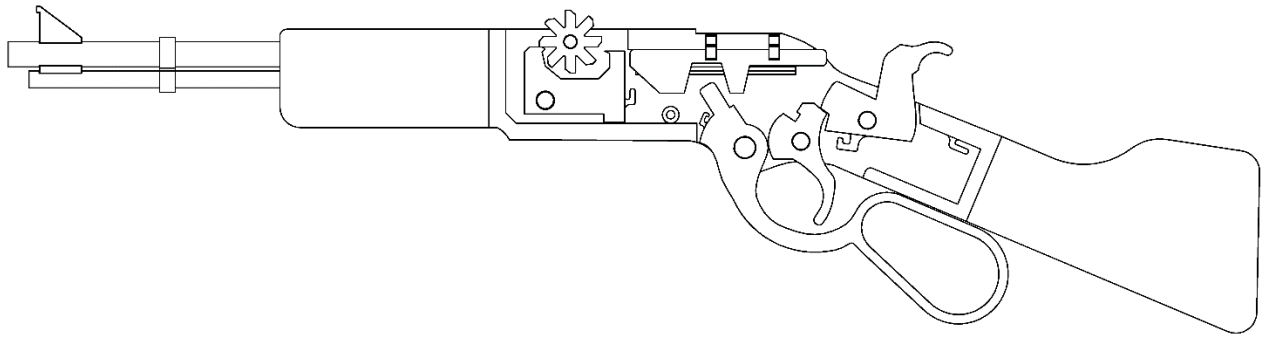


SO YOU WANT TO PRINT THE THING I MADE



A guide by
AVeryHappyTeddyBear

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Introduction

This is my second 3D print conversion of one of RBguns designs' and this time I did my best to simplify the assembly. Instead of using push fit pins I opted for print in place pins, this eliminates the hassle of fitting the pins at a significant cost of strength. That said, I believe I've made the design more than durable enough by designing hefty pins with large fillets at the base and by printing the pins at a higher infill to achieve the necessary strength. I've had the latest version of the frame printed for about two weeks and have been pretty rough with it and haven't managed to break any pins. Hope you like it!

List of Parts

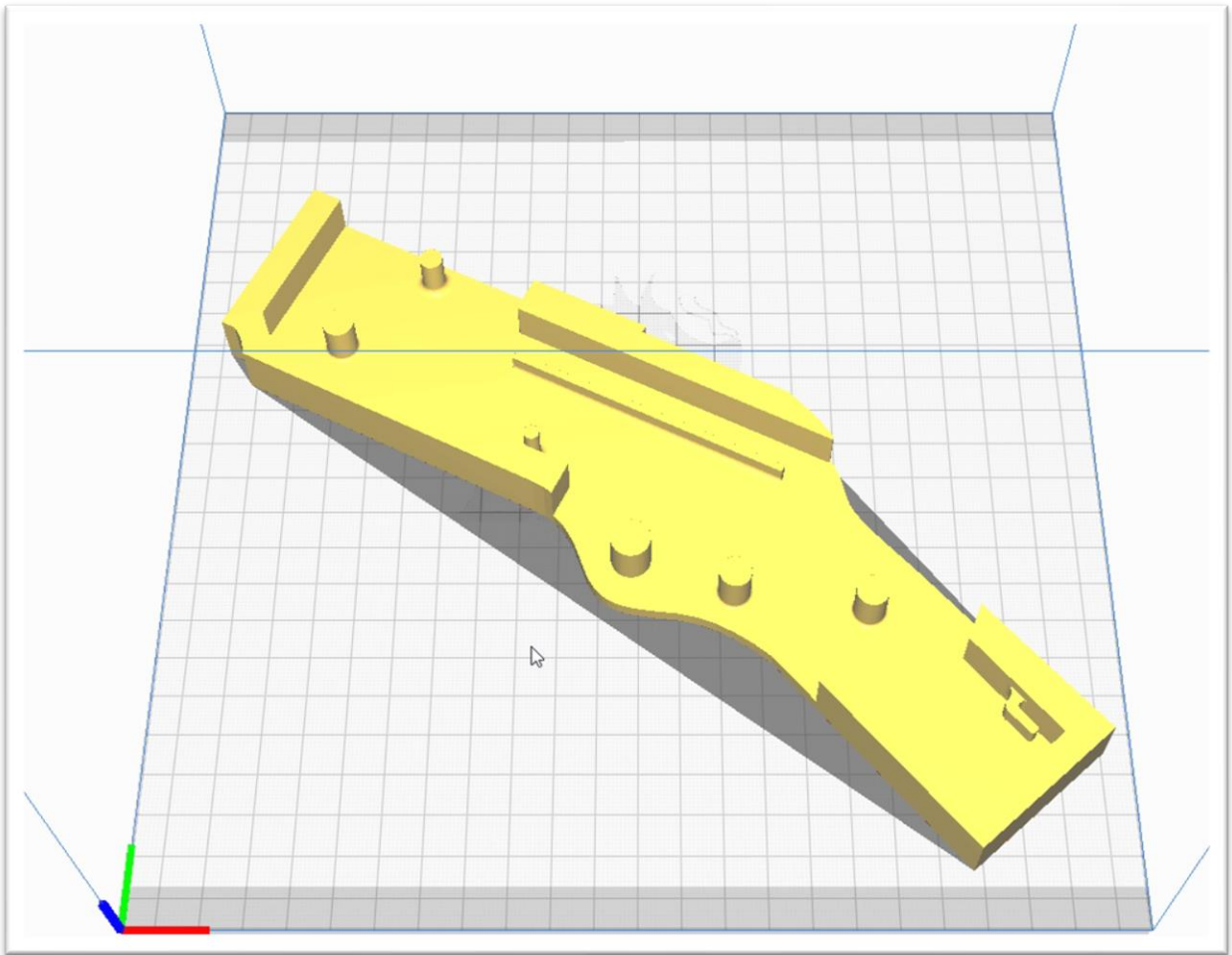
Part Name	Print Settings
	Orientation Support Quantity Infill Other
Barrel A	Print Standing Up, * Support
Barrel B	Print Standing Up, * Support
Lever	Needs Support
Body Cover	
Bolt	
Bolt Clip	x2, Only print if you want the internals exposed (aka no Cover)
Escapement	Needs Support
Front Body	
Hammer	Needs Support
Hanger	
Main Body	Needs Support, * Pin Infill
Rotor	
Sight	
Stock	
Trigger	
* Need for support depends on your printer's ability to bridge small gaps	
* Main Body Infill covered in next section	

