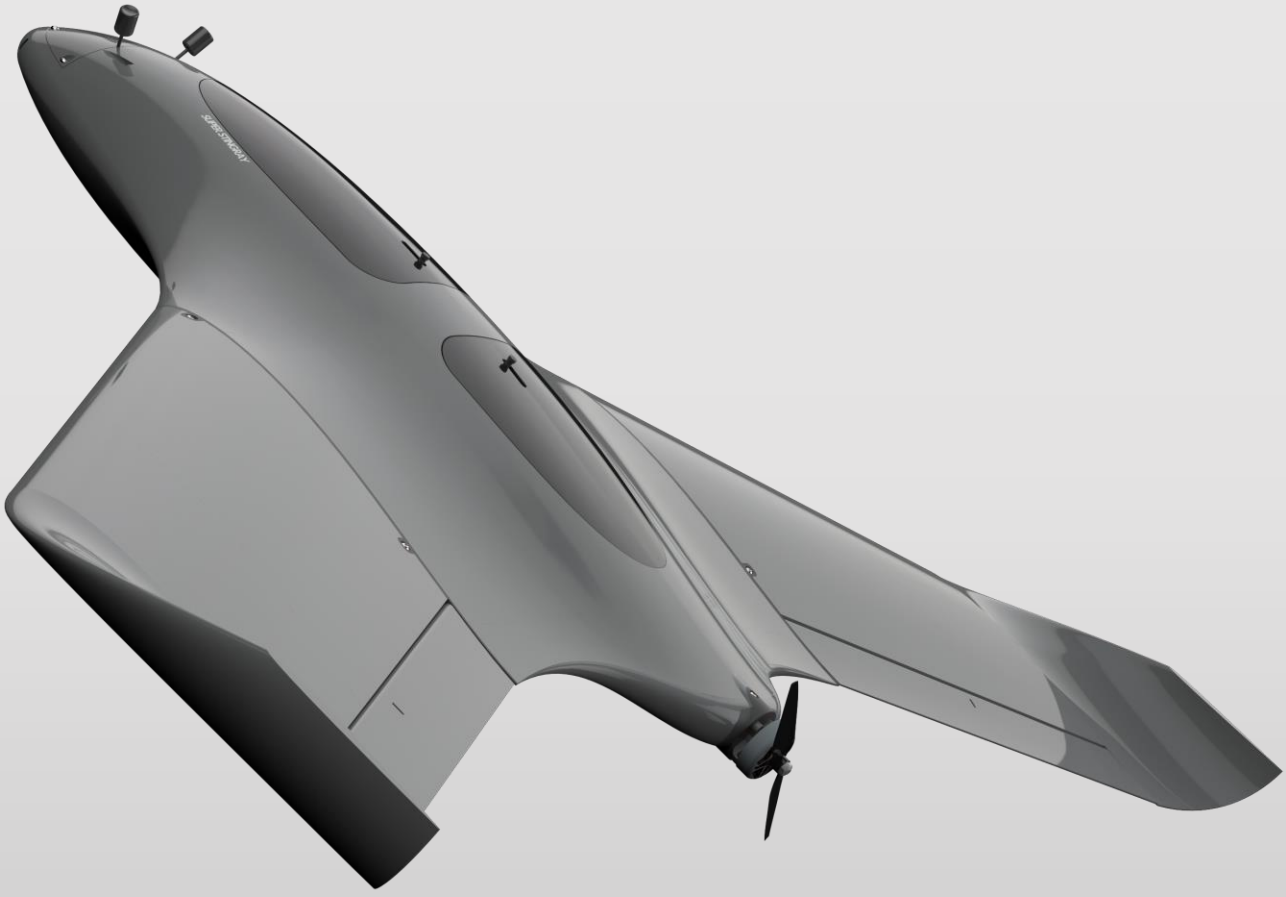
FLIGHTORY

SUPER STINGRAY



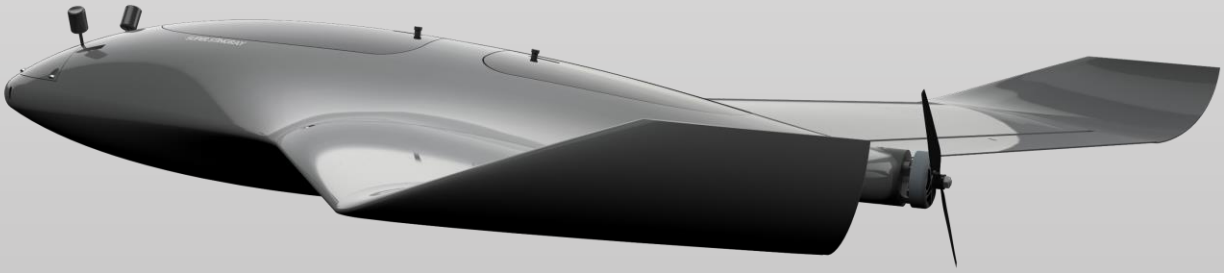
USER MANUAL

V.1

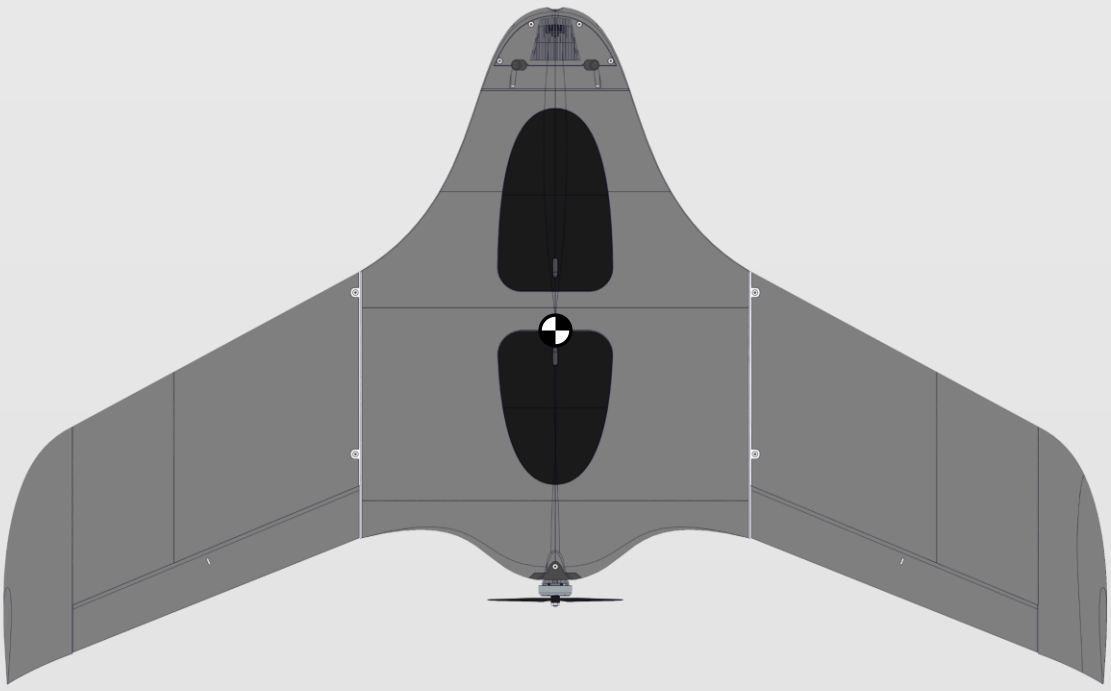
Socials

Join Flightory Tech group on Facebook and create community with us. Share progress of your builds. Any suggestions or questions welcome.
www.facebook.com/groups/flightory

Follow Instagram where I share more footage on a regular basis
www.instagram.com/flightory_

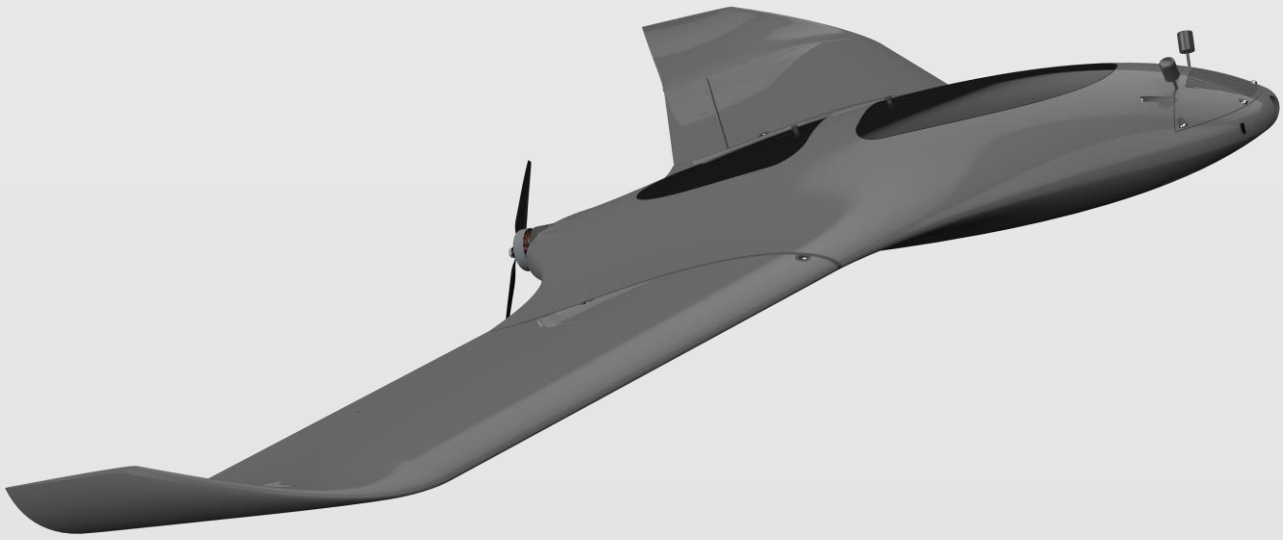


General Aircraft Data



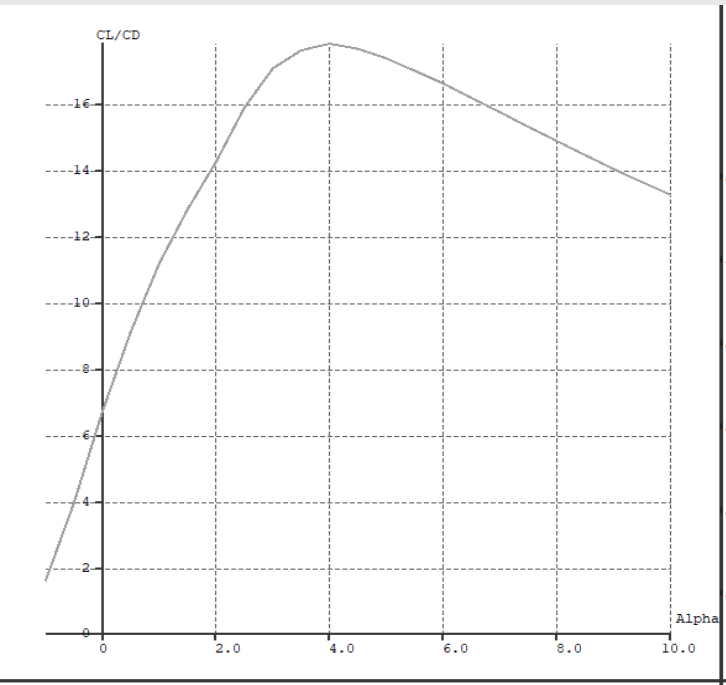
General data	
Wingspan	1130mm
Wing area	31 dm²
Lenght	700mm
Center of Gravity	60mm from leading edge (at wing root)
AUW	1000-2500g
Optimal Cruise Speed	70-90 km/h
Airfoil	Selig S5020
Root Chord	305mm
MAC	271mm
Aspect Ratio	3.7
Wing load	32 - 80 g / dm²

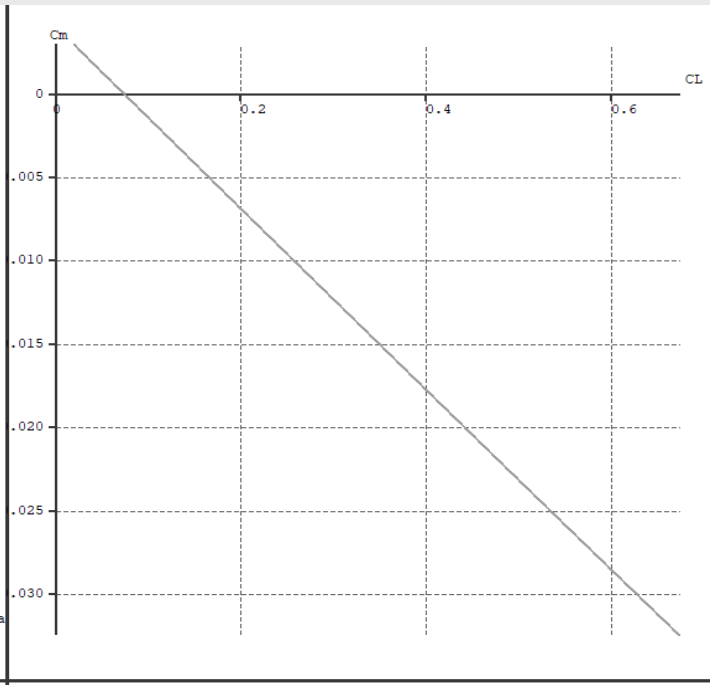
General Aircraft Data

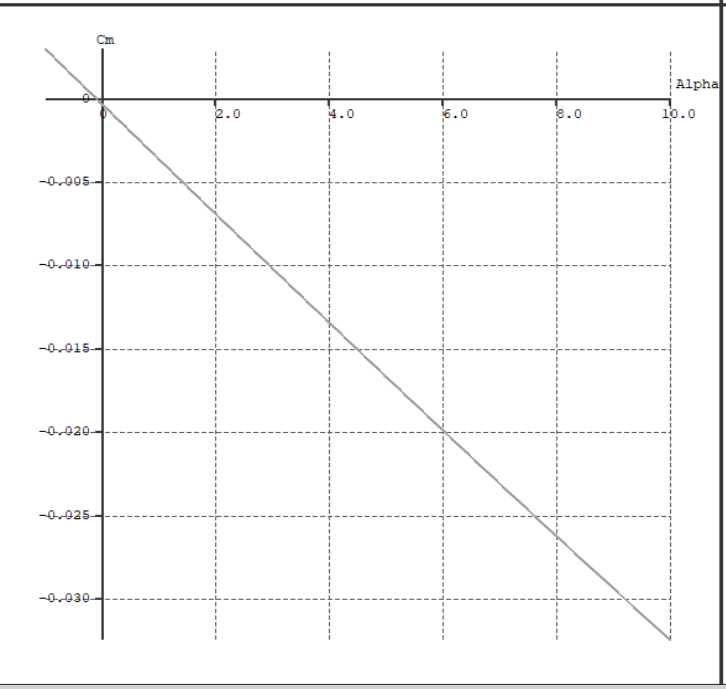


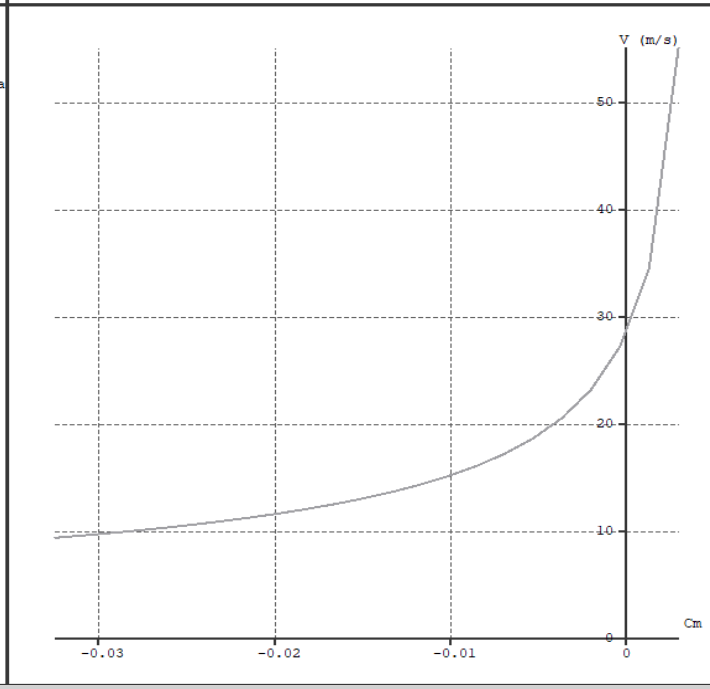
The aircraft features a swept wing design with a single pusher motor located at the rear. It is crafted with compactness and modularity in mind. Geometry has been carefully designed and optimized using CFD and real test flights. The wings, as well as the nose of the aircraft, are detachable. This allows it to be adapted to carry various payloads such as different types of cameras and sensors. By default, it is prepared for a standard 19x19mm FPV camera and any VTX. All files are available in STL format, and some are also available in STEP, allowing for easy editing and adaptation to different cameras, sensors, etc. The recommended equipment ensures high performance and stable flight even below half throttle. The maximum recommended battery is a 4S4P 14Ah, which allows for nearly 3 hours of flight time. The choice of motors and battery capacity depends on the user and is crucial in determining the aircraft's performance for specific purposes.

