

A hot new trend at schools, colleges, libraries, student unions, and similar spaces are 3D printers and sometimes fully-suited Maker Spaces. These new technologies are exciting and everyone seems to want them. Cool new applications regularly are covered by the news and social media. Campuses need to understand that these technologies present new and poorly characterized potential hazards. Campuses are responsible for addressing potential health and safety issues presented by campus installations.

One of the big concerns is the appropriate ventilation for printer installations. It is difficult to discern what comes off during the printing process and how harmful those emissions are. The composition of emissions will depend on the type of materials being deposited, even down to the color. The fine engineering details of the specific printer, its enclosure, and the temperatures that are being used also come into play.

Researchers have found that 3D printers generate volatile organic compounds at significantly higher rates than simple laser printers. 3D printers generate additional chemicals (including chromium), and these emissions may continue to react to form additional chemicals even after the printing is completed. 3D printed objects also continue to emit chemicals. Additionally, some of the emissions from 3D printing include nanoparticles. Nanoparticles may react very differently from more traditional materials. 3D printer manufacturers do not readily provide answers to these questions. It is reasonable, from the information that is slowly being gathered, to have some level of concern.

Campuses would be well advised to consider current NIOSH recommendations to reduce emissions from 3D printers:

- Always use the manufacturer's supplied controls (full enclosure appears more effective at controlling emissions than a cover).
- Use the printer in a well-ventilated place, and directly ventilate the printer.
- Maintain a distance from the printer to minimize breathing in emitted particles, and choose a low-emitting printer and filament when possible.
- Turn off the printer if the printer nozzle jams, and allow it to ventilate before removing the cover.
- Use engineering measures first, such as manufacturer-supplied equipment and proper ventilation, then use materials with lower emissions. Finally, wear protective equipment, such as respirators.

NIOSH is currently conducting some studies and is carefully watching several research groups that are working to better quantify concerns.

Additionally, campuses should review operations associated with the 3D printers in Maker Spaces. Often the 3D printed materials are finished through mechanical means or by treatment in strong caustic baths. These spaces may also have potentially dangerous operations such as laser cutters, cnc machines, and soldering operations that need to be assessed.

References:

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