

Description

The Nova35 is a 100 Watt CO2 laser cutter with a 60cm x 90cm (23.6" x 35.4") bed. It requires training to use, as well as an FBS reservation. Three different cutting heads are available for use: The standard 2" head for most applications, a 4" head for cutting materials thicker than 10mm (0.4"), and a high resolution head for cutting & engraving the finest features. [More info about laser cutter head selection and installation here.](#)

Hazards

Fire! - Cutting highly combustible materials or cutting with poorly tuned parameters can result in a fire. Always ensure that your material is appropriate for laser cutting, and always make a few test cuts when first working with a new material to ensure appropriate cut parameters.

There is a fire blanket and a Halon fire extinguisher located adjacent to the tool. Please be prepared to use these if you encounter a fire.

Never leave the laser cutter unattended while the laser is in use.

Toxic Fumes! - Some materials release toxic gasses when they are vaporized and should NEVER be cut with a laser. For instance, polyvinyl chloride (PVC) will produce dangerous chlorine gas.

Pinching/Jamming! - When jogging the toolhead or bed, ensure that no obstacles are in the way, such as tools, materials, or fingers. The motors are powerful and could damage anything that gets squished by a moving part.

Reflected lasers! - Never attempt to cut mirror-like materials with a laser. If you can clearly see your reflection, it's probably not safe to cut. Mirror-finish materials will reflect the laser beam, causing damage to the lens and potentially the user.

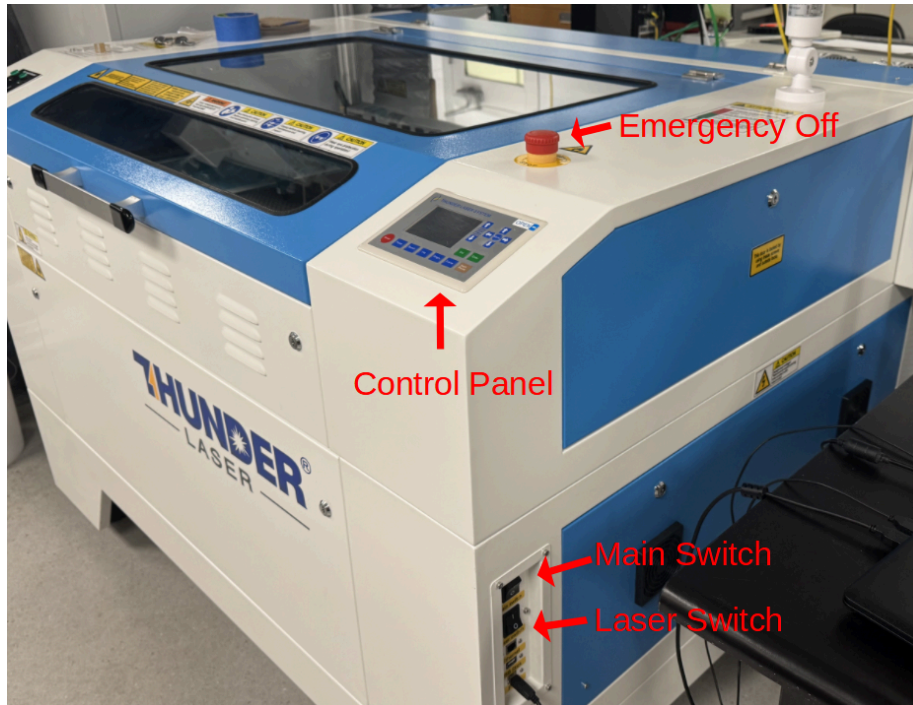
Bright Light - The laser can produce a bright light while cutting. Do not stare into the light, or you may suffer from a temporary blind spot.

PPE Requirements

- Long Pants
- Close-Toed Shoes
- Fire Blanket
- Halon Fire Extinguisher

Preparing the Machine for Cutting

- 1) Ensure that the bed is clear to prevent crashing when the tool homes
- 2) Release the Emergency-Off if necessary



- 3) Turn on 'Main Switch' and 'Laser Switch'
- 4) Wait for tool to home
- 5) Verify that the air assist is functioning by pressing the High Volume button. You should hear and feel air coming from the toolhead. It will turn off on its own.



