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User Guide - Spirit LS/GLS

Issue 4
2021

This document is designed as a quick step training guide and NOT a manual. It should therefore be read in conjunction with the manufacturer's user manual. This can be found on the GCC CD ROM, supplied with your machine. We strongly recommend that you read and/or print out that manual.

WORKSHOP MAINTENANCE SERVICES

WF-Education has a comprehensive service and maintenance package ensuring your workshop equipment will last for future years. Trained engineers will service and maintain the installed machinery and carry out all the obligatory fume and dust extraction tests (LEV). Please contact our Head Office for further details of this service.

PLANNING & WORKSHOP LAYOUTS

We can work in partnership with architects and designers to plan and produce workshop layouts complying with all relevant legislation and suggest quality machinery and equipment that is fully compliant with all health and safety legislation but is also relevant to the modern curriculum.

INFORMATION IN THIS MANUAL

Manufacturers continuously improve their products and may modify the specification or look of their products without notice. We have tried to ensure the highest accuracy to this manual at the time of publication.

TERMS OF SALE

Payment terms are nett monthly account. Please notify us of any shortages or damage within 3 days of delivery and in the case of non-delivery with 10 days of the date of invoice. Any goods conveyed to customers remain the property of WF-Education group until paid for in full, but liability for those goods transfers to the customer upon receipt. All business is transacted under our Terms and Conditions of Business, copies of which we are happy to supply upon request.

CATALOGUE ORDERS

We accept orders by telephone, fax, post and email. We have no minimum order charge.
For secure on-line ordering please visit our website www.technologysupplies.co.uk

ORDER DELIVERY

Orders are despatched within 1-5 days, unless school holidays intervene.
If an order is not complete when first despatched we do not charge carriage on the 'to follow' items. This does not apply to items such as large machines and workbenches which have a longer lead time.
Please advise us if delivery cannot be made during school holidays.

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Warranty Information

Your WF-Education Group Laser and tube are warranted against manufacturing defects for a period of 2 years from the date of purchase, this warranty excludes any consumables items. Subject to the terms and conditions listed below, the warranty will provide for the on-site repair of the laser, or any component thereof, which is identified as faulty or below standard, or is a result of inferior workmanship or materials.

The Conditions of this Warranty are:

- The warranty shall only apply to defects that occur within the 2 year period (12 months on the laser tube).
- Any repair must be carried out by an authorised service technician - any unauthorised work will invalidate the warranty.
- The warranty does not cover any faults or defects caused by accident, misuse, fair wear & tear, neglect, tampering with the equipment, or any attempt at adjustment or repair other than through WF-Education Group. Non-warranted repair visits are chargeable at the current technicians rate.

Within the 2 Year Warranty Period:

- If you experience difficulty using the product, please firstly refer to this manual, if the information you require is not available in the manual then please visit the laser FAQ section on our website www.technologysupplies.co.uk If you are still unsuccessful then phone the Technology Supplies Technical Line for support (please see bottom of this page).
- In the unlikely event of a defect occurring, please phone WF-Education technical Line to arrange a technician's visit.

Outside the Warranty Period:

- Because of the nature of the product, if your laser needs repair after the warranty period, the repair must only be carried out by an authorised service technician. Further damage to the machine and also risks to health may occur when working with laser cutters if correct procedures and parts are not used.
- In the event of a defect occurring, please first contact the WF-Education technical Line who will attempt to resolve or determine the issue prior to arranging for a laser engineer to attend.

Consumables:

These are items that either have a limited life or their life is directly affected by their use, maintenance and care taken with them. For example the filters in the extraction units have a limited number of hours before becoming clogged and are therefore not covered by any warranty.

The following items are classed as consumables and are not covered by the warranty.

- * Fume Extraction Filters
- * Grid bed
- * Gas Struts for Lid
- * Lens & Mirrors (their life is dependant on cleaning and maintenance)
- * Autofocus Probe and connecting components

Total Product Technical Support:

WF-Education includes **unlimited** support throughout the life of the laser cutter.

- 1) The latest drivers, and FAQs, along with updated manuals are published via our website www.technologysupplies.co.uk
- 2) Telephone Support via our Technical Line on 01743 812200, option 2, one of our dedicated technical team members will be happy to help with your enquiry.

General Laser Information

What is LASER an Abbreviation of?

LASER stands for **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation.

How Does a Laser Work?

A CO₂ laser works by exciting the molecules of a carbon dioxide gas mixture. **CO₂ lasers are not powerful enough to mark or cut metal.** The laser beam is focussed through a lens and is so intensive that the beam can vaporise a wide range of materials. If the beam passes over the material quickly an engraved image is produced. By slowing the speed down, the beam has time to vaporise more of the material resulting in a cut right through.

Laser Safety

The safety rating of Class 1 by CDRH means that the laser beam is enclosed in a cabinet and has safety interlock mechanisms to protect the operator from injury. When a Class 1 laser system is equipped with a red dot pointer which allows you to accurately position the laser beam, the safety rating turns into a Class 3a due to the red beam being laser light. This is similar to the laser pointing devices often used for presentations. The main safety precaution to be observed is to avoid placing your eyes in the red beam path. This is difficult given the design of the laser cabinet.

The Conditions of this Warranty are:

- 1) Do not attempt to modify or disassemble the laser system at any time as invisible laser radiation may cause physical burns or severe eye damage.
- 2) Wear appropriate safety goggles especially when engraving with mirrors or **coated** metals such as enamelled brass and anodised aluminium.
(Safety Goggles are provided as standard.)
- 3) A Fume extraction system is supplied and should always be used. The machine should be used in a well ventilated room.
- 4) Always read the manual and caution labels carefully before operation.
- 5) Do not work with reflective metals, heat sensitive surfaces or other materials that may produce toxic substances, such as PVC, Teflon and PTFE.



N.B. PVC, Plastazote, Teflon and some Styrenes produce corrosive fumes that will damage the mechanics of the laser, invalidate your warranty and will be harmful to health. The user is responsible at all times for the health and safety of themselves and the people around the machine with regards to the chosen materials.



- 6) If the nature of the material cannot be ascertained **DO NOT PROCESS IT IN THE LASER!**
- 7) A **CO₂** fire extinguisher should be available on hand at all times.
- 8) Never leave the machine unattended during operation.
- 9) Follow the recommendations for maintaining and cleaning your system. Not only will this enable you to cut and engrave efficiently, it will ensure that your machine runs safely as well.

Fire Prevention

- 1) When cutting materials that can easily catch fire, such as acrylic, wood, paper or card it is **VITAL** that you have the air assist compressor turned on to prevent flames.
- 2) Do not leave any material/debris underneath the laser grid bed or table otherwise when the laser is running the waste material below can be set on fire due to the slow passage of the laser beam and the trapped heat.
- 3) It is strongly advised that the machine is **NOT** left unattended when it is working.

What Materials Can Be Used?

Consult Your MSDS



WF-Education always recommends that you consult your MSDS (Material Safety Data Sheet) supplied with your material, even if the material is listed below as acceptable to be used with your laser. This is because certain materials may contain different chemicals/substances from the manufacturing process. The user is responsible at all times for the health and safety of themselves and the people around the machine with regards to the chosen materials.



Safe Materials to Use in the Laser

A WF-Education laser cutter with a Co2 laser tube can only process non-metal material, by etching or cutting.

Acrylic	Composites Cork	Leatherette	Painted Metals #	Veneer	Polypropylene
Anodized Metals #	Fabrics	Marble #	Painted Materials	Correx	MDF
Bamboo	Fiberglass	Matte Board	Pressboard	Wood	Ply
Balsa	Non PVC Foam	Melamine	Rubber	Slate #	Greyboard
Cardboard	Glass #	Mylar	Silicon Stone	HIPS	Boxcard
Ceramics #	Kevlar	Nylon	Tile #	Plastazote	Plastazote
Vinyl (GEFF)					

= Engraving only (cannot be laser cut)



Materials NOT to Use in the Laser

Below is a list of 'known' materials which are **NOT** to be used in the laser cutter as they will produce corrosive fumes that will be harmful to health, damage the mechanics of the machine and invalidate the warranty.

Material

PVC - This material is extremely toxic, the resulting fumes will pass through most extraction filters.
PTFE
Teflon
Metals
Styrenes (modelling foam board, Styrofoam)
PVC based Vinyls



Risk Assessment for Schools

The following risk assessment is provided to cover the use of laser cutters/engravers in schools to cut plastics, rubber, wood, card and textiles as an example of CAD/CAM. It has been formatted in the style of CLEAPSS. Please note that all of the laser cutters supplied by Technology Supplies are Class 3a lasers (Class 1 without the red beam pointer) not Class 4. The information gathered here assumes a worst case scenario with regard to the use of a laser cutter and highlights the general risks that could be encountered.

General Information

Class 4 lasers must never be used in schools but, when enclosed, the classification of the whole system is reduced to class 1, which is acceptable. Many models incorporate a low-power, visible (red) beam alongside the invisible, high-powered cutting beam. Whenever the machine is in operation, it must be assumed that where ever the visible red beam is seen on the material, the invisible one is also present.

Hazards

Burns	Class 4 (high-power) lasers can cause severe burns to skin.
Blinding	Class 4 lasers can cause blinding if a reflected beam enters the eye; the invisible infra-red radiation from a Co2 laser renders the cornea of the eye opaque in a fraction of a second.
High Voltage	The gas filled tubes used as the source of the radiation operate at hazardous live potentials.
Toxic Fumes	The use of the laser to cut PVC generates toxic vinyl chloride and other decomposition products. Polyurethane foams may give hydrogen cyanide and nitrogen oxides when heated by the beam.
Harmful Particles	The cutting process releases fine particles and decomposition products from the materials being cut. Rubber will produce a mixture of pyrolysis products, including some harmful ones.



PVC, PTFE, Plastazone, Teflon and some styrenes will produce corrosive fumes that will be harmful to health, damage the mechanics of the machine and invalidate the warranty. The user is responsible at all times for the health and safety of themselves and the people around the machine with regards to the chosen materials.



General Information

Burns	Provided the laser beams are totally enclosed (reducing the hazard class of the system to 1), this risk is minimal.
Blinding	Provided the laser beams are totally enclosed (reducing the hazard class of the system to 1), this risk is minimal.
High Voltage	Provided the electrical supplies to the tube are totally enclosed, this risk is minimal.
Toxic Fumes	PVC and polyurethane foams present a serious risk. Some plastics, rubber and MDF can give rise to harmful fumes.

Control Measures

- An interlock if fitted to all models to prevent access to the working area during laser operation whilst the laser is firing. The interlock system will also not allow the laser to be fired without the extraction unit on. This device is essential and it must not be over-ridden.
- Servicing MUST only be carried out by a manufacture authorised and trained technician to control the high voltage risk as well as risks from the beam.
- PVC and polyurethane foams should not be cut even with LEV in use.

Immediate Remedial Measures

Burns

The beam may produce a deep cut in tissue with little bleeding because the wound is immediately cauterised. Obtain specialist treatment.

Blinding

There is no immediate remedial measure.

High Voltage

Taking care for your own safety, break contact by switching off or pulling out the plug. If it is necessary to move the casualty without switching off the supply/use a broom handle or wooden window pole or wear rubber gloves. If the casualty is unconscious and not breathing, check that the airways are clear and begin artificial ventilation. Send for an ambulance. If a trained first aider does not arrive quickly and the pulse is absent, consider carrying out resuscitation.

Toxic Fumes

Remove casualty to fresh air and seek medical attention.

Harmful Particles

If dust is in the eye, irrigate immediately and with water for several minutes, telling the casualty to hold eyelids apart.

Extraction & COSHH Information

In order to meet the requirements of the COSHH Regulations for LEV, the school must operate a strict regime of filter replacement and/or testing.

Pre-filters, which collect the coarse/solid particles, may need changing every couple of months. The main filter, which is a combined activated carbon and HEPA filter which is for fine particles and odour, may last six months to a year (all depending on material & usage).

The latest extraction units are equipped with air flow warning devices to aid the monitoring of efficient filter life. Please refer to the separate section within the manual.

We recommend that a record of filter life is kept over the period of ownership. This will ensure that a school can build a service/maintenance record according to HSE guidelines.



Disposal of Extraction Filters

The fume and dust-control systems must be properly maintained, tested annually and the filters changed according to the manufacturer's instructions. Used filters should be sealed into a strong plastic bags before placing them in the waste, please take care to wear the appropriate PPE clothing when dealing with the contaminated filters.



Laser cutters should be stored in secure locations to prevent un-authorized use.
We recommend that they are used only by teachers/technicians that have undertaken suitable training in the use of these machines.
Laser cutters should NOT be left unattended during operation due to risk of fire.



General Maintenance

The lens, mirrors, bed, auto-focus gauge and runners must be cleaned before use or on a weekly basis to ensure correct operation of the laser, and the fume extractor filters should be replaced as required. If you cut and/or engrave mainly on wood, MDF and plywood then more fumes are produced therefore the lens, mirrors, will need cleaning much more frequently, (Please refer to the maintenance log on page 57).



Keeping the optics and motion system clean is essential for excellent quality engraving and for the reliability of your engraver. Please clean the bearing tracks and x-axis bearing daily to maintain good condition of the machine.

Never pour or spray any liquid directly onto the laser system.

Turn off the power and disconnect from the mains before carrying out any internal cleaning.



Fume Extractor Unit

Please refer to the manual supplied on CD with your extraction for operating and maintenance instructions.

General Maintenance

When laser cutting, waste material builds up under the cutting table and must be removed on a regular basis and cleaned out as this can be ignited by the laser. Especially when wood and card waste are present as they can be ignited more easily.

To clean the waste, lower the bed and remove the grid bed, open the front door panel and then sweep the bed area clean. Any staining on the bed can be removed with cream cleaners such as Cif on a damp cloth and then dried. Ensure that the machine is disconnected from the mains power.

Mirrors & Lenses

These are the most important parts of the laser for ensuring efficient cutting and engraving operations. If there is any sign of dirt or marks on any of these, the lasers power and cutting efficiency will decrease. Only use the manufacturer's recommended cleaning materials.

Identifying the Mirrors

The mirrors in your laser cutter are numbered in the order they get hit by the laser beam. See picture on the right for a visual reference of the mirrors.



Mirror 1



Mirror 2



Mirror 3



Mirror 4

Location Of The Spirit Mirrors

Accessing Mirror #1

Step 1. To access mirror #1 you will need to remove the 3 screws from the tube access panel. By lowering this panel you will reveal the black casing which contains mirror #1. N.B. PLEASE MAKE SURE THE LASER MACHINE IS DISCONNECTED FROM THE MAINS POWER BEFORE OPENING THE TUBE ACCESS PANEL!

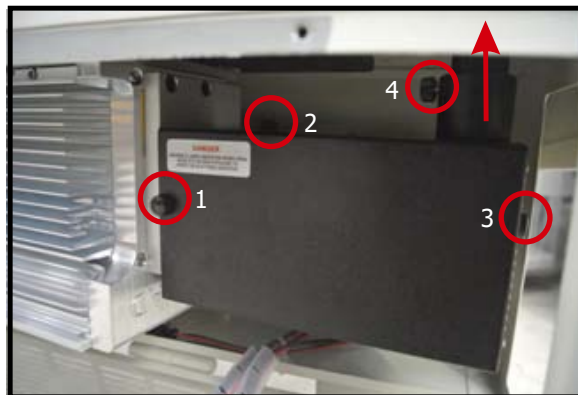


Remove these three screws in order to lower the laser tube access panel.



Black casing

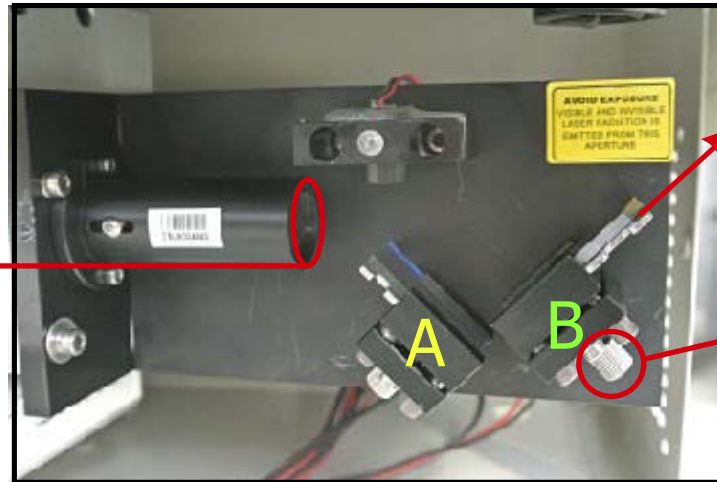
Step 2. Simply remove the three screws and loosen the fourth screw to allow you to raise the dust tube, then you will be able to remove the black dust cover off the mirror 1 housing. **See Below.**



Step 4. With the dust cover removed you will be able to see 2 mirrors (**A & B**). Mirror **A** is the Red Beam mirror and only has to be cleaned if you can no longer see the red beam on the laser bed or material, as this mirror only bounces the red light beam **NOT** the laser cutting beam.

The mirror labelled **B** is mirror #1 which is the first of the four mirrors which the laser beam hits as it passes through the machine. To remove this for cleaning simply loosen the screw and slide the mirror out.

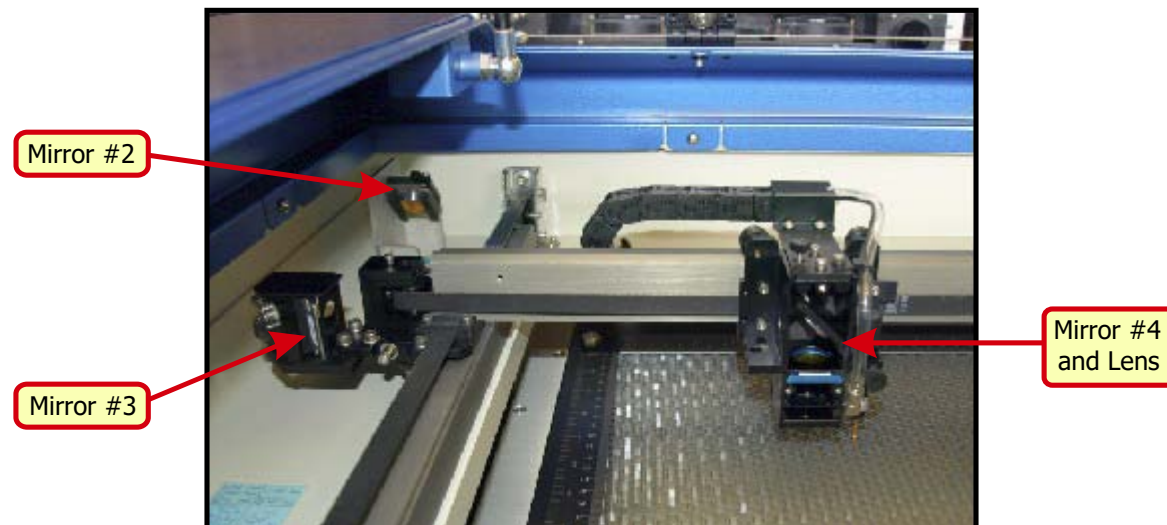
Collimating lens
You will only find a collimating lens on machines that are 40w and above.



Loosen this screw and slide mirror out in the direction shown.

Accessing Mirrors #2, 3, 4 and the Lens

Besides mirror #1, the other mirrors 2, 3, 4 and the lens are all located in the main chamber of the laser cutter. Below is a photograph of the main chamber of the laser with the locations of where each mirror and lens can be found. Mirror #2 would normally have a black dust cover which is held in place with a single thumb screw.



Releasing Mirror #2

To remove the dust cover containing mirror #2 loosen the screw on the bottom flat section of the cover and lift the cover off over the bracket (**Fig 1**). Once the cover has been removed loosen the screw on mirror #2 and slide it out of the bracket (**Fig 2**).

