Idea Fab Labs
Fabrication Lab • Makerspace • Tech-Art Gallery

100 watt KH-7050 Laser: Safety and Basic Use

Lesson 1: Introduction to the Laser Cutter and Engraver

Laser cutters use a laser beam to cut or engrave various materials including wood, plastics, fabric, leather, and more.

Here is a basic description of the steps involved in operating the laser cutter.

1. Design is downloaded or created on a graphic design program such as CorelDraw or Adobe Illustrator.
2. Design is imported into Lightburn software, where it is turned into a toolpath file for the laser cutter machine.
3. Toolpath file is sent to the laser cutter.
4. Material is placed in the laser cutter and laser lens height is adjusted in order to focus the laser.
5. Start Button on laser cutter is pressed to begin cutting/engraving.

Lesson 2: Laser Safety

Safety Rules

Before using the laser cutter, be sure you understand the following safety rules. If these rules are broken or are taken lightly, you are subject to losing your rights to use the zone.

1. Never leave the laser running unattended. There should always be a person in the room watching the laser cutter while it is running. Pause the machine or ask for someone to sit with your work while you leave the room.
2. Small flame, sparks, and smoke are okay, but large flames are dangerous.
3. Fire is a huge risk to the laser and its ventilation system. If you see large flames stop your cut immediately and switch to a lower power setting or turn up your speed. Do not continue a cut if large flames are present.
4. Before cutting, ensure that there is no risk of the lens housing (the part that moves) colliding with any objects on the honeycomb table.

5. The laser cutter is a finely calibrated piece of machinery. Please close the lid gently and do not push or jar the machines at any time. **Do not lean on or press on the screen.**
6. The laser, water cooler, exhaust fan & air assist are turned on and off with the power strip on the right side of the machine. Make sure it is always switched off when not in use, so we don't run out the lifespan of the laser tube or waste electricity.

If a fire occurs

1. Stop the laser from firing.
2. Ensure the flames are out by blowing, smothering with the fire blanket.
3. If all else fails and the fire is growing out of control and damaging either the laser cutter or growing beyond the laser cutter, use the fire extinguisher to extinguish the flames. ***Note: Spraying the fire extinguisher into the laser cutter will damage the laser cutter, so please attempt to extinguish any small flames by other means.***

How to stop the laser

<u>1. Pause button on the machine control panel</u>

WAIT for the machine to stop before you leave it. This method does not
stop the laser immediately. It will finish the current line that it is cutting. Use this method for convenience when you have to leave the room or to just pause the print.

<u>2. Cancel button on the machine control panel</u>

Use this method to cancel the current job completely.

<u>3. Pause in LightBurn software on the computer</u>

Similar to the pause button on the laser control panel.
If Pause is pressed, the file can be restarted afterward.

Lesson 3: Laser Materials

*Check to make sure that the material you are using is in the **ALLOWED** list of materials. If you still aren't sure after googling or asking around, **DON'T CUT IT**.*

Things you can put in the laser cutter

- Paper
- Acrylic and some other plastics
- Wood (careful of fire, treated wood could have additives)
- Many other fabrics
- Leather
- Cotton

- Glass
- Anodized/coated metal
- Linoleum
- "Speedy-cut" rubber

Note: There are many companies offering wide selections of materials that are designed specifically for laser cutters.

Things you should NOT put in the laser cutter

WARNING: Because many plastics are dangerous to cut, it is important to know what kind you are planning to use.

<u>If you are unsure of the type of material, **DO NOT** put it in the laser cutter.</u>

• PVC (Polyvinyl Chloride)/vinyl/pleather/artificial leather/Moleskine notebooks
Reaction: Emits hydrogen chloride (poisonous and corrodes steel) and benzene (a carcinogen) 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.

• Polycarbonate/Lexan thicker than 1/16 in
Reaction: Cut very poorly, discolors, catches fire. Polycarbonate is often found as flat, sheet material. Polycarbonate is a poor choice for laser cutting unless it's very thin.

• ABS
Reaction: Emits **cyanide gas** and tends to melt. ABS does not cut well in a laser cutter. It tends to melt rather than vaporize, and has a higher chance of catching on fire and leaving behind melted gooey deposits on the honeycomb tray. It also does not engrave well (again, tends to melt).

