



Instructions for using the EPILOG HELIX laser cutting machine FABLAB BRIGHTON 2019

HARDWARE PREPARATION

Note: Cutting bed size is **609 x 457 mm**
(24 x 18 inches)

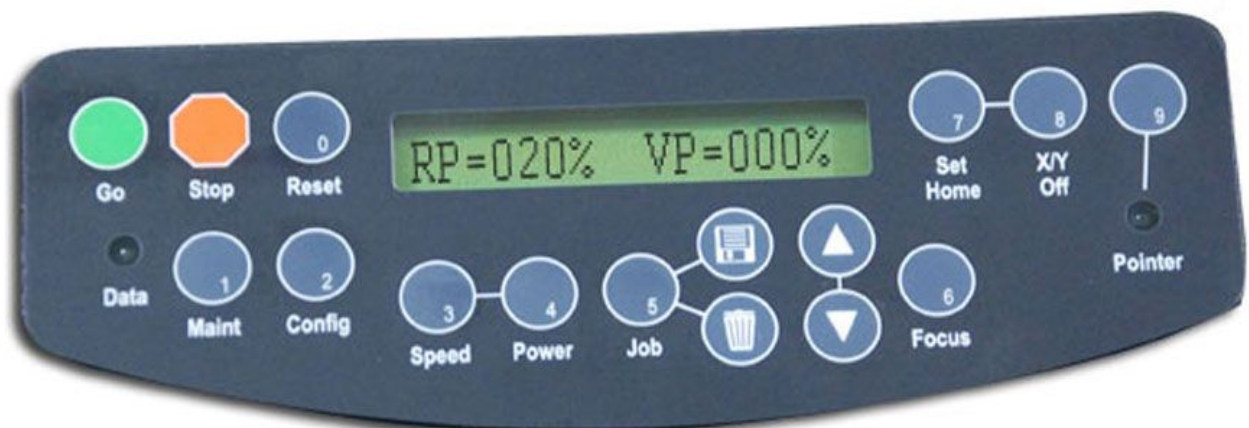
A. Turn on the laser cutter.

B. Place your material on the machine bed, aligning it in the top left against the rulers. Consider raising the material away from the aluminium base using supports.

C. Set up the machine using the front panel.

Note: we work down from button 9 to button 6 (all on the right hand side of the panel), then skip to button 0 to reset the cutter. Buttons 1-5 are not required for cutting.

POWER



- 9.** Press [**POINTER**] to toggle the red laser point on or off to aid with positioning.
- 8.** Press [**X/Y OFF**] and press [**GO**] to confirm (this will turn off the motors which move the laser in X-Y). Physically move the gantry (gently) to your desired starting position (0,0).
- 7.** Press [**SET HOME**] to set the current X-Y position as the origin or home position.

6. Press [**FOCUS**], then attach *magnetic focus tool* (see figure 3 below) and adjust the bed height using [**Δ**] and [**∇**] (up and down arrows) until the height tool on the head is just touching your material.

0. Remove the *focus tool* and press [**RESET**] to move the head back to the starting position.

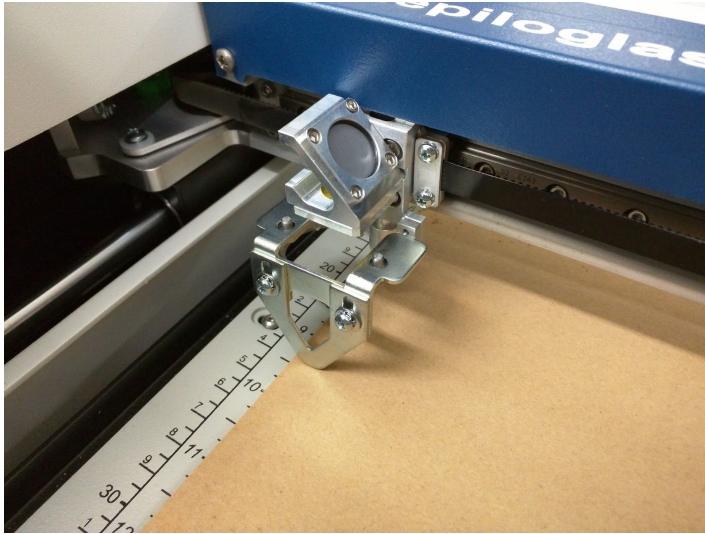


Figure 3: Magnetic focus tool fitted to the head of the laser and cutting bed raised showing focus tool touching material.

