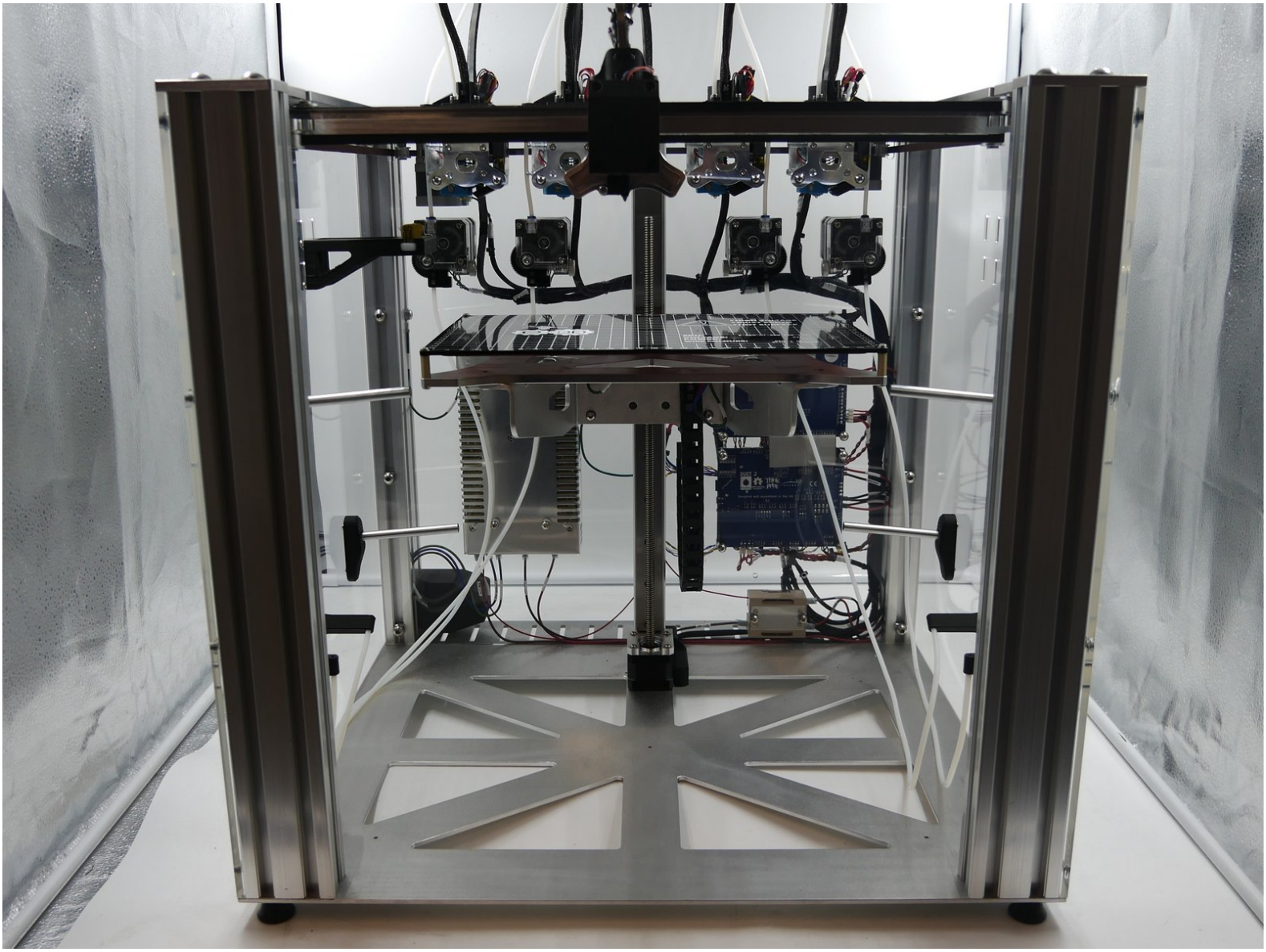
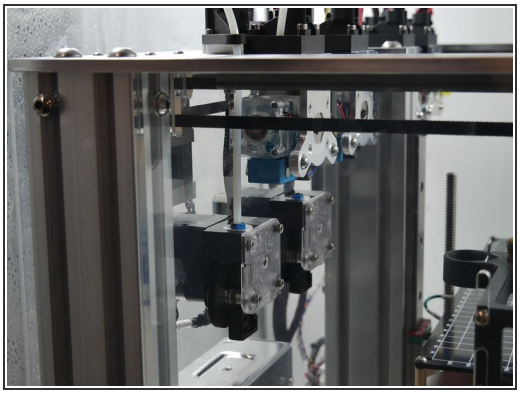
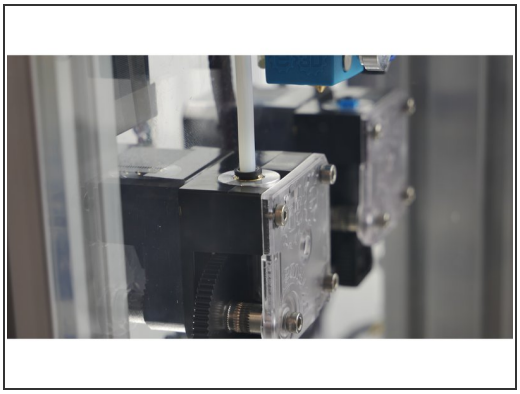
10 - Commissioning.

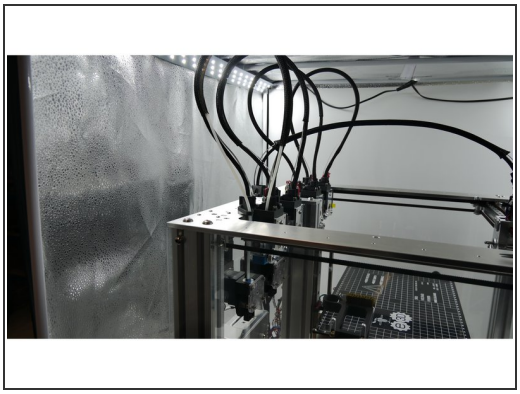
Written By: Greg Holloway



Step 1 — PTFE.



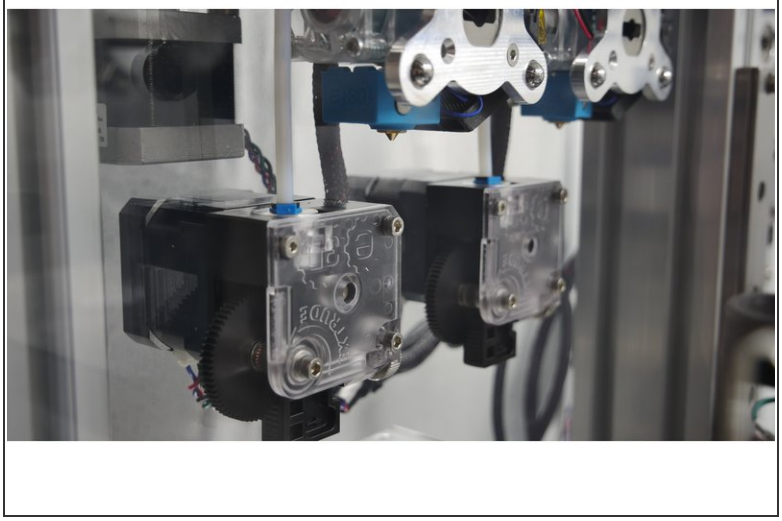


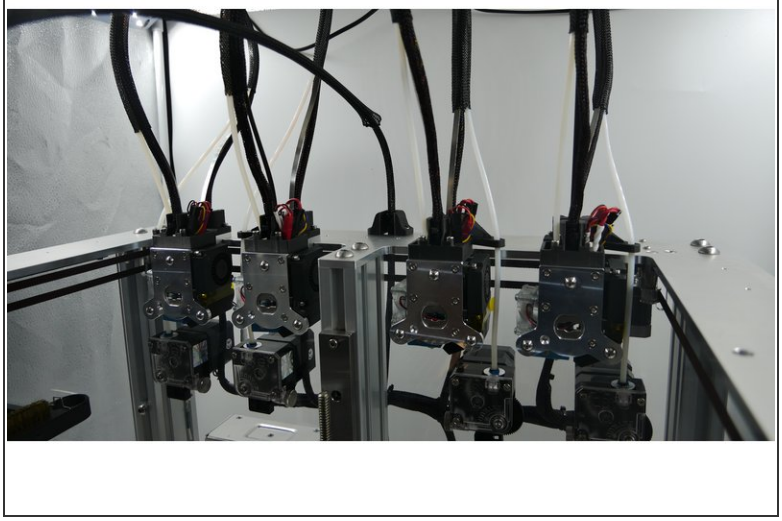


⚠ Ensure both side panels are installed. They are required as they add rigidity to the frame.

- Cut four 790mm lengths of PTFE tubing.
- Feed one end through the printed part on the dock and into the extruder.
- Feed the other end through the braided sleeving and down into the V6 Bowden Tool.

