



**Truckee Roundhouse
CNC Router Class
Phase 2**

The goal of this Phase is for the students to operate the machine under instructor supervision to show the instructor that they have a basic level of knowledge of how to safely operate the TRH CNC router. The students should come to the class prepared to walk through the following in a small group, and working together with instructor supervision, create, modify and run some toolpaths on the machine.

MENTORING UPDATE

Links to Supplemental Information

- Watch Vectric Tutorials: <http://support.vectric.com/tutorials/>
- [VCarve v.10 Makerspace Edition WINDOWS ONLY Installation Directions](#)
- TRH ShopBot CNC Docs Folder: [Google Drive Folder](#)
 - Especially: [Instructables "CNC 101" Class](#)
 - [ShopBot PRS Alpha User Guide](#)
 - [CNC Router Bit Basics](#)
 - [Holding Down Material for Cutting](#)
 - [ONSRUD Cutting Tool Catalog](#)
- [Freud Guide to Estimating Feed Rates](#)
- [ShopBot Guide to Cutting Plywood](#)
- [TRH ShopBot Pre-Run Checklist](#)
- [ShopBot PRS Alpha Quick Start Guide](#)

Phase 2 (#102): ShopBot CNC Router @ the Truckee Roundhouse - Gaining Proficiency

1. Class introductions
 - a. Name
 - b. Experience with CNC
 - c. What you hope to make
2. Review of CNC Machining at the TRH - Concepts / Overview
 - a. Overview: Multi-Part Process
 - i. Design (CAD) (your PC or Design workstation @ TRH)
 - ii. CAM (your PC or the Design workstation @ TRH)

- iii. Toolpathing
 - iv. Machining (VCarve and Fusion 360 on TRH Machine)
 - b. The TRH ShopBot / 3 Control Software
 - i. How to get started - [Use the checklist!](#)
 - ii. Spindle Warmup
 - iii. Absolute 0,0 / Relative Datums and Zeroing
 - iv. Z-Zeroing
 - v. Take care to confirm Z safe height setting in VCarve
 - c. ShopBot Safety Features
 - i. E-Stops and the difference between E-Stop and STOP with keyboard (delay)
 - ii. Spindle Key / Wrench
 - iii. Dust skirt length (*you may need to follow with ShopVac)
 - d. Review of Toolpaths in VCarve
 - 1. 2D
 - a. Profile
 - i. Tabs
 - b. Pocket
 - c. V-Carve
 - 2. Time estimation
 - 3. Potential machine errors and problems to watch out for
 - a. VCarve initial Z height setting
 - b. Incorrect Datums
 - c. Collet / workpiece interaction (bad to very bad - STOP delay issue)
 - 4. Importing designs from other programs
 - ii. What bits to use for what types of toolpaths
 - iii. Speeds / Feed Rates
 - 1. [Freud Calculator](#) (use with caution!) / [Onsrud Catalog \(2017\)](#) / [2021 Onsrud Current Version](#)
 - 2. ShopBot Desktop Starter Kit (Bits)
 - iv. Make your own tool parameters, don't write over others!
- e. Review of materials and bits
 - i. How to safely change bits
 - ii. Holding down material
 - iii. Current system (clamps and screws)
 - iv. Future system (threaded inserts)
- f. Review of Overall Safety & Liability
 - i. Eye protection at all times when machine is on
 - ii. Dust system on
 - iii. Spindle lock / key
 - iv. Condition of Bits and Speed (More Detail in Links Above)

- v. Importance of Previewing in VCarve / Fusion
 - vi. Emergency Stops
 - vii. Hold Downs
 - viii. Liability - user is liable for damage to machine due to operator error
3. Students Run Machine To Demonstrate Proficiency - Cutting Basic shapes
 - a. Team up in small groups
 - b. Students create and cut a small nameplate or logo sign in plywood.
 - c. Choose a shape and some text, adjust the depth and other parameters
 - d. Create pocket / profile / V Carve toolpaths
 - e. Run toolpaths with bit changes

What's Next - Checklist to Pass a Safety Checkout

Students should be able to demonstrate that they know how to:

- Properly turn the machine on/off (warmup Spindle safely)
- Home the machine
- Prepare and safely attach work of all sizes
- Safely estimate tool path and clearance from hold-downs
- Choose the right bit and adjust it's parameters
- Change tools
- Run from a specific line
- Perform an air cut (3D offset)
- Zero (datum) the machine in different ways (corners, center)
- Clean up the router area after use
- Successfully complete a small project during this checkout.

Schedule your Mentor Hours and Safety Checkout directly with **Brian Climenhaga** .
You must be an active Roundhouse member to schedule.

How to Become a Roundhouse Member

Not yet a Member? Apply for membership on our website at truckeergroundhouse.org/memberships or scan the code below. Our core staff will contact you back to schedule a New Member Orientation.



How to Reserve the Machine as a Roundhouse Member

- Download the Mindbody app on your phone
- If you already have a login, use it now. If not, create an account and be sure you used the same email you used to set up your Roundhouse membership
- Search for Truckee Roundhouse - add it to your favorites!
- Click VIEW SCHEDULE
- Toggle to the APPOINTMENTS tab at the top
- Drop down the TOOL RESERVATIONS bar and select the Shotbot CNC Router
- Pick any staff (this app is typically used for massage appointments, it means nothing to us)
- Select your day and pick your time

Reservations are made hourly. Please book no more than 4 hours per day.

If you need to CANCEL your appointment, go to the PROFILE tab and click cancel.

If your cancellation is last minute, please post on the SLACK laser channel that you canceled so others know they can hop in!