

Clints M4 Carbine Prop

BOM and assembly instructions



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M4 Carbine Prop

History of the M4 Carbine

The M4 carbine is a shorter and lighter variant of the M16A2 assault rifle. The M4 is a 5.56×45mm NATO, air-cooled, direct impingement gas-operated, magazine-fed carbine. It has a 14.5 in (370 mm) barrel and a telescoping stock. The M4 carbine is extensively used by the United States Armed Forces and is largely replacing the M16 rifle in United States Army and United States Marine Corps combat units as the primary infantry weapon.[5][6]

The M4 is also capable of mounting the M203 and M320 grenade launchers. The distinctive step in its barrel is for mounting the M203 with the standard hardware. The M4 is capable of firing in semi-automatic and three-round burst modes (like the M16A2 and M16A4), while the M4A1 is capable of firing in semi-auto and full automatic modes (like the M16A1 and M16A3).



As with many carbines, the M4 is handy and more convenient to carry than a full-length rifle. The price is slightly inferior ballistic performance compared to the full-size M16, with its 5.5" (14 cm) longer barrel. This becomes most apparent at ranges of 200 yards and beyond.

While the M4's manoeuvrability makes it a candidate for non-infantry troops (vehicle crews, clerks and staff officers), it also makes it ideal for close quarters battle (CQB). The M4, along with the M16A4, have mostly replaced the M16A2 in the Army and Marines.

Foreword

This model has been optimised for 3D Printing on a FDM printer. where ever possible the use of supports has been minimised to ensure the best aesthetic qualities but as with any complex geometry it is some times not possible and supports must be used.

However with the correct tuning of your support settings you should be able to achieve good supports which break away cleanly leaving little if any post printing tidy up work to be done.

I have designed this model to print on a Prusa i3 mk2 (print area 250/210/210mm XYZ) as this is what I own however only a few of the large parts require the larger print bed of the mk2 many of the small parts I will print on my PrintrBot Simple metal (150/150/150 XYZ).

A future update of this model may see the larger parts split to make printing on smaller machines possible so if you would like to see this done, let me know.

My Slicer of choice is Simplify3D S3D. Throughout this document I will be referring to print settings as they appear in S3D, but theses settings can usually be found in most Slicer software although perhaps as a different name. One advantage of S3D is its ability to create and edit custom supports, I will be taking advantage of this heavily for components that require supports. Again though you may be able to achieve similar results in other Slicer software through that apps support settings.

Required Tools



Side cutters - Useful for trimming and cutting



Needle nose pliers - Good for removing support material



Craft knife - For cleaning up of printed parts



Small craft mallet - For gently fitting parts together



2-4 sets of clamps - Alternatively some strong rubber bands. This is to keep the parts firmly pressed together while glueing



Assorted drill bits - Uniforming and/or reaming holes in the printed parts, use of a drill is not necessary twisting the bits by hand with your fingers will be all that is needed and will give good clean results



Rotary tool and assorted sanding bits - some prints may have to have to be sanded to fit together depending on the accuracy of your printer. Alternatively you could just use sand paper.



3mm hex key



Jewelers files - Optional but good for precise trimming/cleaning up of printed parts



Super glue - for permanent assembly of printed parts

Printer Calibration

For best results a well calibrated printer is a must, this will ensure parts fit together well and look good.

A printer calibrated to within ± 0.1 mm is easily achievable most quality printers will come out of the box doing this. If not though you should work on calibrating your printer using the many guides available many specific to brands and models.

First Layers

Calibration of your first layer using your printers or slicers Z offset setting is key to getting prints that adhere to the bed well and for this model can be assembled and glued together easily.

your first layer when removed from the print bed should be smooth and “glassy”.



Temperature and cooling

Finding the correct temperature for your filament will produce quality printed parts. The M4 Carbine prop prints with a lot of unsupported bridges and over hangs.

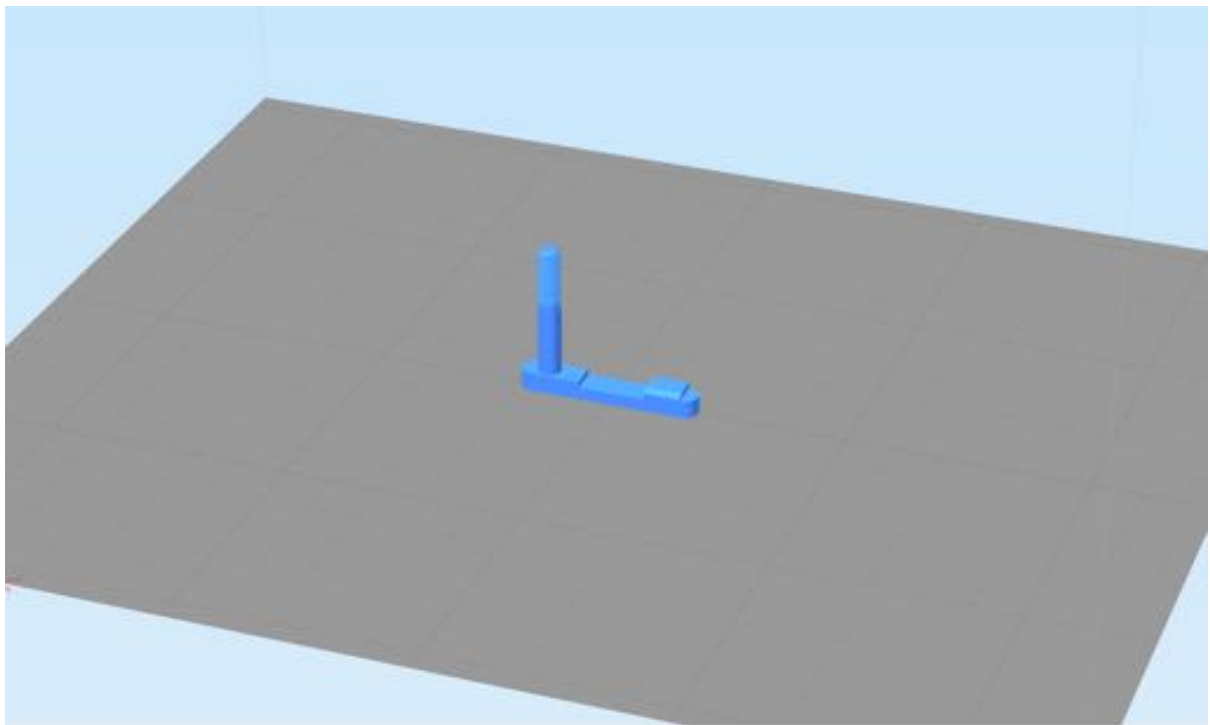
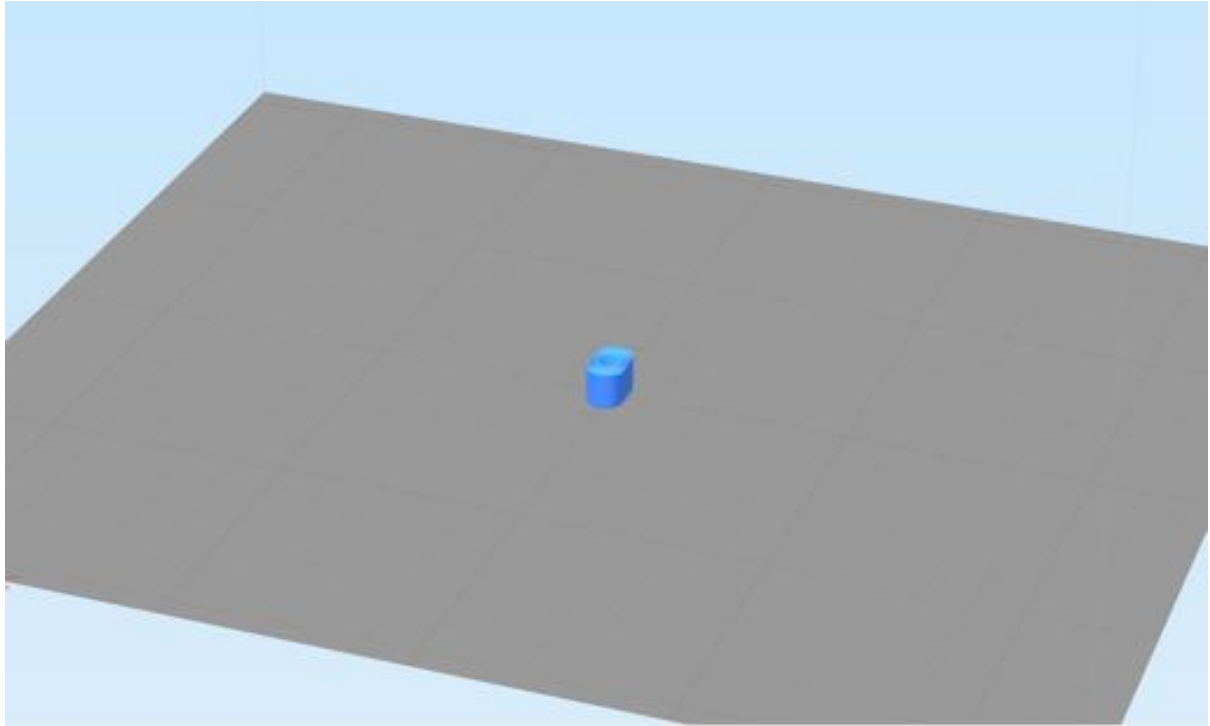
Printing the #3dBenchy model until you achieve quality results is a good way to tune your printer and not waste too much filament. Good results depend highly on the extrusion temperature and cooling. When printing over hangs and bridges a suitable extrusion temperature and effective cooling will reduce and even eliminate sagging which gives undesirable print results.

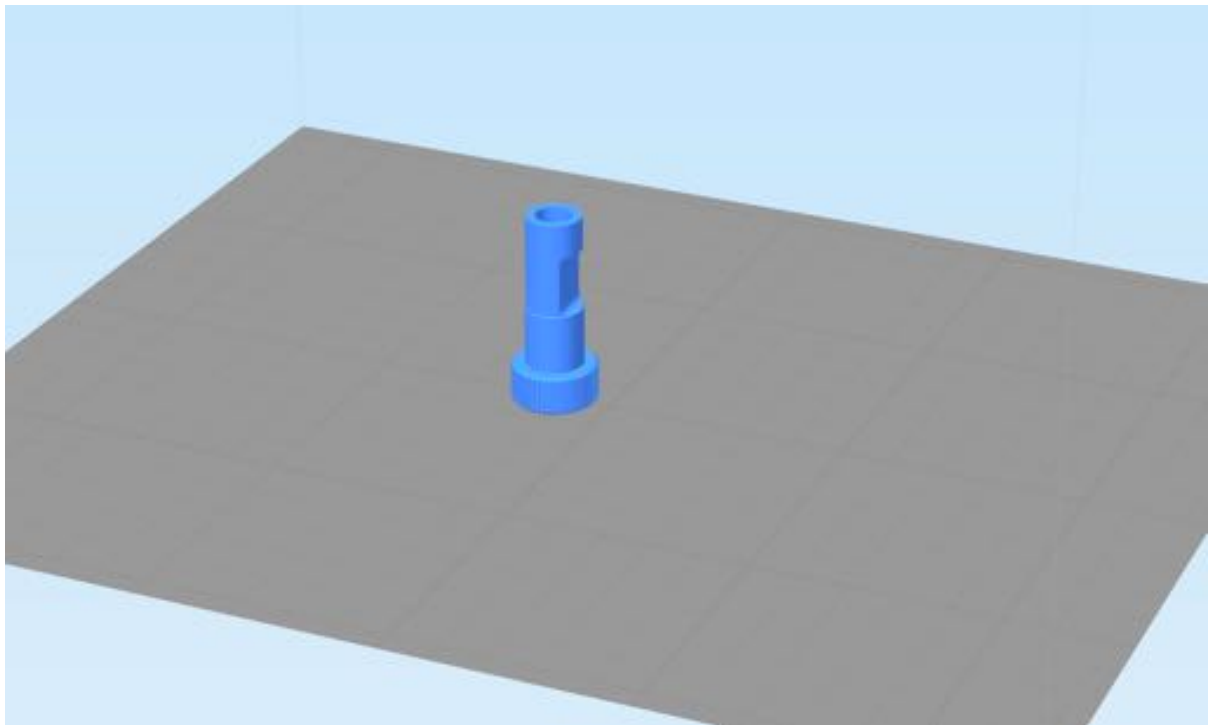
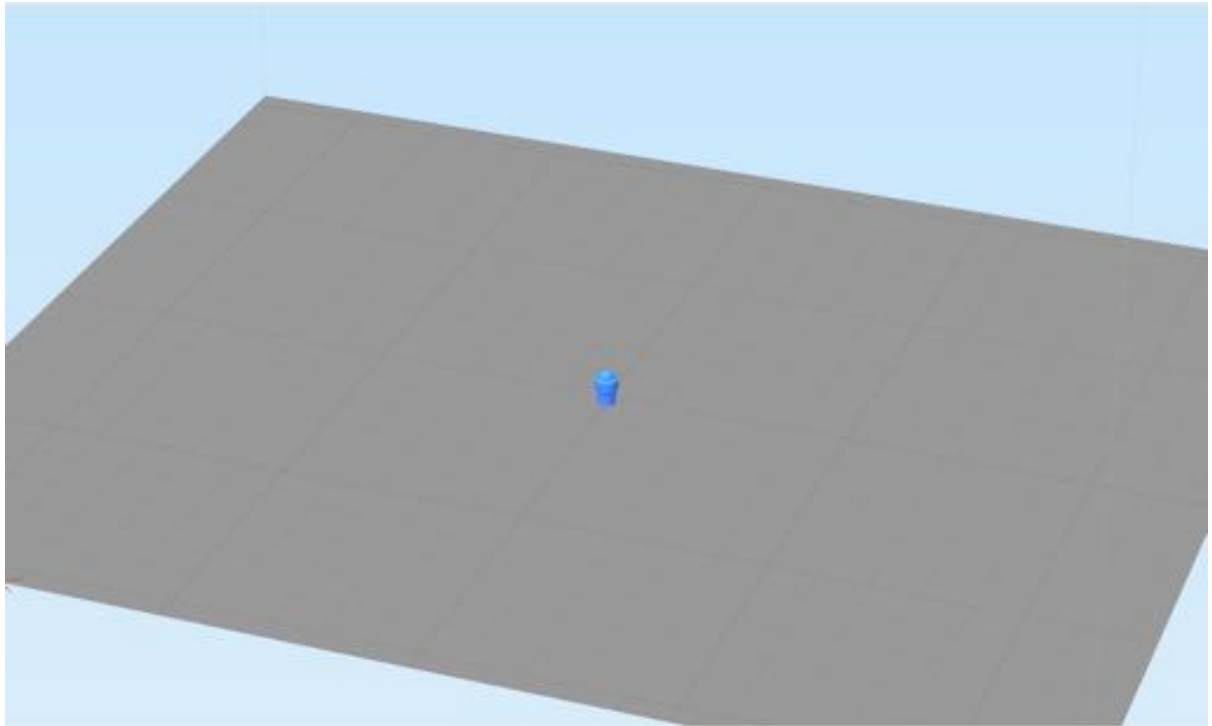
Trial and error is needed here but starting at the recommended temperatures and then going up or down in small increments is the key to success.

