Please listen to the audio

How to use the Laser Cutters in the Dyson Centre

We are here to help and assist you.

Please read this page

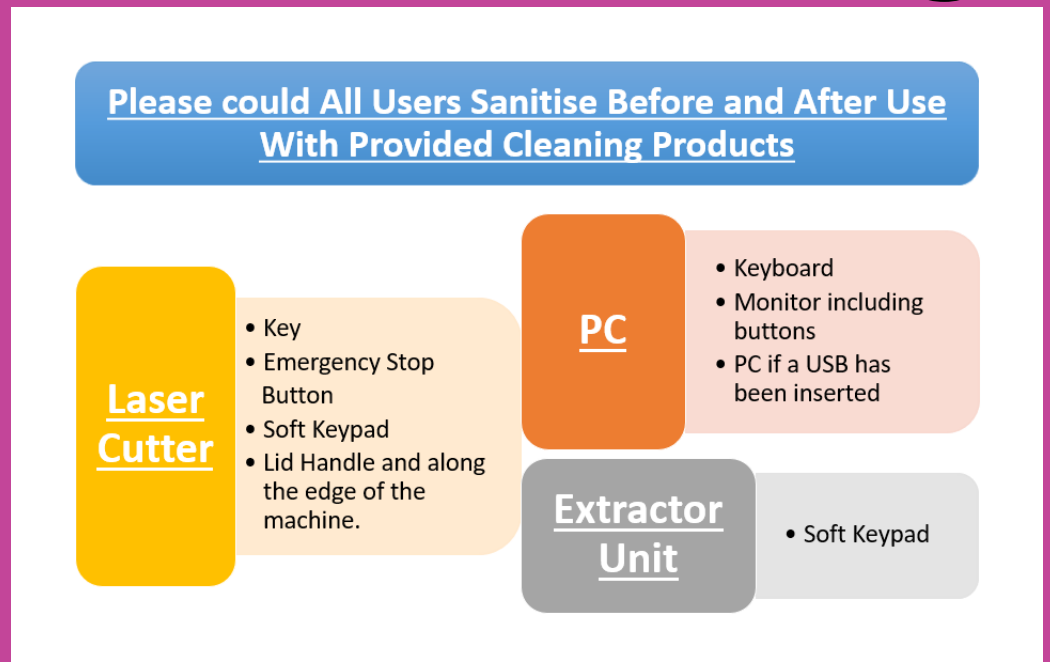
Please note that this is our first attempt at producing a Laser Cutter training Powerpoint, so make such training COVID safe.

We would be grateful of any feedback with you have. Please email Kevin on KJB48@cam.ac.uk .

Hopefully you find this helpful.

Please listen to the audio

Please Sanitise the Laser Cutter Before and After use with the provided cleaning products following the guide on the machine



Please read this page

To use the Laser Cutter please sign into the computer using your Teaching System login details.

The Laser Cutter Key can be Signed Out at the Dyson Centre Desk.

