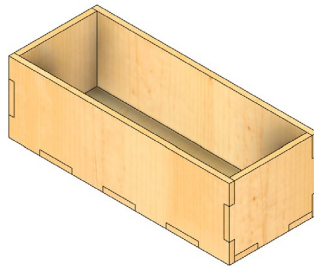


How to format your files for laser cutting

Being able to format your laser cut files is a very important skill to have in CreaTe. You will encounter laser cutting and 3d printing in almost every module, especially during project time.

We have created this document for you to refer to when needed. Using the below model as reference, this guide will take you through every step in correctly producing a formatted design.

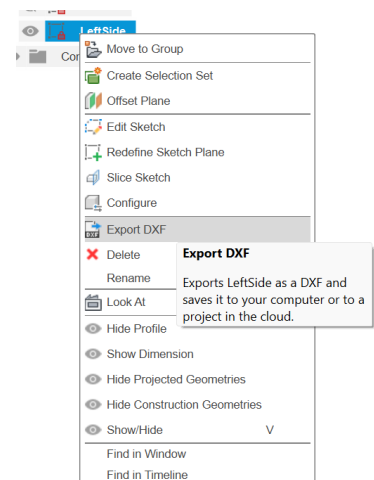
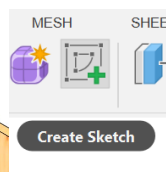
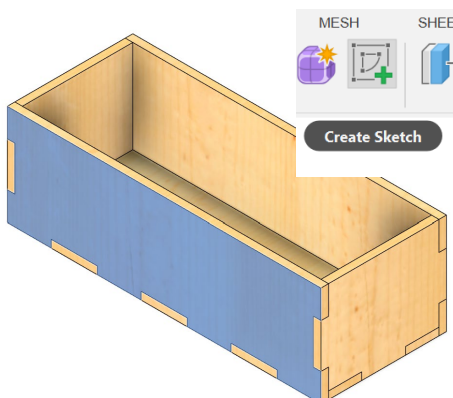


Fusion

Within fusion, once you have a completed a model that you would like to laser cut, you will need to individually create a new sketch and export as dxf for every face that you have.

1) Saving as .dxf

- a. Selecting one face at a time, create a new sketch on that face.
- b. Finish the sketch and **RENAME THE SKETCH** – this will save a lot of time later in the process
 - i. You can use names like: Top, Bottom, LSide / LeftSide etc.
- c. Once you have created and renamed the new sketches for each face, you can now begin exporting each sketch individually as dxf
 - i. To make file management a bit easier, create a new folder on your pc for all dxf files

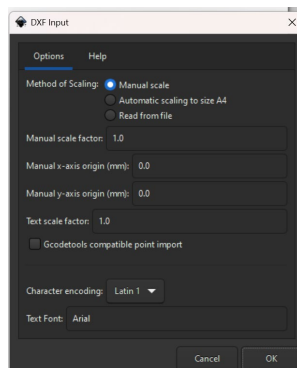


2) Importing into a vector editing software

- a. You can use any vector editing software (CorelDraw, Adobe Illustrator etc.); however, we will be using Inkscape as the desired software as it is free to download and use

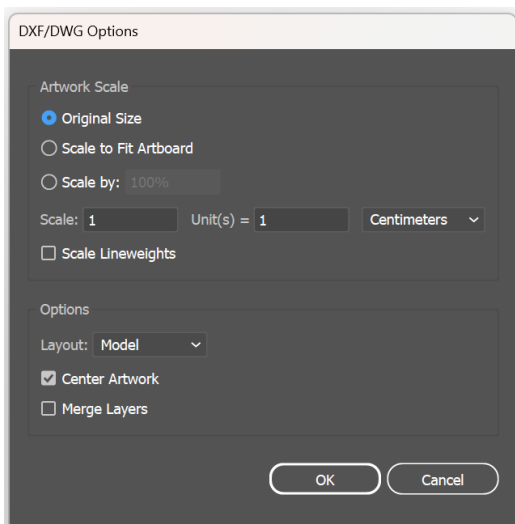


- b. Open a new design in Inkscape
- c. Import all dxf files that you have created
 - i. Now this is where you can encounter very annoying problems. When you import dxf files, the software prompts you to select scaling options.
 1. In **Inkscape**, it's very straight forward, simply press "okay" when prompted



