



# laser cutter

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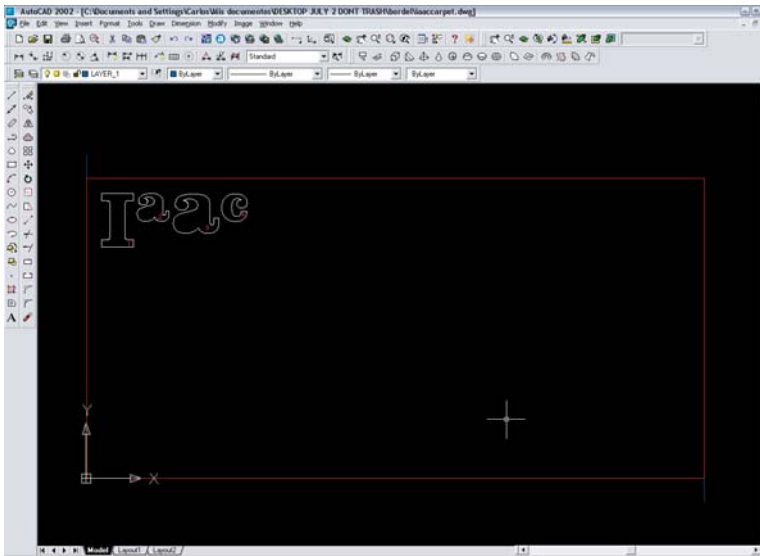
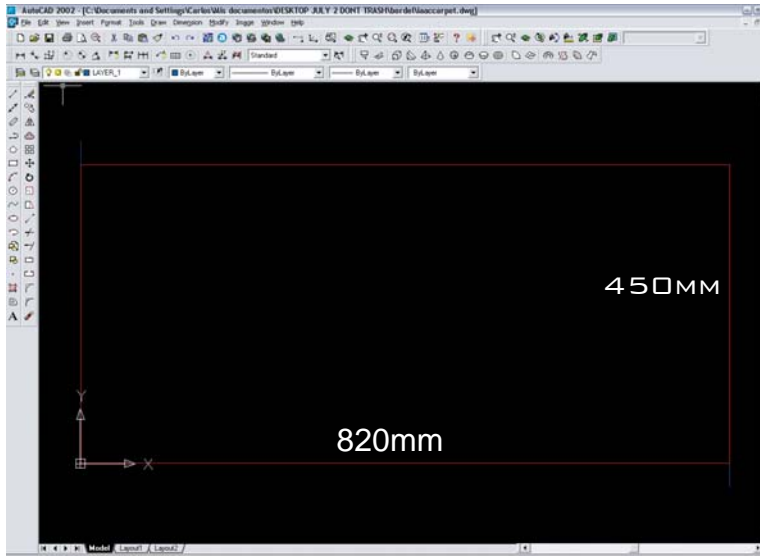
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## Setting up a 2-d Cut in Cad Software

### Virtual Bed

The total cutting area of the machine bed is 820mm x 450mm. In Autocad, draw a rectangle to scale representing the machine bed.



### Adding Your Work

Scale the size of your work accordingly and move it into your virtual machine bed. The machine origin is located in the top left (northwest) corner. Work should be positioned to start at this point.

Please keep in mind the size of your material in addition to the machine bed. It may be a good idea to draw another rectangle representing your material.

## Setting up a 2-d Cut in Cad Software

Check the work you wish to print:

The thickness of the cutting lines should all be set to minimum: 0.00mm.

Make sure you have no overlapping or double lines, and check to be sure splines don't have too few / too many control points.

Multiple layers may be used within one drawing in order to cut at different speeds and powers. (i.e. scribe vs. cut) The Cad colors should match the colors given by the printer. Usually one will not have more than a cut and a scribe layer. As a rule, draw your cuts in white, and your scribes red.

Delete your virtual machine bed and material lines.