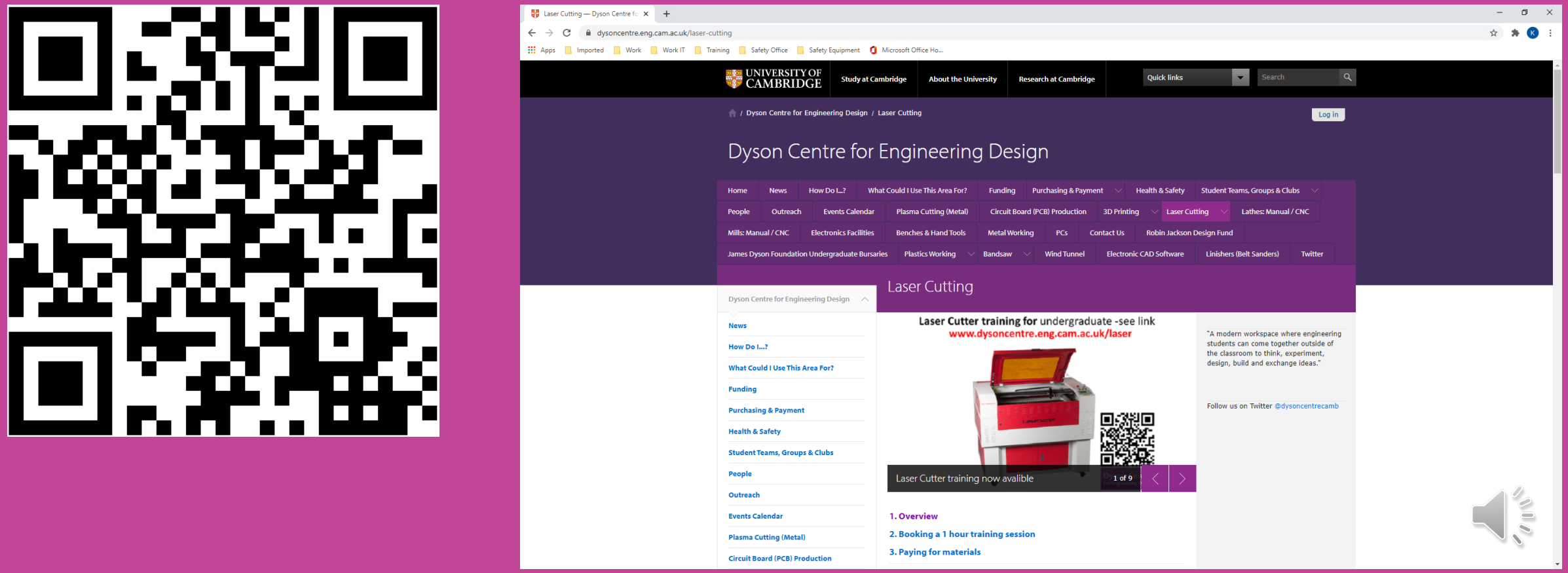
If this is your first time using the machine, please say and we will guide you.

We are here to help and advise you.

Please listen to the audio

For a selection of materials that we have available and how to pay for them please either use the QR code or the Dyson Centre website

