Laser Cutter Onboarding Guide

SAFETY

BEFORE CUTTING:

- ❑ Turn on the fume extractor **AND** air assist located to the left of the machine (the buttons are located on the back sides of the machines). ***Make sure the status light on the fume extractor is green.***
- ❑ Make sure the bed is clear of any debris.
- ❑ Place material flat against the bed. If the material is warped, either use a weight or find another material to use.
- ❑ Use the control panel button to make sure that the extents of your cut are correct.

WHILE CUTTING:

Precautions:

- ❑ You are required to stay with the laser cutter and monitor the job for the entire cutting time. **DO NOT** ever walk away from laser cutter while operating the machine. Never operate the laser cutter while unattended.
- ❑ Always wear laser cutting goggles – don't stare at the laser for an extended period without them on.
- ❑ Keep the surrounding area of the Epilog clean and clear at all times. There should not be any clutter, combustible materials or volatile solvents such as acetone, alcohol or gasoline near the Epilog.
- ❑ Remember that if needed you can adjust the power of the laser cutter on the control panel.

In Case of Fire:

Burning and a slight flame underneath your material is normal, but an actual fire and heavy smoke is not! There is no emergency stop on this laser cutter so you will need to use your judgement to determine if your material is burning or poses a significant fire risk based on what you see happening in the machine.

- ❑ If the flame fire seems to be under control and is not growing, **STOP** the cut and keep the lid closed until the flame goes out
    - Use the start/pause button on the Control Panel to stop the cut
        - There is a delay after pressing pause, the laser will turn off, but the machine will still be moving – if it is an emergency, do not wait for the machine to stop moving to open the lid
        - If you need to stop the machine right away, don't press pause, just open the lid (the laser will turn off, but the machine will still be moving)
- ❑ If the fire is larger, turn the machine **OFF,** unplug from wall and use the fire blanket or fire extinguisher to put out the fire. Then, inform security, Miller, and Yvonne.
- ❑ If the fire is still uncontrollable and there is a lot of smoke in the machine, unplug from wall evacuate and call 911.

Safety Tool Locations:

- Fire Distinguishers – are located by the door **AND** to the left of the laser cutter.
- Fire Blanket – located by the door **AND** to the left of the laser cutter.
- First Aid Kits – under the sink.
- Phone – next to sink (read protocols next to phone for more information).

AFTER CUTTING:

- ❑ Wait to open the lid for two minutes (using timer) so that the exhaust clears any lingering fumes.
- ❑ If you are unsure that the material has been cut, do not move the material. Use tape to see if your cuts will lift from the bed.
- ❑ If you need to run more passes, make sure you close the lid and adjust the parameters if needed.
- ❑ When you are completely done, remove the extra material and any debris, and turn off the laser cutter, air assist, and fume extractor.

WORKFLOW

a. EXPORT FILE AS DXF

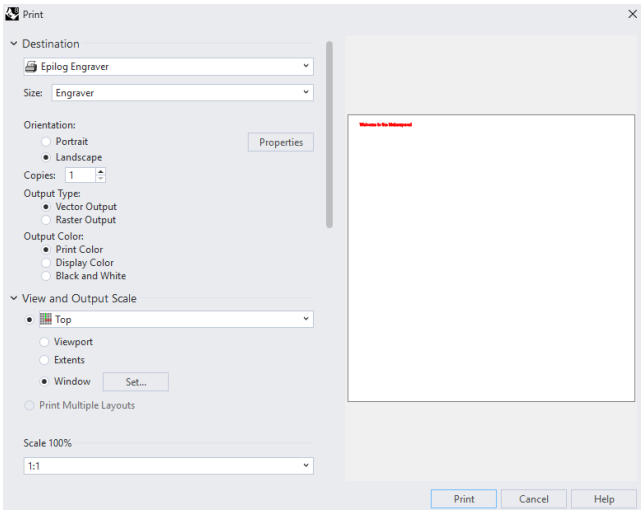
a. In OnShape – right click on the model to export as a dxf
b. Using Trace Frame (see Trace Frame section for instructions)