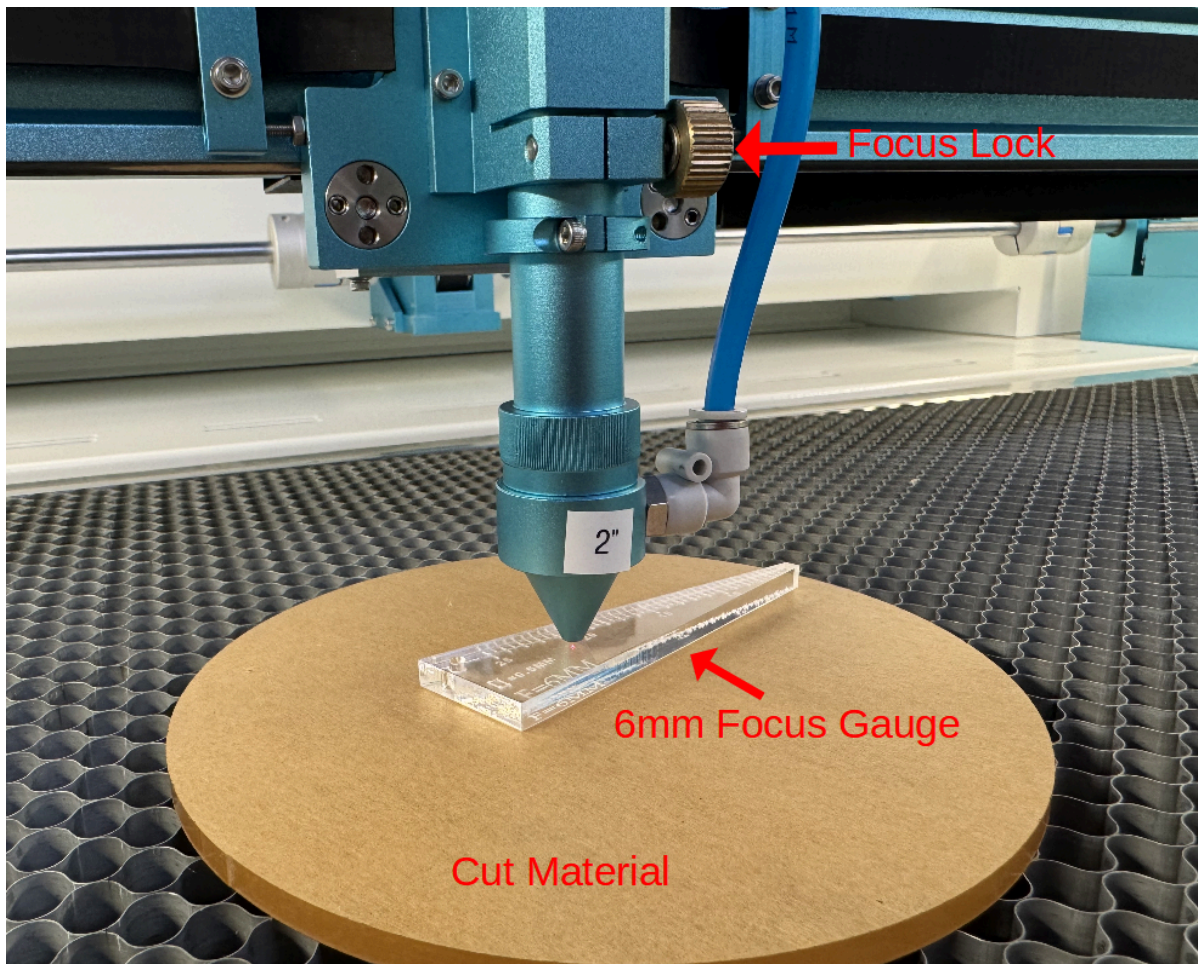
6) Verify that the chiller is on and reading 18-24C.



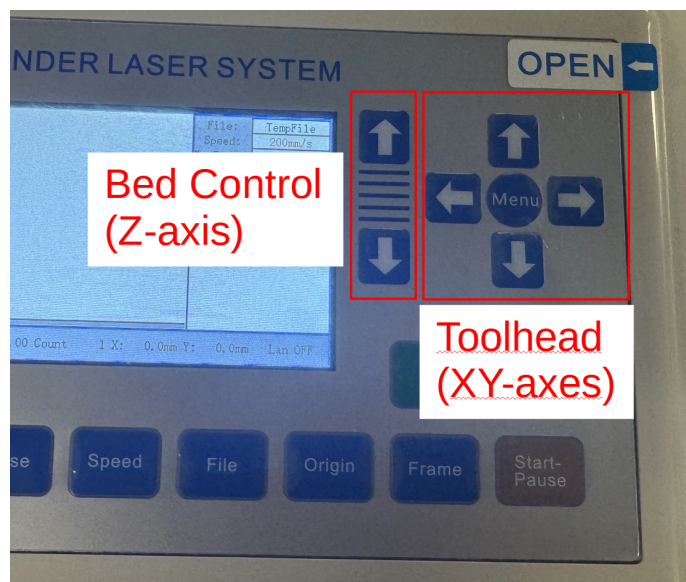
7) Place your material on the bed.

9) Focus the laser head

- a) You must use **manual focus** with the 4" head, High Resolution head, or if using the rotary chuck. In general, manual focus is fast and reliable. *We recommend always using manual focus.* To do so, choose an appropriate focus gauge. (6mm for the 2" head, 3mm for the HR head, 10mm for the 4" head). Loosen the focus knob on the tool head, raise/lower the tool head to meet your gauge, then tighten the focus knob and remove the gauge. The laser is now focused.



