3D Printing

Full range of 3D Printing products available at:

www.rapidonline.com

3D Printing Guide

Designing a model

Don't fall into the trap of merely demonstrating the process by downloading and printing files from the internet. 3D printers can form an invaluable part of the design process, but you will need to be able to create 3D models using one of the many pieces of 3D CAD software that exist on the market if you are to get the most from your printer.

The good news is that the software doesn't have to cost anything. There is a wealth of CAD tools available that are free to use and that will give you all the features that you will ever need. The other good news is that the days of needing high-powered workstation computers for CAD are also a thing of the past which means you have probably already got everything you need to start using this kind of software in your school.

If you have no CAD experience at all, Tinkercad is a great place to start. It runs in your browser window and allows you to "borrow" other Tinkercad users projects and modify them, which is a great way to see how others create 3D models and work your way up to creating your own designs from scratch. For those that fancy something a bit more high-end, have a look at Fusion360 – industry-level CAD software which still has a shallow enough learning curve to make it accessible to novices.

www.tinkercad.com

www.autodesk.com/education

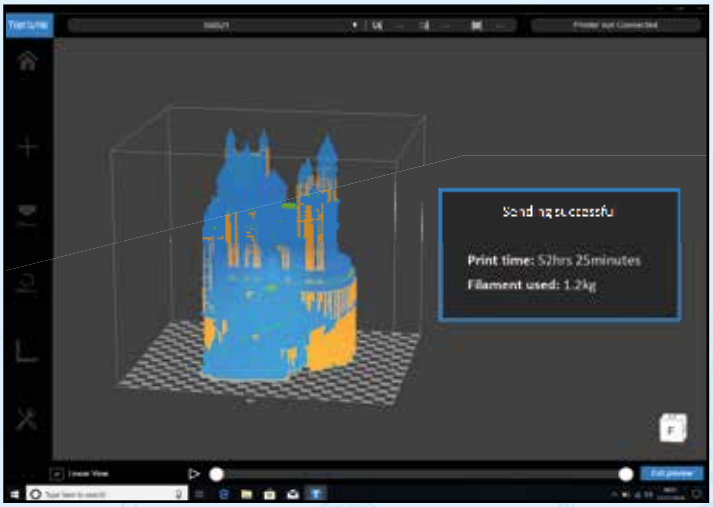
3D printer comparison chart

Model	Order Code	Price	Build Volume	Layer Thickness	Heated bed	Filament Material
UP Mini 2 ES	25-0234	£569.00	120 x 120 x 120	0.15mm to 0.4mm	Yes	ABS/PLA/Nylon
UP 300	25-0233	£1,548.90	205 x 255 x 255	0.05 to 0.4mm	Yes	ABS/PLA/Nylon/Flexible
Dremel 3D45	25-0536	£1081.99	150 x 255 x 170	0.05 to 0.3mm	Yes	PLA/ECO-ABS/Nylon
Pursa i3 MK3S	For comparison only	£577.69	250 x 210 x 210	0.05mm	Yes	ABS/PLA/Nylon/Flexible
Robo C2		£665.83	127 x 127 x 152	0.02 to 0.3mm	No	PLA
Makerbot Replicator Mini		£1,210.00	100 x 125 x 125	0.2 to 0.4mm	No	PLA
Ultimaker 2+		£1,790.99	225 x 225 x 205	0.02 to 0.6mm	Yes	ABS/PLA/Nylon/Flexible

Time

The process of 3D printing is quite slow, especially when using the extruded plastic filament style machines which are the type most commonly used in schools. If you are creating a particularly large piece, it's not unheard of for prints to take 20 hours and with a class of 20 students in a D&T workshop, you could be looking at weeks of print time to get through everybody. Because of this, it's important to get your students to design objects that can be 3D printed in a set time frame.

The Airgineers Micro Drone project is excellent for this – frame designs can usually be printed in less than 2 hours.



