



Change Log		
Date	Change	New Doc Number
02/05/20	P4 - Prusa RC3 Model Print files - url correct	SOP_3D_MAKE_V3.1
03/05/20	P2- Update on printing precautions in relation to Covid-19 symptoms or confirmed cases. P4 - RC2 design is no longer acceptable. Statement updated.	SOP_3D_MAKE_V3.2
05/05/20	Link updated for Maker Dispatch Form	SOP_3D_MAKE_V3.3
10/05/20	P8&9:Update to sections concerning reimbursements	SOP_3D_MAKE_V4

## 3DCrowd Volunteers UK

### Standard Operating Procedures

Welcome to the 3DCrowd UK group: an effort to 'crowd create' 3D printed Face Shields 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 Fused Filament Fabrication (FFF) printing which must be followed in order to contribute to the 3DCrowd UK effort. We have put these procedures in place in order to ensure that parts are printed as hygienically as possible and that the face shields 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 face shields are being created for use in hospitals, so risk of infection must be kept to a minimum, therefore if you currently have, or have had, a confirmed case of Covid-19 you will **not be able to print components for 3DCrowd UK.**

If you have had a suspected case of Covid-19 or are showing symptoms, please do not print the Face Shield components until you and all of your household are given the all clear. Review and ensure you follow the [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 face 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.

Similarly please keep food and drink away from the printer - we don't want an allergic reaction because you dropped a prawn sandwich, or soy from your latté on the headband whilst printing.

If you have an enclosure please use it. Use of one is not mandatory but it will help in protecting the print from contamination and help maintain a constant temperature which will be helpful for printing PETG.

## Before Printing or touching printed parts

Wash your hands thoroughly - you should know how to do this by now 2 full rounds of the Happy Birthday Song 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 face shield and if you have protective gloves - nitrile or vinyl - wear them (**NOT** latex gloves as these can transfer latex to the print and cause an allergic reaction, please just use clean hands instead). If you have a face mask we **strongly** recommend that you wear this as well. 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 face shield



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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 it to dry before printing.

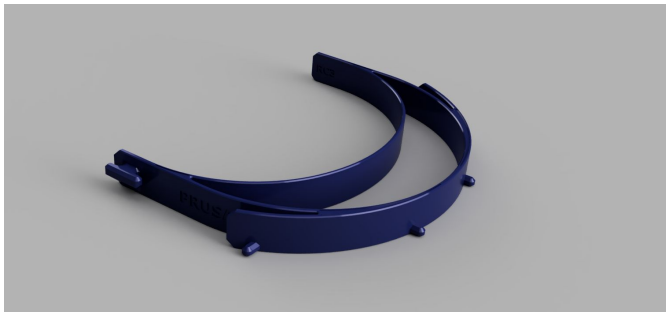
## Printing

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

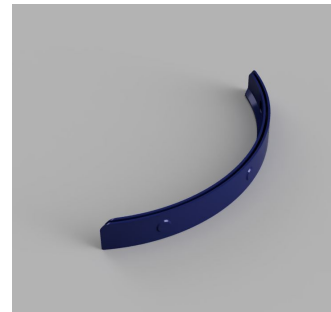
[Prusa RC3 Model - Print Files](#)

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

There are two parts - a top and a bottom - please ensure you print both see below:



*Covid19 Headband RC3*



*Bottom Reinforcement*

The intention is that the face shields will be printed and then sent to a regional location where the clear plastic faceplate and elastic will be added. Face Shield Instructions for the end user on how to assemble will be included with their package (see Dispatch section below).

If you are supplying these complete face shields directly to anyone please ensure you closely follow the Maker Dispatch Process which will ensure you provide the end user with this link to Prusa, via the Face Shield Instructions sheet.

For those with a small print bed you can print just the bottom reinforcement and team up with those local to your area to supply the whole unit. As the CE mark submission only covers the RC3 design we can no longer accept the RC1/RC2 designs.

If you can, print a version with the material debossed on the surface of the headband please do. This link allows you to add this onto the RC3 Design: <https://mod.seblee.me/>

## Nozzle sizes and layer height

Please consult the table below for appropriate print settings for your nozzle diameter. The maximum layer height is approximately  $0.75 \times D$

Nozzle Diameter (mm)	Maximum layer height (mm)	Minimum number of shells	Minimum infill (%)
0.4	0.32	3	30
0.6	0.45	2	30
0.8	0.6	2	30
1.0	0.75	2	30

Please note that nozzle diameters greater than 0.6 mm are not suitable for printing the bottom reinforcement. The wall thicknesses on the bottom reinforcements are around 1 mm, because we want at least 2 perimeter, anything over 0.6 mm will not be able to print the part to a sufficient standard.

Please ensure that you don't start printing without sufficient plastic bags to seal the prints in.

**1st print** - the first print that you create will allow you to test your settings, it will also serve as a suitable face shield for you to wear whilst creating further face shields. If you are sending masks to the central location this is the only face shield that you will require the elastic and clear visor for. The clear face visor for you can be added using a sheet of PETG or items such as a clear laminator pouch or transparency, or even at a push a clear water or fizzy drinks bottle. Its purpose is to protect your further prints from infection by you. The strap can be added by a piece of approximately 35cm elastic or even an elastic band.

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

### Accepted Filaments

- PETG
- PLA

We are currently not accepting any other material types including PLA+,PET, and ABS as it causes confusion in the supply chain and we need to keep things fast and simple.

Exotics - Please do not use PLA+, 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. The reason for not using PLA+ is there is not a consistent use of known modifiers in them and most manufacturers do not state what these modifiers are.

Wash your hands before touching the filament - it will be heated to 200°C 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 Nitrile or Vinyl - these aren't essential but are heavily advised and are a good extra layer of protection, the same goes for a face mask if you have one. **Do not** use latex gloves; these can cause the end user an allergic reaction.

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

Print all parts of the face shield- as there are two parts please ensure to print both, unless you are teamed up with a small print bed volunteer and your regional hub is aware you will not be supplying both parts.

Once the print has completed remove it from the print bed and begin the quality control process.

## Quality Control

Please read the latest version of 3D Crowd's Quality Control Guidance for prints- [QC\\_3D\\_MAKE](#) (and ensure that you are only dispatching prints that comply with it. If you are having challenges with quality try the #printersettings channel in Slack for advice or speak to your local coordinator.

## Packing for delivery

### Packing for your HUB

Once you have taken your prints through quality control, as per the latest QC\_3D\_MAKE, you are ready to pack them up for the Hub.

While the prints are going to be cleaned at the hub for the protection of all, we ask that if your hub coordinator requests it, please seal prints in a large bag rather than in an open package. So do ask your hub coordinator how they'd like to receive the prints.

If you are printing both PLA and PETG please separate into different bags..

On each bag please ensure you label with the following information.

- An email address that we can contact you with should we need to.
- The material of the parts.

If you can print sticky labels with this information to go on the bag then this is perfectly acceptable as well.

### Packing for the END USER

If you are supplying a complete face shield kit for an end user having obtained visors and elastic from the central depot you will need to follow all the instructions as per the latest version of the SOP for Hubs - [SOP\\_3D\\_HUB](#) which now involves a cleaning process. If you are not able to comply with the latest version of SOP\_3D\_HUB, unfortunately you won't be able to supply direct to end users. Your local hub would however be pleased to receive your prints where they can clean and dispatch them.

## Dispatch

### For **MAKER** dispatching to their local **HUB**:

[Delivery Note](#) - Print and complete the delivery note and attach it to the outside of your package.

[Thank You Note](#) - This is entirely optional. If you'd like to send a thank you note for the hub to send on to whoever receives your prints feel free to print and use one of the options on the thank you note link and send it with your package to your local hub.

Arrange a suitable delivery time and method with your coordinator contact (this might be a hub coordinator or area coordinator) be it via the post, a collection or delivery by yourself. We need to minimise & authorise travel to adhere to government guidelines, please read FAQ 2 & 3.



Maker Dispatch Form - Please fill out the [Maker Dispatch Form](#) online whenever parts which you have produced leave your house. This is very important as it will allow us to track your parts and allows for planning.