CFD Analysis



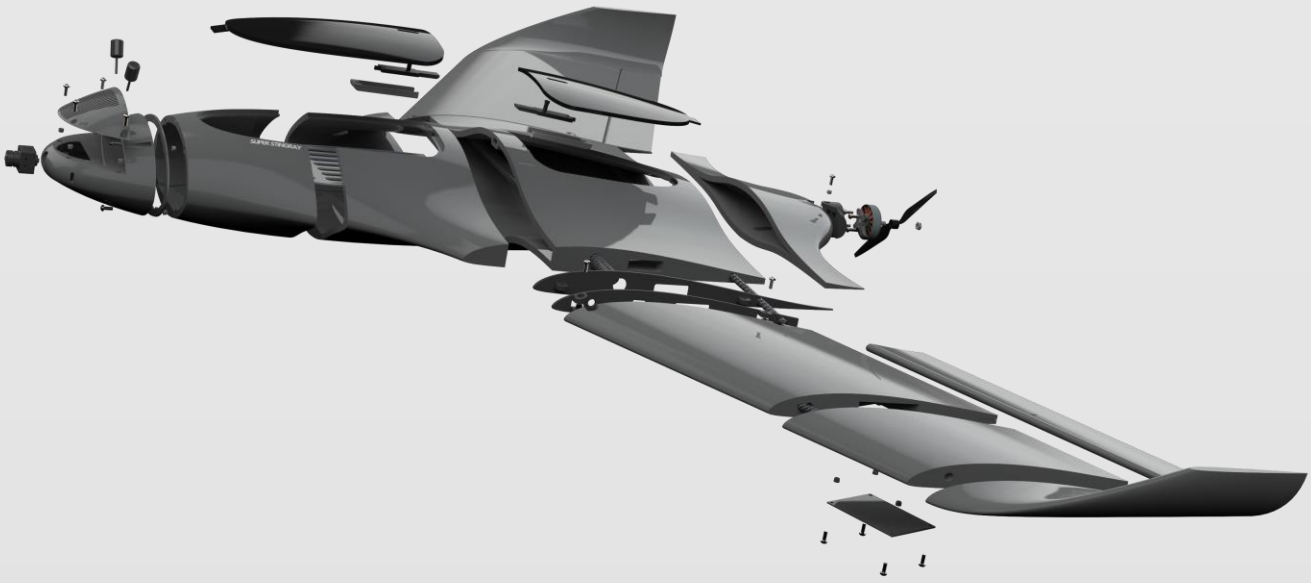


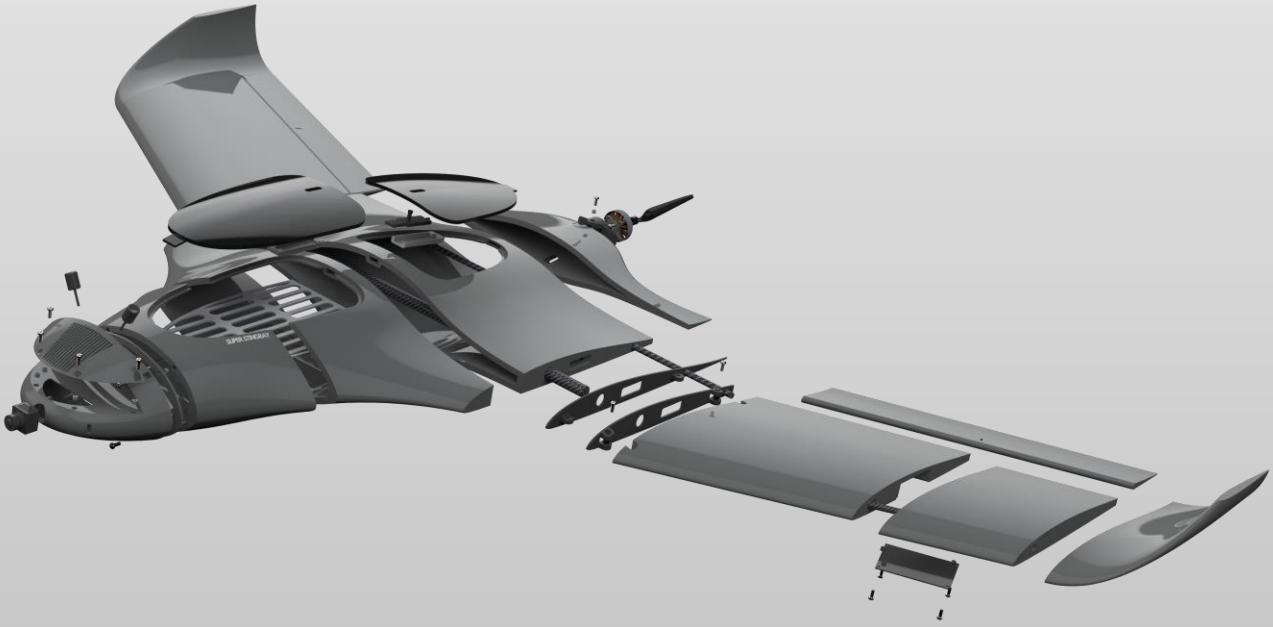




The geometry has been designed and optimized to achieve maximum efficiency while maintaining the stability of the aircraft. The airfoil used is Selig S5020. With the correct center of gravity set at a distance of 60mm from the leading edge (measured at the wing root), the aircraft maintains a longitudinal stability margin and zero pitching moment at zero angle of attack. The highest aerodynamic efficiency occurs between 2 and 4 degrees of AoA at a cruising speed between 60-90 km/h. With the recommended motor and propeller and 4S battery, the aircraft flies steadily in level flight at approximately 40% power, resulting in an average current draw of 5A and providing nearly 3 hours of flight time. There is considerable flexibility in the choice of motor and battery, depending on user preferences.

Exploded View





Reccomended RC Equipment

Reccomended electronics	
Motor	23XX 1000-1400 KV e.g. link / link
Propeller	10x5 / 10x6 e.g. link
Flight Controller	Speedybee/Matek F405 Wing or any other Mavlink FC link / link
GPS	Matek M10Q or similar GPS with compass link
Servos	2x Emax ES08MAII Metal Gear or similar link / link
ESC	BlHeli 30-40A link / link
Battery	4S (max 4S4P 14Ah Li-Ion) or smaller pack / LiPo link
Receiver	Matek R24-D ELRS or similar link
VTX	Walksnail Avatar or any digital or analog VTX link / link / link

Required Accessories

ITEM	QUANTITY
12x460mm Carbon Tube (MAIN SPAR) link / link	1
6x680mm Carbon Tube (SECONDARY SPAR) link / link	1
6x350mm Carbon Tube (WING SPAR) link / link	2
Thin CA Glue link	20g tube
CA Activator link	1 (optional but useful)
M3 Threaded Insert (Outer Ø5mm, height 5mm) link	16
M3 screw	22
M3 nut	4
LW-PLA link / link	1 roll
PETG link	Small amount
Polyester CA hinge 25x20mm e.g. link	8
Pen spring	2
Velcro strap link	2
Servo extension cable link	2
Conrtol Horn link	2
Pushrod e.g. link / link	2

PARTS LIST - FUSELAGE

PART	MATERIAL
FUS 1 L/R	LW-PLA
FUS 2 L/R	LW-PLA
FUS 3 L/R	LW-PLA
FUS 4 L/R	LW-PLA
HATCH FRONT 1	LW-PLA
HATCH FRONT 2	LW-PLA
HATCH REAR 1	LW-PLA
HATCH REAR 2	LW-PLA
NOSE	LW-PLA
NOSE VTX COVER	LW-PLA
NOSE CLEAN	LW-PLA
FRONT REINFORCEMENT	PETG
BATTERY PAD	PETG
LOCK 1	PETG
LOCK 2	PETG
FUS ROOT R/L	PETG
MOTOR MOUNT	PETG

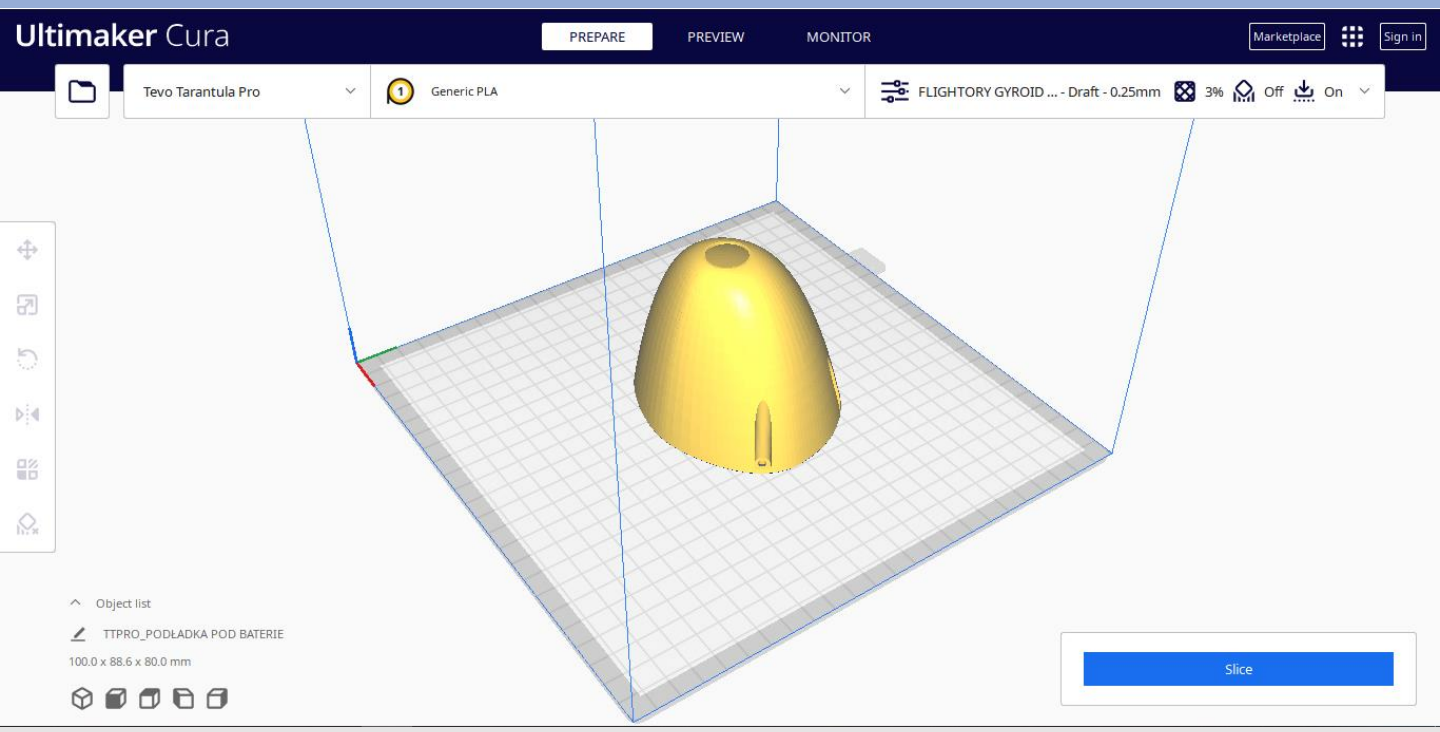
PARTS LIST - WINGS

PART	MATERIAL
WING 1 L /R	LW-PLA
WING 2 L /R	LW-PLA
WINGTIP 1 L/R	LW-PLA
WINGTIP 2 L/R	LW-PLA
AIL 1 L / R	LW-PLA
AIL 2 L / R	LW-PLA
SERVO COVER	PETG
WING ROOT L /R	PETG

STEP FILES LIST

PART
AILERON
FRONT HATCH
MOTOR MOUNT
NOSE CLEAN
NOSE VTX COVER
NOSE
REAR HATCH
WINGTIP

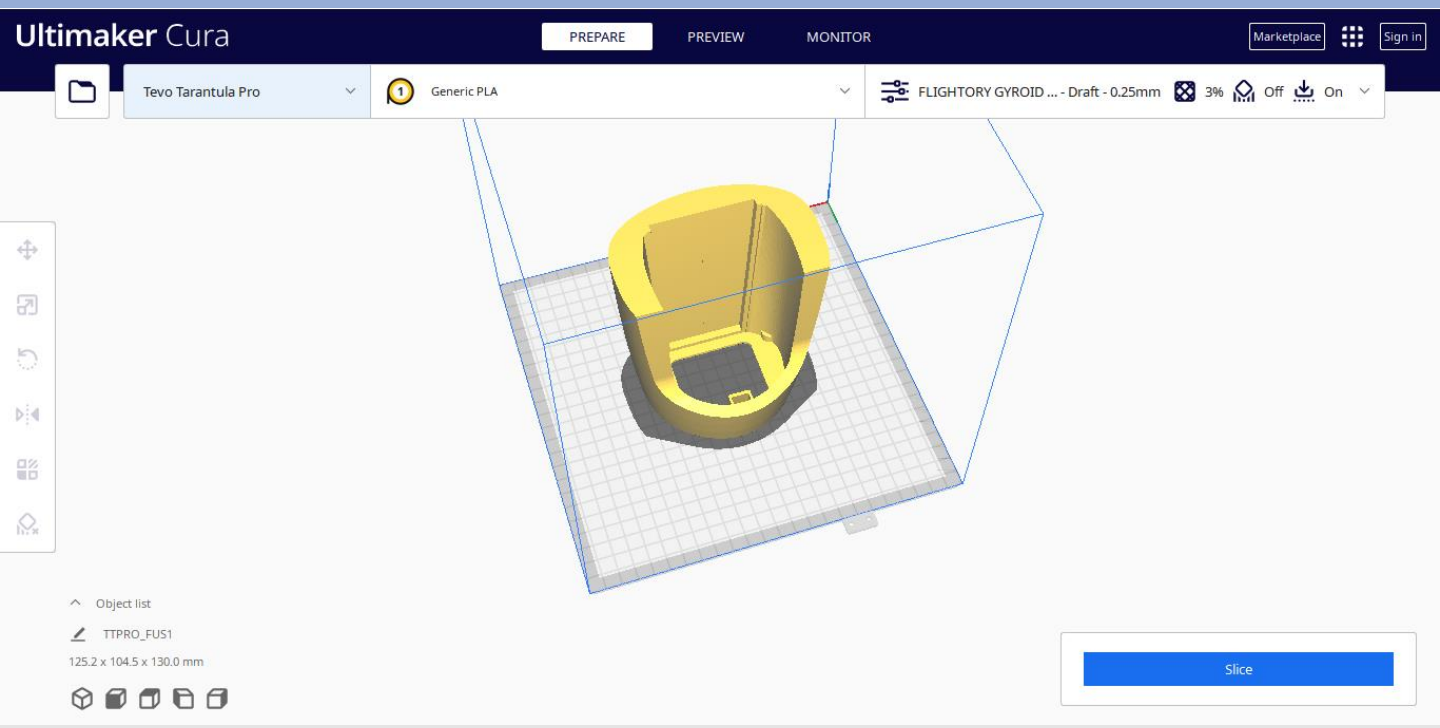
Print Settings



The recommended slicer to use is Ultimaker Cura. All LW-PLA parts, print using the recommended settings detailed on the Flightory website under the Print Settings tab. Whether you are using prefoamed or active foaming LW-PLA, you will find settings for both of these filaments there.
For printing parts with hard materials such as PET-G, ABS, or PLA, use the default CURA profile called DRAFT with 20% infill and a cubic pattern.