**Print:**

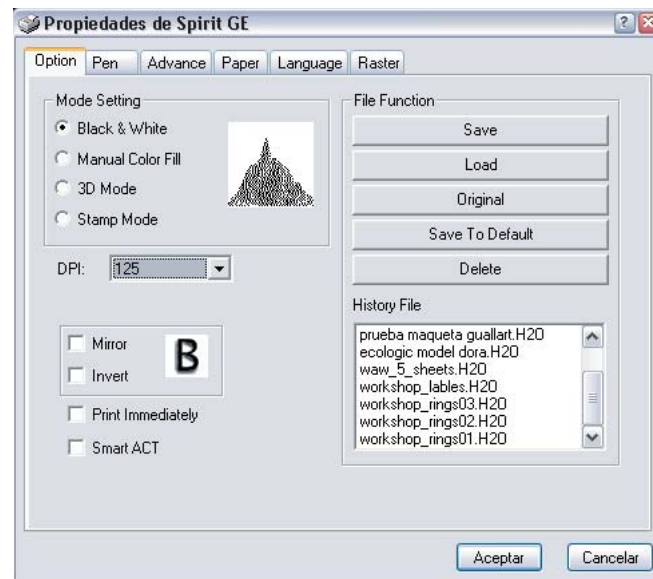
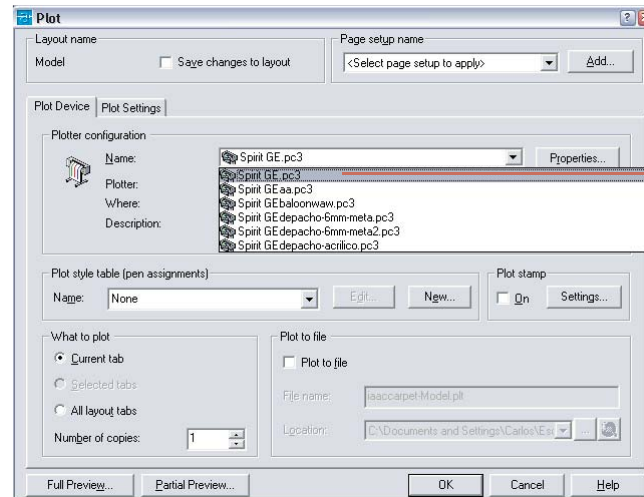
Go to file>plot as if you were printing a regular AutoCad drawing.

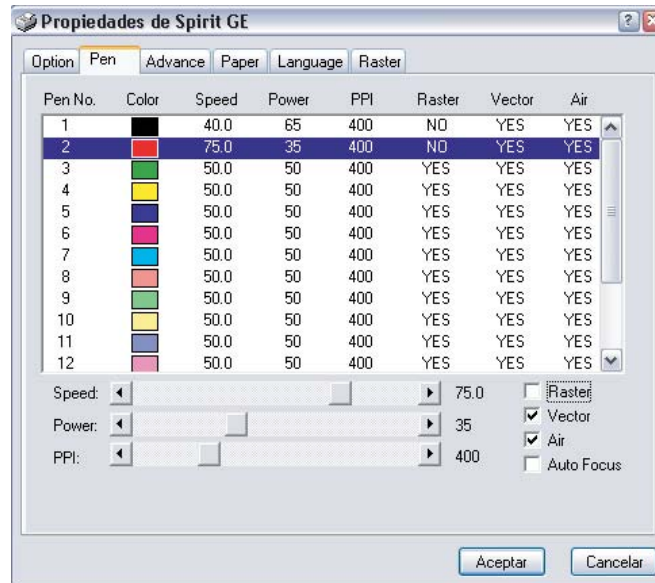
For the plotter, select "spirit GE.pc3"

Then click the "properties" tab and "custom properties" in the next window.

The "Properties of Spirit GE" box should appear.

In this tab, change the "DPI" to 125 for a project with straight cuts, or to 500 for a project with curvilinear cuts.





## Configuring Cutting Settings

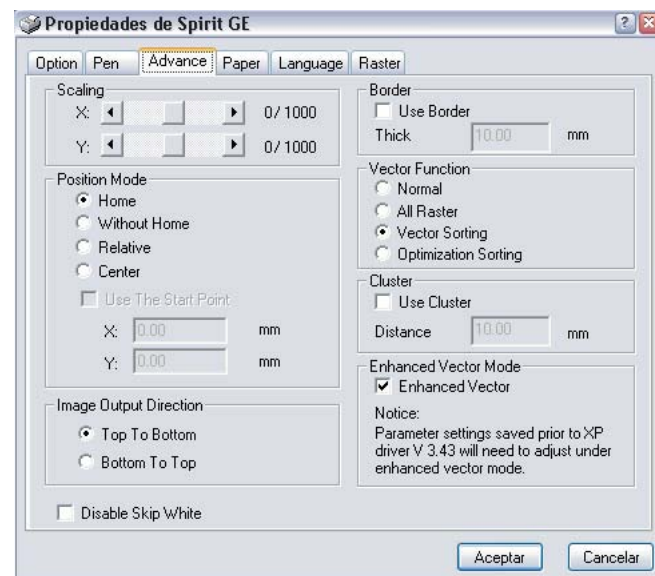
### Pens:

Click the pens tab in the same window. Here the speed and power of the cut can be established. The first **black** layer will be your cut layer (the lines you have drawn in white in autocad) and the second **red** layer will be your engrave layer.

