

Machining with the TECHNO CNC cells

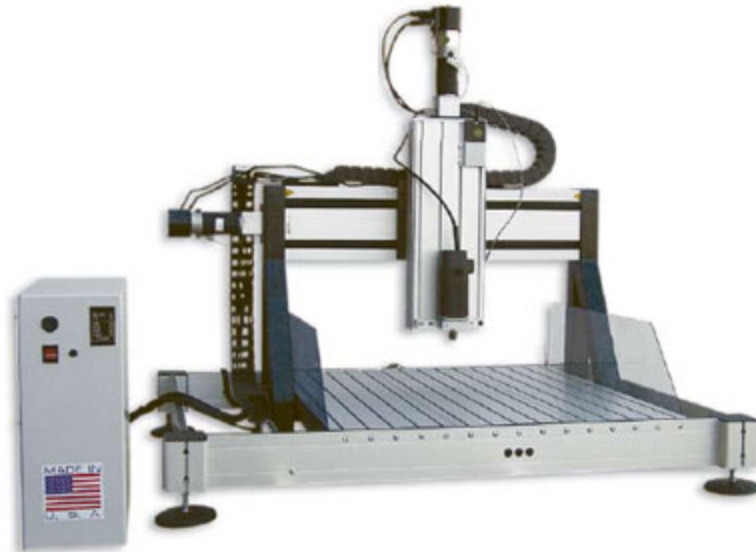


Figure 1: Techno CNC machine similar to those in B19

This handout is intended to be a brief refresher on operating the TECHNO CNC cells in B19. For this class, we will only use the two smaller table-top machines (as shown in Figure 1) that are located along the southern wall of the machine shop area. If it is necessary to machine a part larger than the smaller table-top machines will allow, the large CNC machine can be used under TA supervision (contact either Jason Mayes or Jason Nightingale).

IMPORTANT: when operating any machinery in B19, all machine shop rules must be followed. These include, but are not limited to

- 1) Wear proper eye protection (goggles are available).
- 2) Do not work alone.
- 3) Follow dress-code requirements (no open-toed shoes, hair tied back, ect).

Failure to follow these and all other rules will result in the loss of use of the machines, and possibly failure of the course.

Turning on the TECHNO CNC ROUTER

1. Turn on the machine by flipping the red button located on the front of the controller. When the machine is powered up, five green LED's will be lit up. The power button is shown in Figure 2.
2. On the PC nearest the CNC cell in use, double click the "Techno CNC Interface" icon located on the desktop. This will launch the user interface (Figure 3) through which you will load, control, and execute the .nc files you create.

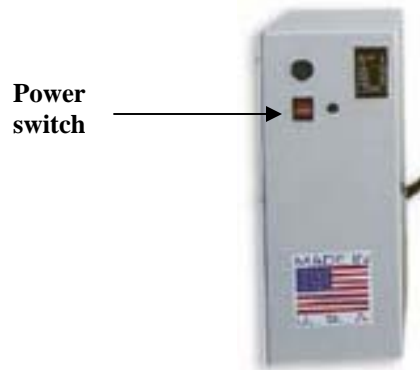


Figure 2: The controller for the TECHNO CNC Router.

Loading a File

1. push the “File” button on the user interface
2. navigate to the folder where your files are located
3. push the “Remember this Folder” button if you will be running multiple sequences out of this folder
4. Choose the file you want to execute and push the “OK” button.

