



Pinc' Open

Gripper low cost & open source

Assembly Guide - v1.0

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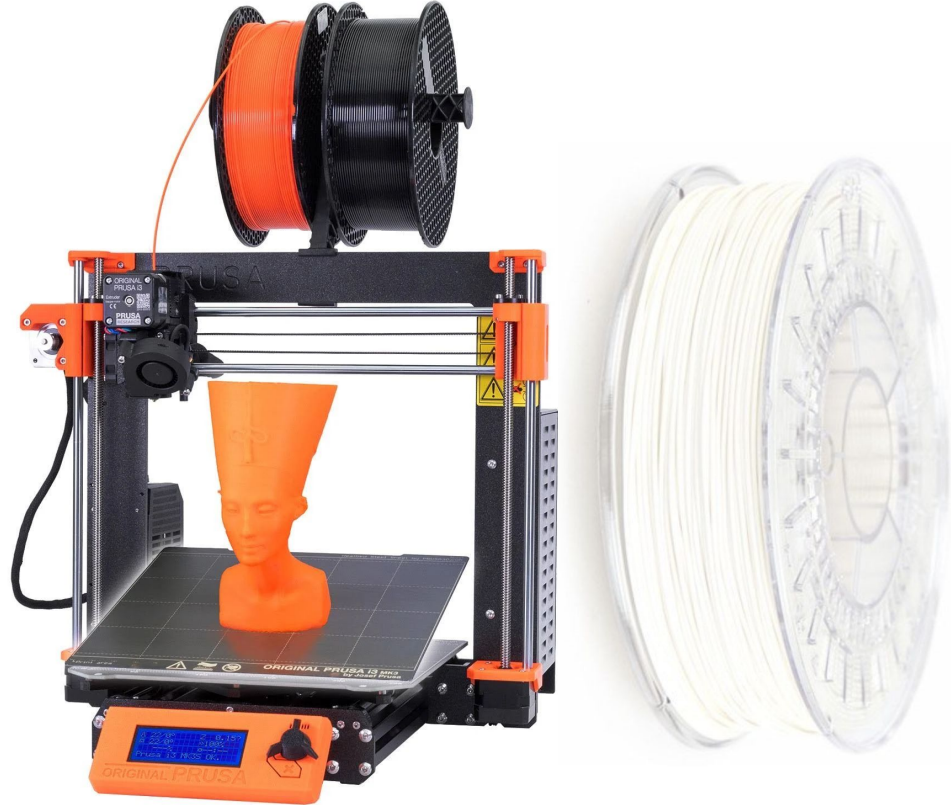


3D Print

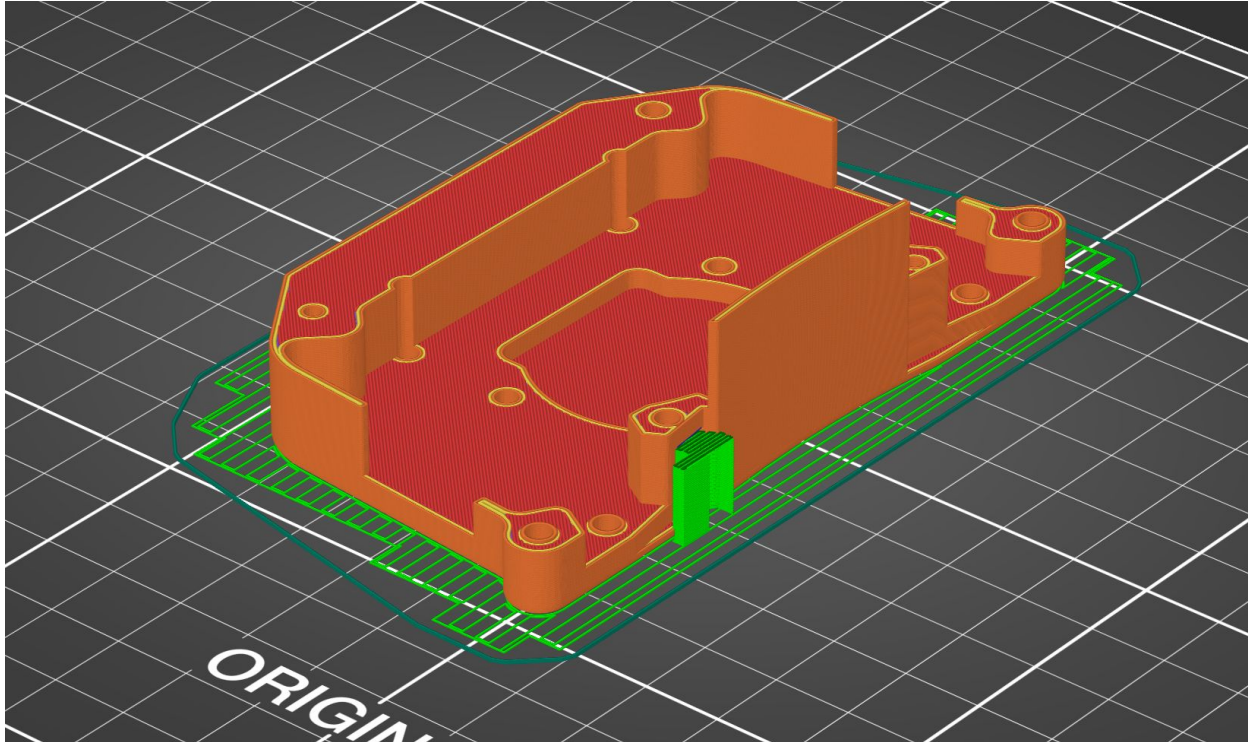
Printer used for this
tutorial :