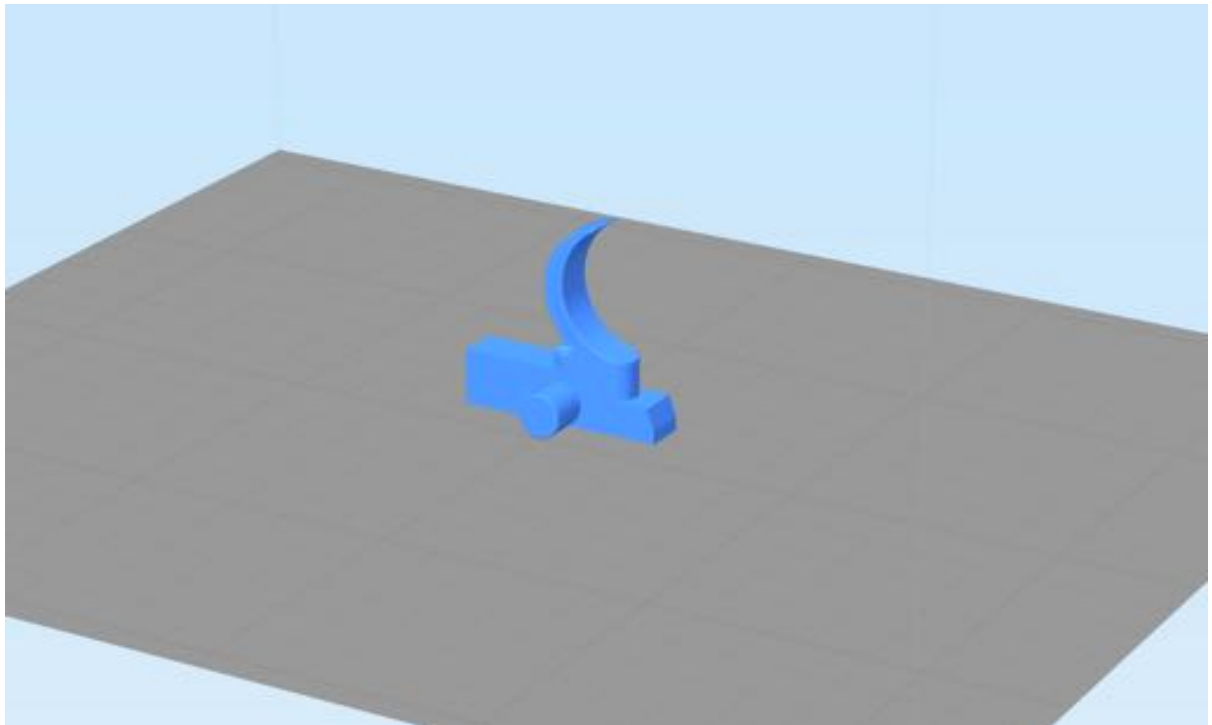
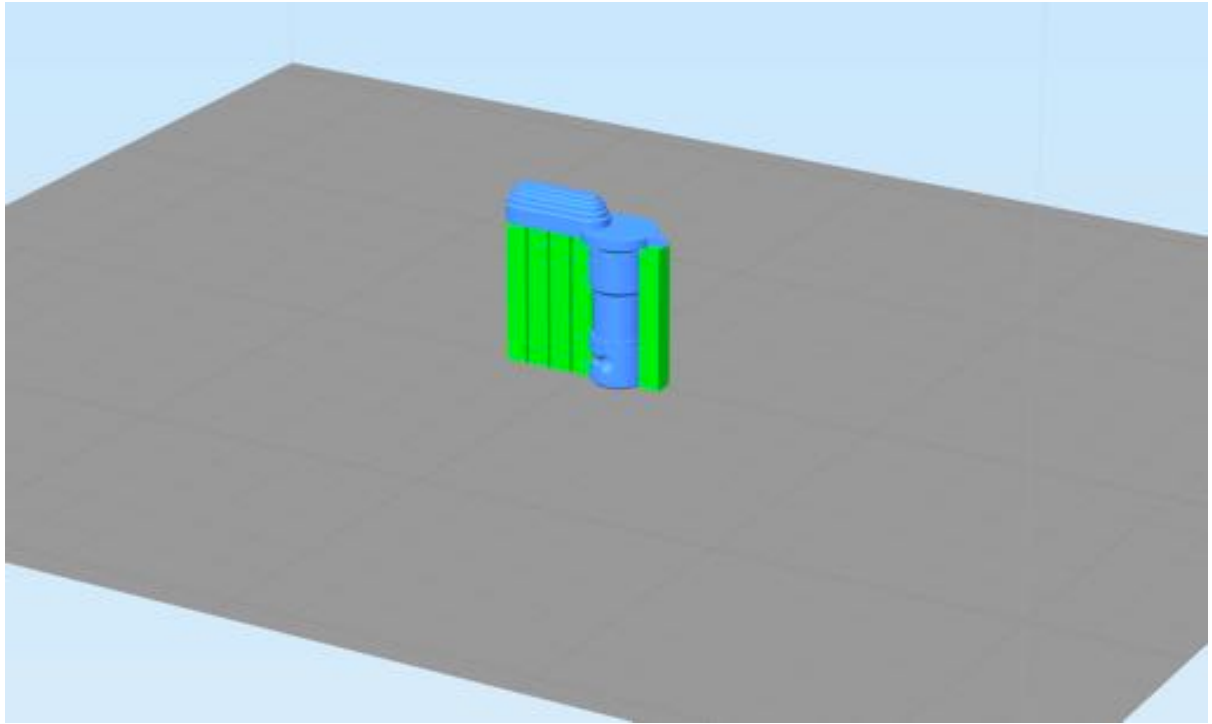
Bill of materials

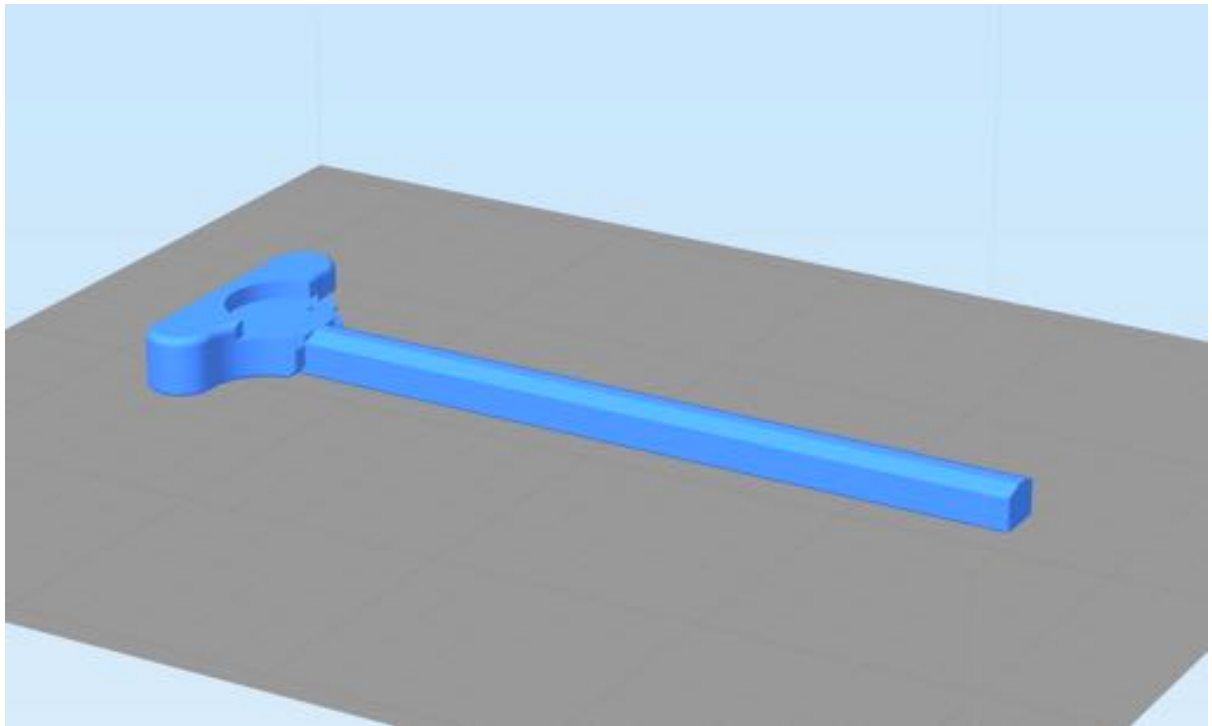
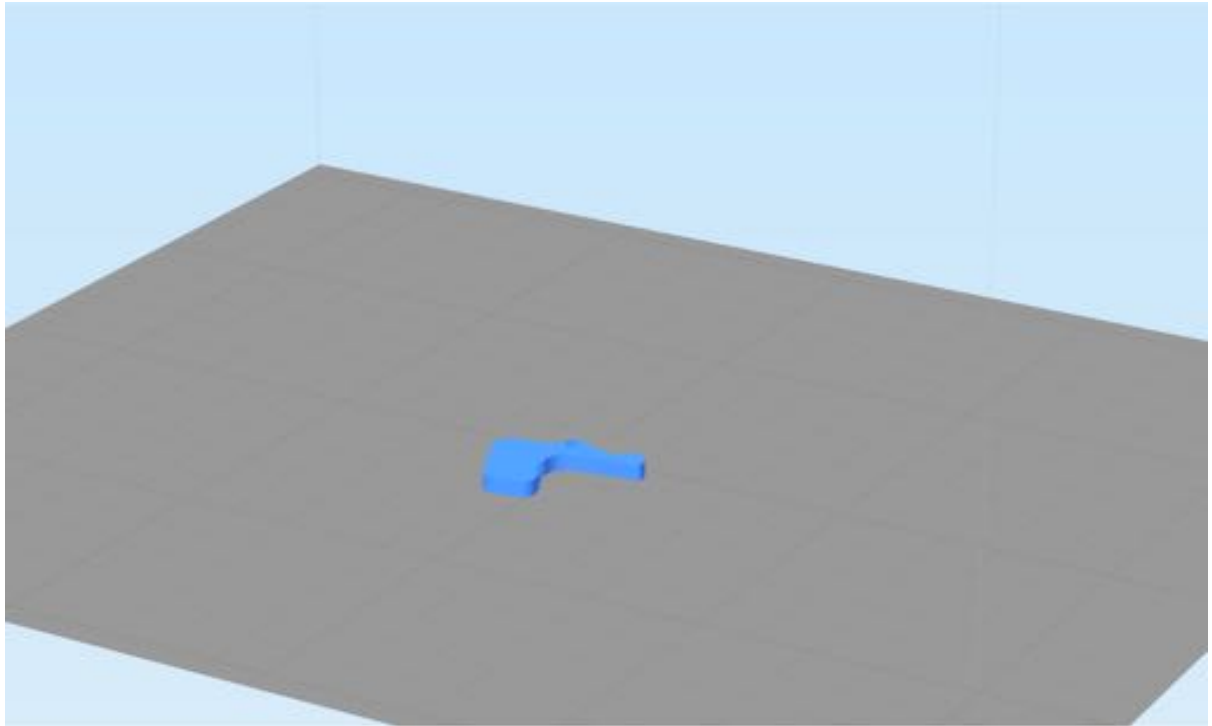
Printed parts:

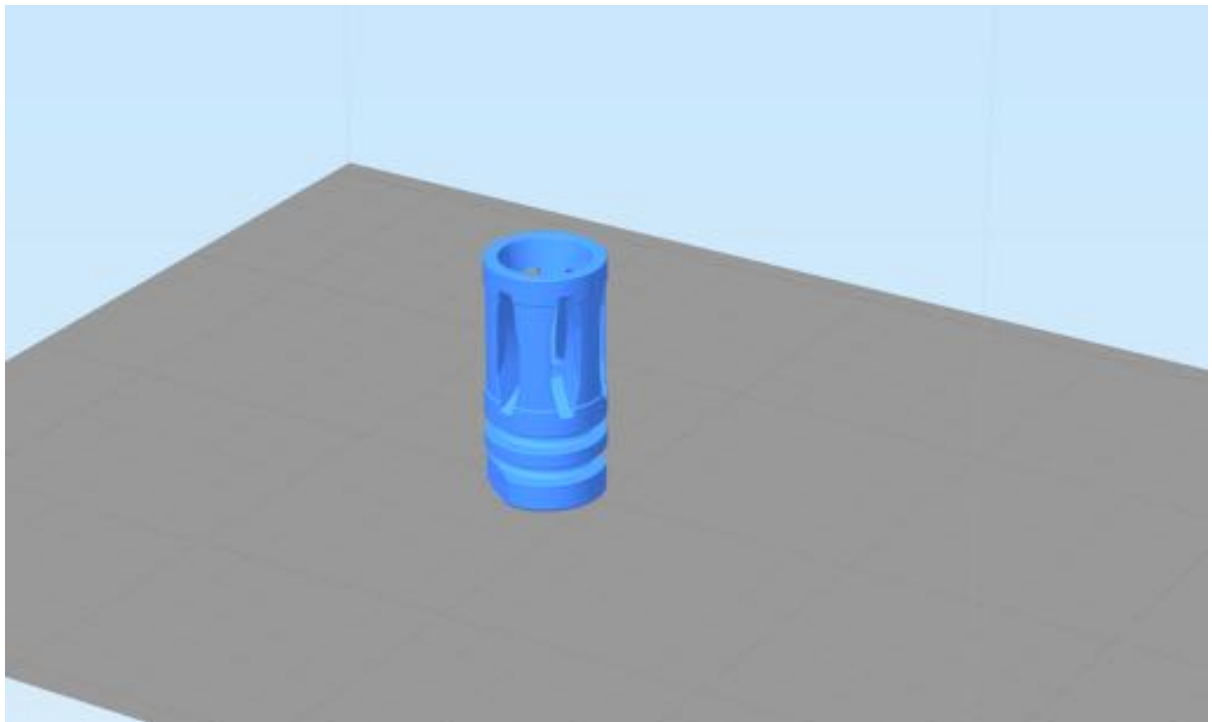
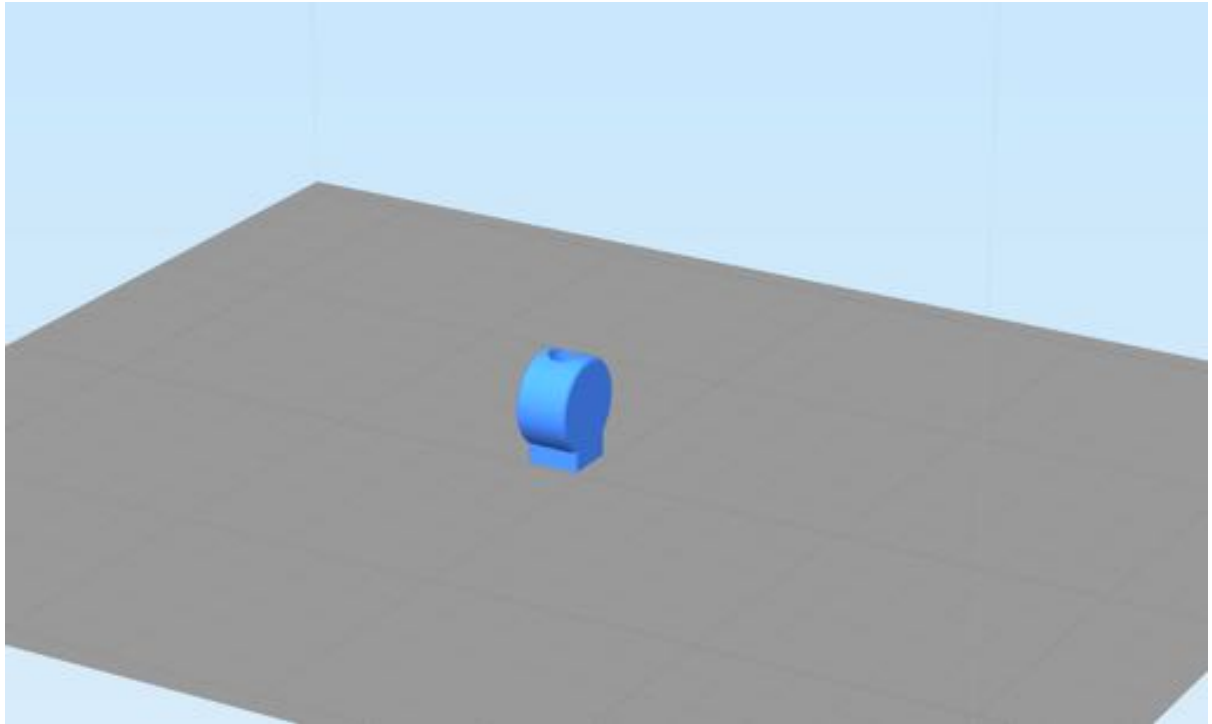
The following images show the orientation of all the printed parts and the location of support material if needed is displayed in green. Simplify3D will allow you to generate these supports and then remove any un-needed support material or add additional supports

