

DiamondMind 3D Printer

v1.0

Documentation –
Extruder
Assembly



Extruder Build

Overview

This is the section of the documentation concerned with assembling the extruder components only. Fitting the extruder to the printer and other assembly techniques are covered in additional manuals.

Extruder Assembly

Before starting construction, please read through this document first and compare the pictures with the parts you have received to familiarise yourself with the parts and their names. You should have a kit of parts similar to that below, the contents of the extruder parts bag, assorted wiring, and will need Wire cutters, wire strippers (or a sturdy thumb and sharp blade), cross-head screwdriver, needle-nosed pliers, round-nosed pliers and beverage of your choice (optional but darn handy) and a 13mm spanner. You may find a sharp spike useful (awl, long, thin cross-head screwdriver, 3.2mm knitting needle etc.), and if fitting the Hot End to the extruder body you will require a slow-speed 3mm drill.



Note: The small drive gear is fitted to the extruder's stepper motor in the same manner as that of the Z Motor.

Attaching the Hot End

Note: If using the official kit, the Hot End will have been fitted to the extruder body for you, and you may skip cheerfully to "Fitting the locator pin."

Take the Hot End, Extruder Body and two #6 1 1/4" woodscrews.

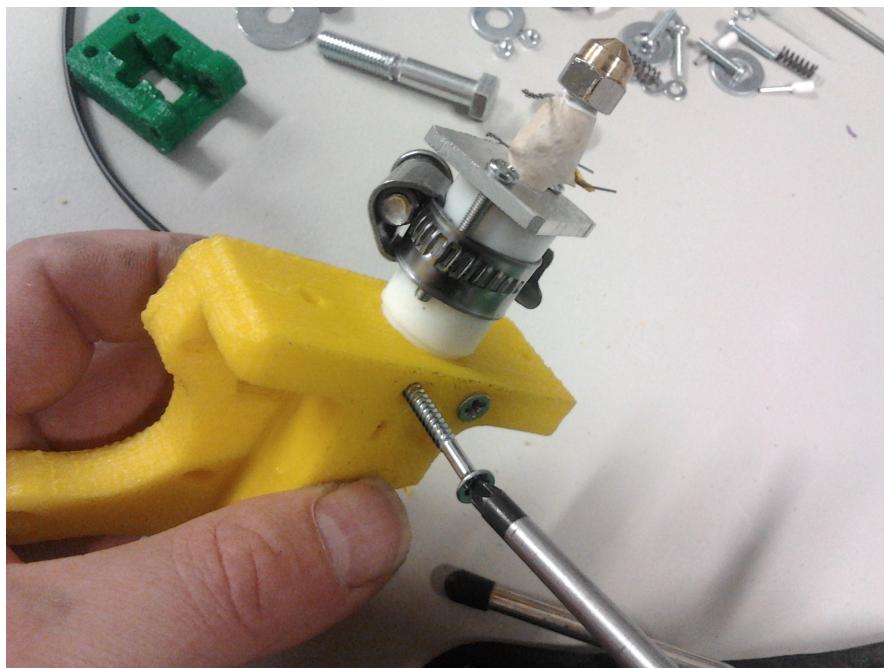
The object of this stage is to attach the Hot End to the extruder body so that it does not scratch the X rails and the large hose clamp on it fits nicely in the gap between the end opposite to the fan duct so:



Having aligned the hot end, drill out the two holes in the bottom of the extruder body, ensuring that the Hot End is aligned square to the extruder body. A low-speed drill or 3mm bit in an electric screwdriver is recommended.



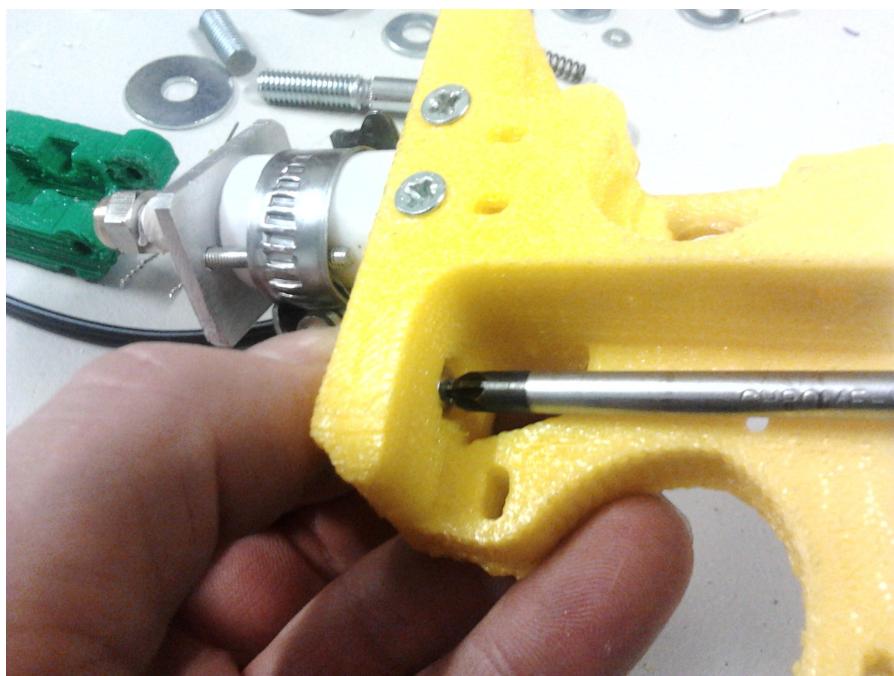
Ensuring the Hot End continues to stay square, fix it in position with the two screws.



