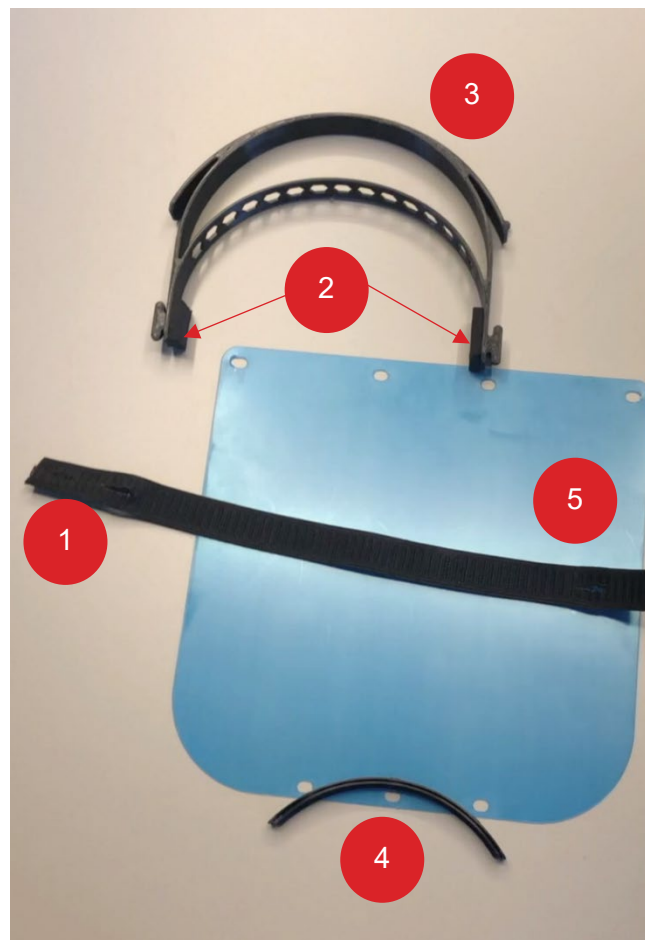


How To Fabricate a Face Shield

The steps given here should enable you to produce a face shield that is very durable and comfortable. Please note that the design files for the 3 d printed portions were obtained from [Prusa](https://www.prusa3d.com/) more information can be found there. The elastic strip the adhesive foam padding and the face shield material (PETG large sheets) were all purchased online. Please note materials may not be easy to procure and this may limit your production capabilities. We also created an assembly procedure so these can be built on site if they need to be sterilized before use.

Below are the final components used to make this face shield:

- 1) Adjustable elastic strip (purchased in bulk and cut to length with slits for adjustment)
- 2) Adhesive foam padding (purchase in bulk and cut to length)
- 3) Head band (3D printed)
- 4) Bottom reinforcement (3D printed)
- 5) Face shield (Purchased in bulk hand cut then laser cut for holes and shape)



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STEP 1 - 3D print parts

Using 3D printers, we created the head band and the bottom reinforcement for the face shield from the files we obtained online. It is critical to have right setting and understand what material, you are printing with as those will influence the outcome of the print. With FDM you may be able to make either 1-3 at a time depending on the size of your printer. On a standard powder bed fusion machine as shown on the right you can make up to 30 pieces at once. Please note printing times can be anywhere from 1 – 10 hours or more.



FDM printer with multiple heads



Powder bed fusion printer

STEP 2 – Cut elastic band to length

We purchased the elastic band in bulk and have to cut the elastic bad to length (typically around 13 ½" long). Then it is necessary to create a slit on either end to connect to the head band. On one end we added an additional slit to adjust for comfort. We used a hot knife so it was able to singe the elastic and have a clean finish, but some heavy scissors should do the trick as well.