Step 2 — Clips.



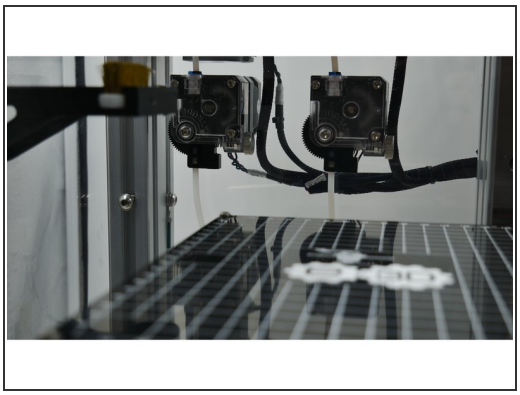
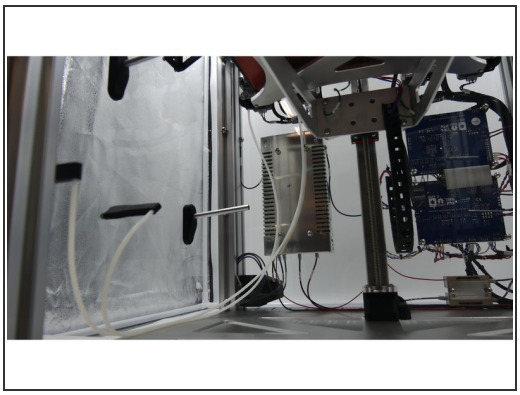


- Clip the end of the PTFE at the extruder.

ⓘ Check the clip is present on the V6 Bowden Tool.

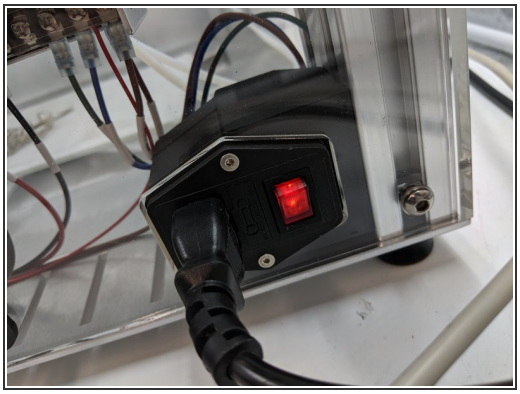
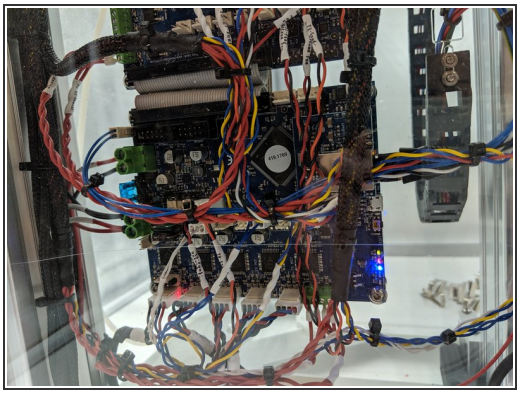
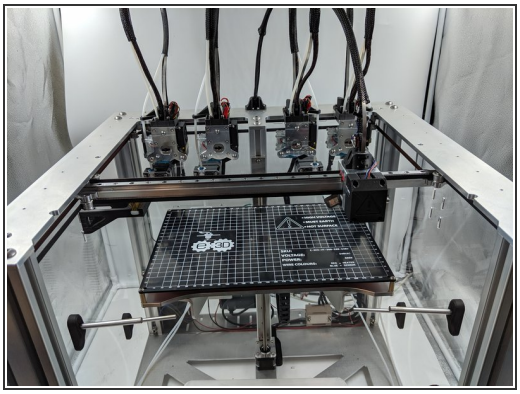
- Repeat for the other tools.

Step 3 — Feed Tubes.

- Cut four 850mm lengths of PTFE.
- Insert one end of the ptfe into one of the printed Pick-Ups.
- Insert the other into one of the Titan extruders.
- Repeat this for the other tools.

Step 4 — Power-On.

⚠ Do a final check of the wiring!

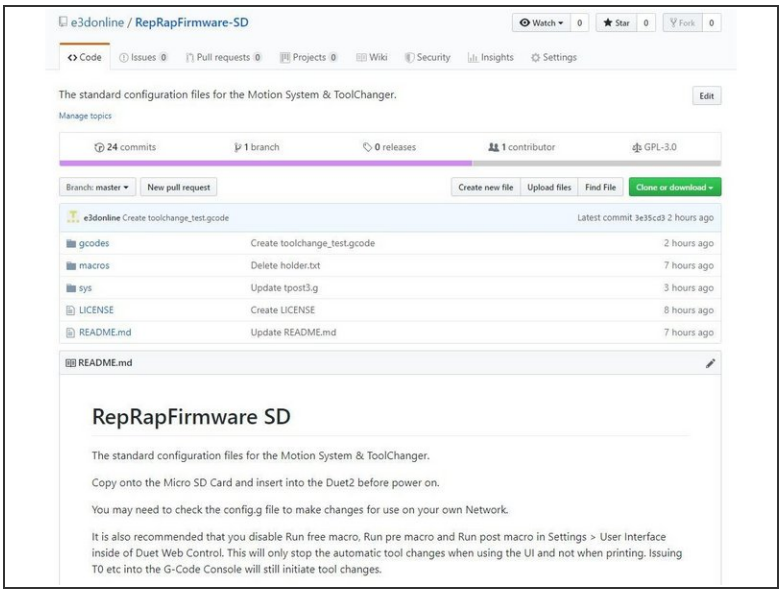
- When you are happy plug in an IEC cable.
- Turn on the power.

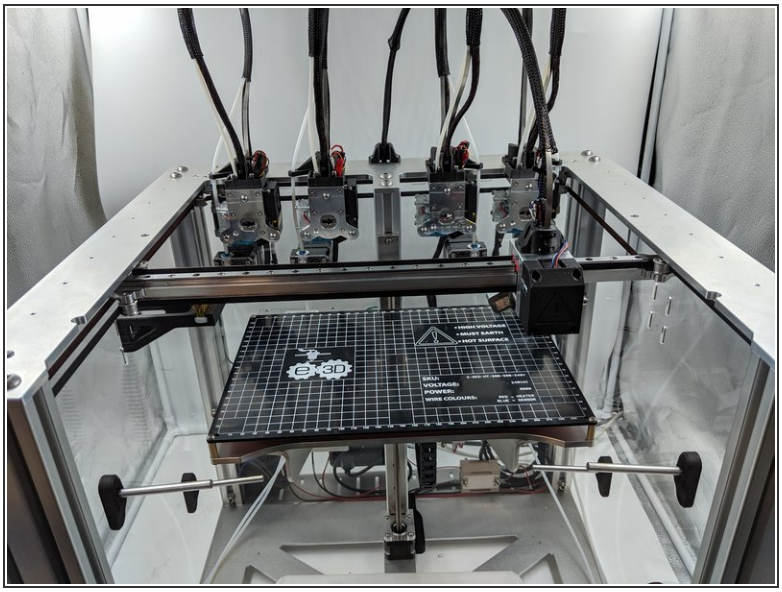
ⓘ Check for magic smoke.

- Admire your work if there are no smoke signals indicating something is wrong..
- Panic and turn off the power if plums of failure are visible, then check your wiring and fix it.

ⓘ You may want to do the initial power-on with the rear panel removed.

Step 5 — Config.



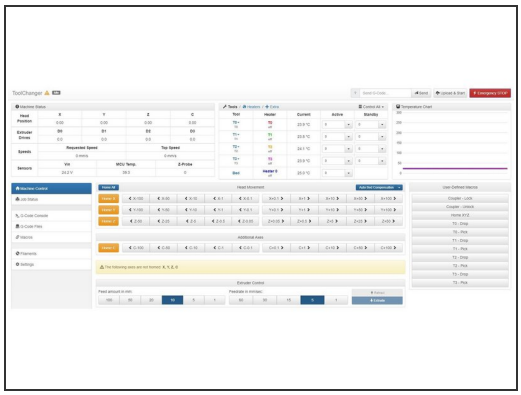


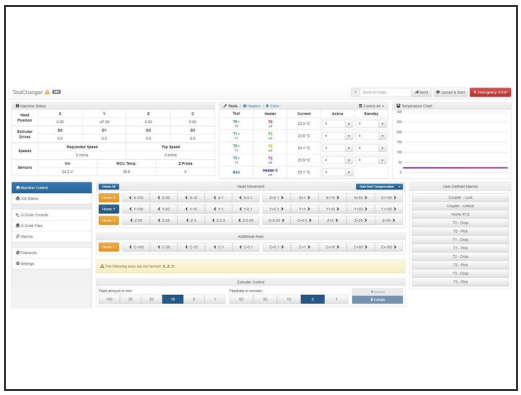
- Power off the machine.
- Remove the SD Card from the Duet2.
- Visit GitHub and download the config files.
- [RepRapFirmware Download]
- Load the files onto the SD Card.
- Power the machine back up again.

