ShopBot Tutorial

SAFETY: wear safety glasses and closed-toe shoes

Note: The Help program in Vcarve is actually quite helpful. Feel free to use it to find out what any icon means and does.

Log in to the shoptbot computer.

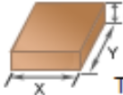Open the program "Vcarve Shopbot Edition"

Go to File: New

Drawing

Job Setup

Job Type
- (●) Single Sided
- ( ) Double Sided
- ( ) Rotary

Job Size
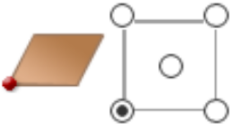
Width (X): 96.0 inches
Height (Y): 48.0 inches
Thickness (Z): 0.44 inches

Units (●) inches ( ) mm

Z Zero Position
- (●) Material Surface
- ( ) Machine Bed

XY Datum Position

[ ] Use Offset
X: 0.0
Y: 0.0

Design Scaling

[ ] Scale design with job size

Modeling Resolution

High (3 x Slower)
2 million points

Appearance

Solid Color

Solid Color: ▼

OK   Cancel

On Job Setup screen:

  Units:Inches;

  Size:The size of your stock(x is the long axis on the machine. This is marked on the aluminum inside rail of the Shopbot for reference);

  Material: Z-zero dot should be on the top of the part. Measure the thickness of your stock with

calipers and input it as the thickness. Don't trust the manufacturer on material thickness ;
XY Origin Position: This is a user preference, we'll use the bottom left corner. Ultimately the origin
for your toolpath will be wherever the gray lines cross, so pay attention to where that happens and
zero the machine correspondingly. Sometimes it is easier to see where the gray lines cross if you
roll the mouse wheel to zoom out a bit.
Turn off "Use origin offset." if it is checked. This shouldn't be checked by default if you start by
creating a new document and import your vectors from the file menu. If your drawing and settings
aren't just right, this can cause the machine to try cutting in places you don't want it to ;

Click OK and then go to File>Import Vectors. Select your vector file and click OK

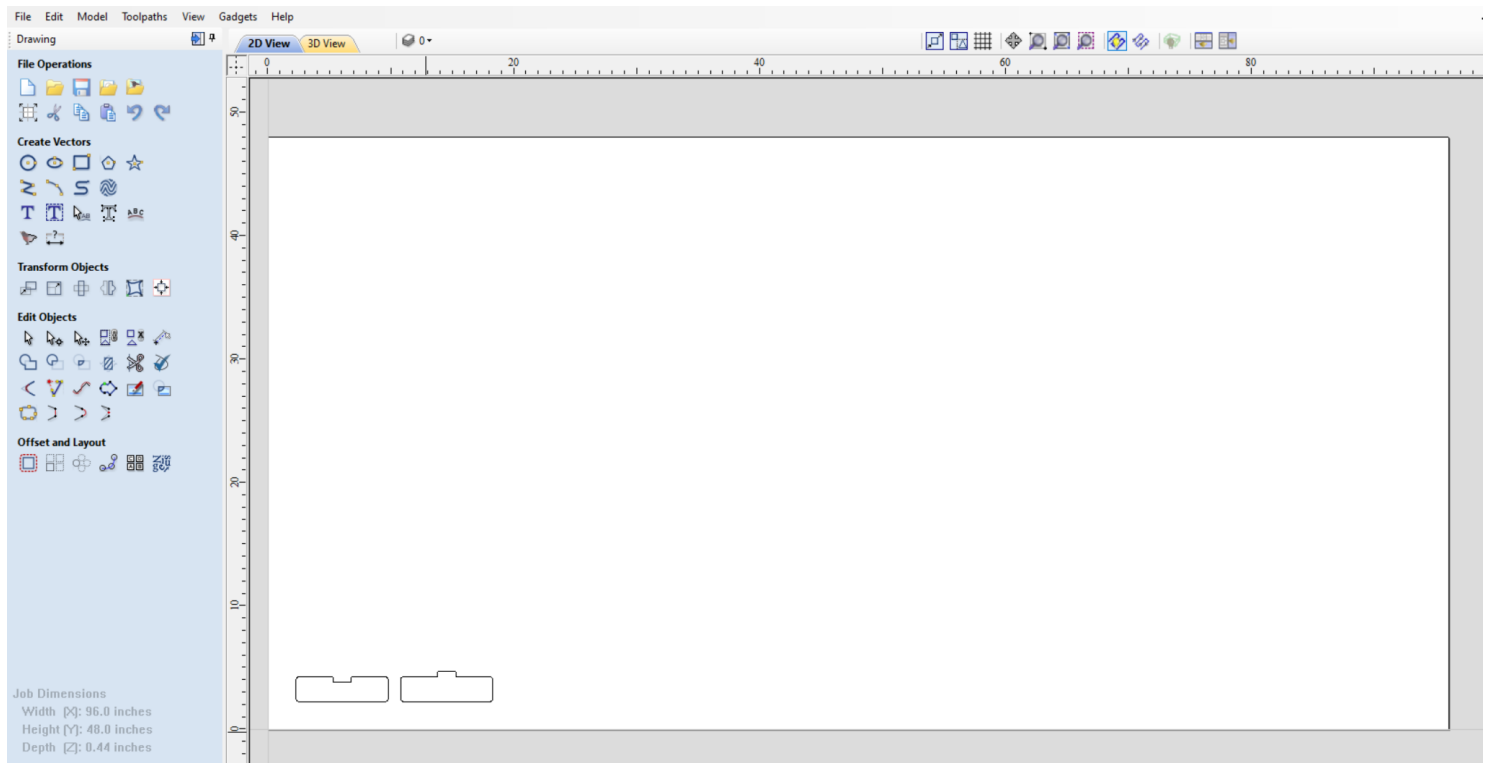On Drawing screen: Under Edit Vectors Heading: Using the 3rd arrow tool from the left (Move, Scale,
Rotate Selection) drag to select your entire part and fit it inside the white box that represents your stock.
This tool can resize or rotate by dragging square-marked and circle-marked corners, respectively, and
move by dragging from the center of the part.