Make sure that “raster” is un-selected on each layer you wish to print.

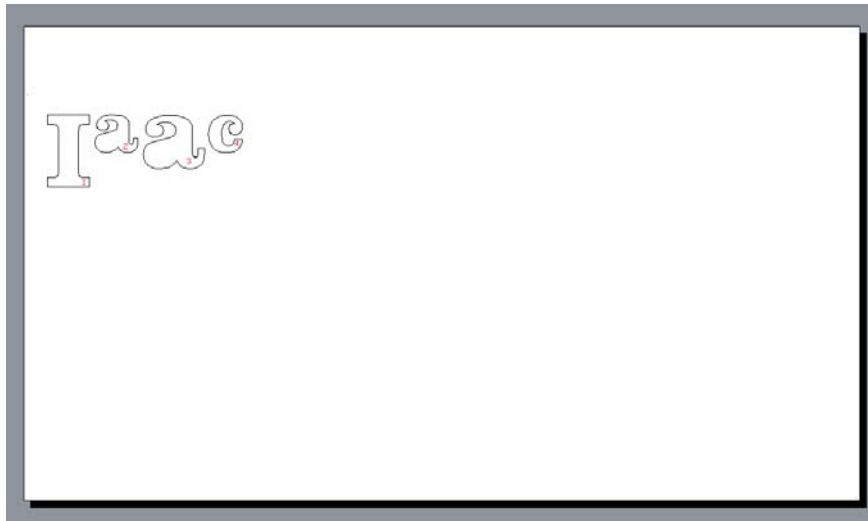
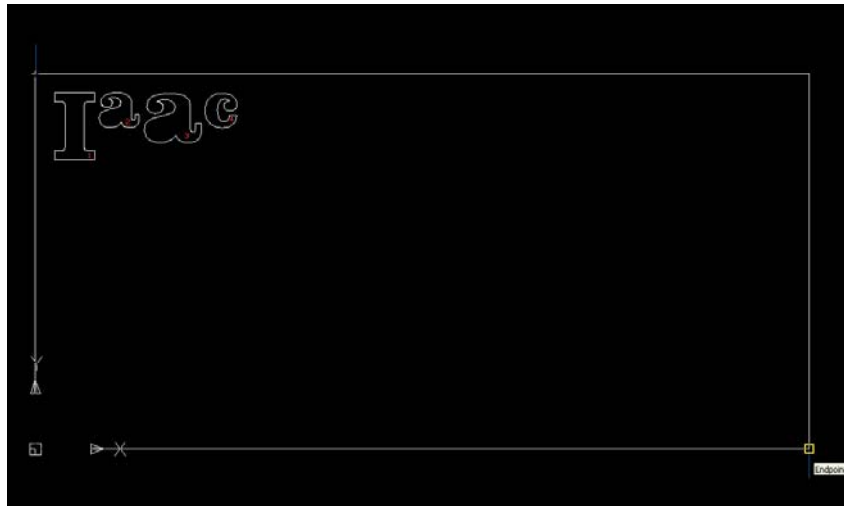
Please refer to the **materials** section for a reference of suggested speeds and power. You can configure up to 16 different layers with different powers and speeds. Please note it may be a good idea to send two different files; first a file with the engraving layers, and second a file with the cutting layer.

Changing the PPI to a greater amount will enhance the cutting power. If you are having trouble making a clean cut, move this to full PPI



Finally, click on the “Advance” tab. Make sure the position is set to “home,” the vector function is set to “vector sorting,” and “enhanced vector” is clicked on. Then Click accept and return to the main plot window.

Window &lt;



## Configuring Cutting Settings

### Printing area:

Click the **window** button on the main print screen. Now highlight the area to be printed represented by the 2 blue position markers. You are now ready to print.

Make sure you **preview** your job to make sure there are not extra lines, and the job is positioned correctly. Turn on the Spirit GE Laserpro (next section) and hit **plot**, and your job will be sent to the digital screen on the laser cutter.