Feel free to modify the settings according to your needs, but the recommended settings provide a good compromise between weight and the strength of the printed parts.

Print Settings



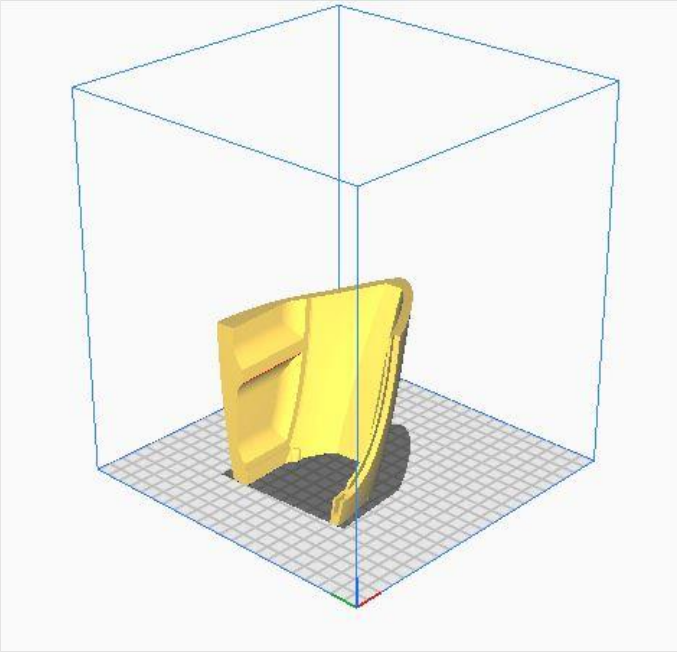
All parts are suitable for printing on any standard printer with a small working area. I printed all parts on a 220 x 220mm area. The settings are just a base that you can change and adjust as needed. The following pages will list my recommended infill settings for each part.

Important: In the file package, you will find fuselage segments divided into left and right sides, as well as assembled into a single piece. For printers with the mentioned print area of 220x220mm, use the components divided into left and right sides. If you have a larger printer, you can print the fuselage segments as a whole if they fit.

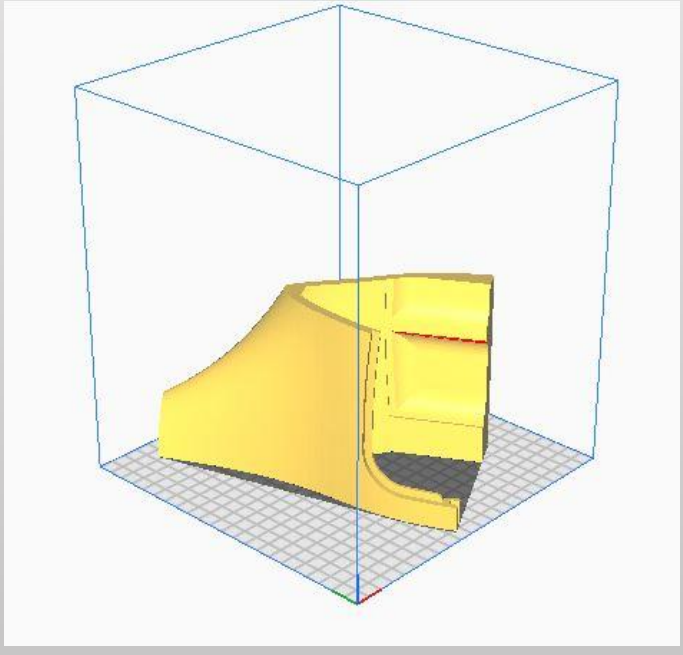
All elements can be printed without supports, but your printer may have a problem with some horizontal surfaces in some places. Depending on the effects, you may then consider turning on supports for these elements and cleaning the printed elements afterwards.

Parts Orientation

Important thing is the correct orientation of the printed parts
to avoid overhangs, and not have to use supports.
Below is the recommended orientation of parts and infill settings.