Prusa i3 MK3S+ 0.4mm

Colorfabb Filament
1.75mm

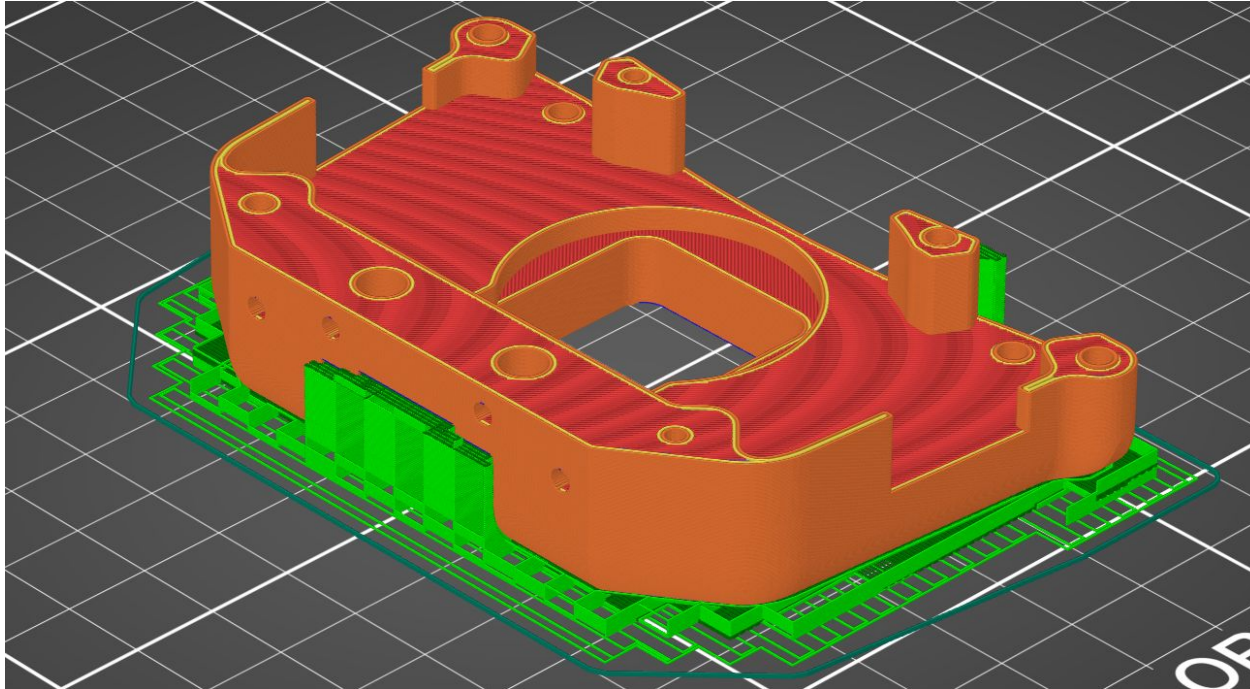


3D Print - 20% infill & Support on build plate only



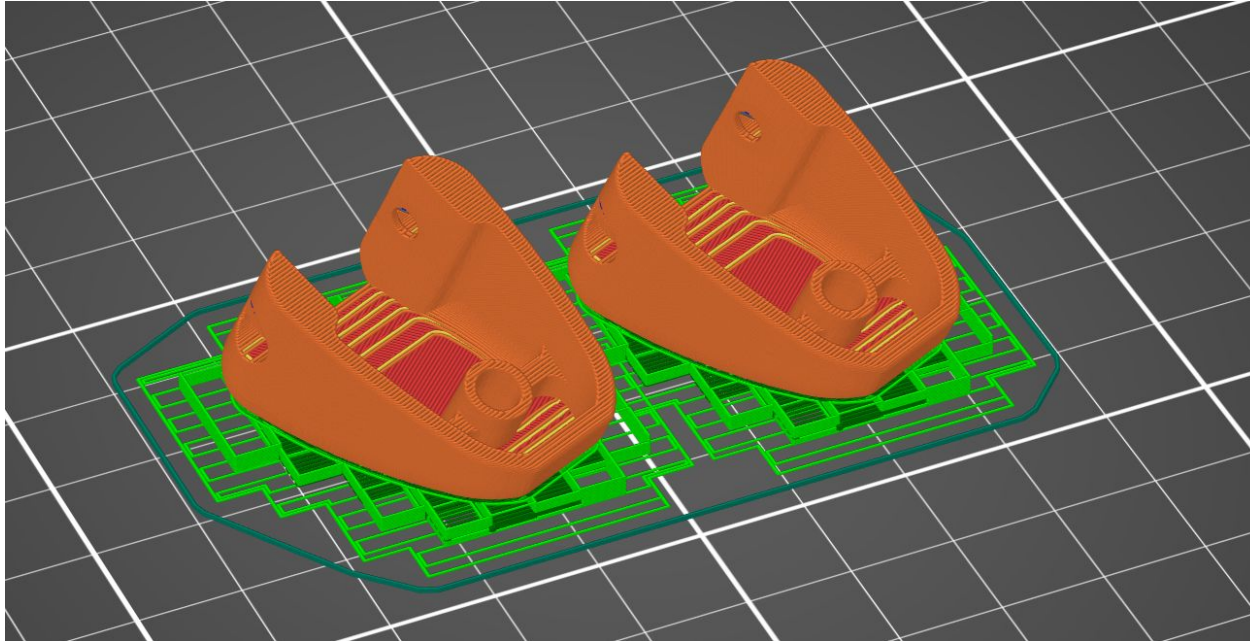
PincOpen - Bottom_Plate

3D Print - 20% infill & Support on build plate only



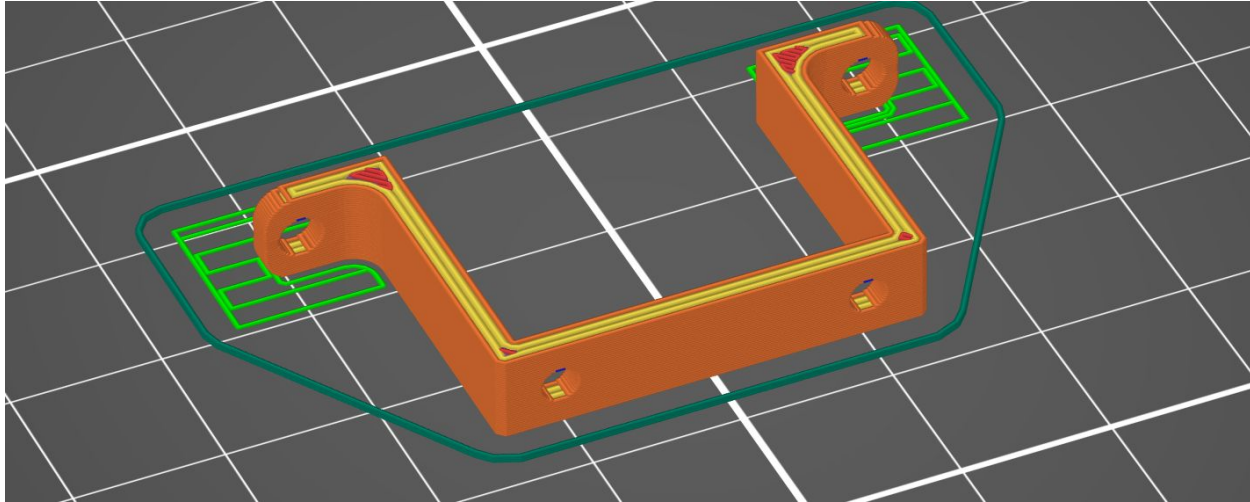
PincOpen - Top_Plate

3D Print - 20% infill & Support on build plate only



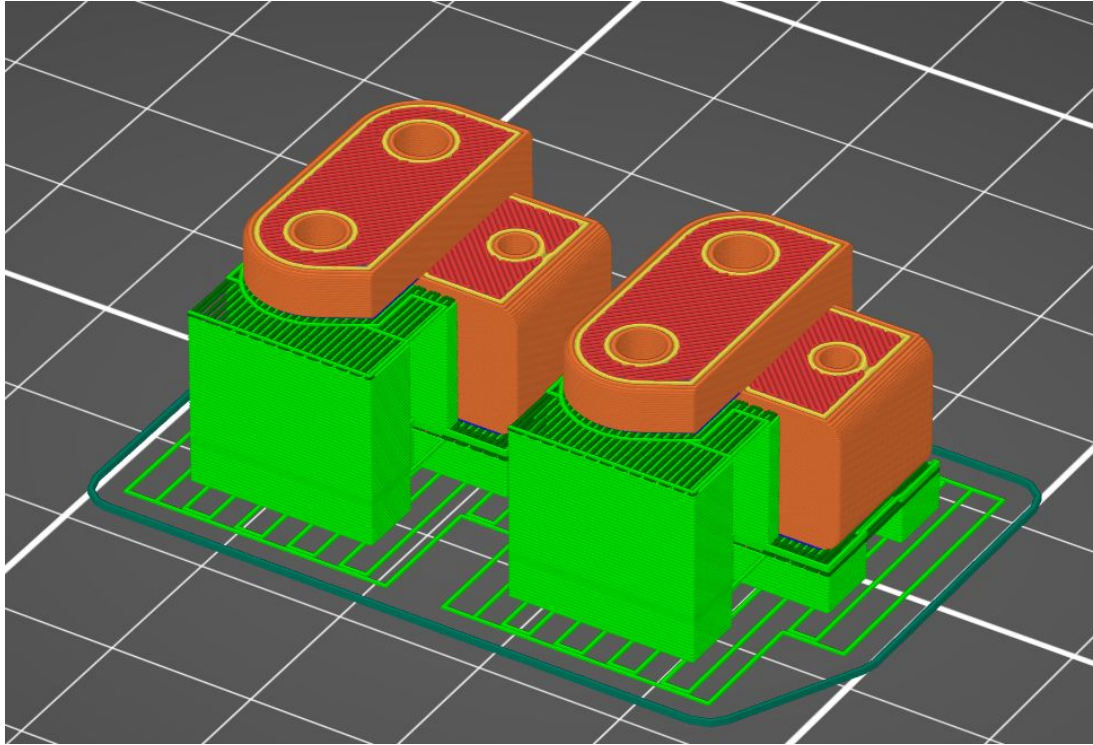
PincOpen - Distal_shell

3D Print - 20% infill & Support on build plate only



PincOpen - Motor_flange

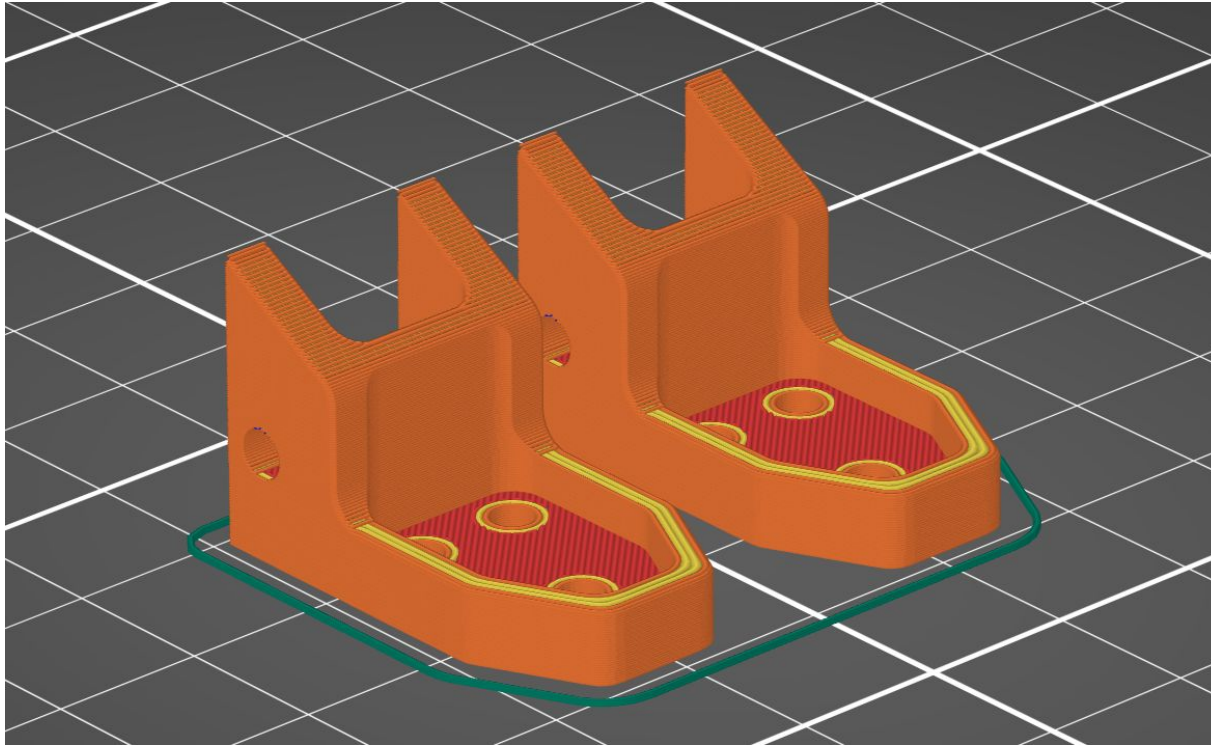
3D Print - 20% infill & Support on build plate only



