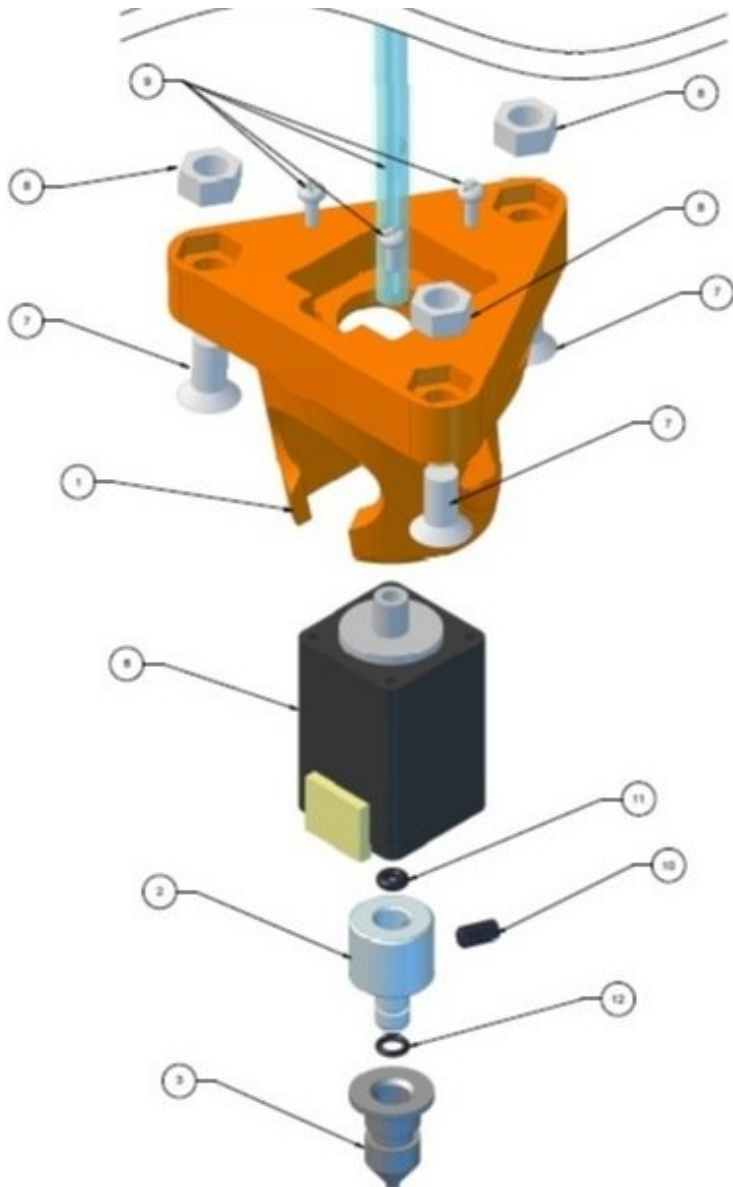


firepickdelta

Assembling the SMT modular tool

Written By: Neil Jansen



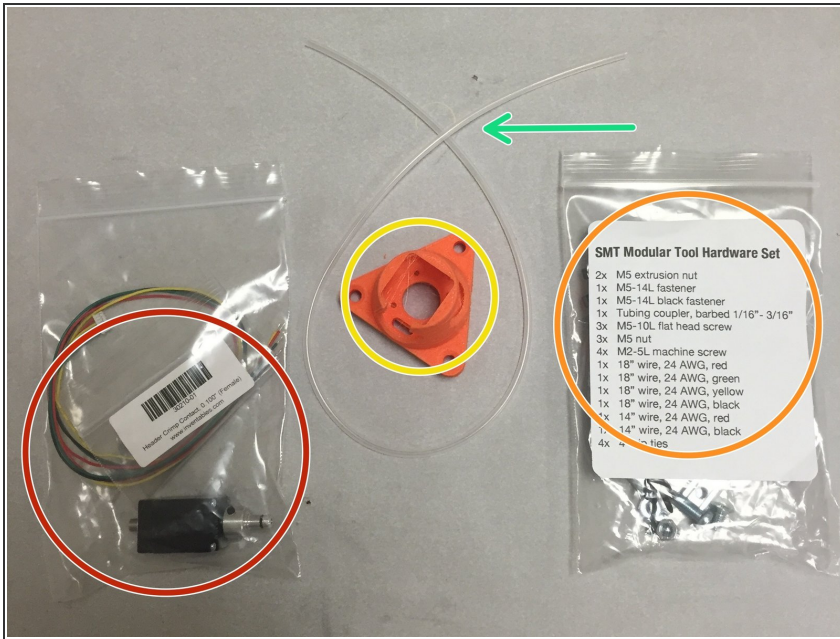
**TOOLS:**

- Soldering iron (1)

**PARTS:**

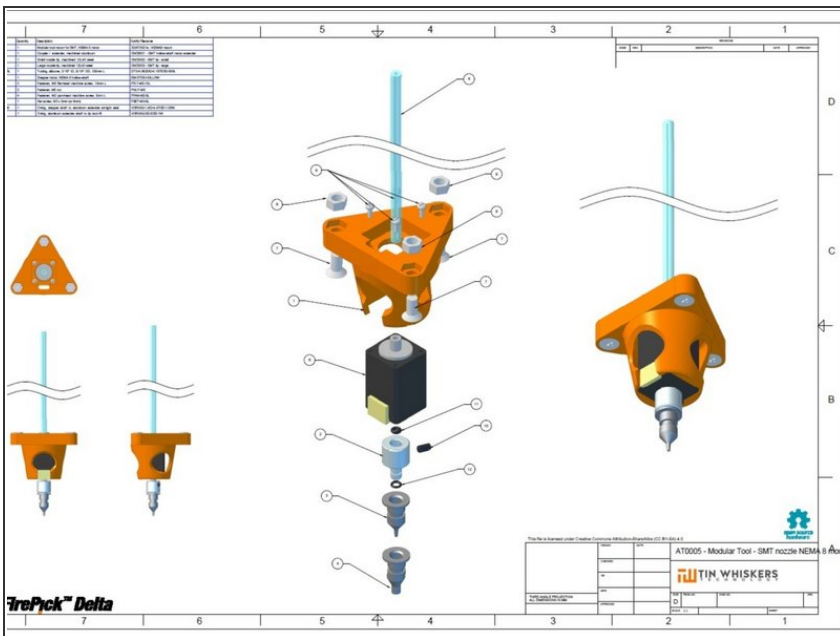
- Heat Shrink Tube - 1/8" diameter (1)
- Heat shrink tube - 3/32" diameter (1)

