FLIGHTORY

STALLION

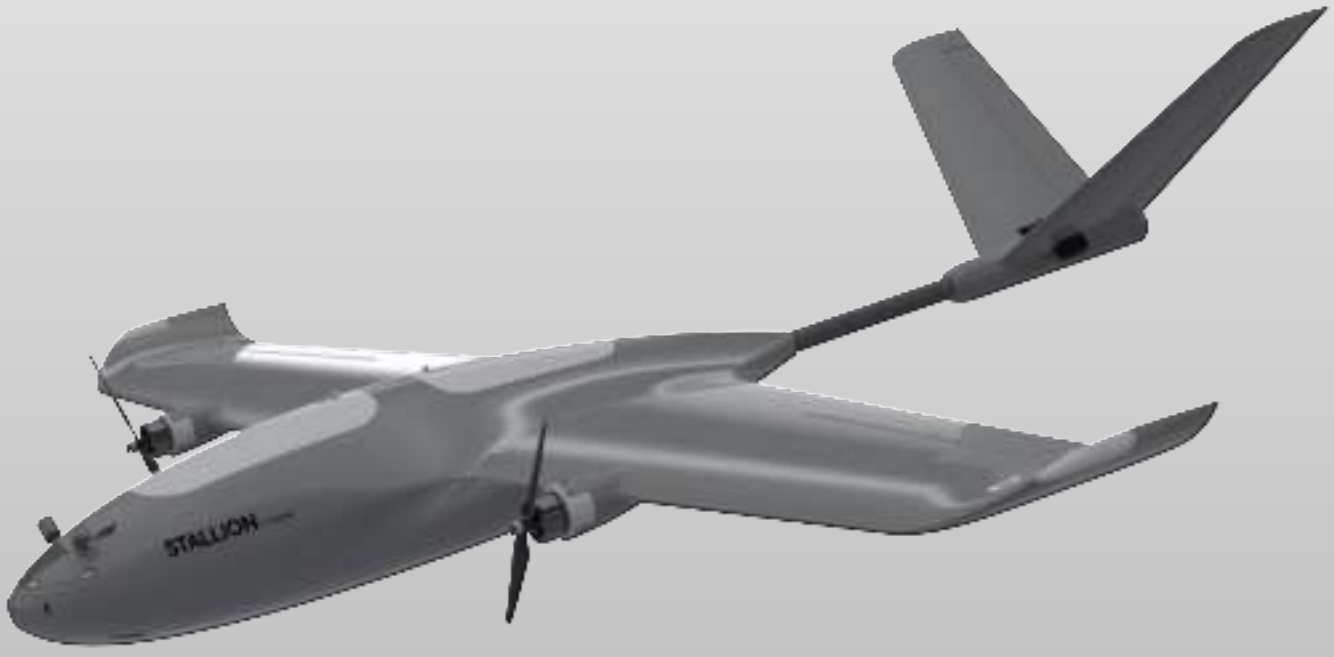
USER MANUAL

V.1

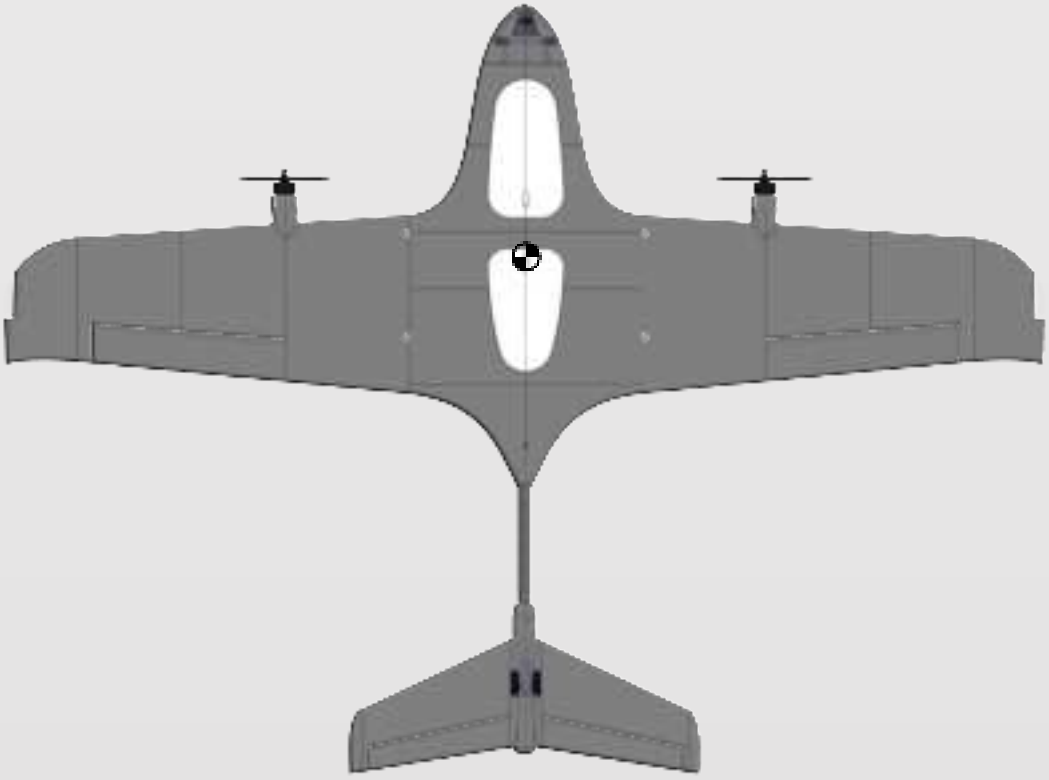
Socials

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

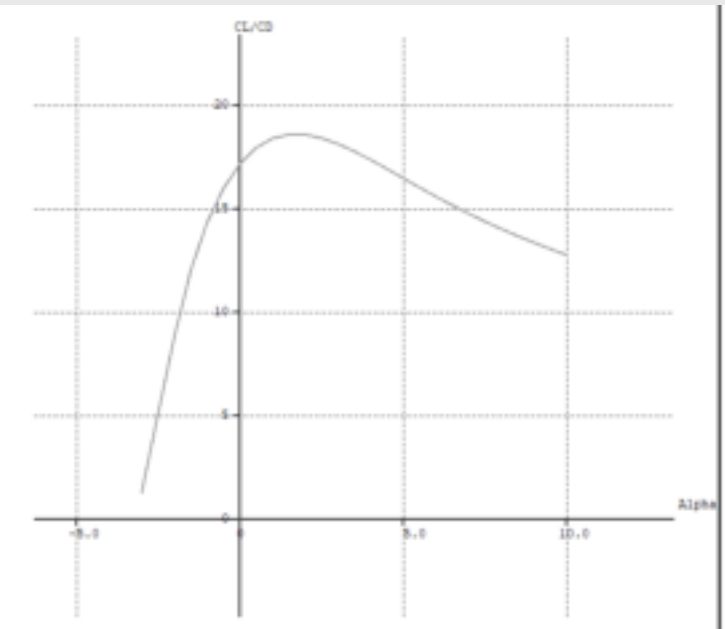


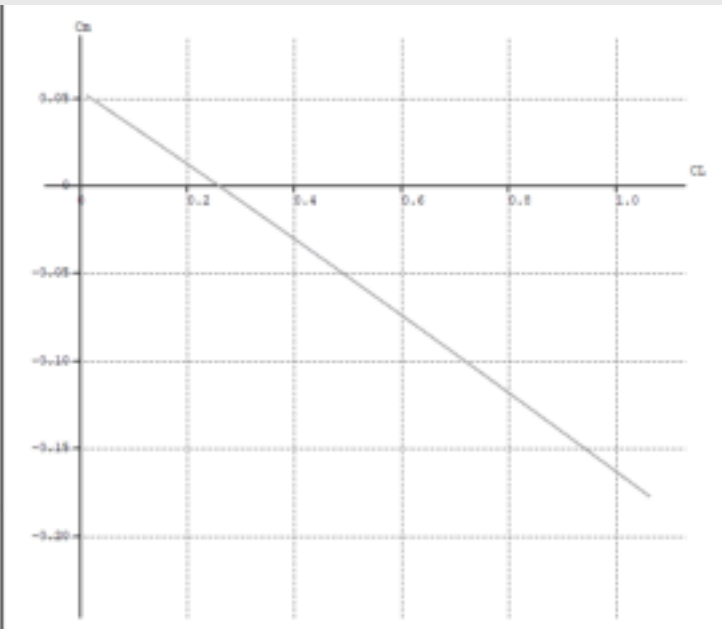
General data	
Wingspan	1340mm
Wing area	26.5 dm²
Lenght	990mm
Center of Gravity	60mm from leading edge (at wing root)
AUW	1500-3000g
Optimal Cruise Speed	60-70 km/h
Airfoil	Eppler E205
Root Chord	255mm
MAC	211mm
Aspect Ratio	5.6
Wing load	55 - 115 g / dm²

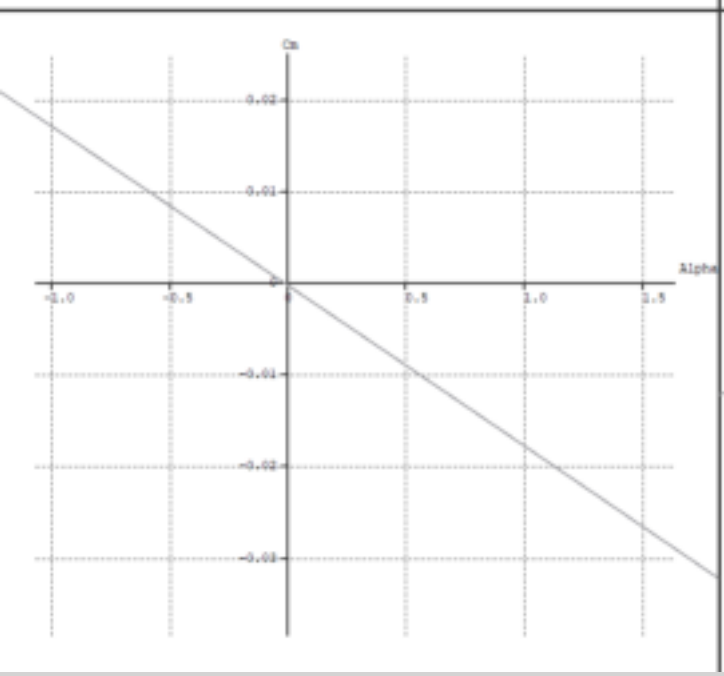
General Aircraft Data

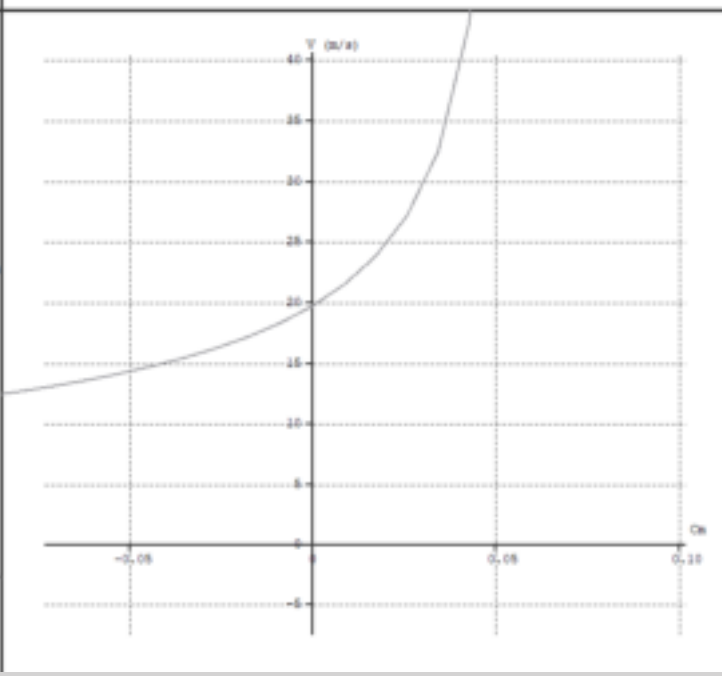
The aircraft is configured with 2 tractor motors, a single tail boom, and a V-Tail configuration. It is designed for optimal performance and compactness. Geometry has been carefully designed and optimized using CFD and real test flights. The airframe is designed with modularity in mind. The nose of the aircraft is fully detachable, allowing for adaptation to various types of payloads. By default, it is prepared for a standard 19x19mm FPV camera. All files are available in STL format, and some are also available in STEP for easy customization of parts such as custom mounts, antenna outputs, sensors, etc. With the recommended motors and battery, the aircraft achieves excellent performance and low power consumption. Stable flight is possible at just under 40% throttle, and with a large 21Ah 4S6P Li-Ion battery, the flight time exceeds 4 hours. In a lightweight configuration, it can even be used with 3S batteries. The choice of motors and battery voltage depends on the user and is crucial in determining the aircraft's performance for specific purposes.

CFD Analysis



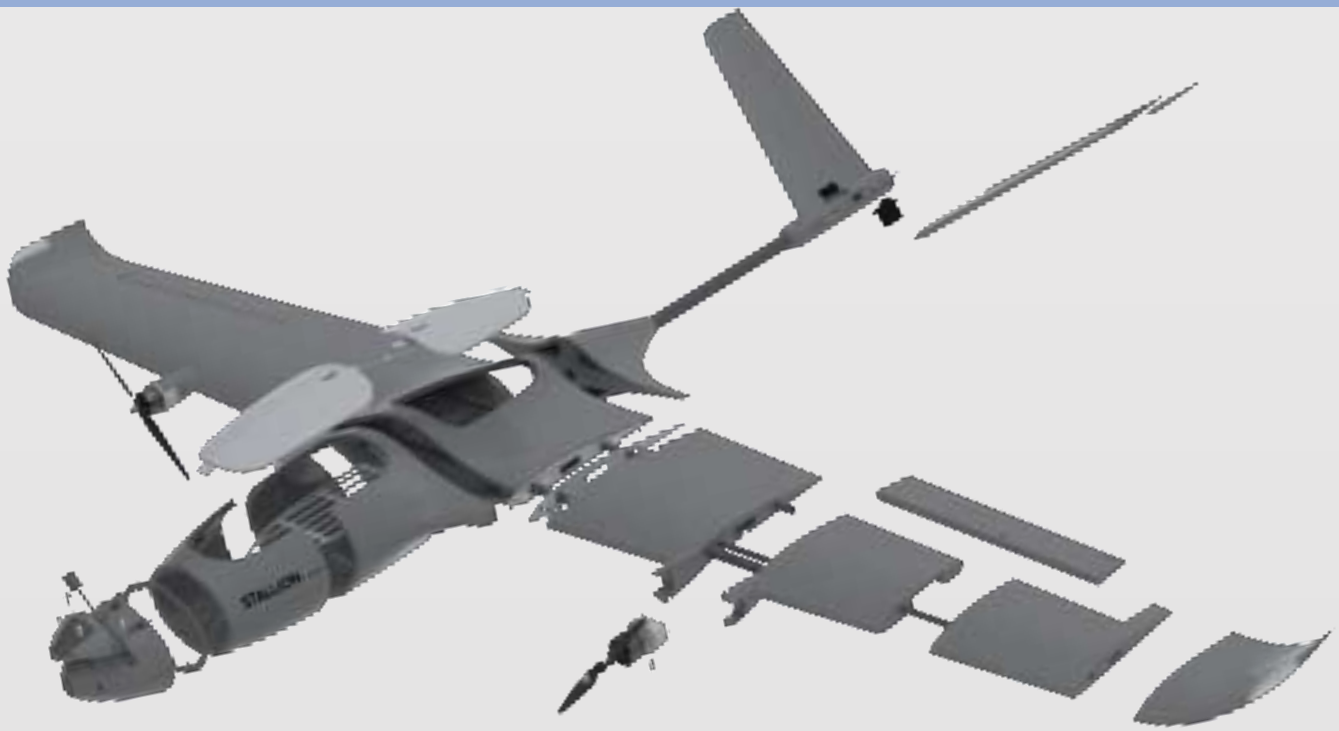


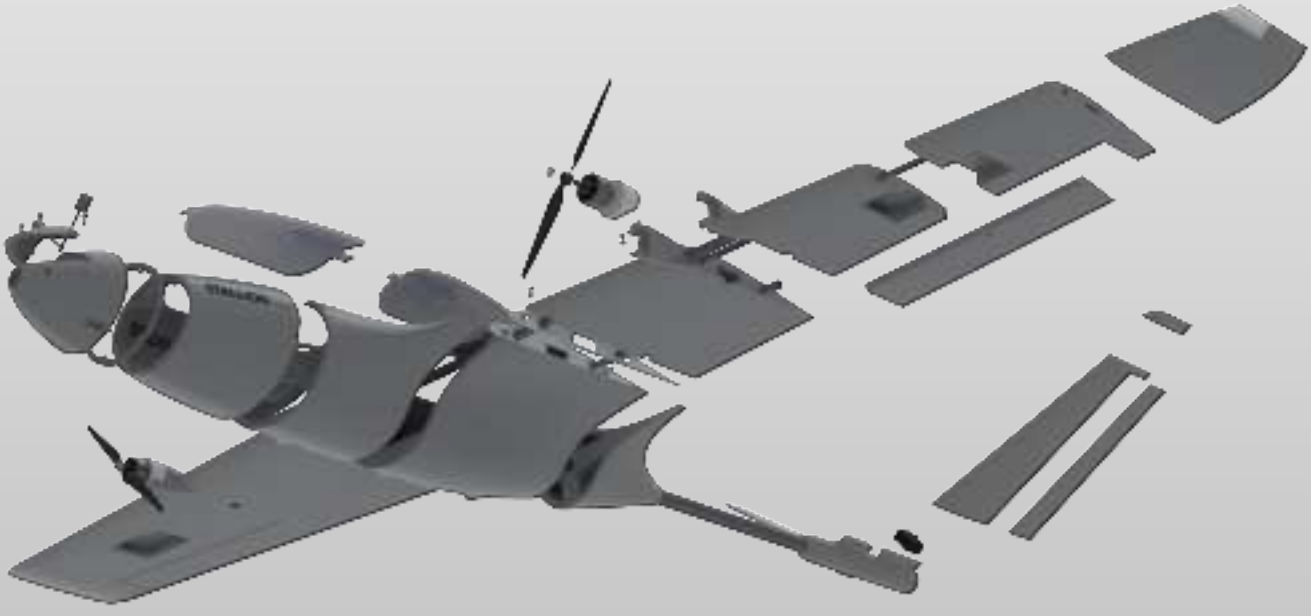




The geometry has been designed and optimized to achieve maximum efficiency while maintaining the stability of the aircraft. The airfoil used is Eppler E205. With the correct center of gravity set at a distance of 60mm from the leading edge (measured at the wing root), the aircraft maintains a longitudinal stability margin and zero pitching moment at zero angle of attack. The highest aerodynamic efficiency occurs between 0 and 2 degrees of AoA at a cruising speed between 60-70 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 4A and providing over 4 hours of flight time. The power reserve is significant, allowing for the use of a 3S battery with lower voltage. There is considerable flexibility in the choice of motor and battery, depending on user preferences. When properly configured, the aircraft does not require a flight controller and can be flown in both manual and automatic modes.

