

# Using the Laser Cutter



## Prerequisites

Before you will be allowed to use the laser cutter, you must complete these three steps:

1. You must have completed the Laser Cutter training at Cyberia
2. You must schedule your window of use online
3. You must pay for the time you have scheduled

## How Do I Get Trained on the Laser Cutter?

We make getting trained easy by giving you two options:

### #1 Take a Class

Go to the upcoming events page at our website and look for (and register to participate in) the next laser cutter training class. The page can be found at **What's Going On**→**Upcoming Events** or directly at <https://clubcyberia.org/Events/Schedule>.

### #2 Request One on One Training

You can request a session with a trainer for \$5 per ½ hour by going to our website and navigating to **Membership**→**How Do I . . .**→**Get Checked Out on a Machine**. Use the big green button to request a training time (please give 48 hour notice prior to your scheduled training) or by sending an email to [helpme@cyberialtd.org](mailto:helpme@cyberialtd.org).

## How Do I Schedule & Pay for Time on the Laser Cutter?

Scheduling and paying for time is as easy as scheduling the training, but without the 48 hour lead time. Go to our website and navigate to **Membership**→**How Do I . . .**→**Schedule Time on the Laser Cutter** or jump there directly at <https://clubcyberia.org/LaserCutter>. From there, use the big green button to schedule and pay for your time.

- If you are using the cutter and you think you are going to need more time, pop over to the website and schedule a little more time

- If someone is using the Cutter and you want to be next, pop over to the website and schedule your time ASAP before someone else uses it
- If your time runs out, and someone has paid for the next block, please move out quickly so they do not lose time. If necessary, offer to buy them an extra block of time for the spot you are using
- If someone is running late and it cuts into your time, please be patient and let them get out of the way. If necessary, ask them to buy you an extra block of time for your work

If there is a problem with abuses, or a problem with the scheduling software, contact us at [helpme@cyberialtd.org](mailto:helpme@cyberialtd.org).

## Setting Up Your Cut Job

Setting up your cut job starts with a drawing. You can use a bit map (jpeg) or vector (dxf, ai) file for engraving, but only a vector art file can be used to cut lines.

The recommended programs for creating vector artwork are **Adobe Illustrator** or **Autodesk Fusion 360**. Both can be found on the design computer, and **Fusion 360** is free for students and adults who make less than \$100,000 per year from the use it. However, you may also use free and open source software like **Inkscape**, **GIMP**, **Libre Office Draw**, and **Open SCAD** to create drawings, so long as they are exported as a dxf or ai file. **PRO TIP: If your export options ask if you should use polylines, accept that option!**

You may also use the drawing functions in **RDWorks** to create your drawing from scratch.

## Installing and Setting Up RDWorks Software

It is recommended that you set up your artwork ahead of time, and bring the saved file from **RDWorks** to Cyberia. This way you do not have to use the time you have paid for messing around with your initial set up.

The link to download the latest version of **RDWorks** can be found on our website by navigating to **Membership** → **How Do I...** → **Schedule Time on the Laser Cutter** or jump there directly at <https://clubcyberia.org/LaserCutter>. A link to the English manual developed by **RDWorks Learning Lab** is also available on that page.

When the installer runs, select the option for LaserWorks to be installed.

When setting up the laser, the bed size is 1300 x 900 mm. Set the Origin to be at the Lower Left.

## Import the Drawing

To import your drawing into **RDWorks**, go to File → Import and select your drawing from the Open File dialog box.

When your drawing is imported, the lines and filled areas will usually be the same size and color as when they were saved, but will usually have no thickness. This is because the laser will follow the center of the line itself when it cuts, leaving part of the kerf (the width of the cut) on either side of that line. You will need to adjust your line position to account for the kerf, and the size will vary based on power, material, and focus of the laser. This is one of the reasons that a test cut is always recommended.

You can save time by assigning your lines colors that correspond to ones used by **RDWorks**.

## Assign Cut Layers By Color

The software will perform the section of the cut program in an order that you specify, and groups similar actions together by color. Because of that, each type of action that you use needs to be assigned a unique color, and each line in the cut is assigned one of those colors. Clicking on the lines that cut through to the other side of the material, and assigning them the same color means that the same priority, speed, and power settings will be assigned to those lines.

That also means that if one line is used for more than one type of operation, it has to be copied, and each copy is assigned a unique color for each operation. For example, if you wanted to etch a box and then cut the box out, you would:

1. Select the box
2. Make a duplicate of the box
3. Set one copy of the box to the color for the etching
4. Set the color of the other box is set to the color for cutting through the object
5. Align the two copies so that they would sit on top of each other (there is even a button in the program to make the center points line up)

## Assign Priority for Each Layer

In the upper right hand corner of the program is a table listing all of the colors that you used, the mode that the laser will act on, and the Minimum and Maximum Power for that action. You can use the mouse to drag these into the order you wish to have them done.

**PRO TIP:** After you cut through the object, the part is very likely to shift, so do any surface effects first, like etching, dots, etc, and then do the steps to cut through last.

**PRO TIP:** When you have parts that are nested inside other parts, make sure you cut out the center pieces before the outer pieces.

