

3D PRINTER

STANDARD OPERATING PROCEDURES DOCUMENT

Scope and Responsibilities

This standard operating procedure (SOP) applies to all personnel who operate and instruct on the safe operation and use the 3D Printer. In a school setting this includes,

- **Administrators/Teachers:** Ensure operators are trained and the SOP is followed
- **Students/Teachers/Operators:** Follow the owner/operators manual, industry recommendations, this SOP, guarding is in place, and wear the appropriate personal protective equipment (PPE)

SAFETY IS A PRIORITY !

DO NOT use this machine unless you have received instruction in its safe use and operation and have been given permission by your teacher.

To ensure the safe and efficient operation of the 3D Printer, this machine requires:



Safety glasses must be worn at all times in work areas.



Long and loose hair must be contained.



Rings and jewelry must not be worn.



Gloves must be worn to protect from burns from hot plastics and extruder nozzle.



CAUTION & WARNING signs commonly displayed on this machine indicate a potentially hazardous situation, which if not avoided, may result in minor to moderate injury.

Personal Protective Equipment (PPE)

- Safety glasses
- Gloves

Pre-Operational Checks

- Always refer to the manufacturer's manual
- Ensure the plastics spool is correctly fitted and feeds into the extrusion head – refer to the User Manual
- Correctly initialize the printer after it has been moved or relocated
- Ensure all cables are inspected, inserted, or connected correctly and securely
- Pre-heat the perf-board / platform (if possible) to maximize adhesion and stability
- Be aware that ABS vapours are toxic. PLA is recommended for education and school use
- Ensure that your work area is well ventilated
- Room temperatures are best between 20-30°C
- Faulty equipment must not be used. Immediately report any suspect equipment or machinery.

This equipment SOP provides a general guideline for operating a 3D Printer. Always refer to the manufacturer's manual, industry best practices, and specific workplace safety protocols for detailed instructions. **IF IN DOUBT, STOP! ASK YOUR INSTRUCTOR or SUPERVISOR.**

Operational Steps

1. Preparation

- Make sure you have been authorized to use this piece of equipment - you have received training, passed the test, have demonstrated the safe use of this piece of equipment and have a safety passport signed
- You are “shop ready” – trained, proper clothing, wearing required PPE, etc.
- Ensure machine is correctly set up and calibrated
- Use only original and authorized power supplies to power your machine
- Use board supplied and approved filament and 3-D printing products
- Complete your design(s) prior to printing and save in the correct file format.

2. 3D Printing Process

- Never attempt to program and run this machine without proper training
- Familiarize yourself with all machine operations and controls – refer to the User Manual
- Place the enclosure over the machine or close doors when in operation (if supplied)
- Only one person should operate this machine – or remove finished products
- Always wear safety glasses and gloves when removing support materials
- Do not open doors or remove guards while the printer is in operation
- Do not touch any moving parts during operation
- When complete allow machine to completely end cycle
- Remove perf-board / platform from machine to remove 3-D printed component
- Keep both hands behind the sharp spatula and tools when removing perf-board and scaffolds
- Use caution when using clippers and tweezers.

3. Shutting Down the Machine

- Turn 3D Printer off as per User Manual
- Remove all waste
- Replace perf-board / platform in the machine for next user or print
- Clean the machine and work area.

Post-Operational Checks

- Ensure the machine is off and unplugged after use
- Return all tools and accessories
- Clean the machine and leave work area in a safe and tidy condition.

Common Problems of Operation

- Machine does not power up
- Nozzles plugged
- Poor print quality
- Bird’s nest of filament
- Failed print
- Warping
- Platens not level or aligned.

Safety Precautions

- Wear Personal Protective Equipment (P.P.E.) such as safety glasses and gloves
- No loose clothing, long hair, or jewelry is allowed in the shop
- Only operate the 3D Printer after you have received instruction and permission from the teacher
- Take notice of any warning and caution labels
- Be aware of the positions of the on/off switches and emergency STOP button.

Common Injuries Sustained

- Burns from hot surfaces and materials
- Sharp edges
- Toxic vapours (dependent on filament type and ventilation)
- Molten plastics
- Eye injury
- Control errors
- Pinch points from moving components.

Maintenance

- Always refer to the manufacturer's manual
- Regularly check and repair or replace damaged or worn equipment immediately
- Clean the machine as required
- Regularly use purge filament to clean nozzles
- Keep a maintenance log for the machine
- Inspect the electrical cords for damage, cracked insulation, fraying, etc.

Work Zones

- Typically, on a table or bench connected to a host computer or workstation
- Work zone or area should be identified on the floor (ie: yellow paint or tape)
- Work zone or area should not be entered while operator is using the machine

Additional Information can be found at,

Ontario Council for Technology Education [SAFEdocs](#) and [ToolSAFE Videos: OCTE](#)
McMaster University <https://www.hr.mcmaster.ca/app/uploads/2019/01/McMaster-3D-Printer-Safety-Information.pdf>

Filaments.ca <https://www.filaments.ca/blogs/3d-printing/things-you-should-know-about-food-safety-3d-printing>

Canadian Center for Health and Safety

https://www.ccohs.ca/oshanswers/safety_haz/additive_manufacturing.html