

Z-Upgrade 3.0 manual

Suivi des évolutions

Indice	Date	Description de l'évolution	Auteur
0.0	27/10/2024	Création	FBR

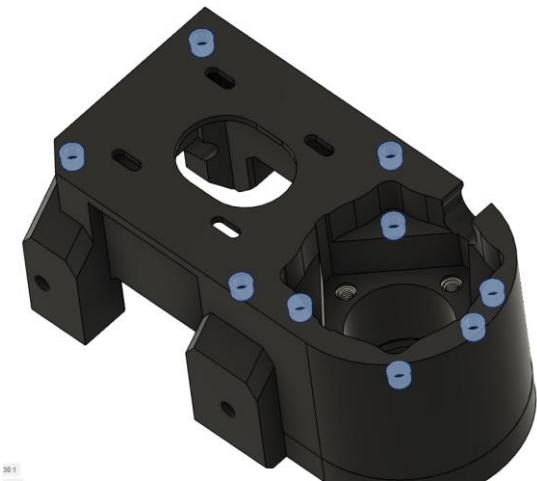
1 Part preparation

You will need to place m4 inserts at those places on the 3 pillar base blocks: 1

You will need to place m3 inserts at those places on the 3 pillar base blocks: 2

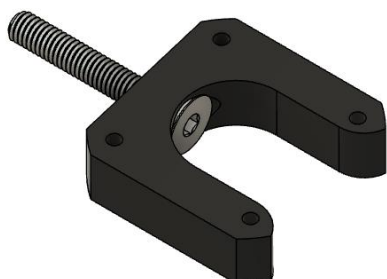


1



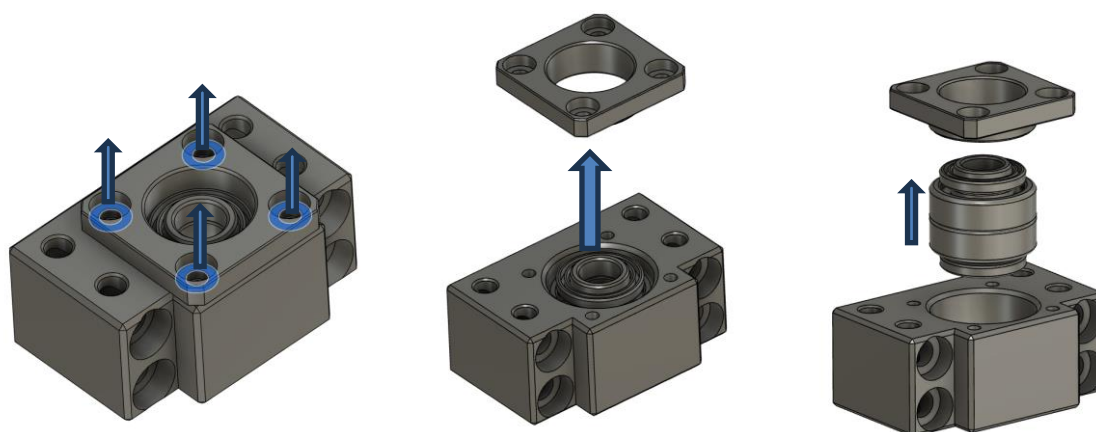
2

Assemble the tensionner :



Basically a Nyloc m5 nut with the countersunk M5x40mm/50mm, lock it with a drop of Cyanoacrylate glue (Superglue)

Dissassemble the BK10:



Remove the 4x M4 screws and remove carefully the internal, some force can be needed to remove the 608 bearings

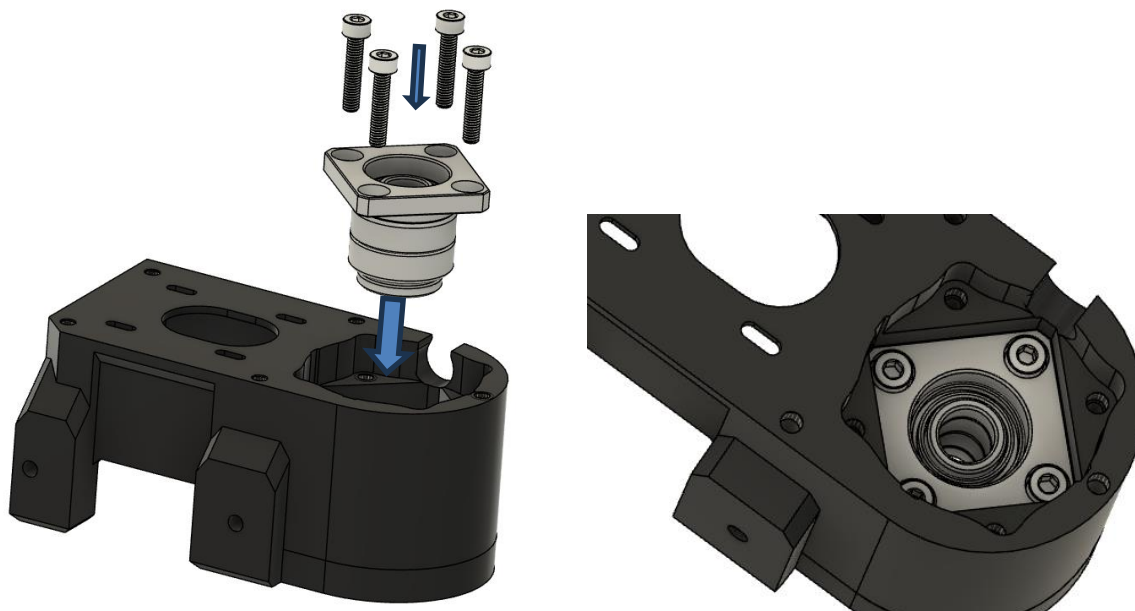
We will keep only that



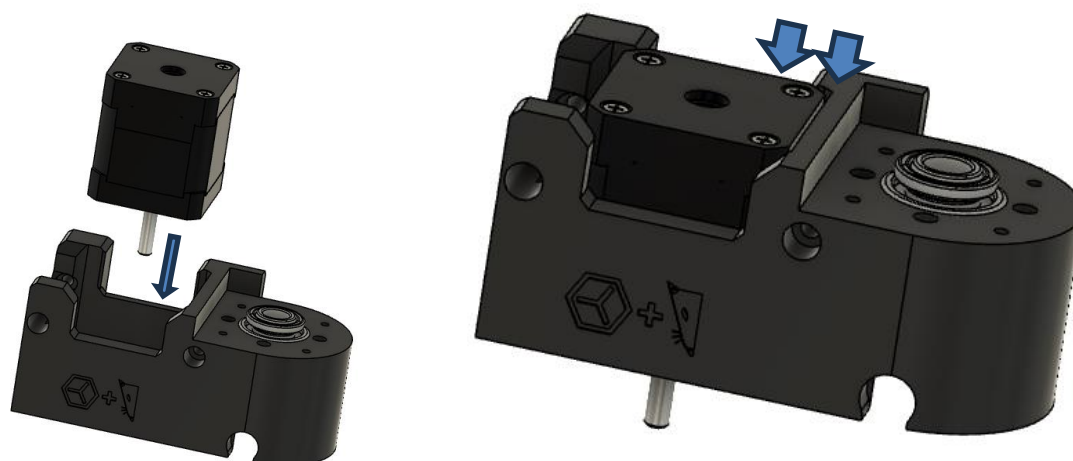
The top, the fist spacer, the 2 Bearings, the second spacer, the dust sock.

