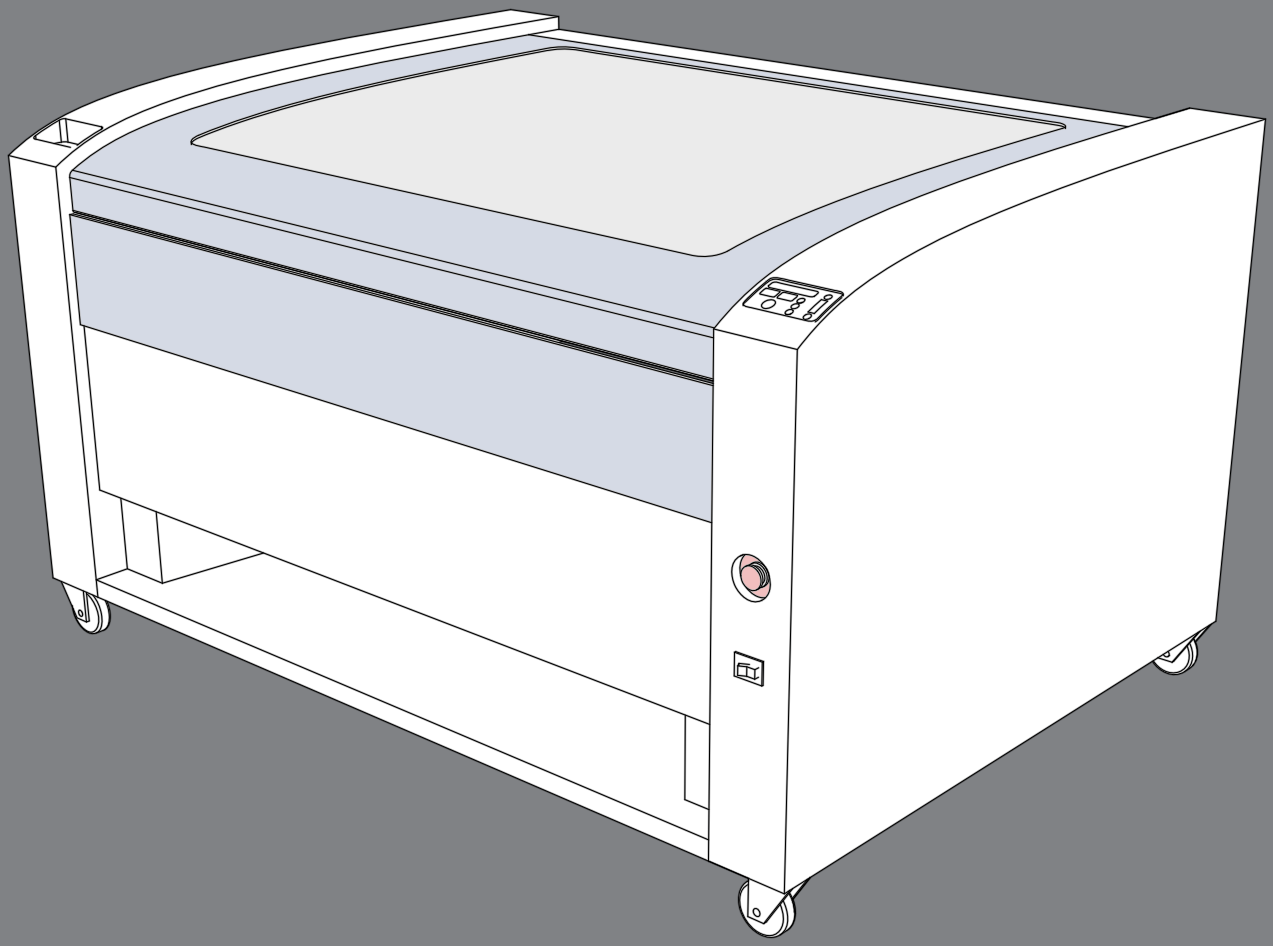
UMass Amherst Digital Fabrication Lab

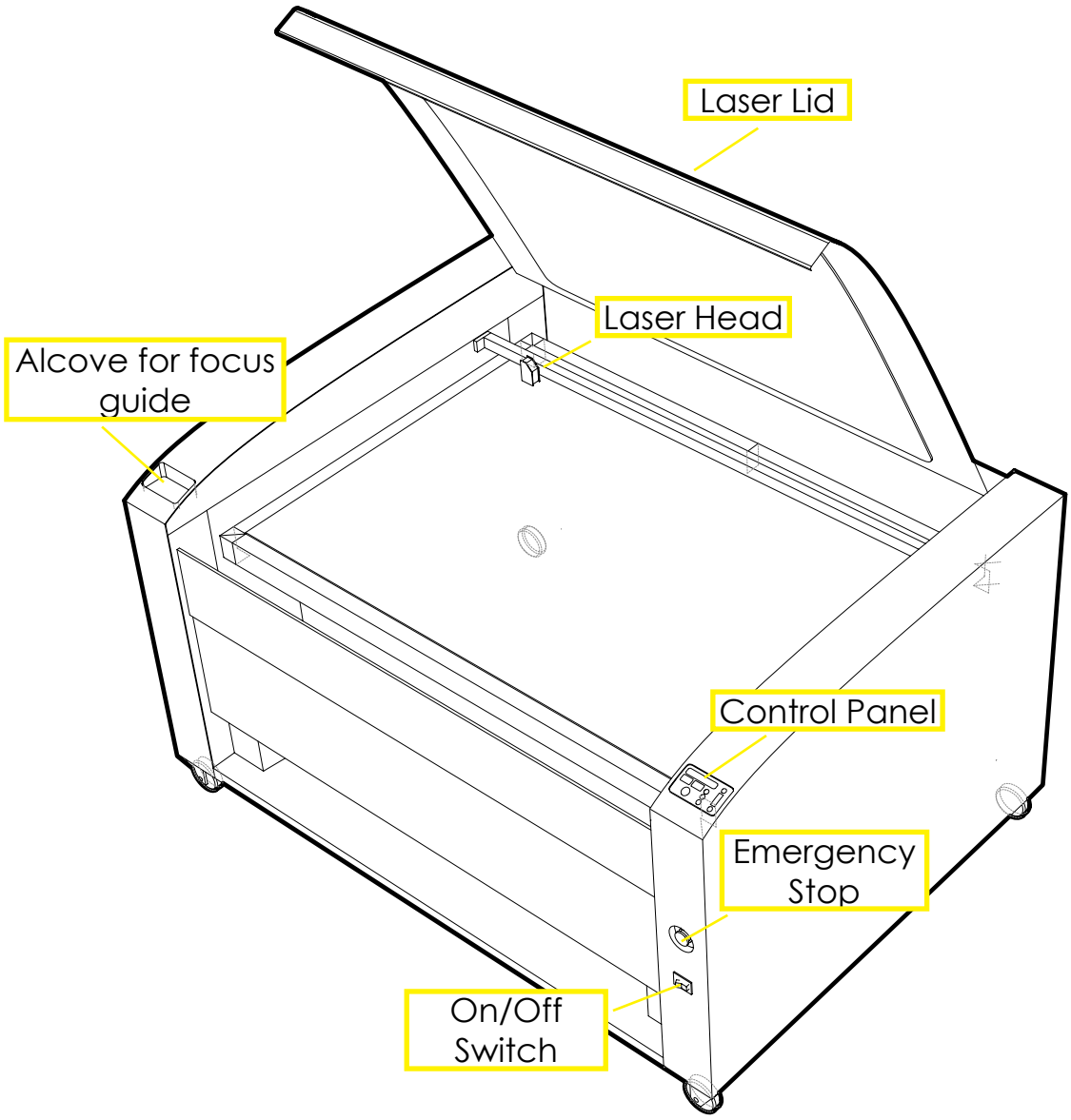
Epilog Fusion M2 CO2 Laser Cutter



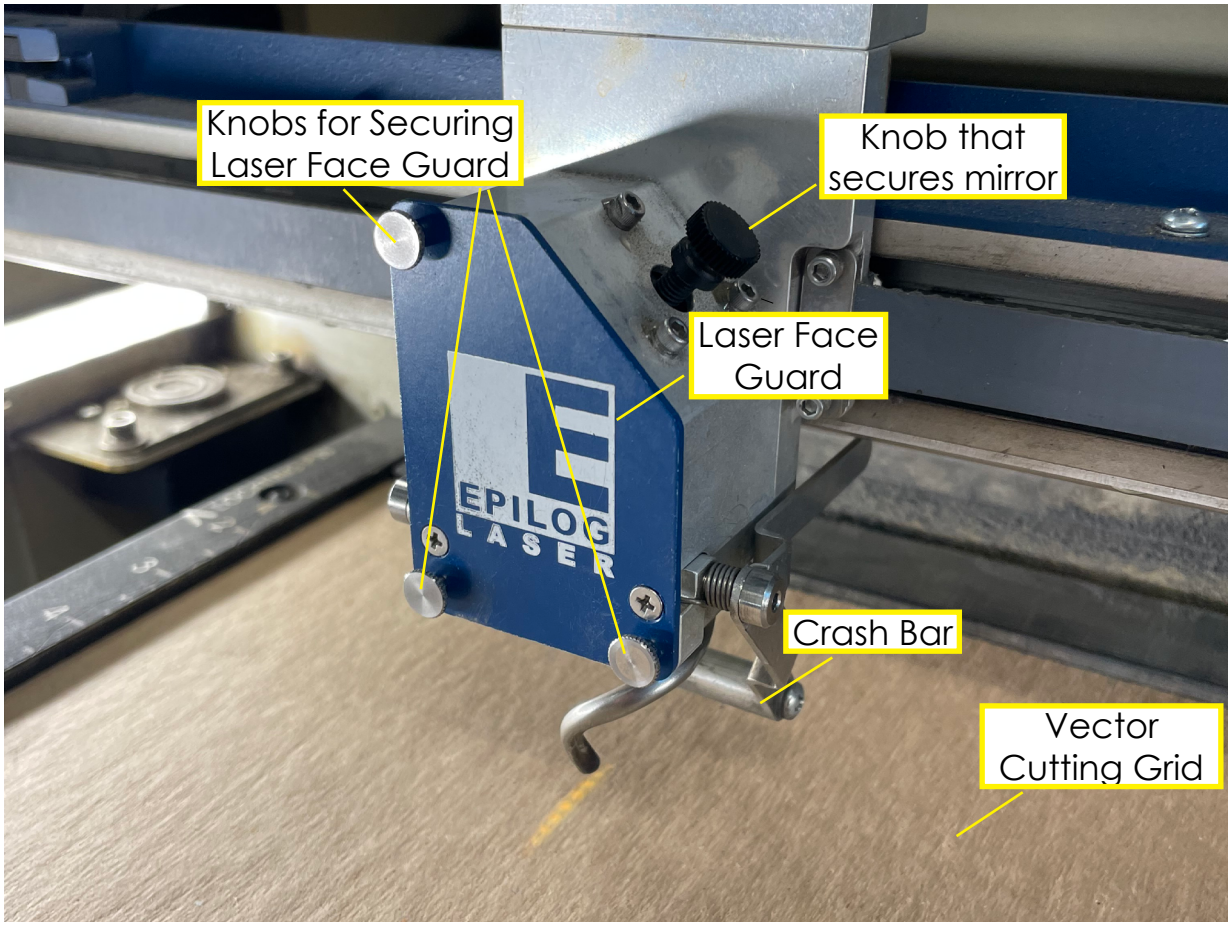
John Olver Design Building
Fall 2022

Epilog Fusion M2 CO2 Laser Cutter: Summary

The Epilog 75-Watt FUSION M2 CO2 Laser Summary uses a laser to cut and etch flat materials up to 1/4" thick. The laser is reflected through small mirrors and lenses which move around on small gantries. Through adjustments in the laser quality, speed, and power different affects can be created. However, the most common uses are for cutting and etching materials either through vector linework or raster images



Epilog Fusion M2 CO2 Laser Cutter: Summary



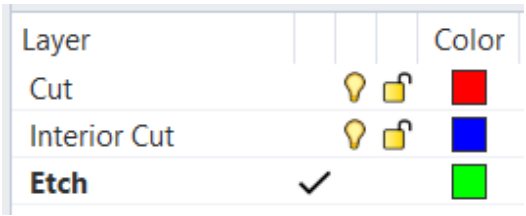