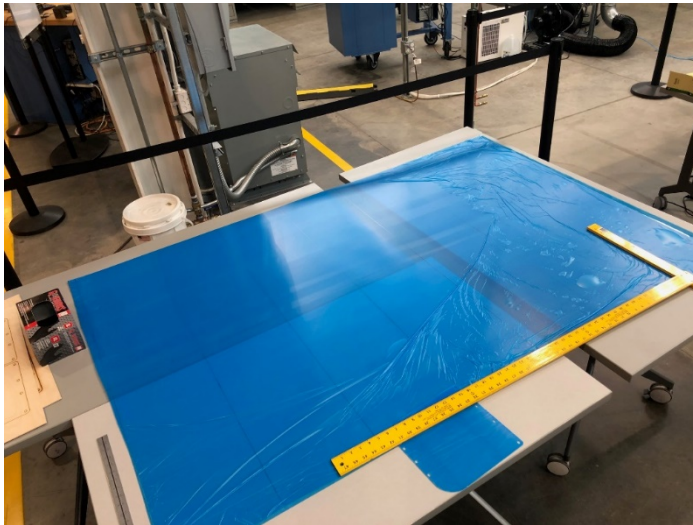


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STEP 3 – create face shield

The next step is to produce the actual shield that attaches to the head band and bottom reinforcement. We purchased a large sheet of PETG 0.5mm thick. I would recommend whatever you can get and basically cut sheets into manageable lengths. We did this since we had a laser cutter. If you do not have one you may have to make a template and cut with scissors and use a hole punch for the connects to the head band.



Start with large sheet that gets cut into pieces that will then be laser cut for fitting onto head band



Template that is used to show how the material will be laser cut to make the shields. Again, if no laser cutter you can still use a template by drawing it and then using scissors and a hole punch.

If you do have a laser cutter this process is straightforward, and we did a set up so we could cut out two face shields in one turn which takes about 30 seconds to do.



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Sheet in laser cutter



Finished shield laser cut ready to be placed on head band

STEP 4 – Finally assembly and packaging

It is important to have a staging area so that you can place all components together for assembly. The last part is purchasing the bulk adhesive foam. This is placed inside the head band for additional comfort. You will have to again cut to length. It is not required but given that these can get used for long periods of time comfort is critical. Also using standard labels we then printed up a label to package and seal the kit.



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View of manufacturing station for face shield



Packaging station



Label printed that will seal the face shields kit





Finished product



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Packaged face shield kit



Face shield kits packaged in box with instructions for assembly



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Face Shield Assembly Instructions

Remove contents from packaging

This package contains:

- 1) Adjustable elastic strip
- 2) Head band
- 3) Bottom reinforcement
- 4) Face shield

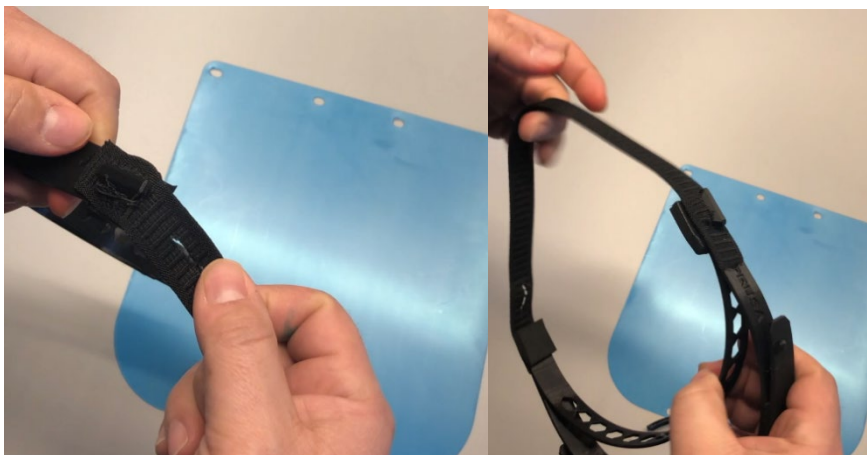


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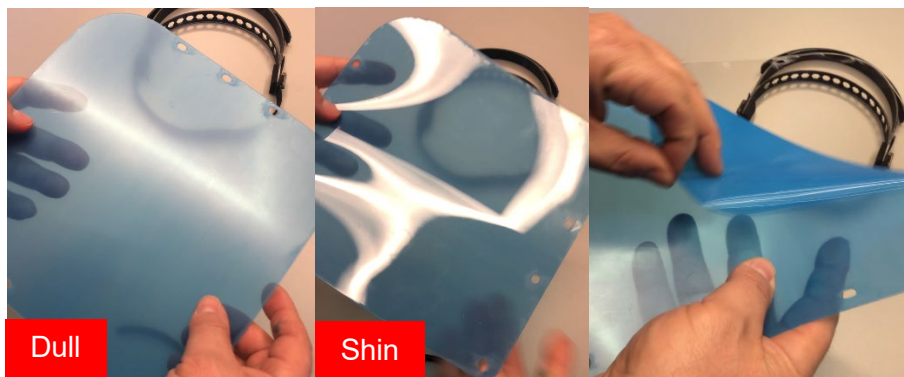
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STEP 1

Apply the adjustable elastic to the head band. Note on one side of the elastic, there are two slots to adjust for comfort.