b. LASER CUTTER

a. Turn on the laser cutter
    i. The on/off switch is located on the back right hand side of the machine
    ii. Wait for it to calibrate and park the laser-head before opening the lid
b. Place material flat on the bed
    i. Lower the bed before placing the material down if needed
    ii. Make sure the bed is clear of any debris
    iii. If the material is warped, use a weight or tape to lay it flat

c. RHINO

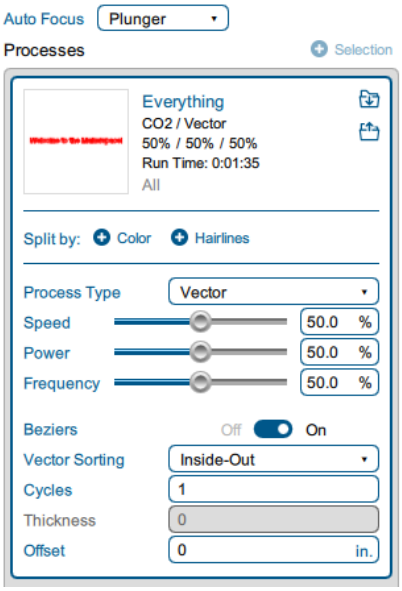
a. Open rhino file = *standard_template_blank_2025*
b. Drag desired file into template
c. Import file
    i. Make sure to adjust the model (whatever units the DXF file was exported in) and layout units (inches)
d. Move anything you want to cut into the black rectangle representing the bed
e. Move anything you don't want to cut outside of the black rectangle but inside of the larger black square
f. Change the layers of the lines you want cut (red), engraved (blue), and/or scored (green)
    i. Anything you don't want cut should be in black
    ii. Do not just change the display color of the line, make sure you are changing the actual layer
g. Press control P to print – the settings should correspond to the image below:



d. EPILOG DRIVER

Auto Focus:

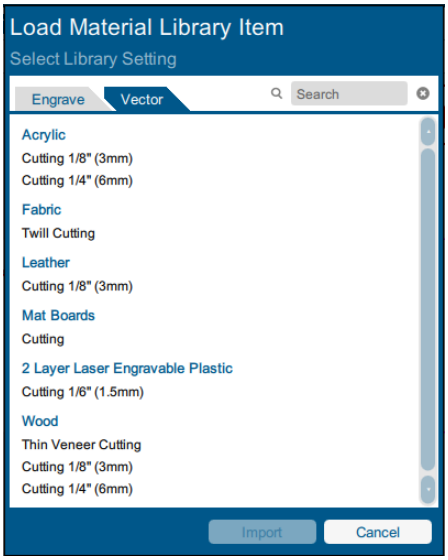
Set Auto Focus to Plunger

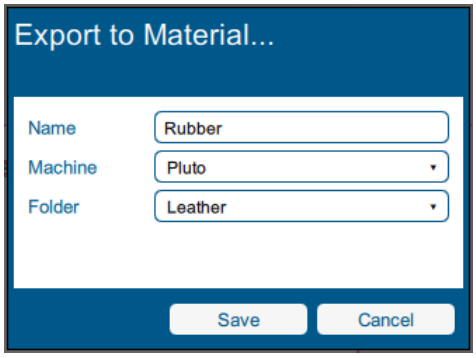


Split By:

a. When you are running more than one operation (cutting/engraving/scoring) you need to split by color and change the settings for each operation
    i. Make sure the process type is correct for each color
b. When you have any black lines (regardless of whether you placed them outside of the rectangle on the template) you need to split by color and turn the process type to OFF

Material Library





a. Import settings for standard materials using the folder icon with an arrow pointing inwards
b. "Export"/save new settings for materials using the folder icon with an arrow pointing outwards
c. If the material settings are not in the library or are not working the way you want them to, ask chat-gpt for recommendations
    i. You can ask: What should the settings be for cutting/engraving/scoring *material* on Epilog Fusion Maker laser cutter?

