Manual for L3VER M2 motor blocks

Suivi des évolutions

Indice	Date	Description de l'évolution	Auteur
0.0	22/06/2022	Création	FBR
0.1	10/10/2022	MAJ	FBR
0.2	07/02/2023	MAJ	FBR

BOM :

Printed parts

Top alpha	X1
Top beta	X1
Bottom alpha	X1
Bottom beta	X1
Lever	X2
Motor holder	X2
Motor base L	X1
Motor base R	X1

Hardware :

625-zz/2RS bearings	X4
Disk coupler 5x5mm	X2
T-nut M6	X12
alu spacer OR printed spacer	X6
Hex nut nylstop M5	X2
Inserts brass m4	X12
Inserts brass m3	X16

F695-ZZ / 2RS	X24
695-ZZ / 2RS	X12
Shoulder bolts m4D5 35mm	X8
Shoulder bolts m4D5 45mm	X2
Countersunk m6x12	X8
Washer M5	X4
Washer M4	X2
M3 35mm	X8
M4 20mm	X4
M3 30mm	X8
M3 12mm	X8
Countersunk M5x40	X2
Flanged M4 hex nut	X2
Microshim 1mm m5	X30
M6x14	X4
D5x55 Steel shaft	X2

Pre-check

BEARINGS

It is a good idea to check bearings health before assembly, it can solve issue before spending time on a painfull full check.

-Choose a 2RS or a ZZ protection to remove the dust to be a future issue

-Check the bearing armor (ZZ) it should be flat, no pinch, no deformations

-Roll it by hand to check an eventual hard point, proof of an internal issue

-Check the presence of dark oil coming from a junction (used bearing), if present, change the bearing. (Bearing are generally cover by a clean film of clear oil/lubricant that is normal)

The M1-M2 design has been made with not need and possibilities to compress the bearing, meaning there will be no issues relative to that.

BELTS

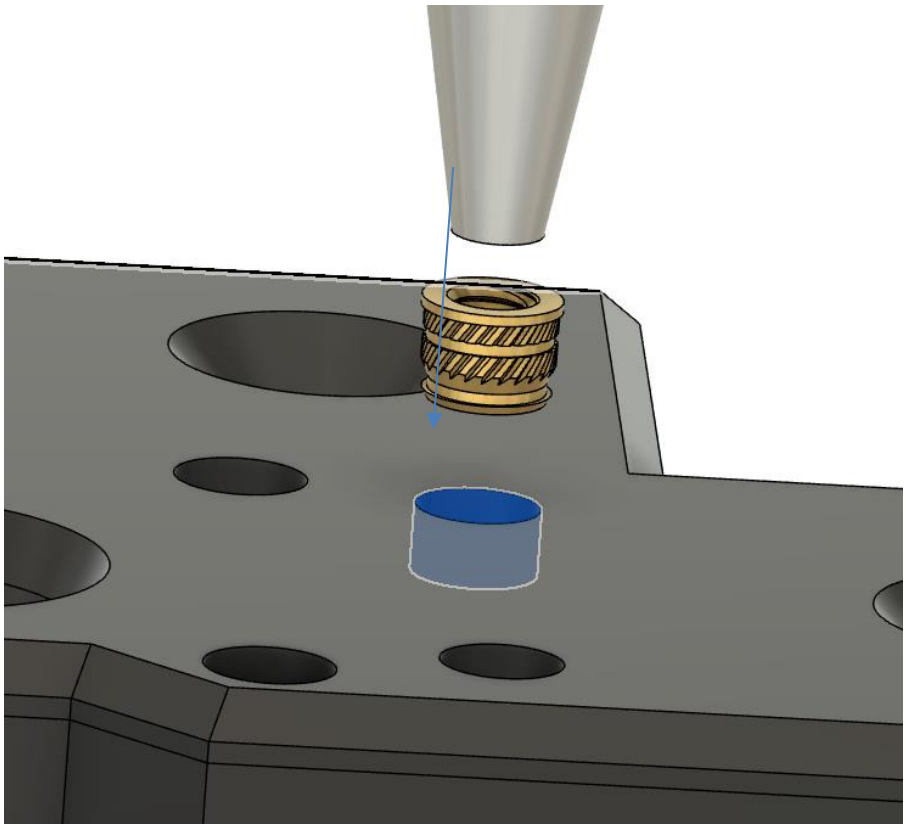
I always advised to use quality genuine Gates belts in order to have less issues in the future, be sure to have the good length (at least 15mm more on each side)

I personally experienced non straight belt with no-name ones, it leads to issue during printing by moving the belt path contact up and down the bearing leading to friction, loose of steps, and even rapid faillures. Choose quality first 😉

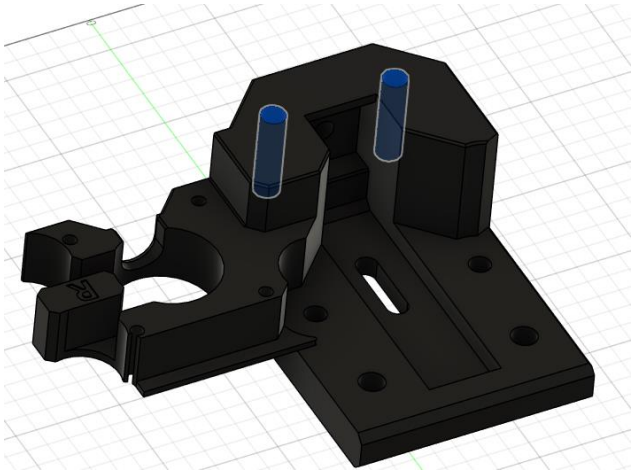
Part preparation

1/ HEAT INSERTS

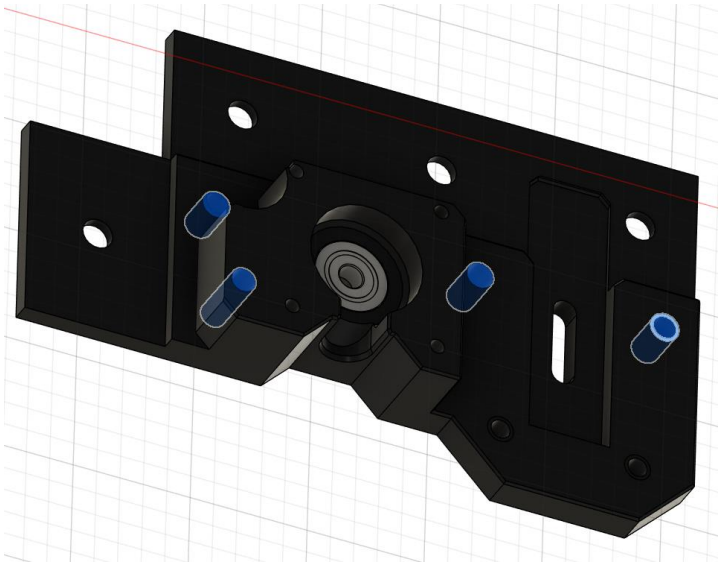
Insert m4 Inserts in the required places with a soldering iron



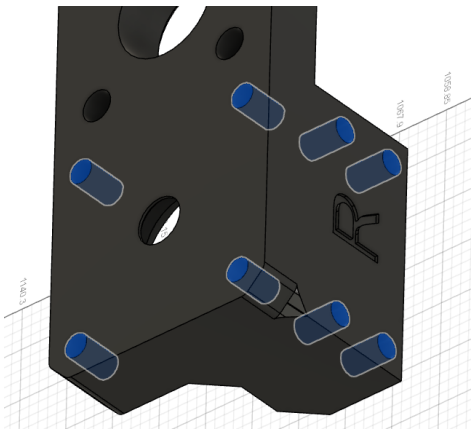
Here the places where a m4 insert is needed:



2x on each Alpha and Beta bottom block



4x in the Shoulder bolt places on each top plate (8x in total)

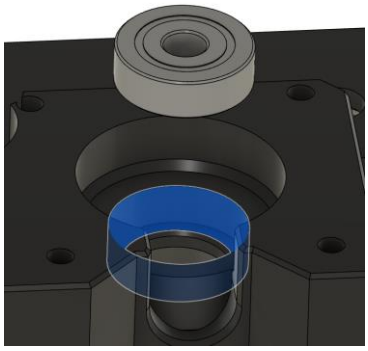


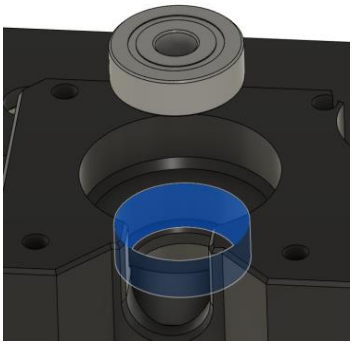
Here 8x m3 insert per part (16x in total)

(For BRS-E Orders, those inserts and bearings are already installed)

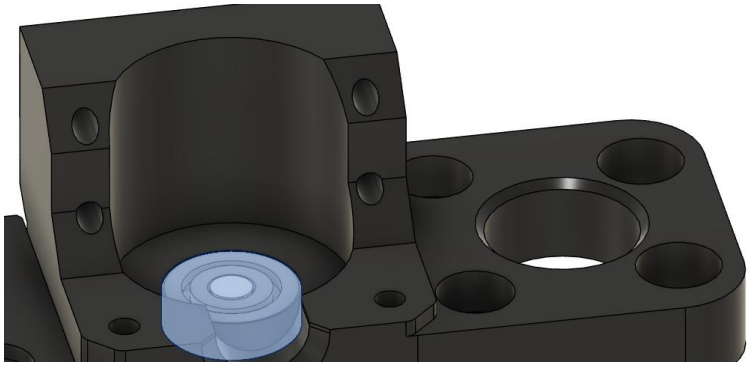
2/ SHAFT BEARINGS

You can already pressfit the 4x 625 bearing, 2x the top cover parts, one on the bottom parts and one in the motor part

