

ShopBot CNC Router Machine Set-Up

INTRO

by Mollye Bendell

Project

We are building hexagonal “tchotchke shelves” with a small engraving.

This tutorial assumes a basic understanding of the ShopBot and the design is ready to cut (i.e. you have finished your design in Aspire and designated toolpaths).

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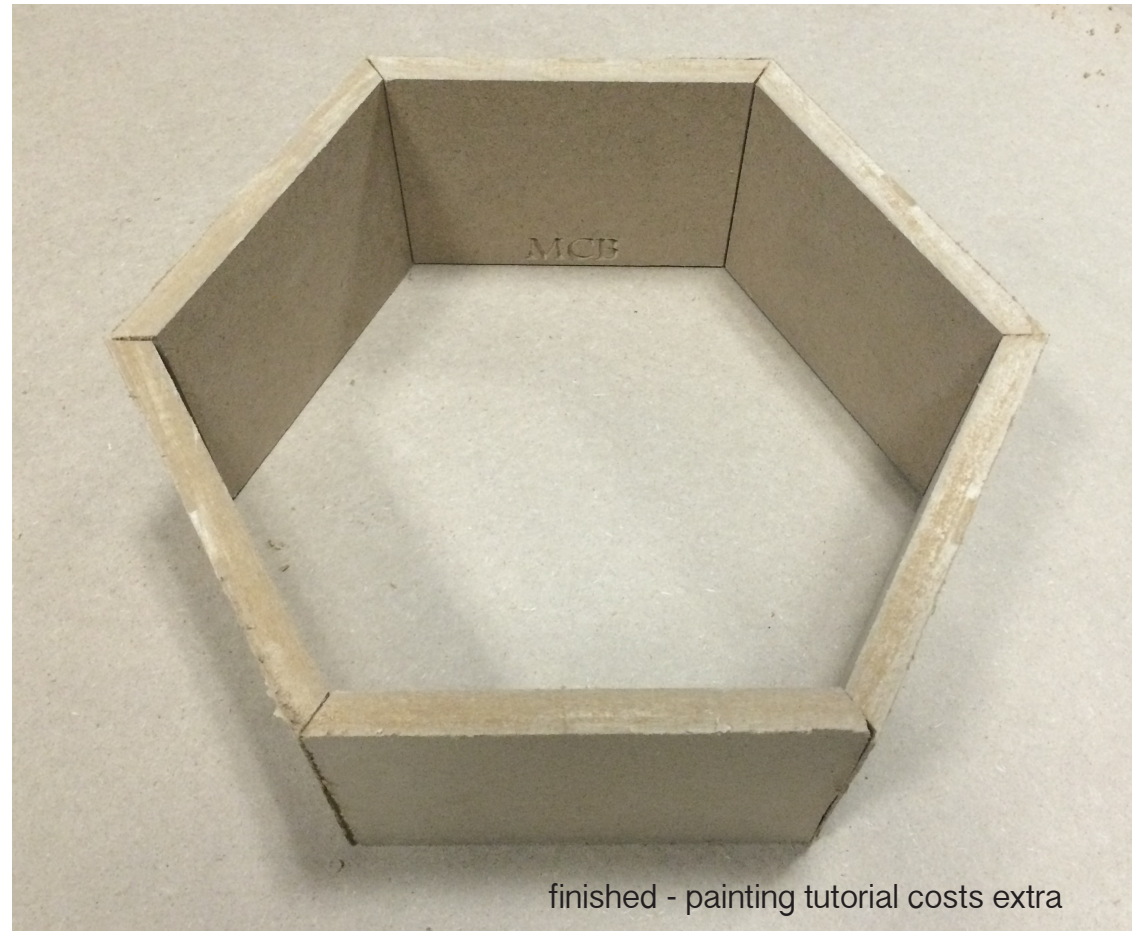
X&Y Zeroed

Z Zeroed

Chip Load Calculated

GO!

Aftermath



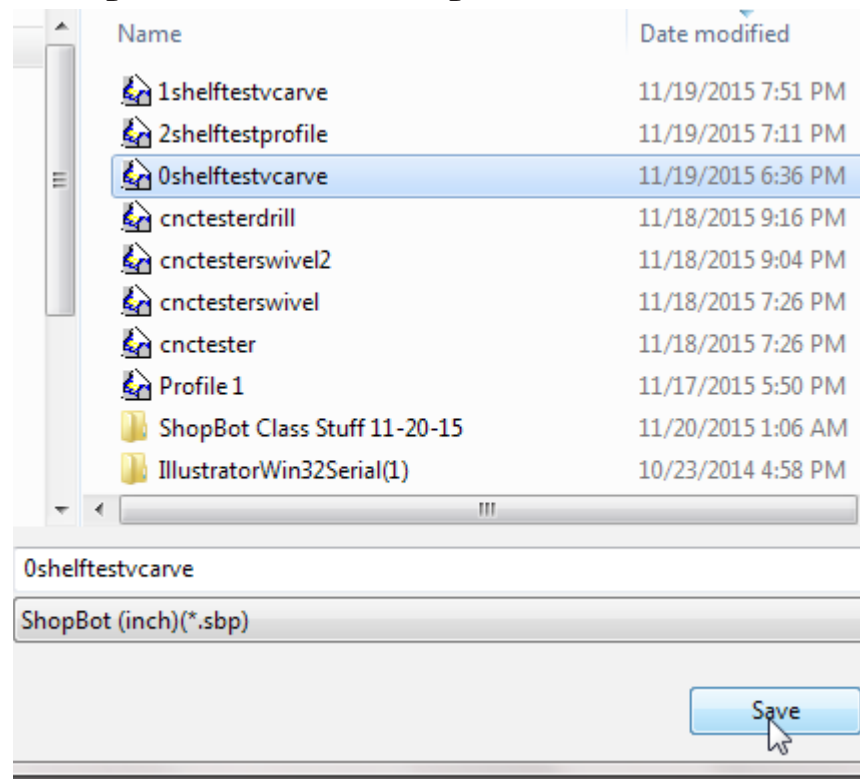
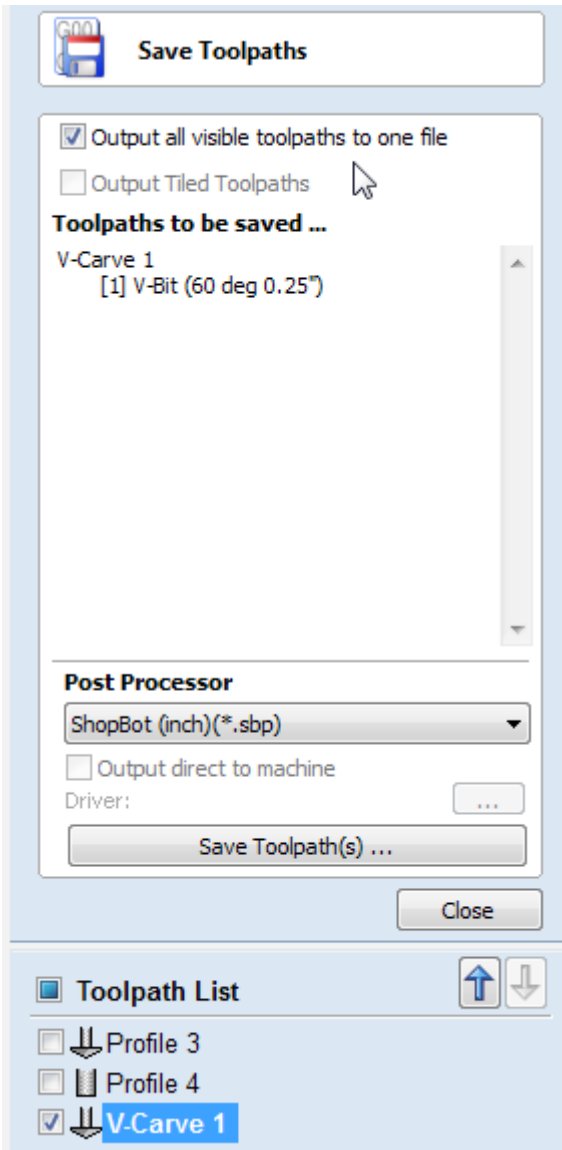
finished - painting tutorial costs extra

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SAVING TOOLPATHS

- In Aspire, in the right-hand panel, click the “Save Toolpaths” button.
- For now, check the “Output all visible toolpaths to one file” box, then check and highlight the toolpath you want to save.
- Name your toolpath something so you can remember what bit to use and when to run it. This is the text engraving so I’ve called it “0shelftestvcarve.”
- Repeat for other toolpaths.