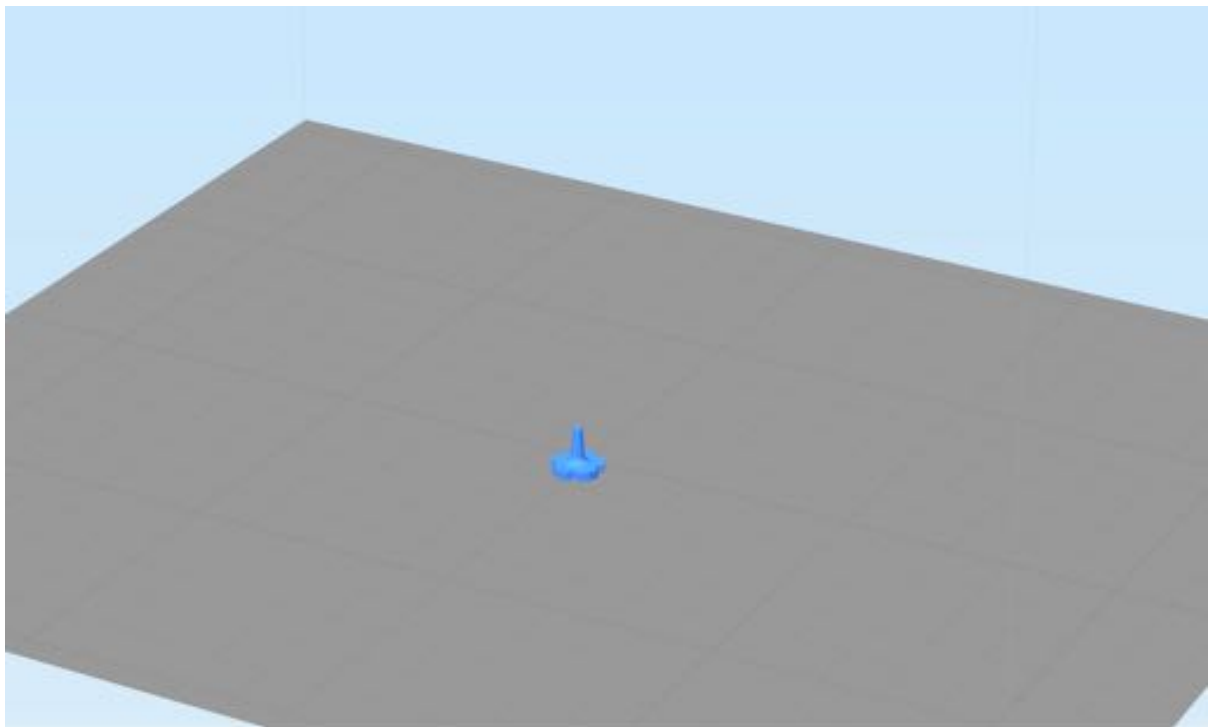
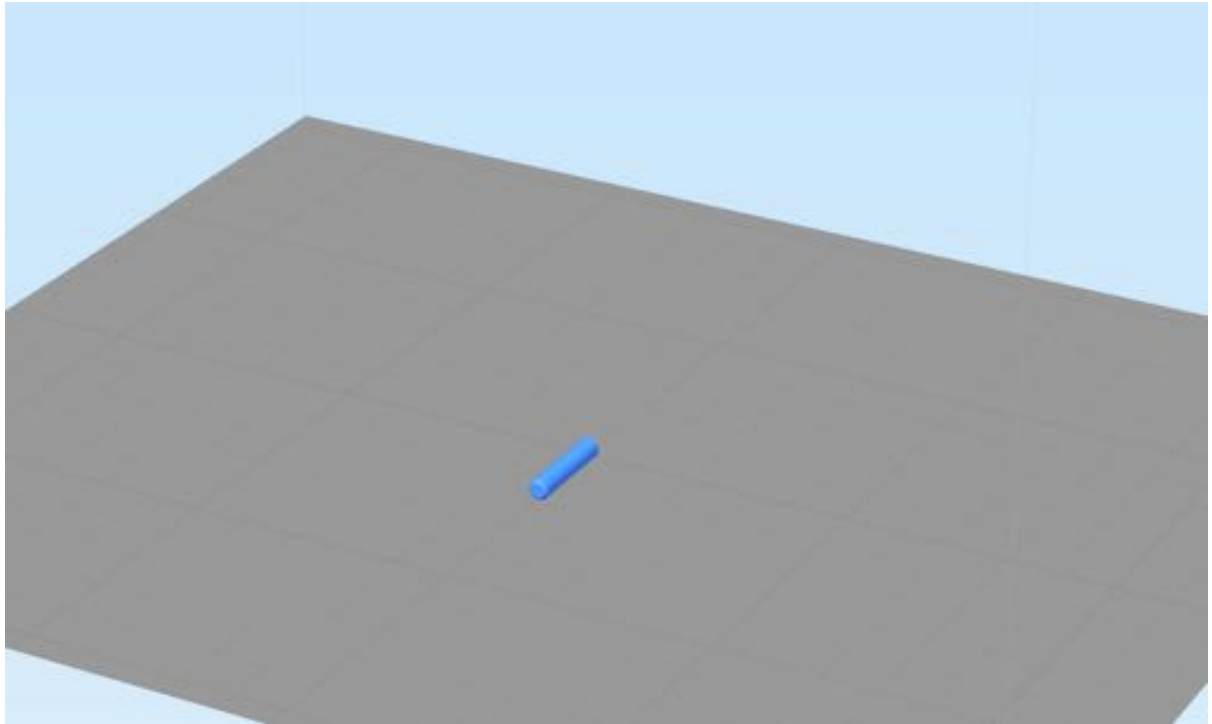


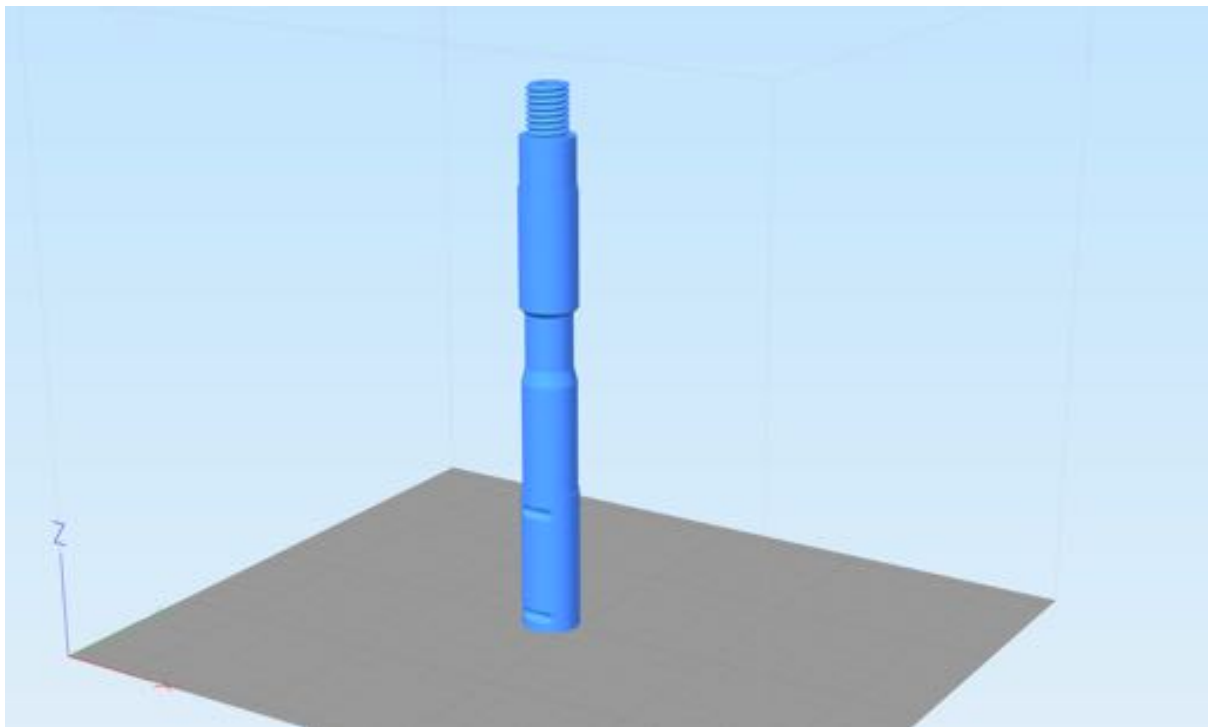
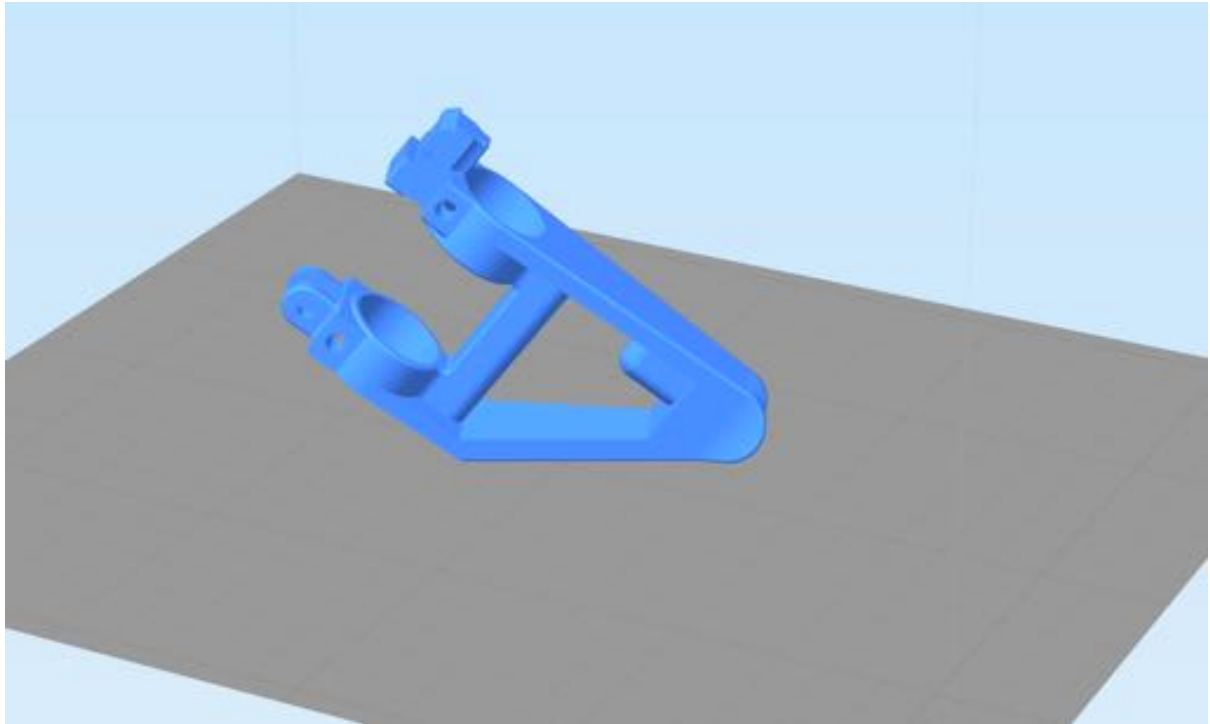


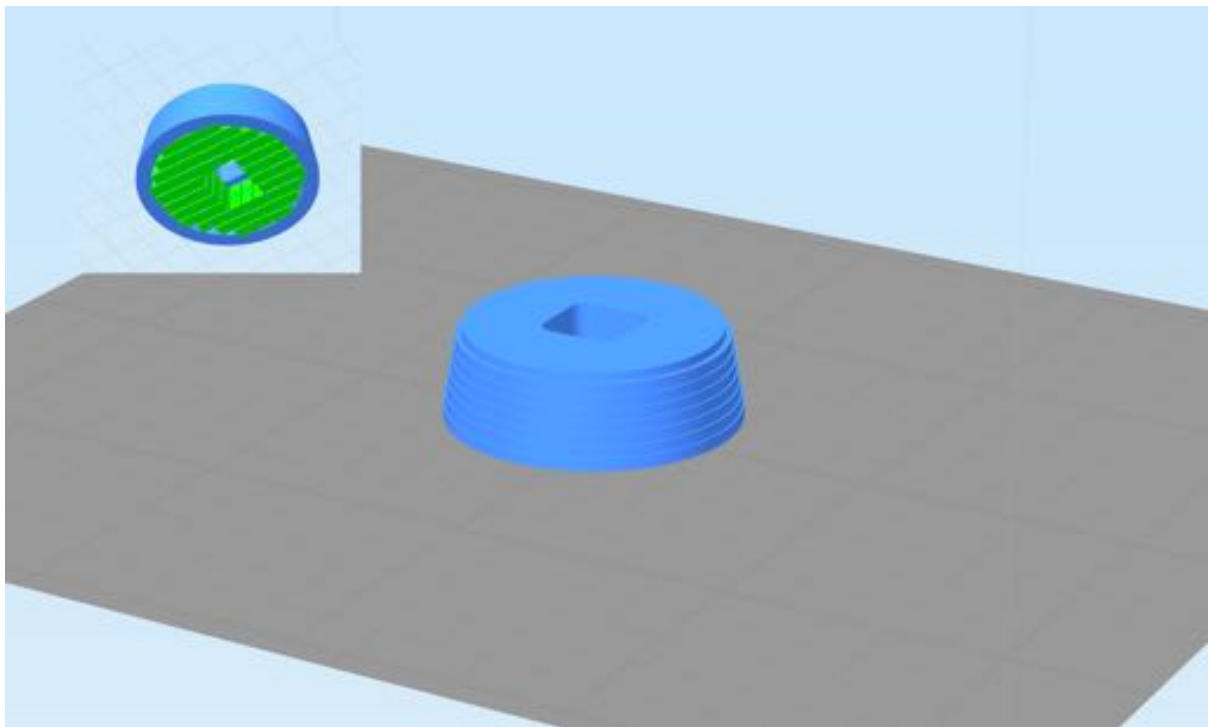
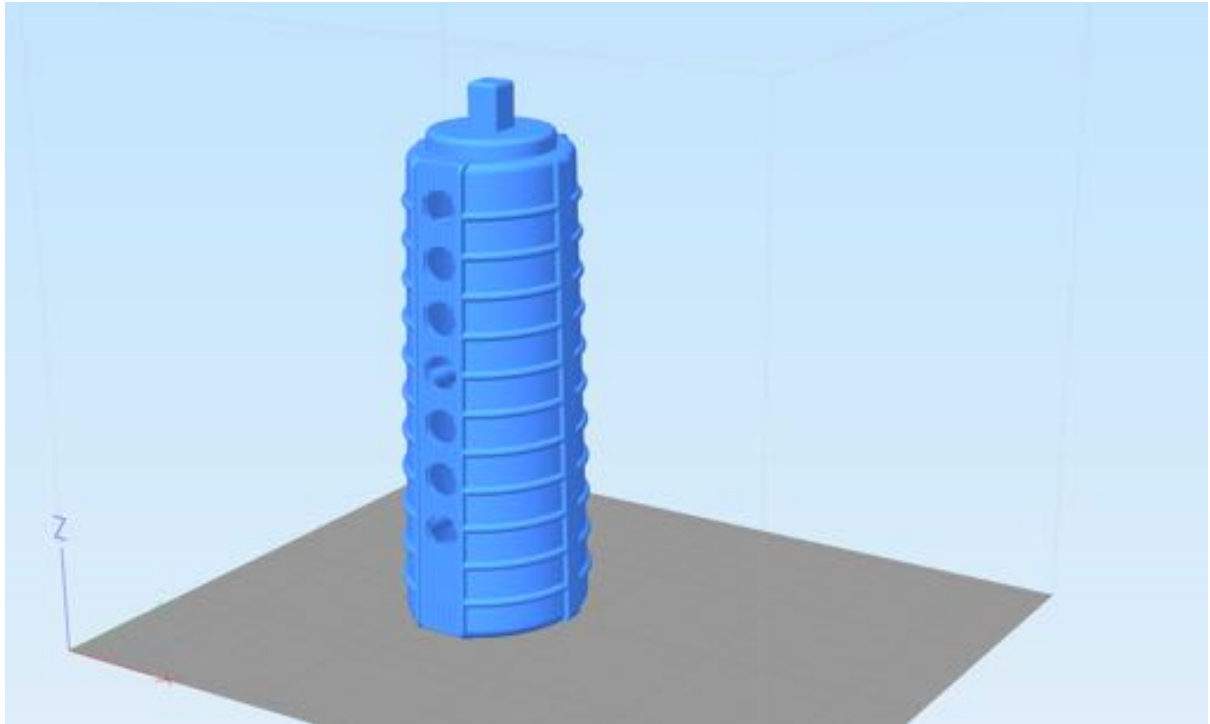