Make parts, not entire objects

Once you have mastered CAD, it's tempting to make some extremely complex models to print. However, 3D printers lend themselves to making parts much better than making entire objects. For example, if you were making an architectural model of a building, rather than trying to 3D print the entire design, use laser or hand cut modelling board for large flat expanses like walls, but use 3D printed parts for items such as corbels, buttresses, staircases or other intricate shapes.

Think about the process of 3D printing when you are deciding what is the best tool for producing your part. To minimise post-production work, you want your model to require as little support material as possible which can be helped by choosing the optimal orientation on the bed when printing the part or minimising the number of overhangs where the angles are greater than 45 degrees, since most printers can happily print 45 degrees or less with no support material at all.

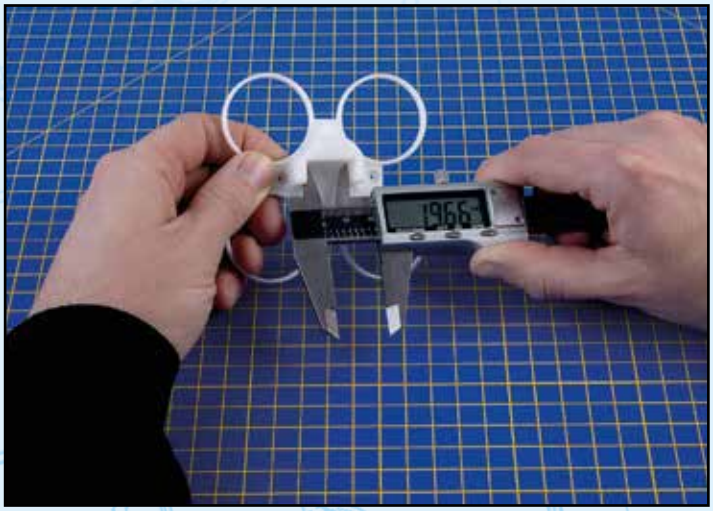
A question of capacity

When selecting a 3D printer, the vast ranges of different machines and specifications can make choosing the right one a daunting task. One of the factors that needs to be considered is the build volume which controls the maximum size of object that you can produce. Printers with a bigger build volume tend to be more expensive but bigger is not always better, especially in a classroom environment. Sometimes, having a larger number of smaller machines can be more beneficial than one large one because whilst you can place lots of different models on a large bed to be produced at the same time, you need to wait until all the models have finished printing before the students can get their hands on their designs. Why is this a big deal? Because design is always an iterative process and you probably won't get it right first time. By having a greater number of smaller machines, you maximise the amount of availability for starting new prints which means students can get their designs manufactured as soon as the next iteration is ready.

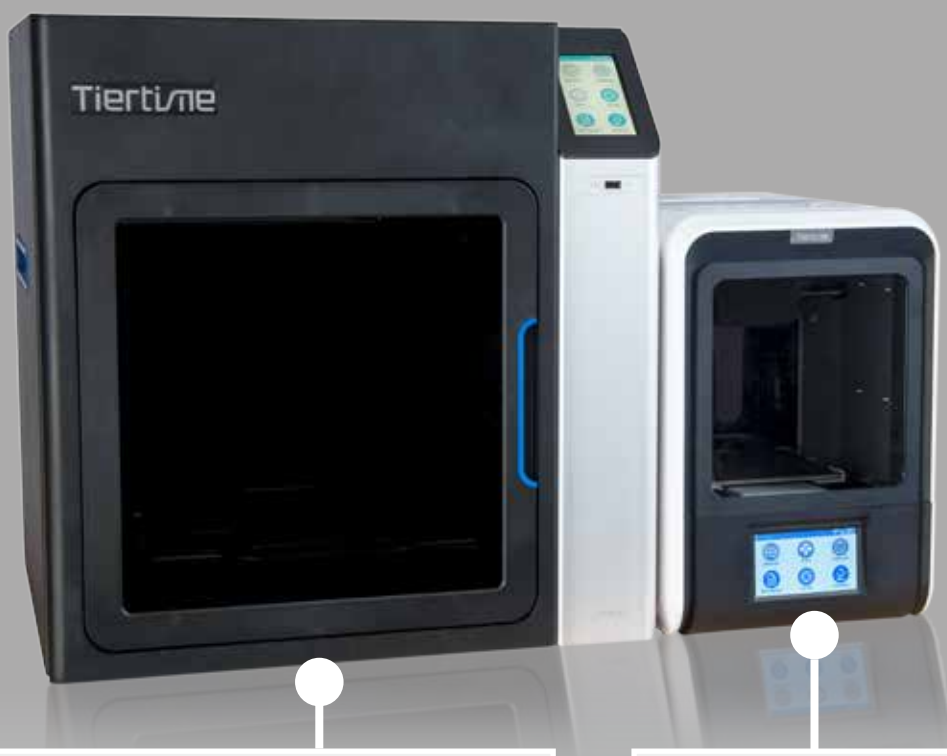
The UP Mini 2 is perfect for this. At £465, you can have three machines and plenty of spools of spare filament for less than the price of a larger machine like an Ultimaker 2+.

