

Fusion3

EDGE 3D Printer

ANVIL:

**IMPROVING LOW TEMPERATURE
MATERIAL PERFORMANCE**

Revision 4/20/2023

IMPROVING ANVIL' S LOW TEMPERATURE MATERIAL PERFORMANCE

Tweaks you can make to improve ANVIL's low-temperature material / low speed performance.

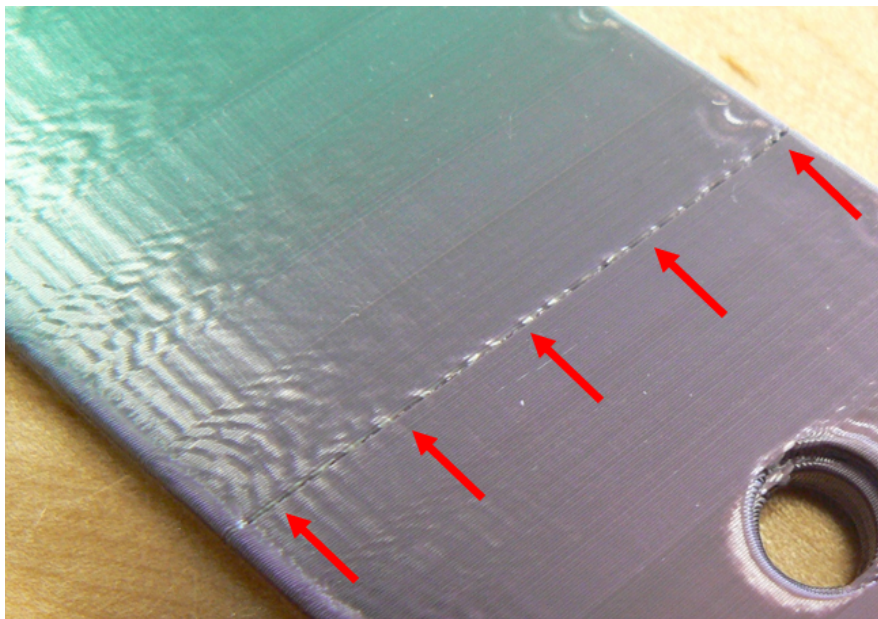
INTRO / WHY DO THIS

ANVIL is our in-house designed print head system used on EDGE and other future Fusion3 products. It's designed and optimized for printing high flow rates of high temperature materials such as ABS, nylons, PC, etc. ANVIL is also capable of printing lower temperature materials such as PLA, but these materials were not a core focus of the design.

Due to a combination of manufacturing tolerances and variations in assembly, it's possible to encounter situations where ANVIL's performance at low flow rates, with low temperature materials, leaves room for improvement. This document describes some simple tweaks you can do to improve the print head's performance in these situations.

WHEN TO DO THIS

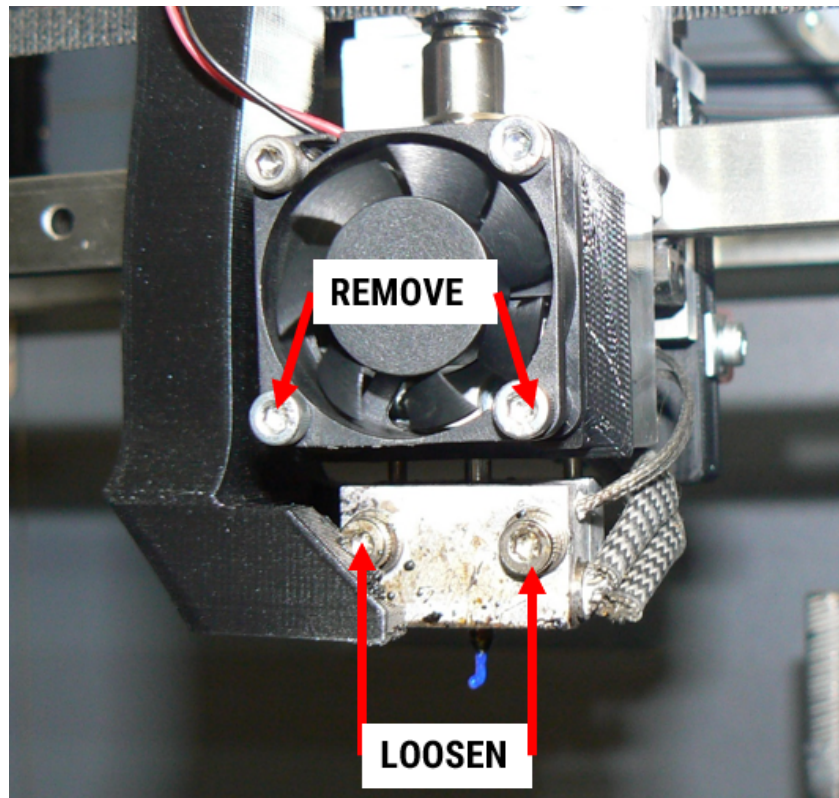
- If you encounter filament feed issues or print head jams consistently with PLA, PETG, or TPU/TPE.
- If you encounter flow starvation, "missing" lines or layers, or other jam-like artifacts in your print that self-resolve with these same materials.