PincOpen - Distal_Rod

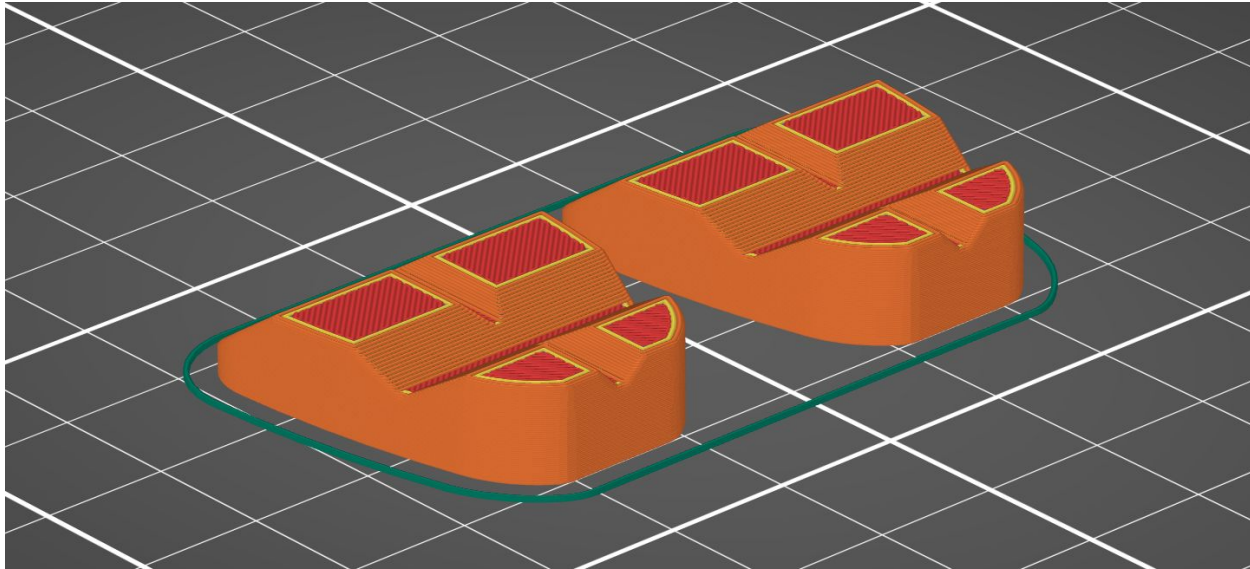
Supports will be a bit tricky to remove, but necessary to have nice circular holes.