Get to know your 3D printer

Make sure you experiment with your machine so that you know how it is going to perform. This knowledge will help you to give good advice to your students when they are designing parts. How much shrinkage will they need to accommodate? What is the smallest wall thickness it can reliably print? It's also a good idea to have a few ready-made example models which can be used to demonstrate how long a print of a given size is likely to take.



	Connectivity	Fully Enclosed	HEPA Filter	Calibration
	USB, WiFi, Ethernet, USB memory stick	Yes	Yes	"Auto nozzle height, Software assisted levelling"
	USB, WiFi, Ethernet, USB memory stick	Yes	Yes	Automatic
	USB, WiFi, USB memory stick	Yes	Yes	Manual
	USB	No	No	Automatic
	USB, WiFi, USB memory stick	No	No	Automatic
	USB, WiFi	No	No	Manual
	USB, SD Card	No	No	Manual



Tiertime

UP300

The Tiertime UP300 3D printer has been designed for users demanding a large build volume and consistent performance across different materials.

Each machine is supplied with three different extruders, each optimised for a different type of material meaning each print can be completed without compromise.

- 205x255x225 build volume
- Heated bed
- Automatic nozzle height detection and calibration
- 0.05mm layer thickness
- Includes three extruders for optimum material compatibility
- Colour touch-screen
- USB, WiFi, LAN and USB stick connectivity
- Includes roll of ABS filament, tools and cables

£1548.90
Order code 25-0233

UP mini 2 ES

Based on the original UP mini 2, the UP mini 2 ES 3D printer offers the same benefits that made its predecessor a best-seller with the addition of an enhanced touch screen, ethernet connectivity and the ability to print STL files directly from a USB memory stick without the need for a PC.

- 120x120x120 build volume
- Heated bed
- Automatic nozzle height detection
- 0.15mm layer thickness
- ABS and PLA printing
- Colour touch-screen
- USB, WiFi, LAN and USB stick connectivity
- Includes roll of ABS filament, tools and cables

£569.00
Order code 25-0234

Both models are fully enclosed designs with integrated HEPA filters which are strongly recommended for use in a classroom environment.

High Quality Consumables

From as little as
£13.99
per spool

ABS and ABS+ 500g Spools

ABS requires a higher operating temperature than PLA but is better for interlocking parts where a little bit of flex is required. ABS+ is stronger and less prone to warping than standard ABS.

- Supplied in **packs of 2 spools**

ABS	Price	Colour	ABS+	Price
25-0231	£27.99	Red	25-0225	£42.00
25-0232	£27.99	Yellow	25-0224	£42.00
25-0229	£27.99	Green	25-0223	£42.00
25-0228	£27.99	Blue	25-0222	£42.00
25-0227	£27.99	White	25-0221	£42.00
25-0230	£27.99	Black	25-0219	£42.00

PLA 500g Spools

Requires a lower operating temperature than ABS and is more forgiving so can be easier to print with.

