

# Open Source - Very Big Stick MKII

## MECHANICAL BUILD GUIDE

**REVISED Beta v1.2**

2023-12-28



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## Mechanical Build Guide Video

Instructions on how to assemble the OS\_VBS MKII gimbal is available on rightrudder-leftstick's youtube channel. Please watch and follow carefully on how to assemble these components.



You can watch the video at this URL:

<https://www.youtube.com/watch?v=IdYbF5dOYag>



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## Bill of Materials

This is a live link to a spreadsheet containing the bill of materials for hardware and parts to be printed.

Note that as this time the Electrical section is just a placeholder

Part name	Quantity	Thicker walls required?	grams each	Total grams	Optional?
PitchFrame_TopPlate	2	n	134	268	
PitchFrame_SidePlate	2	n	47	94	
TM_M36_2020_Adapter	1	y	31	31	Y
Cam_rollerSpacer	2	n	1	2	
Cam_bearing_washer	4	n	1	4	
MainSleeve	1	y	54	54	
PitchFrame_PillowBlock	2	y	95	190	
RollFrame_PitchPin_Gear	1	y	43	43	
RollFrame_PitchPin_Camside	1	y	46	46	
RollFrame_GearSide	1	y	49	49	
RollFrame_CamSide	1	y	49	49	
M12_WasherSpacer	2	n	2	4	Y
SOFT_CAM	4	y	23	92	
TOTAL Filament PETG				926	grams

HARDWARE	Notes
1KG PETG 1.75mm filament	PLA+ untested
2020 v slot aluminum rod - Cut to length	Length depends on your choices
608 bearings	
6003 bearings	
18x24.7x1 Teflon Washers	<a href="https://www.aliexpress.com/item/4000935512060.html">https://www.aliexpress.com/item/4000935512060.html</a>
M3x8mm	Do nut use countersunk heads
M4x20mm Socket head	
M5 vslot drop in nuts	
M5x8mm Socket Head	6 less if TM adapter is not used
M5x16mm Socket head	Put into the middle of the camside 6003 bearings for extra strength
M5x50mm	For the counterweights
M8 washers	
M8 Spring Lock washer	



M8 Nylon Lock nuts	8			
M8x35mm HEX Head	3	Must be hex head for clearance		
M8x50mm socket head	3	Two of them must be Socket Headed		
M8x80mm HEX or Socket Head	2			
M8x100mm HEX head	4	HEX head only		
M12 Washers	20	For counterweights		Y
FRT-C2-301-G1 Rotary damper	2	Make sure to get the kind that dampens both directions!		Y
Extension spring with loop ends. ~60mm unloaded	2	I used this mcmaster part in the design (3630n293), untested! You'll want to test many springs		
Extension spring with loop ends. various lengths	2	This is the second set of side springs, try several to tweak		Y
ELECTRICAL (WIP)		Notes		
5pin mini din connector (male) for TM adapter	1	<a href="https://www.aliexpress.com/item/32859748866.html">https://www.aliexpress.com/item/32859748866.html</a>		y
TLE5010 sensor kit with magnet and PCB	2	<a href="https://www.aliexpress.com/item/4000549883214.html">https://www.aliexpress.com/item/4000549883214.html</a>		
Assorted 22 AWG wire in various colours	1	get at least a meter worth in several colours.		
STM32F103C8 microcontroller	1	Be careful to get the exact right version that supports Freejoy, beware of counterfeits		
Solder breadboard	1	It will be needed to create a "breakout" board for the TLE5010 and Shift register sensors		

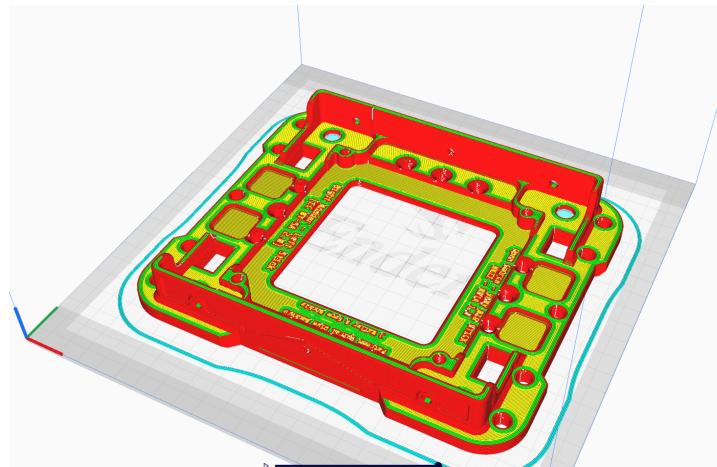


## 3mf Part Reference

Here is information on each 3mf file included with the build and a reference image showing the correct print orientation.

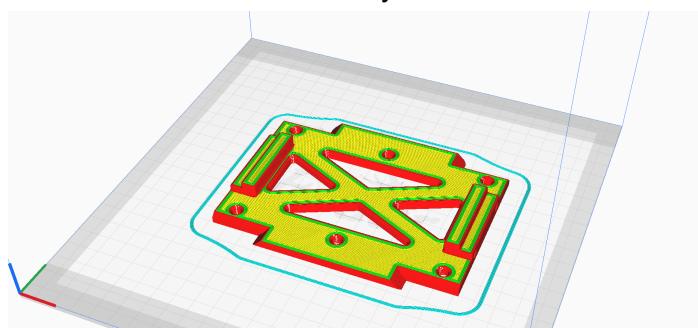
### PitchFrame\_TopPlate.3mf (*revised 1.2*)

Quantity: 2



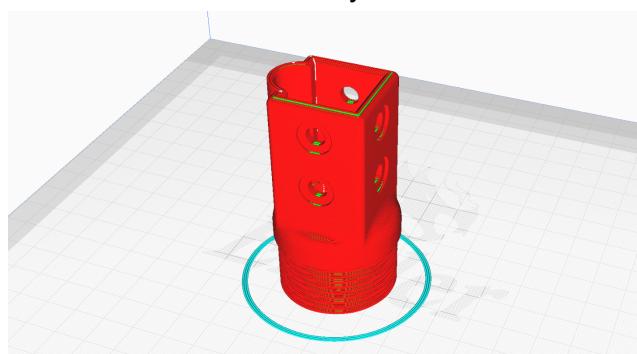
### PitchFrame\_SidePlate.3mf

Quantity: 2



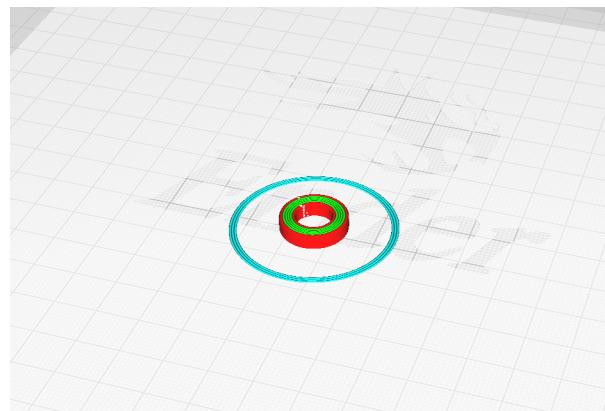
### TM\_M36\_2020\_Adapter.3mf

Quantity: 1



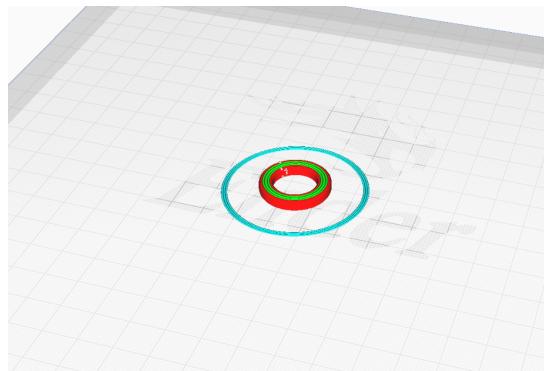
### Cam\_rollerSpacer.3mf

Quantity: 2



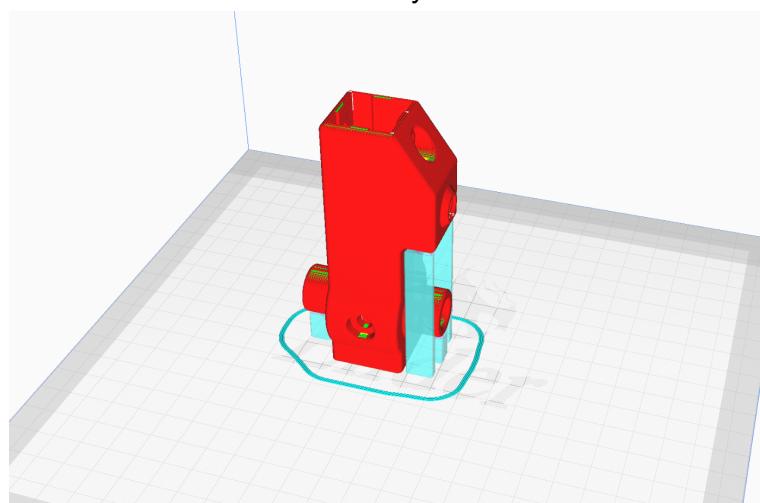
### Cam\_bearing\_washer.3mf

Quantity: 4



### MainSleeve.3mf

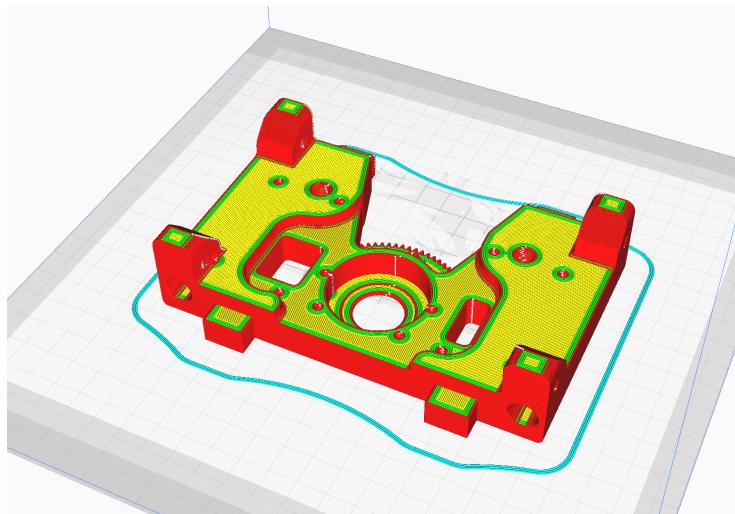
Quantity: 1



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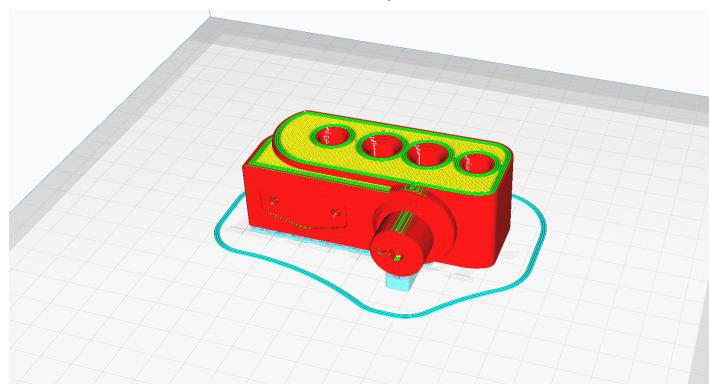
### PitchFrame\_PillowBlock.3mf (**revised 1.2**)