Fig 1

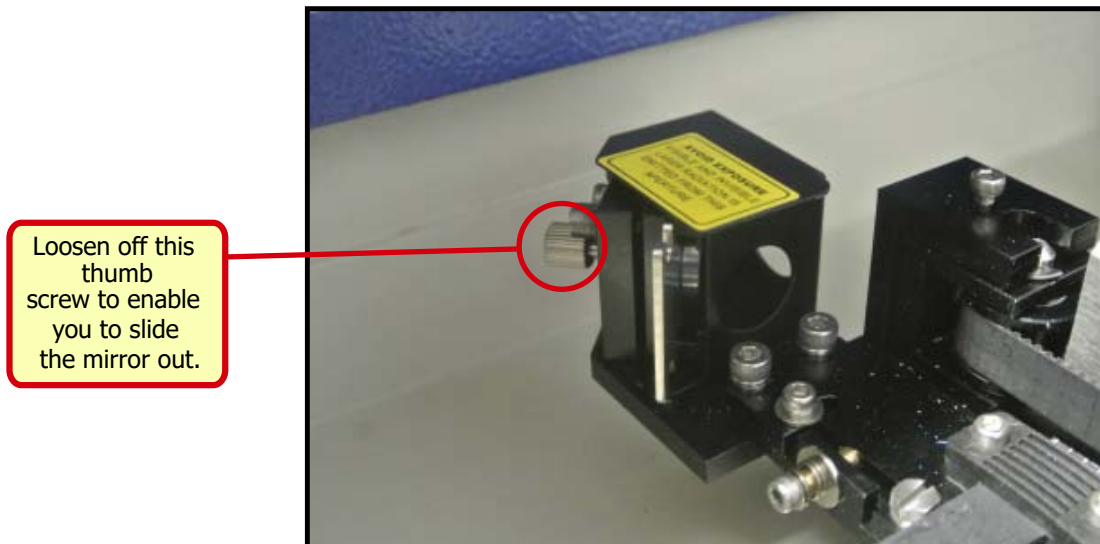


Fig 2



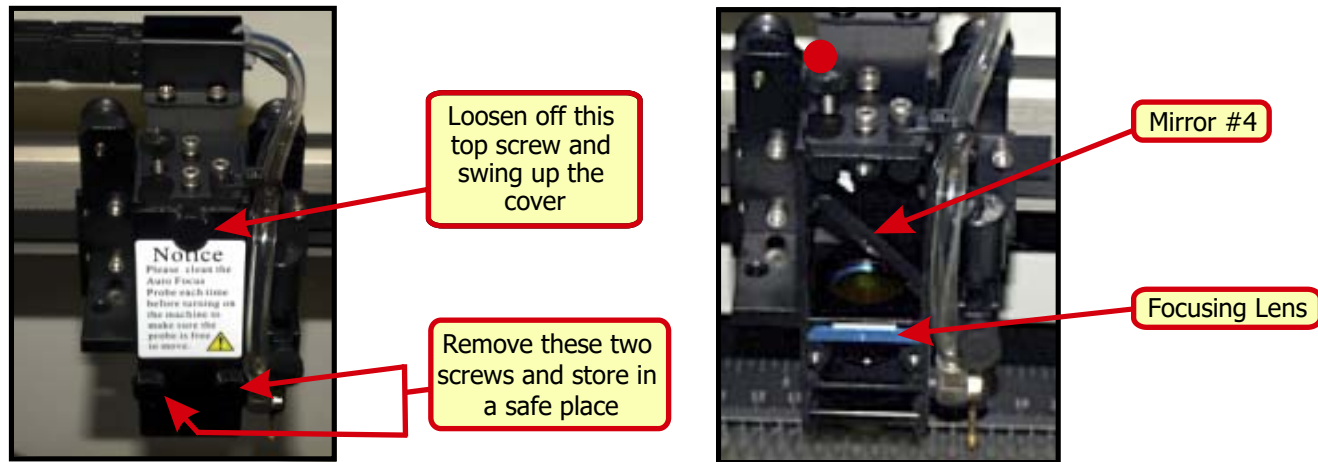
Accessing Mirror #3

To release this mirror you need to loosen off the two screws as shown below and slide the mirror out. Ensure that the mirror is replaced correctly when reassembling.



Accessing Mirror #4 and the Lens

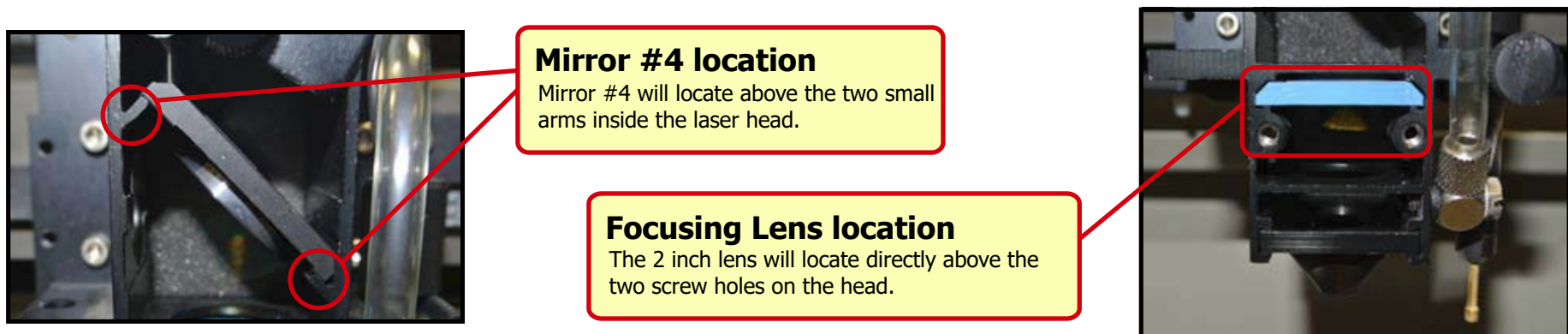
As shown below, to be able to access the lens and mirror #4 for cleaning you need to release the front cover. To do this you need to remove the bottom two screws, and loosen off the top screw. This enables you to swing the cover over and gives access to slide the items out. Ensure that the mirror and lens are replaced correctly before reassembly.



Note: To remove mirror #4 for cleaning you will need to loosen the screw above the mirror (located at ●)

Correct Positioning of Mirror #4 and the 2 Inch Lens

A common problem for first time users is that after cleaning they insert mirror #4 and the lens into the wrong locations. Please see pictures below explaining how to locate these parts correctly.

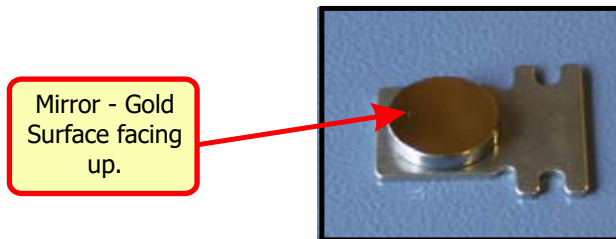


Cleaning the Mirrors and Lens

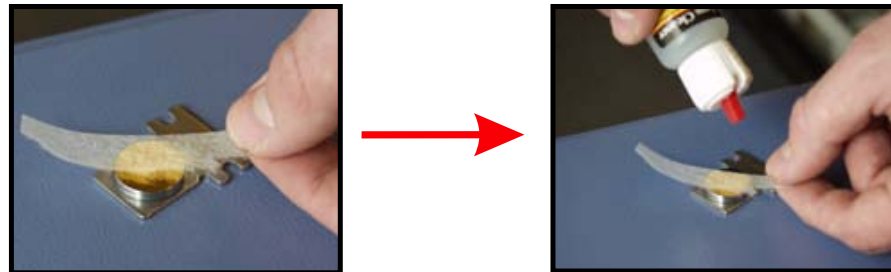
Cleaning the Mirrors

The mirrors should be cleaned on a weekly basis or daily basis depending upon usage. The mirrors are gold faced and can easily be damaged if not handled carefully. The mirrors can blister and crack if they are not kept clean. Always put the mirrors with the gold face uppermost and only use the proper cleaning materials. (See Photo). Kodak lens cleaning fluid and special lens cleaning cloths are provided with the machine for this purpose. Spares are available from our catalogue.

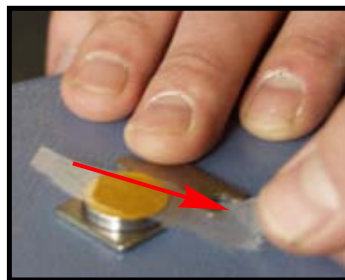
Step 1. Place the mirror gold side up on the side of the laser cutter or on a clean surface.



Step 2. Tear off a 20mm wide strip of cloth, lay one end on the mirror and squeeze one drop of cleaning fluid on to it. **IMPORTANT - USE ONLY THE SPECIFIED CLOTH FOR CLEANING - DO NOT USE THE CLEANING SWABS .**



Step 3. Support the mirror to prevent it moving during cleaning, and holding the dry end, slowly drag the damp cloth across the mirror's surface as show below.



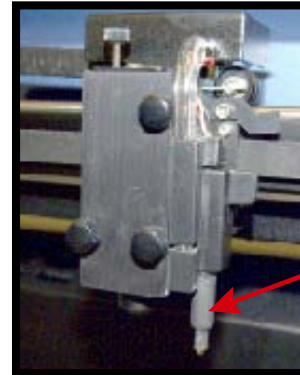
If the mirror is dirty you may have to repeat this process several times with a new cloth each time. The fluid will evaporate leaving a clean and shiny surface. After a period of time, a film of cleaning fluid will build up on the surface of the mirrors. Under these circumstances, it will be necessary to use a complete cleaning sheet, folded into a pad. Drop a spot of fluid onto the cleaning cloth and then apply A REASONABLE PRESSURE with your finger as you drag it across the surface of the mirror.

Lens Cleaning

The lens should be checked often and cleaned, possibly hourly especially if you are processing materials which contain resin such as woods, MDF and ply. Squeeze some lens cleaning fluid onto a cotton swab and gently rub in a spiral motion from the centre outwards on both sides of the lens. If necessary dry the lens with a clean dry swab. If the lens is not totally clean then instead of the laser light transmitting through the lens it can heat up the glass and cause expensive damage.

Cleaning the Auto Focus Gauge

Clean this **every** time the machine is used by wiping the brass plunger with a cloth to ensure it is free to move up and down.

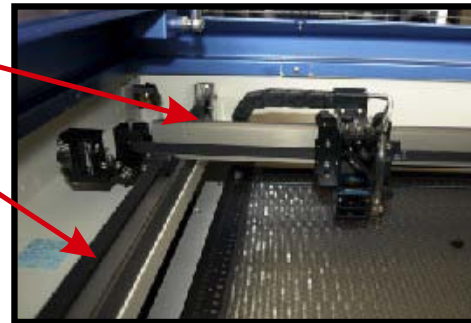


Auto Focus Gauge - ensure the brass plunger has free movement and is clean by gently pushing the plunger upwards and seeing if it springs back.

Cleaning the Gantry Arm & System Tracks

The gantry arm, motion system track and V shaped carriage wheels need to be wiped with a clean dry cloth daily to ensure smooth movement of the laser head.

If you notice a build up of dirt within the wheels then you can simply insert a cotton bud into the groove of the wheel/gantry and manually move the head back and forth to clean out the dust particles. DO NOT apply grease or oil to the motion system tracks.



Cleaning the Laser Grid Bed

The grid bed (cutting table) will over time take on a black stained appearance around the area most used for cutting. In most cases this will be localised around the top left hand quarter. You will find that you will also start to get an odour from the machine itself during and after processing. We have found from experience that the following procedure does dramatically clean the grid bed, but the process may need to be repeated to get a good results.

Step 1 : Obtain a trough big enough to accept the grid bed, which is water tight.

Step 2: Dissolve mild detergent into warm water in your trough.

Step 3: Place the grid bed face down (so that the rubber feet are sticking out of the water) and leave to soak for 24 hours (or preferably a weekend)

Step 4: Thoroughly dry off the grid bed before use. You may have to repeat a couple of times to get rid of the majority of the staining.

Disclaimer: WF-Education Group can take no responsibility for any damage to the grid bed. Degradation of rulers and paintwork will ensue if using detergents and other fluids to clean the cutting surface.

Laser Driver Installation

The latest laser printer driver is usually in the form of an executable installation program and therefore only requires double clicking to install. However sometimes the driver can contain a directory of 9 files, including an inf file in which case please follow the step by step installation on page 18.



Windows 10 does not allow the installation of unsigned drivers, please refer to **page 17** for information on disabling this function and to boot around Windows start up.

Laser driver setup from the executable file (windows 7, 8 & 10), please refer to **page 18**.

Before you start :- Please note that most modern lasers will no longer have the **USB Setup Wizard** option, as **parallel setup is no longer available, in which case ignore the 5 steps below and proceed to the relevant driver installation page.**

- Step 1.** Before installing your Windows driver you may need to change the USB Setup Wizard in the laser control panel. To do this turn the laser cutter **ON** and wait for it to finish initialising, once it has finished **Press F4** (Function, on the laser main menu control panel).
- Step 2.** In the next screen you will see a black diamond **◆** to the left hand side of your options. Move the diamond using the up and down directional keys either side of the enter button on the control panel, navigate to the option, **Machine Settings** and press **Enter**.
- Step 3.** Again using the up and down controls, scroll through the options and select **USB Setup Wizard** and press **Enter**.
- Step 4.** The laser USB is usually set by default to **GCC USB**. You will need to press the right arrow (by the enter button) this will now show either **Common, Windows** or **Vista** depending on your firmware. Once one of these options appears on your control panel screen press **F4** to save the option.
- Step 5.** Now press **F1** (back) until you reach the **Empty File** screen.

Pre-Installation Setup for Windows 8 - 10



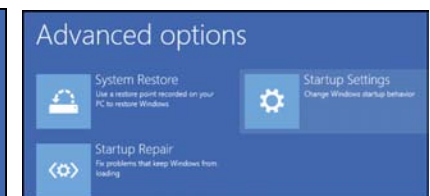
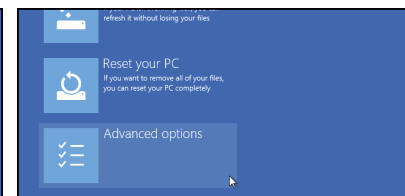
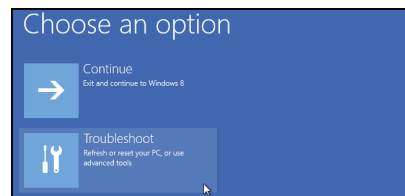
Pre-Installation for Windows 8-10 driver

Many devices ship with unsigned drivers and 64-Bit versions of Windows require digitally signed drivers. Digitally signed drivers include an electronic fingerprint that indicates which company the driver was produced by, as well as an indication as to whether the driver has been modified since the company released it. The laser drivers are NOT digitally signed and therefore will require a workaround.

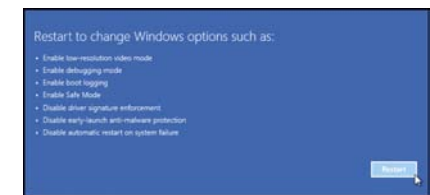
Step 1. To disable driver signature verification, go to the troubleshooting options from the boot manager. The easiest way to bring this screen up is by selecting restart from the power options menu (on Windows 8 that's under Charms or on the login screen, and in Windows 10 it's on the Start Menu). Hold down the SHIFT key while you click Restart.



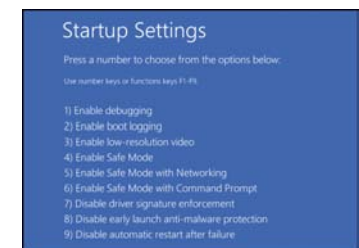
Step 2. Once your computer has rebooted you will be able to choose the Troubleshoot option. Then head into Advanced options, then choose Start-up Settings.



Step 3. Since we are modifying boot time configuration settings, you will need to restart your computer one last time.



Step 4. Finally, you will be given a list of start-up settings that you can change. The one we require is "Disable driver signature enforcement". To choose the setting, you will need to press the F7 key. Your PC will then reboot and you will be able to install unsigned drivers without any error message.



Driver Installation For Windows 7-10



Installing Windows 7 Driver (inf file)

Step 1. Insert the LaserPro driver CD supplied with your laser cutter and close the auto disc startup feature.

Step 2. Go to the **Start** menu within Windows 7 and select **Devices and Printers**. Then select **Add a Printer** from the top toolbar.

Step 3. Select add as a **Local Printer** and click **OK**.

Step 4. Select **USB001 (Virtual Printer Port for USB)** from the "use an existing port" drop down menu, then click **Next**. If the **USB 001** option is not available, remove the USB cable from the computer and re-plug it in and start again from step 2.

Step 5. Select **Have Disk**, then select **Browse**.

Step 6. Now select your Windows 7 printer driver from your Laser Pro CD and keep on clicking through the menus until you reach the driver, select '**Do Not Share**' and '**Do Not Print A Test Page**'

Step 7. Click **OK**, then Select **Next**.

Step 8. Then select **Next** and then click **OK**.

Installing Windows 7-10 Executable Driver File

Step 1. Insert the LaserPro driver GCC CD disc supplied with your laser cutter.

Step 2. Close the auto disc startup and navigate to the laser drivers folder e.g. GCC Disc\X252\LaserPro Driver*.EXE

Step 3. Double click the required file and this will install automatically. When this has finished, close the small install window.

Note: After installation using this method please ensure the port for the printer driver is set to USB001 virtual port.
The laser driver is USB port specific once installed.

How to Test Your Windows Installation

To test that the machine is connected correctly you should go back to the devices and printers section in Windows. You will first see an unspecified device at the bottom of your screen and you will also see your laser cutter printer driver in the printers section just above this. If you now unplug the USB cable from the computer the unspecified device will disappear and your laser printer should grey out on the screen (to indicate it has gone offline). If the printer driver has been installed successfully then when you reconnect the USB cable back into the computer (correct USB port) the unspecified device will reappear and you should see the printer driver become bold again (come back online).

Installation Complete

Recommended Driver Setup

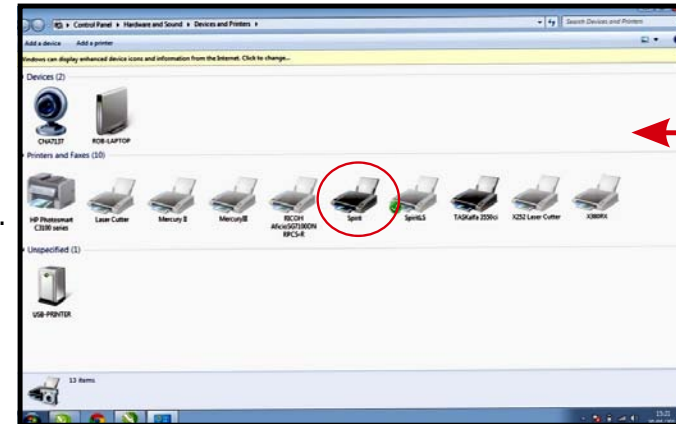
This simple step by step guide is provided to set your machine up for best use within the education sector. By following the guide you will be running your printer driver in conjunction with the recommendations of Technology Supplies Ltd. The settings will reduce users experiencing issues with educational specific software (such as 2D Design). Please perform this setup under FULL ADMINISTRATION RIGHTS.

Laser Driver Setup

Step 1. Go to the Windows start button in the bottom left hand corner of Windows.

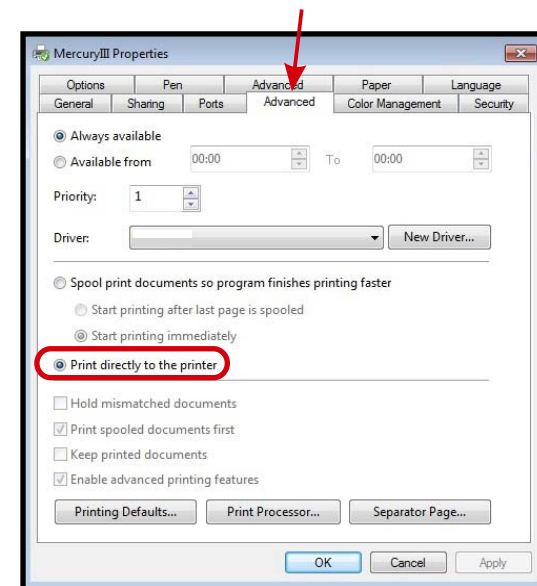
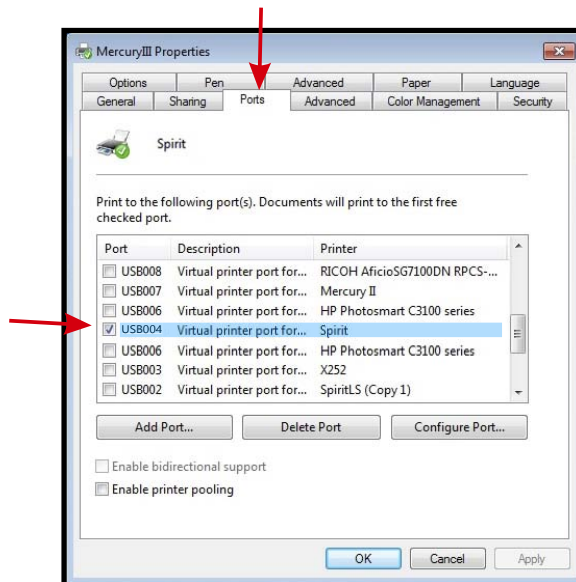
Step 2. Then go to Devices and Printers in Windows 7.

Step 3. Right click on your laser cutters printer driver and select properties at the bottom of the drop down menu (it will be printer properties on Windows 7).