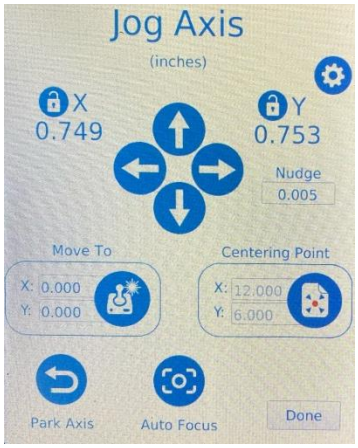
e. TURN ON FUME EXTRACTOR AND AIR ASSIST

a. Refer to safety sections for more clarity if needed

f. LASER CUTTER CONTROL PANEL

A B C D E

a. Refreshes queue
b. Moves bed up and down
c. Turns the red light of the laser on/off
d. Jog axis (used to manually focus and move the laser to specific coordinates)



D

e. Traces the boundary of the cut (always do this before starting your cut)

g. PRESS PLAY

a. You can adjust the power and frequency while the machine is going if needed

h. WAIT 2 MINUTES

a. Set the timer on the laser cutter for 2 minutes and wait for the fumes to be extracted
b. Take out your pieces – do not leave any pieces or debris in the machine
    a. Use tape to check if your piece cut all the way through or to remove small pieces together

SETTINGS

When working with a laser cutter, understanding how to adjust speed, power and frequency is essential for getting clean, efficient, and material-appropriate results. These three settings control how the laser interacts with the material and tuning them correctly depends on the type of material and whether you're cutting, engraving, or scoring.

SPEED:

Speed determines how fast the laser head moves across the material.

Slower speed = more time for the laser to cut or engrave, resulting in deeper cuts.

a. Use when you need to cut through thick or tough materials
b. Use when engraving detailed designs that need deeper contrast or precision

Faster speed = lighter marks and quicker jobs.

a. Use when engraving lightly on delicate or thin materials
b. Use when working with materials prone to burning or melting (like thin plastic or paper)

POWER:

Power controls how much energy the laser delivers. It's usually set as a percentage of the machine's maximum output.

Higher power = more intense cuts, deeper engravings.

a. Use when cutting through materials like acrylic, wood, or leather
b. Use when engraving into harder surfaces

Lower power = lighter surface marking or etching.

a. Use when engraving or scoring delicate surfaces like paper or fabric
b. Use when working with materials that burn or discolor easily

FREQUENCY:

Frequency (sometimes called pulses per inch or hertz) controls how many laser pulses are fired per inch of travel. This setting affects the *smoothness* of the cut and how much heat is applied.

Higher frequency = more pulses per inch, more heat build-up.

a. Use when cutting acrylic for smooth, polished finishes
b. Use when you want a continuous cut line without visible pulse marks

Lower frequency = fewer pulses, resulting in less heat and choppier cuts.

a. Use when cutting wood or leather to minimize charring or burning
b. Use when you want to reduce heat damage or avoid over-burning delicate materials

ROTARY ATTACHMENT

The rotary attachment is stored in the cardboard board box below the 3D printers. This attachment needs to be installed, manually focused each time a different material is being used and removed when it is done being used.