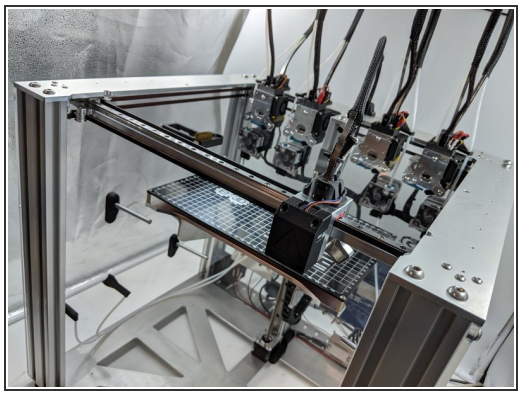
⚠ Please note that Hemera Direct Tools require slightly different configuration settings and offsets.

⚠ **DO NOT RUN ANY SCRIPTS WITHOUT CHECKING THE TOOL POSITIONS. THE DEFAULT SYSTEM IS CONFIGURED FOR BOWDEN V6 TOOLS BY DEFAULT AND WILL NEED ADJUSTING FOR OTHER TOOLS.**

Step 6 — Home Y.







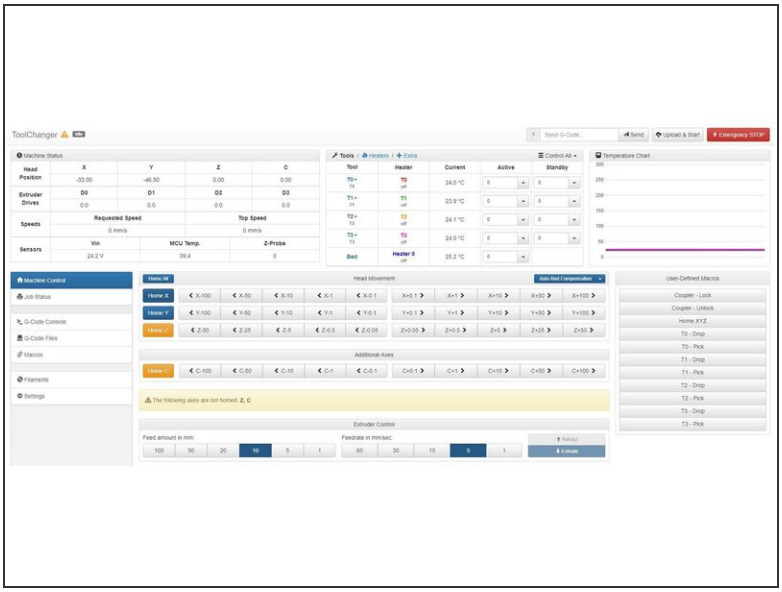
- Open a browser and navigate to the printer.
- Make sure you are on on the Machine Control tab.

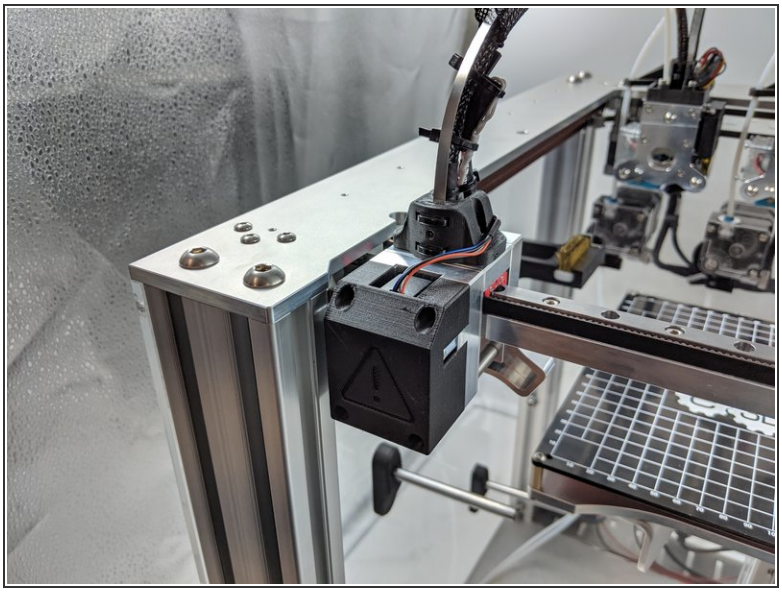
⚠ Check the printer build area is clear and that the bed is below the height of the Z-Axis endstop.

- Click the Home Y button.
- The Y-Axis should travel towards the front of the printer and then stop.

⚠ If this does not happen click the Emergency Stop button if needed and check your configuration and wiring.

Step 7 — Home X

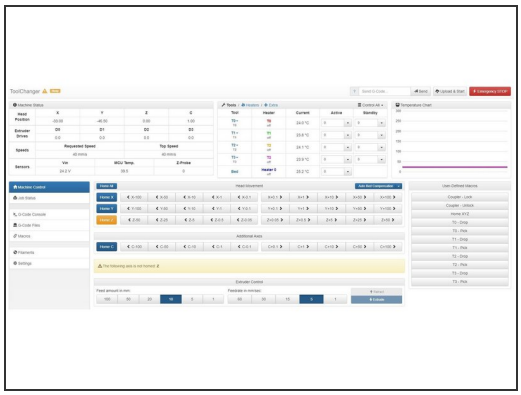


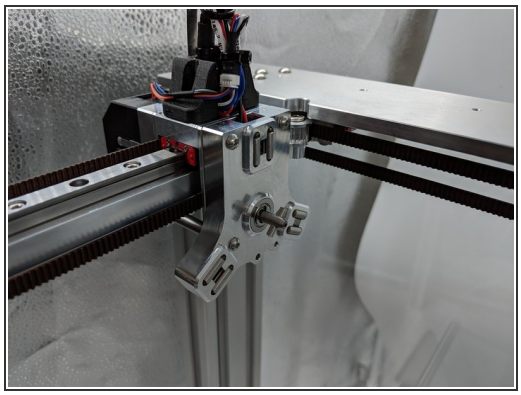


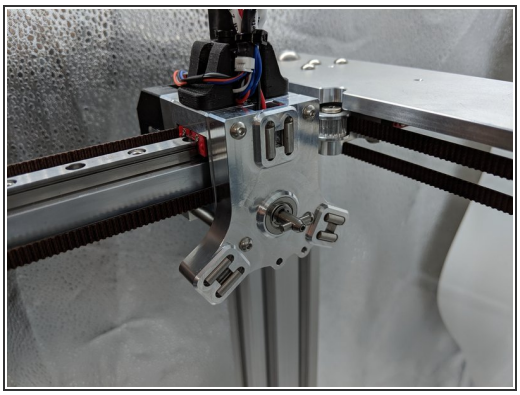
- Click Home X.
- The Toolhead should move to the left and stop.

⚠ If this does not happen click the Emergency Stop button if needed and check your configuration and wiring.

Step 8 — Home C.



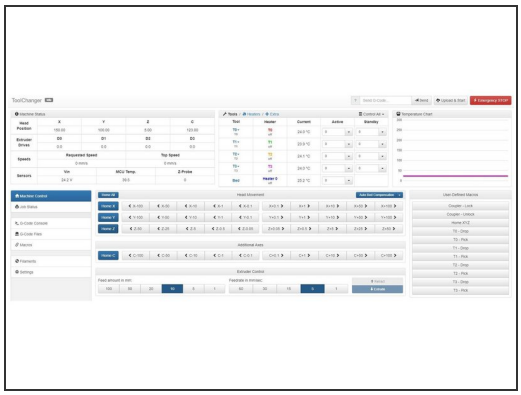


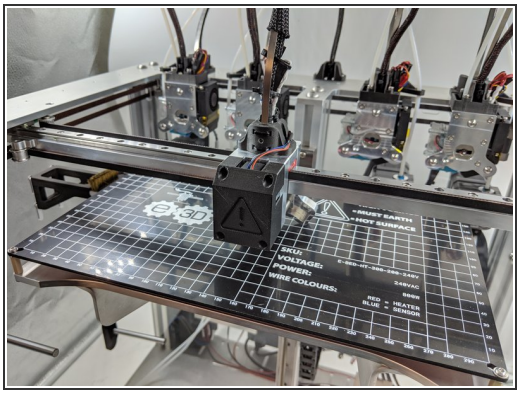


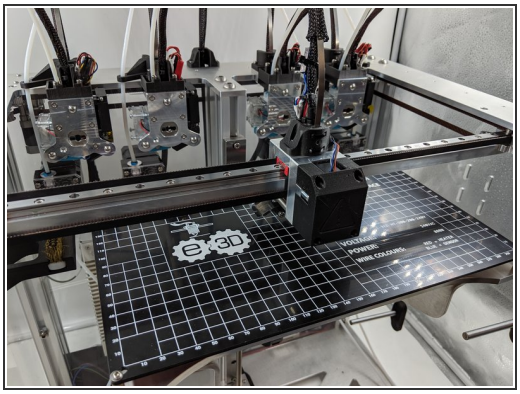
- Click the Home C button.
- The Coupler T-Bar should rotate.
- After a few seconds it will rotate into a horizontal position.