REMEMBER!

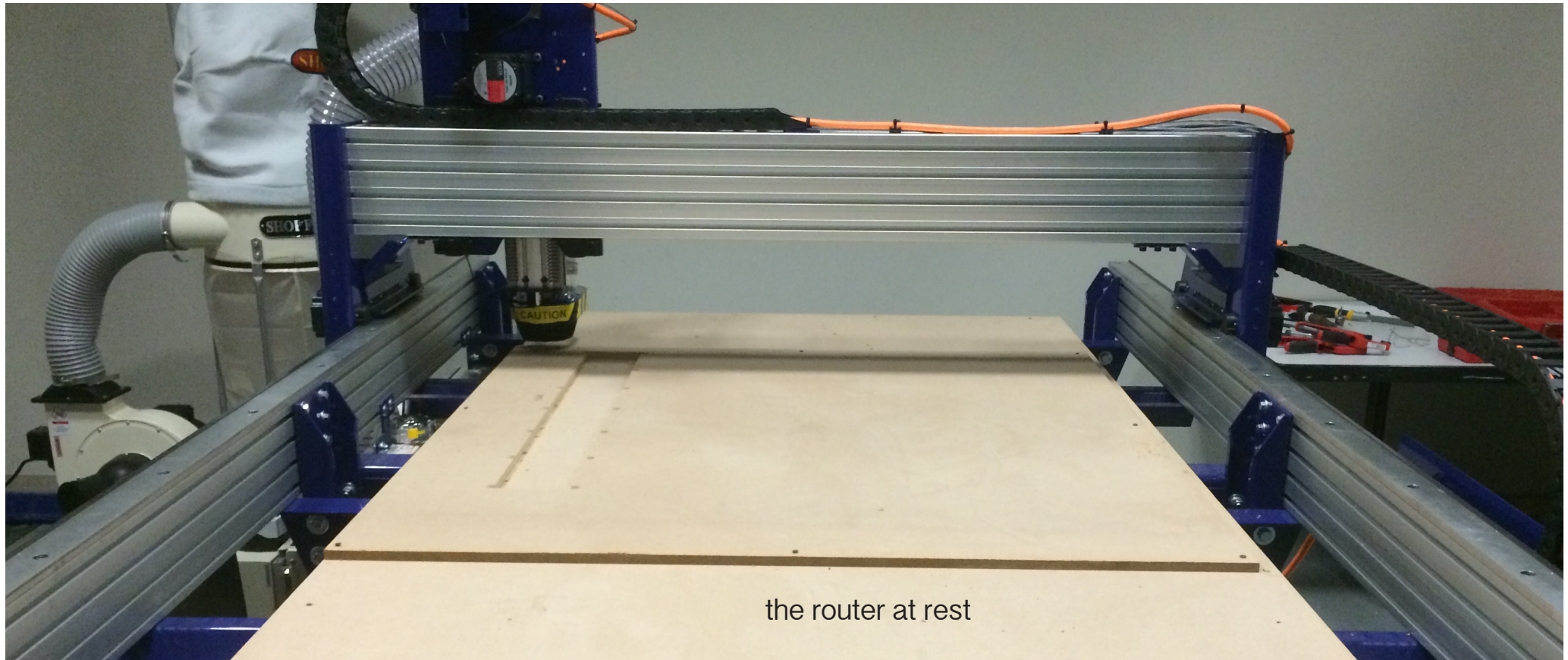
If you change your file, you **MUST** recalculate the toolpath before saving.

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FIXTURING

- Secure the spoilboard and stock to the bed in such a way that they are held down as flat as possible.
- Check to ensure that the bit will not hit screws or other fixtures.
- Drill a pilot hole to keep the material from “crawling” up the screws.
- Flat, level stock will save you a lot of trouble down the road.
- Below, the 4x8' MDF spoilboard with 4x4' MDF stock screwed onto to it. A test part has already been cut.



