

HOW TO USE THE CNC MILL: 4-Axis

If 4-Axis is not installed, inform Lab Staff and they will switch it out for you.

Prepare your file...

1. To use the CNC Mill, you are going to need an STL file, same as you would use for a 3D printer.

Make sure to have the file sized correctly ahead of time, as this will make the setup process much easier.

2. If the file is one off of Thingiverse, you can resize it in the program once it is loaded in, so don't be too worried if it isn't the exact size you need.

Preparing the Mill...

1. For this, you must use the laptop next to the CNC Mill, and it must be logged onto the wayne39 account, which any lab staff or tech support staff can help you with.



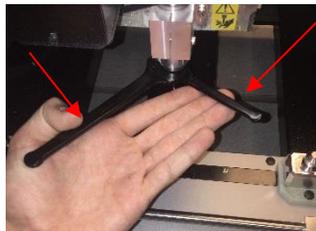
2. First, select the program VPanel and open it

3. Once the program is open, the first thing you want to do is set up the detection jig. You'll see the button for it in the program, but you have to first set up the Mill for it.

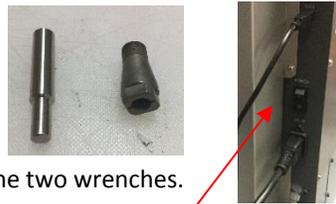


4. To do this, grab the Detection bar in the basket next to the Mill, and secure it in the holder inside the Mill as shown in the image on the right. You also need to grab the detection pin and collet out of the basket as well.

5. To put the detection pin into place, there are two wrenches in the basket next to the Mill you will use. They fit onto the router bit with the large on top, and the small on bottom. To loosen, push the wrenches toward each other, and away from each other to tighten it.



6. Once loosened, remove the drill bit and unscrew the current collet, and replace them with the new collet and detection pin. Then, tighten the detection pin in place with the two wrenches.

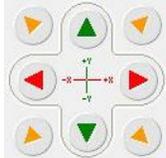


7. Now that the detection bar and the detection pin are installed, close the window and turn on the machine. There are two power switches, the first is at the back next to where the cables plug in. After this switch has been flipped, push the green power button on the front of the machine, and it will do its initialization.

8. With initialization complete, return to the laptop and click the Detect Jig button, and start the detection. The machine will run itself until the process is done.

9. With detection done, open the window and remove the detection bar and replace it with the material you will be using. Keep the Detection Pin installed. For tips on placing your piece correctly, ask Lab Staff.

10. With your piece and the Detection Pin installed, we now want to set up Axis Origins. You do this from VPanel by selecting your axis and where it should be centered. First, select to set the Y Origin and Z Origin at the center of rotation, and hit Apply for both.



11. After that, you want to set your X Origin at the far right side of your piece. To do this, use the motor controls in VPanel to move the bit above the far right edge of your piece.

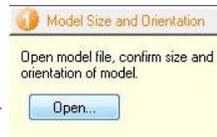
12. Now, use VPanel to set "X Origin Here" and hit Apply.



Preparing the print...

1. Now open the SRP Player right next to the VPanel icon on the desktop.

2. This process will be much simpler if your piece is already sized correctly. You can check this from the dimensions listed on the right side.



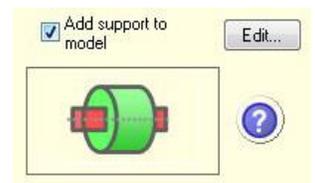
3. First, open your stl file with the open tool on the right side of the screen.

4. Next, orient your object using the buttons at the right side of the screen.

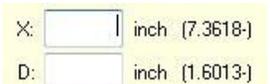
5. Once oriented, click on "Type of Milling" to move on to the next section.



6. Here, simply select the quality settings that match your stl file. At the the bottom, there is also the option to add support. You're going to want to do this if the file doesn't already have support built in. You may also need to click on edit and move the support structures to where they need to be.



7. Click to the next tab. Here, you need to select what type of material you are using, and the dimensions of your piece. Simply enter the length and diameter in this case.



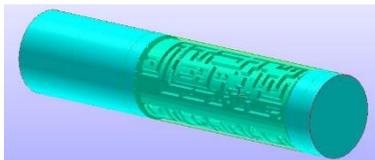
8. Once all that is done, select "Create Tool Path". This will take a second to load.



9. Once that has loaded, select the button next to “**Create Tool Path**” that says “**Edit**”.
10. Here, there will be each step shown of the cutting process. You will see two processes, roughing, and finishing. For each of these, you are going to want to select the bit that you are going to use for each process. While they can technically be the same, the process will go much quicker if you select different bits for each process.
11. For roughing, select a bit either 1/4 in or 1/8 in in size. If your stl file has many curved surfaces, use a ball head bit. If it has flat surfaces, use a square head bit. To tell the program which you are using, open Roughing > Ball/Flat. Here simply select the tool you are going to use.
12. Now, do the same for Finishing, except use a bit 1/16 in or smaller. The smaller the bit, the longer the time, so only go as small as you need.

Note- If your bits are different sizes, you will have to change out the bit halfway through your cut.

13. Now that you have your bits selected, click to the next tab. Select “**Preview Cutting**” to get an idea of whether your cut is going to come out the way that you want it to or not.



14. If this looks good, click to the next tab. If not, go back to the Tool Path Editor and change the bit size so that it accommodates your piece.
15. In the next tab, there is a box with the tools you selected in it, so you can double check those are correct. Once that is correct, select “**Start Cutting**”.
16. This will prompt you to install the listed bit. Use the wrenches once again to remove the detection pin, and then put in the listed bit. When putting in the bit, you’ll see a faint line on the bit where the metal changes color. This is how far in the collet the bit should be.
17. Once installed, you are ready to start the cutting process.



During cutting...

1. At some point, the cutting will stop, and the computer will prompt you to install a new bit for the second process. Hold down “**View**” on the front of the machine, and it will pull the piece toward you. Once it stops moving, open the cover, remove the old bit and install the new one.

2. You can also take this time to sweep up any shavings with the shop vac under the table. This will make it easier for the mill, and will also provide you with a better view of the process.
3. Once you are ready to begin again, close the cover, return to the program, and hit resume.

After cutting...

1. Once your cut finishes, you can hold down “**View**” once again to bring your piece forward. Once it stops moving, open the cover and remove your piece.
2. ****Please clean up after yourself**** There is a shop vac under the table that you can use to sweep up any mess left behind by the mill.
3. Once everything is cleaned up, close the cover, hold down the green power button on the front, and flip the power switch on the back off.