

Laser cutters are currently available at two HCPL locations to patrons who have completed a free orientation class. Laser cutters use focused light to burn through materials in 'vector mode' (cut) or mark the surface in 'raster mode' (etch). The laser beam diameter is small, and the computer-controlled positioning is very precise. Depending on the material used and the quality of the artwork, lasers can cut and etch excellent details. There is no cost to use the laser cutters, but patrons must supply their own materials.

Materials that can be cut and/or etched include natural wood and fabric, paper, uncoated cardboard, tile, stone, and glass (etch only), natural leather and some plastics. The use of PVC, vinyl or any materials containing chlorine is **not** allowed and all materials are subject to staff approval. In general, the lasers at HCPL are capable of cutting through most wood and acrylic plastics up to ¼" - thick on a single pass.<sup>1</sup>

Suitable materials may be found at local hobby and art-supply stores, hardware stores, plastic suppliers and online sites such as Inventables.com, JohnsonPlastics.com and many vendors on Amazon, etc.

Examples of laser projects and vector designs can be found on Thingiverse.com, Inventables.com/projects, MakerCase.com, Vecteezy.com and many other websites.

Almost any program that can edit photographs can be used to prepare raster/etch files, but for cutting, vector-design software is required to produce CAD, SVG, AI or other vector files.

- Tinkercad – <https://www.tinkercad.com/> (free online program – easy for beginners)
- Fusion 360 – <https://www.autodesk.com/> (free download for hobbyists/educators)
- Inkscape - <https://inkscape.org/en/> (free download but full-featured, requires some experience)
- Adobe Illustrator - <http://www.adobe.com/products/illustrator> (commercial, free trial available)

Once the vector and/or raster design is ready, you then send it to the laser cutter as if it were a printer. However, the "print settings" must be properly set for the type of artwork and material used. This may include some trial-and-error, but maker lab staff are available to offer advice. The exact process varies from machine to machine and the details of machine variances are in the hands-on part of the orientation.

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Schedule time to use a laser cutter at HCPL by simply visiting the [Maker Central](#) page and accessing (or creating) your Beanstack account. (This may be the same account you have used for HCPL's Summer Reading Program or other activities.) Signup and attend the Laser cutter orientation to earn your badge then click on "Rewards" within Beanstack for the reservation link. Complete the reservation form and you will receive a confirmation of your schedule request after staff review.



## Using the Epilog Mini 60W Laser

### File Preparation (in Adobe Illustrator):

- For vector cutting, set the line width (stroke) to less than or equal to 0.1 pts.
- For vector engraving in raster mode, set the line width (stroke) to greater than or equal to 0.4 pts.
- For rastering (etching), set line thickness greater than or equal to 0.25 pts.
- Advanced users may wish to color mapping settings to differentiate lines and fills by individual colors.

### Running the Laser Job (please refer to the “Epilog Laser Cutter Quick Reference” for more details):

1. Start by turning on the ventilation system then air-assist pump and laser cutter in that specific order.
2. Position work material in the back-left corner of the cutting frame. If the focus plunger is touching the material, please refer to the quick-reference guide or seek advice from qualified staff to adjust the bed height.
3. Open your file using Adobe Illustrator. (You can import a file from Inkscape, Corel, Photoshop,
4. Click on **“File”** -> **“Print”**, then **“Setup”** in the lower left corner of the screen.
5. Select the correct printer from the opened window (“Epilog Engraver WinX64”)
6. Click on **“Preferences”** to reach the Epilog Printing Dialog Box.
7. Select **“Job Type”**, **“Raster”**, **“Vector”**, or **“Combined”**. Check the **“Auto-Focus”** option and set the **“Piece Size”** to match your artwork size. Specific settings for rastering and vectoring may take some trial-and-error, but guidelines are available under the **“Advanced Tab”**
  - a. Click on **“Browse”**, then **“Windows (C:)”**, **“Epilog Materials Settings”**, and **“OK”**. This will supply some guidelines for a variety of materials along with various thickness options.
  - b. Click on the **“General”** tab to return to the main settings.
8. Click **“OK”**, then **“Print”**. Verify that the document size and media size match (lower-left corner). If they do not, you **must** click **“Setup”** then **“Print”** a second time so the two sizes match.
9. Finally click **“Print”** on the first print menu and this will send the job to the laser cutter, but it will not start automatically.
10. The file name of your job should appear on the LCD screen of the Epilog laser. Press the **green “Go”** button to begin the job.
11. Please stay by the machine to watch the job until it completes. Once the laser completes your job you should hear a beep and the laser position will reset to the top left corner automatically. As a precaution, leave the lid closed for at least 15 seconds to allow any smoke to clear. At the end of the session, the ventilation system and laser need to run for at least 5 minutes before shutting the system down in the reverse order in which you started it.

# Using the Full Spectrum 40W Hobby Series Laser (5<sup>th</sup> Generation)

File Preparation (in Inkscape or Adobe Illustrator):

- For vector cutting, make the line thickness less than or equal to 0.003 pts.
- For rastering (etching), make the line thickness greater than or equal to 1 pt.
- Advanced users may wish to use color mapping settings to differentiate lines and fills by individual colors.

