Laser Cutting

How-to and setup guides for the laser cutters in the 3D Workshop.

What are the Laser cutters?

The lasercutters can be used to cut a wide range of flat materials including wood, plastic, rubber, paper and card. Using 2D artwork it is possible to cut, engrave and score designs. A small selection of lasercut artefacts include slipcases, book covers, rubber stamps, stencils, prototypes, engineered parts and a wide variety of storage solutions and exhibition furniture.

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How do I book the Laser cutters?

Lasercutting collection times can be booked via the **ORB**.

- To book a time slot visit **ORB** on your laptop or desktop and select **Find Rooms and Spaces**.
- Students will be asked to complete a short online quiz the first time they book the laser cutter on the **ORB**.
- Please book a day and time to use the laser cutting service. Appointments are limited to 1 hour slots. Please discuss with a technician if you have a job that will take longer than the allotted time allows.
- It is essential you arrive promptly so there is enough time for you to follow video guidance on how to set up your file in Ruby(the laser cutter software) and run the laser cutter.
- Please bring any materials and your files with you on a USB to the appointment. We only accept .ai illustrator files.
- Artboards and/or files should be labelled with the corresponding material to be laser cut.
- Payment for materials will need to be made via the **Estore**. after job is completed. Please do not purchase material prior to your slot as we need to first make sure the workshop has it in stock, and there is a chance we may have free offcuts for you to use as an alternative to paying.
- For any queries or specialist support please email **3dworkshop.lcc@arts.ac.uk** before you book

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What materials can I use with the Laser cutters?

Materials

We stock a range of materials in our stock room. This includes laser grade plywood, acrylic sheets and stamp rubber:

Laser grade plywood sizes

In 0.8mm thickness

- Small Laser cutter – 610x406 mm
- Large laser cutter – 1220x610 mm
- Full Sheet – 1220x1220 mm

In 1.5mm, 3mm, 6mm, 9mm thicknesses

- Small Laser cutter – 760x500 mm
- Large laser cutter – 1000x700 mm
- Full Sheet - 1520 x1520mm

Acrylic sizes

Clear Acrylic – 3mm and 5mm

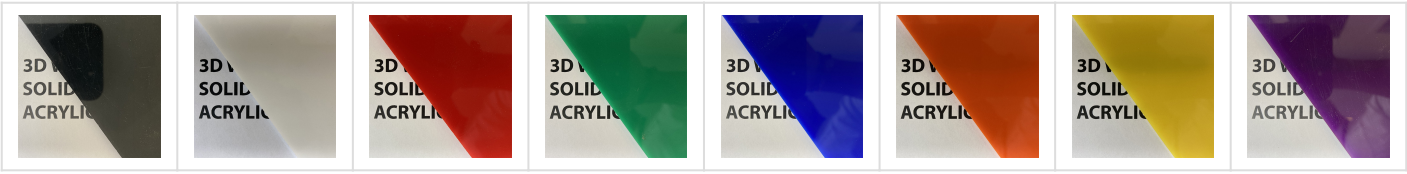
Coloured Acrylic – Frosted, Transparent & Solid – 3mm

- 600mm x 400mm
- 1000mm x 600mm

Available Colours

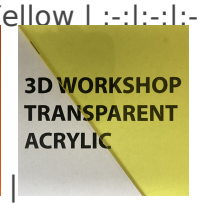
Solid

Black	White	Red	Green	Blue	Orange	Yellow	Purple



Frosted

White	Red	Green	Blue	Orange	Yellow	Purple	Pink
							

Transparent Black | Red | Green | Blue | Orange | Yellow | :-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:| |  |  |  |  |  |  |

Specialist acrylic will need to be purchased externally.

The most up to date prices can be found on the **eStore**.

Students can bring their own materials though are advised to discuss with a technician prior to buying to make sure they are compatible. Personal material must be dropped off at the workshop 48 hours prior to collection to allow for quarantining.

Paper based materials

- Paper
- Card
- Grey card
- Corrugated card – single wall only. Double wall and up are fire hazard

Materials you cannot use

- MDF: Clogs up our filters and smells bad
- LaserMDF: It produces perhaps 50% the gunk of MDF but still too much
- Metal of any thickness doesn't cut
- PVC/**Vinyl**: absolutely not. Produces chlorine
- Faux leather – contains PVC

