

Laser Cutter

Introduction

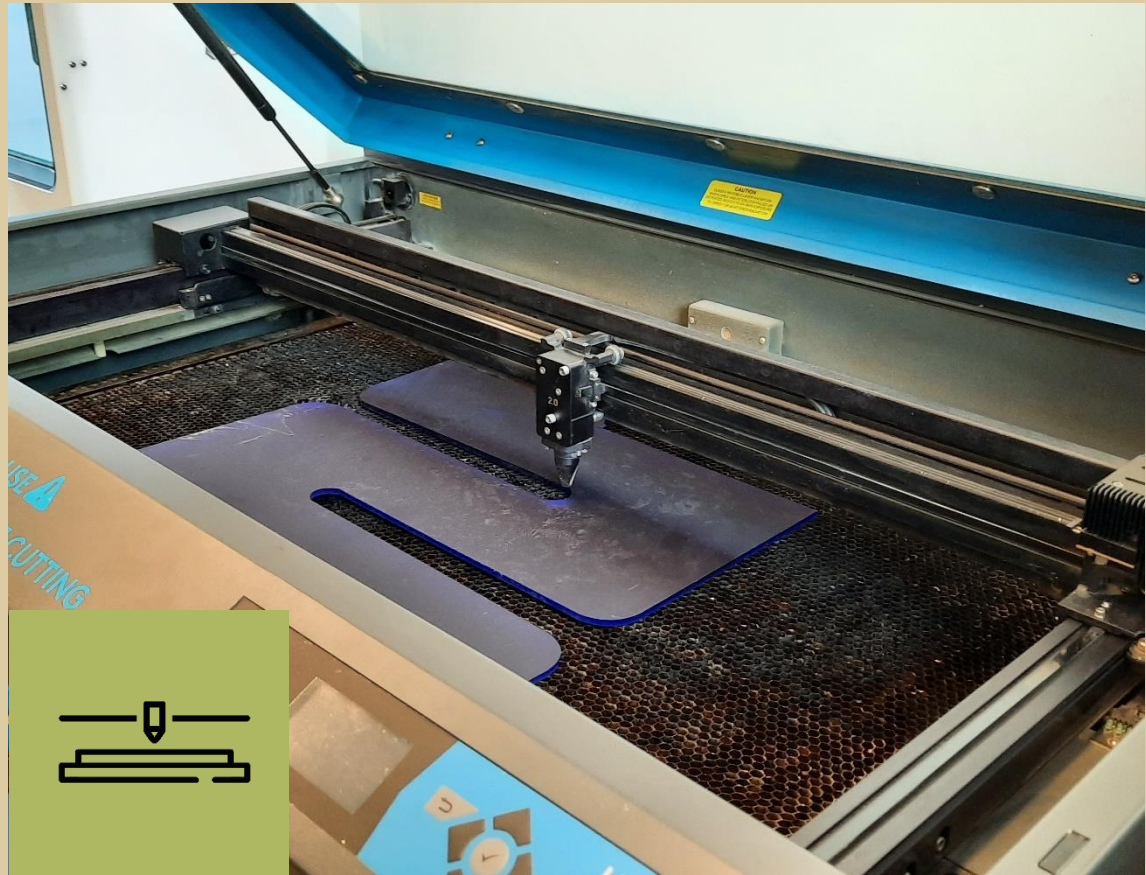


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Introduction

The laser cutter have a working area of **812x457 mm**. The laser cutter can cut up to 6,35 mm thick wood materials and up to 10 mm in acrylic. For wood over 6,35 mm we prefer you use saws in the workshop. Engraving is still possible on thicker materials.

The designing phase usually happens in a vector drawing software such as Adobe Illustrator or Inkscape. Here it is important to design accordingly to match how the laser cutter software reads the design to distinguish what it should cut, engrave or line engrave.

With that in mind you should beforehand make sure which material are allowed to be used with the machine and if you are also allowed to cut in it. Not doing so may potentially cause the machine to break down. Below is a very quick overview of the most basic materials:

Materials*	Cut	Engrave
Cellulosic materials (plywood, cardboard, MDF, HDF, etc.)	Yes	Yes
Plastics (Plexiglas, acrylic, etc.)	Yes	Yes
Textiles (leather, denim, etc.)	Yes	Yes
Metals (anodized aluminium, steel, etc.)	No	Yes
Not clearly defined materials	No	No
Glass, ceramic, stone	No	Yes

*more on [materials](#) later in the guide

But don't worry! Everything will be covered in this document, and you will also hear a lot more about it during the course. You are also more than welcome to contact the MakerSpace Crew if you have any questions!