https://www.dysoncentre.eng.cam.ac.uk/laser-cutting

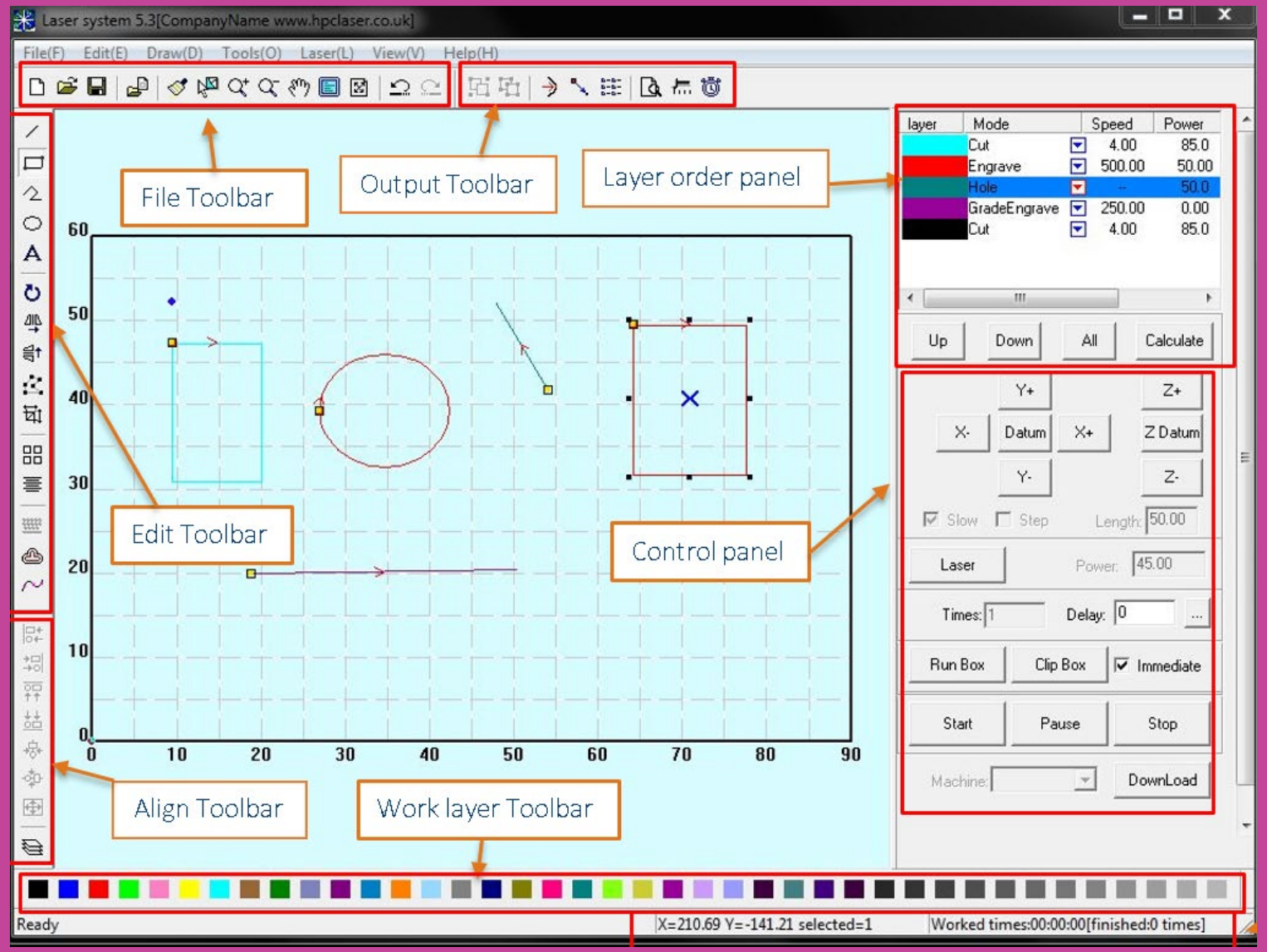


Please read this page

Importable files are .dxf which can be generated in most CAD packages and Monochrome bitmap (.bmp) image files are used for engraving.

Please generate your files before using the Laser Cutter.

Please read this page



The Laser Cut 5.3 software is relatively easy to use.

It is used to import drawings from Solidworks, or draw simple shapes, and then send them to the Laser Cutter.

Drawing in it has similarities to drawing in Powerpoint.

However you may only ever be importing your drawings from Solidworks, so may never need to draw in it.

Please read this page

How to Create a Part (Video Demonstration)

In video format…

- The following page shows you how to draw a rectangle in Laser Cut 5.3.
- We will then draw a circular hole in the middle of it.
- We will colour the rectangle blue (for identification purposes).
- We will colour the hole pink (for identification purposes).
- We will set the cutting order so that pink lines are cut before blue lines (depending on what you're making, order can sometimes be important).
- We will set the power and speed with which the cuts are made.
- Optional: we will simulate the cutting process.
- We will download the cutting instructions to the laser cutter.
- On the two subsequent pages we have written down the detailed instructions

To create a part in LaserCut 5.3

This page is provided for information

Follow the instructions and the next video on how to create a rectangle 100.0mm x 60.0mm in size, with a 35.0mm diameter hole centred in the middle of the rectangle.