- Lexan/Polycarbonate

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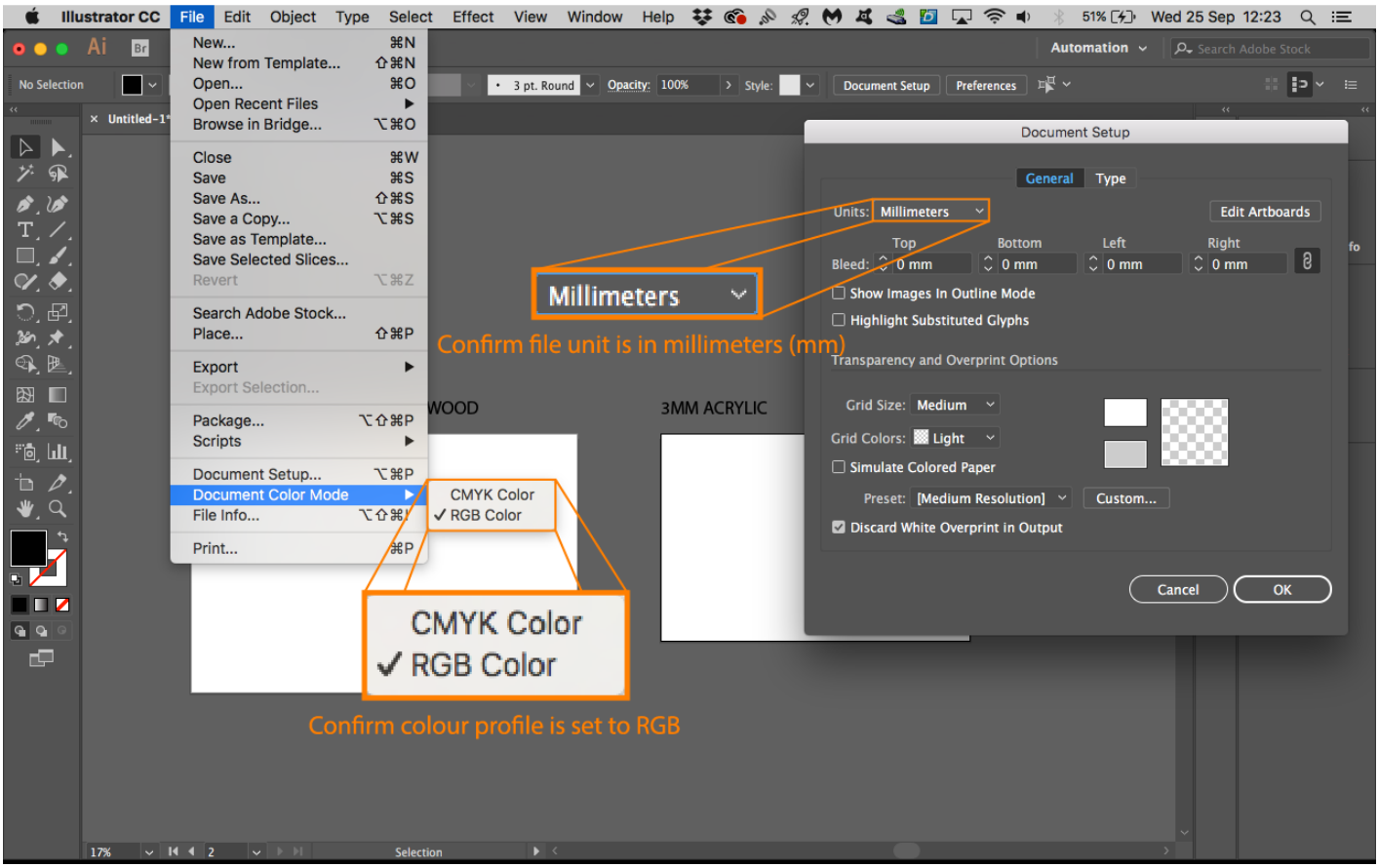
Illustrator file preparation for Laser cutting