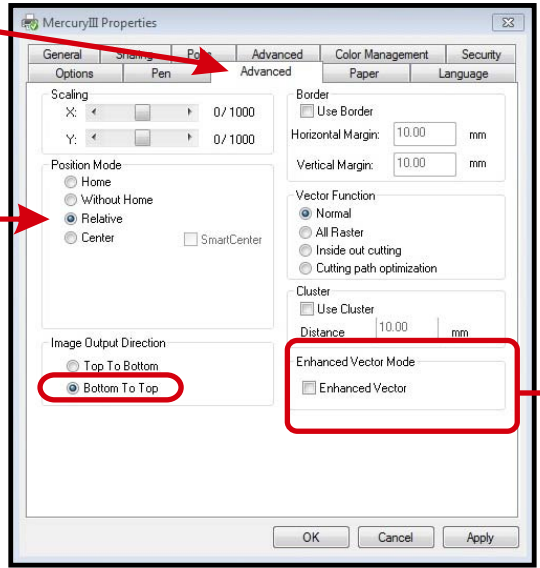
Step 4. The printer properties will now open. Go to the **Ports** tab and set the laser driver to the **USB** virtual port.

Step 5. Go to the **Advanced** tab and set the option called **Print directly to printer**.



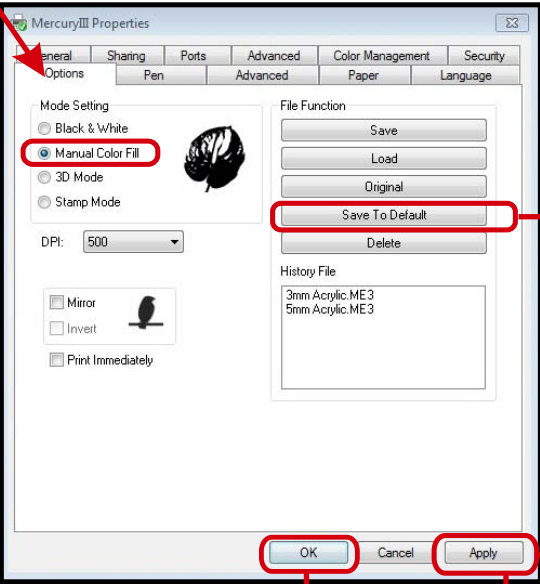
Step 6. Go to the other **Advanced** tab. Here you can set the image output direction to **Bottom to Top** which will engrave your project in the optimum direction.

Position mode. We usually recommend RELATIVE mode by default as this allows you to position the red laser beam over the material which is then relative to the design page datum (0,0). This option can save a lot of time and material waste.



Enhanced Vector. This will produce a cleaner vector cut but will considerably slow down your machine. If your machine is running on enhanced vector then please refer to the enhanced vector settings at the back of the manual when setting the laser cutters power and speeds.

Step 7. Finally go to the **Option** tab in the printer properties. Select the **Manual Colour Fill** mode. Once this has been completed you simply need to click **Save to Default, Apply** then **OK**.



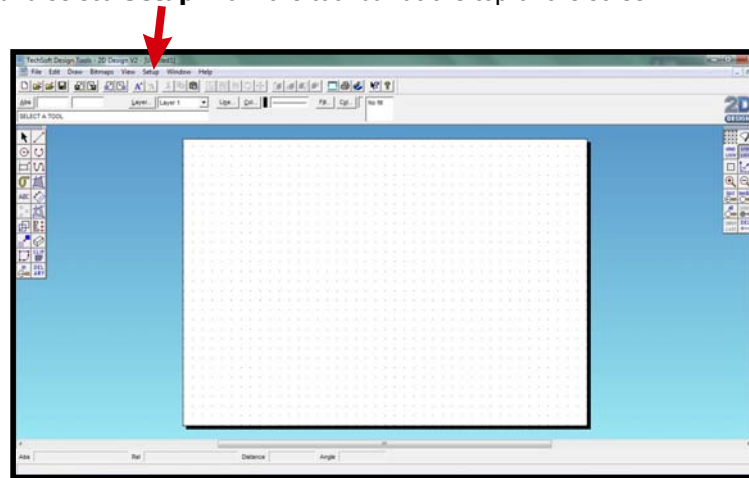
Note: Once the recommended setup has been completed it will be applied to any software that you will be using in Windows ie; Coral Draw, 2D Design etc.

Techsoft 2D Design Version 2 Setup

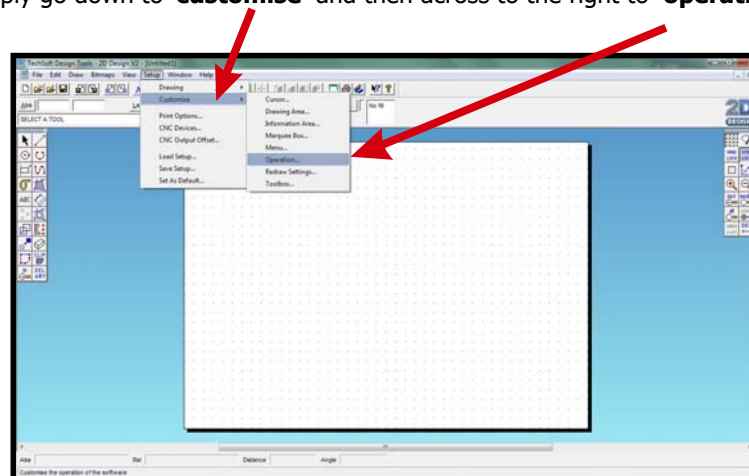
If you are using **Techsoft 2D Design Version 2** to output your designs to the laser cutter then you will need to complete the following setup to ensure that communication can be established between the software and the laser cutter. Please perform this setup under **full administration rights**.

Note: If you are unsure whether or not you are operating from Version 2 of Techsoft 2D Design then simply open up 2D Design and select **'help'** from the top tool bar and then select **'about 2D Design'**. This will now open a box that shows which version of 2D you have.

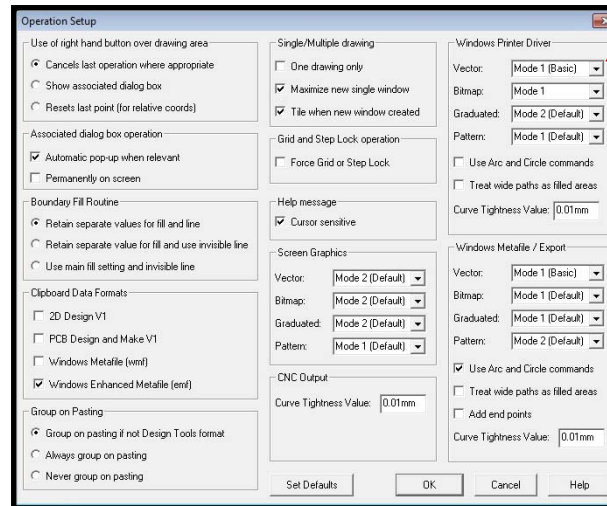
Step 1. Open up 2D Design V2 on your computer and select **'Setup'** from the tool bar at the top of the screen.



Step 2. On the drop down menu that appears simply go down to **'customise'** and then across to the right to **'operation'**. (this will open up a new window)

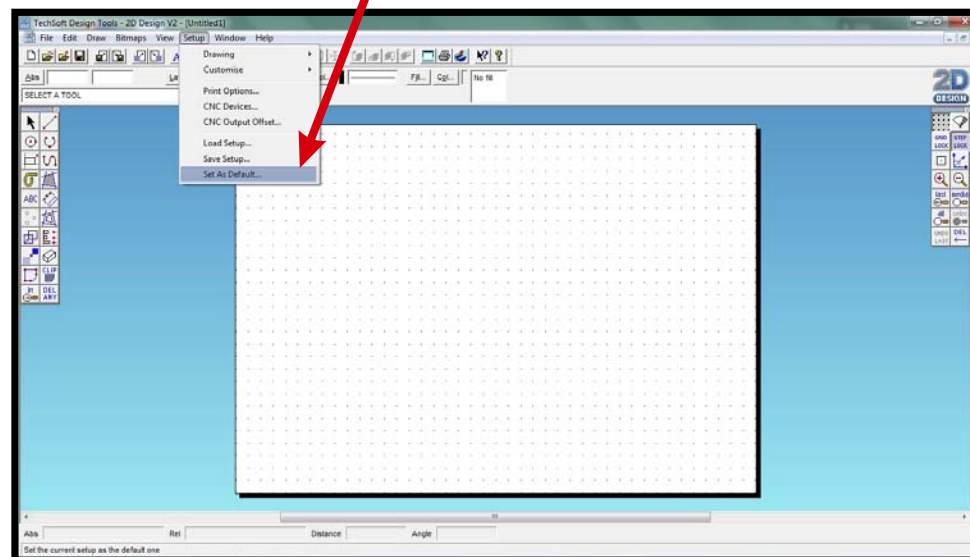


Step 3. In the top right hand corner of the new window will be a section called '**Windows printer driver**'. Within this section you will need to change both the **Vector** and **Bitmap modes** from Mode 2 to **mode 1**.



Step 4. Click OK which will take you back to the main screen.

Step 5. Once you are back at the main screen go up to '**Setup**' on the top tool bar of 2D Design and select '**Set as Default**'. This will save the setup you have just completed and as long as 2D Design is not removed from your computer then you should not have to repeat this process again.



Example Project Using 2D Design Version 2

This section will run through how we recommend you use 2D Design with your laser cutter. We shall use a key fob for this project as this is a simple design but will also cover how you should address larger more complicated projects. Use a systematic approach for setting up the laser, software and printer drivers.

We will cover:

- How to set up your page size in 2D Design so that it matches the size of you material in the laser cutter.
- How to assign the custom colours to define the order in which the design will be cut and/or engraved.

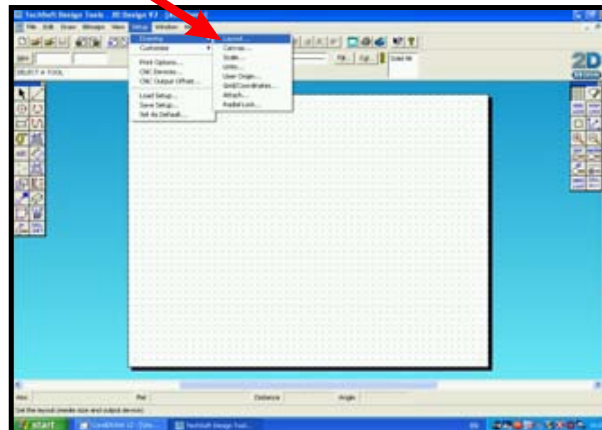
Note: For how to perform the design process itself please use the training demonstrations within the 2D Design Software.

2D Design Page Setup

This step by step guide will run through how to set your page size in 2D Design so that it matches the size of the material you will be working with in the laser cutter.

Step 1. Once you have opened up 2D Design go to **"Setup"** on the top tool bar.

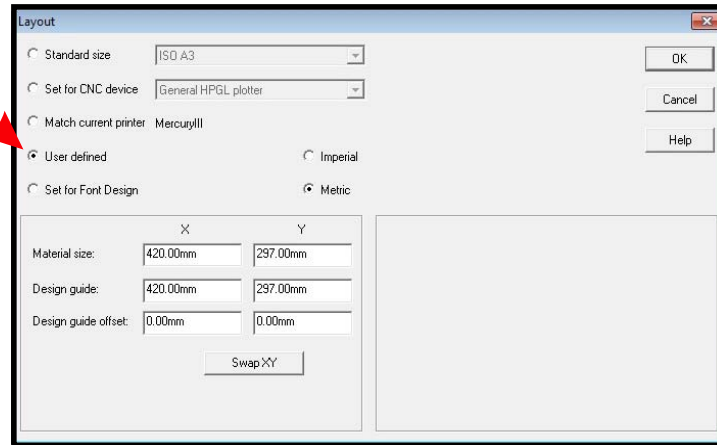
Step 2. Then proceed to **"Drawing"** then across to **"Layout"**. This will open up a new window.



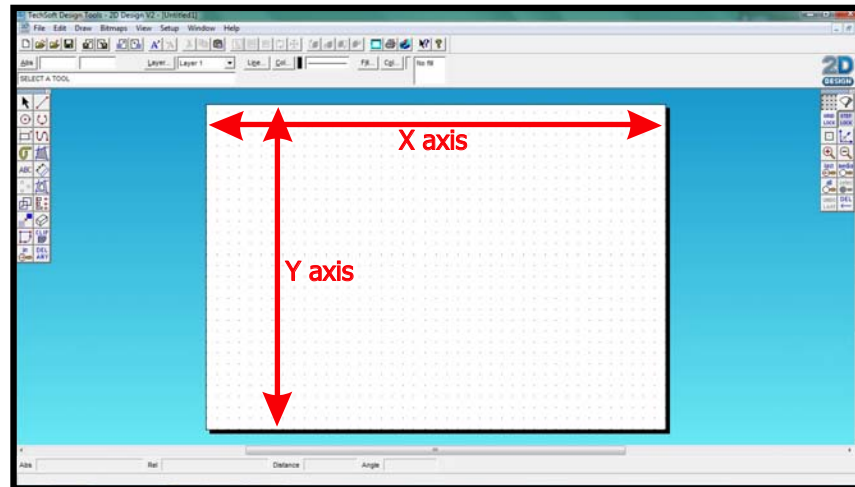
Step 3. Select the fourth option down in this new Window called **"User Defined"**. Once you tick this box it will enable you to input your X and Y axis.

Note: You can use the X and Y rulers in the laser cutter for the material measurements.

Step 4. Make sure that you have matched the X and Y parameters in the sections named **Material Size** and **Design Guide**. Make a note of your parameters as you will need to input them again at a later stage in the printer driver setup. Then you can click OK.



Step 5. Your 2D Design page will now represent the size of the material in the laser cutter.






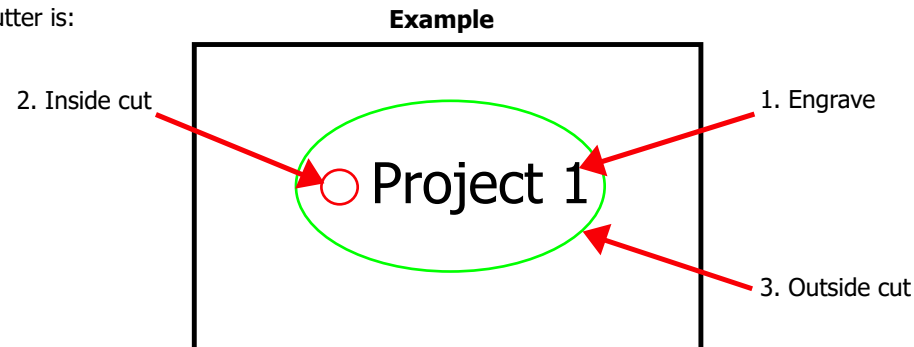
Note: As default the dots on the page will be 10mm apart, this is useful for gauging the size of your Design. Also the default page size in 2D Design is 420mm x 297mm (A3).

How to Assign Colours in 2D Design

This step by step section of the guide will run through how to assign the **Custom Colours** in 2D Design to create a print order on the laser cutter. This will be how you can then determine if a section of the design is engraved, scorn or cut out.

The recommended use of how to setup up colours with the laser cutter is:

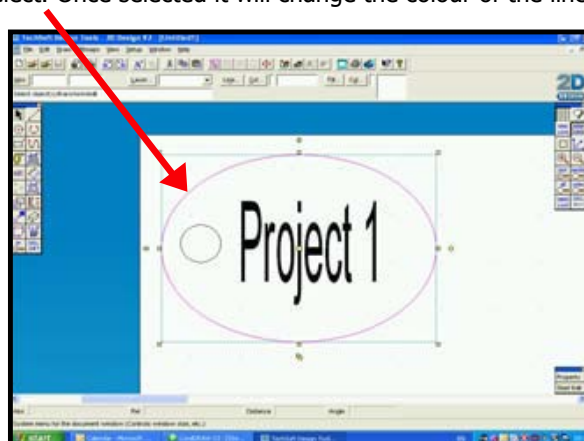
-  Black (1st) = for engraving and/or scoring material.
-  Red (2nd) = for inside cuts.
-  Green (3rd) = for outside cuts.



These colours are recommended in this order so that your project will be printed working from the inside out and always starting with the engrave. This is the safest way to work with the laser as some material after being cut, can drop out of position (ie: when using slightly warped material). By cutting in this recommended order your design will be held in focus until the final part of the project has been completed.

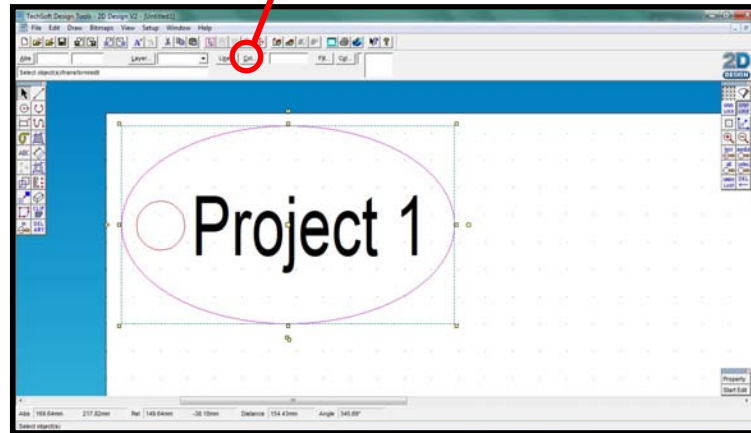
Note: The colours assigned to your project do not represent cuts or engravings, they simply represent an order for the laser to operate in. ie: black is the first job, red is the second job and green is your third job. It's by inputting the power and speed settings that determine whether the colour will be cut or engraved along with setting either a fine line for cutting and solid objects for engraving.

Step 1. After you have designed or loaded up your project, you will need to select the parts of the design you want to assign a particular colour to. To do this click the left mouse button on the part you are wanting to select. Once selected it will change the colour of the line to **purple** to indicate which part/parts are selected.



Tip. For selecting multiple parts you can (after left clicking the mouse to select the first part of the design) use the right mouse button to select other parts.

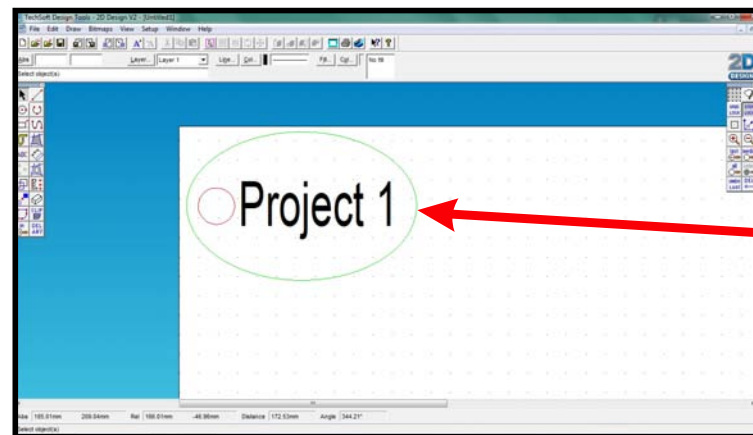
Step 2. Go to the **Colour** button located directly to the right of the **Line** button in 2D Design and select it with your mouse.



Step 3. Once selected you will see the below box open up on the screen.



You will see that the first three of the **Custom Colours** are in the recommended order. Simply click on the colour you want to assign to the part/parts selected and then click OK.



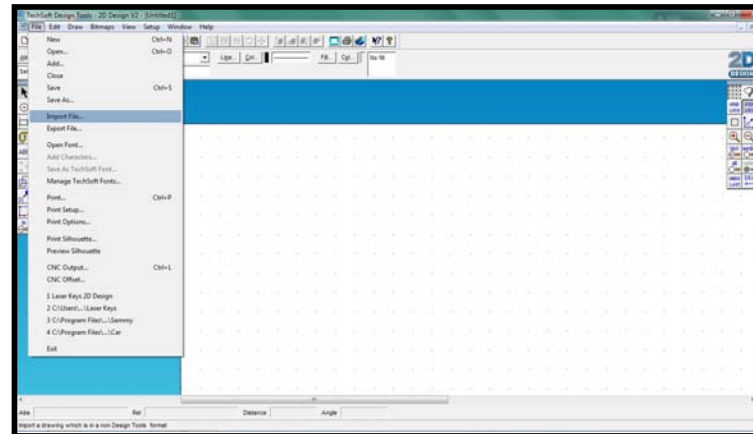
Once you deselect the lines you will now see that they have changed to the assigned colour.

Simply repeat this process until you have all the colours you need assigned to your project. Once this has been done you will be ready to print.

