

COVID-19 Response

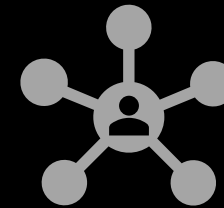
Face Shield Templates



Our world is experiencing an unprecedented crisis and all sectors of society can support the work of our front-line healthcare workers at this time.



Given the worldwide shortages in PPE (Personal Protective Equipment), many people are looking for DIY solutions for making masks, face shields, and other protective gear.



Museums and museum professionals in countries that are not under lockdown have a unique ability to support medical professionals in their regions with one of their urgent needs, the face shield.

Face Shield Templates

How Museum professionals and individuals can support health care workers during the COVID-19 outbreak.

Face Shields

Face shields or visors, protect medical professionals from airborne body fluids, in this case from coughing, sneezing, or intubation. The Center for Disease Control in the United States states, "Goggles are no longer recommended as they may not provide complete skin coverage in comparison to a single use disposable full face shield."

This simple piece of equipment is life saving when used in conjunction with a mask. As you can see, it is comprised of materials that every museum conservation and exhibitions department most likely has on hand.



DIY Face Shields



Templates

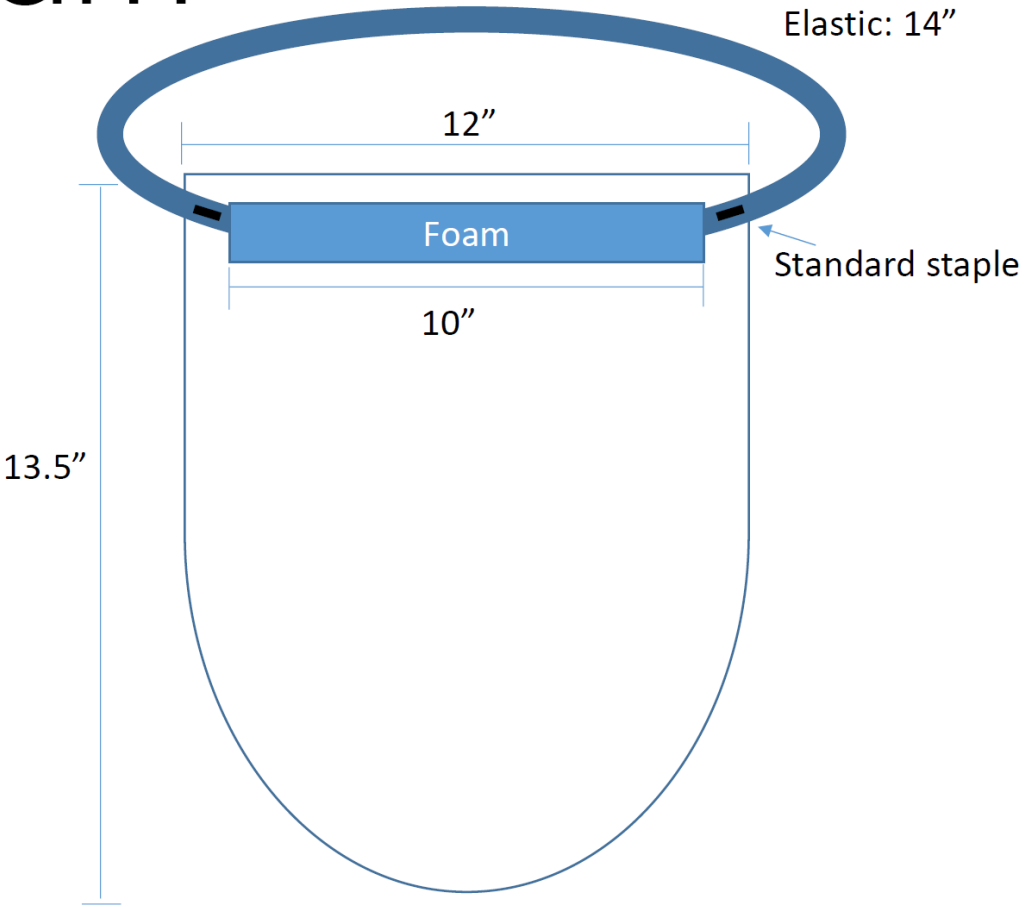
Several hospitals and healthcare workers have developed their own templates for making simple, reusable face shields. Their staff are spending precious time constructing this equipment that they could use to save lives.