3D Print - 20% infill & No Support



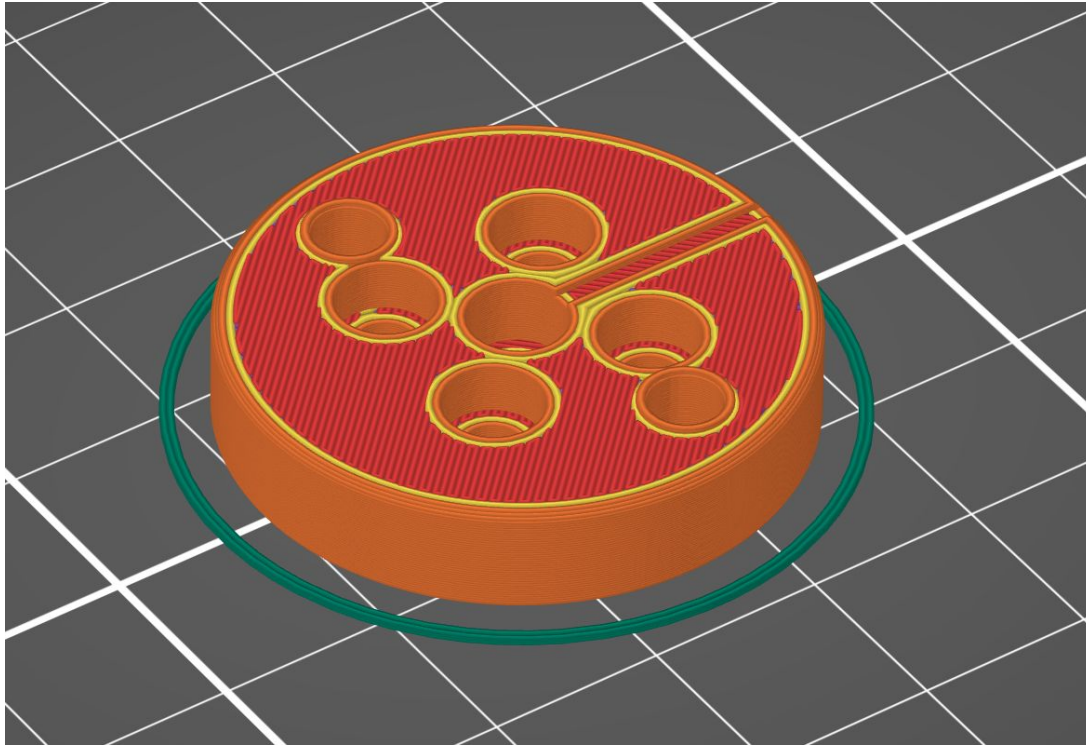
PincOpen - Removable_Tip

3D Print - 20% infill & No Support



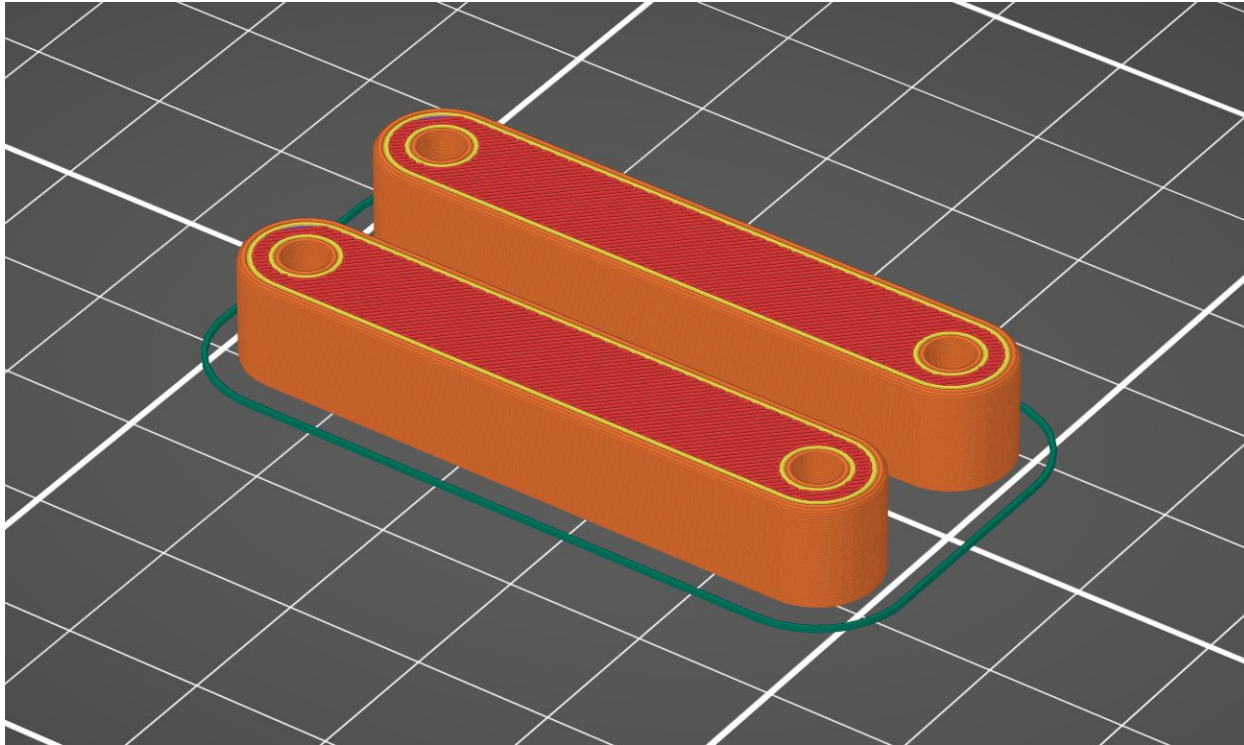
PincOpen - Tip_Support

3D Print - 20% infill & No Support



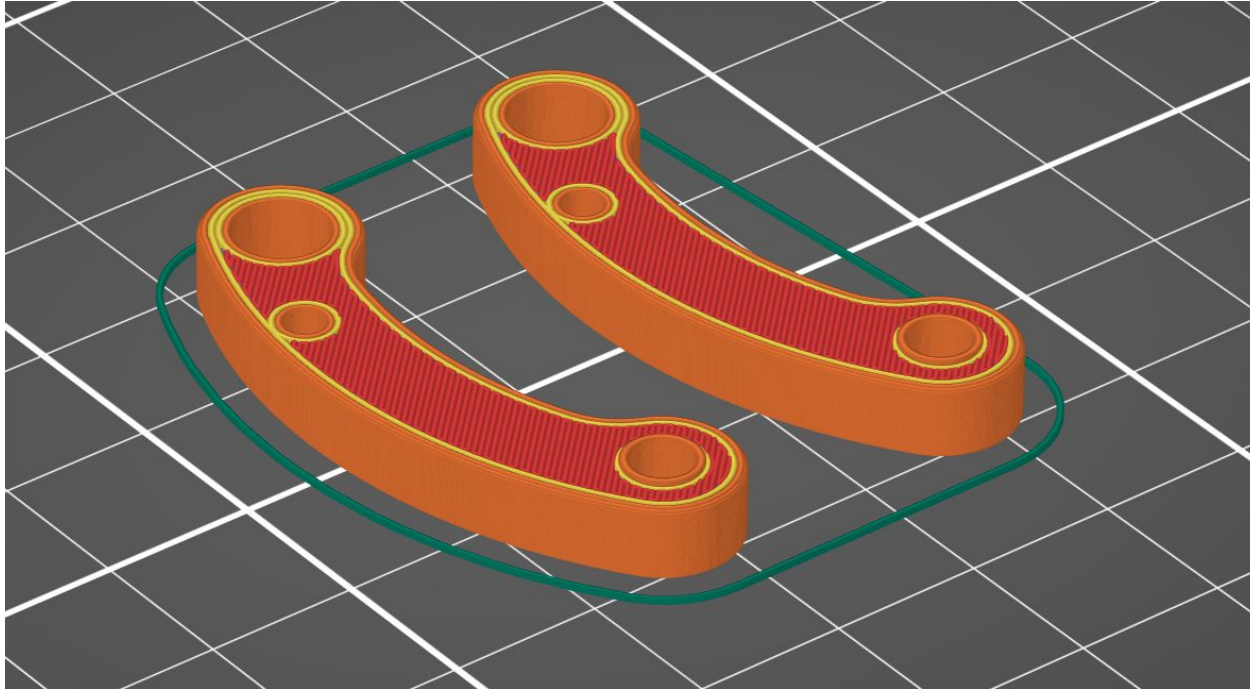
PincOpen - Cam

3D Print - 20% infill & No Support



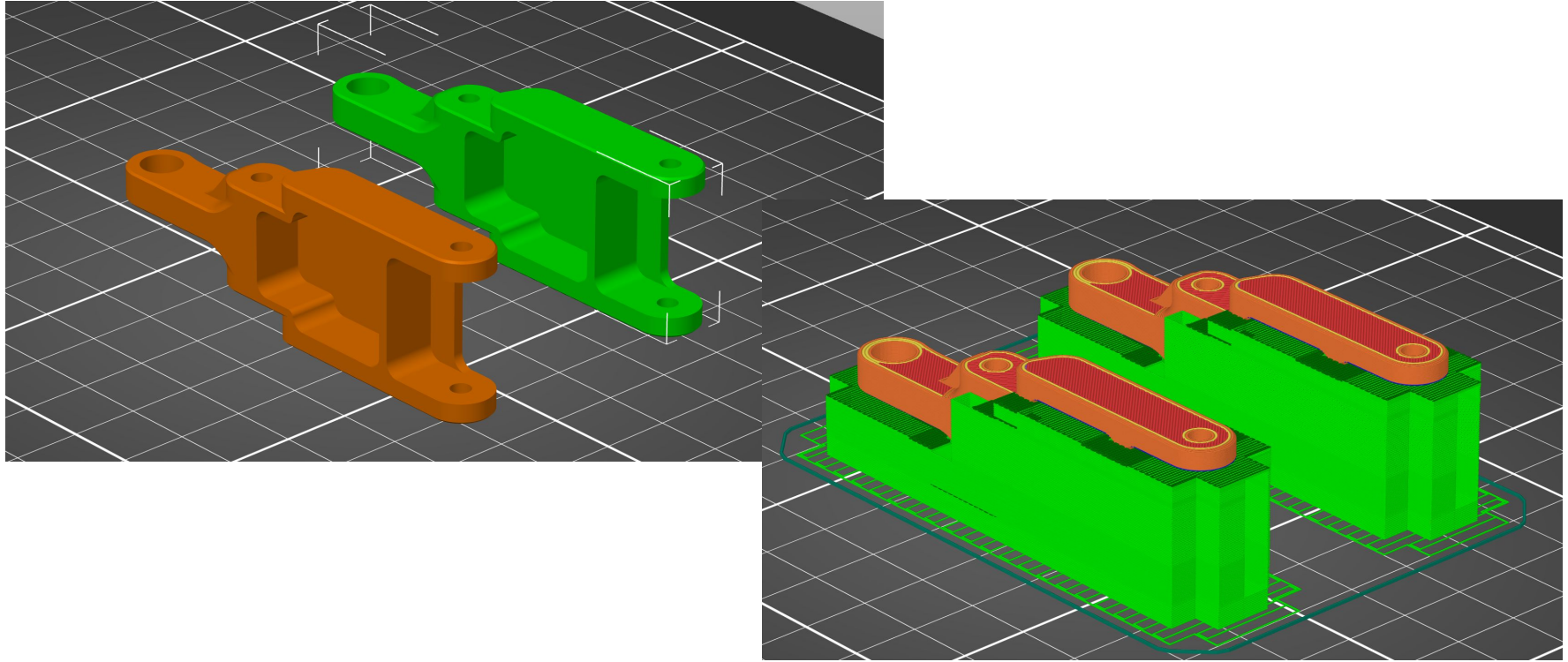
PincOpen - External_Rod

3D Print - 80% infill & No Support



PincOpen - Driving_Rod

3D Print - 80% infill & Support Everywhere



PincOpen - Internal_Rod

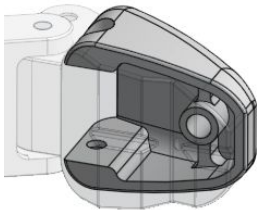
Tools

- Several Phillips screwdrivers
- Small Flat Screwdriver
- Files & 3mm drill
- Cutter
- Strong Glue
- Adjustable Pliers
- (optional) Chatterton Tape
- (optional) Loctite 243 & 648

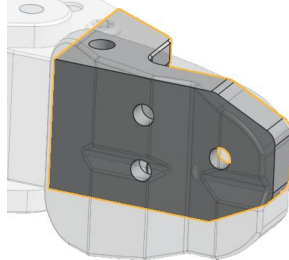
Material Preparation

Custom Parts

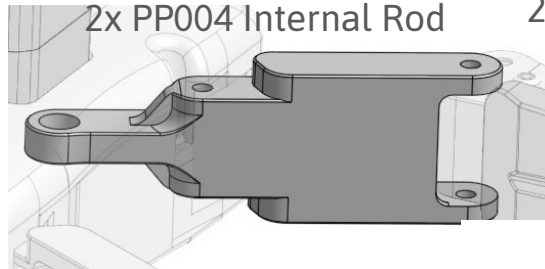
2x PP010 Distal Shell



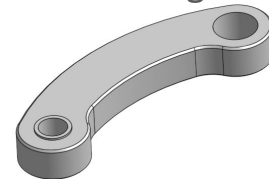
2x PP008 Removable Tip



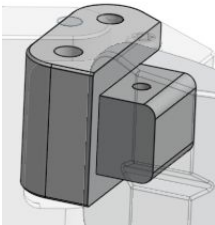
2x PP004 Internal Rod



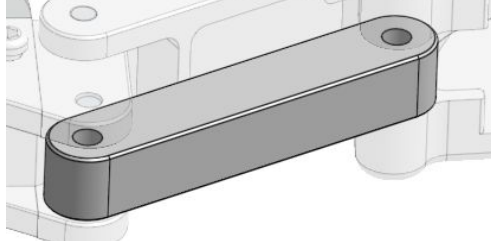
2x PP007 Driving Rod



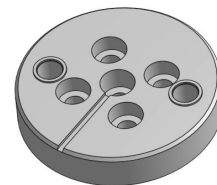
2x PP006 Distal Rod



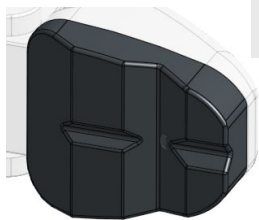
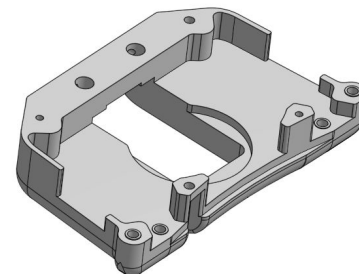
2x PP005 External Rod



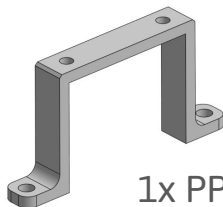
1x PP002 Cam



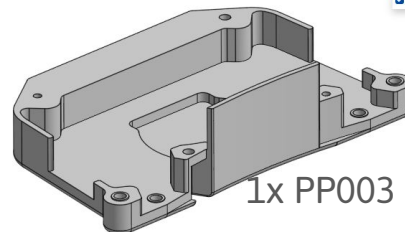
1x PP001 Top Plate



2x PP009 Tip Support



1x PP011 Motor Flange

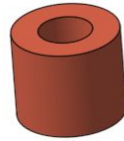
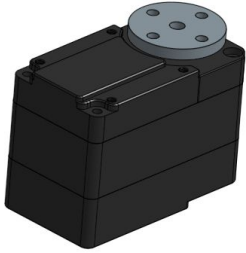


1x PP003 Bottom Plate

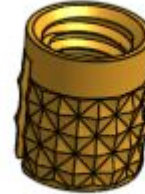
Material Preparation

Standard Parts

1x STD001 Feetech STS3215



4x STD006 plain bearing
3x6x5 mm



4x STD008 Brass Inserts



4x STD003 Pin 3 x 16 (h6)



4x Screws M3x0.5x10

14x STD005 Thermoplastic Screw
2.5x6 mm



4x STD004 Pin 3 x 24 (h6)

Pre-Assembly

Motor Preparing

First configure the motor.
To do so, use Lerobot library :

<https://github.com/huggingface/lerobot>

Then power on the motor and connect the usb interface board.