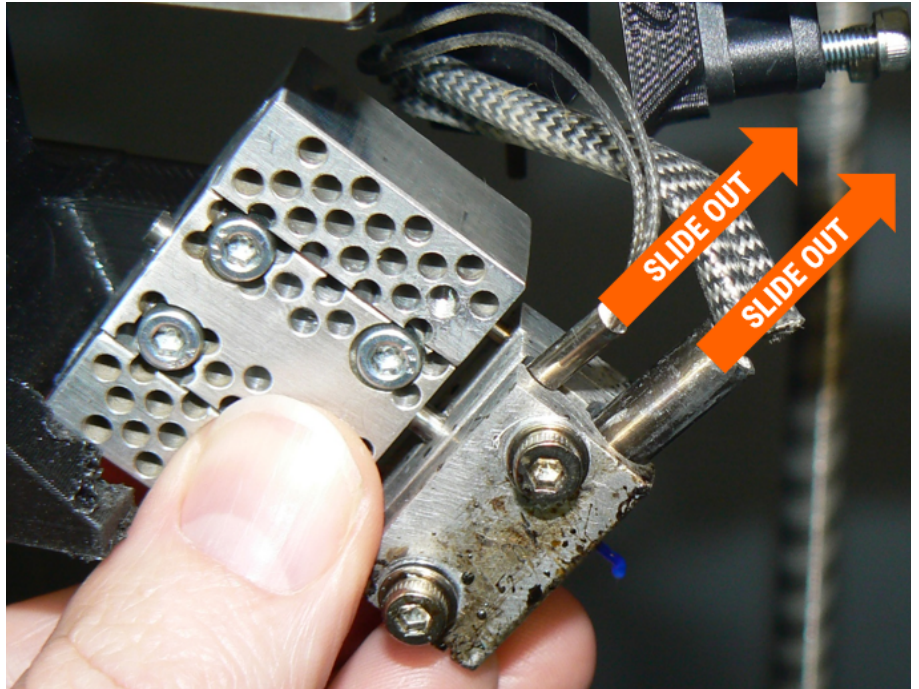
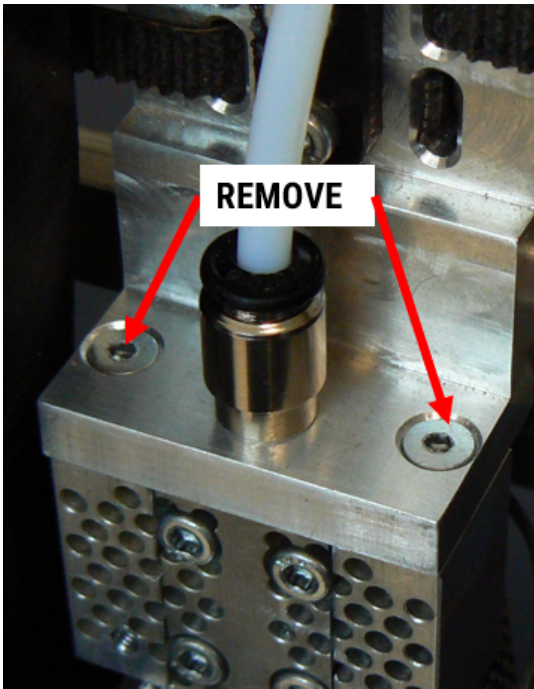
PROCEDURE

Disassembly

1. EDGE should be off and cold, with filament unloaded.
2. Loosen the 2 hot side clamp screws on the print head.
3. Remove the 30mm fan from the front of the print head.

