

3D PRINTING: CREATING A SAFE ENVIRONMENT

Additive manufacturing (AM) - or 3D Printing - is used increasingly in industry, as well as schools, libraries, and homes. Research is on-going regarding the safe operation of these printers, but users are encouraged to minimize emissions. Georgia Tech's Safety, Health, and Environmental Services program provides you tips for keeping yourself safe while using a 3D printer.



Health Hazards of 3D Printing



- Creates ultrafine particles (nanoparticles) that can be inhaled deeply into the lungs where they can cause damage
- Often, numerous volatile organic compounds (VOCs) are also released during printing that can be inhaled

Unknowns



- 3D Printing has not been fully evaluated to determine its safety, and occupational exposures limits (OELs) that are established for adults in the workplace are not applicable for children using 3D printers at home or in schools
- It is best to try to control emissions at the source no matter operational location

Variable Emission Factors

Several process specifics have been identified to either increase or decrease the airborne emissions. Consider these factors when operating your 3D printer:



- Nozzle temperature
- Filament type (PLA, ABS, TPE)
- Filament color
- Filament and printer brand
- Extrusion temperature

Ventilation/Exhaust Options



- Enclose and ventilate/exhaust the printer. Use HEPA-filtration (for the nanoparticles) and a carbon sorbent (for the VOCs) if the air will be recirculated; otherwise exhaust the air to the outside away from air intakes
- The design and size will be dependent on printer, room, materials used, and air movement in the room

Other Recommended Controls



- Use low-emitting filaments when possible
- Lower the nozzle temperature
- Stand away from the printer during operation
- Do not consume food/drinks in the printing area
- Wash hands after handling materials

Helpful Resources



- Georgia Tech Safety and Health Consultation Program: www.oshainfo.gatech.edu
- National Institute of Occupational Safety & Health (NIOSH): <https://blogs.cdc.gov/niosh-science-blog/category/additive-manufacturing/>