1. To start with load up Lasercut 5.3, it could be in various places around the desktop.
2. Select the RECTANGLE feature on the left of the screen.
3. Click on the screen and drag out a rectangle.
4. To size the rectangle click on the SIZE button (on the left Edit Toolbar of the screen) and input into the X and Y lengths the following X100.0mm Y60.0mm
5. Where you can input the X and Y lengths, also you can scale in here by putting a figure in for instance the X axis and clicking the Y axis box it will automatically scale the part.
6. To create a circle click on the ELLIPSE button then click on the screen and drag out an Ellipse to any shape or size (Alternatively you can click once on the screen and hold the Ctrl button on your keyboard and drag out a scaled circle).
7. To adjust the size of the ELLIPSE or CIRCLE use the SIZE button and adjust the X and Y lengths to suit the size required, for us this would be X 35.0 and Y 35.0.
8. To centre the parts to each other you can click select the PICK TOOL (Top of the screen File Toolbar) on the ALIGN TO CENTRES button (which is towards the bottom left-hand side of the screen in the Align Toobar) and will centre the Rectangle and Circle each other.

This page is provided for information

What you do next is as Follows:-

1. The simulation starts by going to the datum position of your part (Set Knife Origin Button)  Say we select top right.
2. We can do a simulation on the screen by pressing the SIMULATION button  that is along the top of the screen (In the Output Toolbar) .
3. The simulation starts from the top right of your part, by drawing a red profile over cut lines and shading in where engraving is set.
4. You always need to adjust the order to what happens first, ie. Engrave and cutting out holes before cutting the profile out as if you cut the profile out first it has a potential for that part of the material being used to move or warp.
5. To adjust the ORDER of the cutting process we go up to where you set the POWER and SPEED for cutting sellect the BLUE colour then just below here is an UP ARROW  or DOWN ARROW  that we click on and it will move the BLUE layer to the second one to be cut. Meaning the PINK (Hole) will cut first then the BLUE (Outer Profile) second.
6. If you need to make changes press the REFRESH button  and this will clear the previous Simulation. Change what needs changing, then RE-SIMULATE again to make sure everything looks OK.
7. The next thing will be to TURN ON the Laser Cutter using the key (Sign Out Sheet at the Dyson Centre Desk)

Please read this page

How to Import a Part (Video Demonstration)

In video format…

- The following page shows you how to important a part (which you may have drawn in Solidworks) into Laser Cut 5.3.
- We then need to “unite lines” as some imported CAD shapes appear as a series of lines which are not quite touching each other, not obvious to the eye.
- We then colour the shapes differently.
- We then set how each different colour is to be processed by the cutter.
- We also order the different colours of cut.
- On the subsequent pages we have written down the detailed instructions.

This page is provided for information

How to Import a File into the Software

1. First click on the File drop down at the top of the screen then scroll down to IMPORT and search for the .dfx file that you have already created in CAD.
2. Hover over the Blue cross in the center of our part and drag it onto the area of the bed as highlighted by the Black Bold lines.
3. Go to the “Tools” drop down at the top of the screen and scroll down to UNITE LINES where you can put in a tolerance of 0.1mm. This should close any gaps up within this file, sometimes you may need to adjust the tolerance a little higher to compensate.
4. Click on the SIZE option  (left side of the screen) and check how the size of your part as sometimes importing causes a file to upscale or downsize. Adjust if necessary.
5. After this, follow the steps in the next slide after the Import video.

If we were to cut this part out

- Select the Rectangle profile then select a colour from the bottom of the screen (say BLUE). When you deselect your part by clicking off it will have changed in colour from BLACK to BLUE and you will notice that the top right of the screen a BLUE will appear.
- We can then follow the same process with the CIRCLE (Hole) and change this to a different colour (say PINK), at the top right of the screen we will now have two colours the BLUE and PINK.
- At the top right on the BLUE colour we can select the drop down arrow level with your BLUE colour here we have a few options of different things we can do:- (See Figure 1)
  - Cut – Cuts the profile out
  - Engrave – Lets you engrave a section. The more power used the deeper the engraving. For scan gap don't go below 0.1mm or higher than 0.3mm the Beam with of the Laser Cutter is roughly 0.3mm.
  - Grade Engrave – allows you to have a tapered side to the engraving.
  - Hole – Cuts out a hole in the middle of the profile. (Size of the laser beam.)
- We are going to select CUT for both the RECTANGLE(BLUE) and Circle (Hole PINK)
- Now double click on the on the BLUE colour, this will bring up a box on the screen where we can adjust the SPEED and POWER to cut through. (See Figure 2)
- See Power settings to adjust to the material you are using. See Figure 3)
- Now the trick for CORNER POWER is if the main POWER is over 50% reduce CORNER POWER by 10%, if the POWER is under 50% reduce CORNER POWER by 5%.
- Make sure that "BLOW" is always selected/