- 10) Jog the laser head to your desired cut origin. You are now ready to cut your material using Lightburn.

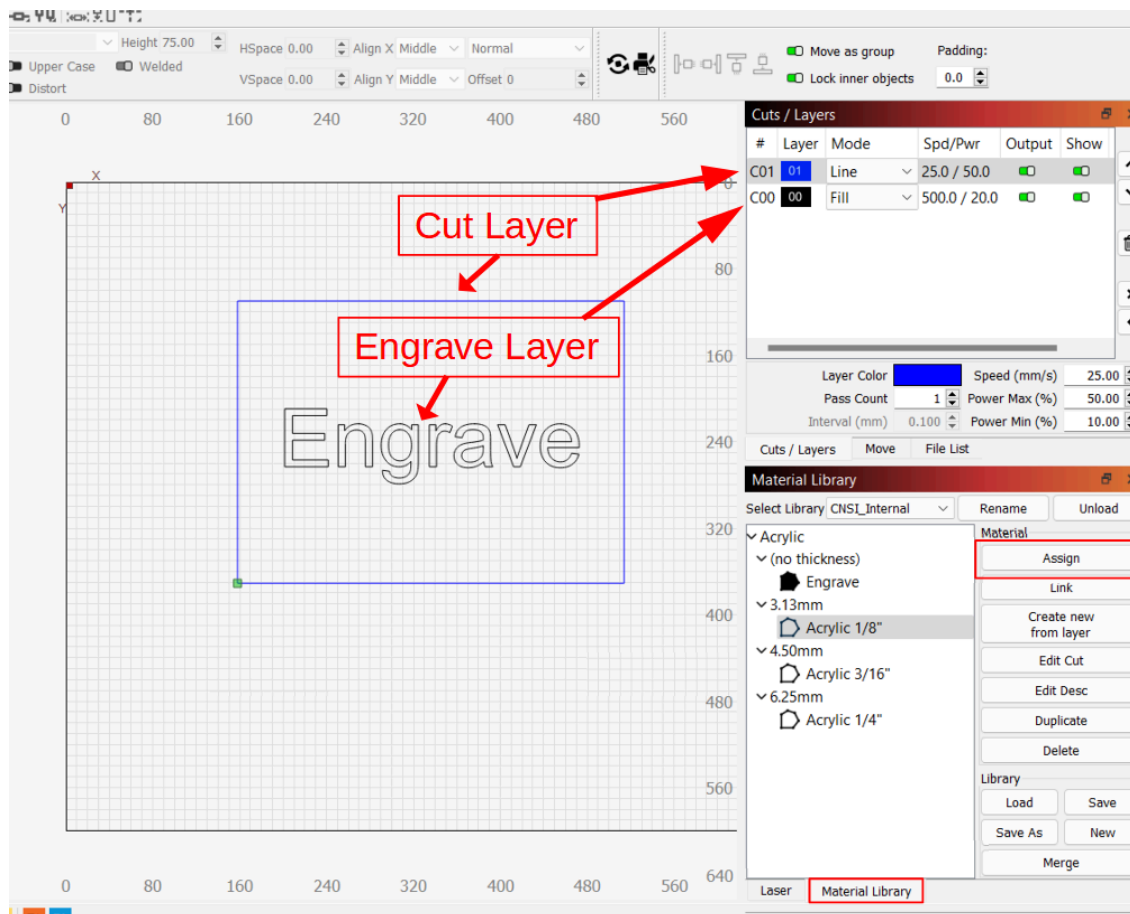


Cutting with Lightburn

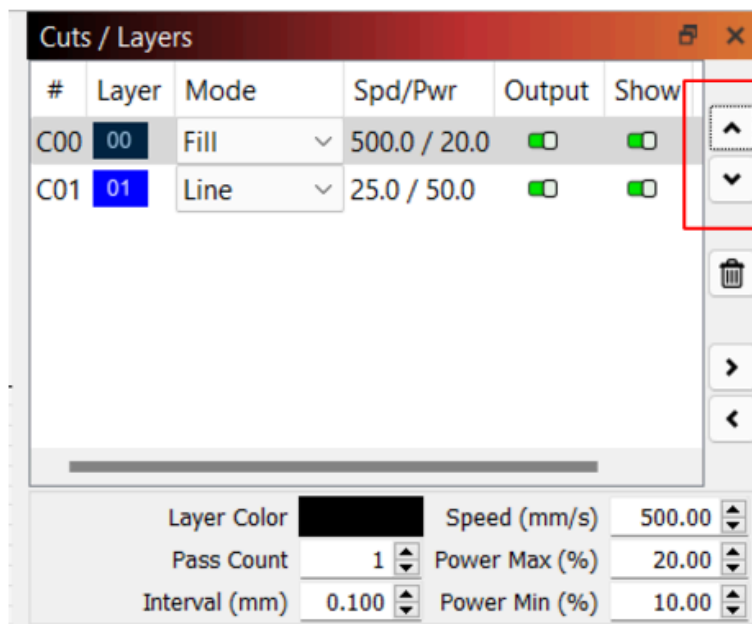
This laser cutter uses a software package called Lightburn for both layout and cutting. Through this software, you can control almost every aspect of the laser cutter. These instructions will help you perform a basic cut or engraving. For additional information, please look through the [Official Lightburn Documentation](#).



