

The Corsi–Rosenthal Box, also called a Corsi–Rosenthal Cube or a Comparetto Cube, is a design for a do-it-yourself air purifier that can be built comparatively inexpensively. It was designed during the COVID-19 pandemic with the goal of reducing the levels of airborne viral particles in indoor settings.

Since COVID-19 was declared a pandemic by the World Health Organization on 11 March 2020, evidence, including increasing amounts of peer-reviewed research, has been accumulating that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus causing COVID-19, is airborne. Superspreading events are generally associated with indoor gatherings.^{6]} In response to the emerging evidence and recommendations of infectious disease researchers, engineers have begun to consider how improved ventilation may reduce indoor viral loads.

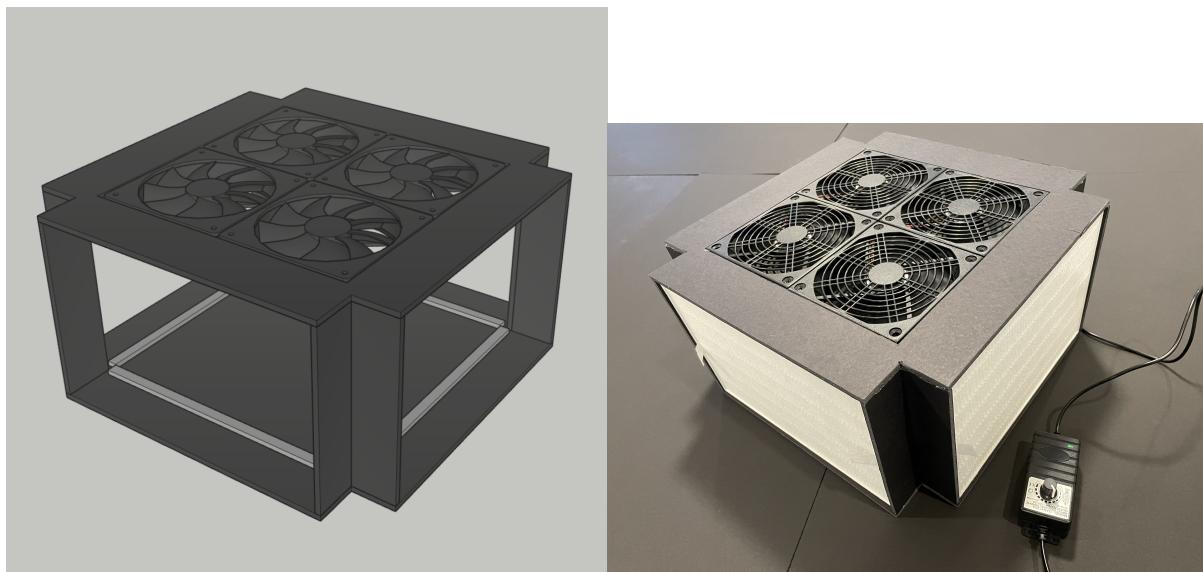
Air purification units with HEPA filtration can be expensive, often costing considerably more than US\$500. In August 2020, Richard Corsi, an environmental engineer and the incoming Dean of Engineering at the University of California, Davis (UC Davis), spoke with Wired reporter Adam Rogers about an idea he had for combining multiple store-bought filters with a box fan to improve the efficiency of home-made air filter designs. Rogers contacted Jim Rosenthal, the CEO of filter manufacturer Tex-Air Filters, who had collaborated with Corsi at the University of Texas and in the Texas chapter of the Asthma and Allergy Foundation of America, to run some tests on a single air filter attached to a box fan. Inspired by Corsi's idea to use multiple filters, Rosenthal later came up with a 5-filter design. Rosenthal named it after Corsi, although after a New York Times article mentioned the boxes by that name, Corsi tweeted that Rosenthal really deserved the credit, and that he preferred the name Corsi–Rosenthal Box.

-- ["# Corsi–Rosenthal Box", Wikipedia \(EN\)](#). Accessed 8 April 2022

Note: This is version 0.1 of this document. 8 April 2022.

Introduction

Here is how to make a mini Corsi–Rosenthal DIY air filter using quiet computer fans and Type R HEPA filters.



While not as powerful as a larger C-R box using a 20" fan, it has the advantage of being much quieter. It is appropriate as a table-top air filter, say in a small room. It is light enough, that I mount them on my walls at home using 3M Command Strips.

Materials

It's more economical to buy items in bulk. So I buy two six-packs of filters, three fan assemblies, and three sheets of foam core board, and maybe a couple of rolls of closed-cell tape.

One (1) GDSTIME ROUTER COOLING FAN ASSEMBLY



- 245mm(L) x 245mm(W) x 50mm(H) or 9.65in(L) x 9.65in(W) x 1.97(H)
- [Amazon Canada Link](#)
- [Amazon USA Link](#)
- [Amazon UK Link](#)

Four (4) Type "R" HEPA Filters



This is any HEPA filter that fits a Honeywell HPA300/200/100 Series purifier. If you buy two packs of six, you can build three units.

- Amazon Canada Links:
 - [LINNIW HPA300 True HEPA Filter R Compatible - 6 Pack \\$53.99](#)
 - ["I Clean" Replacement Honeywell HPA 300 - 6 pack \\$58.99](#)
 - [6 Pack True HEPA Filter R - 6 pack \\$75.99](#)
 - [Fette Filter - 6 Pack of PremiumTrue HEPA Filters - 6 pack \\$89.99](#)
 - [# Altec Filters HEPA Premium Quality Replacement Filters - \\$59.99](#)
- Amazon UK Links (apparently not a popular model in the UK)
 - [Museourstyty Air Filter HEPA Filter](#)
- Amazon USA
 - [Gazeer 6 Packs True HEPA Replacement Filter](#)

Formboard (3/16" thickness = 4.7mm to 5mm thickness)



- Black is a good choice since the black fan assembly will be mounted in one of these boards
- The most practical size is 20" by 30". This will supply the material for one unit. So if you are building three, you need three 20" x 30" boards. The best deals on Amazon seem to be 10-packs
- Amazon USA Links
 - [Black Foam Board 20"x30" 3/16" thick, 10-pack \\$30.03](#)
- Amazon Canada Links
 - [Black Foam Board 20"x30" 3/16" thick, 10-pack \\$55.84](#)
- Amazon UK Links
 - [A2 Size 5mm Black Foam Board With Core Pack of 10](#)

3/16 " close cell foam tape



- - I only have a link for Amazon Canada: Something like this would work [Frost King R338H Self-Stick Rubber Foam Weatherseal](#)
 - Basically a foam tape that is less than 10mm wide and about 5mm tall. It's main function is to serve as a stop when you insert the HEPA filters.