How to Engrave a Photograph Using 2D Design

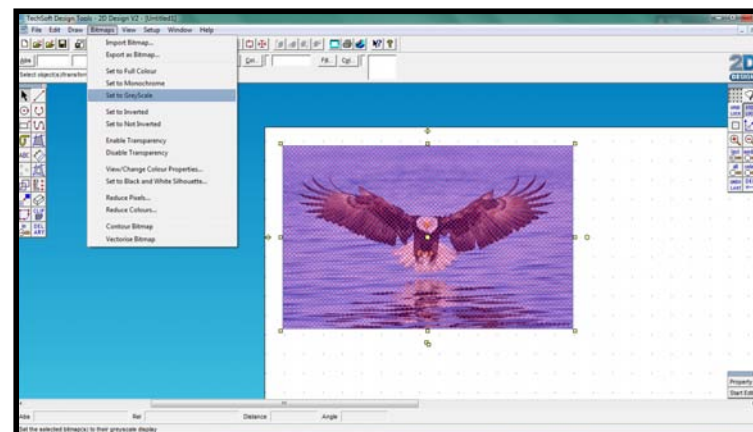
With Version 2 of 2D Design you will be able to engrave bitmaps, this advanced section will show you the extra steps that will need to be taken to engrave a bitmap.

Step 1. Firstly you will need to import your photograph/bitmap into 2D Design. To do this go to **File** and then **Import File**. Select your photo from the saved location on your computer.

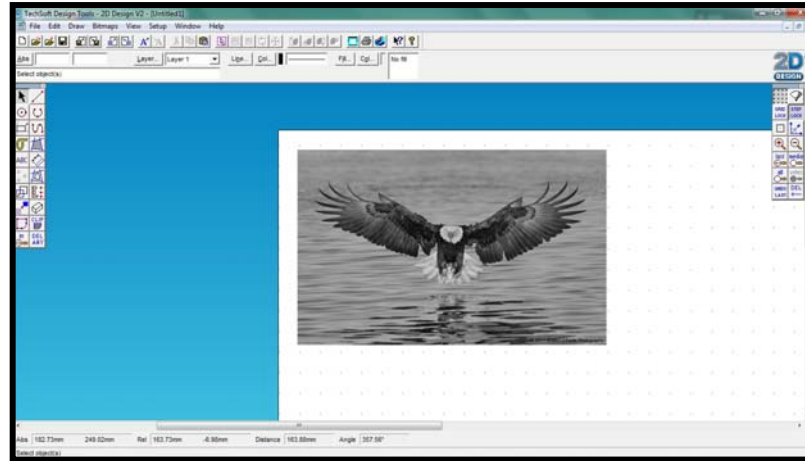


Note: You can also use the copy and paste option to import a bitmap, colour images can be used.

Step 2. Once you have imported your image you will need to change the bitmap into a greyscale image. To do this firstly **Highlight Your Image** by selecting it. Then go to **Bitmaps** on the top tool bar of 2D Design then select **Set To Greyscale**.



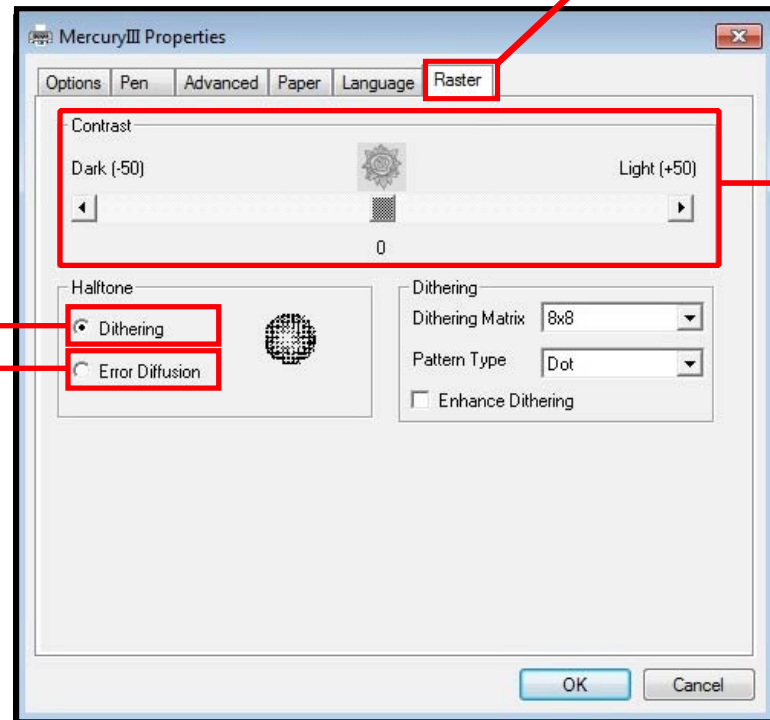
Once you have followed this process your bitmap will now be a greyscale image. (see below)



Step 3 . Follow your normal setup ie. setting the colours and page size in 2D Design. Setup the printer driver the same as you normally would but in the Options tab when you select the greyscale engrave mode called **Black and White** a new tab called **Raster** will appear in the print properties.

Dithering.
This engrave mode will print in a dot matrix style.

Error Diffusion. For best results when engraving bitmaps tick on error diffusion.



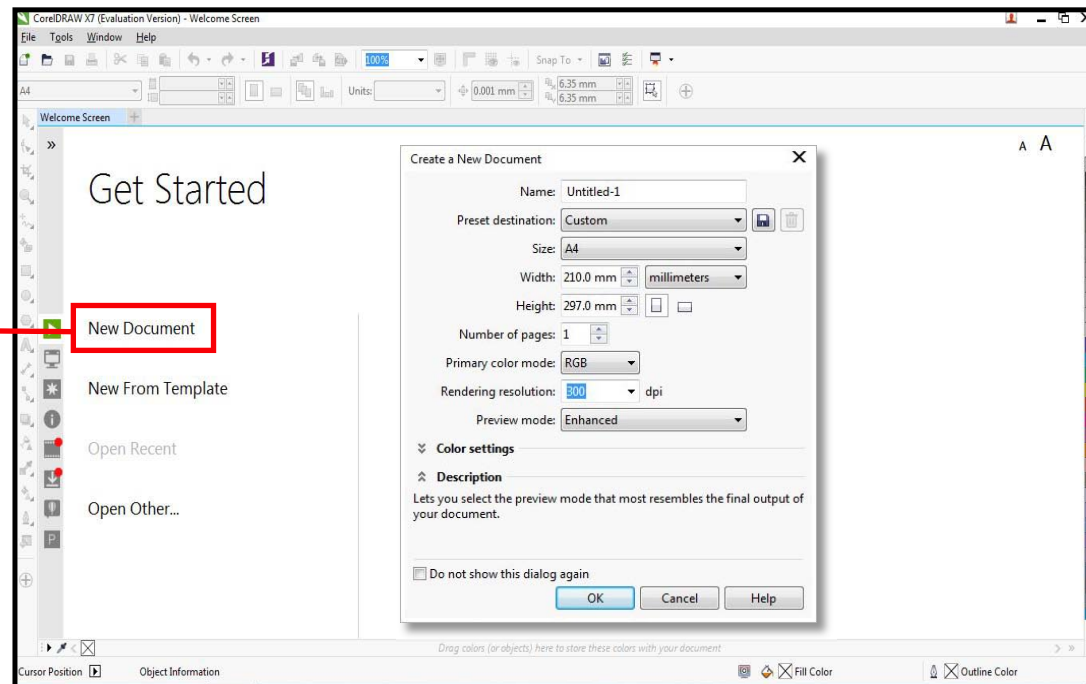
Contrast. This is where you can adjust the darkness and lightness of your image by using the slider bar.

CorelDRAW Setup for Lasers

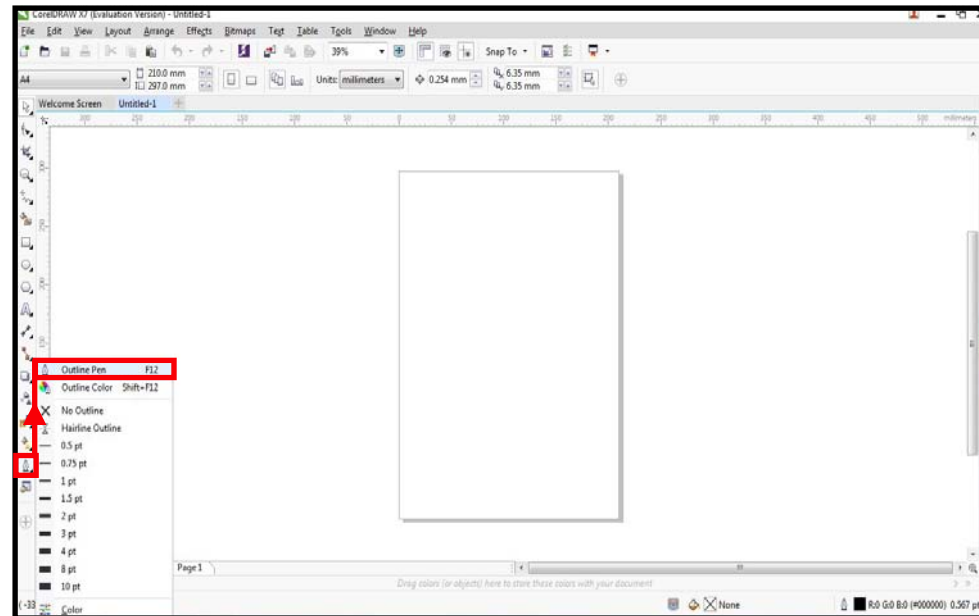
When you first install CorelDRAW the default settings in the program can cause operational issues for the laser, please make sure that you update the software. These issues are that the default line thickness is 0.2mm which means that the laser will always engrave your work and will not perform the vector functions correctly. The colour pallet that you use to set up your project cut order will not match up with the printer driver colours and finally the program will not let you engrave a photograph and cut at the same time.

The below step by step guide will ensure that the software will match the printers requirements for issue free operation.

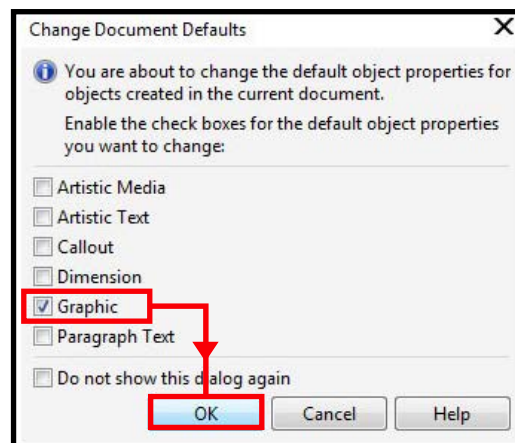
Step 1. Open Up CorelDRAW and start a new blank page, set your page size accordingly but choose RGB as the colour space then click OK.



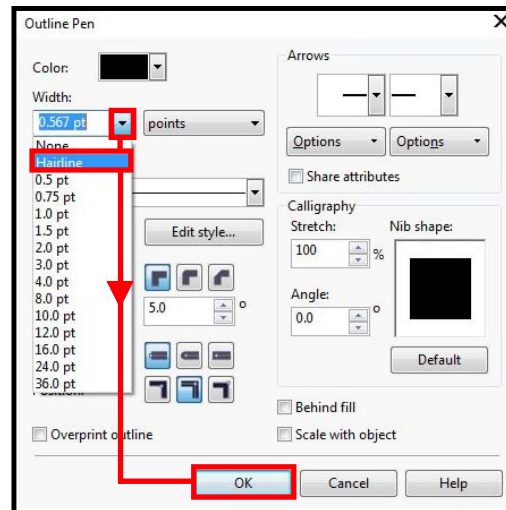
Step 2. On the left side of the program select the pen tip icon, then select the same icon from the menu that appears. If the pen icon is not present, please press F12 on the keyboard.



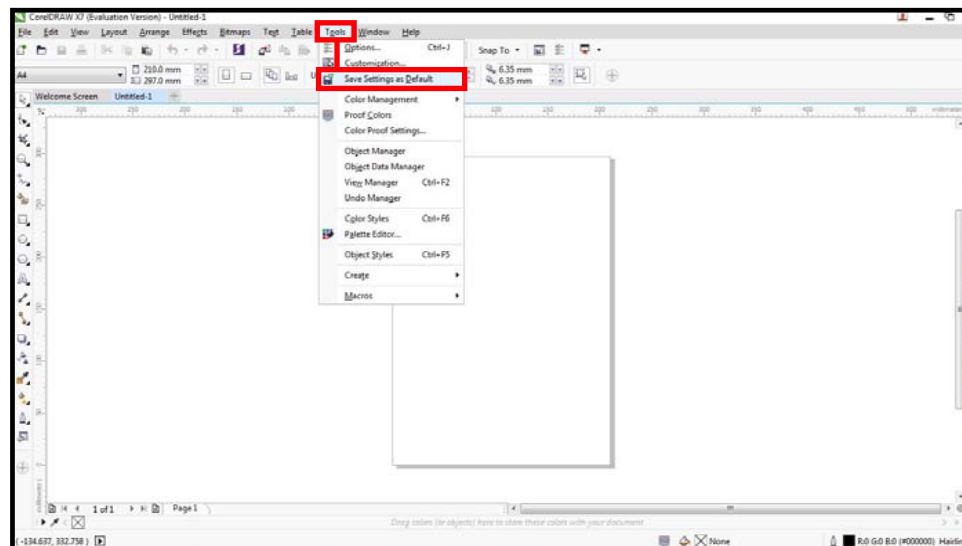
Step 3. From the pop up window that appears make sure that the Graphic tick box is selected and then click ok.



Step 4. Select the drop down arrow from the Width box, then select hairline then click OK.

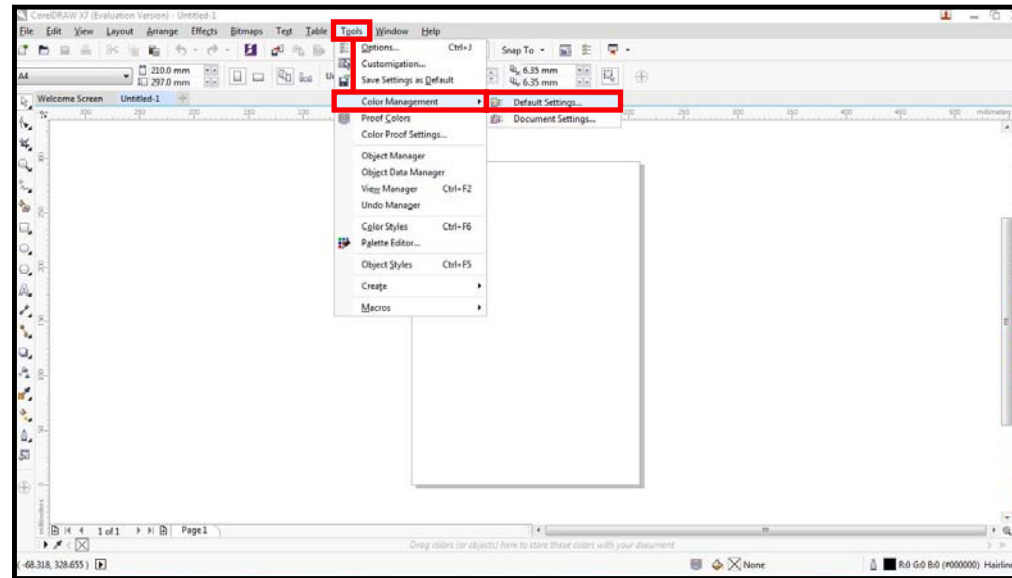


Step 5. Select Tools from the top toolbar then click 'Save Settings As Default'. This will now ensure that the software will communicate the correct line thickness to the laser cutter. This setting needs to be changed on every computer that a student is using to design, if it isn't then files that have been designed will always try and engrave on the laser instead of cut.

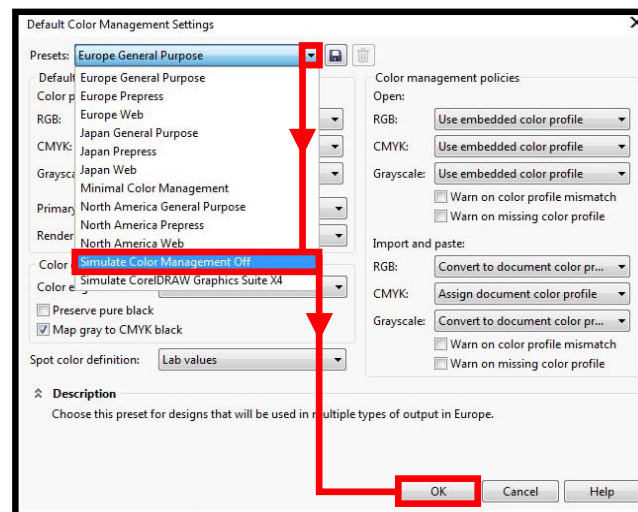


Note: Please be aware, there is a bug in CorelDraw which stops this setting from being saved the first time. Please repeat steps 1-5.

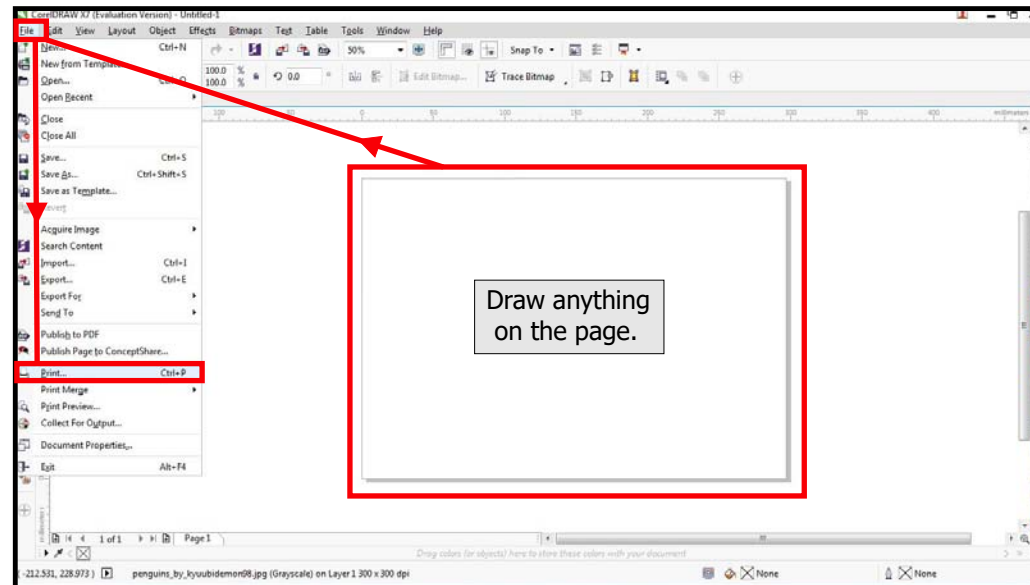
Step 6. To get CorelDRAW colour pallet to match that of the laser cutter click '**Tools**' on the top toolbar and then '**Color Management**' then across to '**Default Settings**'.



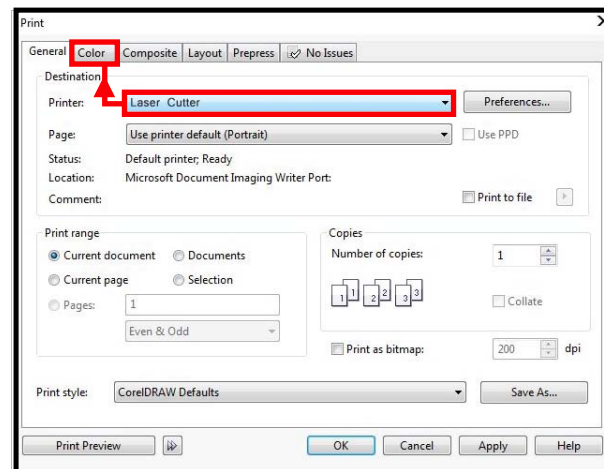
Step 7. From the window that opens up select the '**Presets**' drop down menu and from the list select the option '**Simulate Color Management Off**' then Click OK. You will now notice that the CorelDRAW colour pallet has changed.



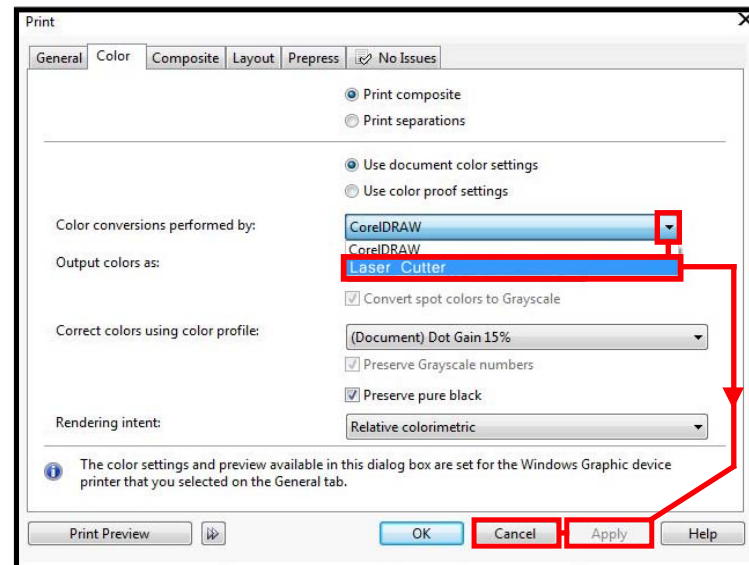
Step 8. To change the settings to allow a photograph to be printed and cut out at the same time then you will firstly need to draw something on the design page. This will enable you to select the **Print** option from the **File** menu on the top toolbar.