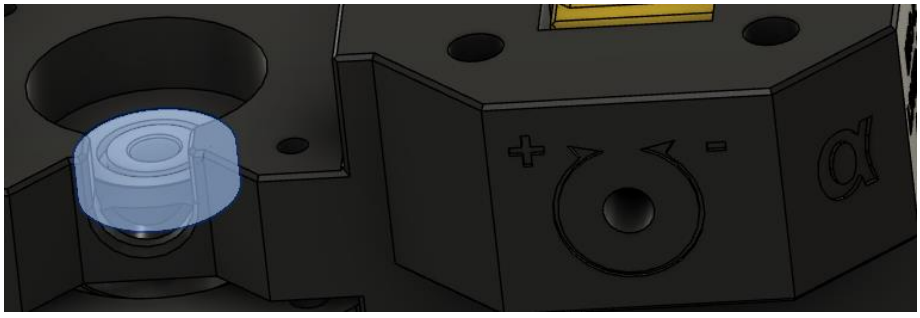




Top part x2



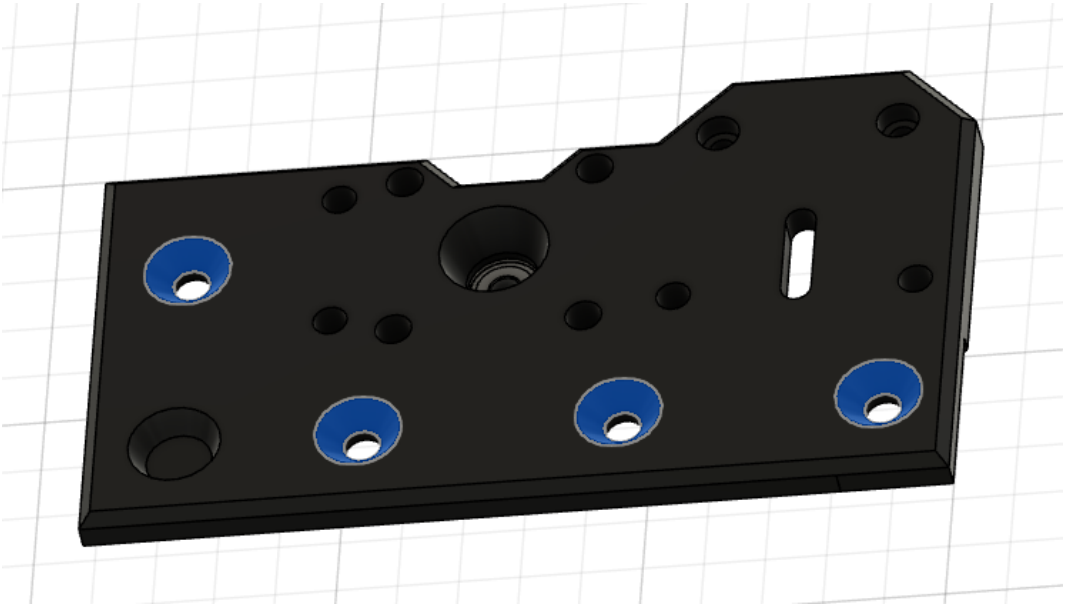
R Motor part x1



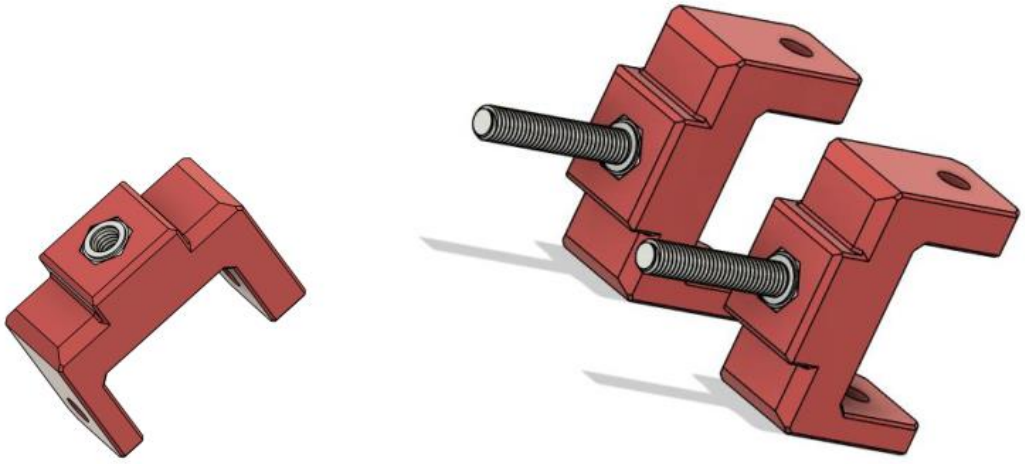
Alpha bottom part x1

3/ SCREWS

Install the M6 countersunk screw with the T-nut now, let it loose



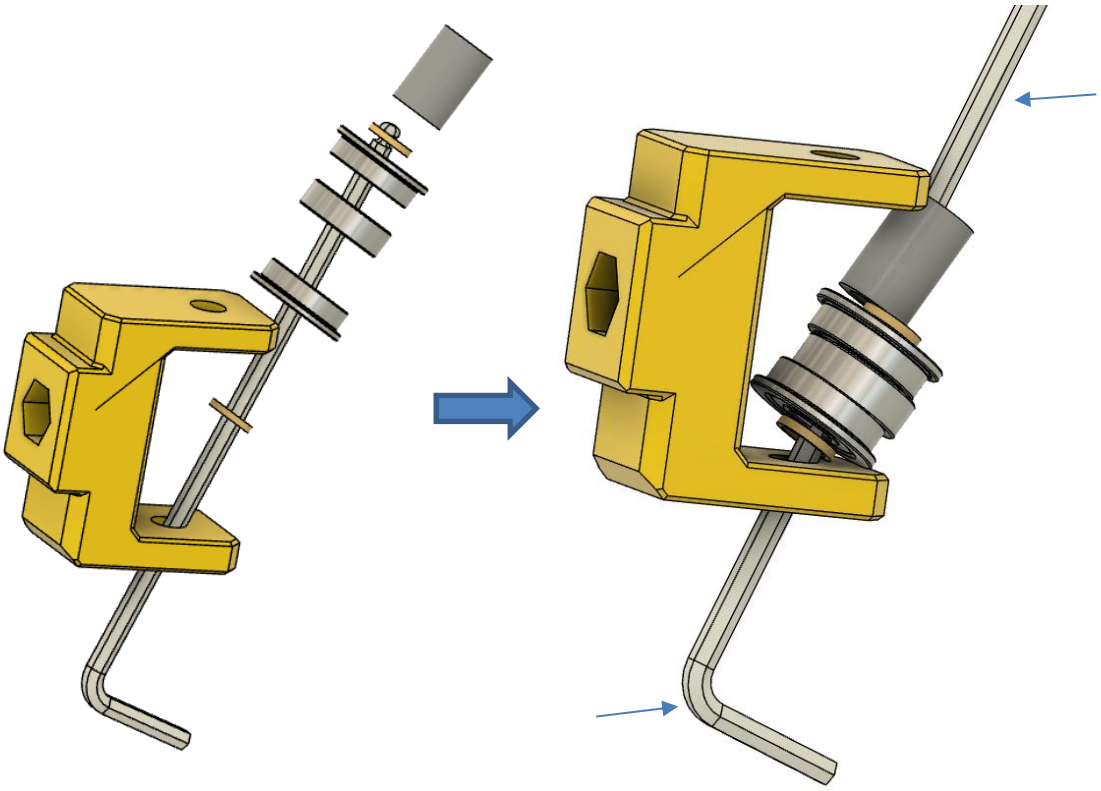
4/ LEVER ARM

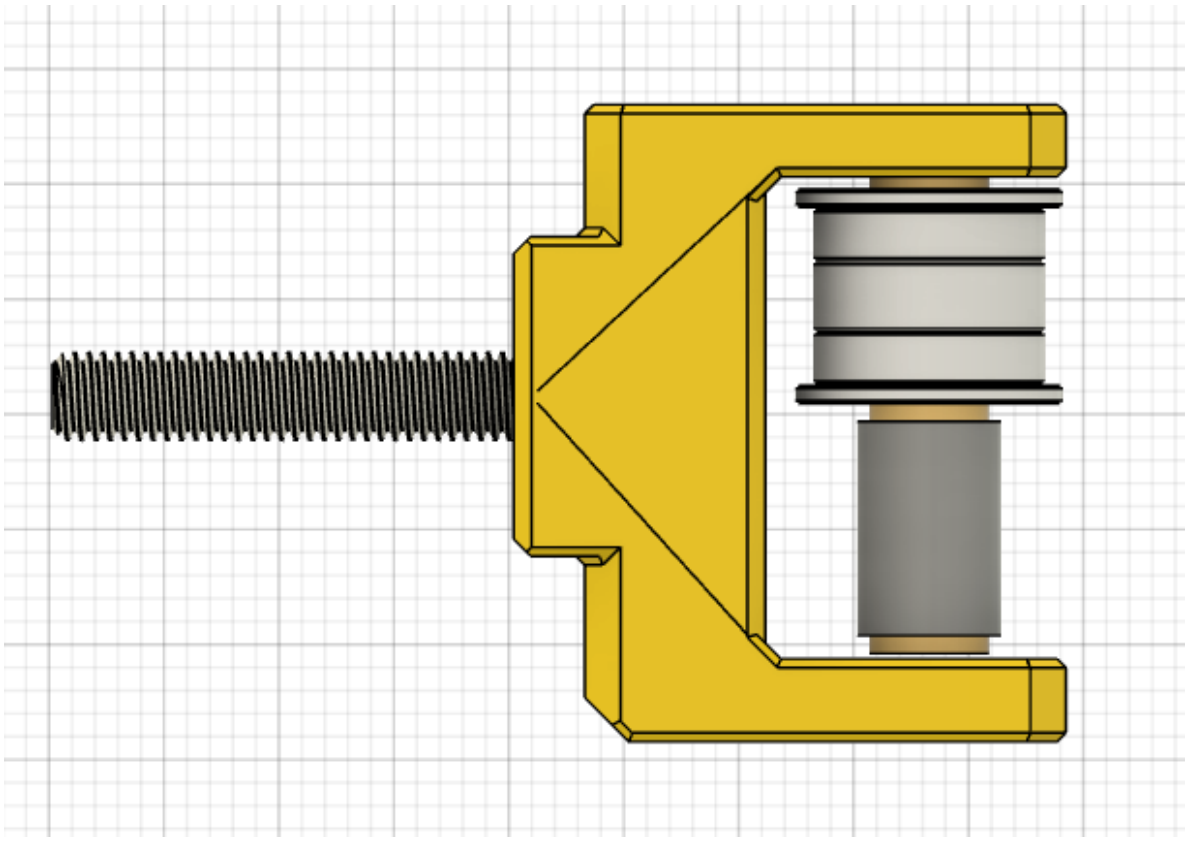


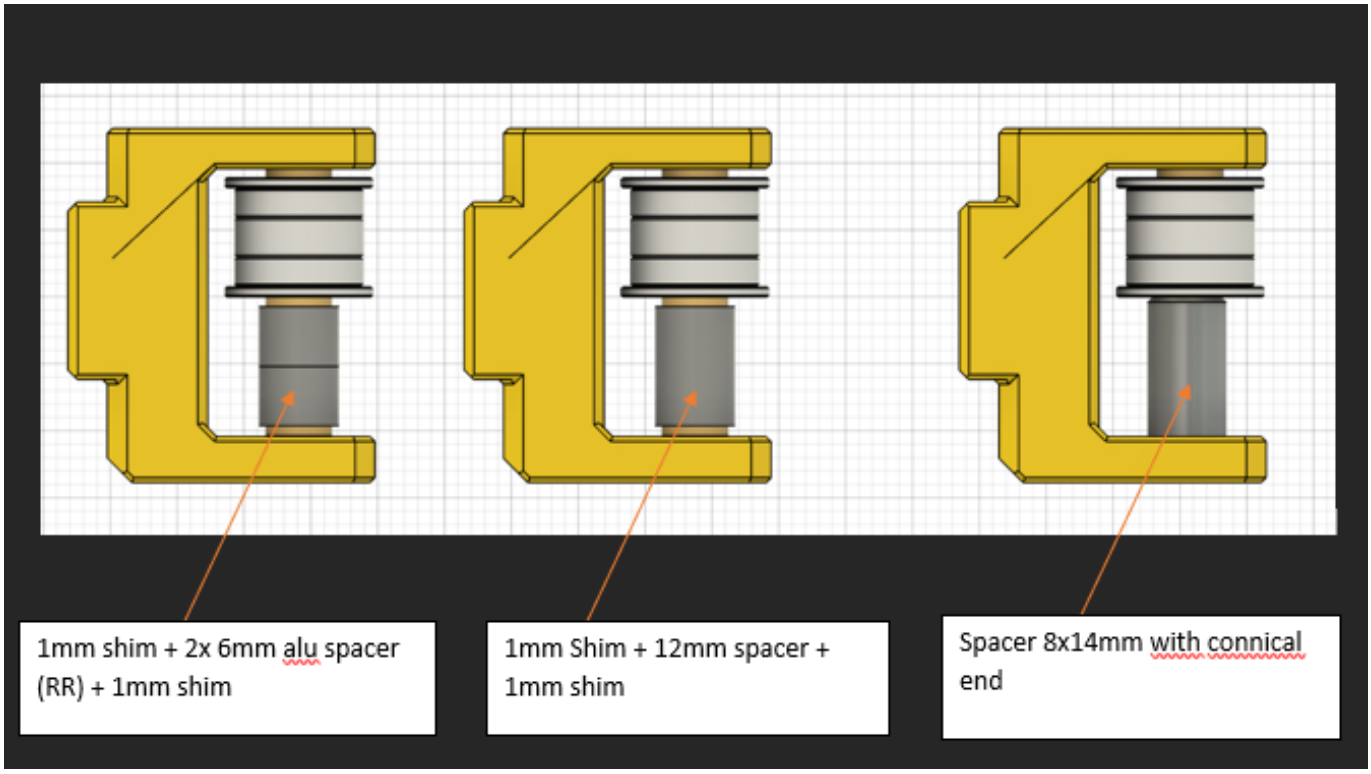
Insert a M5 Nyloc in each lever and tighten the m5x40 screw to it with a dip of cyanoacrylate or threadlocker Countersunk m5x40 completely. This assembly is definitive. Repeat it for the other one

You can already pre install the LEVERS stacks outside for ease of installation:

Use an allen key to slide the stack and the spacer inside. Then use the key to lever the stack in position.





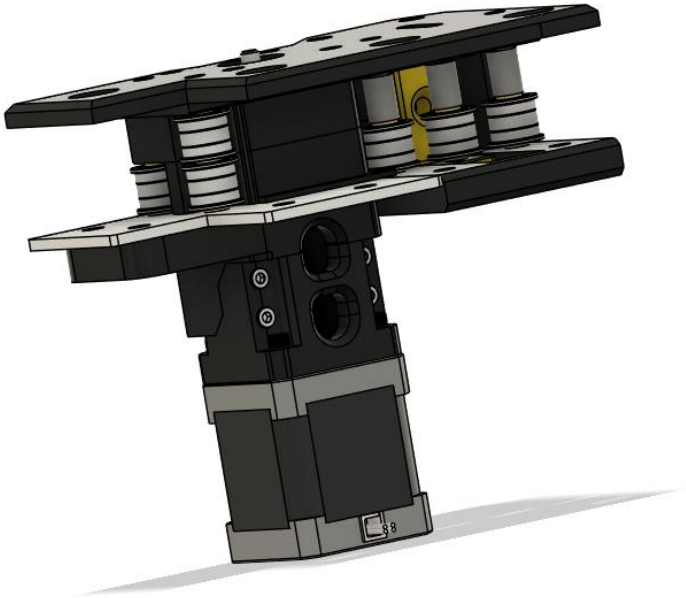


Be aware the stacking has to be reverted to the other Lever, as they are not symmetrical.

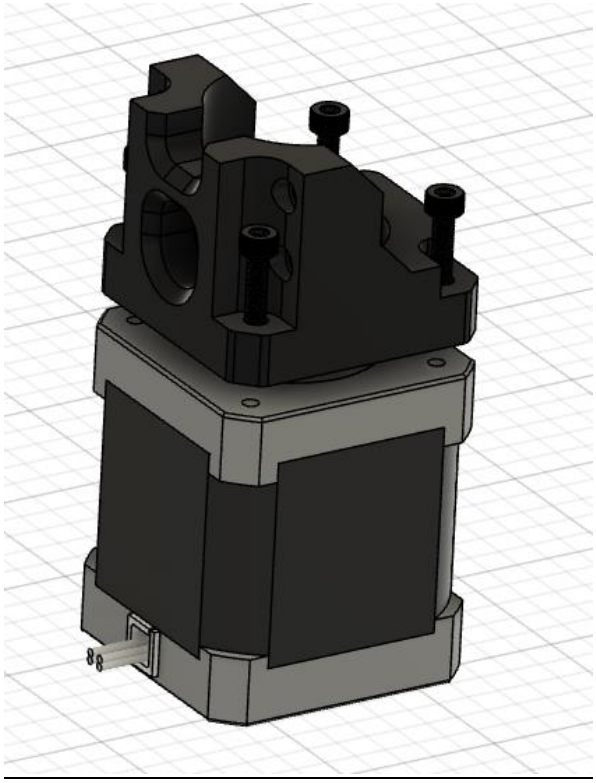
Install the m5 nylock in the Lever parts. Add a bit of threadlock in. Then screw the

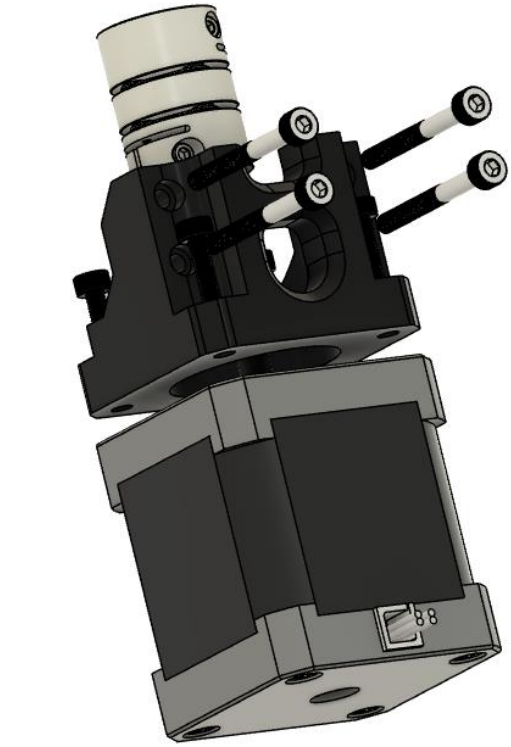
BRS ORDER GENERALLY ARRIVED PREASSEMBLED (If not told otherwise depending the ask)

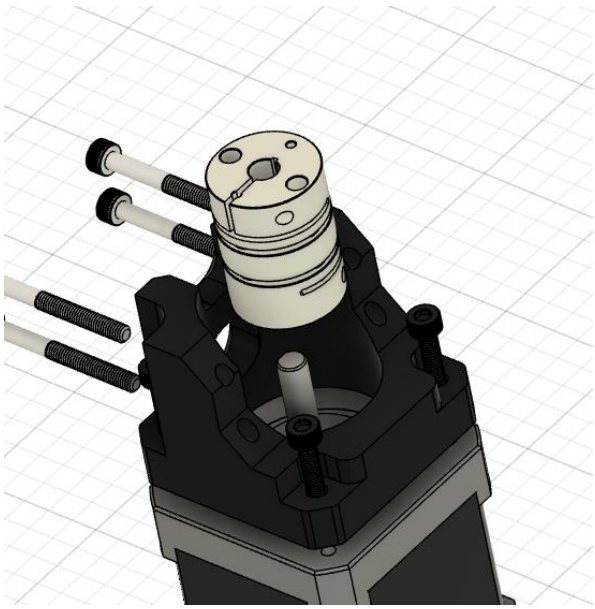
You can try to make an assembly out of the machine to understand the mechanism