## Adjust the Settings for Each Layer

Once you have the actions in the correct order, you can double click on the colors to bring up the dialog box for that colors action. Each action has a bunch of options that can be set, so use the manual and forums from **RDWorks Lab** to learn about using these other options. For now, we will just concentrate on Cut Mode.

Cut mode needs three settings: Minimum Power, Maximum Power and Speed. For most cuts and engraved lines, the Minimum and Maximum Power would be the same. For example, to cut through a 1/4 inch thick piece of MDF, you would use 70% power and a speed of 30 mm/second but to etch it, you would use 15% power and a speed of 600-900 mm/second.

**PRO TIP:** Moving too slowly makes a rough cut and increases the chance that the material will catch fire. Try copying the layer and making multiple passes over the line to cut through.

## Maximum and Dangerous Settings

To keep from operating outside of the safe boundaries, keep the laser power between 15% and 85% and the speed at 900 mm/s or slower. Failure to do so will shorten the life of the equipment, and may result in damage that is your responsibility!

## What Do These Other Options Mean?

This Quick Start Guide will get you able to cut through materials and etch lines on material like MDF and Acrylic. However, the laser cutter's use does not end there. Etching Images, making edge lighted signs, and so much more are covered in the manual and forums at **RDWorks Lab**. Go to <https://rdworkslab.com/> for suggestions and understanding of what else a laser cutter can do!

## Run a Simulation

To see how long it will take for your cut program to run, use the preview button at the top of the screen in RDWorks. The icon looks like a television.

## Setting Up the Laser Cutter

Here is the Checklist for starting up the laser cutter

- Make sure the cutting area is empty
- Verify that the CO<sub>2</sub> fire extinguisher is present and the gauge says that it is charged
- Retrieve the key from the laser cutter toolbox in the lower compartment of the kiosk
- Insert the key in the laser cutter, and turn it clockwise to power everything on
- The laser cutter head will automatically move to the back left corner, then to the last origin position at start up
- Check to insure that the chiller is on - **If the alarm sounds or the green light does not come on, shut everything down and report the issue to us immediately!**
- Verify that the blower at the laser and the blower upstairs are running
- Log into the Computer (the password is **cyberia**)
- Click once on the red **RDWorks** logo at the bottom of the screen to start **RDWorks**
- Insert your USB drive with your project into the front of the computer
- Load your project file into **RDWorks**

## Send Cut Program to the Cutter

Press the “Download” button to send your file to the laser cutter’s controller. The “Download” button can be found on the right side of the screen in **RDWorks**.

## Placing Material

Place your material on the knife bed. It is best to put it in the center of the bed.

If your material is so large that it sticks out of either end of the laser cutter, use the roller stands from the wood shop to make sure the piece is level and does not move.



## Select Program

On the laser cutter, Press the “File” button. The controller’s display will now show a list of files that have been downloaded to the laser cutter. Normally, your file will be at the top of the list.

Use the Up and Down directional arrow keys to highlight your file. Press the “Enter” button to select the program you want to cut. A preview will appear on the right side of the controller’s screen. The preview will appear upside down and backwards from the way you expect it to cut, but that is OK.

## Set the Head Position

Use the four directional arrow keys to position the head.

Press “Z/U”, then Enter to go to Up/Down mode. Use the Left and Right directional arrow keys to move it up and down, respectively.

Place the head just over the material. There will be a jig to help set the correct height, but for now, just keep it 1-2 mm above the material.

Press “ESC” to go to the main menu.

Press the “Origin” button to set the origin location in the laser cutter’s memory. This will match up with the corner marked by a small green square in the **RDWorks** program.

Press the “Frame” button on the controller, and the head will trace a fast square around the area the cut will use. Move the material, and check the position again, if needed.

## Start the Cut Program

Press the “Start/Pause” button on the laser cutter’s controller to begin the cut.

**WARNING: Do not leave the laser cutter unattended during or just after a cut. If you walk away and the material catches fire, you will be responsible for the damage. If the power is too high or air pressure too, the material will be left kindling after your cut job is complete. It can suddenly flash into an inferno 20 minutes after you are done.**

## Cleaning Up

Follow this checklist for shutting down and cleaning up:

- Exit the RD Works Program
- Go to the web site and report any issues
- Exit and shut down Windows on the kiosk
- Remove your material from the cutting bed
- Clear the Debris from the collector pan under the cutting bed
- Wipe down any dust from the cut
- Close the lid over the cutting head
- Log any new material settings in the white binder
- Turn the key to power down the cutter, computer, blowers, and chiller
- Return the key to the laser toolbox in the bottom section of the kiosk

## Making Notes

In order to help each other learn new materials and how to cut and etch them, there is a white binder kept in a tray on the side of the computer kiosk for you to log your successful attempts with new materials. Please be sure to check the log book to find the most recent settings that work for your material. Keeping this up to date will save a lot of trial and error!

## Reporting Problems & Getting Help

If you run into a problem, or an equipment malfunction occurs, notify us immediately by logging into our website and navigating to **Membership**→**How Do I . . .**→**Report a Problem** and use the form there to let us know what happened and when, so we can fix it ASAP.

If you need help with a project, or you are not sure how to get something done, send us an email at [helpme@cyberialtd.org](mailto:helpme@cyberialtd.org) letting us know what you need, and someone will contact you shortly to help you sort through the issue.