⚠ If this does not happen click the Emergency Stop button if needed and check your configuration and wiring.

Step 9 — Home Z.







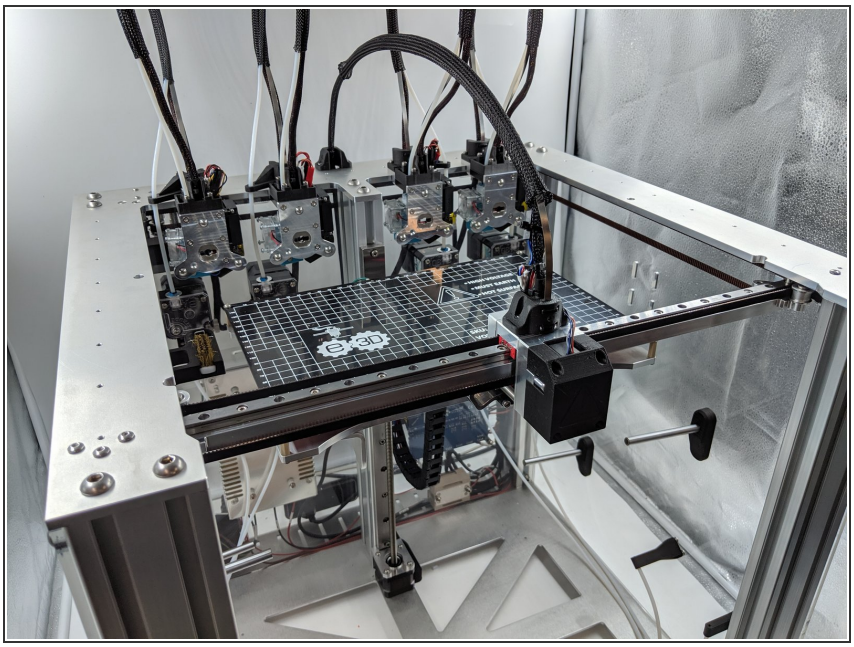
- Click the Home Z button.

ⓘ Newer versions of the Motion System have a 4mm pitch leadscrew. You may need to adjust the steps-per-mm to 800 in the config.h file.

- The Toolhead will move to the centre of the bed.
- The bed will touch against the probe twice and stop.

⚠ If this does not happen click the Emergency Stop button if needed and check your configuration and wiring.

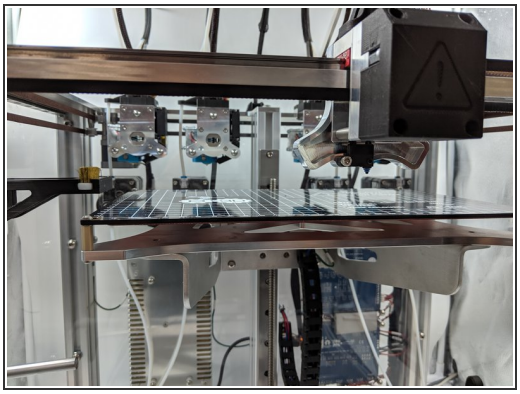
Step 10 — Home All.

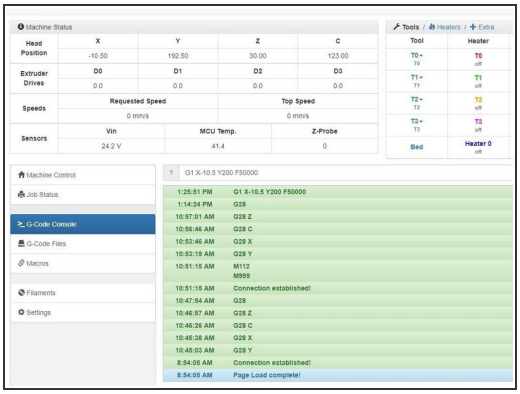


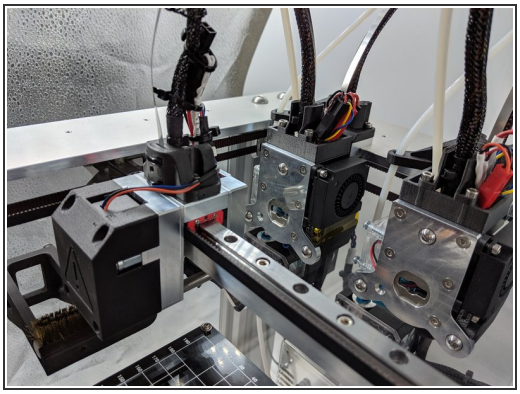
- If all previous steps performed correctly click the Home All button.
- There will be a ~20 second pause while the Toolhead Coupler T-Bar homes.
- The Y-Axis will home, then the X-Axis and then finally the Z-Axis.

ⓘ When homing has finished the Toolhead will move to the front of the printer.

Step 11 — T0 Dock Positon.



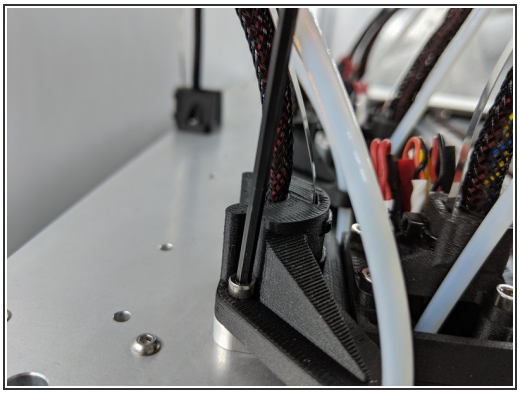
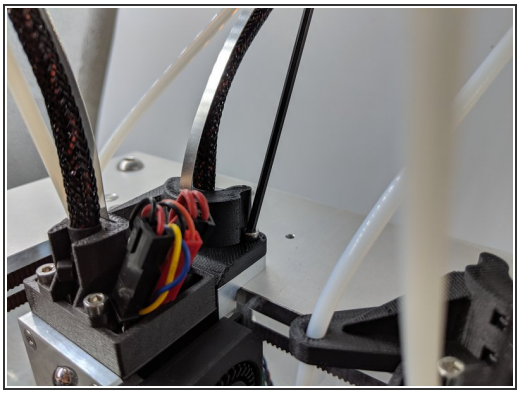
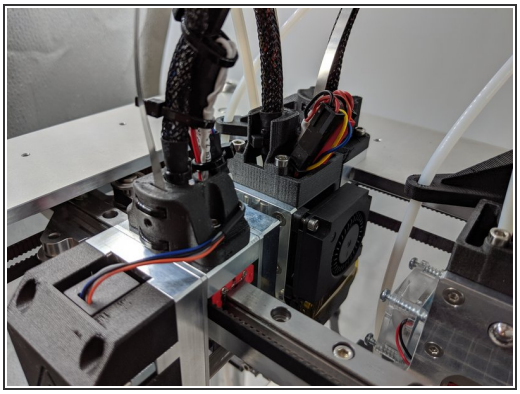




- Ensure the ToolChanger is correctly homed.
- Using the Machine Control tab lower the bed by 25mm (click the Z+25 button).
- Click the Coupler - Unlock macro.
- Into the G-Code Console type...
- **G1 X-10.5 Y200 F50000**
- The Toolhead will now move into a position infront of T0.

⚠ **DO NOT RUN ANY SCRIPTS WITHOUT CHECKING THE TOOL POSITIONS. THE DEFAULT SYSTEM IS CONFIGURED FOR BOWDEN V6 TOOLS BY DEFAULT AND WILL NEED ADJUSTING FOR OTHER TOOLS.**

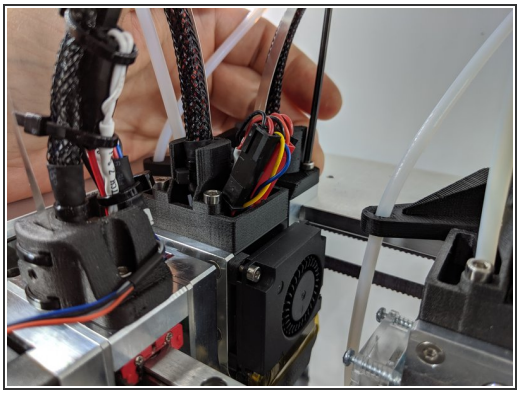
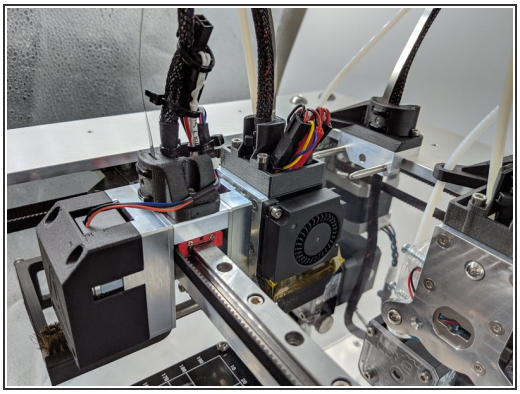
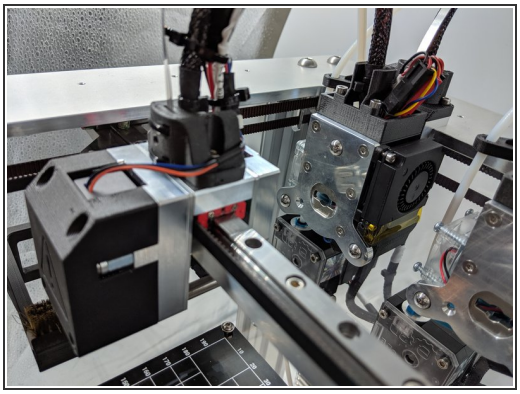
Step 12 — T0 Dock Alignment.