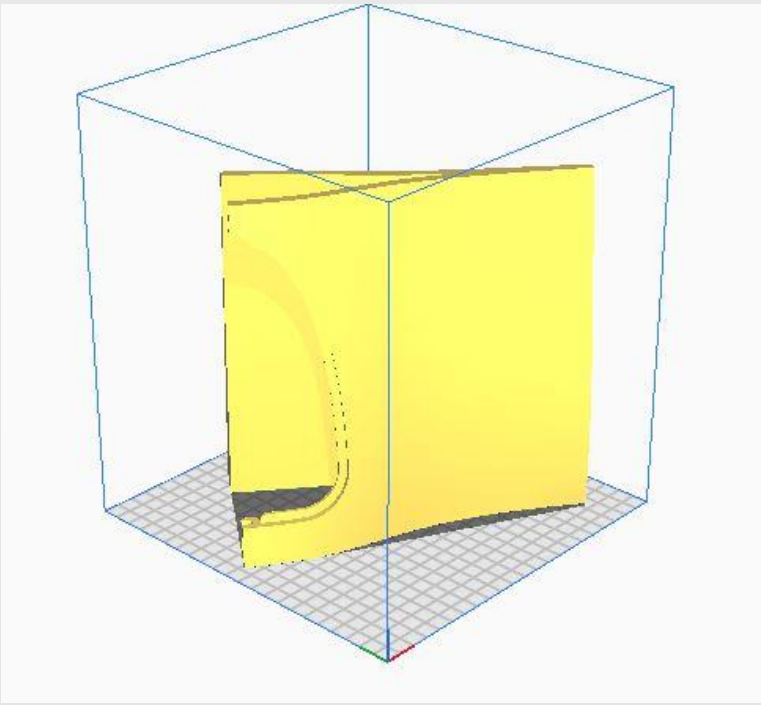


FUS 1 - 3% gyroid infill

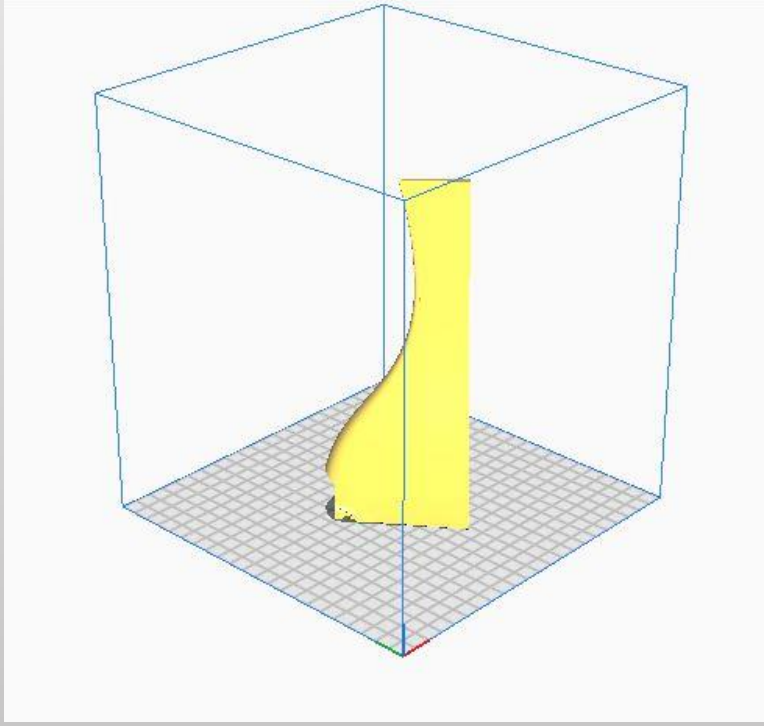


FUS 2 - 3% gyroid infill

Parts Orientation

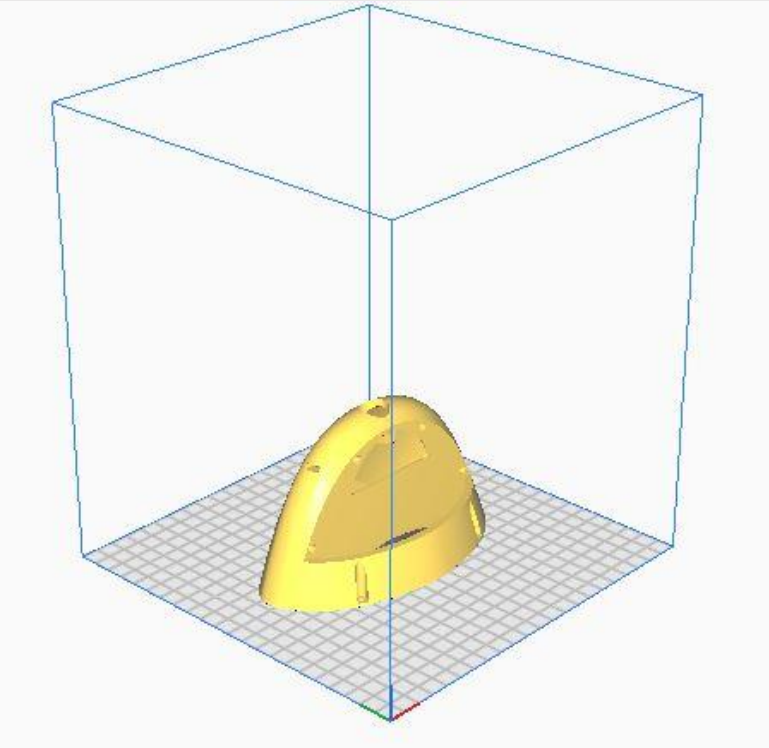


FUS 3 - 3% gyroid infill

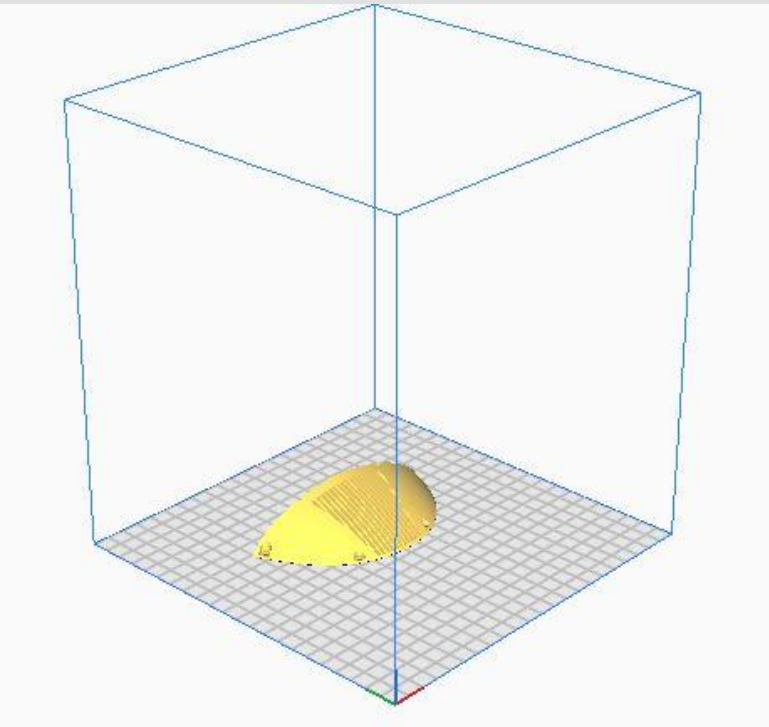


FUS 4 - 3% gyroid infill

Parts Orientation

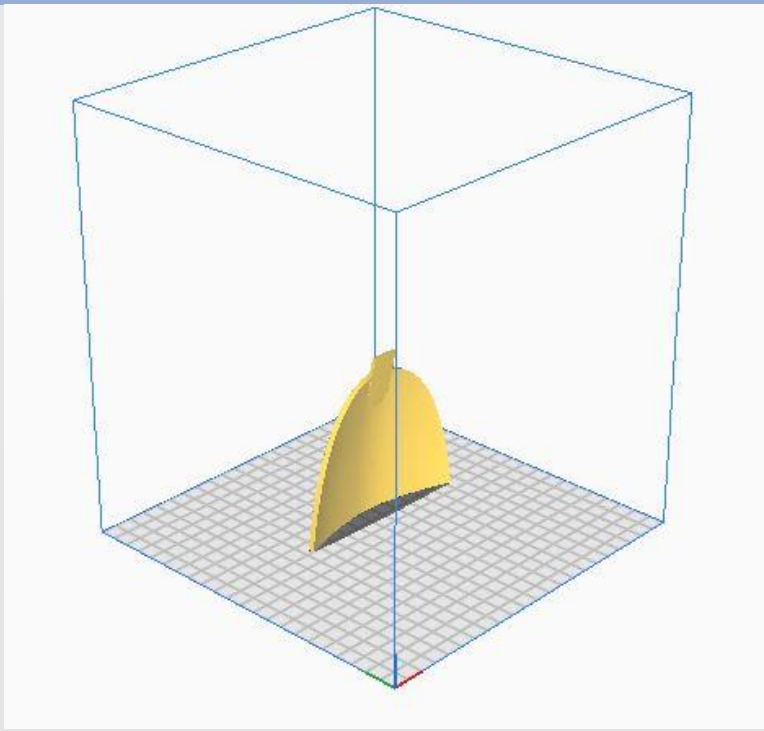


NOSE - 3% gyroid infill + 2 walls

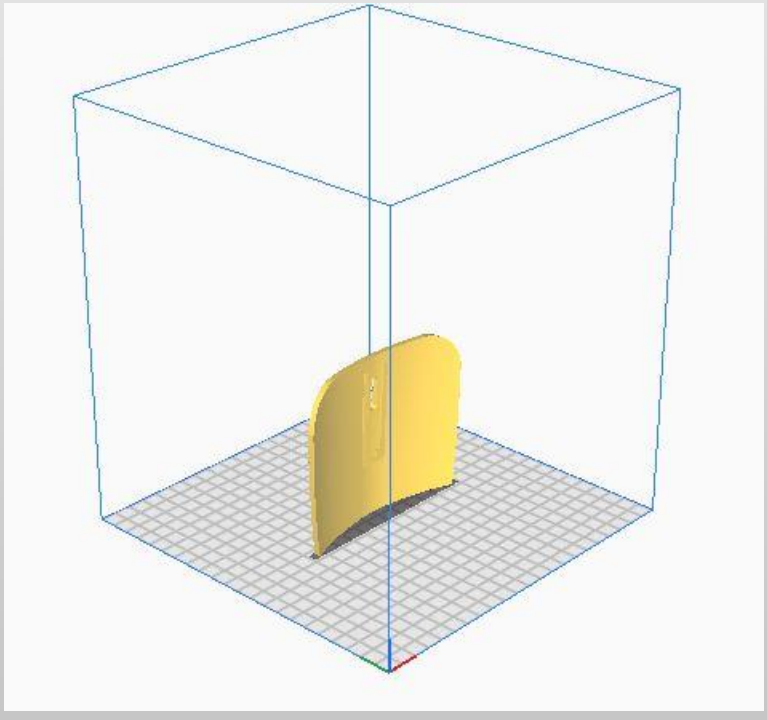


NOSE VTX COVER - 3% gyroid infill + 2 walls

Parts Orientation

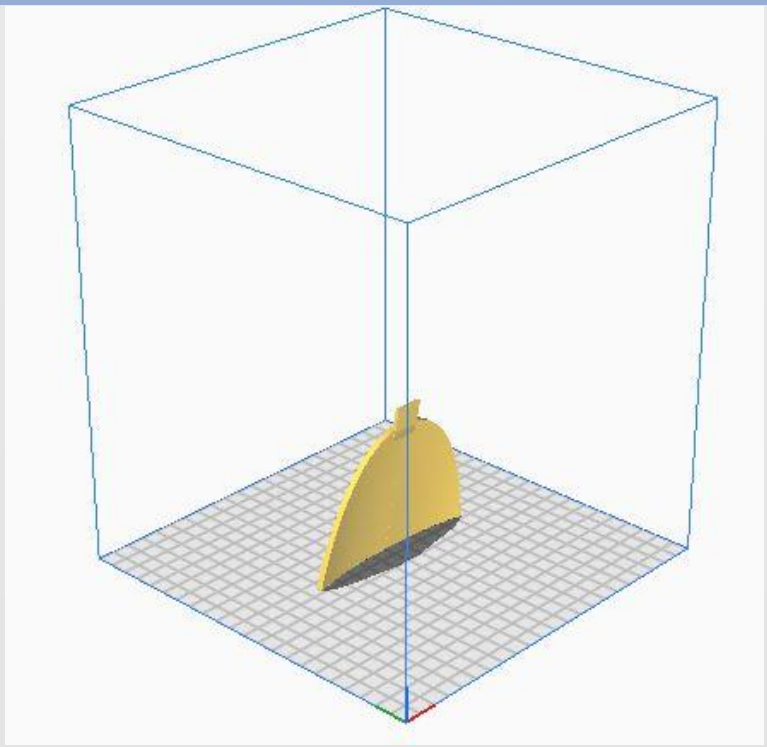


HATCH FRONT 1 - 3% gyroid infill

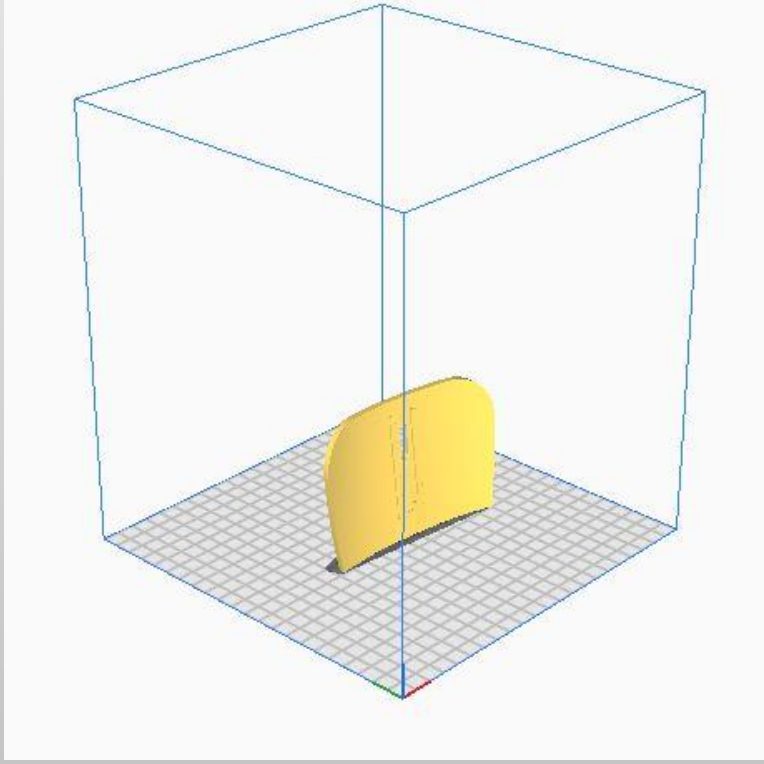


HATCH FRONT 2 - 3% gyroid infill

Parts Orientation

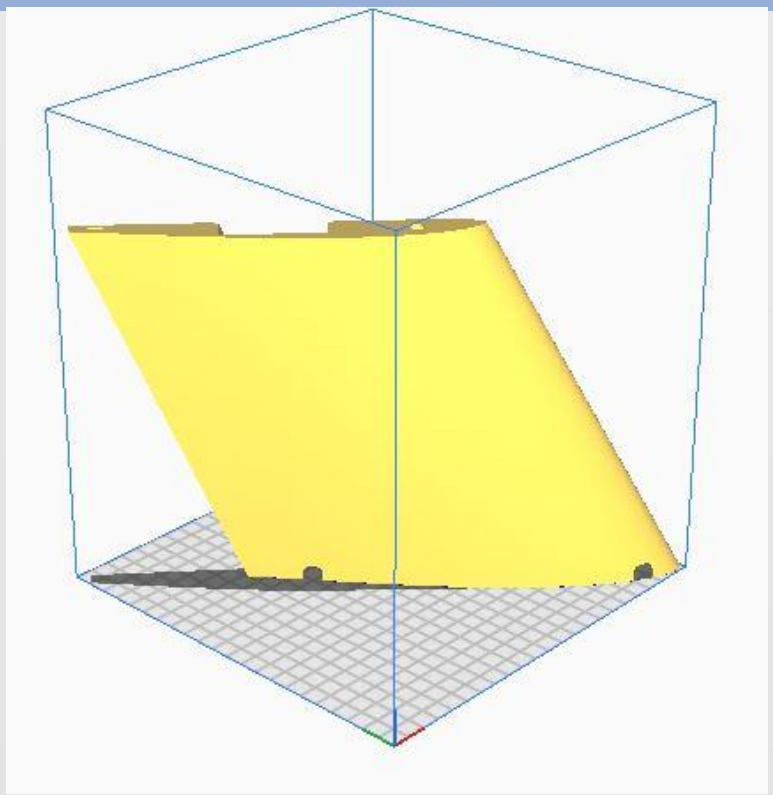


HATCH REAR 1 - 3% gyroid infill

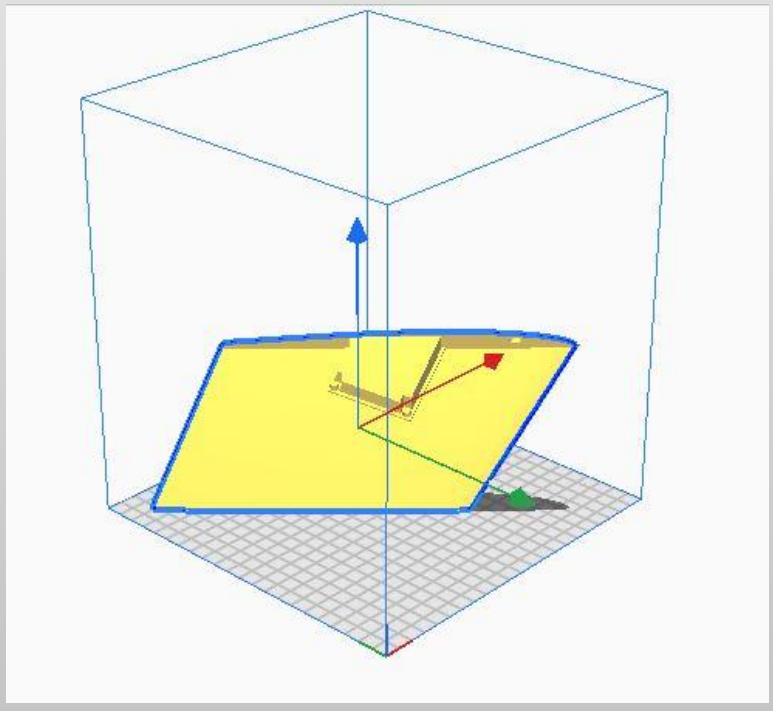


HATCH REAR 2 - 3% gyroid infill

Parts Orientation

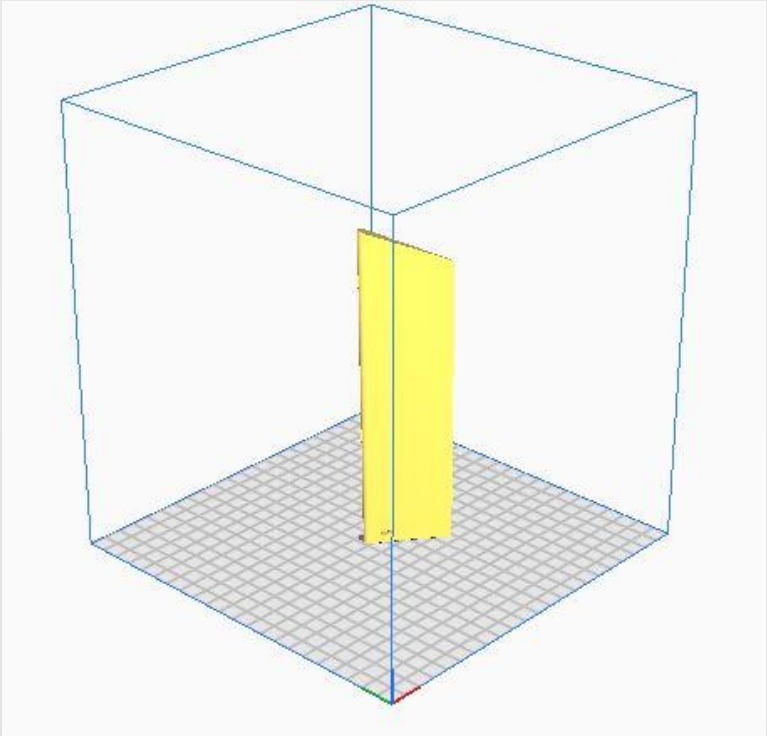


WING 1 - 3% gyroid infill

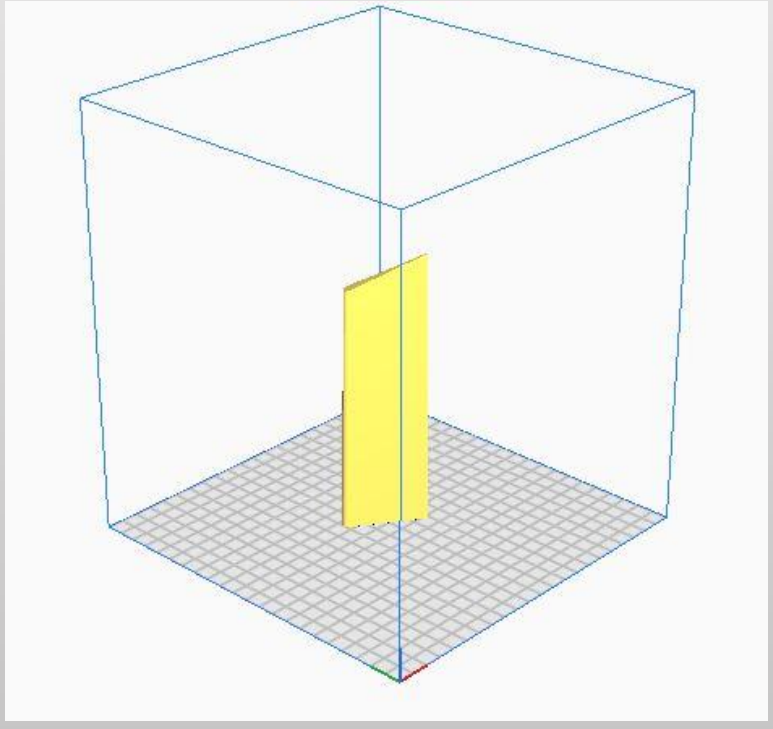


WING 2 - 3% gyroid infill

Parts Orientation

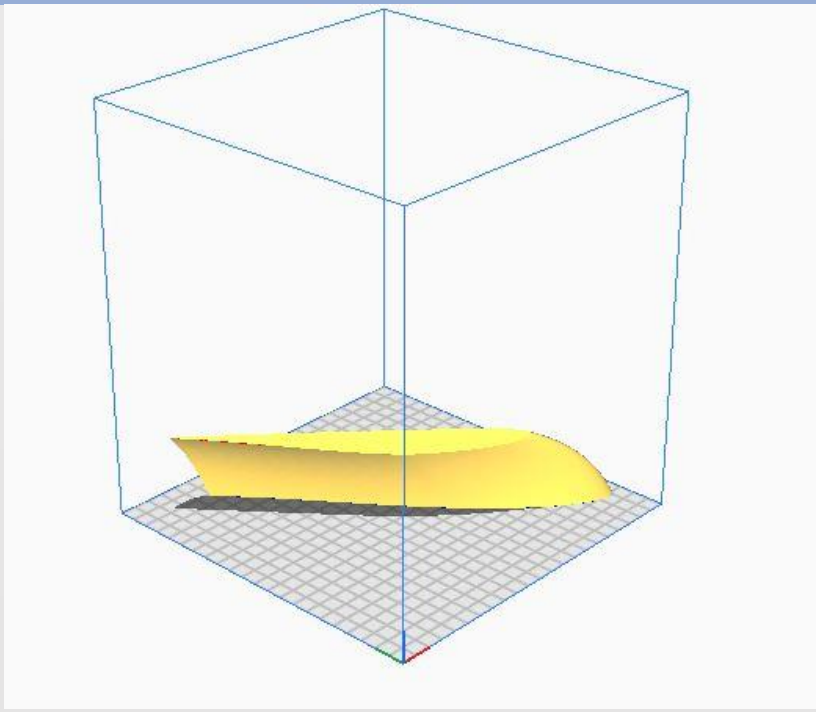


AIL 1 - 3% gyroid infill

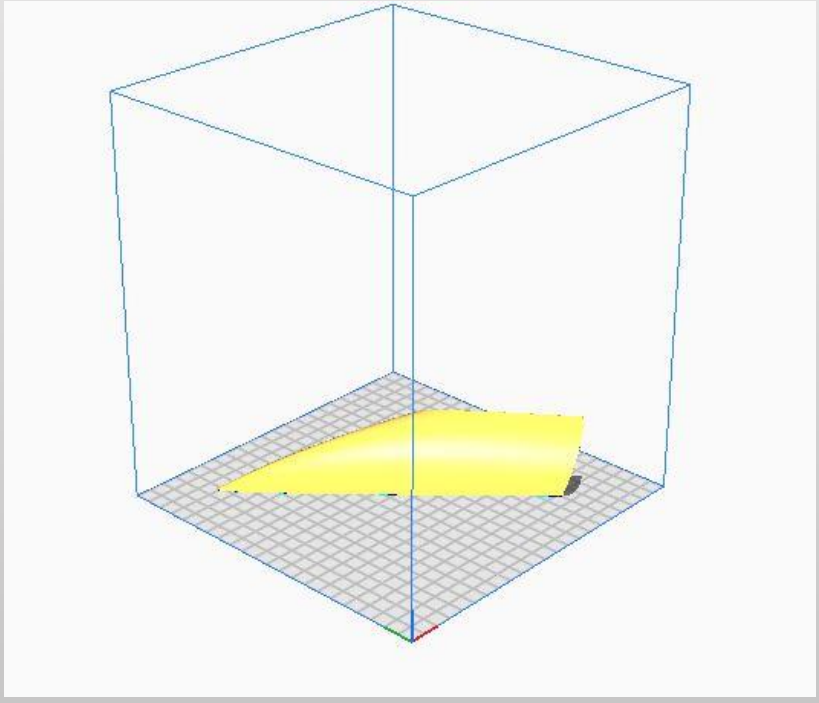


AIL 2 - 3% gyroid infill

Parts Orientation

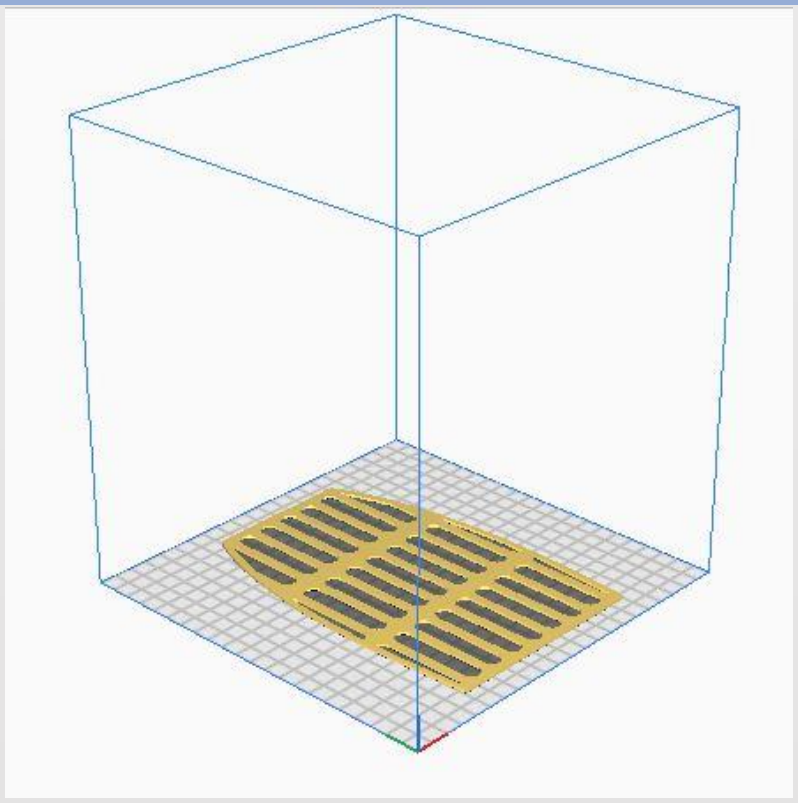


WINGTIP 1 - 3% gyroid infill

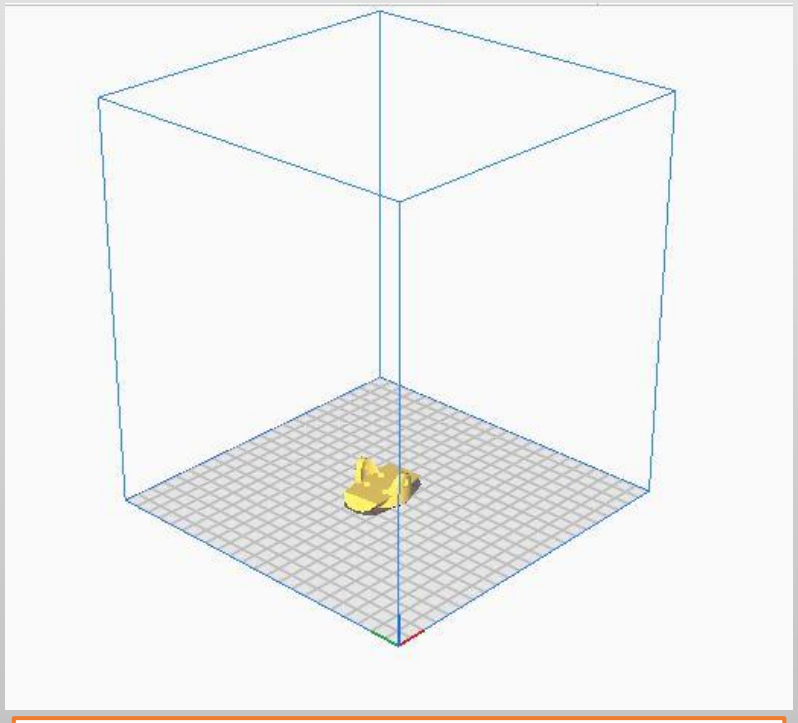


WINGTIP 2 - 3% gyroid infill

Parts Orientation

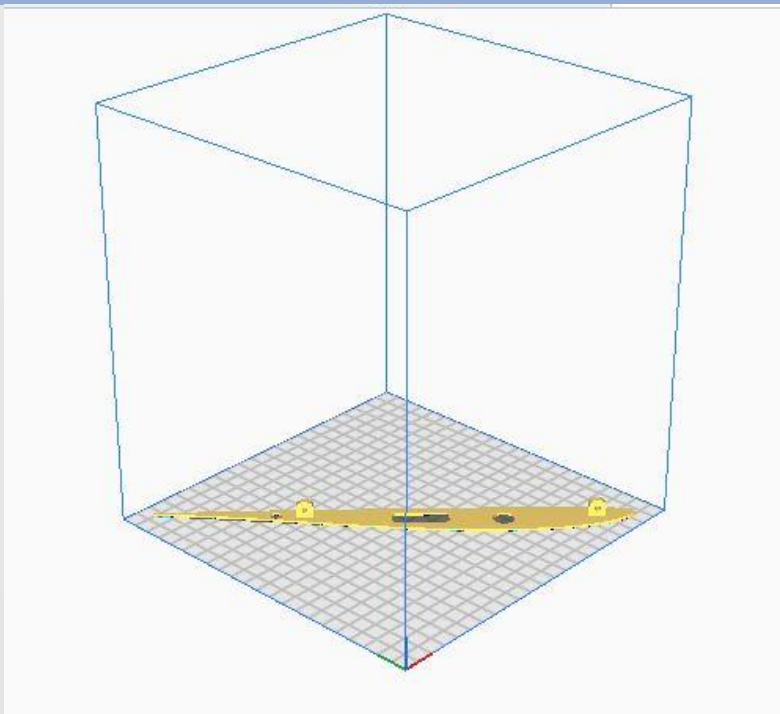


