

ShopBot BT48 PRSAlpha Protocol

Machine Specifications

maximum stock dimensions - **24"x48"x5" or (48"x96"x5" - requires special permission)**

toolholder collets (diameter) - **1/4", 1/2"**

maximum spindle speed - **18,000 RPM**

maximum cut feed rate - **300 IPM (inches/minute)**

mechanical resolution - **0.005"**

recommended materials - **wood, plywood, mdf, tooling foam, machinable wax**

File Preparation

Please prepare a clean RhinoCAM file with MOPS procedures you will use to complete your project. Each MOPS procedure should specify the cutting tool as well as an appropriate feed rate, spindle speed, and cutting depth appropriate for the materials you will be processing. Once your file is ready to go, you may submit it to John Leahy for approval. Please name the file using the format: **(uoregon email id)_(material).3dm**. After he approves your file, he will make a reservation for you to complete your project.

Job Preparation

Please have your material stock cut to size before coming in for your reservation. Secure your stock using either wood screws or clamp blocks and wedges. Use general purpose or sheetrock screws with a length appropriate for securing your stock to the wastebord. **DO NOT ALLOW SCREWS TO POKE THROUGH THE WASTEBOARD!** John or a Shop Tech will assist with loading your cutting tools and setting the height for the dust shroud.

Initializing the ShopBot

Turn on the power to the **Control Box** using the red switch on the side of the aluminum case attached to the base of the ShopBot. Press the blue **RESET** button on the yellow **E-STOP Pendant** (you should see numbers appear on the **VFD Box** mounted to the wall). Before sending your job, you will need to warm up the spindle bearings if the ShopBot has not been used in the past hour.

Spindle Warm-Up Procedure

WEAR EYE AND EAR PROTECTION!

Open the **ShopBot 3** controller software on the iMac workstation. This should open both the **ShopBot Console** window and the **ShopBot Position** window. **Input Channels 2 & 3** should have a green circle with a solid yellow ring around it. **Input Channel 4** should have a green circle with a solid red ring around it. If **Input Channel 4** is flashing, press the **RESET** button on the yellow **E-STOP Pendant** again. In **ShopBot Position** window, click on the yellow icon just beside the **Move/Cut|Preview Switch** to open the **ShopBot Keypad**. Press **alt+1** or click on **Output Channel 1** to turn it on. Please note that while **Output Channel 1** is on, opening any other window or application on the workstation will turn it back off. A solid blue circle should appear for **Output Channels 1 & 4**. Walk over to the **VFD Box** mounted on the wall and adjust the frequency for the spindle speed to **3.0** (3,000 RPM). Press the green **START** button on the **E-STOP Pendant** to turn on the spindle. Allow the spindle to run for **2 minutes** at 3,000 RPM. Then, continue to raise the spindle speed slowly using the keypad arrows on the **VFD Box** to **6.0** and run the spindle for another **2 minutes**. Continue to slowly raise the spindle speed and allow it to run for two minute increments at **9.0, 12.0, 15.0, and 18.0**. When finished, go back into the lab and press **alt+1** or click on **Output Channel 1** to

turn off the spindle, and close the **ShopBot KeyPad** window.

Setting an Origin

Before outputting your file, you must first zero your X, Y, and Z coordinates on the machine. This must be done everytime the machine is turned on. It does not maintain an origin from a previous job. You must first establish a common origin between your material stock location and the virtual stock you created for your MOPS set in RhinoCAM. It is recommended that you mark your material stock origin to assist with accurately positioning the tool. Open the **ShopBot KeyPad** and use the direction arrows on the KeyPad to position the tool in the X, Y, and Z axes about 2" above the mark you made on your material stock. Use the right-hand rule to orient the arrows on the **ShopBot KeyPad** with the positive X and Y axes directions marked on the wastebaord. In the **ShopBot Console** window, open the **Zero** drop down menu located at the top, and select **zero [2] axes (X & Y)**. Verify in the **ShopBot Position** window that the values for the X and Y axes read **0.000**. Before zeroing the Z-axis, make sure the tool is positioned over enough of your stock material to provide a level and stable surface for supporting the **Z-Zero Plate**. If needed, use the **ShopBot KeyPad** to position your tool. Remove the **Z-Zero Plate** and **Alligator Clip** from the gantry arm on the machine. Clamp the **Alligator Clip** directly to the cutting tool, and position the **Z-Zero Plate** directly underneath. Return to the lab workstation and click on the **Z-Zero** graphic button located just below the drop down menus in the **ShopBot Console**. Clicking the **Z-Zero** graphic button will open a **Pause in File** window. Verify that the **Alligator Clip** is securely clamped on the cutting tool and the **Z-Zero Plate** is positioned directly underneath. If everything is in position, click **OK** in the window. The cutting tool will move down in the Z-axis to make contact with the plate twice. A new window will prompt you to remove the **Alligator Clip** and store the **Z-Zero Plate**. After you have placed the **Alligator Clip** and **Z-Zero Plate** back in place on the gantry arm, verify that the Z-axis reads **1.000** in the **ShopBot Position** window. If it doesn't, or you received an error anywhere in the process, consult with John.