Some solutions are simple. Others involve 3D printing and CNC routers. While these are valuable, with basic supplies and a simple production line, hundreds of masks can be made quickly for local health care workers.

Two open source templates, and a simple design for a mask follow.



Diagram



Template 1

Providence Healthcare Inc.
Washington state

Face Shield Diagram

Template 1

Providence Healthcare, Inc.
Washington state

Face Shield Supply List

Face Shield Parts

- Vinyl – 16 or 20 gauge marine grade vinyl
- Foam – 1 inch by 1 inch (cut down from larger sheets, if necessary)
- Elastic – Preference $\frac{3}{8}$ to $\frac{1}{2}$ inch (larger might require two staples per side)
- Double-sided tape – 1 inch industrial grade mounting tape (Gorilla, Scotch)

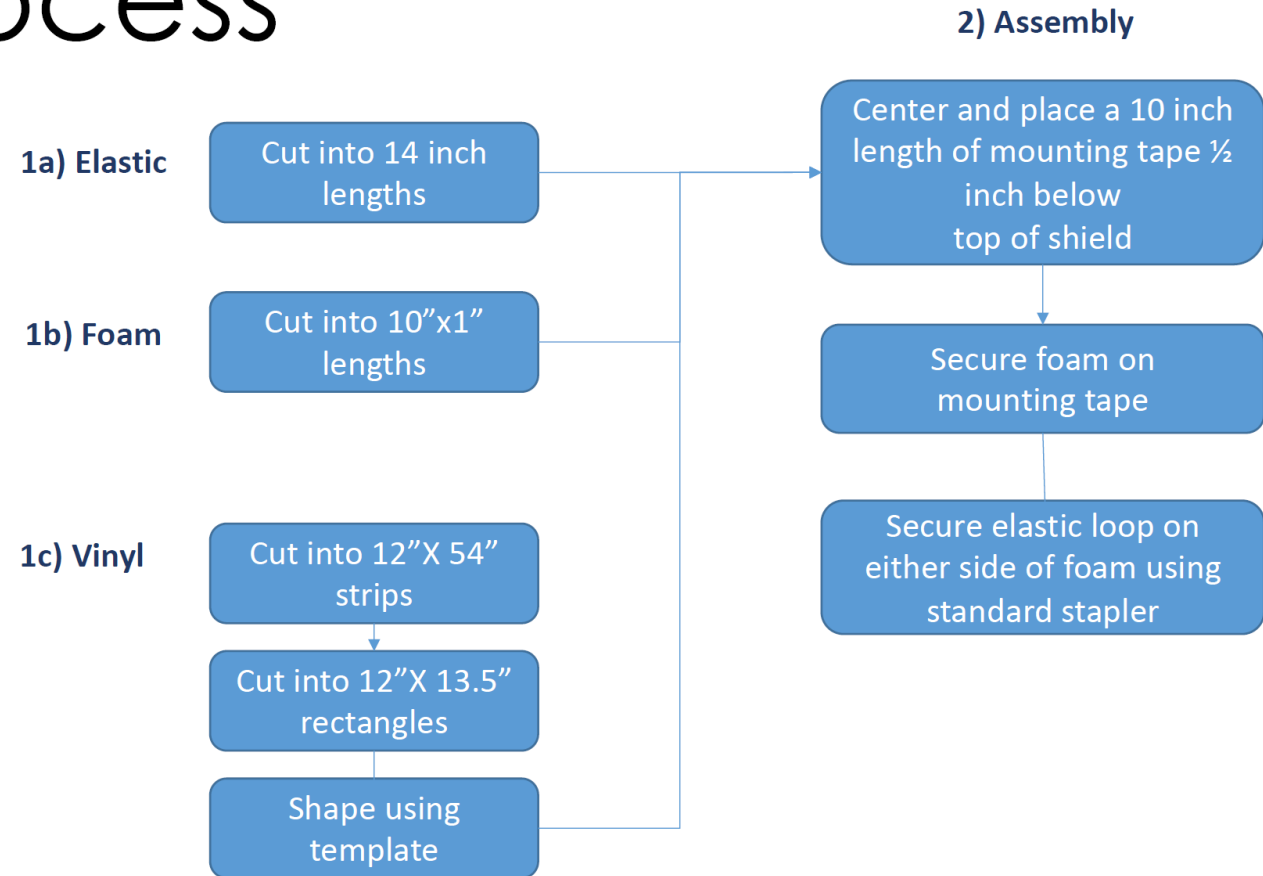
General information only. Providence used these guidelines, with other information and our own experience, to create face shields for our own internal use. You should conduct your own reviews and consider quality and other issues before creating face shields or other products on your own.