Fillet / Tool Radius: 0.125 inches

Click on an angled corner to change corner into a circular fillet

Fillet Type

○ Normal fillet

○ 'Dog-Bone' Fillet

These fillets are used for creating clearance in internal corners to allow slotted pieces to fit together.

◉ 'T-Bone' Fillet

These fillets are used for creating clearance in internal corners when the slot is the same size as the tool

○ 'Plasma/Drag Knife' Fillet

These external fillets are used for machining past a corner when using plasma tools or drag knives

Removing Fillets

To remove a fillet, click on the fillet arc.

Close

Note: Press fit parts require filleted slots on inside corners. To achieve this, select the fillet tool under Edit Vectors, and select T-Bone Fillet. Input your tool size, and click on two lines to create a fillet between them.

Drawing

2D View   3D View   0▾

Join Vectors

Selected vectors:

Closed: 2
Open: 0

Tolerance:

.01 inches

Vectors after joining:

Closed: 2
Open: 0

Join   Close
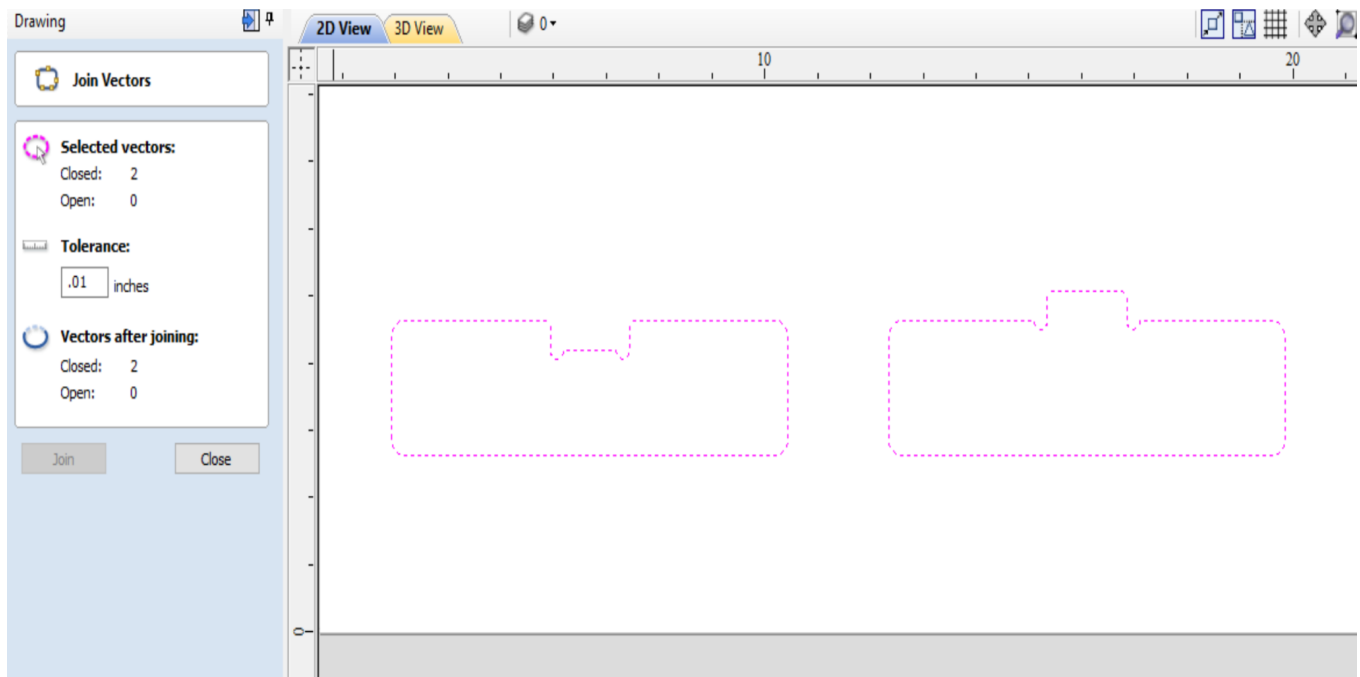
Sometimes it will be necessary to use the join vectors command under the Edit>Join Vectors menu. Even if your vectors were connected as one shape when you exported, they may come into Vcarve segmented and need to be joined to closed shapes.

Click on "Toolpath" tab on right side of screen. Under "Toolpath Operations" select "Create Profile toolpath."
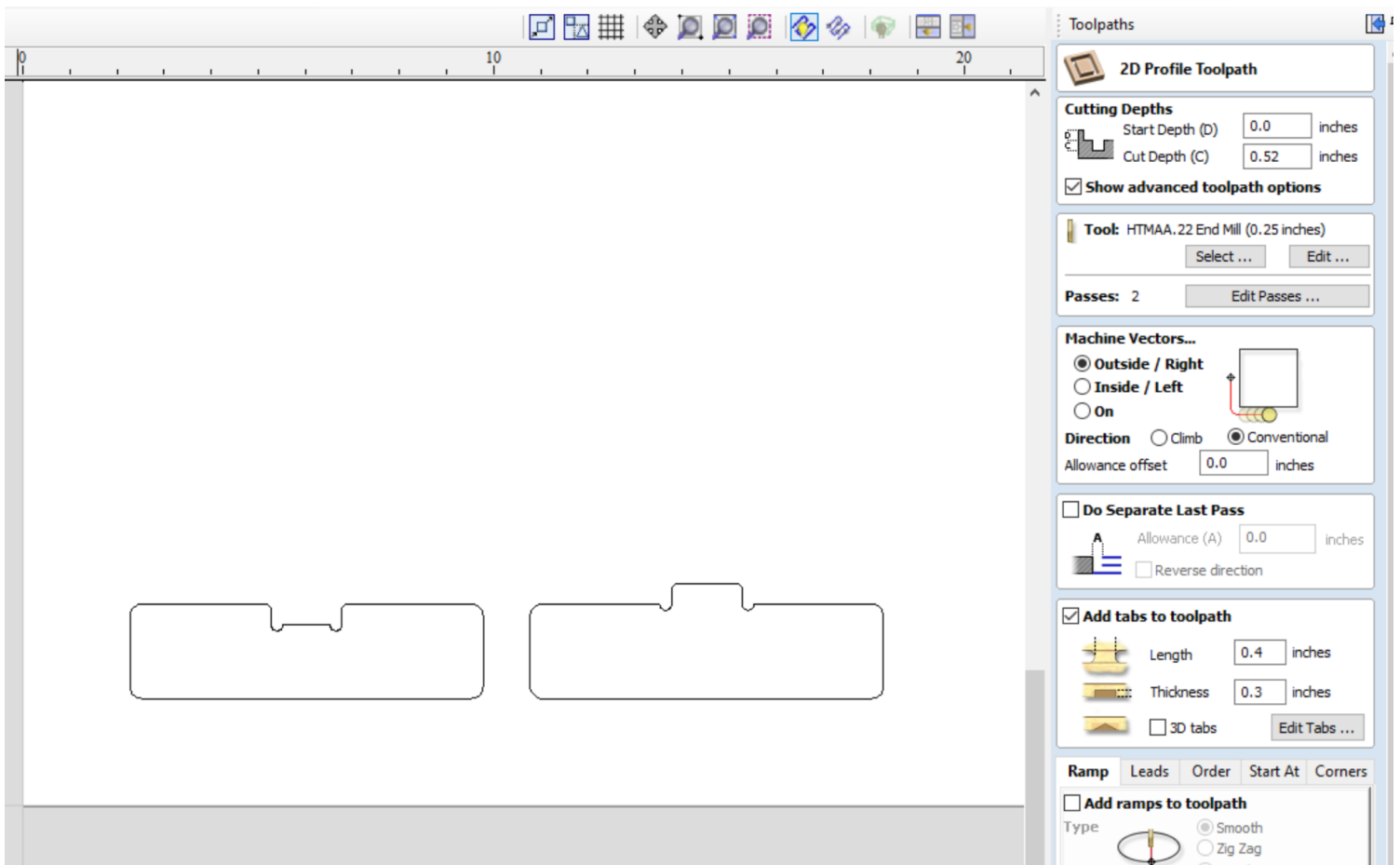
Start Depth: 0" (starting on top of material)