Units of measure and Colour profile

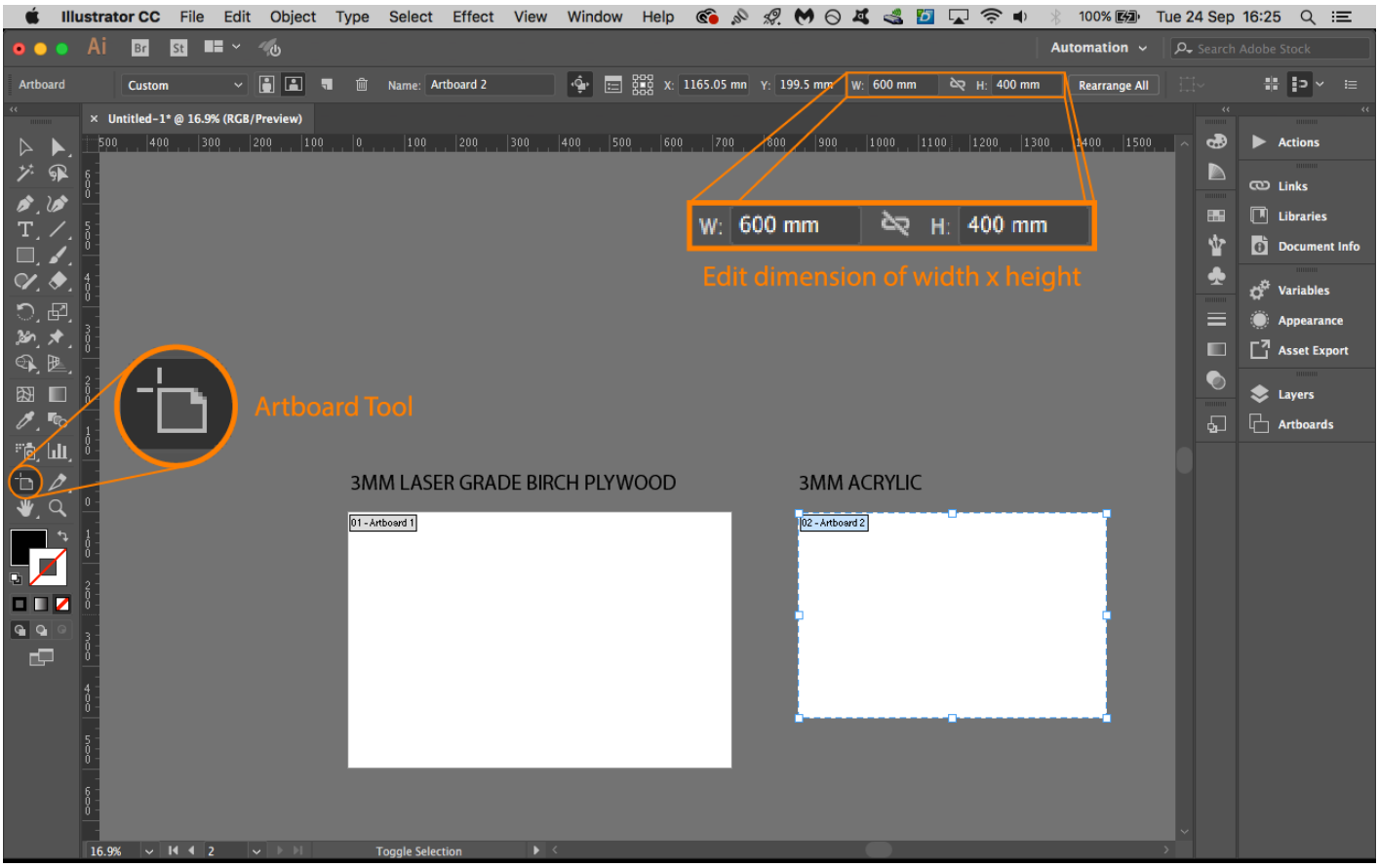
1. Illustrator documents should be set up in millimeters (mm)
2. Document colour mode (under File) should be RGB.



Artboard orientation and size

1. The art board should be set to landscape and the same size as the material you are cutting. For workshop bought materials please refer to the **eStore** for size and prices.
2. Use the artboard tool to create multiple artboards. Collate all Artboards into a single file. Refrain from creating multiple .ai files.

Note: max laserbed sizes are 720x420 mm and 1200x700 mm - material must not exceed these dimensions if using your own materials



Engraving and Cutting Set Up

Below outlines the colour order and stroke settings for cutting, scoring and engraving