Step 1 — Gather parts



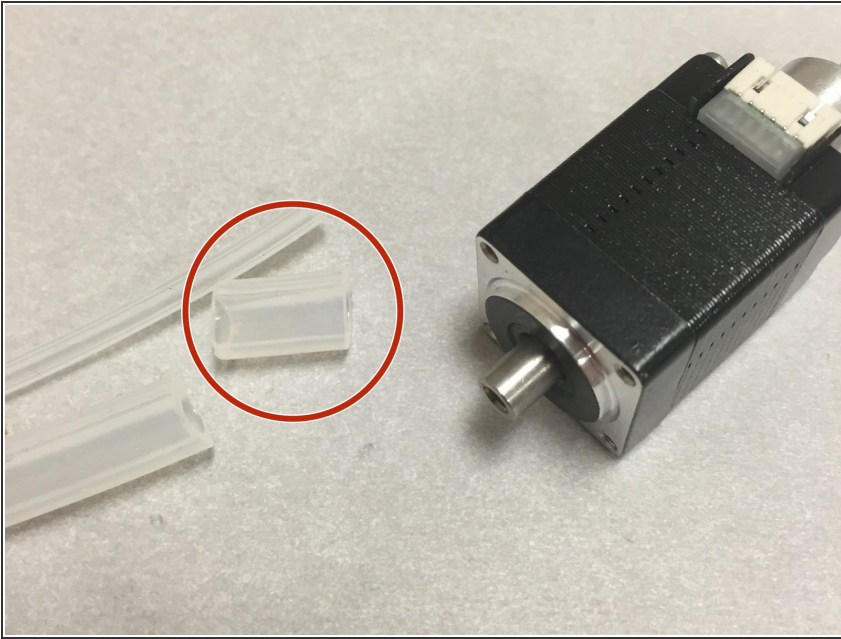
- Gather the following:
 - SMT nozzle / motor bag
 - SMT modular tool hardware bag
 - DTS-0.0625ID-0.1875OD-500L (the small silicone tubing)
 - 3DAT0006a NEMA 8 tool mount
- Not shown: DTS-0.1875ID-0.3125OD-150L (the large silicone tube)