Template 1

Providence Healthcare, Inc.
Washington state

Face Shield Assembly Process

Process



Template 2

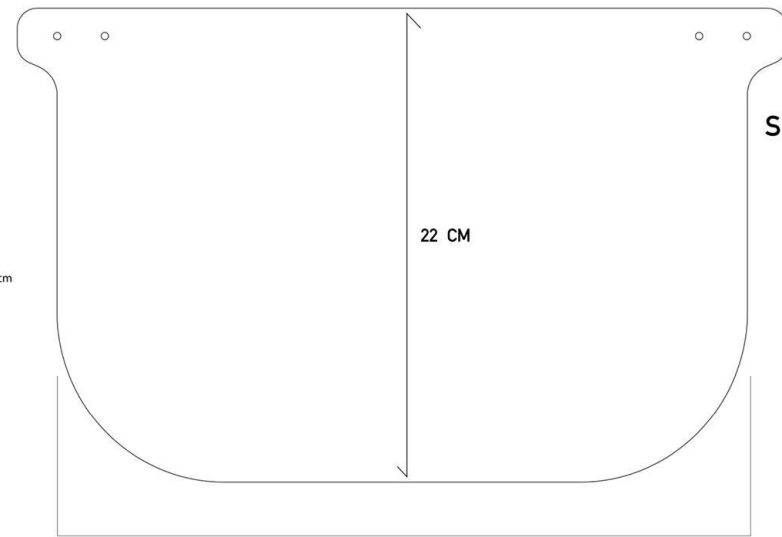
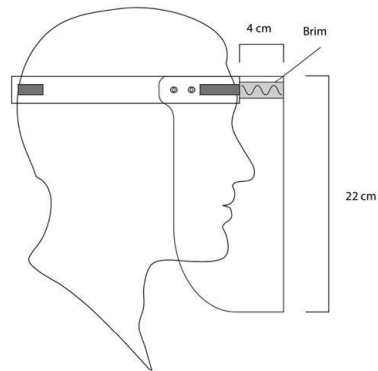
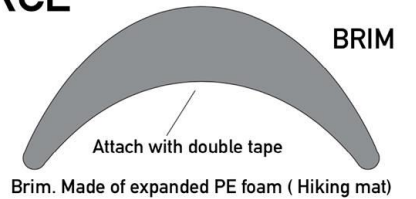
Open-source CNC-manufactured Face Shield

THE ALL CNC FACE SHIELD, REUSABLE, OPEN SOURCE FOR MEDICAL AND FIRSTLINE HEROES

Fast production for CNC routers, or laser cutters.
1/1 SCALE

Ø 3.4 MM, to use with plastic rivets.
please scale Ø accordingly

Add strips of door nitril rubber seal. for friction at forehead



HEADBAND

Adjustable depending on rivet type used.
If not easy to open the rivet,
Make: small, medium, large sizes.

Stays well on head due to tension in the plastic.
Add padding made of door rubber seal strips
(Closed cell, nitril rubber)
on the front and back of headband.

Polykarbonat (Lexan)
PET

Desinfects with:
Alkohol
Chlor
Soap
Scratch Resistant.