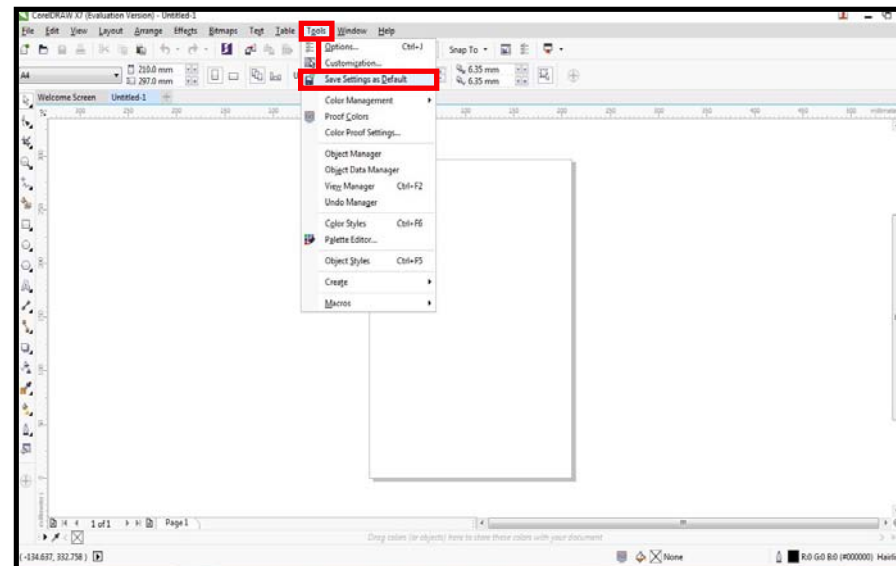
Step 9. Select your laser cutter from the Printer list then click on the Colour tab.



Step 10. From the 'Color conversions preformed by' drop down menu select your laser cutter then click 'Apply' then select 'Cancel'.



Step 11. Finally go to 'Tools' on the top toolbar and select 'Save Settings As Default'. CoreDRAW X7 will now be setup to function correctly with your laser cutter.



Example Project Using CorelDRAW

This section will run through how we recommend you use CorelDRAW with your laser cutter. We shall use a key fob as our project as this is a simple design but will also cover how you should address larger more complicated projects. Use a systematic approach for setting up the laser, software and printer drivers.

We will cover:

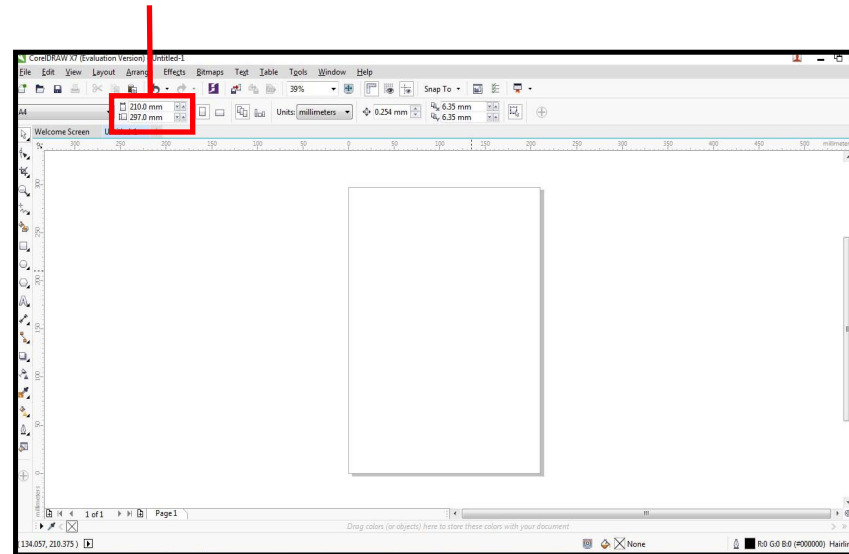
- How to set up your page size in CorelDRAW so that it matches the size of your material in the laser cutter.
- How to assign the colours to define the order in which the design will be cut and/or engraved.

Note: For how to perform the design process itself please use the training demonstrations within the CorelDRAW Software.

Page Setup

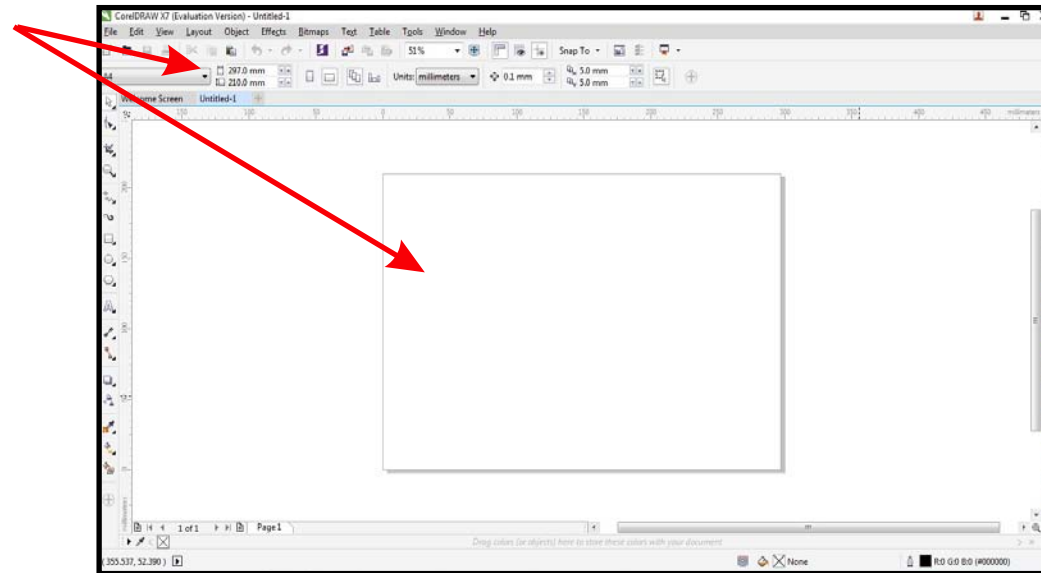
This guide will run through how to set your page size in CorelDRAW so that it matches the size of the material you will be working with in the laser cutter.

Step 1. Open up CorelDRAW and manually input your X and Y axis measurements into the box on the top tool bar.



Note: You can use the X and Y rulers in the laser cutter for the material measurements.




Step 2. Once you press ENTER your CorelDRAW page size will now adjust and represent the size of the material in the laser cutter.

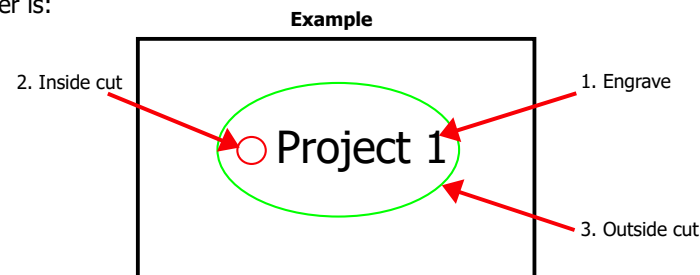


Assigning the Colours to CorelDraw

This step by step section of the guide will run through how to assign the **custom colours** in 2D Design to create a print order on the laser cutter. This will be how you can then determine if a section of the design is engraved, scorn or cut out.

The recommended use of how to setup up colours with the laser cutter is:

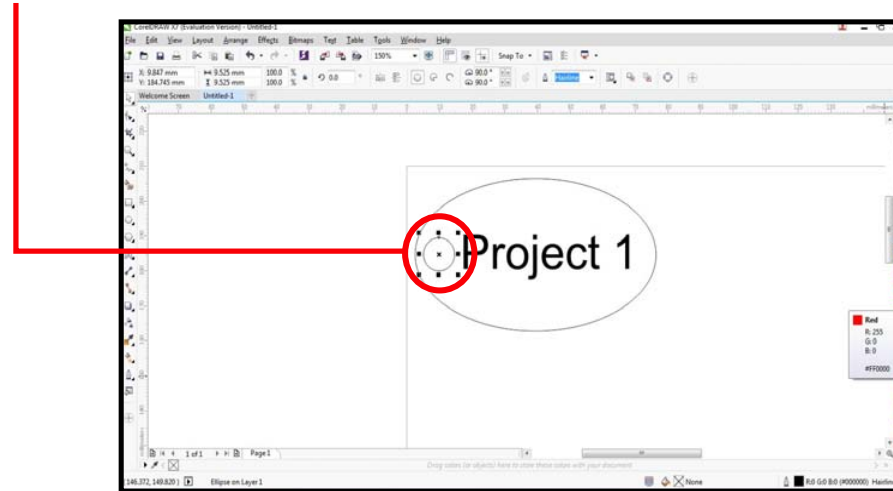
-  Black (1st) = for engraving and/or scoring material.
-  Red (2nd) = for inside cuts.
-  Green (3rd) = for outside cuts.



These colours are recommended in this order so that your project will be printed working from the inside out and always starting with the engrave. This is the safest way to work with the laser as some material, after being cut, can drop out of position (ie: when using slightly warped material). By cutting in this recommended order your design will be held in focus until the final part of the project has been completed.

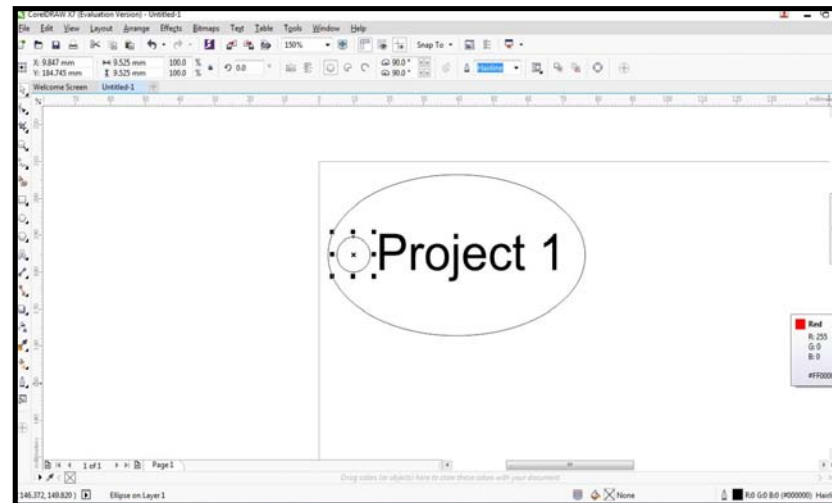
Note: The colours assigned to your project do not represent cuts or engravings, they simply represent an order for the laser to operate in. ie: black is the first job, red is the second job and green is your third job. It's by inputting the power and speed settings that determine whether the colour will be cut or engraved along with setting either a fine line for cutting and solid objects for engraving.

Step 1. After you have designed or loaded your project, you will need to select the parts of the design you want to assign a particular colour to. To do this click the left mouse button on the part you are wanting to select. You will now see eight square sections located around a cross to indicate that the part is selected.



Step 2. With the section of your project now selected you will be able to change the colour. To do this simply move your mouse icon over the colour palette on the right hand side of the screen. Simply select the colour you would like to change your selected part to.

Tip: Right clicking the colour will change the **line** colour and left clicking on the colour will change the **fill** colour.



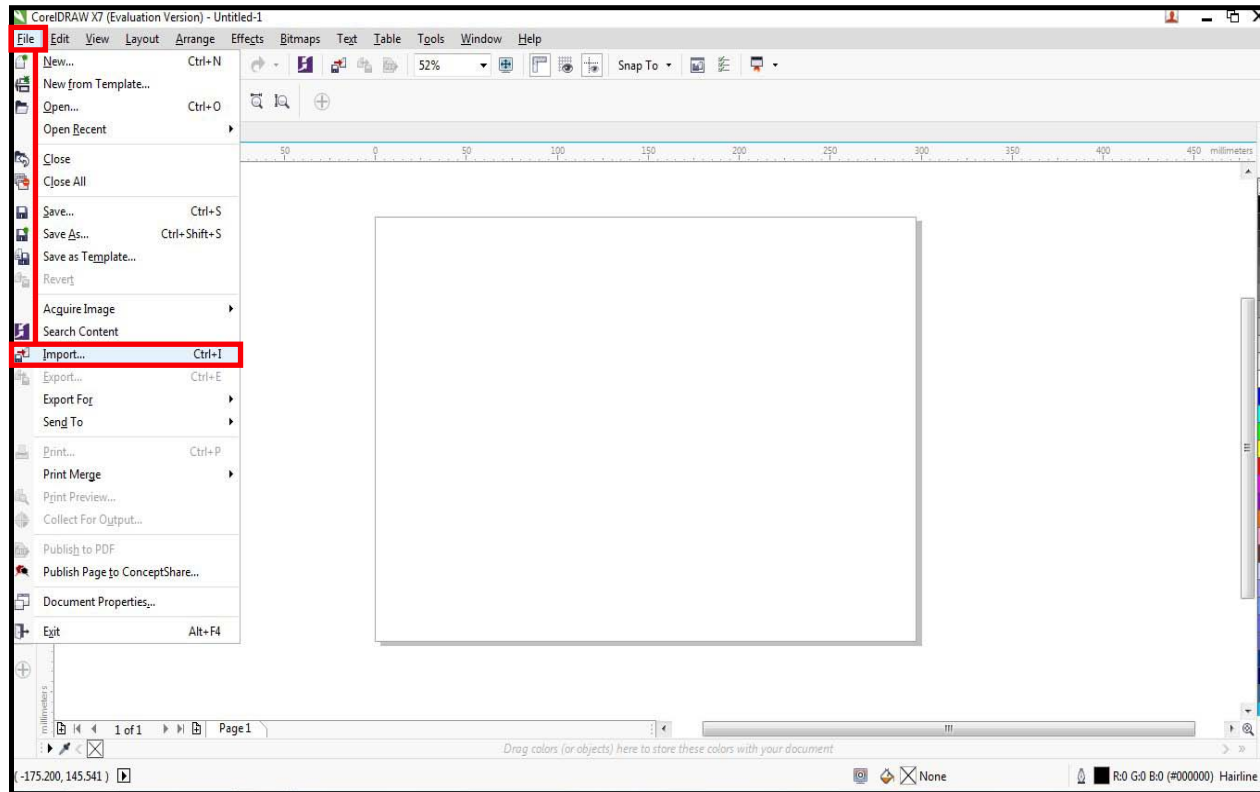
Note: The recommended Black, Red and Green to use on your project with the laser cutter is located in the following positions on the colour RGB palette.
Black = 0,0,0
Red = 255,0,0
Green = 0,0,255
Please note a specifically designed Coreldraw laser palette can also be downloaded from our website and installed to use in Coreldraw. Similarly there is also a laser palette for Adobe Illustrator which can also be downloaded to use.

Simply repeat this process until you have all the colours you need assigned to your project. Once this has been done you will be ready to print.

How to Engrave a Photograph Using CorelDRAW

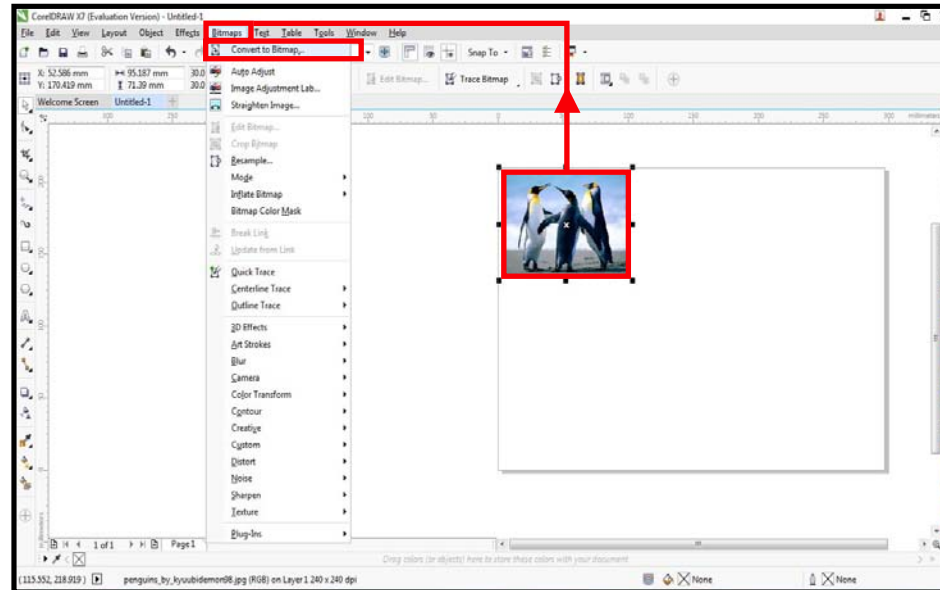
This advanced section will show you the extra steps that will need to be taken to engrave a photograph/bitmap image using your CorelDRAW software.

Step 1. With your CorelDRAW page open go to 'File' on the top toolbar then select 'Import' from the drop down menu.

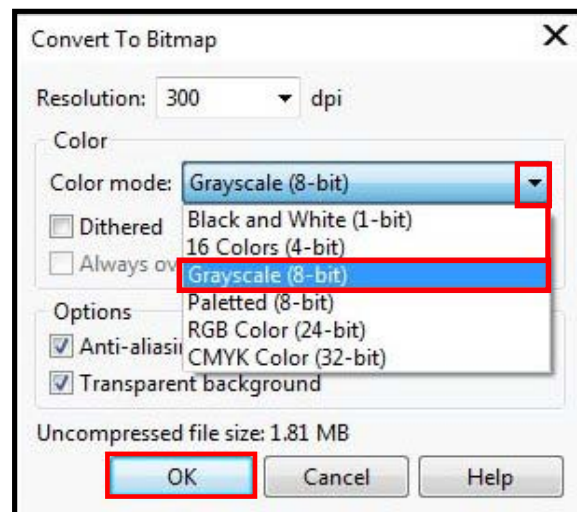


Step 2. Select the image from its saved location on your computer and click 'Import'.

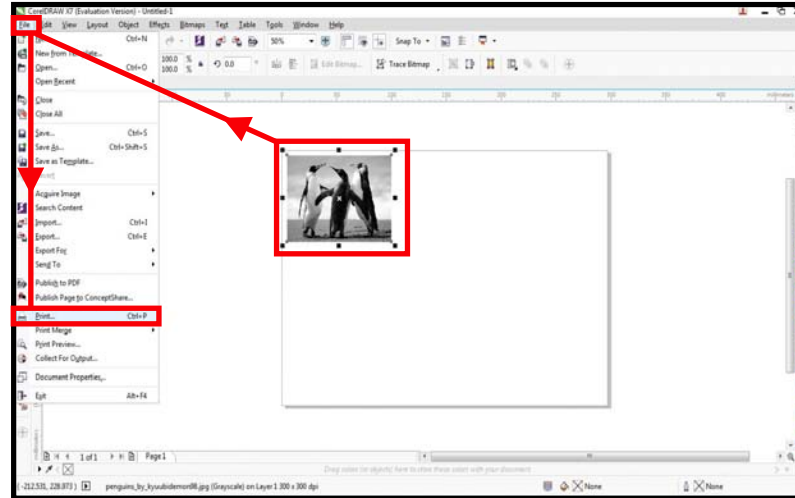
Step 3. Once you have imported your image on to the page select the image and go to '**Bitmaps**' on the top toolbar. From the drop down menu that now appears select the first option '**Convert to Bitmap**'.



Step 4. A pop up window will appear on screen. From the drop down menu select the '**Colour mode**' section and choose the '**Grayscale (8 bit)**' option then click '**OK**'.



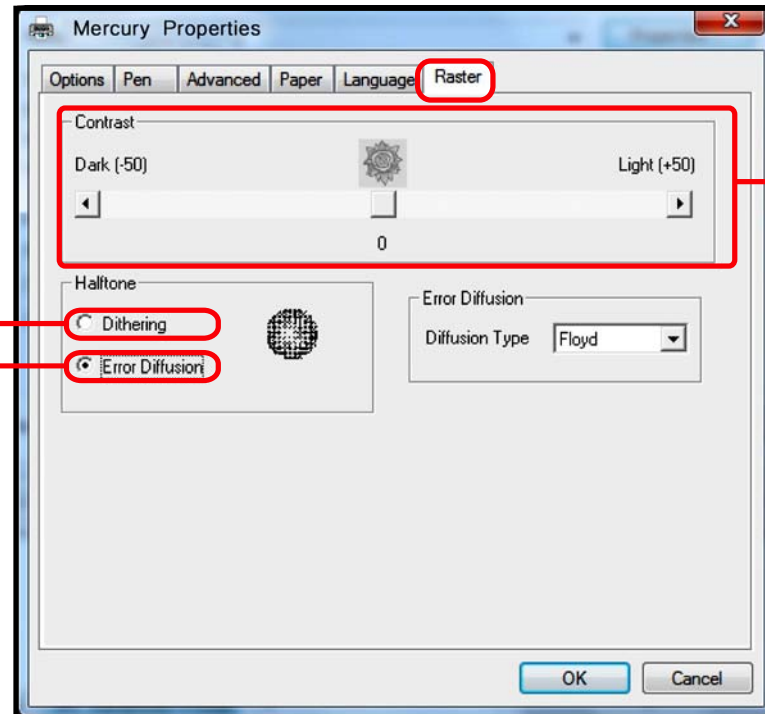
You will now see that your image has changed to a greyscale image. Scale the image to the desired size then proceed to 'File' on the top toolbar and select 'Print'.



