3D printer safety

The main potential hazard associated with 3D printing are the printing materials

Many 3D printers require dedicated ventilation or filtration accessories, so the location of the printer must be carefully considered

Please review product Safety Data Sheets (SDSs) for material specific safety information before using anything in a 3D printer.

Risks associated with categories of printing materials



Chemical Vapors

Heating of certain thermoplastic filament can generate toxic vapors and vapors with high volatile organic compounds (VOCs). 3D printers use a variety of printing materials, each with its own inherent hazards. The most commonly used materials are Polylactic Acid (PLA) and Butadiene Acrylonitrile Styrene (ABS). 3D printing materials emission intensity includes ABS filaments as producing the highest emissions, followed by Nylon, and then PLA.



Metals

Combustible/reactive metal powders are often used to build tools. Finely divided powders, such as titanium and aluminum, can spontaneously combust. Sources of ignition must therefore be eliminated while the printer and taken into account while considering its storage location. This process uses very high heat which may expose users to thermal injury. Inhalation of the powders must also be avoided.



Nanoparticle Emissions

May penetrate and interact with the skin and lungs, in turn reaching multiple organs.



Biological 3D printing

The aerosols generated in the process represent the main hazard. Proper disinfection of the 3D printer between prints must be considered.

Additional risks associated 3D printers



Corrosive Baths

Some 3D printers require the use of corrosive baths to remove the extra material surrounding the 3D-printed item. The use of corrosive baths must be reviewed and approved by the Safety Unit to ensure proper ventilation, procedures, training, emergency equipment and personal protective equipment are provided.



Waste handling

Waste products from the printing process may be flammable and ignite spontaneously.



Electrical

Ensure the printer is properly grounded and plugged directly into an outlet. Never use the printer if wiring and safeguards are suspected as not intact.



Mechanical Hazards

Moving parts must be safeguarded to prevent accidental contact. Safeguards must never be bypassed.



Ultraviolet Light

Never stare directly at the lamp and ensure the UV screen is visually intact before use.

Safe Handling of 3D Printers

Always notify the Safety Unit when acquiring a 3D printer to complete a thorough safety assessment including the following parameters:

- Exhaust requirements if hazardous gases or vapors are emitted
- Appropriate PPE considering the 3D printer's feedstock and process
- Training requirements

Always use manufacturer's instructions as a guide for installation and use, emphasizing –

- Tampering/override of safety interlocks
- The use of appropriate feedstock

Consult Safety Data Sheets (SDSs) for product-specific information and safe handling recommendations on the material feedstock

Additional information can be found at <u>https://ultimaker.com/learn/6-factors-that-affect-indoor-air-</u> quality-when-3d-printing