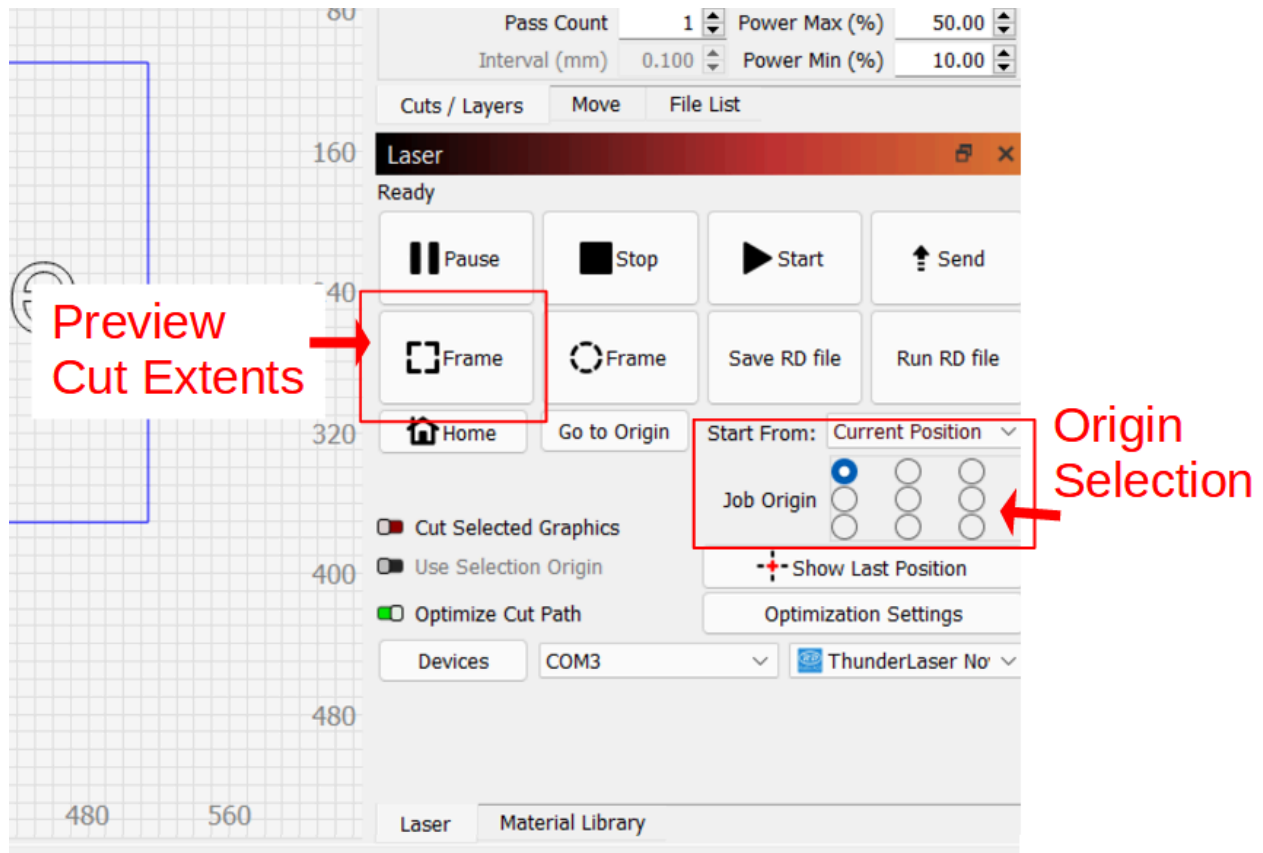
- 1) Open Lightburn.
- 2) Draw your desired features using the primitive shapes in Lightburn, or import your features from a dxf, pdf, svg, bmp, jpg, or png file. You must use a different layer color for each unique operation. For example, if you want to cut and engrave, your cut features must be on a different layer than your engrave features.
- 3) Verify that your features are scaled correctly by checking their dimension(s).



