



COVID-19 Volunteers UK

Standard Operating Procedures

Welcome to the Covid-19 Volunteers UK group an effort to 'crowdcreate' 3D printed visors for NHS and frontline staff and help alleviate the strain on existing supplies. Below you will find the group's Standard Operating Procedures (SOP) for FDM printing which must be followed in order to contribute to the Covid 19 Volunteers group in order to ensure that parts are printed as hygienically as possible and that shields manufactured and supplied are effective and contribute to the effort to fight the virus, rather than having a detrimental effect.

Please read the whole document (we know it's boring) and take care to follow all of the measures that are described in it - this ensures that both you and the recipients of your printed parts are as fully protected as far as possible and we can help to have a positive effect against this pandemic.

Thank you for your efforts.

Location of printing and precautions to take

The shields are being created for use in hospitals, so it is important that any risk of infection is kept to a minimum.

If you have the virus, or are showing symptoms, please do not print these shields until you and all of your household are given the all clear. This is 7 days for those with symptoms, and 14 days for others as per NHS guidelines.

Printing should be carried out in a well ventilated room, ideally separate from areas subject to high traffic or contamination.

Clean your workbench - if you have a workshop which doubles up as a garden shed, the NHS do not want sawdust from your latest carpentry project embedded in the shields.

Ensure children and pets are kept out of the printing environment - sticky fingerprint paintings by a toddler are not considered desirable or attractive on face shields.



Ideally, printing should be carried out in an enclosure. This will protect the print from contamination and help maintain a constant temperature which will be helpful for printing with filaments such as PETG or suitable alternatives.

Before Printing

Wash your hands thoroughly - you should know how to do this by now 2 bars of Happy Birthday etc etc, back and front of hands and make sure your nails are clean.

Ideally use hand sanitizer before touching any parts that will form part of the finished shield and if you have protective gloves wear them - protective gloves means clean and sterile not your washing up gloves or those you use in the garden whilst you're pruning the roses.

Clean your printing bed with a suitable disinfectant. 70% Isopropyl alcohol is commonly used to clean printing beds anyway and is suitable for this purpose.

Make sure you have enough filament to complete each part. This will prevent either a half finished print or a cooling and reheating of the part allowing it to become contaminated. Each faceshield part takes approximately 55g's of material. Please do not multi material print or use filament from different makes or types in a single print.

PETG is known to stick fast onto print beds so if you are using an intermediate layer to protect your printer (such as painters tape) please spray or wipe with disinfectant and allow to dry before printing.

Printing

We are printing the Prusa RC3 model. The download files can be found here:

<https://www.prusaprinters.org/prints/25857-protective-face-shield-rc1/comments>

The files are subject to update so please ensure you are working from the most up to date files.

The intention is that the shields will be printed and then sent to a central location where the clear plastic faceplate and elastic will be added so you do not need to do this part for any item except your first that you will use.

You can still print and supply the RC2 and RC1 models if you have previously downloaded and printed those but RC3 has several advantages.



If you have the skillset it will be useful to model the following information onto the print ensuring you do not affect the structural integrity of the print:

Your name, date printed and material - this information will be on the packing bags if you are unable to do this but now is a great time to learn how to model a little whilst we're all cooped up

1st print - the first print that you create will allow you to test your settings, it will also serve as a suitable shield for you to wear whilst creating further shields. The clear face shield can be added using a sheet of PETG or items such as a clear laminator pouch or transparency. The strap can be added by a piece of 25cm elastic or even an elastic band.

2nd print and onwards - put your shield on whilst working on subsequent prints.

Filaments

- PETG - This is the best filament to use because it is food safe and less likely to harbour the virus
- HIPS - is a suitable alternative as this is also food safe however this is an unusual filament to print with so please ensure it is clearly labelled when packaged as sterilization measures are not clear for this material
- PLA - can also be used if there is no alternative, as a bioplastic (made from corn starch) it is more prone to bacteria buildup so less ideal than PETG it also deforms at relatively low temperatures (60⁰C) i.e. hot water/dishwasher - even though these items are intended as single use.
- ABS - is not currently advised as it may cause skin irritation
- Other filaments - No other filaments are currently advised but please ask if you have any questions
- Exotics - Please do not use PLA infused with wood, metal or other stuff such as glow in the dark or glitter - the NHS has a PPE shortage not a lack of fashion sense

Wash your hands before touching the filament - it will be heated to 200⁰C by the hotend but this is a new virus and information is limited on how long it survives in set environments.

Wear protective gloves if you have them.

Keep contaminants away from the printer whilst printing - that includes those pets and children

On a clear plastic bag please write the following with a permanent marker or similar pen that will not damage the integrity of the bag:



- The material that the shield has been made from
- The date of printing and sealing the last unit that will be included in the bag
- Your name and email address
- If you are assigned to print for a particular order or hospital the name of the order/hospital

Once the print has completed remove it from the print bed with the minimum of handling and seal in a clean and ideally clear plastic bag (sealable freezer bag or ziplock).

Ideally, there would be one bag per print but we realise that this may not be practical so please try to keep no more than five units per bag.

If you are printing several different materials please ensure a different bag for each material.

After printing

Current information is that the virus can last for up to 3 days on plastic therefore it is recommended that finished units remain sealed for that period prior to use.

If sending through the post please seal all bags in a cardboard box or protective padded envelope ensuring all edges are sealed with packing tape.

Follow the instructions from the order or project that you signed up to create shields for on where and how to send your finished shipment.

If you are sending the items via Royal Mail please ensure you minimise trips outside of the home. If the package is being picked up ensure it can be retrieved by the courier from a clean dry place.

If you become symptomatic

Please, if you come down with symptoms and suspect you have COVID-19 - please ensure that you inform the admin team ASAP, so that appropriate precautions can be made to destroy or quarantine the stock that you have already created.



Print this out and include in the main package (do not include inside the plastic bags):

Disclaimer

In response to the COVID-19 Crisis, volunteers have joined efforts to provide DIY masks to prevent spreading the infectious disease. These masks are intended to be used by people that are NOT in direct care of patients that are positive COVID-19. These are simply to provide an alternative for other ancillary departments and personnel in healthcare and lay people in other settings with some type of protection in order to reserve the medical grade, approved devices for our frontline providers.

These devices are not manufactured to, nor meet any particular industrial or medical required standard. The homemade masks are made out of various materials and there is no representation or claim as to their efficacy to filter, block or protect against any pathogen or particle. Recipients are responsible to use their own judgement in deciding to utilize these homemade masks in any setting.



Checklist

- Find suitable print location
- Clean your workbench
- Wash your hands, don protective gloves if available and shield if this is not your first print
- Clean the print bed with disinfectant (isopropyl alcohol)
- Check filament supply
- Print shield
- Complete information on plastic bag
- Seal shield pieces in bag