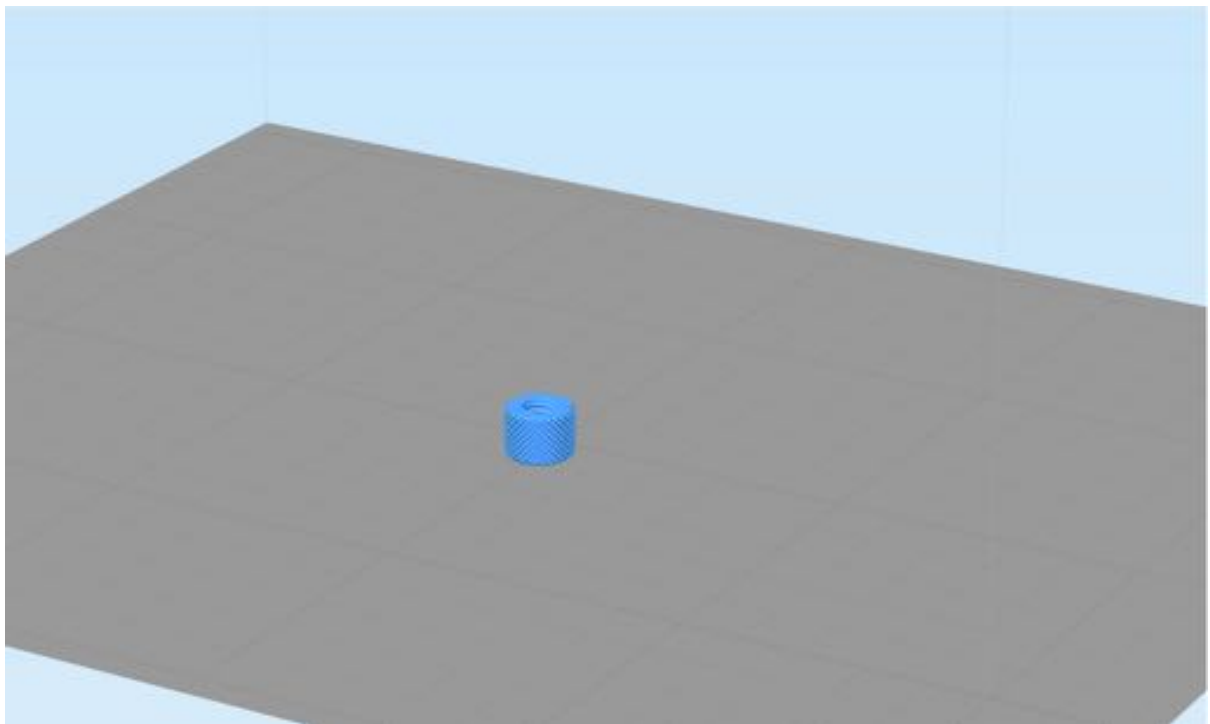
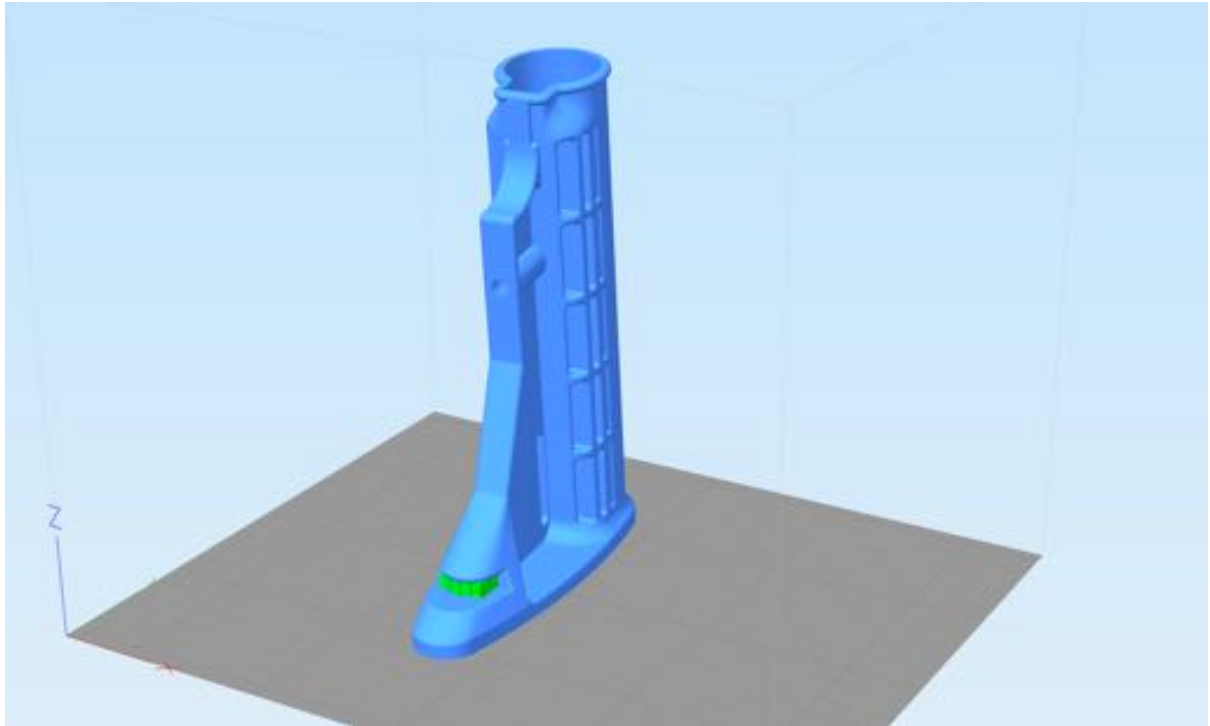


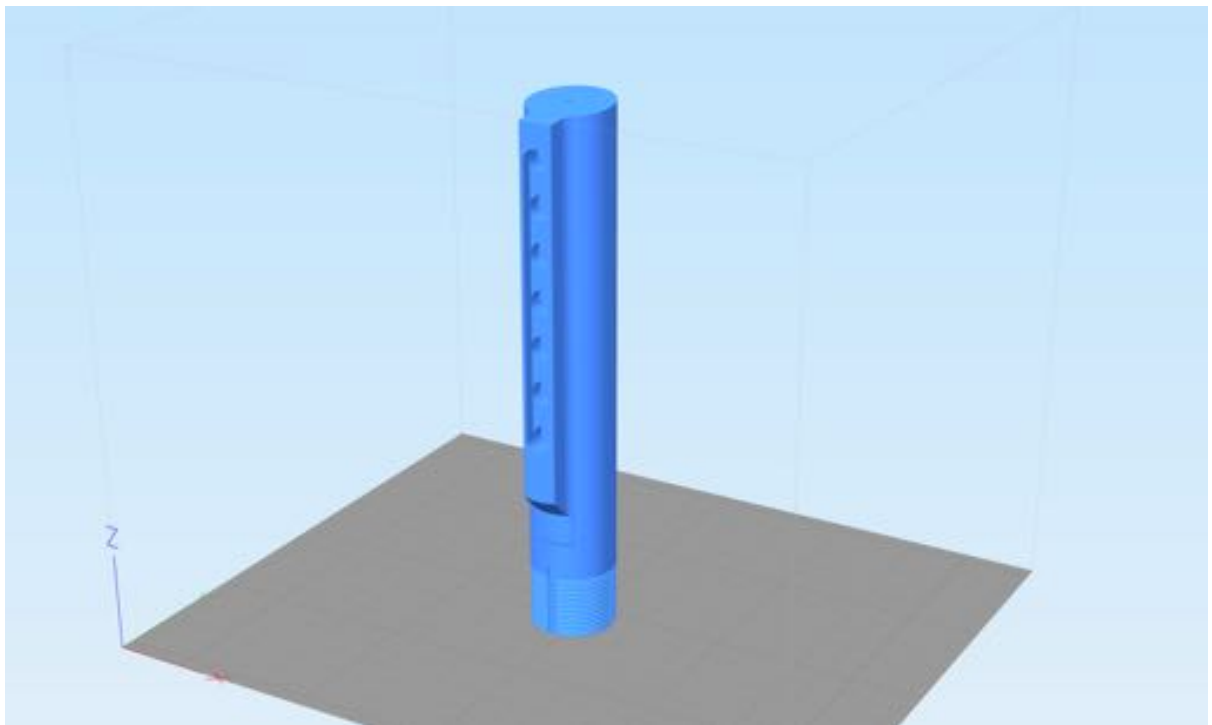
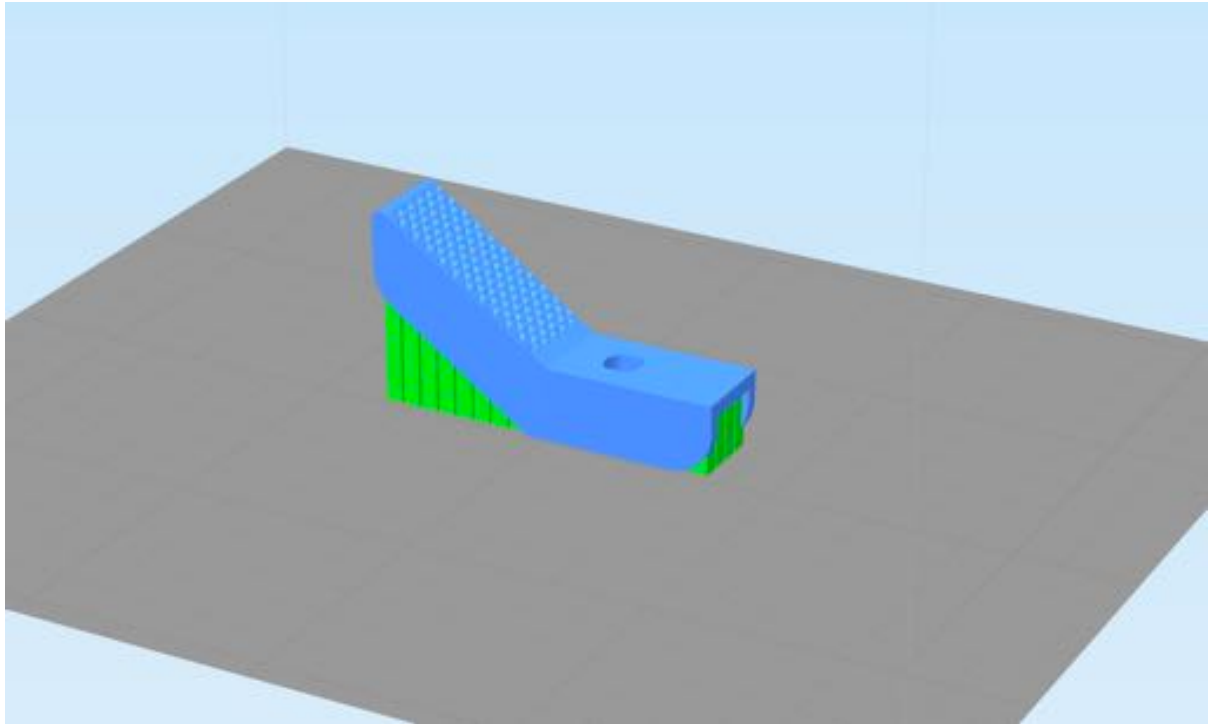


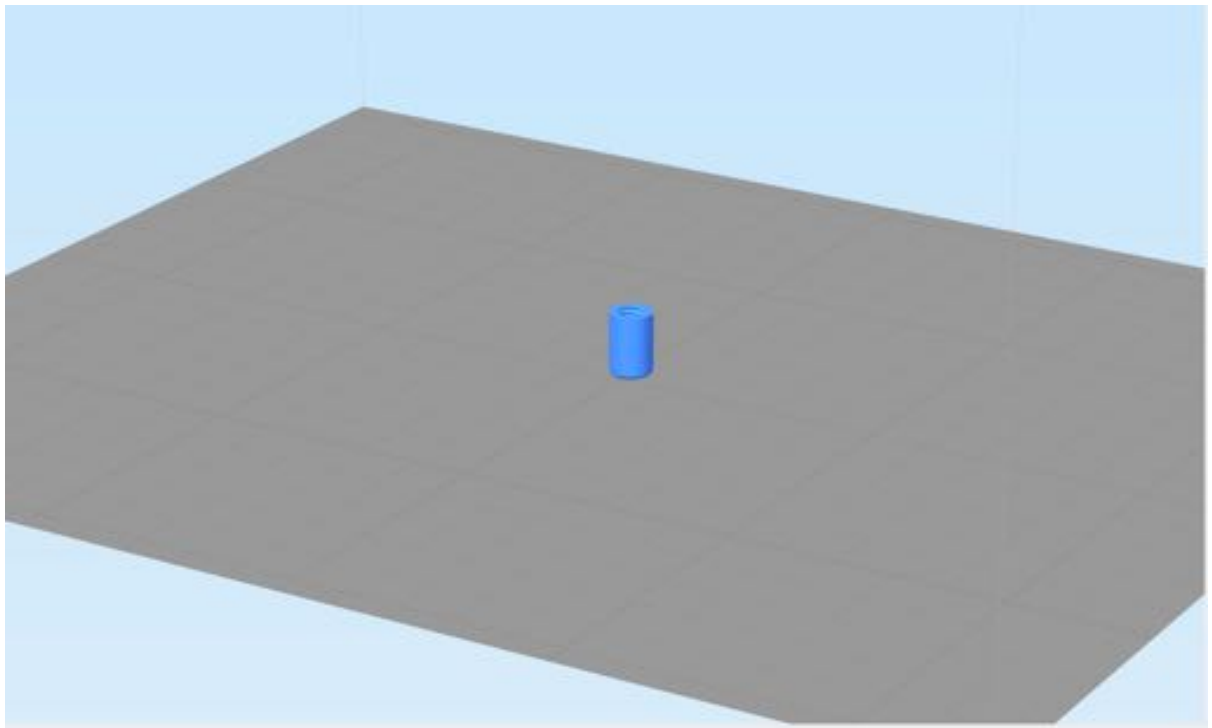
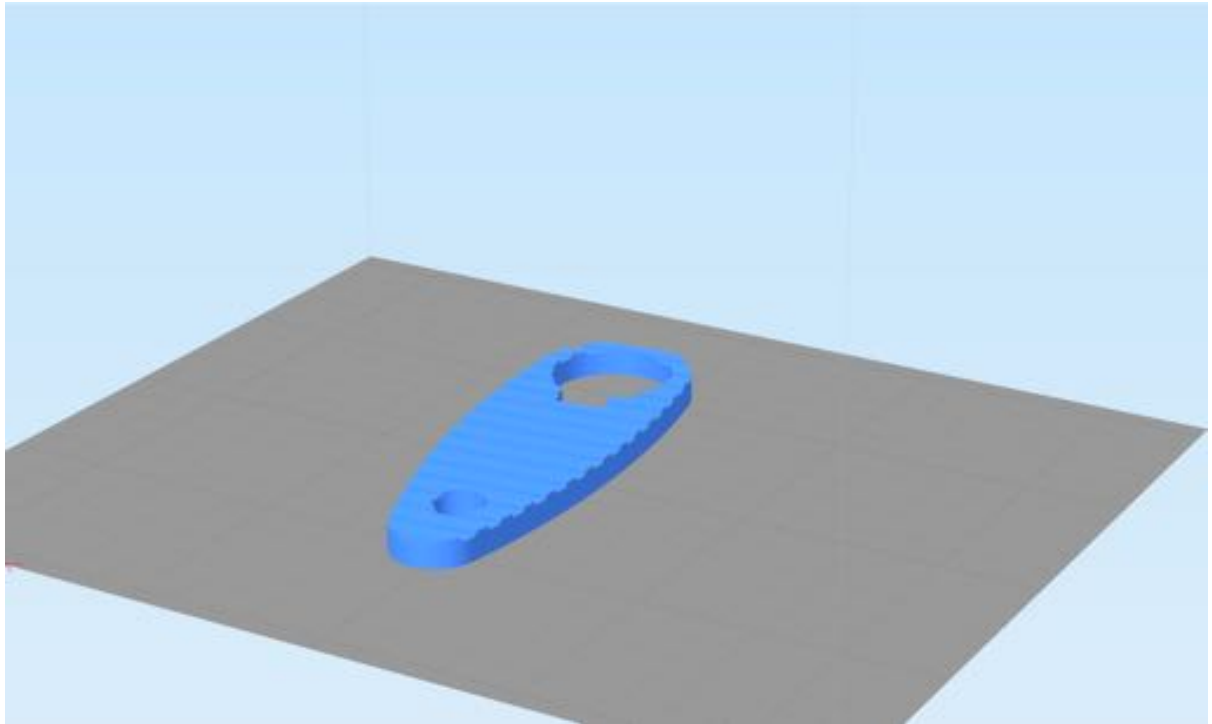