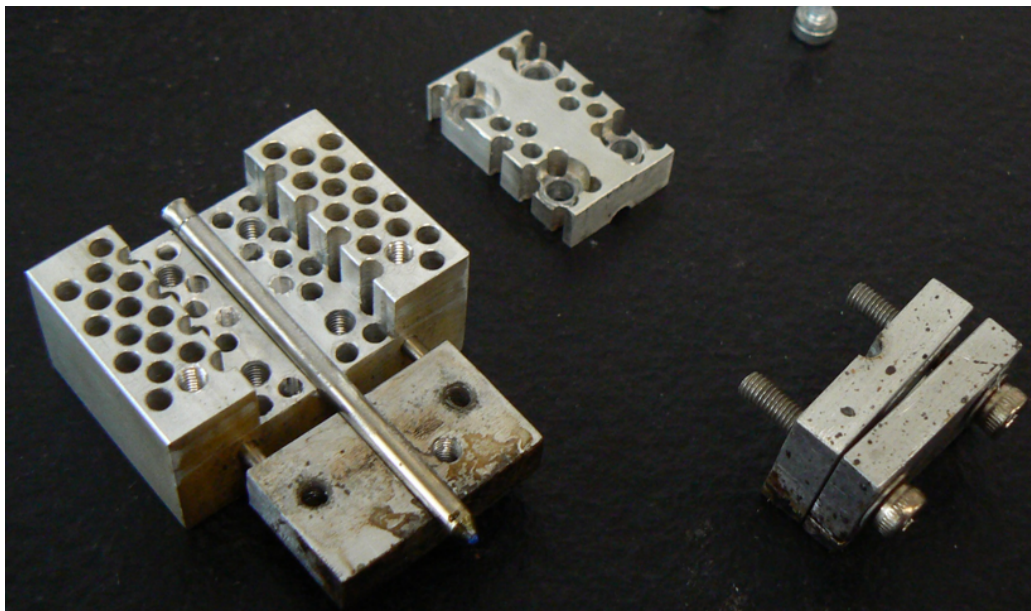
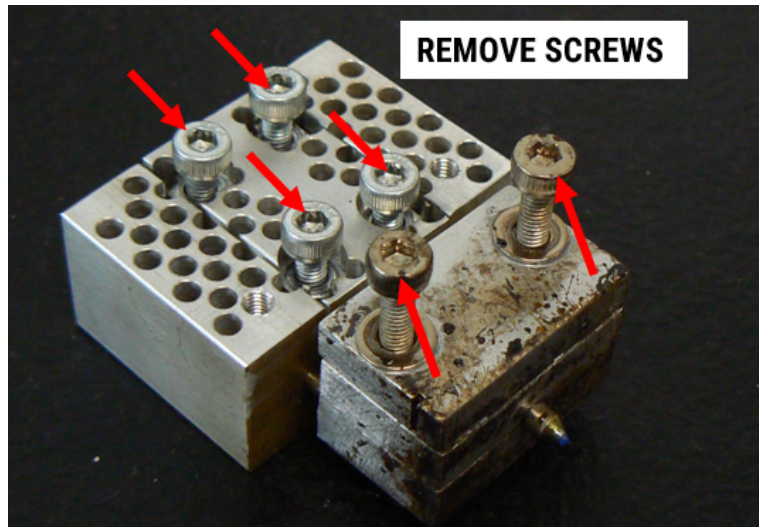


4. Unbolt the print head from the X carriage assembly. Leave the heater and sensor plugged into the printer and simply slide them out of the hot side.



5. Move the print head to a separate work surface.

6. Unbolt the hot side clamp and cold side clamp so the tube can be lifted straight out of the print head instead of sliding in from the top (normal tube installation method).