- Supplied in **packs of 2 spools**

PLA	Colour	Price
25-0226	Hawaii Blue	£33.98
25-0217	Rio Green	£33.98
25-0218	Pompeii Grey	£33.98

Tel: 01206 751166 Fax: 01206 751188

DREMEL
BIG ON DETAIL

FREE TEACHER NOTES

Bring your ideas to life with easy and reliable 3D printing. From experimental creation and design to prototyping for beginners and experts.

A variety of filament types, supported by RFID filament recognition, assisted build platform leveling and Wi-Fi connectivity allow you effortless and successful prints for your 3D printing purpose.

£1081.99

Order code 25-0536

FREE
One 500g reel of each green, blue, red and white PLA filaments

Dremel Digilab 3D Printer 3D45

- The innovative extruder with active filament monitoring ensures successful builds
- WiFi and integrated camera – Print and monitor your 3D object remotely
- Print in multiple materials – PLA, Eco-ABS, Nylon
- RFID filament recognition – Printer automatically adjusts settings by reading the filament RFID tag
- Heated bed – For optimal printing results
- Accurately calibrate your build platform with Quick Level – Guided 2 point levelling
- The full colour touch screen allows you to optimally preview your 3D object
- The 3D printer has a large removable build platform for your bigger projects
- Maximum build volume: 25.5 cm x 15.5 cm x 17.0 cm
- The enhanced cooling system prevents warping and keeps the objects crisp
- Odorless Printing – Added filtration to minimize smell of some materials
- BOFA 3D filtration compatibility
- **Free teacher notes**

Dremel Filament 500g Spools

Type	Colour	Printer	Order code	1+
Idea Builder, Build Tape		3D40	**25-0534**	14.99
PLA Filament	White	3D40/3D45	**25-0521**	16.65
PLA Filament	Black	3D40/3D45	**25-0522**	16.65
PLA Filament	Red	3D40/3D45	**25-0523**	22.23
PLA Filament	Orange	3D40/3D45	**25-0524**	16.65
PLA Filament	Purple	3D40/3D45	**25-0525**	22.65
PLA Filament	Blue	3D40/3D45	**25-0526**	16.65
PLA Filament	Green	3D40/3D45	**25-0527**	16.65
PLA Filament	Silver	3D40/3D45	**25-0528**	16.65
PLA Filament	Gold	3D40/3D45	**25-0529**	16.65
PLA Filament	Translucent Whiter	3D40/3D45	**25-0530**	16.65
PLA Filament	Pink	3D40/3D45	**25-0531**	16.65
ECO-ABS Filament	Black	3D45	**25-0532**	20.99
Nylon Filament	Black	3D45	**25-0533**	25.99

FLASHFORGE® 3D PRINTER

Hunter DLP Resin 3D Printer

NEW

The **Flashforge Hunter** is a professional grade industrial desktop **3D printer** that utilises photosensitive resin to produce high resolution, high quality 3D prints quickly and easily.

The printer is especially designed for use for prototyping and in the dental and jewellery industries. The hardware and software promotes the establishment of data libraries for common designs whilst still allowing for precise and personal designs. Products are economical and convenient to print and suit a well ordered workflow. The printer uses **FlashDLPrint** software to slice the 3D model files to prepare them for processing, producing an SVGX file that can be printed.

The **Hunter** uses Digital Light Processing (DLP), a new method of 3D printing where the image signal is first digitally processed before being projected into the photosensitive resin vat to produce a smooth and high resolution solid 3D model. The process is known as **Stereolithography** and is a form of 3D printing technology that is used for creating models, prototypes, patterns, and production parts in a layer by layer fashion using photochemical processes by which light causes chemical monomers to link together to form polymers. Those polymers then make up the body of a three-dimensional solid.