Tools Needed

Glue Gun



And some glue sticks

Box-cutter, X-acto knife



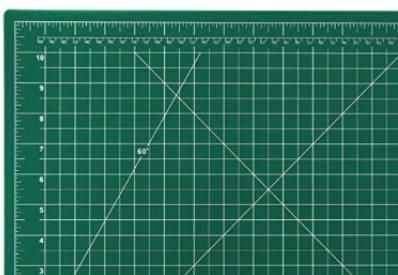
Something like this. Fresh blades are important.

T-square



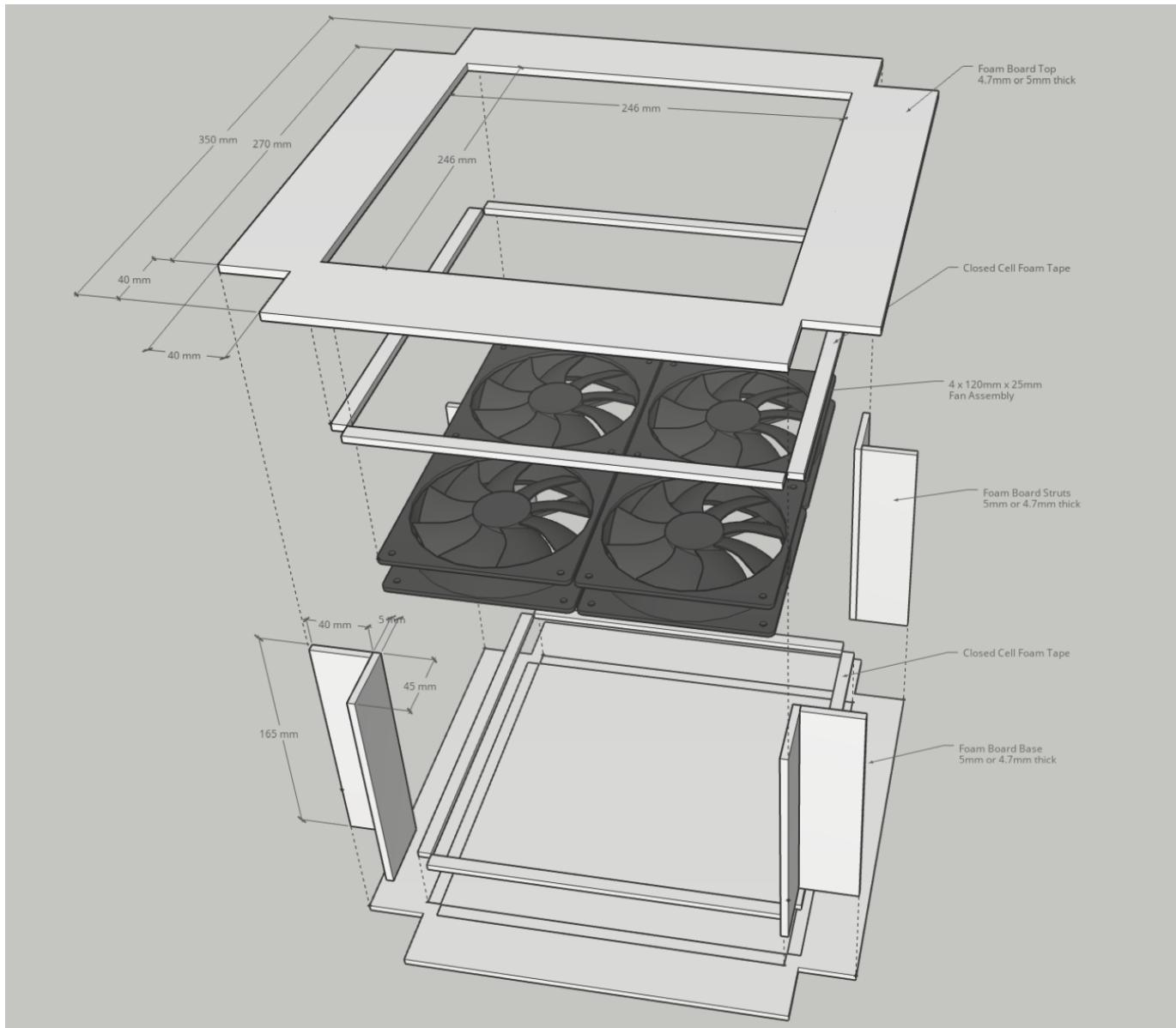
Not all foam boards are going to be cut at perfect right angles. So you need some way to cut a perfect square with really good 90 degree angles.

It's important that you have a surface that is safe to cut on. I use a PVC self-sealing cutting mat like this:



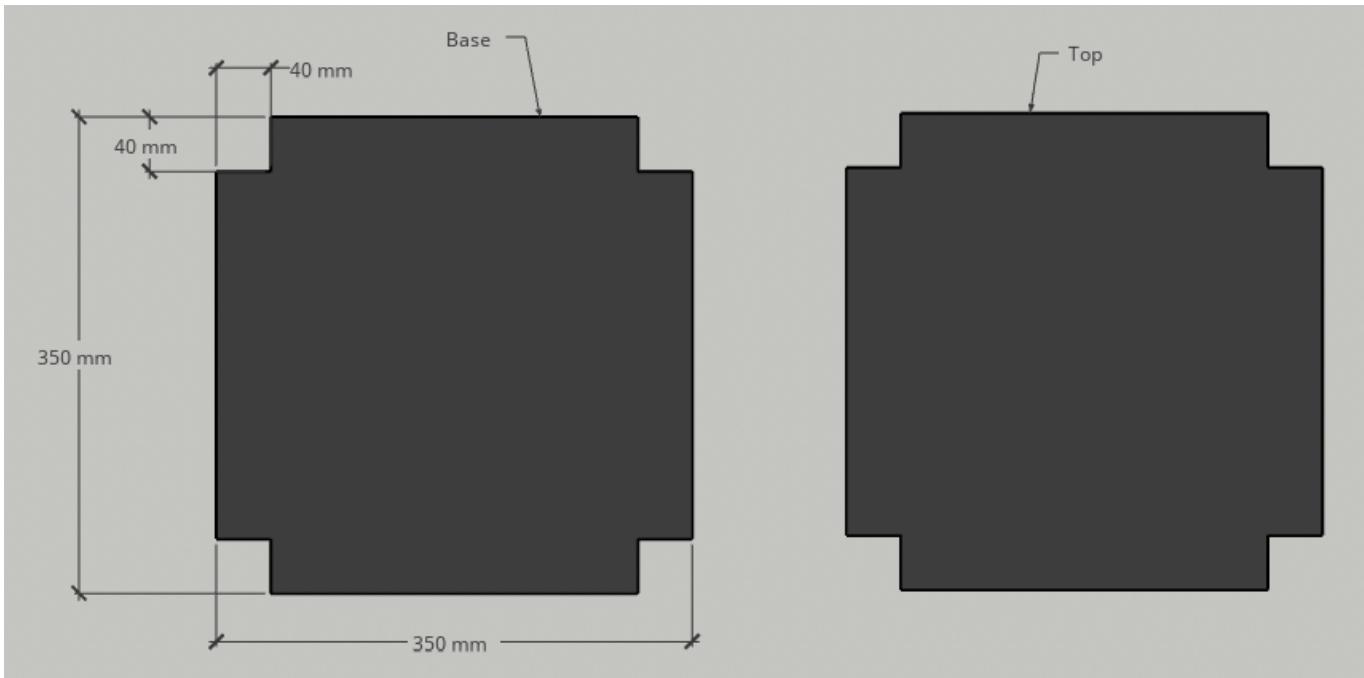
Overview

Here's how the whole apparatus fits together

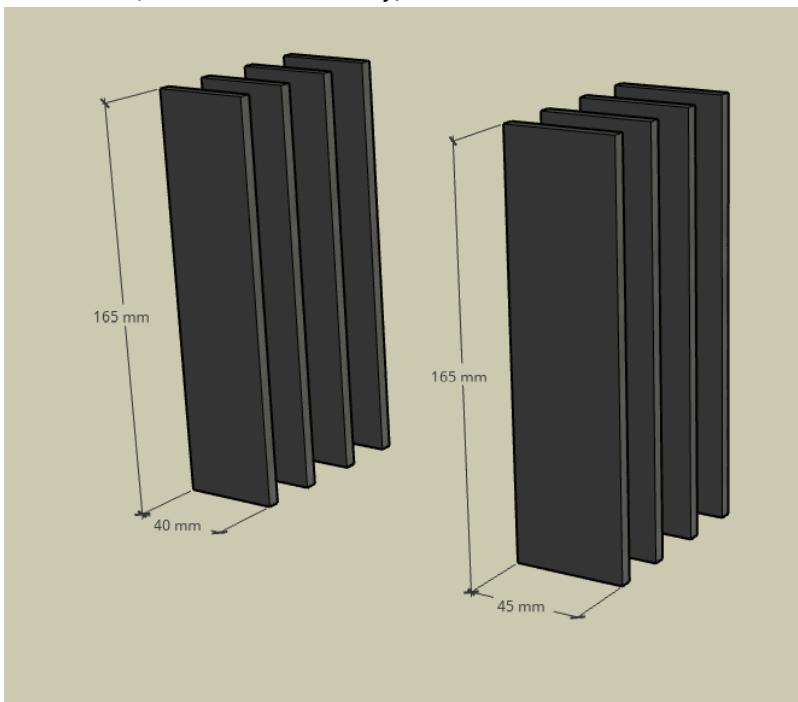


Instructions

Cut two (2) large square pieces of foam board, 350mm x 350mm. One will serve as the Top and one will be the Base of the device. Create a 40mm square notch in each corner.



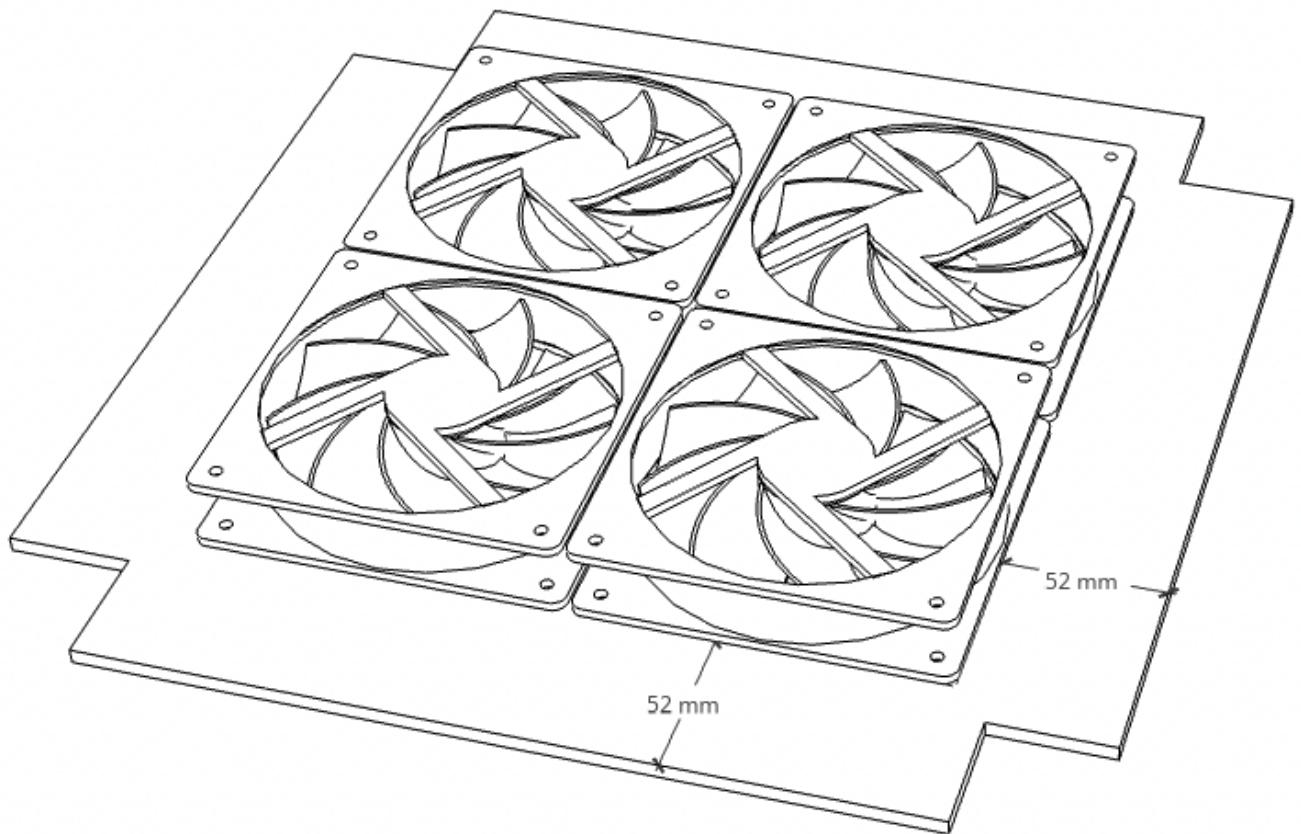
With the remaining material, cut eight (8) rectangles for the struts. All eight (8) will be 165mm long (not coincidentally, the width of a Type "R" filter). Four of them will be 40mm wide and four (4) of them will be 45mm wide. The 5mm different is (also not coincidentally) the thickness of our foam-core board.



