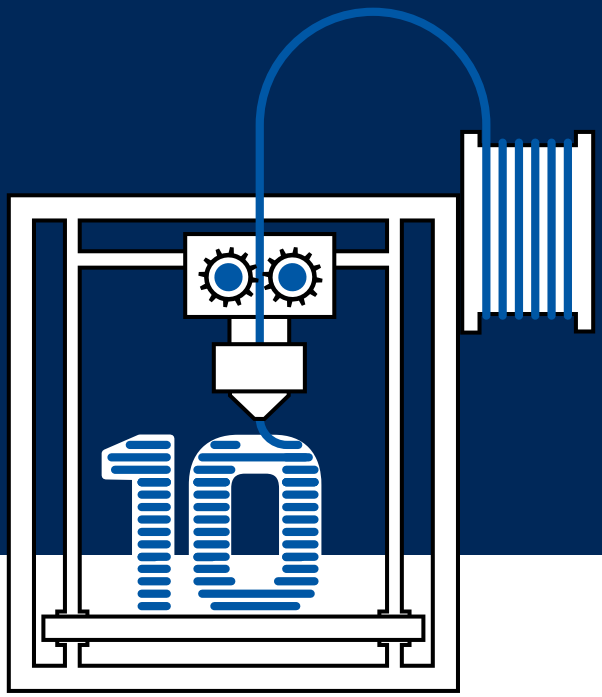
UL Research Institutes | Chemical Insights

3D Printer Safety

10 Ways to Promote Healthy Indoor Air Quality While Using a 3D Printer



1. Understand the health risks

When in use, 3D printers release a complex mixture of pollutants. These emissions include volatile organic compounds (VOCs) and very small particles called ultrafine particles (UFPs). VOCs can be irritants, carcinogens and odorants. UFPs are so small they can be inhaled like a gas and enter our lungs and blood.

2. Consider printer type

3D printers are not all equal. When possible, use a printer that has been ANSI/CAN/UL 2904 certified to produce fewer emissions. Any special printer features, such as direct exhaust lines and filtration systems, should have verification information available to show they are effective.

3. Minimize filament emissions

Filaments vary and release different types of emissions. Of the common types, ABS filaments typically have higher emissions, followed by Nylon, and then PLA. Use PLA if possible, but always use the filament type and brand specified by the manufacturer.

4. Incorporate fresh air

Whether natural or mechanical, good ventilation is critical. Use the 3D printer in a room with good air distribution and/or operable windows. If possible, use a local exhaust fan above the printer. Be sure to keep the printer away from return air vents.

5. Keep people away

Locate the 3D printer away from heavily trafficked areas, such as hallways and common spaces, to minimize occupant exposure. When the printer is in use, post a sign to alert others to stay away. If the room where the printer is located has a door, close it.

6. Don't hover

While it may be enjoyable to watch the action, being close to an operating 3D printer significantly increases exposure to emissions. It is best to limit direct observation and rely on cameras or viewing windows instead.

7. Protect yourself

If you do need to check on an operating 3D printer, minimize the amount of time spent near the printer and wear protective safety glasses. Basic dust masks are not effective at preventing inhalation of released VOCs and UFPs.

8. Keep it cool

To minimize VOC and particle emissions, operate the printer extrusion nozzle and base plate at the lowest possible temperature. Operating at a higher temperature can increase emissions. But remember, always follow the manufacturer's instructions.

9. Get rid of the evidence

After each use, once the 3D printer has cooled down, remove any filament build-up. Specifically, clean both the extrusion nozzle and the build plate. This will minimize the airborne pollution produced the next time the printer is used.

10. Don't forget what you can't see

While you won't see any VOCs or UFPs, remember to clean up after use. Dust the printer and surrounding surfaces with a disposable wet cloth. Clean with a high-efficiency particulate filtration (HEPA) vacuum. Finally, thoroughly wash hands with soap and water.

Learn more about 3D Printer safety: chemicalinsights.org/