FREEFLOE FACE SHIELD

Designed by Kadin Feldis

with help from Taz, Kiana, Laura & Kevin

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Before we begin, I would like to thank our sponsors who made significant donations for the initial batch of face shields and made the project possible.

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I would also like to thank the other companies that made this project possible.

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BEFORE YOU BEGIN:

Below is a general overview of what you will need to manufacture your own face shield at home. If you do not have what is listed below, get creative. Many of the steps can be adapted and modified based on what equipment and material you have available. You are responsible for your own safety; we take no responsibility for harm or injury caused by the creation of this face shield. We also ask that you use what supplies you have at home or order them to your front door. Please be mindful of the risk you pose to the community if you leave your home to get supplies.

RAW MATERIALS:

1. 0.08in thick acrylic or similar
2. Welding helmet headgear
3. Extra washers that fit the headgear bolt (they may come with the headgear or you can improvise)
4. Acrylic Glue

TOOLS / EQUIPMENT:

1. Oven (one that will not be used for food later)
2. Laser cutter or X-acto knife
3. Roughly 8in external diameter PVC pipe, plastic bucket or other suitable cylindrical object
4. Heat resistant gloves
5. Respirator
6. Metal Sheet or Cookie Sheet (flat works best)
7. Aluminum Foil
8. Drill with bit diameter that matches welding helmet headgear attachment bolt

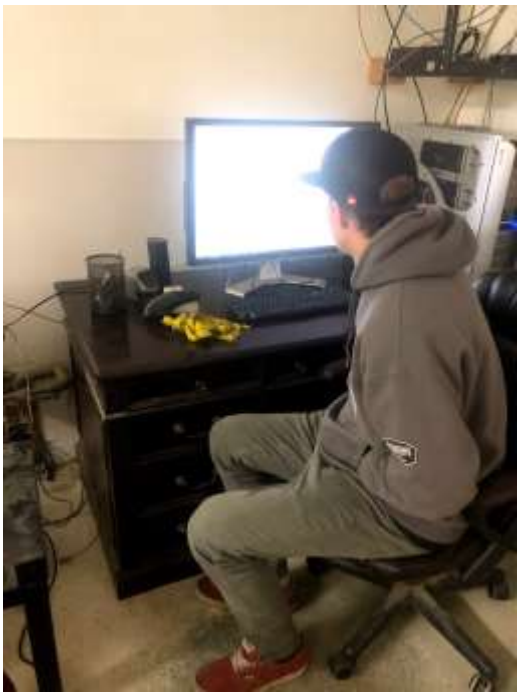
INSTRUCTIONS

These instructions are intended to guide individuals in the design and creation of face shields for personal use or non-profit distribution. The guide may not be complete and is not intended to be a complete manufacturing guide.

STEP 1 – PREPARE & CUT YOUR ACRYLIC

There are two major parts that need to be cut. The lens, which will cover the user's face, and the top cover, which prevents splash over the top of the lens.

METHOD 1
The most accurate and efficient way to cut your acrylic is on a laser cutter. This process is highly dependent on your laser cutter so I will leave it up to you. If you choose this process, I recommend that you laser cut the holes for the face shield to mount to headgear/headband.



METHOD 2

The best way I have found to cut acrylic at home without the use of a laser cutter is the score and break method.

First, use a ruler and draw out your pattern on the acrylic sheet.

Second, score the outline with a razor blade or X-acto knife, making sure that you make multiple passes to get a sufficient depth of cut.

Finally, place the scored edges on the edge of a counter or another surface with sharp edges. While applying pressure to the acrylic on top of the counter, firmly hit the plastic that is hanging over the edge. This should break the acrylic cleanly along your score lines.

Work your way around the shape one side at a time until you have broken out the entire pattern. For this method, I recommend drilling mounting holes after bending the acrylic, but it is up to you. Make sure you use a drill bit that corresponds to the size of the attachment bolt on the welding headgear you have chosen.

STEP 2 – SHAPE THE ACRYLIC

Shaping acrylic without ruining its surface finish takes a bit of practice but results in a very polished final product once you have fine-tuned your method. Please be mindful that acrylic fumes are dangerous. Wear an appropriate respirator and make sure to have proper ventilation while working with acrylic.

METHOD 1

The best way to evenly heat a sheet of acrylic is in an oven. You will need an oven that is large enough to fit the pattern you have just cut out, and that will not be used to make food again in the future.

I have found that in a conventional oven 4 minutes and 15 seconds at 350 Fahrenheit is just about the optimal heating time. Make sure the oven is pre-heated, and test a few scrap pieces of acrylic before heading and shaping your first lens.

Peel the protective plastic layer off both sides of the acrylic lens shape you have cut. Line your metal sheet or cookie sheet with aluminum foil, with 3-4 inches of extra foil extending out both sides of the sheet. Place the lens piece on top of the foil that is on top of the sheet. Place the sheet in the oven and immediately start the timer.

METHOD 2

Another option, for those who do not have a spare oven, is to use a heat gun. This process is more difficult because it is hard to evenly heat the acrylic and avoid melting the surface. That being said, it can be done.

STEP 3 – SHAPE THE HEATED ACRYLIC LENS OVER THE PIPE

Put on heat resistant gloves.

After approximately 4 minutes and 15 seconds, remove the metal sheet from the oven and place on top of the stove.

Quickly lift the aluminum foil with the heated acrylic on top and drape it over the pipe (external diameter approximately 8.5 inches). ** Transfer method by Taz **

With gloves on, immediately press the sides of the hot acrylic firmly against the pipe or other cylindrical object, such as a trash can or bucket. ** Shaping method by Kiana ** Hold tightly for about 1.5 minutes. The acrylic will cool and take the curve of the pipe.

Remove the acrylic, set aside to cool completely being careful not to scratch it, and place the foil back onto the metal sheet. Place a new acrylic lens on top of the foil and repeat the process. You will find your own rhythm heating and bending the acrylic, depending on whether you are working alone or with a partner or two.

NOTE: Things to watch out for

If you heat the acrylic too much, the surface will begin to melt and the view through the lens will look wavy, like looking through an antique piece of glass.

Never leave the oven unattended, even for a minute.

Practice a bit and the process will begin to go smoothly.

STEP 4 – ATTACH THE HEADGEAR / STRAP TO THE LENS

The next step is to simply attach the cooled, shaped acrylic lens to the headgear. This will likely cause the lens to bend further. Do this **before** you glue the top cover onto the lens.

Bolt the acrylic lens to the welding headgear piece with the built- in bolts on the headgear. Use additional washers if needed to achieve a secure fit.

STEP 5 – GLUE THE TOP COVER TO THE LENS

Gluing acrylic can prove tricky. Epoxies often work but the best option is to use a specialty glue/ solvent that chemically bonds the two acrylic surfaces together.

Place the acrylic top cover piece flat onto a piece of newspaper at the edge of a counter. Tilt the headgear so it is not in the way. Put the lens upside down on the flat cover piece. Run the glue evenly along the front of the seam between the lens and the top cover. The glue should seep between the top cover and lens. You can run a bead of thicker glue along the seam as well to achieve a secure bond. Place a book or weighted object on top of the lens to press the two surfaces together while the glue sets. It usually sets in about 15 minutes enough to move the face shield, but will fully set over a few hours. Refer to the instructions on the acrylic glue you choose.

Clean dust and fingerprints off the face shield, and you are ready to deliver!