- Loosen the two screws securing the T0 Dock.
- Using the Machine Control tab slowly move the Toolhead backwards towards the tool.

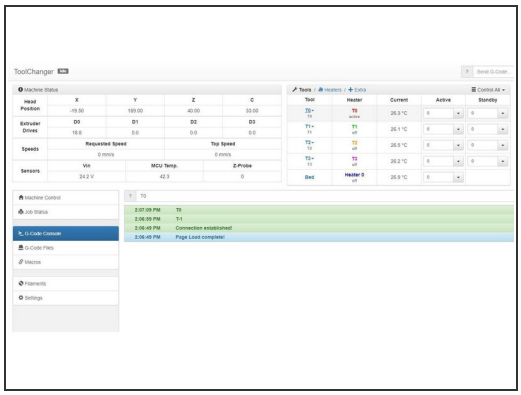
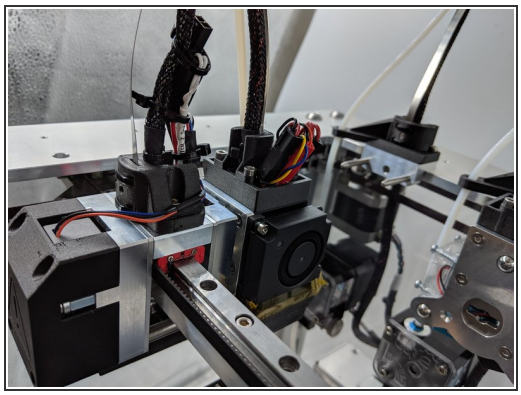
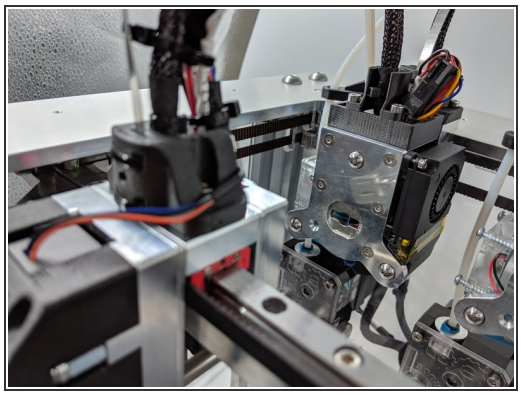
⚠ When the X-Axis is at Y243 stop moving the Y-Axis.

Step 13 — T0 Dock Adjustment.

- Click the Coupler - Lock macro. The Toolhead will lock onto the T0 tool.
- Using your hands push the dock forwards up against the tool.
- While holding the dock pressed against the tool tighten the two screws in the dock.
- Using the Machine Control tab click the Y-0.1 button 5 times so the X-Axis moves to Y242.5
- Click the Y-50 button and the tool will be removed from the dock.
- Click the Y+50 button to return the tool to the dock.
- Click the Coupler - Unlock macro.
- Click the Y-50 button and the Toolhead will back away leaving the tool on the dock.

Step 14 — T0 Tool Test.

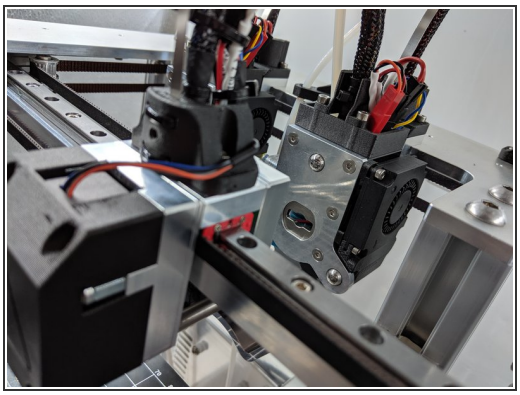
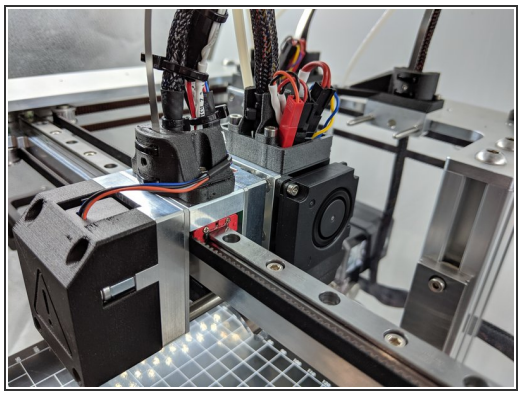
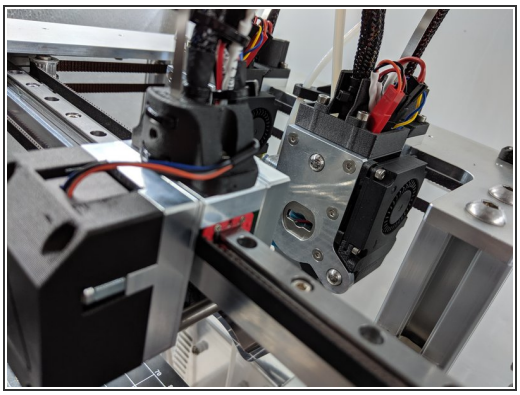




- To check the Dock has been correctly set we will run a tool change.
- Into the G-Code Console type **T-1** to clear any potentially selected tools.
- Then type **T0** into the console.
- The Toolhead should go and pick up T0.

Note that the PCF fan on T0 will turn on when the tool is picked up.

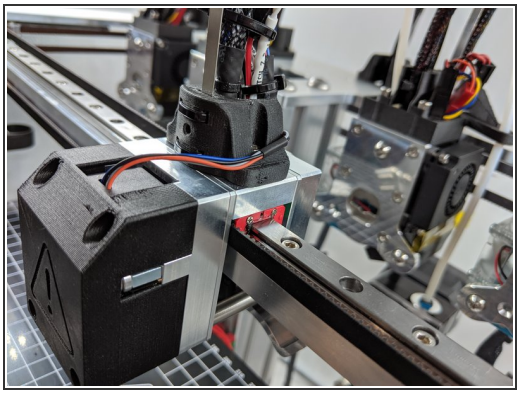
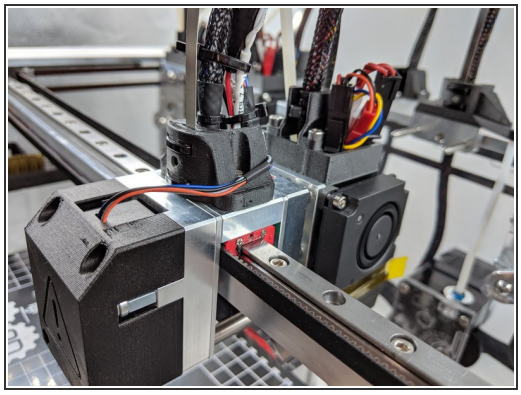
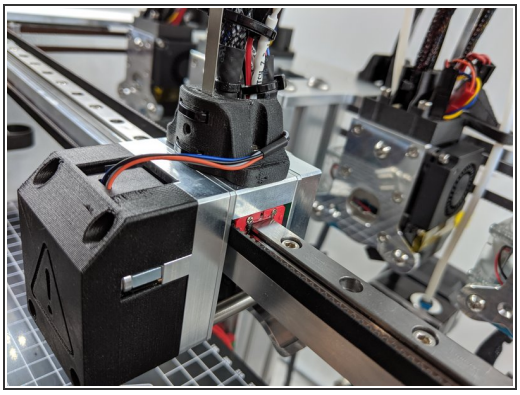
- Typing **T-1** into the console will return the tool to it's dock.

Step 15 — T1 Dock Position, Alignment, Adjustment & Test.