Quantity: 2



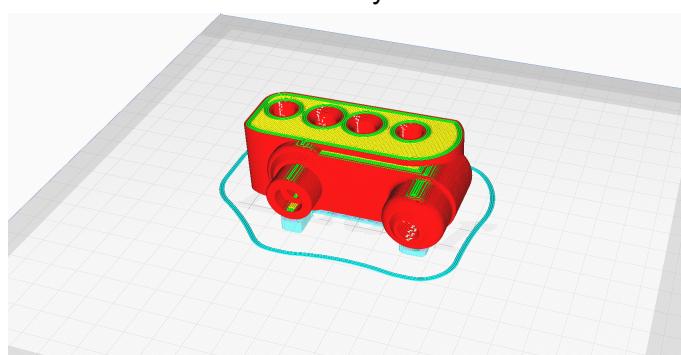
### RollFrame\_PitchPin\_Gear.3mf

Quantity: 1



### RollFrame\_PitchPin\_Camside.3mf

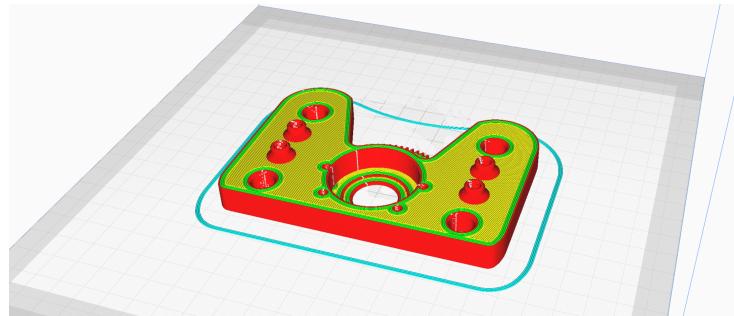
Quantity: 1



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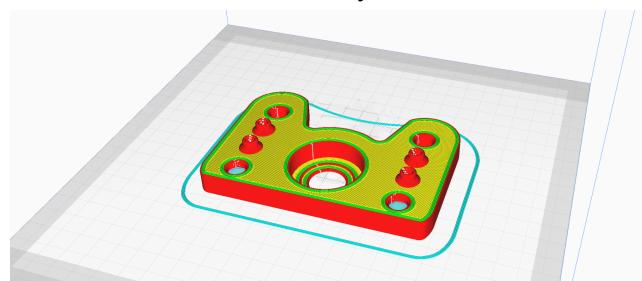
### RollFrame\_GearSide.3mf

