

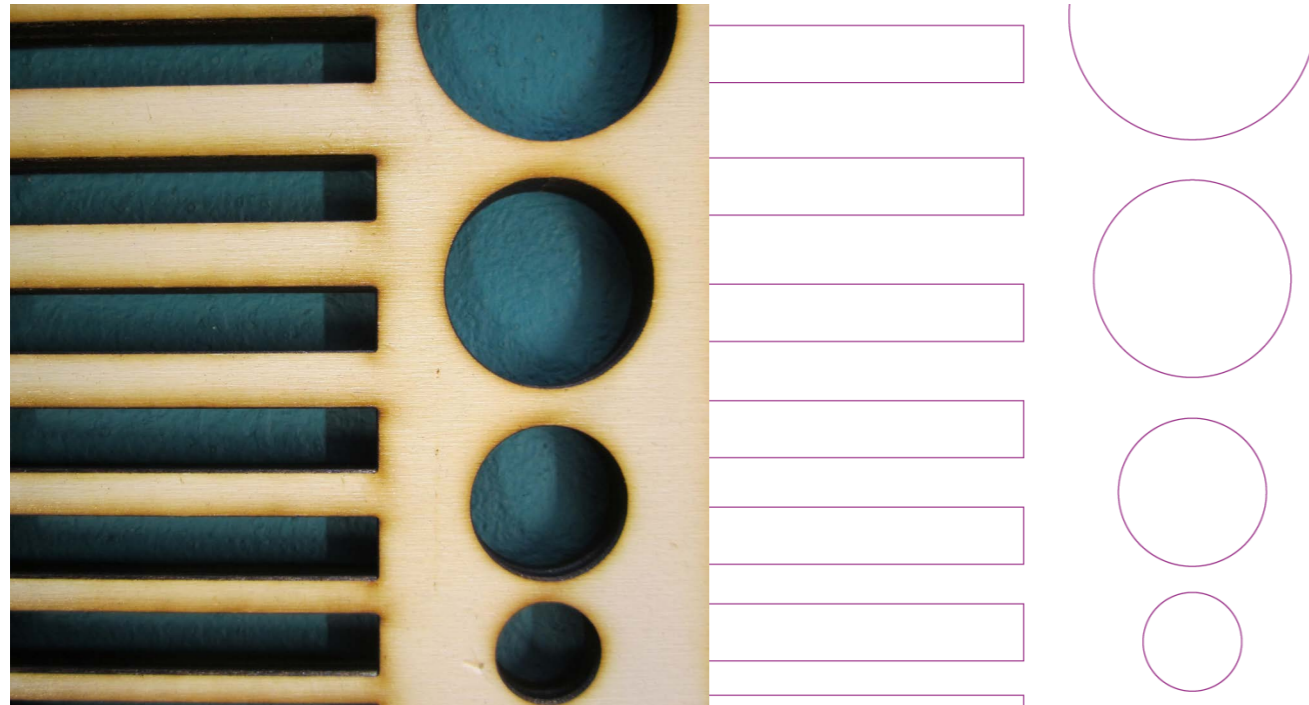
Guide to Adobe Illustrator for Laser Cutting

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Laser Techniques

Vector Cutting



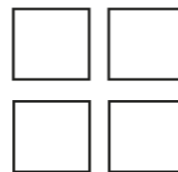
Vector Cutting is the most common application of laser machines. The laser's computer will follow the vector line which you have drawn in the files to cut all the way through the material you have chosen.

Above there is an image of vector cutting from 6mm Laser Plywood and the corresponding file which the laser machine cut it from. The amount of material which is lost from the use of cutting is minimal, but each material varies: the thicker the material, the higher the power of the laser and the slower it passes over the line, therefore more material is lost.

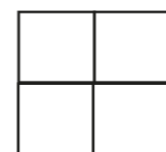
A couple of pointers:

- Never use the edge of the material as a cut edge: always ensure that your designs fit within the sheet of material you are using, leaving at least 3mm on all sides to the edge, that way your designs will be as accurate as you need them to be.
- Don't share lines between objects: make sure each shape has complete sides of its' own: If you need four 10mm squares, leave a couple of mm gap between each of them, not connecting each of the four squares making one 40mm square with two lines splitting them into four, as diagram on right. This, again, ensures accuracy and also means that the design won't fall through or move half way through.