Step 2 — Exploded view reference



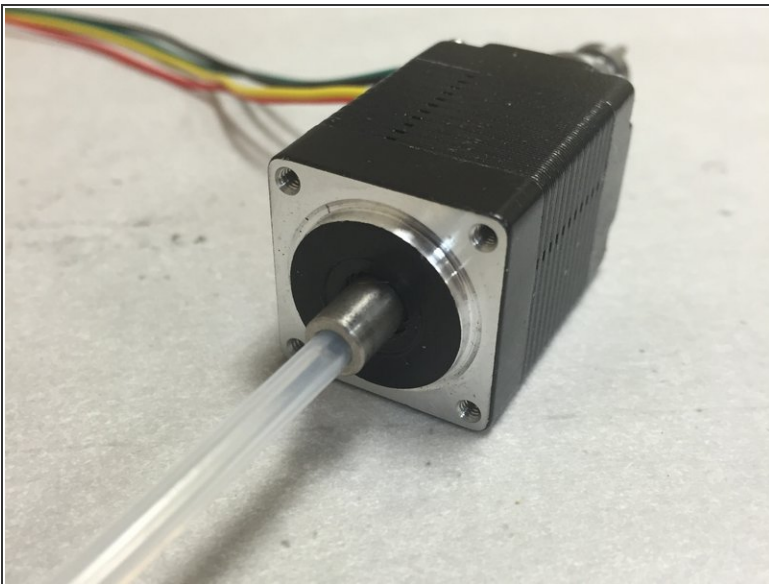
- PDF link:
<https://drive.google.com/file/d/0B-U7icB...>

Step 3 — Cut off a Piece of the Large Tubing



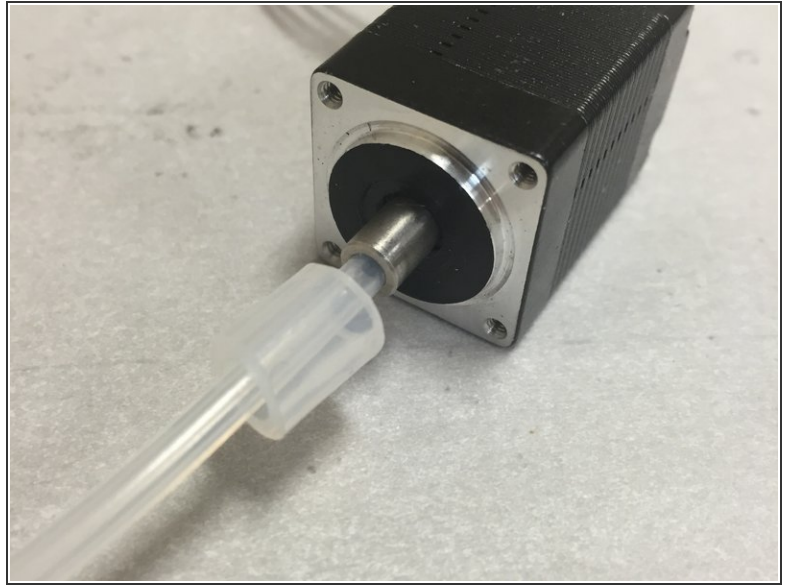
- Start by cutting off about 12-13mm of the large silicone tube (DTS-0.1875ID-0.3125OD-150L). Try to get a nice clean perpendicular cut.

Step 4 — Insert Tubing Into Hollow Shaft



- Insert the small tubing into the hollow shaft. Shove it down as far as it will go (~3-4 mm or so).