Exploded View





Reccomended RC Equipment

Reccomended electronics	
Motors	T- Motor F60 1750KV / T- Motor F90 1300KV
Propellers	7x4 / 7x5 / 7x6 (one CW, one CCW)
Flight Controller	Speedybee F405 Wing or any other Mavlink FC
GPS	Matek M10Q or similar GPS with compass
Servos	4x Corona 929MG Metal Gear or similar
ESC	2x BlHeliS 40A
Battery	4S (max 4S6P 21Ah Li-Ion) or smaller pack / 3S battery also possible
Receiver	Matek R24-D ELRS or similar
VTX	Digital or analog VTX

Required Accessories

ITEM	QUANTITY
10x800mm Carbon Tube (MAIN SPAR)	1
8x600mm Carbon Tube (SECONDARY SPAR)	2
6x430mm Carbon Tube (WING SPAR)	2
16x435mm Carbon Tube (TAIL BOOM)	1
4x260mm Carbon Tube (V TAIL SPAR)	4
Thin CA Glue	20g tube
CA Activator	1 (optional but useful)
M3 Threaded Insert (Outer Ø5mm, height 5mm)	18
M3 screw	22
M3 nut	4
LW-PLA	1 roll
PETG	Small amount
Polyester CA hinge 25x20mm	14
Pen spring	2
Velcro strap	2
Servo extension cable	4
2812 ARM LED (NAV LIGHTS)	3 (optional)

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
FUS 5 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
BOOM FUS MOUNT	PETG
LOCK 1	PETG
LOCK 2	PETG
FUS ROOT R/L	PETG

PARTS LIST - WINGS

PART	MATERIAL
WING 1 L /R	LW-PLA
WING 2 L /R	LW-PLA
WING 3 L /R	LW-PLA
WINGLET (NO LED) L/R	LW-PLA
WINGLET (LED) L /R	LW-PLA
WING LED COVER L/R	LW-PLA
AILERON L / R	LW-PLA
SERVO COVER (print 2)	PETG
WING ROOT L /R	PETG
MOTOR MOUNT F90	PETG
MOTOR MOUNT F60	PETG

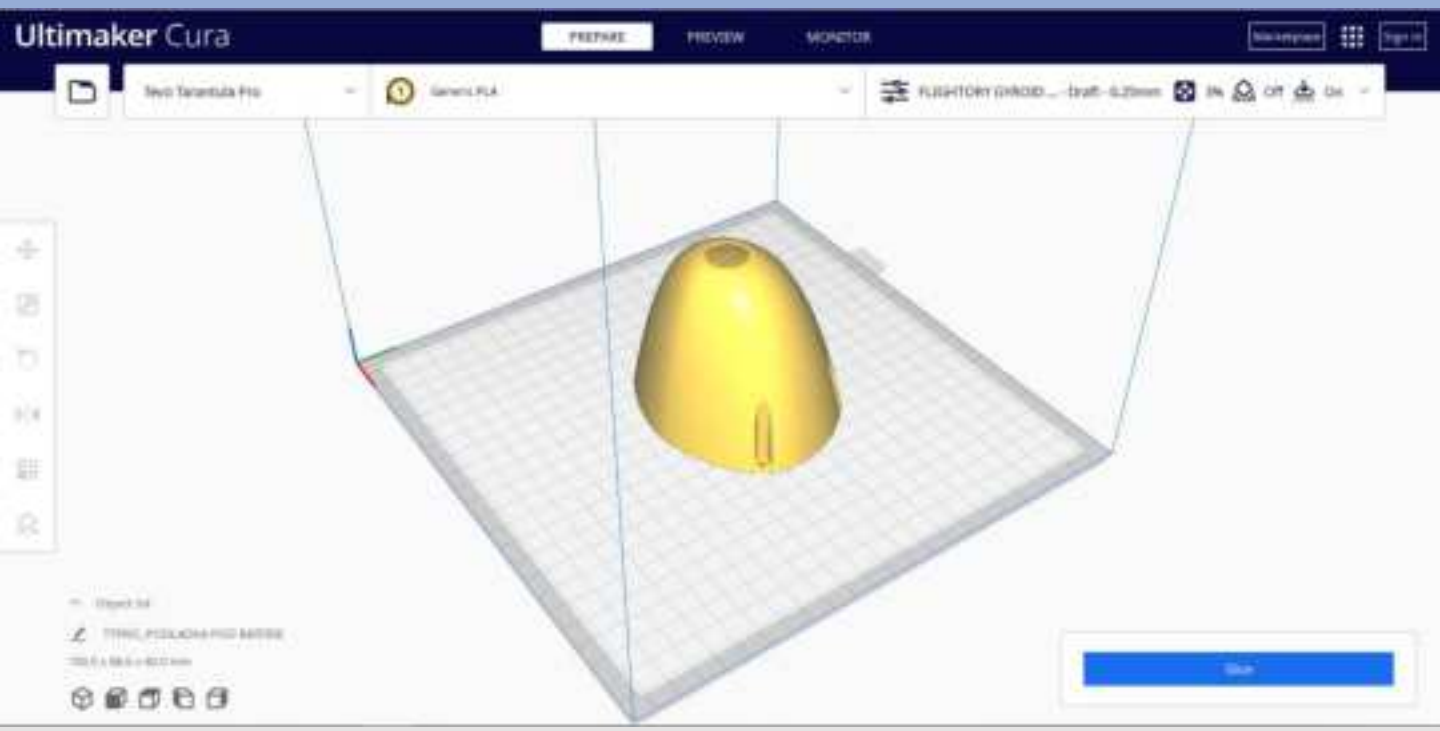
PARTS LIST - TAIL

PART	MATERIAL
TAIL 1 (LED)	LW-PLA
TAIL 1 (NO LED)	LW-PLA
TAIL 2 (LED)	LW-PLA
TAIL 2 (NO LED)	LW-PLA
TAIL 3 (LED)	LW-PLA
TAIL 3 (NO LED)	LW-PLA
V TAIL 1 L/R	LW-PLA
V TAIL 2 L/R	LW-PLA
V TAIL TIP L/R	LW-PLA
RUDDER 1 L/R	LW-PLA
RUDDER 2 L/R	LW-PLA
BOOM TAIL MOUNT	PETG

PARTS LIST – BOOM DRILL

PART	MATERIAL
BOOM DRILL FUS	PETG
BOOM DRILL TAIL	PETG

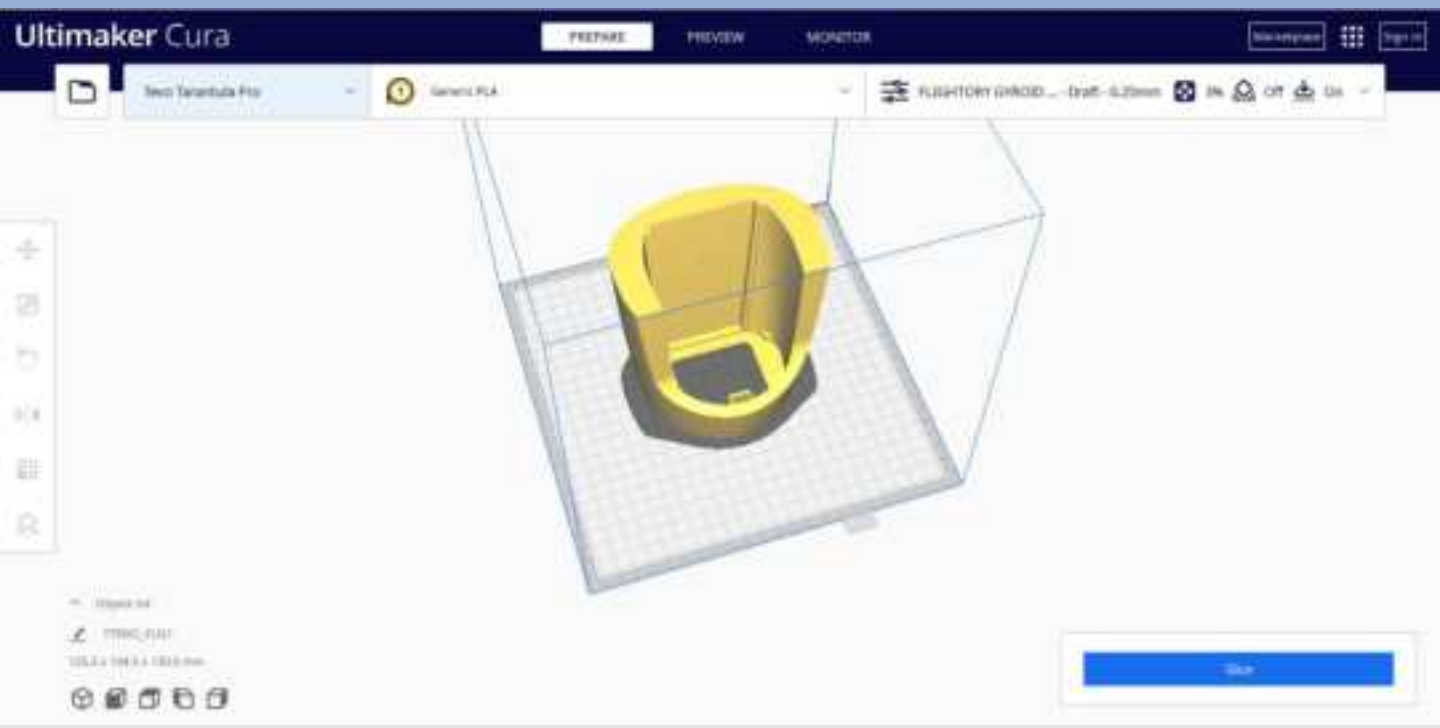
Print Settings



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 grid 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



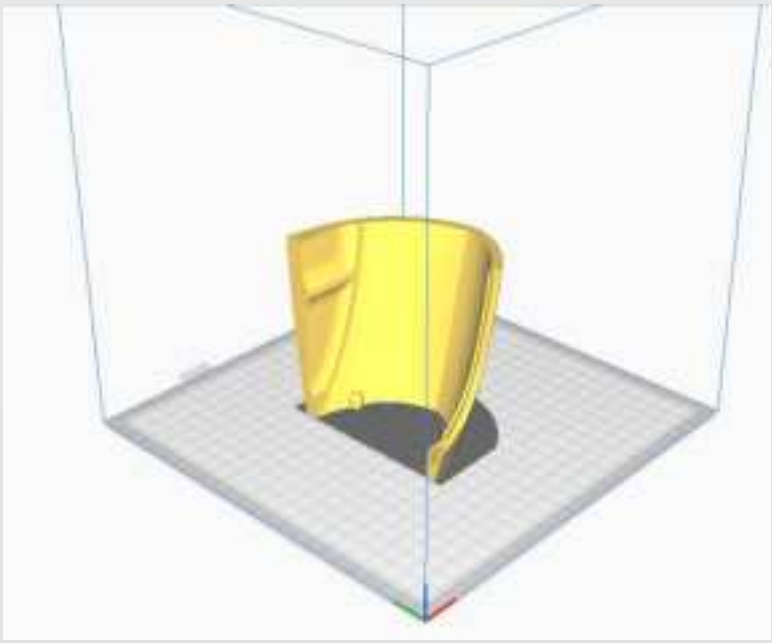
All parts are suitable for printing on any standard printer with a small working area. I printed all parts on a 220 x 220mm area. The settings are just a base that you can change and adjust as needed. The following pages will list my recommended infill settings for each part.

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.

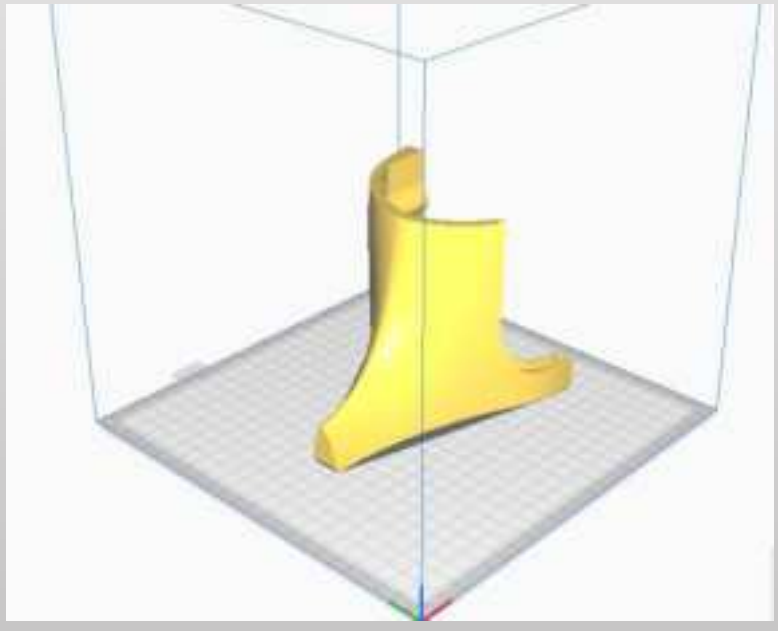
All elements can be printed without supports, but your printer may have a problem with some horizontal surfaces in some places. Depending on the effects, you may then consider turning on supports for these elements and cleaning the printed elements afterwards.

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.