Quantity: 1



### RollFrame\_CamSide.3mf

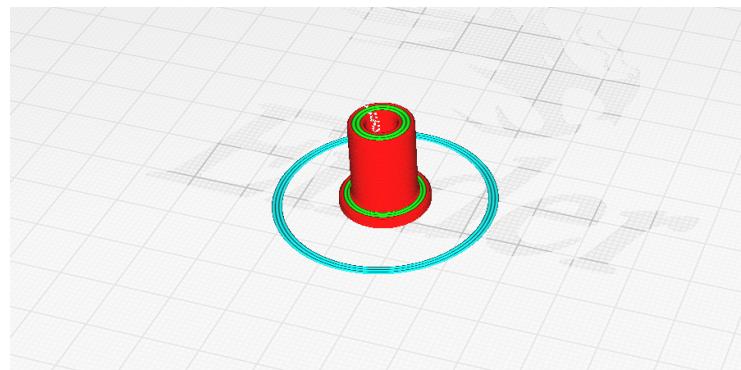
Quantity: 1



### M12\_WasherSpacer.3mf

Quantity: 1

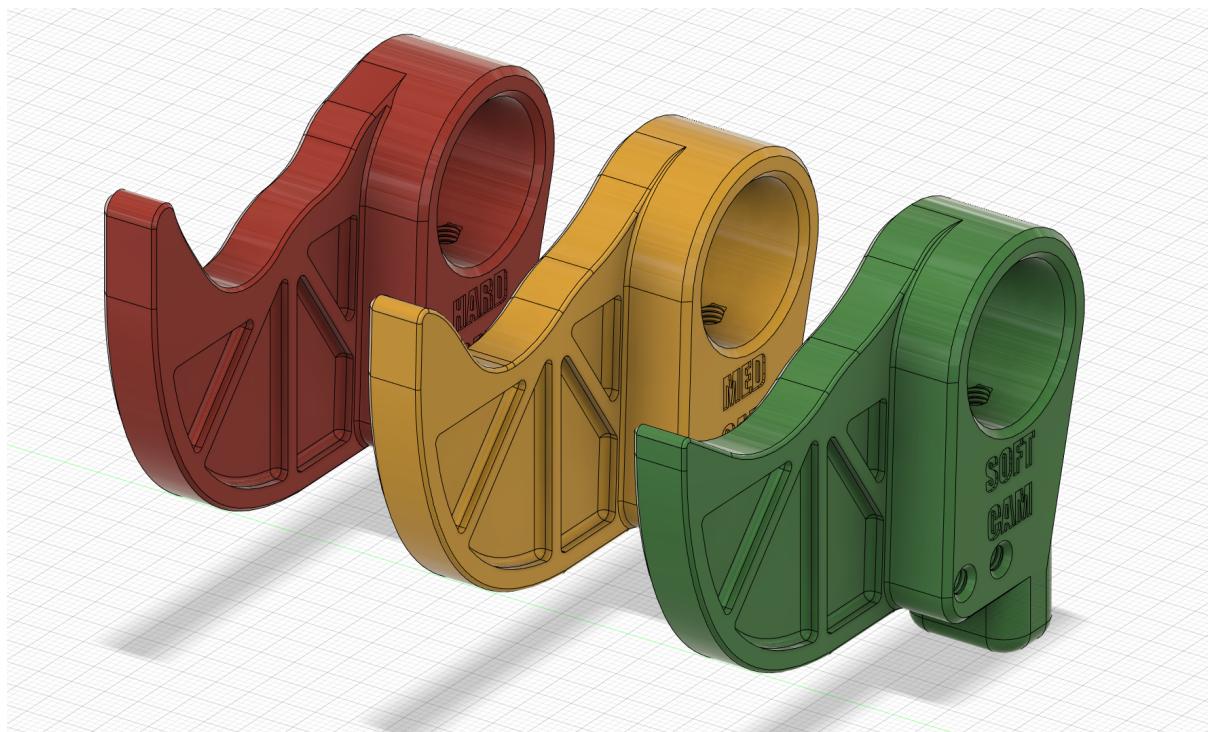
**Optional**



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## CAM Profile Options

The design currently comes with three different options of CAM profiles. They can be mixed and matched on different axis to produce different force feelings, such as a stiffer pitch but a lighter roll motion. They are scaled from Soft to Hard.