Some Particular Infill

As I mentioned in the introduction, the pins on the main body need to be printed with higher infill (**60-70%**) or else they will break during use. So, in this section I will cover how to do this without wasting material and increasing the infill of the entire print. I am going to cover how to do this in Cura, *the slicer I personally use*, if you **don't** use Cura or **already know how** to increase the infill of an area, then you can skip the remainder of this section. Just make sure you increase the infill from one layer below the base of the pin to at least $\frac{3}{4}$ of the way up the pin.

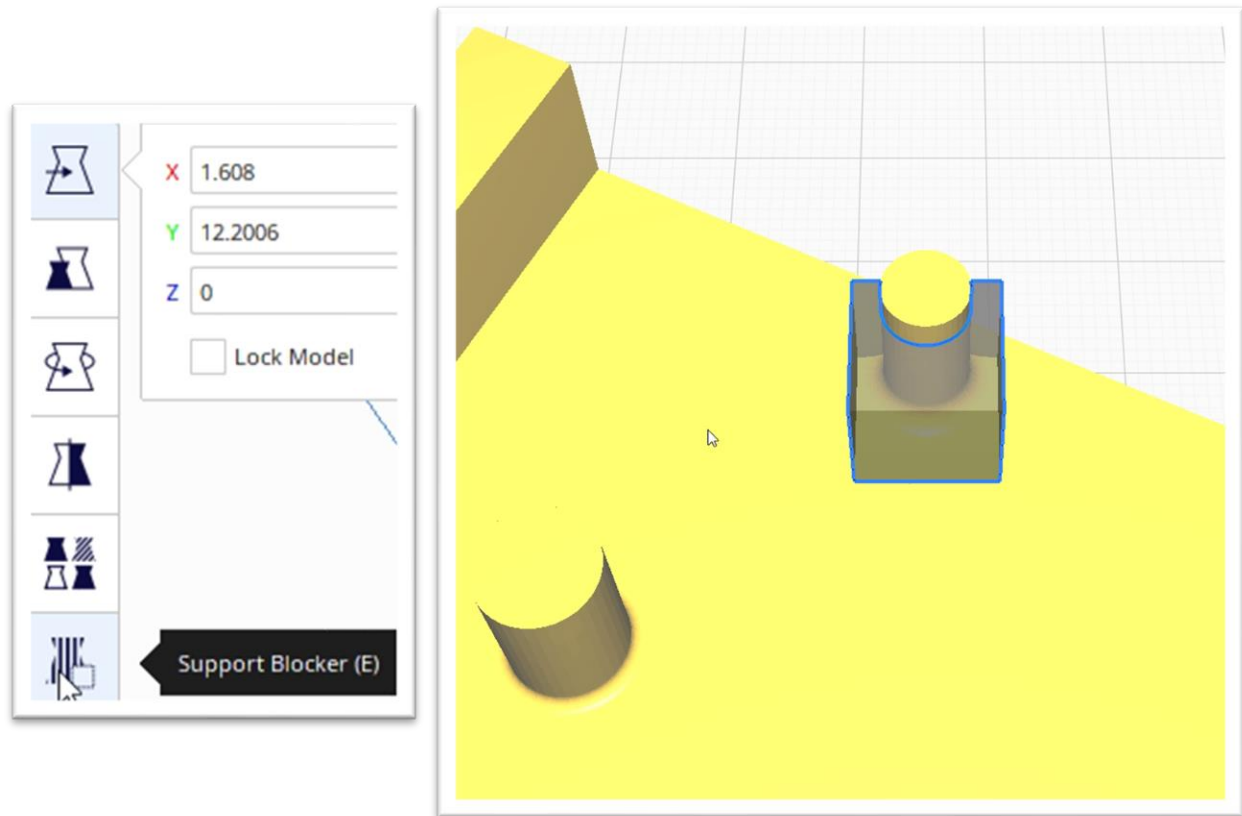
Step One:

Firstly, you need to get the main body to fit on your print bed, to make it fit on my Ender 3 (220x220mm) I had to turn off the skirt and do some rotating:



Step Two:

Now select the model and click the **Support Blocker** tool on the sidebar. Next, click again on the model and a cube should appear



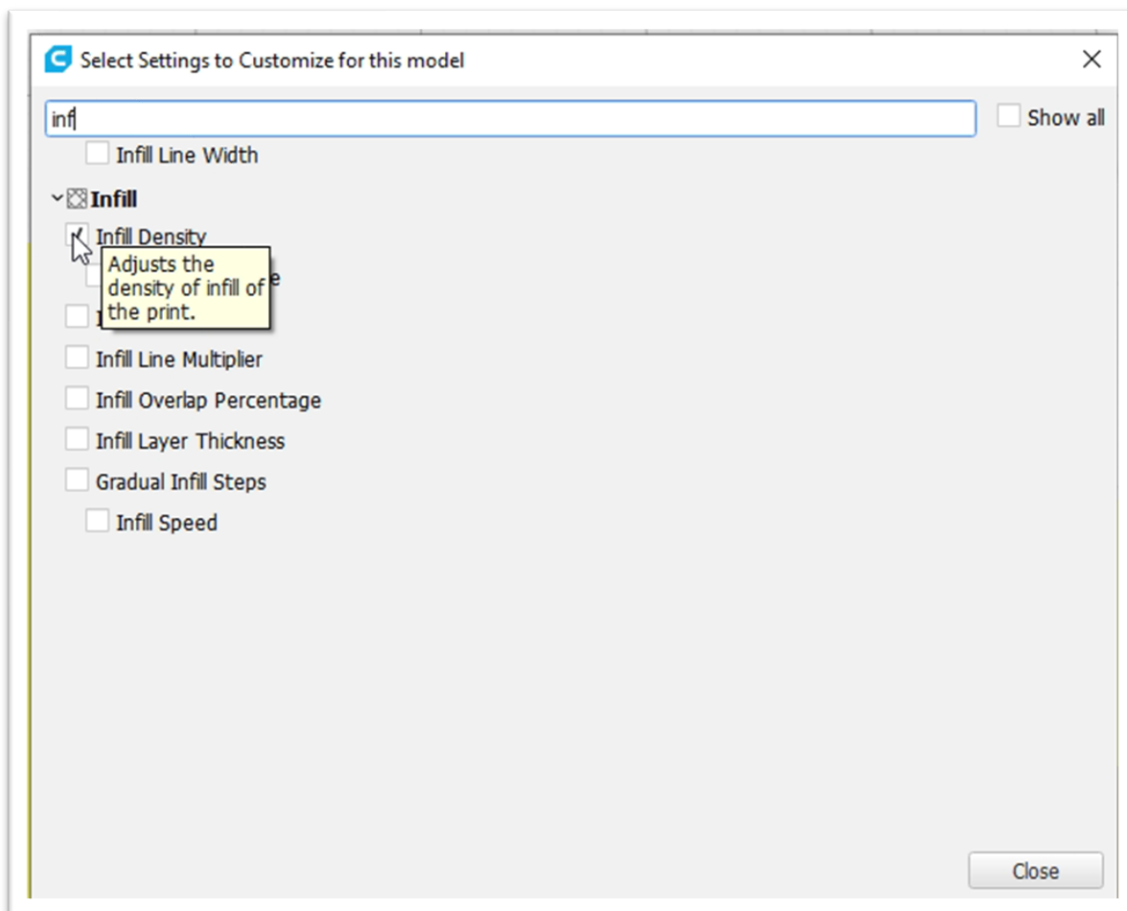
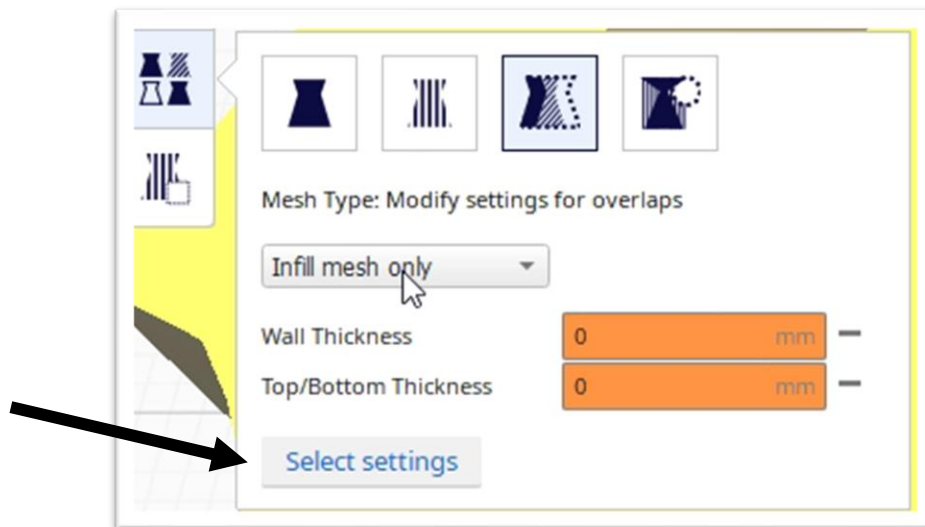
Step Three:

Select the cube you just placed and click the **Per Model Settings** button on the sidebar. Now from the menu that appears click on **Modify settings for overlaps**



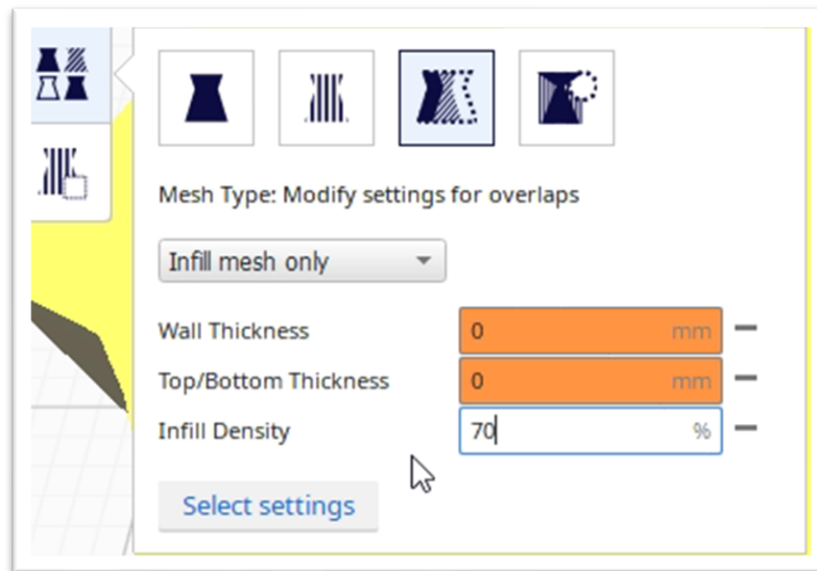
Step Four:

Next, click the **Select settings** button which will open a window full of checkboxes. In this window you can either scroll until you see the **Infill Density** option, or search for it in the search bar at the top of the window. Once you find the option and check the box you can click **Close**



