

## An introduction to using HPC Laser Cutter



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## Machine Familiarisation

### Machine Front



## Machine Familiarisation

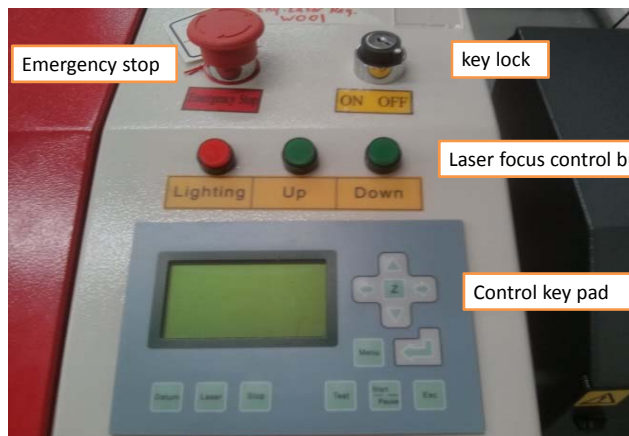
### Machine Back

Lockable covers at the rear of the laser cutter (these should be **left locked** to avoid exposing the laser tube).



## Machine Familiarisation

### Laser Cutter Controls



## Machine Familiarisation

Extractor fume unit and Water based-cooler unit

The fume filter unit control panel



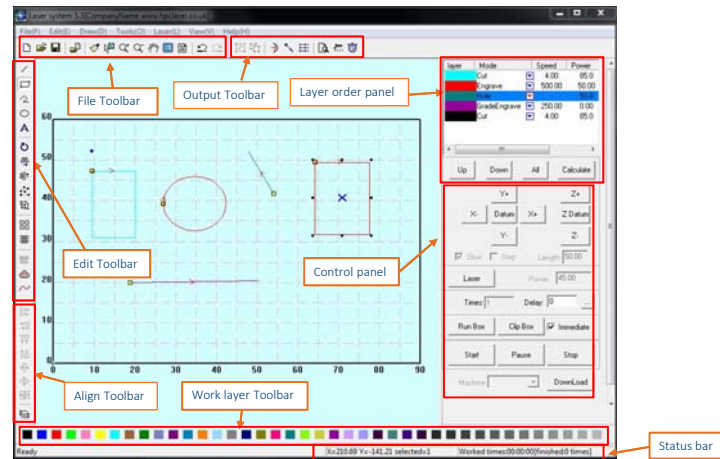
Water-based cooler unit control panel



## Using LaserCut 5.3 Software

## Using LaserCut 5.3 Software

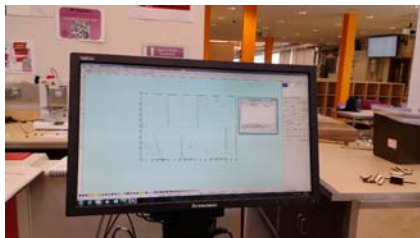
### Familiarisation with software interface



## Using LaserCut 5.3 Software

### Importing file into Lasercut 5.3

- Formats including \*.PLT, \*.AI, \*.DXF, \*.DST, \*.BMP, NC code etc
- No duplicate lines
- Select file to import click
- Select 'Unite lines' so each polyline is connected to the next



## Using LaserCut 5.3 Software

### Creating a file from scratch in Lasercut 5.3

This simple program is limited in what it can do listed below are some of its functions:

- New file
- Save/save as (\*.ecp)
- Tools
- Layer properties
- Data check (check the data to make sure it is closed)
- Smooth curve
- Unite lines
- Offset curve
- Define first cut (specify where the first cut should be made)
- Simulate operation time

## Using LaserCut 5.3 Software

### Creating a file from scratch in Lasercut 5.3

Specific Draw Functions

- Line, Rectangle
- Multipoint
- Ellipse
- Bezier Curve
- Text (single line text, however previews of the text are not shown)
- Array
- Rotate
- Mirror
- Size (will not set X and Y in relation have to be set separately.)
- Group
- Align

## Using LaserCut 5.3 Software

### Setting up LaserCut 5.3 to cut

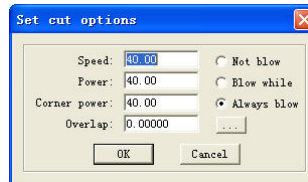
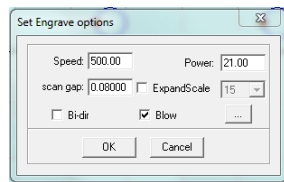
#### Main Interface of Layer Management

- Use the up and down arrow to set the layer order.