#### Maker Stock Update

After completing the Maker dispatch information you will have the option to complete a Maker stock update. You can also update your stock via the Slack StockBot which is an automated reminder you will receive in Slack. It is up to you which method you use.

#### **For MAKER dispatching directly to an END USER**

If you are supplying a complete face shield kit for an end user having obtained visors and elastic from the central depot you will need to follow all the instructions as per the latest version of the SOP for Hubs - [SOP\\_3D\\_HUB](#) which includes a new cleaning process. If you are not able to comply with the latest version of SOP\_3D\_HUB, unfortunately you cannot supply direct to end users but do please send your prints to your nearest hub for cleaning and dispatch.

Copies of all documents are located at [www.3dcrowd.org.uk/wiki/docs](http://www.3dcrowd.org.uk/wiki/docs)

The Maker Dispatch Form is accessed directly from the link in the Maker Dispatch Form section on P8



## Mini-FAQ

### 1 Will you reimburse any expenses?

As of 5pm on May 10th, due to the current funding situation, we are no longer able to reimburse any expenses related to the making, packing and delivery of the prints / face shields.

Please pause printing if you are not able to donate your prints, we don't want anyone to be out of pocket.

We hope that this is a temporary pause on reimbursements.

If you do wish to continue making we do still require makers dispatch forms to be filled out in order to track what has been made and allow coordinators to track and plan deliveries. You may still select the option to be reimbursed in the future if funding what to ever allow this but please do assume that any parts created or journeys undertaken after 5pm on May 10th are donations.

If you are a hub creating parts as well as dispatching please don't also forget to complete a makers dispatch form for any of your own prints.

If you are a maker delivering Face Shields direct to the end user see the latest version of the [SOP for Hubs](#) regarding reimbursement for additional hub expenses.

### 2 How should I package it?

Padded envelope or carefully boxed is the ideal. Multiple small clean bagged items inside a large box is another. We want to reduce the possibility of Covid-19 transmission via post. Please ensure all open edges are sealed with packing tape. If you are having the package picked up please ensure it can be retrieved from a clean and dry location. Maintain social distancing rules during drop offs and collections.

Packaging advice: [https://www.dpd.co.uk/content/products\\_services/shipping\\_advice.jsp](https://www.dpd.co.uk/content/products_services/shipping_advice.jsp)

### 3 Can I organise a group pickup to make enough for a dropoff?

Yes, please self-organise with your hub and area coordinator, if you can hit 50, great - the Slack communication channels can help but it's possible your area coordinator will have some form of logistics team in place to help. Please note that any travel has to be authorised by your area coordinator which is why it's important to include them in the conversation. If you are collecting / dropping off maintain distance guidelines when handing them over (no self congratulatory bear hugs at having achieved 50 units) and keep travel distances to a minimum.

#### 4 What if I get stopped for non-essential travel while driving for 3DCrowd?

There is a 3DCrowd Driver Authorisation Letter that your area coordinator or their nominated coordinator can send you when they have approved your travel.

#### 5 How often should I send?

Whenever you have enough to complete an order you've been supplied by your area coordinator or have enough pieces to make 20 visors for the local hub. However your area coordinator may advise differently please do as they ask.

### **If you become symptomatic**

If you come down with symptoms and suspect you have COVID-19, please stop printing straight away and dispose of any stock you have in your house. Inform your area and regional coordinator ASAP, so that appropriate precautions can be made to destroy or quarantine the stock that you have already created. Review and ensure you follow the [gov.uk](https://www.gov.uk) advice on self-isolation.

### **Checklist**

- Find suitable print location
- Clean your workbench
- Wash hands, don protective gloves & mask if available & shield if this is not your first print.
- Clean the print bed with disinfectant (isopropyl alcohol)
- Check filament supply
- Have a supply of plastic bags to bag up prints
- Print Shield
- Carry out a Quality Control check on the print
- Label plastic bags ready for prints
- Seal prints in bag or full splash shield kits if sending to an end user
- Package and send
- Complete a Maker Dispatch Form