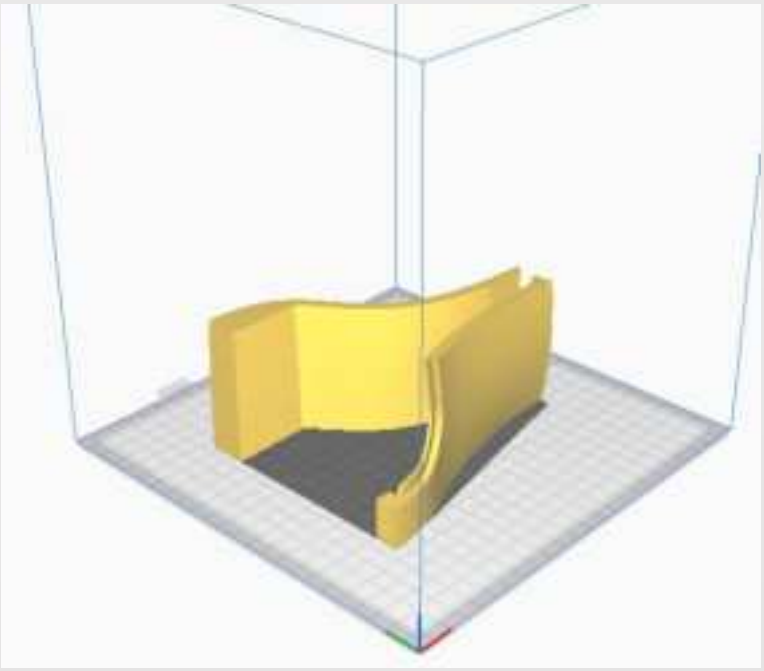


FUS 1 - 3% gyroid infill

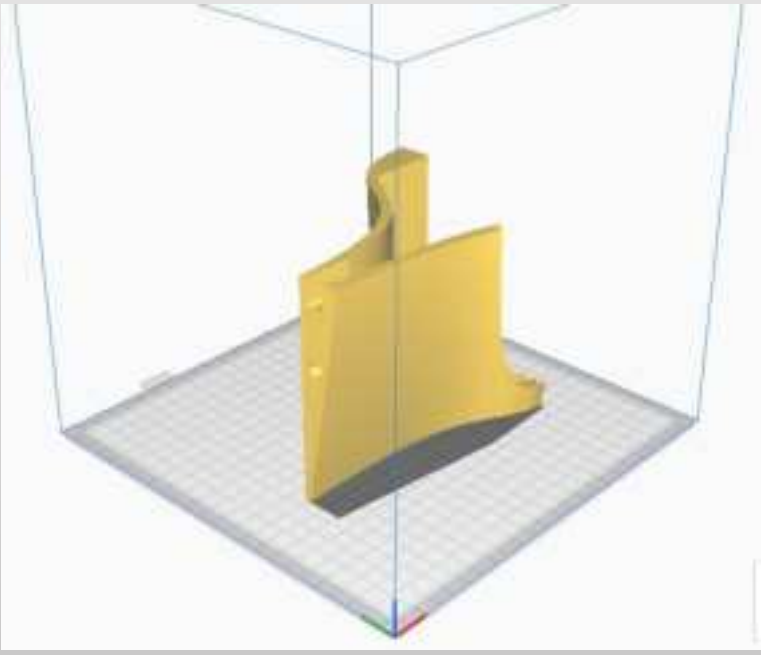


FUS 2 - 3% gyroid infill

Parts Orientation

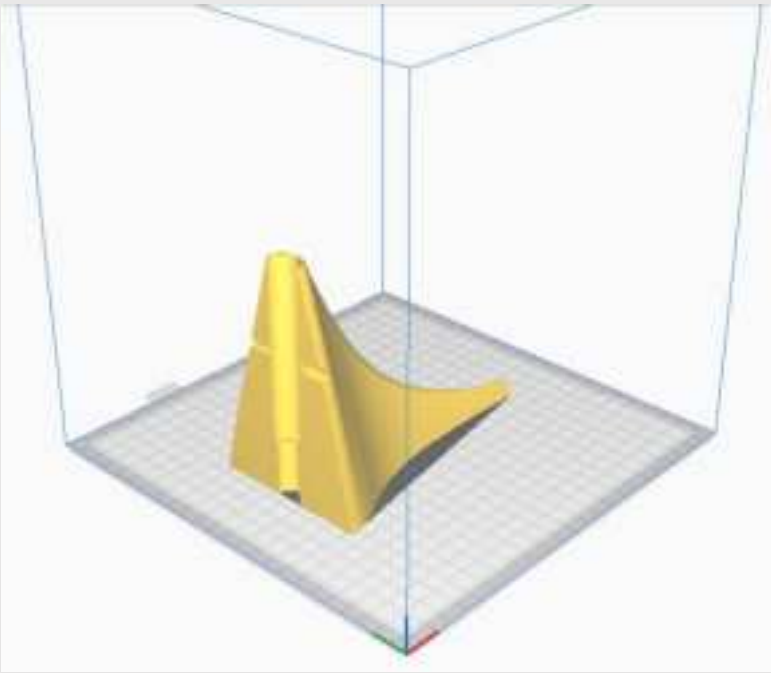


FUS 3 - 3% gyroid infill

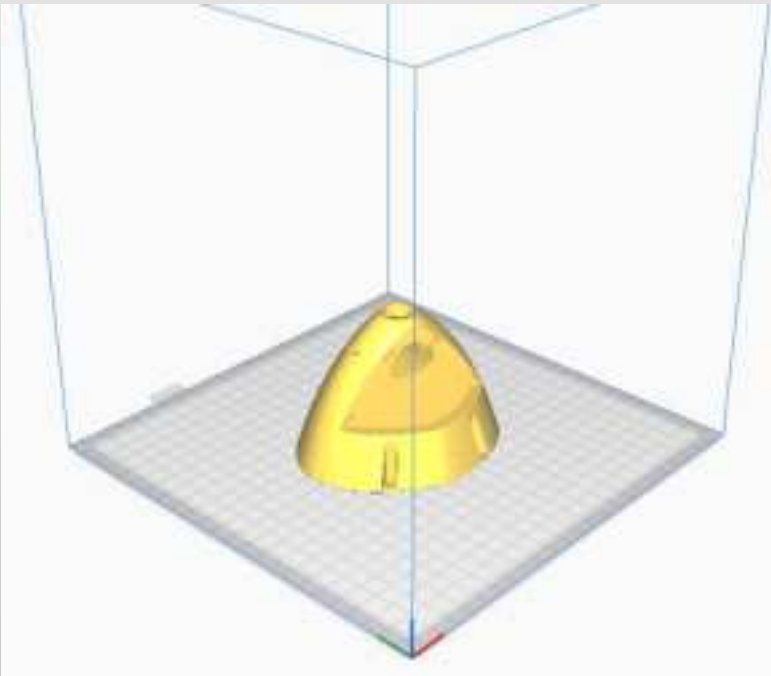


FUS 4 - 3% gyroid infill

Parts Orientation

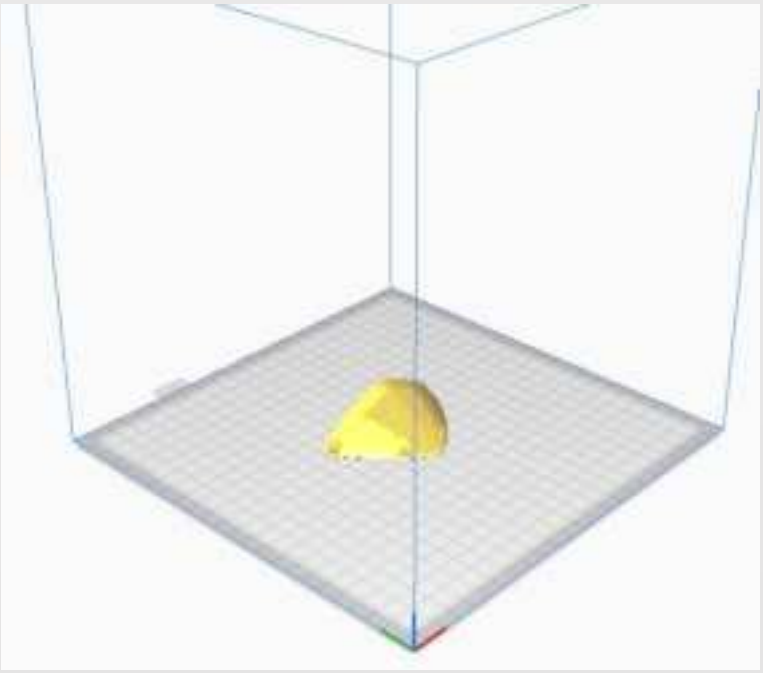


FUS 5 - 3% gyroid infill

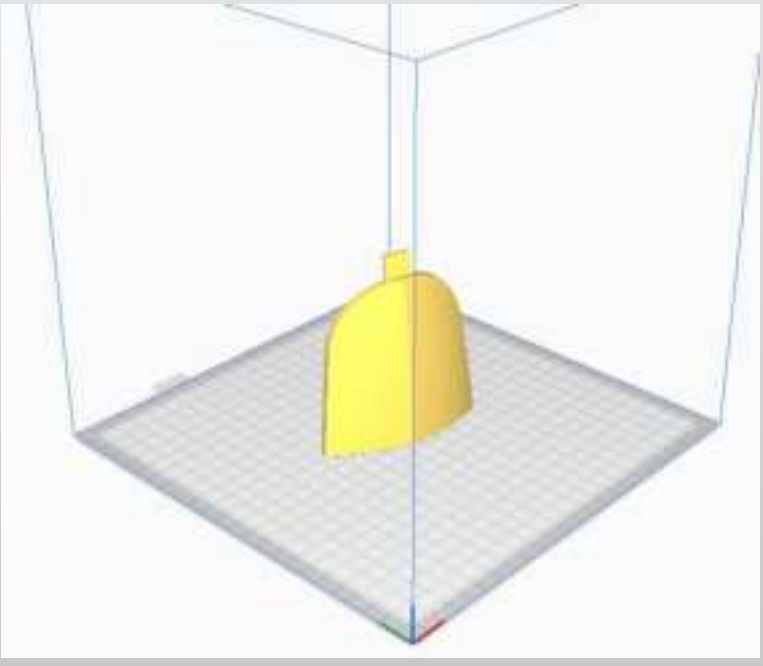


NOSE - 3% gyroid infill + 2 walls

Parts Orientation

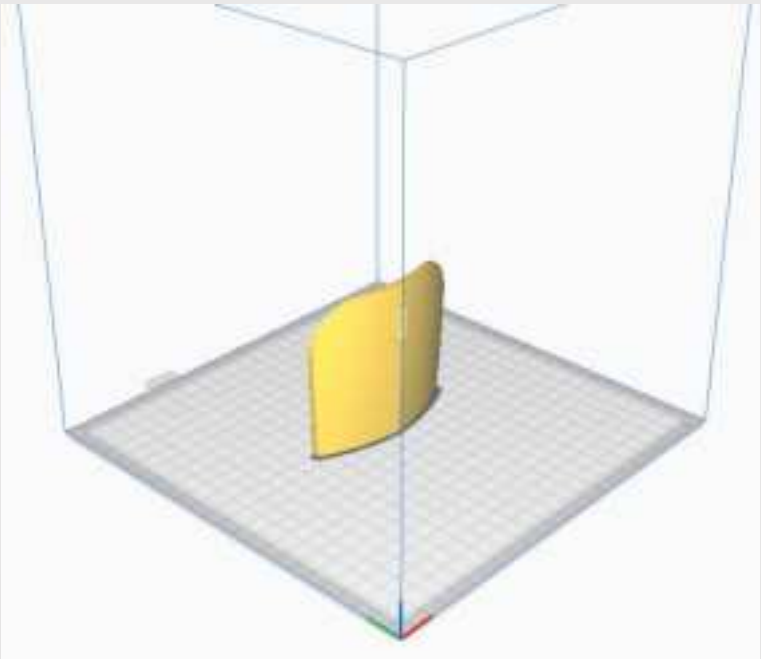


NOSE VTX COVER - 3% gyroid infill + 2 walls

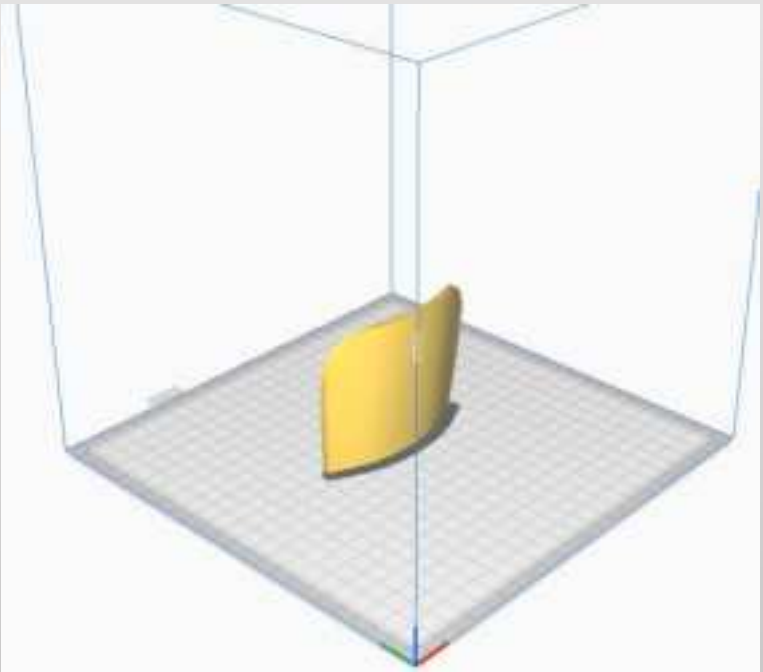


HATCH FRONT 1 - 3% gyroid infill

Parts Orientation

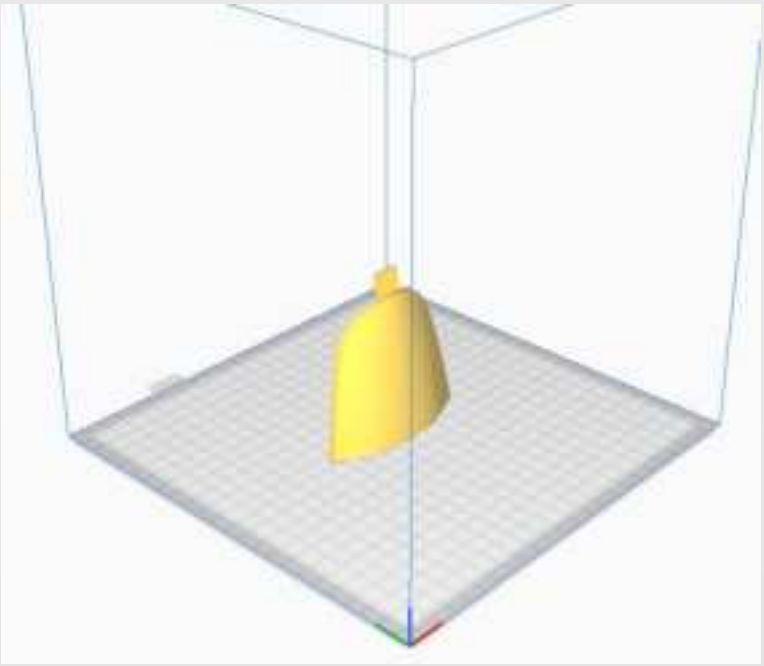


HATCH FRONT 2 - 3% gyroid infill

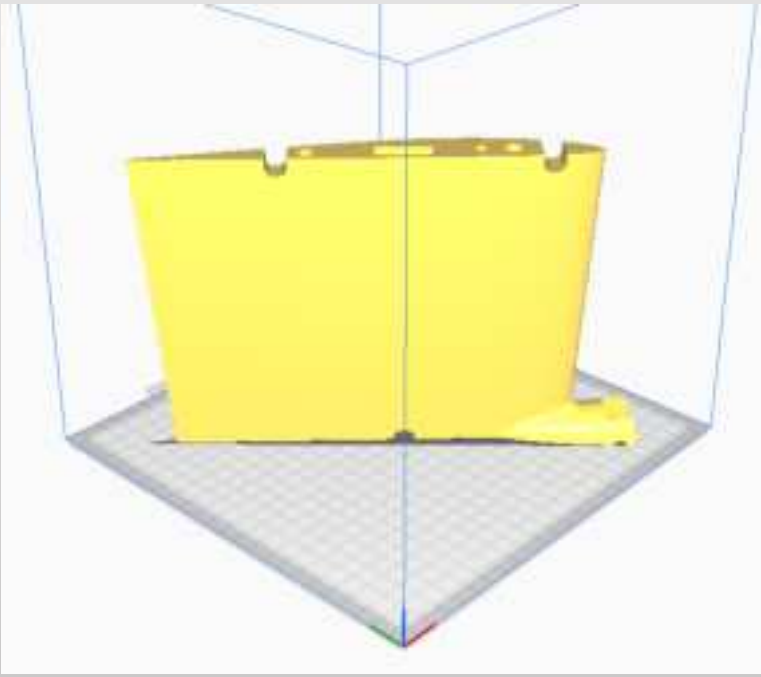


HATCH REAR 1 - 3% gyroid infill

Parts Orientation

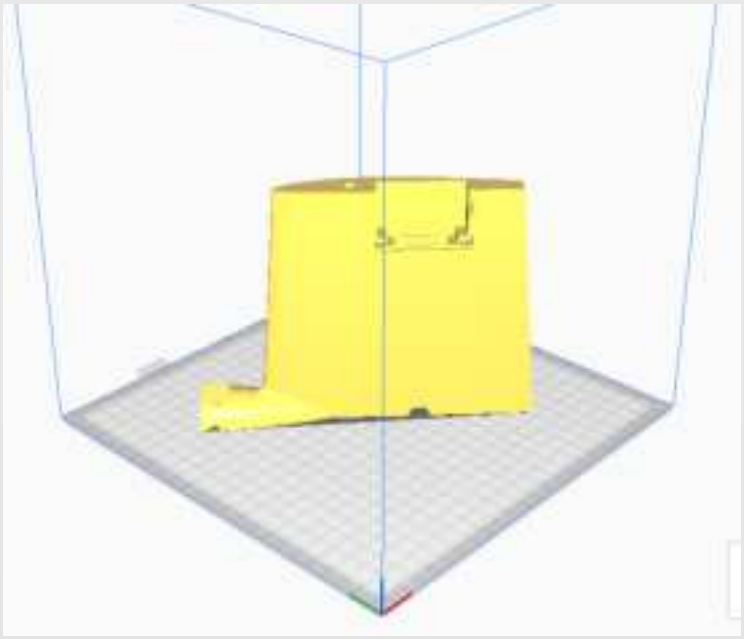


HATCH REAR 2 - 3% gyroid infill

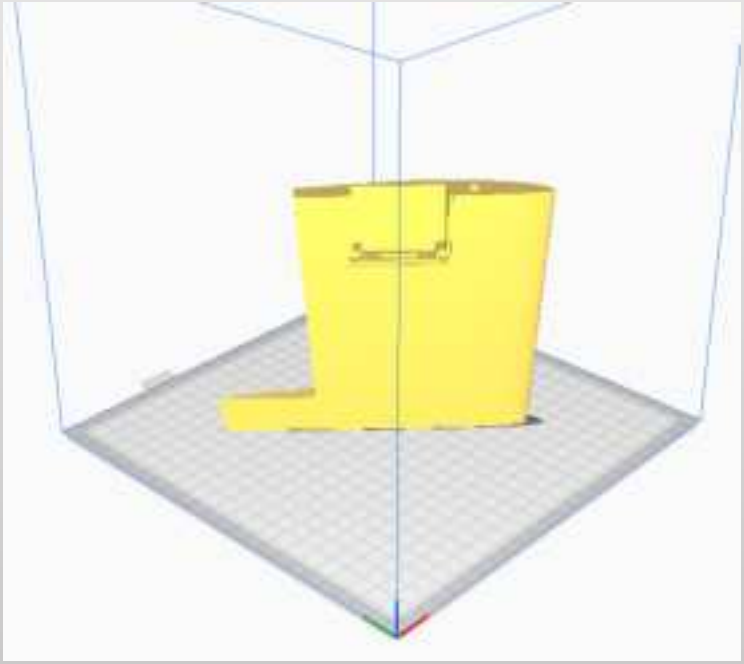


WING 1 - 3% cubic subdivision infill

Parts Orientation

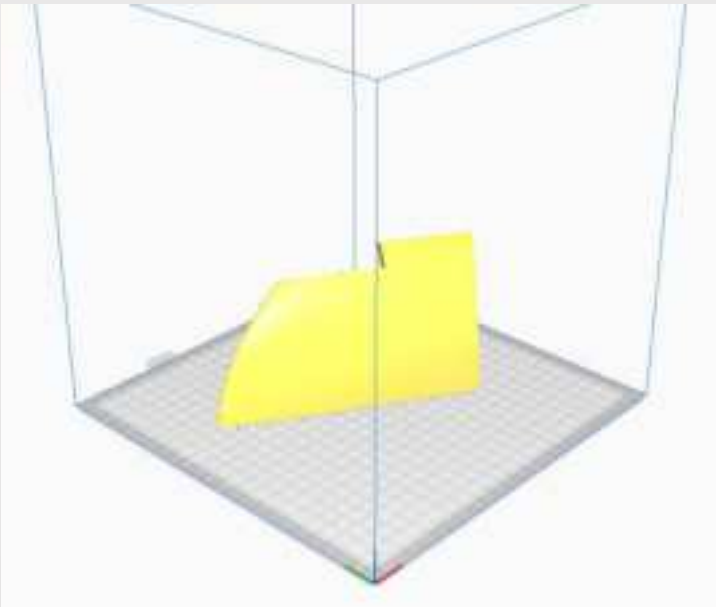


WING 2 - 3% cubic subdivision infill

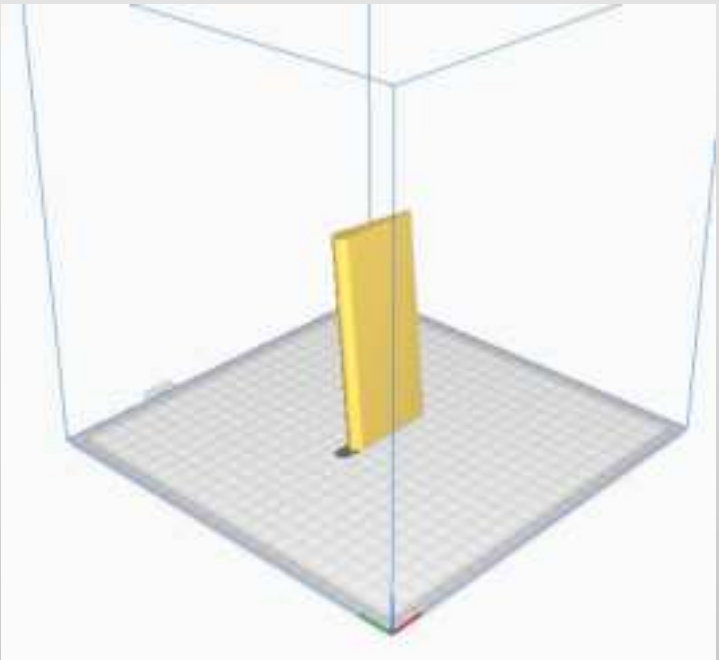


WING 3 - 3% cubic subdivision infill

Parts Orientation

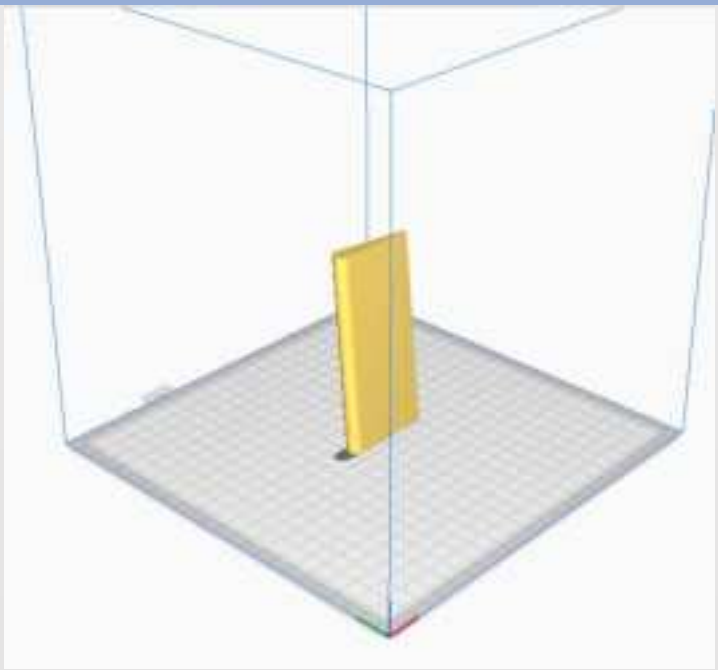


WINGLET- 3% cubic subdivision infill

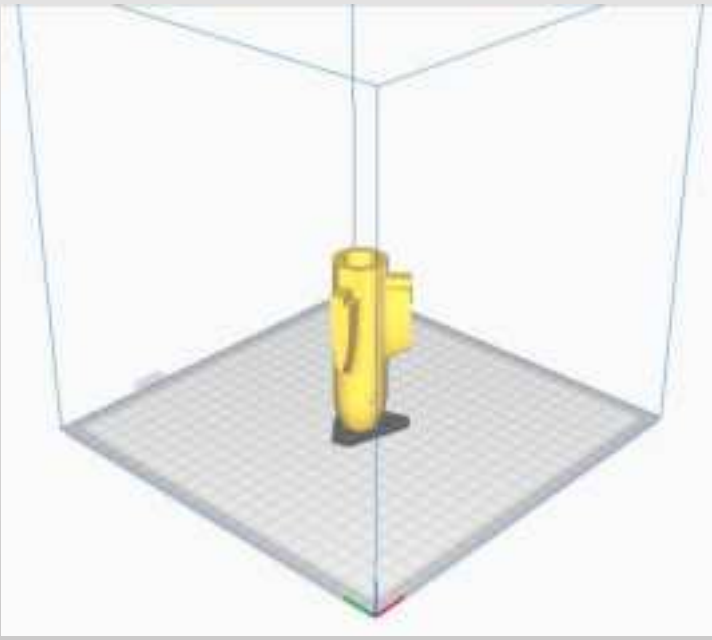


AIL 1- 4% cubic subdivision infill

Parts Orientation

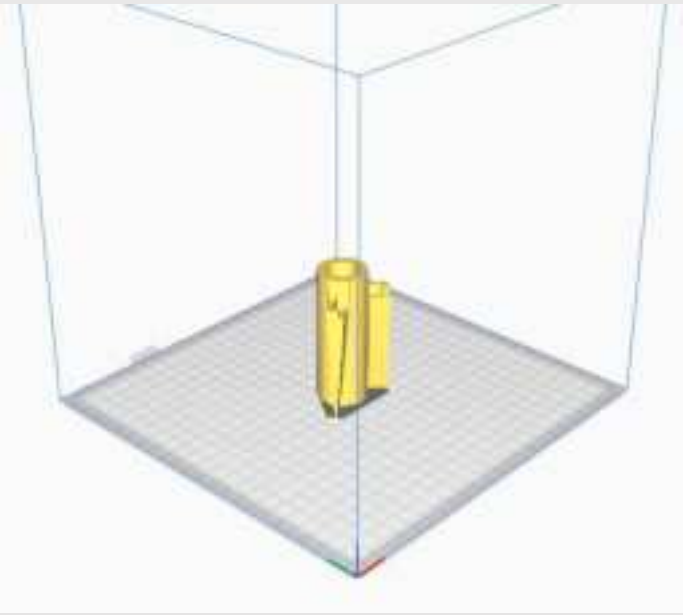


AIL 2 - 4% cubic subdivision infill

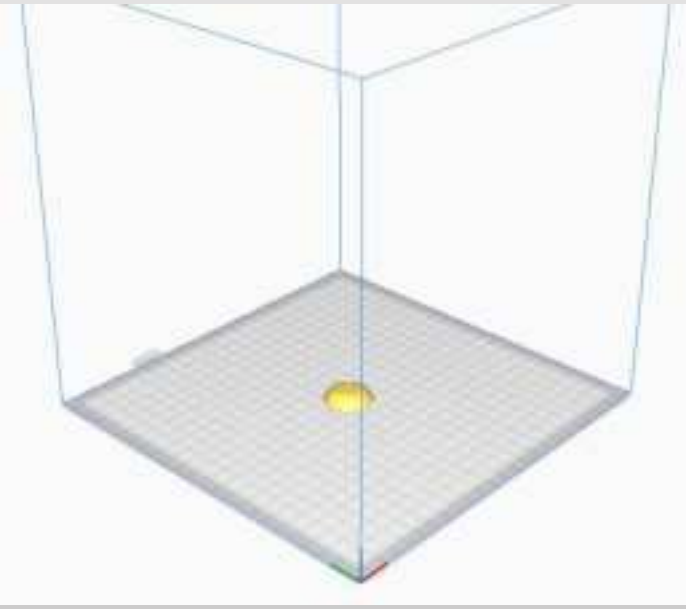


TAIL 1- 6% gyroid infill

Parts Orientation

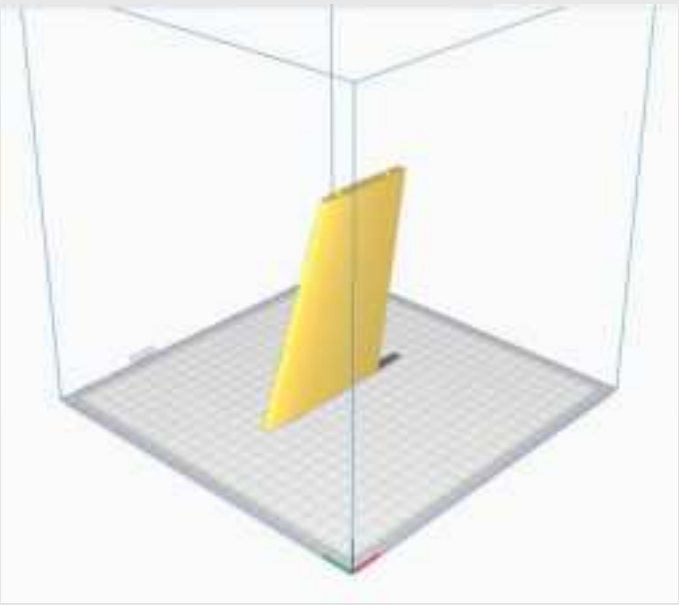