BATTERY PAD- 20% cubic infill + 2 walls

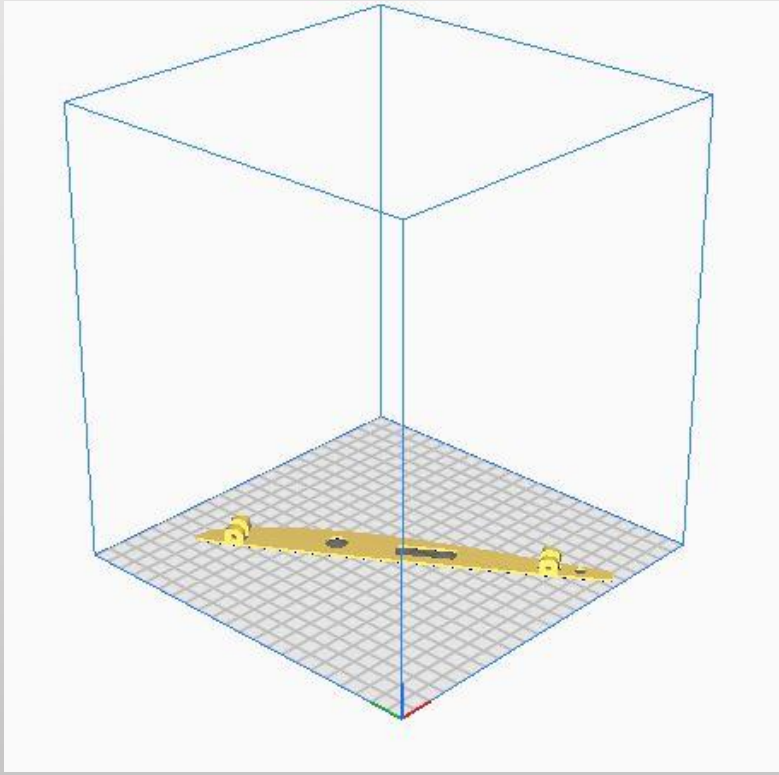


MOTOR MOUNT- 20% cubic infill + 2 walls

Parts Orientation



FUS ROOT - 20% cubic infill

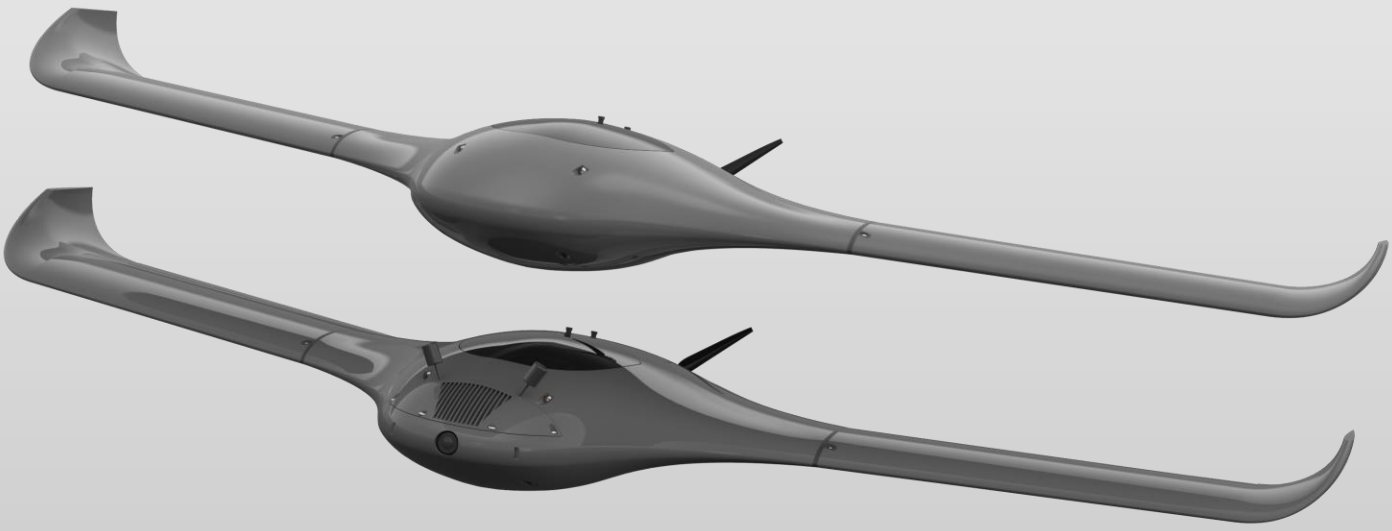


WING ROOT - 20% cubic infill

NOSE VARIANTS

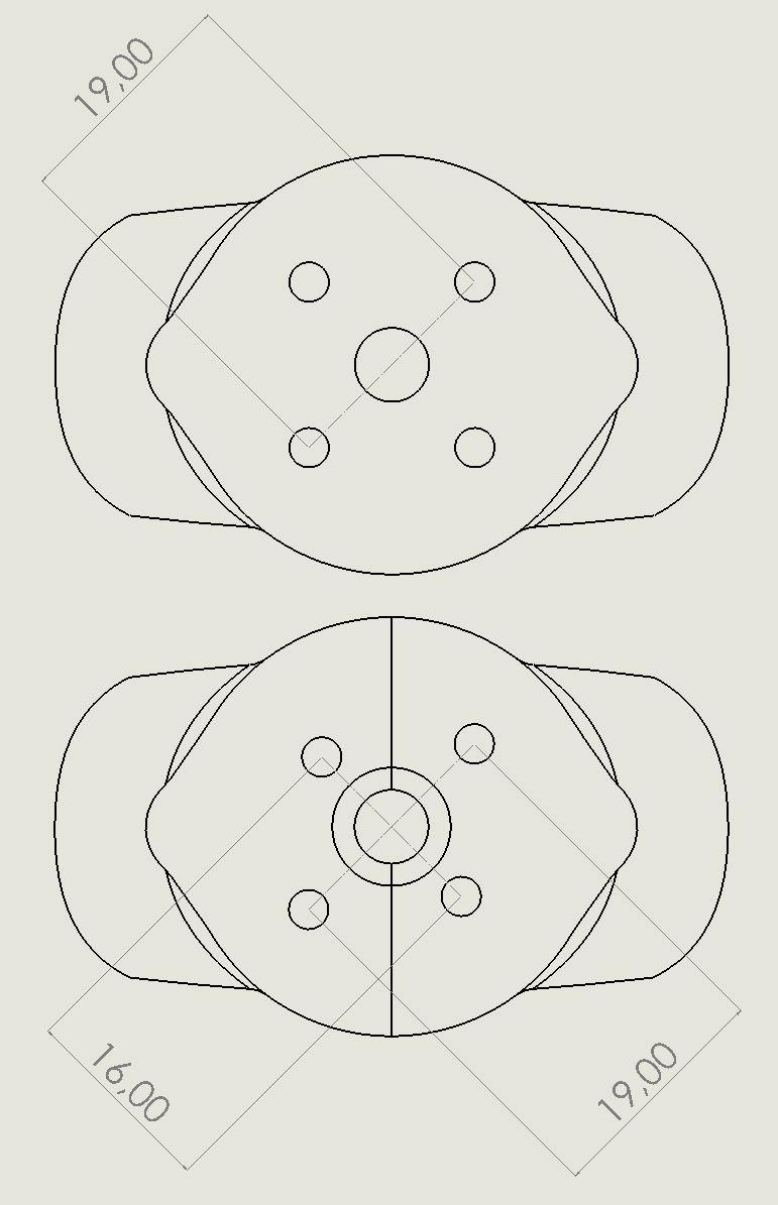
There are 2 variants of the nose. You can choose version with a VTX mounted inside and a 19x19mm FPV camera, or a clean version without any mounts. The VTX mounts on a "shelf" and the available space is sufficient to accommodate any VTX.

The nose is fully removable, mounted on four M3 screws. It is also available in STEP format for easy editing. You can edit this part and adapt it to your own more individual needs and to mount different payload. You can also have several versions of the nose and change them according to the needs of a particular mission.



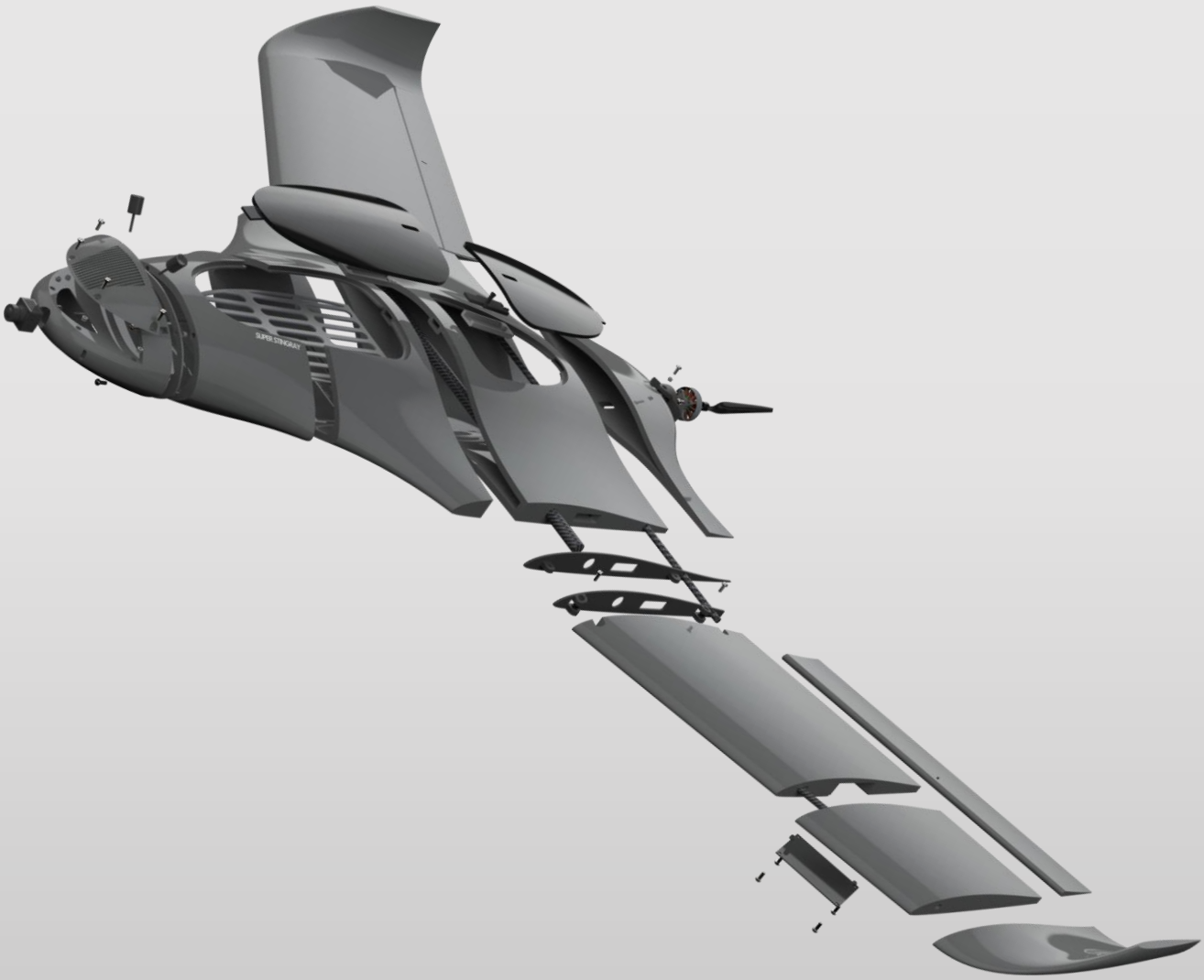
MOTOR MOUNTS

There are two types of motor mounts available, differing in screw spacing. One has a fixed spacing of 19mm, while the other has two screws spaced at 19mm and other two at 16mm. These are the most common dimensions for motors of this class and size. If your motor comes with a metal mount plate, you can omit it and attach the motor directly to the printed motor mount. This part is also available in STEP format, so if any changes are needed, you can easily make them.