• HDPE/milk bottle plastic
Reaction: Catches fire and it melts. It melts onto the honeycomb tray and cannot be removed.

• Polystyrene Foam
Reaction: Catches fire, it melts, and only thin pieces cut. **This is the #1 material that causes laser fires!**

• PolyPropylene Foam
Reaction: Catches fire. Like polystyrene, it melts, catches fire, and the melted drops continue to burn.

Lesson 3: Operating the laser

Vectors (Lines) vs Rasters (Fills and Images)

The laser cutter has 2 basic behaviours:

1. *Vectoring:* The laser head follows a path, called a vector. Outlines of shapes, line drawings, and any type of line can be a vector. Vectoring is used to cut through materials or on lighter power settings, to engrave lines.
2. *Rastering:* Rastering is how the laser prints pixels. The laser head moves back and forth, over and over again. Standard ink printers print by rastering. While rastering the laser prints each line of pixels in an image (or fill) one line at a time, slowly moving down the page, until all the lines of pixels have been printed. Photos, images, fills are all made of pixels and would therefore be rastered.

Turning on machine:

Step 1: Turn on laser machine with “main switch” located on right side of machine.

Step 2: Turn on pc, start LightBurn software

Importing your designs into LightBurn software:

Step 1: Draw or import your design. DXF is the preferred file type for vectors. JPG, BMP, PNG are the preferred file type for images.

Step 2: Elements of the design are assigned power and speed settings based on color. Change the color of an item (vector or image) by selecting the item and then selecting a color from the color palette at the bottom of the screen. Imported items will be imported as whatever color is currently selected in the color palette.

Assigning power, speed, etc:

- In the “Cuts” window set speed and power settings for each color.
- DO NOT GO ABOVE 65% POWER OR YOU WILL DAMAGE THE LASER TUBE!

Adjusting Bed Height

Use the red buttons labeled “Lifting Platform” (up) and “Drop Platform” (down) located on the right side of the machine to adjust the height of the bed. The distance between the top of the material to be lasered and the bottom of the cone-shaped laser lens housing should be 20 mm. There is a red acrylic height tool hanging from the handle of the laser door, which measures 20 mm. This should fit between your material and the cone-shaped laser lens housing.

Starting your print:
There are 3 different ways to send your file to the laser in the “Laser Work” window, normally located at the bottom right of your monitor.

1. **START:** Sends a file to laser and begins cutting immediately. The file can be re-run from the laser control panel but will be erased as soon as another file is sent using the same

button. **Pause/Continue** will pause and continue mid-print. **STOP** will completely end the print and return home.
2. **SAVE:** Used to save a .lbrn file for later use.
3. **SEND:** This sends the file to the machine's file system. It can then be printed from the machine's control panel and will be saved on the machine even if it is powered off until it is deleted from the machine's memory.

The Laser Control Panel:

1. **Up/Down Arrows:** Manually moves the laser head or move the cursor through the menu.
2. **ESC:** Returns to the home screen or goes back one screen. (when in doubt, hit ESC until you are at the home screen.)
3. **ENTER:** Select the current menu item.
4. **FRAME:** Moves along the path of the file without firing laser, which can be used to align your material.
5. **FILE:** Opens file system.
6. **START/PAUSE:** Starts print and pauses print. A paused print can be canceled completely by hitting ESC.

Easiest Way to Print:

1. Use **SEND** button to send files to laser memory.
2. On the laser control panel, press **FILE**.
3. Use arrows to choose your file, and press **ENTER.**
4. Turn on the laser tube by pressing the switch on side of the machine, labeled **LASER SWITCH**.
5. Press **START/PAUSE** to print the file.

Lesson 4: Cleanup Procedure

1. Remove all scraps and material from the laser and work area. Use the shopvac to remove any small pieces.
2. Turn off the laser machine.
3. Remove all your scraps from the laser, table, and work area.
4. If you have filled the trash can with any large pieces empty it into the outdoor dumpster.

Lesson 5: Reserving the Laser

Reserve time on the Laser
https://chicofablab.org/zones-and-tools
Fill out the Form and view the calendar to see available slots.