3D Printed Face Shield
Assembly Guide
INSTRUCTIONS:
3D PRINTED FACE SHIELD

The following document describes the tools, materials, and processes required for the mass production of the 3D printed face shield developed by a transdisciplinary team at Temple University in Philadelphia. The face shield consists of 5 elements.

1. 3D Printed Shield Frame.
2. Three Hole Punched Clear Plastic Shield.
3. Top Foam Protective Insert (optional).
4. 3D Printed Elastic Adjustment Clip (optional).
5. Elastic Strap

Unlike resin cast face shields, 3D printing does not require any heavy machinery. The only requirement is access to a 3D printer. For increased production, the standard 0.4 mm nozzle may be switched to a 0.8 mm to decrease print time. Shield production consists of the following steps:

1. Download frame file.
2. Slice STL to create G-Code for printer.
3. Print the frame. (PETG is recommended)
4. Inspect the print and sand necessary areas.
5. Coat PETG in epoxy.
6. Cut plastic for shield.
7. Punch holes in plastic.
8. Cut foam.

REQUIRED TOOLS:
1. 3D Printer
2. 3 – Hole Punch
3. Sandpaper
4. Epoxy
5. Scissors

REQUIRED MATERIALS:
1. High Density Foam or comparable material (i.e. Renshape 5025).
2. PETG 3d printing filament.
3. Face shield plastic.

ADDITIONAL RESOURCES:
Visit this devices webpage to see troubleshooting tips and links to additional resources. Contact us with any questions or concerns!
OVERVIEW: 3D PRINTED SHIELD COMPONENTS

3D Printed Shield Frame _ 1
Clear Plastic Shield w/ 3-hole punch _ 2
Foam Insert _ 3
3D Printed Elastic Adjustment Clip _ 4
Hand Cut Elastic Strap _ 5

NOTES:
All components in this face shield are interchangeable and reusable. Additionally, all components are pressure fit. No fasteners or adhesives are necessary.
NOTES:
During the shield cutting process, it is important to ensure that the plastic is not scratched. Additionally, it is important to work in a clean environment as during unrolling, the plastic may become electrostatically charged, thereby picking up local debris.

For final assembly, the elastic can be attached either by means of a slit cut on the strap or by means of an optional 3D printed adjustment clip. Although the 3D printed clip allows for variable pressure in the shield, the simple elastic cut works equally well.

The foam insert is meant to accomplish two goals: 1. Protect the face from contamination from above and 2. Create a soft surface between the shield frame and increase comfort to the face. When laser cutting the foam, it is important to follow machine and material guidelines for cutting and ventilation.
1 _ Attach Plastic Face Shield
   - (Begin by inserting middle hole of plastic sheet into the middle face shield connector)
   - (Bend one side connecting a second hole and repeat for the third)

2 _ Inserting Foam Insert
   - (Slide foam insert into hole in cast resin shield frame)
   - (Laser cut trough should fit over inside resin frame creating a forehead cushion)

3a _ Attach Elastic Headband & Clip
   - (Slide elastic band through headband clip opening)
   - (Attach headband clip to both sides of face shield frame)

3b _ Attach Elastic Headband & Clip
   - (Pinch & pull open cut on elastic band and slide over the frame mount)
Face shields may constitute a class I medical device when used in certain healthcare settings. This product has NOT been FDA cleared or approved. Manufacture of this product may be authorized by FDA under an Emergency Use Authorization (“EUA”) letter for use by healthcare providers as personal protective equipment, see https://www.fda.gov/media/136842/download. If produced in accordance with the EUA, this product is only authorized for the duration of the declaration that circumstances justifying the authorization of emergency use under Section 564(b)(1) of the Act, 21 USC 360bbb-3(b)(1) unless the authorization is terminated or revoked sooner.

This device should NOT be used as a replacement for conventional and approved Personal Protective Equipment (PPE) when available. Use of these face shields alone will NOT prevent infection from microbes or viruses, including COVID-19. This device has not been industry tested nor has it been NIOSH approved.

These face shields have been designed by Temple University for low impact use to protect the user’s eyes and face from bodily fluids, liquid splashes, or potentially infectious materials. These face shields were designed for multi-use by a single provider, however, users should exercise caution and clean the face shields after each use. Manufacturers and users are solely responsible for any and all risks associated with production, use, and cleaning of face shields. THIS PRODUCT DESIGN AND RELATED INFORMATION IS MADE AVAILABLE AS-IS, AND TEMPLE UNIVERSITY EXPRESSLY DISCLAIMS, ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NONINFRINGEMENT. Reference to any particular product brand name or materials does not constitute an endorsement, guarantee, or representation by Temple University.

RESOURCES:

Turbine mixer: https://www.smooth-on.com/products/turbine-mixer/

Mixing cups: https://www.uline.com/Product/Detail/S-22983/Pails/Mixing-Containers-2-1-2-Quart (note: this is the one we actually ordered, at the 2.5 qt size. We talk about 1.5 qt in the document, which they don't have. I worry that 1 qt is going to be too small.)

Mixing sticks: https://www.homedepot.com/p/5-gal-Paint-Stick-3-Pack-PSSG-3/206871624?MERCH=REC-_pipsem-_206137830-_206871624-_N


Mold Max 40: https://www.smooth-on.com/products/mold-max-40/

Smooth-Cast 65D: https://www.smooth-on.com/products/smooth-cast-65d/

Task 8: https://www.smooth-on.com/products/task-8/


Accel-T: https://www.smooth-on.com/products/accel-t/ (Note: We do not mention this in the document, but we are using Accel-T to drop the 24-hour cure time on the Mold Max 40 to 6-12 hours. If we add that into the details, we can list this as another material we’re using.)

Note: All drawings & diagrams by Andrew John Wit unless otherwise noted. No use or modification without prior written consent.