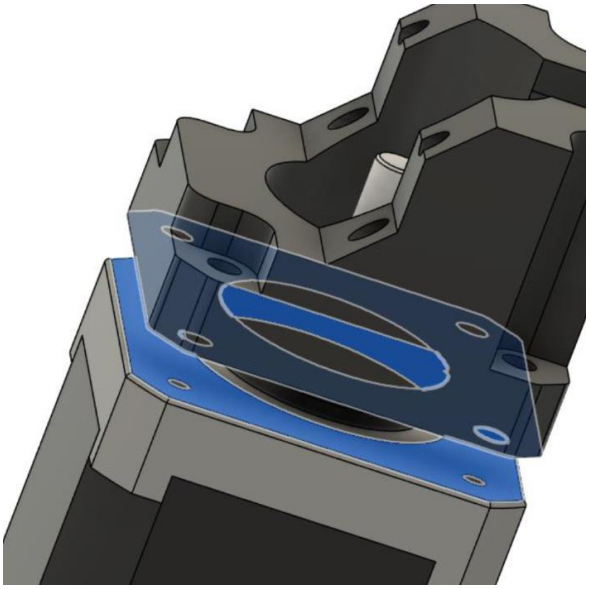


5/Motor units





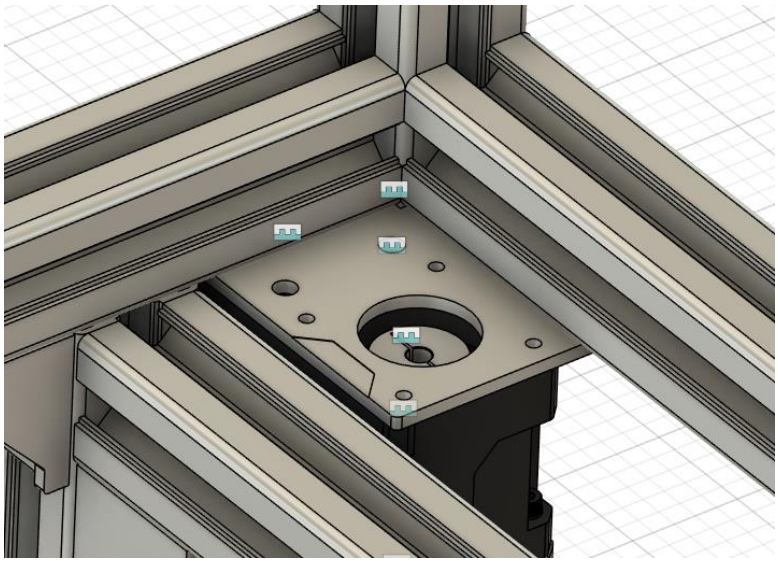
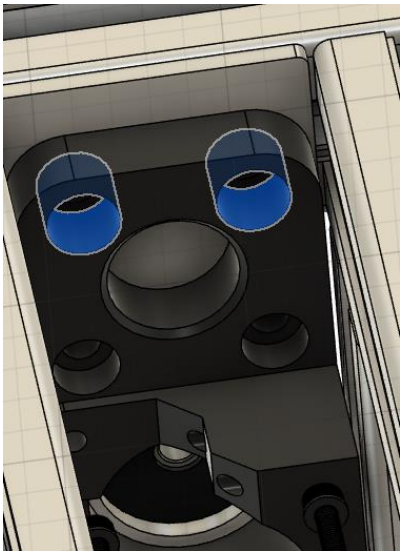




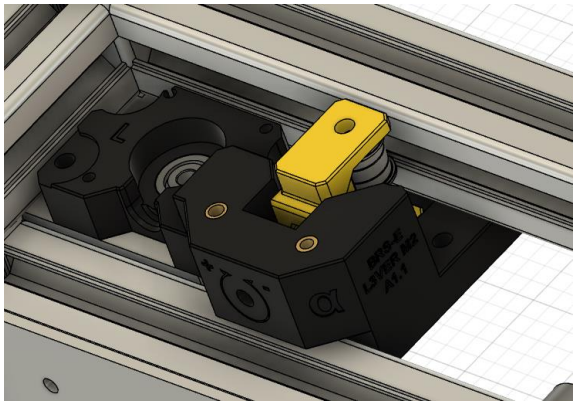
Fix the motor to the part, then slide the m3x30 in the holes, and attach the coupler to the main shaft

Installing a decoupler is highly recommended : It will drastically reduce the overall noise of the motor and will behave better, featuring Anti-Resonance and Torque Ripple Smoothing.

Mainparts installation

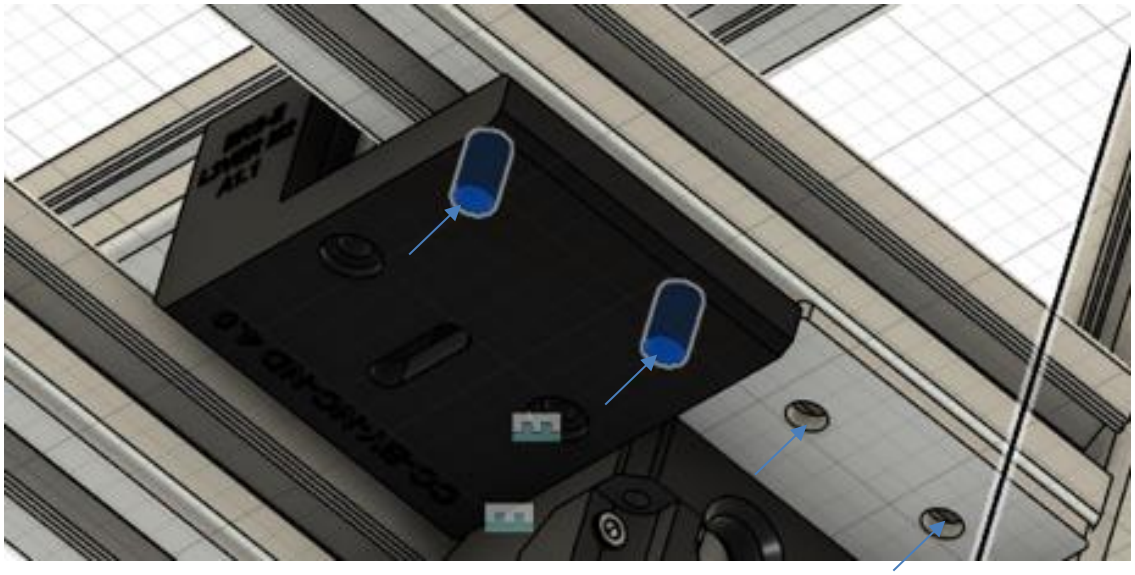



You need to use the motor mount as an anchor to the frame, holding the Aluminium Stock plate (it replace the tiny squared parts from the stock design)

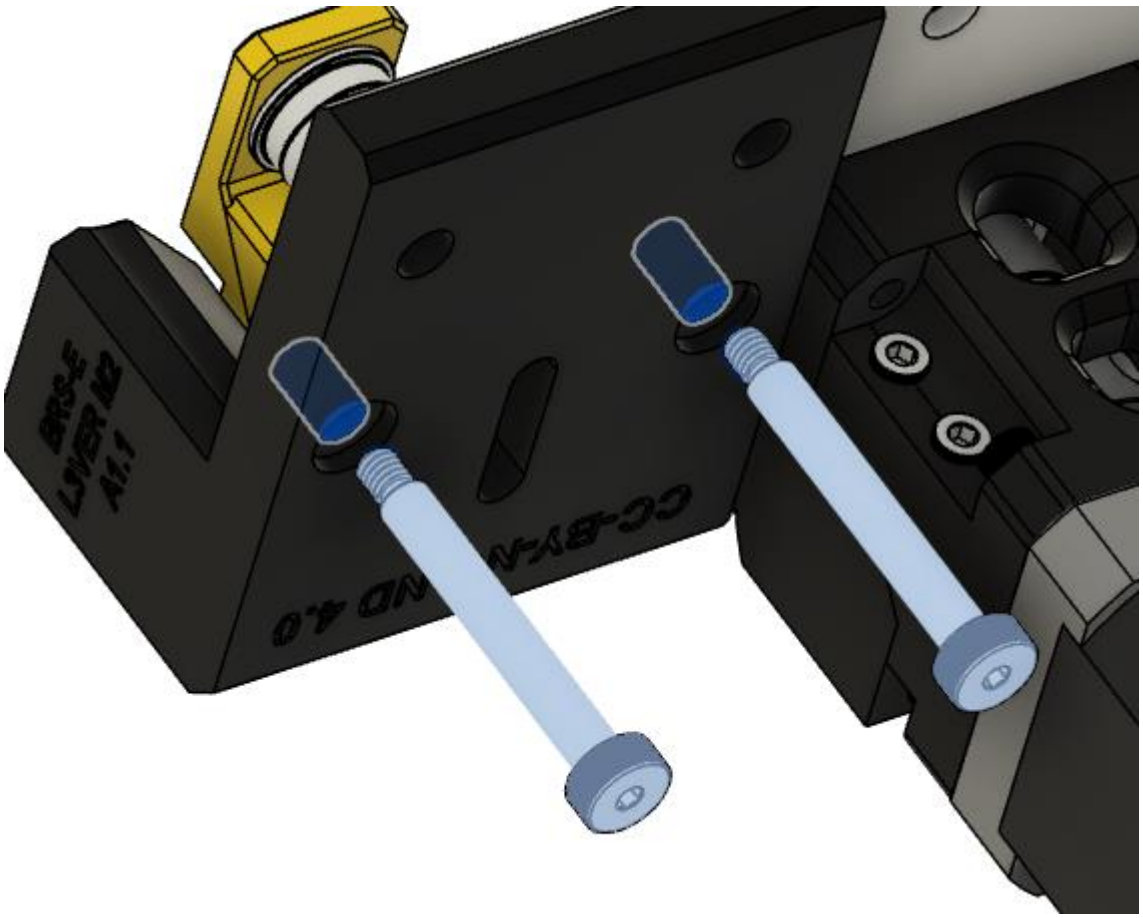


You can install the levers inside (one side is thicker) you can confirm the right assembly by gliding it inside the Rail, it need to be tight a bit but should glide with a bit a resistance)