YES: Correct



NO: Incorrect

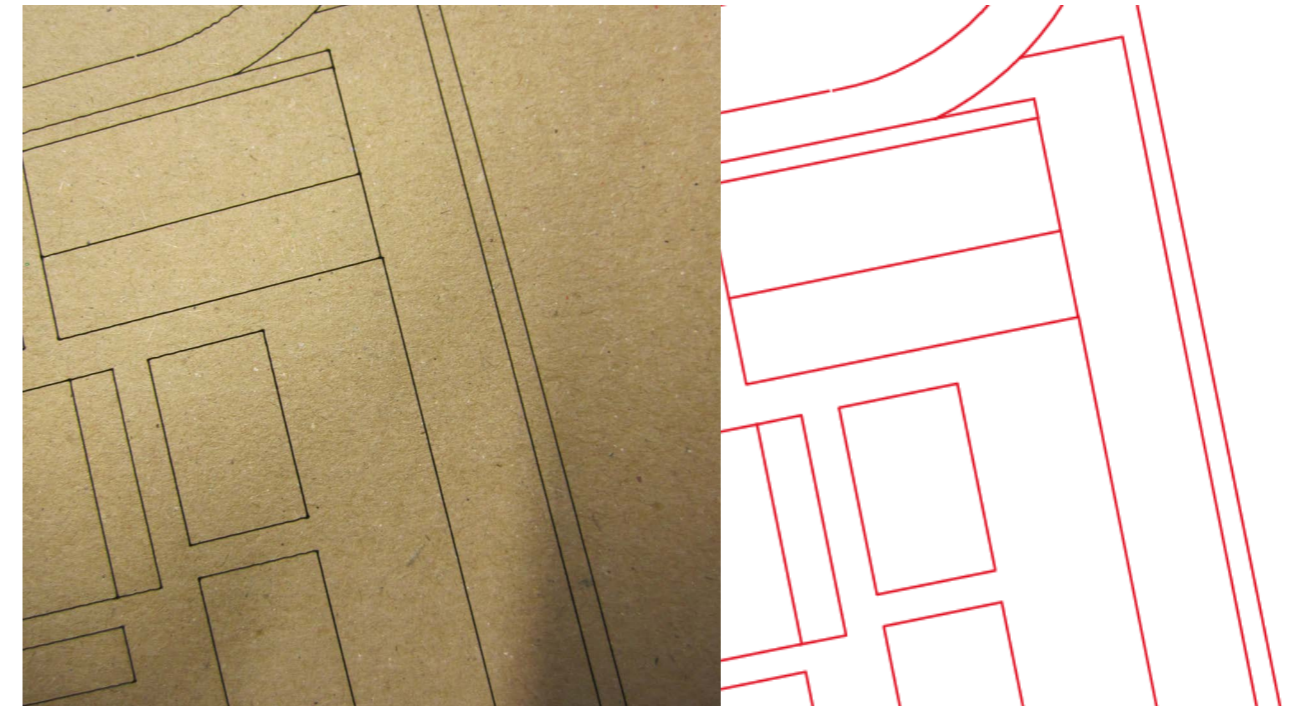


Laser Techniques

Basic Guide to Laser Cutting

Laser Techniques

Vector Engraving (Surface Cut/Kiss Cut)

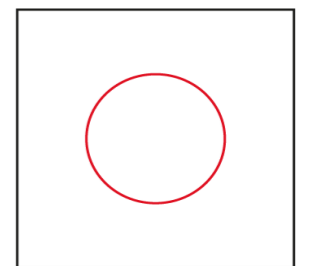


Vector Engraving, also known as Surface Cutting or Kiss Cutting is a method of drawing onto the surface of the material. The laser's computer will follow the vector line which you have drawn in the files to etch only the surface of the material.

Above there is an image of vector engraving from 2mm corrugated cardboard and the corresponding file which the laser machine cut it from. This example is from an architectural site model, showing where buildings or roads are.

A couple of pointers:

- To differentiate between a cut line and a vector surface cut, change the colour on the file, like the example to the right and specify on the file in text as to what you intend the coloured lines to be.
- Generally surface cuts are quicker than infill engraving, but if there is a huge amount of information and alot of detail to be engraved it can be quite time consuming. If you are making a scale model, you may benefit from reducing the detail, for example drawing on every brick on a 1:200 model will be very time consuming.



