

# LASER CUTTER

## Part 1. The machine

The machine is switched on, or off, using the illuminated green rocker switch on the right-hand side. This turns on everything at once, the cutter, the extractor fan, the cooling system and the air assist pump.

Immediately after switch-on, the laser head moves. Firstly it moves to X and Y home position, then moves to the position it was when last switched off.

The laser head can be moved using the four arrow controls on the panel on the right of the top surface machine.

The laser cutter can be used on a range of flat materials: plywood, mdf, acrylic (perspex) are commonly used. It must not be used on metal, PVC or anything not included in the safe materials list. ([https://wiki.richmondmakerlabs.uk/index.php/Laser\\_cutter#Materials](https://wiki.richmondmakerlabs.uk/index.php/Laser_cutter#Materials))

The laser beam must be focussed on the top surface of the material to be cut. There is a gauge for this purpose. Place the material on the cutting bed, and move the laser head above it. Use the two yellow buttons on the right-hand side of the machine to raise or lower the cutting bed so that the lens height above the sheet material matches the size of the gauge.

It's best to raise the bed to a height so the gauge will not fit under the lens, then lower the bed until the lens just slides into the space. Adjustment within about +/- 1mm is quite sufficient.

Set the position of the laser head to the top right-hand corner of the area you want to cut. Do this either by moving the material on the cutting bed or by using the arrow push buttons. The red light indicates (approximately) where the laser beam is focussed. It is safe to look at the red light when the machine is not actively cutting.

When the laser cutting is in progress, you should never look at the white laser beam as the intensity is dangerously high for your retina. There are safety glasses which reduce the glare somewhat, but even with glasses, you should restrict your viewing to the minimum.

## Part 2. The software

Log in to the computer as user 'rml' with password 'rml'. The software to drive the laser cutter is named RD Works, and appears as a red icon on the taskbar at the bottom of the screen. You can get a free download for use at home at <https://www.rdacs.com/download?id=1&m=software&a=RDWorksV8&v=4>

Open RD Works, answer Yes to the security window.

The screen shows a grid which corresponds to the whole bed of the laser cutter. Dimensions are in mm.

RD Works is fairly useless for creating your cutting file, unless it's something very simple. You should generally prepare files before your laser cutter session and bring them in as a .dxf type of file, on a USB stick.

The DXF should consist of a single layer and single colour, as RD Works can't cope with anything more complicated.

Use File->Import... or click on the Import icon, to locate your file and display it.

You can control the power of the laser beam and the speed with which it moves. Power and speed together determine how deeply the laser beam will penetrate.

There are two modes of burning: Cut and Scan.

Power, speed and mode are selected from the table near the top right corner of the screen, and they can be set separately for different parts of the image by assigning specific colours on-screen.

## **Cut**

To cut fully through a piece of 3mm acrylic, power 60% and speed 18mm/s is about right. Plywood or MDF might require the same power and less speed, and thicker material may need the speed to drop down to 12mm/s.

To mark the surface without cutting through can be done with power 30% and speed 100mm/s. It will depend on the material and on how deep you want the mark to be.

Never exceed 60% power, as that stresses the laser tube without creating a stronger laser beam.

## **Scan**

Scan involves burning marks on to the material surface, not all the way through. It therefore requires power in the 30% region and speed in the 100-200 region.

You can import an image as a .jpg file, and burn it into the surface of your material. To do this, the laser burns a matrix of dots with varying intensity. The JPG file must be black and white. A coloured JPG will not produce correct shading.

Alternatively, if there are closed shapes in your DXF image, where Cut would trace a line around the perimeter, Scan will fill the area with a solid region of burn.

The results from Scan depend on experimentation, so be prepared to try it out and find what works best on your material.

There's plenty of information on the Richmond MakerLabs wiki,  
<https://wiki.richmondmakerlabs.uk/> Search for Laser cutter