2 Preambly

Insert the BK10 internals on in the 3 blocks and secure it with the BK10s M4 short screw

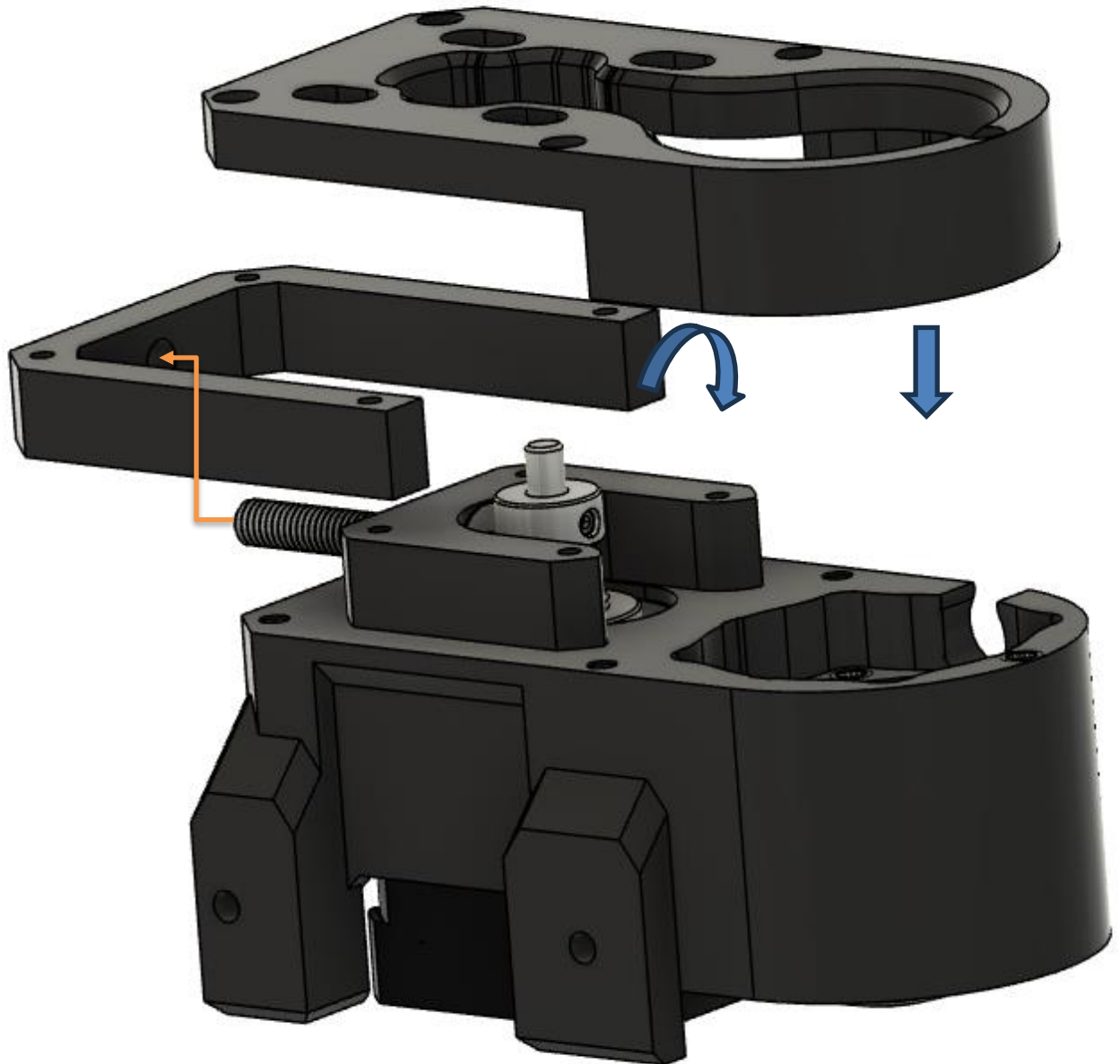


Install the NEMA

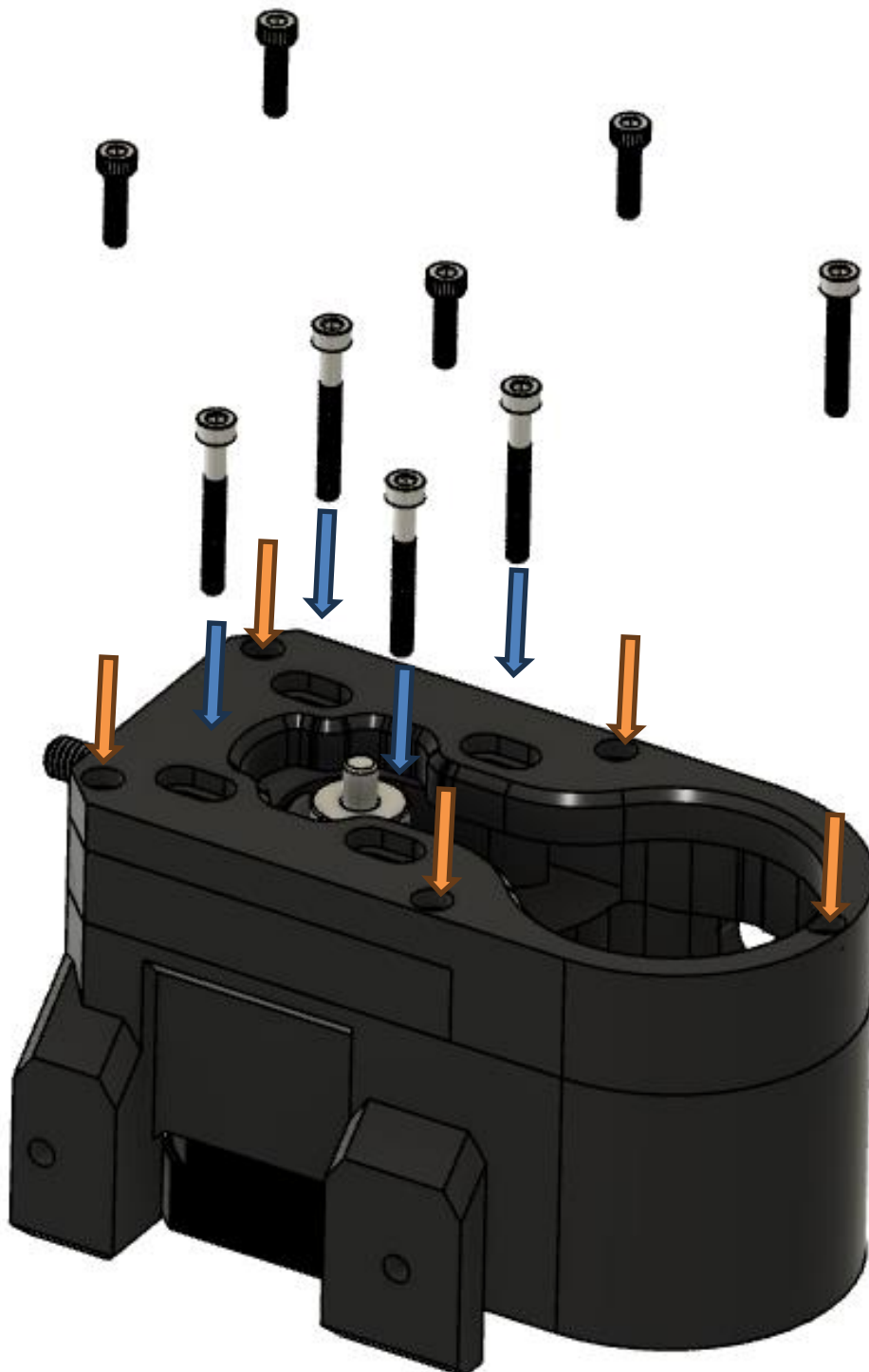


It should be flush

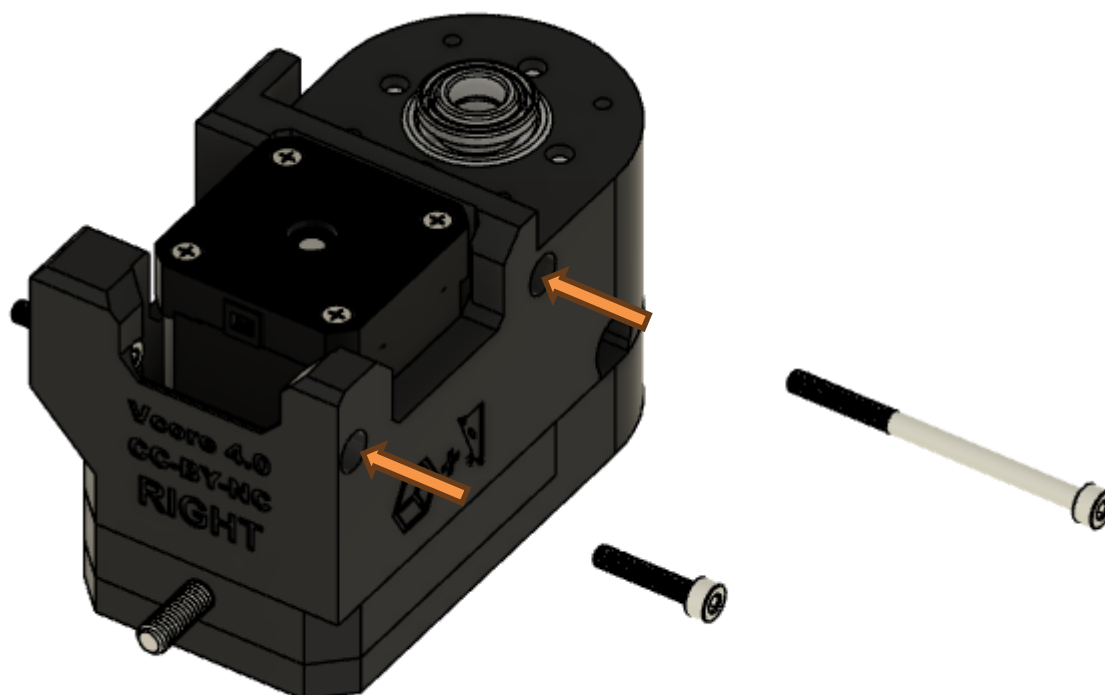
Then we will place the pulley and the rest of the retain parts



Then close it with the [M3x25mm screw](#) and then the [M3x20mm](#)