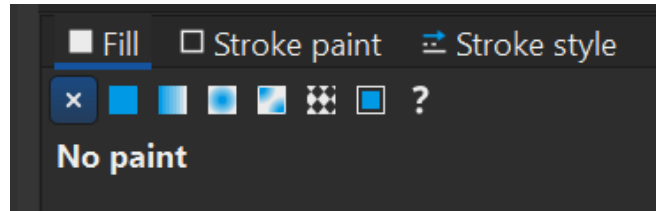
2. In **Illustrator** it's a bit more tricky.
You have two options:

- a. Either fit to Original Size
 - i. **USE THIS ONE!!**
- b. Or Scale by 100%
 - i. This does not scale to real world sizes (aka the dimensions you created in Fusion) and will most likely distort your design

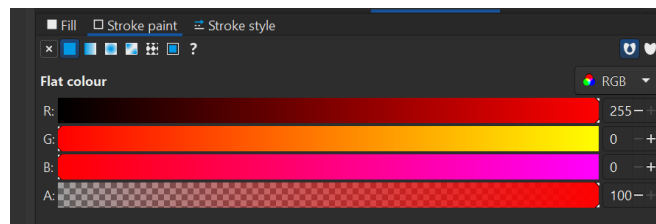


3) Correctly formatting the design

- a. Once all dxf files have been imported:
 - i. Make sure that the lines do not have any fill



- ii. Set the stroke colour to RGB Red (R: 255, G: 0, B: 0)



If you want to engrave an image or pattern onto your design, use either black or blue lines.

LASER CUTTING

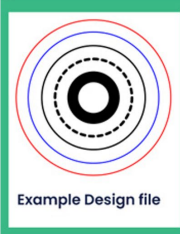
Line Types

To "understand" what our designs are, laser cutters use colour mapping:

- **RED** : Cutting
- **BLACK** : Engraving
 - Bitmaps / filled shapes
- **BLUE**: Etching
 - Fine lines / single paths