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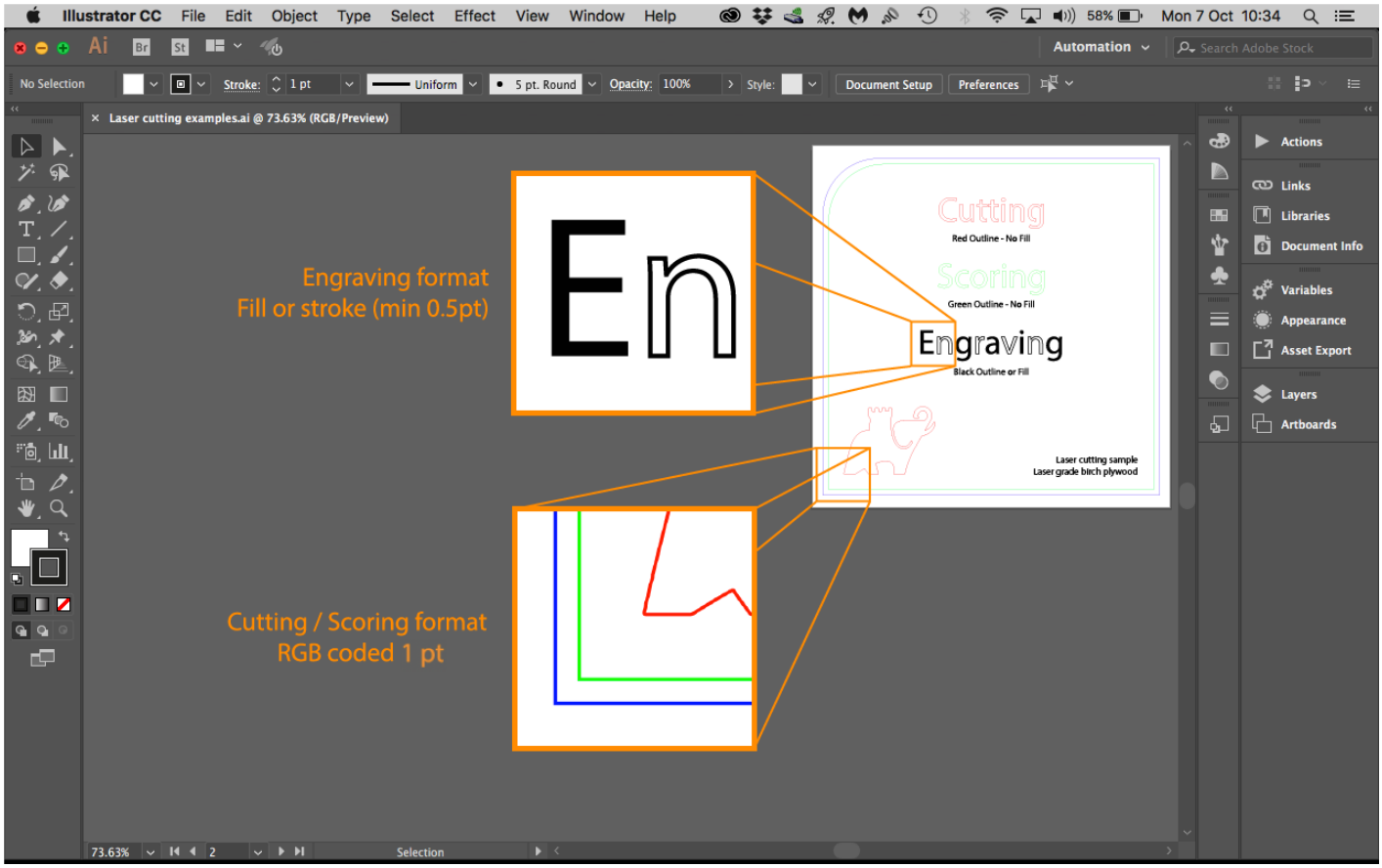
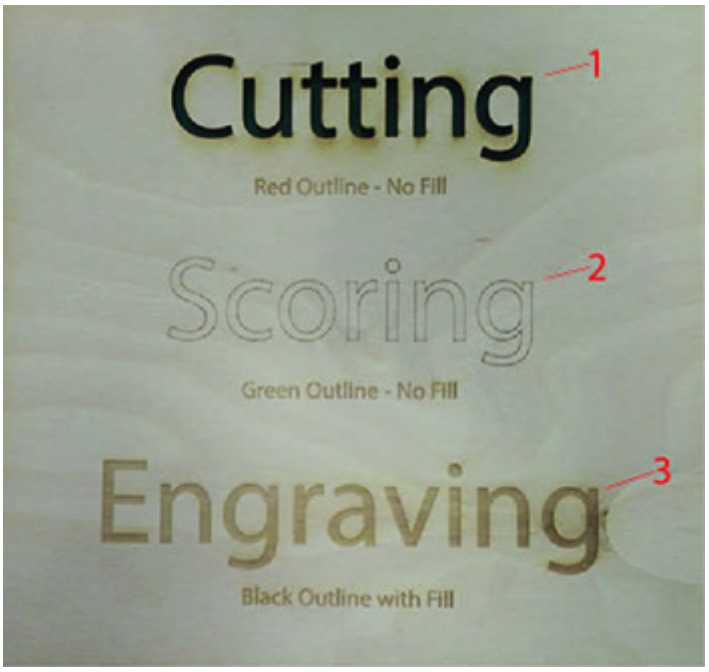
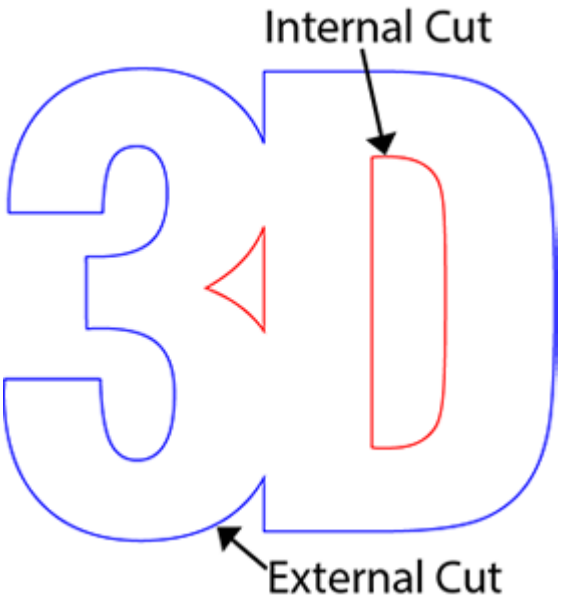


Order of operation:

Colour	Action	Parameters	RGB code
Black	Engraving	Fill and/or Stroke (min 0.5pt)	R:0, G:0, B:0,
Green	Scoring	Stroke (1pt)	R:0, G:255, B:0,
Red	Internal Cut	Stroke (1pt)	R:255, G:0, B:0,
Blue	External Cut	Stroke (1pt)	R:0, G:0, B:255,

Internal cuts are any cuts within another object. External cuts are the objects enclosing these internal cuts.