Finally run the following commands and replace <ID> by 6:

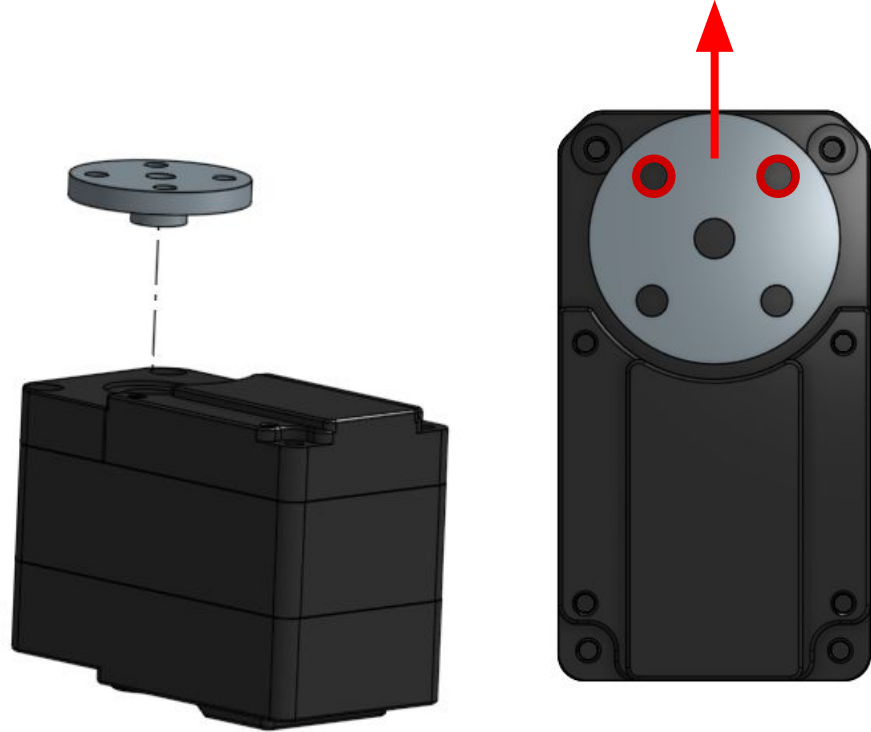
```
python lerobot/scripts/configure_motor.py --port /dev/ttyACM0 --brand  
feetech --model sts3215 --baudrate 1000000 --ID <ID>
```

The motor rotates and place itself to its “zero position”

Pre-Assembly

Motor Preparing

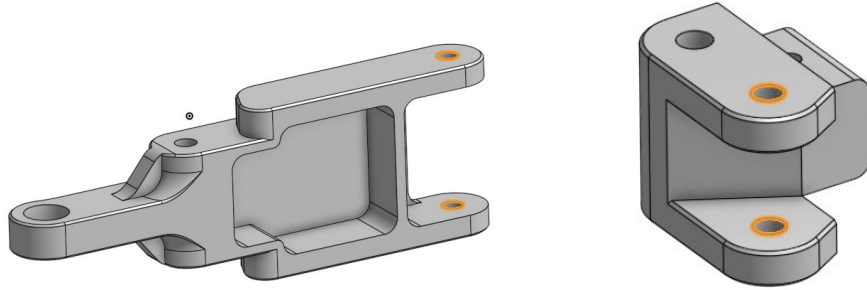
Force the spreader bar onto the motor, using the screw to tighten.
2 holes must face upwards, not one.



Pre-Assembly

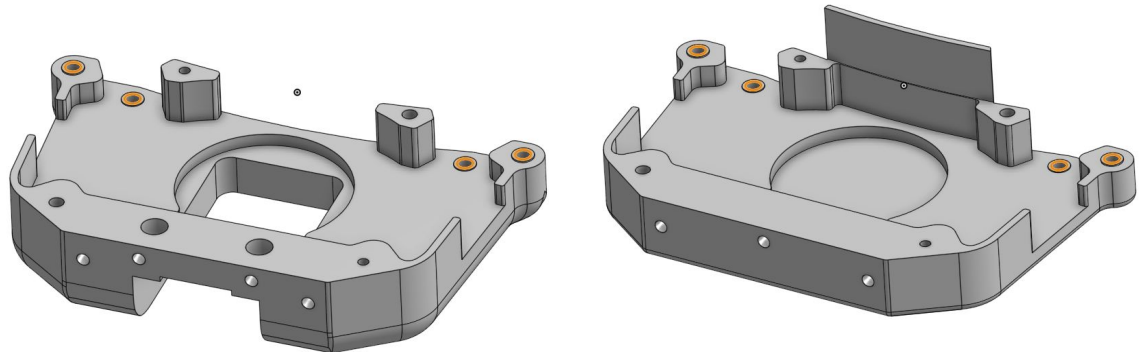
Filing & Re-drilling

Check that the pins fit securely and are held tight in the parts shown :



If it's too tight, use a file or a drill to give some backlash. Not too much, it must be well tightened.

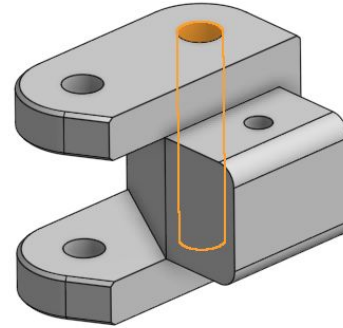
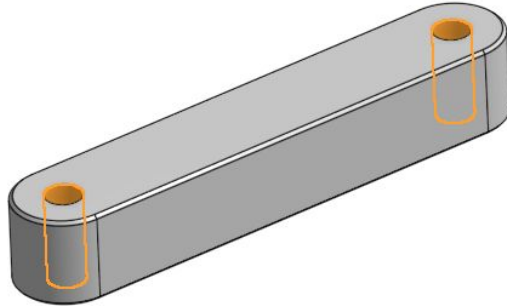
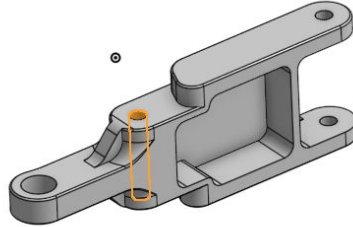
If it's too loose, use will need glue in further steps.



Pre-Assembly

Filing & Re-drilling

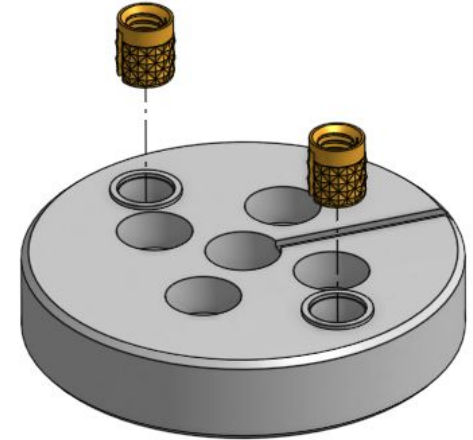
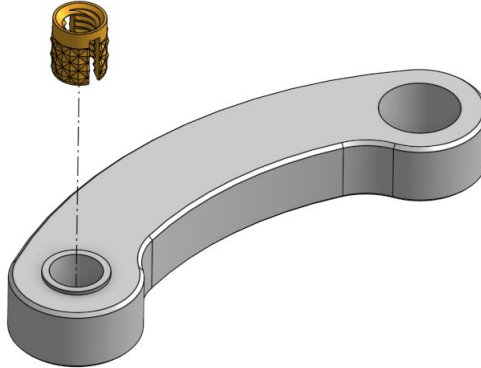
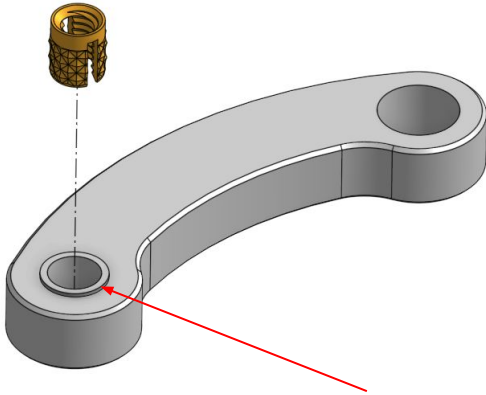
Check that the pins fit and rotate easily and are not held in the parts shown :
If it's not loose enough, use a drill.