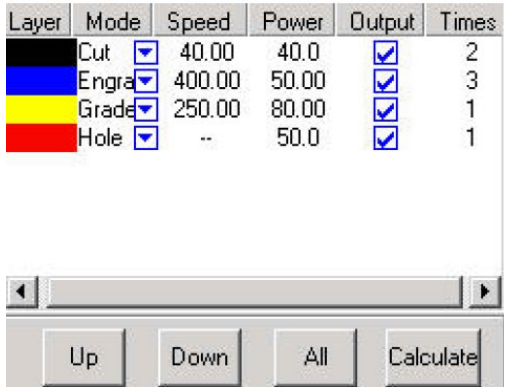


Figure 1

Please read this page – this is fundamental information!

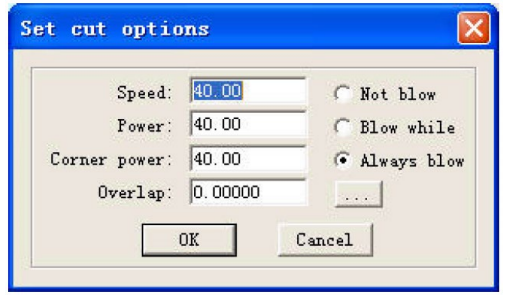


Figure 2

Suggested Power/Speed depending on material, material thickness and the desired effect.

Material	Material thickness	Desired effect	Speed	Power
Perspex, Birch PLY, MDF	3mm	Cut through	12	50%
Perspex	5mm	Cut through	8	50%
Perspex	10mm	Cut through	4	80%
Perspex	All	Engrave	400-500	30%
Birch PLY	4mm	Cut through	10	50%
Birch PLY	6mm	Cut through	6/8	60%
Birch PLY	Alll	Engrave	500	30%
MDF	4mm	Cut through	10	50%
MDF	6mm	Cut through	8	60%
Power/Speed plaques also available for Card, Paper and Corrugated Card (single and double) upon request				

Figure 3

Please read below – this is fundamental information!