Cut depth: Choose a finished depth of cut. Make sure you don't make the cut so deep as to make the remaining material too thin and not sturdy, but do cut deep enough to be able to see what you've cut. On this .44" thick piece of osb, we're cutting our profile to .52";

Tool Database

Tool List

- **SB Starter Set**
  - HTMAA.22 End Mill (0.25 inches)
  - End Mill (0.093 inches)
  - End Mill (1.25 inches) for cardboard t
  - End Mill (1.25 inches surfacing)
- **Wood**
  - End Mill (0.375 inches)
  - Ball Nose 0.25 inches Dia
  - Ball Nose 0.25 inches Dia - Dan L
  - Ball Nose 0.25 inches Dia - Dan L
  - 1/8" Tapered Ball Nose (77-102)
  - 60 Degree V-Bit 1/2" (37-82)
  - 1 1/4" Spoil-Board Cutter (91-00
  - 1/2" Straight (48-072)
  - 1/4" Down-cut (57-910)
  - 1/4" Up-cut (52-910)
  - 1/4" Straight (48-005)
- **SB Desktop Starter Set**
- **Plastic**
  - 1/4" Up-cut (13729)
  - V Bit 90 (13732)
  - 1/16" Tapered Ball Nose (13731)
  - 1/8" Ball Nose (13727)
  - 1/8" 63-763
- **Wood**
  - Samuel's 1/8" downcut

New ...   Copy ...   Delete

New Group   Import...   Export...

Tool Info

Name	HTMAA.22 End Mill (0.25 inches)
Tool Type	End Mill
Notes	HTMAA.22 End Mill (0.25 inches)

Geometry

Diameter (D)   0.25   inches

Cutting Parameters

Pass Depth   0.26   inches

Stepover   0.2375   inches   95.0   %

Feeds and Speeds

Spindle Speed   10000   r.p.m

Feed Rate   140.0   inches/min

Plunge Rate   60.0   inches/min

**Tool Number**   0   Apply

OK   Cancel

Under Tool, click select. 1/4" 2 flute downspiral endmill is appropriate for this job. In this Tool Database screen, select your tool from the list on the left. Verify that the named diameter of your tool matches the Diameter listed under "Geometry." In this case, .125 inches.

Cutting parameters:

Pass Depth: determines how much deeper the tool goes with each pass. We're using the tool diameter, which the Pass depth should not be greater than.

Stepover: How much the tool will overlap on each pass when rastering a pocket. We're not doing that right now, so this value is N/A, but feel free to play with adjusting the stepover for pocketing toolpaths and previewing the generated toolpaths

Spindle speed: We're using 10000 RPM. This is based on material, tool diameter, feed rate and number of flutes on the tool. Our material is plywood.

Feed Rate: We're using 140 in/min.