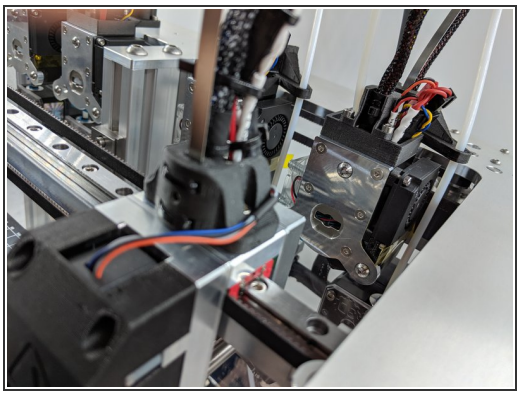
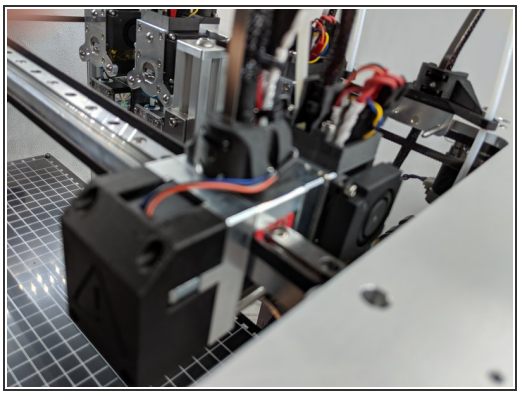
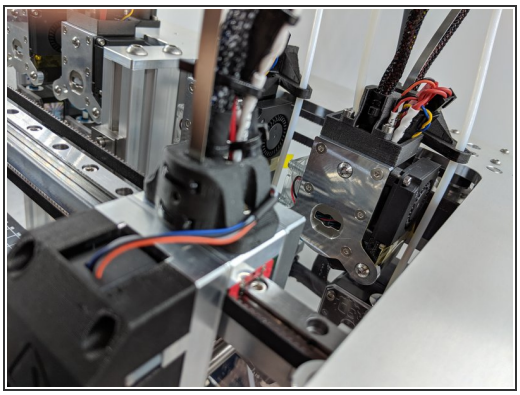
- Ensure no tool is currently attached to the Toolhead. Type **T-1** into the console to be sure nothing is active.
- Move the Toolhead to the T1 position.
- **G1 X79.5 Y200 F50000**
- Repeat the previous process as described for T0.

Step 16 — T2 Dock Position, Alignment, Adjustment & Test.

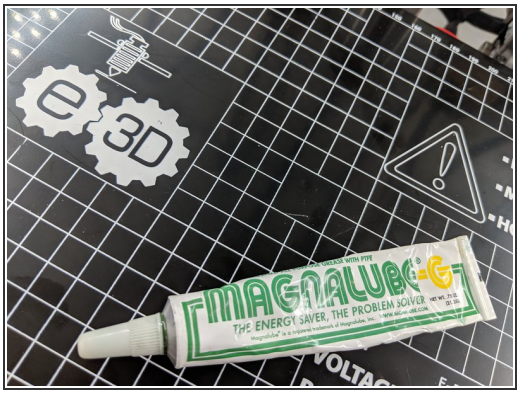
- Ensure no tool is currently attached to the Toolhead. Type T-1 into the console to be sure nothing is active.
- Move the Toolhead to the T2 position.
- **G1 X214.5 Y200 F50000**
- Repeat the previous process as described for T0.

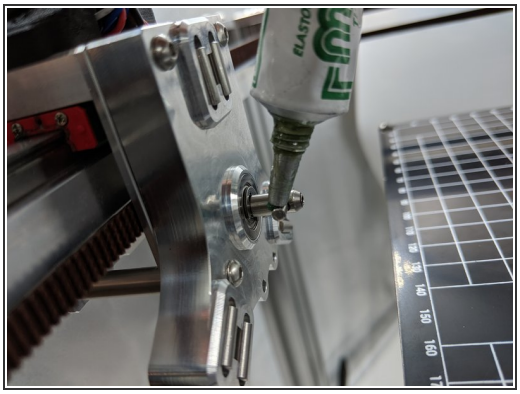
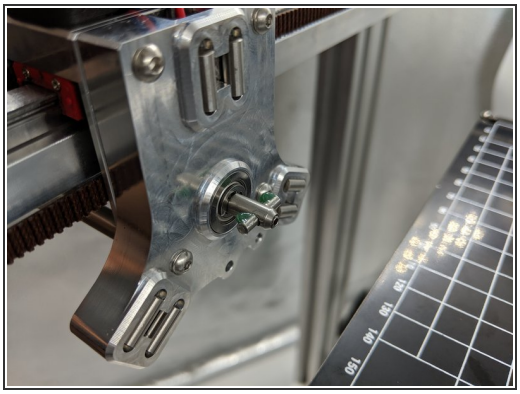
Step 17 — T3 Dock Position, Alignment, Adjustment & Test.

- Ensure no tool is currently attached to the Toolhead. Type T-1 into the console to be sure nothing is active.
- Move the Toolhead to the T3 position.
- **G1 X304.5 Y200 F50000**
- Repeat the previous process as described for T0.

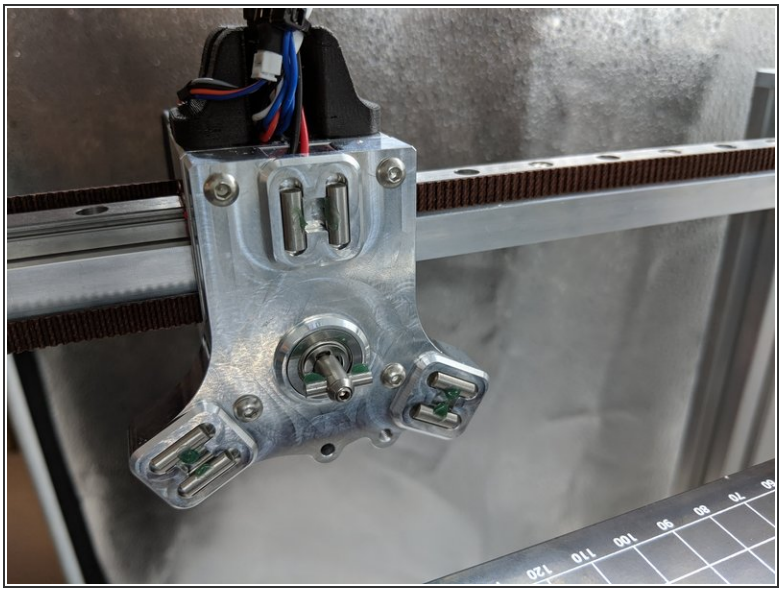
Step 18 — T-Bar Lubrication.



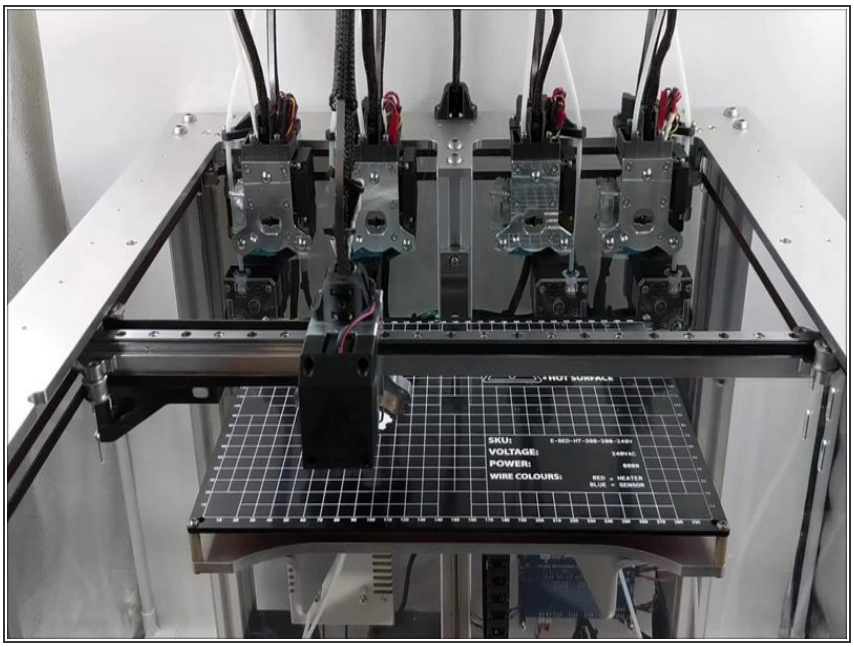
- Apply lubrication to the T-Bar.

Step 19 — Pin Lubrication.



- Apply lubrication to the pins.

Step 20 — Tool Change Test.



- In the G-Code Files tab select the file named **toolchange_test.gcode**.

⚠ Ensure the Build Area is clear.

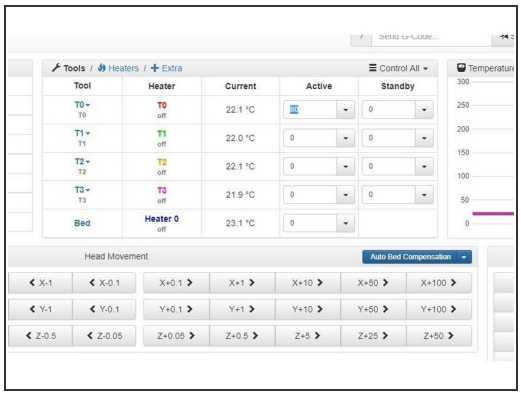
- Click Yes to run the file.
- The ToolChanger will run through a script which will firstly home the Toolhead and then swap between each tool in turn and return the Toolhead to the parked position at the end of the sequence.