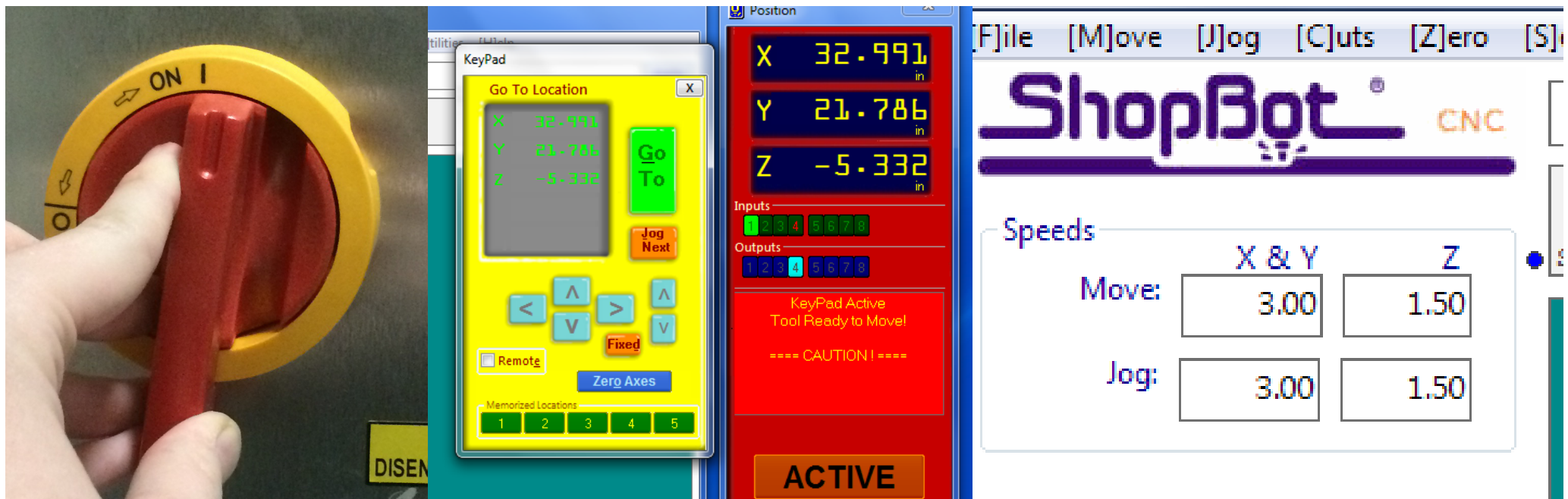
the router at rest

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TOOL CHANGING

- Turn on the control box.
- Open ShopBot 3 on the ShopBot computer.
- ShopBot has menus but runs best on the command line. To test this, type [K] (no brackets) and use the arrow keys to practice driving it around.
- Move the bit to the front of the bed where you can easily access it. Press PgUp to lift it about 8 inches away from the material.
- If the movement is noisy, that is not dangerous, but it will run faster and quieter using the settings in the right picture.



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TOOL CHANGING

- To access the tool, the dust skirt must be temporarily removed.
- Loosen the knob on the front of the router and ease the skirt down.
- If you can't easily access the bit, remove the skirt by pulling the pin on the left of the hose and sliding the skirt towards you, away from the spindle.