No heath treatment! Temps above
60°C / 140 F, will weaken the tension in shape.

V0.2



open source
hardware

CREATED BY STIG SKJELVIK
@VARDA STRUCTURE PROTECTION SOLUTIONS AS
18.03.2020, NORWAY

0,5- 0,75 mm (0,25 inch) or similar PC, PET sheets

Template 3

Open-source
DIY Face Shield Supplies
Transparent binder covers, elastic
twine, foam sealant rods



Template 4

U. of Wisconsin
(WISC) Maker Space Face Shield



U. of Wisconsin (WISC) Maker Space Face Shield Template

SHOULD YOU HELP?

POSSIBLY. MAKE SURE SOMEONE NEEDS FACE SHIELDS AND CAN ACCEPT THEM.

If you are a maker space, a light manufacturer or just a handy family, this may be a way for you to give back. There are a just a few things you need to make this happen.

Connections to hospitals

You should figure out who to talk to at a hospital see if they have a need for face shields.

See if their Infection Control department or their Materials department will approve use of this mask.

Be very clear that this mask is **intended for one-time use and might be difficult to disinfect before or after initial use.**

Money

It's about \$1,500 in materials to make 1,000 face shields.

We suggest selling these to the hospitals, not donating them to make sure your organization will be able to keep working on this and not lose steam. Incentives work.

Equipment

You will need a laser cutter or steel rule die, a stapler, a shear and a heat sealer.

You could probably get by with scissors, an Xacto, a stapler and Ziplocs.

Wear gloves and find an area you can keep segregated and kept clean.

The shields don't need to be sterile, but good manufacturing practices are important.

Labor

You need people to assemble them, package them and ship or transport them.



REVISIONS

V1 INITIAL RELEASE

V2 TALLER SHIELD, SHORTER FOAM, REVISED STAPLING

V3 FEWER STAPLES, ADDED "HOW TO" AND THIS COVER PAGE

V4 UPDATED DISCLAIMER. STAPLE DESCRIPTION AND DIMENSION ADDED.

LEGAL DISCLAIMER

This face shield design and specifications are being provided as a free service to the community during this public health emergency. This face shield is not intended to prevent specific diseases or infections. Individuals or organizations that manufacture face shields utilizing the design and specifications are responsible for any federal or state regulatory requirements that apply to the manufacture of face shields intended for medical use, and are responsible for informing health care providers to which the masks are supplied that they are responsible for decisions regarding appropriate personal protective equipment for their personnel. Individuals and organizations are free to use, copy and share this design and specifications, including for commercial manufacture, without payment of any fees or charges, but may not assert ownership in the design and specifications, ownership of which belongs to the Board of Regents of the University of Wisconsin System and/or the individuals who created the design. EXCEPT WHERE SPECIFICALLY PROHIBITED BY LAW, NO WARRANTIES OF ANY KIND ARE OFFERED FOR THE FACE SHIELD DESIGN AND SPECIFICATIONS, INCLUDING WARRANTIES OF NON-INFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE.

OPEN SOURCE FACE SHIELD V4
DELVE | MIDWEST PROTOTYPING | UW MAKERSPACE
WWW.DELVE.COM EMAIL JESSE.DARLEY@DELVE.COM WITH SUGGESTIONS
<https://making.engr.wisc.edu/shield/>