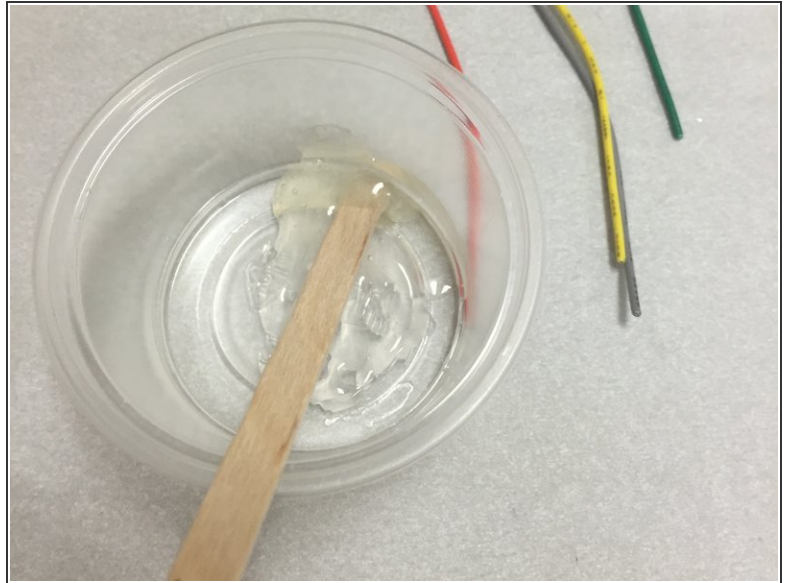
Step 5 — Slide on Large Tubing Piece



- Slide on the large tubing cut from the previous step.
- Slide it down onto the hollow shaft

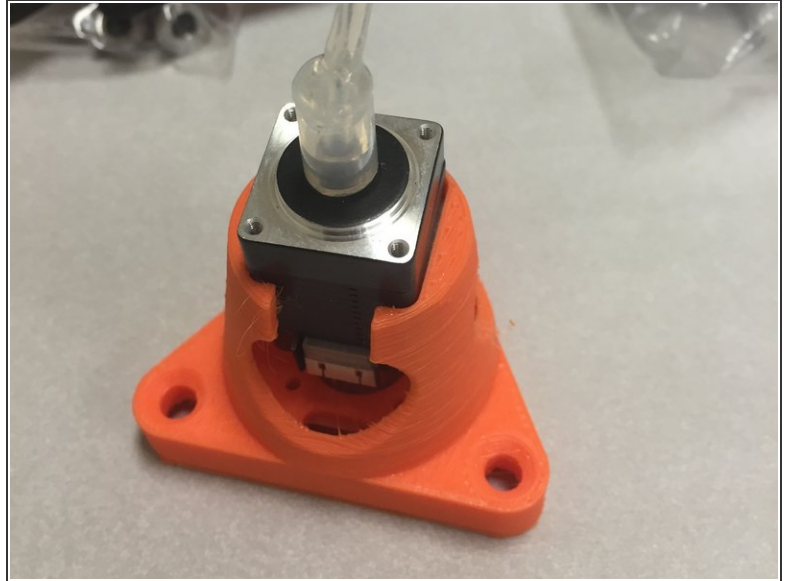
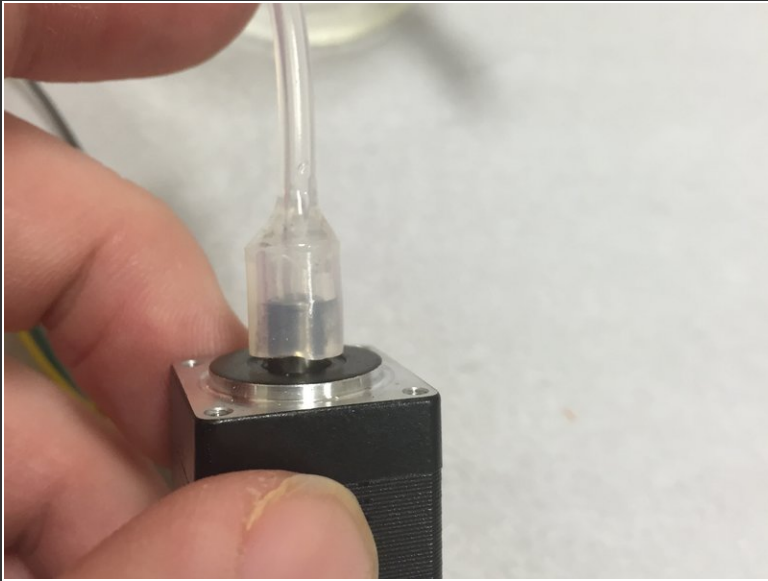
⚠ Ensure that there is at least 1mm between the bottom of the silicone tubing and the motor. This will need to rotate freely.