Running the Laser Job:

1. Turn on the ventilation system and the power strip on the side of the laser cutter cabinet.
2. Open Retina Engrave 3D software on the computer so that it is running in the background.
3. Open your design file using Adobe Illustrator or Inkscape.
4. Click on **File** -> **Print**. (follow either step A or B based on the software in which you opened your design file)
  - A. If you are working in Inkscape, you must specify paper size. Click **File** -> **Print** -> -> **Select Full Spectrum Engineering Driver** as printer -> **Properties** -> **Advanced** -> **Change paper size to Hobby 20x12**.
  - B. If you are working in Adobe Illustrator – Click **File** -> **Print** -> **Select Full Spectrum Engineering Driver** as printer -> **Specify Media Size as Hobby 20x12**.
5. This will send your design to Retina Engrave.
6. Within Retina Engrave click **Hobby 20X12** at the top of the screen -> **Specify IP Address for Connection** -> **Connect**
7. Click the House icon to home the machine.
8. Load your material onto the laser cutter bed.
9. Jog the lens carriage over your material with the jog arrows.
10. Focus the lens with the designated calibration cylinder.
11. Move the laser to your job origin (top left of your material.)
12. Enter your speed and power settings.
  - Raster settings: Speed and Power
  - Vector settings: Order, Speed, Power, and number of passes
13. Make sure to have the correct tab open for the laser function you want to perform first (Raster or Vector).
14. Press the **Perimeter** button on the machine to make sure the laser aligns with your material.
15. Press the **Play** button to begin the laser job.
16. Please stay by the machine to watch the job until it completes. Once the laser finishes your job, leave the lid closed for at least 15 seconds to allow any smoke to clear. At the end of the session, allow the ventilation and laser to run for 5 minutes before turning them off.

# Using the Full Spectrum Muse Core (Hobby) 40W Series Laser

**Note – This model does not have the camera function**

## Running a Laser Job:

### Powering equipment and starting accessing web-based software

1. Turn on the Full Spectrum fume extraction cabinet by pressing the red power button located on the front. The system will start up in the last settings that were used for the power of extraction and filtration through the machine. \*Based on your specific material and job settings you may need to increase or decrease this setting using the buttons next to the power button.\*
2. Turn on the Cool Box by toggling the on/off switch located on the rear panel of the box. You should hear the compressor, water cycling and see the fan in motion on the front panel of the box.
3. Turn on the Muse Hobby Laser cutter by toggling the on/off switch located on the right rear corner of the machine.
4. Using Google Chrome®, open the Retina Engrave v3.0 software using the following IP address: <http://169.254.10.119> . The IP address will be visible on the lower left corner of the Full Spectrum Muse Hobby laser LCD screen.

## Project design:

You may complete your project in the Retina Engrave v3.0 software or export it from design programs such as Adobe Illustrator, Inkscape, Corel Draw, Autodesk123D and most CAD software. Here are the steps you'll use to open and export your design file from Adobe Illustrator or Inkscape. (Outside of Retina Engrave v3.0 the two most common used computer aided design (CAD) programs are Adobe Illustrator and Inkscape.)

### File Preparation (in Inkscape or Adobe Illustrator):

- For vector cutting, make the line thickness less than or equal to 0.003 pts.
  - For rastering (etching), make the line thickness greater than or equal to 1 pt.
    - When rastering you must leave ½ of an inch on the left and right on the project in the workspace within the Retina Engrave v3.0 web-based software.
  - Advanced users may wish to use color mapping settings to differentiate lines and fills by individual colors.
1. Click on **File** -> **Print**. (follow either step A or B based on the software in which you opened your design file)
    - a) If you are working in Inkscape, you must specify paper size. Click **File** -> **Print** -> -> **Select Full Spectrum Engineering Driver** as printer -> **Properties** -> **Advanced** -> **Change paper size to Hobby 20x12**.
    - b) If you are working in Adobe Illustrator – Click **File** -> **Print** -> **Select Full Spectrum Engineering Driver** as printer -> **Specify Media Size as Hobby 20x12**.
  2. Your design is now exported to Retina Engrave v3.0.

## Adjusting object properties and machine set up to start a job:

1. Click the House icon to home the machine.
2. Load your material onto the laser cutter bed.
3. Jog the lens carriage over your material with the jog arrows.
4. Move the laser to your job origin (top left of your material.)
5. Enter your speed and power settings.
  - Raster settings: Speed and Power
  - Vector settings: Order, Speed, Power, and number of passes
6. Make sure to have the correct tab open for the laser function you want to perform first (Raster or Vector).
7. Press the **Perimeter** button on the machine to make sure the laser aligns with your material.
8. Press the **Play** button to begin the laser job.
9. Please stay by the machine to watch the job until it completes. Once the laser finishes your job, leave the lid closed for at least 15 seconds to allow any smoke to clear. At the end of the session, allow the ventilation and laser to run for 5 minutes before turning them off.

VECTOR	RASTER
Project Examples	
Signs, Logos, Parts, Gears	Image Engraving, Surface Marking
File Types	
PDF, SVG	JPEG, GIF, PNG, TIF
Preferred File Type	
PDF	JPEG
File Composition	
Geometric Formulas	Pixels