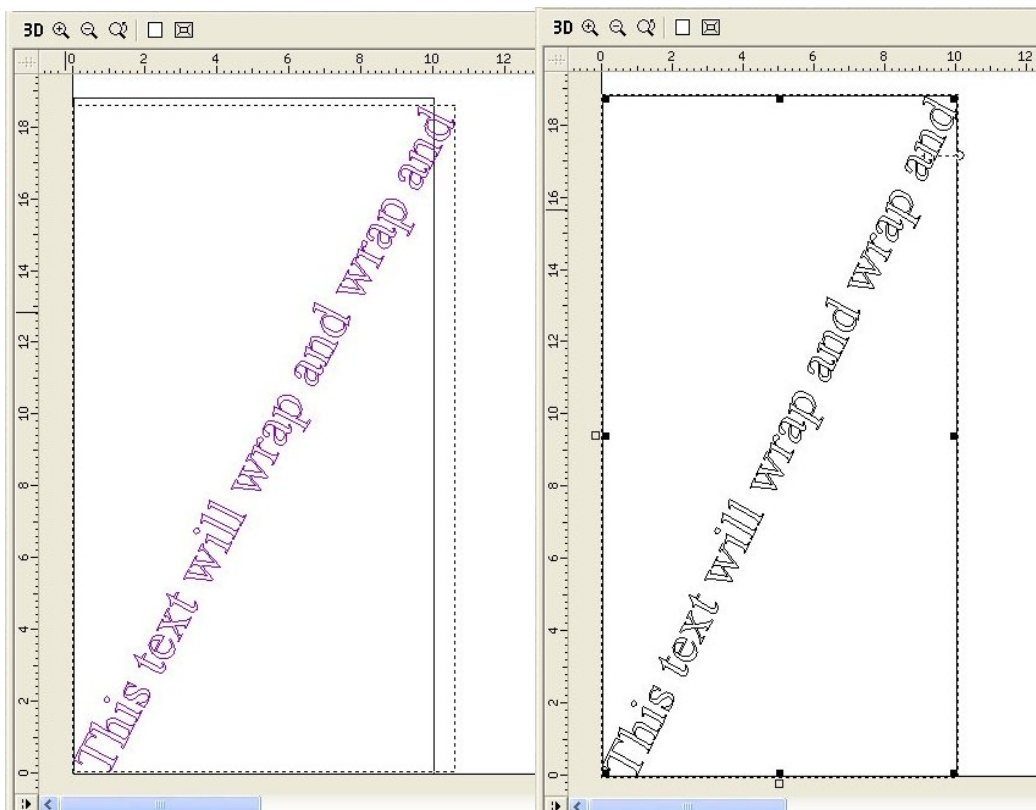
When the blank has been created, click the Import vectors icon and open "wrap_template.dxf" in your "C:\program files\shopbot\virtual tools\indexer\wrap" folder.

There will be a box that represents the area that the text will need and also a line next to the box that shows you the approximate length that the text string needs to be.

Create the text using one of the v-carveable fonts. Then size it so that it is as long as the line that the template created.



Click the Transform Icon and type the rotation value from the Wrapper in the Rotate box. The text should now roughly fit diagonally from lower-left corner to upper-right corner on the PW blank, so now just drag the text into the rectangle representing the text area. The fit will not be exact due to the height of the text, so click the transform button, then move and resize the text until it fits the way that you want it to.



When you're satisfied with the way it looks, create your toolpath the way you normally do. To make it easy to find, we suggest putting it in the "Wrap" folder in "C:\program files\ShopBot\Virtual Tools\indexer" folder.

Now, go back to the Indexer Virtual Tool and select the "wrap text around the blank" option. Fill in the text boxes to your blank values and then click "Make the file". First, select your output file name - the file that you'll eventually run on the indexer. Next, pick the file with the text that you want to carve - the file that you just created in Part Wizard. Voila...you're done!