# ***3D printing***

What is 3D printing?

3D printing is a way of creating three dimensional (3D) objects by building up the object layer by layer. Lots of 3D printers print in plastic because it is cheaper. However, some printers use polylactic acid (PLA - this is what our school one uses because it is biodegradable) or metals and ceramics but these two are more expensive.

Benefits of 3D printing

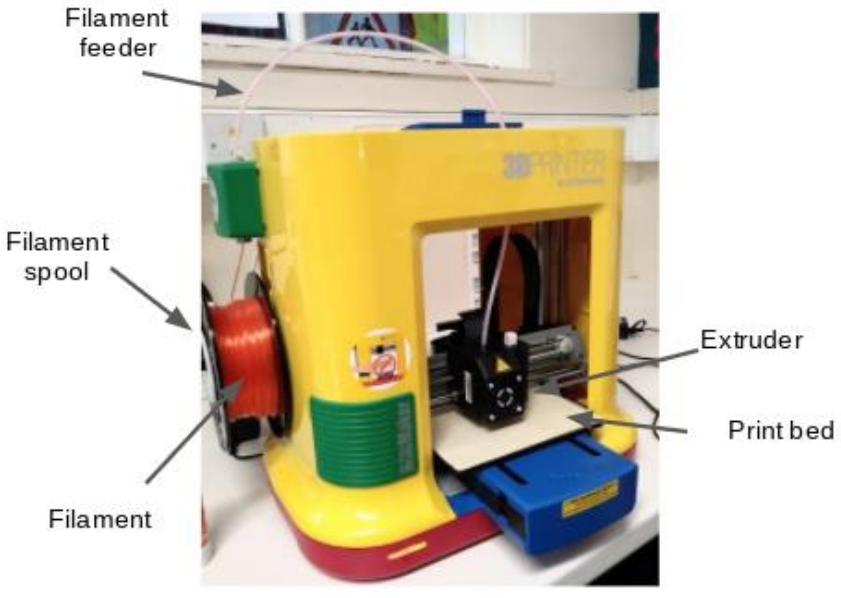
New objects can be printed very quickly and with great detail which means an engineer can test out lots of new designs to see if they work, rather than having to wait for someone to make them. 3D printers can also make plastic parts for something which is broken, such as in a toy or a computer. There is also a lot less waste material and the ability to create more complex shapes which couldn't be made using different manufacturing processes.

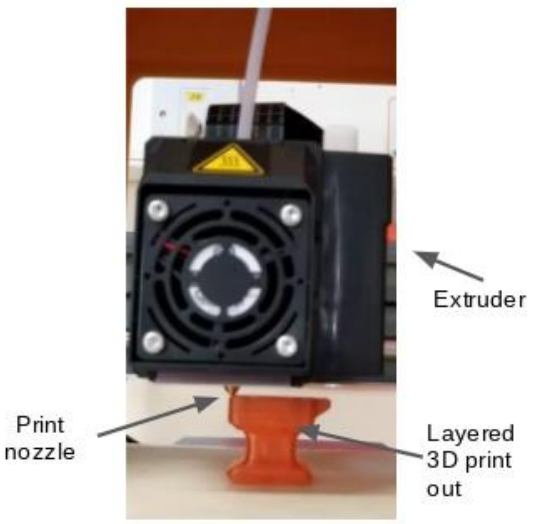
A brief history of 3D printing

In 1974, David Jones first wrote about the idea of 3D printing in a journal called the *New Scientist.*
In 1981 the first 3D printing patent was awarded to Hideo Kodama. His 3D printing machine used UV light to harden the material.
In 1984 Chuck Hall created a 3D printer which used the stereolithography technique - the building up of an object layer by layer. He also developed the STL file format - digital files which can be read by 3D printers.

How does it work?

First, a blueprint of the object you want to print needs to be created using a 3D printing program such as Tinkercad or Solidworks. Once the design is finished it needs to be sent to the printer in the correct format for the program, such as an STL (stereolithography) file. When the printer receives the data, it slices the image into layers ready for printing. The filament (the plastic or PLA etc. material) is pulled through from the spool and is melted at a high temperature in the extruder. The melted material is then deposited by the print nozzle onto the print bed where it quickly cools. This continues until all the layers have been printed.



3D printing achievements

3D printing can be used to make medical supplies cheaply. Its biggest uses may be in printing hearing aids and false teeth! Prosthetic arms and limbs can be printed, and a toucan even had its beak reconstructed using 3D printing.
A supercar, made in Sweden in 2014, was made with many 3D printed components. In 2015 the Royal Air Force Eurofighter Typhoon jet flew with many 3D printed parts.
There is a 3D printer on the Space Station which is used to print parts rather than having to send them up into space. They are looking at making recycled waste plastic materials into the filament so that they don't have to keep sending up more filament from earth.
Food can be 3D printed! Such as chocolate and sweets and things like crackers, pasta and pizza. NASA has been printing food to create less waste and to make food which has all the correct nutrients for the astronauts.
Many museums have invested in 3D printers to make parts to fix their relics. Some even make replicas of their relics to sell in their gift shops.
It took less than 24 hours to 3D print a house in Moscow! It's thought that it could last for up to 175 years.

With 3D printing, the possibilities are endless…