Step 5. Follow your normal setup i.e. setting the colours and page size in CorelDRAW. Setup the printer driver the same as you normally would but when you select the options tab, select the greyscale engrave mode called **Black and White** and a new tab called **Raster** will appear in the print properties.

Dithering.
This engrave mode will print in a dot matrix style.

Error Diffusion. For best results when engraving bitmaps tick on error diffusion.



Contrast. This is where you can adjust the darkness and lightness of your image by using the slider bar.

Setting Up the Laser Machine

Step 1. Ensure that all the cables are correctly connected to the laser cutter, i.e you have the power and correct data cable linking the laser cutter to your computer. If this is OK, turn on the laser cutter at the rocker power switch.

Step 2. Wait for the laser cutter to complete its initialisation process before loading your material onto the honeycomb bed. Lower the material flat onto the honeycomb cutting table. Locate it against the guides so that it sits in the back left hand corner of the honeycomb table (See below).

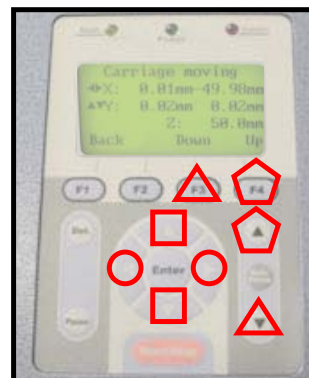


Step 3. Use the cursor keys on the control panel to move the head of the laser over the solid material. To do this press any directional key located around the enter button once, this will bring up the **carriage moving** screen on the lasers LCD panel. Then press and hold a directional button to move the head in that direction.

To access the movement screen press any of the directional keys

○ = These two buttons control the X axis control of the laser head.

△ = F3 buttons can be used to control the Z axis's downwards drop of the bed in the machine when in the movement screen

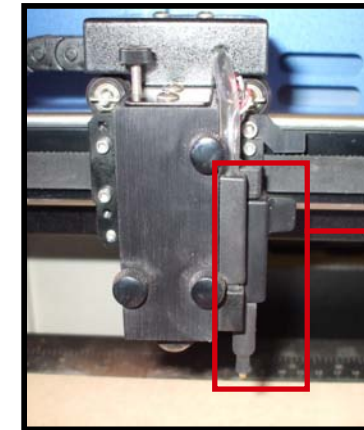


□ = These two buttons control the Y axis control of the laser head.

⬠ = F4 can be used to control the Z axis's upwards motion of the bed in the machine when in the movement screen.

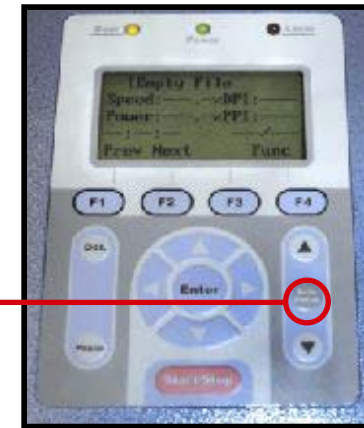
Note: You can also move the laser head manually simply by moving it around by hand. This is extremely useful when using the machine in relative position mode.

Step 4. Make sure that the **Auto Focus Probe** is located over **Solid Material** . i.e; that when the auto focus button is pressed the probe will not pass through the grid bed.

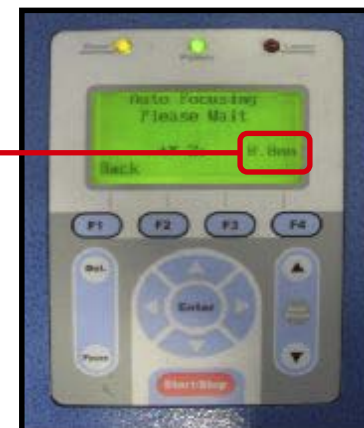


Auto Focus Probe

Step 5. Press the **Auto Focus** button on the control panel (Shown below), this will raise the material to contact the auto focus probe which will in turn lower the material ensuring that the lens inside the head is at its optimum distance a way from the material (2 inches).



Step 6: When the auto focusing has completed the LCD panel will display the message **Auto Focusing Please Wait** When the auto focusing is complete **0.0mm** will be displayed, pressing the **F1** button will return you back to the main menu screen.

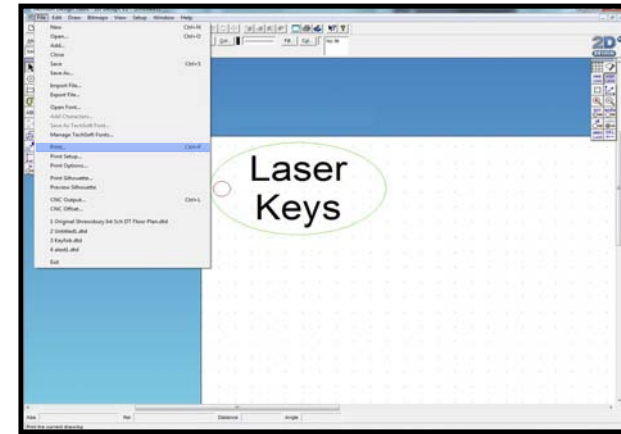
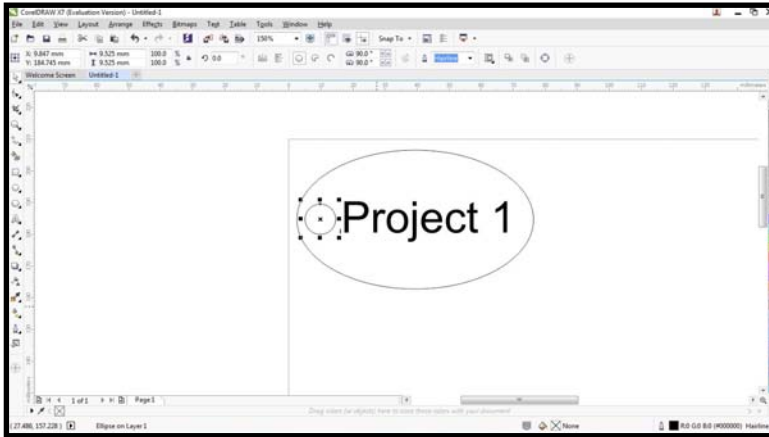


The machine setup has now been completed.

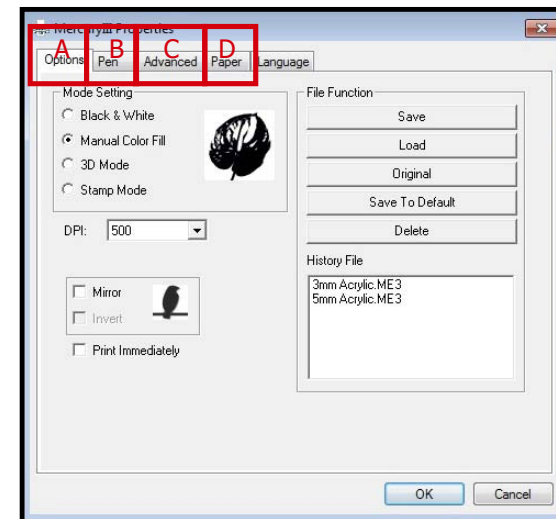
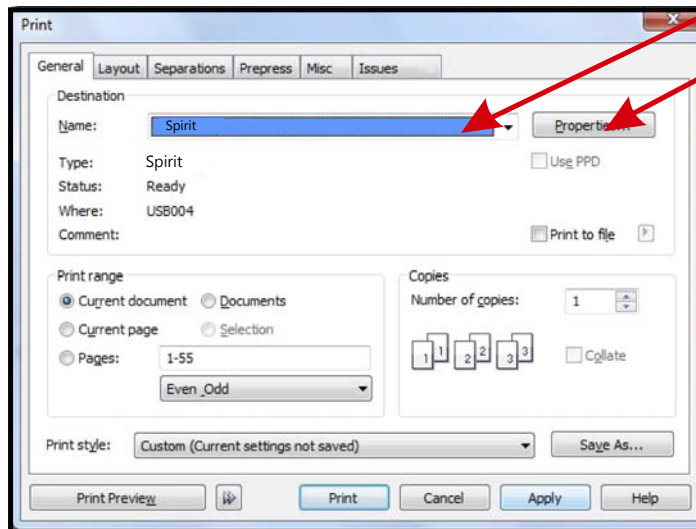
Setting Up The Printer Driver To Send A File

This section will cover how to set up your printer driver, input your power and speed settings, assign engrave modes and set up your paper size to match the design page in 2D Design.

Step 1. With your design complete and the colours assigned within 2D Design or CorelDRAW, simply select 'File' and then 'Print'



Step 2. Select the name of your laser cutter from the Printer name section (A) and then proceed to properties (B).



Note: When you select **Properties** the window above right will open. You will need to work through tabs A,B,C and D **Before** clicking OK. If you click OK after each tab you will keep getting returned back to the Print menu.

Step 3. (Tab A) The first tab you come to is called 'Options'. Here you will need to select which type of engrave mode you would like to use with your project. Once you have selected the relevant engrave mode click on the next tab.

Brief Explanation Of The Engrave Modes

Black and White.

This mode is for use with grayscale images, such as bitmaps and photos.

Manual Colour fill.

This Mode is for use with any file that is monochrome, such as text, clip art images.

3D Mode.

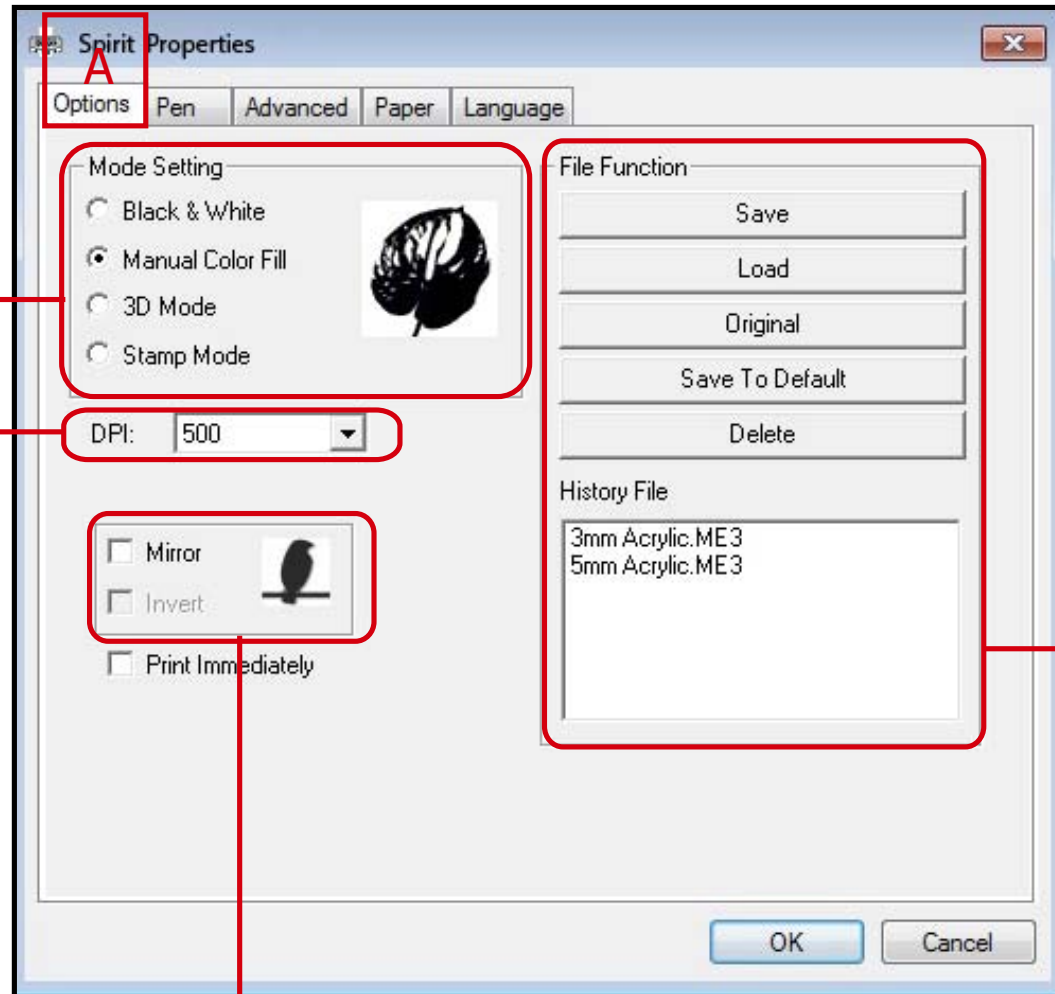
This is for use with Images that have a black background and a white foreground.

Stamp Mode.

This allows you to taper the sides of the engrave so that the base of your design will have more support so that it can be used as a stamp.

DPI stands for "Dots per Inch". This can be set between 125 - 1000.

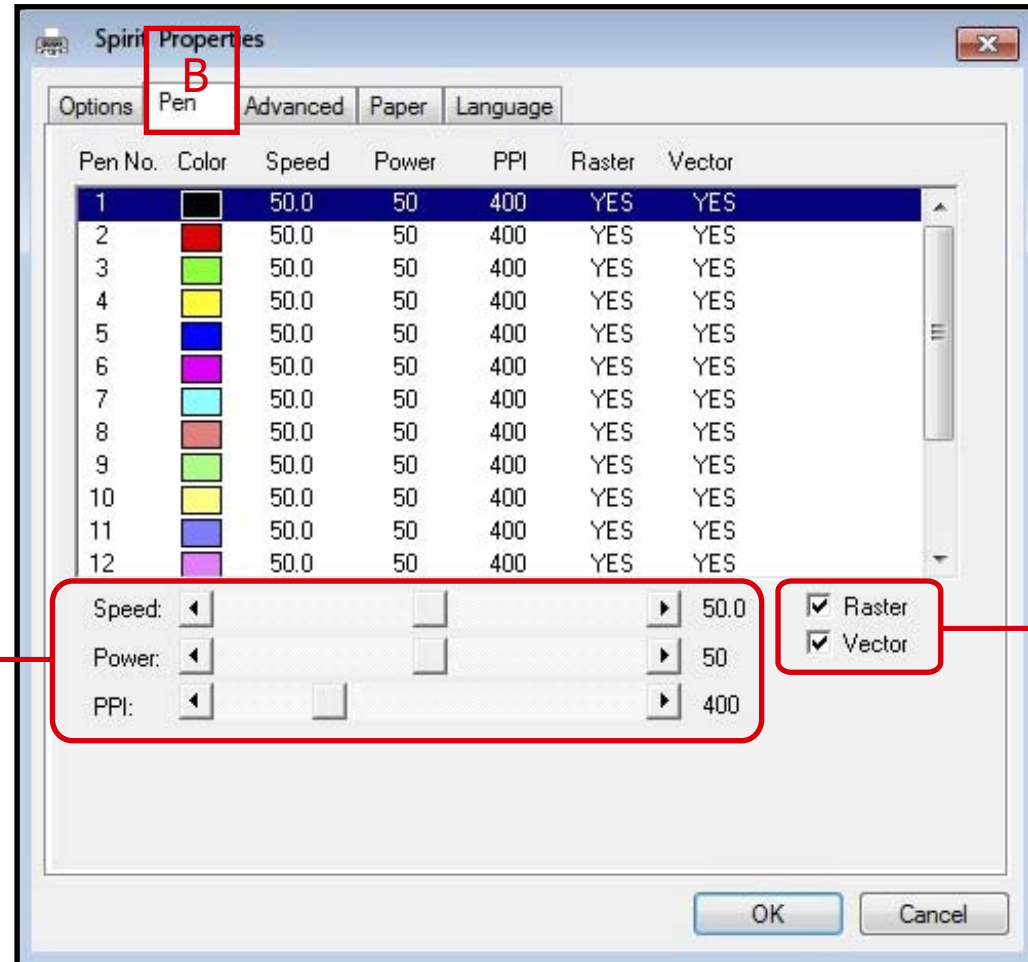
This part of the Option tab will let you invert and/or mirror you design. This can be useful when producing engraving for stamps or printing.



File function

This is where you can save and load your print setup information using the name of the material it's setup for ie; 3mm Acrylic. It is best to set up all of the tabs before saving your settings.

Step 4. (Tab B) The second tab you come to is called **Pen**. This is where you will set up the power and speed that you would like the laser to run at for the different materials (refer to the Engrave and Cut settings at the back of this manual). To input the settings simply move the slider bars left or right for the required settings.



Adjust the slider bars here to set the speed, power and PPI (Pulses Per Inch). The PPI numeric setting is used for ENGRAVING. For CUTTING, adjust the slider to the far right, this will change from a numeric value to X. (X equals a constant firing beam).

Leave the raster and vector boxes ticked at all times.

Step 5. (Tab C) The third tab called **Advanced** is where you can set which position mode the laser starts from, which Y axis direction the laser will engrave in and whether you will use enhanced vector with a job.

Position Mode. This mode will determine the start point of your project in the laser cutter. Out of the 4 modes available, we would recommend that you will only need to use either **Home** or **Relative**.

Home position means that the top left hand corner of your design page is equivalent to the **0.0** (X & Y) point of the laser (marked as **+** in the screen shot below).

Relative position means that the top left hand corner of your design page is equivalent to the **Red Beam** pointer in the laser (also marked as **+** in the screen shot below).

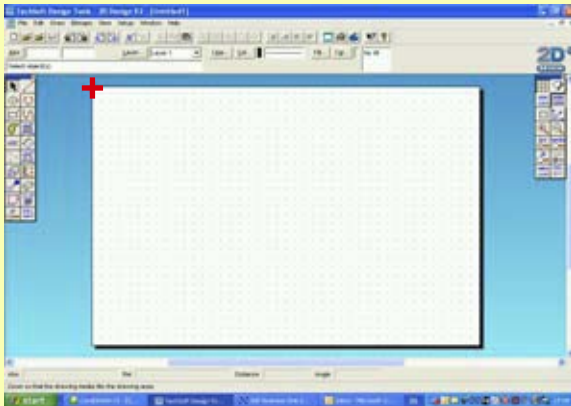
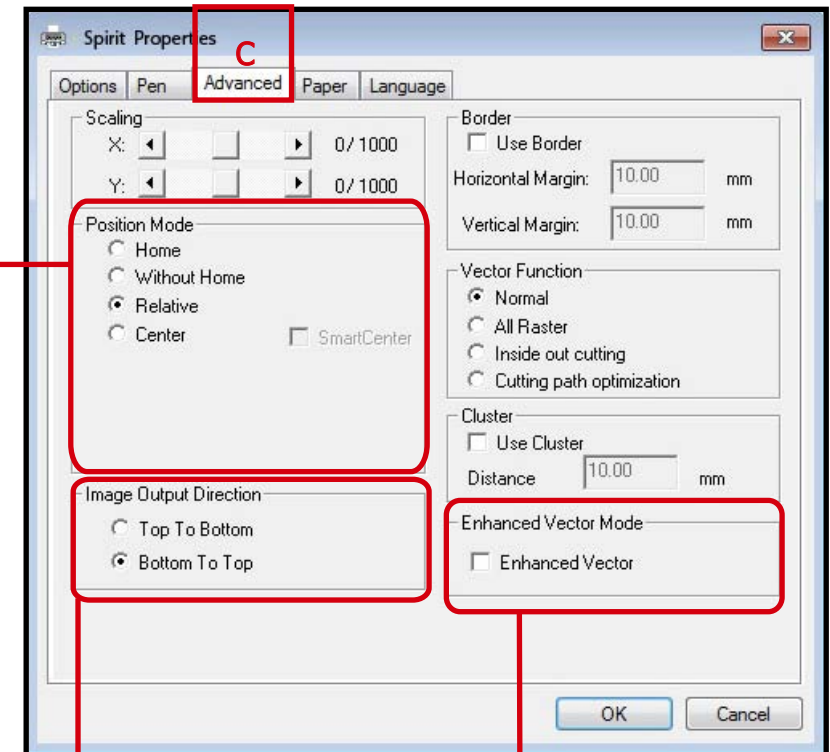


Image Output Direction. This mode determines whether an engrave is to be performed from top to bottom or bottom to top. WF-Education Group recommend bottom to top mode as this will reveal the image, whereas top to bottom can obstruct your view.