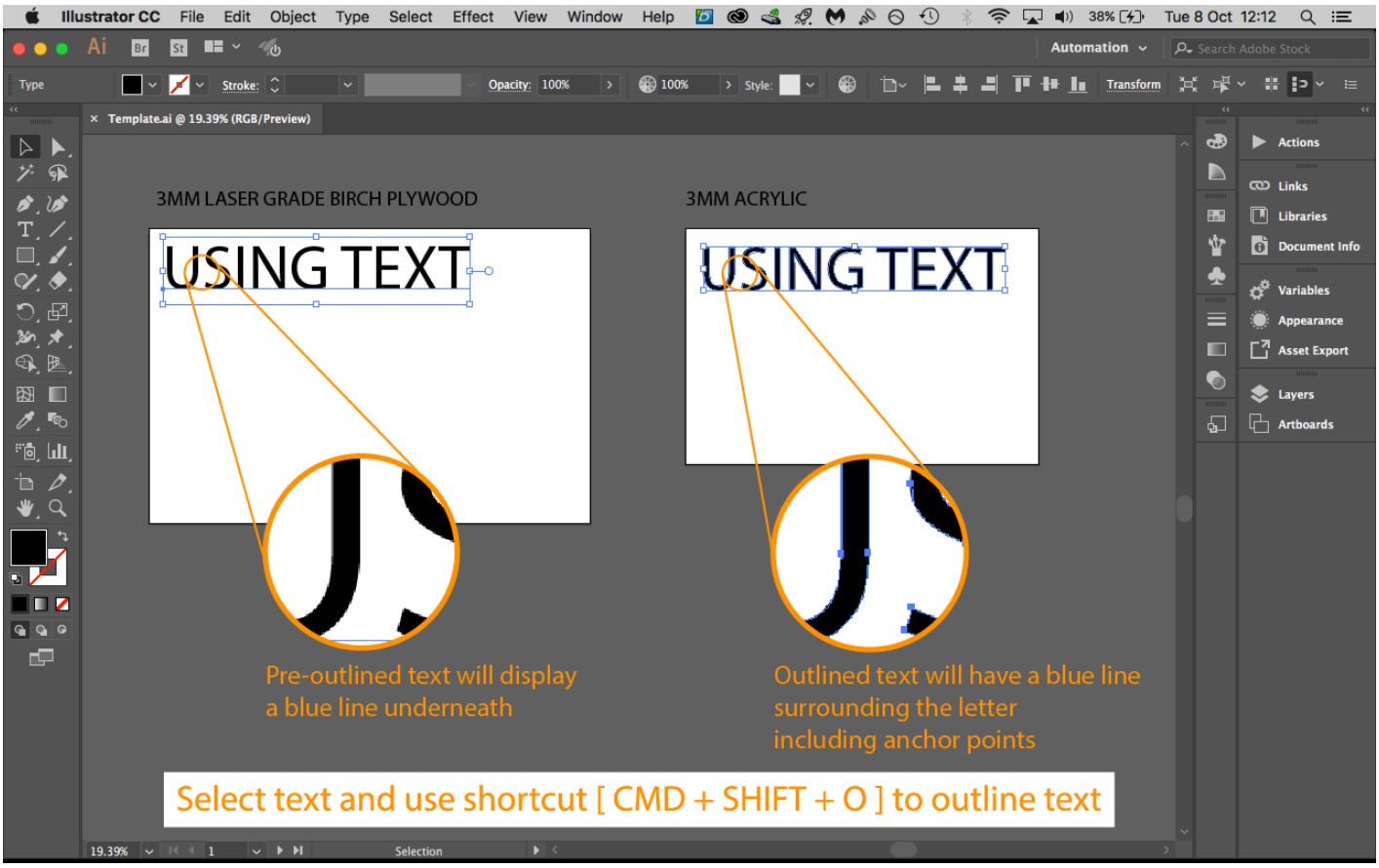




Using type

You must expand text to retain the format and appearance.

