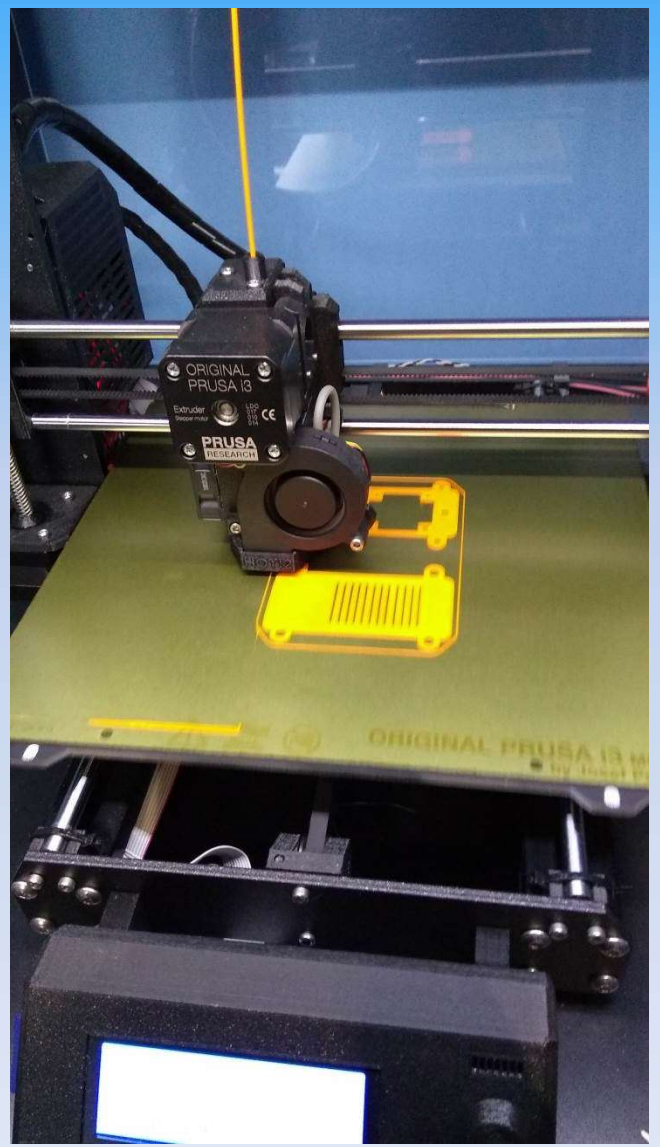
3-D Printing for Amateur Radio

Gareth Evans – G4XAT

Topics

- Brief history
- Three types
- The ‘cheap’ one…
- Machine choice
- Filament types
- File sources
- CAD packages
- Questions