Lab users cutting files on the machine shouldn't have to touch any of these parts.

Epilog Fusion M2 CO2 Laser Cutter: Formatting

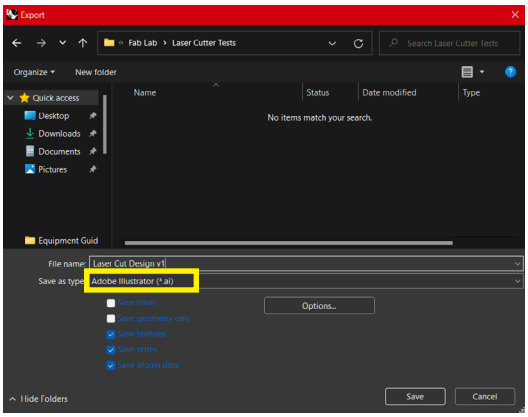
STEP ONE: Rhino File Prep

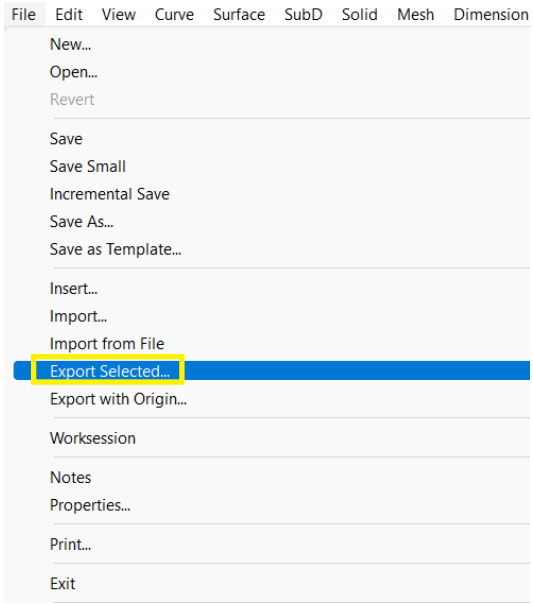
It is good practice to set up your file in Rhino or AutoCAD. Start by labeling the two or three different layers/operations you intend on using with the machine. This is most often Etch, Interior Cut, and Cut. You can also setup the colors that the machine reads (which is described further on the next page) as true RGB red, green, and blue.

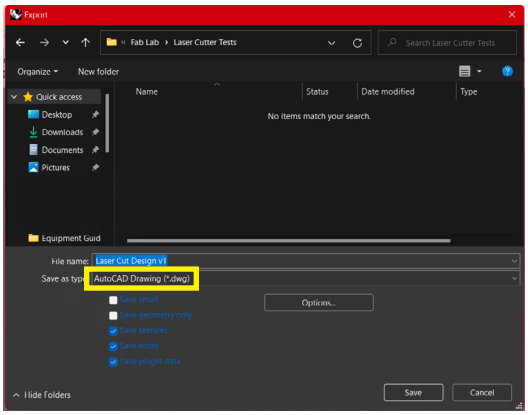
Label your layers and set the colors in Rhino/AutoCAD



Export your linework to illustrator either as a .ai illsutrator file or as a .dwg file which can be opened with illustrator