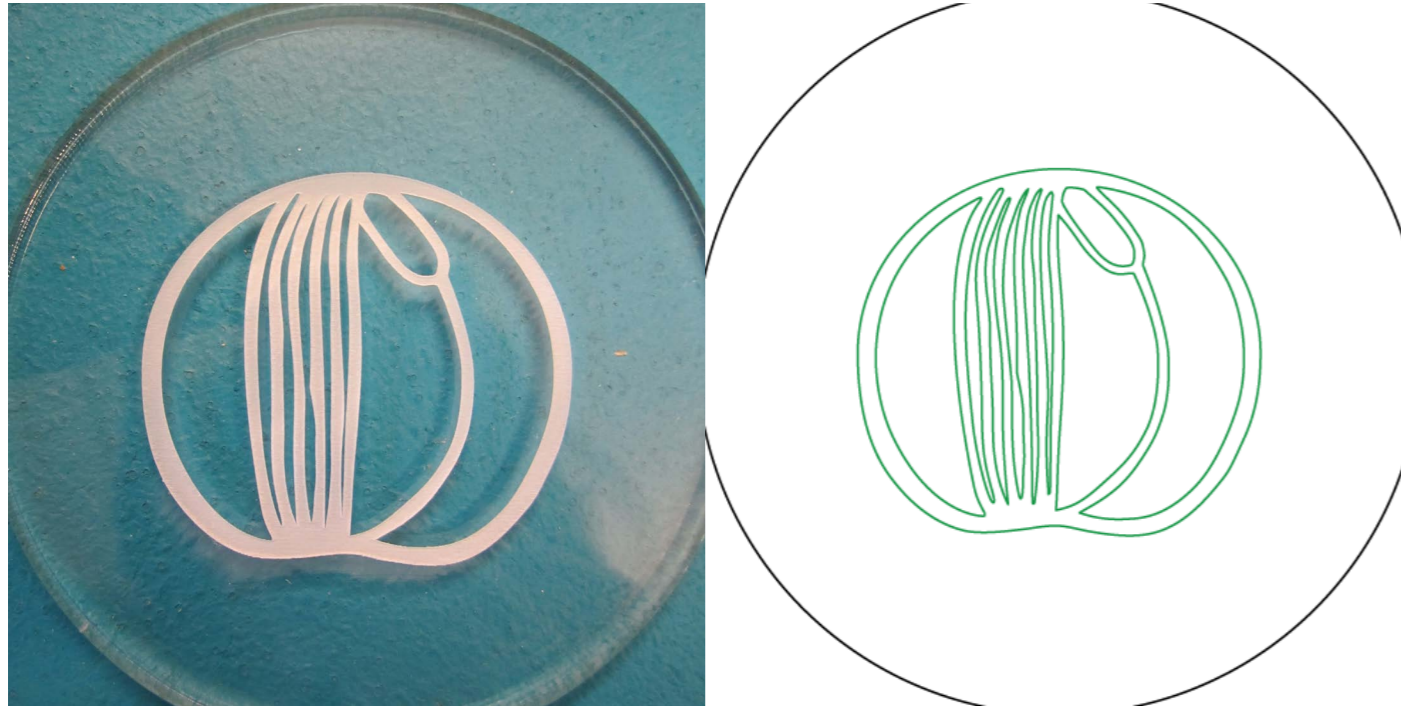
Red - Vector Engrave
Black - Vector Full Cut

Laser Techniques

Basic Guide to Laser Cutting

Laser Techniques

Raster (Infill) Engraving

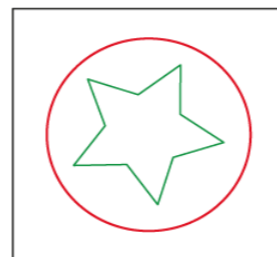


Raster Engraving, also known as Infill Engraving is a method of marking the surface of the material of an area. The laser's computer will infill the shaped vector line which you have drawn in the files to etch only the surface of the material.

Above there is an image of vector engraving from 5mm Clear Acrylic and the corresponding file which the laser machine cut it from. The laser machine reads only outlines not infill, so although your raster engraving will be infilled the file must show only an outline.

A couple of pointers:

- To differentiate between a cut line, a vector surface cut and an infill engrave, change the colour on the file, like the example to the right and specify on the file in text as to what you intend the coloured lines to be.
- Infill engraving can be very time consuming, it works like an inkjet printer, moving side to side, turning the laser on and off quickly drawing a line every 0.05mm. So to speed up the process arrange all of the parts of the file that require infill engraving together and preferably in a horizontal line across the file so that it can be done all together.