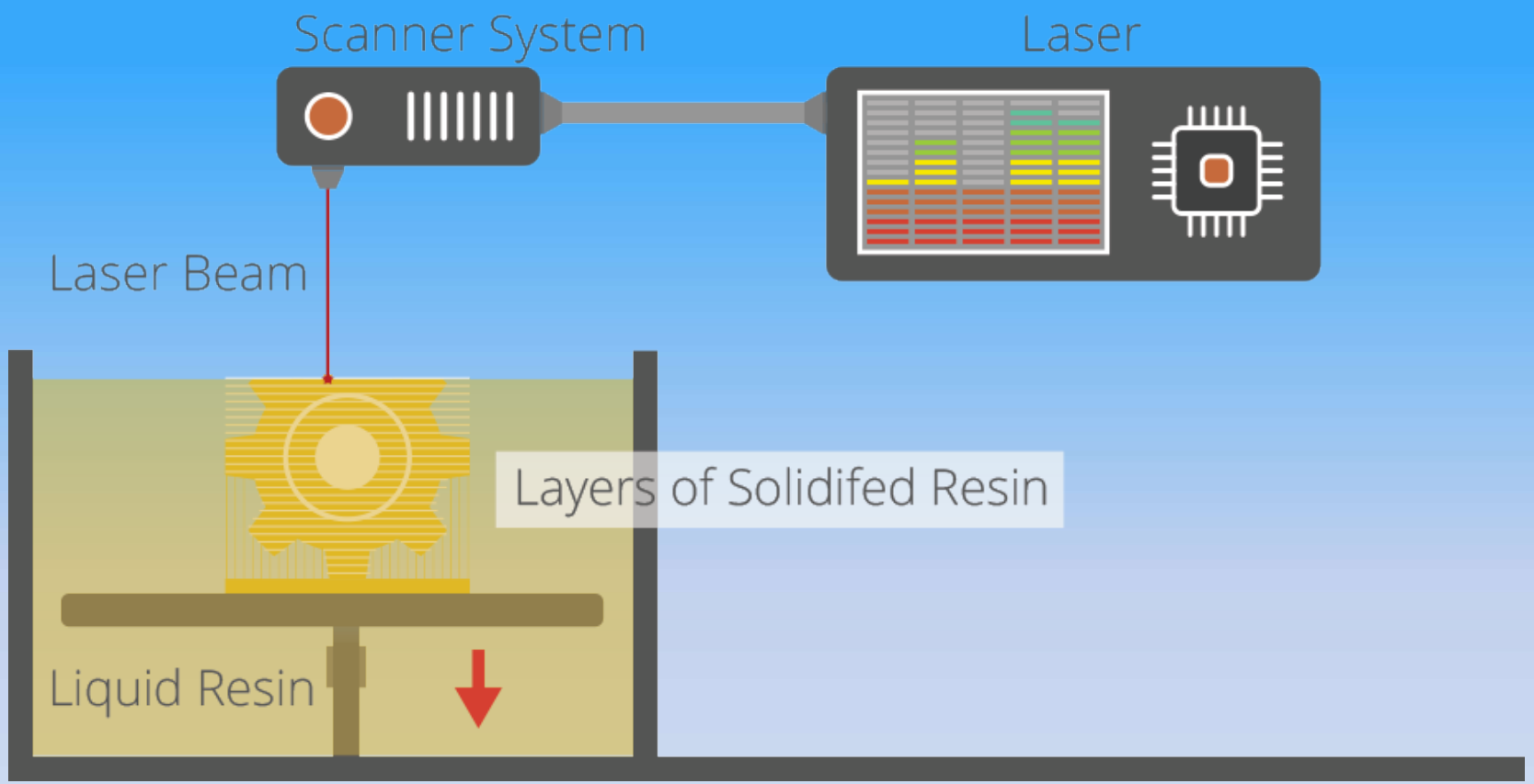


RAPID PROTOTYPING

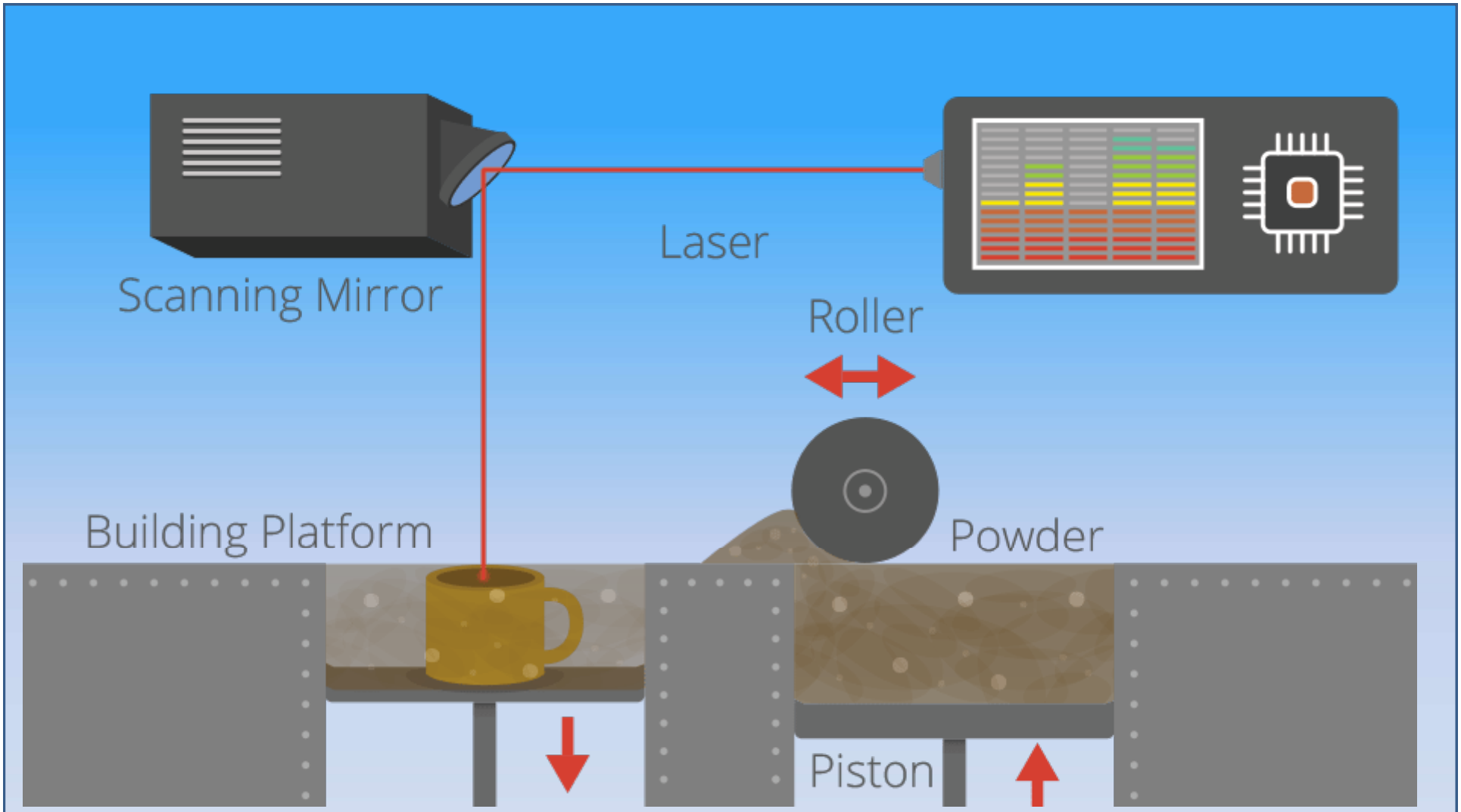
- Around about 2000 I went on a one day visit to Warwick University Rapid Prototyping Centre.
- An industry sponsored development / display facility which featured…
- Three methods of the then new emerging technology that has become…..
- 3-D printing

There are 3 main technologies…..