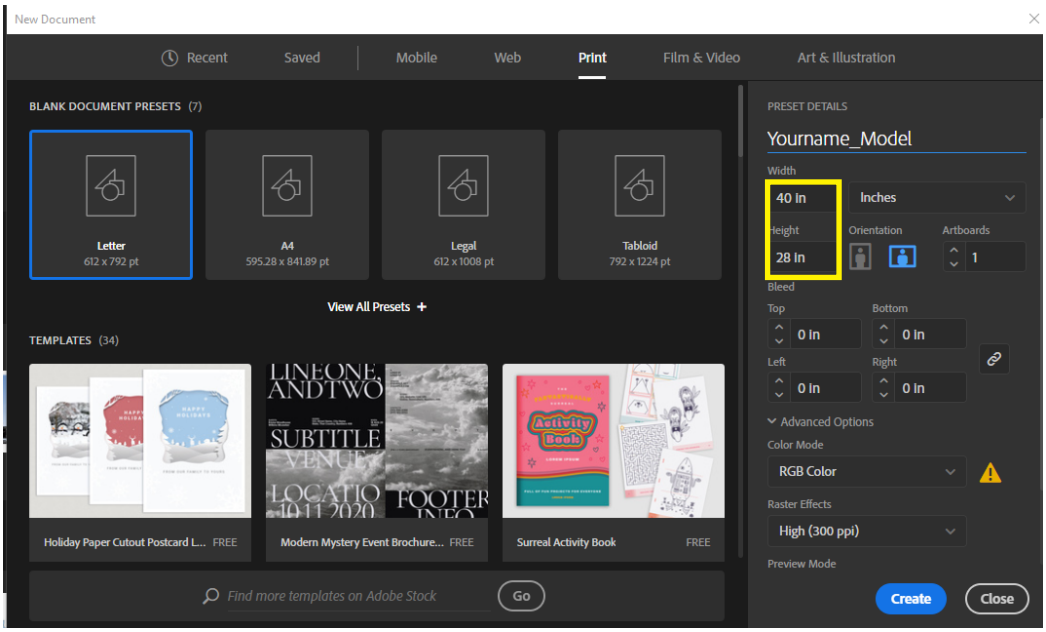




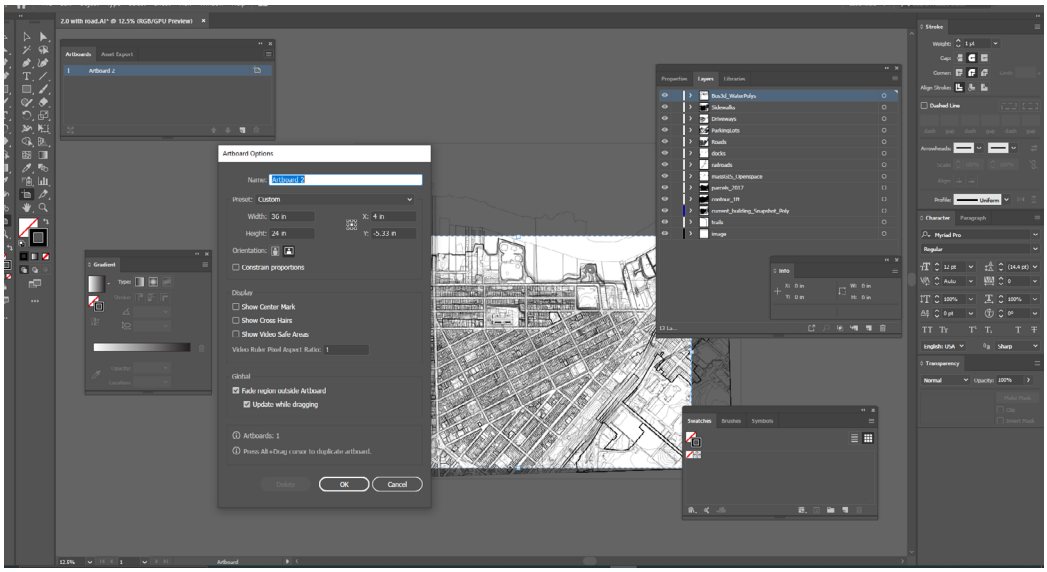
Epilog Fusion M2 CO2 Laser Cutter: Formatting

STEP TWO: Illustrator File Prep

If you're starting from scratch, create a new Adobe Illustrator document, with a 40" x 28" horizontal artboard. Specify an RGB Color Space.



If your artwork already exists you can open your recently created illustrator or dwg file. When open you need to first adjust the artboard size using: Window > Artboard > "Artboard" menu > artboard options: and make sure that the artboard is 40" x 28". The artboard represents the size of the laser cutter bed. You can use guides to designate where your material sits on the artboard.



Epilog Fusion M2 CO2 Laser Cutter: Formatting

STEP THREE: Formatting your Illustrator artwork

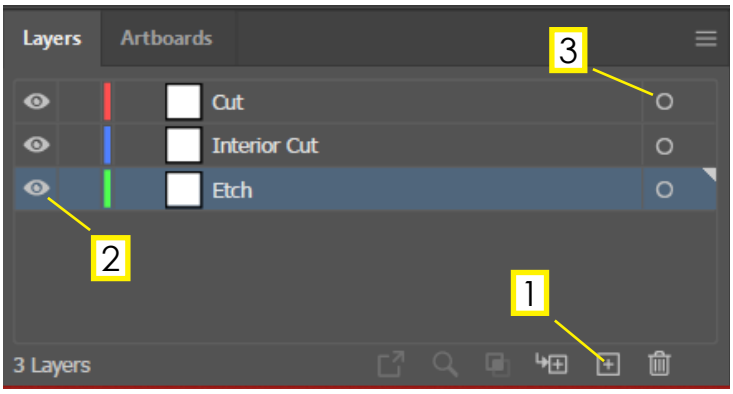
ETCH, CUT, INTERIOR CUT, and/or RASTER must be described by a color. The only colors the Epilog recognizes:

Stroke Colors:					
	Red:	R-255	G-0	B-0	"system red"
	Green:	R-0	G-255	B-0	"system green"
	Blue:	R-0	G-0	B-255	"system blue"

CUT: Laser cuts cleanly through the material
INTERIOR CUT: A cut through the material but in a separate operation from the exterior cut
ETCH: Laser scores the material along lines
RASTER ETCH: Laser prints an image using repeating motion. Used for shading images and marking complex patterns.

Finally the stroke weight for all of the linework needs to be set to **0.025 pt**. The laser cutter will not recognize the linework unless the stroke weight is set.

If you set up your layers in Rhino or AutoCAD then they should already be transferred into illustrator. If not then you should set up your 'cut', 'interior cut', and/or 'etch' layers

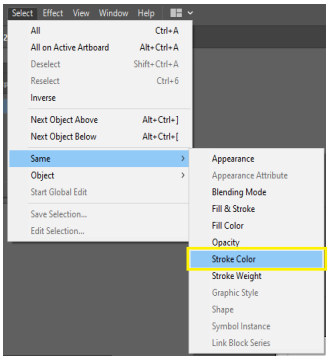


1. Create new layers

2. Toggle Layer visibility

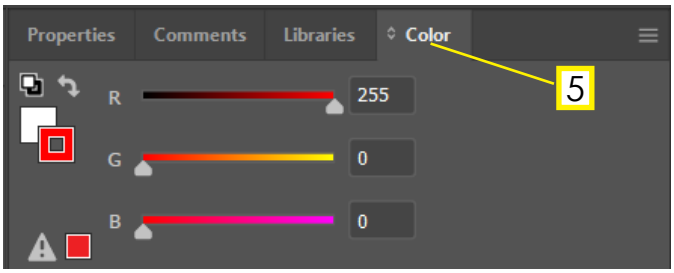
3. Select all artwork on layer

You can use the Select > Same > Stroke Color to easily select all the lines of the same color to easily move them between layers.

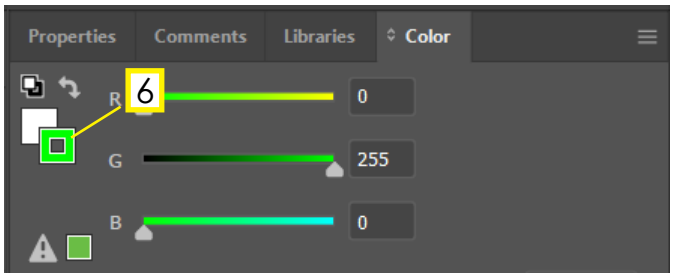


Epilog Fusion M2 CO2 Laser Cutter: Formatting

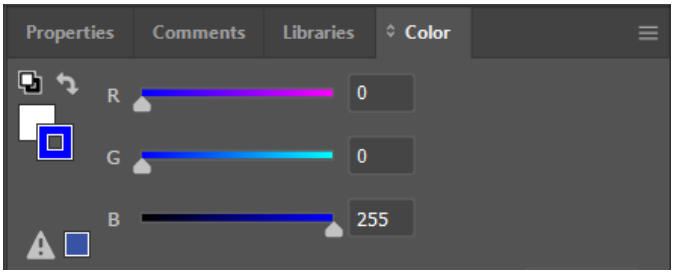
4. Specify line color by first selecting all the linework per layer

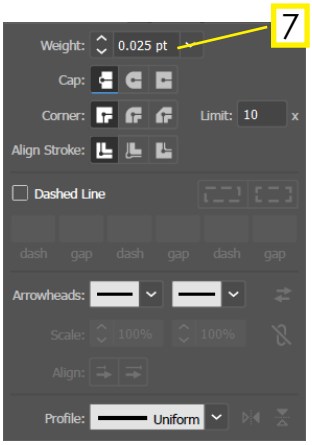


5. In the Color Panel, you will see the current linework color. Make sure you are using RGB and that your linework is using on of the three acceptable colors.