Green - Infill Engrave
 Red - Vector Engrave
 Black - Full Cut

Materials

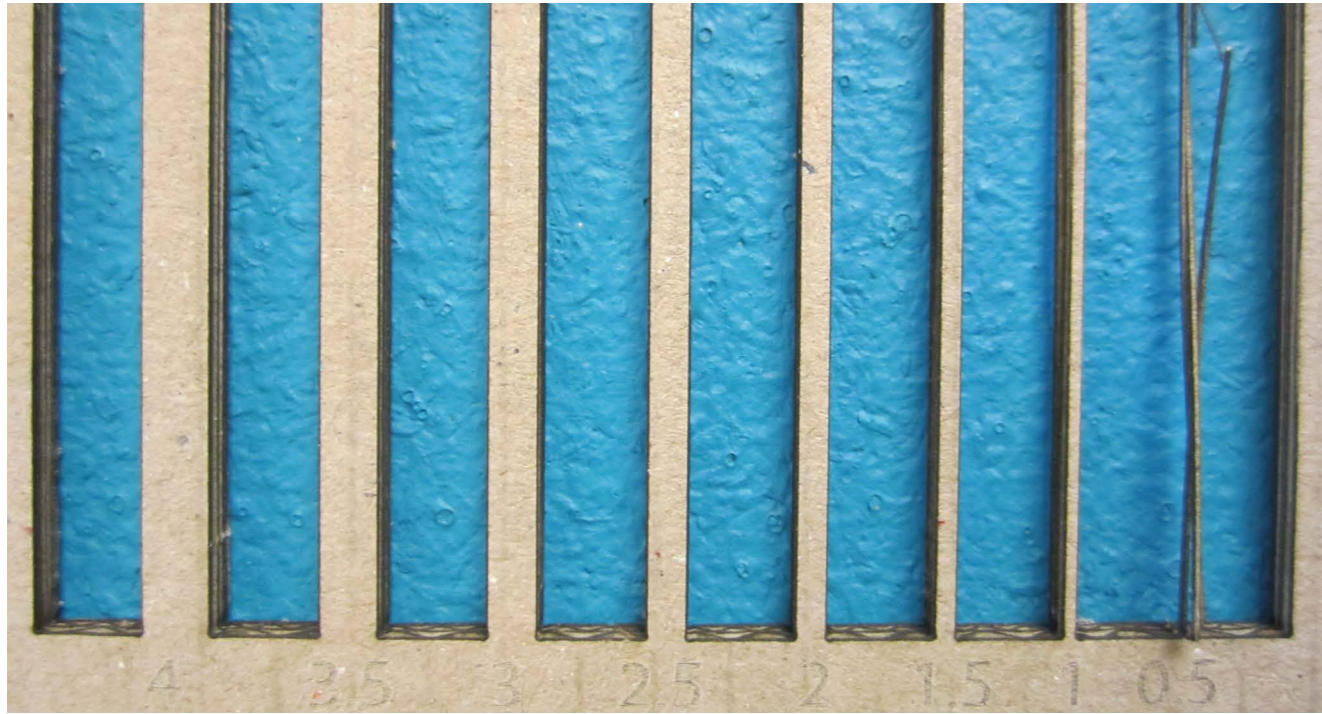
Material Suitability

Material	Cut	Max. Cut Thickness	Vector Engrave	Infill Engrave
Acrylic	Yes	10mm	Yes	Yes
ABS	Yes	3mm	Yes	Yes
PVC	NO - Poisonous	-	NO - Poisonous	NO - Poisonous
Mylar	Yes	3mm		
Nylon	Yes - melts badly	5mm	Yes - melts badly	Yes - melts badly
Vinyl	NO - Poisonous	-	NO - Poisonous	NO - Poisonous
Styrene	Yes	5mm	Yes	Yes
HDPE	Yes - melts badly	3mm	Yes	Yes
Any Metals	NO	-	Yes-with thermal paste	Yes-with thermal paste
Paper	Yes	-	Yes	Yes
Card	Yes	-	Yes	Yes
Foam Board	NO - Poisonous	-	NO - Poisonous	NO - Poisonous
Mountboard	Yes	-	Yes	Yes
Cotton	Yes	-	No	No
Textiles	Yes - except PVC	-	Varies - best to provide samples	
Laser Safe Rubber	Yes	3mm	Yes	Yes
Leather	Yes (Smells Bad)	2mm	Yes (Smells Bad)	Yes (Smells Bad)
Pure Wool Felt	Yes (Smells Bad)	6mm	Yes (Smells Bad)	Yes (Smells Bad)
Acrylic Felt	Yes (Smells Bad)	6mm	Yes (Smells Bad)	Yes (Smells Bad)
Laser Plywood	Yes	9mm	Yes	Yes
Standard Plywood	Yes	6mm	Yes	Yes
Wood	Yes	4mm	Yes	Yes
MDF	Yes	6mm	Yes	Yes
Glass	No	-	Yes	Yes
Ceramics	No	-	Yes	Yes
Slate	No	-	Yes	Yes
Stone	No	-	Yes	Yes
Cork	Yes	3mm	Yes	Yes
Zote Foam	Yes	10mm	Yes	Yes

This list is not exhaustive, so get in contact if there is a specific material you require.

Materials

Material Qualities & Tolerances



Although it sounds obvious, think about the material quality of the material you intend to use. If it is a model of a self supporting structure, don't choose a thin paper. Likewise if it is to be an intricate framework only 0.5mm thick, don't use corrugated cardboard - as shown in the example above made from 2mm corrugated card, it won't stay together.

