Bookable Resources - 3D Printer

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Why use a 3D Printer?

In essence, 3D Printers turn digital objects into physical ones.

3D printing (aka Additive Manufacturing) is now pretty well established in industry as a prototyping tool, and is becoming more common as a process for creating customised parts, parts on demand, or small production runs.

In the home, printers can be a marvelous tool for solving practical household problems—for example, by repairing items, or creating new items that are fully customised for their position or use case. Printers also can be used for fun, and are popular for making tabletop gaming minis, toys and artwork.

Getting Started

Induction & Booking

To use this equipment you will need to have completed a general induction (which brings you up to speed with the overall safety of the Fabrication Lab) and an additional, specific equipment induction. Check out the Inductions Page for more info.

Induction Info

After you have completed the inductions you will be able to book in to use the machines. Check out the Booking Policy page for info and book in via The Edge page on the SLQ Website.

Our Machines

We currently have 5 Prusa MK3s 3D Printers. They have a maximum build volume of 250 x 210 x 210 mm and they can print a wide range of materials and colours, though our default set up is grey PLA filament, and a 0.4mm nozzle.

One of our five machines is our 'experimental' machine where materials other than PLA (such as PETG, chopped carbon fibre, etc), different sized nozzles and novel techniques can be explored once your proposal has been approved by staff.

Our info about these machines

Manufacturer's info

Guides

The creation of a 3D print starts with a digital 3D model comprised of triangulated surfaces. The model is imported into a software program called a slicer, which works out the code for the 3D printer to follow. Once the object has been printed, there is often some post-processing (e.g., support material removal, sanding, assembly, painting) required.

To obtain a digital model you have 3 main options:

- Download them from websites such as Thingiverse, PrusaPrinters and My Mini Factory. PrusaSlicer will import *.stl, *obj, and *.step file types.
- Make your own using 3D modeling software:
    - **Hard surface modeling** which is great for if you're just starting out and allows you to make blocky objects. TinkerCAD or 3D Builder are great options, especially if you've never done any 3D modeling at all before.
    - **Sculpting** is great for making organic shapes like people, animals, trees or landscapes. It's akin to working a digital block of clay. A great piece of free software for this is SculptGL, though Meshmixer is another option.
    - **Parametric Design** is great for making highly dimensioned-objects. things that need very specific distances and angles for example tools, boxes etc. Fusion 360 is a common choice, as is FreeCAD. There's also OpenSCAD if you think you might like syntax-based parametric design.
- Another option for getting a 3D model is to scan an existing object into the computer. Photogrammetry software such as AliceVision is great for this if you want to use a digital camera you already have. The Fabrication Lab also has various other scanning technologies such as the Konica Minolta Laser Scanner.

Once you have your 3D model you will need to slice it to turn it into code the printer can read, this is done through software which is generally called a 'slicer' because it cuts the object into layers before working out the code. The most common slicers include PrusaSlicer (which we use here in the Fabrication Lab) and Cura. Both are free to download.

Then it's onto printing! There are many kinds of 3D Printers, but ours fall into the range of FDM (Fused Deposition Modeling) machines, which work kind of like hot glue guns that move around. These machines work by squeezing a plastic string called 'filament' through a hot nozzle (which melts the filament). As the filament is squeezed out, the nozzle moves around to draw cross sections of our object. After completing a cross section, the nozzle lifts up and draws another cross section of our object. In this way an object is built up in layers.

Once our print is complete we remove it from the bed and have a physical object! Woo! From here some people like to prime, sand, paint or otherwise 'finish' their models, though others like to leave them raw. If you do wish to paint your model, automotive primer/filler is great and acrylic paint is best. Depending on the shape of the object there may be some support material to remove (support material is set up in the slicer and provides a temporary structure upon which the printer nozzle can build part details that aren't otherwise supported by the build plate. Some people might also use 3D prints as a prototype or as a master for taking a mould and casting in another material like silicone or resin.

Our Standard Operating Procedures contain a basic workflow with a focus on safety.

Standard Operating Procedures

More information about 3D printing using our current machines can be found on their page.

Prusa MK3s info

Materials

The default filament we provide for use with our printers is grey-coloured PLA (polylactic acid). PLA is a thermoplastic polyester polymer made with the byproducts of renewable resources such as corn and sugar cane. It is a great material to print with, as it is really easy to work with and quite strong (albeit not particularly flexible). Its only real downside is that it can warp out of shape at relatively low temperatures (60°C) which makes it unsuitable for some applications (for example, objects intended for use inside a hot car). If different material properties or colours are required, we do have an experimental printer where we can print other thermoplastics such as PETG and flexible filaments. We have some of these in stock, but not all materials are suitable for use in our facility. Have a chat to us before you buy stuff.

Currently we don't charge for 3D prints unless you are doing a lot of printing/ using a lot of material, as the material cost is relatively negligible. If you plan on doing large runs of items, printing very large things, or running jobs with long print times, have a chat to us so we can work out a plan.

More info

There are many communities (external to State Library Queensland) that have been built around 3D Printers, which each host a lot of information if you would like to learn more, including:

- The 3D Printing Discord is great for help and friends and also maintains and excellent wiki which is jam-packed with resources
- The 3D Printing Subreddit is a great place to get inspiration about projects