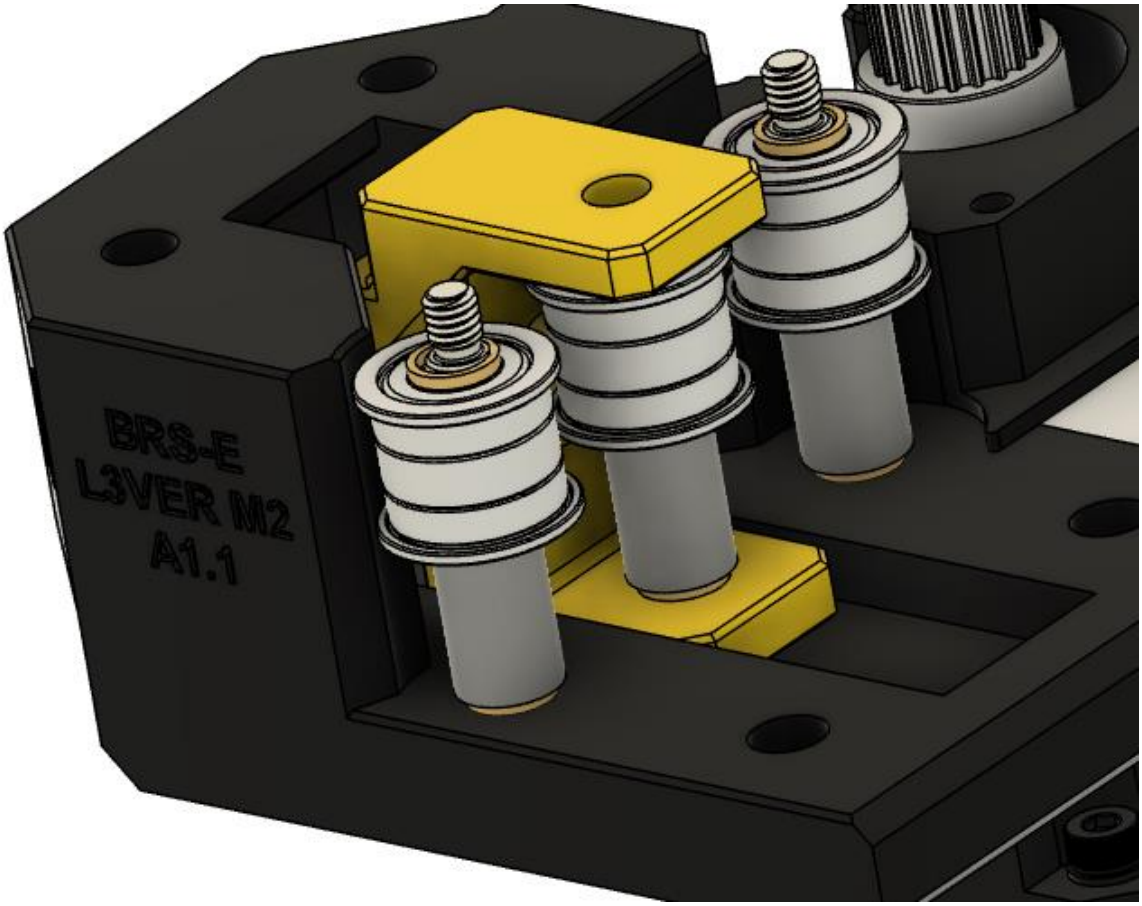
Now insert the lower block part and secure it with x2 M6x14 and T-nuts



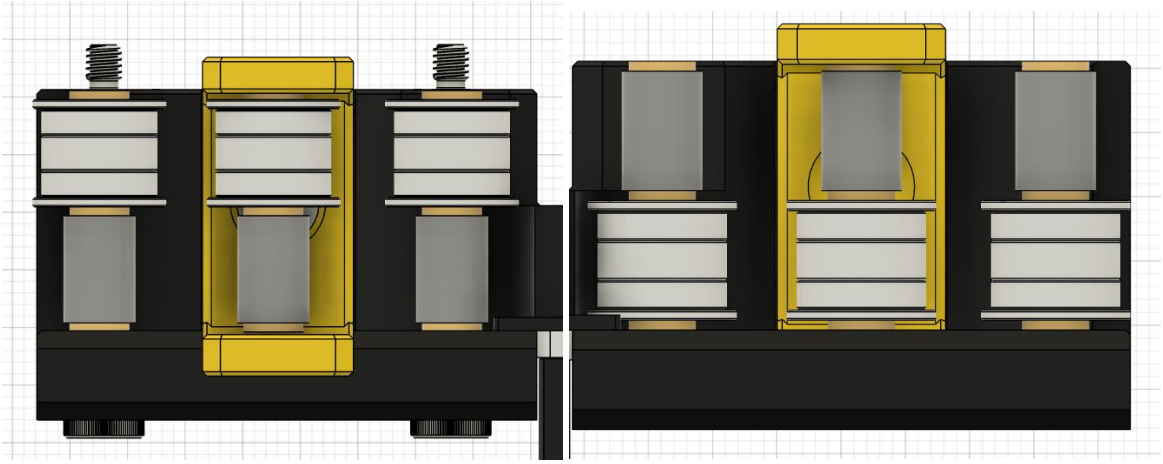
M6+T-nut on each holes



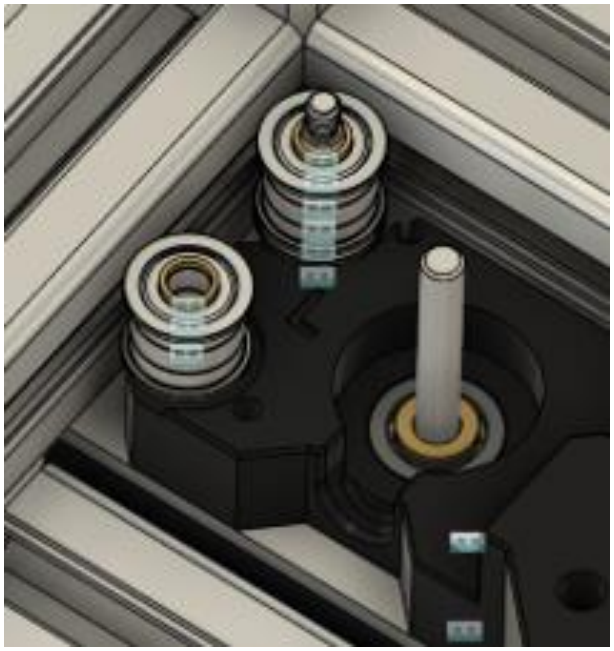
Install the 2 D5M4x35mm shoulder bolts on each side Alpha and Beta. The holes are tight preventing it to fall, you will need to push it a bit.

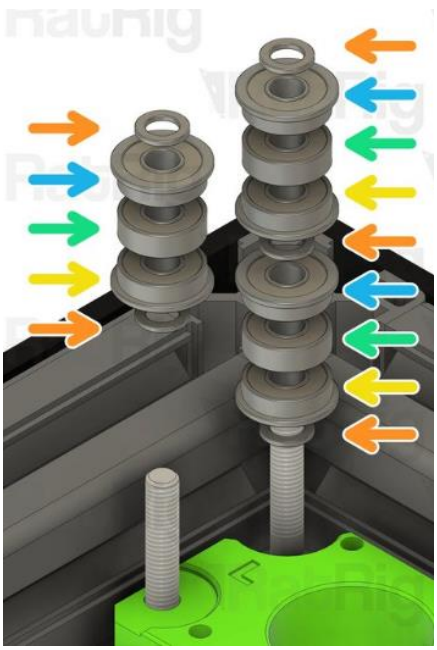


Install the bearings stack with spacer and Shim: here a detail of the order (be aware R and L has to be inverted to match each belts)

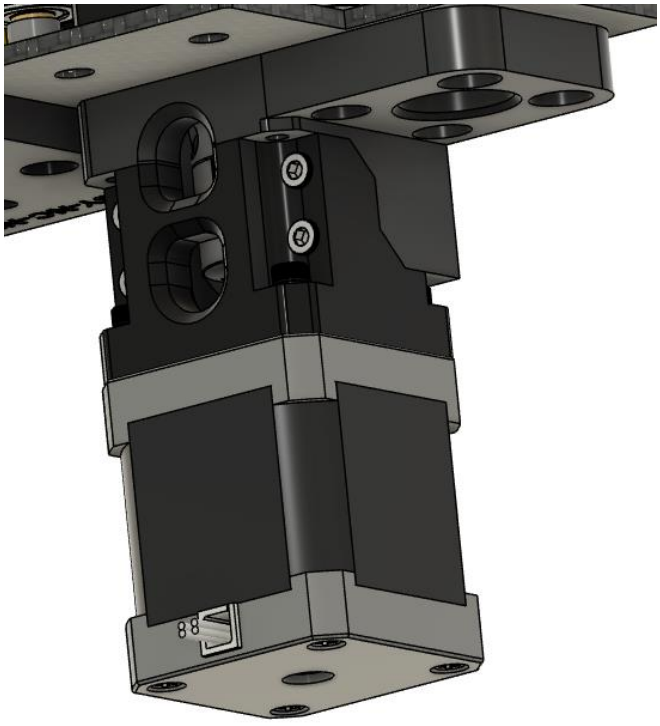


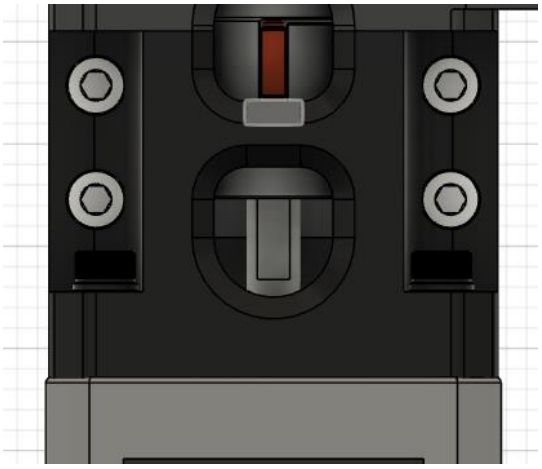
This is a sample exemple, You can use a 14mm spacer (no shim), a 12mm spacer (+2x 1mm shim) or 2x 6mm alu spacer like RR does, with 2x shim