6. You may need to select the stroke line color picker tool in the color panel.



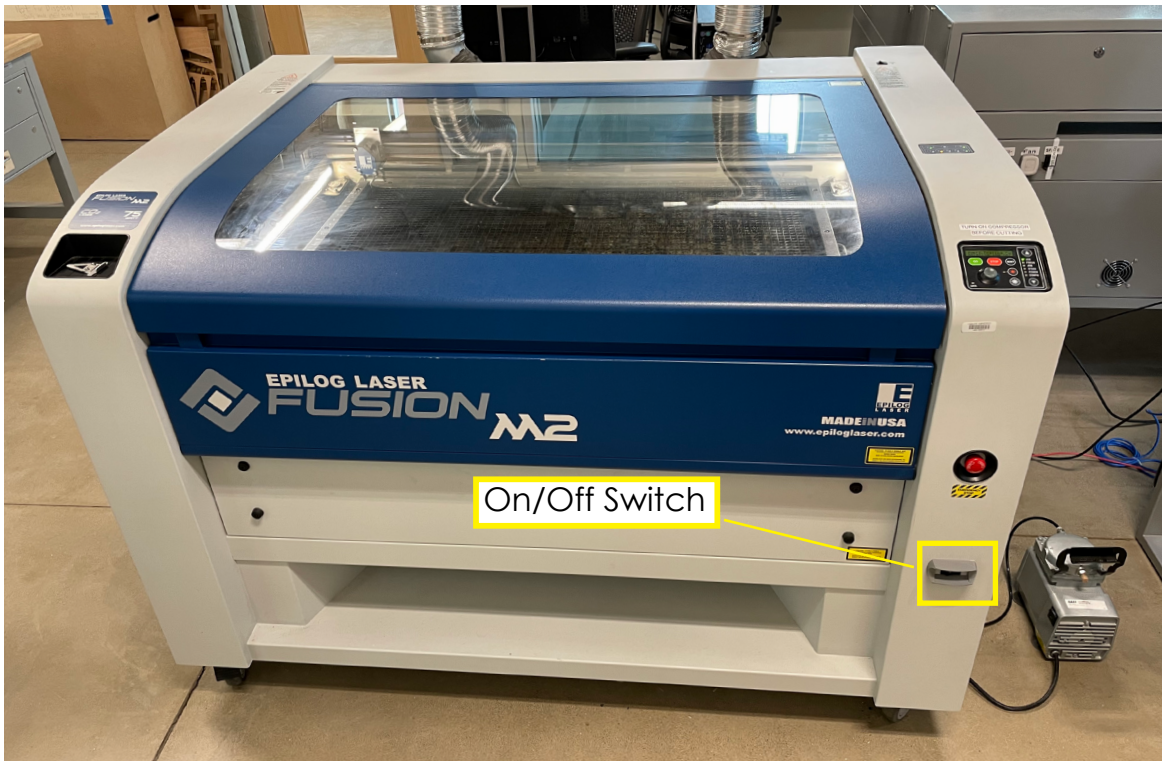


7. Finally, you need to set the stroke weight for all your linework to **0.025 pt.** The laser cutter will not recognize the lines if they are not this stroke weight. Repeat these steps for all of your layers

Epilog Fusion M2 CO2 Laser Cutter: Printing

STEP FOUR: Preparing the laser

Turn on the Epilog Laser. The switch is located on the front of the machine in the lower right hand corner below the emergency stop.



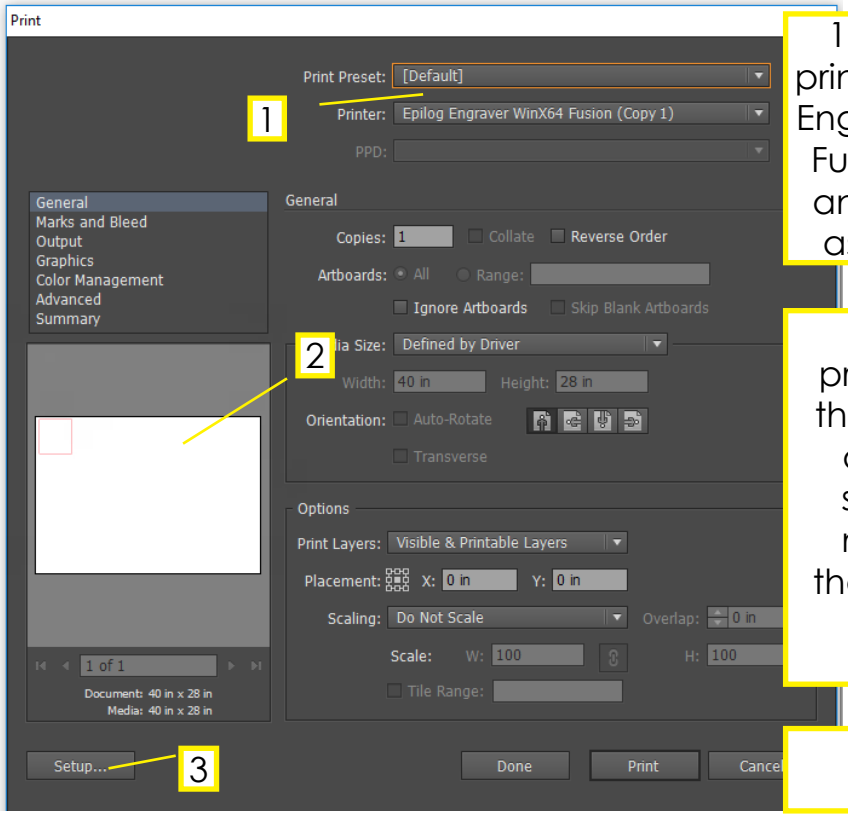
When the machine is ready, the display will read "JOB:"

Up/down arrows navigate the menu on the right. The joystick inputs values and movement.

Epilog Fusion M2 CO2 Laser Cutter: Printing

STEP FIVE: Sending your work to the laser cutter

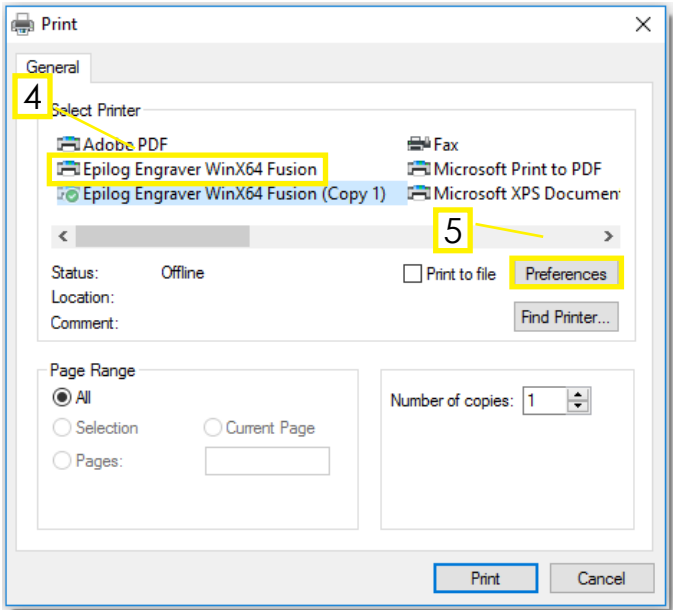
Begin by clicking File > Print in Adobe Illustrator. This brings up the Adobe Print dialogue box.