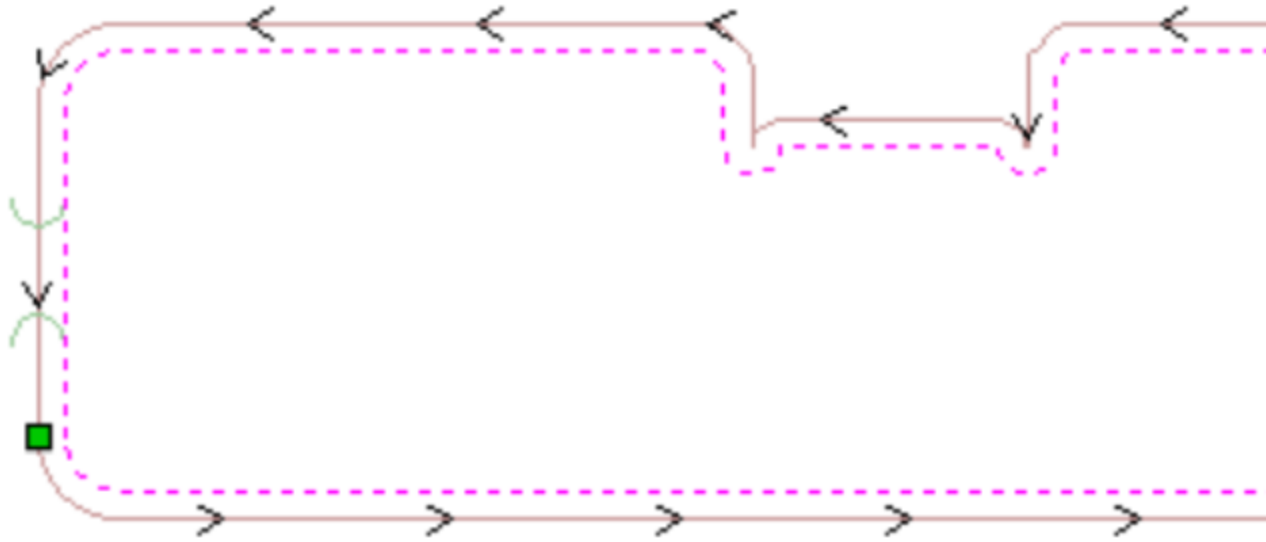**Plunge rate:** We're using 60 in/min.