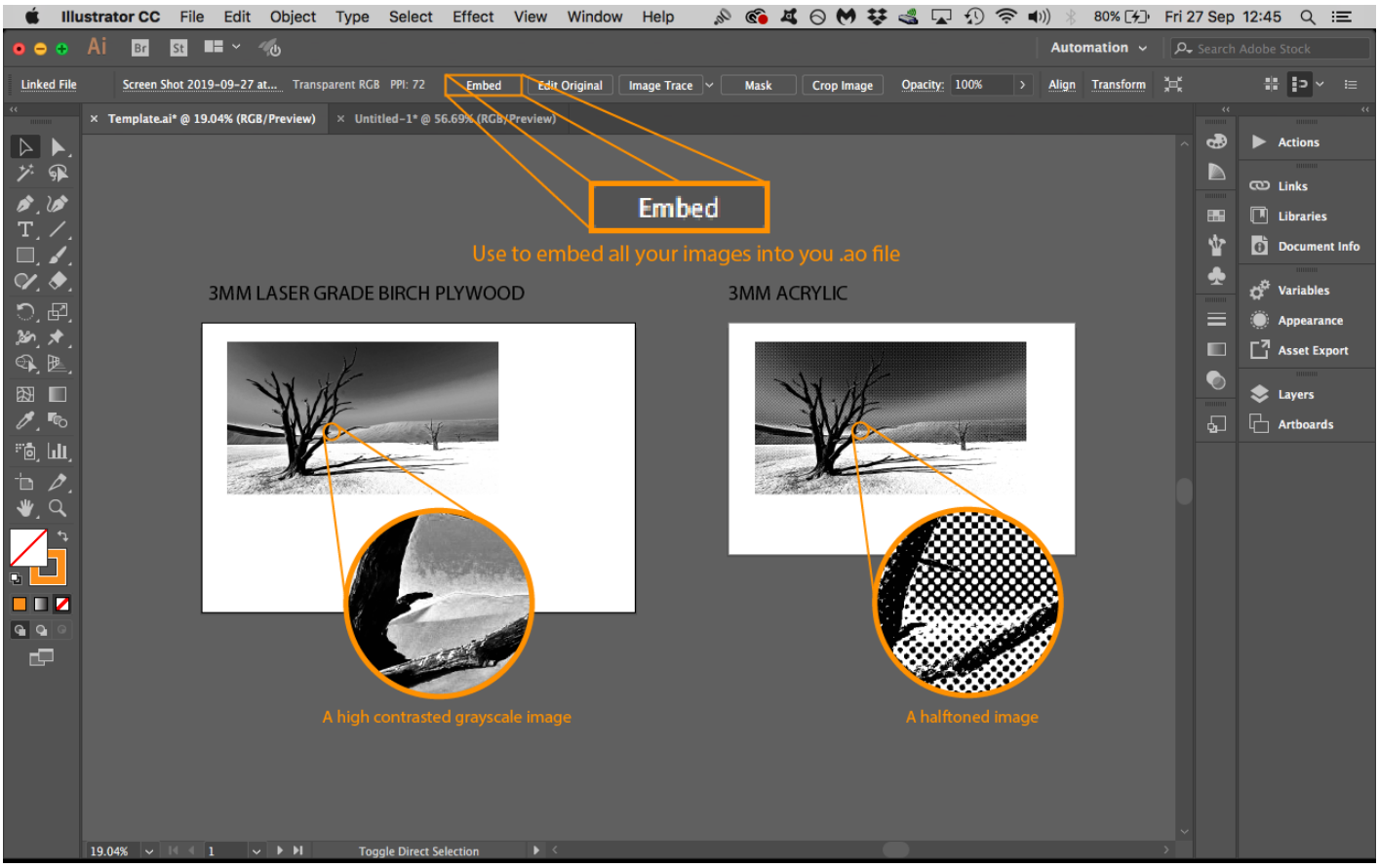
1. Check if text is outlined or not. Outlined text will have a blue line surrounding the letter, including anchor points. Non outlined text will display a blue line underneath.
2. To outline your text select your text and use shortcut " Command + Shift + O " to outline text or alternatively right click and select "create outlines"



Using Images

Images must be greyscale in order to engrave. Anything black will engrave. The white of the image will be ignored. High contrast greyscale images will be a better quality engraving then halftone images.

All images must be embedded otherwise they will be lost when transferred over for printing. Use the embed button to do this.