1.Specify the printer as "Epilog Engraver WinX64 Fusion Copy 1" and the preset as "EJ Preset"

2. In the preview pane the document and media sizes should match and the orientation should be correct

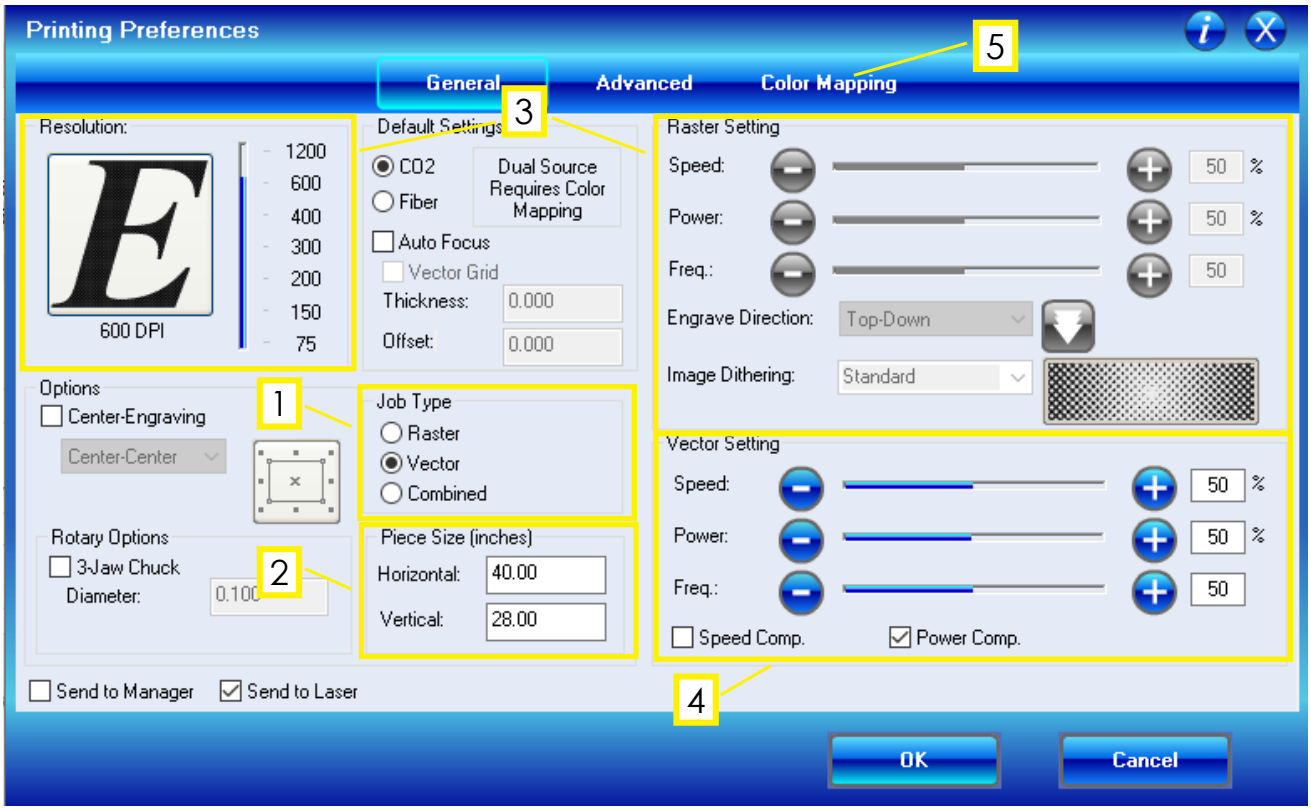
3. Click on "Setup"



4. Select the "Epilog Engraver WinX64 Fusion", or Epilog Engraver WinX64 Fusion Copy 1

5. Select "Preferences"

Epilog Fusion M2 CO2 Laser Cutter: Summary



1. Specify the job type: "Raster", "Vector", or "Combined" according to the project. Vectoring is for cutting and etching: tracing lines onto the materials. (Most common) Rastering is for etching images and shading. (Less common). Select "combined" if your file contained both rasters and vectors

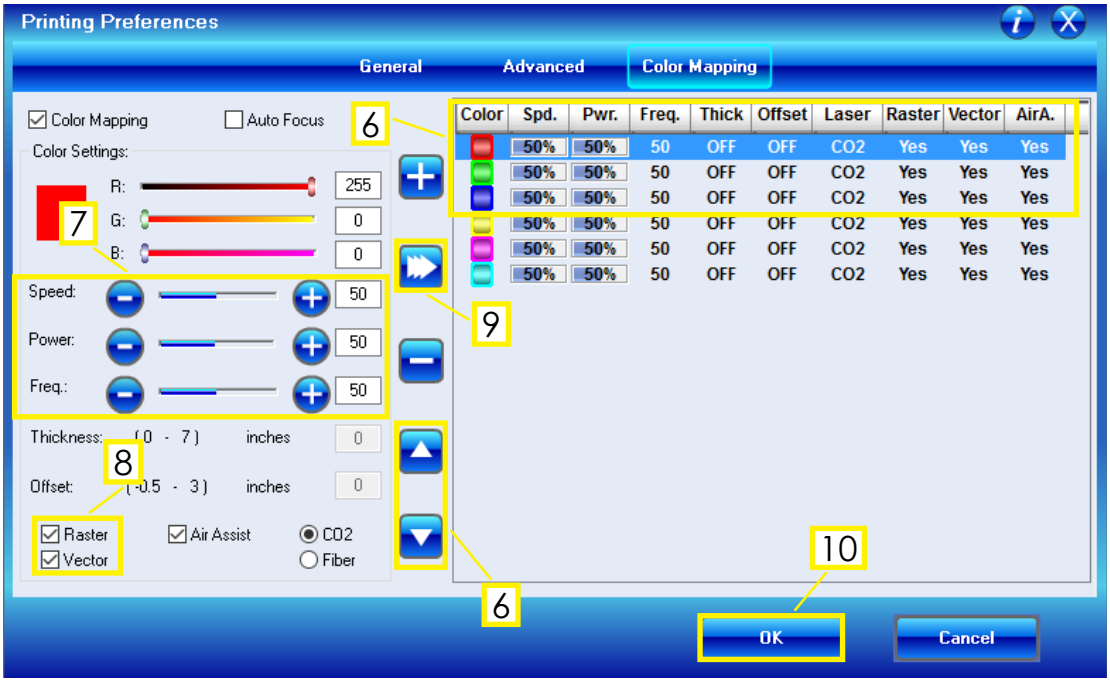
2. Check that the artboard size should be 40" horizontal, 28" vertical

3. If rastering, specify speed and power under "Raster Setting". This is most often the same as your etching setting. These settings can be found on the material settings guide. You will also need to set a resolution DPI for the raster. The higher the DPI the darker the result and more time it will take

4. If vectoring, click over to the "color mapping tab"

5. Next click on the "color mapping" tab

Epilog Fusion M2 CO2 Laser Cutter: Summary



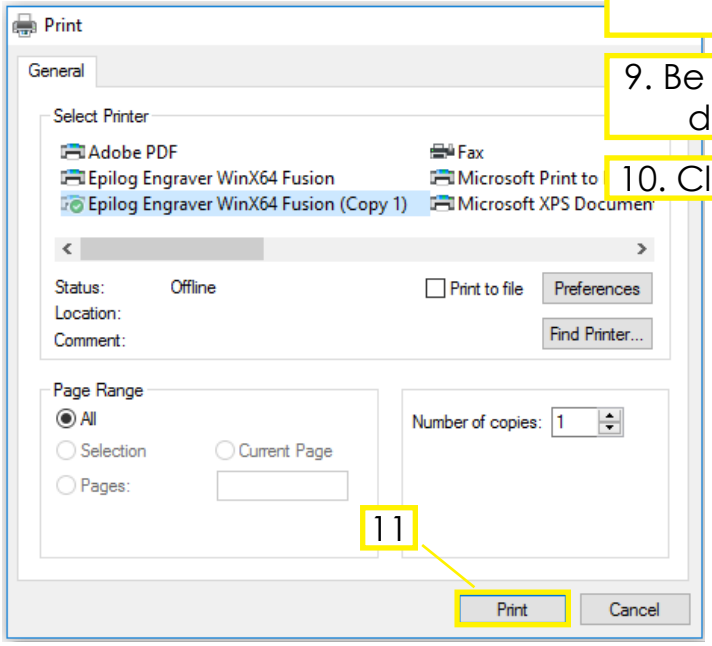
6. Select one of the colors you used in your file prep for your layers (i.e. red, blue, green). Use the up and down arrows to reorder the colors so the order of operations is correct. Normally this follows as 1 - Etching, 2 - Interior Cuts, and 3 - Exterior Cuts