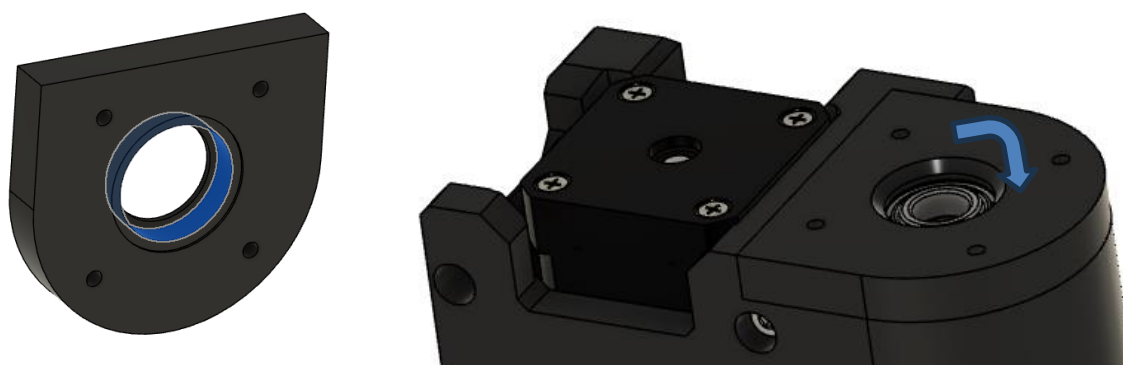


Add the retaining m4x20mm and m4x60mm bolts for the frame anchor. Add a M4 Tnut on each



3 Assembly

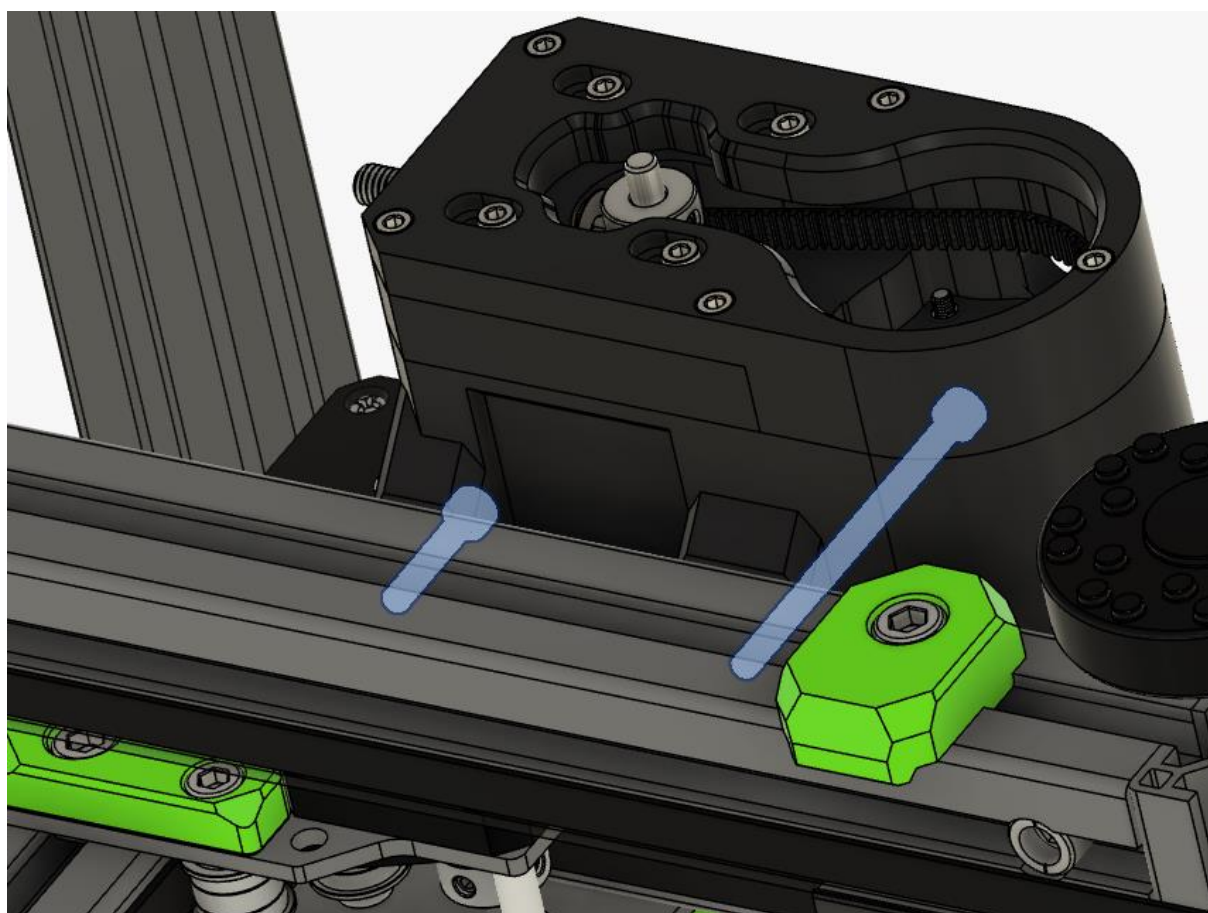
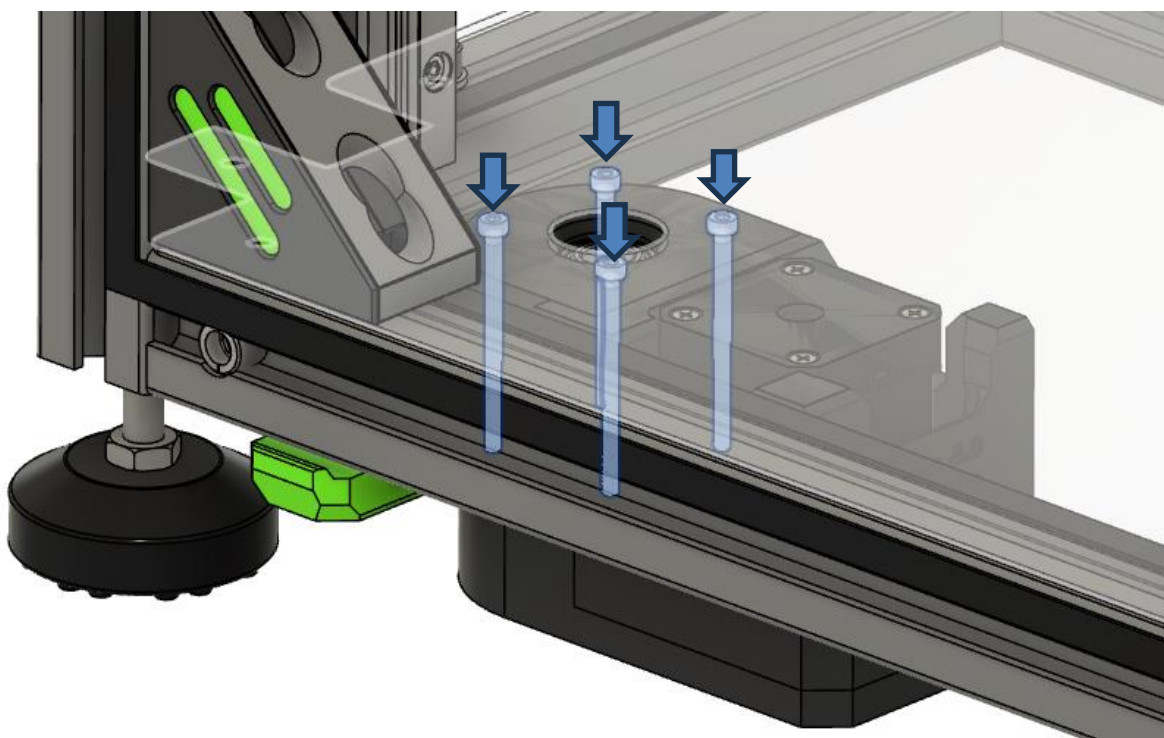
The easier way to do it is to lean the machine on the back or the side, but that is completely up to you depending the status of the machine (Kit or already assembled)



