



Desktop Metal Shop: Donning and Doffing PPE

Learn how to safely and effectively don and doff PPE while operating the Desktop Metal Shop system.

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Introduction

Usage of Personal Protective Equipment (PPE) around metal powder based 3D printers is a critical step towards the safe operation of these machines. Although there is minimal powder exposure during normal processes, the safety standards are defined to prevent and minimize danger in a worst-case scenario.

The order of operations for PPE donning and doffing are designed to minimize powder exposure to personal items, clothing and exposure to skin. This falls under process and equipment related safety controls.

Images by: Terrapin Works



TOOLS:

- [Anti-static Gloves](#) (2)
 - [Cotton Jacket](#) (1)
 - [PAPR System](#) (1)
 - [Protective Booties](#) (2)
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Step 1 — Donning: Retrieving and Checking the PAPR System



- Retrieve a PAPR carrying bag and a charged battery
- Install the battery into the blower unit
- Retrieve and install the Airflow tester to the blower unit:
 - Power on the blower and hold up to eye level, making sure to keep the testing tube pointed up
 - After about 1 minute, check the reading and compare to the attached table
- Log results to record of inspection form

Step 2 — Donning: Assembling PAPR Unit



- Assemble the blower unit onto the belt:
 - Align the tabs and slots
 - Push up on the belt to lock the blower unit in place
- Attach the face shield tube:
 - Push into the socket
 - Twist until locked
- Set the PAPR system on a clean surface, put away the carrying bag

Step 3 — Donning: Putting on Booties



- Insert heel of foot into bootie opening
- Pull back with heel of foot while extending your toes in order to get the bootie to snap over the toes of your shoes
- If necessary, pull up the edge of the elastic to avoid extra material bunching up below

Step 4 — Donning: Removal of Personal Items and Putting on Gloves



⚠ Remove as many personal items as possible before proceeding

- Personal items can become damaged and contaminated by metal dust
 - Personal items include watches, phones, bracelets or other similar items
- Retrieve anti-static long-cuff gloves and put them on (be sure that they are sized correctly)
- Other PPE should be staged for the following steps

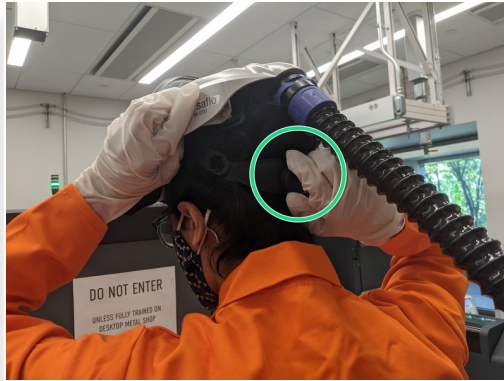
Step 5 — Donning: Putting on Jacket



- Retrieve and wear an appropriate sized cotton jacket:
 - Bring the airtight container with jacket inside to within the Powder Exclusion Zone (PEZ)
 - With gloves on, remove the top of the container and slowly remove the jacket from inside
 - Inspect jacket for excessive metal powder, if clean then put it on
 - Snap all of the buttons closed

⚠ If the jacket has evidence of excessive metal powder, then discard in pink waste bag appropriately and use a different jacket

Step 6 — Donning: Putting on the PAPR System



- Put on the blower and belt assembly around your waist
- Clip the buckle and adjust length
- Put the face unit on
- Adjust tension of the face unit by using the knob
- Turn on the system using the power button
- Airflow can be adjusted by pressing and holding the fan button until beeps are heard

Step 7 — Ready for Powder Processing Tasks



- After putting on all PPE, powder processing tasks can begin
 - Anti-static gloves
 - Cotton Jacket
 - PAPR System
 - Protective Booties
- Personal items should NOT be brought into powder processing areas

Step 8 — Before Doffing



⚠ Before doffing any PPE, be sure that all powder processes are complete

- Any waste from doffing PPE should be put in a separate pink bag to minimize the amount of powder open during doffing

Step 9 — Doffing: Removing Powder Exposed Gloves



- Remove anti-static gloves by:
 - Pinch both gloves simultaneously below the cuff with the opposite, gloved hand
 - Turn wrists and pull apart in a single motion, slowly to turn the gloves inside out and remove them at the same time
- This method avoids touching the outside (contaminated) side of gloves

Step 10 — Doffing: Removing the PAPR System and Jacket



- Retrieve empty airtight container for cotton jacket
- Remove the belt and blower assembly of the PAPR (while still on)
- Set this assembly on the floor or stool nearby
- Slowly unbutton and remove jacket, fold and put in airtight container
 - Avoid touching the outside of the jacket as much as possible
- Remove face unit of PAPR system

Step 11 — Doffing: Removal of Booties and Cleaning



- Remove booties inside out and dispose appropriately in pink waste container
- Clean outer surfaces of PAPR unit (avoid lens) with DI water and paper towel
- Clean inner surfaces of PAPR unit with cleaning kit
- Pack up PAPR unit and return to storage location
- Clean feet on sticky pads (4 steps)
- Wash hands with non-stripping (smooth or moisturizing) hand soap