Note: You should be able to push a piece of filament manually down the filament hole all the way to the tip at this point. If there is a blockage, remove the very tip of the extruder and push 3.2mm pointed rod (skinny cross-head screwdriver or knitting needle etc.) through the filament hole in the body and eject the obstruction. You will also need to do this if you have a need to adjust the hose clamp.

Fitting the locator pin

Take an M3 16mm machine screw, two M3 washers and am M3 nut.



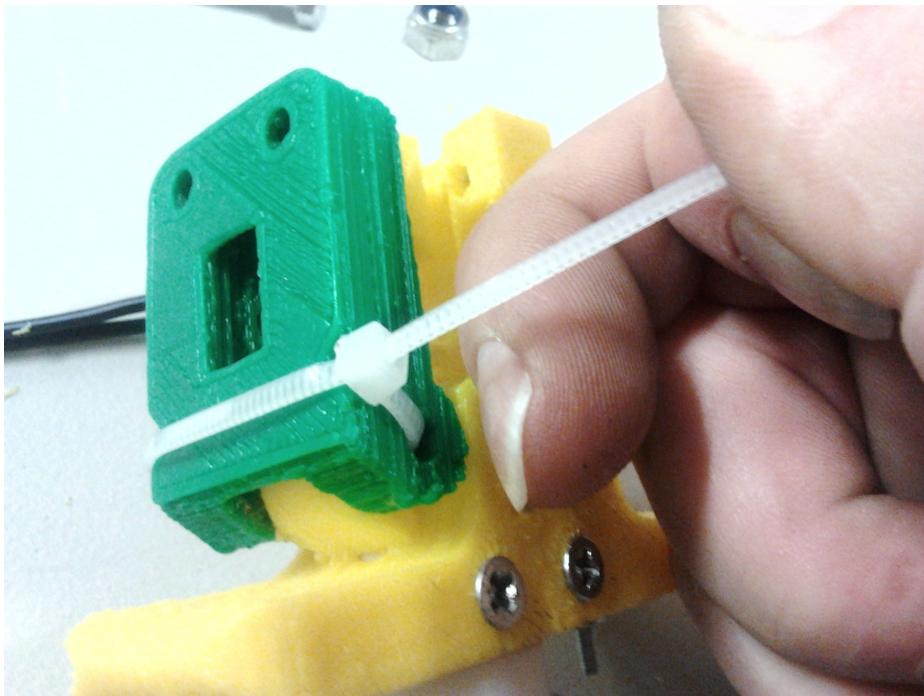
Put a washer on the screw, and put the screw in the hole in the base of the extruder body as per the

picture above. Fix on the other side with the remaining washer and nut. The protruding part of the screw will locate the extruder correctly n the X carriage.

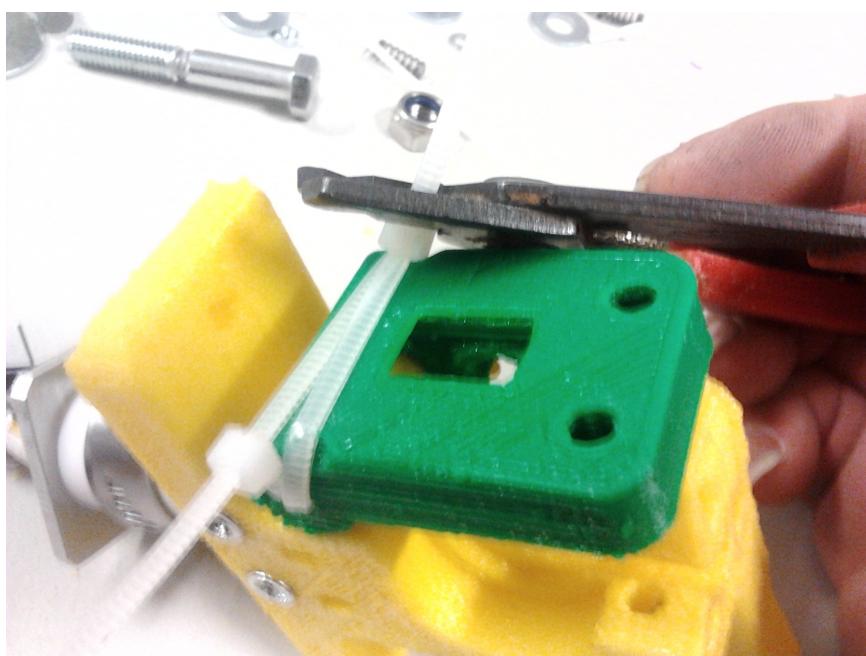
Fitting the Idler Bracket

The the extruder assembly, the extruder idler bracket and two small cable ties.

Ensuring that the idler fits on the hinge of the extruder body (there can be excessive quantities of plastic deposited on the hinge due to overhang support) and that the matching holes in both parts are clear, use two zip ties to hold the idler in place by threading them through the idler and hinge, hitching them in the notches provided in the sides of the idler.



Zip ties are used instead of bolts as they hold the bulk of the idler in compression. A bolt placed in these holes will hold the small hinge area under tension and will likely fail.

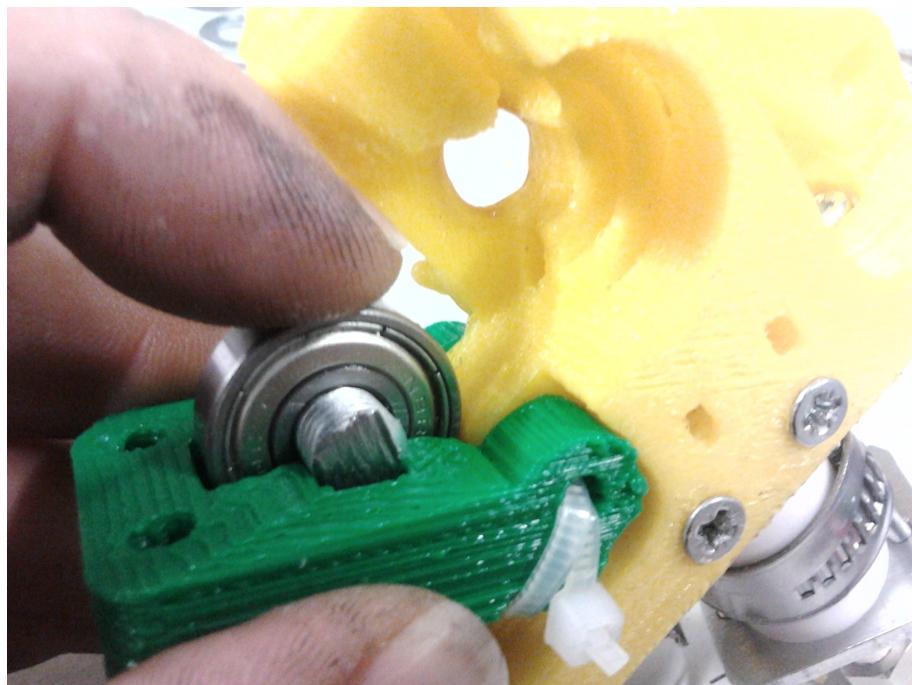


Ensure that the zip tie ratchets do not protrude to the side and snip off the excess zip tie so that it does not catch in the driven wheel that we fit later.

Fitting the idler

Take the 18mm length of M8 rod and a 608 bearing.

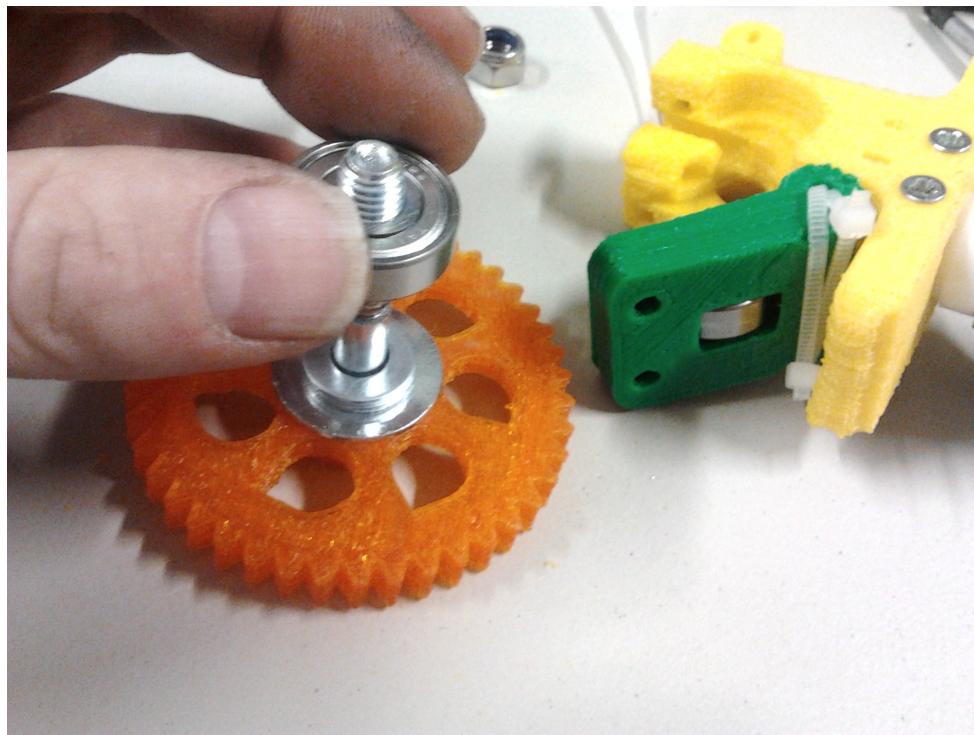
Put the 608 bearing on the rod and firmly push it into the matching recess in the idler bracket.



Fitting Driven Gear to Hobbed Bolt

Take a driven (large) gear , the 50mm M8 hobbed bolt, one 25mm M8 washer, two or three 16mm M8 washers as required and a 608 bearing.

Put the bolt through the gear and ensure it is firmly seated. Warm the gear and apply force if necessary to ensure that the majority of the bolt head is within the gear body. Then thread on the large washer and two smaller washers.



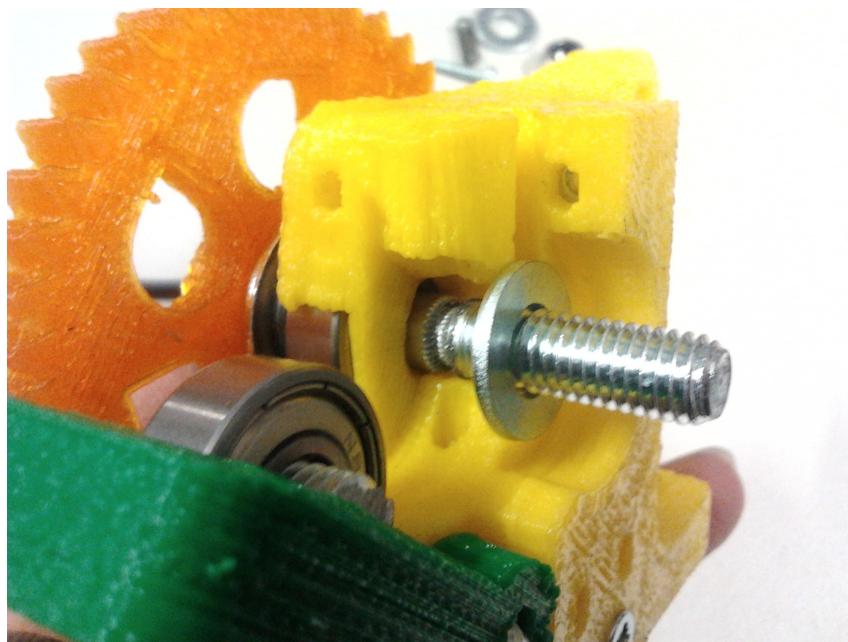
If the hobbed section of the bolt does not line up with the filament hole in the extruder body it may be necessary to return to this step and add a third small washer or possibly remove one.