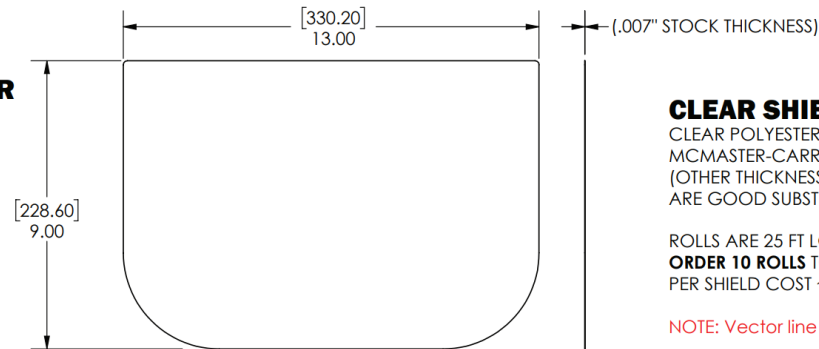
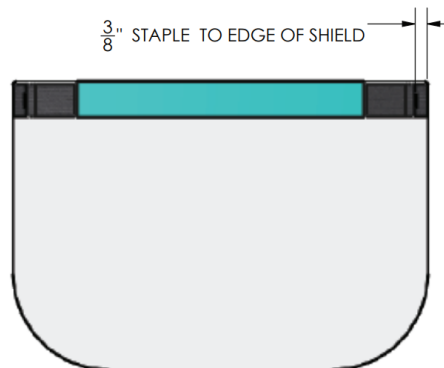
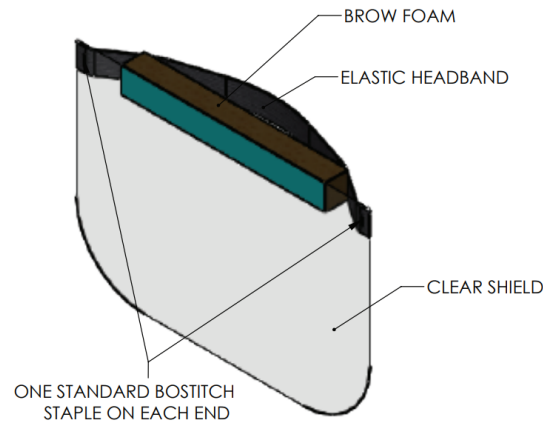
<https://www.delve.com/assets/documents/Open-Source-Face-Shield-Drawing.pdf>

U. of Wisconsin (WISC) Maker Space Face Shield Template



MATERIALS LIST

~ \$1,500 TO MAKE 990 FACE SHIELDS
WITH MCMASTER-CARR PARTS AND A STAPLER



CLEAR SHIELD

CLEAR POLYESTER FILM - 0.007" THICK
MCMASTER-CARR PART NUMBER 8567K64 (<https://www.mcmaster.com/8567k64>)
(OTHER THICKNESSES AND MATERIALS SUCH AS PET, PETG, POLYCARBONATE ARE GOOD SUBSTITUTES. BONUS FOR ANTI-FOG COATING.)

ROLLS ARE 25 FT LONG X 40 IN WIDE AND COST \$78. YOU CAN GET 99 PARTS FROM A ROLL.
ORDER 10 ROLLS TO MAKE 999 SHIELDS
PER SHIELD COST ~\$0.79

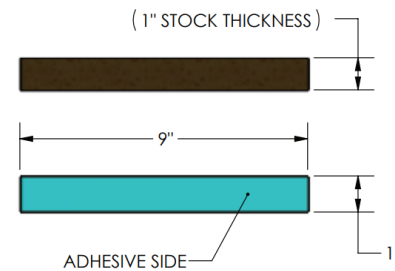
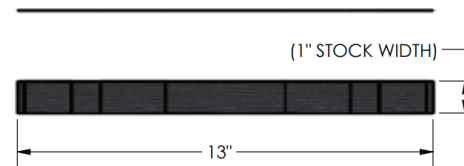
NOTE: Vector line work is included on Page 4 of this drawing for laser and die cutting

ELASTIC HEADBAND

ELASTIC LATEX FABRIC (1" WIDE X 13" LONG)
MCMASTER-CARR PART NUMBER 88225K68 (<https://www.mcmaster.com/88225k68>)

ROLLS ARE 36 FT LONG AND COST \$11. YOU CAN GET 33 PARTS FROM A ROLL.
ORDER 31 ROLLS TO MAKE 1000 SHIELDS
PER SHIELD COST ~\$0.34

Please note that this elastic **has latex** and some people are allergic to it. It is highly preferred to use a non-latex elastic but McMaster does not offer one. Hospitals **MAY** accept latex **IF** it is clearly labeled.