## Starting the Machine

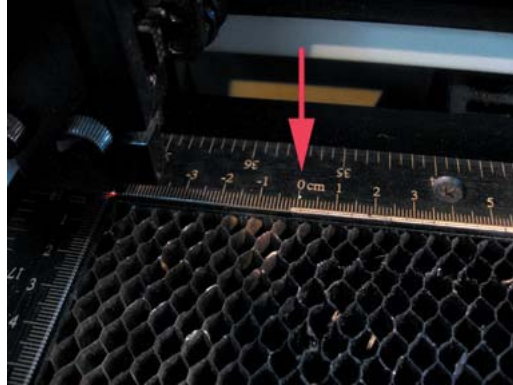
Turn on the machine:

There are **two** buttons that must always be pushed before using the machine.

The first is the machine power, located on the right side of the machine.



The second button controls the cooling air, to keep the lens from burning. Be sure to turn this button on! If it is not on, the lens will be destroyed and it is very costly to replace. This **red** button is located behind the lower right door on the front of the machine.



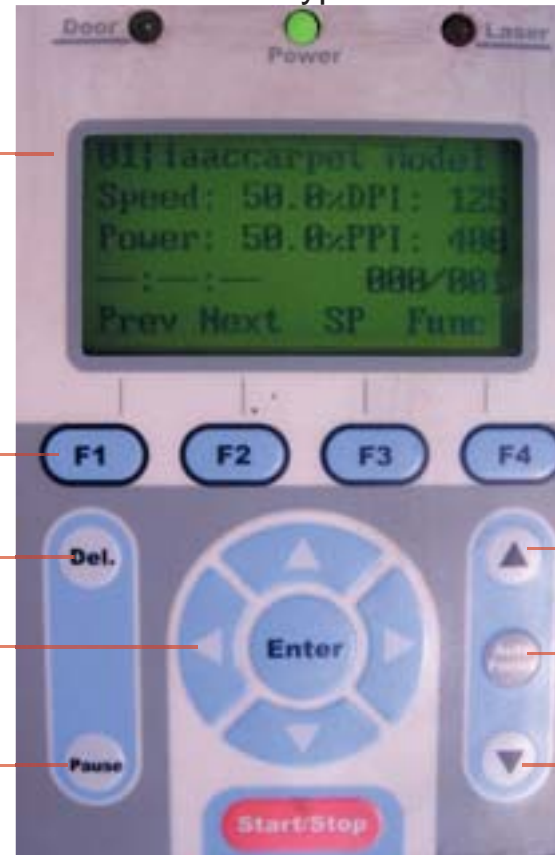
## Adding Material

The origin:

The origin is located on the top right corner of the bed where the ruler is marked "0cm." Move the bed down to allow clearance, (see keypad below) and place the top right corner of the sheet at the origin.

The keypad:

current job



toggle jobs

delete

move laser

pause

move bed up

autofocus laser and set material height

move bed down

start / stop job



Smaller more flexible pieces can be placed in the laser bed from the top.



Placing the top left corner at 0cm.



Larger non-flexible pieces should be placed in the bed through the removable front door.



Placing plywood in the bed.

## Adding Material

### Setting material height:

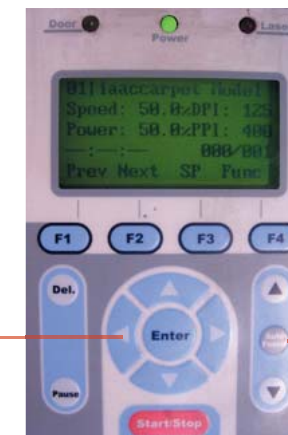
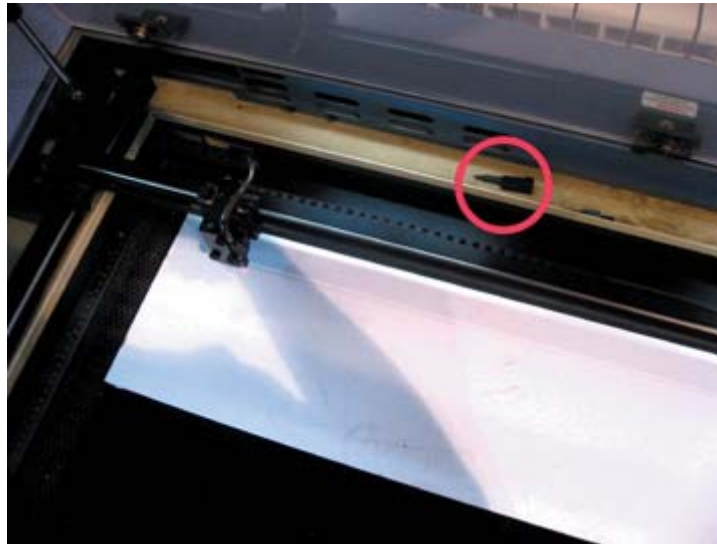
Now you must set the material height in order for the laser beam to have correct focus on the material.