Finally, add a bearing to the bolt.

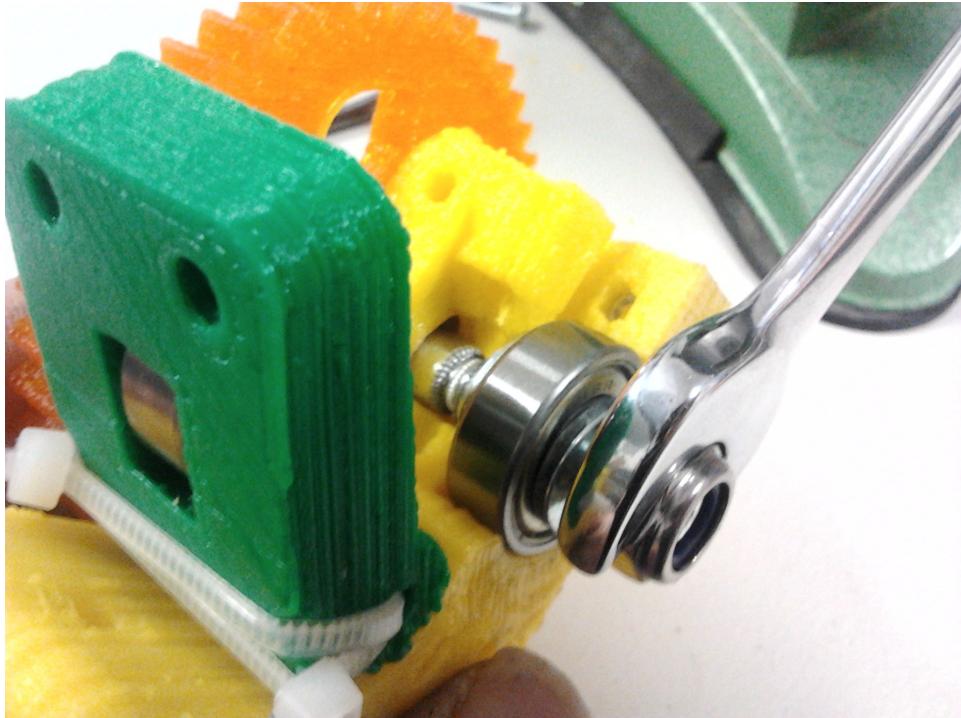
Fitting the Hobbed Bolt

Take the gear assembly, extruder assembly, a 16mm M8 washer , an M8 split washer and an M8 Nylok nut.

Insert the gear assembly from the previous step into the flat side of the extruder body. Add a washer onto the protruding bolt. Do not omit this washer as it guides the filament.



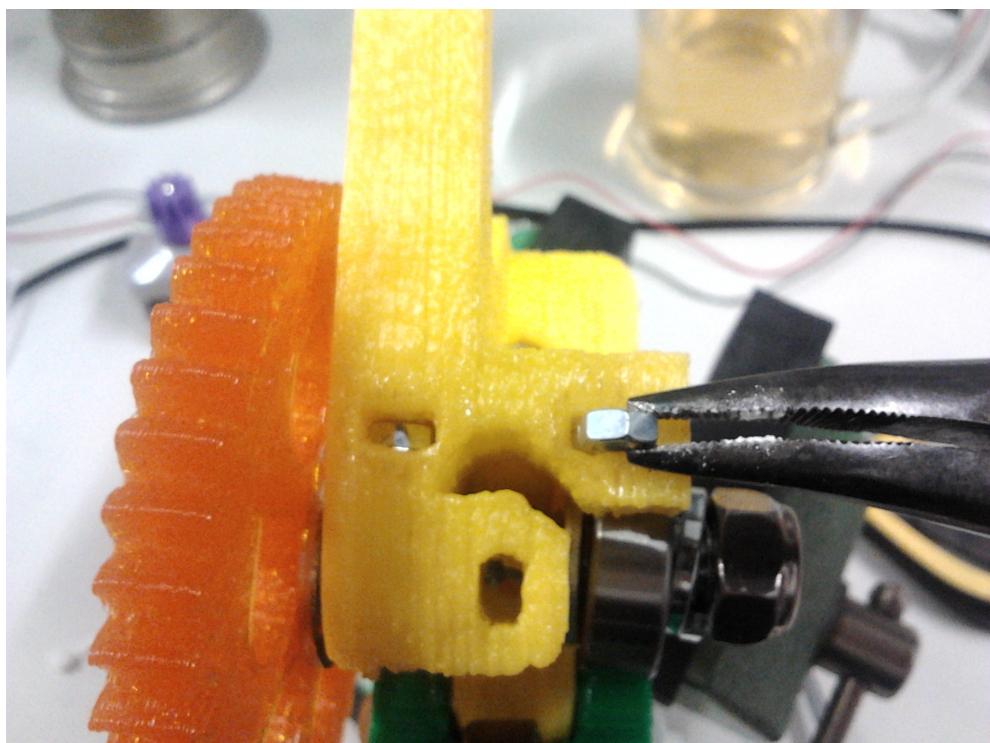
Next put a bearing, split washer and Nylok nut on the bolt, and tighten the nut with a spanner so that it will not come lose yet allows the gear and bolt to rotate freely. The fit need not be overly tight, and enough slack may be left to allow the hobbed portion of the bolt to position itself in line with the filament hole in the extruder.