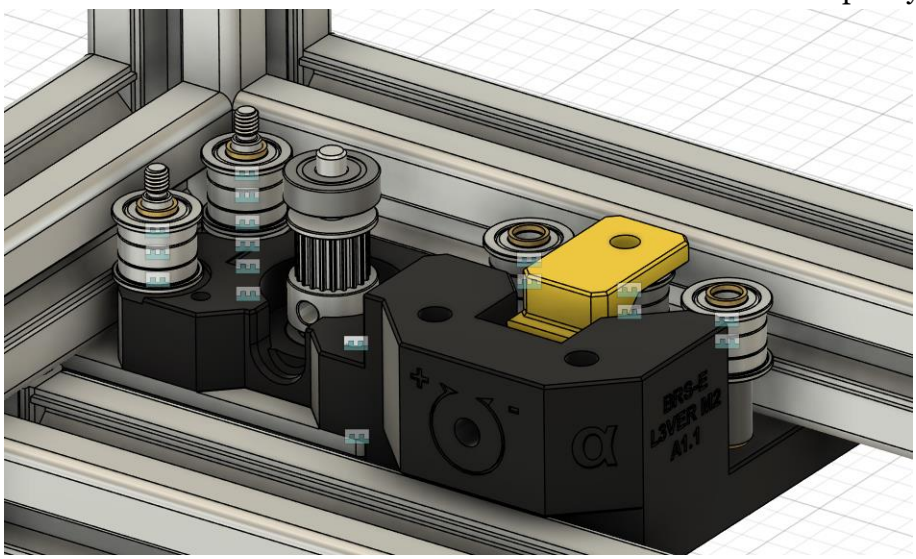
Add the bearing on the corner, the same way than te original Block



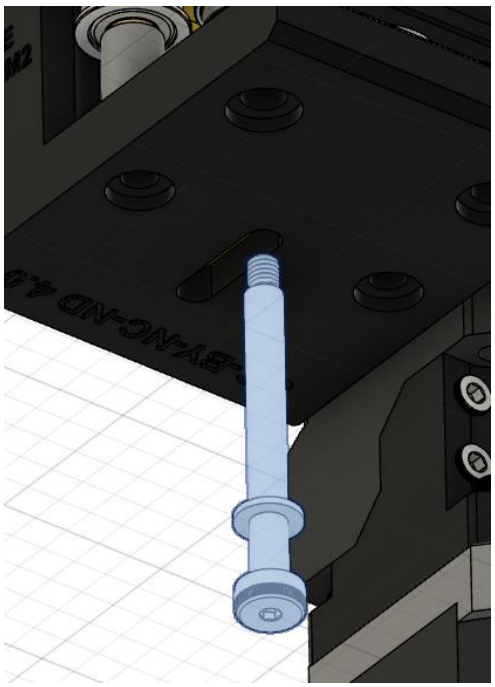


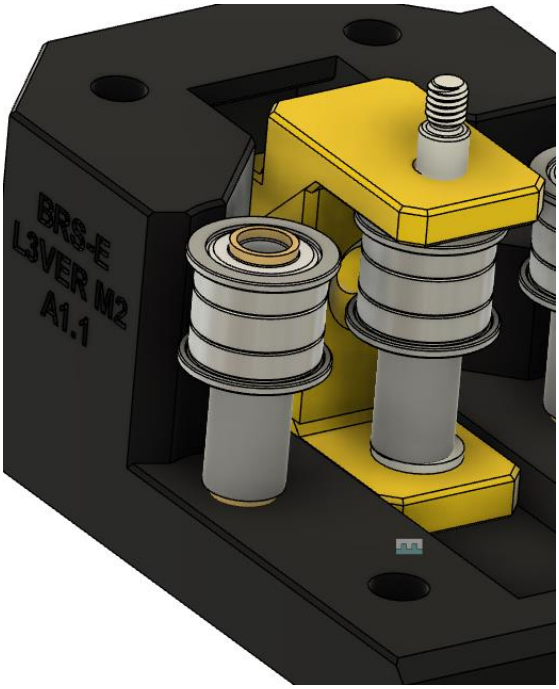
Attach the motor bloc and secure it with the 4x m3x30, add the 55mm shaft extension throught the 625zz, you have room to use an allen key and adjust the tightening of the couplers

You can now add the motor and the shaft and install the toothed pulley

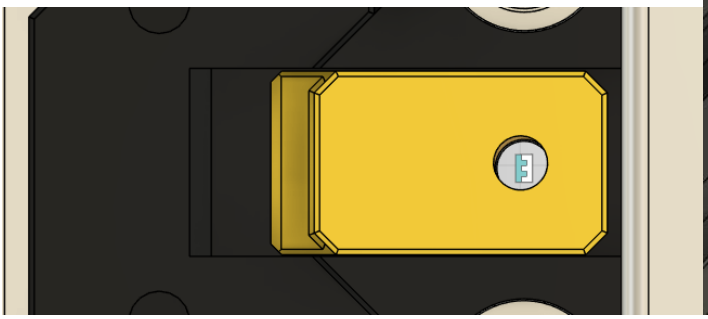


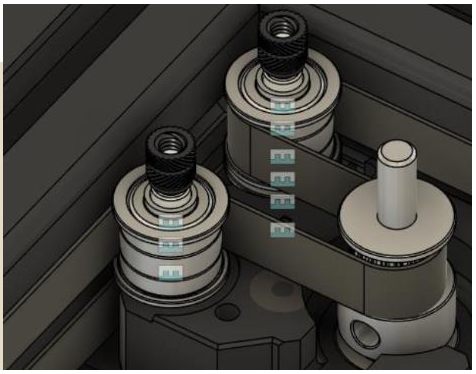
From bellow, insert the D5M4x45 shoulderbolt with a 8x5x1 microshim, this will secure the Lever assembly for belts routing.

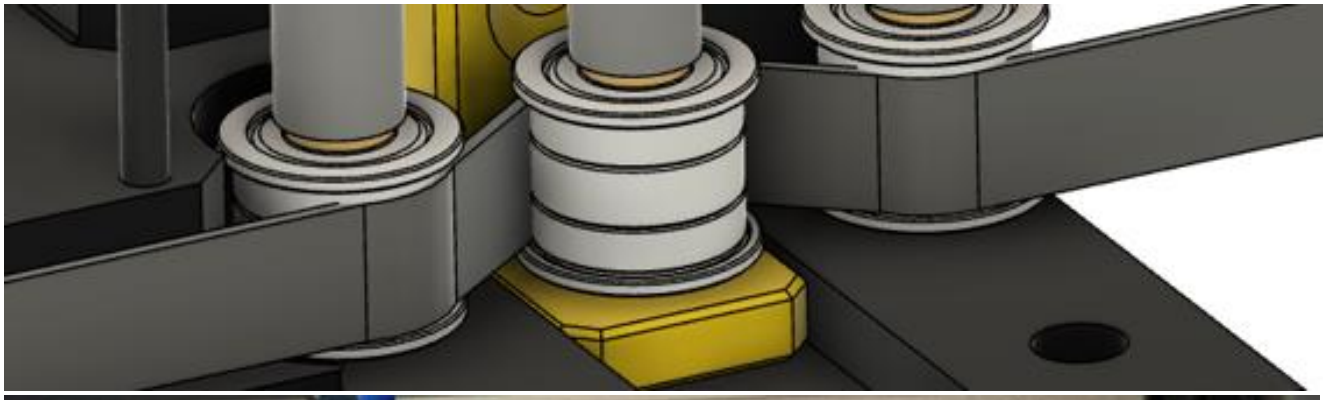




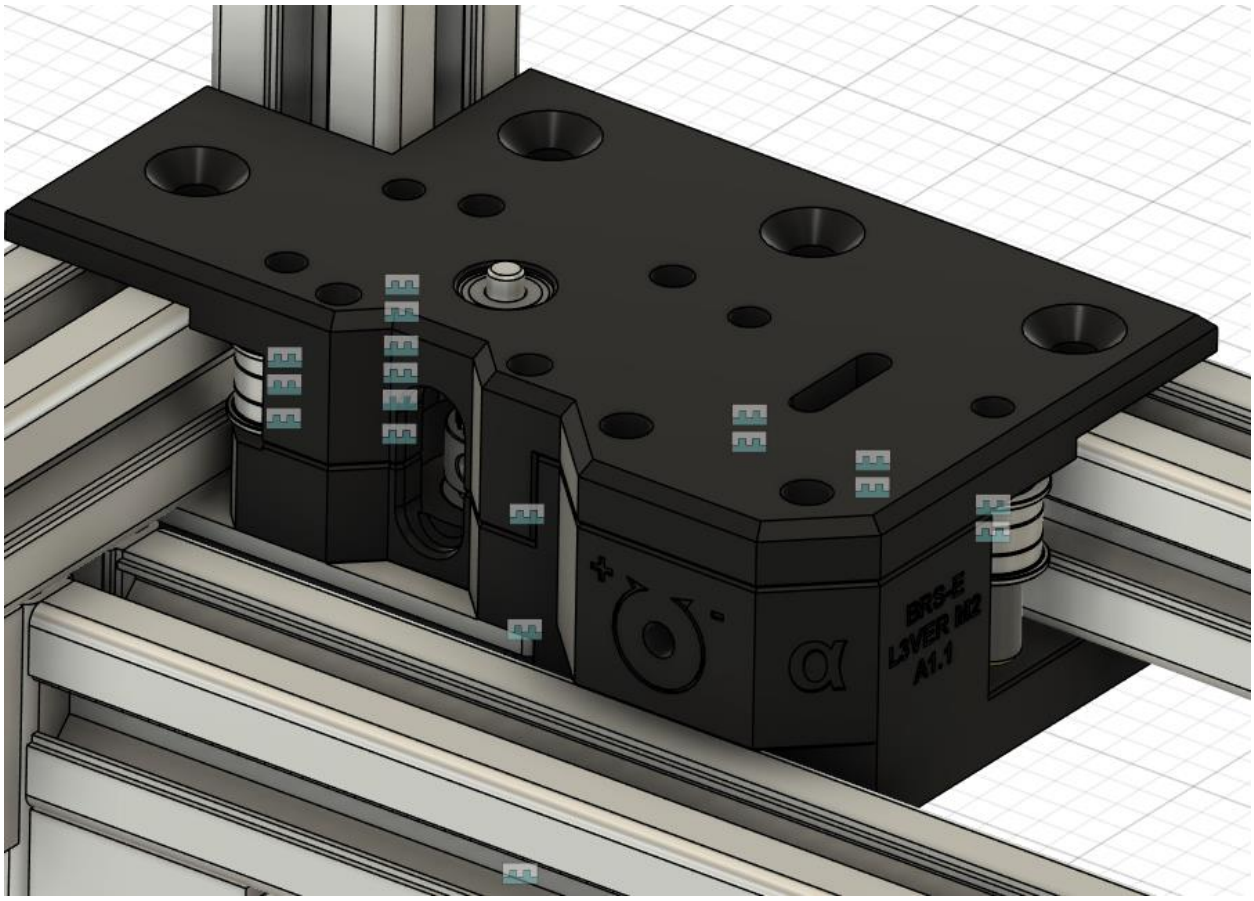
Do the 2 motors block in the same time. Once done you can begin the belt routing (like a stock block + the Lever passage detailed here), let it loose the lever in the lower position (against the 3030)