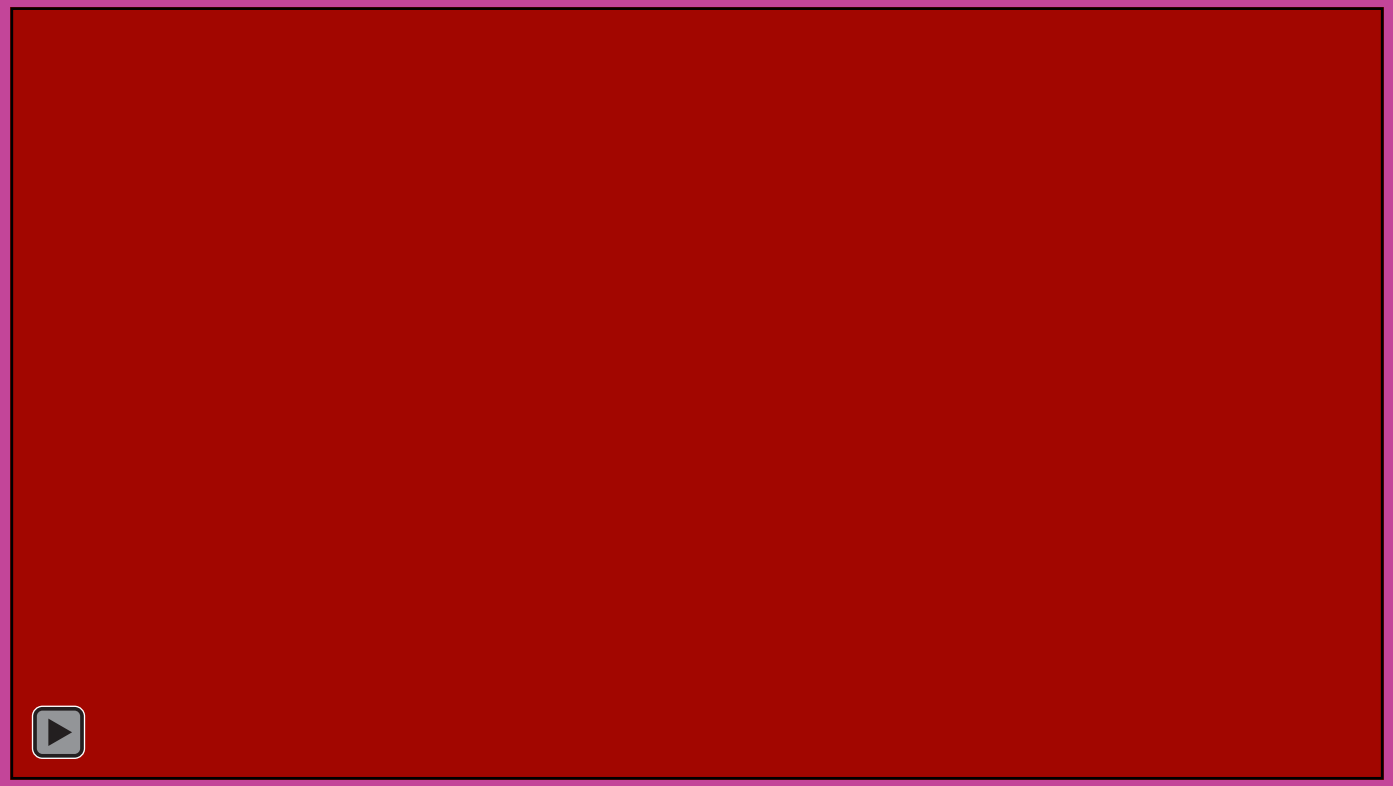
Please watch the video below

How to Download a file to the Laser Cutter

- Put the key into the laser cutter and turn the key to the ON position (the Chiller cabinet will turn ON too).
- Using Lasercut 5.3 go to the Download Button

(Right side of the screen). Click the following buttons:-

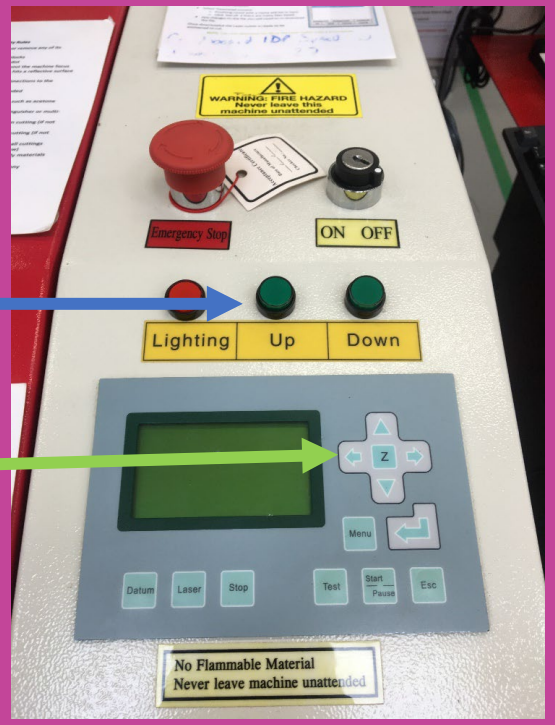
- Download
- Delete all
- Download Current
- This will transfer the file the
- Laser cutter.