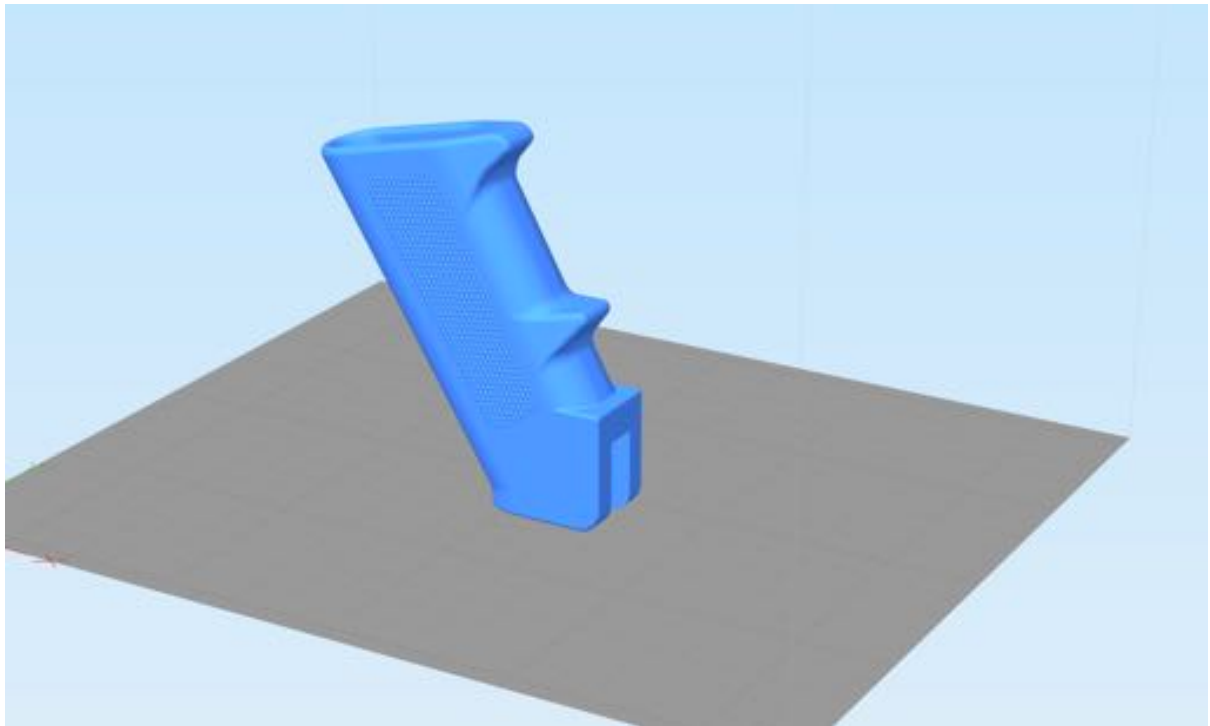
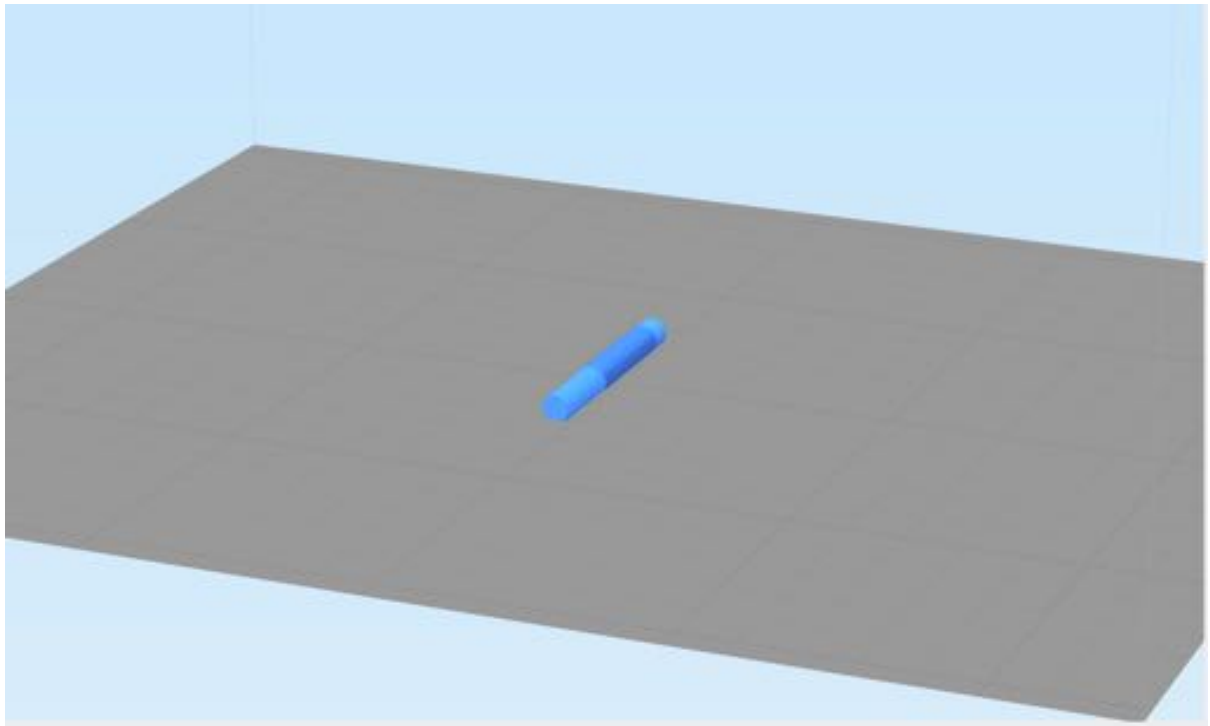


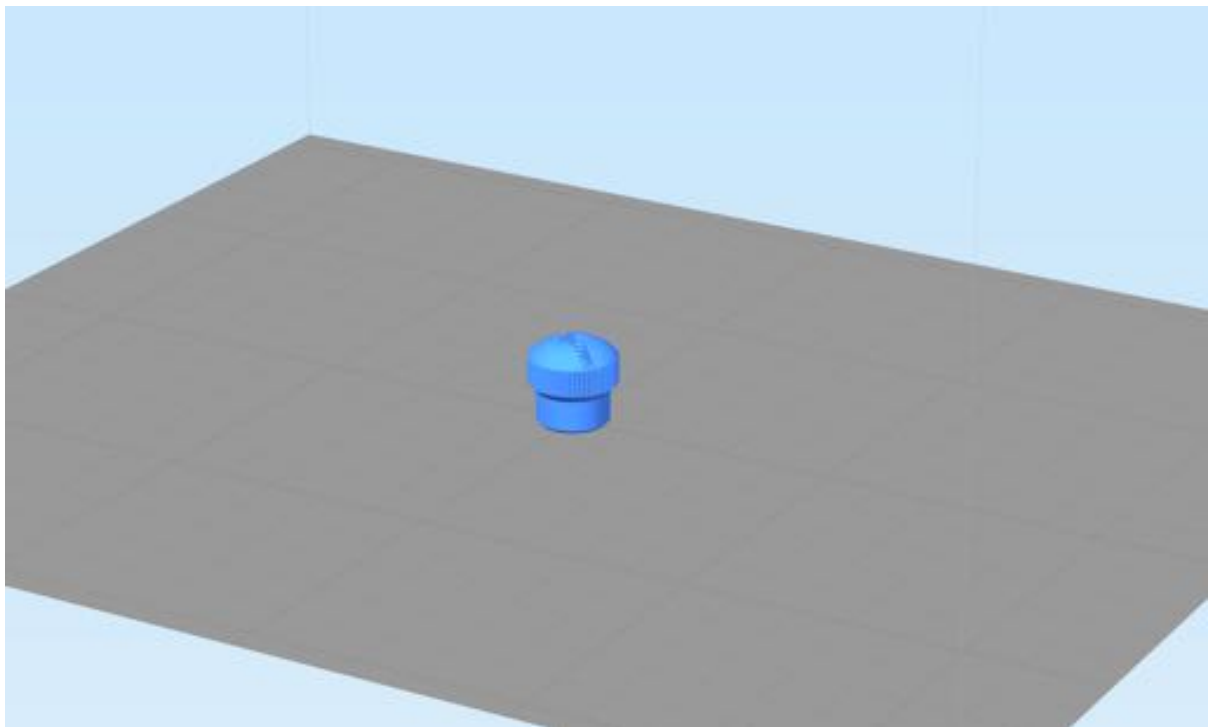
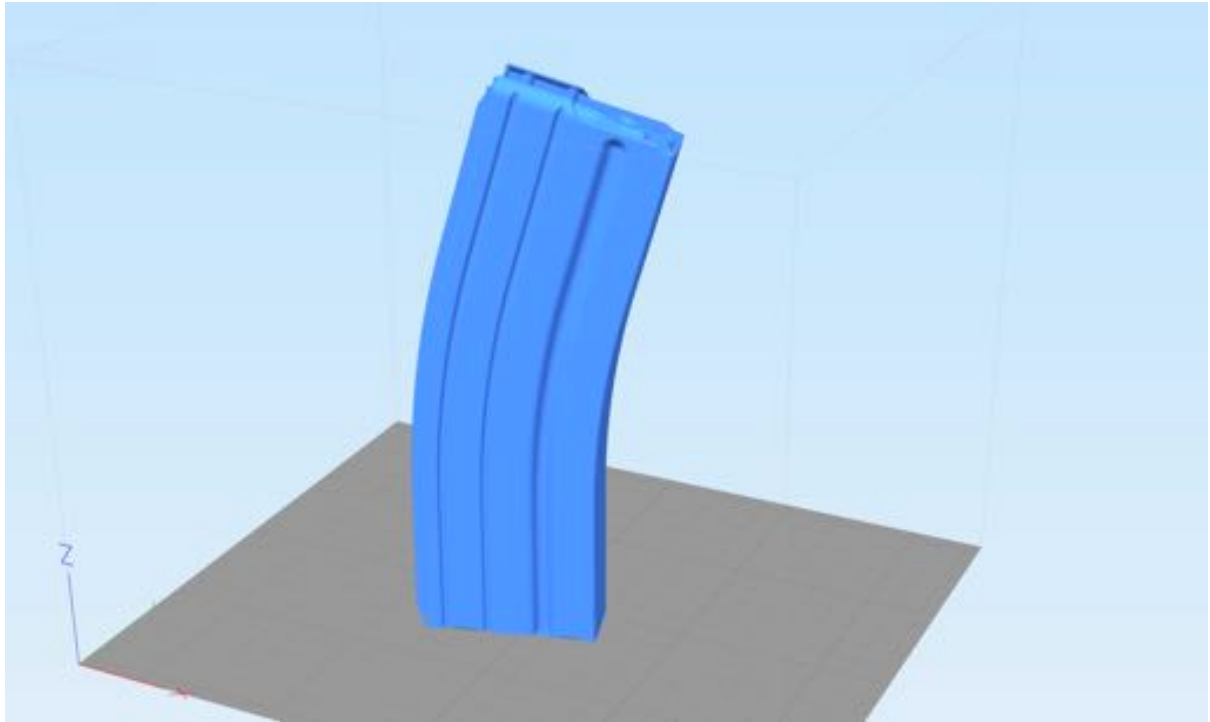


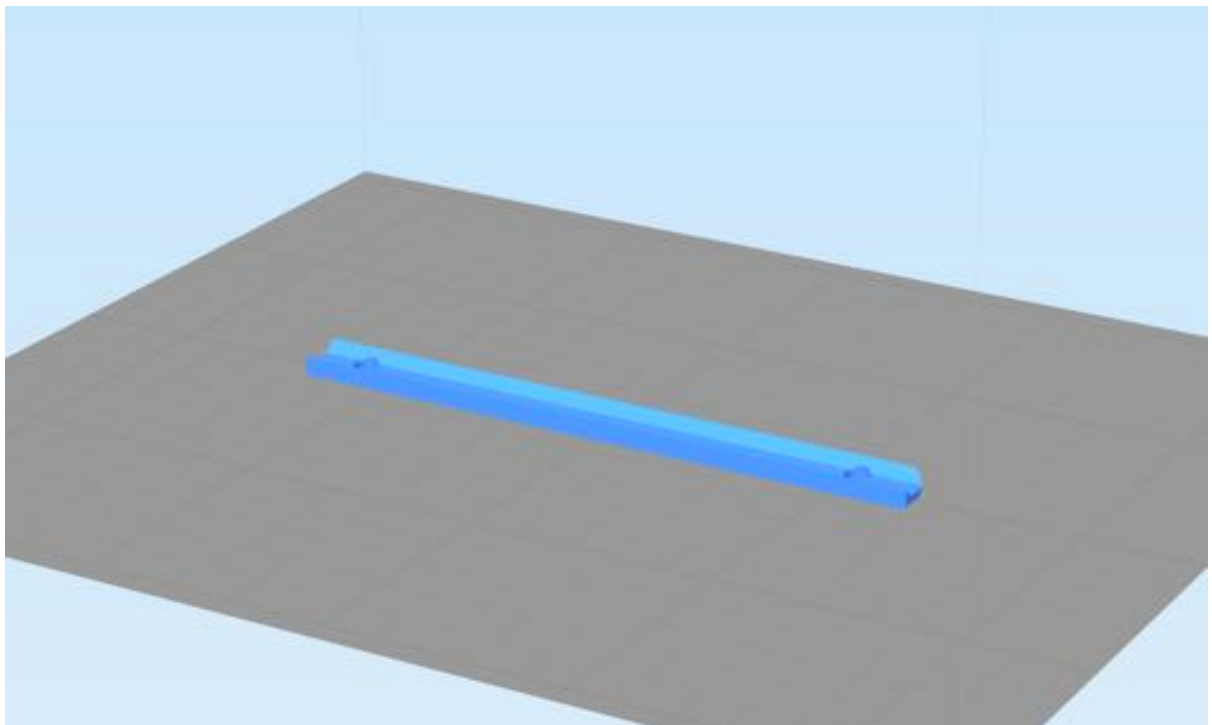
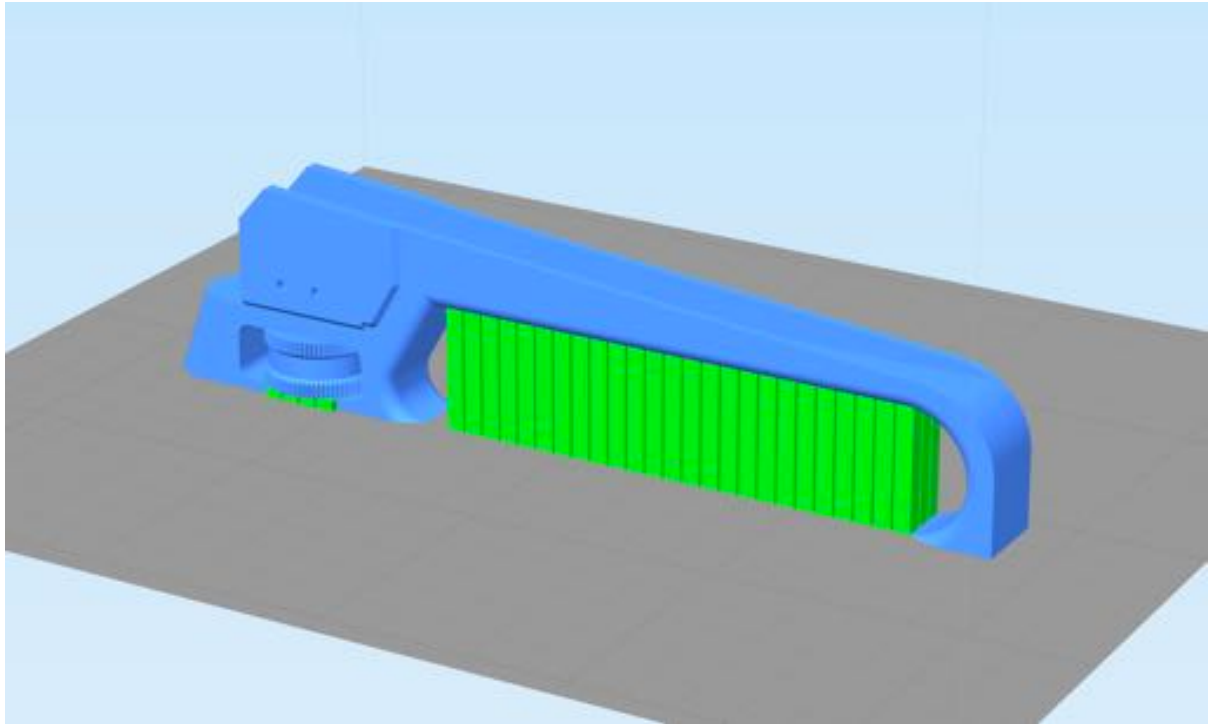


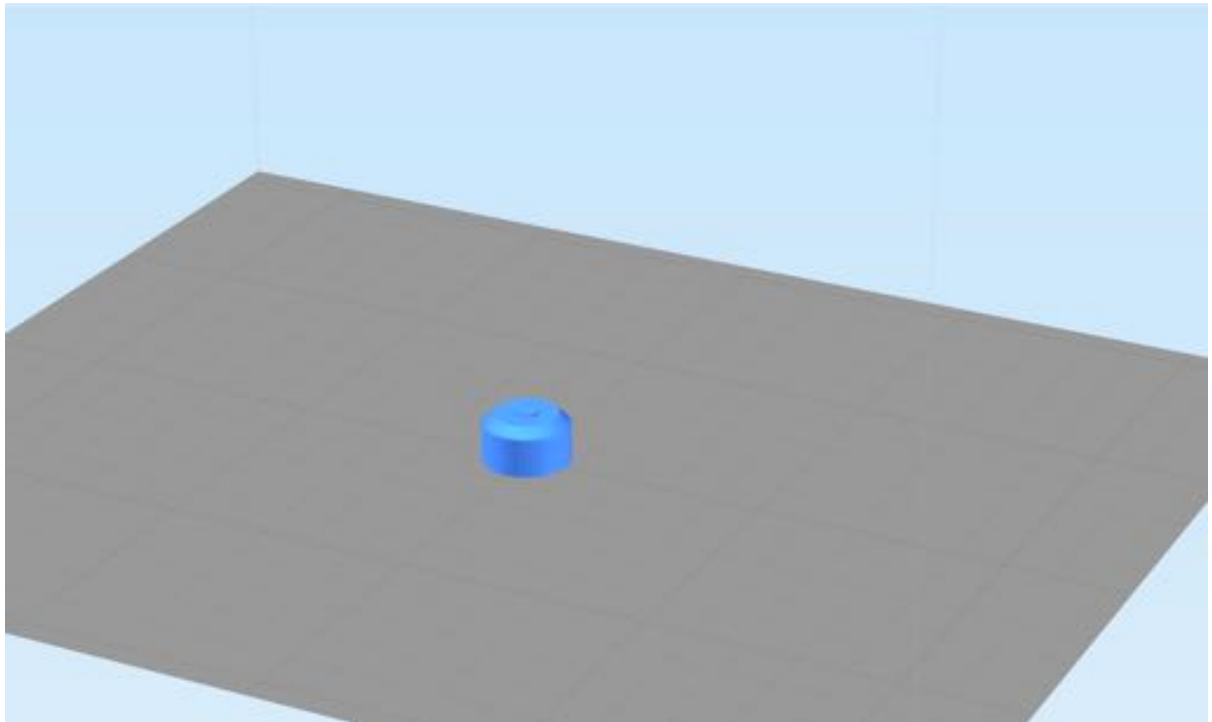
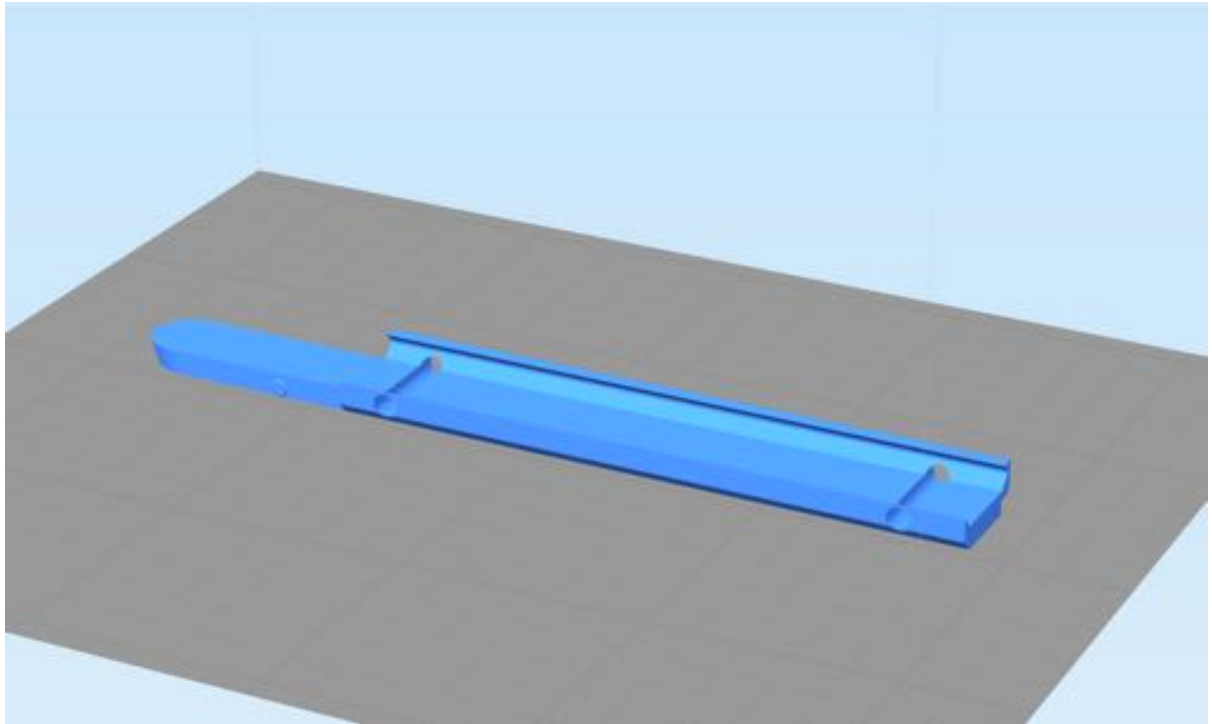


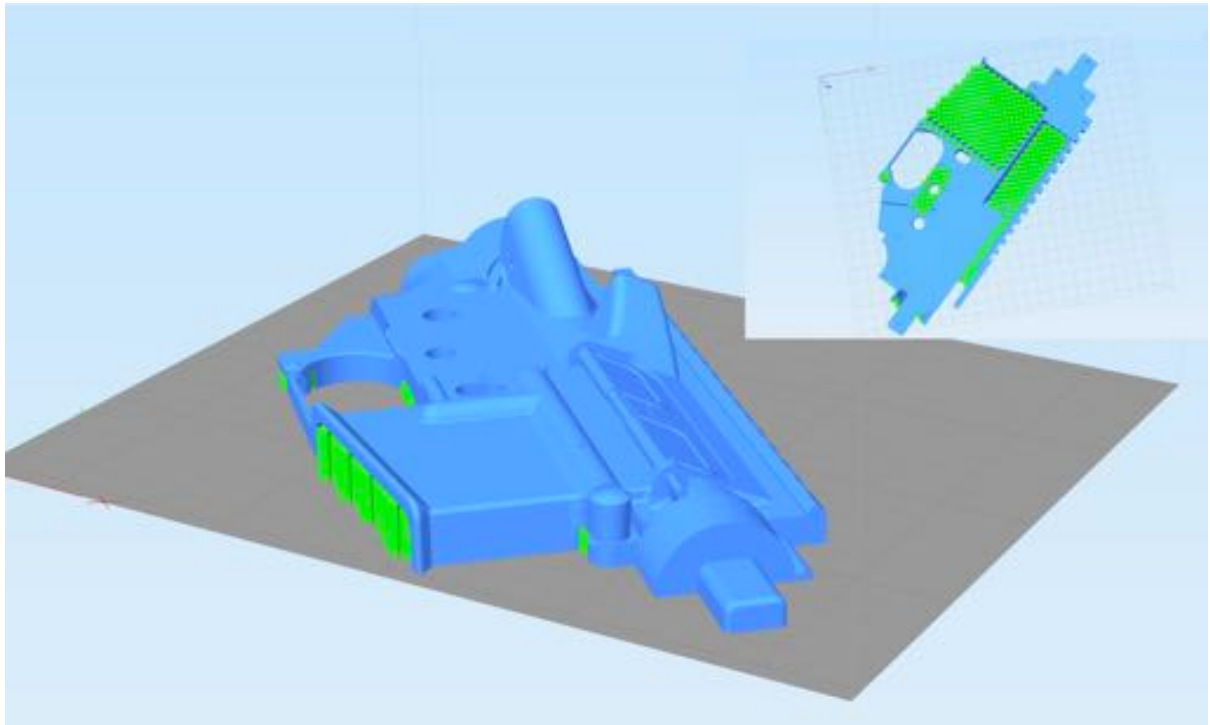
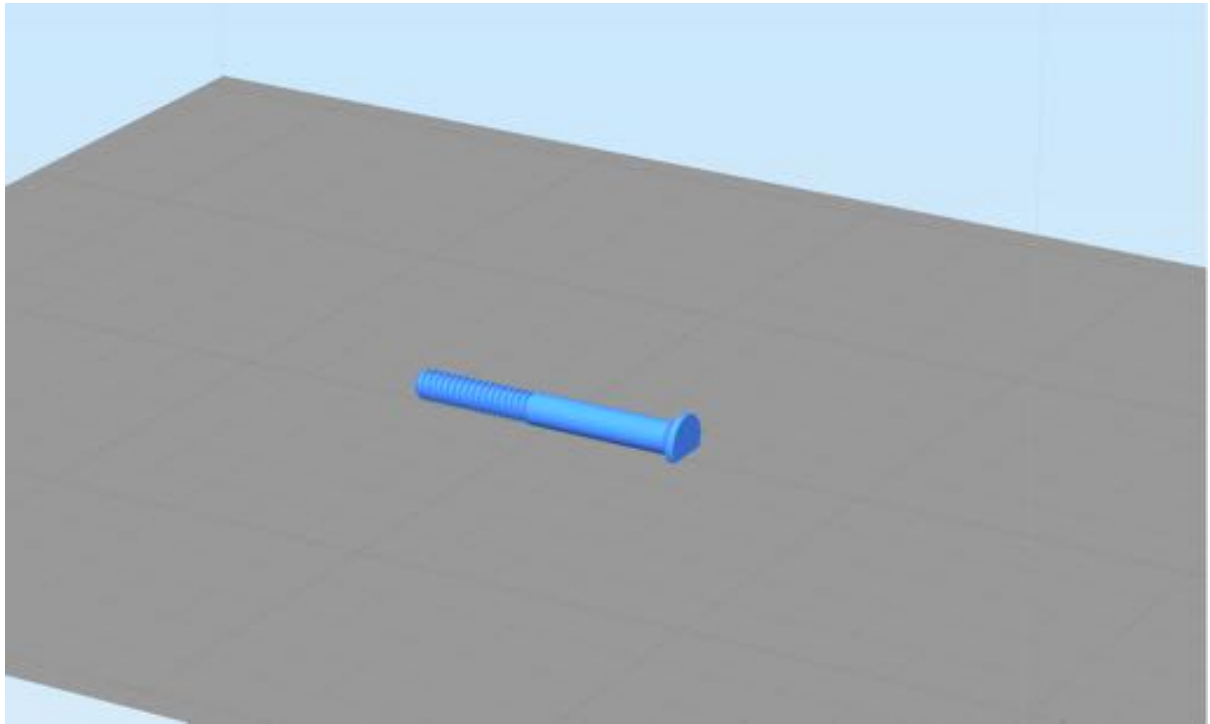


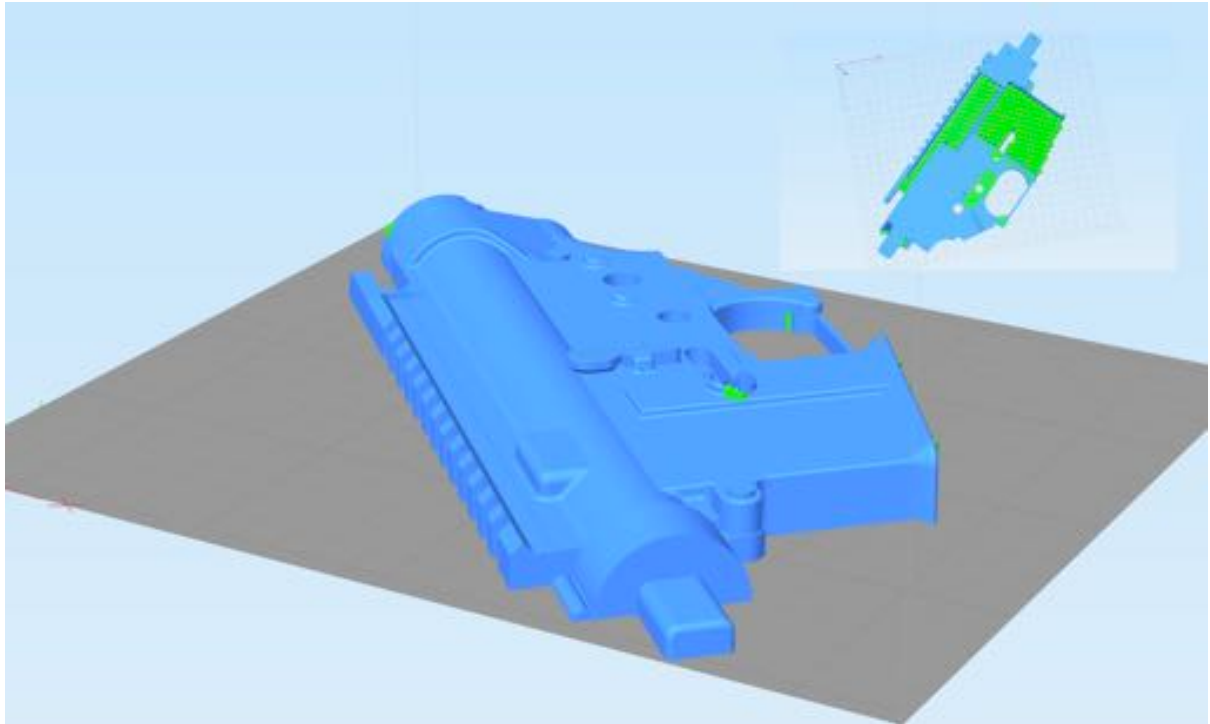







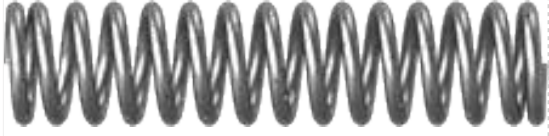
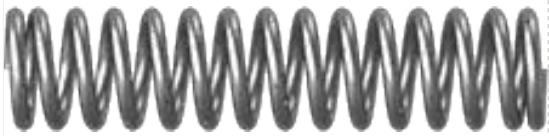








Hardware

<p>HEX SOCKET CAP</p>  <p>M3 x 12</p>	<p>Qty. 1</p>	<p>H1</p>
<p>HEX SOCKET CAP</p>  <p>M3 x 25</p>	<p>Qty. 1</p>	<p>H2</p>
	<p>5x12mm compression spring</p> <p>Qty. 1</p>	<p>H3</p>
	<p>7x33mm compression spring</p> <p>Qty. 1</p>	<p>H4</p>
	<p>5x25mm compression spring</p> <p>Qty. 1</p>	<p>H5</p>



85x18mm
compression spring

Qty. 1

H6

I purchased an assorted packet of springs from the local hardware store https://www.bunnings.com.au/spring-assortment-century-no1_p3969419



Before assembly

Before assembly it is important to do some post printing work on the parts to ensure they fit well together due to the very tight tolerances to ensure a nice snug fit, not too tight and not too loose.