Step 6 — Mix Up Some Epoxy



- Mix up a bit of 2-part epoxy (not included in the kit). General purpose clear epoxy should work fine, this can be purchased from any hardware store, and even most big-box stores in the hardware section.

Step 7 — Work Quickly!



- Add the epoxy to the gap between the large and small silicone tubes.

⚠ Work quickly! The epoxy should begin to harden within a few minutes, tops.

- The orange 3D printed piece may be used as a stand to hold the motor in a level position. **Do not fasten at this time.**
- Do not let the epoxy drop down onto the motor.

Step 8 — Wait for the Epoxy to Dry.



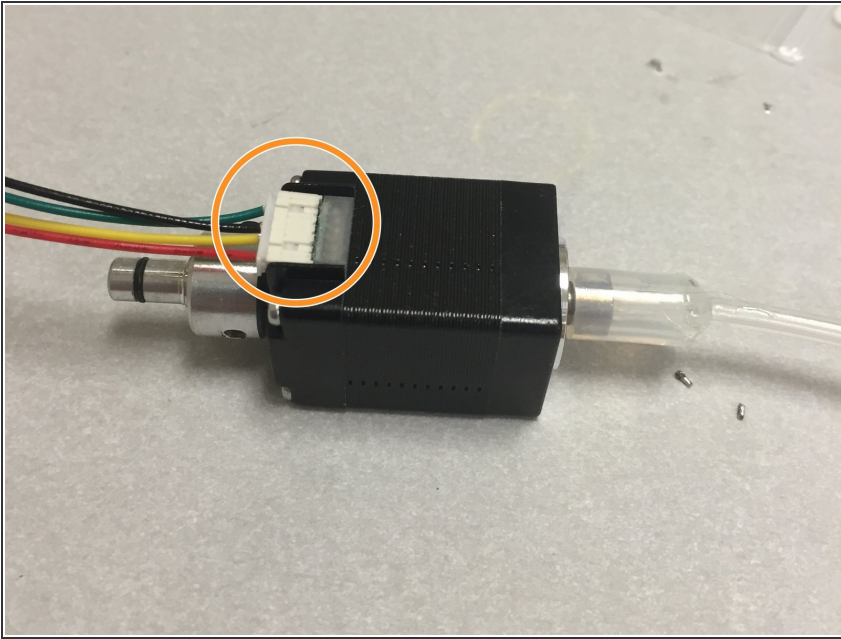
- Wait for the epoxy to dry.
- i** While you're waiting, here's a picture of a cat with a chicken hat on his head.

Step 9 — Behold the Machine SMT Nozzle Extender!