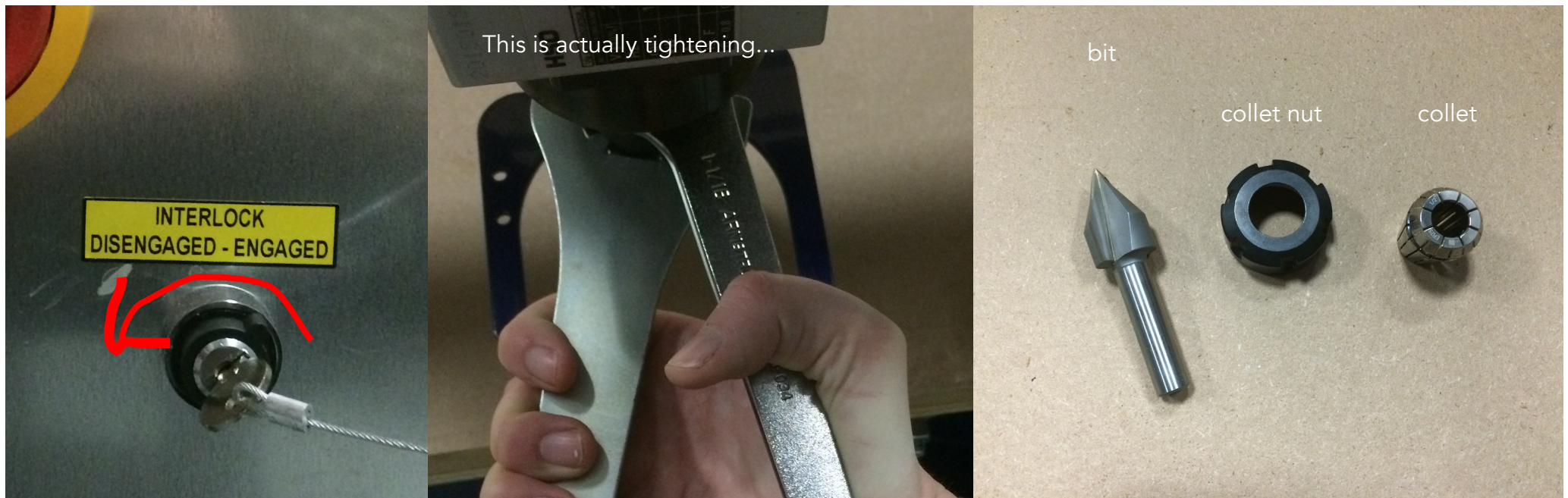


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TOOL CHANGING

- Remove the key that attaches the collet wrench to the interlock by turning it to “DISENGAGED.” The spindle cannot turn on if the key is not “ENGAGED.”
- Grab both wrenches and seat them into the spindle and collet nut respectively.
- The TOP wrench moves counter-clockwise to loosen the collet. Then you can loosen by hand.
- The collet usually has a safety catch ~0.5” down to let you know that the bit is about to fall out. Nudge past the catch with the wrenches and be careful not to let the bit fall on anything hard, like concrete.



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TOOL CHANGING

- sit the collet upright on the table and put the collet nut on top of it. Press down with the palm of your hand until the collet pops into place.
- Slide the bit into the assembly as far as it will go. If your bit is fluted, leave 0.125" between the flute and the collet to avoid kicking dust into the machine.
- Thread the collet nut onto the spindle. Be careful not to cross thread, it should easily screw in at first. Hand tighten as much as possible, then use the wrenches to tighten the rest of the way.
- Do not overtighten. Just make sure it is secure.
- Replace the dust skirt so that it sits about 1/4" above the bit.



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X&Y ZERO

- Move back to the computer and drive the router to “Part Home” the point on the bed you want to correspond to the bottom left hand corner/origin of your Aspire file. “Machine Home” is the corner of the ShopBot bed closest to the power switch. The long side of the ShopBot is the X axis.
- When you have driven to your Part Home, press [ESC], then type [Z2] to (z)ero on (2) the X&Y axis.
- Check in the red Position window that X and Y both read 0.000.

The screenshot displays the ShopBot software interface. On the left, a menu is open with the following options: [Z]ero, [S]ettings, [V]alues, and [T]ools. Under the [Z]ero option, there are several sub-options: zero [X] axis, zero [Y] axis, zero [Z] axis, zero [2] axes (X and Y) (which is highlighted by a mouse cursor), zero [3] axes (X, Y and Z), and zero [I]able base coordinates. On the right, the 'Position' window is visible, showing the current coordinates for the X, Y, and Z axes. The X and Y axes both read 0.000 in, and the Z axis reads -4.774 in.

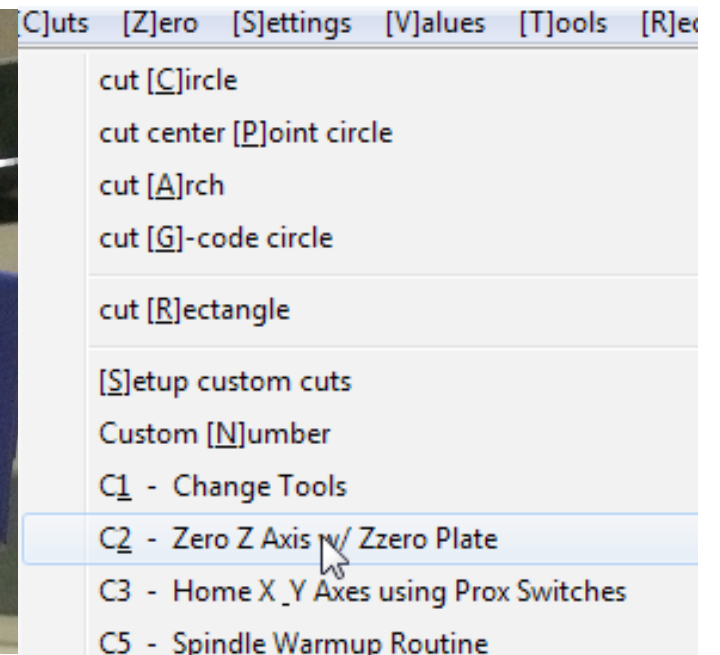
Axis	Value (in)
X	0.000
Y	0.000
Z	-4.774