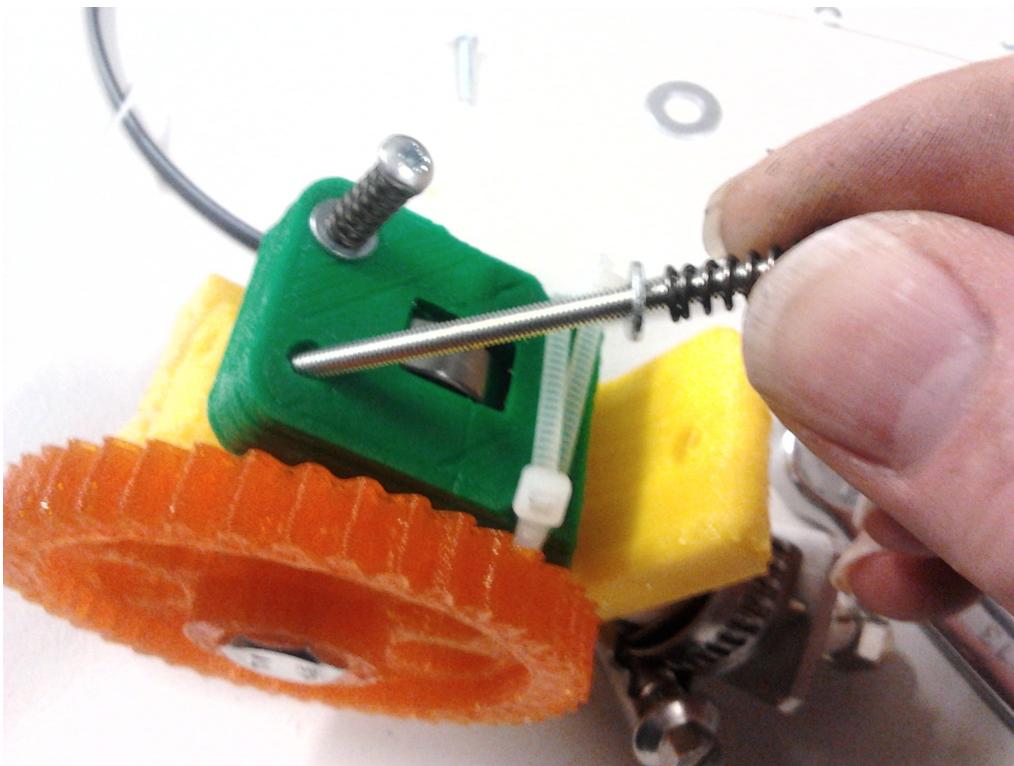
Fitting the idler tensioners

Take two each of M3 nuts, springs, M3 x 50mm screws and M3 washers.

Into each of the two cavities on top of the extruder body insert an M3 nut. Needle-nosed pliers are useful for this. Use a spike to ensure the nuts are aligned with the holes in the side of the extruder body.



To each screw add a spring and a washer. Then insert each screw through the hole in the idler and engage with the nuts you have just fitted. Do not fully compress the springs at this stage.



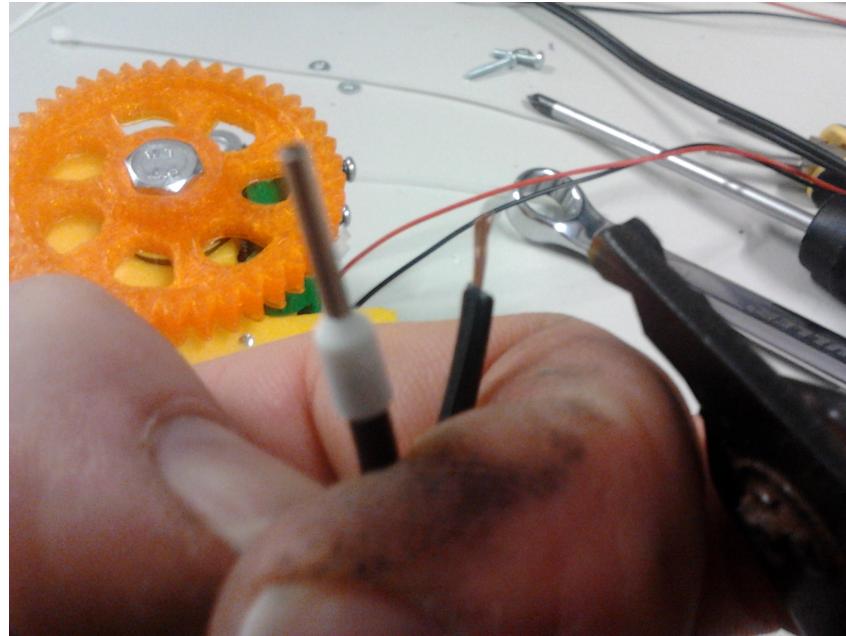
Wiring the Hot End

First take the heatshrink sleeve provided and snip off lengths long enough to cover the metal section of the ferrules