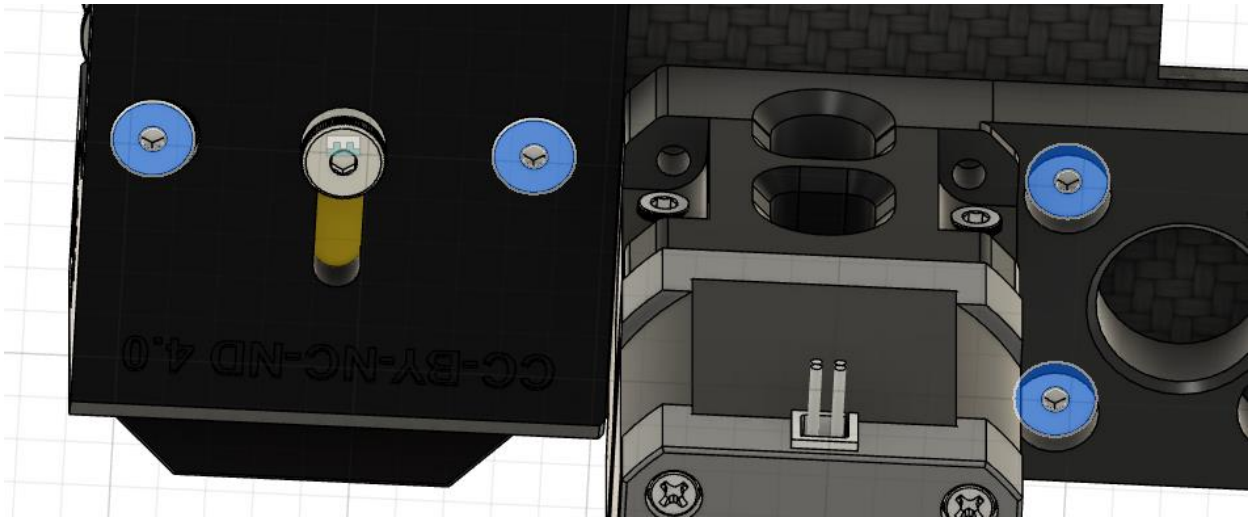




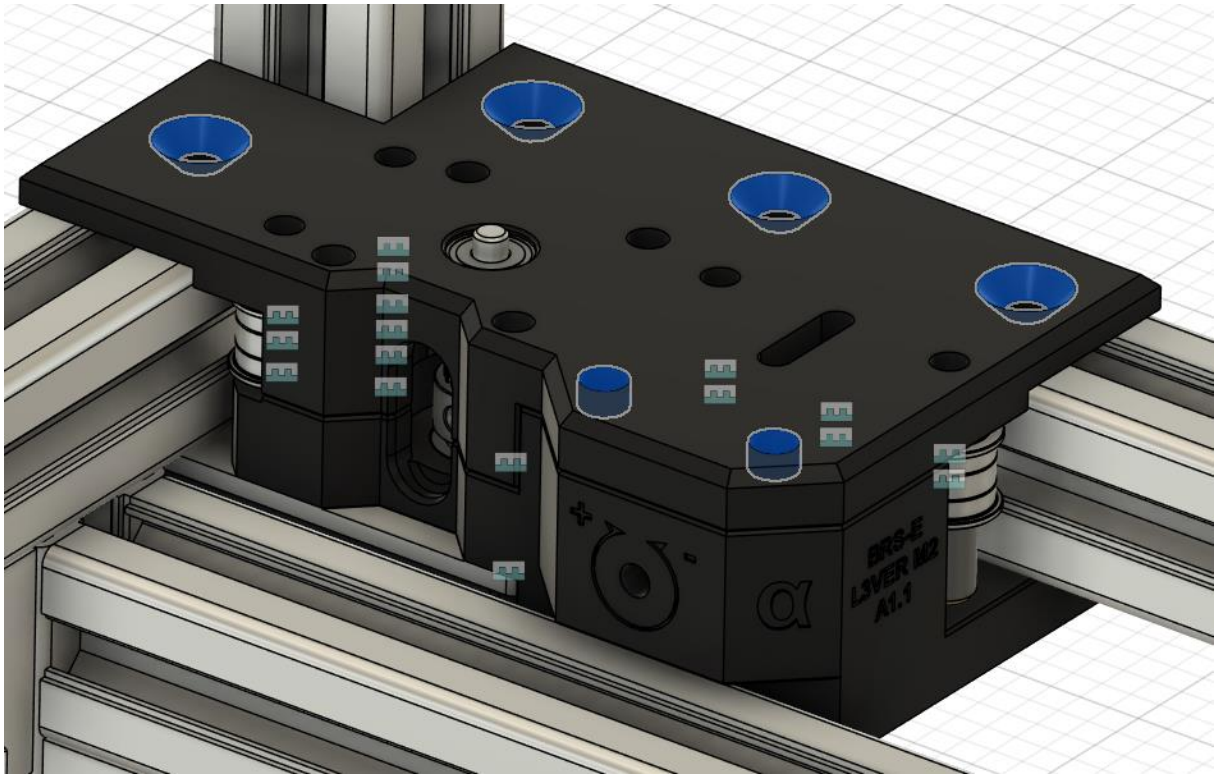
Once done, you can secure the whole assembly with the top plate, (with the other 625 bearing already inside)



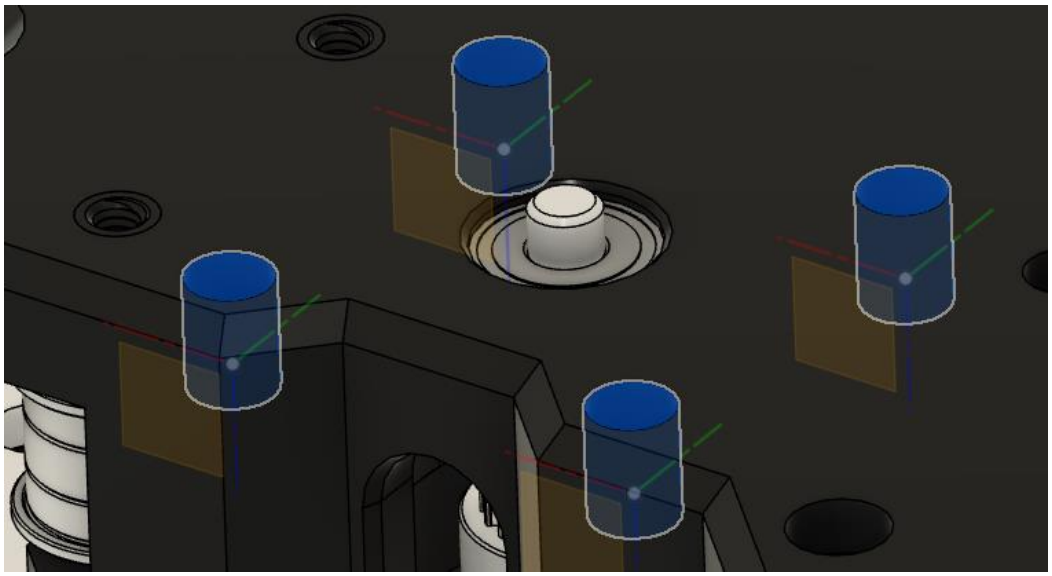
Use the 4x 35mm shoulder bolts from bellow and adjust them few turns each to heavenly fix the top part



The secure the ensemble with the x4 M6 countersunk the and 2x m4x20 screws at the top



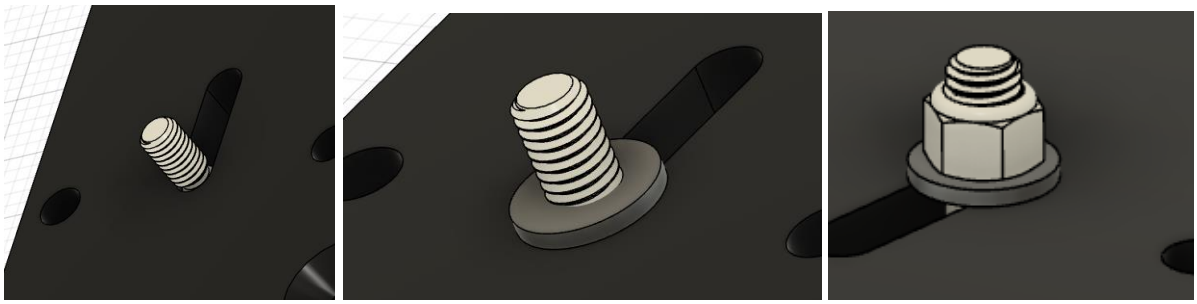
Then the x4 m3x35 to grab the motor from the top (same as the stock RR block)



I don't specifically cover the rest of the assembly since it is already described in the PMB2.0 motor block and the Ratrig stock manual. Those parts shares some features.