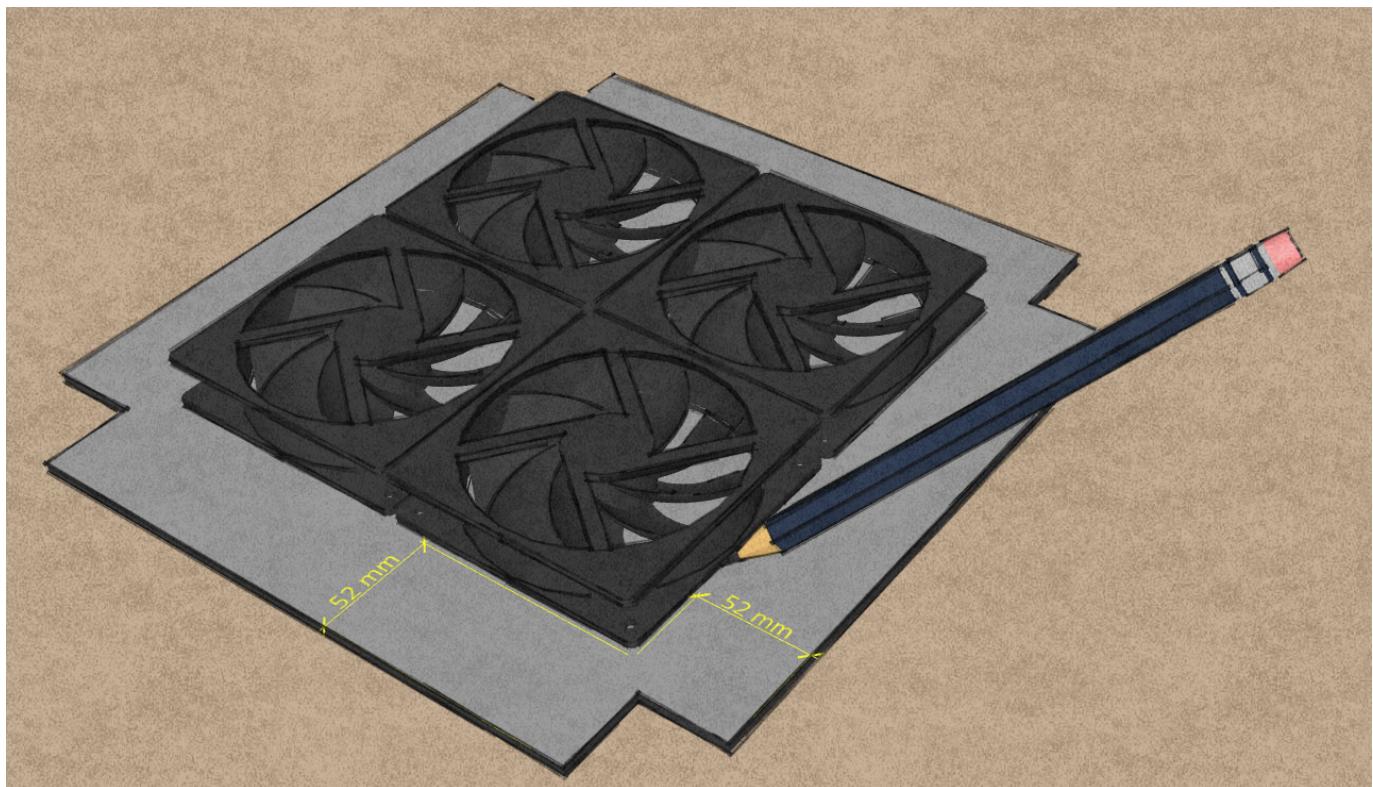
Now we have all the foam core pieces we need. Next we start putting it together.