TAIL 2 - 6% gyroid infill

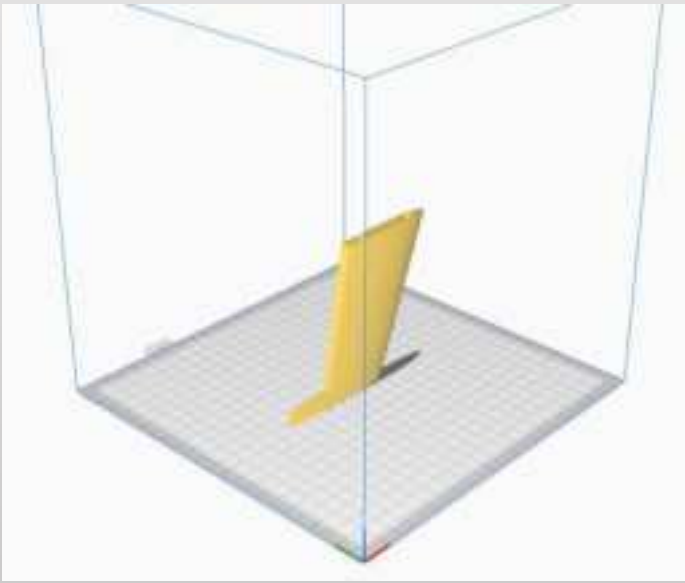


TAIL 3 - 3% gyroid infill

Parts Orientation

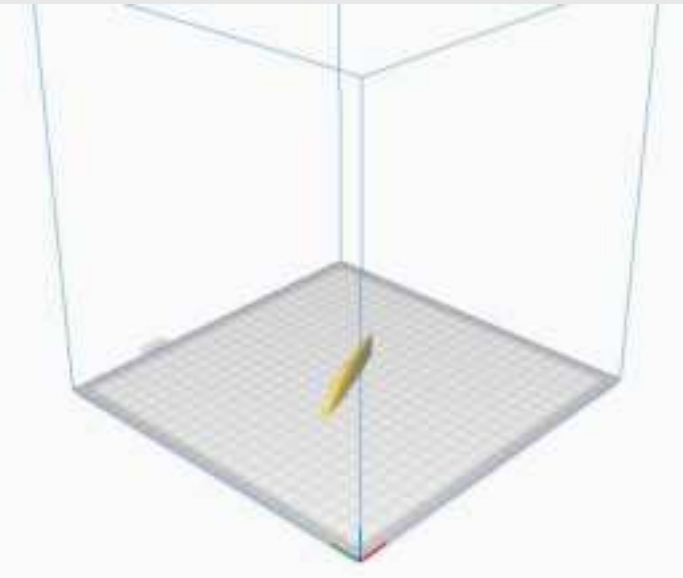


V TAIL 1 - 3% gyroid infill

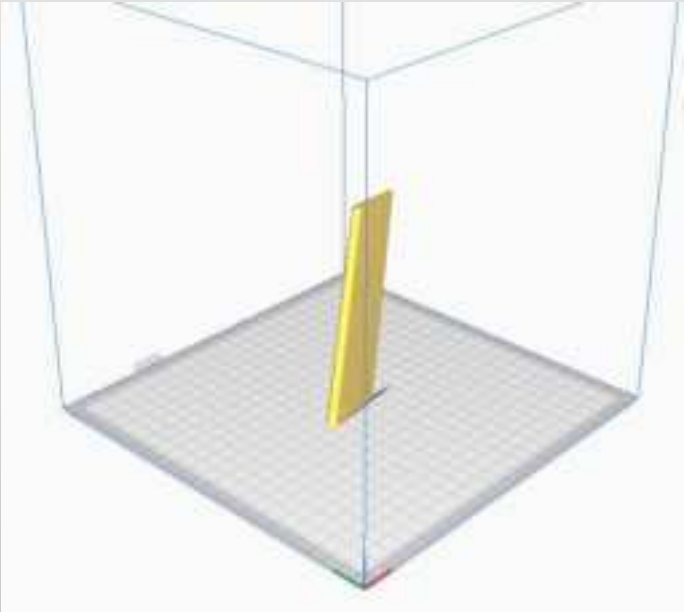


V TAIL 2 - 3% gyroid infill

Parts Orientation

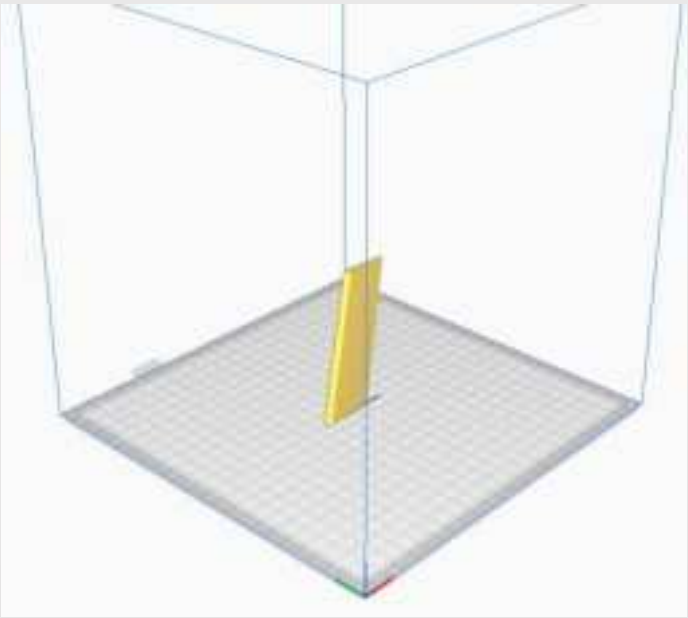


V TAIL TIP - 3% gyroid infill

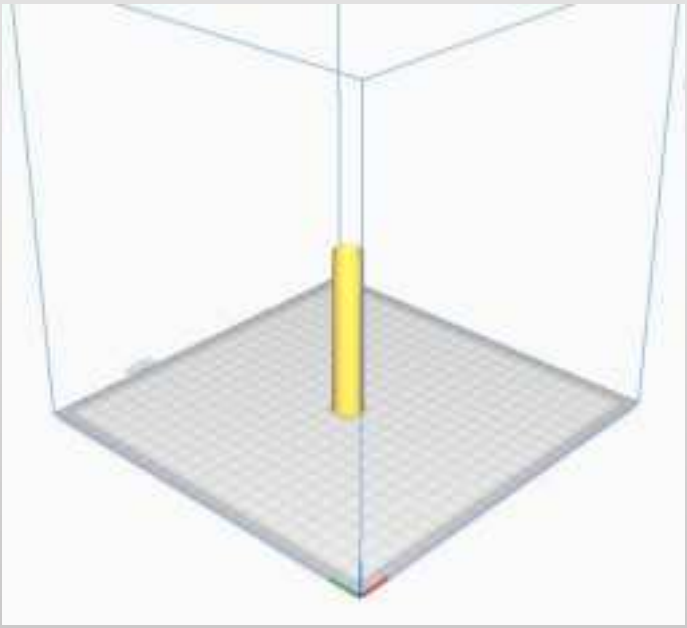


RUDDER 1- 3% gyroid infill

Parts Orientation

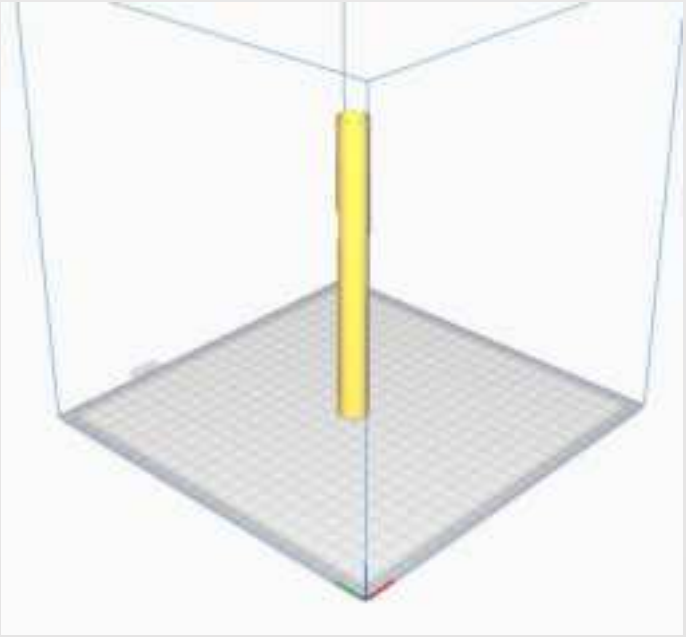


RUDDER 2 - 3% gyroid infill

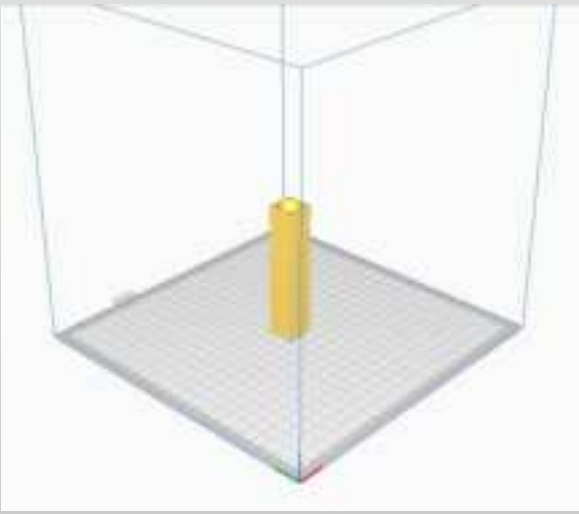


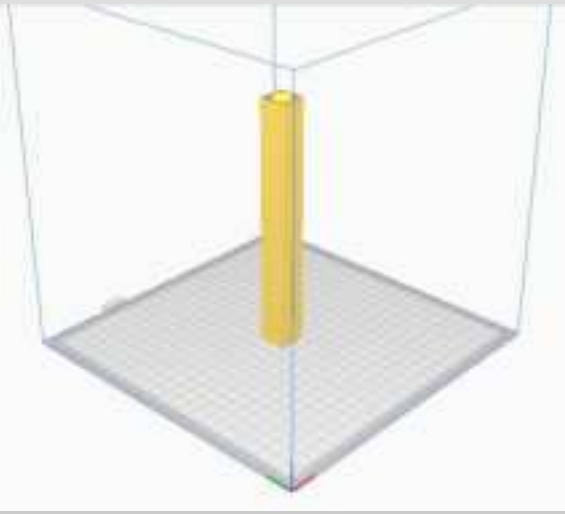
BOOM FUS MOUNT– PETG 20% GRID INFILL

Parts Orientation



BOOM TAIL MOUNT – PETG 20% GRID INFILL



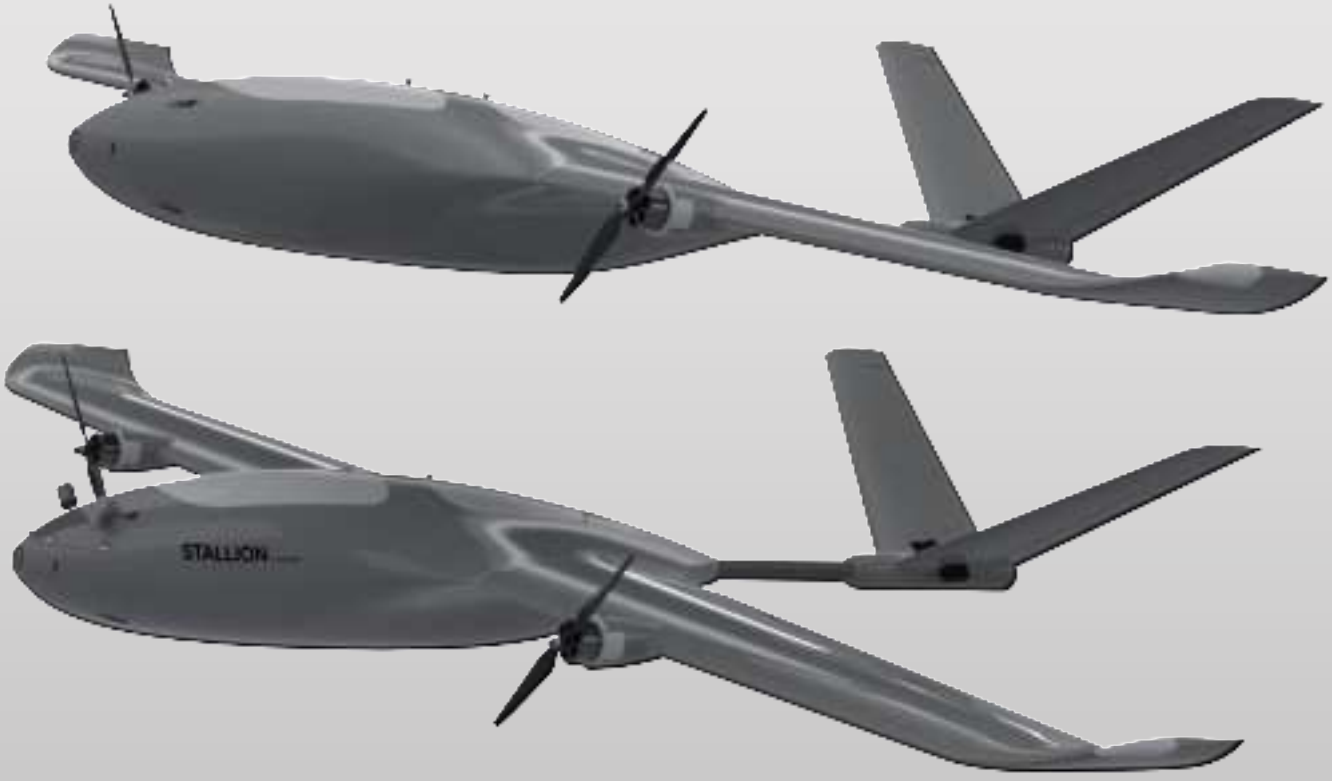


BOOM DRILL – PETG 20% GRID INFILL

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 with just the FPV camera. 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.



TAIL VARIANTS

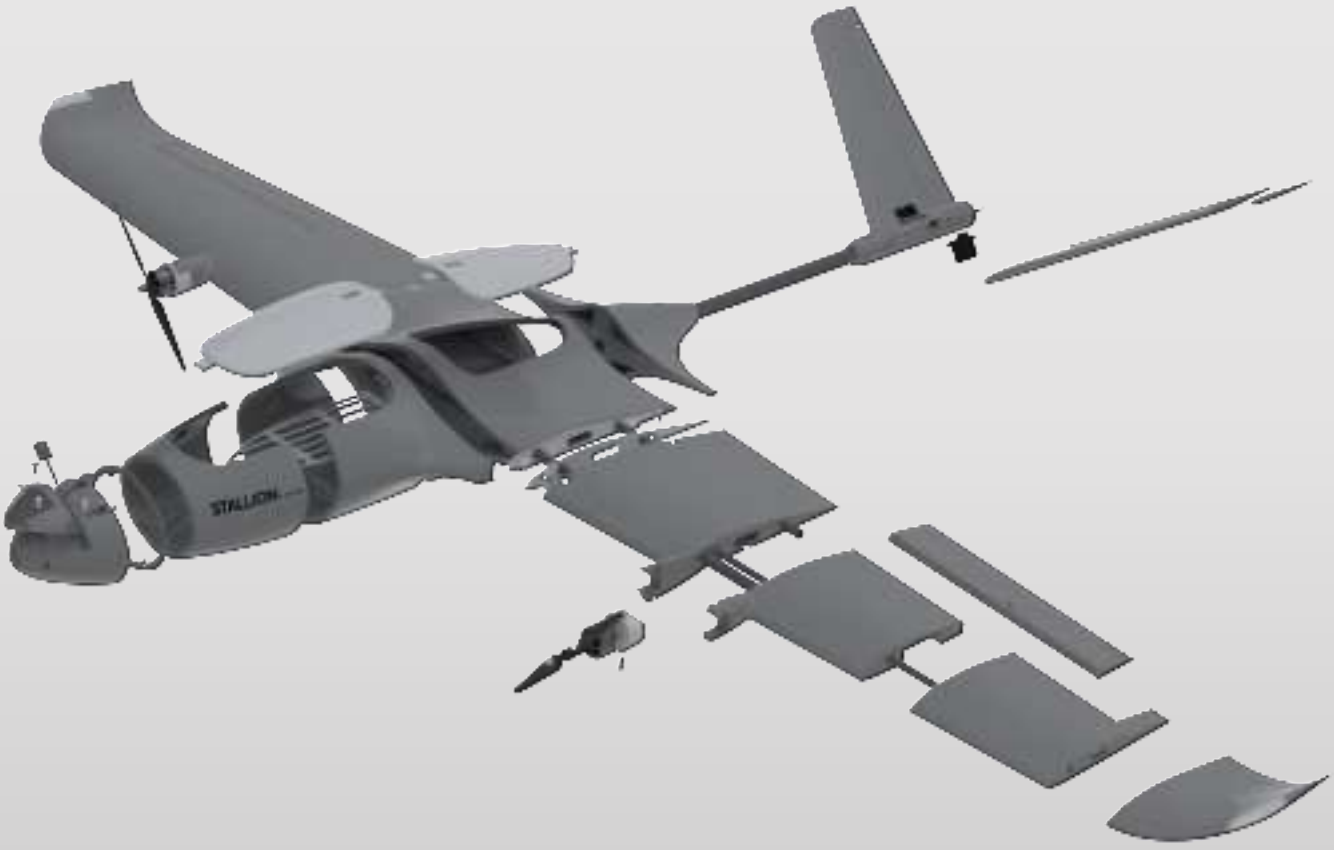
There are two tail options to choose from. You can select the version with a designed slot for the 2812 ARM LED or without it. Additionally, you can choose whether you want to route the wires through the hole at the back of the tail or thread them through the holes designed near the servos. Routing the cables through the hole in the rear part of the tail is easier but less aesthetic. The second option allows for complete hiding of the wires inside the tail structure. However, it requires an additional cut in the tail boom and a bit more effort in routing the wires. This will be described further in the instructions.