Click Apply, then OK.
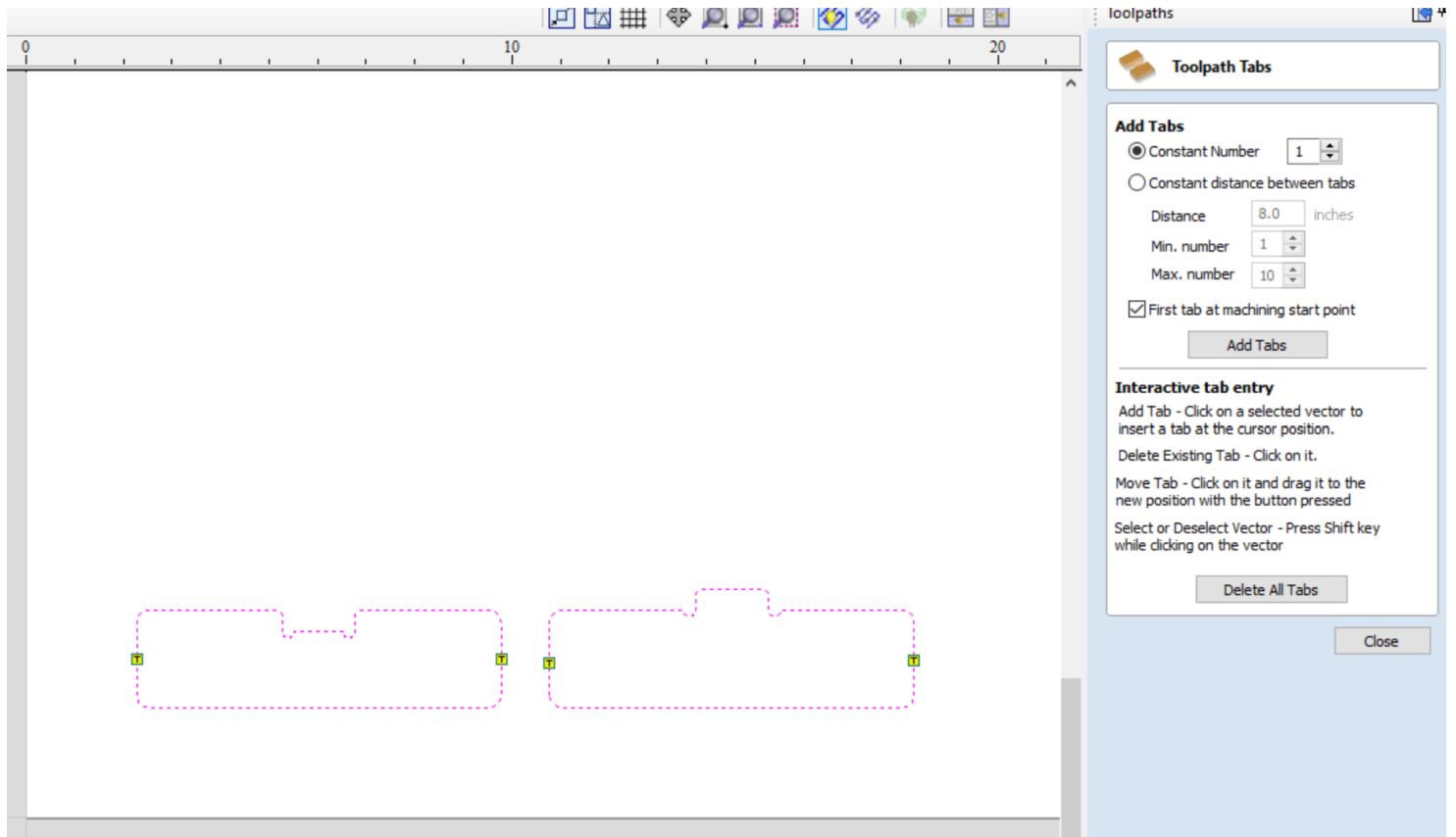
If you'd like to add tabs, you can check that box in the tabs section. Define the length and depth of your tabs then click edit tabs to start clicking where you want them on your part, or add them automatically.

We're using cut direction Conventional, and cut direction: outside/right.

Click Calculate.

You will get a preview of your toolpath that defaults to showing in 3d, but sometimes is more useful to click the 2d tab behind it to view your top-down with the centerline of the tool represented by a red line with arrows indicating direction
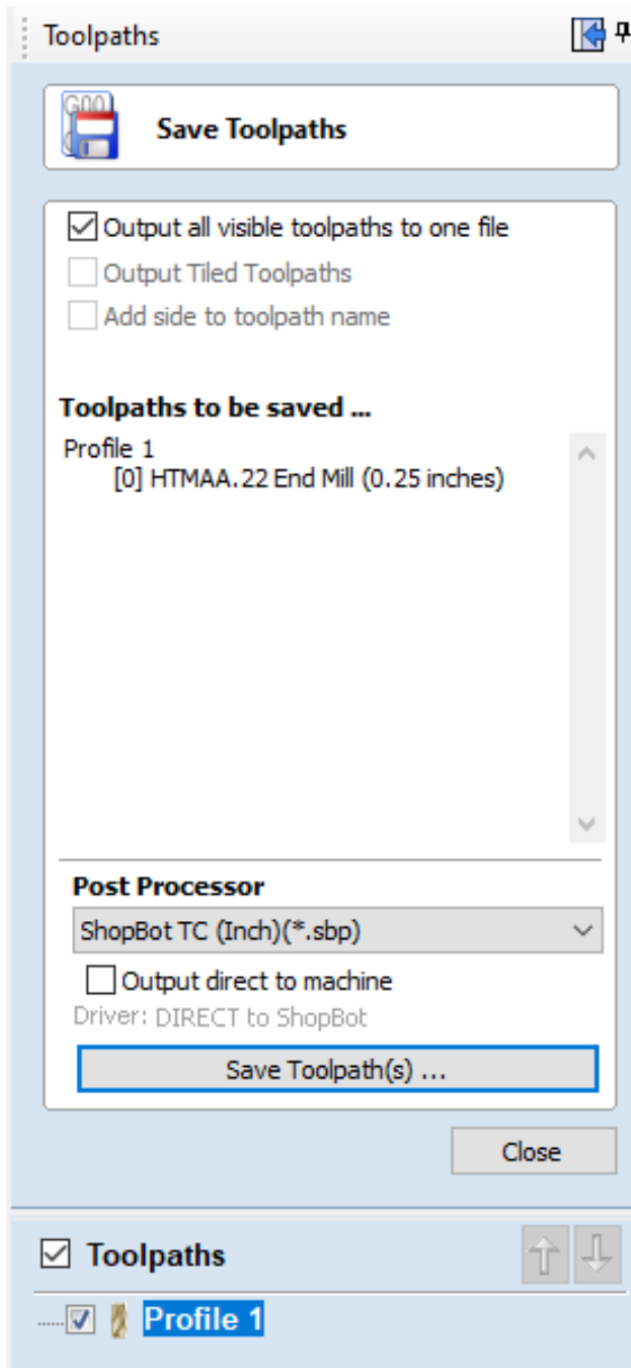
Under Toolpath Operations, Click Save Toolpath, the icon that looks like a floppy disk. Because we're using the same tool for all cuts, we can click the "Save all visible toolpaths to one file" button, but make sure that the cuts are listed in the correct order above this box before saving as such. Make sure Post Processor is in "Shopbot TC (inch)(*.sbp)" Click Save Toolpath. Name it. Also, go to File:Save As and save your file as a Vcarve file for easy editing if necessary.