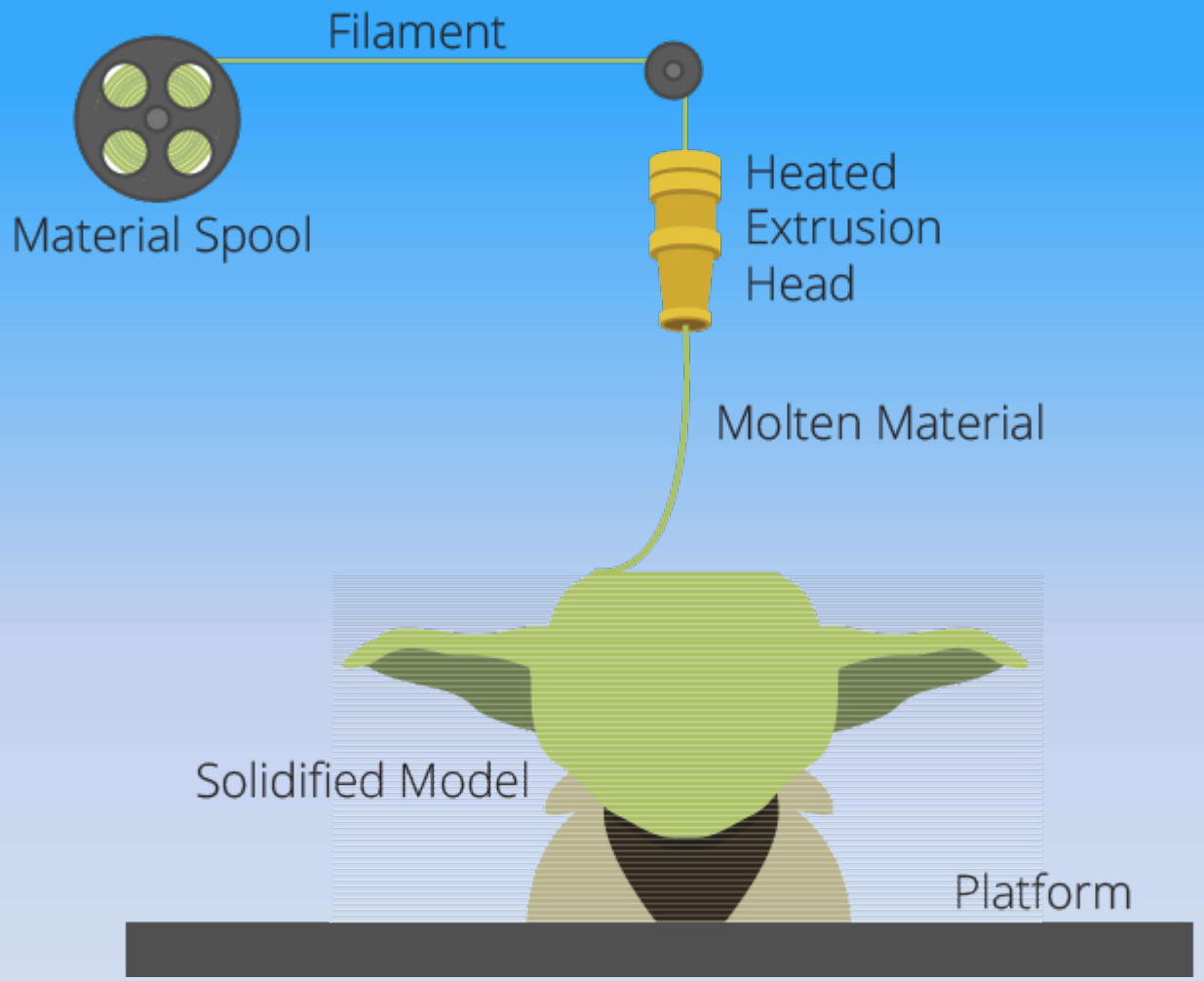
- Stereo lithography (~~£££££~~’s)
- Laser sintering (~~£££££~~’s)
- Extrusion or Additive printing, AKA F.F.F. / F.F.M. (Free Form Fabrication / Manufacturing) (£150-£5000)
- In the hobby marketplace F.F.M. is usually what people assume you are talking about if you say ‘3-D Printing’ ….



Stereo lithography……high capital cost and running costs, messy to clean up the print – solvent etc etc