COMPONENTS:

b. Wheels on the left are the drive wheels which spin the object
c. Adjustable wheel clamp can be installed on the left side in between the drive wheels for extra support for weirdly shaped objects to help them rotate better
d. Wheels on the right are for support
    i. Squeeze the tabs on the scissor jack on the right to move the wheels to the right or the left (adjust for the length of the object)
    ii. Rotate knob clockwise/counterclockwise to raise the wheels (to level the object with the x axis)

INSTALLATION:

b. Turn on laser cutter
c. Lower the bed until you see the white connector on the back right side
d. Turn off laser cutter
e. Put the rotary attachment on the bed
    i. Thicker wheels on left side
    ii. The sides should be flush against the top and left side rulers
f. Plug in the connector
    i. White plug on right side
    ii. You can't see it if you don't lower the bed enough
    iii. MAKE SURE LASER CUTTER IS TURNED OFF

g. Turn laser cutter back on
    i. The new home position should automatically be over the rotary attachment
h. Lower the table for clearance for the objects that will be placed on the rotary attachment

MANUALLY FOCUSING:

a. Level your object on the rotary attachment
b. Move the laser over the center
c. Place the manual focus gauge into the slotted hole on the left side of the laser chamber
d. Manual focus gauge can be found on the front left side of the laser cutter when you open it
e. Raise the bed so the object touches the bottom of the focus gauge
f. Remove the manual focus gauge

CENTERING POINT:

a. Move the laser to the center of where you want your material to be engraved
b. Select D on the control panel and press Centering Point to set the center point

RHINO:

Import your DXF file into the same standard rhino template we use for laser cutting without the rotary attachment and prep it as outlined in the workflow section (except you can't cut materials using this attachment, only engrave or score)

EPILOG DRIVER:

a. Go to the Advanced Tab (top left corner)
b. Turn on rotary
c. Set the Centering Point as desired
    a. If you don't understand what each option means, play around with it - select one, send it to print, and hit trace to see how each option changes the path of the laser
d. Turn on the Rotary Setting
e. In Preview Tab there should be a red dot representing the center point of the image
f. Import any settings/input any values
g. Set Dithering to Stucki (for engraving)
h. Print

TRACE FRAMES

The Trace Frames are a tool that we can use to turn drawings into DXF files right away.

STEP 1: LOG-IN

Scan the QR code on the back of the Trace Frames using your phone. You will be prompted to log in to the Makerspace Shaper account. Use the following information:

Username: cooperunionmakerspace@gmail.com

Password: Makerspace707!

STEP 2: DRAW

Use the Shaper pen to create your drawing on white paper.

STEP 3: SCAN

Place the frame over your drawing and follow the on-screen prompts.

STEP 4: CONVERT SVG TO DXF

Use this link to convert the svg file to a dxf file: https://convertio.co/svg-dxf/

STEP 5: IMPORT INTO RHINO & FOLLOW LASER CUTTING WORKFLOW

MAINTENENCE

There are a couple of things operators should do to maintain the laser cutter that are outlined below:

WIPING DOWN DUST:

The top of the laser cutter frequently gets dusty, make sure to regularly wipe it down

VACUUMING DEBRIS TRAY:

1. Using an Allen key, carefully unscrew the two silver screws on the bottom left and right on the front of the laser cutter
    a. Make sure you are holding on to the front cover because once you remove the screws it will fall
    b. The inside will most likely look like this:

2. Remove all the debris using the vacuum
    a. Also make sure to vacuum the dust that collects on the circles on the back wall
3. Put the front cover back on

CLEANING THE LENS:

The camera lens is located on the black section in the middle of the lid to the laser cutter. Make sure to wipe it down with a microfiber towel once in a while to make sure that there is always clear visibility in the epilog driver.

RESOURCES

General Help:
https://dozuki.umd.edu/Guide/Epilog+Fusion+Pro+36+Complete+Walkthrough/869

Rotary Attachment Help:
General Workflow PDF:
https://www.epiloglaser.com/downloads/pdf/fusion_rotary_attachment.pdf

Video Tutorials:
Fusion Rotary Attachment for PRO, EDGE & MAKER
Laser Quick Tip: Using the Rim-Style Rotary Attachment (youtube.com

Free File Generators:
MakerCase - Easy Laser Cut Case Design
Gallery - Boxes.py
Maker Design Lab

Free SVG Files:
SVG Repo - Free SVG Vectors and Icons

SVG to DXF Converter:
https://convertio.co/svg-dxf/