Pre-Assembly

Brass inserts

Insert brass inserts using a soldering iron.
Check that you are on the good side (red arrow)



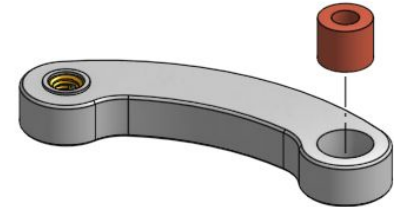
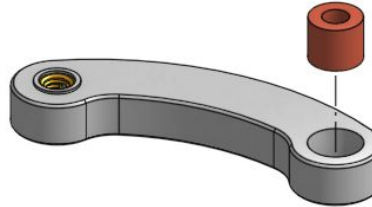
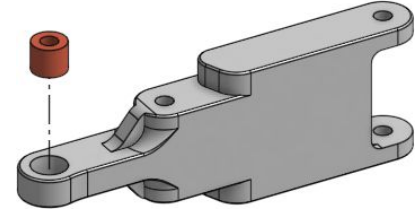
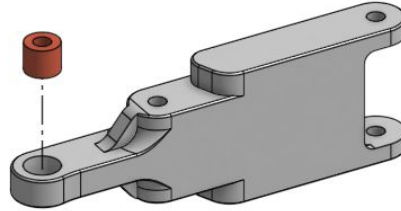
Pre-Assembly

Insert the bearings in the bores provided

The bearing is supposed to fit by forcing with hand, or pressed onto a solid surface. No tool is needed here.

If it's too hard, file or drill the hole a bit and repeat so that it fits tighter.

If the hole is too wide, put a drop of glue.

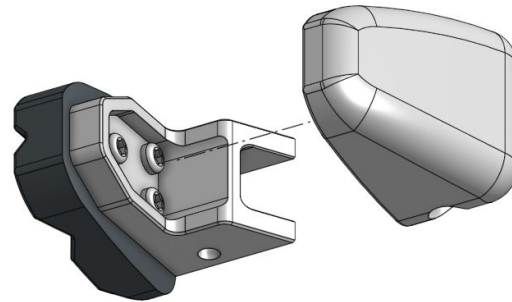
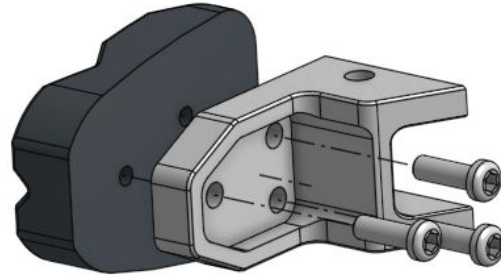


Finger Assembly

Tip Assembly

Use 3x 2.5x6 Thermo screws
To fasten the tip on the distal
rod

Then just press the shell on the
assembly.
It will be securely attached
later.

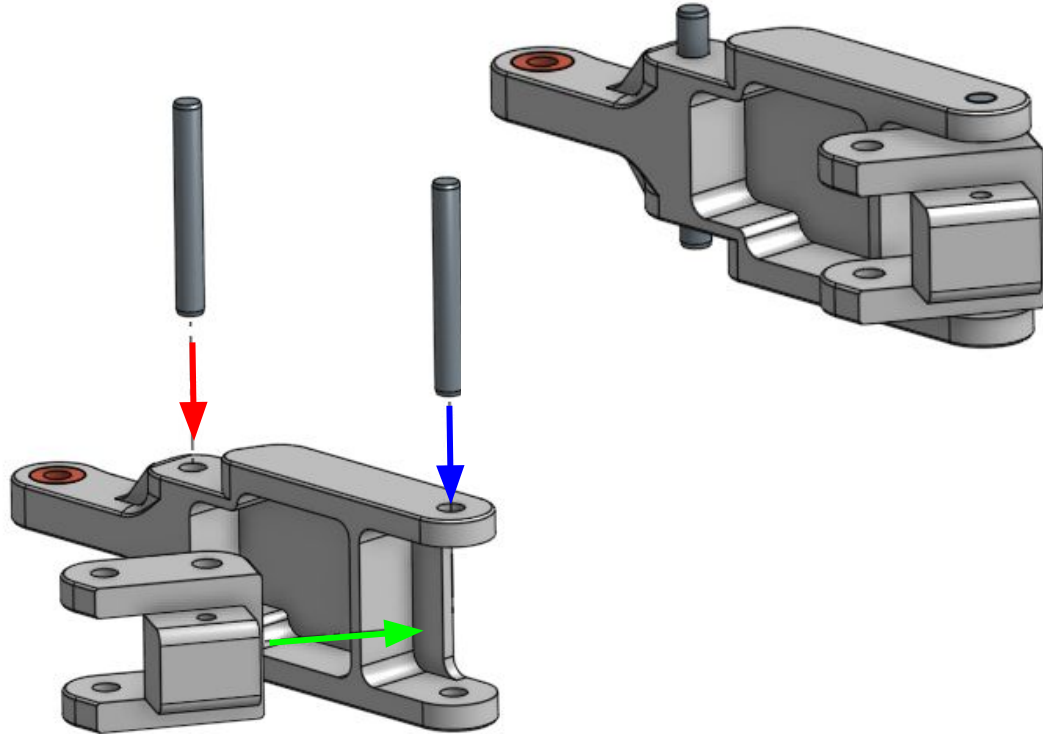


Finger Assembly

Phalanx Assembly

First place a 3x24 Pin in the red hole.

Then put the distal rod as shown on the picture (green).
Then put the other 3x24 Pin (blue)



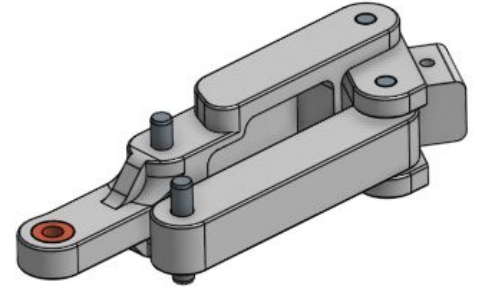
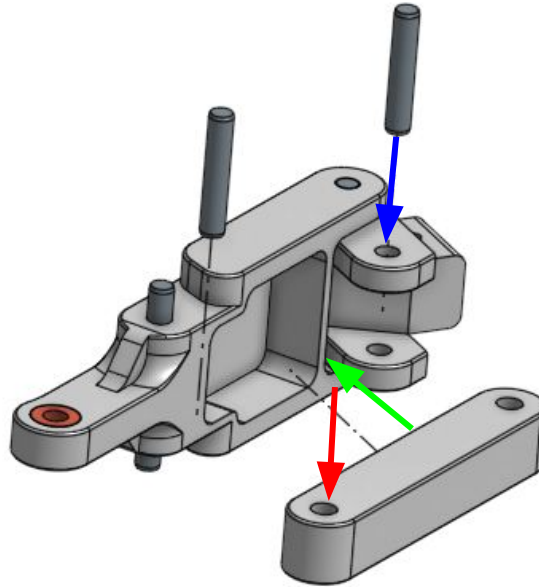
Finger Assembly

Phalanx Assembly

First place a 3x24 Pin in the red hole.

Then put the External Rod as shown on the picture (green). Then put the other 3x24 Pin (blue).

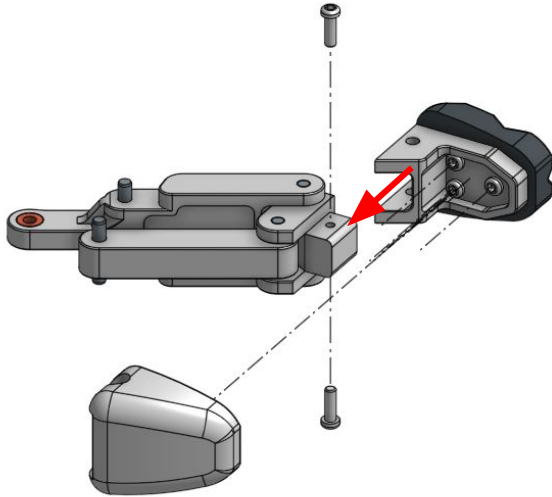
The External Rod must be on the hollow side of the phalanx.