- 4) Choose appropriate laser settings (speed, power, air) for your material. You may save and load materials from the Material Library, but always double check parameters before starting a cut. If you are cutting a new material, you must do some test cuts first. Please see the following section for testing new materials.
- 5) Apply your desired settings to the correct layer by selecting your material from the library, then selecting the corresponding layer, and finally clicking 'Assign.' Generally, cut operations should be done in 'Line' mode and engraving operations should be done in 'Fill' mode.
- 6) Arrange your layer order by clicking the up/down arrows next to the layers window. The top-most layers will occur first, so we recommend moving your engraving layer(s) above your cut layer(s).



For best results,
engrave layers
should be above
cut layers



- 7) Choose your cut origin. You may use an absolute origin (top left of the bed), but for most jobs we recommend that you choose 'Start From Current Position,' such that the red laser pointer corresponds to the origin of your cut.
- 8) Click the 'Frame' button to outline your job without cutting. Verify that your cut will occur where you expect. If needed, adjust your material location or the toolhead location until you are satisfied with the frame.
- 9) Close the Laser Cutter hood.
- 10) Click 'Start' to begin your cut.
- 11) Once your cut completes, wait for any residual smoke/vapor to exhaust. Then retrieve your stock + part(s) and power down the tool by turning off the MAIN switch. Make sure the bed is empty when you leave.

Cutting or Engraving a New Material (i.e. creating recipes)

If you are cutting any material other than acrylic, it's likely that you will need a new recipe. You are welcome to do this yourself, but please reach out to the lab staff or lab manager if you would like assistance with a new material.

The goal of this section is to help you optimize cut parameters for a new material quickly and safely. The greatest risk when working with any new material is fire, so you must initially err on the side of caution.

- 1) Ensure that your material is safe to laser cut. Our wiki contains [a brief list of acceptable and unacceptable materials](#). If you don't see your material, please contact IW staff.
- 2) Follow the normal machine setup procedure. (Choose head, place stock, focus laser)
- 3) In Lightburn, make a test pattern. The goal is to make a pattern that is large enough to give you valuable feedback on your recipe, without wasting too much stock. The geometry of this pattern may depend on your material thickness and the features you hope to cut. For a new *cut recipe*, I recommend a 1-2 cm square. For a new *engrave recipe*, I recommend a 3-6 mm square.
- 4) Choose your initial cut/engrave parameters. Use an existing recipe to help choose these initial parameters from a material of similar thickness and composition.

Generally, cut operations use higher power (60 - 90%) while engrave operations use a lower power (20 - 50%). In either case, start with a speed that is much faster than you expect. E.g. if a similar material uses a speed of 20mm/s, start with 40mm/s for now.

Remember, the goal is to prevent a flare-up. We do this by cutting fast to prevent our material from heating up too much.

- 5) Perform your test cut and evaluate the results. If your cut does not go all the way through, lower your speed, choose a new cut origin, and try again. If your initial cut does go all the way through, consider increasing your speed until it's just enough.
- 6) During any cut, be ready to push the emergency off if you notice a flare up. This tool uses a nitrogen air-assist, so flare ups are very uncommon. If you see a large flame, something is probably wrong and you should contact the lab staff.
- 7) Once you're happy with your new recipe, save it to a personal location or write it down. You can enter it into our material library, but always double check before using any recipe. This is a community resource and it's always possible that someone else has edited your recipe.

Rotary Chuck Instructions:

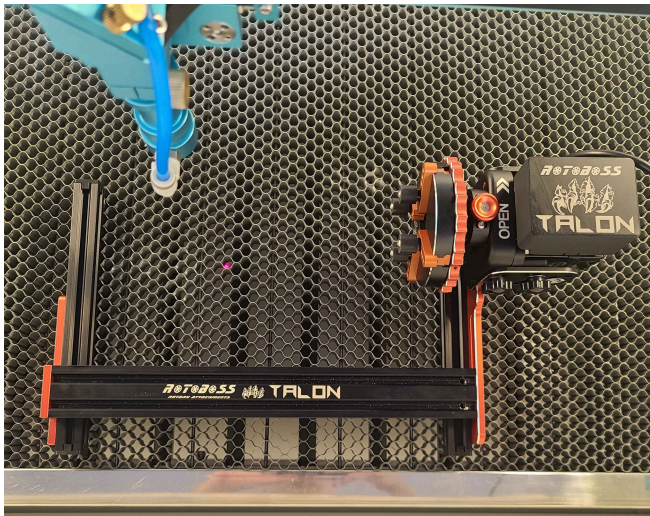
(Requires additional training)

Description:

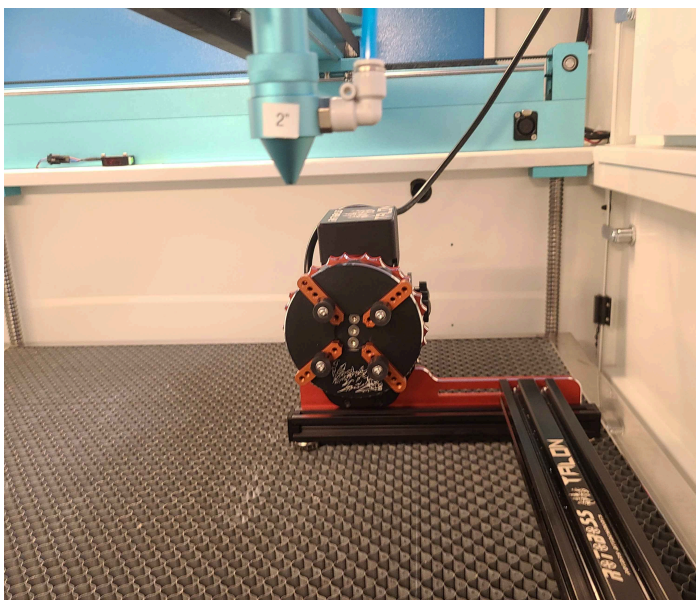
The rotary chuck allows you to engrave features on circular surfaces such as tape wrapped on a cylinder ([Rotoboss Talon](#)). This is a separate tool that is stored [INSERT POSITION HERE].

Please follow the instructions below for operating the rotary chuck:

1. Turn on the Nova 35
2. Place the rotoboss onto the bed. Orient the chuck to be on the right side.



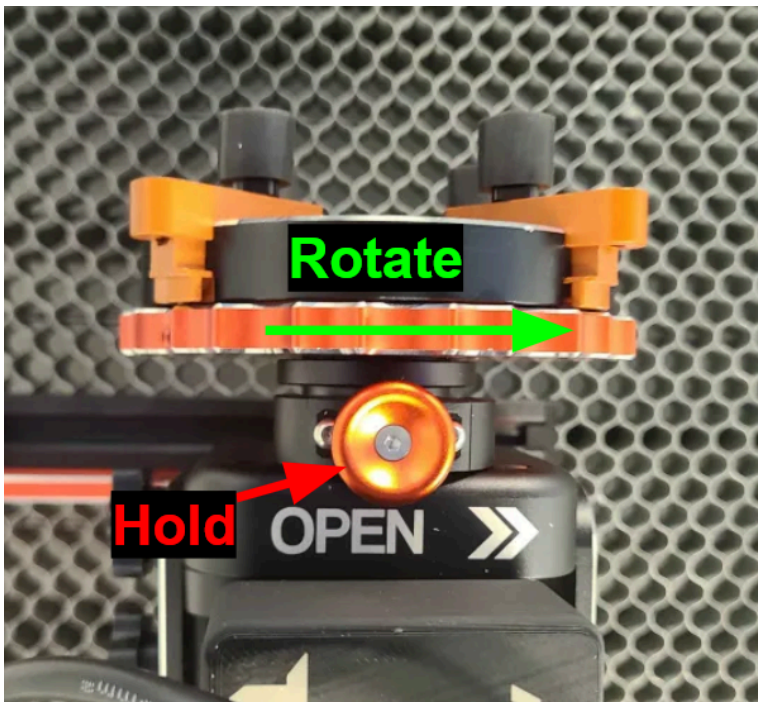
3. Lower the bed low enough so the head is able to clear the top surface of the Rotoboss (to prevent crashing the tool when testing cuts)



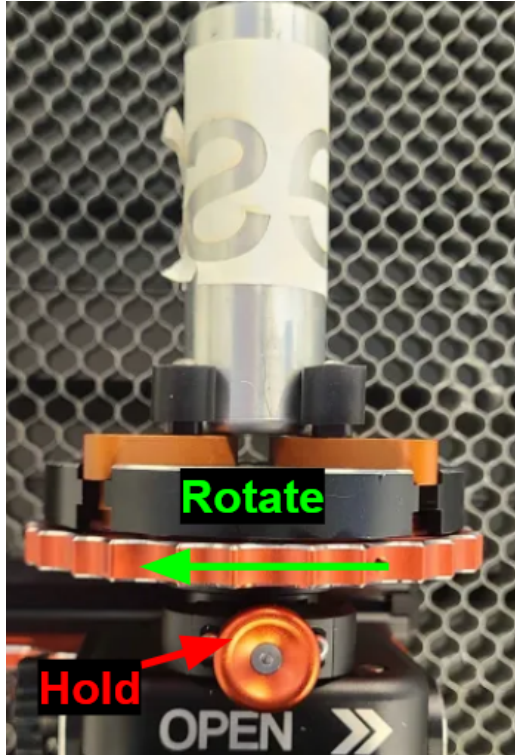
4. Plug the Rotoboss power cable into the “Rotary” power supply located towards the front right corner of the bed:



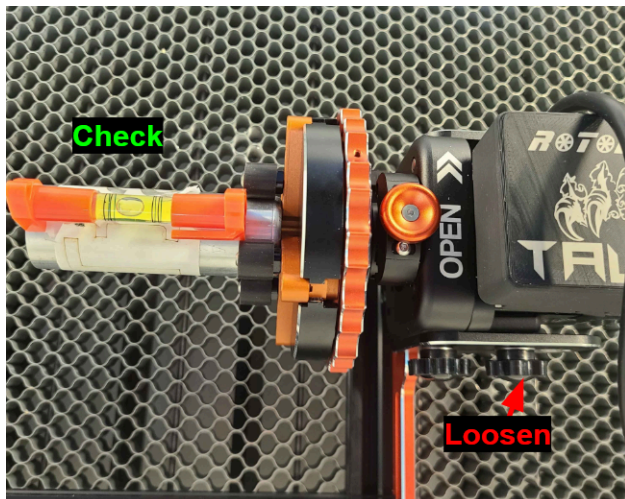
5. Open the 4 jaws on the chuck by rotating the red handle counterclockwise while holding the OPEN button:



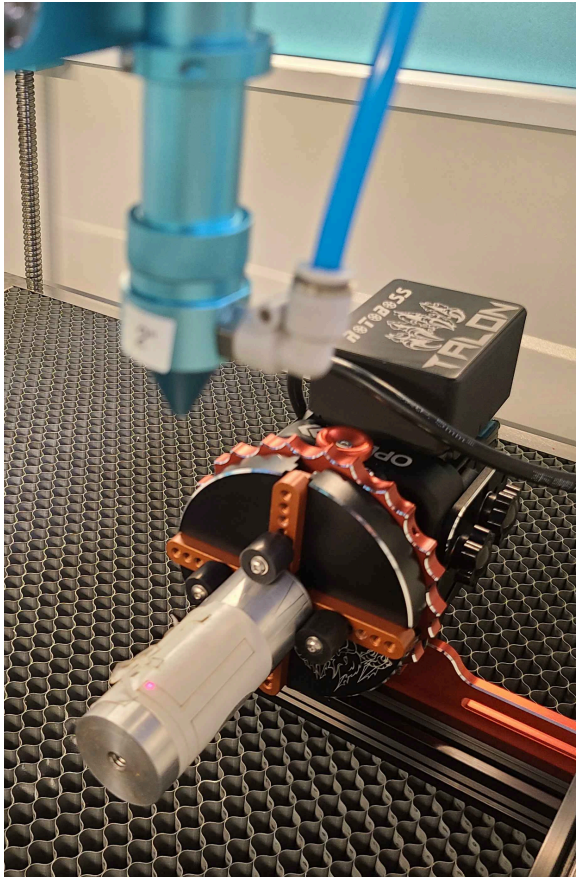
6. Insert your part between the 4 pegs on the jaw, and tighten the chuck by rotating the handle clockwise. To fixture parts from the inside, rotate the handle counter clockwise to tighten. Feel free to reposition the pegs on the jaw to fit your part. Additional slots are located [INSERT PLACE] to fixture larger parts.



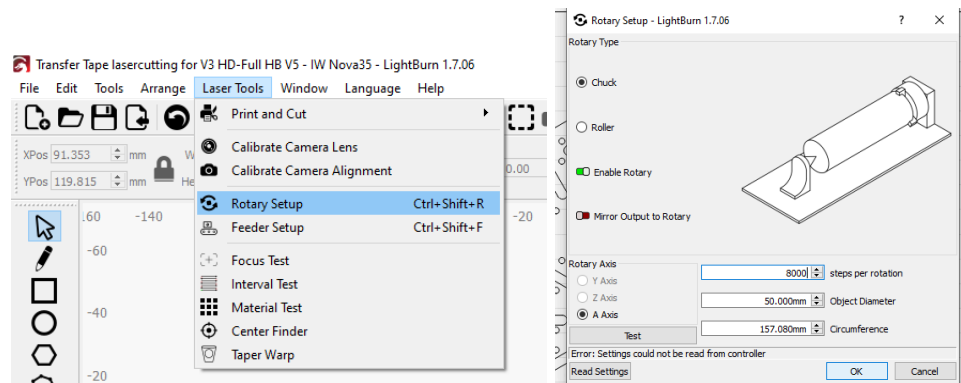
7. Use the included leveling tool to ensure your part is mounted flat. Loosen the set screw on the base of the motor to adjust the angle:



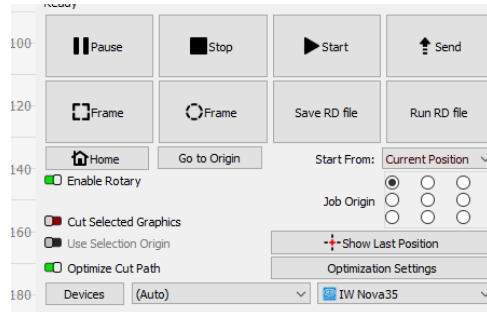
8. Position the head over the center axis of your part.