BROW FOAM

ADHESIVE BACKED POLYURETHANE FOAM (1" TO 1 3/8" THICK)
MCMASTER-CARR PART NUMBER 8614K84 (<https://www.mcmaster.com/8614k84>)

SHEETS ARE 60" X 54" AND COST \$112. YOU CAN GET 288 PARTS FROM A SHEET.
ORDER 4 SHEETS TO MAKE 1000 SHIELDS
PER SHIELD COST ~\$0.40

A NOTE ON MATERIAL SELECTION

We chose these materials because they are simple to order and come from one supplier. As this design catches on, it's likely that McMaster-Carr will struggle to keep up. We encourage you to find alternative suppliers. Many different clear plastics will work, even transparency film! Many foams will work and glue can be substituted for adhesive backing. We know this can be daunting, but you can do it. Use your inner MacGyver!

U. of Wisconsin (WISC) Maker Space Face Shield Template



HOW TO MAKE IT

THIS IS OUR METHOD, BUT PLEASE EXPERIMENT AND FIND A BETTER WAY.

PREP COMPONENTS



Cut clear plastic into rectangles that fit your laser cutter bed.



Mark centers of each shield on bed of cutter.



Weigh down each shield to avoid curling. Experiment with speed and power of laser.



Cut elastic straps to length.



Cut foam to length and width using a shear, Xacto blade or scissors.

ASSEMBLE



Line up elastic with edge of shield, slightly below the top of the plastic.



Insert into electric stapler. This should staple about 3/4" from end of strap.



Remove liner from foam to expose the adhesive.



Center foam along top edge of shield and press down to get the adhesive to stick.



Compress the foam with your thumb to get the elastic to lay flat. Staple the other end of the strap.

BAG (10 PER BAG)



Find a bag that will fit the number of shields you want to ship. We ship in packs of 10 and use a heat sealer to cut and seal the bags.



Finished bag ready to be boxed and delivered.



We use 16" x 16" x 16" boxes that hold 100 face shields each (10 bags of 10).

<https://www.delve.com/assets/documents/Open-Source-Face-Shield-Drawing.pdf>

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Connections to hospitals

You should figure out who to talk to at a hospital see if they have a need for face shields. See if their Infection Control department or their Materials department will approve use of this mask. Be very clear that this mask is **intended for one-time use and might be difficult to disinfect before or after initial use.**

Money

It's about \$1,500 in materials to make 1,000 face shields. We suggest selling these to the hospitals, not donating them to make sure your organization will be able to keep working on this and not lose steam. Incentives work.

Equipment

You will need a laser cutter or steel rule die, a stapler, a shear and a heat sealer. You could probably get by with scissors, an Xacto, a stapler and Ziplocs. Wear gloves and find an area you can keep segregated and kept clean. The shields don't need to be sterile, but good manufacturing practices are important.

Labor

You need people to assemble them, package them and ship or transport them.



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U. of Wisconsin (WISC) Maker Space Face Shield Template

Template size:
13 " x 9 "



<https://www.delve.com/assets/documents/Open-Source-Face-Shield-Drawing.pdf>

Template 5

NYC Maker Space
Collective preferred
3DVerkstan Face Shield Designs



Template 5

NYC Maker Space Collective preferred 3DVerkstan Face Shield Design

3DVerkstan templates are made for North America, Europe and Sweden. This design is for North America.

- **Materials and Methods:**

- A4 sheet of transparent plastic (~0.2mm PET recommended)

- 3-Hole punch

- 3D Printer

- A rigid filament

- A rubber band (if desired)

- Download 3D printer settings and templates here:

<https://www.youmagine.com/designs/protective-visor-by-3dverkstan/>

Template 5

NYC Maker Space Collective preferred 3DVerkstan Face Shield Design

NORTH AMERICA

This version is made to be used with North American 3-hole "Letter" punches.

The 3-hole pattern turned out to not be sturdy enough, so we use a 1/2" spacer to create a 6-hole pattern with a 1" offset instead.

This is the version to go for:

If you are making these in North America and want to use letter size sheets.

How to do the punching:

Set your hole punch to the setting for a Letter sheet

Make a test punch in a piece of paper, then measure how far the holes are from each edge and make sure it is symmetric.