7. Change the Speed and Power Settings (Frequency is normally left at default 50). Speed and Power settings vary by material and thickness. These settings are found in the material settings guide

8. If your file doesn't have any rasters, uncheck "raster". Make sure "vector" is checked

9. Be sure to click the "save" arrow after defining each color's properties.

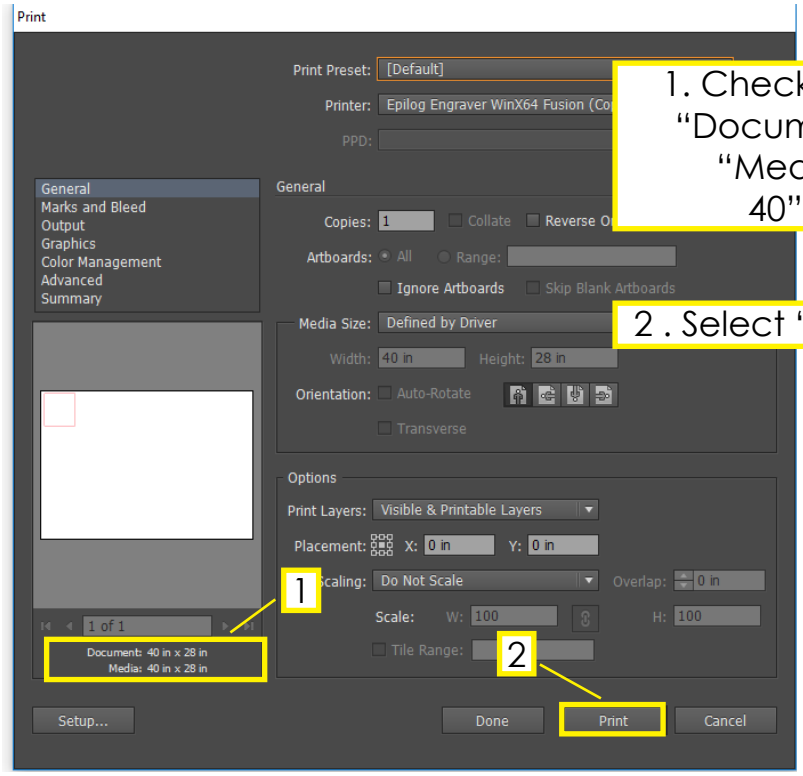
10. Click "OK"



11. Select "Print"

Epilog Fusion M2 CO2 Laser Cutter: Printing

STEP SIX: Sending your file to the Laser Cutter
After you select "Print" in the illustrator menu it will send the file to the queue to the Epilog Laser Cutter. The panel should read "Job: <your illustrator doc title>" The number below is a time estimate in HH:MM:SS format. The more complex the linework the longer the file. See the troubleshooting pages if the time reads 00:00:00.



1. Check that both "Document" and "Media" are 40" x 28"

2 . Select "Print" again

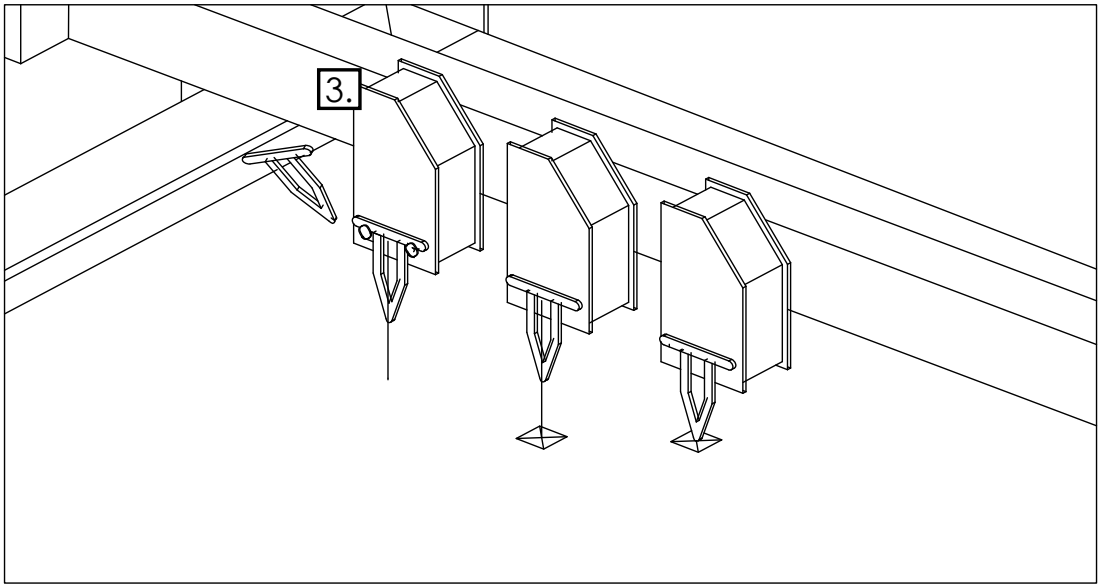
3. Verify job title and time

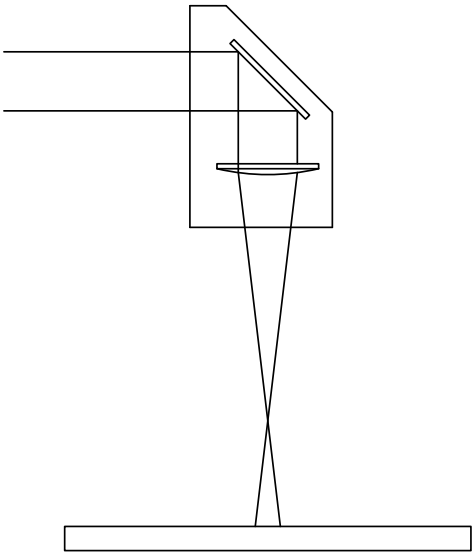
Don't press GO yet! Continue to next page

Epilog Fusion M2 CO2 Laser Cutter: Printing

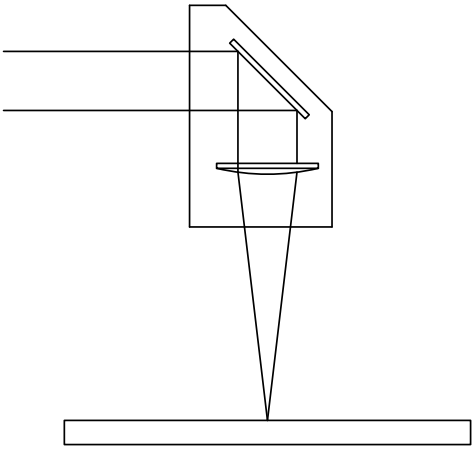
STEP SEVEN: Focusing the Epilog Laser

The cutting laser is focused in by a lens in the carriage.
Imagine the laser as a cone, pointing downwards from the lens. In order to make the laser cut effectively, the height of the laser head needs to be adjusted. The adjustability allows for materials of different thicknesses.



