

Laser Cutter

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Picture of laser cutter here!

Location

The Laser Cutter is in the OEDK Room 111, right next to the 3D printer.

Charging Use Time

The Laser Cutter is technically under the shared equipment authority and requires the user to have fund and group number in order to use. If you are part of a design group (senior design, freshman design, etc) you are free to use the laser cutter so long as you respect the reservations that others have made.

Focusing the Laser

Before you do any cutting on the laser cutter, the laser must be properly focused. VIDEO HERE!

To properly focus the laser:

- Retrieve the laser focusing dongle that is stored inside the laser cutter bed on the left edge. PIC
- Remove ALL materials from the bed of the laser cutter (not doing so could result in damage to the head in the next step)
- Press the Z button on the laser cutter, laser head should move to the top left corner
- Place the material into the bed underneath the laser head
- If material will not fit underneath laser head remove material, use the Down arrow to move the bed down (away from the laser head) until you have enough room to insert the material underneath the laser head.
- Place focusing dongle with black foot down on material and the notch on the top white part facing the read laser head. Approach the laser head from the right (going to the left).
- Flat part of the white section on the focusing dongle should be flat against right side of red laser head.
- Raise or lower the bed until the laser head just barely touches the notch about halfway from top of focusing dongle. Dongle should be pushed slightly out of the way as the laser head comes into contact with the notch.
- Press the select button on the laser cutter front interface to switch to a much smaller step size for moving the bed in smaller increments.

- Continue resetting the focusing dongle and moving the laser head to just barely touch the focusing dongle until you are satisfied that is happening at the same number indicated on the laser cutter front interface screen.
- The laser cutter is now focused. Press the Z button again to confirm and save the focusing setting.

Modes of Operation

Raster vs. Vector

Rubber Stamp Mode

Using Multiple Modes in the same File

The laser cutter works like a large, powerful pen plotter. The way it knows which settings to use on which curves in the document is by the color of the curve. So if you wanted cut 1 part of the document deeply and raster in the inner portion for etched appearance you could do both operations in 1 go. All you have to do is make sure that the line color is one of the "Laser Cutter X" colors (where X is normal color like blue or red...hence the color should read something like "Laser Cutter Black"). DO NOT use just any color, these colors are the ONLY colors that the laser cutter software will recognize and translate to motions and cuts on the laser cutter.

Gotchas

- Beware that the laser cutter does remove material (albeit a very small amount) when it cuts. Pieces will become loose in the laser cutter bed if you cut them out. Ex: You want to etch a Rice Logo into a circular piece of acrylic so you make the logo red and the circular border black. So far so good. But the laser cutter may end up cutting the circular outline first and THEN etching the inside. At this point the circular piece is just "floating" on the laser cutter bed, it has been cut away from the larger rectangular stock and the gas assist from the laser cutter may very well push it around a bit and the etching may suffer in quality.

Abilities and Restrictions

The laser cutter has the following abilities:

- Minimum features size: TBD
- Focused laser point size: 0.007 inches
- Max width of material for full cut: Varies by material... no more than 0.5 inches

Important Settings

Speed and Power

Unless you are popping off many, many parts the speed setting of the laser cutter is more like a modifier coefficient to the power since the laser cutter makes its cuts relatively quick regardless of the speed setting. Imagine the laser cutter is to power 70, but is going really slowly. That power now has more time to "soak in" to the material and cut deeper (and possible wider). If the laser cutter is set to the same power but to a higher speed the cutting laser will only be over any particular spot for a very short period of time and hence may only scratch the surface.

While this may make it seem like the speed should always be as slow as possible it is also important to note that if the laser sits in one place for too long and it cuts all the way through the material on the bed, the laser will begin to scatter off of the honeycomb and aluminum backing. This can cause pits and scratches on the back of your material. Care should therefore be taken to optimize the speed for maximum penetration whilst avoiding unnecessarily long soak times. This setting varies on the material and thickness being cut. Precomputed tables for optimal speed and power settings have been provided in the [Tables](#) section.

Backlash

Since the laser cutter is not a perfect machine it is susceptible to backlash. The laser head builds up considerable momentum at high speeds, since the machine is not bolted to the floor this can cause the entire machine to shift in one direction or another. While not a problem for most cuts, if great accuracy is needed this should be taken into account.

Effects of Too Much Speed

- Lower Quality

- Cuts not deep enough

Effects of Too Much Power

- Cuts too wide
- "Spattering" on back of soft materials [picture](#)
- Burned out sections [wood_burn_out](#)

Gas Assist

DPI

Useful for making smooth circles. The Higher the DPI the smoother the shape comes out. Also usually slows down speed of cut. If edges of cuts or rasters seem jagged or unclear, try increasing the DPI. Default DPI is about 300.

Training Materials

[Link to youtube oedk training video]

Supported Materials

The laser is generally good for anything that isn't metal. Remember that it works by heating the material up very quickly with the laser. If the material doesn't heat well, it probably won't cut well.

Wood

- Ply Wood -- (How many layers)
- Hardwood
- Particle Board

Plastic

- Acrylic -- sizes
- ABS -- Sizes

Paper

Foam

Leather

Printing From Programs

We suggest you export your file to an Adobe Illustrator file if possible. Most drawing programs will be able to export to an illustrator file. If you can not do this then simply export to one of the vector file formats (svg, eps, ai). DO NOT just take a screen shot or try to print a rastered picture (jpg, png, bmp, etc). The laser cutter needs a vector file to correctly cut things. You can go through the [vectorization](#) process to turn a rastered image into a vector set, but the results are never perfect. Export to vector to ensure a good cut.

Adobe Illustrator

AutoCAD

SolidWorks

Cool Things to do with the Laser Cutter

- [Laser Cut Project Boxes](#)