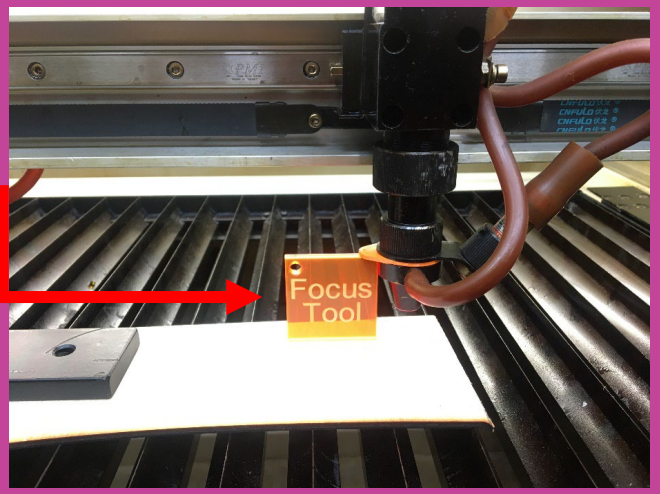


Please read below – this is fundamental information!

In the next video you will be shown how to set up the correct laser focus height.

- Take the orange Focus Tool of the key ring.
- On the Laser Cutter control pad select the ESC button/
- To move in the X or Y direction we hold down the left or right arrow (the longer you hold the button down the faster that axis will go).
- Place you piece of material on the bed of the machine (Caution should always be
- Take that the door is lifted all the way up as if not it could come down).
- Move the axis over your piece of material.
- Next, we have the Green Up and Down buttons that we can adjust to fit the Focus Tool under the tab on the nozzle.
- Above the keypad we have an Up (raises the bed up) and Down (lowers the bed) buttons so that the Focus Tool will fit under the tab. Always remove the focus tool before adjusting either axis.





Please read this page – this is fundamental information!

To Cut out the part

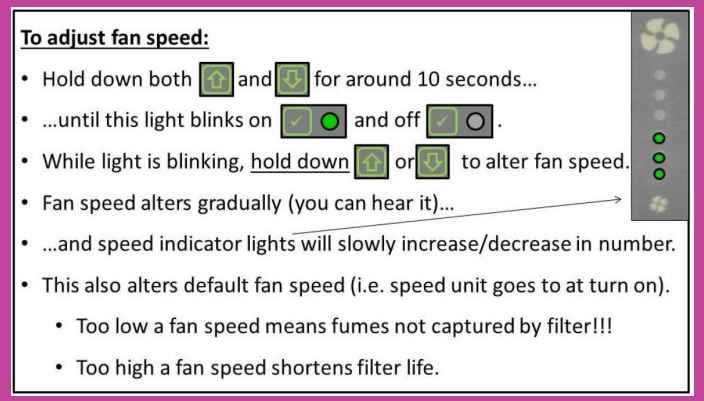
- To cut out the part turn the Extractor unit On.
- Adjust the extraction rate to the settings on the following slide.
- Press the Start/Pause button on the Laser Cutter.
- The cutting should start.
- When the cutting has finished, wait a moment for the smoke and fumes to disappear
- Then put the extractor back to 3 blue lights of extraction and wait for the green light to stop flashing before opening the door of the machine to retrieve your parts.
- Don’t forget to turn the extraction unit Off when you have finished.
- Turn Off the Laser Cutter.
- Remove any leftover material.
- Remove all parts and debris form the Laser Cutter.
- Return the Key to the Dyson Centre desk and sign the key back in.
- Pay for any materials via the Dyson Centre EPOS system.
- If you are not sure please ask for help and we will guide you.

Please read this page – this is fundamental information!

Please Turn ON the Bofa Extractor Unit Before Cutting Anything

Turn ON Green Switch on front Panel

- To adjust the settings follow the information on the extractor.



