	CNC ROUTER
	Standard Operating Procedure (SOP)

Penn State Abington Makerspace
Rydal 002
(267) 670-1945, wrc11@psu.edu

Emergencies

Immediately notify local emergency services by dialing 911 for serious incidents (e.g., injuries requiring professional medical attention, fires, explosions, etc.).

Environmental Health and Safety (EHS) is always available for notification of incidents and/or consultation regarding laboratory safety issues. They can be contacted by dialing 814-865-6391. Their website is located at www.ehs.psu.edu .

I.   Scope, Purpose, and Keywords

Scope: To explain the safe operating procedure of the of the Shapeoko CNC Router

Purpose: To give a brief tutorial on operating the Shapeoko CNC Router
                 Shapeoko CNC Router
Keywords: Router, CNC, Drill, Fabrication, Enclosure

II.   Hazard Assessment
All hazards associated with this procedure should be identified in this section of the SOP.

Hazard	Required Engineering Controls and/or PPE
Router Bit	Dust Cover, keeping hands away
Moving Gantry	Keep hands away from any pulleys, belts, and screws on the machine

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III. **Procedures**

All required safety procedures designed to protect those performing this procedure should be included in this section.

1. Approved Procedures
   a. Creating an object from stock material using the Shapeoko CNC.

2. Personal Protective Equipment (PPE)
   a. CNC Enclosure. If opening doors while in operation, wear safety goggles.

3. Environmental Controls
   a. Ensure the dust collection system is turned on, and all blast gates except the CNC Router gate is closed.

4. Required Training
   a. General Shop Training.
   b. CNC Router Safety Training.

5. Inspection before use
   a. Ensure the machine powers on.

6. Standard Operating Procedure
   a. The Software
      i. Open the MeshCam software.
      ii. Open your *.stl 3D model file, and rotate, scale, and make sure the file is within the bounds of the tool path.
      iii. Make sure the job type is a 3-Axis cut
      iv. Go to the Toolpaths tab, select the toolpaths you need to cut
         1. Once the Sub-menu opens up, select the first instance of a tool (For example, 1. 0.25 in End Mill)
      v. Once all the toolpaths are selected, click 'Calculate Toolpaths', export the *.nc file to the desktop.

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    b. The CNC Router
- i. Ensure the correct bit is in the router.
- ii. Secure your stock to the machine with the included clamps in the rails of the machine's bed.
- iii. OPTIONAL: Find center of your stock if you have set 0 for center.

    c. The CNC Router's Software
- i. Open Carbide Motion, connect to the cutter if needed.
- ii. Click 'Initialize Machine', this will perform the Homing Operation.
- iii. Go to the Jog menu, move the machine's head to the center, then go to 'Set Zero', and click 'Zero All'. This is your new Home position.
- iv. Go back to the first menu, click 'Load new file', and load your *.nc file.
- v. Turn the Router on the machine ON, close the doors to the enclosure, then click 'Start Job.'
- vi. Once the job is complete, turn off the Router, move the head, remove your completed job, and clean the machine with the Shop Vac, power off everything once completed.

7. Waste Disposal
    a. Dust Collection system and Shop Vac will take care of it. Monitors empty collection bins as needed.

IV.   References
Include referenced protocols, Safety Data Sheets (SDS) and any other references in this section.

Shapeoko User Manual: https://my.carbide3d.com/manuals/

V.   Revision History
Document prepared date and author identification

This document was created and prepared on 9/15/2023, by Michael Ryan, Head Safety Monitor.

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Certification Page

My signature below attests that I have read and understand this SOP and agree to fully adhere to its requirements.

Date	Name	Penn State User ID	Signature

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