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Illustrator file preparation for Laser cutting - Video

Setting up a laser cutting Illustrator file for the first time

Before coming to the workshop you must prepare your Illustrator file in a specific way so the laser cutters can process it. Please follow the video below when setting up your file.

https://www.youtube.com/embed/sIbWWR2b48k

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Ruby file preparation for Laser cutting - Video

Setting up Ruby for laser cutting for the First time

Ruby is the software that the laser cutters use to process your Adobe illustrator file. You will use it in the 3D workshop when running your laser cutting files.

https://www.youtube.com/embed/1wFQ967Fnn0

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File preparation for Trotec Camera registration

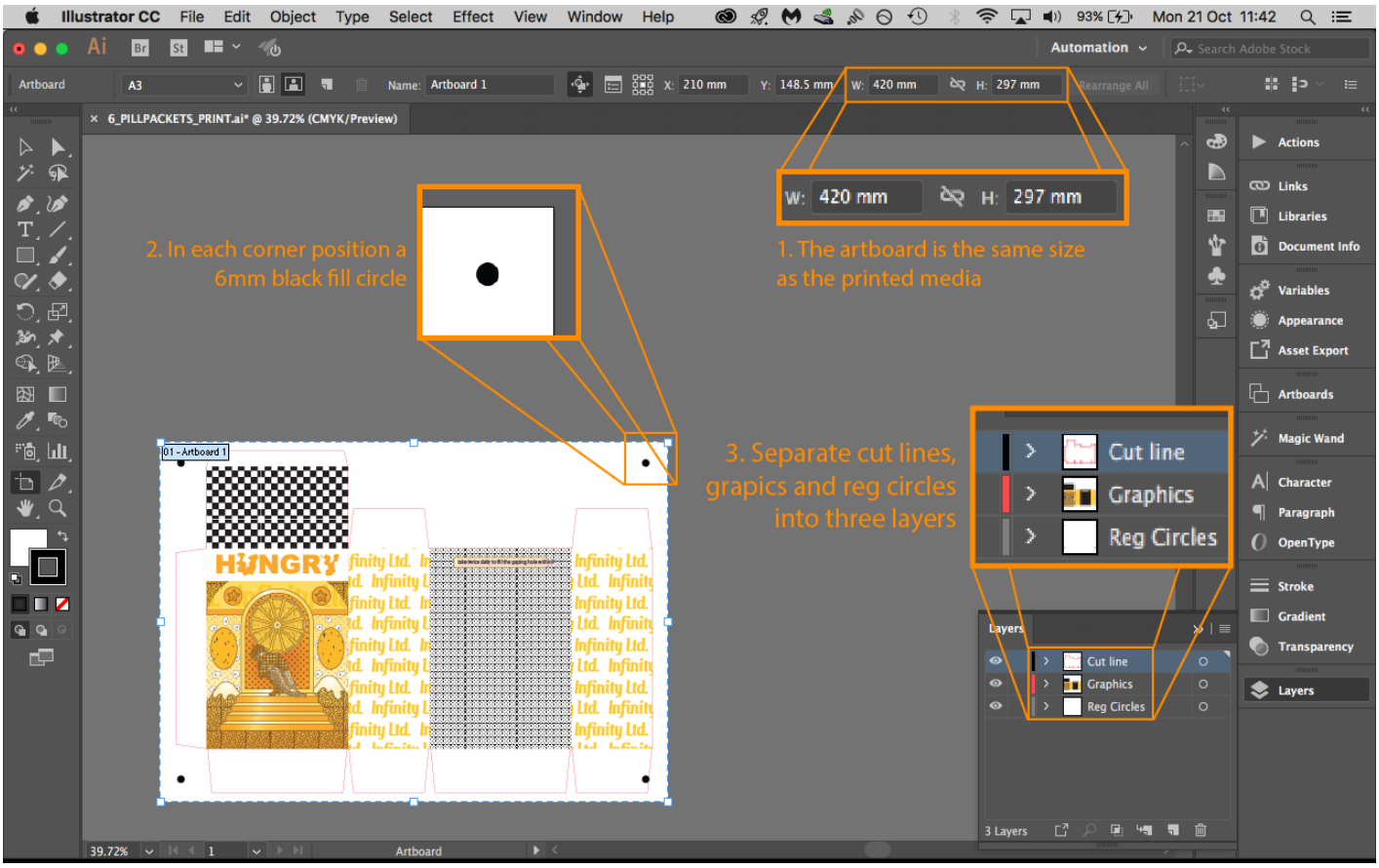
The SP500 laser cutter is capable of perfectly cutting printed material assisted by a camera system and registration mark detection. The lasercutter can account for rotation, scale and distortion to adjust the cut lines to match your printed artwork. **Please discuss with a technician prior to printing your graphics.**

File set up

1. Artboards should be the same as the printed paper size
2. Position 6mm black fill registration circles with a 0.001 stroke in each corner
3. Separate your cut lines, graphics and registration circles into 3 layers. These layers should be named:
   - Cut Line
   - Graphics
   - Reg Circles

Downloadable templates

A4 (297x210) **A3 (420x297)** **A2 (594 420)**



An example of a finished printed box cut using the trotec camera is shown below:

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Embossing or Debossing Preparation

IMPORTANT! Speak to the Print technicans on the 3rd Floor of the workshop block before creating your embossing debossing plate. To complete your embossing you will have to have attended the Intaglio induction workshop.

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Letterpress Preparation

IMPORTANT! Speak to the Letterpress technicans on the 2nd Floor of the workshop block before creating your letterpress files.