The Laser Cutter Procedure

- 1.** Create your design in your favorite vector graphic software. We recommend using Adobe Illustrator because in our experience it showed to be most consistent.
- 2.** Find the material you wish to engrave and or cut in. Make sure you are allowed to use the material with the laser cutter. If you are in doubt look at the material samples in MakerSpace or ask the MakerSpace crew.
- 3.** Clean the lens! Always check and clean the lens before using the laser cutter. If you drop one of the screws in the honeycomb, simply open the slit and take the honeycomb out and shake it up to get it out.
- 4.** Place your material within the cutting area defined by the rulers along the edge
- 5.** Print your design by pressing (CTRL + P) and selecting PLS6.150D as the printer.
- 6.** Open the UCP software and make sure the colors show up properly. If the Red, and blue does not show up, you must go back to your file and make sure the colors are set to RGB and are (255,0,0) for red, (0,0,255) for blue and (0,0,0) for completely black. If that is not the problem, it might be the line thickness. Make sure it is 0.01 mm /pt.
- 7.** Turn on the Laser Cutter.
- 8.** Line up the design within UCP software to match where you want to cut by using the "Focus View" tool and the "Move Tool".
- 9.** Under settings find the material under the material database. Look at the material samples to find out which profile you should use. Lastly enter the material thickness that you have already measured.
- 10.** Add weights if needed and turn on the ventilation by pressing the green button and wait for it to be around 600 then press the green play button and watch the magic!

The Design Phase

At SDU's Entrepreneurship Lab's MakerSpace all the pc's have the Adobe Creative Cloud which you have access to when using your SDU student mail (user@student.sdu.dk) including Adobe Illustrator, which we highly recommend.



You must make sure that what you will cut and or engrave are not bigger than **812 x 457 mm** as this represents the maximum material size that can be inside the machine.

We can therefor make a new file with a white canvas in this size. Make sure that you change the document color mode to RGB. This can be done in the creation of the file or afterwards under edit->document color-mode.

This is because the UCP software, which is the laser cutting software, needs the proper information to read the file correctly.

With that said these are the following colors and the correct properties:

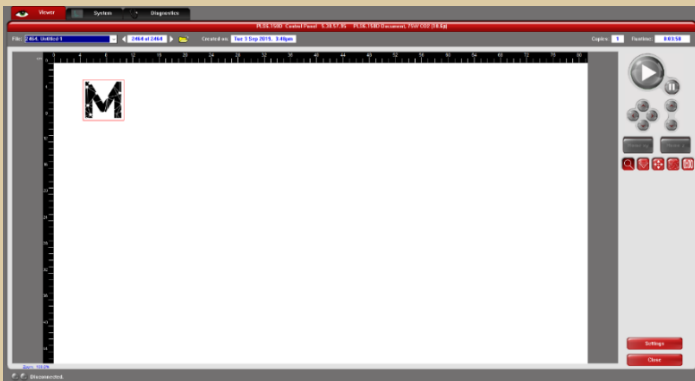
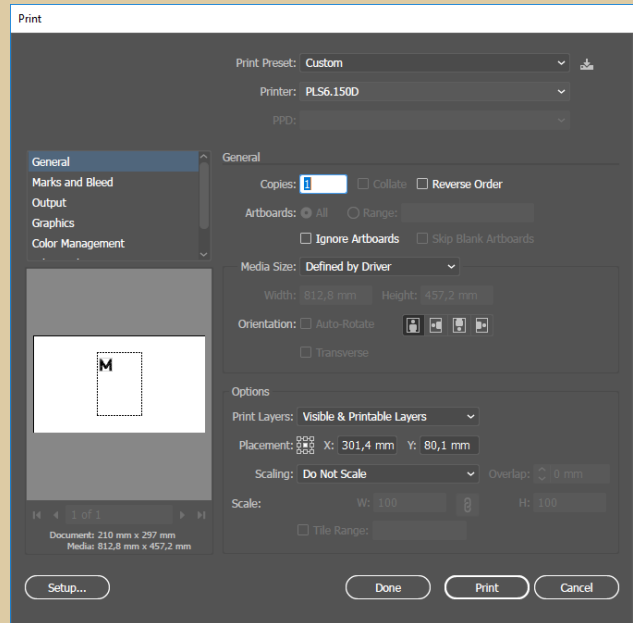
Colors:	What it does:	RGB Value:	Line thickness:
RGB red	for cutting lines	(255,0,0)	0.01 mm / pt
RGB black	for area engraving	(0,0,0) or Grayscale	Fill
RGB blue	for line engraving	(0,0,255)	0.01 mm / pt

Often it occurs that you might miss the right color or line thickness, but don't worry within the UCP software the colors won't show up properly, meaning that something is wrong with either the RGB value and or the line thickness.

You can then go back and change up and reupload your design to see if the changes fixed the issue.

Exporting The Design

You export your design to the UCP software by going to (file -> print) or simply pressing CTRL + P and choosing "PLS6.150D" as the printer.



