3D PRINTERS - NOTES FOR MODELLERS

"Small-volume plastics manufacturing in the home"

1) TWO BASIC PRINTING METHODOLOGIES

Both types accept the 'xxxx.STL' file type as a starting point (see section 4 below). Both use the principle of building successive layers on a flat, level build plate which is finely-driven to allow each layer to set (or partially set) before the next layer is laid on top of it.

A. FDM (Fused Deposition Modeling)
The working principle of 3D printers based on FDM Technology is to extrude the melted thermoplastic onto the 3D printing platform, layer by layer until the final 3D model is finished. There are more kinds of 3D printer materials using FDM technology, from common ABS, PLA to composite materials doped with a variety of reinforced powders, which makes the FDM 3D printer used widely.
Material = Polylactic acid (PLA) is a biodegradable thermoplastic derived from renewable resources like cornstarch or sugarcane.

B. SLA (Stereolithography)
The SLA 3D printer uses a UV laser or a light projector to continuously track each slice layer of an object, solidify the photosensitive resin into a hardened plastic until the final 3D model is finished.
Material = UV-curable photopolymer resin

2) MANUFACTURERS OF HOME-USE PRINTERS

Home-use printers start at around £120, up to >£1000. Some manufacturers expect users to tinker with and fix or upgrade their printers themselves, even when under warranty!

A. **Creality** - entry-level printers, both SLA and FDM. Generally good quality, but personal experience is that when (not 'if') they go wrong, Creality will support the user/owner but will not repair, even under warranty.

B. **Bambu** - somewhat higher level of quality and support. However they have recently insisted that models created over a network do so via their own servers (headquartered in China!). Don't think they produce SLA printers, just FDM.

C. **Elegoo** - good level of quality and support, but no personal experience. Produce both SLA and FDM printers.

D. **Anycubic** - good level of quality and support, but no personal experience. Produce both SLA and FDM printers.

E. **Flashforge** - no personal experience. Produce only FDM printers.

F. **Prusa** - Prusa Research was founded as a one-man startup in 2012 by Josef Prusa, a Czech hobbyist, maker and inventor - and now one of the most famous names in the 3D printing industry.

3) MANUFACTURERS OF HOME-USE 3D PRINTING MATERIALS

Lots - mainly Chinese origin - search for '3D printing PLA filament' or '3D printing resin' (e.g. on Amazon or Google search engine). Some printer manufacturers produce their own filaments and resins, but there is no requirement to use 'own-brand' materials.

4) SOURCES OF RAILWAY MODELLING FILES FOR 3D PRINTING

Various web sites, including:

www.yeggi.com	www.thingiverse.com	www.cults3d.com
www.printables.com	www.makerworld.com	www.thangs.com

5) PRODUCERS OF 'SLICER' SOFTWARE

This is computer software (Windows/Mac/Linux) that converts the 'STL' model files to code that is specific to the printer being used to create the 3D model.

Prusa Slicer (FDM)	Creality Slicer (FDM)	Ultimaker Cura Slicer (FDM)
Bambu Studio Slicer (FDM)	Creality Halot Box (SLA)	Lychee Slicer (FDM)

6) PRODUCERS OF CAD PROGRAMS

Unless downloading a ready-made 'STL' file, a CAD (Computer-Aided-Design) program is needed to create the necessary 3D STL file.

A. **TINKERCAD** - produced by Autodesk and free for use as an online tool. Can upload and export STL files for creation and/or modification. Has limitations on file sizes, but no cost involved for home use. Can achieve some surprisingly detailed models.

B. **FreeCAD** - free to use as the name suggests. Personally, I have never got on with it!

C. **Blender** - free to use. No personal experience.

C. **Autodesk Fusion for Personal Use** - free download from AutoDesk (AutoCAD). Very detailed models possible, but steep learning curve if you are unfamiliar with CAD programs.

D. Others exist, paid for and free to use for home-use, but the learning curve for CAD programs can be quite high.