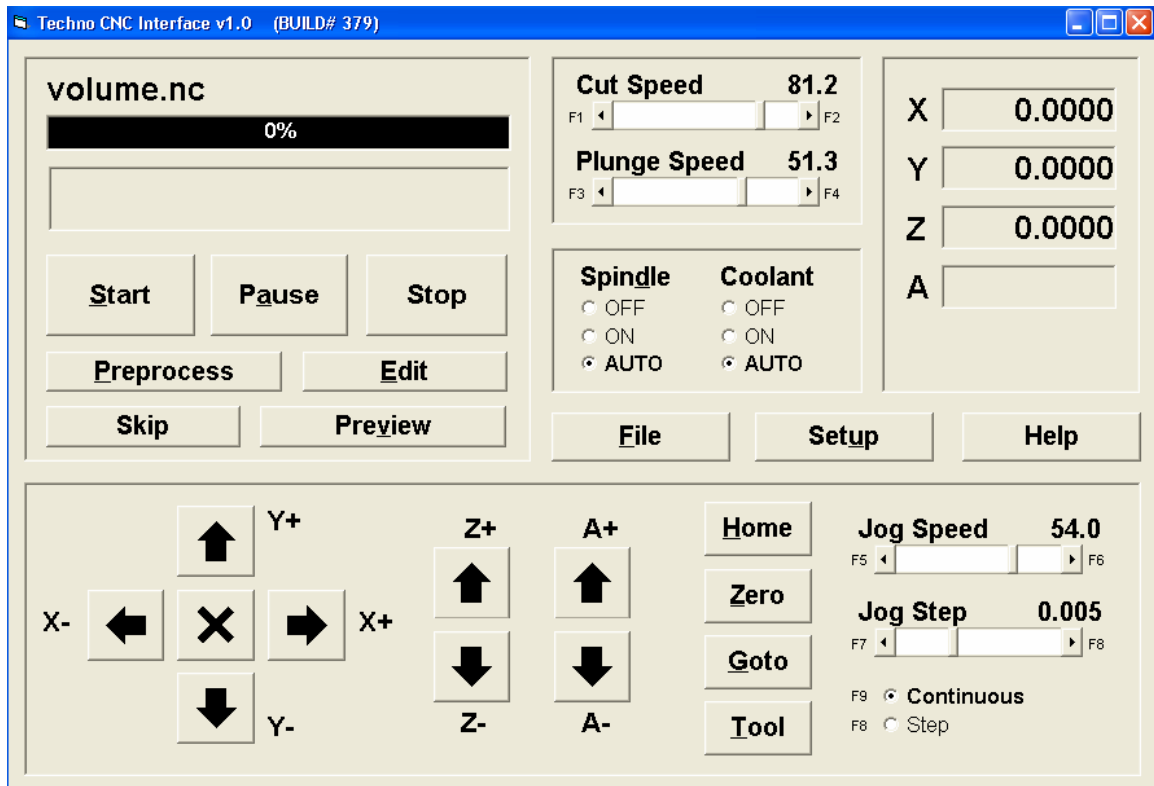


Figure 3: The user interface

Previewing a File

1. Push the “Preview” button to preview a file. Previewing will allow you to see the tool path the bit will follow. Note: the tool path is the path the center of the tip of the bit will travel, not the edge.
2. Orient the preview to better see the tool path. This can be done by using the buttons “Top” and “Fit.” Top will orient the view so you will see it from directly above. Fit will scale the view to fit the screen.
3. push “Exit” when you have finished previewing the file

It is important to preview the file for several reasons. From the preview screen, you should be able to see if you have selected the correct file, if there is anything incorrect in the tool paths, and what the orientation of the part is with respect to the x-y coordinates of the machine. From the top view, the origin, x, and y axis are shown using two red lines as shown in Figure 4.