Layer	Mode	Speed	Power	Output	Times
Cut	40.00	40.0	1		
Engrave	400.00	50.00	1		
Grade	250.00	80.00	1		
Hole	--	50.0	1		

#### Interface of Set cut options

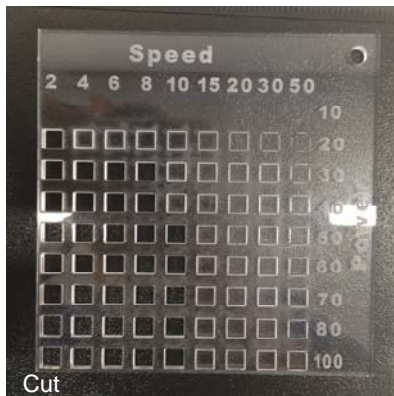
- Double click the colour identification bar to select the power and speed that each of these cuts should be made at.



## Using LaserCut 5.3 Software

### Setting up LaserCut 5.3 to cut

Use the cut and engrave mock ups to decide on the power and speed



## Layer management

### Cutting/Engraving

Before downloading check the settings for each layer in the layer manager

Layer	Mode	Speed	Power	Output	Times
Cut	40.00	40.0	<input checked="" type="checkbox"/>	2	
Engrave	400.00	50.00	<input checked="" type="checkbox"/>	3	
Grade	250.00	80.00	<input checked="" type="checkbox"/>	1	
Hole	--	50.0	<input checked="" type="checkbox"/>	1	

Up Down All Calculate

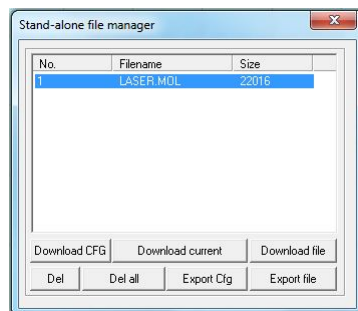
Check:

- Layers order to be cut or engraved.
  - The top one will be cut/engraved first
- Power and speed
- Check that material is square to on the bed
- Make sure the extractor and the cooler are both on

## Download

### Download data

Once completed download the design to the laser cutter MPC6515

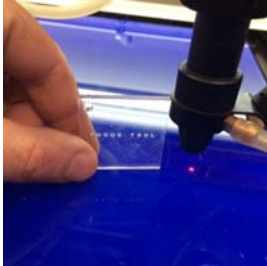


- **Download current file** - Download the current processing data displayed
- **Download file** - Download processing data to MPC6515 controller.
- **Del** - Delete the file which is selected.
- **Del all** - Delete all the files in MPC6515 controller.
- **Export Cfg** - This will create a \*.mol file which includes all the parameters of "Options". The file can be downloaded to MPC6515 controller by USB disk.
- **Export file** - This will create a \*.mol file which includes all the parameters of a processing data. The file can be downloaded to MPC6515 by USB disk.

## Laser Focus, Positioning, Test and Cut

### Laser Focus

To create a clean, fine cut the laser need to be set to certain distance from the material



Ensure that all covers to the machine are closed, and the lockable covers are locked

1. Turn on the Laser cutter using the key.
  - Leave to run for 5 minutes before cutting anything,
2. Position the material to be cut on the bed.
3. Position the laser in the middle of the material.
4. Move the bed up/down focus the laser using the **focus tool**
5. The laser is now in focus and ready to cut.

**NOTE:** Can only download the file to the Laser cutter once it is turned on.

## Laser Focus, Positioning, Test and Cut

### Positioning and test

Positioning the laser on the material

The area that the design covers will be traced out in a rectangle using this function.

1. Using the arrow buttons on the control key pad position the laser.
2. Select 'test' in the control keypad.
3. The laser head will then move (not cutting) tracing the area that design will fit into one rectangle.
4. Once set so the design fits within the material the laser can be set to cut.



**WARNING:** Once the laser has been set to cut you **CAN NOT** leave the laser unattended, as a fire could start in the machine.



## Laser Focus, Positioning, Test and Cut

### Cutting



The red dot laser shows the position of the laser as it is cutting.

