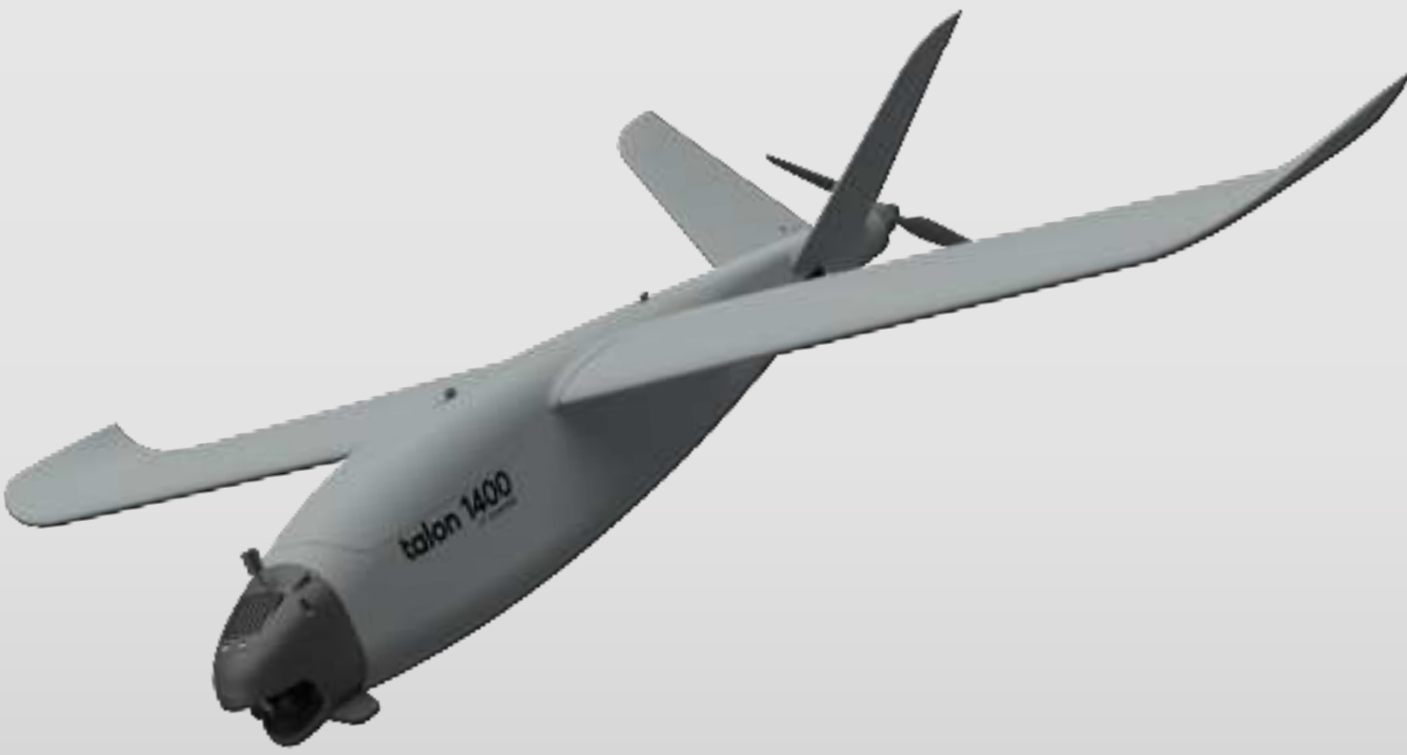
FLIGHTORY

talon 1400



USER MANUAL

V.2

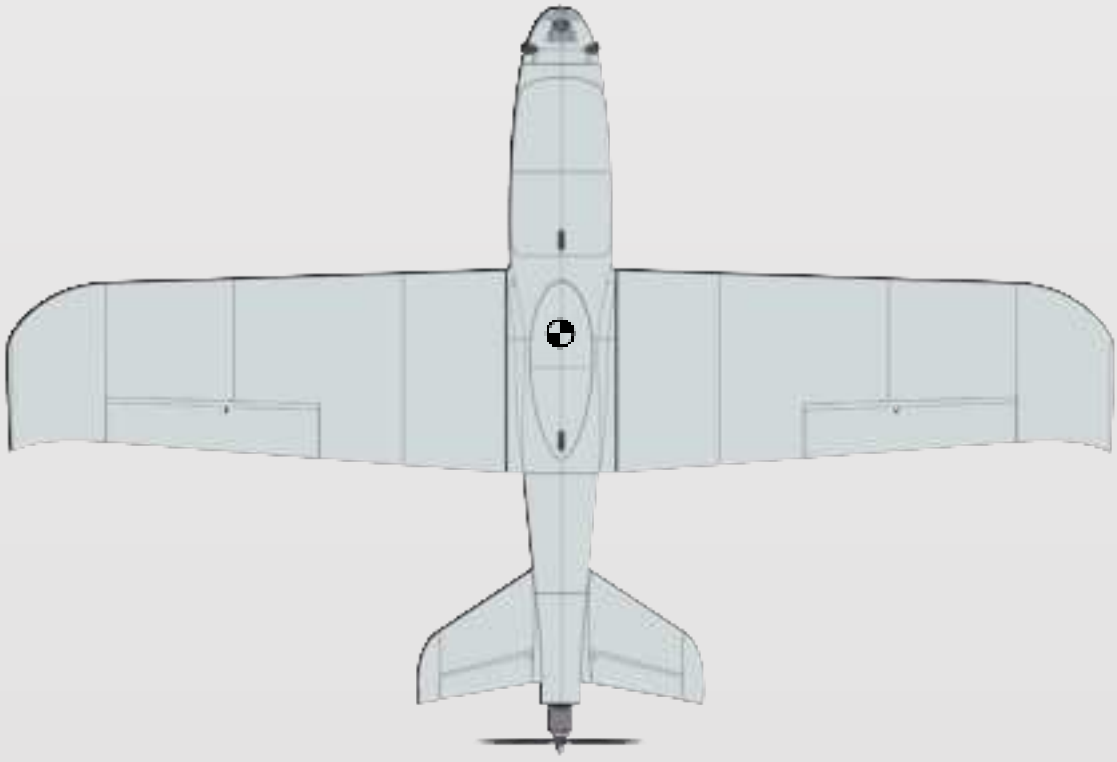
Socials

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

Join our Discord server as well, where the discussions are organized by topics, and the interaction between users is lively.
https://discord.gg/GPMgDZ3Cxv

Follow us on Instagram for regular updates and fresh content
www.instagram.com/flightory

General Aircraft Data

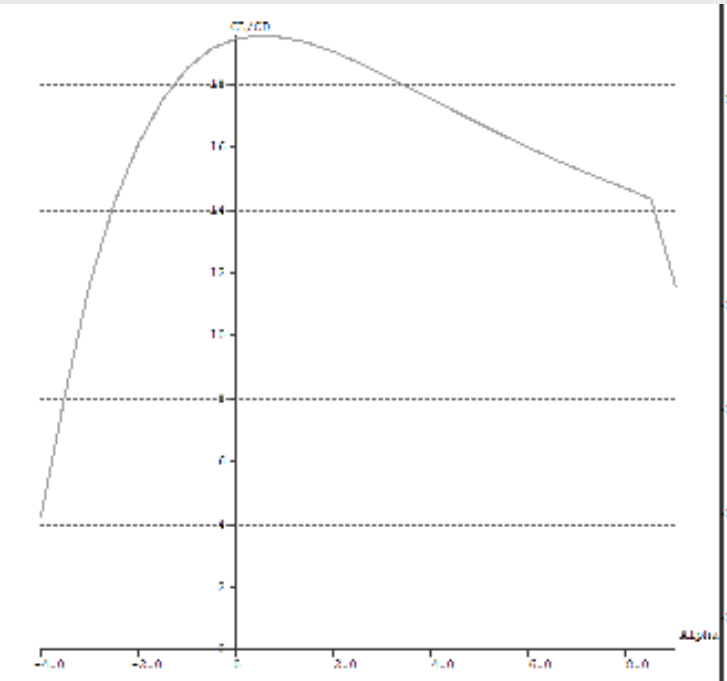


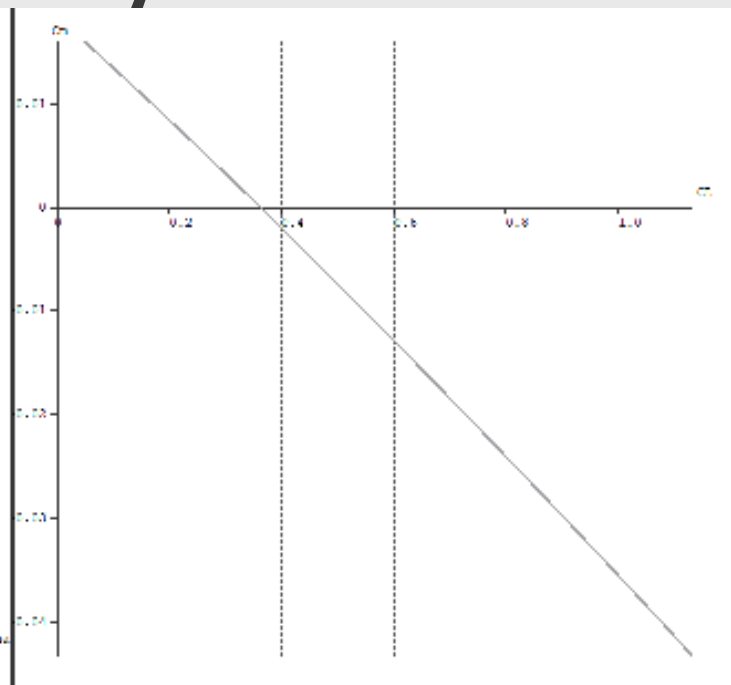
General data	
Wingspan	1305mm
Wing area	27.5 dm²
Lenght	830mm
Center of Gravity	63mm from leading edge
AUW	1500-3300g
Optimal Cruise Speed	55-65 km/h
Airfoil	Eppler E205
Root Chord	240mm
MAC	211mm
Aspect Ratio	6.3
Wing load	54 -120 g / dm²