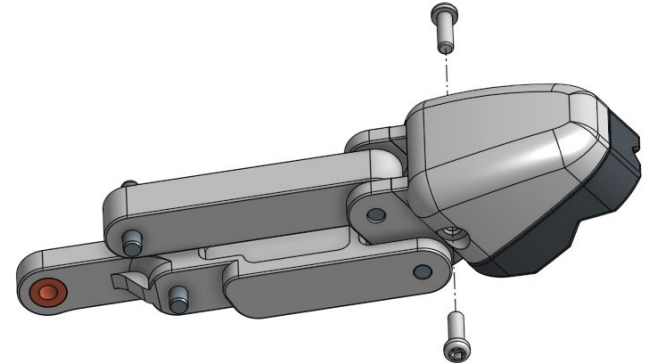
Finger Assembly

Phalanx Assembly

Remove the shell.
Insert the pre-assembled tip on
the dovetail (Red Arrow)



Then replace the shell and
tighten 2x Thermoplastic
2.5x6mm Screws



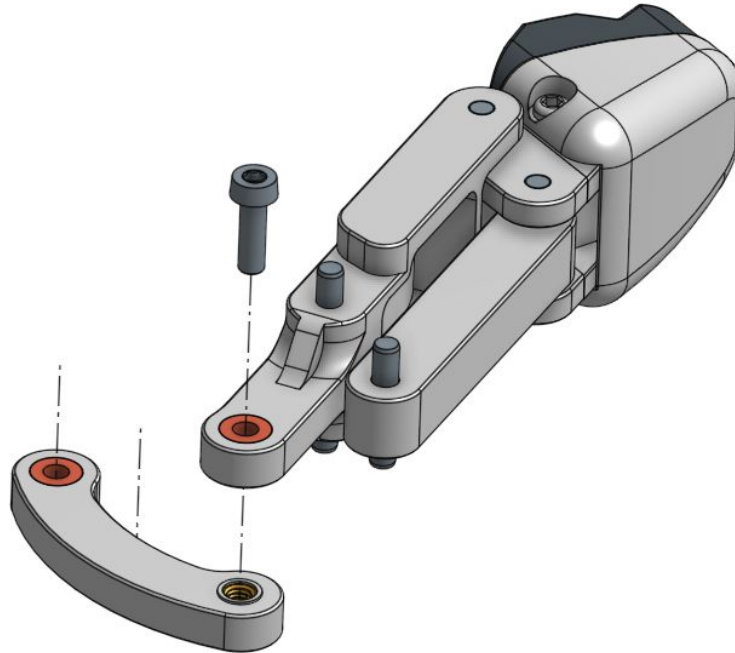
Finger Assembly

Right Finger

For the right finger, the Driving Rod must be placed as shown on the picture.

Use a M3x0.5x10 screw to tighten them and put some loctite 648 to lock it. It should be free to rotate don't tighten it too much. The loctite secures it.

(You can use strong glue if you don't have loctite 648.)



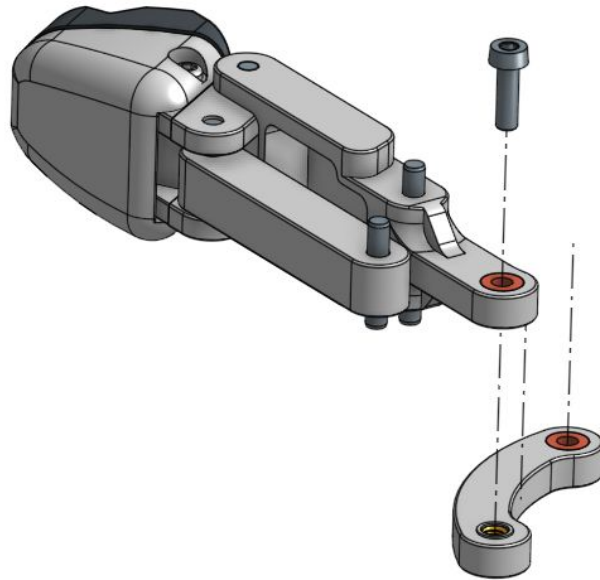
Finger Assembly

Left Finger

For the leftt finger, the Driving Rod must be place as shown on the picture.

Use a M3x0.5x10 screw to tighten them and put some loctite 648 to lock it. It should be free to rotate don't tighten it too much. The loctite secures it.

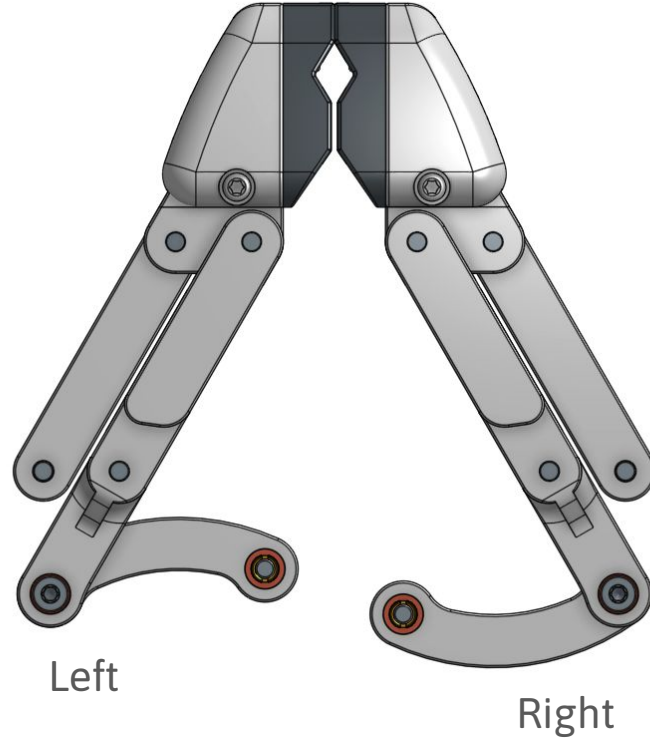
(You can use strong glue if you don't have loctite 648.)



Finger Assembly

Both Fingers

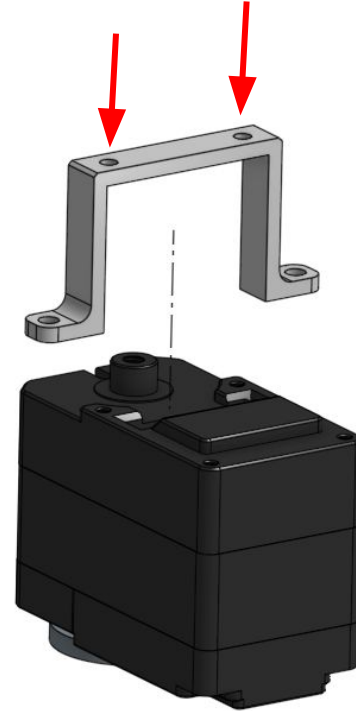
You left and right fingers must look like this:



Palm Assembly

Motor Flange

Use the self-tapping screws provided by Feetech to fix the flange on the motor.



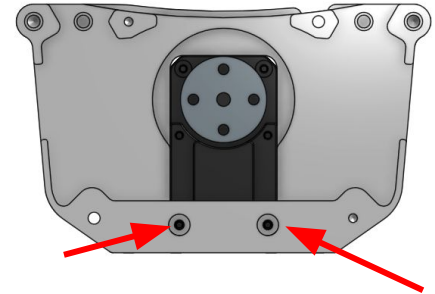
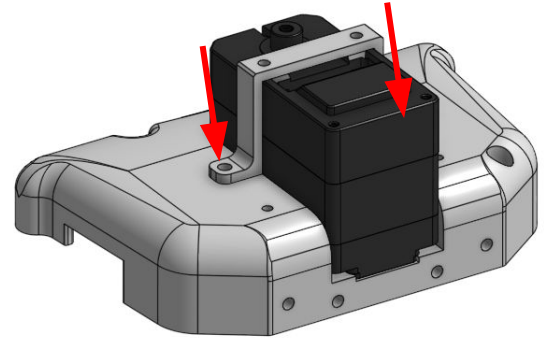
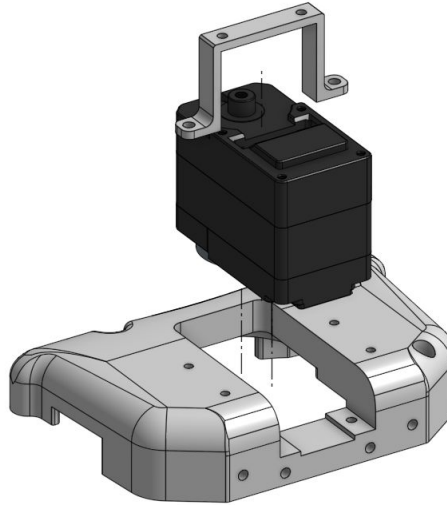
Palm Assembly

Motor on palm

Put the motor in its slot on the palm. You shouldn't have to force much.

Then use 2x thermoplastic 2.5x6mm screws but don't tighten them.

Finally put 2x Feetech self-tapping screws as indicated on the last picture. Tighten them well, then tighten the first 2x screws on the top.



Palm Assembly

Cam Assembly

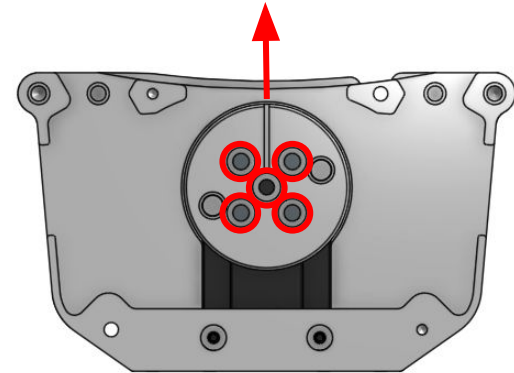
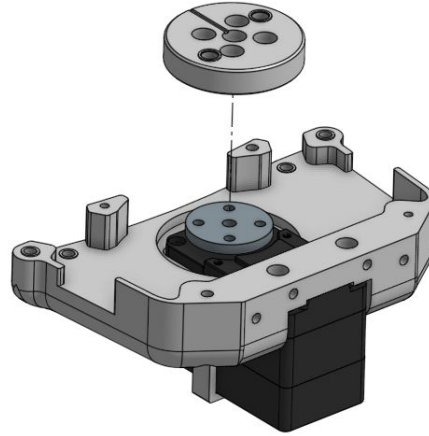
Flip the whole assembly.