The speed and power of the laser have been set in the lasercut 5.3 software

- Wood lower power



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## Laser Focus, Positioning, Test and Cut

### Engraving



The laser scorches the wood engraving in a printer like fashion

The image/ design can be inverted to be shown like a photo negative.

The design has to be in BMP format with no colour to ensure the design can be read by the laser cutter



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## Inspiration and Design

### Inspiration

- Web resources such as Thingiverse, Instructables



Thingiverse

### Design

- By designing and share the DXF of the design
- Can be design in all types of software









## Information and Safety

### Adjusting the Fan speed

When cutting material the fan speed may need to be increased or decrease

#### To adjust fan speed:

- Hold down both  and  for around 10 seconds...
- ...until this light blinks on  and off .
- While light is blinking, hold down  or  to alter fan speed.
- Fan speed alters gradually (you can hear it)...
- ...and speed indicator lights will slowly increase/decrease in number.
- This also alters default fan speed (i.e. speed unit goes to at turn on).
  - Too low a fan speed means fumes not captured by filter!!!
  - Too high a fan speed shortens filter life.



**NOTE: If the smell of burnt material is strong increase the fan speed more via the instructions.**

**Suggest a fan speed of min 3 lights.**

## Information and Safety

### Safety

- Do also beware of the effects on you and the fire alarm of fumes escaping.
- Do stop cutting if:
  - you feel unwell at all, and seek help, or
  - there are any unexpected smells in the air.
  - fire starting
- Leaving the cover down for a few seconds longer to ensure fumes have been removed by the extractor.
- Risk assessments understood.



## Information and Safety

### Laser cutter Safety Rules

- **PLEASE DO NOT**
  - leave the machine running unattended
  - disassemble the machine or remove any of its protective covers
  - interfere with the door interlocks
  - look directly at the red laser dot
  - make or break any electrical connections to the system
  - use combustible materials, volatile solvents such as acetone / alcohol
  - attempt to cut **ANY** metal
  - look directly at the 'cutting point'
  - cut any items containing PVC or Vinyl



## Information and Safety

### Laser cutter Safety Rules

- **PLEASE MAKE SURE**
  - the dust/fume extractor and air assist compressor is turned on when cutting
  - keep the laser bed clean and remove any small cuttings from the draw below)
  - seek a member of staff if you are unsure of any procedures
  - the area around tidy and clutter free
  - have a fire extinguisher nearby.

## Materials

### Charge forms and in house materials

Laser cutter material are sold in the Dyson building

Lacerable material can be brought in to be used but proof of the what the materials is, is needed.

Once finished please fill in a charge form and hand in to the Dyson centre managers desk

All prices for materials can be found on the wall near the laser cutters

If requested materials can be ordered in and paid at cost price

No profit is made, all the materials are sold at cost price.

Can Cut Wood, Acrylic, Paper, Card. Can Engrave Glass and Slate

Please take this to the Dyson centre desk to pay upon completion

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*For Engineering Design*

**Dyson Centre Laser Cutter Charging and Job Record Sheet**

Which machine/s were used?

<input type="checkbox"/> Laser Cutter W801 (Mounted to wall)	Date: _____
<input type="checkbox"/> Laser Cutter W802 (Purchased from wall)	Date: _____

Who was using the machine/s?

Name/s: \_\_\_\_\_ Email: \_\_\_\_\_

Supervised by: \_\_\_\_\_

**Materials used and cost?**  
(Note: The machine charge is not applied to the Dyson Centre as the undergraduate - others may want to record their own materials, and any small charges will be added to the Job Charge Form. If you are not sure please discuss with the supervisor next time. Design/charging fees apply to all the machines used for all jobs.)

Charge for machine use?

<input type="checkbox"/> Undergrad use	Price of charge (this is what the machines were paid for by our design)
<input type="checkbox"/> Postgraduate or staff research use	12% of machine cost for one period of time, including setting up and using machine not exceeding 1 hour) + £500*1.8 (hour) <small>(Receipt: £90.00)</small>

Job no (if applicable): \_\_\_\_\_ Total cost: £ \_\_\_\_\_

**Receipt for Laser Cutting service/materials.** **Dyson Centre**  
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Cash Receipt For £ \_\_\_\_\_

Details: \_\_\_\_\_ Name: \_\_\_\_\_

Manager's Signature: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

## Laser Cutter Training

**Training is now  
being offered so that  
the laser cutter can  
be used with out  
being supervised.**