**STEP 2**

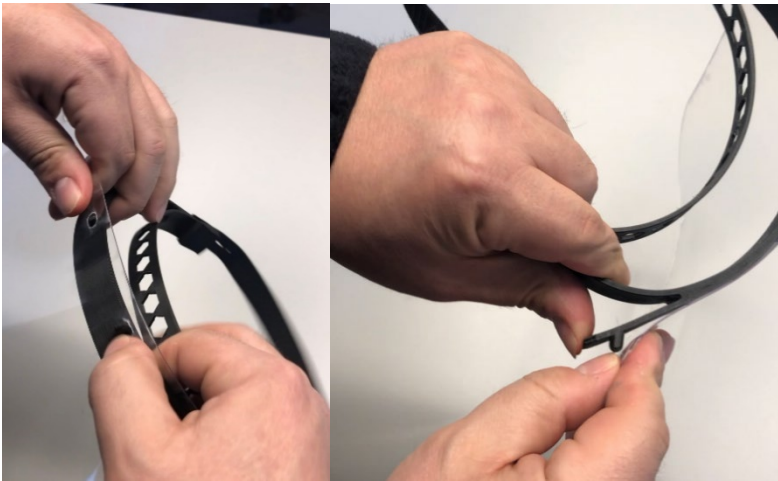
Peel the protective film from the face shield. This protective film is on the dull side of the face shield



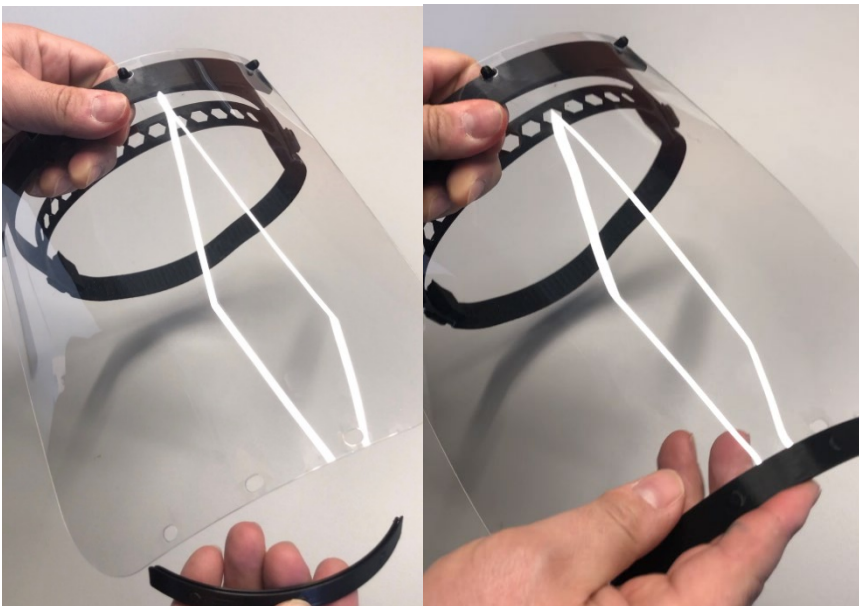
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STEP 3

Apply the face shield to the head band start from right to left and insert into the pegs. The last step you must push the head band towards the shield and slip it on and pull the shield over, to ensure a tight fit.

**STEP 4**

Apply the bottom reinforcement, it should pop into the grooves located inside the piece.



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The United States must utilize all available digital technology capabilities to speed its COVID-19 response. MxD and its nearly 300 members are committed to helping the defense industrial base bolster national security and public health in response to COVID-19 — and to being better prepared for future crises. Learn more: <https://mxdusa.org/covid-19>

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