3D Printer Procedure

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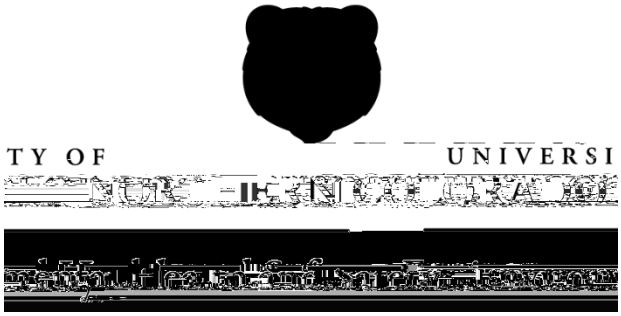

3D Printer Procedure

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3D Printer Procedure

I. Purpose

The 3D Printer Procedure establishes the minimum requirements necessary to allow for the safe use of 3D printers located in the University of Northern Colorado (UNC) facilities. The procedure is presented in recognition of the continued expansion of 3D printer use by faculty, staff and students. Studies have indicated that 3D printers are capable of generating potentially harmful concentrations of ultrafine particles (UFP) and chemical vapors during the print process and through processes used following printing to treat the finished product.

II. What is 3D Printing

3D printing, an additive manufacturing technology, has made rapid prototyping and small-scale manufacturing easier and more accessible. However, this revolutionary process does not come without hazards.

3D printing refers to various processes used to create or replicate an object by using successive layers of material (usually plastics) to create an object. Objects can be of any shape or geometry and produced from a 3D model or from a design fed into the 3D printer by a computer.

A. ABS vs. PLA Feedstock

Each 3D printer is designed to use certain types of materials. The most common type of desktop 3D printer technology joins thin strands, or filaments, made of ABS (Acrylonitrile Butadiene Styrene) or compostable materials, such as Polylactic Acid (PLA). Using a computer-generated image, a 3D printer heats and melts the feed material, placing layers of filament on top of one another to form a precise 3D replica of the image.

The materials being fed into the machine (feedstock) can have inherent hazards and may release vapors and gases that may be more hazardous, for example, after they are heated during the 3D printing process.

Generally speaking, ABS represents a greater health and safety risk than PLA media.

D. Purchasing Department

Review all 3D Printer purchase requests with EHS.
Ensure printers are not ordered until approval, from EHS, is received.

IV. 3D Printer Guidelines

A. Approval Process

All 3D printers purchased for use on campus shall have to go through an approval process. EHS shall be notified by the interested purchaser/requester of the make and model of the desired 3D printer. EHS shall research the 3D printer for safety and other concerns. If any concerns are found, the requester shall be notified by EHS of these concerns.

Turn off the printer if the printer nozzle jams, and allow the printer to ventilate before removing the cover.

Maintain a safe distance from the printer to minimize the inhalation of emitted particles.

D. Engineering Controls

Particle emissions are the focus, especially when multiple printers are running simultaneously. Another consideration is toxic vapors that can be generated by heating plastics. Engineering controls should be considered first to assist with minimizing hazards. These may include the following:

Use 3D printers ONLY in properly ventilated areas.
Choose low-emitting printers and feed materials/filament when possible.
Purchase and use the manufacturers supplied controls, such as an interlocked enclosure. (Enclosures appear to be more effective at controlling emissions than just a machine cover.)

V.

(Appendix A)