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Z ZERO

- Drive the router somewhere over your stock that you think represents a level part of the material.
- Remove the plate from the side of the router and clip the alligator clip onto to something electrically conductive to the bit. To double check this, look at the Input 1 indicator in the Position window. Tap the plate to the bit. If the light turns on when you touch the bit, you have conductivity.
- Do NOT attempt to run the Z-Zeroing routine if the plate is not conductive.
- Place the plate below the bit and type [C2] (Don't forget, you have to [ESC] out of the keyboard commands to do this.) You will receive a safety prompt, then the bit will come down, kiss the plate, pull back a little bit, then come back down more slowly.

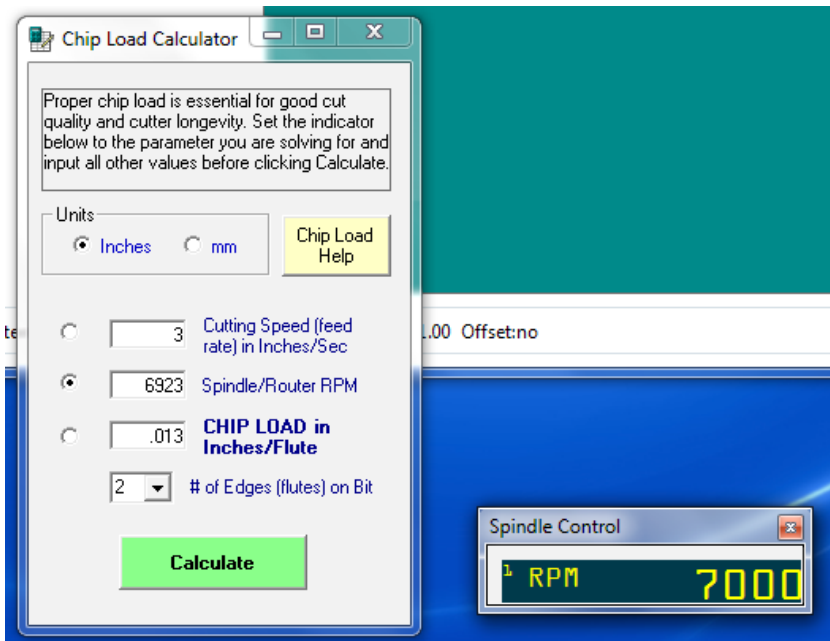


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CHIPLOAD CALCULATOR

- For the VBit, the default spindle setting of 12,000 rpm will work at our feed rate. Refer back to this page when it is time to cut with an endmill.
- Refer to http://www.shopbottools.com/mTechShop/files/ChipLoad_inch.pdf for an overview of how to work with chiploads to determine spindle speeds.
- In ShopBot 3 go to Tools > Chipload Calculator and enter in your Feed Rate (3 ips) and your chipload (for MDF with a 1/4" endmill, I chose a chipload of 0.013.) and the number of flutes on your bit (2). Then hit "Calculate."
- To set the spindle speed, highlight the current RPM in the Spindle box on the bottom of the screen and type your new value. Then press enter. Your speed should change on the physical spindle as well as on the computer.



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GO! (AND STOP)

- You're ready to run your part! Double-check all the previous steps. Make sure you are wearing eye protection. You may also want ear plugs.
- Go to File > Part File Load. Turn on the dust collection by pulling the yellow and red tab on the vacuum toward you. Press the big green Start button in the Position window.
- You MUST be within arms reach of an e-stop at all times. The left mouse click, the space bar, and the big red "STOP" button are all stops while the tool is in motion. They communicate with the tool via the software (i.e. a soft stop.) For a hard stop to cut electrical power to the tool, turn the router off using the same knob you used to turn it on.



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ALL DONE

- The End! Remove your material from the bed and cut your part from the waste with a flush saw. Don't forget to clean up - vacuum, put tools away, etc.!