The motor should be on its zero position after configuration.

Two holes pointing forward.

Place the cam following the pictures: the mark should be pointing forward too.

Fix it with 5x Feetech screws.
Use Loctite 243 to lock them.



Palm Assembly

Right Finger

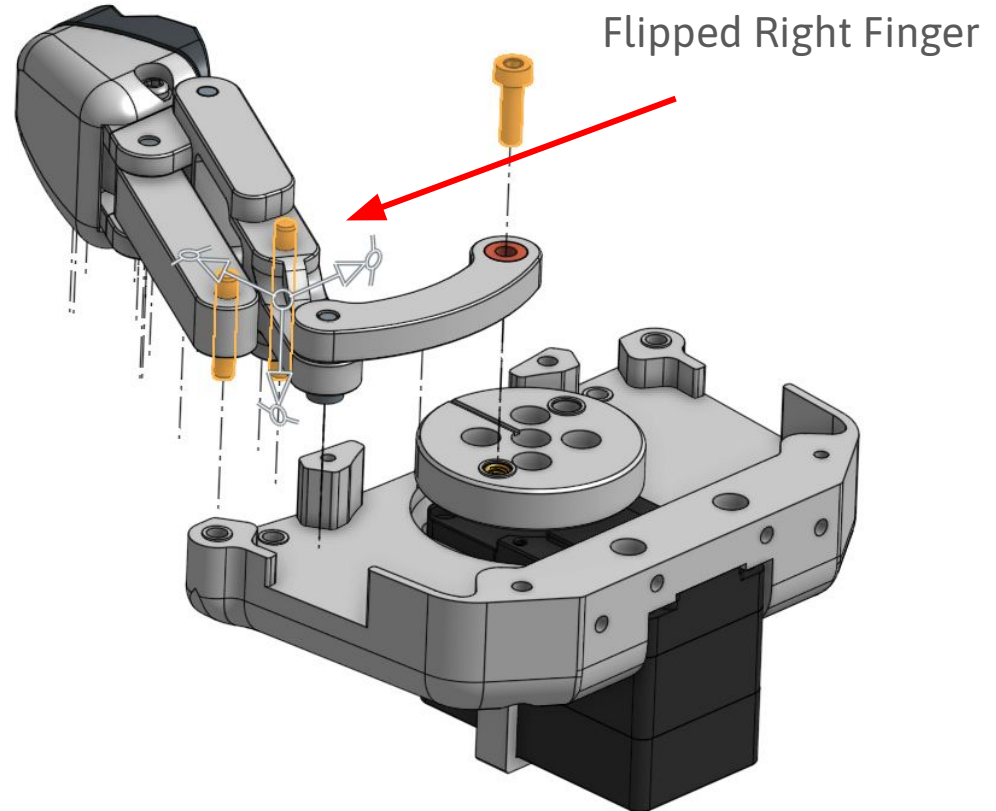
As the assembly is flipped, the right finger is flipped too and on our left now.

Insert in the indicated holes the 3mm pins.

Adjustable pliers can be used to help fitting the pins in the holes strongly.

Use a M3x0.5x10 screws and loctite 648 (or glue) to tighten the driving rod on the cam.

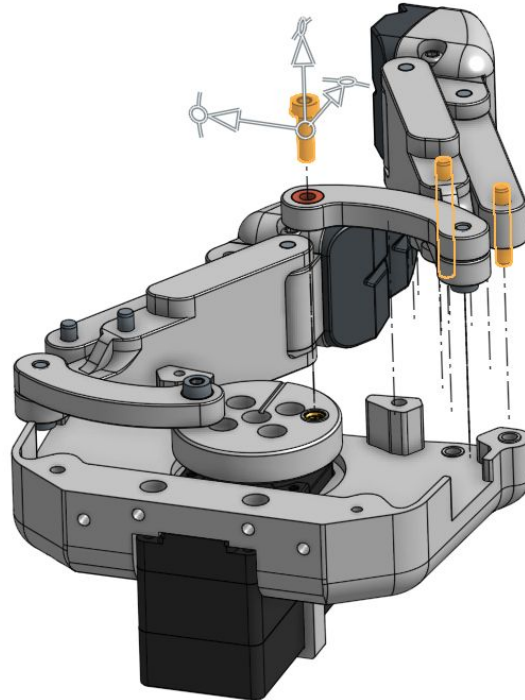
It should be free to rotate, don't tighten too much. the glue secures it.



Palm Assembly

Left Finger

Repeat the last step for the
flipped left finger.



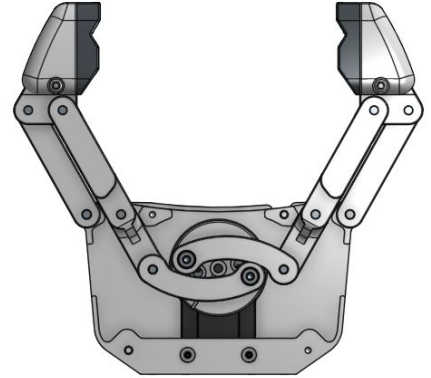
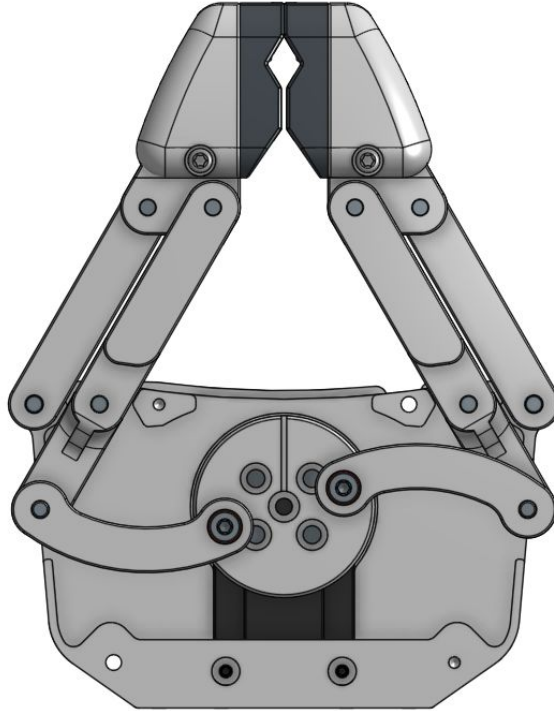
Palm Assembly

Flipped Palm & Fingers

The whole palm and fingers assembly should look like this when it's upside down.

Check that the motor rotates and the gripper can open and close itself well.

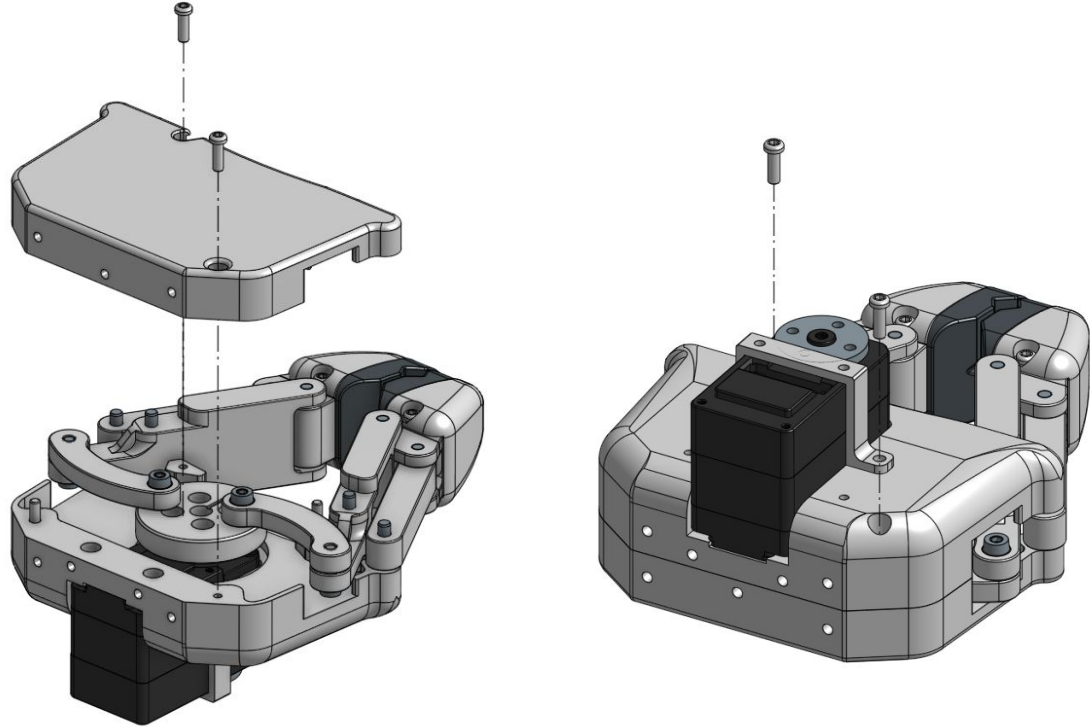
Singularity may appear, and lock the mechanism. Just rotate the shaft by hand to unlock it.



Palm Assembly

Shell closing

Use 3-4x 2.5x6 Thermo screws
To close the palm with the
bottom plate.



Final Assembly