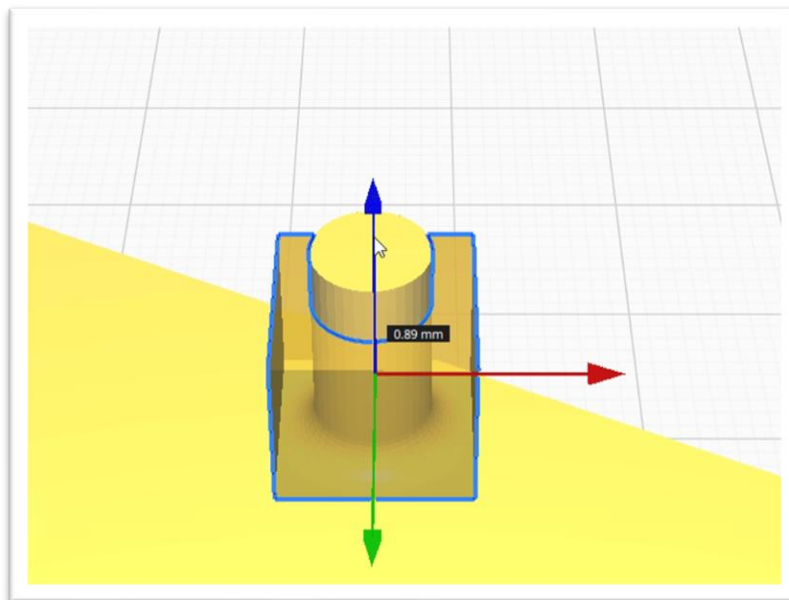
Step Five:

Now the Infill Density option should appear in your initial sidebar window. Change whatever the initial value was to **70%**



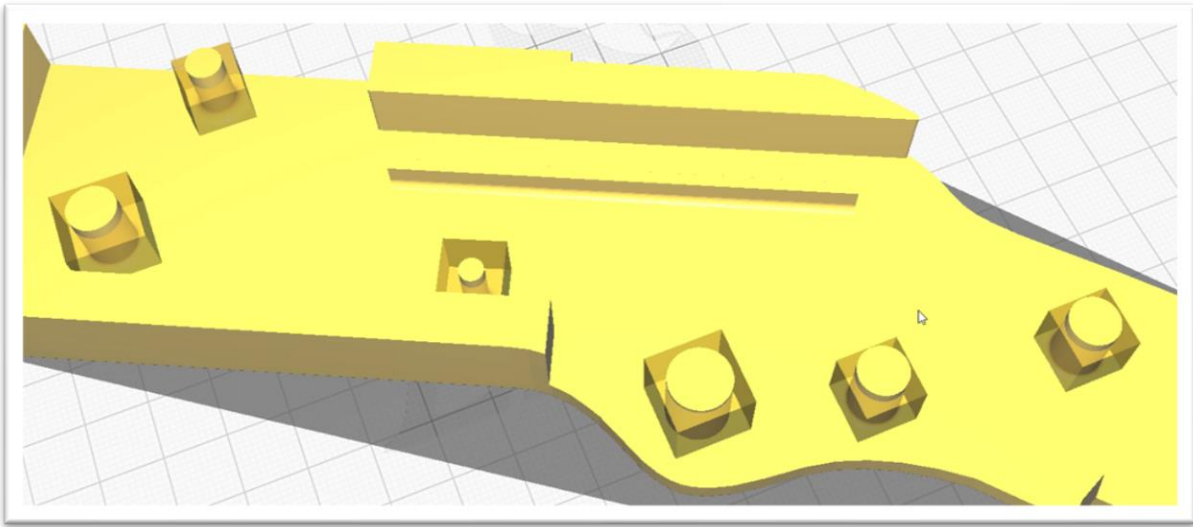
Step Six:

Position the cube so that it covers the entire of the base of the pin and reaches about $\frac{3}{4}$ of the way up the pin. For some of the larger pins this will require resizing the cube slightly



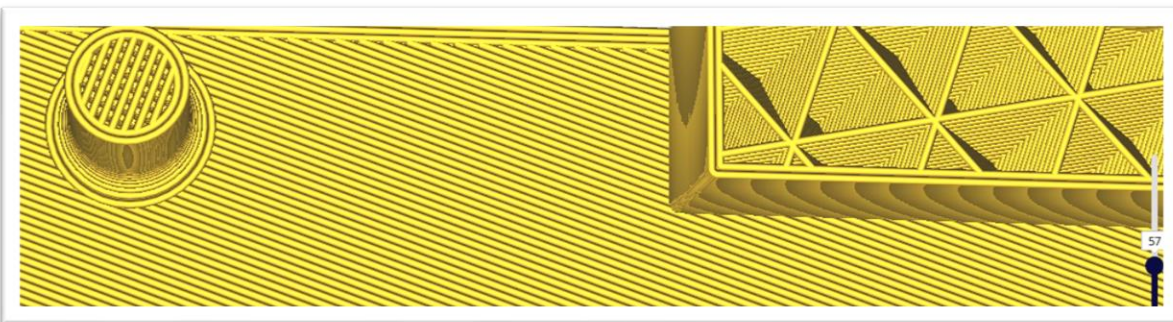
Step Seven:

Currently there is a bug in Cura that prevents you from copying these cubes we've created, so sadly Steps 1-6 will need to be repeated for each pin. When you're done it should look something like this:



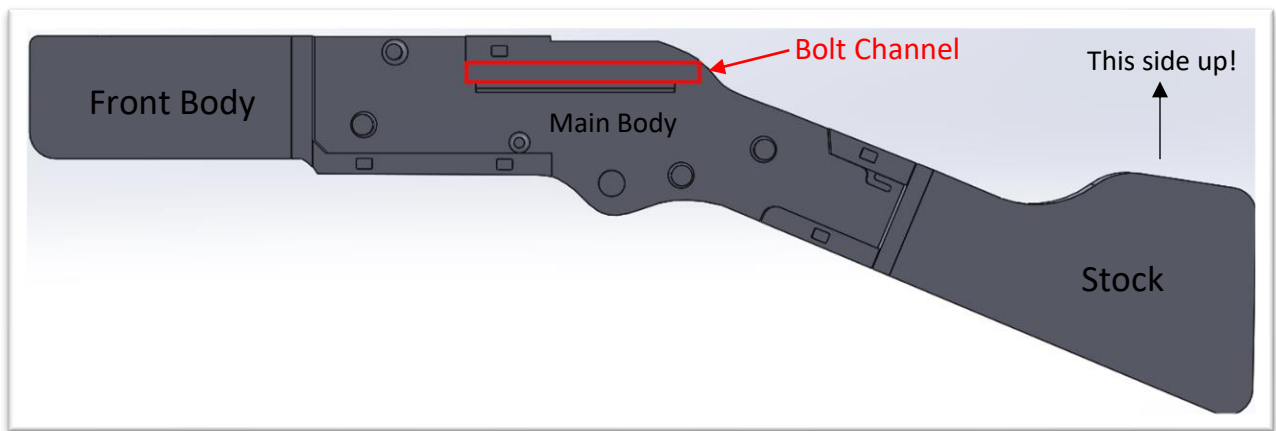
Step Eight:

Make sure to check your work by slicing and previewing the gcode to make sure you got the intended result. If it all looks good, then you're off to printing!



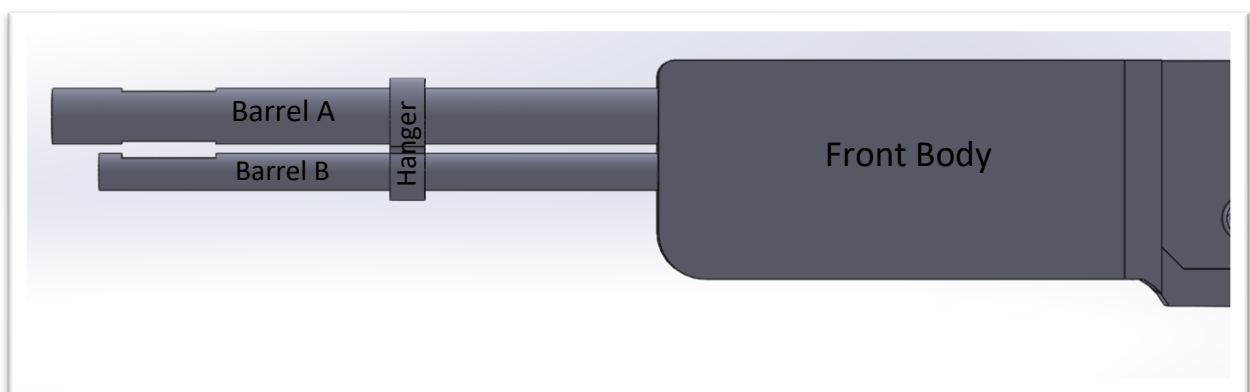
Assembly

The assembly is straightforward and will require some glue, personally I like to use Loctite all-purpose super glue because it sets stupid fast (Be careful to not get it on your skin) and adheres really well to prints. **Before you start gluing** parts together you want to sand on the main body if your printer left any blobs on the pins or if the walls of the bolt channel (*Highlighted below*) aren't very smooth. Now you can attach the pieces as they are shown:

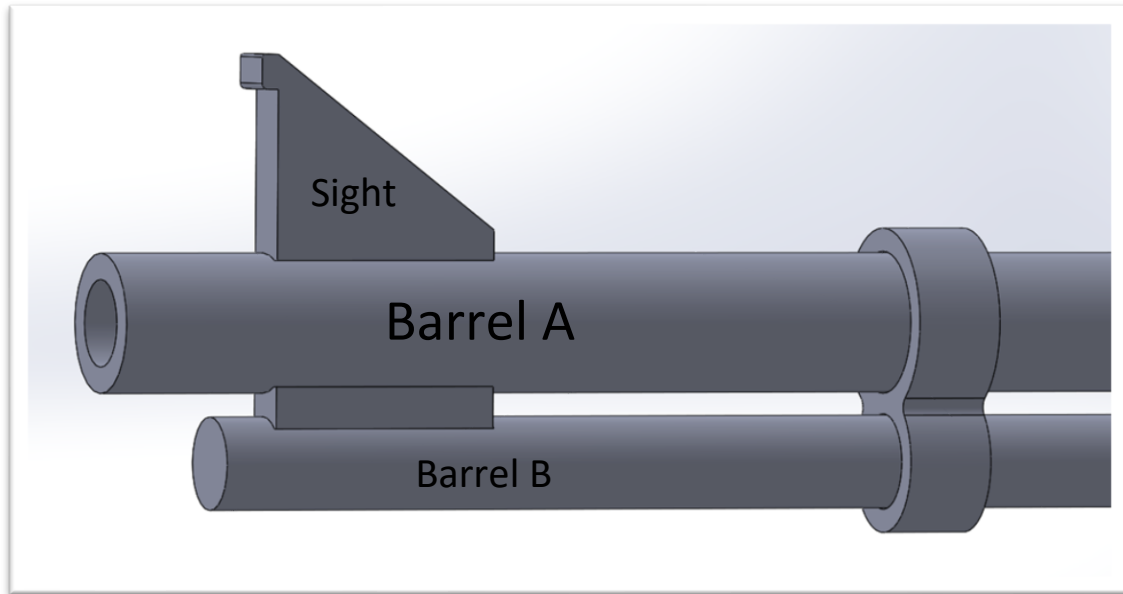


Next,

We will attach the **barrels A and B** to each other using the **hanger** and then slot them into their respective holes on the **front body**. This shouldn't require any glue, the fit alone should be tight enough to hold them, in fact you are more likely to need to sand the two barrels in order to get the hanger on and to make them go into their slots. Assemble the barrels and hanger as shown:

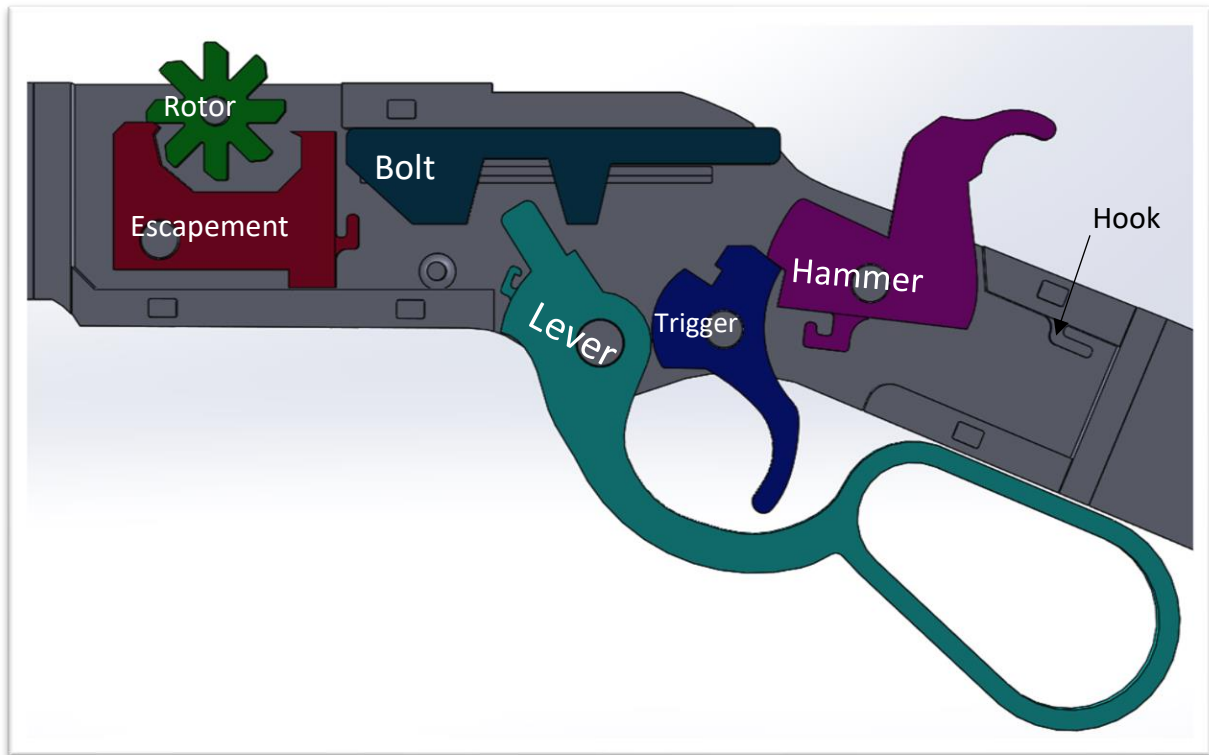


At this point the **sight** can be attached, this will not require glue, it simply slots the two cutouts in **barrel A** and **B**:



Then,

The internals can now be installed. The first part that should be put in should be the **lever** followed by the **escapement**, **rotor**, and **bolt**. Then, get a size-16 rubber band (these are like the universal size, if you have any rubber bands in your house already these are probably it) and double it up by twisting it once and then folding it over itself and attach it to the hook on the **escapement** and the hook on the **lever** while making it sure it passes underneath the unused pin between the two parts. The **bolt** can now be dropped into its channel. Get another size-16 rubber band, double it up as was previously described, and attach it to the hook inside the **main body**. Now you can place the **trigger** into the body and hook the other end of the rubber band over the notch on the **trigger**. Then, get four more size-16 rubber bands and once again double up each of them as was previously described and then attach each one to the hook inside the **main body**, give them each a tug once you get them on the hook to ensure they don't pop off while you're attaching the next one. Now the hammer can be put in the frame by 'sandwiching' it between the rubber band that connects the trigger to the hook on the frame and the four doubled up rubber bands can be attached to the hook on the hammer. That was a mouthful



Some of those instructions for running the rubber bands were confusing so heres a picture of what the final product should look like:



Finally,

The **cover** can be slotted into the tabs along the top edge of the main body. If the fit isn't tight enough and it can fall off, wrap a rubber band around the outside of the frame to hold it on. You don't want to permanently affix the cover to the body in case you need to readjust the rubber bands inside.

Testing/Troubleshooting

Basics and Ammo

Now with the gun assembled it's time to test it. Make sure the bolt moves smoothly through the channel when you use the lever and make sure the trigger is set once the hammer is cocked back. The rest of the testing will require ammo, so it's time to discuss which rubber bands to use. This is designed to fire size 19, 1/16th thick rubber bands - it's a slightly uncommon size so you may not be able to find it in stores, but they are readily available online.

Loading and Firing

While loading please be aware of where you're aiming because it's possible to have a misfire if your hammer has too much tension, somewhat ironically this misfire can only occur when the hammer is **not** cocked, so you may want to cock it while loading for safety. With this in mind, start loading by first sliding the rubber band over the sight and then pulling it back onto the rotor. To load more rubber bands, click the rotor back one position and then repeat the loading process. I've managed to load and fire up to six rubber bands reliably.

Now if you have cocked the hammer (Which can be done with the lever or by pulling the hammer back yourself) it should be ready to fire. If when you pull the trigger and the hammer comes down, but the rotor doesn't rotate it means you either have too much tension on the escapement or too little on the hammer. This may require some trial and error to correct as the balance in forces is a little delicate and the variance in strength between size-16 rubber bands is wide. Start troubleshooting by adding more rubber bands to the hammer, if you begin to have misfires then you've added too many.

Credits

Like my last project, this is based on one of RBguns' wooden designs, if you've never seen his work you should check it out. You can find his projects at <https://rbguns.com> and on YouTube under the name RBguns. Since both designs share the same action his video may help clarify how to load and fire it: <https://www.youtube.com/watch?v=XPhqbKehqKA>