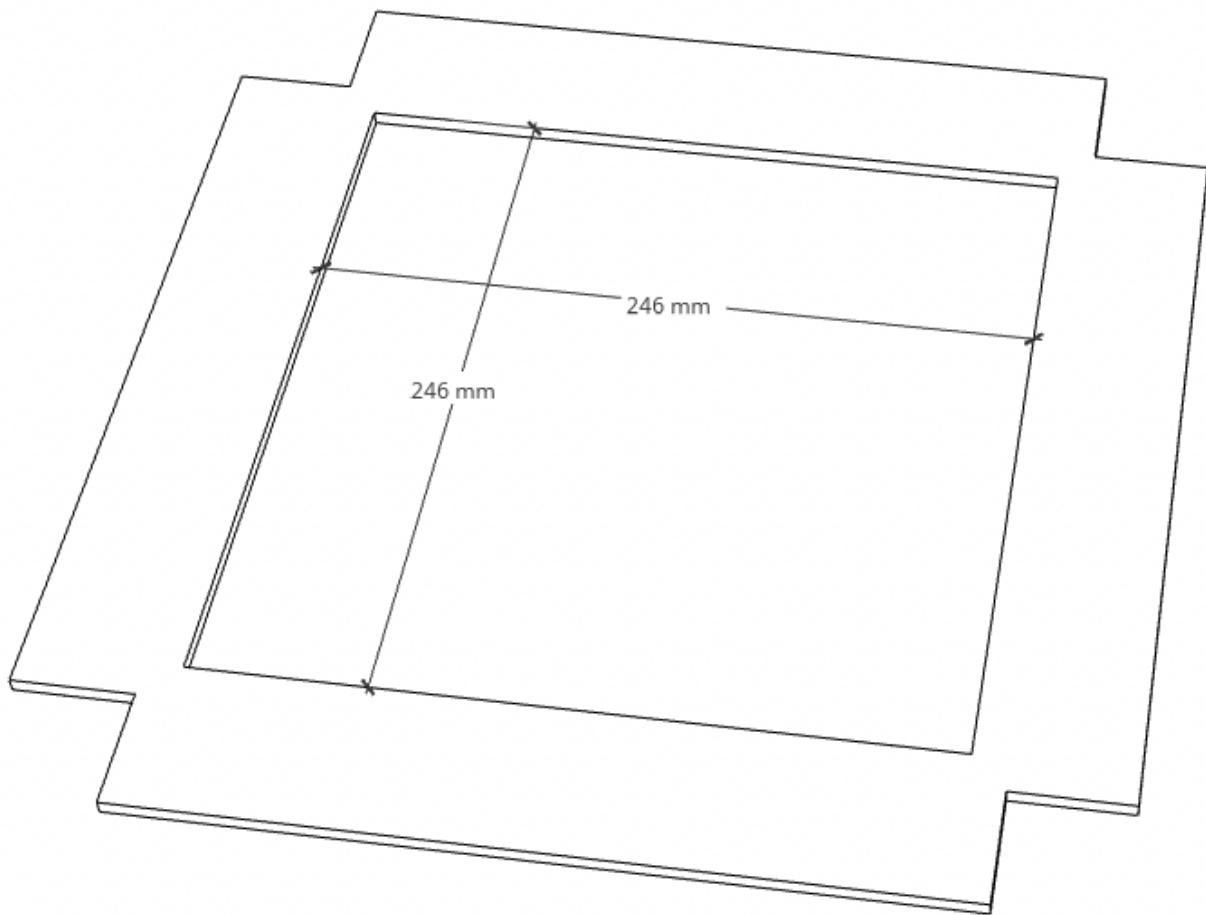
Grab one of the 35cm x 35cm board we previously notched out. We will call this one the "Top" piece (and the other one will be the "Base" piece.)

Place the fan assembly upside down on the Top piece. Position it evenly in the center of the Top piece. Each side of the fan assembly should be about 52mm from the nearest edge. (Note: In this diagram, the fan grills on top of and below the fan assembly are not shown. That's simply because I couldn't find a model for them. Don't remove them to try to match this diagram's appearance.)



Once centered to your satisfaction, trace an outline of the fan assembly with a pencil. Using your knife, remove the outlined area. It should be close to 246mm wide in both directions.

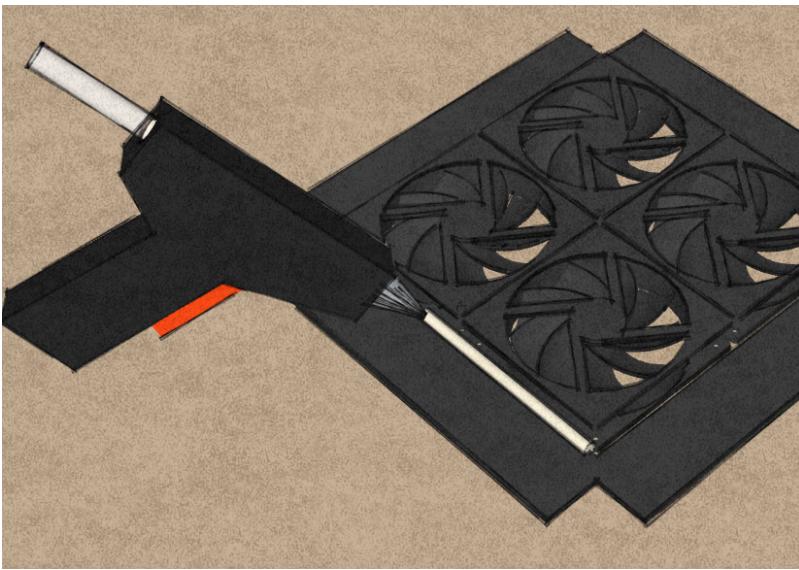




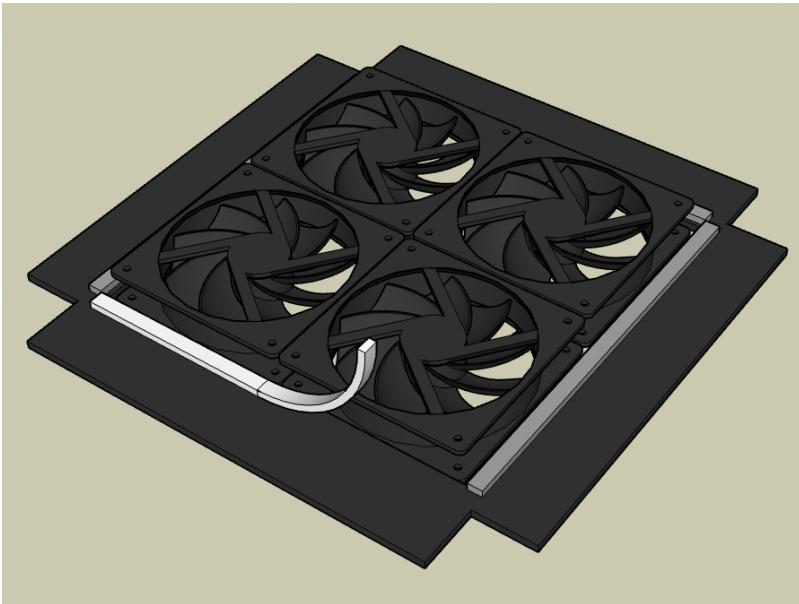
Set the fan, upside down, into this opening. It should rest comfortably on the cutting mat below. If it doesn't seem to fit, try rotating it by 90-degree increments. The fan assembly may not be perfectly square, so you'll need to orient it exactly as it was positioned when you traced the outline with a pencil. If it doesn't fit, you're on your own at this point.