Add the Sealring of the BK10 and then plate it on top of the housing

You can now place it on the M3 plate hole and add the 4x M3x45mm to retain it

Don't forget to tight the anchors points (2x per blocks)

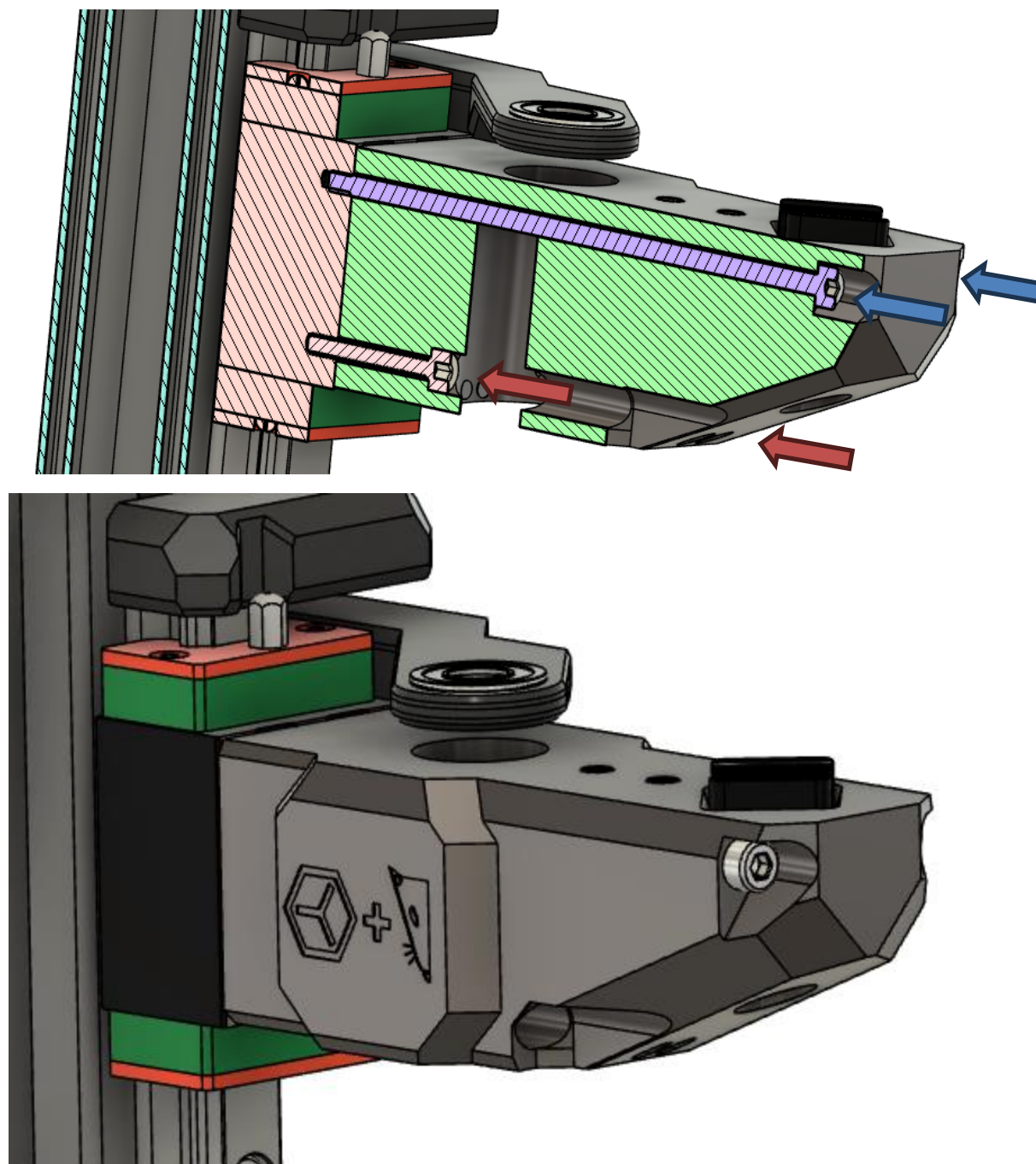


Repeat this process for the 3 blocks

The rear one is a bit different with 2 anchor points being M6x40 screws.

We can now install all the arms

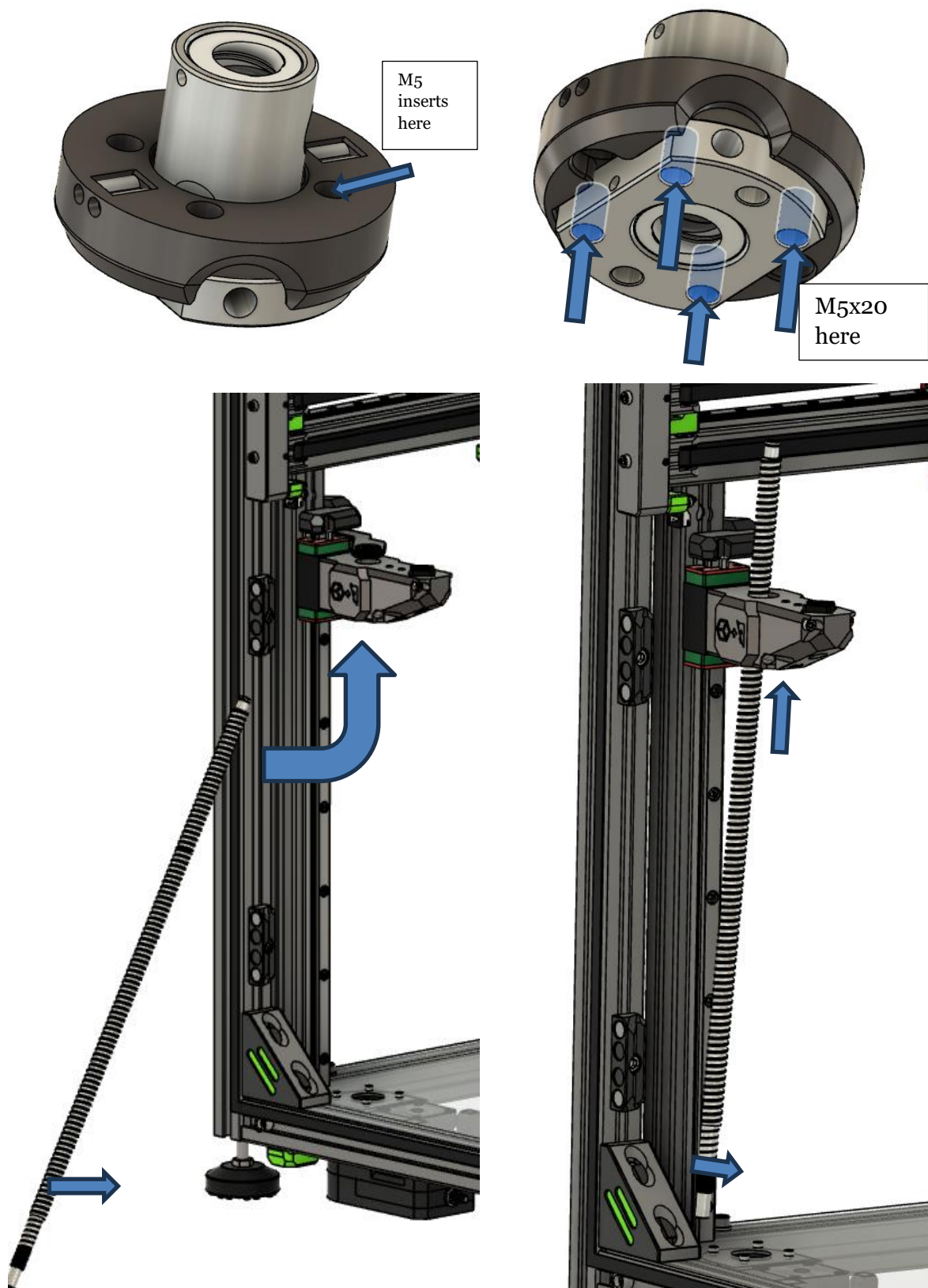
Same logic than the stock ones, but this time we use the 2x m4x100mm and 2x M4x25mm