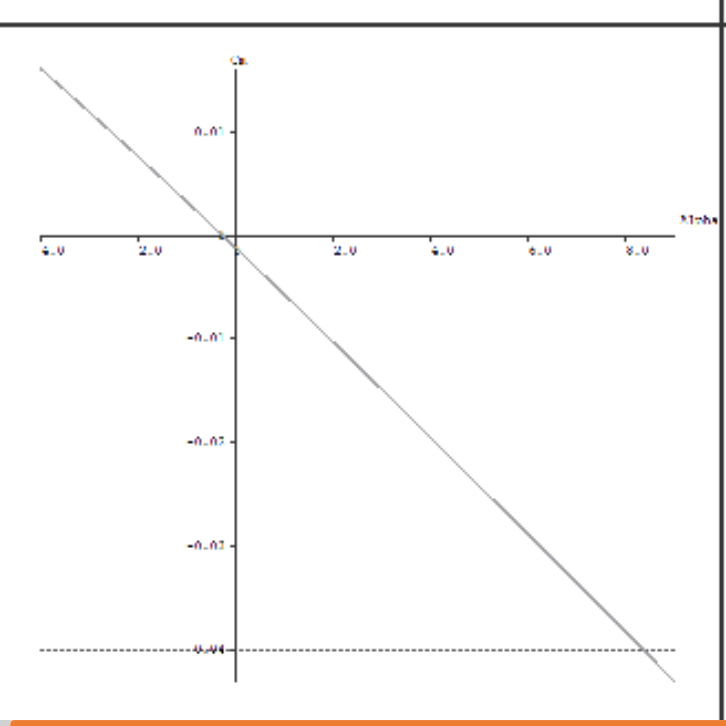
General Aircraft Data

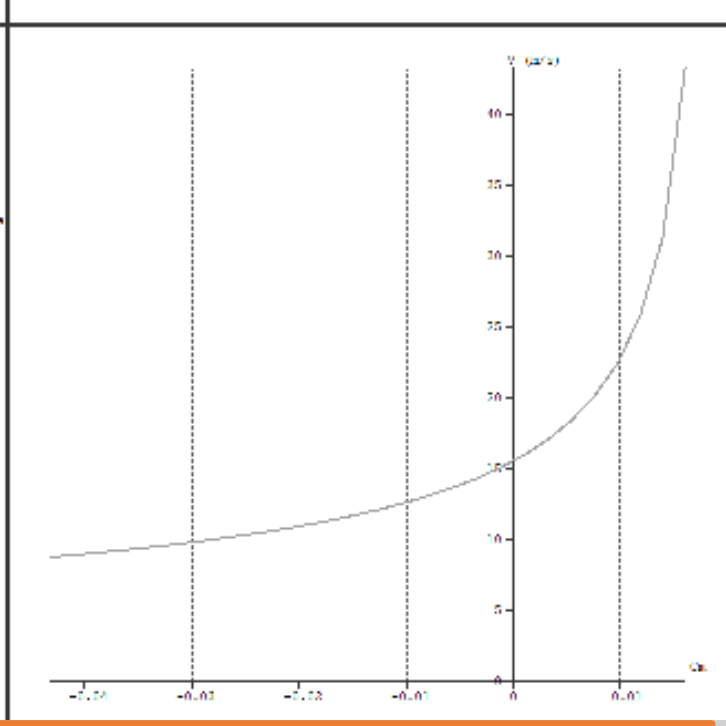
The aircraft is a 3D printed UAV platform in a size that combines compactness and high flight performance. Talon 1400 is in the popular layout with single push propeller. The design focuses on optimizing flight performance as possible, accommodating large battery pack and additional equipment, and modularity. The geometry was carefully refined and studied using CFD and real-world flight tests. Using optimal equipment and a large 4S6P battery, you can achieve a flight time of about 4 hours. Easy accessibility for everyone and the possibility of using different types of equipment is also an important aspect. The aircraft has two tail variants to fit popular motor sizes. You can decide which motor you will use. In addition, the nose is also available in two versions and is fully detachable. You can choose a version with a VTX mounted on the nose with a 19x19mm FPV camera, or a version with an FPV gimbal. The nose is also available in a clean version, as a solid block to allow for custom payload modifications. Customization of the design was an important aspect during the development process. The file package includes a range of elements in STEP format to facilitate adaptation for various types of cameras, antennas, sensors, etc. A list of all files can be found later in this document.