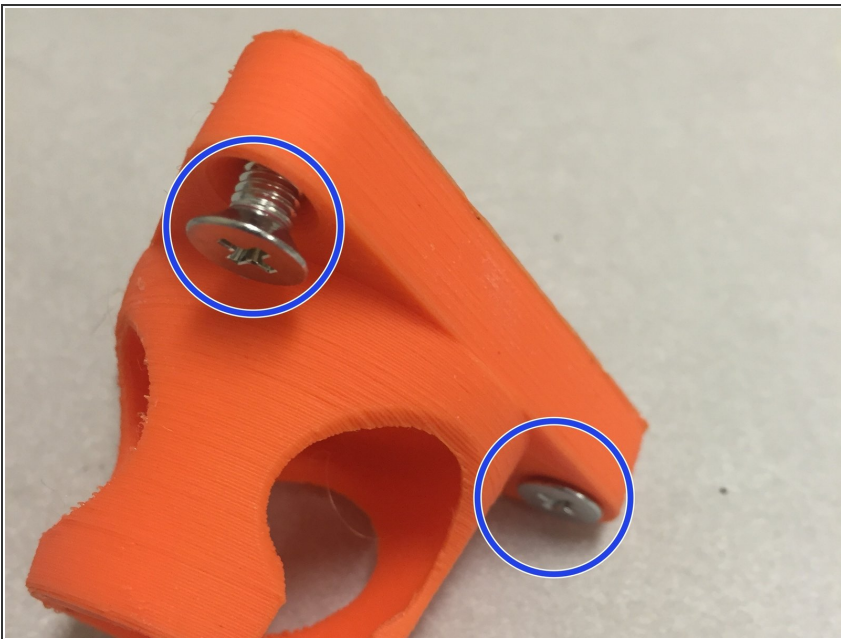
- We already did this step for you, if you purchased the kit from us. You may spend a second and take in the beauty of fine machining work that we had commissioned by brave souls with superb numerical control skills.
- There are two o-rings in this assembly:
 - One on the outside, that holds the nozzle tip onto the extender.
 - One that goes between the aluminum extender and the stepper motor shaft. The primary duty of this o-ring is to provide a strong seal so that the vacuum is not lost in the gap between the two pieces.
- There should be a set screw holding the aluminum extender onto the shaft. Ensure that it's tight, but not so tight to strip the hex key hole.
- Ensure that the two nozzle tips fit well when placed onto the aluminum extender.

Step 10 — Plug in Stepper Motor Cable



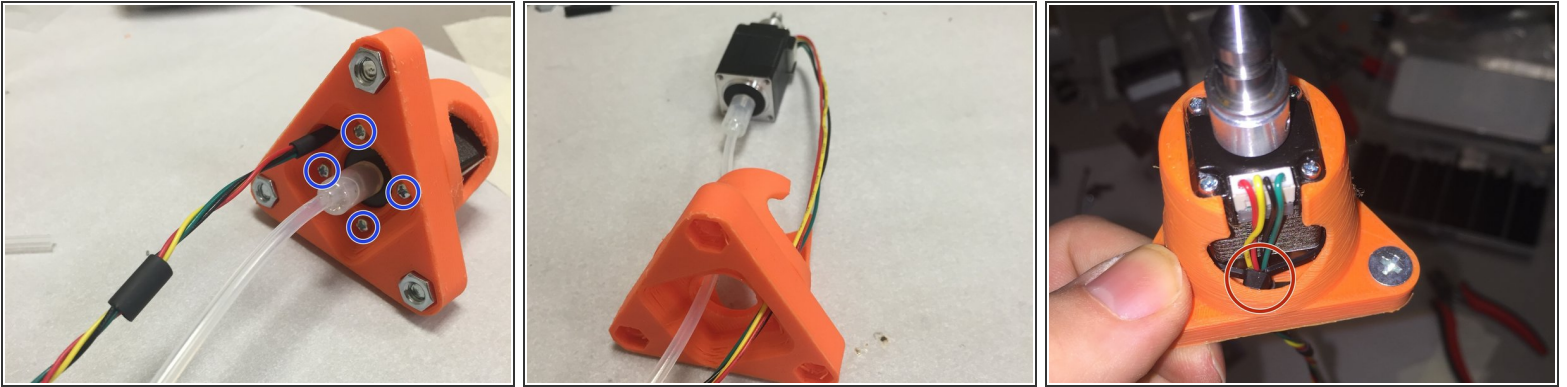
- Plug in the stepper motor cable.