Setting up the Shopbot: Select the appropriate collet for your tool.

Push it into the collet holder (The black threaded ring) until it clicks.

Start to thread the collet holder onto the spindle, one or two threads on. Insert the tool into the hole in the collet. Push it in until the flutes are almost touching the collet, but not. Hand tighten the collet holder on the spindle.

Grab the flat sides of the spindle with a 27 mm wrench. Use the black ER25 Collet Wrench to grab the collet holder. Using both of these, snug the collet holder onto the spindle.

Raise the dust collection skirt up over the tool. There is a thumb screw between the 2 springs behind the spindle to hold it in place.

Insert the key attached to the collet wrench into the keyhole on the control box (left side of the shopbot if sitting at computer) and turn it. Turn on the control box with the big red switch.

The machine won't talk to the computer until you reset the drivers. This is accomplished using the yellow control box with a big red button, a blue and a green button. Press the blue button.

Attach material to bed using screws. Make sure the piece is flat by either putting lots of pressure in the stock while screwing it down, or having clearance holes in the stock so it can be pulled flat to the bed. Make sure to align your X and Y correctly. Horizontal lines on your drawing are X, and they line up with the long axis on the cutting bed. You can put the material wherever you like, as we will choose the origin later, but make sure the axes are lined up properly. Also, be sure you don't put any screws where the material will be cut, this will probably break your tool.

Open "Shopbot 3" on the desktop.