Thickness

- Hairline



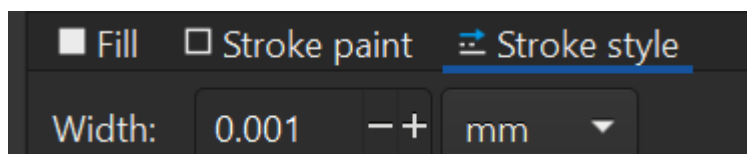
Example Design file

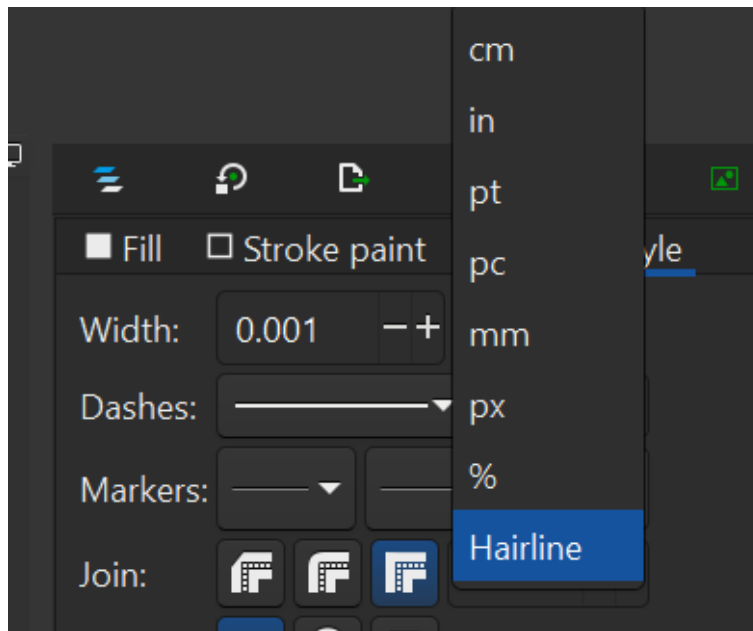


Finished Laser Cut Piece on plywood

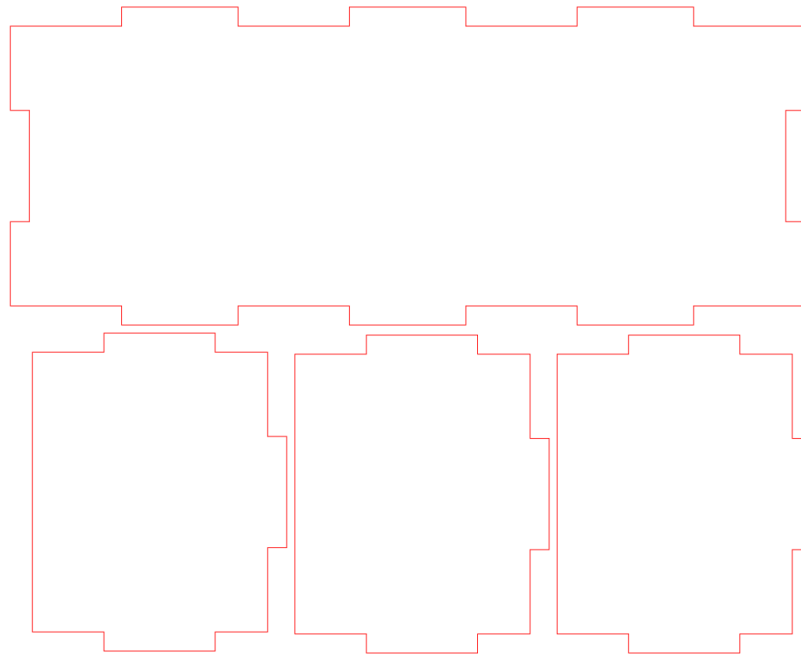
UNIVERSITY OF TWENTE

- iii. Set the thickness of the lines to HAIRLINE
 1. In Illustrator, there is no option for Hairline, so you will need to manually change the thickness to **0.001pt**





- iv. Try to arrange the designs to minimize space in-between each other. Avoid overlapping the designs.

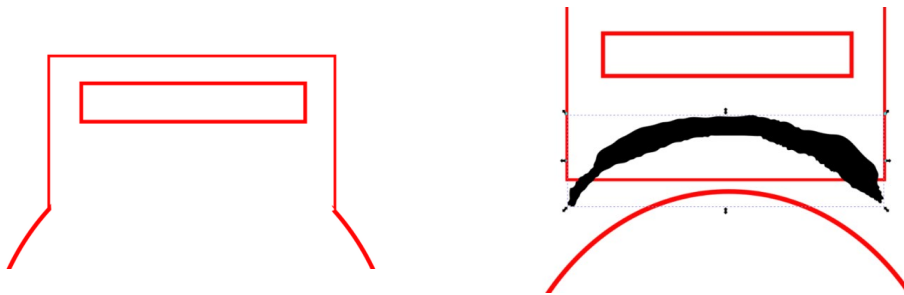


4) Things to look out for

There are a few problems that you must be aware of before you send the files to cut. In most cases you are only dealing with individual designs (no overlapping shapes), but in some situations you must take care in making sure the files are producible no matter how appealing they look.

