

# Work from Home Resources

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# 3D Scanning at Home Options

If you need to scan outside of the 3D Workshop there are photogrammetry software and apps available for this.

Photogrammetry is different than 3D scanning but the end results are the same, a digital model of a physical object. Photogrammetry involves taking photos of an object that a piece of software then generates a 3D Model from.

[Lynda.com](https://www.lynda.com) has a thorough how-to guide which explains photogrammetry and how to get the best results. This is an excellent starting point to learn more about photogrammetry.

## Photogrammetry software:

- [Meshroom](#) (Windows/Linux) is a free, open-source 3D Reconstruction Software based on the AliceVision framework.
- [Scann3D](#) (Android)
- [Scandy Pro](#) (iOS)
- [Qlone](#) (Android/iOS)

Many newer phones will also have a 3D scan option in the camera settings. Be aware that models generated by a smartphone are often not as good quality as a scanner or computer generated models.

## Manipulating 3D Scans

If you want to manipulate your model after you scan there are multiple ways that you can.

If you have some 3D modelling skills the best option is to use your scan as a base for modelling in a traditional modelling software. Both [Cinema 4D](#) and [Blender](#) are taught in the Digital Space if you want to learn how to 3D Model

[Blender](#) is an open source, free software which allows for traditional solid modelling as well as sculpting. On top of the training available in the Digital Space there are plenty of good tutorials available online and through [Lynda.com](https://www.lynda.com)

Sometimes this type of scan manipulation will produce files which may have holes or degenerate geometry which will not 3D Print correctly. To check and repair files you may want to consider using [Netfabb](#) (which is free for students).

The software currently only runs on Windows. There is an older, unsupported, version of Netfabb Basic for Mac which you may be able to find online (alternatively you can use on one of the computers in the 3D Workshop).

The following video explains how to fix files:

<https://www.youtube.com/embed/StqAtQIR3Bs>

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# 3D Modelling Software

## Free Software

[\*\*Blender\*\*](#) is the free and open source 3D creation suite. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, video editing and 2D animation pipeline.

[\*\*Sketchup Free\*\*](#) is a free version of Sketchup's 3D design software which runs in the browser and allows you to download .stl files for 3D Printing.

[\*\*Cinema 4D\*\*](#) offer educational licensing exclusively for training and learning purposes for instructors and students at qualified schools, colleges, universities and educational institutions. It may not be used directly or indirectly for commercial, professional or other profit-making purposes.

[\*\*Autodesk\*\*](#) also offer a range of free software for students and educators.

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# 3D Printing at Home Options

## Champion 3D

**Champion 3D** are based in South London are open 10am-6pm Mon-Fri and orders can be placed 24/7 online.

**Email** [questions@champion3d.com](mailto:questions@champion3d.com)

**Phone/Whatsapp** 020 3936 1003

**Website** [champion3d.com](http://champion3d.com)

## Designing for 3D Printing

**3D Verkstan** have produced a useful guide on [designing for 3d printing](#) which is worth reading to get the most out of the Ultimaker 3D printers.

## Getting Better Prints

There is also a useful guide on [3D Verkstan](#) with some tips on [how to get better prints](#).

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# Thing to consider when laser cutting externally

If you plan to use a laser cutting service outside of the university it is important to be aware that many companies will charge for fixing files if they are not correct. Preparing your file properly will save you time and money.

There are many different ways of running laser cutters so your first step should be to ask the company you are using if they have a basic setup guide. This should tell you how the company differentiates the processes, such as external cuts and engraving. Some do this with colours like we do in the 3D workshop. Others will require named layers.

Additionally there are a number of things you can do to ensure the files are as clean as possible. The tips below apply to all laser cutters and are good basic practice. If you follow these tips your files will cut quicker and they should not need fixing.

## **Check outlines**

In Illustrator, to view in Outlines (toggle Ctrl+Y.) This mimics how the laser cutter will “view” and process your drawing. If there are any vectors strokes that you don’t want to have cut or engraved trim using the Scissors Tool or delete.

## **Purge your file of artefacts**

Clear the all guides and stray vector points in your file to avoid confusion, a bad cut and wasted time.

1. Select Select > Object > Stray Points to delete stray vectors not attached to a path.
2. Select View > Guides > Clear Guides to delete all guides.

## **Remove double lines**

Lasers read exactly what is in the file. If there are 10 lines on top of each other the laser will cut that line ten times which will ruin the quality of a cut and also increase the potential for fire. If the laser is redoing cuts it has already done this adding to the time/cost unnecessarily.

An easy way to remove a lot over double/overlapping lines in Illustrator is to

1. Select all your lines with the selection tool (Black Arrow)
2. Click on the outline icon in the pathfinder panel

Screen Shot 2016-10-04 at 18.04.58-copy.png

3. This will remove the stroke colour making the lines invisible but simply select them again and add a stroke colour to see them. Now any double/multiple lines will be reduced to a single line.

This is not a perfect solution as the creating outline command will also divide and crossing vectors into their constituent parts so if there are only one or two overlapping lines it is best to simply click and delete them. The above is good solution if your file is riddled with multiple overlaps, say if you've flatten a 3 D file into 2 D.

### **Raster engraving lines & fills**

While you can raster engrave thin vector strokes, it's advised that you score them. This will be a lot quicker and will look better for very thin lines. Check with the company you are using to confirm how they differential their cuts (e.g a particular colour or layer name)

To turn a stroke into a filled shape:

- Set strokes to a minimum of 0.50mm (anything thinner won't engrave) • Expand strokes. Select Object > Expand > Stroke / Fill
- Set all fill colours to RGB black R 0, G 0, B 0.

### **Nesting components**

If compiling a file with lots of components on one sheet of material, make sure there is a gap of at least 3mm between the components and that they are laid out to save material and time.

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### **Small details / cut widths**

It is generally recommended that minimum cut widths be no smaller than the thickness of the material. E.G. If cutting from 3mm acrylic, it's best not to allow cut widths less than 3mm.

### **Close Vector paths/shapes**

Try and make sure that all your vector paths are continuous. If strokes/closed shapes are constructed from more than one path, make sure that you join/close the paths.

To do this, use the Direct Selection Tool and select the open endpoints. Select Object > Path > Join (Ctrl+J) from the top menu.

### **All text used needs to be outlined / converted to paths**

This is to convert the text to vectors and preserve your font. If you don't do this and the company does not have your font installed on their computers, the file will open in default font Myriad or Arial. The middle islands of some letters will fall out when laser cut which can make the text difficult to read. If you would like to prevent this you can work on the outlined text as shapes and

create a stencil.

Select text box and the Type > Font > Create outlines from the top menu

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### **Releasing all clipping masks**

You can't use the clipping mask function to draft a drawing for laser cutting. Vectors cannot be covered/hidden in a laser file, they need to be deleted.

To release clipping masks select all vector strokes and fills, select the mask then

Object > Clipping mask > Release

### **Kerf width/Slot together parts**

The nature of laser cutting means that a portion of the material is burnt away when the laser cuts through, leaving a small gap. This 'gap' is known as the kerf width and ranges in size depending on the material type, thickness and other conditional factors.

For a slot together project you will need to account for the kerf within your drawing by adding or subtracting the kerf width from your component dimensions. Generally for 3 to 6mm acrylic and birch plywood, a kerf of 0.25mm is adequate for push fit assemblies. This is a starting point, as could require changing so we recommend building a prototype first.

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