



# MAKER LAB Safety Instructions Specialty Tool Training: ShopBot



**Note:** All the instructions from Basic Training apply to Specialty Tool Training. If you have not completed Basic Training, do so before you complete Specialty Tool Training.

## ShopBot Desktop CNC Router

The ShopBot table router is a computer-numerically-controlled three axis wood router (CNC Router). It can perform precise cutting, drilling, machining, and shaping of wood and used mostly for decorative pieces.

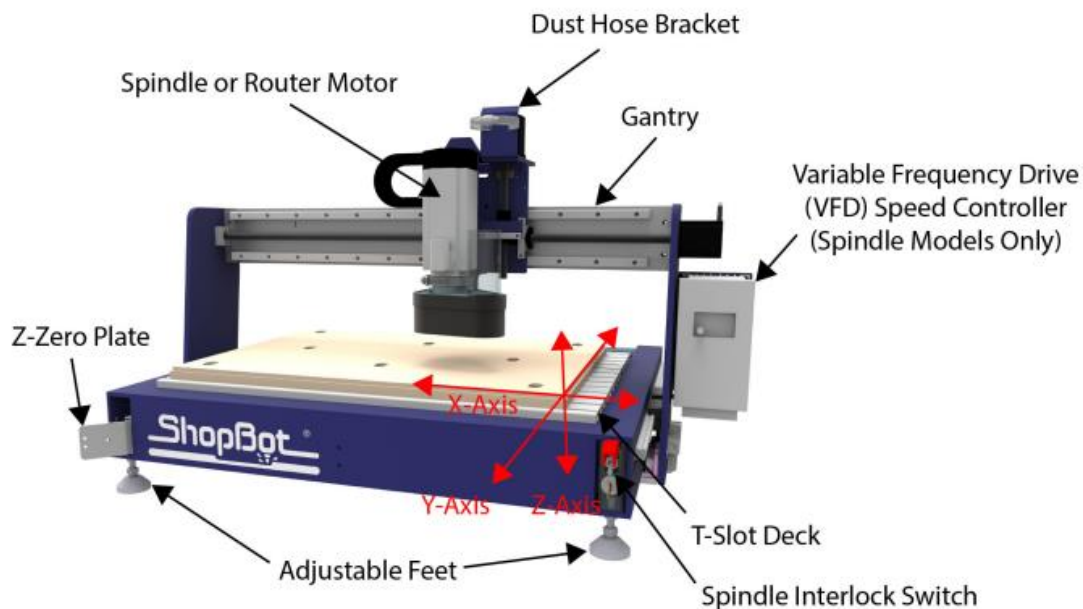


Figure 1: ShopBot

This Maker Lab Safety Instructions and Safety Training only covers the use of the ShopBot Table Router. Individual equipment training is performed for usage of Specialty Tool Training equipment.

**Disregarding lab rules or working unsafely will result in suspension or revocation of lab privileges depending on the severity of the infraction.**

**In an Emergency:**

**Call 4444 from the lab phone (or 408-554-4444 or 911 from a cell phone).**

The Maker Lab is located at 455 El Camino Real, Rm 301 (3<sup>rd</sup> floor)

**Maker Lab Website:** <http://makerlab.engr.scu.edu>

**Maker Lab E-mail:** [scumakerlab@gmail.com](mailto:scumakerlab@gmail.com)



# Specialty Tool Training: ShopBot Safety Guidelines

## Emergency Information

1. **Injuries:** For immediate help notify Campus Safety at x4444 (408-554-4444) and follow their direction. Do not attempt to remove foreign objects from the eye or body; it is better to have trained medical personnel remove foreign objects from the eye or body.

## Being ready to work

2. **Do not operate** equipment unless you have been properly trained to do so. If you're unsure about the safe operation of a tool or any aspect of a job – ask for help. **If you can't do a job safely, don't do it!**
3. **Never work when you are impaired.**
4. **Be prepared** and have your file ready and plan ahead before coming to the Maker Lab.

## Personal Protection

5. **Never work alone.** At least two people must be in the lab at all times when operating power tools and equipment. An approved Maker Lab Supervisor must be present.
6. **You must wear safety glasses with side shields at all times.**
7. **Hearing protection** is recommended.
8. **Must wear appropriate apparel.** No loose clothing or jewelry, closed-toed shoes, hair tied back.

## Shop and Tools

9. **Always keep aisles, exits and access to emergency equipment** (fire extinguishers, fire alarms, first aid kit) clear at all times.
10. **Become familiar** with how the ShopBot works and the dangers before using it. Ask for help!
11. **Verify the overall condition of the equipment and the material being** used (e.g. condition of bits, debris buildup, defects in the tool housing or anything that would compromise the safe use of the ShopBot).
12. Keep the area around the machine clean and free of clutter and trip hazards.
13. Pay attention to the machine at all times.

*Sign and date in space provided, verifying you have received a copy of and have read and understand the safety instructions.*

**Student Name:** \_\_\_\_\_

**Maker ID:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_



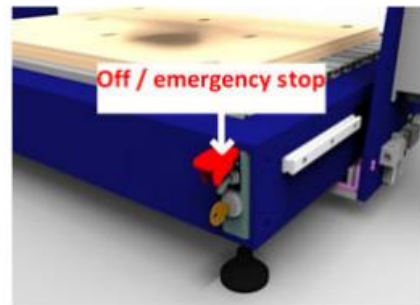
## Specialty Tool Training: ShopBot

You may not operate the ShopBot without the requisite training and approval from the Maker Lab Staff.