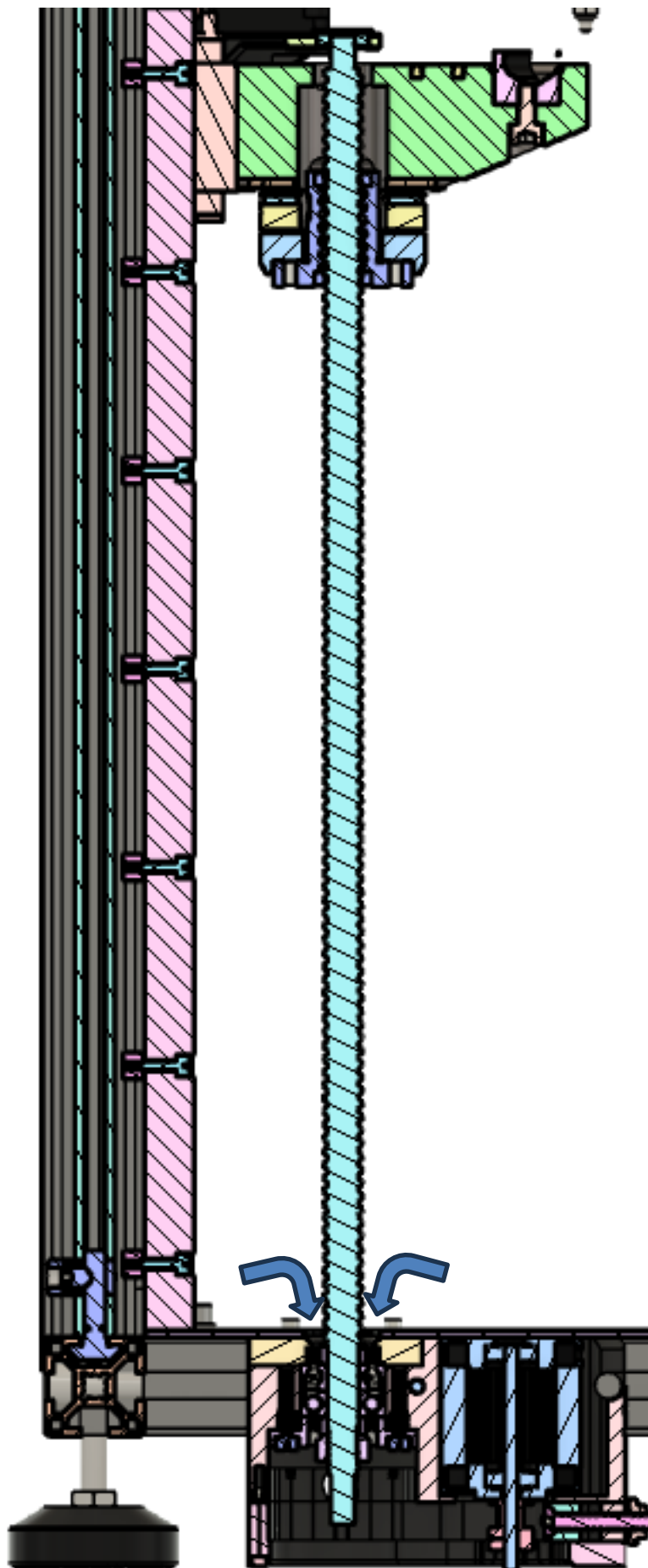
Once done, depending the Oldham / WobbleX choice made, you can prepare the ballscrews

4 BRS-Oldham

You need to assemble the lower ring on the Ballscrew Nut first



On those pictures, the Nut and the Oldham are not represented, but should be positioned on the middle of the ballscrew.