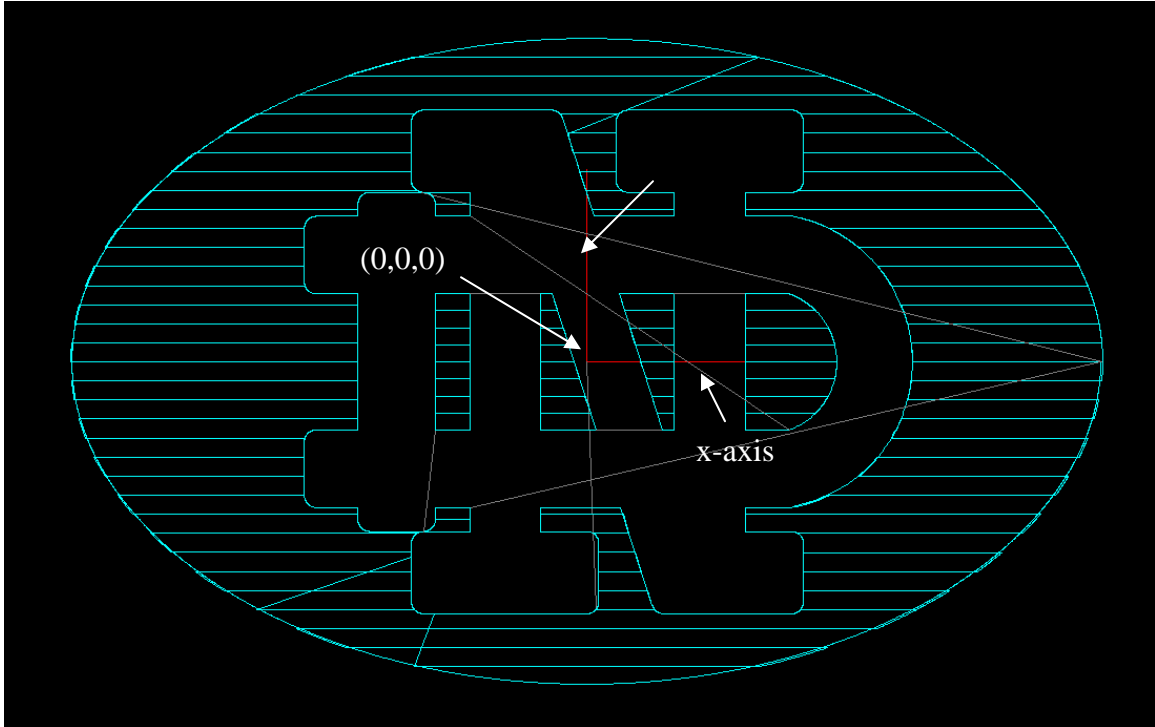


Figure 4: Top view of the file volume.nc for the NDLogo.prt

Preprocess the File

Before a file can be executed, the file must first be preprocessed to load the tool paths. Push the “Preprocess” button to load the tool paths for the .nc file.

Preparing the Stock for Machining

Before machining it is important that the stock the part is to be machined out of is securely clamped to the table.

1. Make sure the table and the stock are clean and clear of any debris.
2. Using the controls on the User Interface, make enough room to clamp down both the stock and a piece of scrap material for a backing.
3. Clamp the stock down on top of a piece of scrap using at least 3 'stair clamps.' Be sure to tighten the clamps enough that the stock will not move during machining.
4. Be sure that both the bit and the gantry holding the router will not strike any part of the clamps during machining.

Zeroing the tool-bit

1. Using the controls on the interface, move the tool to the approximate location on the stock of where you want the (0,0,0) of the part to be.
2. Change to Step Mode on the user interface to make fine adjustments. You can also change the step size.
3. Place a piece of paper on top of the stock and slowly lower the bit until the paper is 'pinched' between the stock and bit.
4. Push the "Zero" button on the user interface and then choose "All" to zero all of the position counters.

Running the File

1. Check that the feed rate and spindle speed are correct for the stock material. For HDPE, the spindle speed should be set to about "3" on the router and the federate should be set to approximately "80" on the user interface. The plunge speed should be around "50."
2. Push the "Start" Button. After pushing start, the interface will ask you to Load Tool. Since you have already loaded the correct bit, push "Resume." The router will then spin the bit up to the specified spindle speed. There is a 10 second delay from the point at which you push Resume and the start of the sequence. If the spindle does not speed up, pause the process using the "Pause" button on the remote control attached to the controller and turn the collar on the router to the ON position. **WHEN THE FILE IS BEING EXECUTED, YOU CANNOT PAUSE FROM THE USER INTERFACE. BE SURE YOU ARE ALWAYS MONITORING THE PROGRESS OF THE SEQUENCE WITH THE REMOTE.**
3. When the sequence is complete, the bit will return to the (0,0,0) location you have specified. At this point, you may use the user interface to clear the router away from the stock to unclamp the part.

IMPORTANT: While a sequence is being executed, you CANNOT pause it from the User Interface. Be sure to have access to the remote in case of a problem. Remember, if you pause a program, it will continue to run whatever line of code it has already processed and will only pause after it has been completed. If you need to abort a sequence immediately, use the Emergency Stop button on the remote.

Cleaning Up

You are responsible for cleaning up any debris from the machining. Use the brush and vacuum to clean the table, computer and floor. Please remove left over stock from the machining area.