WINGLET VARIANTS

There are also 2 versions of winglets. One with a space for 2812 ARM LED and a cover printed from transparent material, or a regular version without a navigation light.

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.

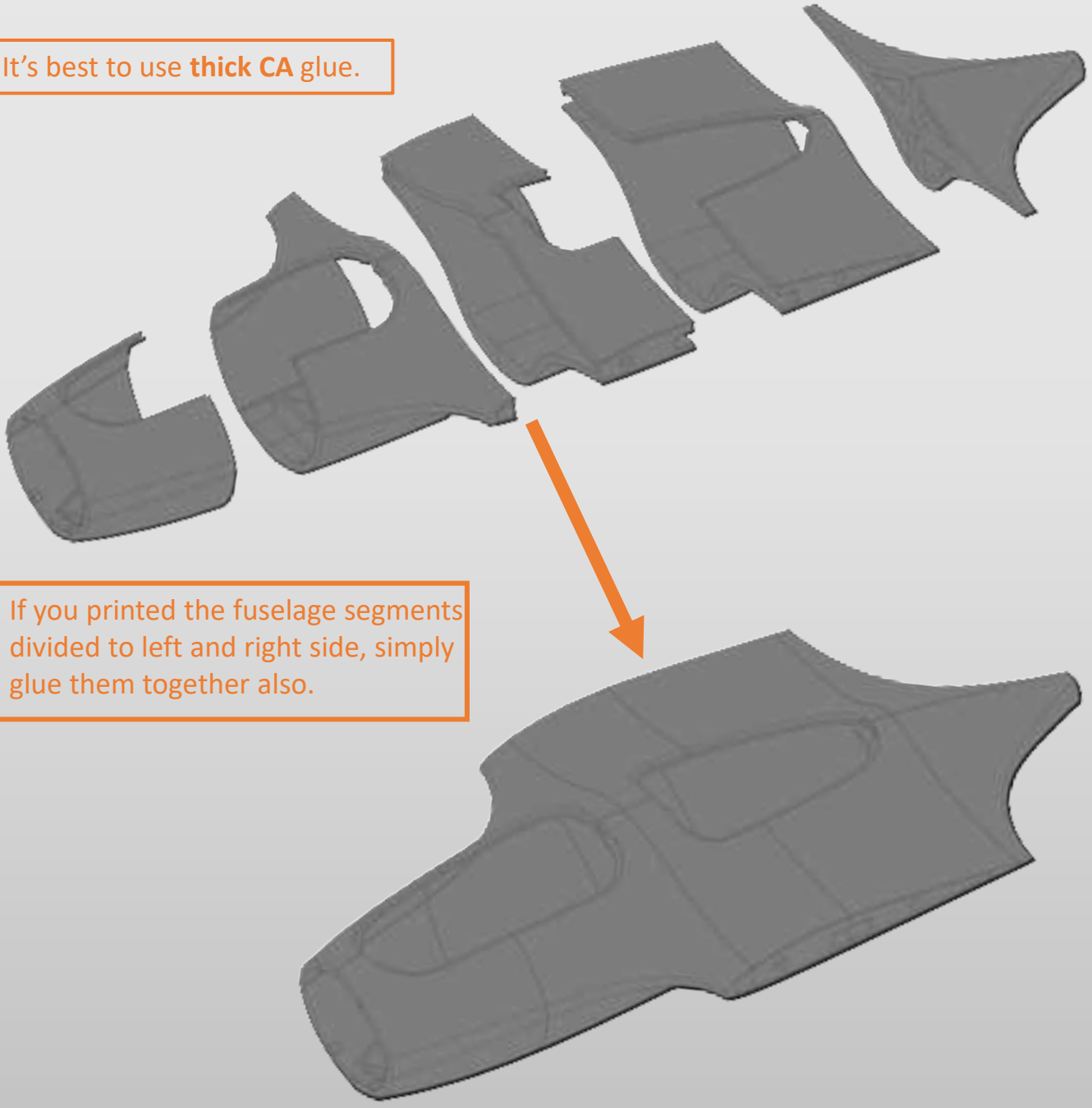


You can find these files in folders labeled STEP

Fuselage Assembly

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

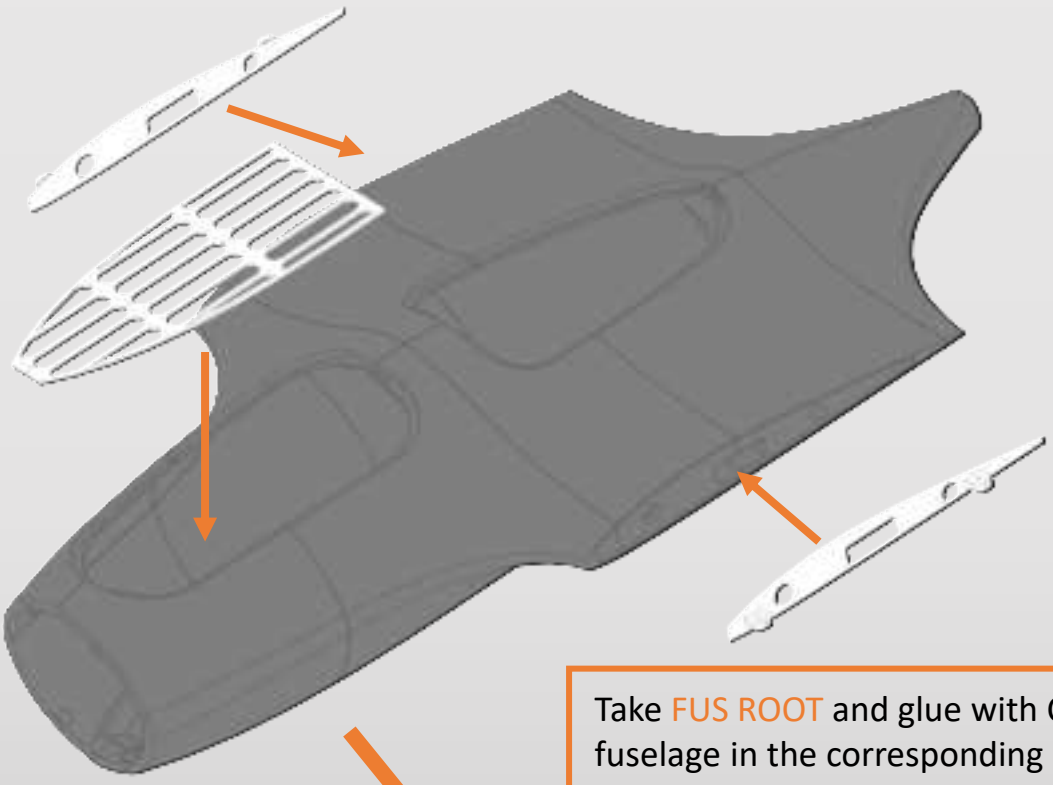
It's best to use **thick CA** glue.



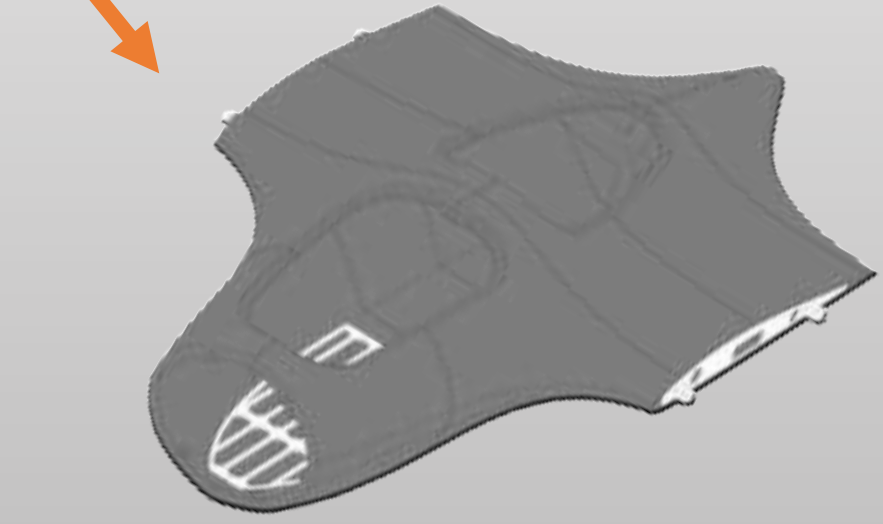
If you printed the fuselage segments divided to left and right side, simply glue them together also.

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.

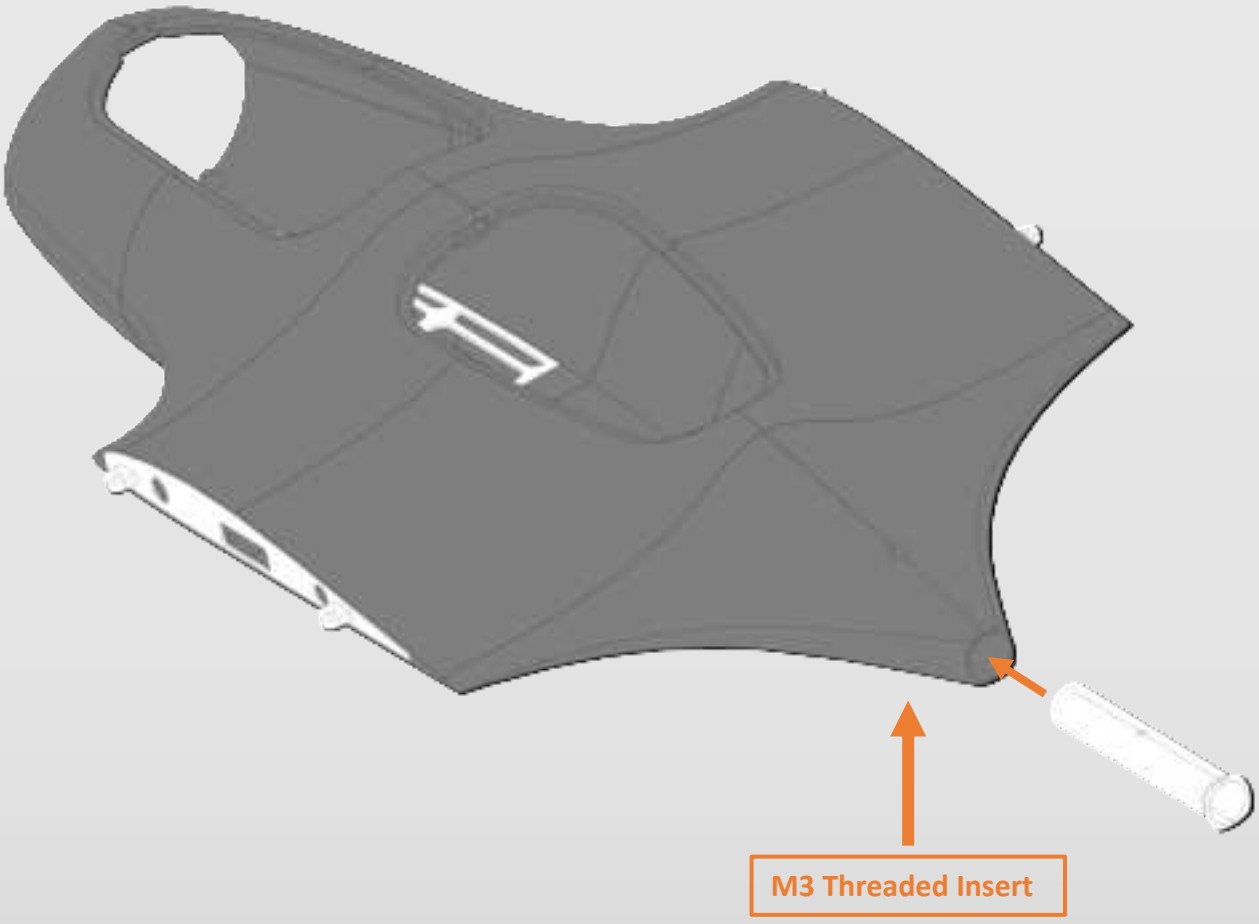


Take FUS ROOT and glue with CA to the fuselage in the corresponding places.



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

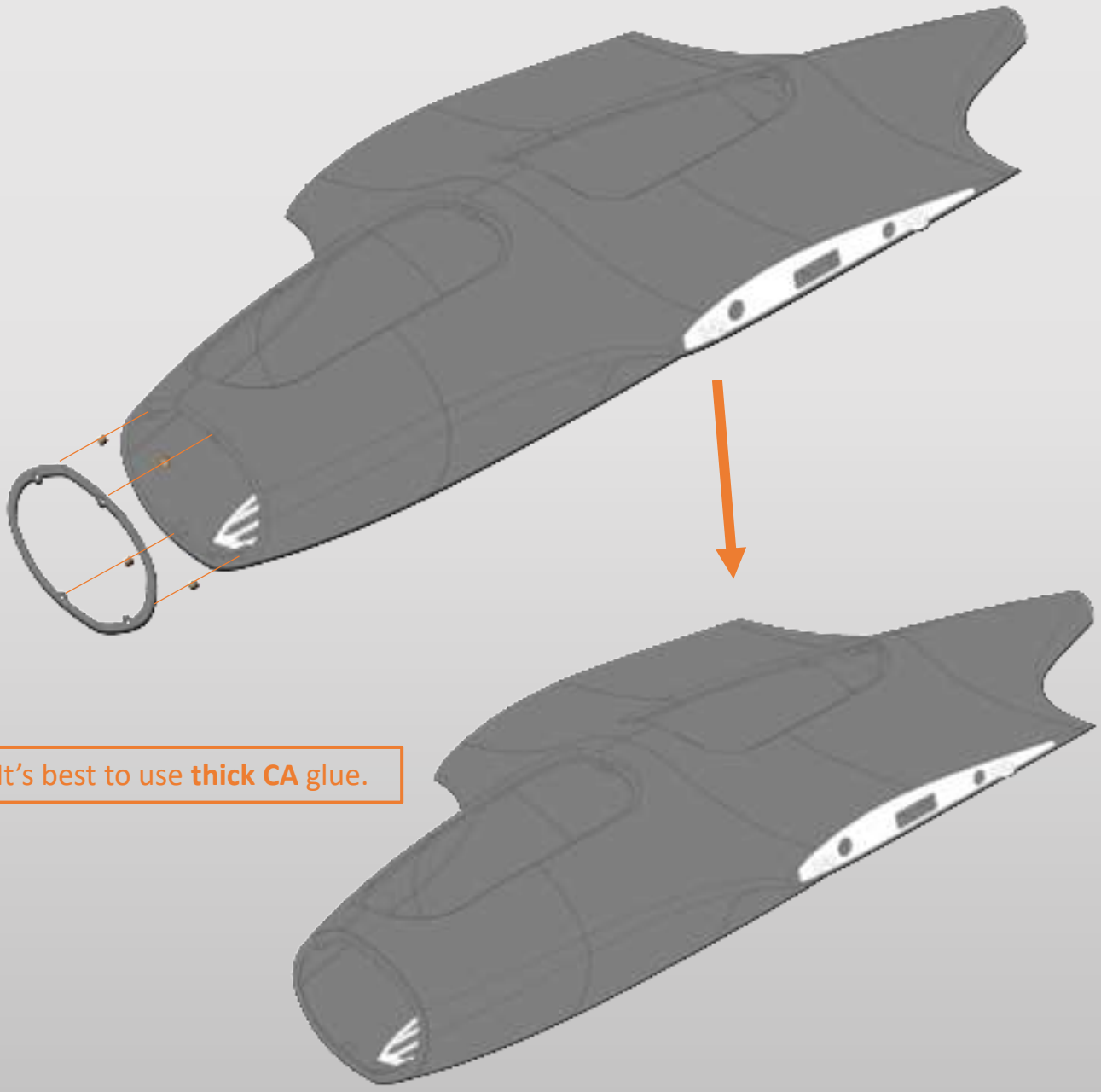
Fuselage Assembly



Take the TAIL BOOM MOUNT printed with PETG or another rigid material and paste it into the designated slot. This component reinforces the section of the fuselage to which the tail boom will be attached. From the bottom of the fuselage, insert the M3 threaded insert, which will be used for securing the tail boom to the fuselage with a screw. You can easily do this by gently pressing it with a slightly heated soldering iron.

Fuselage Assembly

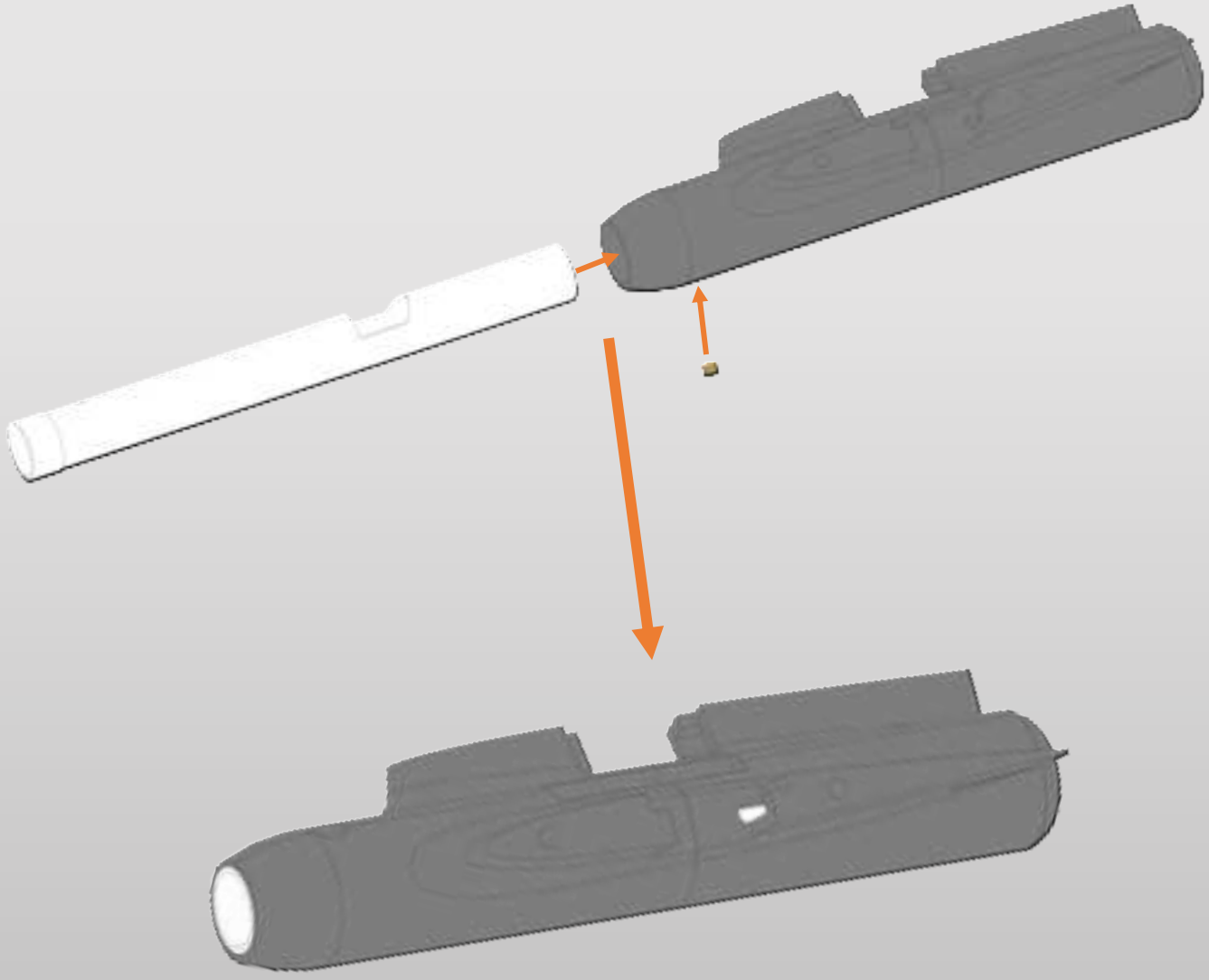
Now take M3 threaded inserts with an outer diameter of 5mm.
Glue them into the designated places in the front part of the fuselage.
You can use a slightly heated soldering iron for this. Then glue NOSE REINFORCEMENT printed with PETG or other hard material. This noticeably increases the strength of the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