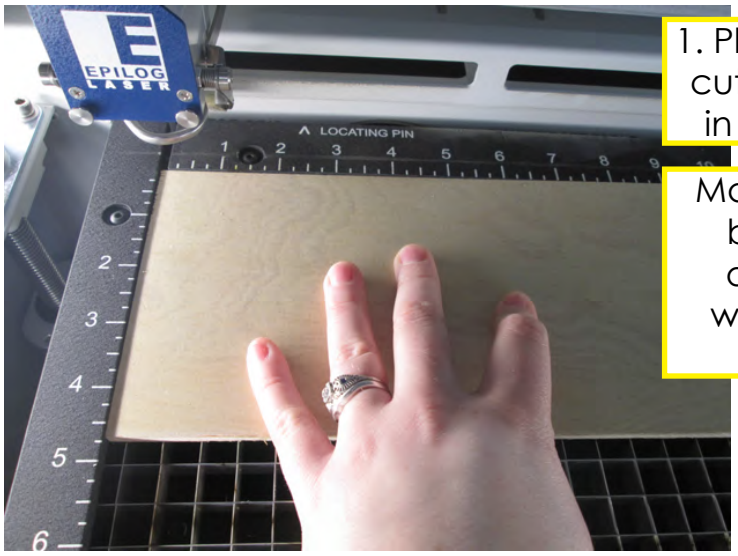


Unfocused laser beam



Correctly focused laser beam

Epilog Fusion M2 CO2 Laser Cutter: Summary

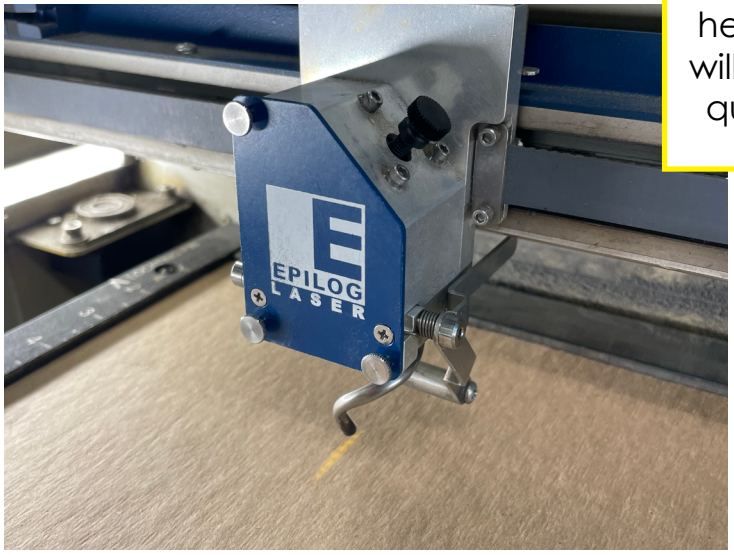


1. Place your material on the cutting bed so it is oriented in the top left corner (0,0)

Make sure that the cutting bed is clean and clear of debris and that your workpiece sits flat on the bed

2. On the Epilog control panel, use the up and down arrows to select "jog". Then use the joystick to move the laser head out into the middle of your material.

The purpose of this step is to find an average height for your material. If your material has a slight warp to it, you'll want to move the laser head to a space that roughly represents the median height of the material. This will ensure you get the best quality across your whole material.

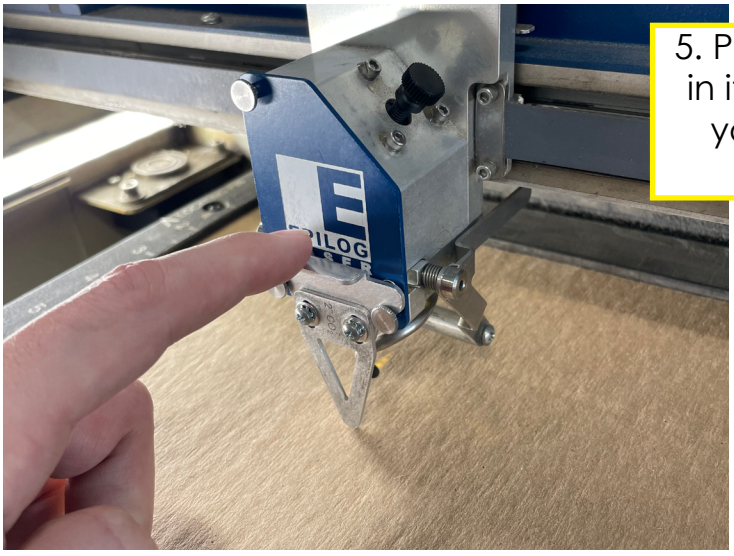


Epilog Fusion M2 CO2 Laser Cutter: Prep

3. Remove the focus guide from the little tray where it is housed and hang it from the laser head's pins

4. On the Epilog control panel, use the up and down arrows to select "focus". Then, use the joystick to adjust the bed height until your material just touches the focus guide

You can lightly tap the top of the focus guide to help indicate when it comes in contact with your material