On the red Shopbot Position Window, locate the yellow "Show Keypad" button and click it. We can now jog manually using the keyboard. The arrow keys control X and Y, Pg Up and Pg Dn move Z.
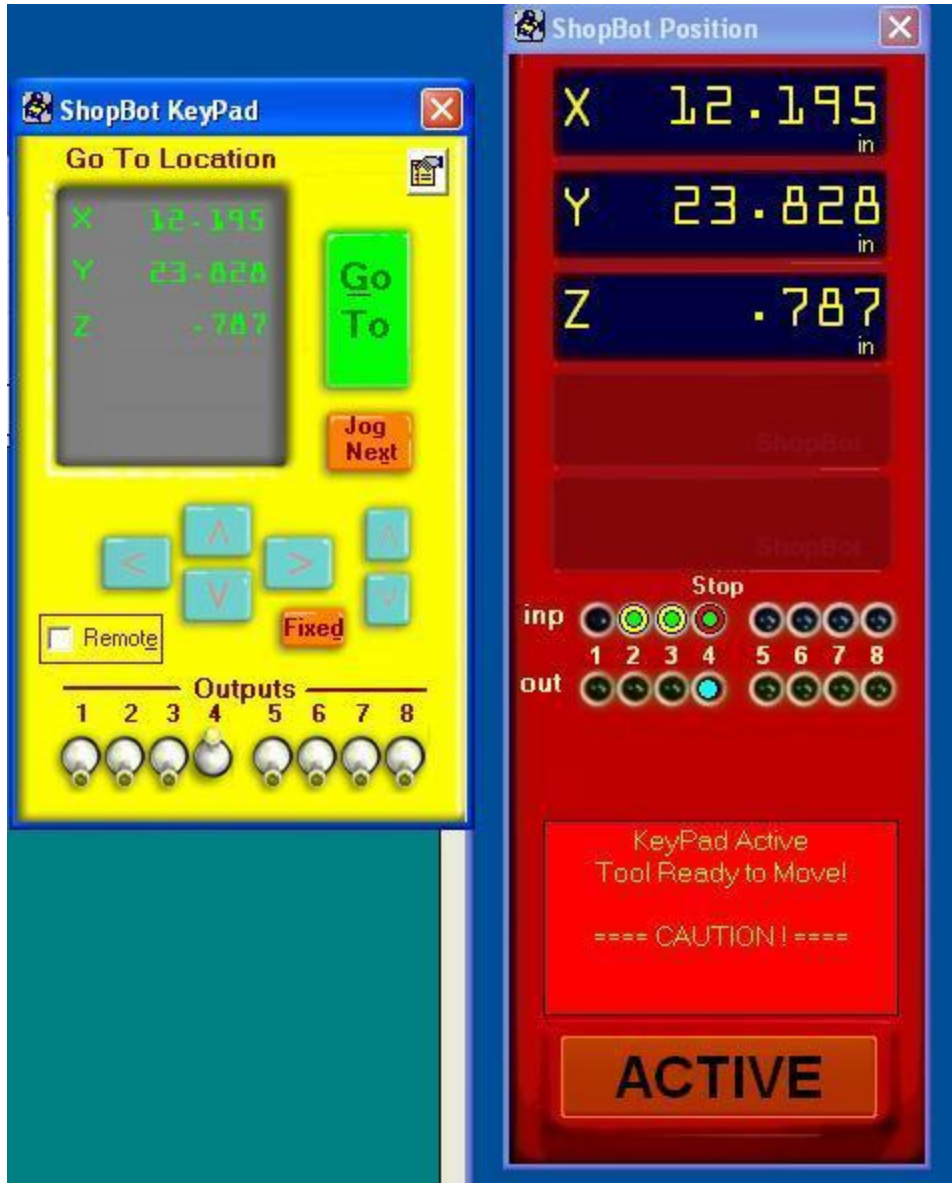
Move the tool over the material. Lower the tool until it is a few inches away from the material. Remove the long metal plate from the side of the spindle holder and lay it flat on your stock, under the tool.

In the Shopbot Console, go to menu "Cuts" and run command "C2 - Zero Z axis w/ ZZero Plate." Click OK. The machine automatically zeros the Z axis. Click OK after. Return the metal plate to its holder on the side of the spindle.

Red window: Show keypad again. Jog the tool so it is over the origin that you selected in step 4. In our case, this is the bottom left corner of the stock. Be sure and close the yellow keypad so there is no longer an "active process" running, or the shopbot3 software could crash when you begin clicking around in the command console menus

In the Shopbot console: go to the "Zero" menu, and run "Zero [2] axes (X & Y)"
In the red window, the position should now say .000 for X and Y.

We must set the spindle speed manually. There is a gray controller box on the side of the Shopbot

(V7-4X) Use the arrows to set your desired spindle speed. In our case, this is 10.0 which means 10,000 RPM.

Shopbot Console: File: Part File Load. Open your sbp file.

At this point: Turn on Dust Collector with green button

Ignore the piece of yellow lined paper that pops up, and press START on the red positioning box

STOP.

The screen now says Starting Router/Spindle.
When you hit OK, the Shopbot will start moving regardless of if you've started your spindle. Before you hit OK, you must start the spindle.

To start the spindle: On the yellow control box with the big red button and smaller blue and green buttons, hit the green button to start the spindle.

You may now click Ok to begin cutting. Have your hand near the big red emergency stop button on the yellow control box, because if something looks wrong with the cutting, you need to stop it before anything gets damaged. Pause with the mouse if you need to stop but there's no emergency. Hitting the emergency stop could result in losing your zeros, and be hard to recover from if the machine was interrupted mid-cut

If nothing is wrong, your part will be cut out now.

After, remove the screws, and vacuum up all scrap and dust created by your job. You have a fancy computer cut part now!