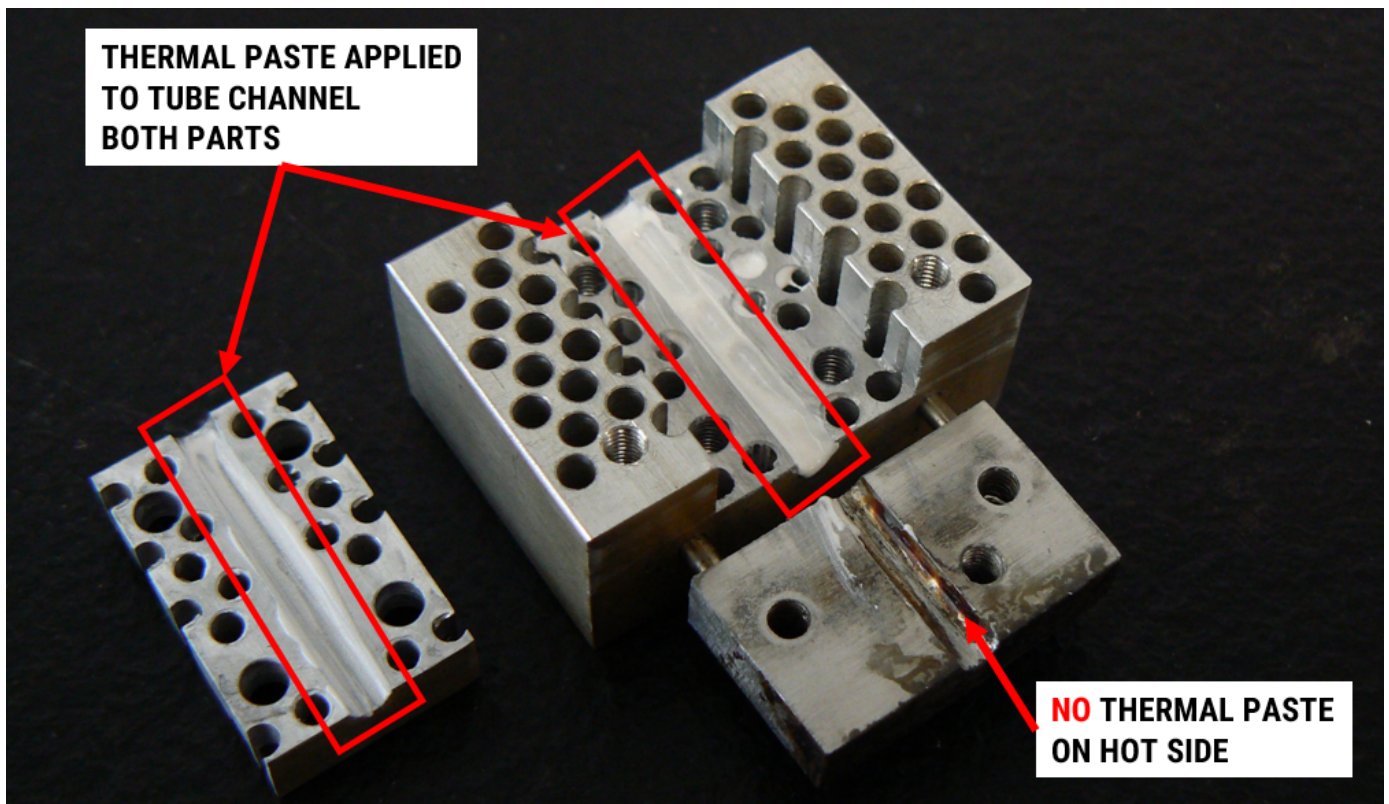


7. Remove the tube from the print head. Inspect it. If you see debris or char on the section that goes in the hot side, clean it up by following the instructions in the last section.