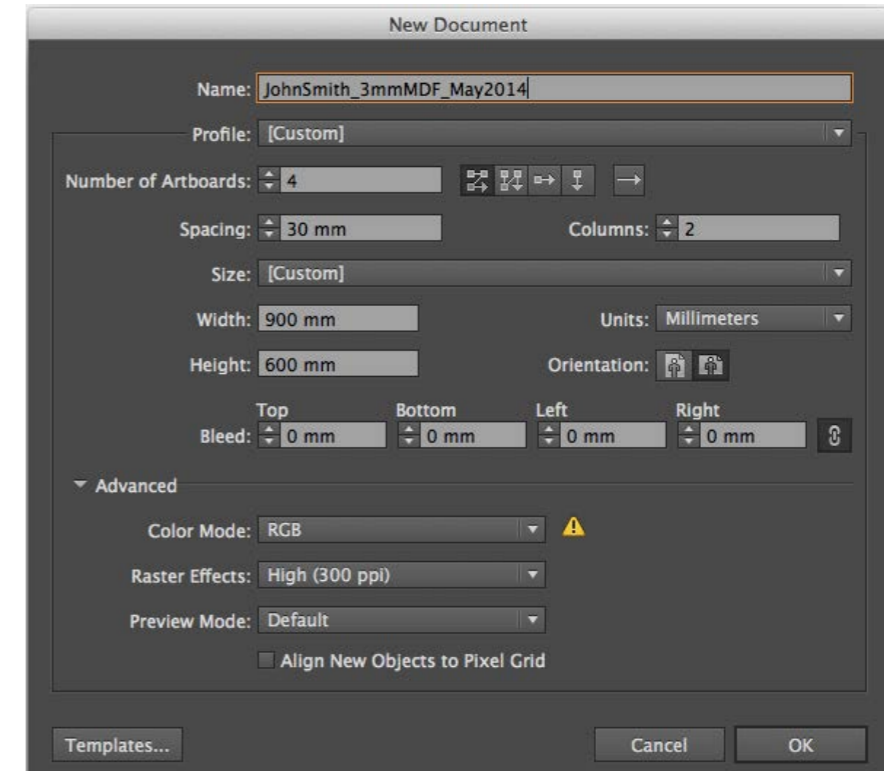
Each material has its own tolerances and strengths. As a general rule of thumb the material will only be strong up until its own thickness if there are supports top and bottom, any thinner and it will be fragile. For something that is self supporting the minimum width should be at least twice the thickness, but this depends on the material, so this is something to consider before choosing the material.

The flammability of the material is also something to consider, cutting many thin sections next to each other will heat up the material and may cause it to set on fire. Cardboards, paper, wood and acrylic are all very flammable. Please leave suitable gaps and separate out sections that are repeated. Check for double lines - leaving multiple lines will lead to excessive charring on the finished cuts and may also set it alight.

Materials

Setting up your files

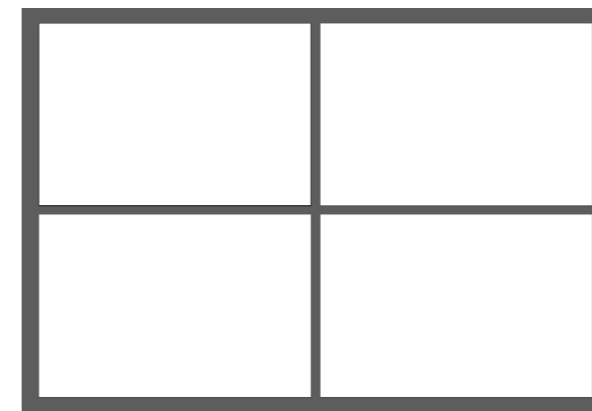
Artboards



In Adobe Illustrator, Artboards allow you to lay out your files on a sheet like it will appear on the final cut material. If you are going to be using multiple sheets of the same material, we need you to set them up as multiple artboards in the same file. This reduces the time taken to process your files.

As the screenshot above shows, you can choose the number of artboards, the spacing between them and the dimensions of the artboard itself - set this to be the size of the material. We also require all files to be set up as RGB colour mode (this can also be changed when in the file: File>Document Colour Mode>RGB). We also require you to save the file as YourName_Material&Thickness_Date or File Name.

