

How to build a Clean Hood

By Bruce Swan, Logan Hoon and Chris Graham - South Dakota State University

A clean hood is used for creating a contamination free workspace to work with non-hazardous materials in a lab. Air is pushed through a HEPA filter, by a blower motor, into the hood. This keeps a flow of air moving through the hood, theoretically protecting from contamination. We wanted to make a DIY flow hood for our lab, using materials from a local hardware store, to save money rather than buying a new one.

This was our first time doing something like this so our methods could be improved to be more efficient. Planning ahead can definitely save time and money on materials.

Outline

Materials:

Dimensions:

Cutting the Plexi/Acrylic:

Cutting and drilling the Aluminum:

Filter box:

Extras:

Materials:

- 8 Plexiglass/Acrylic sheets
 - 5 - 36" x 24" x .17" thickness
 - 2 - 36" x 30" x .22" thickness
 - 1 - 48" x 24" x .25" thickness
- 3 - 48" x 1" strap aluminum
- 13 - 36" x 1/16" x 3/4" angle aluminum
- UV CORN light
- 1 carabiner
- 1 hanging eyelet bot with 2 nuts and 2 washers
- MR. BLOWER blower motor
- 1 x 14 x 20" HEPA filter
- Silicon sealant
- 4 - 1" hinges with screws (6-32 hole size)
- 1 cabinet/door handle
- 150 - 200 ct. 6-32 x 1/2" screws
- 150 - 200 ct. 6-32 nuts
- 2 - 8-32 x 1/2" screws for filter box
- Pack of 4 rubber legs(Any)
- Sharpie

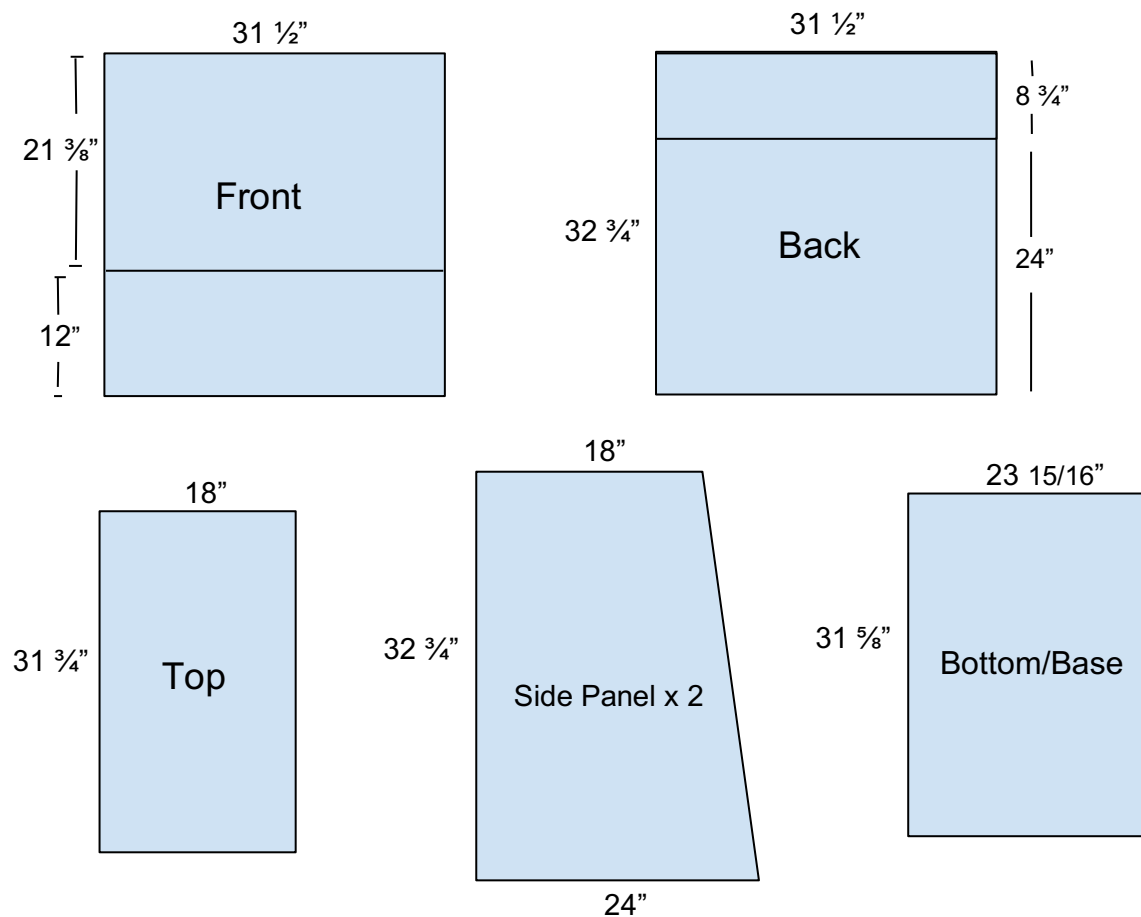


Tools:

- Plexiglass cutter knife
 - (makes clean cuts but can also use power grinder wheel)
- Straight edge (ruler or anything with a straight edge to cut along)
- Tape measure
- Power Drill
- 9/64 drill bit
- Angle grinder with cutting wheel and sanding wheel
- 2 vice grips or clamps
- Drill press (optional)
- 150 grit sandpaper (optional)
- Hole saw bit (optional)

Dimensions:

The dimensions we used came from a previous flow hood we have in our lab. We decided to imitate this hood as we like the size for what we work on. The dimensions are as follows:



The dimensions can be changed to any desired size. We would recommend planning the dimensions ahead so you can buy plexi sheets that are big enough. A problem we encountered was joining two plexi sheets together (Back panel) since our sheets weren't big enough to cut one piece out of.

*We had to join the back panel with 2 different pieces to fit our dimensions. We did this by cutting and drilling 1" aluminum strap and fastening the 2 panels together with screws/nuts. It would be preferable to buy plexi sheets as big or bigger than the desired dimensions to avoid this step.



1. Cutting the Plexi/acrylic:

We used both a power angle grinder and a plexi knife to cut our plexi sheets. The angle grinder is faster but makes rough cuts. The knife makes clean cuts but takes more time and effort. Either method works fine but you may need to sand the plexi after using the angle grinder. Mark your lines on the plexi sheets with a sharpie where you want to cut. Place your plexi sheet on top of something sturdy (empty garbage cans). Place your straight edge along the sharpie line and clamp down with vice grips or other clamps (might be helpful to place cardboard under the plexi sheet to prevent scratching). Cut along the straight edge with either angle grinder or plexi knife. Make sure to make clean cuts and save the scrap pieces. These are what we used to build the filter box.

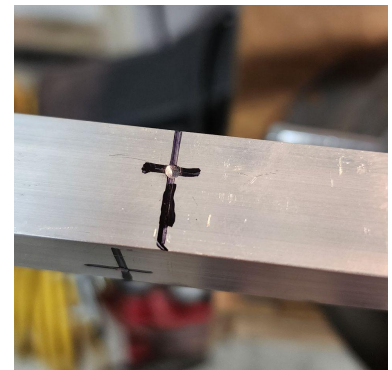


2. Cutting and drilling the Aluminum and fastening:

Set up the cut panels on a table and loosely tape the hood together. This will shape the hood to gauge how long to cut the angle aluminum for the corners. There will be angle aluminum on each corner to frame the hood. We measured the length of each corner, starting with the vertical corners (sides), and cut the aluminum using the power angle grinder to the length of each corner. The vertical aluminum on the front will only be the length to the door, while the backside will be full length. Place the cut angle aluminum on the outside of the hood corners and mark 6 - 7 pairs (12 - 14 total) of holes for each corner.

* Offsetting the holes is preferable to placing them next to each other. We did not offset the holes at first, but this caused problems with getting the screws and nuts to fit.

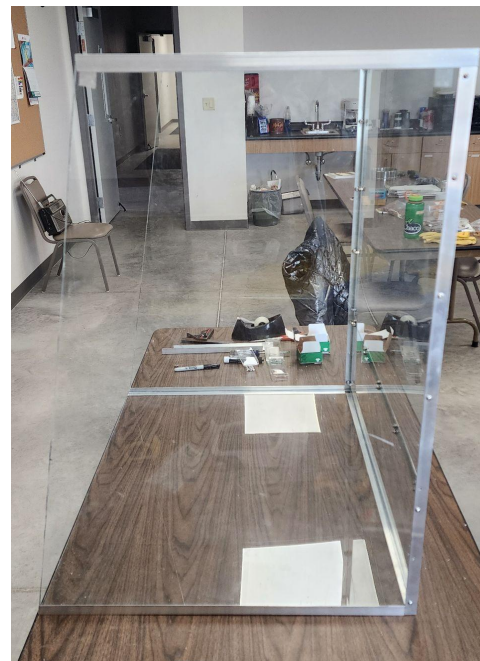
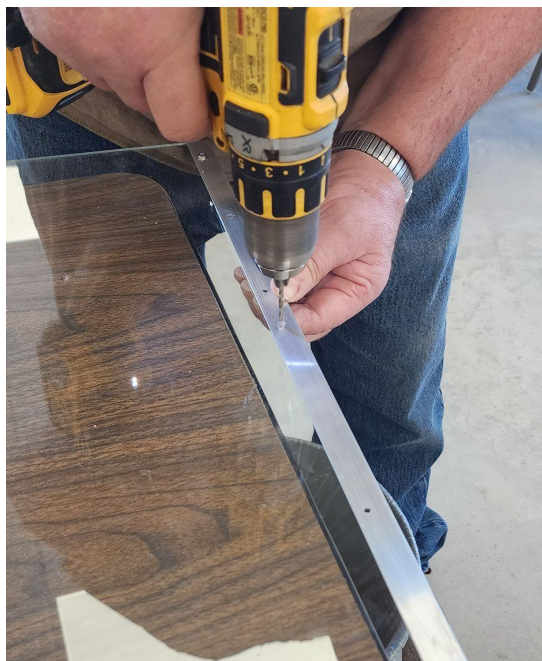
After marking the angle aluminum with a sharpie, use an awl and hammer to mark the hole for drilling. Use a drill press with 9/64 bit, or secure the aluminum down and drill holes with the power drill, using 9/64 bit.