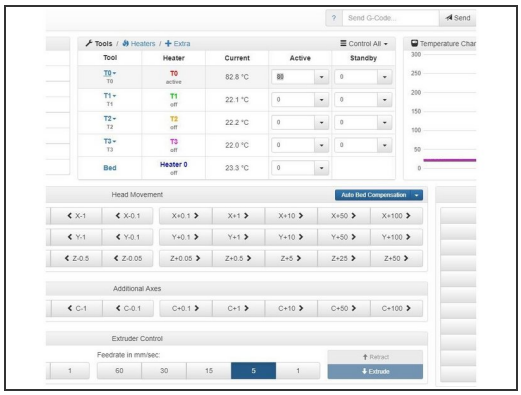
ⓘ The bed will move down during this process, this is perfcectly fine.

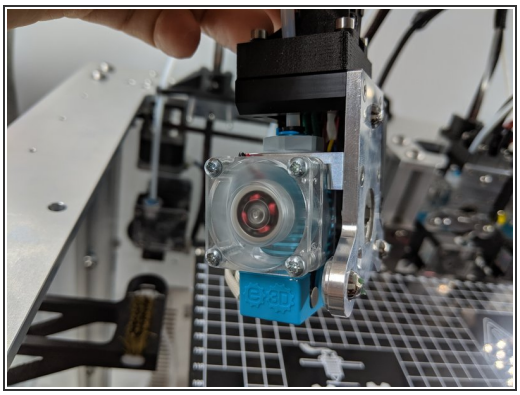
- If everything has been setup correctly nothing will go wrong.....

ⓘ Check the PCF fans turn on when a tool is picked up.

Step 21 — Hotend Fan Checks.



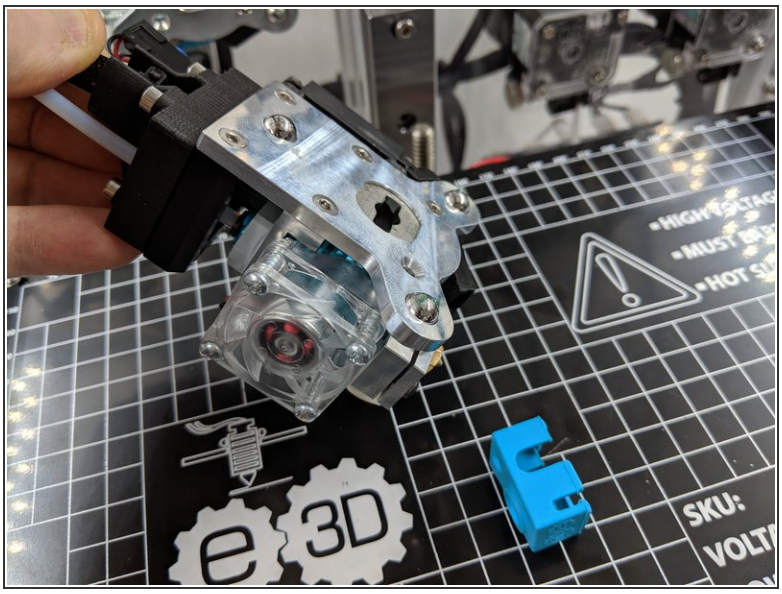


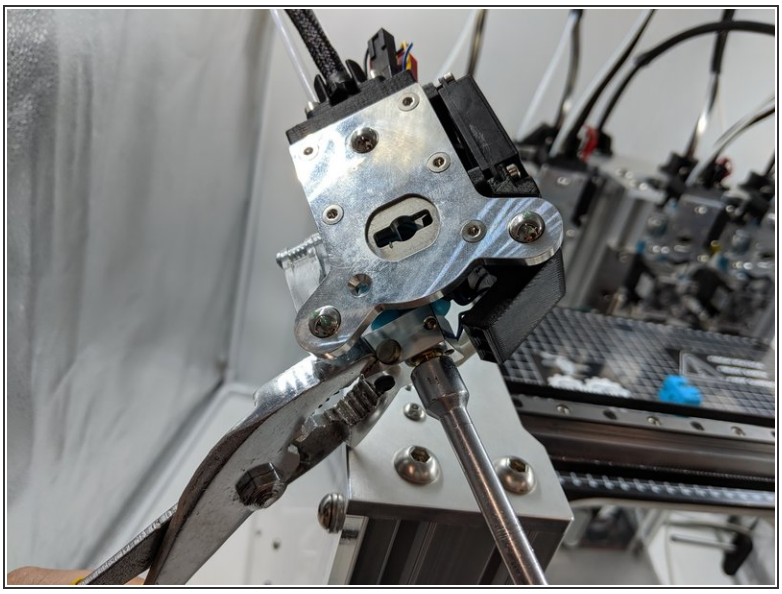


- The Hotend fan is configured to turn on when the Hotend reaches 70C. We need to test the fan works as expected. In Duet Web Control in the Tools window for T0 Active temperature type in **80** and press enter.
- Next click T0 in the heater column so the status changes to active.
- The Hotend will now begin to heatup.
- Once the temperature passes 70C the Hotend fan should begin to spin.
- Pick the tool up and check the fan is working.
- To turn off the Hotend click the T0 in the Heater Column until it changes to off and clears the temperature.
- Repeat this for each Hotend making sure everything functions as expected.

⚠ If a Hotend does not get hot or a Hotend Fan does not turn on as expected, turn off the system and check your wiring.

Step 22 — Hot Tightening.

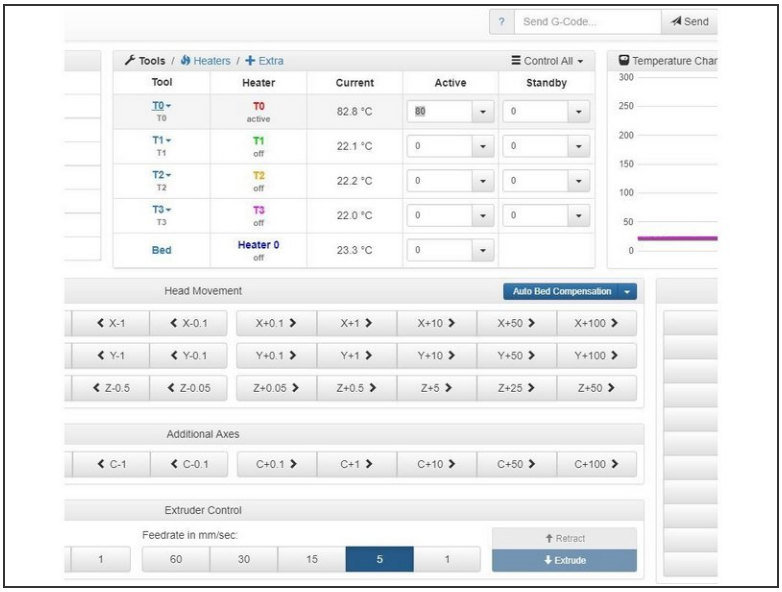


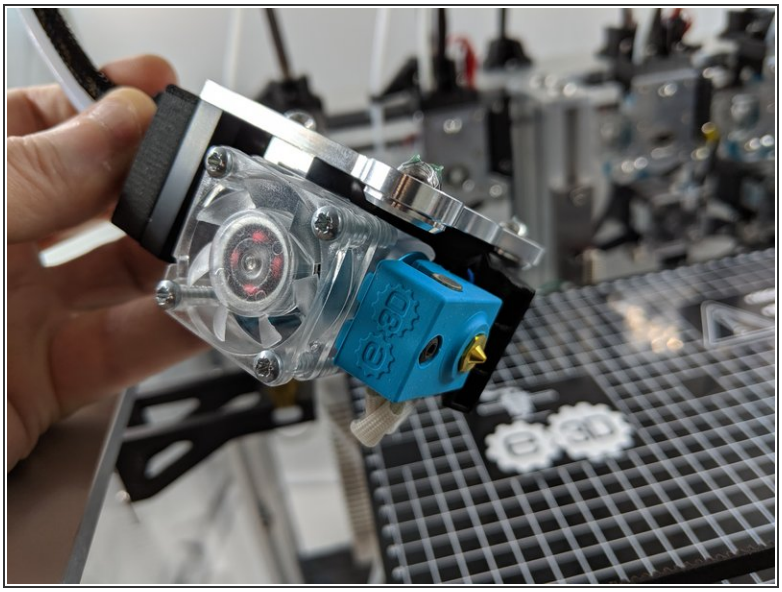


- Remove the sock from the T0 heater block.
- Set the T0 Active temperature to 285C.
- Set the T0 Heater to Active.
- After the temperature has reached 285C allow it to stabilise for 1 minute.
- While holding the Heater Block use a 7mm spanner to tighten the nozzle.
- Turn off the Hotend when done.

ⓘ For detailed instruction on how to Assemble a V6 visit the V6 Assembly Guide.