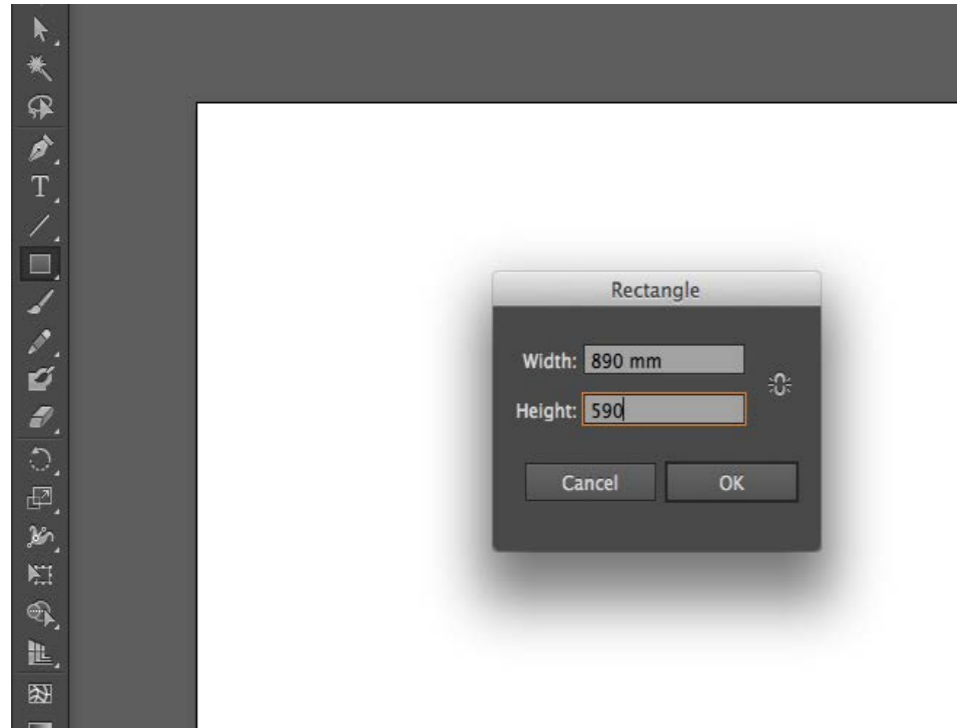
After clicking OK, the file will appear as shown below:



Setting up your files

Setting up your files

Margins



When laser cutting, we do not use the edge of the material as a cut edge. We need you to leave at least 3mm on the top, bottom and edges on each file. For ease of working within these boundaries, we suggest drawing a rectangle to work inside of. This can be done by selecting the rectangle tool, clicking once on the page which will bring up the box as shown in the diagram above.

Repeat this on each artboard or sheet that is being cut, you can delete this before you send the completed file to us, otherwise we will cut it, taking more time on the laser.

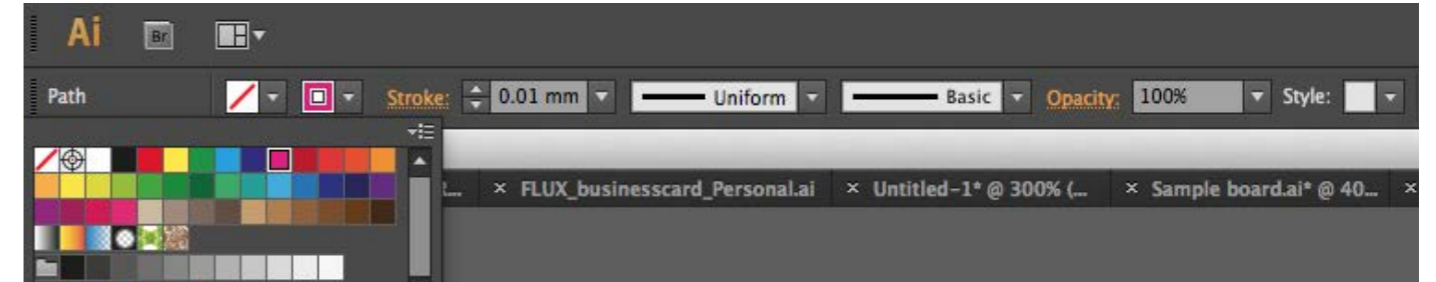
If your work leaves less than 5mm on all sides of the edge of the material, we cannot guarantee that all the information be cut accurately, so do double check this before sending the files to us.



Setting up your files

Drawing your files

Coloured Lines

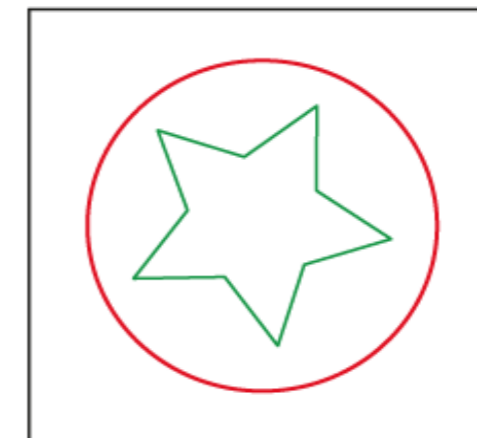


As show in the laser techniques section, we require different techniques to be drawn in different colours. For example, a full cut in black, vector engrave in red and infill engrave in green. You can use different colours but it is imperative that you include a key stating which each mean as below.

Again, even though an infill engrave (the green star) will be filled in by the laser, it only reads the coloured outline, so it needs to be as the drawing below.

The colour of the lines can be changed as above, we recommend that the stroke weight be set at 0.01mm (the minimum Adobe Illustrator will allow), this means that it is easier for you to check that all lines meet up.