STEP FILES

All files are available in STL format. In addition, some important elements are available in STEP format, which allows easier editing and customization.

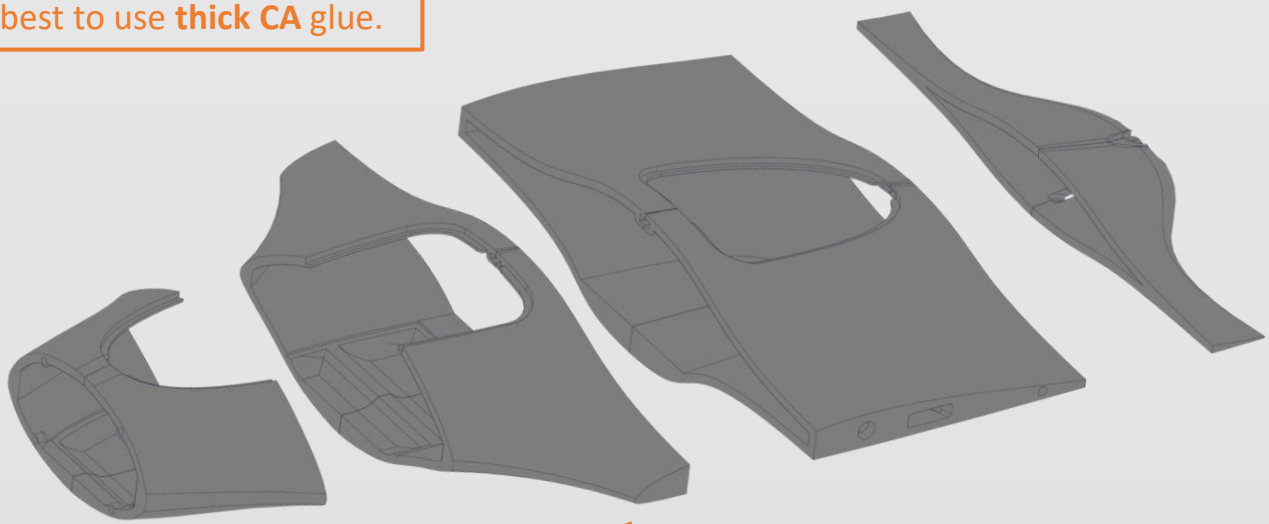


You can find these files in folders labeled STEP

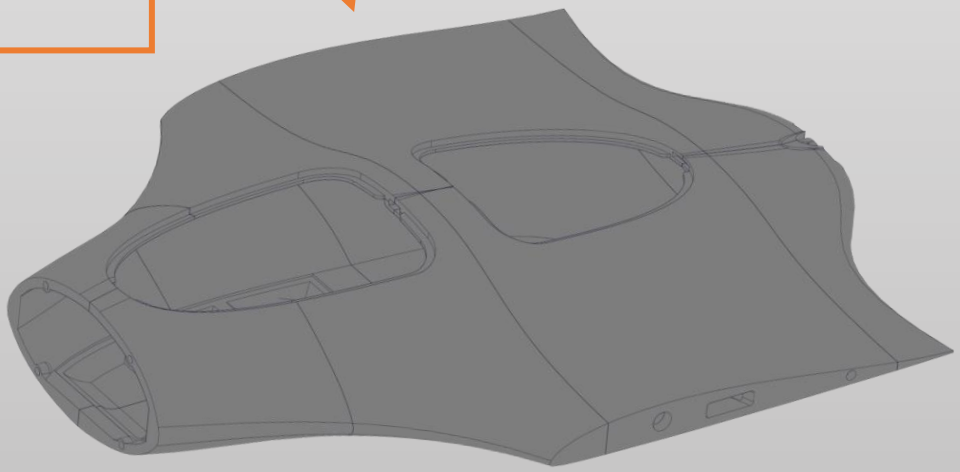
Fuselage Assembly

Prepare all fuselage segments. Before gluing, you can gently sand the surface of all elements, especially the gluing surfaces.

It's best to use **thick CA** glue.

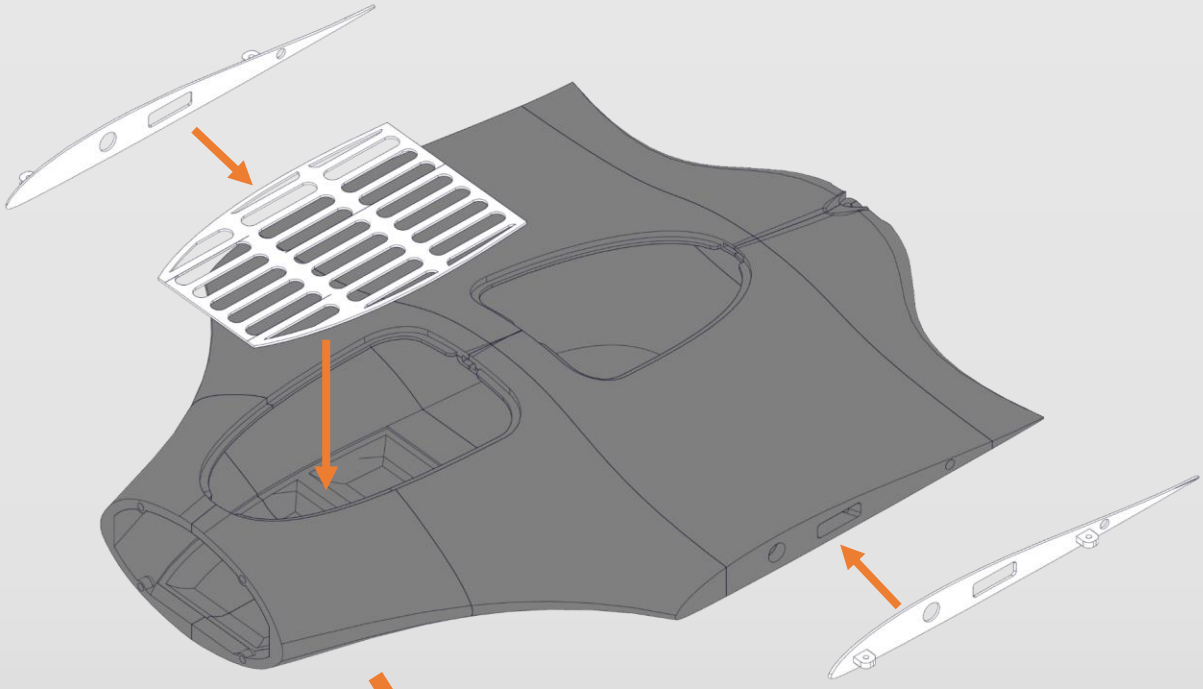


If you printed the fuselage segments divided to left and right side, simply glue them together also.



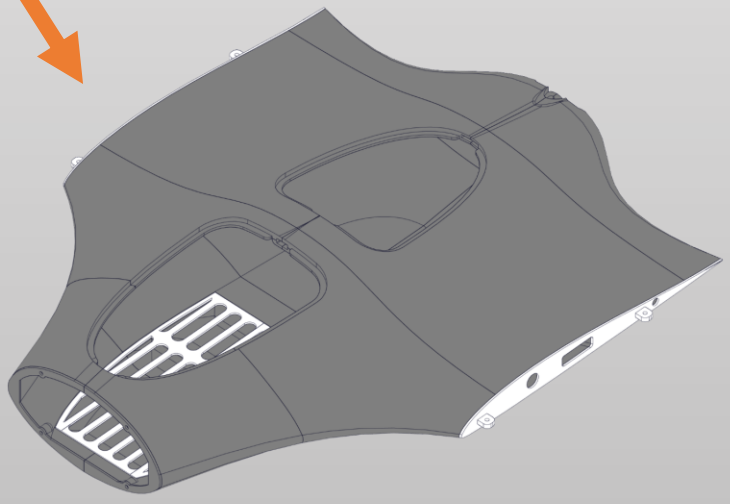
Fuselage Assembly

Prepare parts printed with PET-G or other hard material. Take the BATTERY PAD and paste it in the designated place in the front of the fuselage.



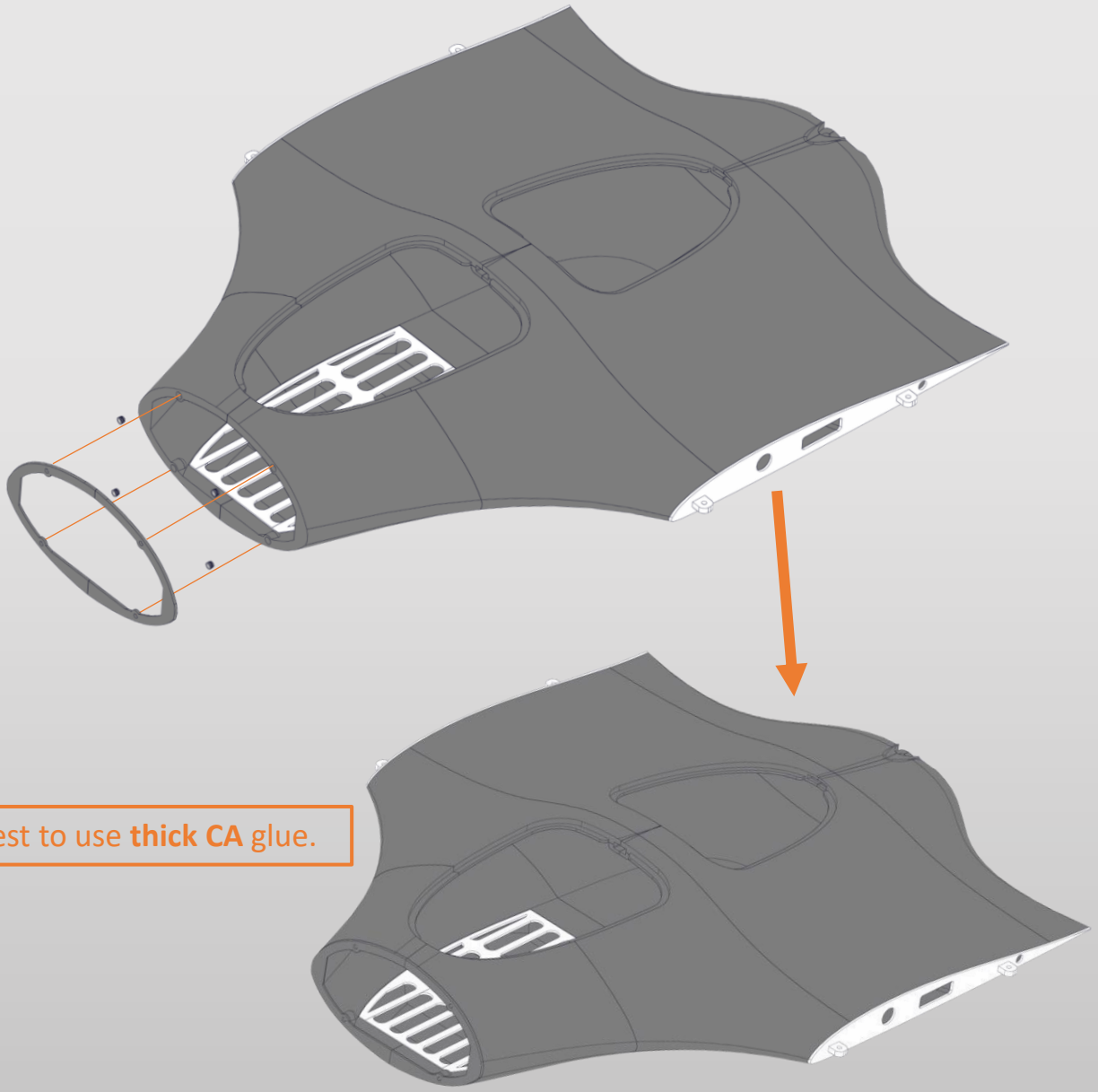
Take FUS ROOT and glue with CA to the fuselage in the corresponding places.

It's best to use **thick CA** glue.



Fuselage Assembly

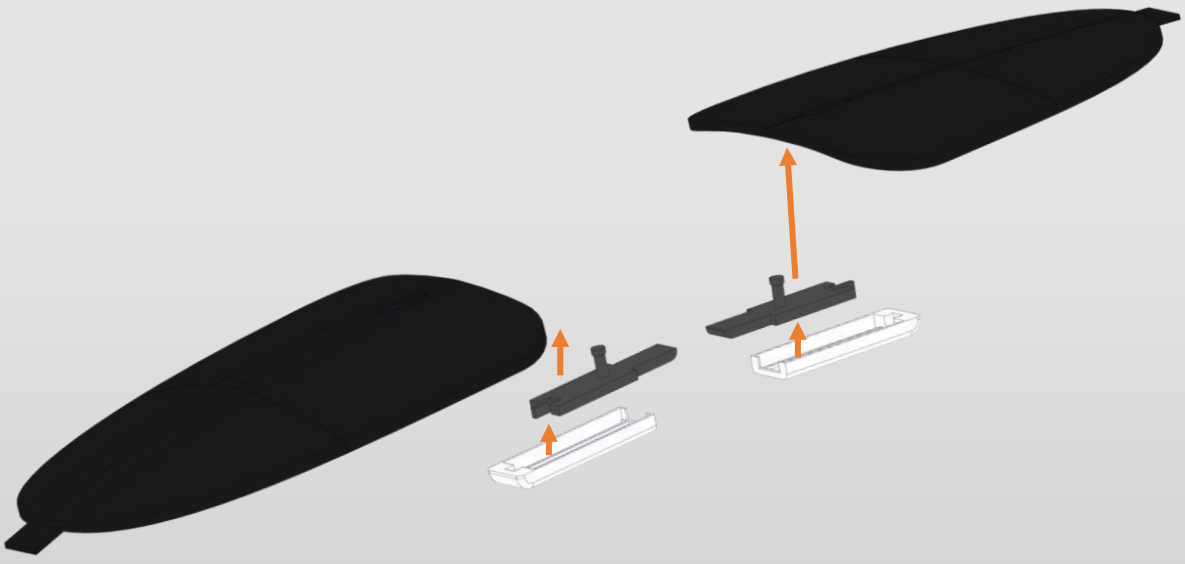
Now take M3 threaded inserts with an outer diameter of 5mm.
Glue them into the designated places in the front part of the fuselage.
You can use a slightly heated soldering iron for this. Then glue NOSE REINFORCEMENT printed with PETG or other hard material. This noticeably increases the strength of the nose when it is frequently unscrewed and prevents the threaded inserts from being torn out.



