**Standard Operating Procedure for Fused Deposition Modeling (FDM) 3D Printer with Polylactic Acid (PLA) Filament in [Department/Shop/Maker Space]**

***Instructions****: Update this template with details specific to the 3D printer(s) in your department/shop/maker space. Language that may apply to most situations is provided and should be changed as applicable.*

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| **TOPIC** | **PROCEDURES** |
| **1. Process** | PLA filament is loaded onto the printer, melted, and extruded onto a heated build plate, following a pre-programmed 3D design. |
| **2. Equipment** | FDM printer and filament materials |
| **3. Personal Protective Equipment (PPE)** | Safety glasses, chemical, cut and/or heat-resistant gloves (define type(s) required)  *List additional required PPE (if any) based on the* [***Shop PPE Hazard Assessment***](https://www.ehs.washington.edu/resource/shop-personal-protective-equipment-ppe-hazard-assessment-guide-1334)*, which may include*   * *Lab Coat* * *Face Shield* * *Goggles* * *N95 filtering facepiece respirator (voluntary typically, should confirm while completing hazard assessment)* |
| **4. Engineering /**  **Ventilation controls** | Ensure the equipment is secure so it doesn’t move when in use.  *Document specific ventilation and environmental controls:*  ***Notes****:*   * *A dedicated ventilation system should be in place to capture the particulate emitted during the printing process. Another option is to use a room air cleaner equipped with a HEPA and activated carbon filter. The size, type, and number of printers will influence the adequacy of room ventilation. Please consult UW EH&S if multiple printers will be utilized in the same space.* * *Workstations should be located away from printers.* |
| **5. Required training or approval** | *List required training:*  *List pre-use requirements:*   * All users are required to complete the required training prior to use. * Get approval from the Safety Coordinator before use. * Review and observe [general safety practices](https://www.ehs.washington.edu/system/files/resources/staying-safe-shops-poster.pdf). * Refer to the manufacturer’s operating manual for all operating procedures. * Refer to the operating manual for appropriate bed and filament heating temperature, type of filament, and speed settings for varied materials. |
| **6. Inspection requirements before use** | *Update this list as appropriate and add additional requirements for pre-printing, printing, & post-printing, as applicable.*   * If applicable, make sure the printer is enclosed and has an interlock system. * Ensure the printer head/nozzle is clean and in good working condition. * Beware of FLAMMABLE materials while using the FDM printer. Certain materials, like flammable solvents and powder, are more likely to ignite. * Use the manufacturer’s recommended PLA filament. Consult UW EH&S if you are using other filament material such as acrylonitrile butadiene styrene (ABS). * Ensure there is a Class ABC fire extinguisher nearby for electrical or material fires. * Ensure that all body parts, loose clothing, jewelry, hair, and other objects are clear of printing area prior to turning on the equipment. |
| **7. Safe operating procedures or precautions** | *Update this list as appropriate and add additional requirements for pre-printing, printing, & post-printing as applicable.*   * Position workstations away from printers and limit your time working around printers while it is operational. * **Never leave the 3D printer unattended** when it is on. Consider using video monitoring or observation windows if needed. * If the printer malfunctions, stop the print job but let the printer cool and wait for emissions to dissipate before troubleshooting or restarting. * **Always** make sure to turn off, unplug, and cool down the unit prior to cleaning, repairing, or accessing the product. * When an operator has finished using the 3D printer, the power must be shut off and the machine must come to a complete stop. * Wash hands thoroughly after handling parts and materials. * Read the safety data sheet (SDS) and use the appropriate PPE when using chemicals to clean printed parts or remove support structures. |
| **8. Waste cleanup** | Avoid waste material build up; clean up and properly dispose of waste, scraps, and dust. Check the dust collection system and make sure it is properly maintained and material is removed frequently.  Please consult material SDS and/or refer to the [Chemical Waste Disposal page](https://www.ehs.washington.edu/chemical/hazardous-chemical-waste-disposal) on the EH&S website for proper handling and labelling of hazardous waste.  *Add process/equipment-specific waste handling details*. |
| **9. Emergency response and accident reporting** | In case of fire or emergency, dial 9-1-1.  Report any accidents, injuries, or near miss events using [UW’s Online Accident Reporting System (OARS) at](https://oars.ehs.washington.edu/)oars.ehs.washington.edu. |

**Name**:       **Title**:

**Signature**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Date**: