Manual Push model Assembly Instructions

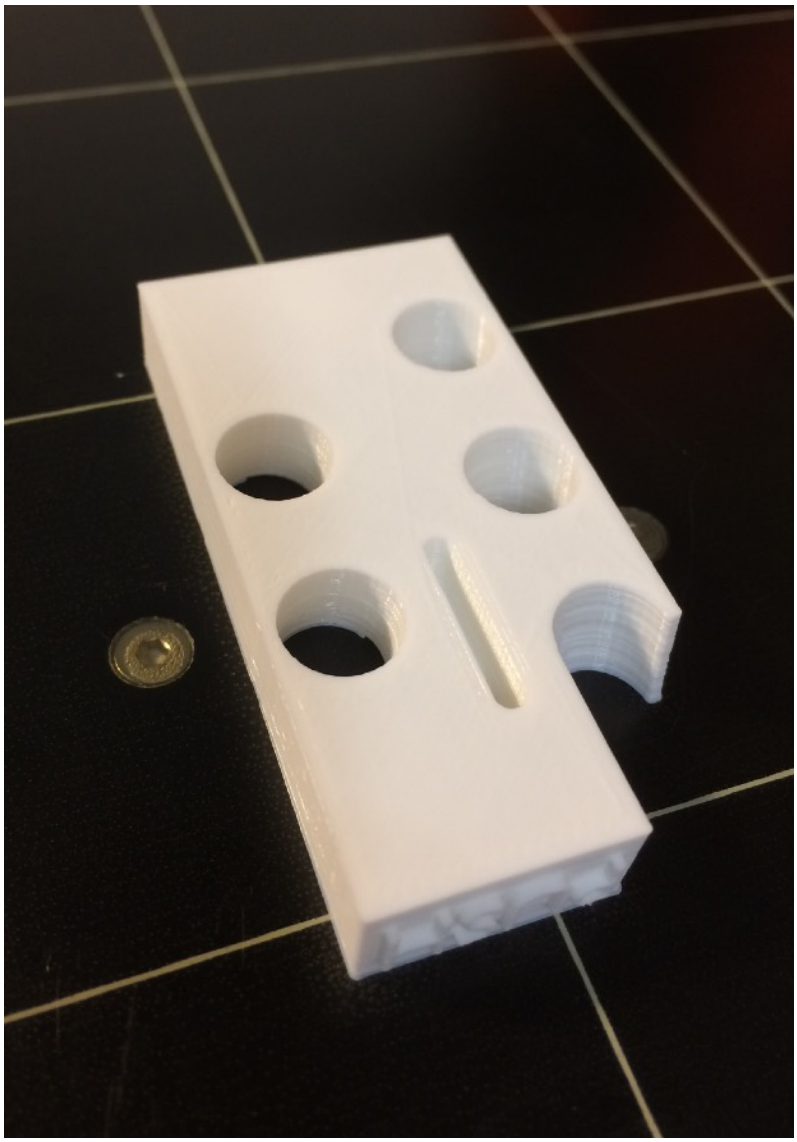
Follow these instructions to print and assemble the hand operated Push (Piston) model. Depending on your 3D printer you may need tweezers and sandpaper to clean the track. You may also want some rubber feet for the bottom, and optionally a 1.6mm diameter screw to limit the pistons motion, and enhance its reliability.

Print the lifting piston by itself in the horizontal orientation. Because of the direction the balls pass through this piston it is necessary to print it with a reduced layer height. This ensures the paths through piston are as smooth as possible.

For PLA and a 0.4mm nozzle use these settings:

Layer height: 0.1mm
Print speed: 40mm/sec
Wall thickness: 1.2mm
Top/bottom thickness: 0.8mm
Infill: 15%
Temperature: 210F
Bed temperature: 60F

Be sure to DISABLE supports.



Print the Push maze without a brim. Be sure the cooling fan is operating at its fastest speed after the first layer, to ensure the bridging won't have too much sag.

For PLA and a 0.4mm nozzle use these settings:

Layer height: 0.2mm
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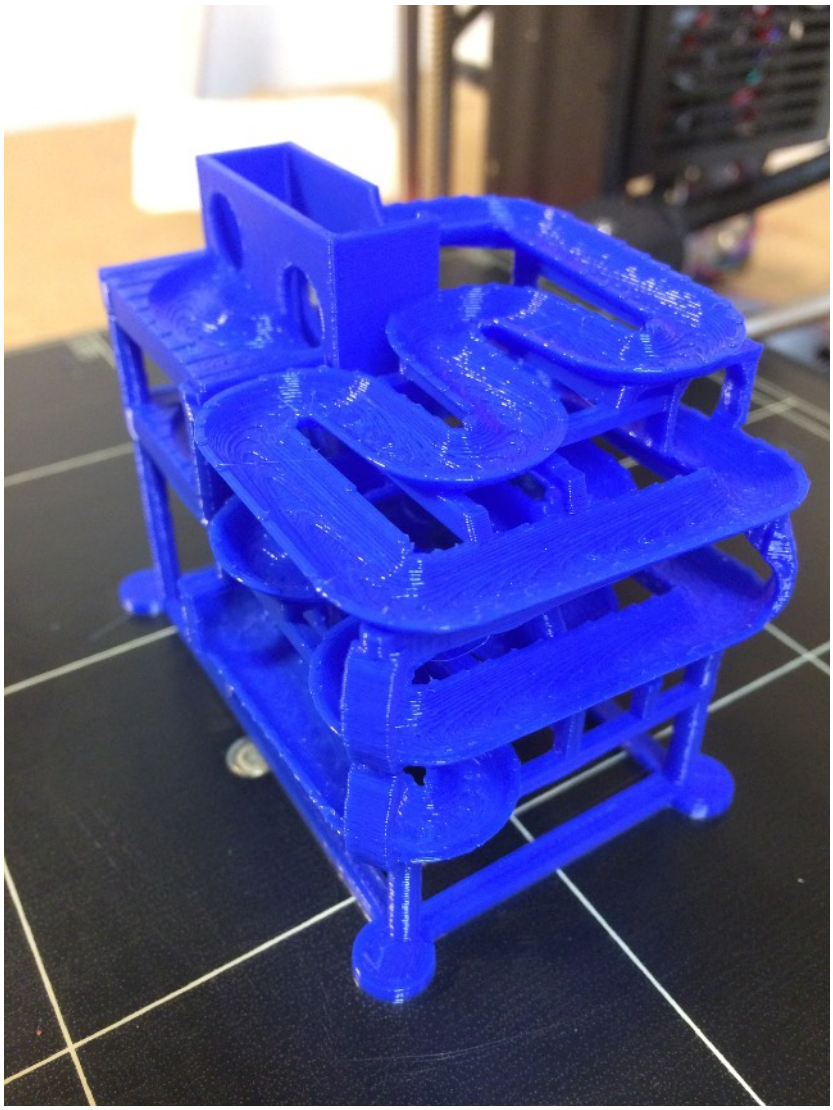
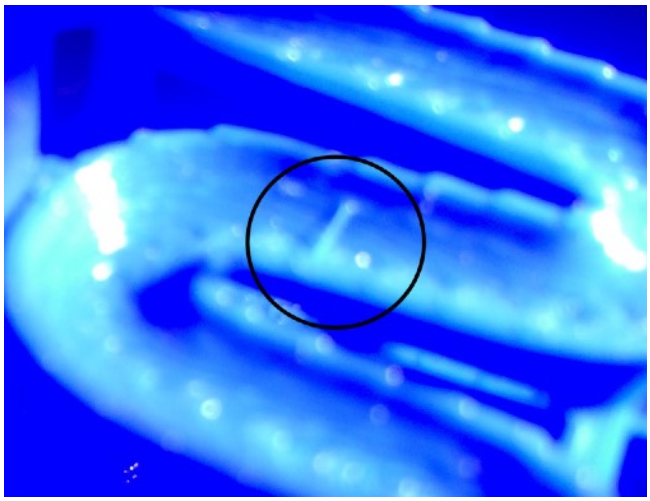
Top/bottom thickness: 0.8mm
Infill: 15%
Temperature: 210F
Bed temperature: 60F

Be sure to DISABLE supports

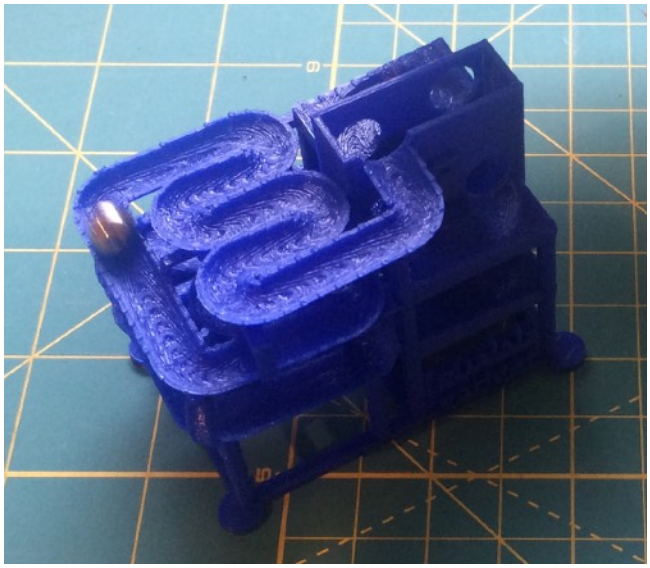


In this picture you can see a small piece of plastic that bridges across the ball track in the Maze. These sometimes occur during the printing process. Follow the track looking for these and remove them with tweezers. Any other bits of plastic that obstruct the balls should also be removed.



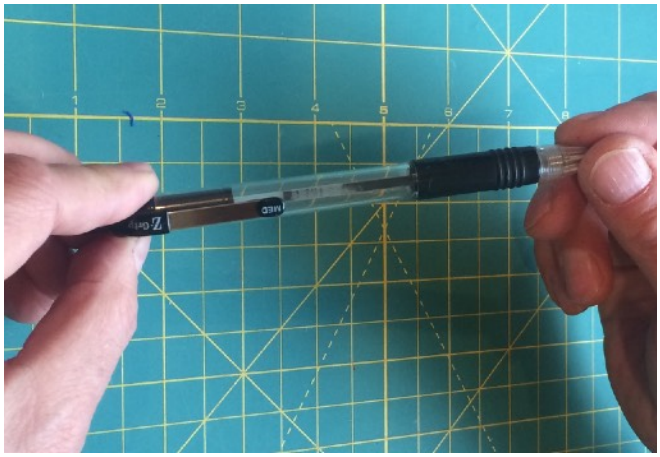
You can test how clear the tracks are by placing balls on the top and watching them roll to the bottom. The balls will get stuck where pieces of filament need to be removed. Once the balls travel down the track a couple times without getting stuck you've got it clean enough to continue with the build.

The plastic parts are durable, but you want to treat them gently, especially the maze. Don't squeeze hard when holding it to attach components, and don't drop it.

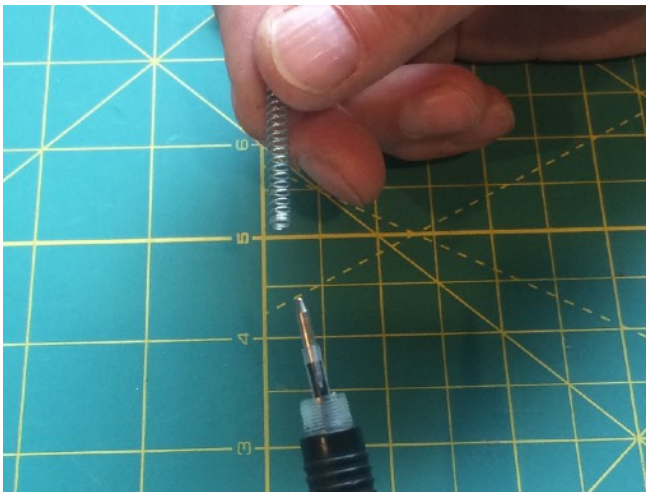


Check that the passages into the piston chamber are clear of plastic. You may want to use some sandpaper to smooth them. Be sure there are no sharp edges where the balls will pass into and out of the piston.

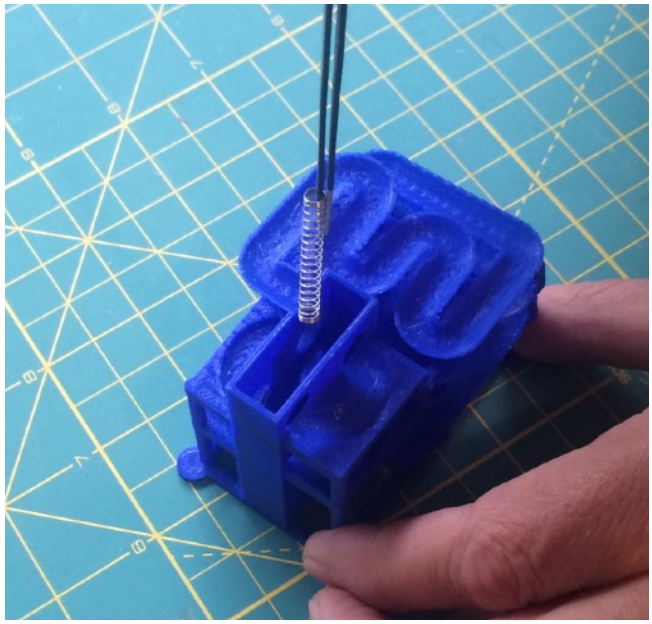
If you don't have our parts kit you can get a spring from a ballpoint click pen. Open up the pen and remove the spring.



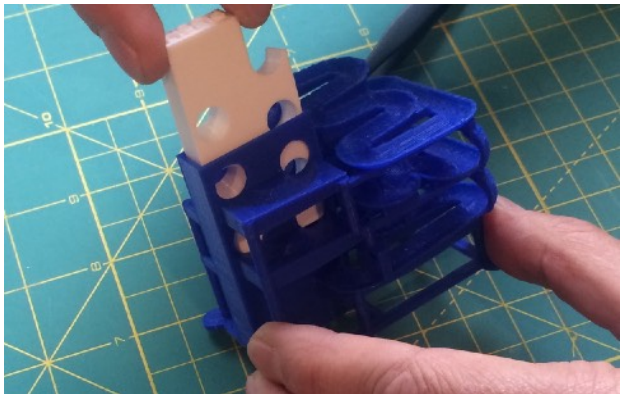
The spring should be about 20 to 25mm long when uncompressed and less than 10mm long when compressed.



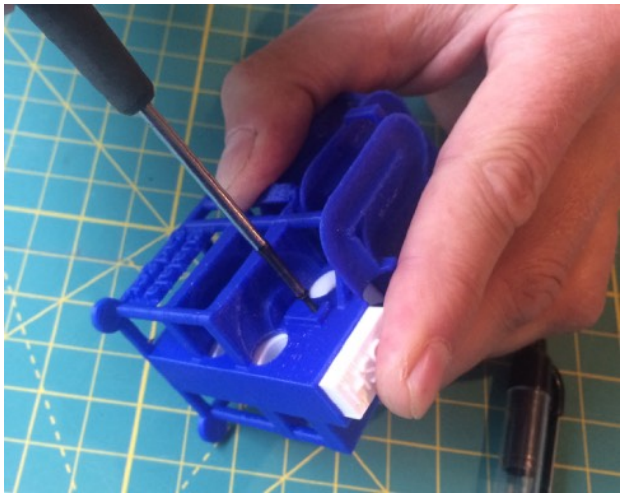
With the maze in the right-side-up orientation use tweezers to insert the spring into the piston chamber. There is a small plastic pin at the bottom of the chamber that the spring sits upon.



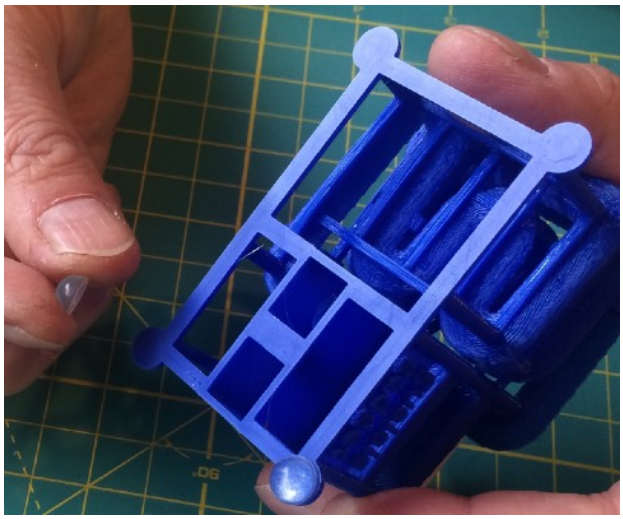
Insert the piston into the chamber. Be sure the spring enters the small hole on the bottom of the piston, and remains atop the plastic pin inside the maze.



As an optional step, you can attach a 1.6mm screw to the small hole in the maze between the top two lifting holes. This screw limits the movement of the piston, and makes device operate more reliably.



Attach the feet.



Add the 8mm bearings and test.

Your done!