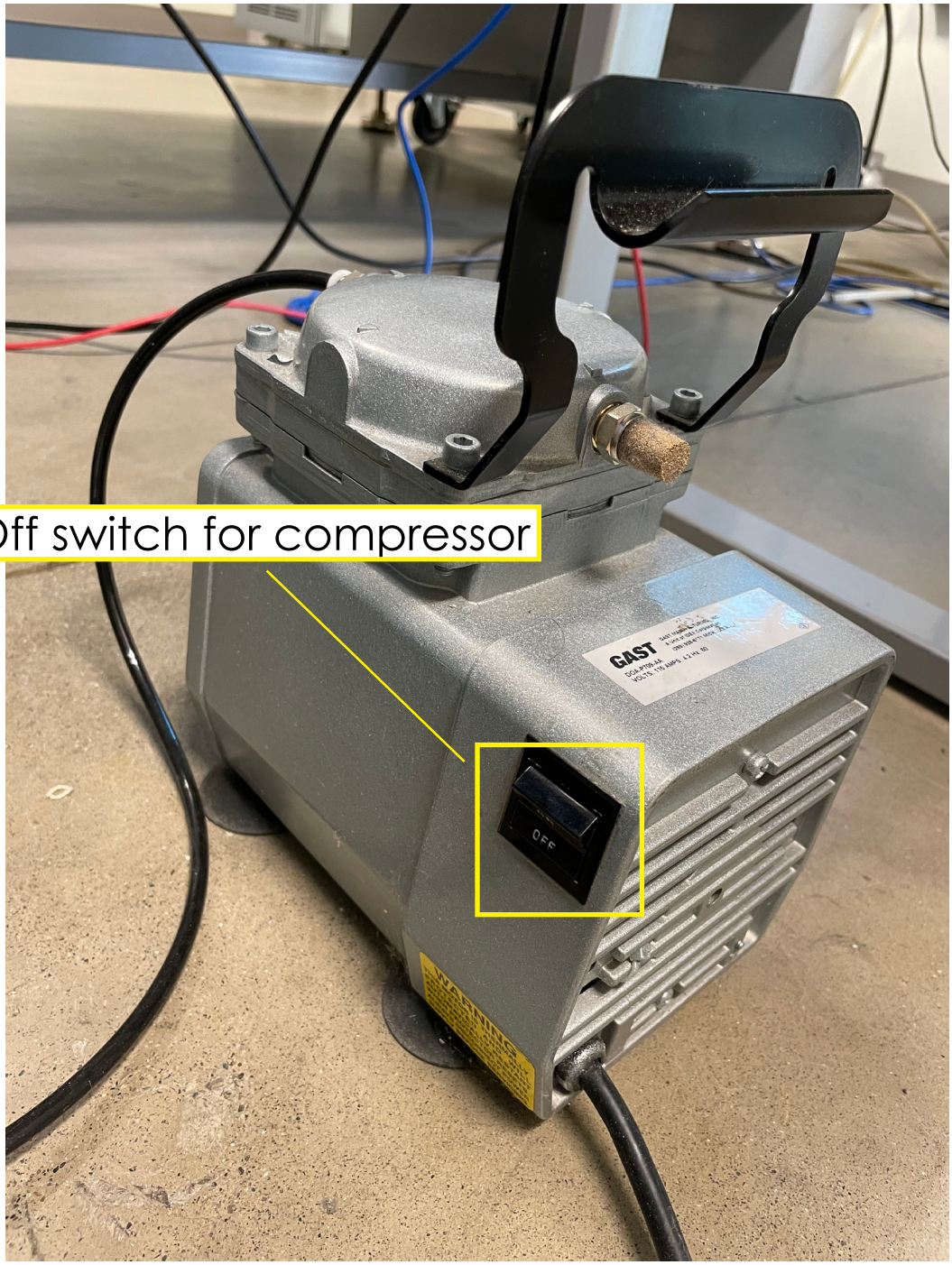


5. Put the focus guide back in its home before running your cut. Don't lose this object!

Epilog Fusion M2 CO2 Laser Cutter: Summary

STEP EIGHT: Activating the Compressor

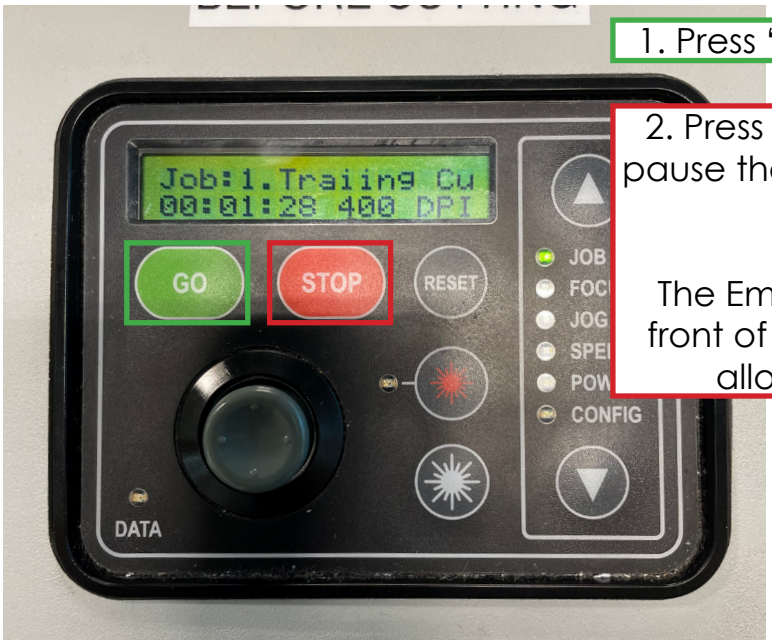
Beside the laser cutter is a small compressor is located on the ground, to the right of the machine. It makes a purring/bubbling sound when running. This must be switched on before running. It helps push smoke and material debris away from the laser point and will create a cleaner and safer cut.



Epilog Fusion M2 CO2 Laser Cutter: Summary

STEP NINE: Running the cut

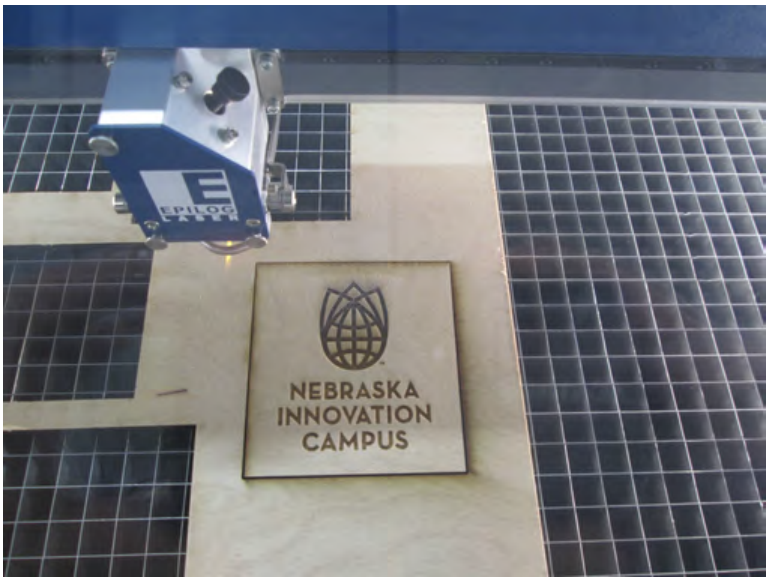
You should be ready to run your file. Plan your time appropriately, and pause the cut if you're leaving the room. All occupants of the lab should be wearing safety glasses while the laser cutter is running.



1. Press "GO" to begin the cut

2. Press "STOP" if you need to pause the cut, and "GO" again to resume.

The Emergency Stop on the front of the machine will NOT allow you to resume.



The laser will not fire if the Epilog's lid is up. If you're aiming for a small area of material, you can use this feature as a test run.

Don't touch the finished material until you're sure it's done. So long as you don't displace the material, you can make small corrections and additions to the cut.

Epilog Fusion M2 CO2 Laser Cutter: Troubleshooting

Problem:	Cause:
Colors revert from an true RGB red, blue, green, to another value.	Document is in CMYK mode; Illustrator is trying to make sure the colors you use can be created with ink.
Document is empty when it reaches the Epilog; time estimate reads as 00:00 or 00:01.	The Epilog can't find any acceptable geometry.
Lines are cut too thick.	Machine is not focused properly. The distance between the lens and the material is important.
There is a visible flame at the point where the laser is cutting, and it creates a burn on the material.	Compressor is not running/ "Air assist" is not working.
Color reverts to grey, machine will not recognize lines.	Illustrator doesn't recognize imported colors
Scale between AutoCAD, Rhino, etc, and Illustrator is wrong.	Scale factor is wrong. There are many possible causes of this.
Illustrator file is blank after import, but has named layers/colors.	Linework was imported, but is too big or located away from origin.

Epilog Fusion M2 CO2 Laser Cutter: Troubleshooting

Solution:

Change document to RGB color mode. File > Document Color Mode > RGB Color.

If vectors are desired, check that all lineweights are 0.025pt. Check that "Vector" is checked in the Epilog Print window, as well as for each color, in the "Color Mapping" tab.

File > Print > Setup > Preferences > "Job Type" area. "Color Mapping" tab, on top of window.

Focus the laser. If needed ask a monitor or TA and/or see the Epilog literature on how to properly focus the machine.

Turn on the portable compressor, located at the base of the machine. Check that "air assist" is checked in the Epilog print window, and in the "Color Mapping" tab.

Create a new swatch, in RGB, @one color = 255, other colors = 0. Select problem line. Select > Same > Stroke Color. Change to new color. Repeat.

Unclick "Scale to fit artboard" when importing linework into Illustrator. When exporting from Rhino, be careful to input decimal values, and not a quotation or fractions (Rhino will round).

Check import scale, see above. Try moving CAD linework closer to the origin.

Epilog Fusion M2 CO2 Laser Cutter: Troubleshooting

Problem:	Cause:
Laser fails to cut fully though the material.	Multiple causes.
Laser is moving too quickly, not cutting fully through.	Color mapping values have reset to their defaults: speed: 50%, power 50%, frequency 50%.
Document jumps from landscape to portrait mode, after inputting settings.	Preset or Piece Size was not set correctly.
The estimated time is much longer then seems reasonable.	There could be duplicate lines, unjoined lines, or lots of rasters.
Your linework moves away from the origin 1" in the x and 1" in the y.	The origin on of the machine has been moved, either on the machine or via a mistake in the settings of the illustrator file.

Epilog Fusion M2 CO2 Laser Cutter: Troubleshooting

Solution:

Double check that the laser is focused correctly.

Double check that the settings in the "Color Mapping" tab are appropriate for the material (File > Print > Setup > Preferences > "Color Mapping" tab). Reference tables found taped to computer table, or in Epilog literature found in the "Epilog Laser" drawer of the island.

Reset color mapping values; see above.

Change Print Preset value. File > Print > Print Preset: change from "Custom" to "Default". Double check that Color Mapping setting have not been scrubbed after making this adjustment.

Check your file for duplicate lines or unjoined lines and if needed go back to your Rhino/AutoCAD file to correct this issue. If too many rasters, try decreasing the DPI or converting them to vector outlines.

This is a configurable setting that should be corrected by the TA or shop manager. It is corrected by adjusting the origin on the config tab on the epilog machine.

Epilog Fusion M2 CO2 Laser Cutter: Quick Step Quide

____ Organize and Label Layers by Laser Cutter Operation (“cut”, “etch”)

____ Set artboard to **40” x 28”** in illustrator

____ Use guides to designate where the material sits

____ Layout out artwork on artboard with in material boundaries

____ Set Layers and Operations to RGB true **red, blue, and green**

____ Set Stroke Weight for all vector lines to **0.025 pt**

____ Click Print and in the Illustrator print menu change the preset

____ Click Setup and then Click Preferences

____ In the Epilog print menu check the Piece Size is 40” x 28”

____ Set the **Job Type** to match your file (“vector”, “raster”, “combined”)

____ If needed set raster DPI

____ Set default **Raster and Vector Settings**

____ In Color Mapping organize colors by **order of operations**

____ Change colors to correct **job type** and **speed** and **power** settings

____ Click the submit button for each color to save settings

____ Click “OK”, “Print”, and “Print”

____ Check Epilog for file name and time estimate

____ **Focus the laser** head using “Jog” and “Focus” commands

____ Put on **Safety Glasses** and Turn on the **Compressor**

____ Click **“Go”** and run your cut