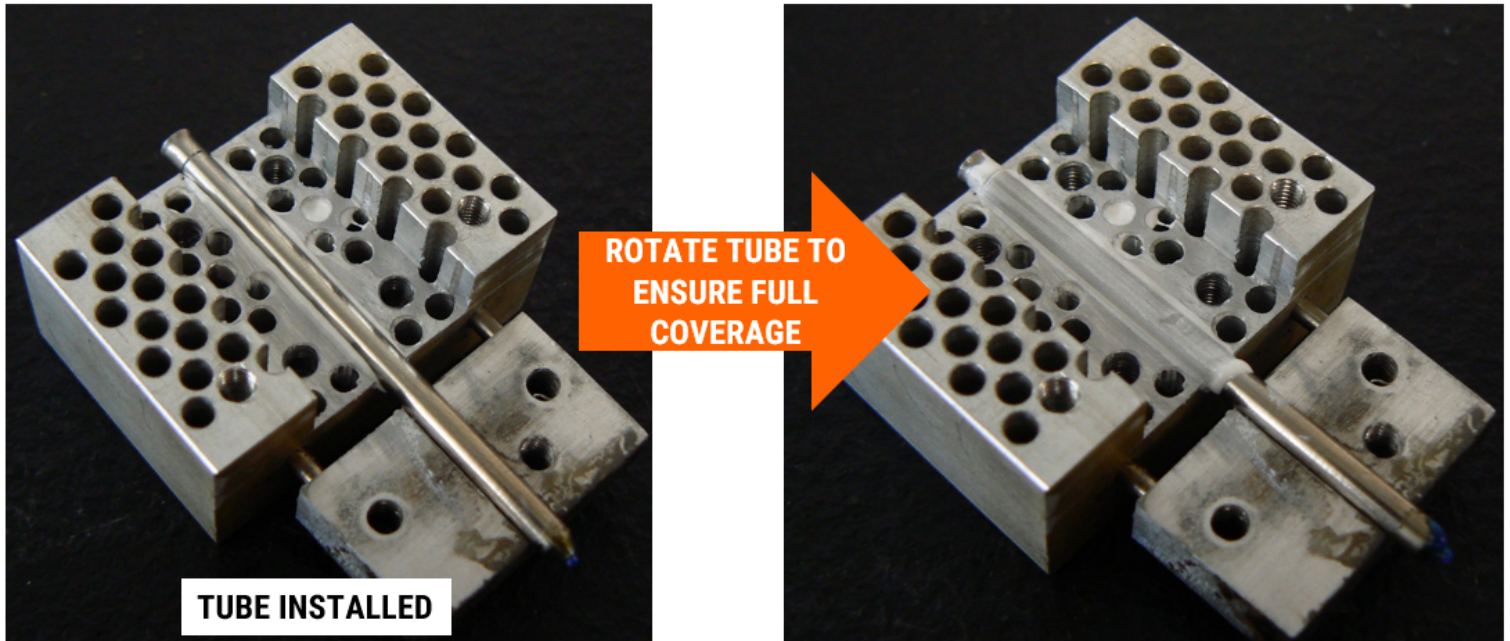
Adding Thermal Paste

1. On the cold side body, add a small bead of thermal paste to the channel the tube sits in. We want to use enough to ensure complete coverage and gap fill, but not so much that it gets everywhere and clogs the ventilation holes.
2. Repeat this procedure on the cold side clamp.

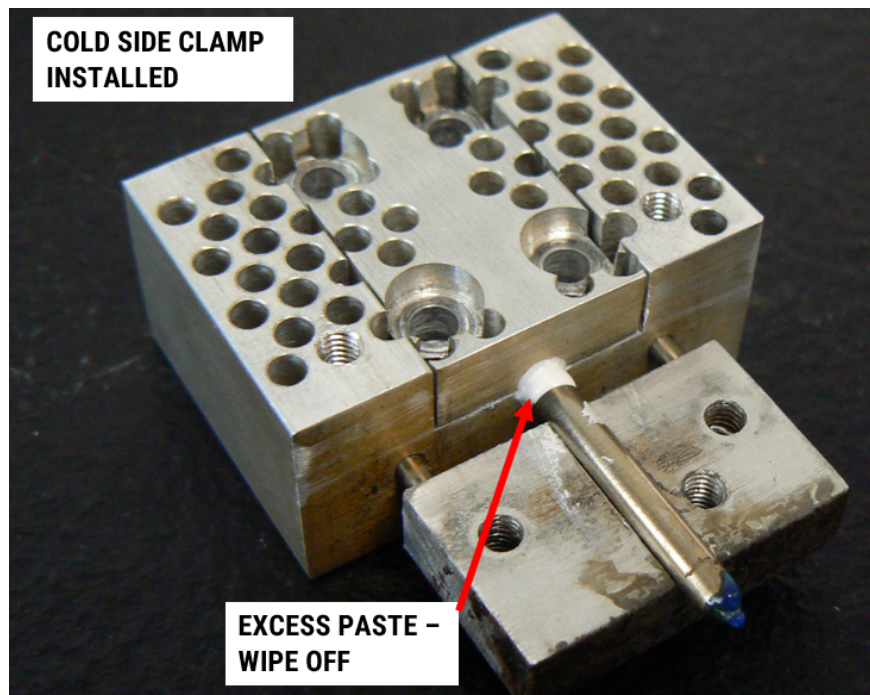


NOTE: DO NOT add thermal paste to the hot side. The hot side temperatures exceed the working range of thermal paste, and will rapidly degrade, make a mess, and not enhance performance.