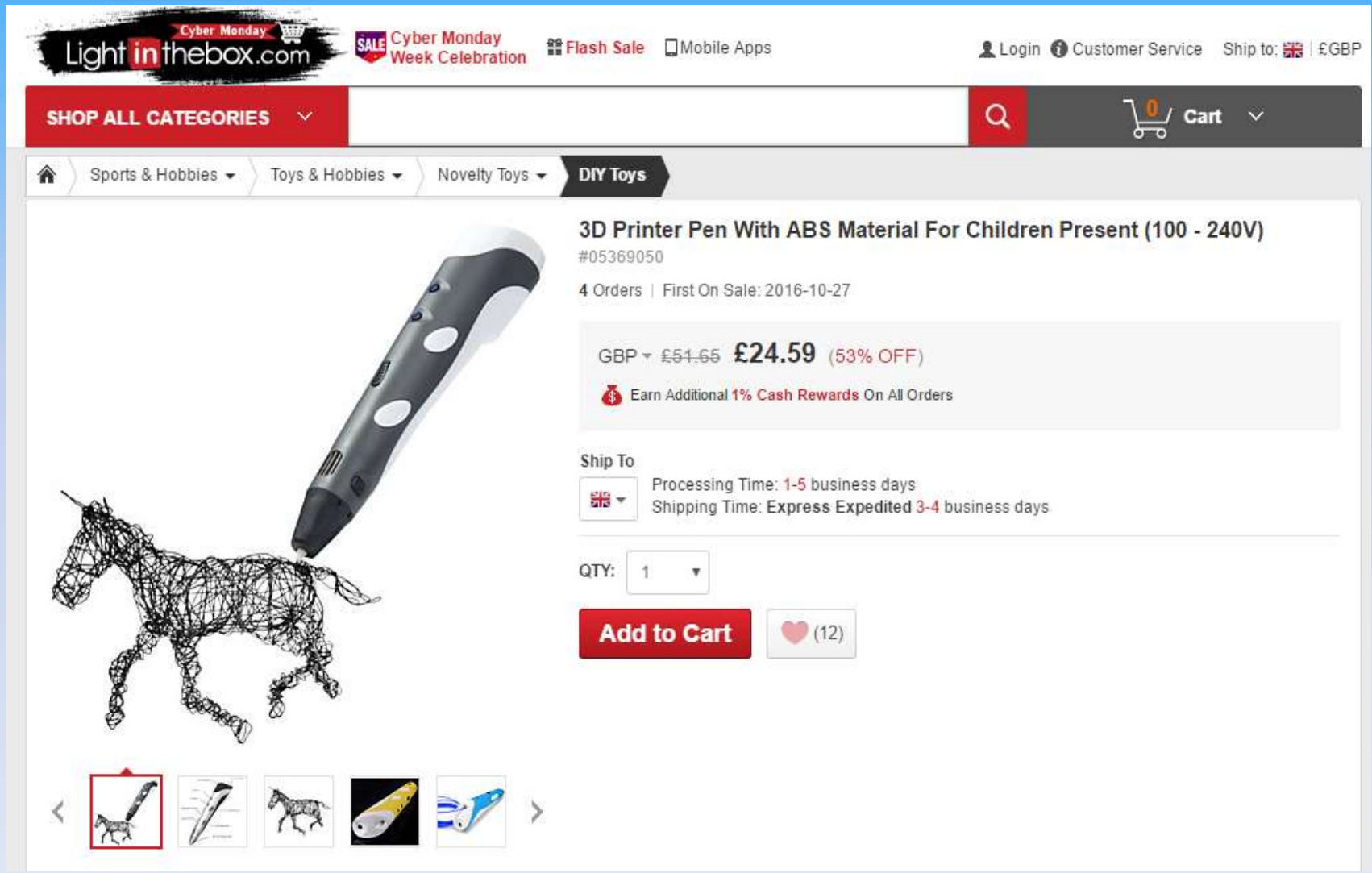


Laser sintering….high capital cost, slow, surface finish rough – its like a sandcastle…..built one grain at a time…..



Extrusion or Additive printing, AKA F.F.F. / F.F.M.
(Free Form Fabrication / Manufacturing).
The head is MUCH closer to the job than shown.....
The layer height can be from 0.05mm up to 0.3mm (on my printer)

So which method are we talking..