a. Overlapping shapes / lines

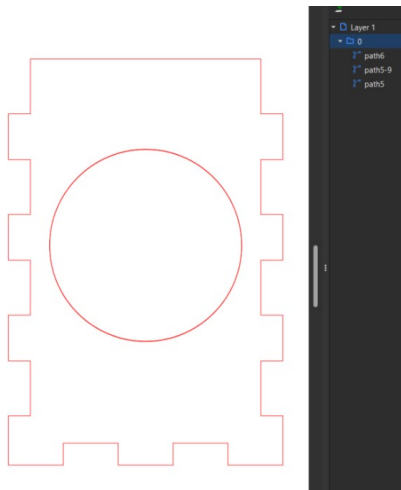
In this example you can make out two different shapes that “fuse” into each other. You might be tempted to erase or draw over the lines using a pen tool, however, what looks nice to us will probably not be interpreted the same with a computer.



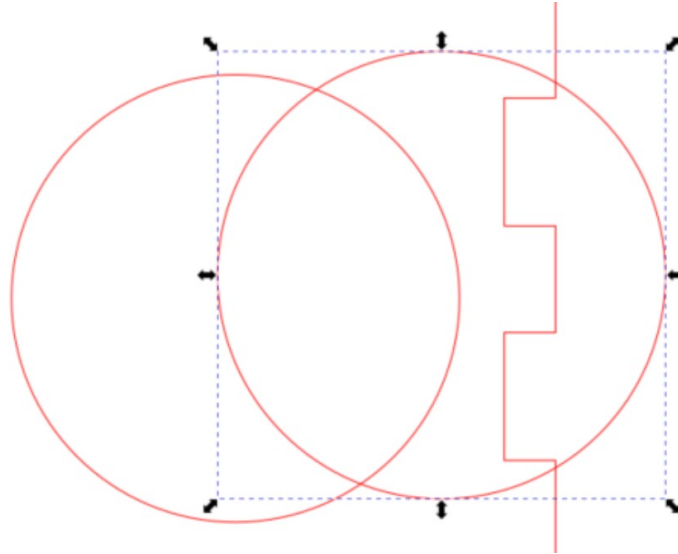
If you want to create a design with shapes that fuse into each other, go back to fusion and create an object with said design.

b. Duplicates

Sometimes duplicate lines are added into the design, again it might not seem like a big deal, however, the computer reads this as another line to cut. This can result in burnt wood or fragile pieces as the laser cutter goes over these lines two or more times.

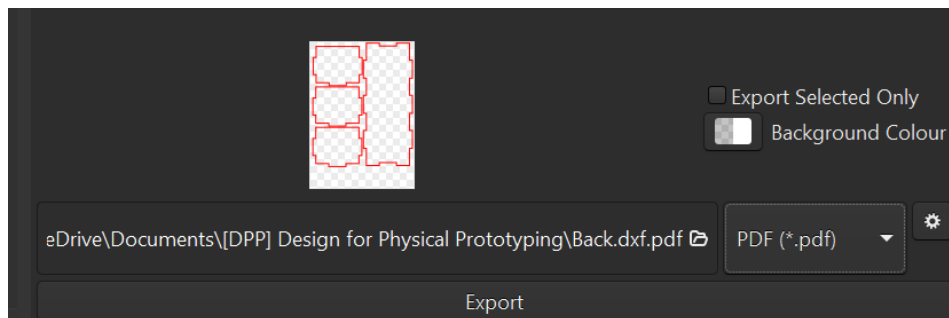


You can see how there should be only two paths in the hierarchy (one for the finger joint plate and another for the circle), however, three paths appear. If you find yourself in this situation, go over each object / path in the hierarchy to make sure there are no duplicates.



5) Exporting your design

You can now export the file as a **pdf**



6) Emailing your design

Congratulations! You have now correctly formatted your files that are able to be produced in the laser cutter. You can now email your file to:

smartxp-laser-3d@utwente.nl

Please make sure to mention:

- The desired material and thickness (e.g. Birch 4mm)
- How many pieces that you would like cut
- Mention if you have used Cut / Engraving / Etching in the file
- Other details that may be necessary for the cut

(Reminder to write a nicely worded email – it would be very much appreciated)