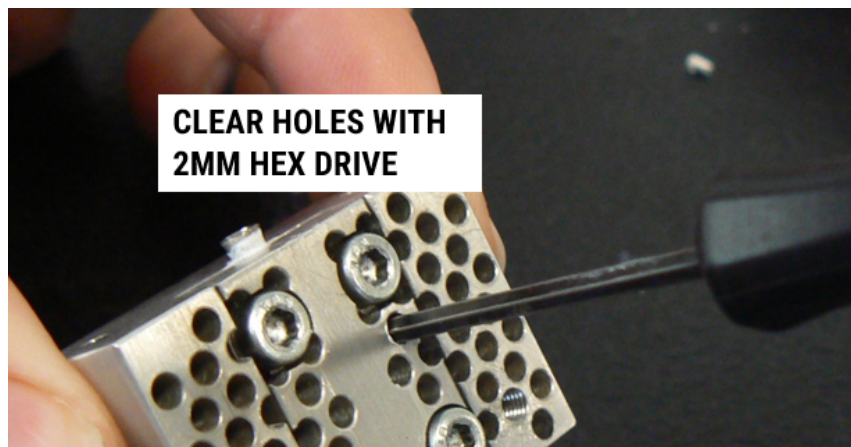
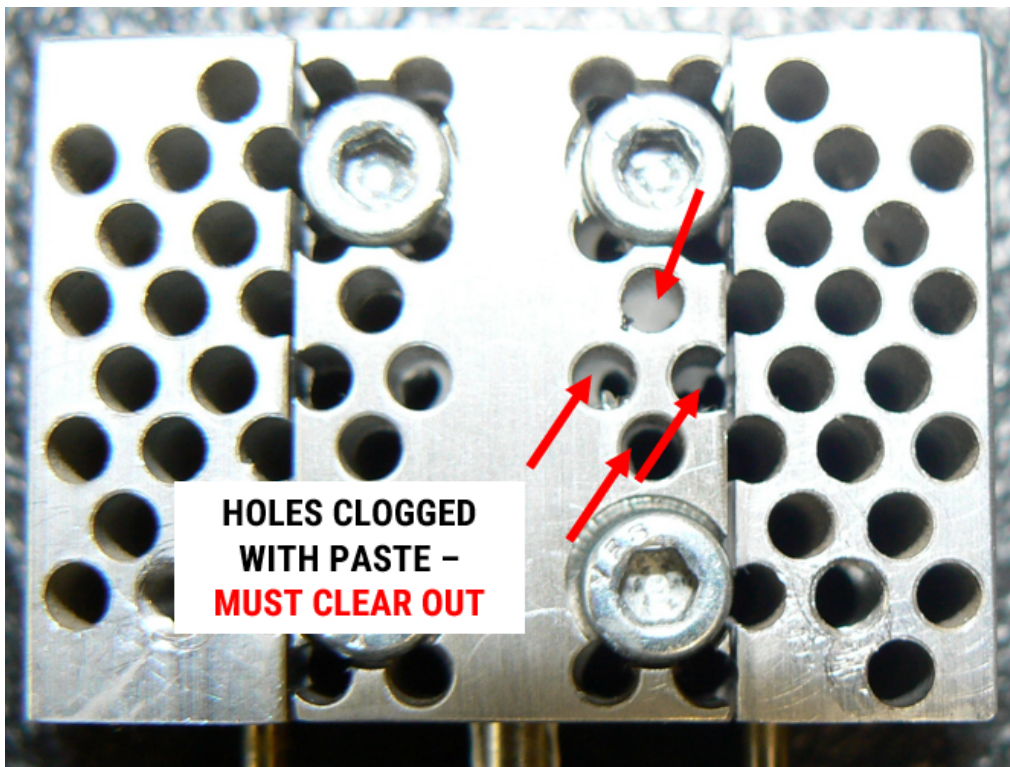
3. Install the tube and slowly rotate it to ensure complete coverage.



4. Do a test fit of the cold side clamp. This will "squish" excess paste out of the channel. Clean up as needed.



5. Reassemble the print head. Leave the hot side screws loose so you can install the heater and sensor in the next step.
6. Clean any excess thermal paste out of the ventilation holes or other areas where it shouldn't be.



7. Install the print head back on the printer, install the heater/sensor, and bolt on the 30mm fan.

OPERATION WITH THERMAL PASTE

Able to use ANVIL normally. Take slightly more care when changing the tubes. If thermal paste gets lodged on the tip of the new tube, it could clog it. Disassemble and refresh thermal paste if you notice performance degrade again.

CLEANING THE PRINT HEAD TUBE AND HOT SECTION PARTS

If the tube or the hot section parts are dirty, they may not go back together correctly. These parts can be cleaned up by CAREFULLY using 400-800 grit sandpaper to remove debris, WITHOUT affecting the geometry of the metal parts. If you sand too aggressively the shape of the parts will change and this will negatively impact the print head's performance.

For the tube, you can gently chuck it into a drill and spin it while gripping the dirty section in sandpaper to quickly clear debris off.

Parts do not have to be pristine; you want to remove any debris that might impact the fit of the parts but no more.