Step 11 — Insert M5 Flat-head Screws and M5 Nuts



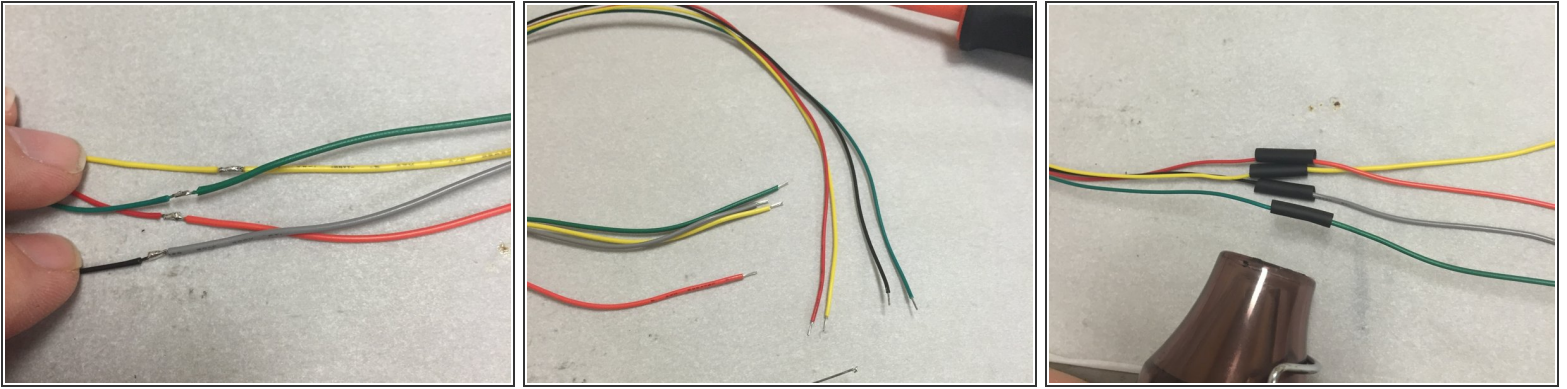
- Insert the M5 flat-head screws into the three holes, as shown.
- Place M5 nuts in the nut traps, and tighten.

Step 12 — Insert Stepper Motor Into 3D Printed Housing



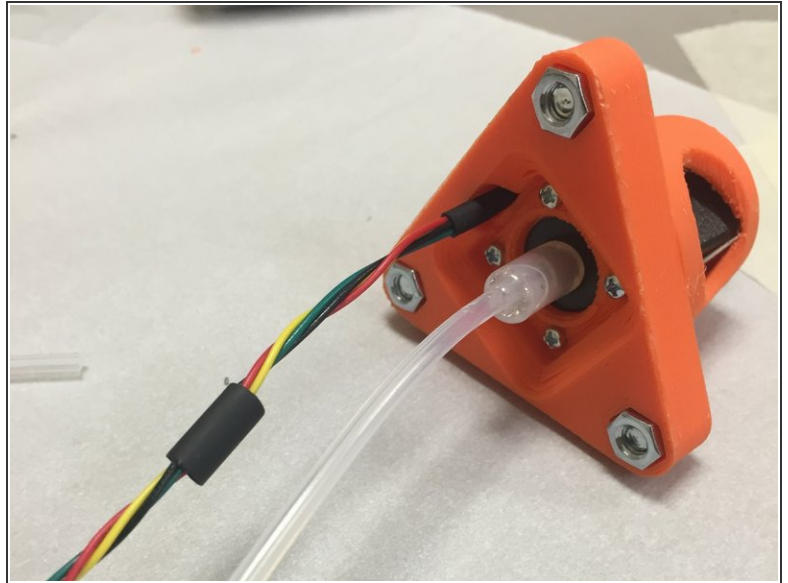
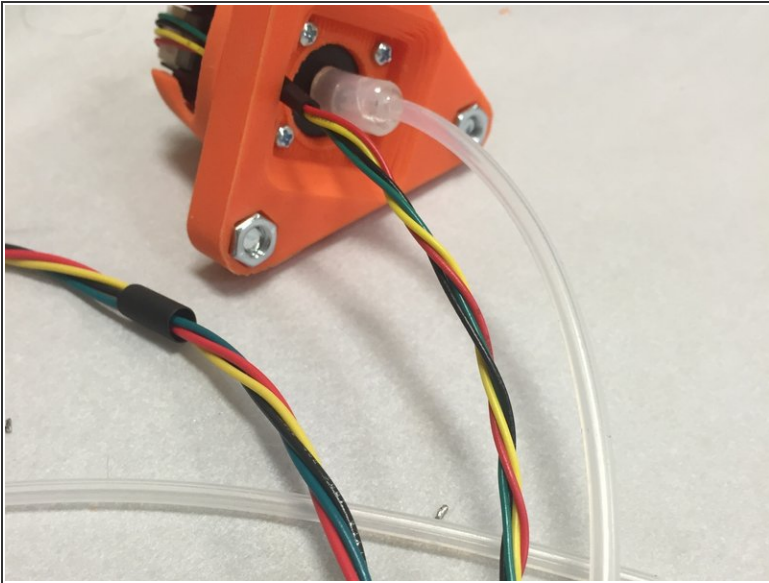
- Insert the stepper motor into the 3D printed housing, making sure to insert the side with the M2 screw holes.
 - Use the included M2 pan-head screws to secure the stepper motor into place. Do not over-tighten.
 - Use a cable tie to keep the stepper motor cable secured. Thread it around the motor, and make sure to slide the zip tie towards the flange, so that the head doesn't stick out of the conical section.
-  Ensure that the stepper motor cables are exiting the designated slot, as shown in the picture.