Move the bed down to allow clearance, and obtain the auto-focus device from the rail located above the bed. This is its location, so please return it there after use.

Attach the device to the right side of the laser. When you are pushing in on the connection, please support the left side of the laser as to not move the head and break a belt.

Once it is attached, move the laser head over the middle of the material using the up down arrows on the keypad.

Now press the autofocus button, and the bed will slowly rise until it has calculated the correct position. Remove the auto-focus device and return it to its original location.



move laser

auto-focus

## Cutting!

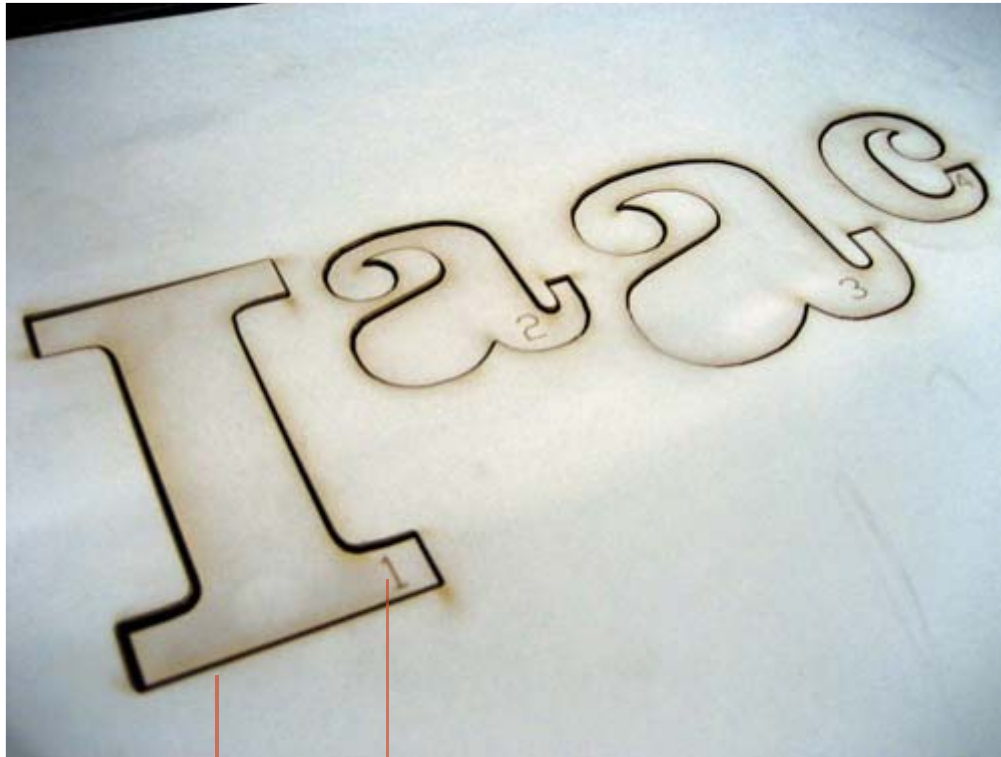
### Start the cut:

You are now ready to cut. You have pre-established the origin in your print settings so there is no need to worry about the x-y location of the laser on the bed.

Click the **Start / Stop** button to start the job. Once the job is in progress, you may **pause** the job, or **stop** the job if it is cutting incorrectly.