For the next step, I generally put a sheet of parchment paper underneath, so the hot glue doesn't bond to my cutting mat.

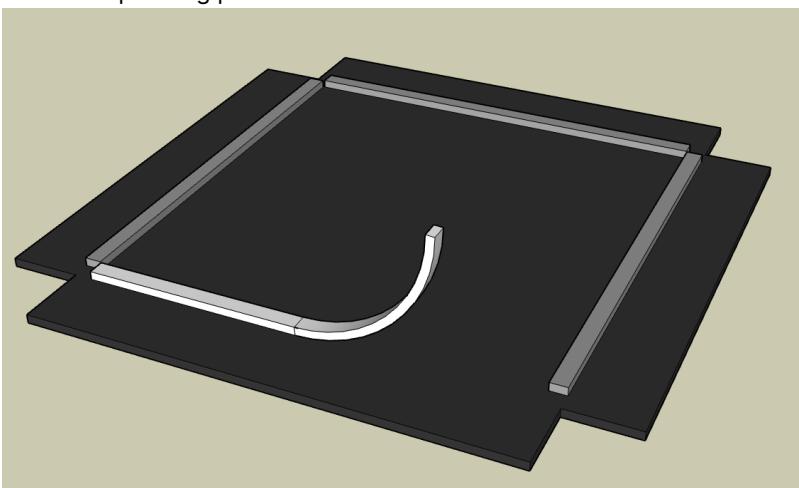
Run a bead of hot glue around the entire perimeter of the fan assembly. (Remember, this is going to be the under-side of the Top.). I generally aim for the gap between the fan assembly and the board. Let it cool long enough that the fan assembly is securely bonded to the foam core Top.



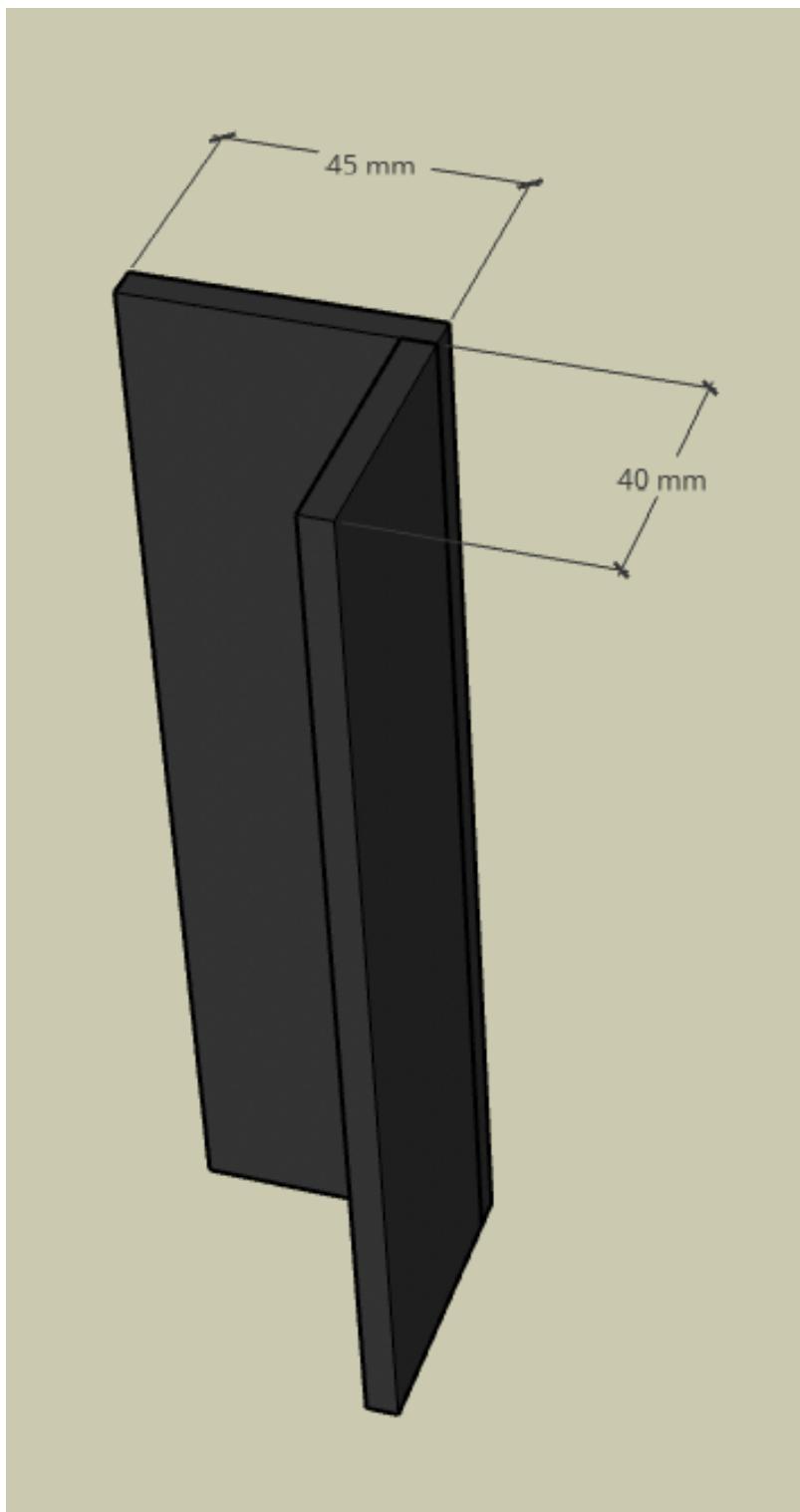
The final step of the Top apparatus, is to attach strips of foam tape to act as a stopper when you insert a filter. Apply a strip along each side of the fan assembly. They should line up with the notches. This will give the filter about 4cm of space.