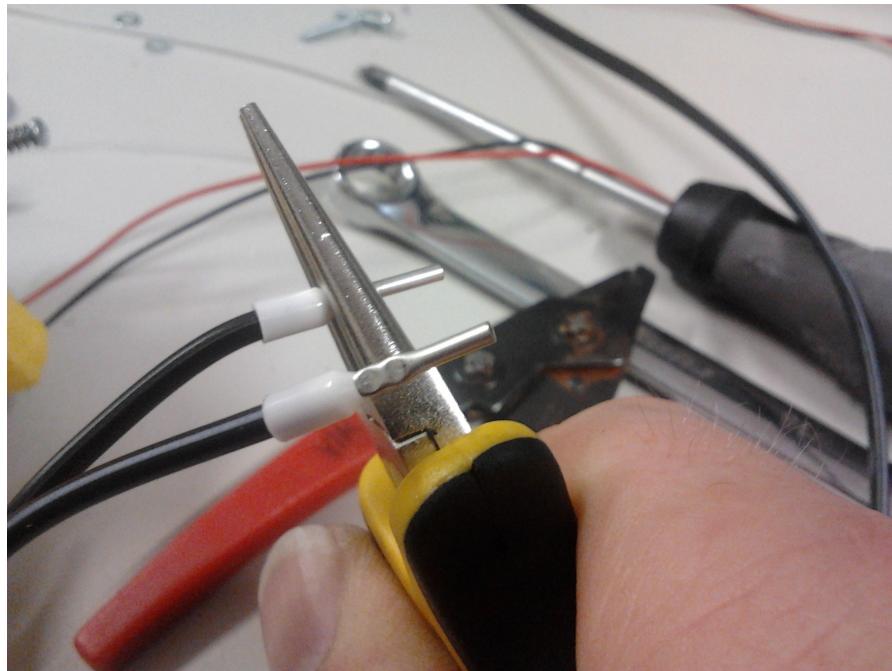


Take these segments, the four ferrules, the thick 2-core cable and one pre-assembled lead marked "THERM."

Strip the ends of the cable to approx 4mm, twist each end, and push each one snugly into the white end of the ferrule.



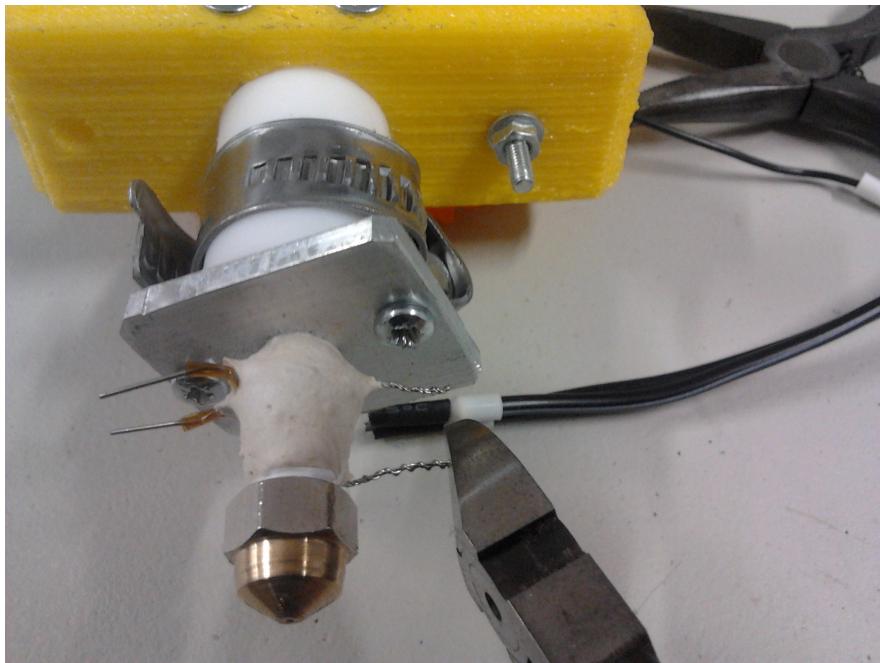
Using round-nosed pliers (or needle-nosed pliers, or even a proper crimping tool!) put two crimps in the ferrule's tube close to the entry point of the wire.



Repeat the process with the two wires on the THERM lead and heat the heatshrink segments onto the metal pars of the ferrules.



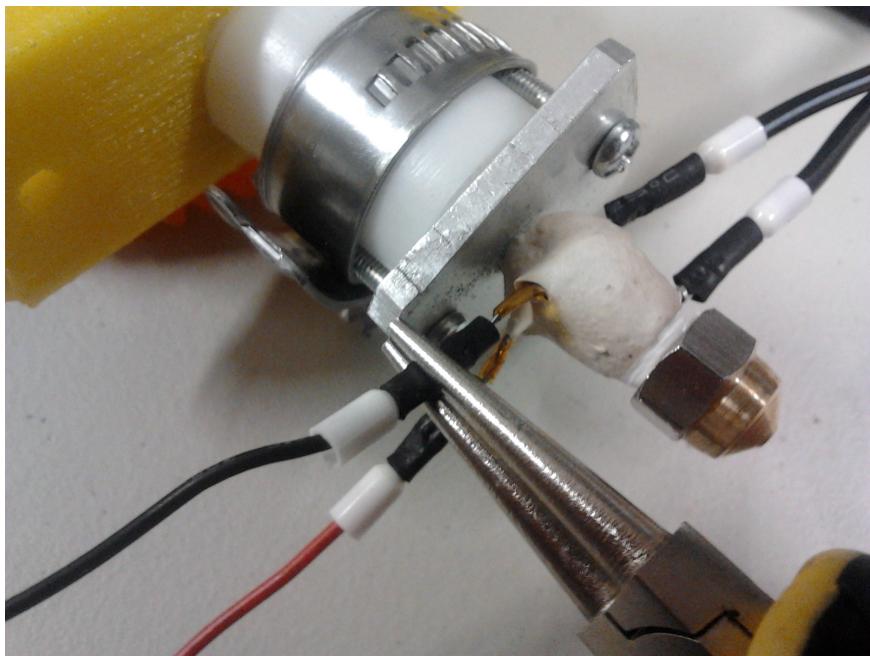
With wire-cutters, trim the two braided heater element wires so that they are slightly shorter than the heatshrink-covered end of a ferrule.