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Laser Engraving a Stamp Preparation

IMPORTANT! Speak to the Laser technicans in the 3D workshop before creating your Stamp files.

You do not need to flip/invert your text or designs before engraving the stamps - the laser software will do this for you.

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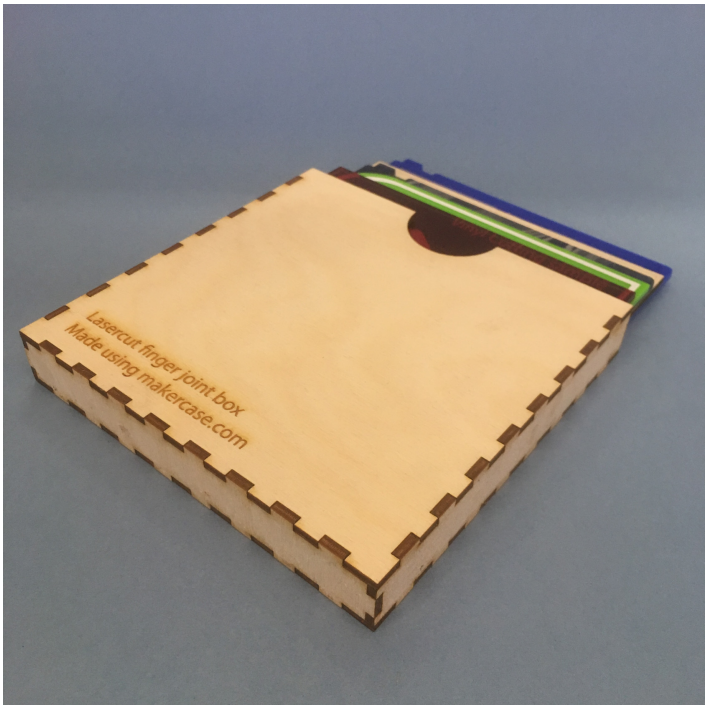
Downloads and Links for Laser cutting

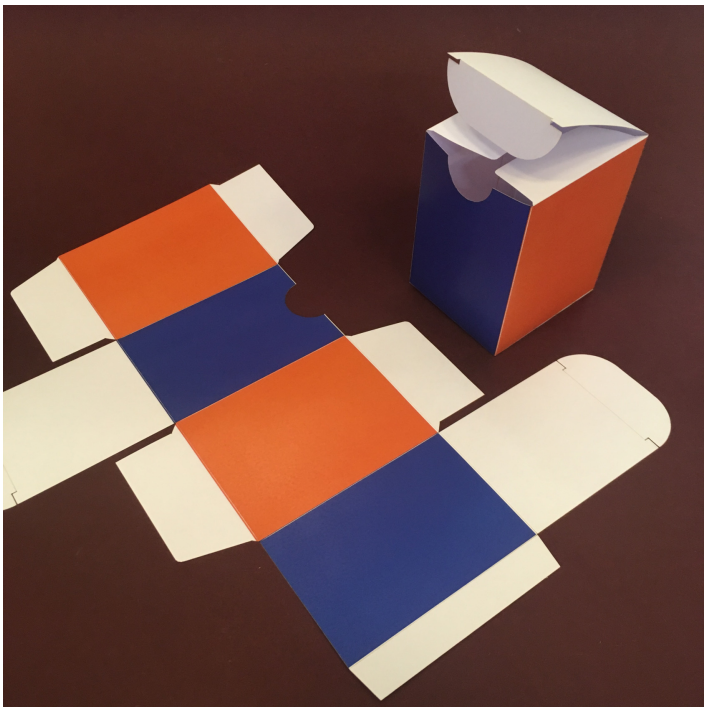
Below are examples of objects generated via free online services and some available for download.

Finger joint box (plywood and acrylic)



Made using **Makercase**.

Box net packaging (paper and card)



Made using **Template Maker**.

Finger joint box with lid

Download finger joint box plans **here**.

Heatbent box

Download heat bent box plans **here**.

iPad and iPhone exhibition security cases

Download ipad case plans **here**

Download iphone case plans **here**

Boxes.py

Boxes.py is an Open Source box generator written in Python. It features finger and (flat) dovetail joints, flex cuts, holes and slots for screws, hinges, gears, pulleys and much more.

Lasercut Living Hinge

If you're looking to create a “living hinge” – a laser-cut pattern that allows hardwoods and other non-flexible materials to bend with ease - there are some good templates online:

- **Flexible Book Hinge**
- **Smaller Book Hinge**
- **How-to and templates with a range of options**
- **Flexible cut kerf types**

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Laser cutter preparation - Video

Setting up the laser cutter for laser cutting

How to set up the laser cutter before running your files

https://www.youtube.com/embed/MpDPV8rOfio

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