Even if lines are white or have no colour, the laser's computer will still see them, so make sure you delete them before sending the file to us.



Green - Infill Engrave
Red - Vector Engrave
Black - Full Cut

Drawing up your files

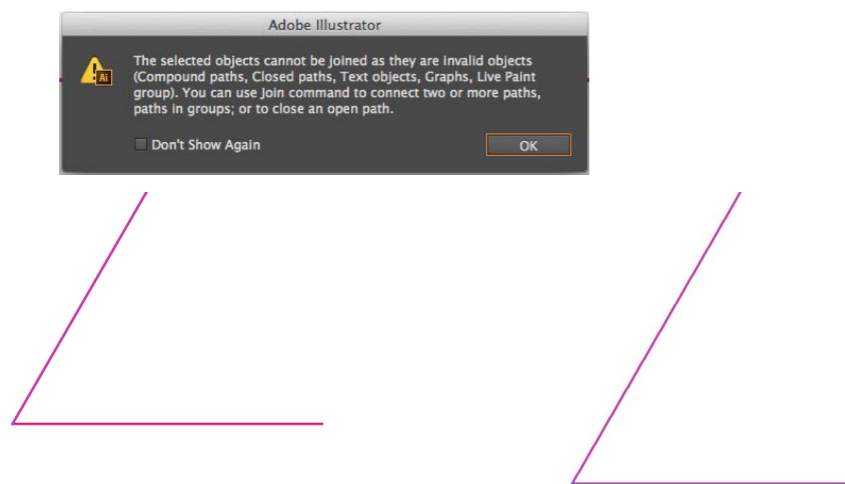
Drawing your files

Joining Lines



In the above left example the bottom line of the triangle does not meet up with the top section. We would recommend ideally that you redraw the shape. But as a quick fix you can select all three lines and choose Menu Object>Path>Join, or command-J twice and it will join up the lines by drawing extra lines, as shown in the above right image.

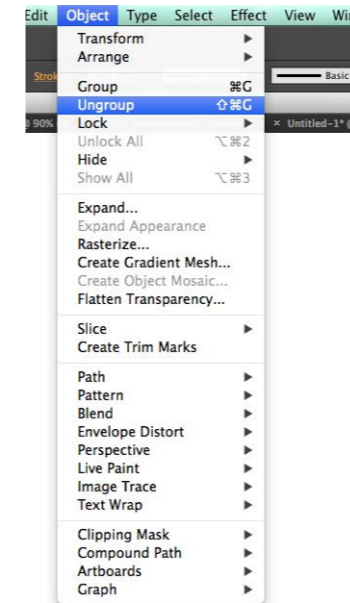
The joining is best when the two corners already meet but are not part of the same line, complete the same method as above and it will become one line, so when you select one side of the triangle all are selected. You may need to repeat it, for example to join three lines, you will need to select Menu Object>Path>Join, or command-J, three times, or until such a time the bottom pop up box appear or you cannot select it again from the menu.



Drawing up your files

Drawing your files

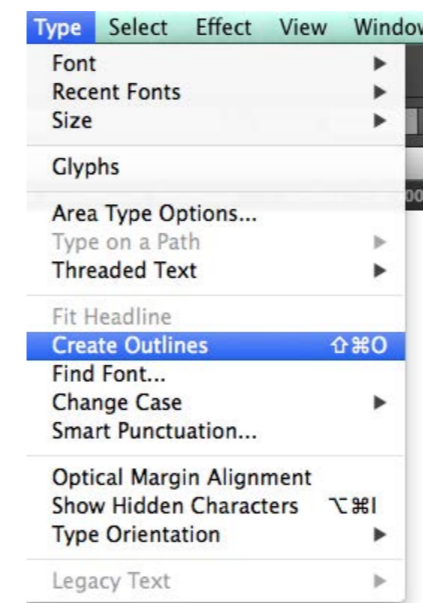
Ungrouping grouped objects



When drawing up your file, you might group items together to make it easier to rearrange and to organise. When items are grouped together, the laser's computer sees them all as the same colour, or if they are grouped together multiple times, it may not see them at all.

This can be done quickly by selecting everything (Command-A) and Menu Object>Ungroup(Command-Shift-G), this will need to be repeated as many times as it takes for you not to be able to select it from the menu.