This printer is ideal for high quality, high resolution, small, integrated printing such as jewellery and dental making it ideal for use in both industry and education, across a variety of applications.

- Digital light processing 3D printer used in prototyping, dental and jewellery market
- FHD 1080p resolution and 50,000 hours life span
- Micron accuracy, achieving smoother printing surface
- Build volume 120 x 67.5 x 150mm
- Adjustable layer resolution
- 4.5" Touch screen with simple and intuitive user interface
- Built in resin setting in slicing software
- Aluminium resin vat, long service life, easy replacement
- jewellery support mode for producing casting models for jewellery and accessories
- Grey compensation algorithm ensures a smoother model surface
- Distortion correction algorithm ensures high dimensional accuracy of prints
- Multiple connectivities USB, memory stick, Wi-Fi
- Software supplied on USB stick in accessories kit (included)

Order code **25-0054** **£2795.00**

Technical specification

Print technology	Digital Light Processing (DLP)
Screen	3.5in Colour IPS touch screen
Build volume	120 x 67.5 x 150mm
Layer resolution	0.025 to 0.02mm
Print accuracy	± 0.05mm
Positioning accuracy	1920 x 1080 pixel
Material	Photopolymer resin
Build speed	10mm/h
Light engine life span	50,000 hours
Software	FlashDLPrint
Support formats input	3MF/STL/OBJ/FPP/FDP/SLC
Support formats output	SVGX
OS	Win XP/Vista/7/8/10, Mac OS, Linux
Product Dimensions	560 x 360 x 320mm
Net Weight	17.8kg
AC Input	100 to 240VAC, 47 to 63Hz, 65W
Connectivity	USB cable, USB stick, WiFi

Kit includes:

Photopolymer resin 500ml	Brush
Power cable	Metal scraper
USB Cable	Plastic scraper
Power adaptor	Rinse bucket
Quick start guide	Soft cloth
Vat film	Filter screen
Gloves	Accessories kit
Spare screw kit	

Accessories kit contains:
Hexagon wrench (2.5mm x 1/3mm x 1/5mm x 1), Phillips screwdriver, USB stick, Plastic tweezers)

Spare Screw kit contains:
Hexagon socket head cap screws, flat washer, spring washer)

Standard Uncastable Resin for 3D Printing 500g Bottle

A 500g bottle of standard uncastable resin for the use of the **Flashforge Hunter DLP 3D Printer** (Order code **25-0054**).

- Colour grey

Order code **25-0056** **£85.00**

THE TOOL FOR THE DIGITAL CRAFTSMAN

MFS1V2 Desktop 3D Scanner

The new V2 version desktop 3D digital scanner from Matter and Form is the perfect tool for the 3D scanning of objects and creation of 3D printable files.

Using an eye-safe laser scanner and the MFStudio with +Quickscan software you will be able to capture a digital replica of your object with up to 0.1mm accuracy. Suitable for anyone - from beginner to pro - and designed for many applications such as archiving, art, design, modelling, etc. Set up and scanning is quick and easy, with just 65 seconds required for a single scan, and the unit will produce 3D printable files that can be used with all 3rd party 3D printers and modelling programs to produce your amazing models.

The scanner has fully customisable controls and will manage your project workflow. Full documentation and live customer support is provided, so that peace of mind is guaranteed.

Included with the scanner is the MFStudio with +Quickscan software. MFStudio is a powerful scanning application with precise colour texturing and robust cleaning tools, and the +Quickscan addon feature delivers immediately responsive scanning. Together, MFStudio and +Quickscan produce fast, precise results that allow you to quickly set up a scan and see the results in minutes.