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

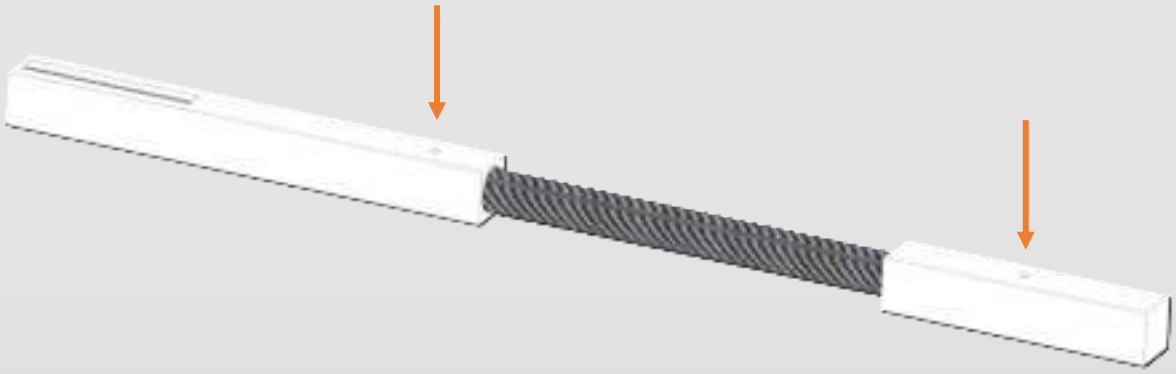
Tail Assembly

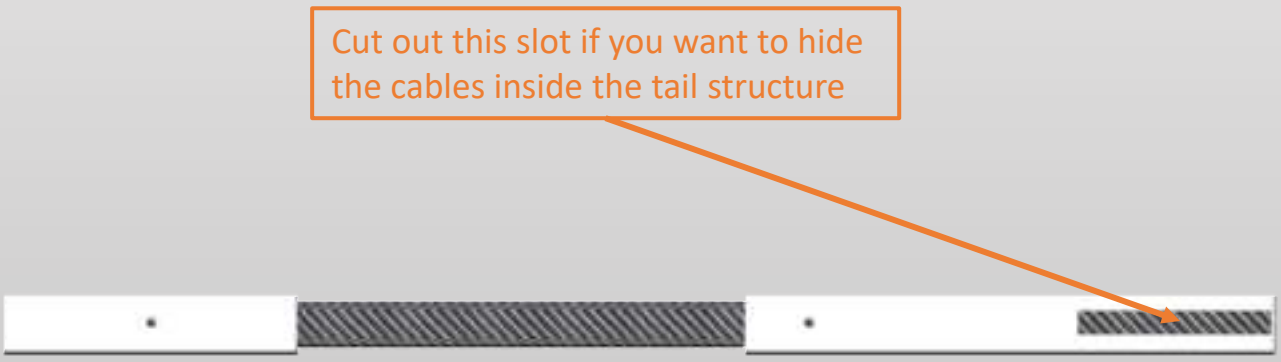
Now, take the tail components and assemble them. Choose the version with LED or NO LED and decide whether you will route the cables through the rear tail opening or press them inside near the servos. Take the BOOM TAIL MOUNT printed with PETG or another rigid material and glue it inside the tail at the designated location. At the bottom, you can see a hole into which insert the threaded M3 insert, which will secure the screw attaching the tail boom.



Tail Boom Drilling

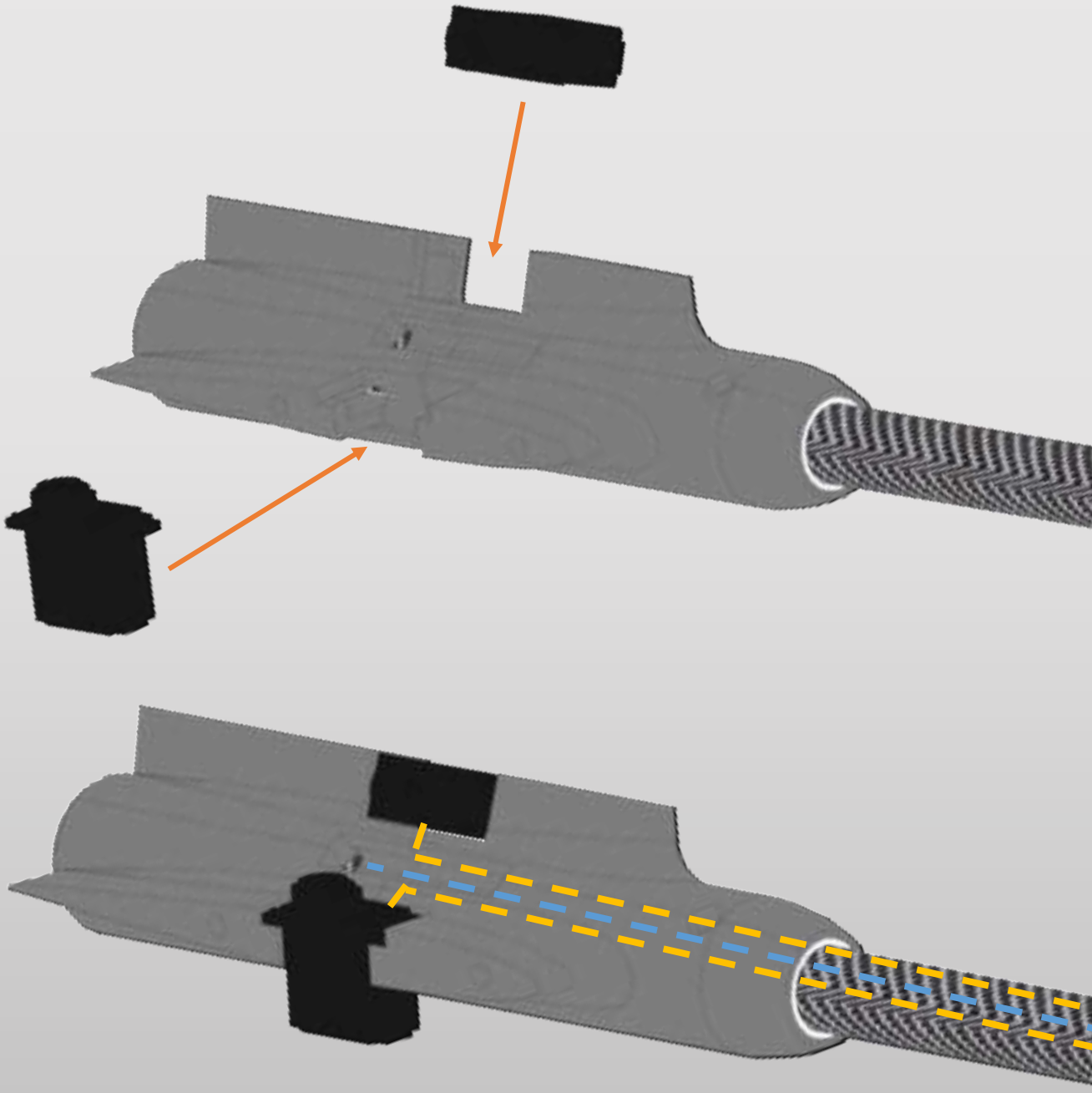
Now, prepare the parts for tail boom drilling printed with PETG or another rigid material. Take the tail boom, which is a carbon tube with a diameter of 16mm cut to a length of 435mm. Insert the tube into the printed parts all the way, ensuring a tight fit. Placing it on a stable flat surface, drill holes at the designated locations using a 3mm drill bit. Additionally, at the rear of the tube, you can see a rectangular slot, which should also be cut out if you intend to hide the cables inside the tail structure. It is best to cut this using a Dremel or similar tool with a small composite cutting disc. If you are routing the cables from the rear of the tail, you can skip this cutout





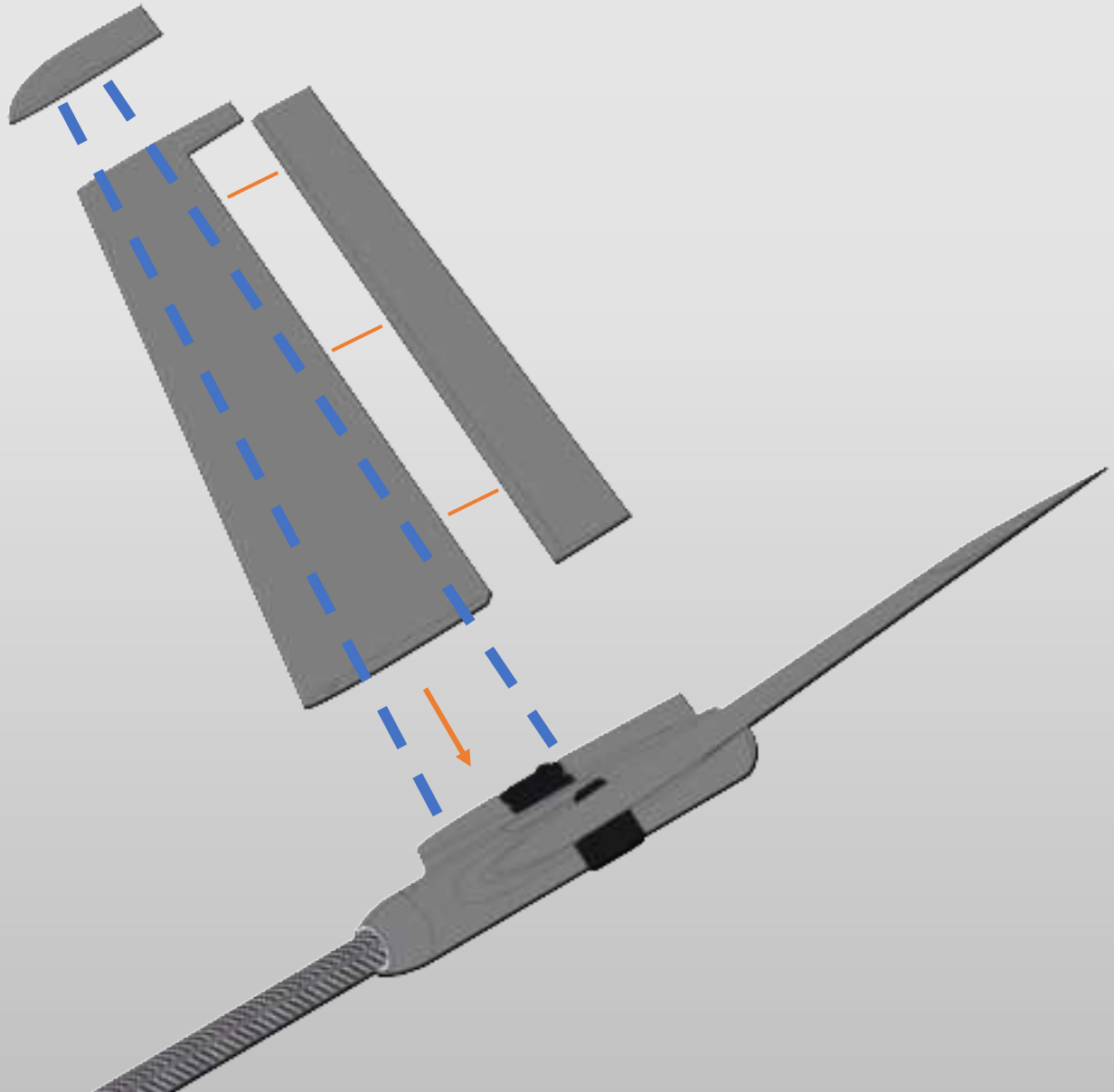
Tail Assembly

Now, take the servos and place them in the designated locations. Press the servo cables into the openings designed for them. If you are also installing LED, route the wire from the LED at this stage as well. Glue the servos in place using hot glue. Finally, insert all the wires into the tail boom and push it all the way in. The slot cut earlier in the carbon tube allows for easy placement of the wires inside. Remember to extend the wires if needed so that they protrude on the other side of the carbon tube. The version with hidden wires inside the tail structure is described.



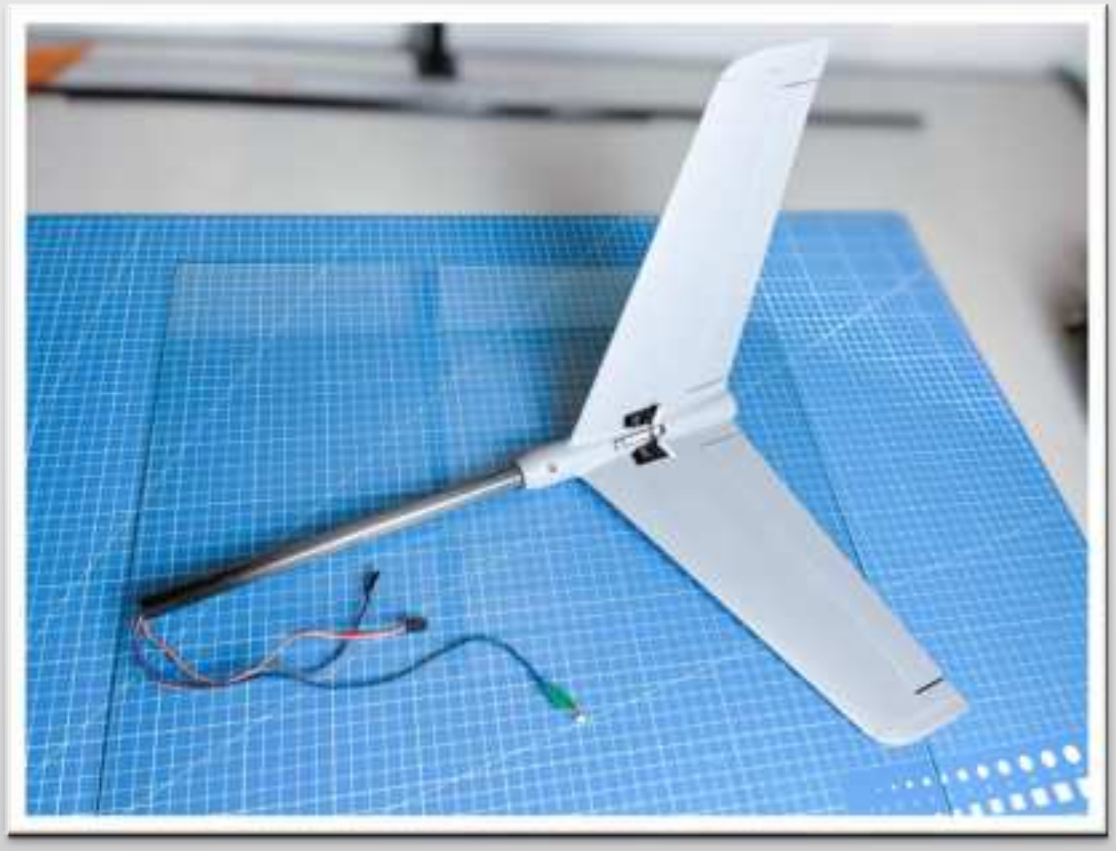
Tail Assembly

Prepare the V-tail components. Take carbon tubes with a diameter of 4mm cut to approximately 260mm. Insert the tubes into the designated slots. Note that the tubes are not parallel to each other. To facilitate easy assembly, insert one tube first, then fit stabilizer, and glue it in place to tail base. Next, insert the second tube, further reinforcing the structure. Finally, glue the tip. The last step is to glue the rudders on 25x20mm polyester hinges with thin CA glue. Insert them them into the designated slots. At this stage, you can also glue the control horns and connect them to the servos with pushrods.



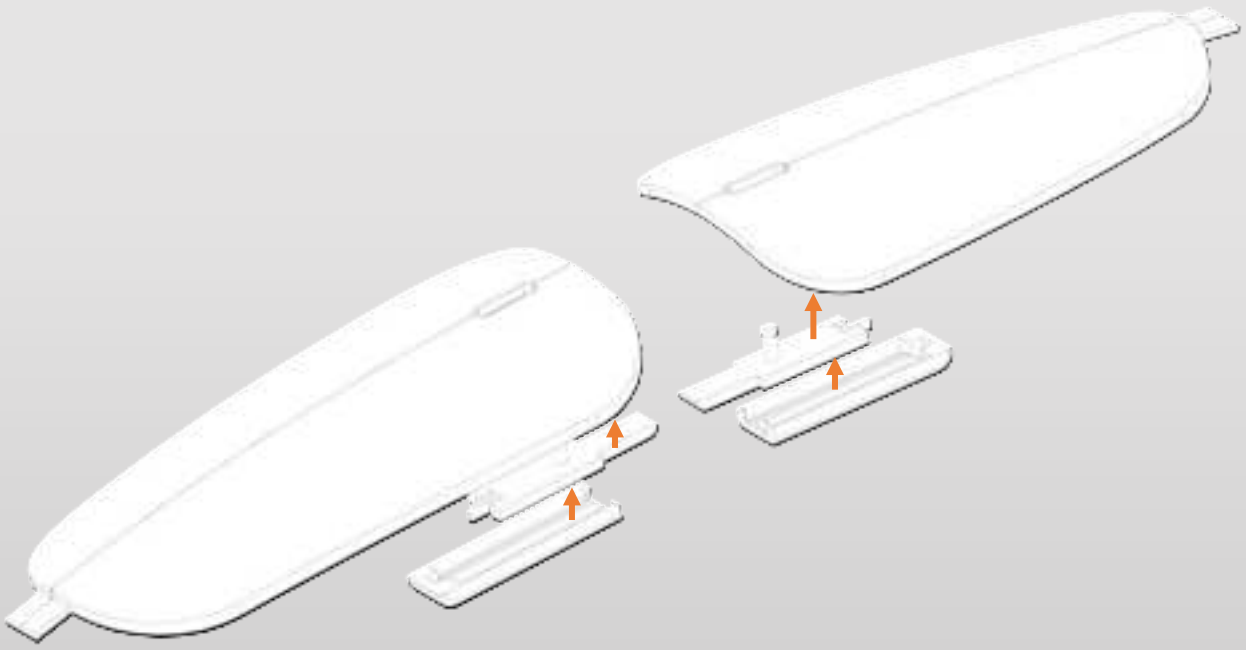
Tail Assembly

Finally, you can screw in the screw securing the tailboom. In the picture, you can see the version with hidden wires inside the tail structure and the LED in place. This solution, of course, allows for the disassembly of the entire tail boom

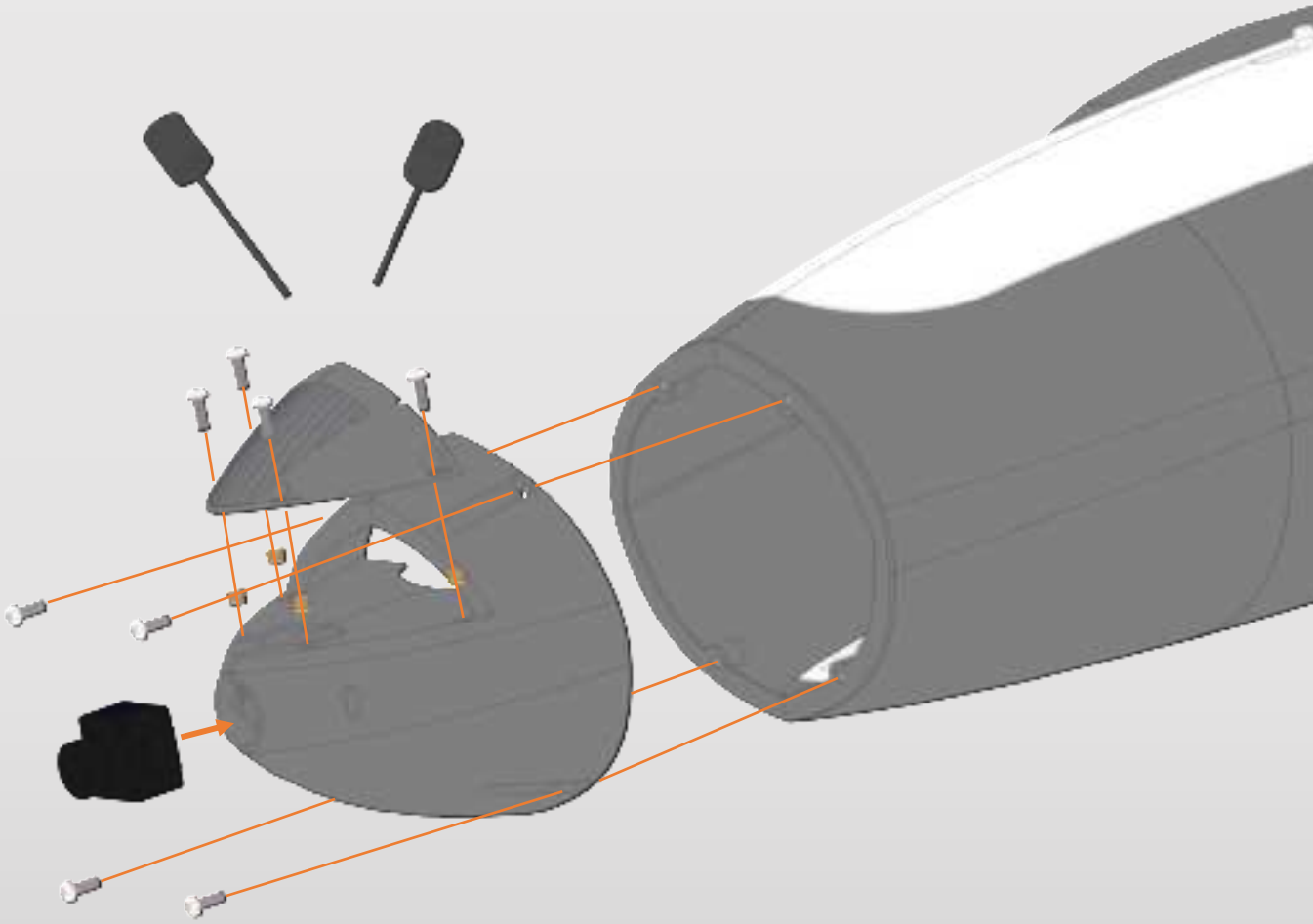


Hatches

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.