Especially the Motor mount, and the shaft assembly:

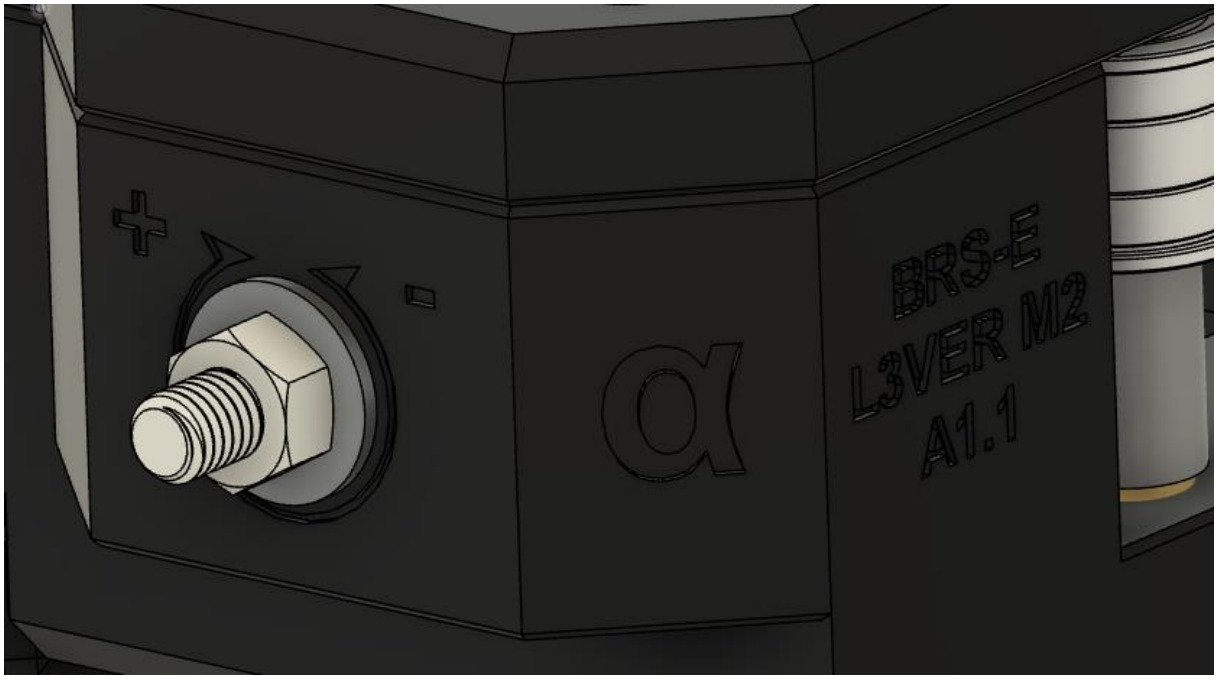
https://github.com/FlorentBroise/BRS-Printers-Mod/blob/main/manuals/Manual-PMB.pdf



Install a m4 washer with a M4 nyloc nut

At this point you can control the motion of it by gliding it inside.

There is +-14-17mm of travel here.



Install a M5 washer and a m5 nut to the Lever screw

Here you saw the same logic than the stock RR motor block, PMB2.0 and LEVER M1 A

https://github.com/FlorentBroise/BRS-Printers-Mod/blob/main/manuals/Manual-PMB.pdf

https://github.com/FlorentBroise/BRS-Printers-Mod/blob/main/manuals/Manual-Tensionner-L3VER-M1-A.pdf

https://ratrig.dozuki.com/Guide/02.+XY+Drive+Assembly/55?lang=en

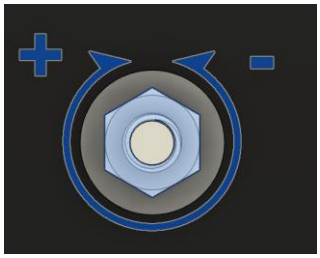
You can no proceed to finish the belt path routing, clamp them to the head when the LEVER are completely untight and apply a bit of a tension when doing so, this way you will be more accurate to finish the tension.

To use it:

-unscrew a bit the lever shafts

-place the gantry is the front position to check the matching on each side to the front blocks

-turn the M5 nut og the LEVER accordingly to apply symmetric tension



-Check the tension with the tension frequencies procedure

https://github.com/FlorentBroise/BRS-Printers-Mod/blob/main/manuals/belt.pdf

-Tight back the top m4 nyloc to secure the block

-This tension procedure has to be done several time, over time, for the system to settle

-You can confirm the correct tension or adjust it in the Shaper, still be aware the system will settle over few days, with a usage of it, repeat it accordingly.

! This mod has been designed fot a 3mm plate for Electronic panel ! It works with 4mm too

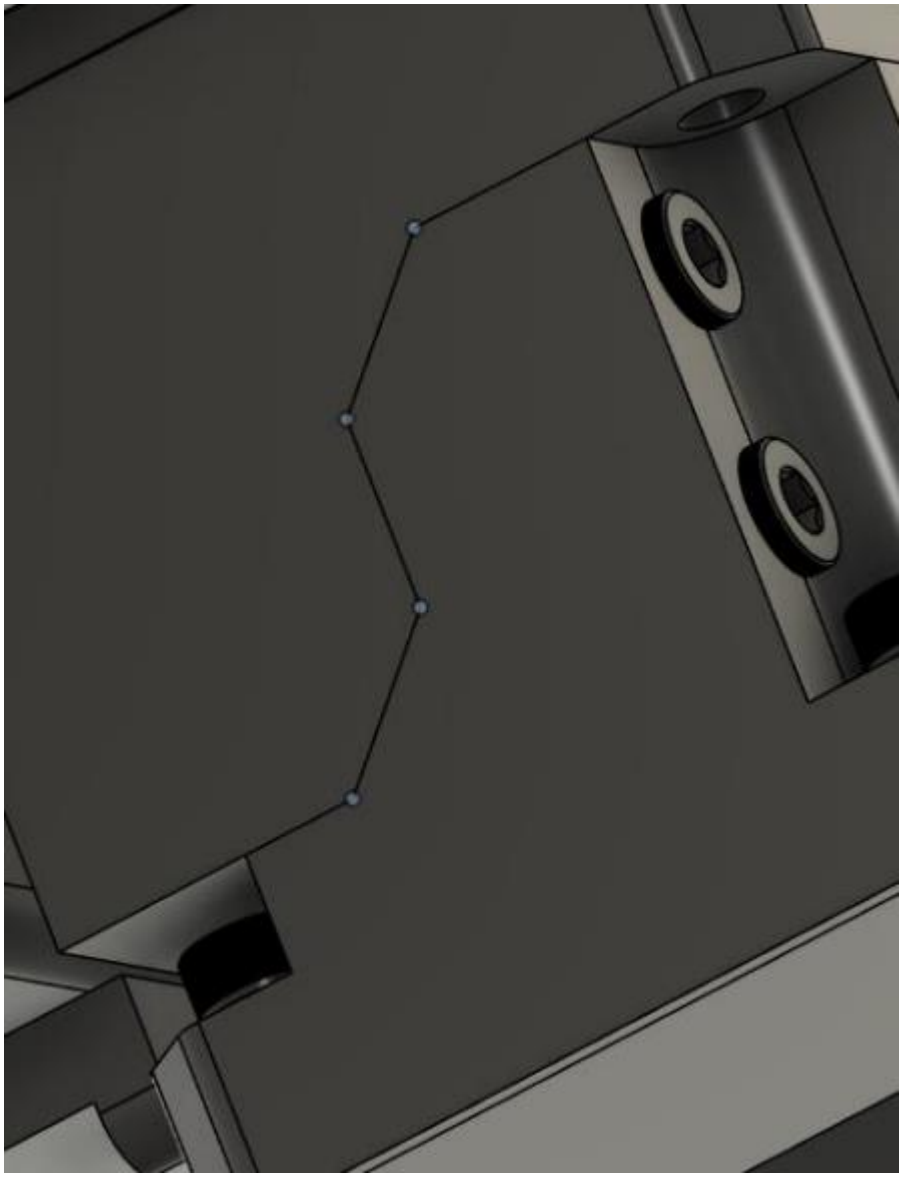
The open frame mod, Skeleton cover mod, stock version, use the same manual

IMPORTANT Checks:

THIS STEP IS IMPORTANT : Move the toolhead at 45° then 135° to indiviually check if we have a good shafts/motor alignements. If you feel a repetitive pattern of resistance, recheck the alignement in the blocks until the movment is smooth.

If you are dubitative about the junction of the two elements, you can use a round grind to make those angle more round (points on the next picture). Depending of the quality of the printer used to produce the part it may be an issue if you are not very good with dimensionnal accuracy. BRS-Engineering parts you ordered are precheck to match alignements, no issues will occur with them.

625 bearing can be faulty but this is more rare, giving a hard point in the rotation sequence, generally a damage shielding or an oil leak can be a good indicator of their status. Check if the rotation by hand seems flawless.



LAST CHECK

1- Check the tightening of all screws, nema etc (to be done after few hours of use)
2- Check the alignments, in particular the Shafts
3- Hard point checks
4- Check the motor wiring, order on the steppers !!!! If not done; system breakage possible
5- Check the motor functions in Klipper with "STEPPER_BUZZ STEPPER = stepper_z"
6- Double check everything before switching on!
7- It is a good idea to recheck the screws tightening after one week.
8- Input shaper will move after few days, time to the system to settle and adapt. Dont' forget to remake one timt to time to be perfectly tuned

Disclaimer

The system is designed to operate on a correctly assembled Vcore 3. Even a slight mounting error can make it impossible to upgrade. If the parts to be printed are made by the customer, check the dimensions after the print, they need to be respected : a bad dimension will block (+ -0.08mm) the assembly. The kit is installed in the simplest way without destructive modifications of the machine This kit is an optional upgrade, intended for an informed public and with advanced experience, its assembly and / or its function and / or its quality of execution are the responsibility of the customer and are not guaranteed in public view. of parameters by BRS-E. BRS-Engineering accepts no responsibility in the event of bad sourcing (bad quality and / or bad dimensions self-prints), bad assembly by the customer, or bad assembly of the based Vcore. The kit has proven its POC and POW in quality controls at BRS-E as well as at a test customer, As is, the design works with all expected expectations By purchasing the kit, or by having it done by BRS-Engineering, you accept the CGU as well as the previous disclaimer

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Thanks for following this document, if any question occurs you can contact me!