Order code **25-0381**

£709.83

- **Scans as fast as 65 seconds per pass**
- **Capture scans up to 0.1mm accuracy**
- **Camera exposure previews**
- **Adaptive regular scanning**
- **Windows 7, 8, 10 (64 bit), Mac OSX 10.11 and higher**
- **Includes power adaptor, USB cable, calibration card, documentation, small plastic toy**

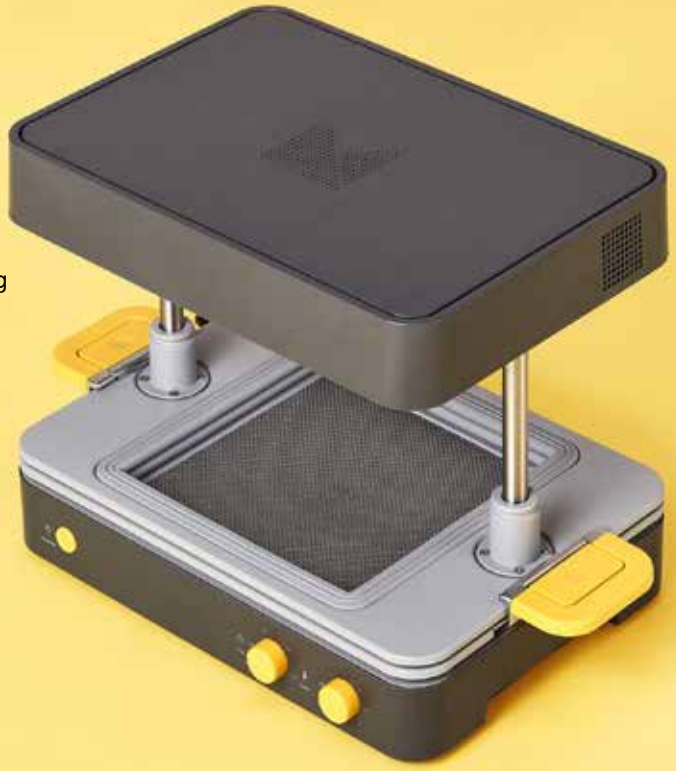
For technical specification visit **www.rapidonline.com**.

MAYKU

A Desktop Vacuum Former to Help You Bring Your Ideas to Life

The Mayku FormBox puts the power of making in your hands. Powered by any vacuum cleaner, it works with a range of materials and helps you to make your ideas real. Whether you're crafting by hand or partnering with your 3D printer, the FormBox forms part of your very own desktop production line.

The FormBox is ideal for home, classroom or small business use. It's safe and easy to operate and can be used to make almost anything. Use food-safe plastics to create customised chocolates or sweets, make your own candles, soaps or plastic parts for your creations. You can cast in plaster, concrete, resin or just about anything else you can think of.



Integrate with CAD/CAM
Design moulds using your favourite CAD software and CAM machine such as a 3D printer or CNC milling machine.

Make moulds by hand
If CAD is not your thing and you prefer crafting by hand, you can make moulds from wood, clay, cardboard or even carved from a potato!

- 200 x 200mm bed size
- 160°C to 340°C heater range
- Compatible with PETg, HIPS, ABS, polystyrene, polycarbonate, polyethylene and acrylic PMMA from 0.25 to 1.5mm thickness
- Desktop machine 466 x 274 x 315mm
- Universal adaptor to fit almost any vacuum cleaner
- Automatically switches the vacuum on when required
- UK mains cable

Mayku FormBox

£479.00

Order code 70-0021

Mayku Cast

Transparent and food-safe 0.5mm sheets for making reusable moulds. The slight flex and non-stick surface that the sheet provides ensures that your templates and casts can be removed with ease.
Fully recyclable and partly made from recycled plastic waste.

- Sheet size 230 x 230mm
- Transparent PETg
- Food-safe
- Supplied in a **pack of 30**

£23.99
Order code 70-0028

Mayku Form

A 0.5mm versatile, easy-to-use white HIPS sheet. Great for product packaging, prototyping and enhancing decorative craft projects.
Fully recyclable and partly made from recycled plastic waste.

- Sheet size 230 x 230mm
- White HIPS
- Supplied in a **pack of 30**

£23.99
Order code 70-0029

Tel: 01206 751166 Fax: 01206 751188