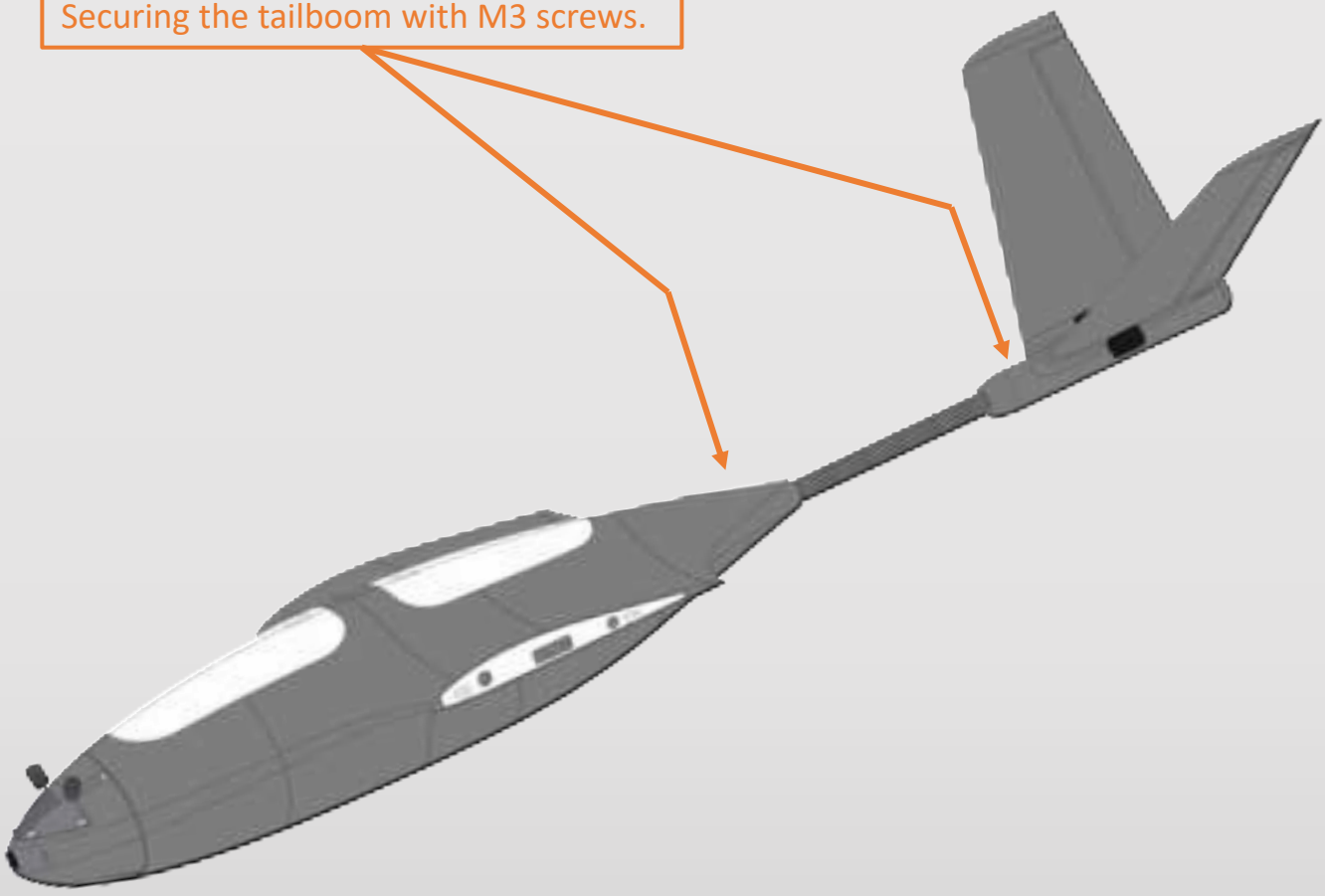


Nose Mount



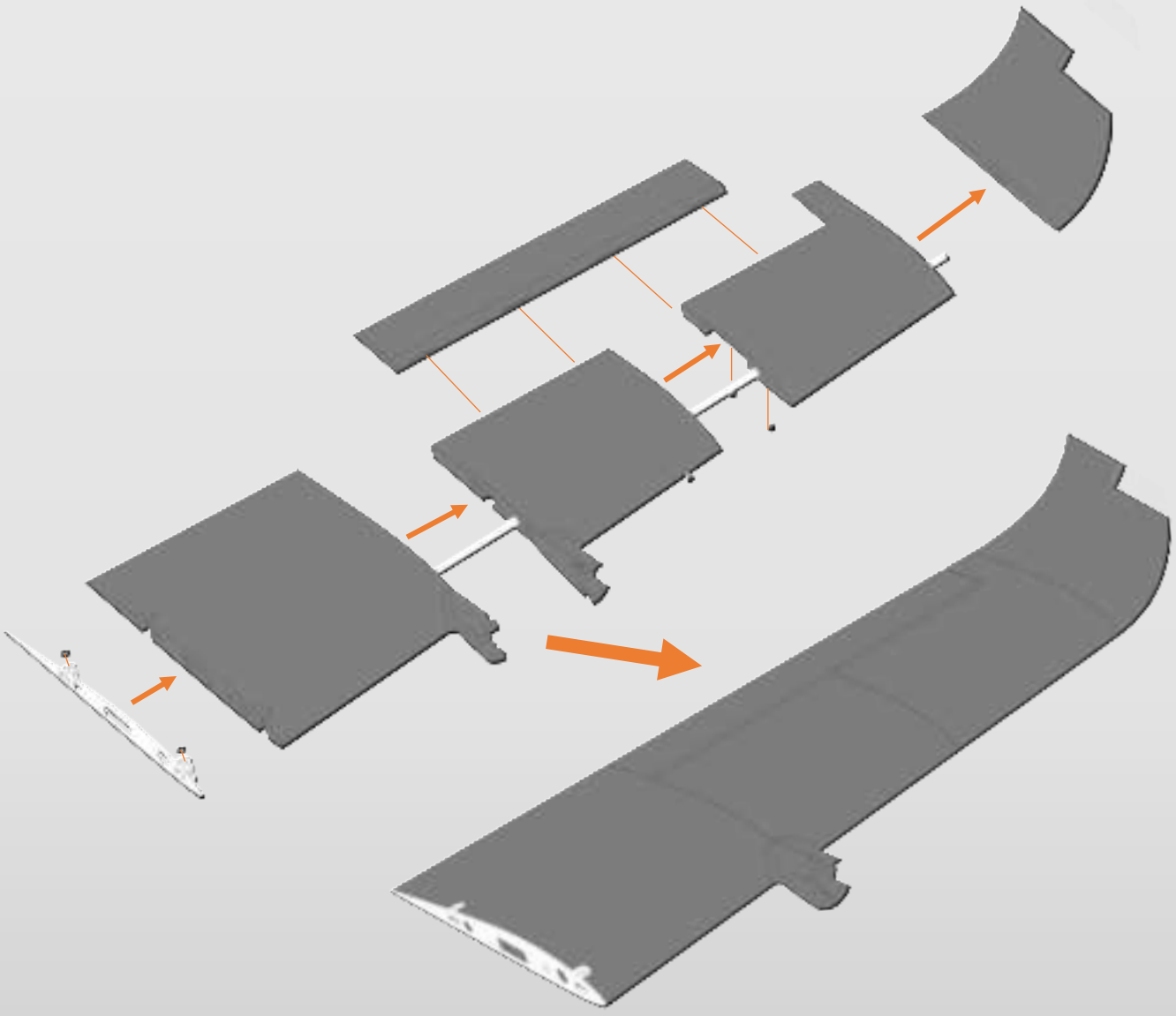
Now you can mount the nose with short M3 screws. If you are using version with VTX, you can put your VTX on the "shelf" and cover it with NOSE VTX COVER and secure the antenna.

Tail Assembly



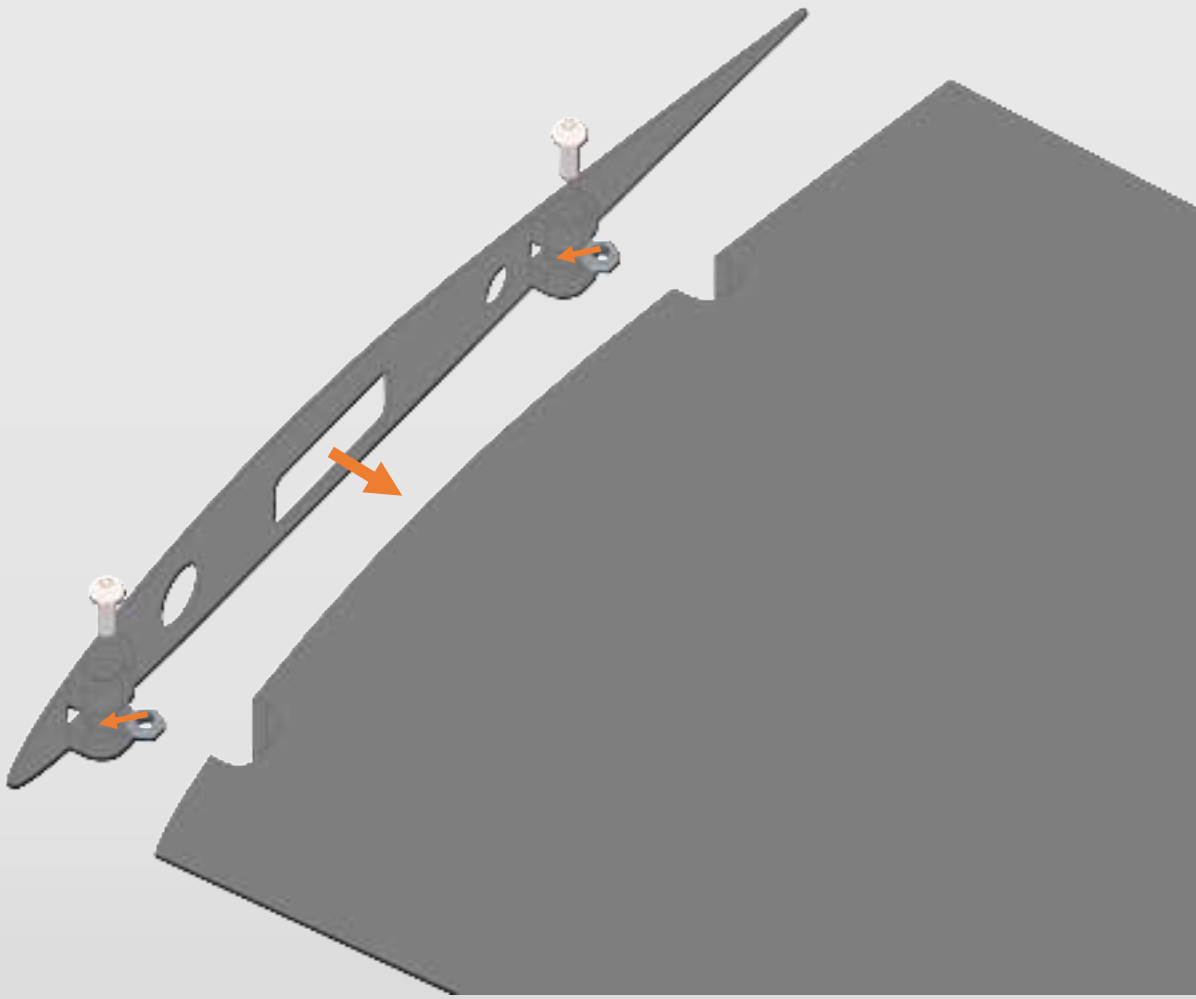
Now you can assemble the entire fuselage by connecting it to the tail. Insert the tailboom into the fuselage, route the tail wires, and secure it with an M3 screws

Wings Assembly



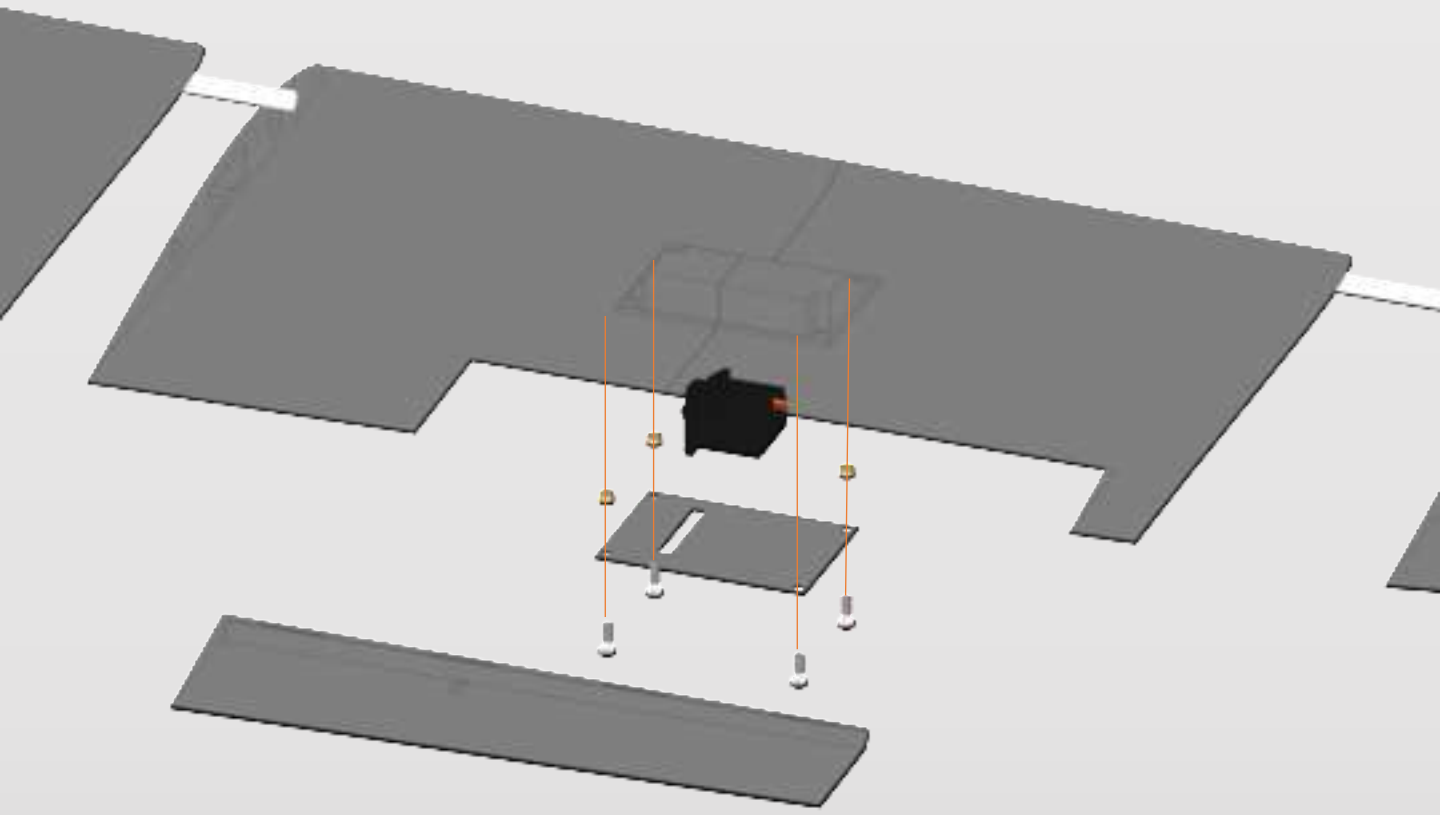
Glue the wing segments together. At this stage, choose which winglet you want to use, whether with navigation lights or without. Insert a 6mm carbon tube cut to a length of 430mm. There is no need to glue the tube, just insert it into the designed slot

Wings Assembly



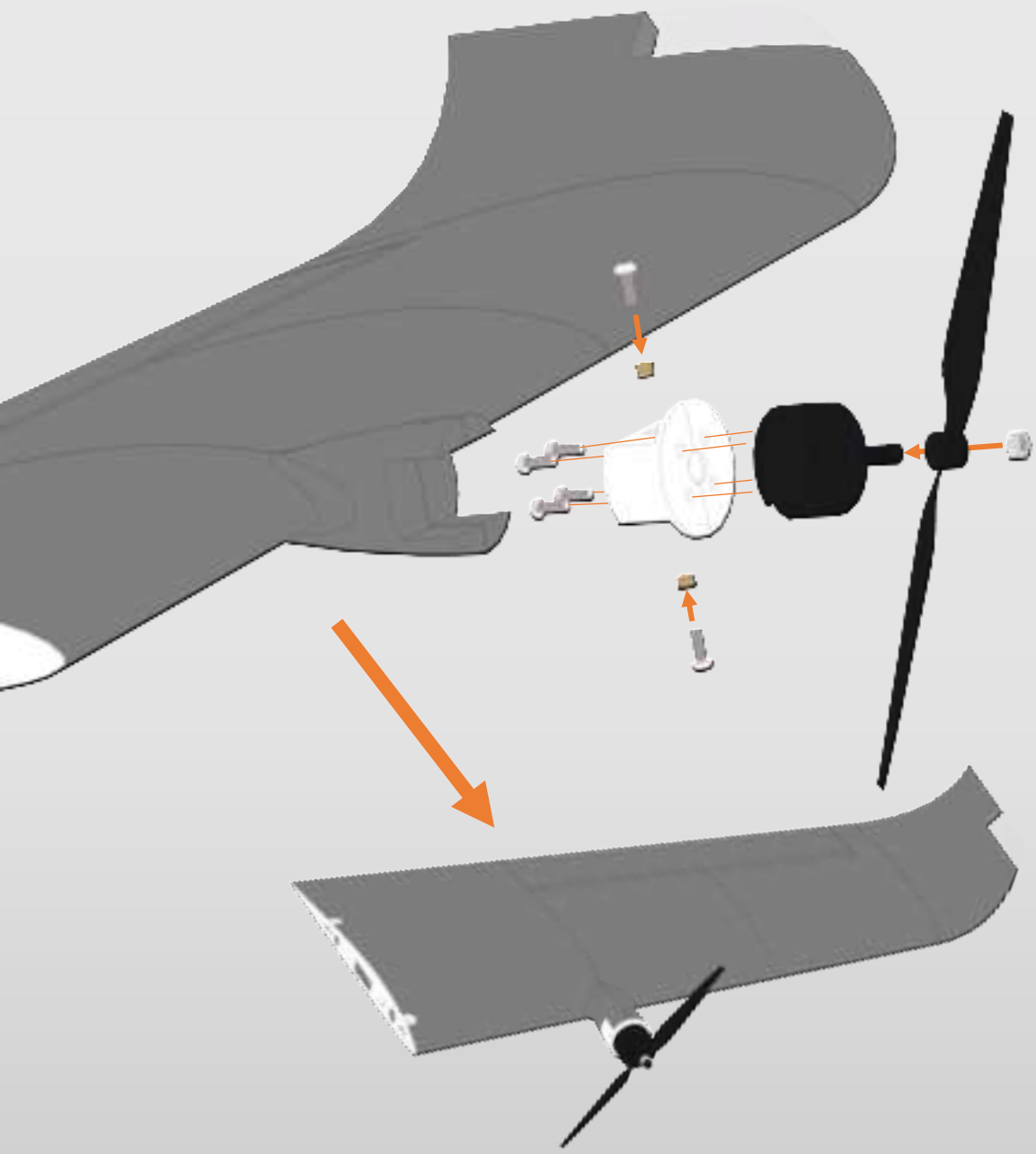
Finally, install the WING ROOT printed from PETG or another rigid material. In the lower part, there are designed slots for regular M3 nuts, which will be responsible for attaching the wings to the fuselage. Insert them there and secure using a few drops of CA glue.
Then, glue the root to the wing.