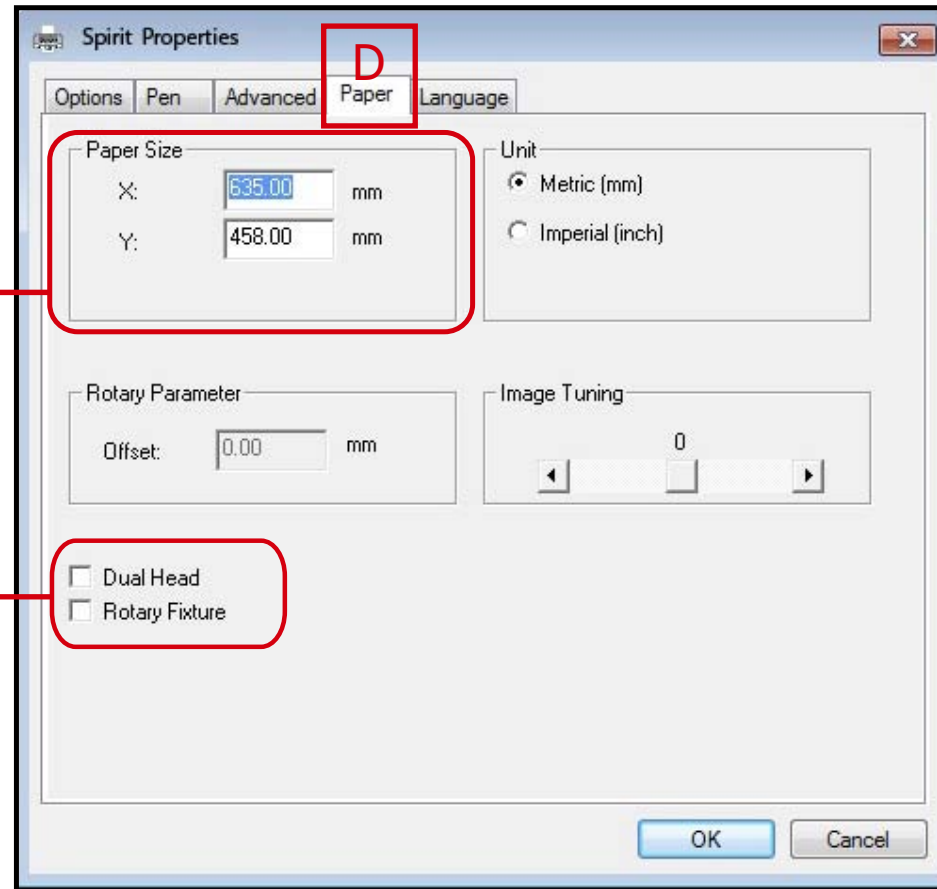


Enhanced Vector. This mode will enable the laser to produce a cleaner vector cut. This will basically run the machine at half it's cutting speed.

Step 6. (Tab D) The fourth tab called **Paper** is where you setup the printer driver paper size to match the size of your design page in your design software. Please note that the paper size is not required to be changed as the installed laser driver will automatically set this paper size to the laser bed size, which is the maximum working area.

Paper Size. This section of the printer driver is about how to set up your paper sizes. Simply input the X & Y measurements to match the X & Y measurements set up in the software.

Rotary Fixture. This tick box is to be selected when using the rotary table with the laser. This will then ask for extra information. See rotary section of the manual for details.



Step 7. Once you have completed your file setup you can then click **OK** and this will take you back to the print menu. Click **OK** at the print menu to send the file to the laser cutter. All being well the file title should now be seen on the laser control panel window. You are now ready to process the job, start the extractor unit and wait for the amber door light to go out before pressing the start button on the laser control panel.

Using the Rotary Attachment

The rotary attachment is an optional item for GCC Laser cutters. It adds a 4th axis that provides the capability of engraving onto cylindrical objects such as glasses, vases and tubes.

The unit can handle objects up to the maximum length of 450mm and has a padded rubber drive wheel and a clamp for holding and rotating the workpiece. The wheel has a maximum diameter of 94mm, however the maximum diameter of the loaded object can be up to 180mm with a limited loading weights of 7kg.



This section of the user guide includes instructions to fit, setup and use the rotary attachment.

Step 1. Lower the laser bed down enough to give clear access to the cutting table using the down button on the control panel. Remove the two screws from the bed before removing the grid bed (as shown in the picture below) through the top panel of the laser.

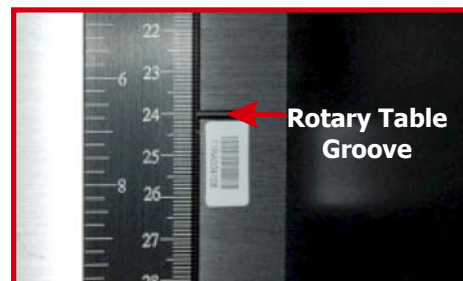


Remove both screws

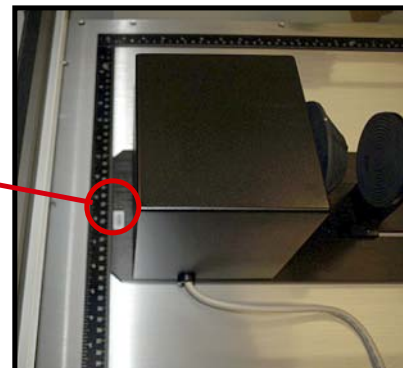
Note: Store the grid bed in a safe place while it is removed from the machine so that it will not get kicked or damaged.

Step 2. Turn power to the machine **OFF**. This is because the laser needs to run through a different initialisation process.

Step 3. Insert the rotary attachment onto the laser bed. When inserting the rotary attachment make sure that the **groove** by the bar code of the attachment is located by the **24cm** mark.

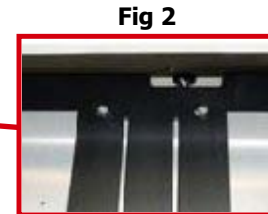
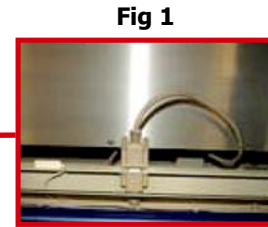
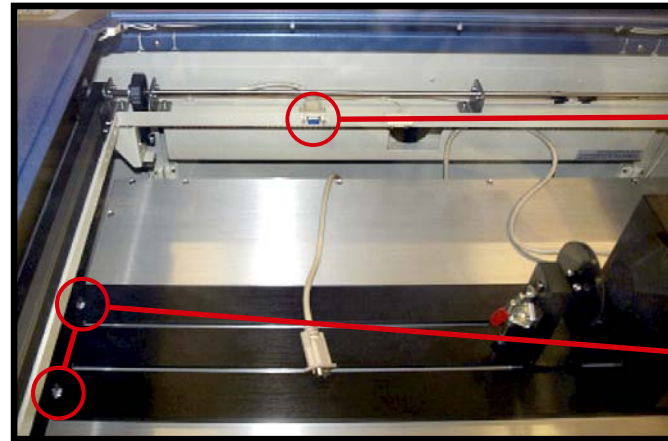


Rotary Table Groove

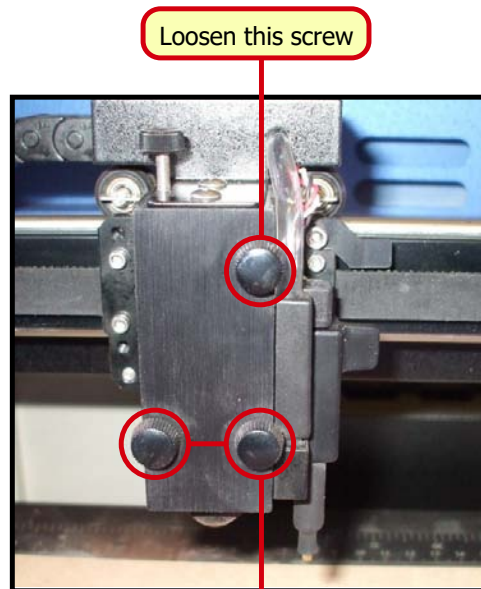


Step 4. Plug the serial lead connection into the port located in the inside front of the laser **figure 1**. Then you can screw the rotary fixture to the laser bed via the two screw holes at the right hand side of the rotary attachment as shown in **figure 2**.

Note: This photo is from the **back** of the laser to give a clear view of the port. The port connector is on the inside front of the laser cutter.

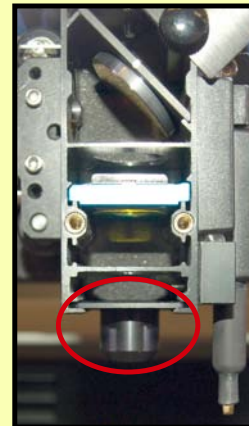


Step 5. Now take the cone out of the laser head, this will give you maximum clearance between the laser head and the highest section of the rotary attachment. To do this simply remove the bottom two screws and loosen the top screw, then swivel the face plate clockwise. This will enable access to the cone which slides out of the front of the laser head. Once the cone has been removed, replace the face plate to its original position and tighten the screws back up.

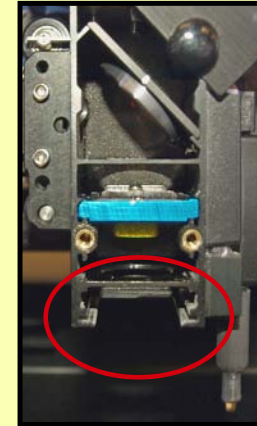


Remove these two screws

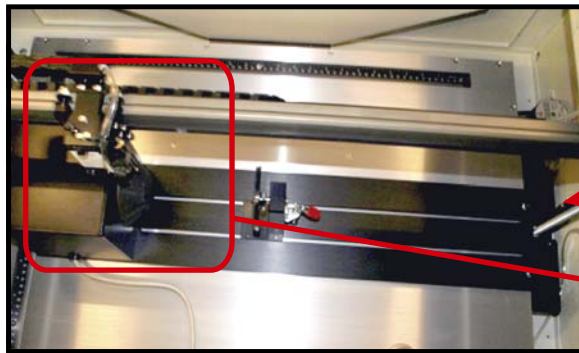
Before the cone has been removed.



After the cone has been removed.



Step 6. Turn the power to the laser back **ON**. The laser will now go through a different initialisation process which will involve the laser bed lowering to activate the **lower Trip Switch**. The laser head will move along its X and Y axis before centering over the cone on the rotary attachment, the Y axis will now be locked. The left and right directional arrows on the control panel will move the laser head along the X axis and the up and down arrows will now rotate the cone on the rotary attachment.



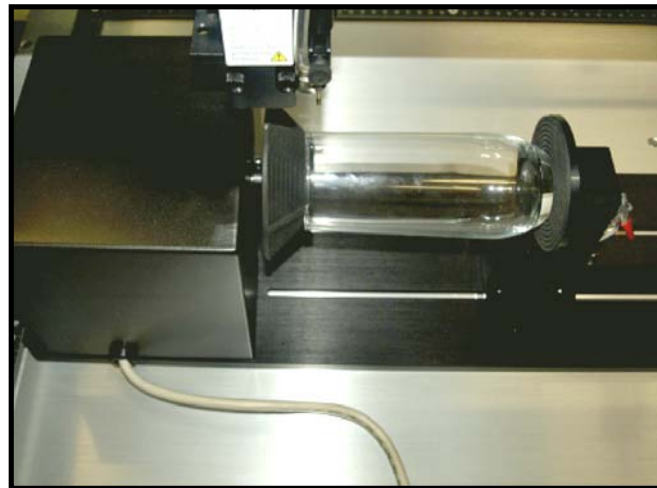
Lower
Trip
Switch



Note: If the laser does **not** activate the lower trip switch then turn the laser power **OFF**. This will mean that the laser cutter has not recognised the rotary attachment. Simply make sure the cable from the attachment is correctly connected and restart the laser cutter.

Step 7. Measure the length and diameter of your object. Make a note of these measurements as you will need to input them at a later stage into your printer driver.

Step 8. Insert your glass/cylindrical object into the rotary attachment. Insert the hollow end of the object over the rubber cone on the rotary attachment then clamp it into position.

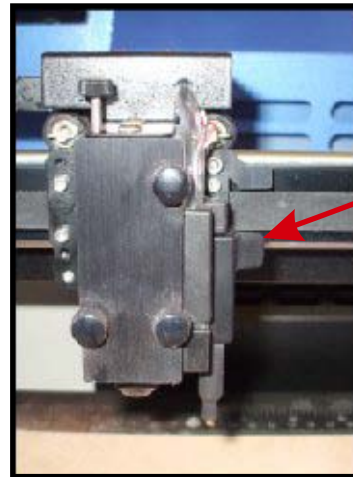


Step 9. Using the directional arrows on the laser control panel, rotate the rotary attachment to check that your object is centred. To return the rotary attachment to its "Home" position simply press F4 twice from the main screen. If your object is spinning unevenly then make the necessary adjustments until the object is centred.

Note: Cheap/lesser quality glass may have been manufactured in such a way that you will never get it completely centred. This will mean that you may have to refocus and engrave a glass numerous times to get it to complete your job. This will also be the case with any object that has a tapered edge (eg; wine and pint glasses).

Step 10. Using the control panel on the laser cutter, move the laser head over the **Highest** point of your object and press the auto focus button. This will focus the laser to the object.

Step 11. Once you have auto focussed the laser you will now need to remove the auto focus probe from the laser head to allow maximum clearance between the object and the laser head. This probe will simply detach from the laser head.

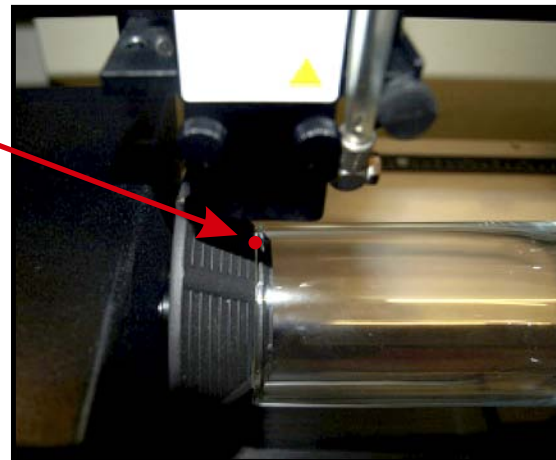


The auto focus probe will unplug when pulled by this tab.

Important: Always remember to return the probe to its original position after printing your project before re-focusing the laser on your next project. Not doing so **may cause damage** to the laser head and gantry.

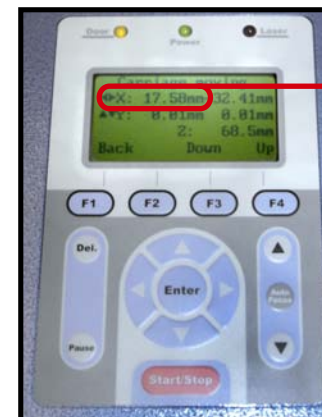
Step 12: Finally you will need to establish an **Offset** measurement that you will need to input into the laser printer driver at a later stage. To get this measurement you will need to move the laser head to the right until the red beam pointer hits the edge of your glass on the cone (see Fig 1). You can then obtain the offset reading by looking at the **X** axis on the laser control panel. The **X** measurement is your offset (see Fig 2), make a note of this offset as you will need it during the printer driver setup.

Fig 1



Look for the red beam pointer to hit the edge of your object.

Fig 2



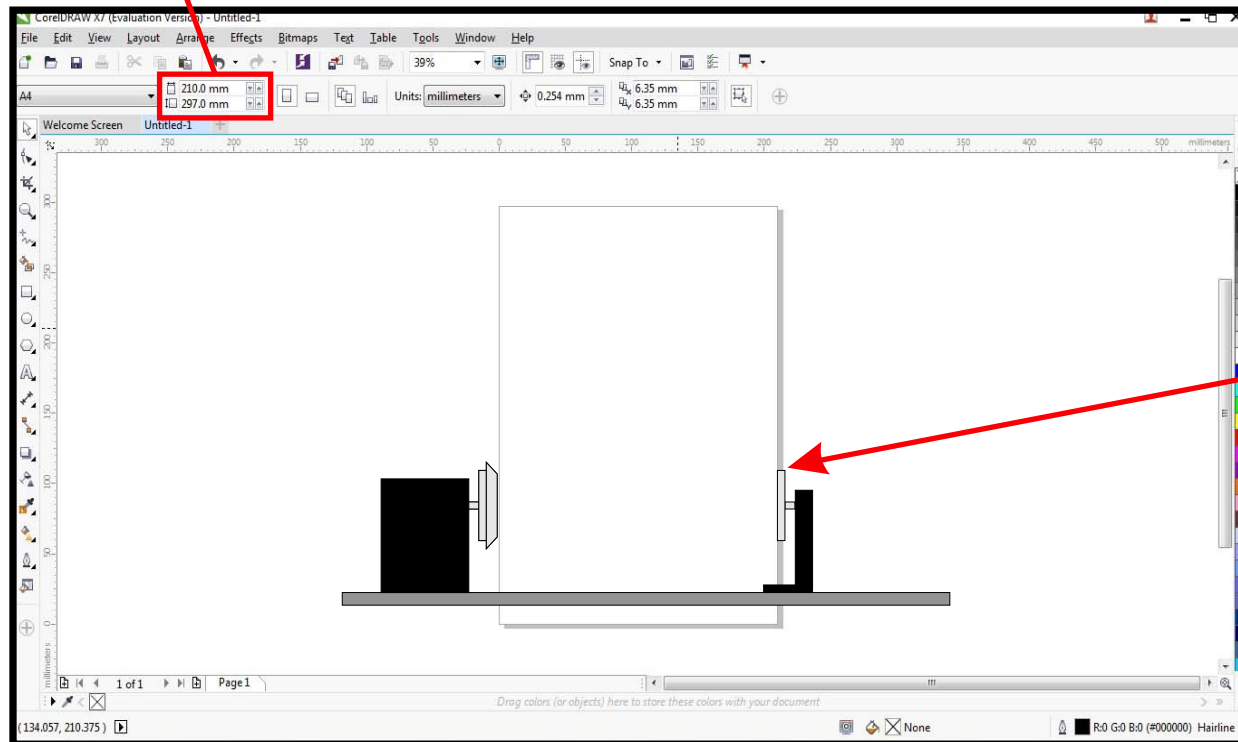
X axis offset reading to be taken from here.

Page Setup for Rotary Attachment Using CorelDRAW

This section will take you through how to setup your page in CorelDraw for use with your rotary attachment.

Step 1. Firstly you will need to measure the length and width of your object.

Step 2. Put your glass length in as your **X** axis measurement and the your **Y** axis will be the width of the object multiplied by π (3.14).
Once you have entered these values your page size now represents your object unravelled as a flat piece of material.



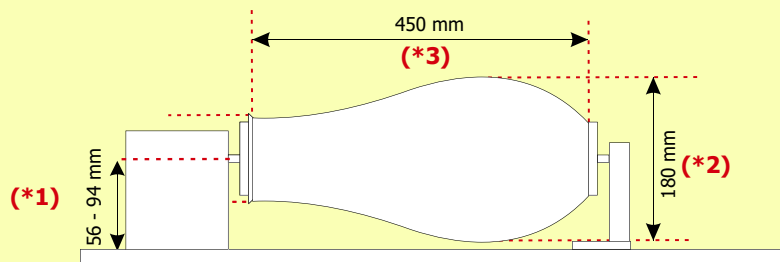
A visual representation of how your page will sit in the rotary attachment. The height of the page is the circumference of the object and the width of the page is the height of the object.

Step 3. Rotate your design by 90 degrees if you would like it to wrap around the object. Then you are ready to send the project to print.

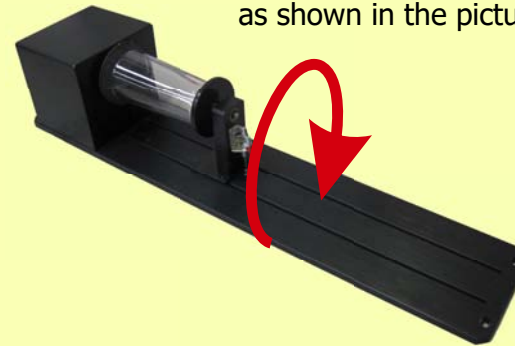
Printer Driver Setup For Rotary Attachment

Useful Rotary Attachment Information

- The smallest diameter that can be fitted to the rubber cone pad is 56mm. (*1)
- The largest diameter that can be fitted to the rubber cone pad is 94mm. (*1)
- The maximum diameter of object that can be engraved is 180mm. (*2)
- The maximum length of object that can be engraved is 450mm. (*3)



The unit rotates in a clockwise direction when viewed from the right hand end of the laser (the control panel end) as shown in the picture below.