Extraction Rates Needed are as follows:

- **Laser Ply Cutting 6 Green Lights**
- **Laser Ply Engraving minimum 5 Green Lights**
- **Laser MDF Cutting 6 Green Lights**
- **Laser MDF Engraving minimum 5 Green Lights**
- **Acrylic Cutting 4 Green Lights**
- **Acrylic Engraving minimum 4 Green Lights**
- **For other materials Pleas Ask.**

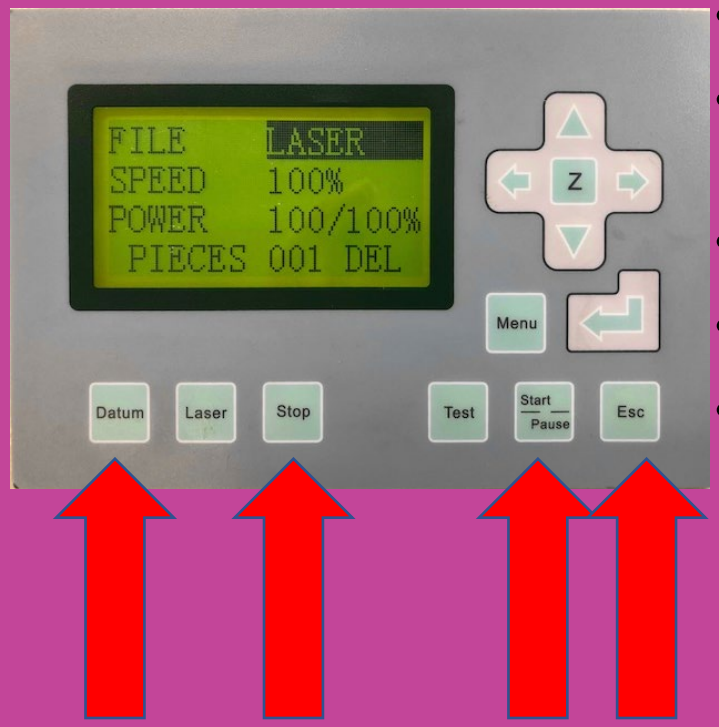
Please make sure that the Chiller Cabinet is also Turned ON

Please read this page – this is fundamental information!

If Anything Goes Wrong. Don't Panic.
Hit The START/PAUSE Button on the Laser Cutter.

If lots of smoke

- Press the START/PAUSE Button.
- Wait for smoke to disappear.
- If smoke disappears after Pausing.
- Continue cutting by pressing START/PAUSE button and it will resume.
- Be cautious and if more smoke appears pause the machine again and ask local DYSON CENTRE Staff for advice.



If a FIRE

- Press Pause, so if it self extracts. (Goes out).
- If not Press STOP, ESC and DATUM (machine references to Laser cut right corner).
- If small flame and it is safe to do so use
- water bottle to extinguish little fire.
- For big Fire hit the ESTOP Button (EMERGENCY STOP) SHOUT FIRE and attract the attention of DYSON CENTRE STAFF.

Please read this page – this is fundamental information!

Most Common User Issues – Press ESC

Soft Stop

- Means not enough travel in either the X or Y axis to accommodate your part.
- Check the Set Knife option top row of screen (17th button) for where your datum position is, I prefer Top Right. Adjust if needed.

Limit Stop

- Part that is required is bigger than the cutting area (900mm x 600mm).
- Adjust position of laser head to accommodate.
- Or resize part / make in two halves.

Invalid Config Re-Download Config File

- Contact Local Dyson Centre Staff

Dots appearing on the part, Go to the Engrave Option under the Blue drop down arrow where we set what we would like to do with that Colour layer and hit the Engrave then there is a small box with 2

Laser Cutter Zooms off in Wrong Direction

- Re-tick the Immediate Option Right hand side of the screen and Download to the Laser Cutter again.
- If this doesn't work contact local Dyson Centre Staff.

Please read this page

Thank you for watching, listening and reading.

You should now read, digitally sign and return to us the risk assessment.

When you're ready to come in to cut something, please use the booking sheet to book a 1 or a 2 hour slot.

If it is your first time using the laser cutter, please make this clear on the sheet, so that we can supervise you at a safe distance, and answer any questions which you have.