Outputting Files

WEAR EYE AND EAR PROTECTION!

TURN ON THE DUST COLLECTOR AND OPEN THE BLAST GATE!

You are now ready to output your cutting file. Post your MOPS set from RhinoCAM and save it as an **.nc** file to the desktop. Take the time to review the nc code and verify that **positioning values** for the X, Y, and Z axes seem correct. Also, verify that the **cutting feed rate** is appropriate for the material being cut. If uncertain, please consult John before continuing. After you have verified that your **.nc** file is ready to go, press **alt+1** to turn on **Output Channel 1** (if you open the **ShopBot KeyPad** window to do this, you must close it before loading your part file). This is a very important step. BE SURE TO TURN ON OUTPUT CHANNEL 1 BEFORE LOADING YOUR PART FILE! If you don't, the spindle will not turn on and you will damage the machine, the cutting tool, and your material. Please note that while **Output Channel 1** is on, opening any other window or application on the workstation will turn it back off. If **Output Channel 1** is on and has a solid blue circle, you may load your part file by pressing **alt+L** or clicking the **Load Part File** button in the **ShopBot Position** window. Select your file with the correct **.nc** extension and click open. This will open a **Pause to START ROUTER/SPINDLE!** window. Verify that **Output Channels 1 & 4** are on and have solid blue circles. Walk over to the **E-STOP Pendant** and press the green **START** button to turn on the spindle. Do not proceed if the spindle doesn't turn on. Allow the spindle to turn on and rev up to speed. Adjust the spindle speed to an appropriate value for cutting your material using the arrow keys on the **VFD Box** mounted to the wall. Turn on the **dust collector** and open the **blast gate** for the duct connected to the ShopBot. Return to the lab and click **OK** in the **Pause to START ROUTER/SPINDLE!** window. The Shop-

Bot will begin outputting your job, and the cursor will become locked over the **STOP** button in the **ShopBot Position** window. Clicking on the **STOP** button or pressing the **spacebar** will pause your job. If the job is running smoothly, have a seat next to the ShopBot beside the **E-STOP Pendant** and watch your job carefully. If something goes wrong, hit the **Big Red Button** on the **E-STOP Pendant** to immediately cancel your job. This will immediately cut power to the machine. Never hesitate to use the **Big Red Button**. Having to take the time to restart the machine and your operations is more prudent than potentially damaging the machine, tool, or your material. Be sure to wear eye and ear protection while running your job. Never go behind the safety curtain while the ShopBot is running. It can be very dangerous to go behind the safety curtain. Because the ShopBot table is moving, this presents a very high risk of injury. There is no need to go behind the safety curtain to verify if a job is cutting correctly. Just watch carefully beside the **E-STOP Pendant** and listen for smooth and even tones while the ShopBot is cutting. If anything sounds strange, pause the job and consult with John.

Cleaning Up

When the ShopBot has finished outputting your file, close the **ShopBot 3** software and turn off the power to the **Control Box**. Turn off the dust collector, if no one else is using it, and close the blast gate for the duct connected to the ShopBot. Vacuum up all swarf and dust on and around the ShopBot. The area behind the safety curtain should be completely clean. Remove the crews or clamps used to hold your material and ask John to help you remove the cutting tool from the spindle.

Checking Out

Total your estimated run time for the MOPS set in RhinoCAM. The operating cost for the ShopBot is \$0.50/minute. Please see a Shop Tech for payment with campus cash.