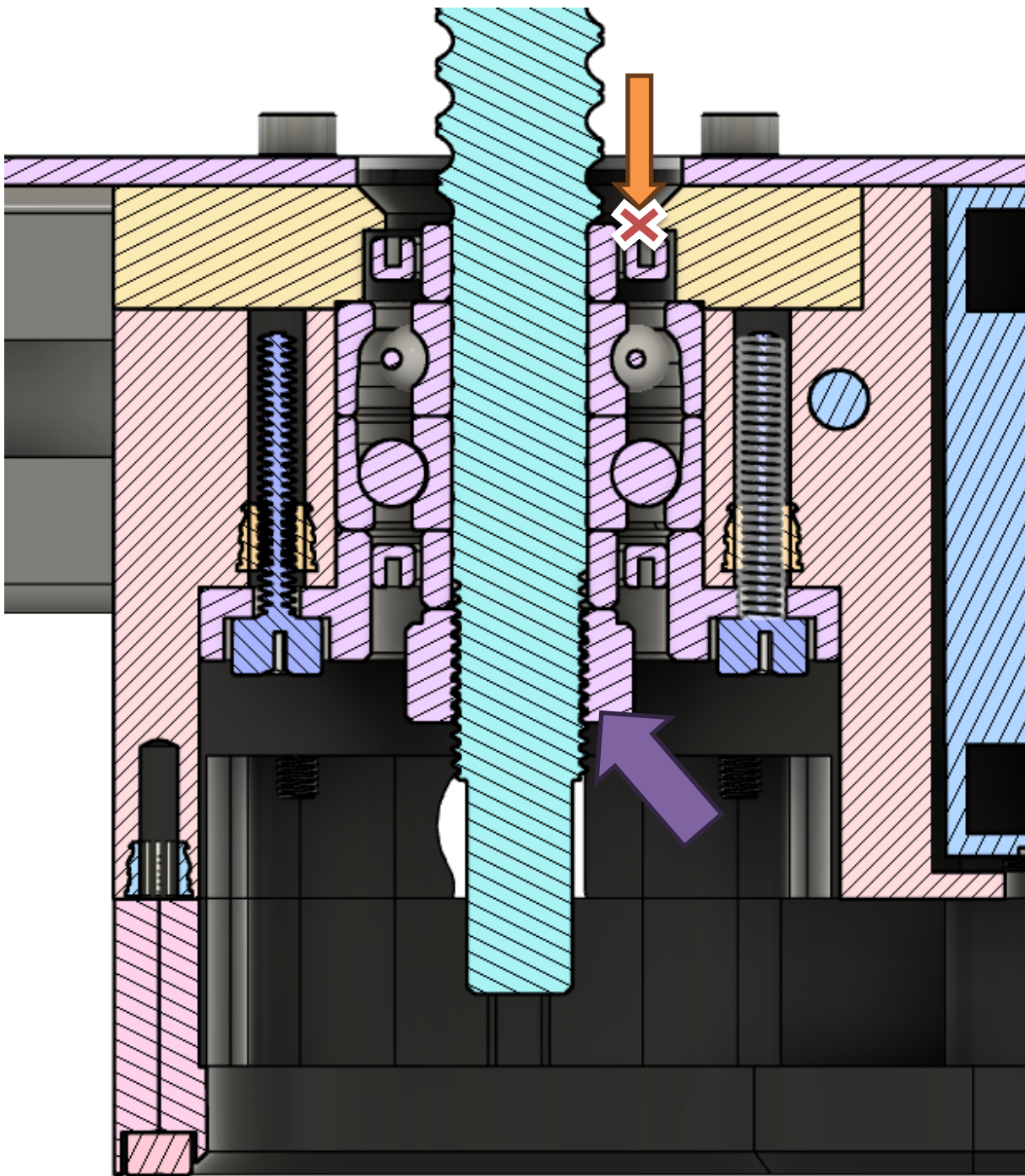


Figure 5

5

You need to first insert it in the arm hole, you may need to remove the top retainer to give you clearance, and then place the machined end in the lower motor block through the BK10 Internals

When the spindle is inserted in the BK10, be sure it **goes against the black spacer**, and **add the retaining nut** (don't overtighten it) (Figure 5)

5 WobbleX



For the wobbleX (12/16), same logic: Add some M5x20 to fix the BS nut to the lower ring, add the WobbleX middle ring and install it the same way with the spindle motion seen above.

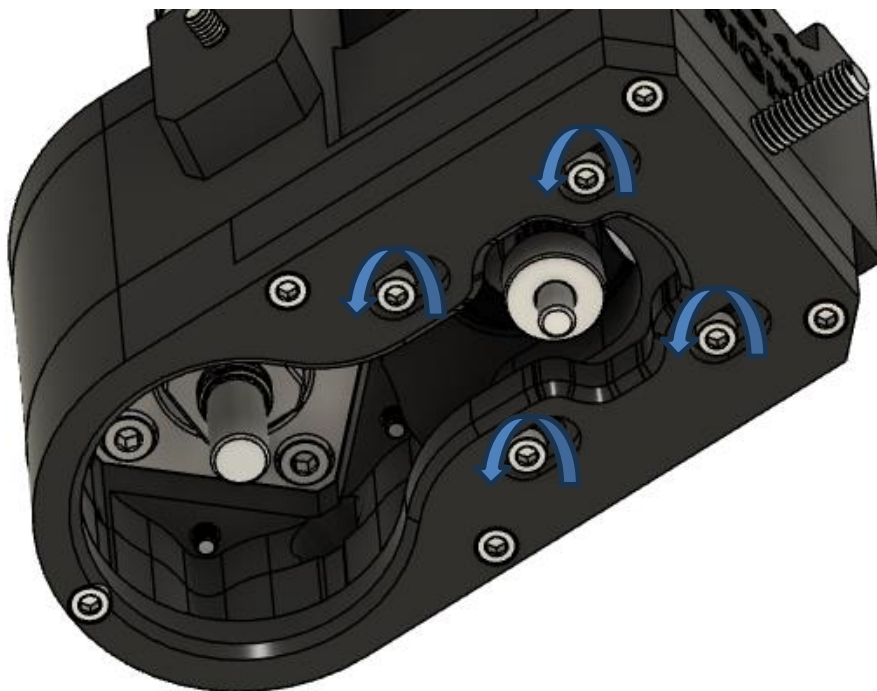
Be careful: 1204 and 1605 version got some differences:

- Discs are larger, and use a different layout, 1605 and 1204 are not compatible between each others
 - Arms got a different hole layout and dimension as their pins position
 - In some case scenarios, you may need to remove the arm partially to insert the BS spindle
- At this point you can change the methods, as few exist to get to the same objective.

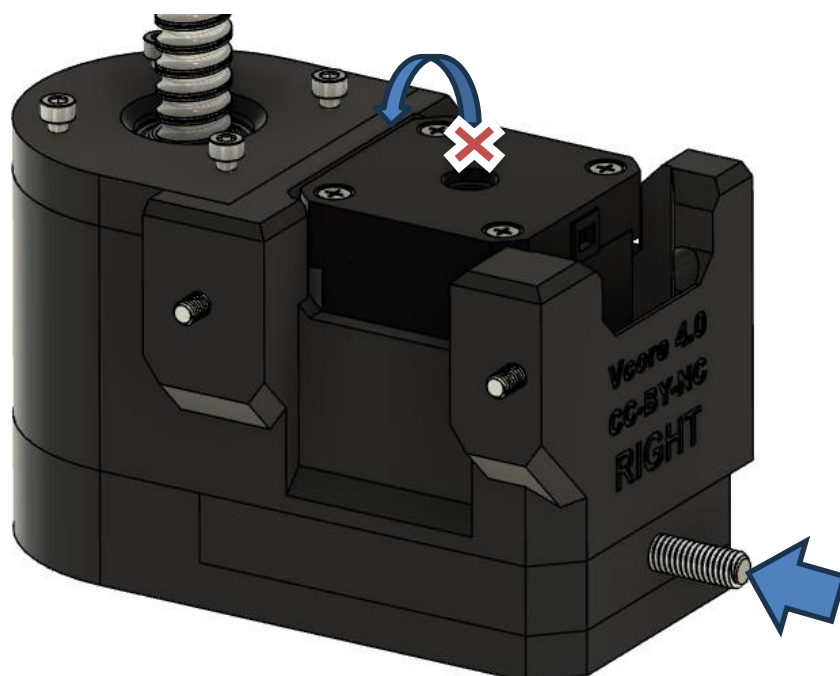
6 Z-Belts

For the purpose of the exemple, let's isolate the next pictures of the full frame.

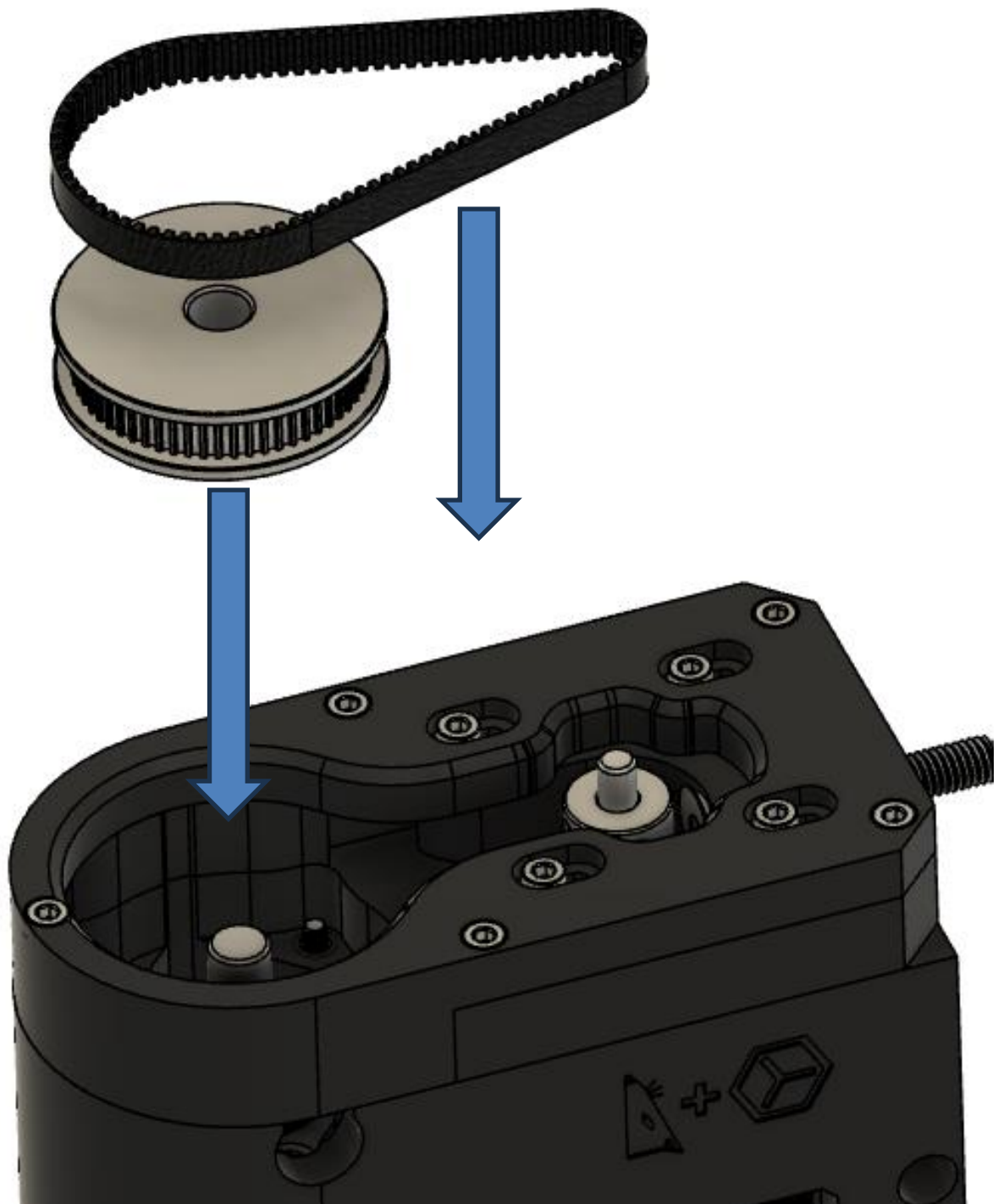
To insert the belt and the 60T pulley, we need the motor the closest possible from the spindle