1. Always wear protective gear including eye and ear protection and closed toe shoes. Avoid loosely-fitting clothing or dangling jewelry.
2. Keep eyes, hands, hair and clothing away from the ShopBot and router while it is operating. Tie long hair back. Do not use your hands to hold down parts that may come loose as they are cut out.
3. Listen for changes in sound that may indicate a problem while running the tool. **ALWAYS be near enough to be able to stop the ShopBot** should a problem arise (lift the shield or press stop to stop).
4. **You must have yourself (the operator) and one other person on site for safety at all times.**

### Specifications

- Workspace:
  - Width 24", Length 18", Depth 4"
- Input Format: Use Fusion 360 CAD/CAM to save as .sbp
- Material: Wood (plywood, hardwood, MDF, etc.);  
Plastics (ABS, acrylic, polycarbonate, HDPE, etc.);  
Foam (Urethane foam, Insulated foam- pink and blue);  
NO FIBERGLASS

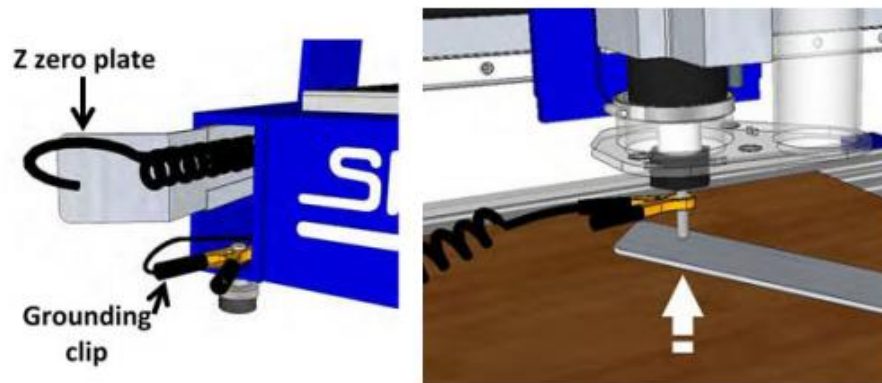


### Operation

A User Manual produced by ShopBot is available in the binder labeled 'Resources' which goes into more detail about the operation and settings.

1. Setting up the Software
  - a. Design your part in Fusion 360 or import a solid model into Fusion 360
  - b. In Fusion 360, set up dimensions of the work piece, choose the origin, set up the tools, set the toolpaths, preview toolpaths, etc.
    - i. Tabs are advised when cutting through the workpiece
    - ii. Think about how you will secure the workpiece to the table to make sure the tool will not collide with any fixtures or screws
    - iii. Refer to the following two tutorials
      1. <https://www.autodesk.com/products/fusion-360/get-started>
      2. [http://shopbottools.com/mProducts/software\\_fusion360.htm](http://shopbottools.com/mProducts/software_fusion360.htm)
  - c. Save the g-code using one of the ShopBot post processors in Fusion 360
2. Prepare the work piece and ShopBot
  - a. Inspect work piece for any nails, staples, large knots (imperfections in the wood) or foreign objects that might come in contact with the bit
  - b. Place the workpiece onto the bed of the ShopBot in the desired location and orientation
  - c. Drill your workpiece into the ShopBot's bed using the appropriate
    - i. Make sure that the piece is completely flat and secured in at least 3 locations
  - d. Turn the ShopBot on by disengaging the emergency switch and flipping the 2<sup>nd</sup> switch upwards

- e. On the top of the router, slide the grey switch upwards to engage the spindle. Don't disengage until you are ready to cut.
  - f. When you are ready to cut, turn the dust collection system on (next to the miter saw) and open the slide on the vacuum port behind the ShopBot.
  - g. Make sure that the screws that are bracing the workpiece are as far out of the way as possible and are not in the way of the bit tool path.
3. Running your project
- a. Open "ShopBot 3 – Run"
  - b. Using the Position (Red) panel, select "Show Keypad" next to the "Move/Cut" switch
  - c. Using the right-most up arrow, make sure that the drill bit is comfortable away from the workpiece
  - d. Use the "up-down-left-right" arrows on your keyboard to move the bit to the pre-specified origin location
  - e. In the "ShopBot Console", in the "Zero" dropdown, select "Zero Axes (X & Y)"
  - f. In the "ShopBot Console" toolbar, select "Zero Z"
  - g. Remove the Zero Plate and the Grounding Clip and configure them as below



- h. Using the "Position" panel, select "Load Part File"
  - i. Load the .sbp file into the software
  - j. Review and confirm the information in the pop-up screen and press start to begin the cut.
4. Safety
- a. Listen for change of sounds that might indicate the machine is having issues
    - i. Broken wood could be stuck in gears
    - ii. Bit could have come loose, etc.
  - b. **To shut off ShopBot in an emergency**
    - i. Press "Stop" on the "Position" panel
    - ii. Flip the red emergency switch down
5. Cleaning up
- a. Push the grey switch on the top of the spindle down to disengage the spindle
  - b. Use the "Position" panel to move the spindle away from the part
  - c. Unscrew the piece from the platform of the ShopBot
  - d. **Make sure to vacuum everything well**
    - i. Be gentle with the electronics inside the housing.
    - ii. Clean up floor around you when done.