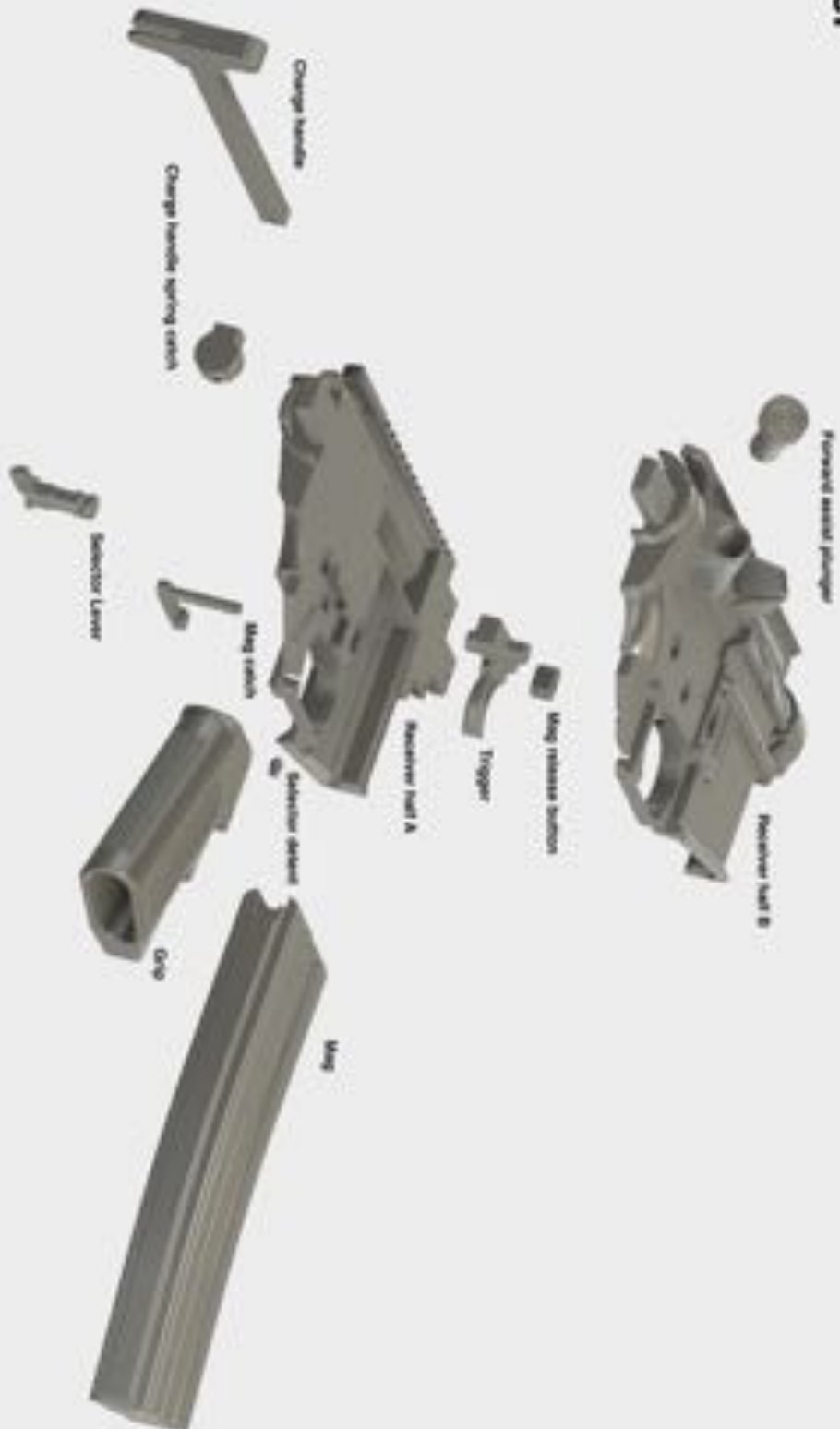
All holes should be uniform and their corresponding parts fitted and tested. This can be done by using a drill bit and twisting it by hand through the holes or with jewellers files.

The edges that were in contact with the print bed may need to be sanded or filed to take any elephant footing from the first layer off of them.

All threaded parts will need to be mated with their corresponding part gently start the two threaded parts to gather ensuring they are not cross threaded, then gently twist the threads together just a fraction and then back it off, repeat this twisting on then backing off until the parts are entirely threaded together. Then they may still need to be screwed and unscrewed multiple times to lap and mate the parts. Using some water based lubrication can also help this process. Do not allow the parts to become hot from the friction as this will melt the threads.



Receiver





Rear sight



M4 Carbine

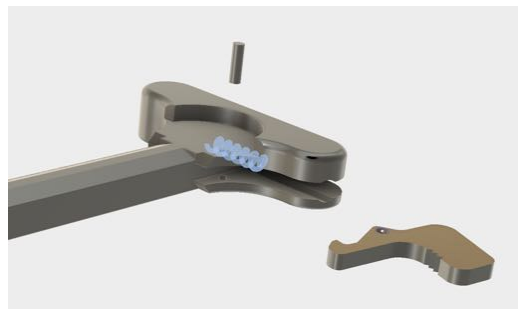


Charging handle assembly

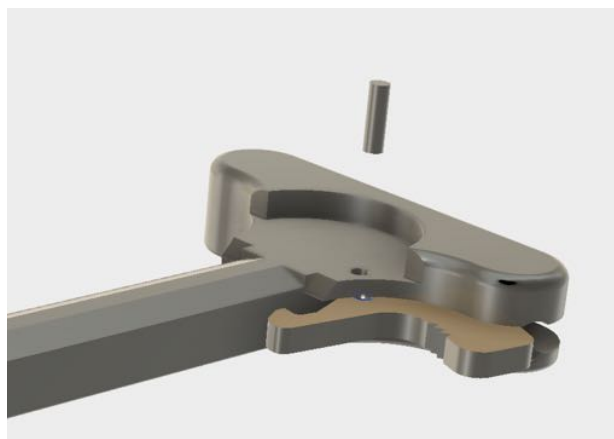
1. Take the spring catch and share handle and use screw H1 to attach the spring catch to the charging handle



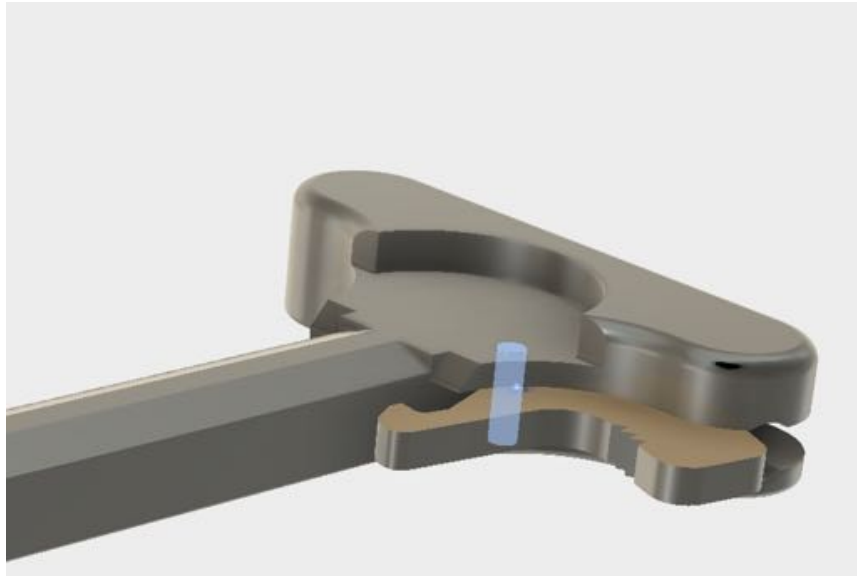
2. Insert the spring into the cut out for the charging handle latch



3. Insert the charging hand latch into the slot pushing down the spring

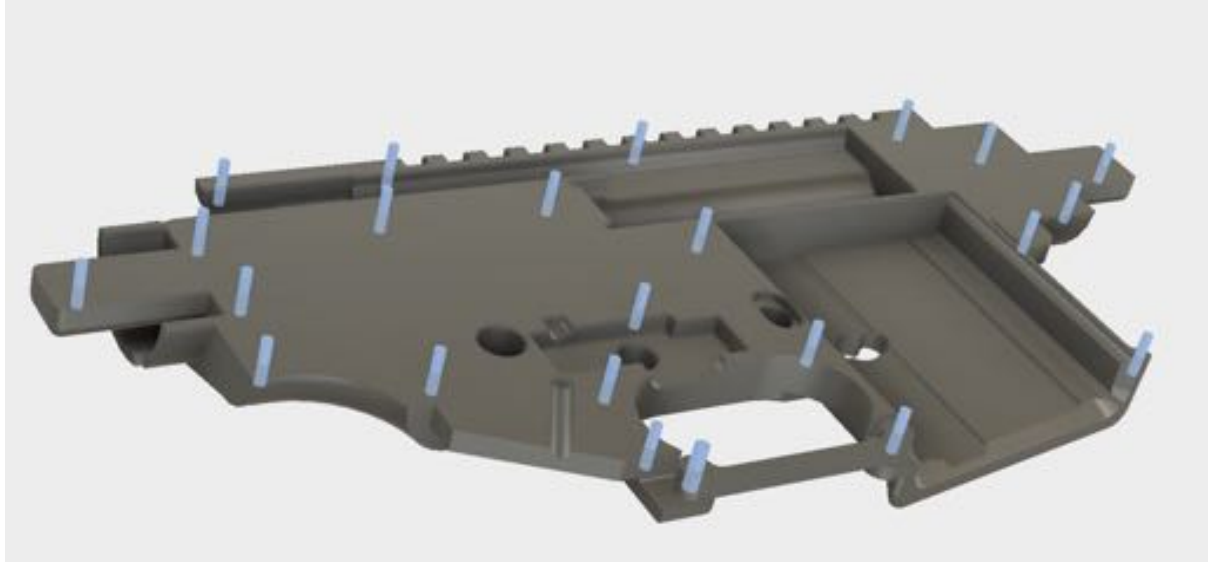


4. insert the pin (5mm length of 1.75mm filament)



Receiver assembly

1. Take one half of the Receiver and insert 23 Pins cut from 1.75mm filament into all the pin holes.



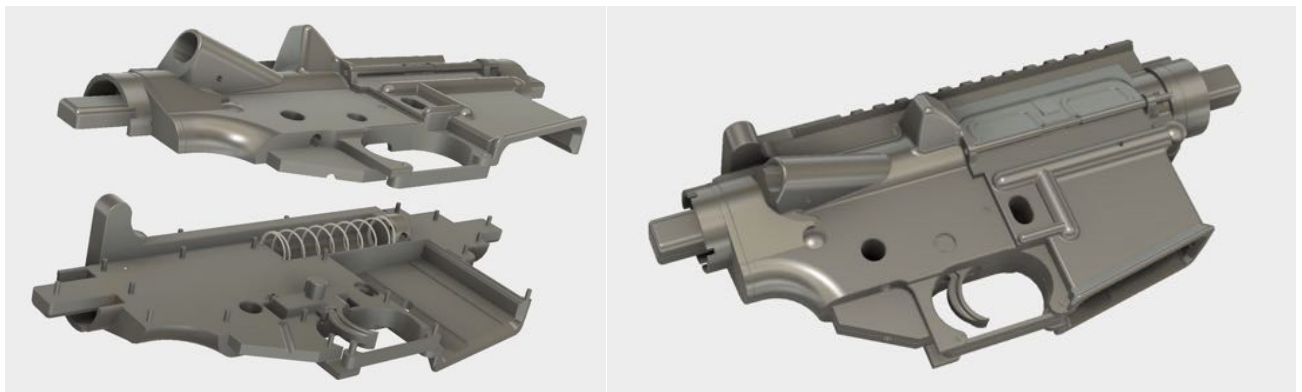
2. Place the Charging handle and main spring H6 into the cutout as shown in the picture.



3. Place the Trigger and trigger spring into the slots in the receiver



4. Place the top half of the receiver down over the lower half making sure the pins line up with their holes and that the charge handle, trigger and springs all stay in place. This can be difficult. You can also use some super glue for a permanent assembly but it is not necessary



5. Insert the selector lever into its hole



6. insert the selector lever detent and spring into their hole on the other side.



7. Place the grip onto the receiver this will hold the Detent and detent spring in place and then insert the Grip screw to hold the grip in place.



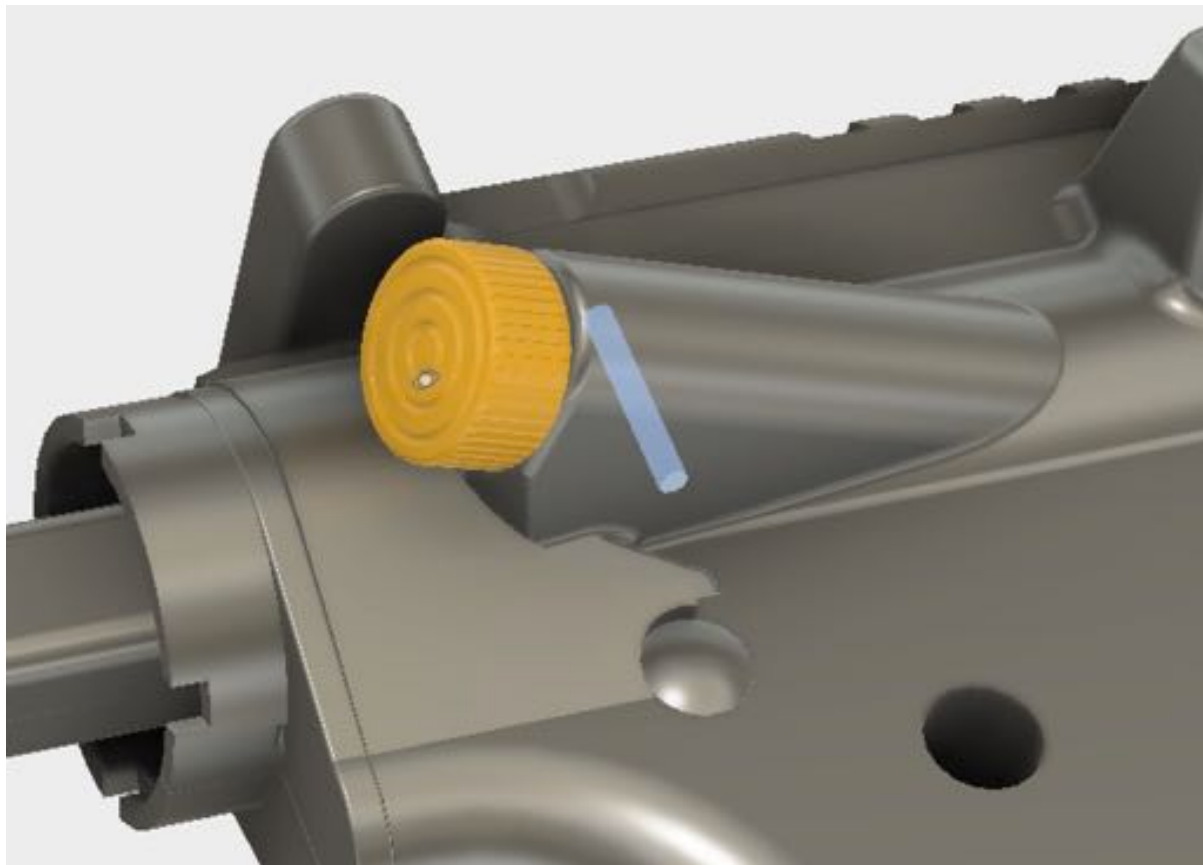
8. Insert the forward assist plunger spring into the hole making sure it sits in the hole for the spring inside the main hole.



9. Insert the forward assist plunger taking note of the cut out on the plunger this must line up with the hole for the assembly pin.



10. Push the forward assist plunger all the way in then insert the assembly pin. You can then let go of the Plunger as it will be held in place by the pin



11. insert the mag catch sting into its hole



12. insert the mag catch button into the hole over the spring and push it all the way into the receiver until it stops



13. Insert the Mag Catch into the hole on the opposite side while holding the mag button pressed all the way in screw the Mag catch as far into the button as you can and then line it up with the cut out slot for the catch and let go of the mag button



Stock Assembly

1. Take the stock pin and cap and screw them together. You can use some super glue to make it a permanent assembly.



2. take the stock and drop the spring through the hole in the top down into the hole below



3. slide the Stock Latch over the pin, while holding the pin depressed with your finger or a tool.