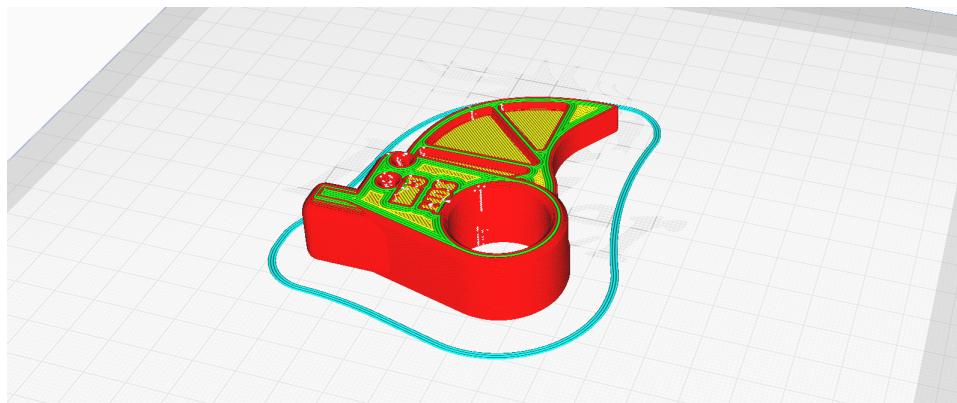
They also feature mounting for a bottom extension spring as well as 4 M4 holes on the side for mounting a secondary side spring. This can either augment the force of the primary spring or allow the use of a very light spring for low spring force applications like helicopter cyclics.



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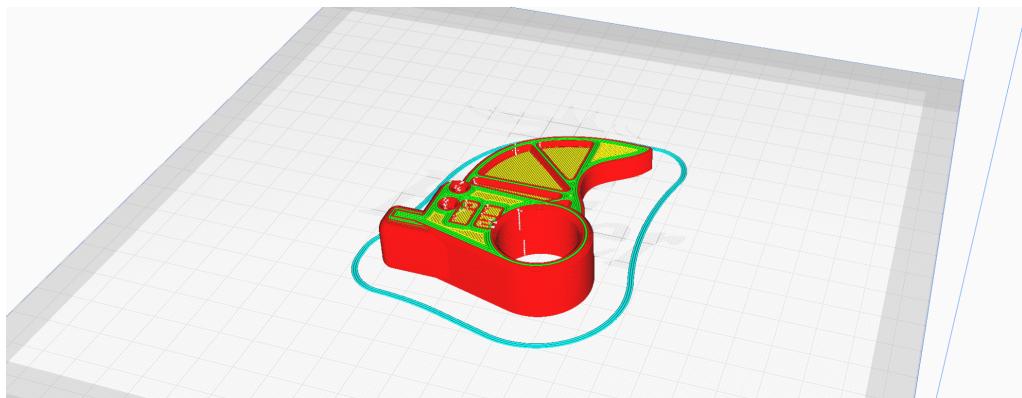
### SOFT\_CAM.3mf

Quantity: 4



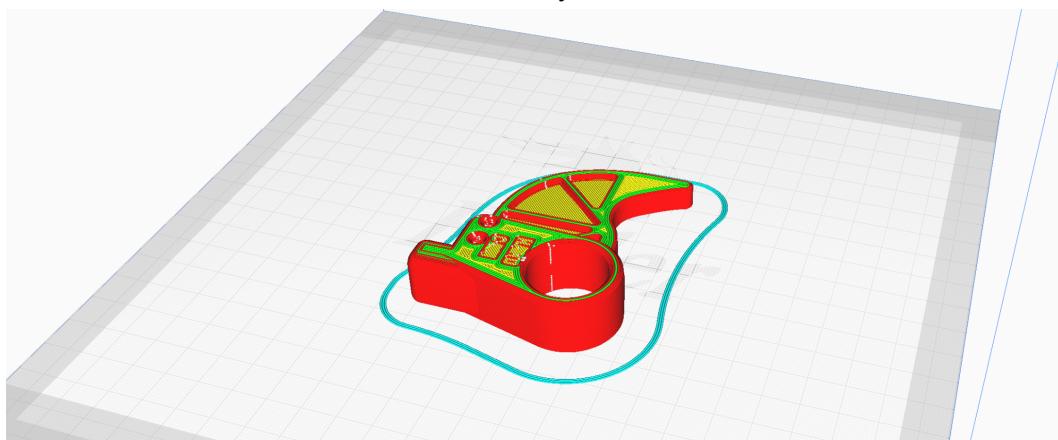
### MED\_CAM.3mf

Quantity: 4



### HARD\_CAM.3mf

Quantity: 4



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