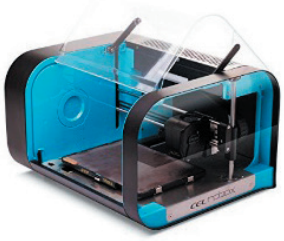
3D Printing in schools: changes to Health & Safety



Rapid Prototype machines (3D Printers) are being more commonly used within education establishments. There are a wide variety of machines on the market, but generally they can be categorised as either being enclosed systems or open air frames.

Recent research from the Health and Safety Executive has found that rapid prototype machines (3D Printers) can emit particles of a size range that can potentially enter the airwaves and lungs. Heating certain filaments were found to release vapours known to be hazardous to health.

There are a range of filaments available for 3D printing and the question of which are best to use is commonly asked. The main 2 we will look at is PLA (Polyactic Acid) and ABS (Acrylonitrile Butadiene Styrene)

PLA

PLA is the most common filament material. It is a starch/sugar cane based material with a low odour and will print at a lower melting temperature compared to other filament material. It is also classed as a biodegradable plastic which makes it more environmentally friendly. This filament comes in an array of colours.

ABS

ABS is another common filament material, however maybe not used in education as much as PLA. This filament material has a higher melting temperature and can be prone to warping without a heated bed. The important thing to remember when working with ABS is that due to its composition make up combined with its high melting temperature makes it prone to giving off harmful emissions.

HSE recommendations

Controlling these particles and fumes can be significantly reduced by implementing the following control measures:

- Only use filaments by a reputable supplier.
- Use filaments with a low emission rate.
- Reduce nozzle temperature to minimise fume and particle emissions.
- Using an enclosed machine with a suitable extraction system with a particulate filter to filter off any fumes or particles.
- Allow adequate time (20 minutes) before removing material from the print bed to allow fumes to be adequately extracted from the enclosure.
- A securely enclosed machine also reduces the risk of incidents and injuries e.g. trapping fingers in moving parts or sustaining burns from hot areas of the printer.

Following on from the research provided by HSE, SSERC as an organisation would recommend that all rapid prototype machines (3D Printers) are enclosed and a sufficient LEV (Local Exhaust Ventilation) system is in place to minimise the risk of the inhalation of potentially harmful fumes and vapours.

More information regarding the use of rapid prototype machines (3D Printers) can be found on the HSE website [1]. <<

Reference

[1] https://www.hse.gov.uk/research/rrpdf/rr1146.pdf.

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