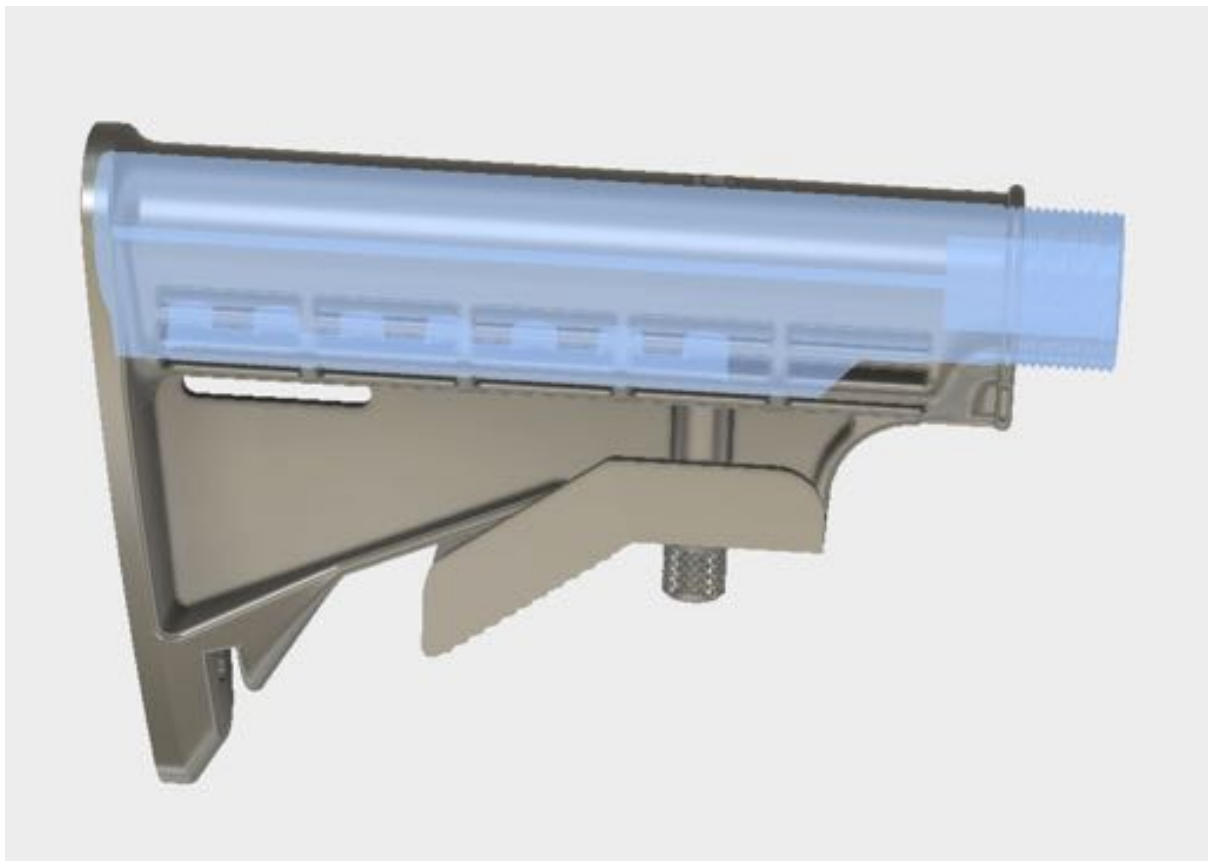


4. While holding the pin depressed screw the thumb nut onto the pin to hold everything in place. Only screw the thumb nut down until it is level with the thread so that the pin sticks out inside the stock.

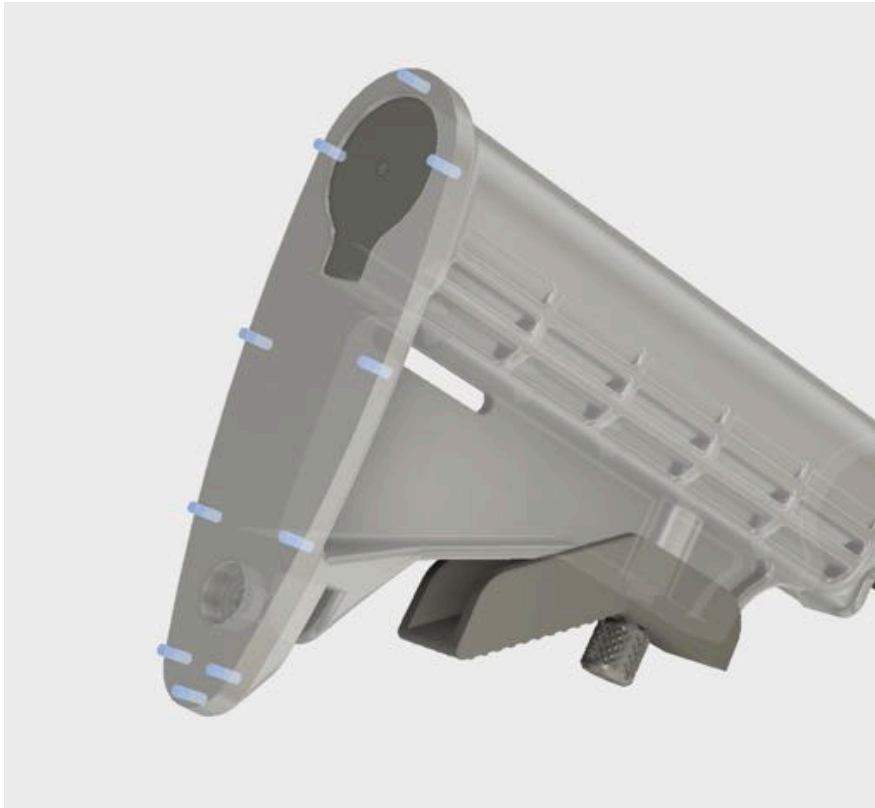




5. using the stock latch to operate the pin pull down on the latch to allow the buffer tube to enter the slide. You can now squeeze the stock latch to operate the pin and make stock adjustments



6. Optionally you can attach a butt pad printed in TPE, insert pins cut from 1.75mm Filament.



7. then attach the butt pad using the pins for alignment some super glue may be necessary



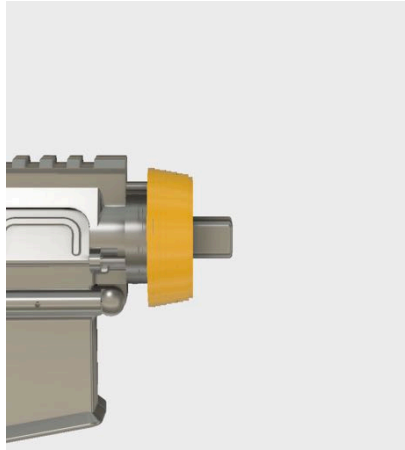
Attaching the Stock to the Receiver

1. Press the stock onto the boss on the receiver firmly until it is seated all the way in. Optionally super glue can be used for a permanent assembly.



Barrel Assembly

1. Slide the Delta ring down over the boss on the end of the receiver



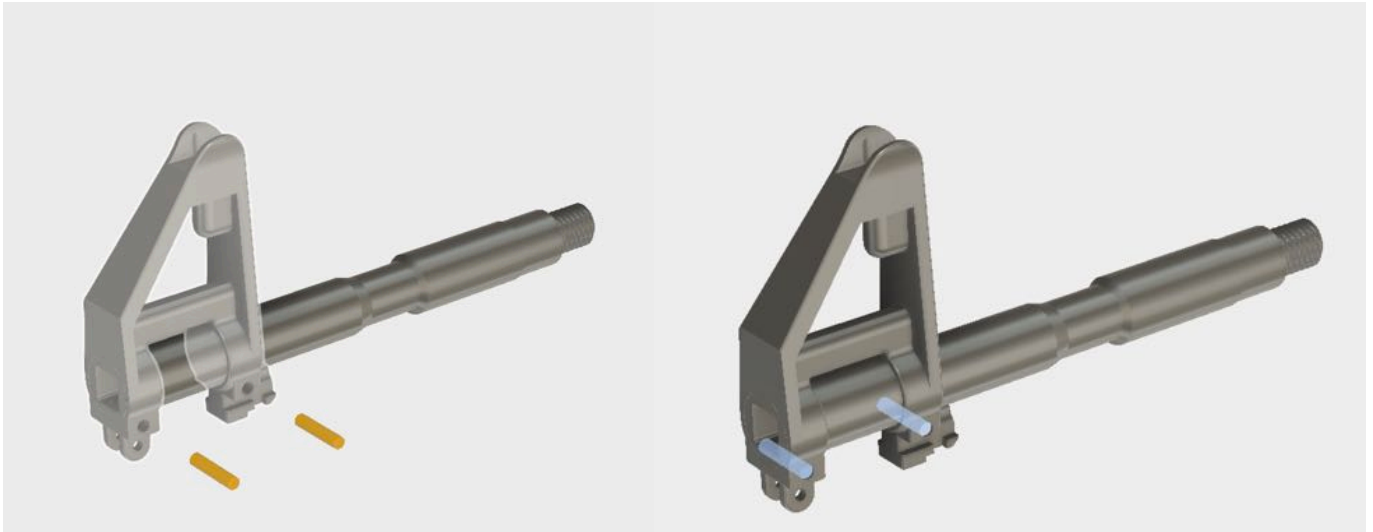
2. Slide the Hand guard down over the boss and on top of the Delta Ring



3. Slide the Front sight onto the Barrel



4. Align the slots on the barrel with the Holes on the Front sight and then insert the Front sight pins to hold the Front sight onto the barrel and stop it from moving



5. screw the muzzle brake onto the end of the barrel



6. insert a pin into the front sight post and then glue the front sight post onto of the front sight using the assembly pin for alignment

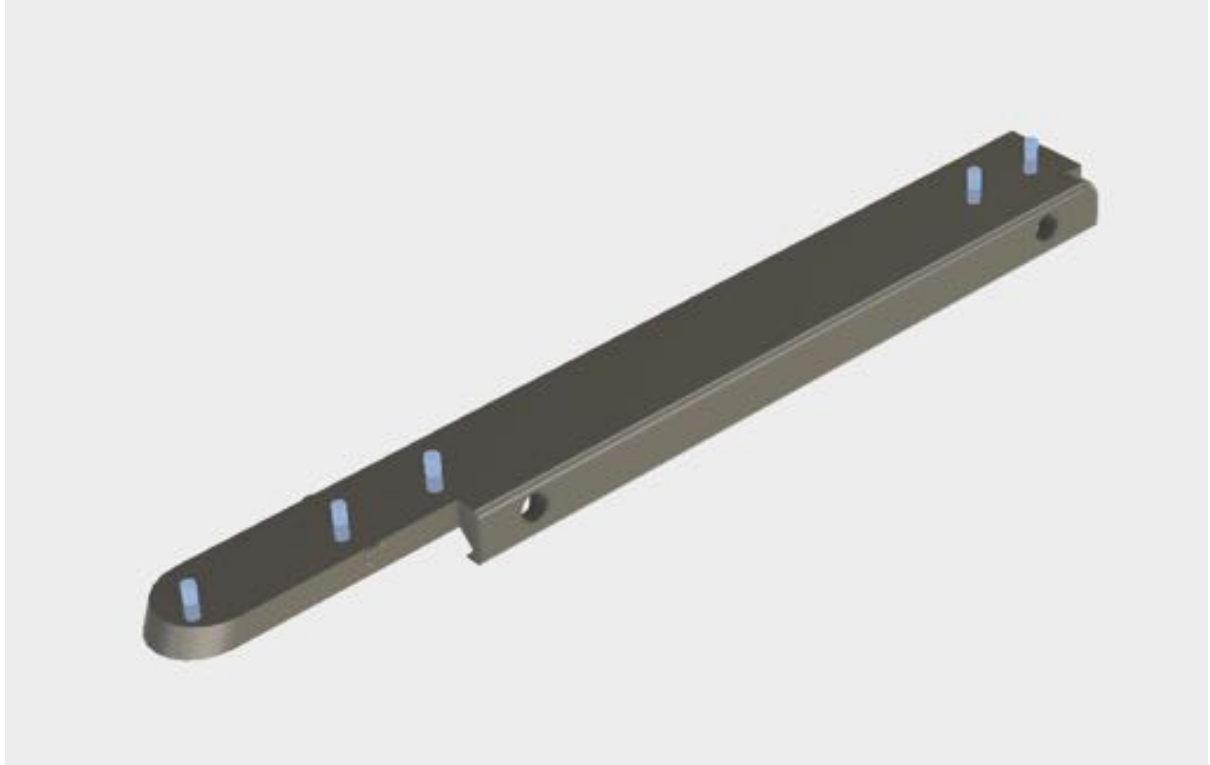


7. slide the Barrel onto the boss on the hand guard. Optionally super glue can be used



Rear sight/Handle Assembly

1. insert pins cut from 1.75mm filament into the Rail Clamp



2. Glue the Rear Sight/Handle onto the rail clamp using the pins for alignment



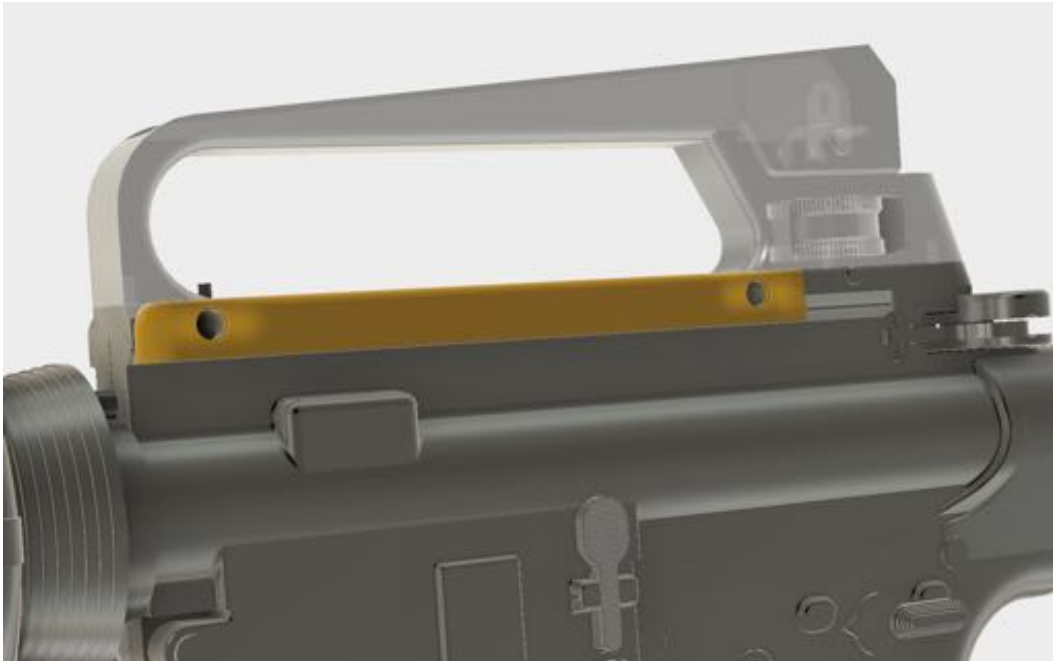
3. insert pins into the windage knob and glue it to the side of the Rear Sight/Handle using the Pins for alignment



4. Allow the Glue sufficient time to set. using some clamps to hold everything tightly together while the glue dries is a good idea
5. Place the Assembled rear sight onto the receivers accessory rail



6. Place the Clamping bar on to the side of the rear sight and insert the Cross bolts



7. Screw the Thumb nuts onto the cross bolts to hold everything together



Insert The Magazine and test everything

Insert the magazine into the receiver it should be captured by the mag catch and only come out when the mag release button is pressed



Pull the charging handle using your index and middle finger, as you pull the charging handle latch should move to unlock the handle and allow it to be pulled back just like on a real M4. Pull the handle all the way back and let it go. It should snap back to its home position

The forward assist luger can be pushed in and then spring back on its own. The Trigger should be able to be pulled and spring back.