Converting Text to Vectors



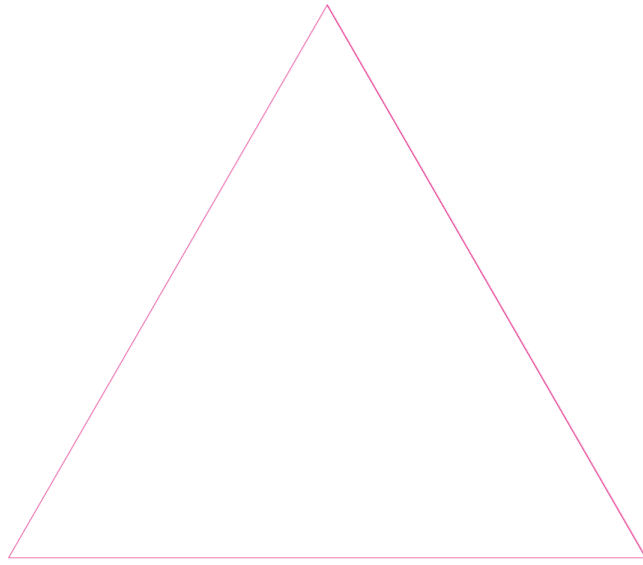
The laser's computer only sees vectors, therefore the text must be converted to vector outlines.

This can be done quickly by selecting everything (Command-A) and Menu Type> Create Outlines (Command-Shift-O). These may still be infills not outlines as required by the laser machine, convert them to the correct coloured outlines as you have done with the rest of the file.

Drawing Your Files

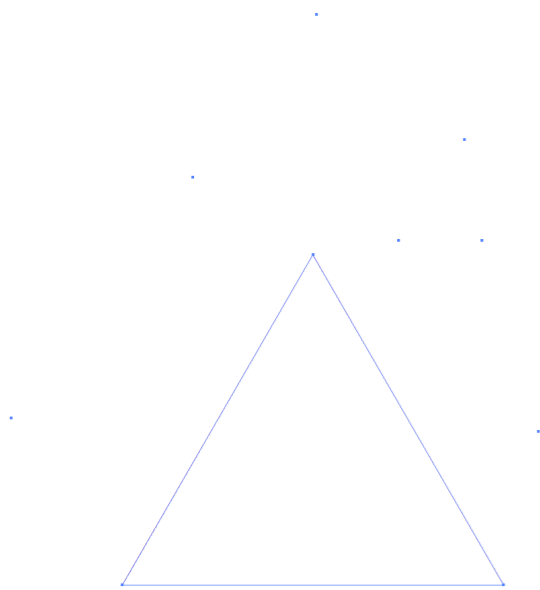
Drawing your files

Removing double lines



When drawing up your file, you may end up overlaying a couple of things which causes overlapping lines. The laser's computer will see this as multiple paths that it will cut several times- this may set the material on fire or cause damage to your final design. Illustrator shows these as slightly thicker or darker lines as on the right side of the triangle. You will need to manually go through and remove these, using either the black or white mouse tool

Cleaning Up Your File



When drawing up your file, a common error is to delete the lines but leave behind anchors. The laser machine will pick up on these 'invisible' points and make dots with the laser, or may cause the computer to crash and not be able to cut your work. Select everything on your file (Command-A) and Menu Object>Path>Clean Up - All the boxes ticked - OK.

Drawing Your Files

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Sending your files to us

Final Checklist

Before sending the files please ensure you have done the following:

- > UNGROUPED ALL OBJECTS
- > CLEANED UP FILE
- > CHECKED FOR DOUBLE/OVERLAPPING LINES
- > CONVERTED TEXT TO VECTORS
- > ENSURED ALL OBJECTS ARE OUTLINES WITH NO INFILL
- > INCLUDED A KEY TO COLOURS
- > ENSURED SUITABLE MARGIN AROUND EDGE OF FILE
- > NAMED THE FILE IN THE FOLLOWING FORMAT
FirstNameSecondName_Thickness&Material_SheetSize(ifRequired)_Date/Filename

Formats for saving files

From Adobe Illustrator:
Save as .ai format - CS5 or earlier

From AutoCad:
Save as .dxf 2000 or earlier

From other vector programs (ie:Inkscape):
Save as a .dxf 2000, .pdf or .ai.

If there are none of the above, contact us directly and we will try and help you out.

Sending your files to us

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Sending your files

Emailing the files to: hello@fluxlaserstudio.co.uk

We need all files to be sent to us via email.

Please put the subject of your email as your name, the month and materials you require.

In the email please provide us with the following information:

- Your Full Name
- Whether you are a student (we offer 25% student discount, with a valid student ID, or email from a student email account)
- What material, thickness and how many sheets you require
- Whether you are providing the material or using our stock
- Collection or delivery? - we can offer affordable postage all over the UK and abroad if required.
- Deadlines - we usually work to a 24-36 hour turn around, although this may be longer during busy times of year, if you need it fast let us know as soon as possible.

We will get back to you as quickly as we can with a time estimate and a full quote, as each file and material varies, until we have the files we cannot give you a price. We then need you to confirm the quoted price by email, and we will not start cutting your files until you have confirmed this in writing. We will email over the invoice for the completed job once it is ready to be collected.

Once you have confirmed, we will cut the files you have sent over, so check before you send everything over that it is 100% correct and no changes need to be made.

Sending your files to us

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