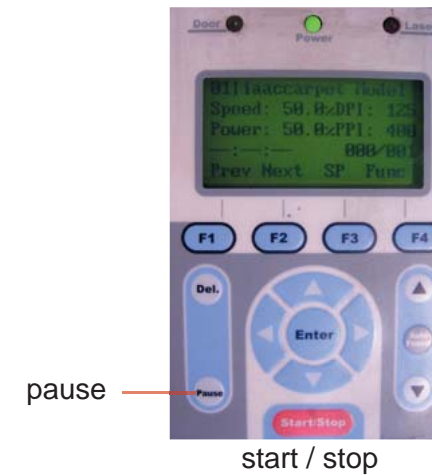
**Never leave the machine unattended.** (more on safety in the next section)

In addition, the filter to the right of the laser machine should start running. If this doesn't happen, please notify a shop operator.



cut

engrave



pause

start / stop

## Suggested Speeds / Powers:

For best results, use cardboard, plexi, or thin wood. Other materials need more testing in order to establish speeds and powers.

Quick reference guide:

Material	Power	Speed
Cardboard	95%	40%
Plexi 2mm	95%	6%
Plexi 3mm	95%	4%
Plexi 4mm	95%	2.5%
Plexi 5mm	95%	1.8%
Plexi 6mm	95%	1.5%
Plexi 8mm	95%	0.8%
Plexi 10mm	95%	0.5%
Fabric	100%	60%
Wood	100%	20%



If in doubt about what to use for speeds, please ask a shop operator. The Fab Lab @ IaaC will also be starting a material library consisting of materials cut and scribed, indicating the speed and power.

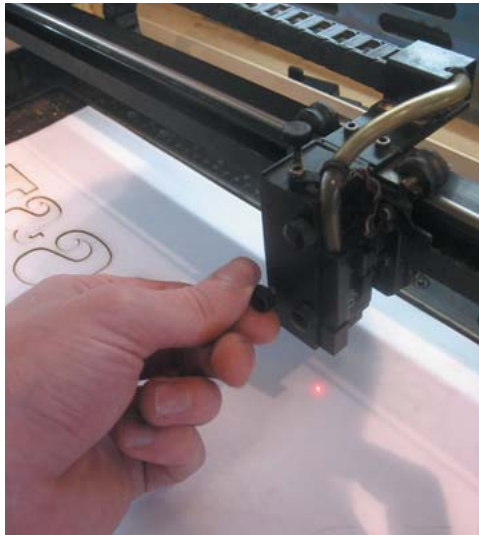
### Never leave the machine unattended:

The machine burns through the material with a laser. Therefore there is a chance of the material starting on fire or the lens burning. While cutting, always be aware of what is happening in the machine.

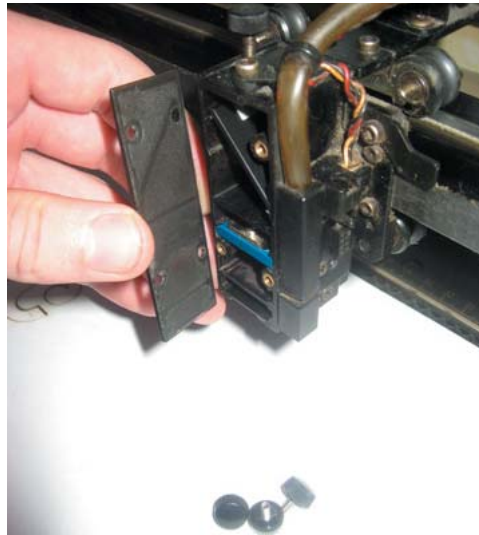
If a flame should start, stop the job. Normally the filter air will stop all small flames.

There is a fire extinguisher located to the right of the machine if there is an emergency situation. Please keep in mind that this is a very expensive machine, and the extinguisher should be used for emergency only.





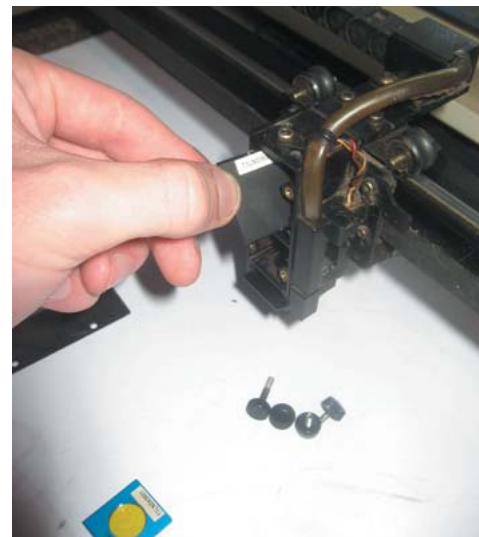
1. Center the laser head, and remove the screws and the front cover.