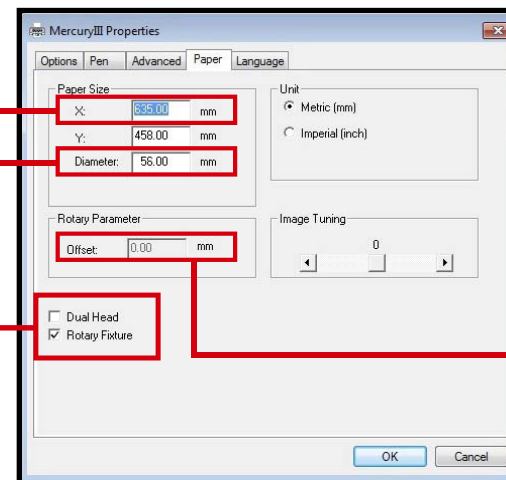
Printer Driver Setup for Rotary Attachment Information

To set up the printer driver for use with the rotary attachment you would simply follow the same setup procedure that you use when working with the flat grid bed.

The difference will be that when you get to the "Paper" section of the setup simply follow the instructions on the right instead.

Step 2. Input the measurements you acquired during step 7 on page 51. X (being the length of your object) and the diameter.

Step 1. Tick the rotary attachment box



Step 3. Insert the offset acquired at step 12 on page 52

Manual Focus Probe

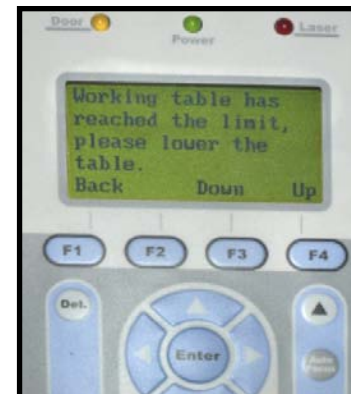
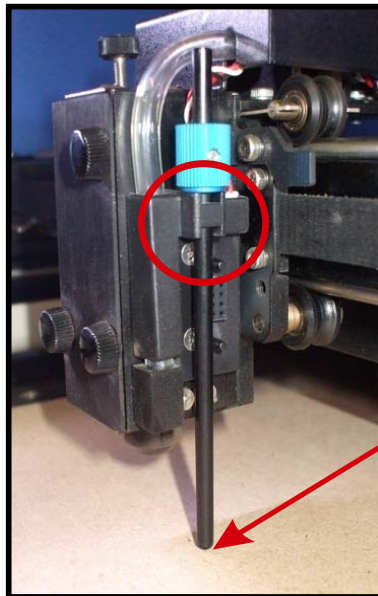
At some point during the life of your laser cutter, it may be necessary to use the manual focus probe to set the correct distance between the cutting head and the material. This probe is located in the white accessories box originally supplied with the laser cutter. This probe is often used when an auto focus probe on a laser cutter is either faulty or damaged as it will enable you to carry on working with the machine.

A common use for the manual focus probe is when the control panel displays the "working table has reached the limit" message. This will happen when using thin materials such as paper, textiles, etc and simply means that the upper trip switch in the laser cutter has been triggered before the auto focus probe could focus.

Step 1. Remove the auto focusing probe and insert the manual focus probe in the hole on the right hand side of the head.

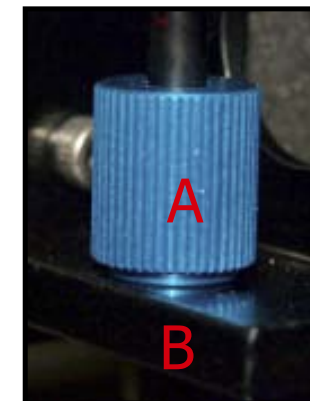


Pictured above is the manual focus probe.



With the laser bed in its raised position and the shown message is displayed, would indicate that you will need to use your manual focus probe.

Fig 1.



Step 2. Press the up arrow on the laser control panel to raise the laser bed until the material touches the underside of the manual probe as shown in the image above. This can be gauged easier by looking for the points A and B to meet as shown in figure 1 on the right.

Step 3. Once this has been performed simply remove the manual probe and run your file as normal.

Useful Control Panel Commands

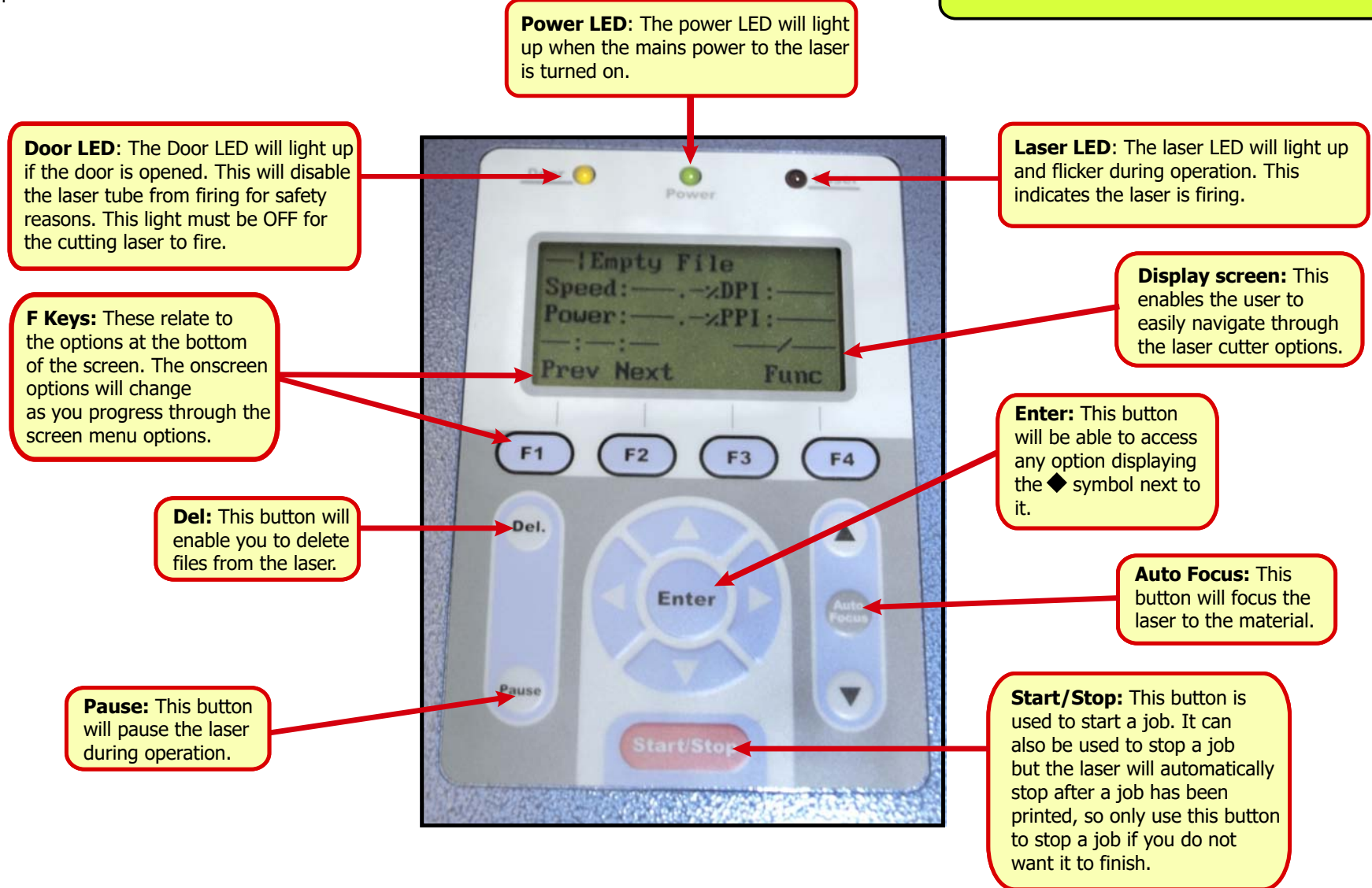
The picture below is of the laser at the main menu screen. From this screen you will be able to navigate your way through various different options regarding the machine settings. The below diagram will show the different parts of the control panel followed by useful commands to aid operation of the laser cutter.

Useful control panel commands: (from the main menu)

Deleting a file: F4, Enter, (then press either) F3 to delete a single file or F4 to delete all files.

Sending the laser head to HOME: Press F4 twice.

Pause and resuming a job: During operation either press the Pause or F1 buttons. To resume press F1.



How to Enable/Disable the SMART Guard

The SMART Guard is an optional extra on our range of laser cutters and is a fire detection device that provides an early warning of potential fires in the laser cutter. The sensitivity of the SMART Guard can be adjusted between 1-9 seconds but on some applications such as wood cutting and glass engraving it may still trigger the SMART Guard to be set off. If this happens then you will need to disable the SMART Guard.




WARNING! Even though the SMART Guard helps to warn you of a potential fire risk it will **NOT** extinguish any fire that may break out. Therefore **do not leave the laser unattended during operation.** If you have to disable the SMART Guard we would always recommend that you enable it after finishing your project.



To enable/disable your machines SMART Guard follow the below guide.

Step 1: From the Empty file screen (as shown left) **press F4.**

Step 2: Move the  down to the Advanced Settings and press **Enter.**

Step 3: Again move the  down to **SMART Guard** and press **Enter.**

Step 4: Press on the control panel either:

The left arrow to disable the SMART Guard

The right arrow to enable the SMART Guard

Below this function you can also adjust the sensitivity from 1-9 seconds.

Step 5: Press F4 to save your chosen settings.

Step 6: Press F1 to back out to the Empty File screen (main menu).

Maintenance Log

This maintenance log template sheet is provided for schools to correctly record ongoing maintenance. Cleaning your laser as per our recommendations will help ensure the machine operates efficiently and will reduce the risk of needing an engineer's visit. The maintenance schedule is a guideline as this will be dependant upon usage and material type. Your machine may need to be cleaned more frequently than the recommended guidelines stated below.

Laser Type : **Spirit LS/GLS** Laser Power : **12 W** **25 W** **40 W** **60 W** Serial No :

Part Description	Date Checked	Checked By	Date Checked	Checked By	Date Checked	Checked By	Date Checked	Checked By	Date Checked	Checked By
Mirror 1 <i>Minimum Every 6-8 weeks</i>										
Mirror 2 <small>Clean hourly if using resin based materials</small> <i>Minimum Every 2-3 weeks</i>										
Mirror 3 <small>Clean hourly if using resin based materials</small> <i>Minimum Every 2-3 weeks</i>										
Mirror 4 <small>Clean hourly if using resin based materials</small> <i>Minimum Every 2-3 weeks</i>										
2 Inch Lens <small>Clean hourly if using resin based materials</small> <i>Minimum Every 2-3 weeks</i>										
Collimating Lens <small>Only on 40w Machines and above</small> <i>Minimum Every 6-8 weeks</i>										
Motion System Tracks <i>Minimum Every 2-3 weeks</i>										
Auto Focus Probe <small>Check spring before each use</small> <i>Once a day (minimum)</i>										
Grid Bed <i>Once a Term</i>										
Stainless Steel Bed <i>Every day</i>										
Underneath the bed <i>As often as possible</i>										
Extraction Filters <small>Both the lower pre filter & the upper active carbon filter</small> <i>Every 12 months</i>										

Spirit LS/GLS Engrave Settings

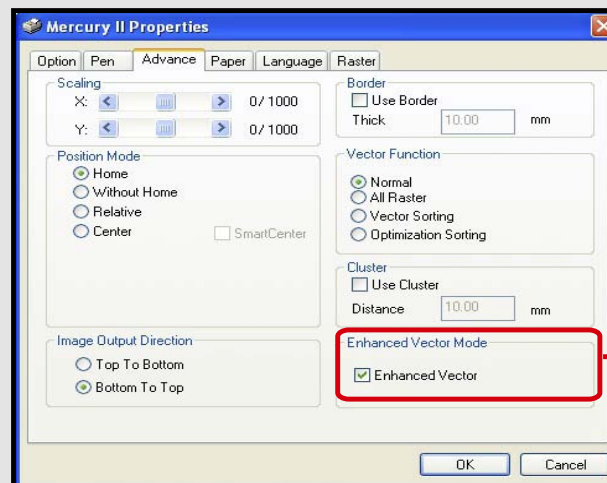
Note: These settings are to be used as a rough guideline **ONLY** as each individual laser tube can vary.

		Acrylic	Polypropylene	Fabric	Balsa Wood	Laser Ply	Thin Card	Boxcard 475mic	Lino	Cork	Glass	Correx	Leather
12w	Speed	100	50	100	100	100	100	100	100	100	100	50	100
	Power	45	100	40	100	50	60	60	50	18	30	100	85
	PPI	400	400	400	400	400	400	400	400	400	400	400	400
25w	Speed	100	100	100	100	100	100	100	100	100	100	100	100
	Power	25	90	20	75	100	40	50	40	8	20	100	55
	PPI	400	400	400	400	400	400	400	400	400	400	400	400
40w	Speed	100	100	100	100	100	100	100	100	100	100	100	100
	Power	10	75	10	35	100	10	10	20	10	10	90	35
	PPI	400	400	400	400	400	400	400	400	400	400	400	400
60w	Speed	100	100	100	100	100	100	100	100	100	100	100	100
	Power	8	65	8	25	90	7	7	15	7	7	50	20
	PPI	400	400	400	400	400	400	400	400	400	400	400	400

Enhanced Vector Information

Enhanced vector is a mode used commonly with cutting thick pieces of material that cannot be cut in the default vector mode. This mode will slow the machine down by up to 50% enabling the laser beam to cut more material. The side effect to this mode is it will also slow down your engraving speed.

Depending on a laser cutters age the firmware in the machine can vary and some laser cutters will be set up to use the enhanced vector mode. To tell if your machine is set up with this mode simply look for the enhanced vector box to be checked in the Advance tab in the print properties setting. (See Right)



Note: If your enhanced vector box is ticked then all you need to do when inputting your cut settings is multiply your **cut settings only** by two.

Eg: If the chart recommends
2.0% Speed and 100% Power
on Enhanced vector the settings will be
4.0% Speed and 100% Power

Spirit LS/GLS Cut Settings

Note: These settings are to be used as a rough guideline **ONLY** as each individual laser tube can vary.

		Acrylic 2mm	Acrylic 3mm	Acrylic 5mm	Acrylic 12mm	Acrylic 20mm	Thin Card	Balsa
12w	Speed	1.4	1.1	0.4	0.1	Can Not Cut	25	9
	Power	100	100	100	100	100	100	100
	PPI	X	X	X	X	X	X	X

		MDF 4mm	MDF 6mm	MDF 9mm	MDF 12mm	Laser Ply 4mm	Laser Ply 6mm	Laser Ply 9mm	Laser Ply 12mm
Speed		1	0.4	Can Not Cut	Can Not Cut	1.1	0.4	Can Not Cut	Can Not Cut
Power		100	100	100	100	100	100	100	100
PPI		X	X	X	X	X	X	X	X

		HIPS 1.0mm	HIPS 1.5mm	HIPS 2.0mm	HIPS 3.0mm	Polypropylene	Fabric	Greyboard 3.2mm	Correx
Speed		1.3	1.4	0.5	0.2	1.3	3.6	1.8	1.2
Power		100	100	100	100	100	100	100	100
PPI		X	X	X	X	X	X	X	X

		Acrylic 2mm	Acrylic 3mm	Acrylic 5mm	Acrylic 12mm	Acrylic 20mm	Thin Card	Balsa
25w	Speed	2.4	1.6	0.8	0.3	0.1	55	18
	Power	100	100	100	100	100	100	100
	PPI	X	X	X	X	X	X	X

		MDF 4mm	MDF 6mm	MDF 9mm	MDF 12mm	Laser Ply 4mm	Laser Ply 6mm	Laser Ply 9mm	Laser Ply 12mm
Speed		1.6	1.1	0.2	Can Not Cut	1.6	1.1	0.2	Can Not Cut
Power		100	100	100	100	100	100	100	100
PPI		X	X	X	X	X	X	X	X

		HIPS 1.0mm	HIPS 1.5mm	HIPS 2.0mm	HIPS 3.0mm	Polypropylene	Fabric	Greyboard 3.2mm	Correx
Speed		2.6	1.8	1.1	0.6	2.4	6.8	3.2	1.2
Power		100	100	100	100	100	100	100	100
PPI		X	X	X	X	X	X	X	X

Spirit LS/GLS Cut Settings

Note: These settings are to be used as a rough guideline **ONLY** as each individual laser tube can vary.

40w		Acrylic 2mm	Acrylic 3mm	Acrylic 5mm	Acrylic 12mm	Acrylic 20mm	Thin Card	Balsa
	Speed	3.2	2.2	1.1	0.4	0.1	100	30
	Power	100	100	100	100	100	80	100
	PPI	X	X	X	X	X	X	X

	MDF 4mm	MDF 6mm	MDF 9mm	MDF 12mm	Laser Ply 4mm	Laser Ply 6mm	Laser Ply 9mm	Laser Ply 12mm
Speed	2.1	1.4	0.7	0.2	2.1	1.4	0.7	0.2
Power	100	100	100	100	100	100	100	100
PPI	X	X	X	X	X	X	X	X

	HIPS 1.0mm	HIPS 1.5mm	HIPS 2.0mm	HIPS 3.0mm	Polypropylene	Fabric	Greyboard 3.2mm	Correx
Speed	3.5	2.8	2.1	1.1	6.4	9.2	4.4	2.9
Power	100	100	100	100	100	100	100	100
PPI	X	X	X	X	X	X	X	X

60w		Acrylic 2mm	Acrylic 3mm	Acrylic 5mm	Acrylic 12mm	Acrylic 20mm	Thin Card	Balsa
	Speed	4.7	3.2	1.8	0.9	0.3	100	4
	Power	100	100	100	100	100	60	100
	PPI	X	X	X	X	X	X	X

	MDF 4mm	MDF 6mm	MDF 9mm	MDF 12mm	Laser Ply 4mm	Laser Ply 6mm	Laser Ply 9mm	Laser Ply 12mm
Speed	3.2	2.2	1.1	0.5	3.2	2.2	1.1	0.2
Power	100	100	100	100	100	100	100	100
PPI	X	X	X	X	X	X	X	X

	HIPS 1.0mm	HIPS 1.5mm	HIPS 2.0mm	HIPS 3.0mm	Polypropylene	Fabric	Greyboard 3.2mm	Correx
Speed	4.8	3.6	2.8	1.8	9.2	16	6	4.2
Power	100	100	100	100	100	100	100	100
PPI	X	X	X	X	X	X	X	X

Personal Material Settings Sheet

Material														
Speed														
Power														
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Laser Setup Check List

Please refer to this section to aid you in setting up and running a job through the laser.

- Step 1.** Carefully place your material onto the laser bed, manoeuvre the auto focus probe (laser head) over the material, either using the direction keys or by hand and then press the auto focus button. Once the laser has finished auto focusing the display will read **0.0mm**, press **F1** on the control panel to return to the default laser window.
- Step 2.** With your on-screen design ready to send to the laser, make sure that your cut lines are all hairlines 0.003mm (2D = fine line, Illustrator = 0.009pt) anything other than a hairline will be engraved. Check that the cut and engrave colours are correct, (refer to page 26 for the **Custom Colours**) then press **File** then **Print**, in the **Destination** names box make sure it reads **Spirit**, then click the **Properties** button.
- Step 3.** Enter your specific laser job settings on the four tabs in the print properties window. Choose **Manual Colour Fill** on the **Options** tab if performing simple cuts and flat engraves, or choose **Black & White** if performing a greyscale photo engrave and cuts. If choosing to perform a greyscale engrave, a new tab will appear, entitled **Raster**. This provides a contrast slider to adjust the 'exposure' of your image (deep or shallow) along with a halftone option of **Dithering** or **Error Diffusion**. On the **Pen** tab, select your speed and power settings for each colour, (refer to material settings at the back of this manual) remembering to change the **PPI** setting to **X** (all the way across to the right hand side for cutting), for standard engraving a setting of around **400 PPI** is recommended. On the **Advanced** tab, either choose the **Relative** or **Home** position mode, relative mode allows you to manually position the laser head so that the red beam is relative to the 0,0 (datum) of your on-screen design page. **Home** position mode means the laser head will start and usually finish in the far left corner of the bed. The **Paper** tab requires you to input the materials size in millimeters as the X & Y measurement, this can also be left at the maximum laser bed size if preferred. An error warning will be displayed on the Print window if this size is smaller than the page/paper size in your design software. Once you are satisfied with your selected settings, press the ok button which takes you back to the **Print** window, click **Apply** and then **Print**.
- Step 4.** The file will be sent to the laser machine and the files title should now show on the laser control window. With all the laser doors closed, make sure your extraction is switched on and wait for the amber door light to go out. You can now press the red Start button on the laser. When the job has finished you will hear a long beep.



Never leave the laser machine unattended whilst it is running!