Step 13 — Extend the Wires



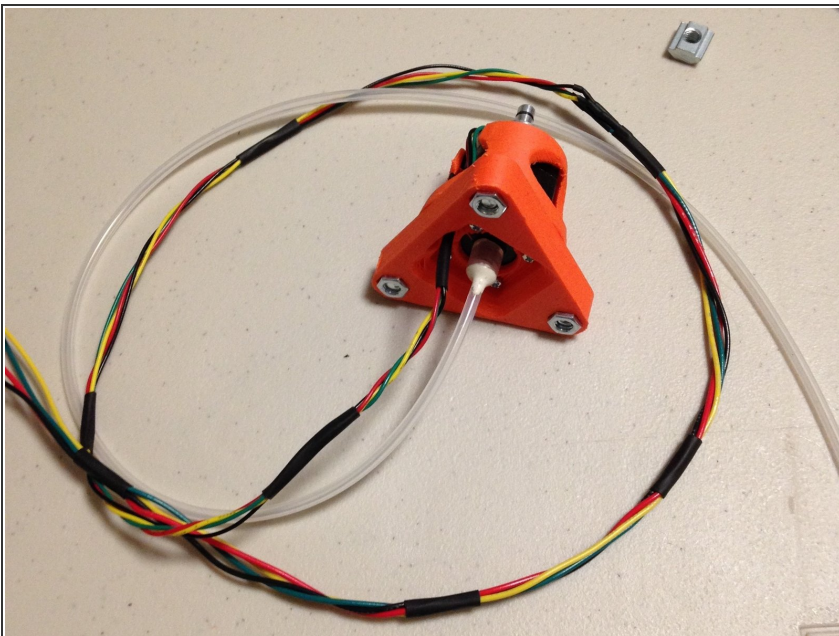
- Find the included four pieces of 18" (~450mm) wire in the hardware bag. **Make sure not to use the two 14" (~350mm) pieces of wire (red and black).** Those will be used for the vacuum pump.
- Strip and tin one end of the extra included wires. Also strip and tin the end of the NEMA 8 stepper motor cable wires, if not done already.
- Solder the wires together, using the same color (the exception being gray -- use the black wire for this).
- Cover the soldered connections with heat shrink tubing. Use four pieces of 3/32" heat shrink tubing (2.38mm), about 12-14mm long. Note, these pieces weren't included in the kits.
- Shrink the tubing using a heat gun.

Step 14 — Twist the Wires, Cover with Heat Shrink



- Twist the wires tightly, for the entire cable length.
- Use small (~6-8mm long) pieces of 3/16" (~4.76mm) heat shrink tubing, and shrink these into place, approximately every 40-50mm (2in) along the length of the cable.

Step 15 — Now Build the Vacuum Pump



- The SMT modular tool is now complete. Next, [build the vacuum pump](#) if you haven't already.
- Then, proceed to the [final wiring guide](#) for the SMT tool.

See next step: [Assembling the Vacuum Pump Mount](#)