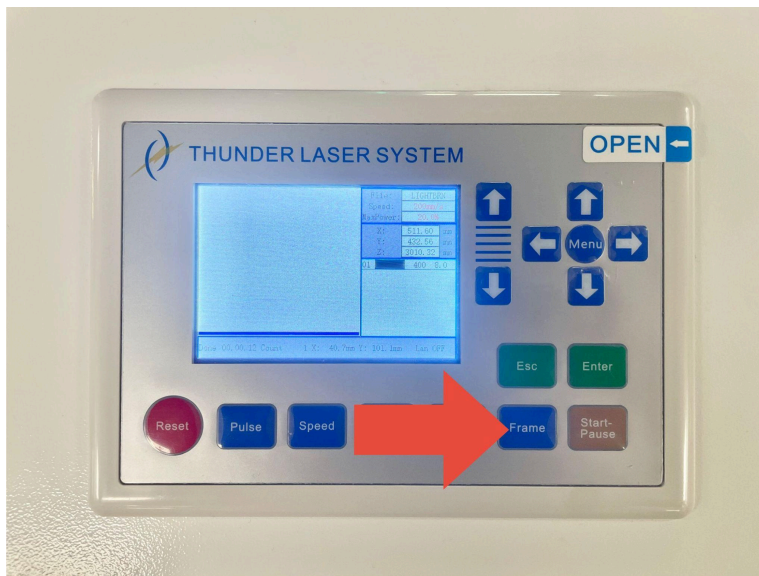
9. Measure the outer diameter of your part using calipers
10. Now go to the lightburn software on the computer and go to: laser tools (at top of screen)
- rotary setup
- a. Change object diameter (circumference should automatically update)
 - b. Steps per rotation: 8000
 - c. Rotary Type: Chuck
 - d. Rotary Axis: A Axis
 - e. Press Read Settings
 - f. Press OK to confirm these parameters



11. Check the box “Enable Rotary”, located beneath the home button (check) on the lightburn laser main screen.



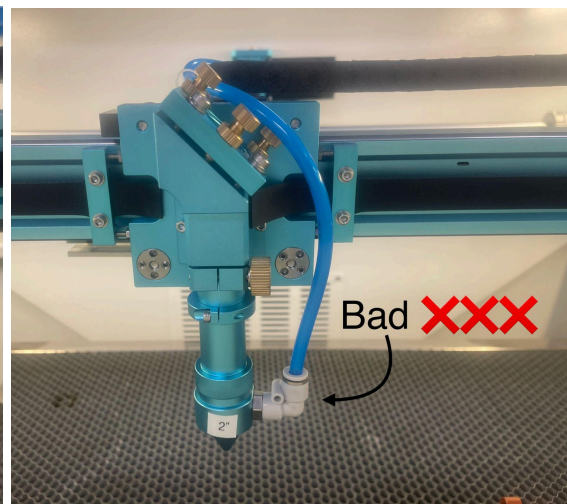
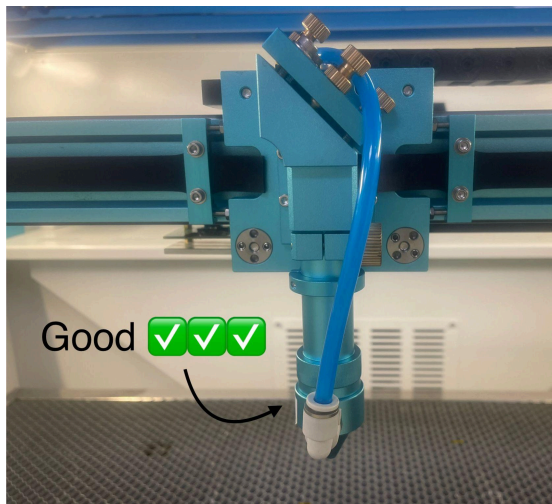
12. Add your design to lightburn
13. Once your design is ready, ensure “start from current position” is selected. press the send button on the lightburn laser main screen (see in last picture under step 11).
14. Before cutting, try doing a test run by pressing the “frame” button on the control panel of the laser cutter. You should see the rotary attachment and the laser head move. The laser should start and end at the same position of your piece you are cutting (make a mark/tape to test this).



15. Once you are ready to cut move head above your part where you would like the cut to start.
16. Press the “Origin” button on the laser control panel to set this spot as the origin.



17. Focus the laser in z using the acrylic triangle. **Make sure that the air assist tube is rotated towards the front of the laser cutter machine, facing you. It is possible that when you are focusing the laser the tube can move and face the rotary chuck which is NOT GOOD because it may crash into the chuck when cutting 😞😞



18. Press "Start/Pause" to run your cut.