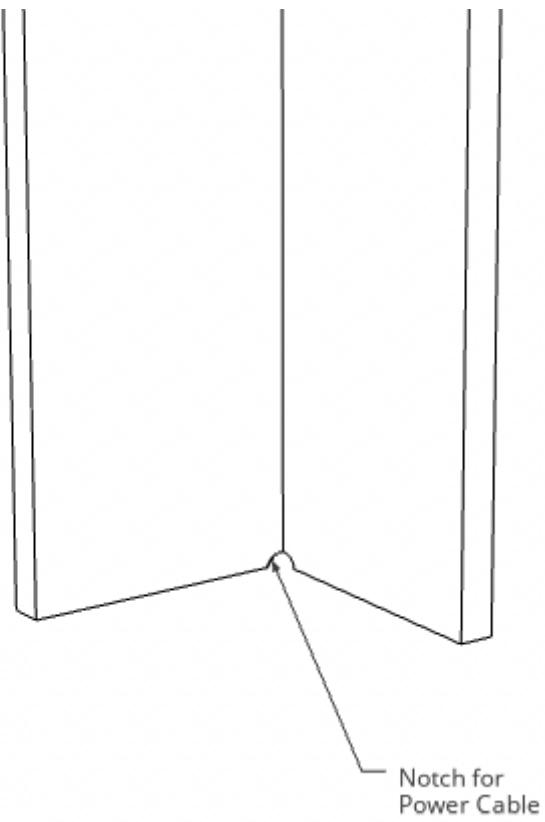
While we have our foam tape handy, now is a good time to grab the Base piece and apply some filter-stoppers to it in the corresponding place.



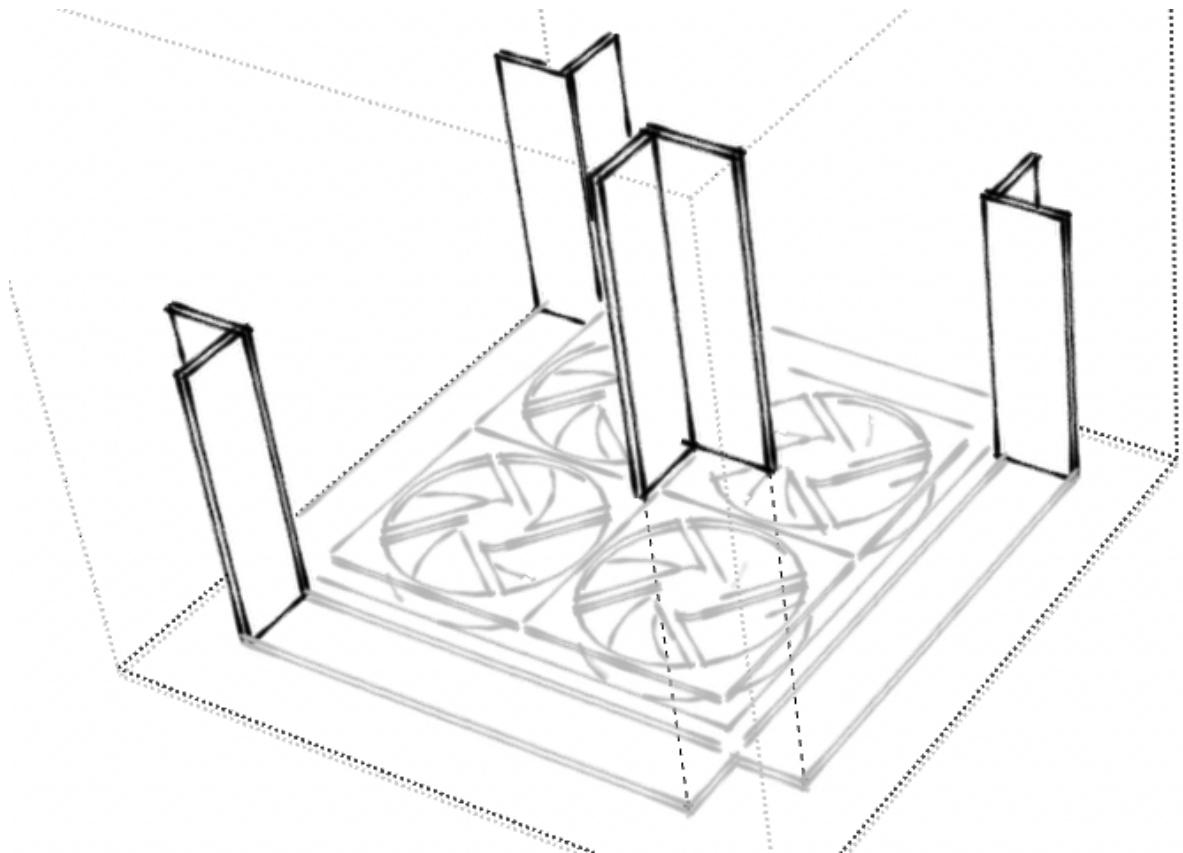
Now we can move onto the struts that connect the Top to the Base. For this we will need our eight (8) 165cm long rectangles. Pair up one 40mm wide rectangle and one 45mm rectangle to form an L-shape:



We are going to use these struts to secure the Fan Assembly's power cable. Using a knife or a pen, make a notch at the bottom of **one** of the four struts. Plan ahead so that this strut is going to be placed near the power cable extending from the Fan Assembly.