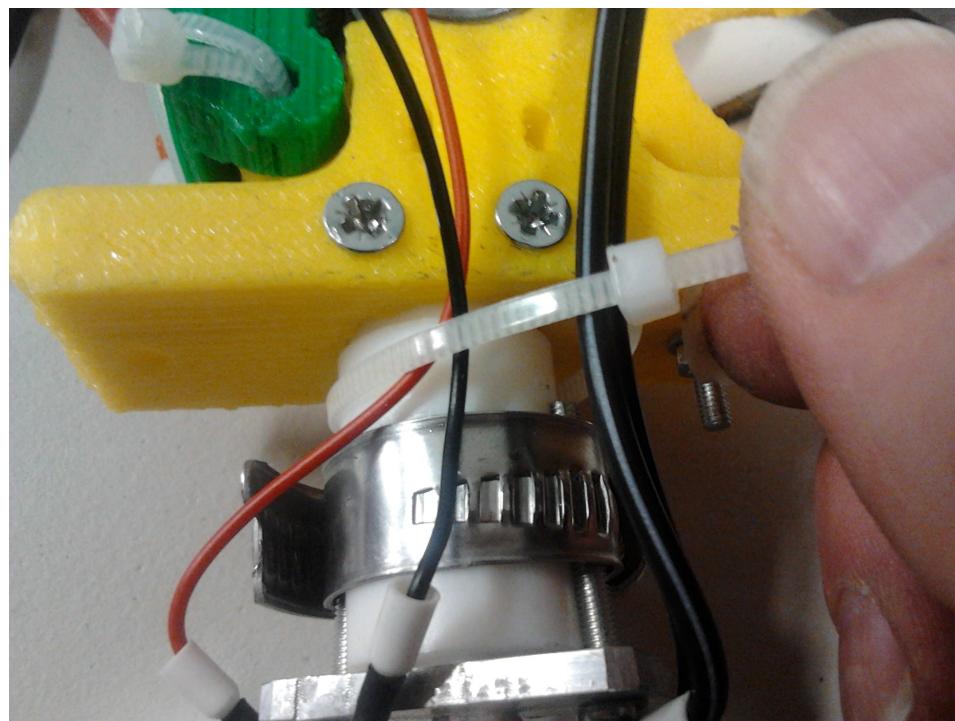
Crimp the two thick wires onto the braided heater wires. It does not matter which one gets the striped wire; the heater can safely be connected either way round.



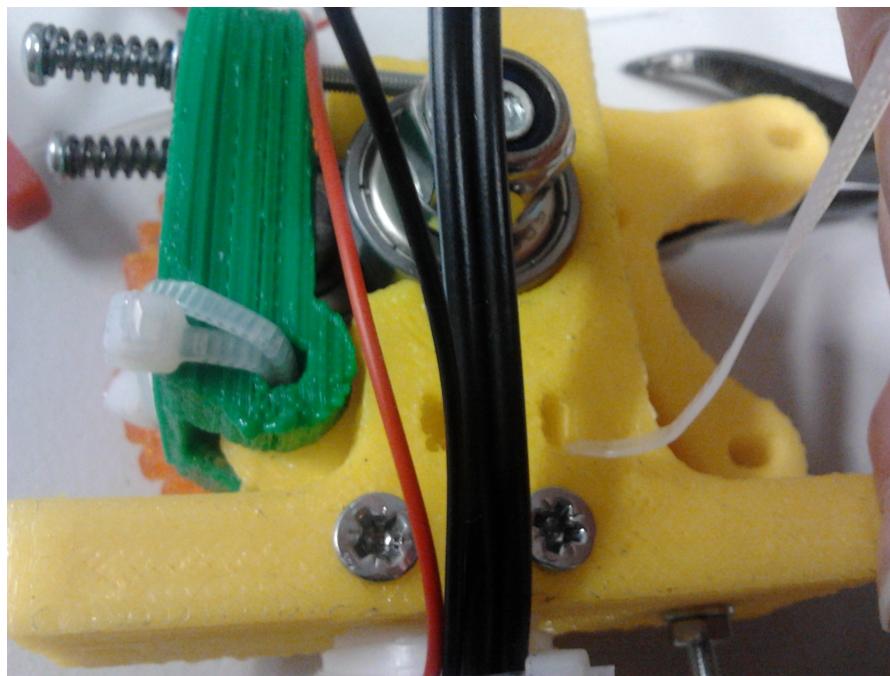
Now repeat the process, crimping the THERM wires onto the bare ends of the insulated thermistor wires.