Print the Spacer piece and put it on top of your guide bar. This is what creates the hole offset needed.

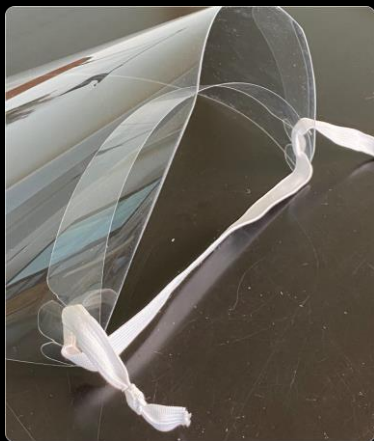
Put the Letter (8.5"x11") and make one punch along one of the long sides, with the short edge resting on your spacer piece.

Flip the Letter sheet around its short axis, and make one punch on the opposite side, so you end up with 6 holes along the same edge.

Further 3D Printed Template Resources

More 3D Printed designs are available from NYC Makes
PPE website here:

<https://nycmakesppe.com/>



Design by the NYU COVID-19 Task Force at right.



Template 6

Face Shield Supplies for Museum Makers

These are the simple supplies needed to make face shields that many museums, install teams, art handlers and conservation professionals have in stock. Be creative with what you have.

Mylar

3M double-sided tape

Polyethelene Foam

Glue and glue guns

Twill tape or similar

Staplers

Tyvek

Office Supplies-clear binder dividers, elastics

Anti-fog treatment (optional)



Face Shield Preparation for Museum Makers

Mylar or Vinyl Clear Binder Dividers

- Cut into 12"x 13.5" rectangles or lengths as in Template 1, slide 6 (edges can be rounded off, length can be shortened to 9")

Twill Tape or Elastic

- Cut into 30" lengths

Foam

- Cut into 10"x1.5" lengths

Double-sided Tape

- Cut into 10" lengths

***Tyvek can be added to shields if available, but is not necessary**

Face Shield Preparation for Museum Makers

Assembly

Follows basic diagram on Slide 6 with variations:

1. Center and place a 10" length of double-sided tape $\frac{1}{2}$ inch below top of shield
2. Secure twill tape or elastic on double-sided tape, ensuring that it is centered so twill tape is evenly distributed on each side for tying it around head.
3. Center and place a 10" length of double-sided tape on top of twill tape or elastic
4. Secure foam on double-sided tape
5. An extra piece of twill tape can be added on top of the foam as a barrier between the foam and skin if supplies allow
6. If using an elastic loop, secure elastic on either side of foam using standard stapler
7. If available, an anti-fog treatment can be sprayed on inside and outside of shield

The Importance of a Face Shield

- Wrap-around face shield protects face and neck from direct splatter and contact with virus
- 1.5” Foam headband holds shield away from face for use of glasses and mask
- May prolong mask life for healthcare workers who have run out of masks and are reusing them
- Anti-fog treatment on inside and outside of shield maintains optical clarity (optional)

NYC Makerspace Face Shield Production Protocols

Wrap-around face shield protects face and neck from direct exposure

When manufacturing PPE, follow these instructions recommended by Prusa Research:

Act as if you were infected by the COVID-19 virus. Wear a **face mask** and a **fresh pair of gloves** when collecting each batch of printed parts. Store the parts immediately in a sealable bag.

Talk with whoever you're making the shields for, let them know about your manufacturing environment.

There is still debate about how long the virus survives on plastic, but most sources mention 2-3 days. That means that by letting the packed face shields sit for 2-3 days before distributing them, you'll greatly reduce risk of transmission.

Do not store the entire stock in one place, minimize the risk of cross-contamination.

Disclaimers are available here:

https://nycmakesppe.com/assets/pdf/Face_Shield_Disclaimer.pdf

May prolong mask life for healthcare workers who have run out of masks and are reusing them

Anti-fog treatment on inside and outside of shield maintains optical clarity (optional)

Thank you for supporting first responders around the world.



info@curatorswithoutborders.org