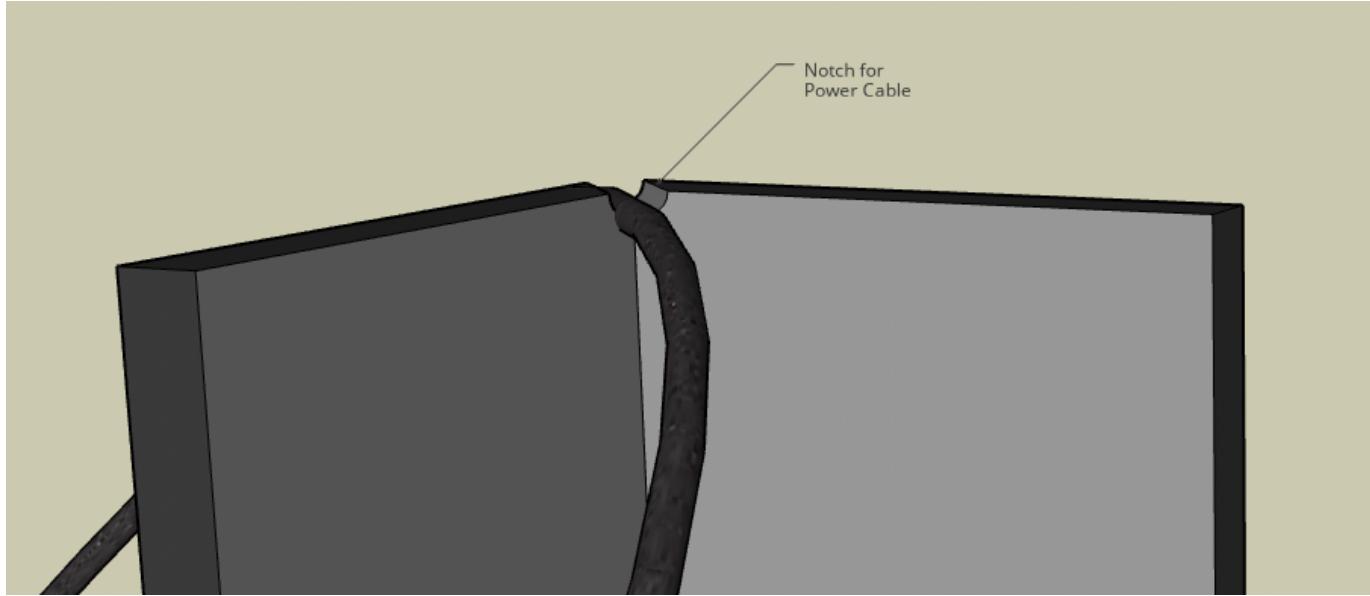


Using your glue gun, glue each of these four (4) struts to the corners. They should be set on top of the Top panel. (That is they aren't glued to the edge of the Top panel.). The strut with the Power Cable notch should be glued with the notch "up" in the diagram below:

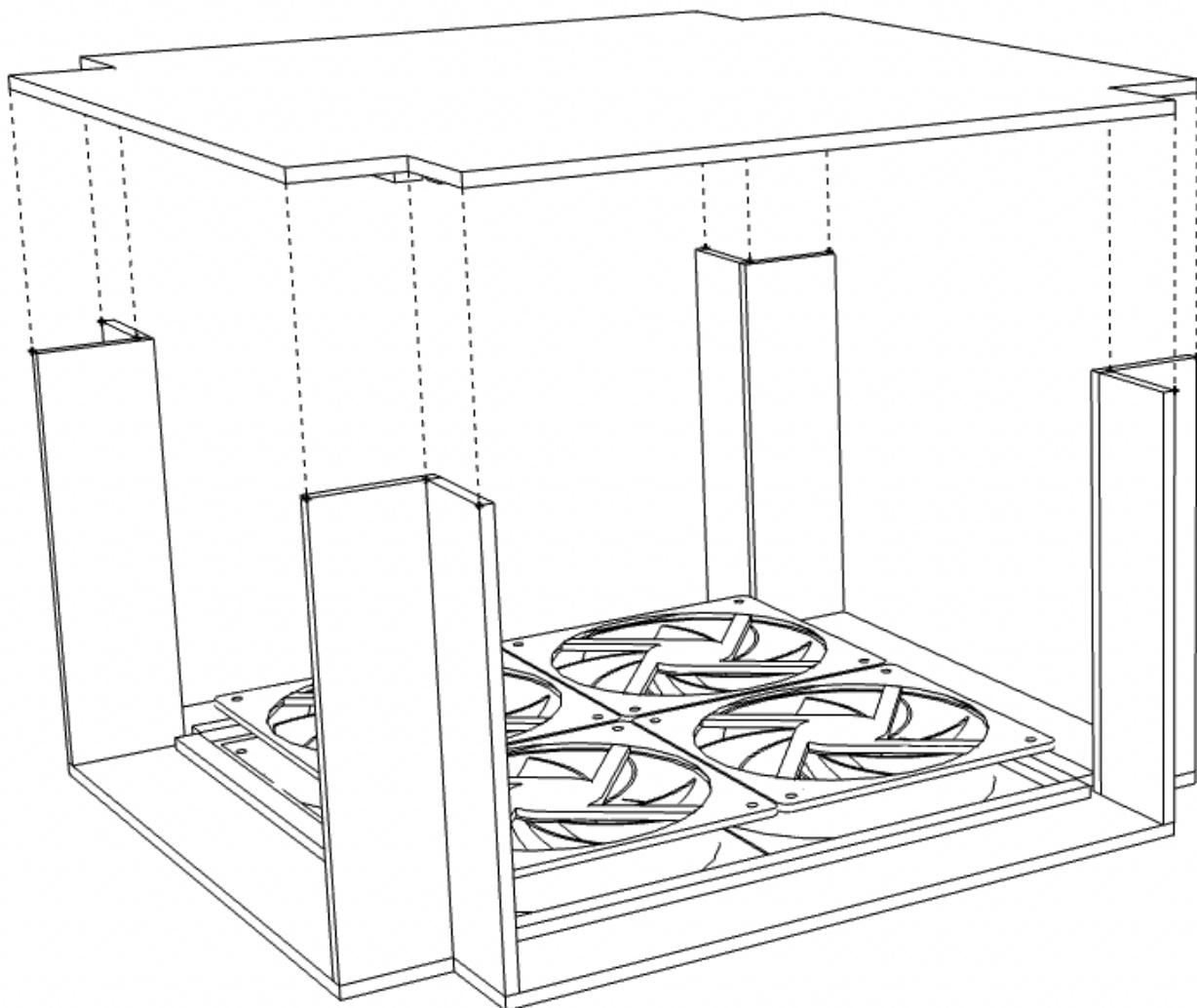


Let the struts dry for 10 or 15 minutes to ensure that they have bonded well.

Lay the power cable through the notch and fix it there with some glue from the glue gun



The last piece of assembly is to line up Base piece and glue it to the struts. Again, let everything dry well before attempting to insert any filters.



Let it dry for a good 20 minutes. Turn it over onto its base and insert filters.