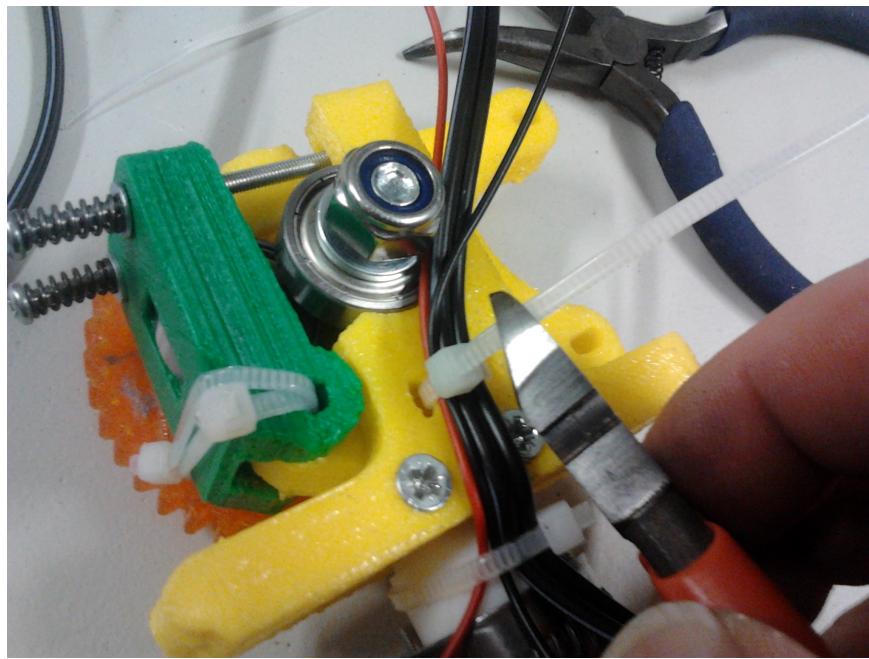


Take a small cable tie and firmly anchor the crimped wires to the white insulator on the hot end. Keep all the wires on the side with the exposed screw heads as shown below.



Take another small cable tie and curl the end between thumbnail and forefinger. Then thread it through the belay point above the screws...



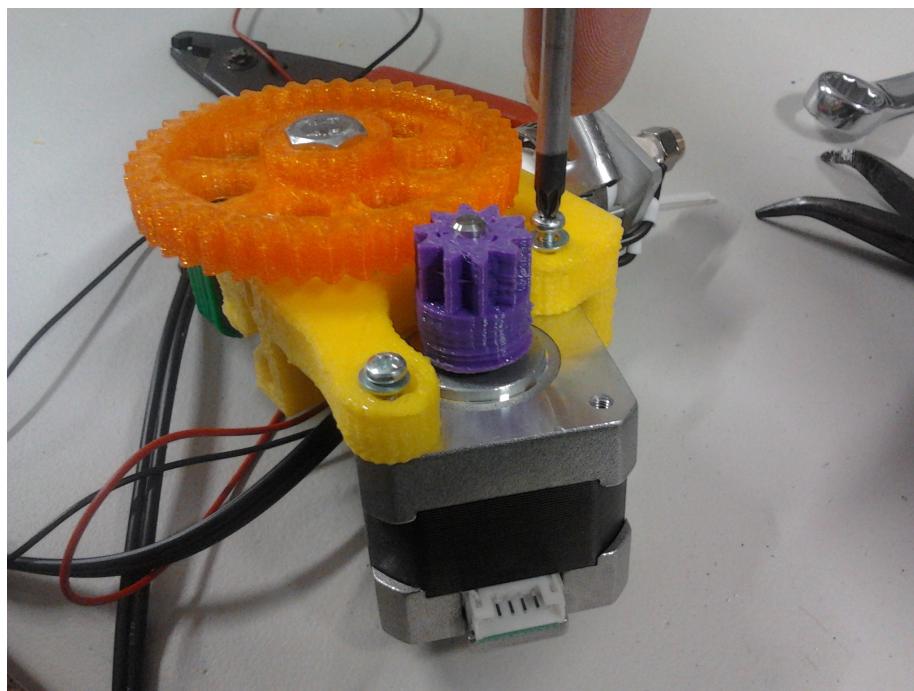


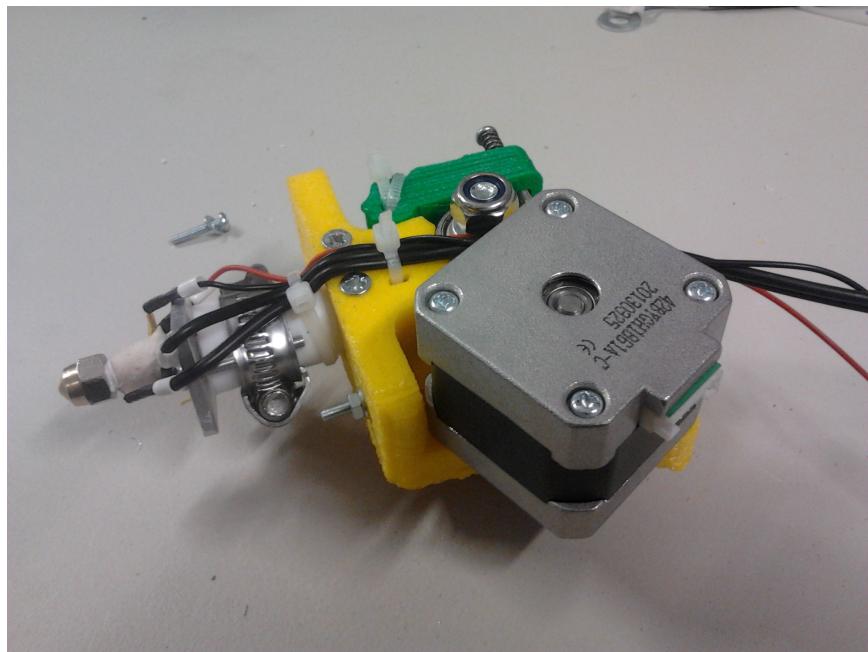
... and anchor the wire firmly in place. Trim off excess from the zip ties.

Fitting the Extruder Motor

Take the motor fitted with drive gear, two M3 16mm screws and two M3 washers.

With the motor's wiring pointed away from the driven gear, secure the motor with the two screws and washers. Some adjustment is possible to ensure the two gears mesh cleanly.





Finished. The remaining screw and washer will be used to attach the extruder to the X carriage in later manuals.

All illustrations in this manual were performed by a highly trained stunt technician. No extruders were harmed in the making of this documentation.