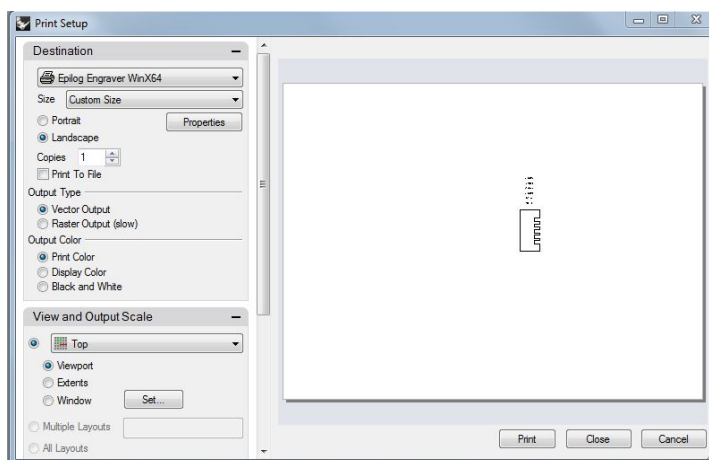
SOFTWARE

D. Create image using any software that can export to *.dxf file*.

E. Go to cutting software (e.g. Rhinoceros or Illustrator), and import the *.dxf file*. Make sure your lines are joined together, this will ensure that the laser works sequentially around the drawing (rather than moving randomly between lines).

IN RHINO:

In Rhinoceros, choose **FILE > PRINT**. Click on **SET** to define the bed size. Place it over the top of your drawing. Note that in Rhino you can adjust the colour/line thickness of various **LAYERS**, so if you want to change lines from vector (cut) to raster (engrave), adjusting the colours/line thicknesses is the best way to do this.



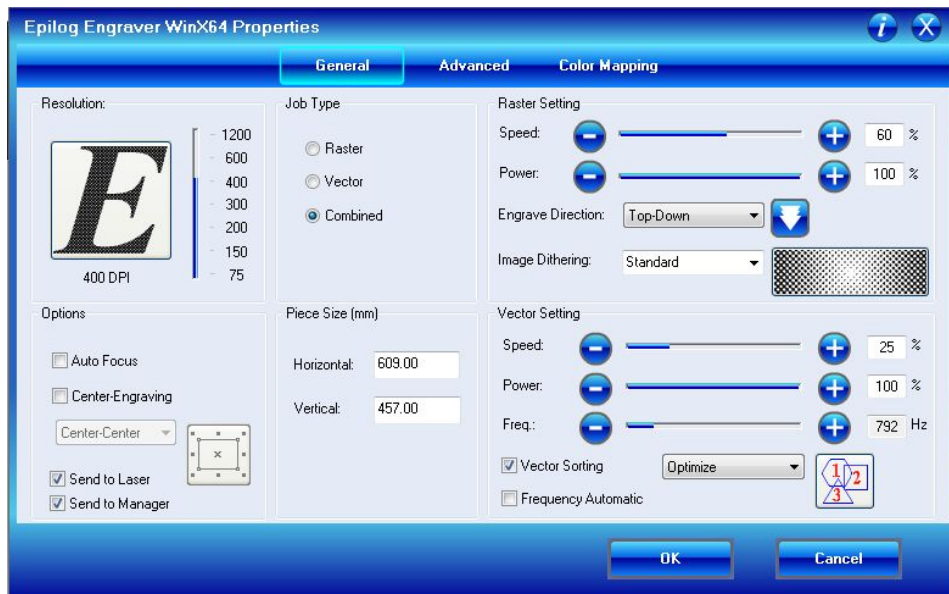
IN ILLUSTRATOR:

Choose **FILE > PRINT**. Click on **PREFERENCES**.