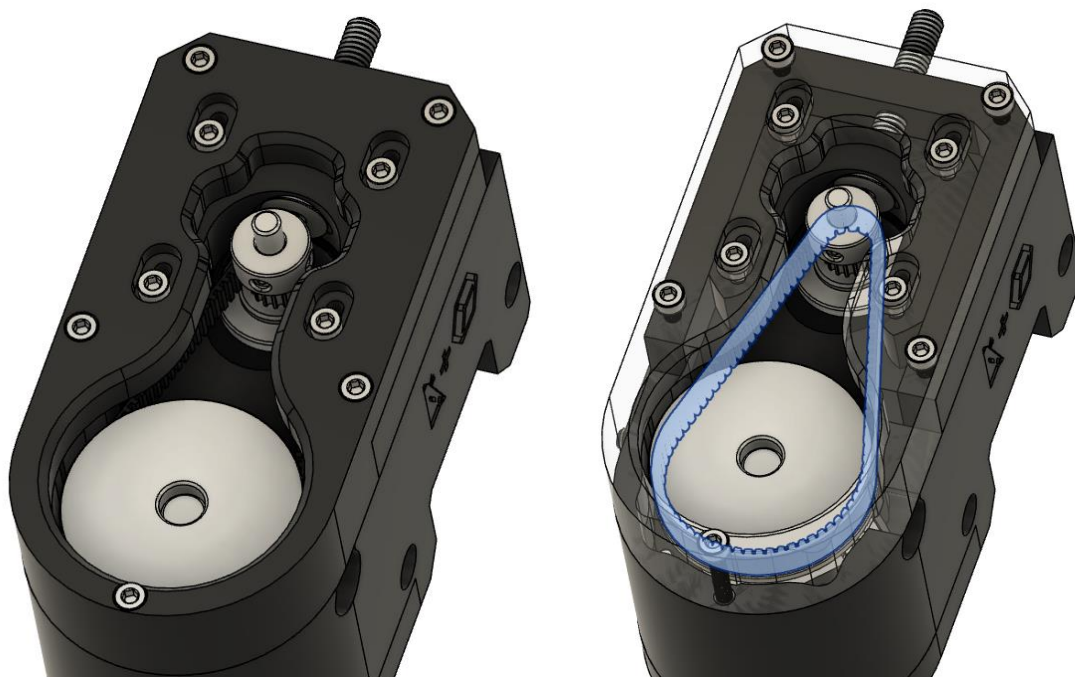
Unscrew a bit the 4 NEMA retainer screws



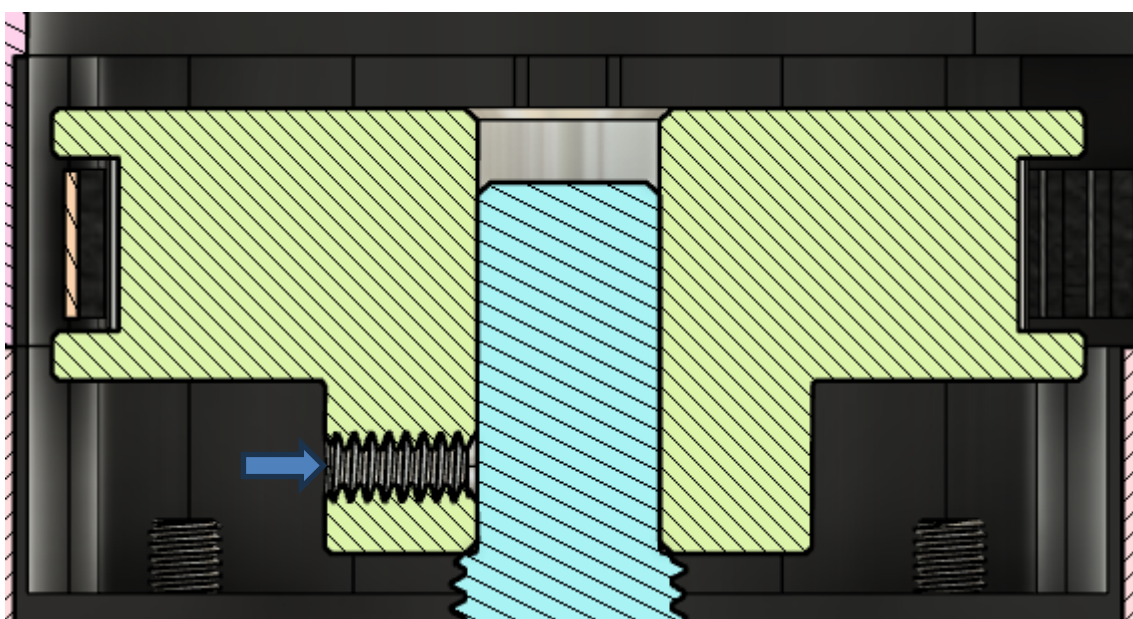
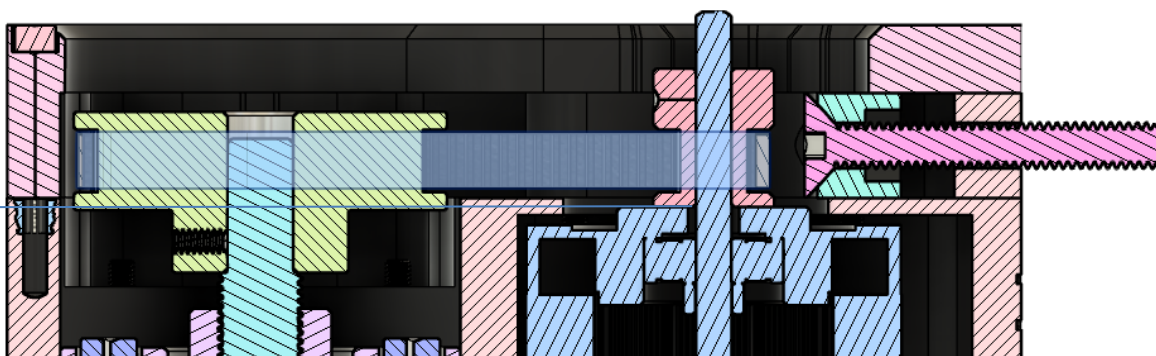
Push the M5 bolt to gain the minimal position.