Wings Assembly



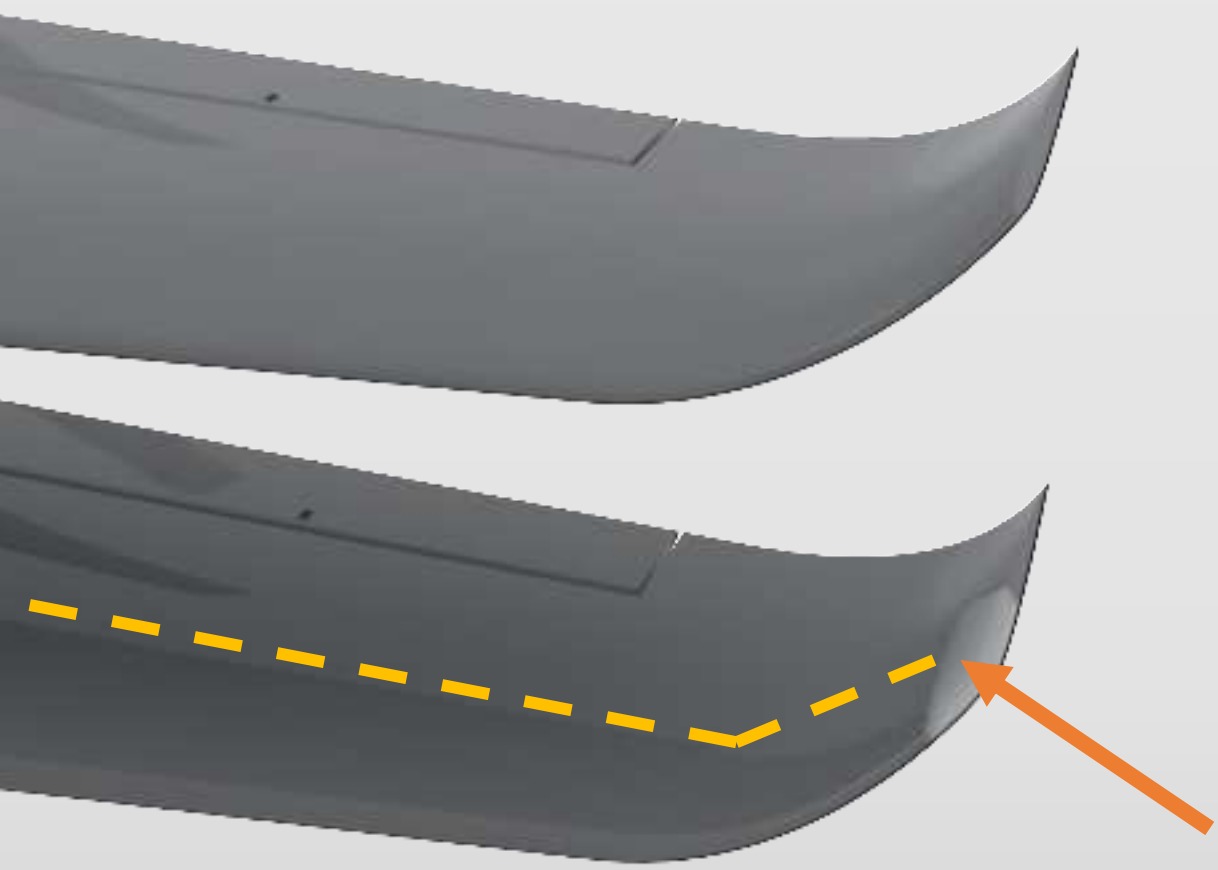
Insert the aileron using 25x20mm polyester hinges or ones made from another material, similar to the elevator. Then, using a slightly heated soldering iron, attach M3 threaded inserts designed for servo cover mounting. Set the servo so that the control horn protrudes through the opening in the servo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

Wings Assembly



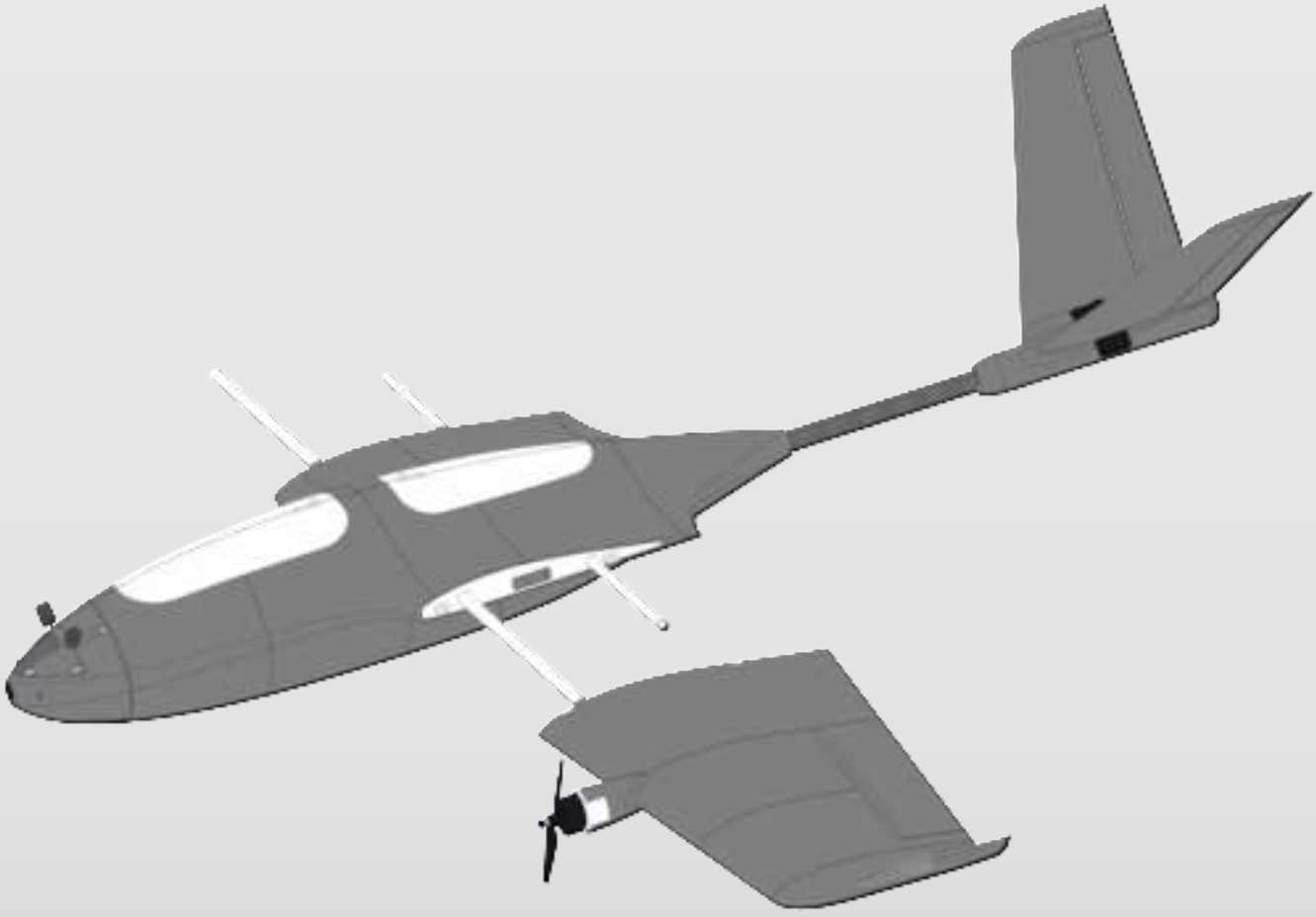
Prepare the motor and the motor mount printed in PETG. There are two versions available for T MOTOR F60 and F90 motors. The assembly is secured to the wing using two M3 screws, one from the top and one from the bottom. To do this, attach M3 threaded inserts to the motor mount. Then, route the motor cables through the hole in the bottom of the wing and slide them through the channel to the outside of the wing.

Wings Assembly



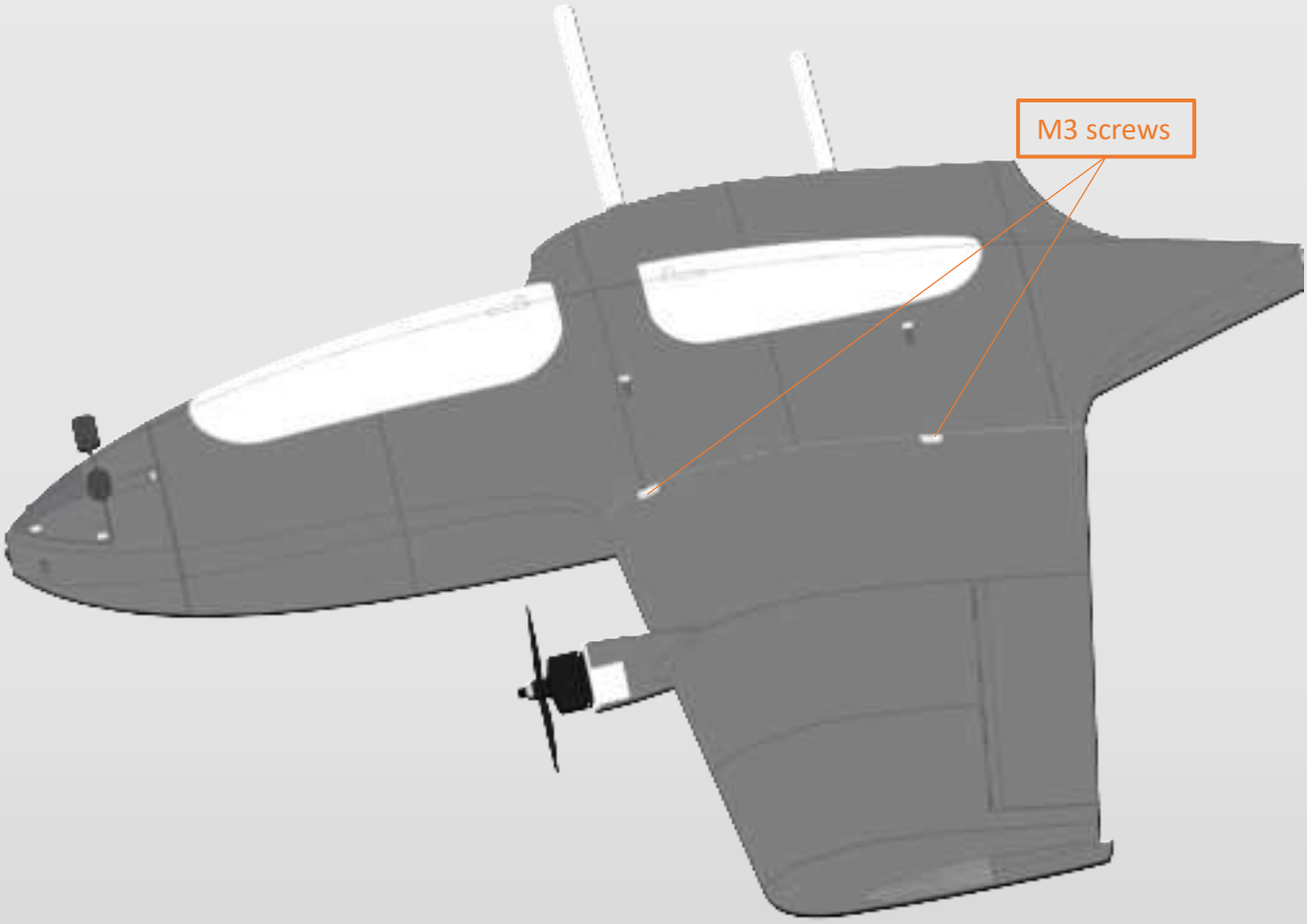
If you have chosen the version of the winglet with an LED, place it in the designated area. LEDs 2812 ARM work well for this purpose, and you can attach them, with strong double-sided foam tape. Inside the winglet, there is a channel through which the wire should be routed. This channel then connects to the servo bay and continues all the way to the wing root where, along with other cables, enters the fuselage. Cover the LED with a cover printed with transparent material. You can attach it normally using CA glue.

Wings Assembly



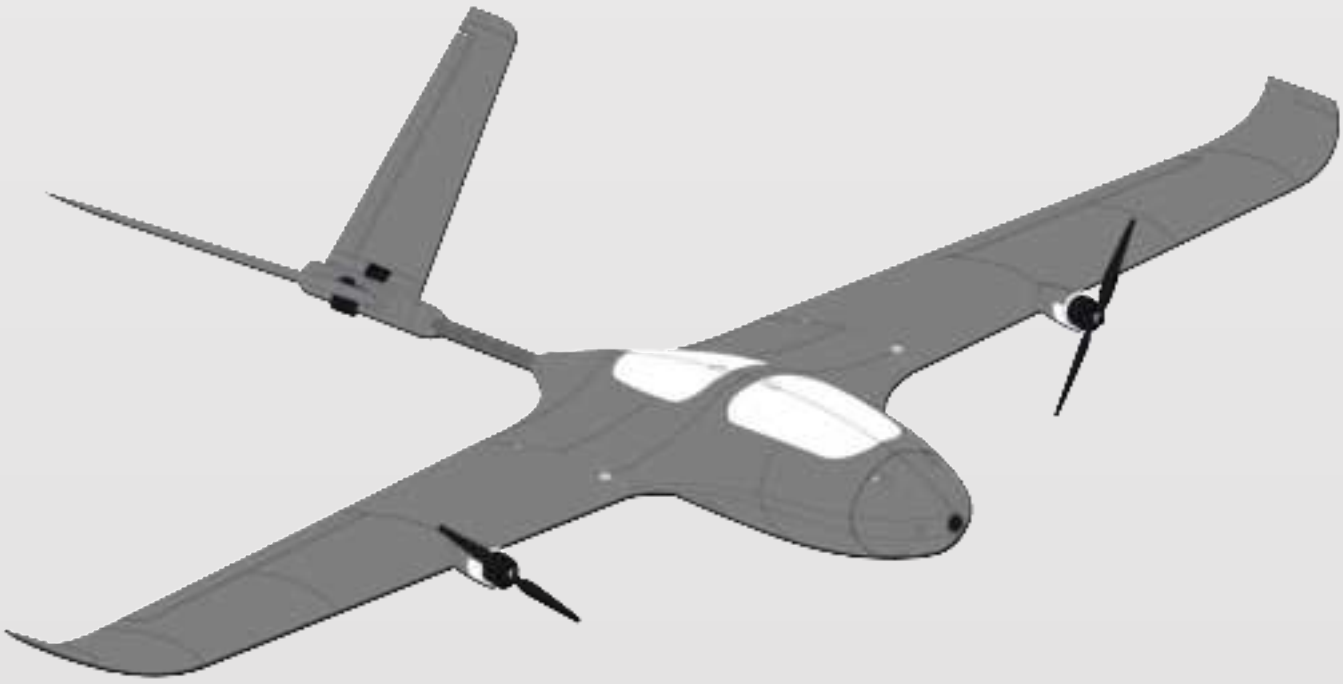
Now, insert carbon tubes: 10x800mm and 8x600mm. These are the main wing spars. Slide the wings in and push them against the fuselage. Thread all cables through the designed channels and lead them into the fuselage.

Wings Assembly



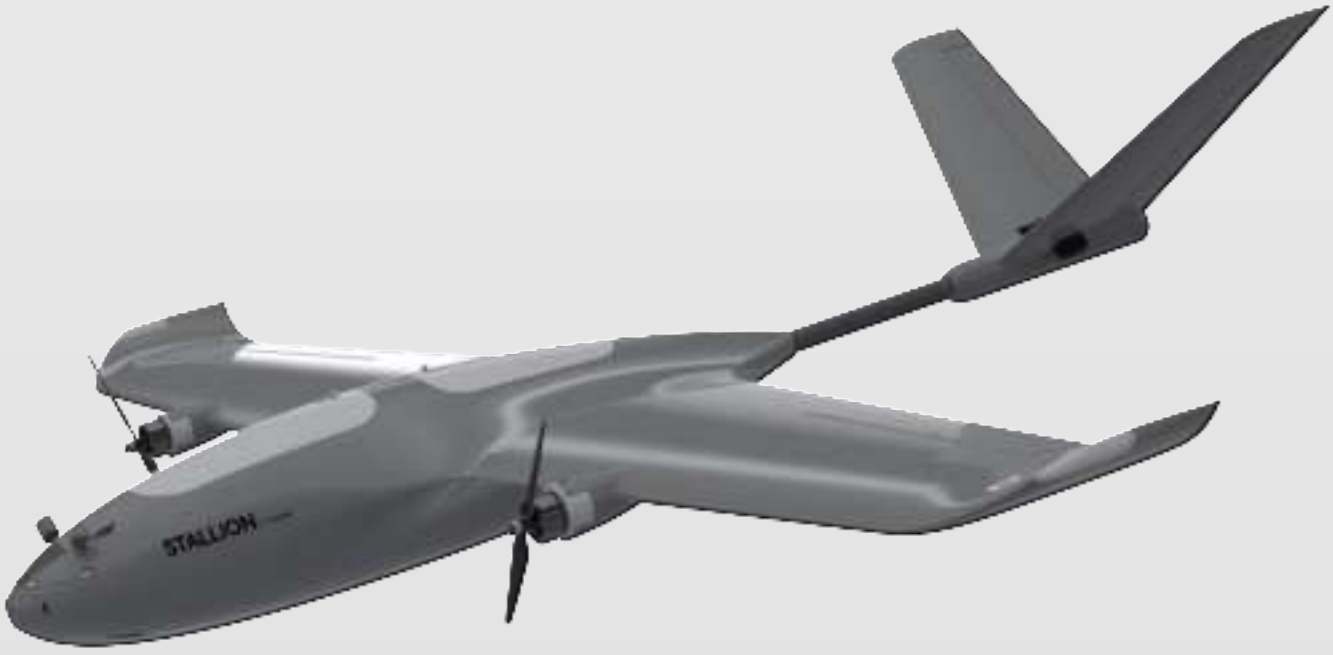
The wing assembly is simple and quick. After pushing the wings against the fuselage, screw in two M3 screws into the designated places. The screws are anchored in PETG-printed material, making the system durable and resistant to repeated wing disassembly

Finishing Build



Now, organize the rest of the equipment. The Battery Pad can accommodate large batteries, even 4S6P Li-Ion. Of course, you can also use smaller batteries also. Use of the recommended motors ensures very good performance and a long flight time. The choice of is up to you: T Motor F-60 motors and 7x5 propellers, along with a 4S battery, are sufficient to ensure stable flight at around 40% throttle. The aircraft can also be used with 3S batteries for this reason. Of course, the choice of motors and battery voltage is flexible and depends on the effects you desire. The remaining space in the fuselage is very spacious and can easily accommodate all the necessary equipment: FC, ESC, GPS, receiver, and more.

Before Flight



The model is ready to fly. Before flying, take care of the correct balance, which is 60 mm from the leading edge (at wing root). Check the correct operation of the ailerons and rudders and the direction of propeller rotation. Remember to use CW and CCW propellers. The motors should rotate in opposite directions to balance the airflow and stabilize the aircraft. The takeoff is done by hand throw. Grab the fuselage under the wings and throw it in a confident motion at a slight angle of attack. Good luck with your flights!

FLIGHTORY

STALLION