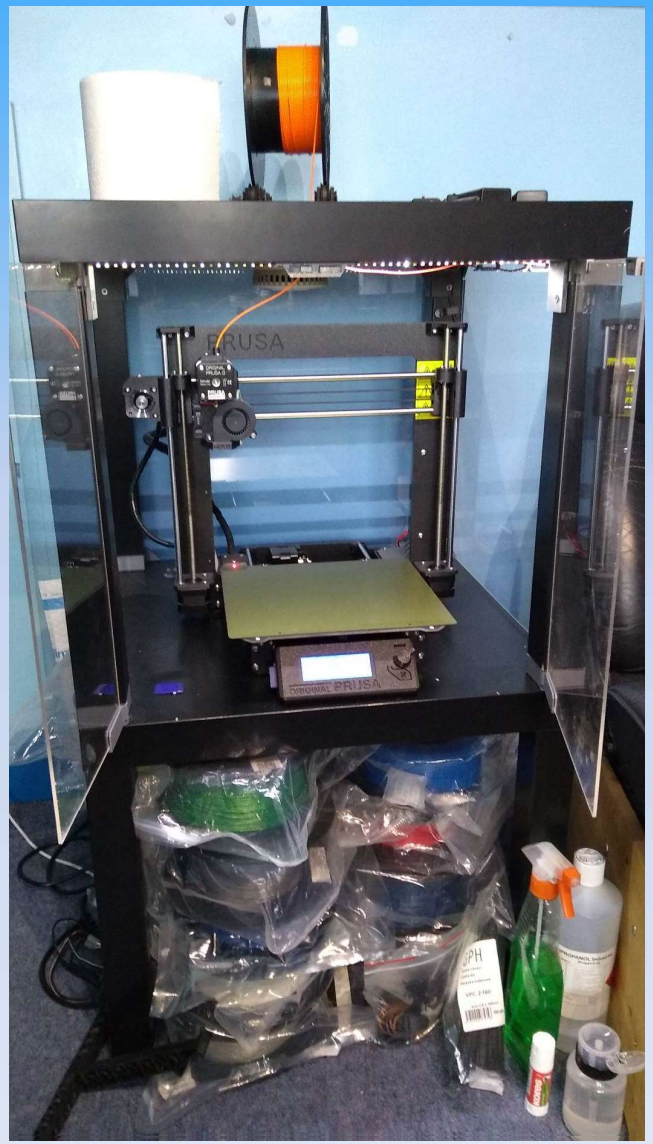
OK, I'd like one. How much?

- Cheap Chinese 'clones' of the original 'Rep-Rap' concept - £150 (plywood, cheap PSUs)
- Hobby machines (Aldi+Lidl, around £300)
- PRUSA I3 (was recommended to me) £700 (https://www.prusa3d.com/about-us/)
- Self-assembly or add £200 for ready built
- Makerbot – a range of machines £2000++
- After sales/build volume/multi-material
- You tend to get what you pay for (as life)

Yes but I need something that…

- These types of printer all use a plastic ‘filament’ raw material, there is a wide range to suit the end application…….
- PLA, PET-G, ABS, CPE, CPE+, PC, Nylon, TPU 95A, PVA - yes wood glue – soluble support structure!
- Poly-lactic Acid, Polyethylene Terephthalate-Glycol, Acrylonitrile-Butadiene, Chlorinated Polyethylene, Polycarbonate, Nylon and Thermoplastic Polyurethane and many more including ‘flexibles’ (like a hard rubber)

Printing tips:



- Set up the printer as per makers specifications
- Keep clean and dust free
- Clean the bed plate every print – IPA for PLA
- Keep filament stock dry
- Add a smoke / heat alarm
- Learn to use CAD ☺

Sources of .stl (STereoLithography)

- Of course the www is full of sites offering files to print and printed files (£'s)
- www.thingyverse.com has a huge repository of things you may need (or not)
- There are others with similar offerings – GOOGLE is your friend ☺
- Or learn a CAD package… 'NEEDS MUST'!
- Which is exactly what drove me…..
- to learn Autodesk Inventor for my Portsdown..

Which CAD package?

- But we amateurs like free stuff…..
- Designspark Mechanical by RS components
- FreeCAD
- Fusion 360
- Onshape
- OpenSCAD
- Tinkercad and many more….
- An abundance of ‘how-to’ tutorials or ‘Youtube’ clips to help you complete tasks
- It’s ADDITION manufacturing, not attrition….

Any questions?

- Please browse the many and varied parts here to illustrate what's possible
- Some from Thingyverse….
- Some from a need….(my son Josh's work)
- Contact Gareth at g4xat@ntlworld.com