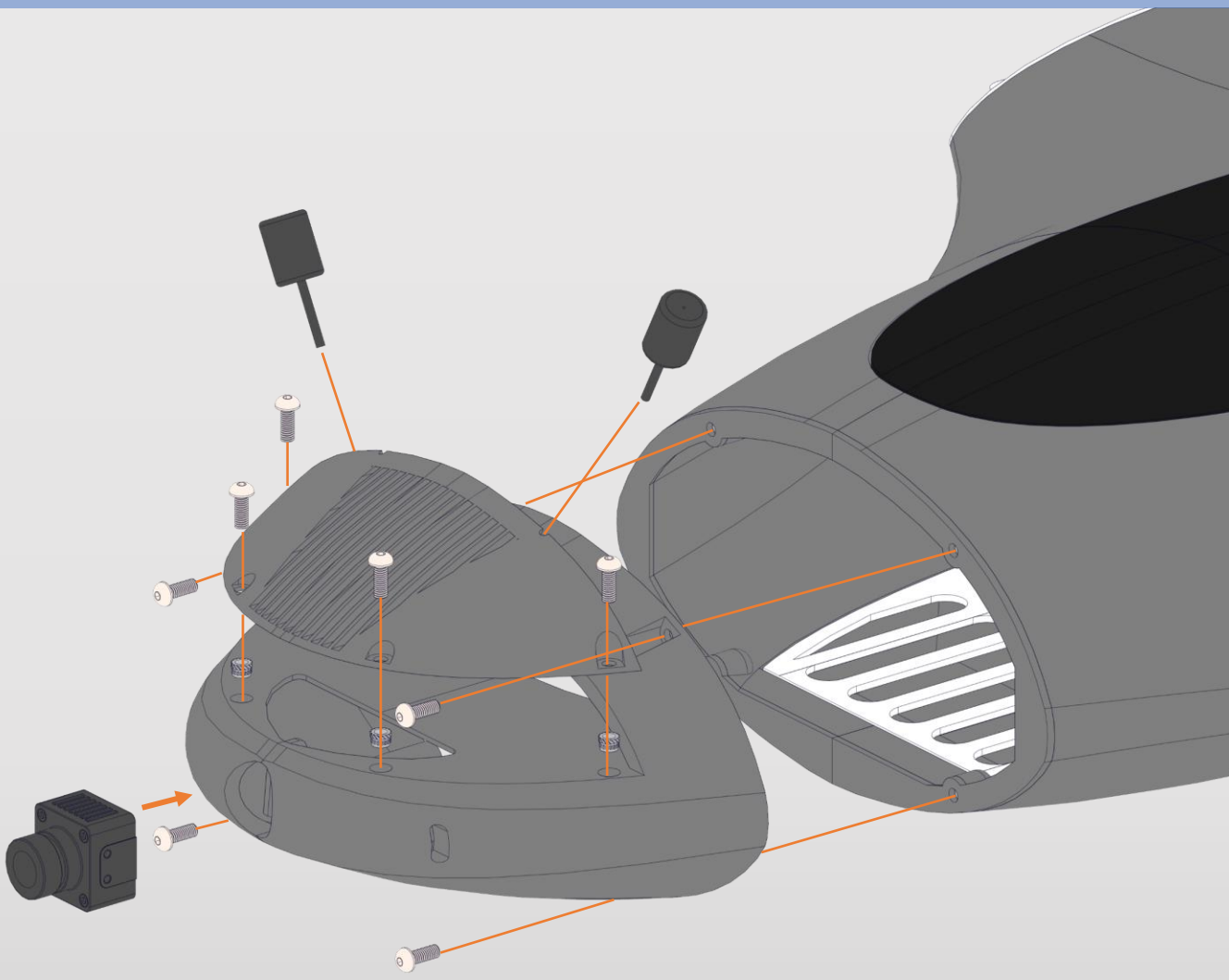
It's best to use **thick CA** glue.

Hatches

Take the hatches parts and assemble them. Insert LOCK 1 and LOCK 2. Assemble it, adding a small spring, and glue it in the designated place. Use a small amount of CA glue, but be careful not to spill the glue and block the lock.

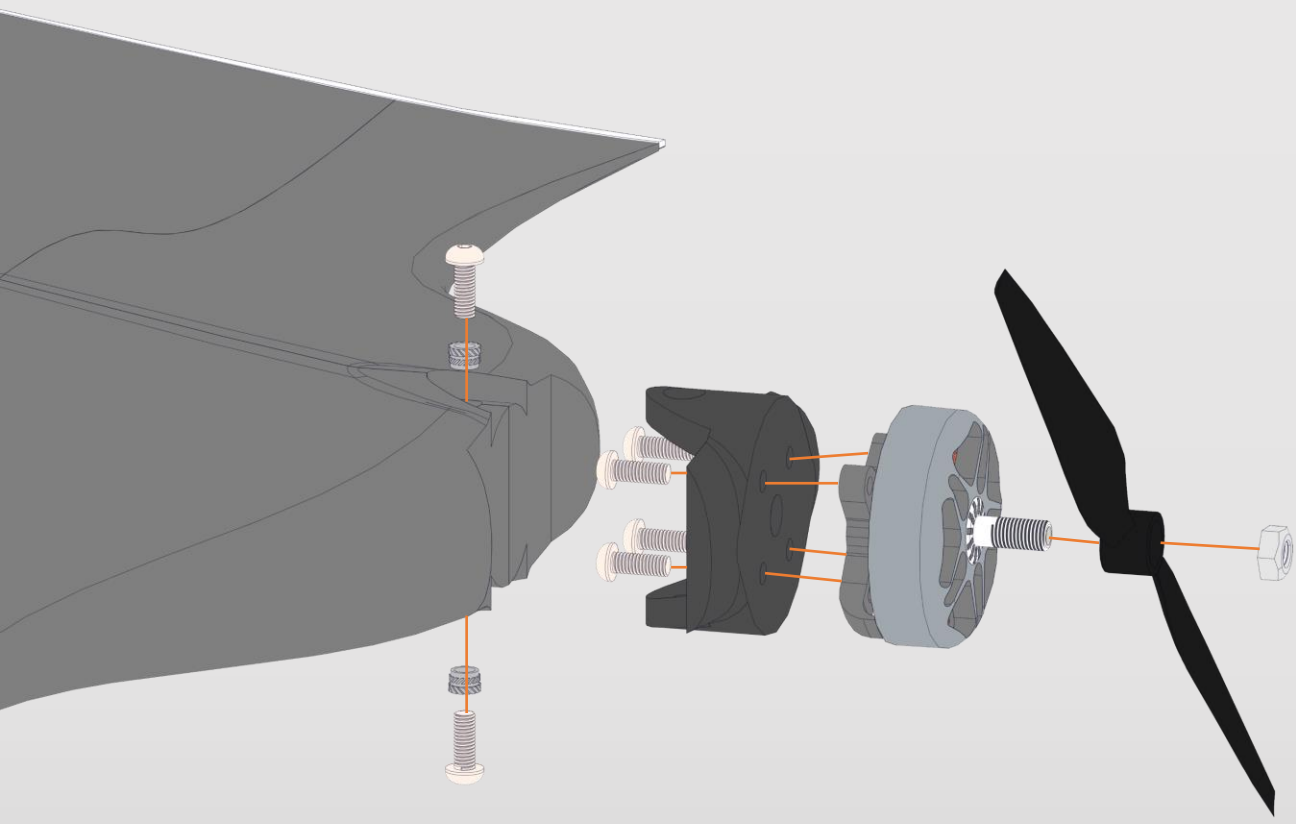


Nose Mount



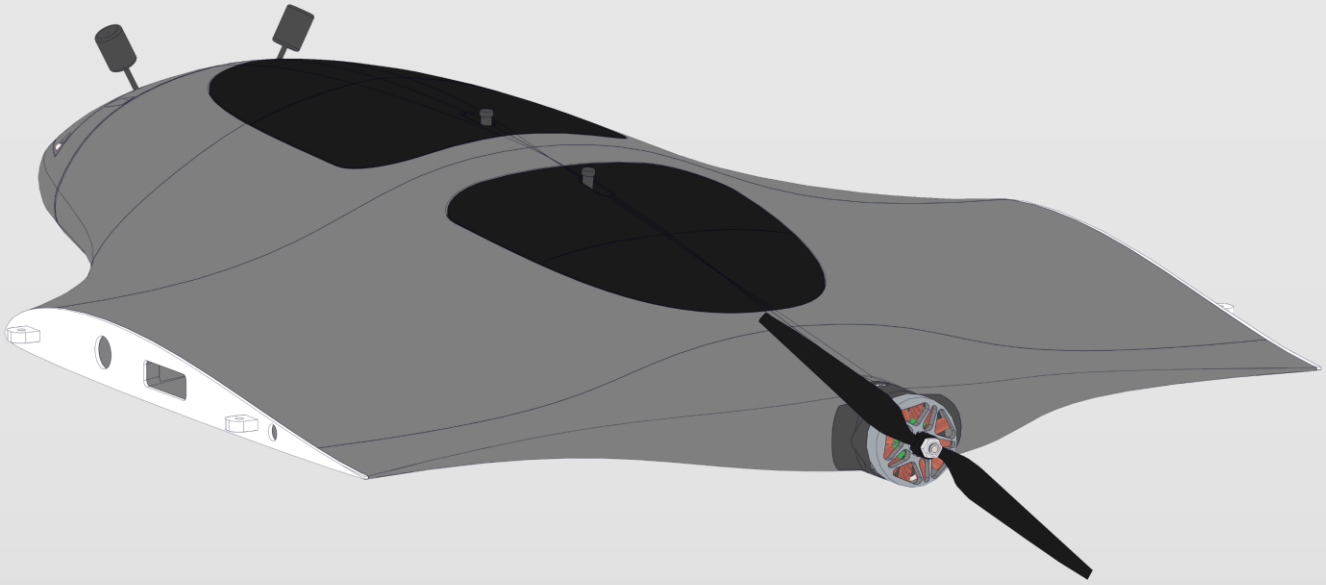
Now you can mount the nose with short M3 screws. If you are using version with VTX, you can put your VTX on the "shelf" and cover it with NOSE VTX COVER and secure the antenna.

Motor Mount



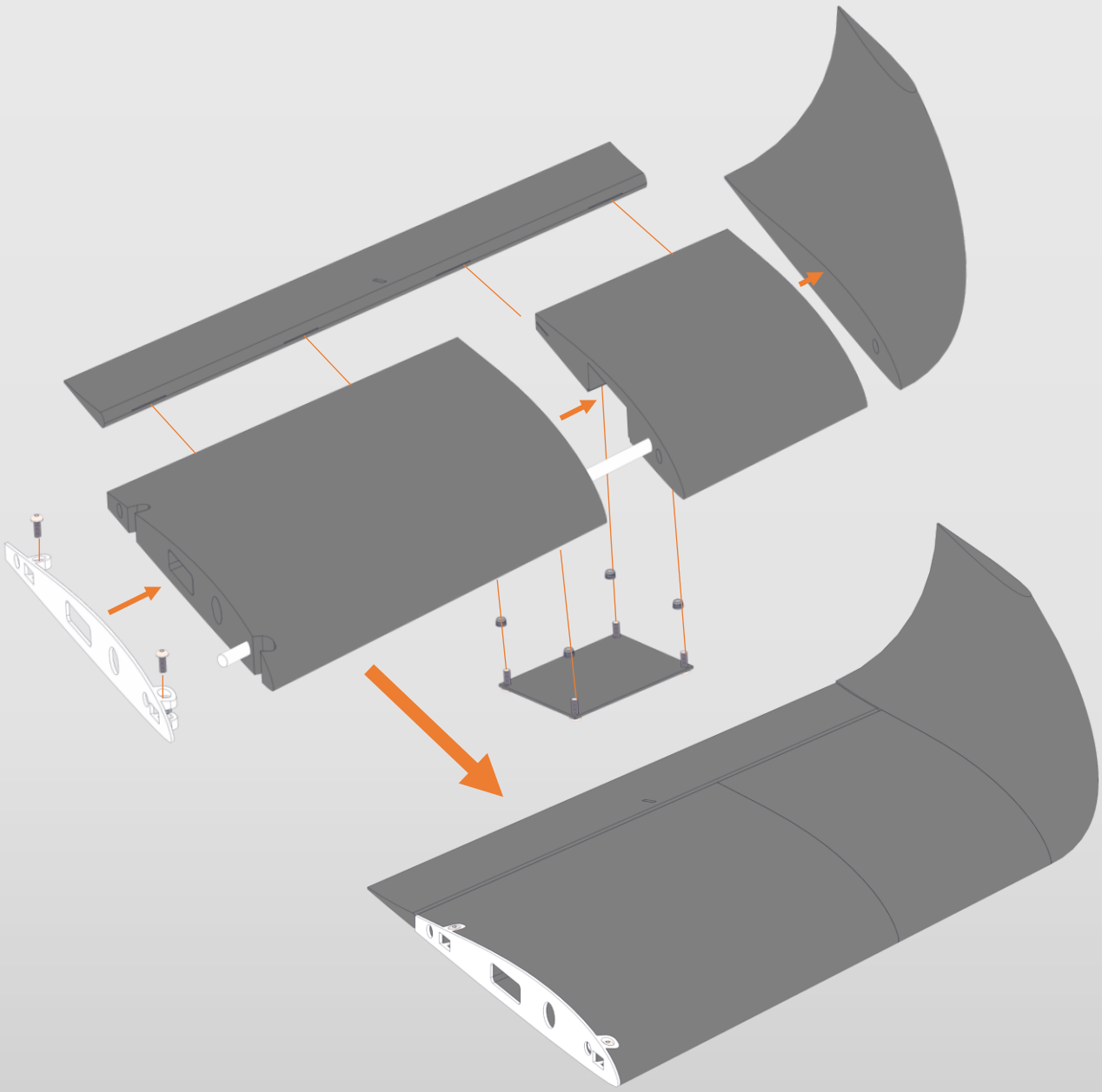
Choose the motor mount that matches your motor and attach it. In the rear part of the fuselage, there are places for M3 threaded inserts on both the top and bottom. Insert the threaded inserts into these spots. Mount the prepared motor in the fuselage, securing it with M3 screws. The motor cables should run through the bottom and enter the fuselage through the designated opening.

Fuselage Assembly



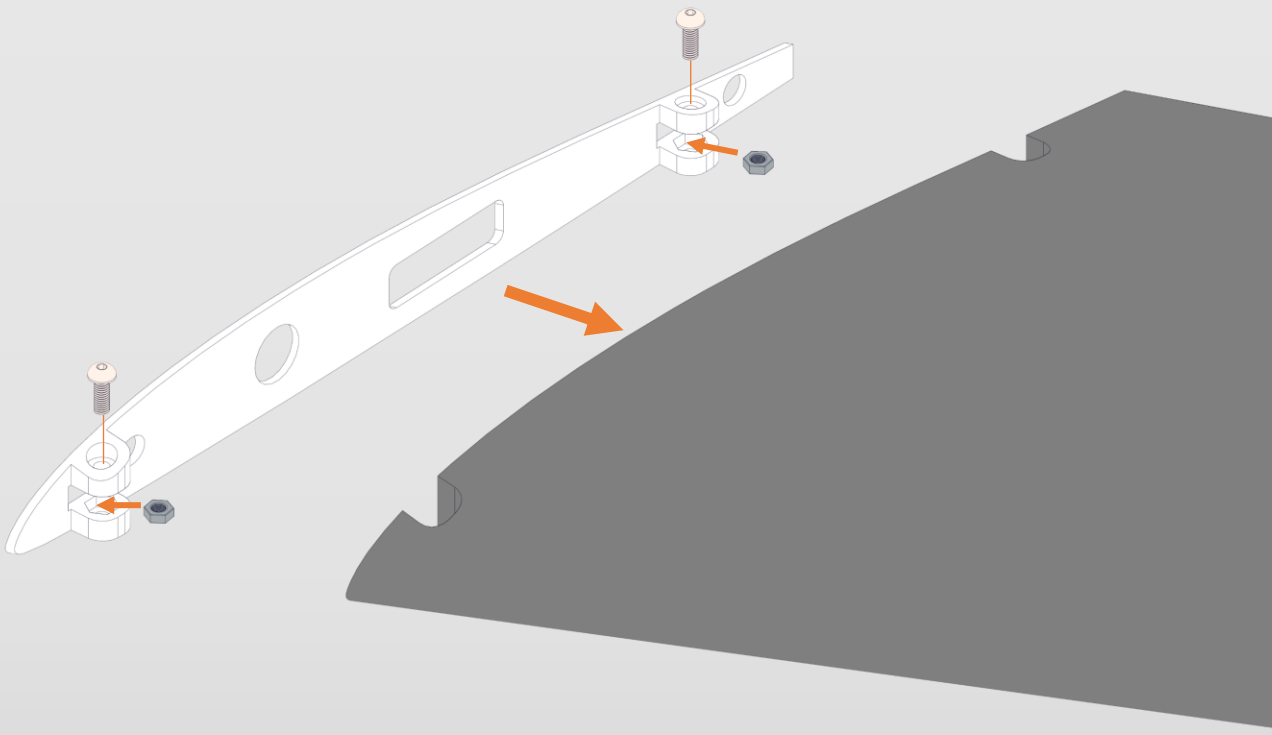
The fuselage is ready, now it's time to assemble the wings.

