GUIDELINES

Workbench 3D Printers
Selection, installation, and use

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Category	3D Printers
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1. Purpose

The purpose of this communication is to provide general guidelines for the selection, installation, and use of workbench 3D printers and associated activities at EPFL.

2. Selection of a 3D printer and installation at EPFL

2.1. 3D printers must be CE certified.

2.2. Whenever possible, purchase a 3D printer model that is enclosed.

2.3. The installation must comply with the manufacturer's instructions including:

- the minimal general ventilation of the room (air changes per hour or ACH)
- the need for a direct connection to the ventilation (respecting the recommended flow) and/or
- the need to filter the air exhausted from the machine, respecting the required filtration type and efficiency (HEPA, activated carbon, etc.) as well as the filter model suggested by the manufacturer.

2.4. In the absence of higher/more restrictive requirements regarding general ventilation from the supplier/manufacturer, 3D printers should be placed at least in a laboratory or workshop "with risk of emissions" with the applicable renewal rates from the latest “cahier de normalisation sécuritaire des laboratoires et des ateliers”: currently 6-8 ACH, or a minimum of 4-6 ACH if located in a building with technical limitations, until further renovation.

2.5. Prior to the purchase of a 3D printer, an appropriate location for its installation should be identified, which should respect the requirements listed in points 2.3 and 2.4, as well as any other needs associated with the printing process (e.g. cleaning of pieces, see section 4).

2.6. If there are particular ventilation needs that require some infrastructure work (for example, a printer should be connected to the ventilation), its feasibility should be confirmed by the Faculty Infractucture's representative prior to the purchase of the machine.

2.7. The installation of 3D metal powder printers requires a risk assessment and approval by the OHS (http://go.epfl.ch/support-ohs).

3. Use of a 3D printer

3.1. Users must comply with the rules from the corresponding user manual and the instructions from the safety data sheet (SDS) of the printing materials. In particular, the recommendations of the manufacturer in relation to the following elements must be respected:

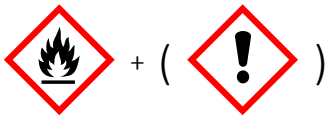
- Authorized printing materials and brands/models. Whenever possible, purchase filaments associated with low emissions.
- Maximum temperature admitted for each printing material. When possible, set the temperature of the nozzle and build plate (i.e. flat surface that printed objects will stick to during a print) at the lowest recommended value by the manufacturer to minimize potential emissions.
- Safety and hygiene precautions as well as recommended personal protective equipment.
- Cleaning and maintenance procedures, including, when applicable: cleaning the nozzle before each use, cleaning the build plate after use, and change of filters on the recommended periodicity.

3.2. Working surfaces shall be properly cleaned. Cleaning methods should minimize the risk of emissions (e.g. use wet methods for cleaning powders).

3.3. Storage of inks, cleaning products, and any other used chemicals should respect the manufacturers' recommendations as well as the EPFL rules (Chemical Hazards, Chemical Storage Workflow).

4. Cleaning of 3D printed pieces

4.1. Use of flammable solvents for cleaning process and/or cleaning baths



4.1.1. Follow SDS instructions.

4.1.2. Whenever possible clean the pieces inside a fume hood and dispose of the solvent as soon as the cleaning process is finished. For the disposal of the solvent, the waste management tree must be followed (Waste Management Tree).

4.1.3. If a solvent bath is necessary:

- Use certified solvent containers, mechanically and chemically resistant, with a lid. Glass is not allowed.
- Adapt the volume of the bath to the size of the pieces. Avoid excess.
- The bath should be kept in a fume hood.
- The volume of the bath should be less than 3L (CFST 1825, LEX 1.5.7). Bigger volumes require a risk assessment by the OHS team (http://go.epfl.ch/support-ohs).
- The maximum volume of flammable products outside the ventilated cabinets should be less than 15 L per room (CFST 1825, LEX 1.5.7, Chemical Storage Workflow).
- The bath must be closed always, except when the pieces to be cleaned are being transferred in and out.
- The bath must be properly labeled: name of the user, date of preparation, chemical composition without acronyms, and with the pictogram indicating the hazards present in the bath.
- The waste management tree must be followed for the disposal of the solvent (Waste Management Tree).
- If a fume hood is not available, the bath may exceptionally be placed on a bench of a ventilated laboratory/workshop (according to section 2), only if all the previous requirements are fulfilled and if:
  - The solvent consumption (evaporation rate) is below 100 mL/day per room.
  - The bath is placed at least one meter away from heat and spark sources.

4.2. Use of toxic, corrosive and/or oxidant substances with one or more of the following pictograms for cleaning process and/or cleaning baths:

4.2.1. Follow the SDS instructions for each product.

4.2.2. Products of these categories must be handled always inside a fume hood.

4.2.3. If a solvent/chemical bath is necessary:

- Use certified chemical containers, mechanically and chemically resistant, with a lid. Glass is not allowed.
- Adapt the volume of the bath to the size of the pieces. Avoid excess.
- The bath must be closed always, except when the pieces to be cleaned are being transferred in and out.
- The bath must be properly labeled: name of the user, date of preparation, chemical composition without acronyms, and with the pictograms indicating the hazards present in the bath.

- The waste management tree must be followed for the disposal of chemical waste (Waste Management Tree).
- If the substances used for the bath are also flammable the following additional measures are also required:
  - The volume of the bath should be less than 3L (CFST 1825, LEX 1.5.7). Larger volumes require a risk assessment by the OHS team (http://go.epfl.ch/support-ohs**).**
  - The maximum volume of flammable products outside the ventilated cabinets should be less than 15 L per room (CFST 1825, LEX 1.5.7, Chemical Storage Workflow).

5. Occupational health and safety questions

- For any questions regarding the potential risk of exposure or any occupational hygiene questions, please contact: hygienetravail@epfl.ch
- For questions regarding chemical storage or any other safety-related questions please contact: http://go.epfl.ch/support-ohs