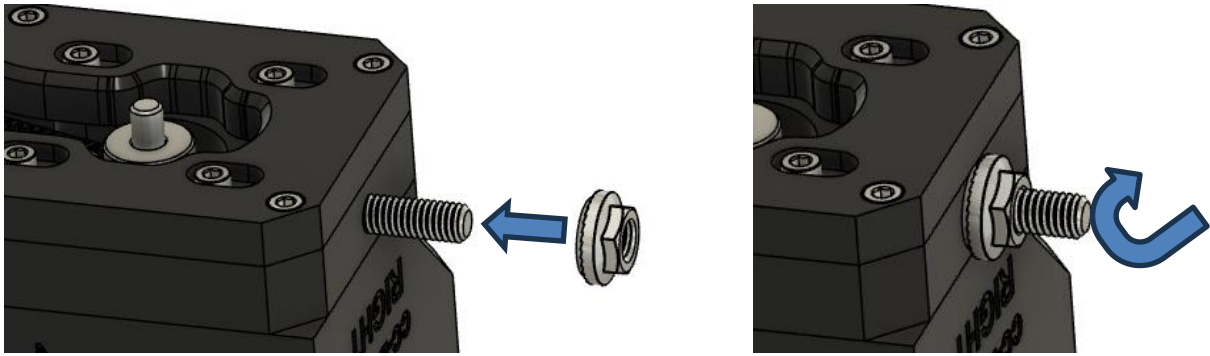
Then install the Belt and the 60T pulley. Wiggling it a bit to fit the 20T.



Control the alignment



You can now tighten the 60T headless screws, holes are present in the part to do so.



Now tune the belt tension through the M6 Nut + washer here

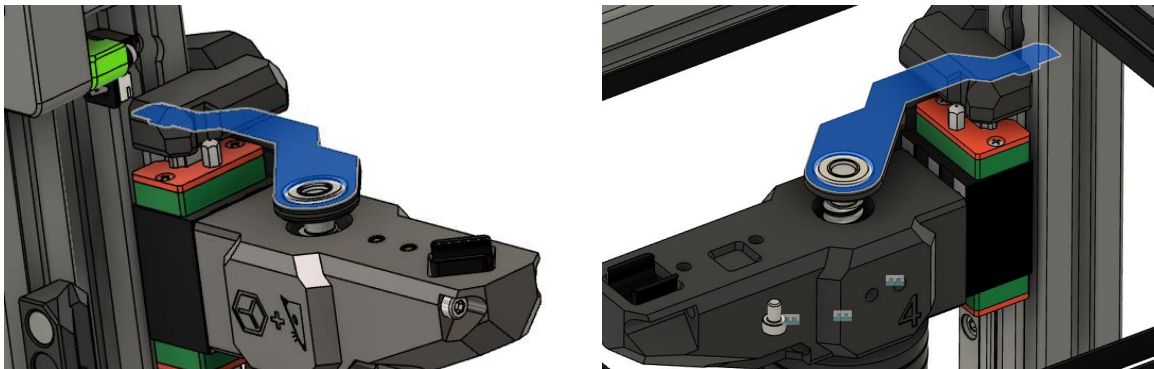
We need it to be tight but do not overtension it either, we want a firm flex on the belt.

Repeat the process with the 2 other remaining block

7 Final assembly

For the 1204 version, simply keep the standard stock LS/BS retainer at the top, we use the same ID 8mm ball bearing

If you are using the 1605 variant, use the compatible bracket designed for 10mm ID bearings



here the example the stock VC4 retainer which are compatible with the stock Leadscrews and the 1204 ballscrews tips.

You can adjust a bit the height of them if necessary.

You can at this point add the bearing balls into the OLDHAM/WOBBLEX assembly

8 Config cfg

The first thing to do is to correct the **rotation_distance** of all Z sections

1204: **4**

1605: **5**

Then we need to reverse ALL the Z motors since they are inverted (pointing the bottom)

Simply add a “!” in front of the “**dir_pin**” (ex: **dir_pin: !PC12**) in the [stepper z] section (3x times)

Do a full Z descent once you did your first home, this way you will be able to read your exact ZMAX position depending the Toolhead used, and then get the perfect number.

9 Final checks

Check for consistent NEMA/BK10/Ball Screw/retainer alignment. If no mounting errors have been made on the Vcore structure, or on the printing of parts, the alignment should be correct. Normally the VC4 structure and lower plate don't allow you to go misaligned, but still you can check it.

You should be able to rotate the SFU spindle to see if the rotation is smooth Control a rotation without hard points, without deviations.

Double check the screw, Strictly recheck the alignment of the screw in relation to the upright of the printer, finish tightening the low supports as soon as the dimensions are satisfied

Check the rotation without hard points, without excessive deviations (there will be some).

Clean the ball screws with a clean cloth and lubricate them with a HIWIN GSo4 type grease or any other lithium based grease compatible with bearings

CAUTION, grease loaded with particles such as Graphite, Molybdene or charged type, are to be avoided, do not use WD40 (except cleaning), dry PTFE lubricants are also to be avoided! I personally use Lithium based grease

-Close the m6 openings of the ballnuts with grub screws or M6 grease nipples

Position the nuts of the screws at the bottom, control the rise of the arms by releasing the coupling from the magnetic decoupler, control a fluid and linear movement, without hard points and without the arm rubbing the SFU1204. Repeat the alignment if this not the case.

The decoupling wings or Oldham are capable of handling up to +-2.5mm circular deflection. This is more than enough for C7 grades.

Control and / or adjust the depth of the Y endstop so that the distance between the back of the toolhead does not collide with the rear bar and the top of the binding.

It is mandatory to make your own limits and measurements to integrate them into Klipper's printer.cfg. The breakage of the machine or the ball screws is a risk if this step is not carried out rigorously.

For the Z axis, it is MANDATORY to modify the line [Stepper_Z] position_max: (your value). A ball screw can literally twist the frame or crush parts due to its high torque, **THE MISTAKE WOULD BE FATAL** for the machine **or your fingers**.

- 1- Check screw tightness.
- 2- Check Alignments
- 3- Hard Spot Checks
- 4- Lubrication, Checks (Rails + Ballscrews)
- 5- Check motor wiring, order on stepper!!!! If not done; possible system break
- 6- Check engine functions in Klipper with "STEPPER_BUZZ STEPPER=stepper_z"
- 7- Z-probe check!!!
- 8- Z Min/Max position to be calibrated, All hotends or probes setups can influence very different Z max and Z total travel from the nozzle to the ballscrew base block

	Z-Upgrade 3.0 For VCORE 4.0	BRS-Engineering

10 Disclaimer

The system is designed to operate on a properly assembled Vcore 3.0/3.1. Even a slight mounting error can make it impossible to upgrade. That said the quality of the design or the prints are strictly related to the assembly made by yourself.

If the parts to be printed are made by the customer, check the dimensions at the printer output:

The kit is installed in the simplest way without destructive modifications of the machine, the old stock system can be reinstalled

This kit is an optional upgrade, its assembly and/or its function and/or its quality of execution are the responsibility of the customer.

BRS-Engineering relieves itself of all responsibility in case of poor sourcing (poor quality and/or bad dimensions), bad customer assembly, or bad assembly of the basic Vcore.

Some version compatible have been individually made and can not perfectly reflect the manual here, without compromising it either! If you have a question, don't hesitate to contact BRS-ENGINEERING (contact@brs-engineering.com) or Florent Broise on Discord, Meta messenger, or on the BRS Store website <https://store.brsengineering.com/>

By purchasing the kit, or having it done by BRS-Engineering you accept the GTC as well as the previous disclaimer

BRS-ENGINEERING is proud of designing, developing, manufacturing, and testing VCORE 3.0/3.1/4.0 Mods products

Lifetime Warranty: I want all of my customers to print happy, therefore: All mods carry a lifetime warranty against manufacturing defects. The Z-Upgrade warranty covers defects in materials or workmanship by manufacturers.

Thanks to you and your support

11 LICENSE

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