Wings Assembly



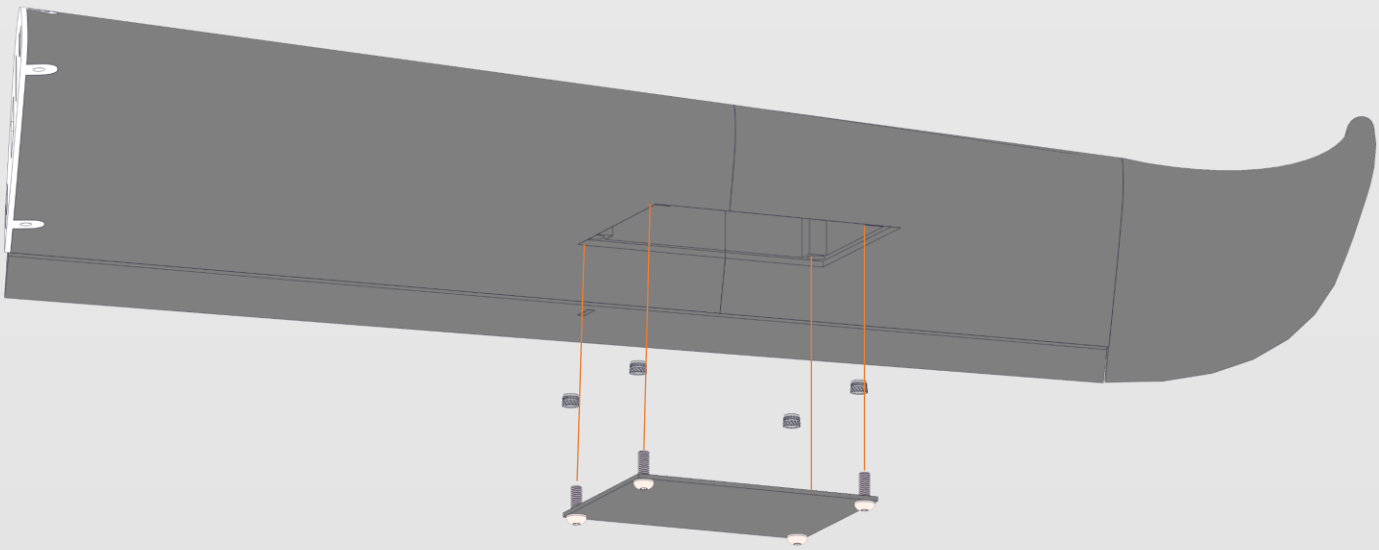
Glue the wing segments together. Insert a 6mm carbon tube cut to a length of 350mm. There is no need to glue the tube, just insert it into the designed slot

Wings Assembly



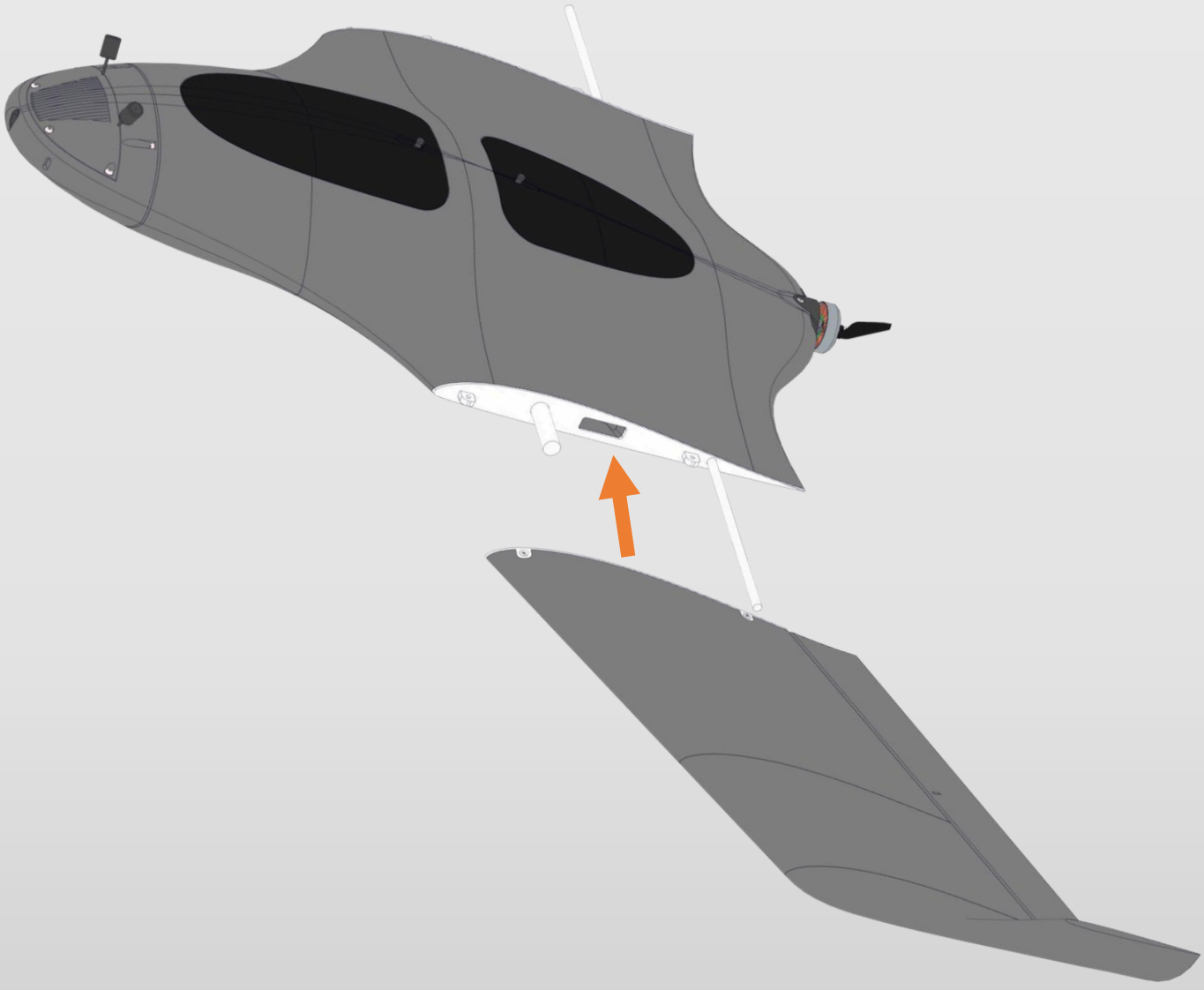
Finally, install the WING ROOT printed from PETG or another rigid material. In the lower part, there are designed slots for regular M3 nuts, which will be responsible for attaching the wings to the fuselage. Insert them there and secure using a few drops of CA glue.
Then, glue the root to the wing.

Wings Assembly



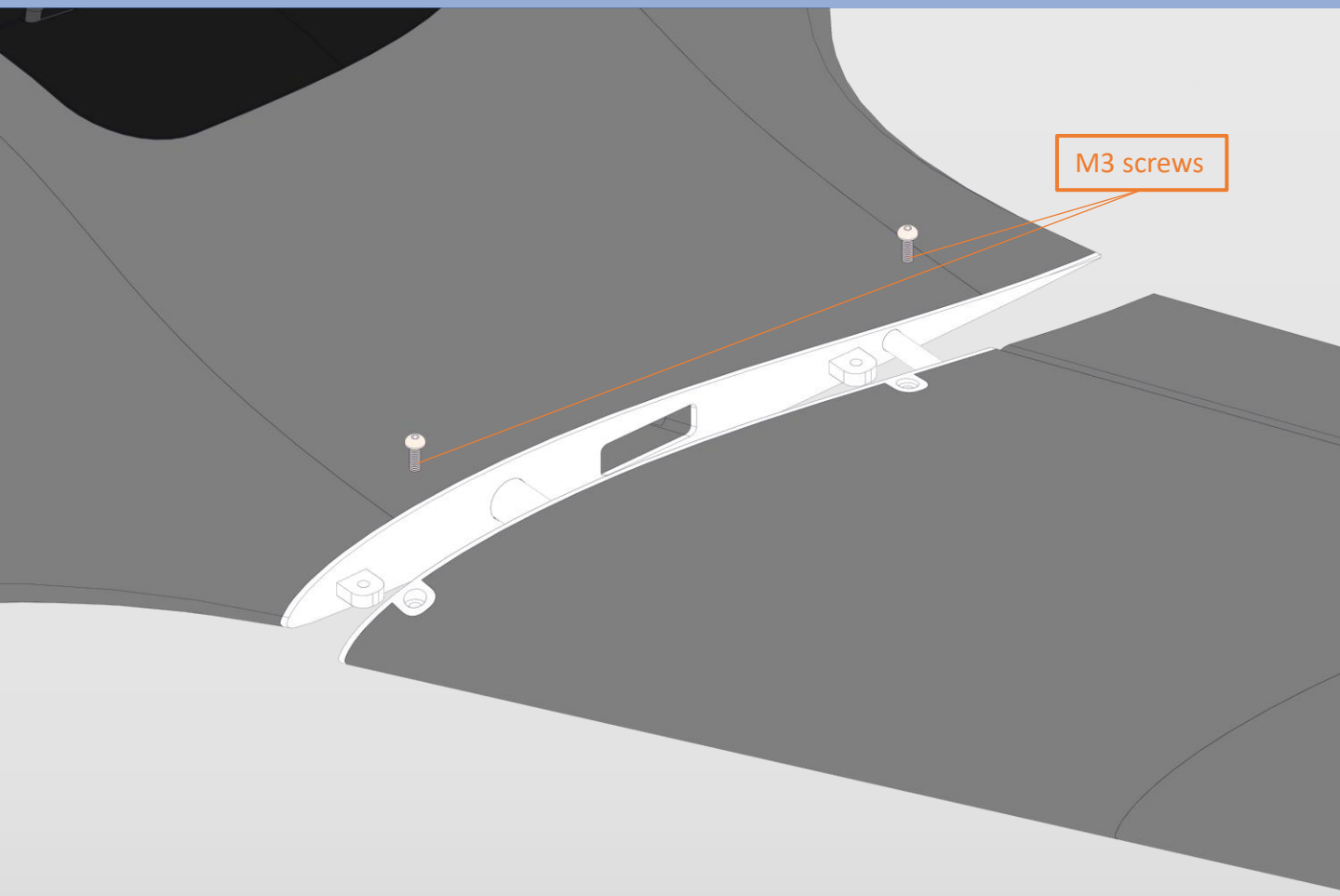
Insert the aileron using 25x20mm polyester hinges or ones made from another material, similar to the elevator. Then, using a slightly heated soldering iron, attach M3 threaded inserts designed for servo cover mounting. Set the servo so that the control horn protrudes through the opening in the servo cover, glue it in place using hot glue, and cover it. Then, connect the servo to the aileron using a pushrod.

Wings Assembly



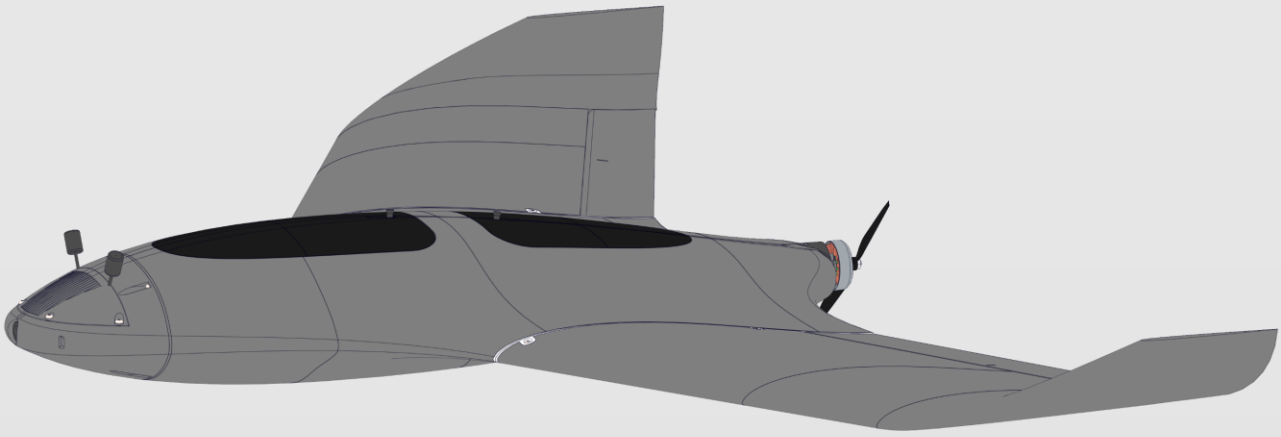
Prepare the 12x460mm and 6x680mm carbon tubes, which serve as spars passing through the fuselage. Slide the wings on and route the servo cables into the fuselage.

Wings Assembly



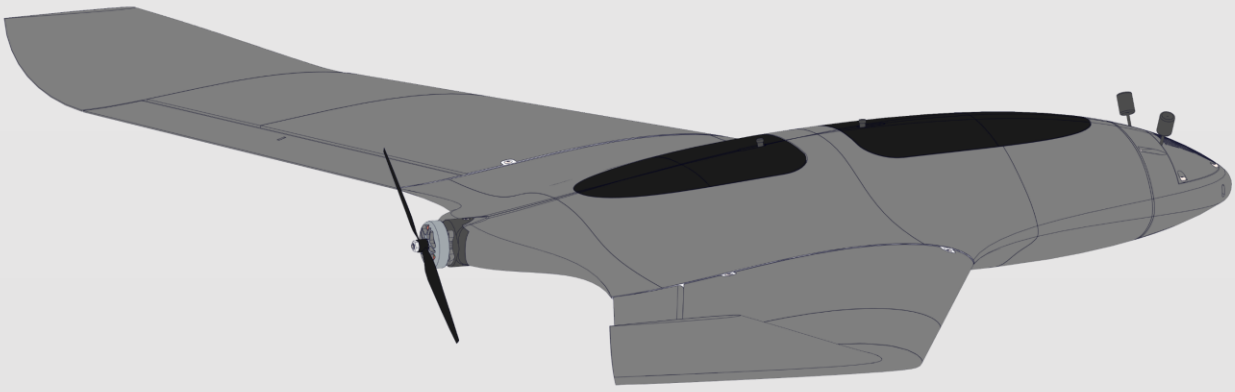
The wing assembly is simple and quick. After pushing the wings against the fuselage, screw in two M3 screws into the designated places. The screws are anchored in PETG-printed material, making the system durable and resistant to repeated wing disassembly

Finishing Build



Now, organize the rest of the equipment. The remaining space in the fuselage is very spacious and can easily accommodate all the necessary equipment: FC, ESC, GPS, receiver, and more. After placing all the equipment, balance the aircraft by positioning the center of gravity 60mm from the leading edge, measured from the wing-fuselage junction. You can support the aircraft at this point with your fingers or other supports and adjust the battery placement to achieve the proper balance.

Before Flight



Before takeoff, ensure that the direction of the aileron deflection and propeller rotation is correct. For this design, the best way to launch is by throwing it with both hands backward behind your back while holding it wide by the leading edge. The launch technique is demonstrated in the flight videos available on the product page. Good luck with your flights!

FLIGHTORY

SUPER STINGRAY