Prototype V3 of my direct granules extruder was largely build using the rule of thumb, which is why this can’t be an exact build instruction. For more info see:

https://homofaciens.de/technics-machines-3D-printer-Granule-Extruder-V3_en.htm

or:

https://hackaday.io/project/181165-my-machinery-2021

Extruder Details

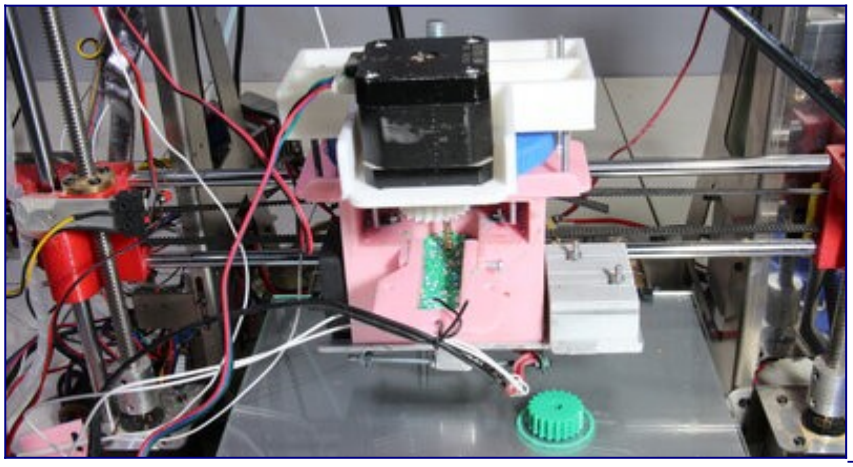


Figure 1:
Version 3 of my granulate extruder works (finally) reliably. Earlier versions had problems with clogging of the nozzle, which occurred particularly often after switching the printer on again and heating up.
The printer mechanism is a Zonestar QR2, from which I also took the heating element and the stepper motor for driving the auger (5mm wood screw).

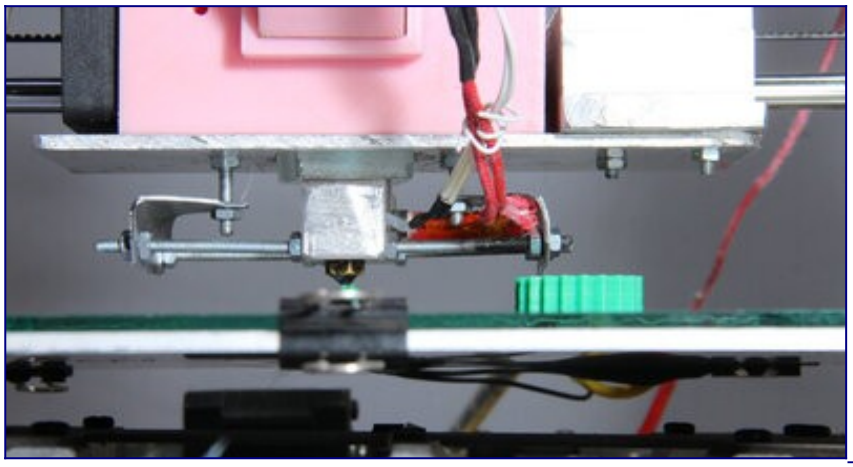
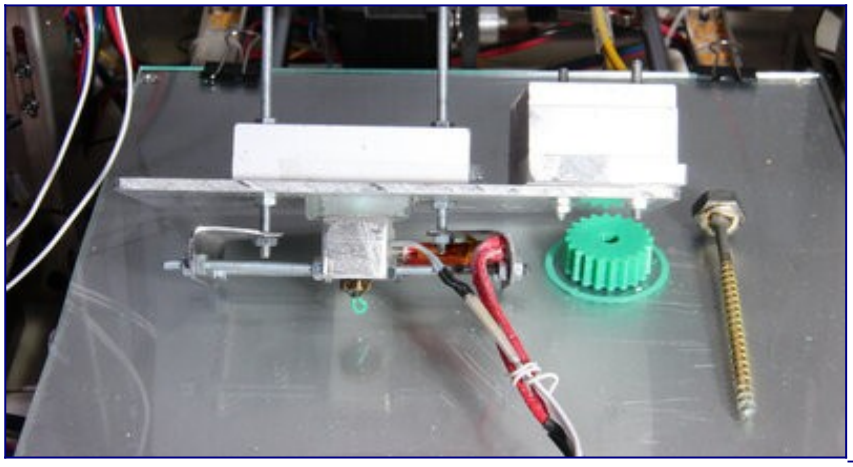


Figure 2:

 Figure 3:
The series of pictures gives a good overview of the construction. Everything is handmade.

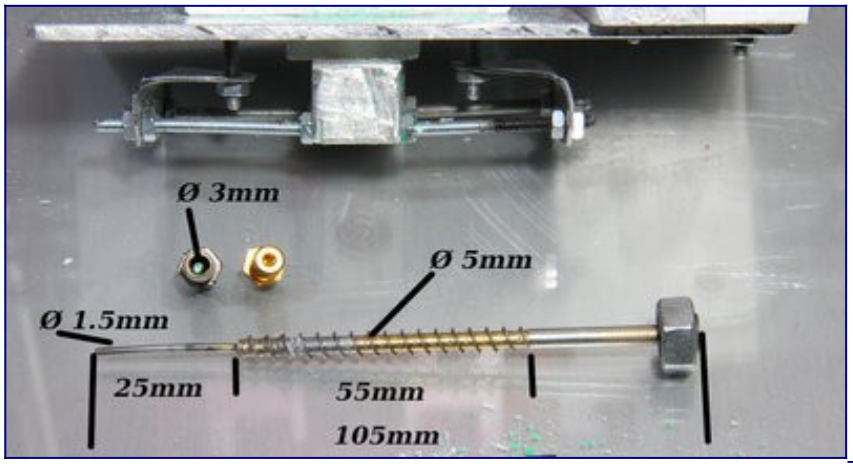


Figure 4:
The central element is the auger screw:
This consists of a simple wood screw with a diameter of 5mm and a total length of 105mm. At the top I hard soldered a 25mm long piece of 1.5mm wire. I widened the neck of the brass nozzle with a 3mm drill so that the plastic can pass this point with less resistance - the tip of the screw would otherwise lead to clogging issues. An M8 nut is soldered to the screw head.

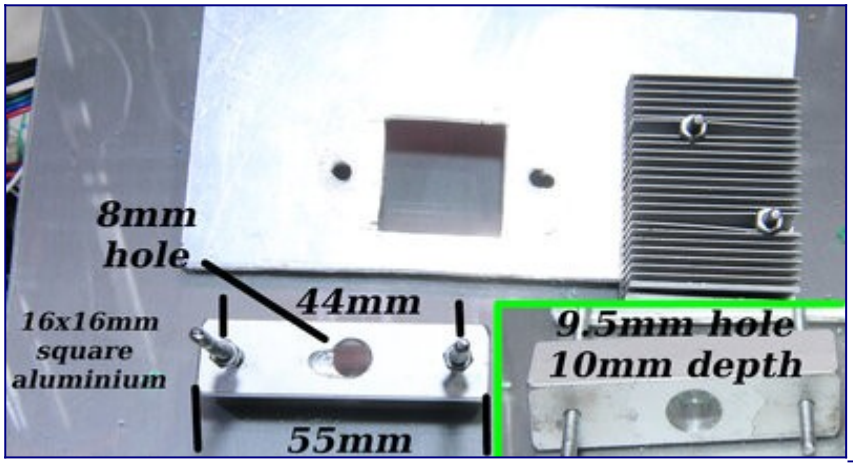


Figure 5:
The "cold side" of the extruder:
The central drilling is done first with an 8mm drill. Then the hole on the underside is widened to 9.5mm with a depth of 10mm. A small groove, about 3mm deep, is milled on the top, which improves the forwarding of the granulate.

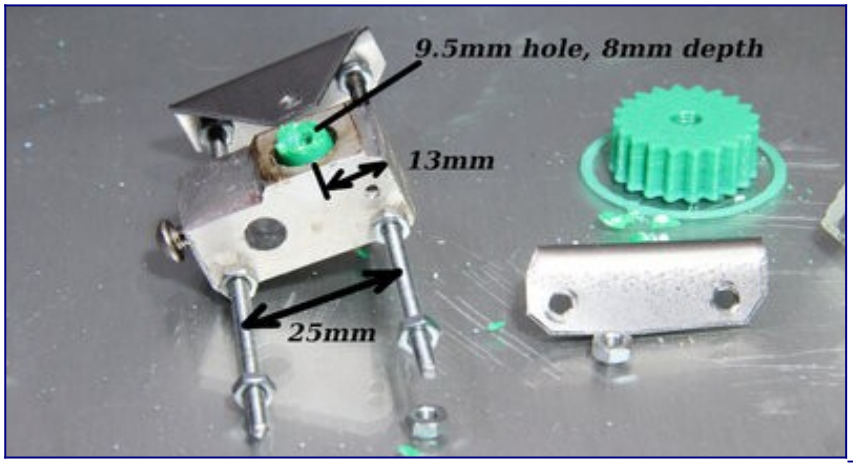


Figure 6:

The "hot side" of the extruder is also made of 16x16mm aluminum:
First, a 5mm hole is drilled about 13mm from the edge. Then this hole is widened at the top to 9.5mm, about 8mm deep. The thread for the brass nozzle is made with a 6mm thread cutter.
Holes for the heating cartridge (diameter 6mm) and the temperature sensor (diameter 2mm) are drilled so that there is sufficient distance to the central hole.
About 3mm of material is filed on the upper side, so that only a small contact area with the coldend is formed.
Finally, two 3mm holes with a distance of 25mm are drilled on the lower edge. Two 90mm long threaded rods are screwed in there. Hotend and Coltend are screwed together using the two metal angles, made from 0.5mm sheet metal. The threaded rods allow you to adjust the components so that the central holes of the Coltend and Hotend are in line.

I filed about 3mm from the upper edge so that there is only a small contact area with the glass block. This reduces the heat flow to the coldend.

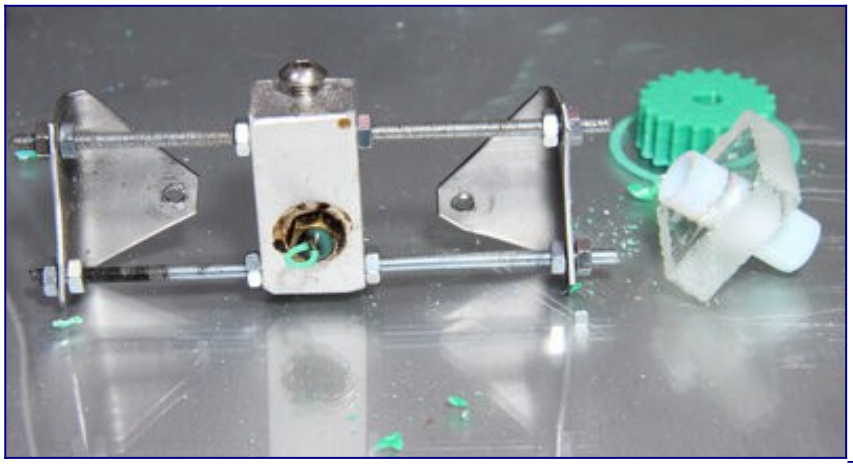
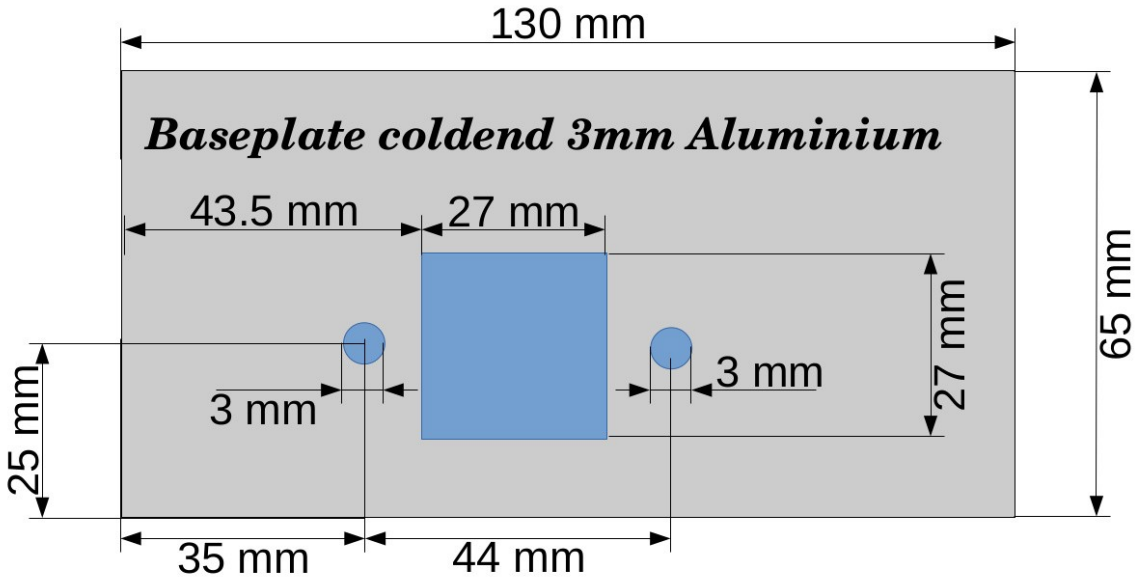


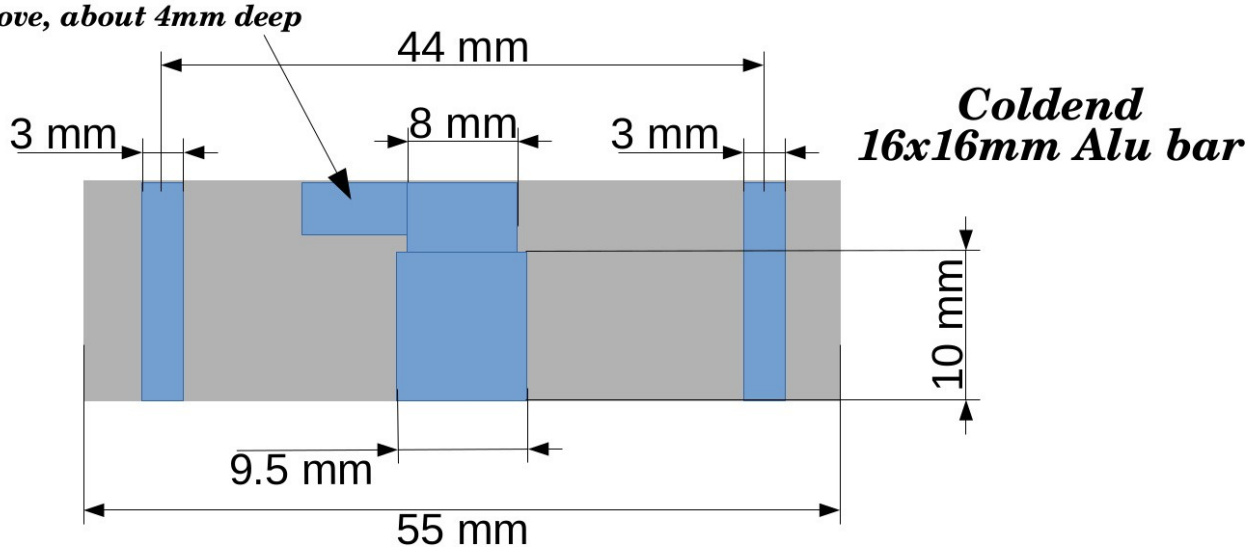
Figure 7:

Thermal insulation:
In order to keep the heat flow from the hotend to the coldend small, there is a piece of 8mm glass as an insulator between the two components. I cut the 25x25mm block with the help of an electric tile cutter with water cooling for the diamond disc. I made the 9.5mm hole with a Dremel and a diamond-coated drill, also with water cooling.
A Teflon tube (about 10mm outer and 8mm innber diameter, 26mm long) runs from the coldend to the hotend and ensures the least possible friction on the walls.

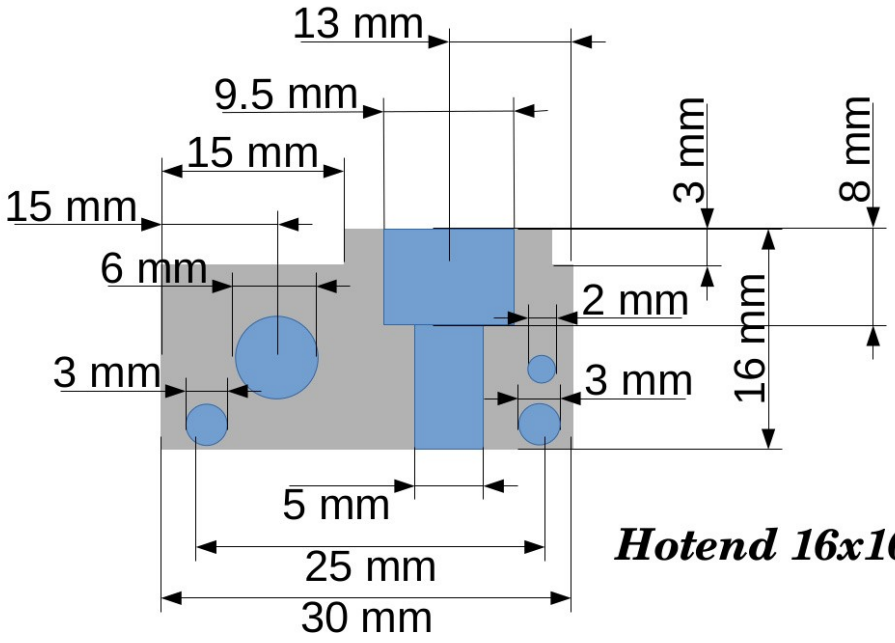
Direct Granules Extruder V3



Grove, about 4mm deep



Coldend 16x16mm Alu bar



Hotend 16x16mm Alu bar