Click on **PROPERTIES**. These are GENERIC properties for this laser cutter, regardless of software.

Note: PIECE SIZE is 609 mm x 457 mm, and usually you want to start the cut from TOP LEFT (click on little icon).

Note: sometimes you need to go into the SETUP twice for the piece size to register.



Colour mapping to set different cut speeds depending on the colour of the layer:



STANDARD SETTINGS FOR THE MACHINE:

Resolution: Measured in DPI (Dots per Inch). Higher number means higher quality.

Options: No auto focus, no center-engraving, tick send to laser, tick send to manager.

Job Type: Raster (Engraving), Vector (Cutting), Combined (Both Engraving and Cutting).

Piece Size: Horizontal 609.00 and Vertical 457.00

Raster Setting: Check settings table at the end of this document

Vector Setting: Check settings table

EXTRACTION

E. Then, before actually cutting, we **MUST** turn on BOTH the BOFA extraction system (next to the PC stand), AND the COMPRESSOR (which is on the floor, next to the laser cutter). Wait until the extractor has reached the desired setting e.g. 330m3h (On the extractor screen the top number is the current setting and the bottom number is the desired setting.)

FINAL CHECK and CUT

F. Make sure:

1. Focus tool is removed.
2. Compressor and extraction system are running.
3. Correct job is loaded on cutter in correct orientation.

G. Press **[GO]** and the cutting will start.

DO NOT leave the laser cutter running unattended. It is quite easy to start fires!

After the cut has finished, leave the extraction on for a further 60 seconds to clear the fumes.

A note on materials

Material	DANGER!	Cause/Consequence
PVC	Emits chlorine gas when cut!	Don't ever cut this material as it will ruin the optics, cause the metal of the machine to corrode, and ruin the motion control system.
Thick (>1mm) Polycarbonate/Lexan	Cuts very poorly, discolors, catches fire.	Polycarbonate strongly absorbs infrared radiation. This is the frequency of light the laser cutter uses to cut materials, so it is very ineffective at cutting polycarbonate.
ABS	Melts / Emits Hydrogen Cyanide	Cutting ABS plastic emits hydrogen cyanide, which is unsafe at any concentration. ABS also does not cut well in a laser cutter. It tends to melt rather than vaporize and has a high chance of catching on fire.
HDPE/milk bottle plastic	Catches fire and melts.	It melts. It gets gooey. Don't use it.
PolyStyrene Foam	Catches fire.	It catches fire, it melts, and only thin pieces cut. This is the #1 material that causes laser fires!
PolyPropylene Foam	Catches fire.	Like PolyStyrene, it melts, catches fire, and the melted drops continue to burn and turn into rock-hard drips and pebbles.
Epoxy	Burns, smokes.	Epoxy is an aliphatic resin, strongly cross-linked carbon chains. A CO2 laser can't cut it, and the resulting burned mess creates toxic fumes. Items coated in epoxy, or cast epoxy resins must not be used in the laser cutter.
Fiberglass	Emits fumes.	It's a mix of two materials that can't be cut. Glass (etch, no cut) and epoxy resin (fumes).
Coated Carbon Fiber	Emits noxious fumes.	A mix of two materials. Thin carbon fiber mat can be cut, with some fraying - but not when coated.

Credit: ATX Hackerspace

Material Settings

The official Epilog Legend Series material settings guide is here:

<https://www.epiloglaser.com/assets/downloads/legend-material-settings.pdf>

Here are the Fab Lab Brighton experiences:

Material / Operation	Thickness	DPI / Frequency	Speed / Power
Wood / Cutting	3 mm	500f	30s 100p
Wood / Cutting	6 mm	500f	10s 100p
Wood / Engrave	-	600 DPI	10s 100p