For the horizontal top corners, we placed them over the top of the vertical pieces and cut the corners at a 45 degree angle using the power angle grinder (see pic). For the bottom horizontal corners, we butted them against the vertical pieces. Most of these measurements were eyeballed and made to fit. With some minimal planning and measuring, our methods could probably be improved upon and more precise.



After drilling the holes into each aluminum piece, we placed the aluminum onto the loosely assembled hood and used the holes as guides to drill through the plexi panels. After drilling through the plexi panels, the screws and nuts can be placed into the holes to secure the plexi and aluminum together.



1" aluminum strap was used horizontally across the front on the bottom. This was measured across to butt against the angle aluminum. Fastened with screws and nuts.

*Legs can be placed in all four corners to keep the screws from scratching the surface that it sits on.

After getting the basic frame around the hood and placing the screws/nuts in, we focused on the front panel. This panel is split in two and connected by two hinges, as it will act as the door. The top piece is measured at 31 1/2" x 21 3/8" x .22" thickness. The bottom piece is measured at 31 1/2" x 12" x .17" thickness. We beveled the area to rough 45° where the two panels connect using the angle grinder sanding wheel. A 150 grit sanding block was also used to smooth the edges out. A Handle was also added to the smaller door panel.



The pre-drilled aluminum angle should be drilled and connected to the front already. To connect the front panel, hold it up in the hood and drill through the plexi using the angle aluminum as a guide. After drilling the first hole, place a screw and nut into the hole to secure it. This will keep the panel from moving while drilling the other holes. Drill all the holes and make sure the door opens. Shaving some aluminum may be needed to clear any areas that bind.



At this point, the hood is mostly complete, aside from the filter box, fan, and light.

3. Filter box:

To build the filter box, we took advantage of the scrap pieces of plexi. Most of the pieces measured out to 6" tall, so that is what we used. The dimensions for the plexi box is 14" x 20 ½" x 6" using whatever thickness plexi that is available. Aluminum angle was used to frame the box in the same fashion as the hood. There is also angle aluminum on the inside and outside of the box. The inside aluminum holds the filter in place and the outside secures the box to the hood. Cut the plexi to size, and tape them together roughly (Using the filter as a guide can be helpful to get the corners square). After taping, measure and cut the aluminum angle for the corners (~6" x 4). Also measure and cut some aluminum angle for the inside. The inside aluminum has 45° cuts at every corner(see pic).



After placing the aluminum angle on the corners and inside, 2 pairs (4 screws) of holes can be drilled on each corner. Drill the bottom pair to line up with the aluminum on the inside so one screw can fit through both pieces (See pic below).

*We had to drill an extra piece of .17" thick plexi on the inside of the box to help the filter fit snug into the box.