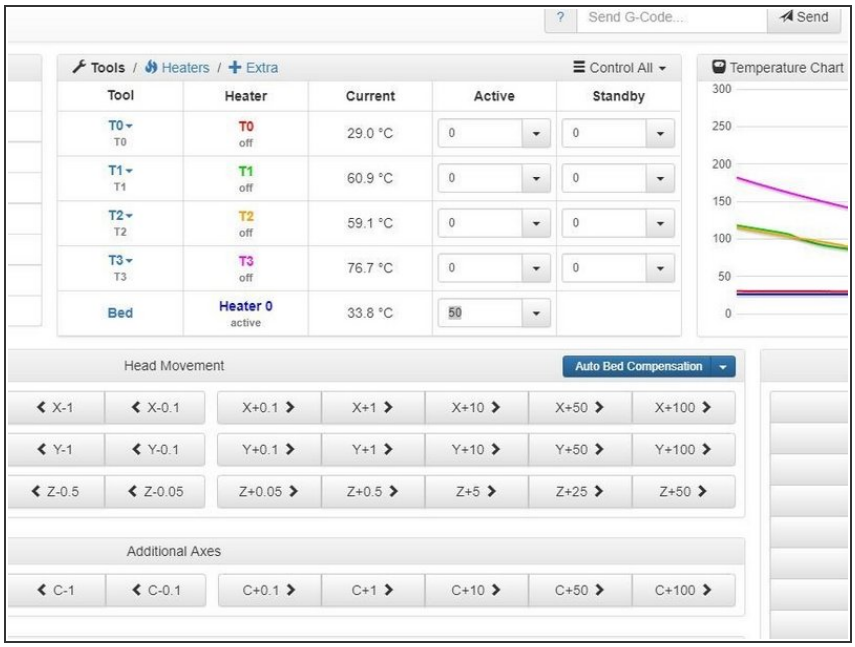
Step 23 — Hot Tightening - Cool Down.





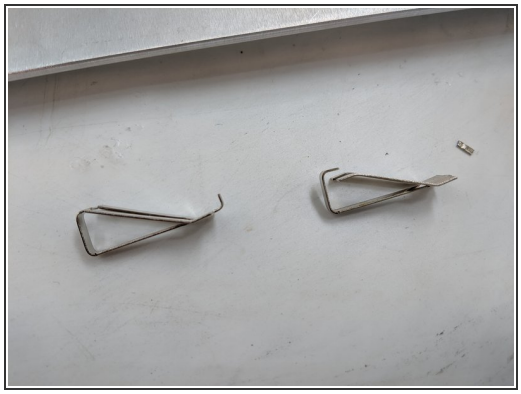
- During Hot Tightening the Heater may report a fault. This is caused by the cooling down of the heater block by the tools used to hot tighten the Hotend.
- The fault is not anything to worry about and can be reset by typing the following into the G-Code Console.
- **M562 P<heater number>**
- M562 P1 will clear the fault for T0 (P0 is the Heated Bed).
- Check the Duet Wiki for an indepth explanation of M562.
- Once the Hotend has cooled refit the sock.
- Repeat the process for the other Hotends.

Step 24 — Heated Bed.



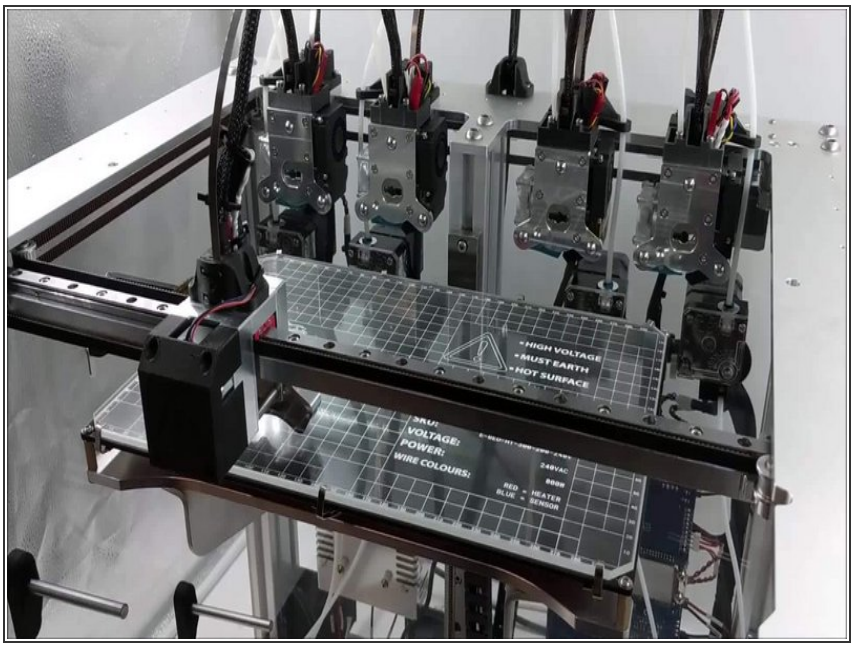
- Into the Bed Active temperature type 50 and hit enter.
- The Bed will heat up. If you have an HT Bed fitted it will do so rapidly.
- Carefully verify the Bed has reached it's set temperature.
- If everything is ok turn the bed off.

Step 25 — Glass Bed.



- Prepare 7 Swiss Clips as shown.
- Apply your favourite bed adhesive to a Glass Bed.
- Place the glass onto the Heated Bed.
- Secure with Swiss Clips.

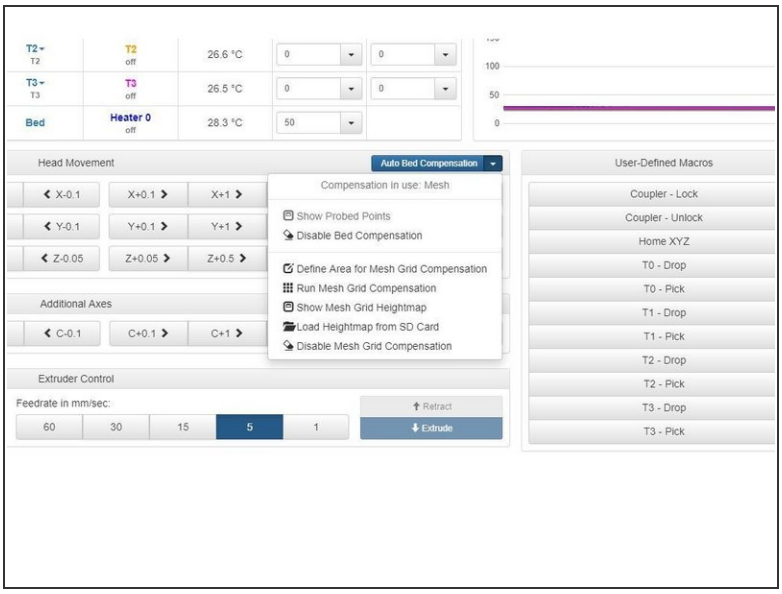
Step 26 — Mesh Leveling.

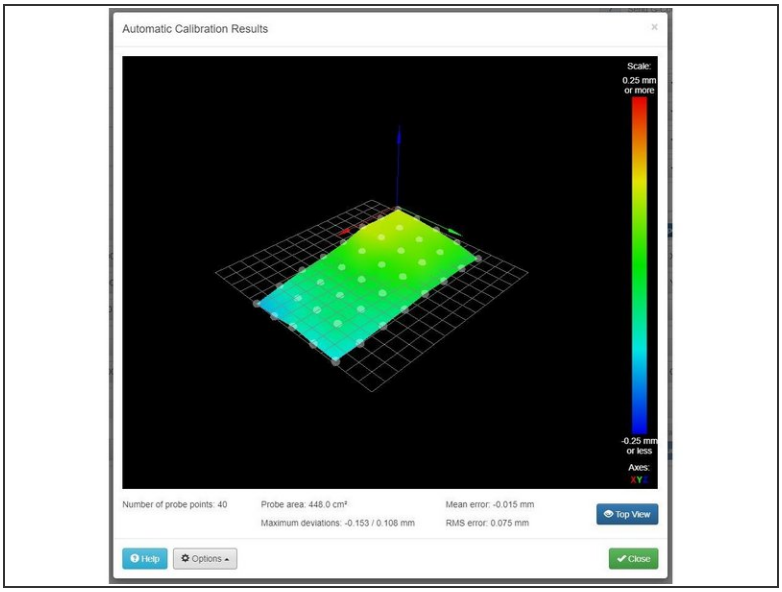


⚠ Home the machine.

- Click the Auto Bed Compensation button.
- The Toolhead will probe several points on the bed and finish in the park position at the front of the machine.

Step 27 — Mesh Compensation.





- To view the results use the Drop-Down arrow on the Auto Bed Compensation button and click Show Mesh Grid Heightmap.
- Mesh Compensation is disable after the probing has completed.
- In the startup script of your slicer you will need to add the command **G29 S1** to enable Mesh Compensation when a print starts.
- In the ending script of your slicer add the line **G29 S2** to disable Mesh Compensation at the end of a print.