2. The lens is the bottom blue chip, and mirror 1 is at an angle above.



3. Remove the lens.



4. Take off the top screw and remove mirror 1.

## Fab Lab:

Please remember to leave the fab lab as you found it. Clean up all left over materials in the machine, on the floor, and on the tables. Please do not leave any extra material in the fab lab.

## The Machine:

The machine must be cleaned on a regular basis.

## Basic Maintenance:

Every few days, the machine can be cleaned of dust and debris. A tray under the cutting bed can be removed and wiped free of excess pieces.

## Mirrors:

The laser beam is directed by mirrors which must be cleaned on a regular basis. Every two weeks, the lens and the 3 upper mirrors should be cleaned. See images at left and on the following page for instructions.

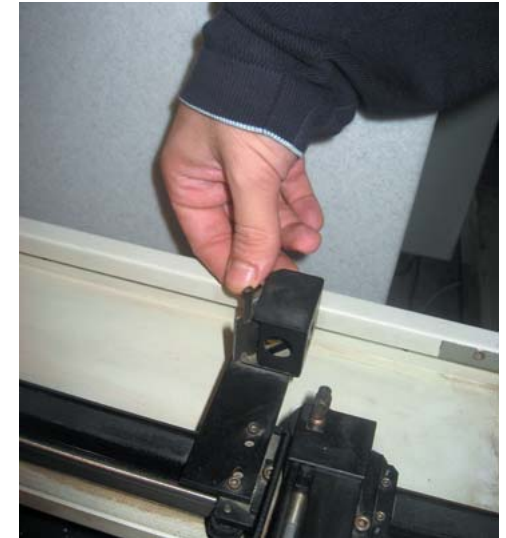
## 05\_CLEANING



5. Lift the top of the machine up from the back, and lock it into position.



6. Remove mirror 2 in this location.



7. Removing mirror 2.



8. Remove the box around mirror 3.



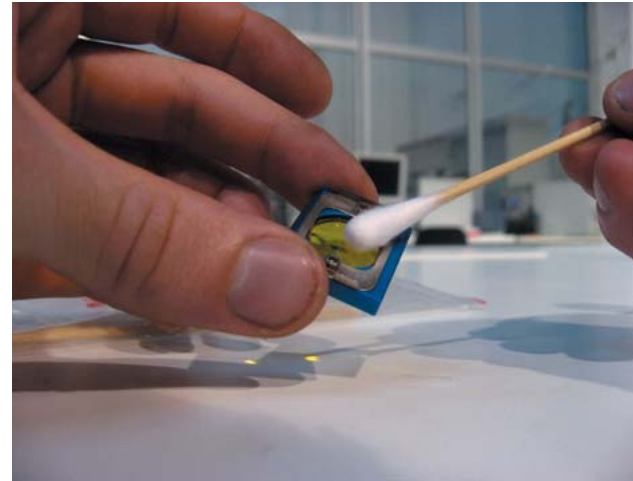
9. Removing mirror 3.



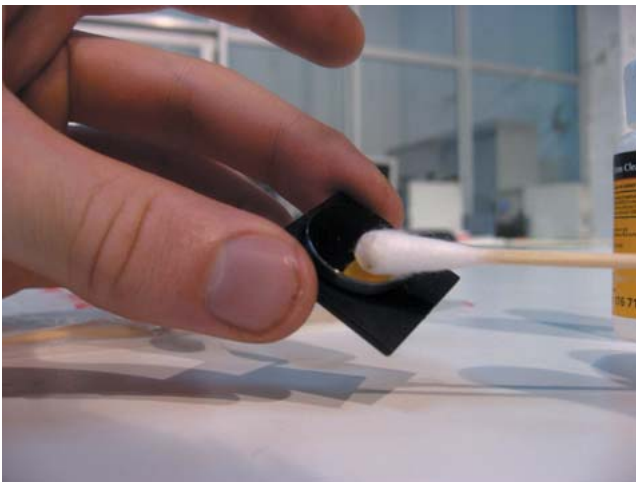
10. The lens, mirrors 1-3, and the cleaning pack.



11. Use the lens cleaning solution and place a drop on the lens, or wet the swab.



12. Clean the lens with a cotton swab. If the swab becomes dirty, rotate or replace.



13. Repeat this for mirrors 1-3.



14. Put the mirrors and lens back in their original positions.



Fab Lab BCN @ IaaC:

This manual was done by Fab Lab Bcn Team  
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