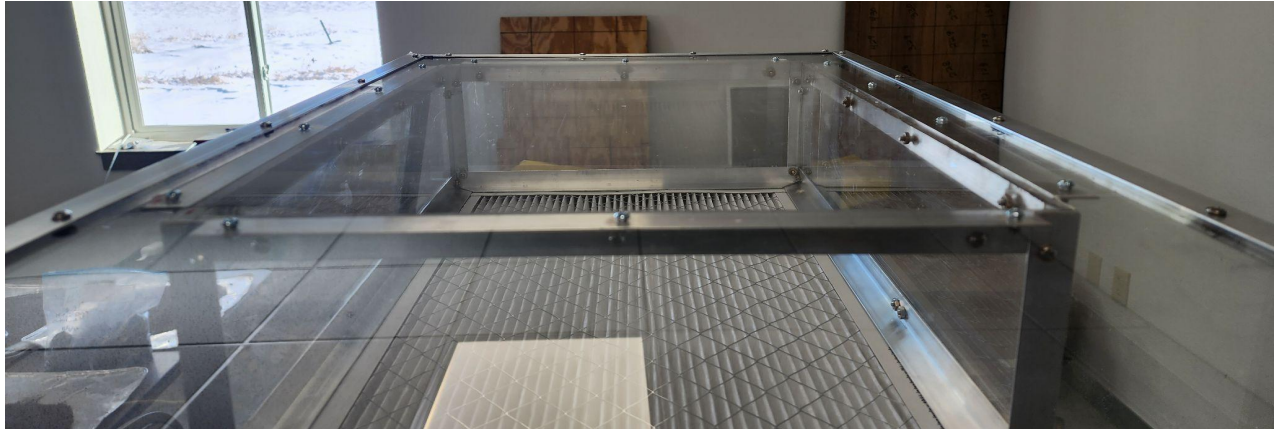
Aluminum angle will also be placed on top on all four sides and drilled to both the filter box and the top of the hood. Four screws on each face should be efficient. On the back of the filter box, 1" aluminum strap can be bent and cut to hold the filter in place. To bend the aluminum, place it in a vice and bend to 90° while lightly tapping with a hammer. Two hinges are mounted on the back with screws and nuts and the front is held in with two screws. Two holes were drilled and tapped in the front so an 8-32 screw can screw in without a nut.

***To tap holes, drill holes 2 sizes too small with a drill bit, then tap with the 8-32 size tap.



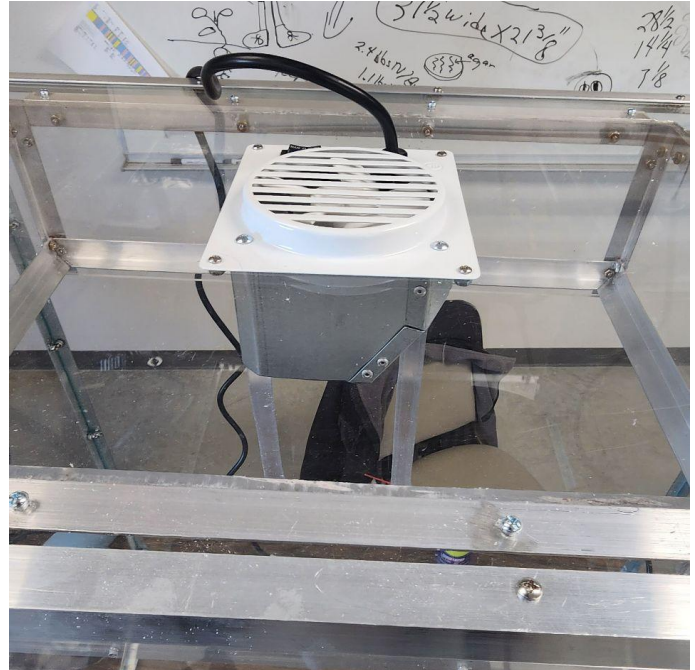
After the filter box is completed, it can be placed inside the hood. To fasten the filter box inside the hood, we tipped the hood on its side. This makes it easier to place the nut on the screw inside. Using the pre-drilled holes on the filter box, we drilled holes through the plexi to secure it with screws and nuts.





After fastening the filter box, we cut the hole for the fan that will provide air flow throughout the hood. Remove the filter before cutting the plexi to minimize any debris falling into the filter. We used a piece of cardboard to find the correct hole size. We trimmed the cardboard until it fit snugly around our fan. We then cut the hole on top of the hood with our angle grinder and cutting wheel. Some sanding or trimming may be needed to help the fan fit snug. To secure the fan, we drilled holes through the plexi and placed screws and nuts on.





4. Extras:

After the fan was placed, we drilled a hole for our UV light. We drilled through the top with the same size drill bit as our hanging eyelet. To secure the eyelet, we used a washer and nut on both sides of the hole. After the eyelet is secured, place the UV light on using the carabiner.



After the light is installed, a hole can be cut for cords to pass through. We used a 2" hole saw bit attached to the power drill. A big drill bit could also be used. The hole can be placed on any side. To keep the light cord out of the way, we placed small plastic cord holders to the back of a few screws/nuts.

After cleaning, the hood is mostly finished at this point and ready for lab use.



Extra Notes:

- Regular lighting could be added for better visibility inside the hood.
- Instead of screws keeping the filter in place, we changed them out for knobs with 8-32 threads. This makes it easier to change the filter when needed.

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