Nothing happens, but do not worry, simply go to the desktop and open the UCP software and you should see your design. At this point you should make sure that the red, blue, and black colors are showing up as in your design.

Otherwise go back and make sure that the properties are properly set.

Quick Tip: the UCP software are so old that Windows does not recognize it as a regular application in the process bar. A little tip is to use ALT + TAB to scroll through the windows you have open

Preparing The Laser Cutter

Now it is time to look at the machine itself. In the back of the machine there is a big 75 Watts laser. The laser beam is directed to the housing through a setup of multiple mirrors. Within the housing there is also a lens that direct the beam down towards the material in a concentrated manner.

Before using the machine, you always must clean the lens.

Make sure that the machine is turned off to move the housing manually. Place a piece of paper underneath the laser unit, to prevent the finger screws to fall into the engraving table.

Slide out the front panel. Here you see a mirror and the lens. The next step is to take the lens cleaner and apply one drop of it onto the lens itself (the round, light yellow, transparent part), then take one of the small cloth pieces and wipe it off and with the same piece just wipe the other side and then everything can be reassembled.

Quick Tip: If you at any point may believe you accidently moved the housing while the machine was on, you simply turn it off and back on to recalibrate it to the home position.

Preparing To Cut

The next step consists of multiple things, find and measure the material you want to cut, place it in the machine, print your file from Adobe illustrator, check everything is as it should be, line up your print with where you want to cut. Enter the material profile and thickness, turn on the ventilation and hit play.

Voila!

But let's go through every steps in more details

First you must find a material that you are allowed to use with your file and that does not surpass the maximum thickness. Not doing so will break the machine. If you ever left in doubt on whenever a material is allowed, you can always look at the material sample in the MakerSpace besides the laser cutter or the list in the end of this document.

But here is a rule of thumb that at least must be applied:

Maximum thickness for wood material: 6 mm

Maximum thickness for acrylic: 10 mm

Once you have your material measured place it in the laser cutter machine. It does not really matter where you put it as we will line up the print file in software but placing it towards the home position (top right corner) will slightly make the cutting process faster.

Notice: A lot go to Bauhaus or a similar store and buys the wood plate. They are not made for laser cutting! You must look for material that specifically states it is for laser cutting. Or look for MR-glued plywood. All plates bought at archi-tegn.dk are made for laser cutting.

Next you can find your print file and hit print as stated in the previous section, "Exporting". Remember to check that the colors show up properly.

With the print file in the UCP software it is time to line it up with where we have placed our material. To do this we use the "Focus View" tool and the "Move tool" which is in the toolbar on the right. With the **Focus View tool** you can control the position of the laser cutter head. With this tool you can locate the position that corresponds to one of the corners of your print file on the material. Keeping the laser cutter head in this position you can go to the move tool. Here you see that the corners get a white box with one of them being blue. Select the corner you want and below there should be a button called "to pointer". This will automatically move your print to the location of the laser cutter head based on the selected corner.

It is now lined up but as a rule of thumb we always suggest that you use the focus view tool again to make sure that your whole design is within the material.

Next you will be able to place some weight on top of the material if it bends a lot. Just make sure that they will not be in the way of the laser cutter head and that they are at least placed 5-7 cm away from where your print is.

A rule of thumb is to never place weights that are in between your print and the home position.

The last and final step in preparing is to enter the thickness and finding the profile in the database. What profile should you use for a given material? See the material samples as it is written on top of that. Next you will have to find it in the material database. Afterwards you enter the thickness below and hit apply and okay.

Now you should be ready for cutting!

During the Cutting phase

To start the running process, you simply hit the big green play button on the screen or on the machine itself. During this phase you always must keep your attention on the machine due to the potential of a fire.

The machine will cut in the following way:

- The **black** engraves colors
- The **blue** line engrave colors
- The **red** line cutting colors

If you at any point might worry that it will hit one of the weights if it continues or for any reason wants to pause it, you can hit the small red pause button in the UCP-program. The laser cutter head will then go to the home position, and you are now able to correct whatever you want. Just make sure you do not move the material itself! To start where it left of hit the red button.

Once it is finished it will go back to the home position and you will have to keep the ventilation on for 2 min before taking your newly cut print out.

If for any reason it did not cut fully through you can go back to settings and check the boxes for the black and blue color and slightly decrease the red to around -20% and hit play. This will make sure to only cut the piece out again with not as much power as we assume it did cut a bit through the material.

After Use of The Machine

Sometimes you will experience that there is some “bleed effect” on the material, usually only happens on the wood material. This can be easily removed with some sandpaper. Turn off the machine and computer after use and check the lens ones again to clean it if any dust or glue material is on it.

That was all the important aspect of the laser cutter, once again, if you have any question or at any point are in doubt of some of the information feel free to contact us or ask in the SDU MakerSpace Facebook group!