CFD Analysis



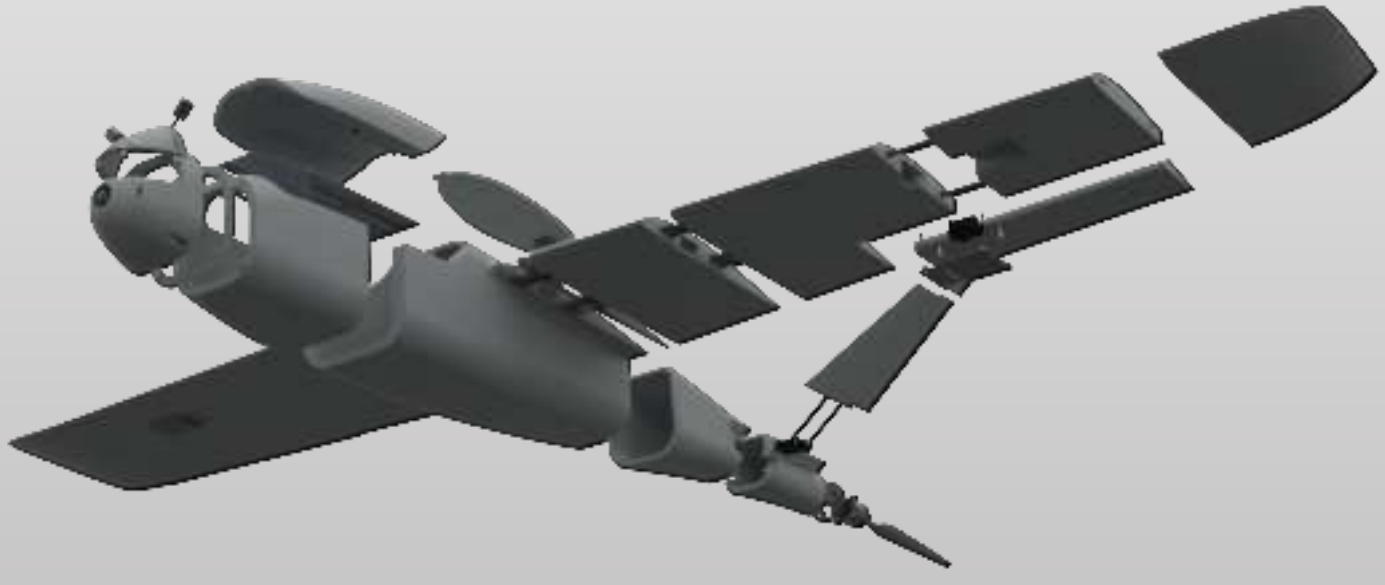






The geometry is designed to provide the best possible characteristics. Eppler E205 airfoil was selected. The shape of the wing and the V-tail stabilizers, as well as their mutual position and incline angles, were optimized to ensure high performance as well as longitudinal stability. At around zero AOA, the aircraft shows no pithing moment. Optimal aerodynamic performance is in the limit from 0 to 2 degrees of AOA and at speeds from 55 to 65 km/h. With a proper center of gravity position of 63mm from the leading edge, the aircraft does not require any trim, and its natural stability allows it to fly in manual mode as well, or without a flight controller.

Exploded view



Reccomended RC Equipment

Reccomended electronics	
Motor	2830 1200KV Prop Drive / 4108 620KV
Propeller	10x5 (2830 Motor) / 12x10 or 13x8 (4108 Motor)
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	BlHeliS 40A
Battery	4S (max 4S6P 21Ah Li-Ion) or smaller pack / similar LiPo
Receiver	Matek R24-D ELRS or similar
VTX	Digital or analog VTX
Gimbal	Caddx GM3 or other similar

This list, along with links, can also be found on the product page.

Required accessories

ITEM	QUANTITY
10x530mm Carbon Tube (MAIN SPAR)	2
6x400mm Carbon Tube (SECOND SPAR)	4
4x175mm Carbon Tube (VTAIL SPAR)	4
Thin CA Glue	20g tube
CA Activator	1 (optional but useful)
M3 Threaded Insert (Outer Ø5mm, height 5mm)	20
M3 screw	20
LW-PLA	1 roll
PLA	Small amount
Polyester hinge 20x25mm	12
Velcro strap	2
Servo extension cable	2

This list, along with links, can also be found on the product page.

PARTS LIST - FUSELAGE

PART	MATERIAL
FUS 1	LW-PLA
FUS 2	LW-PLA
FUS 3	LW-PLA
FUS 4	LW-PLA
FUS 5 / FUS 5 4108 MOTOR	LW-PLA
HATCH MID 1	LW-PLA
HATCH MID 2	LW-PLA
HATCH FRONT 1	LW-PLA
HATCH FRONT 2	LW-PLA
NOSE / NOSE GIMBAL	LW-PLA / PETG
NOSE TOP /NOSE TOP GIMBAL	LW-PLA / PETG
INNER REINFORCEMENT (print 2)	PETG
FRONT REINFORCEMENT	PETG
BATTERY PAD	PETG
FUS ROOT L / R	PETG
FIREWALL / FIREWALL 4108 MOTOR	PETG
4108 MOTOR MOUNT	PETG
LOCK 1 (print 2)	PETG
LOCK 2 (print 2)	PETG
LOCK SPRING	PETG

PARTS LIST - WINGS

PART	MATERIAL
WING 1 L / R	LW-PLA
WING 2 L / R	LW-PLA
WING 3 L / R	LW-PLA
WINGTIP L / R	LW-PLA
AIL L / R	LW-PLA
SERVO COVER (print 2)	PETG
WING ROOT L / R	PETG

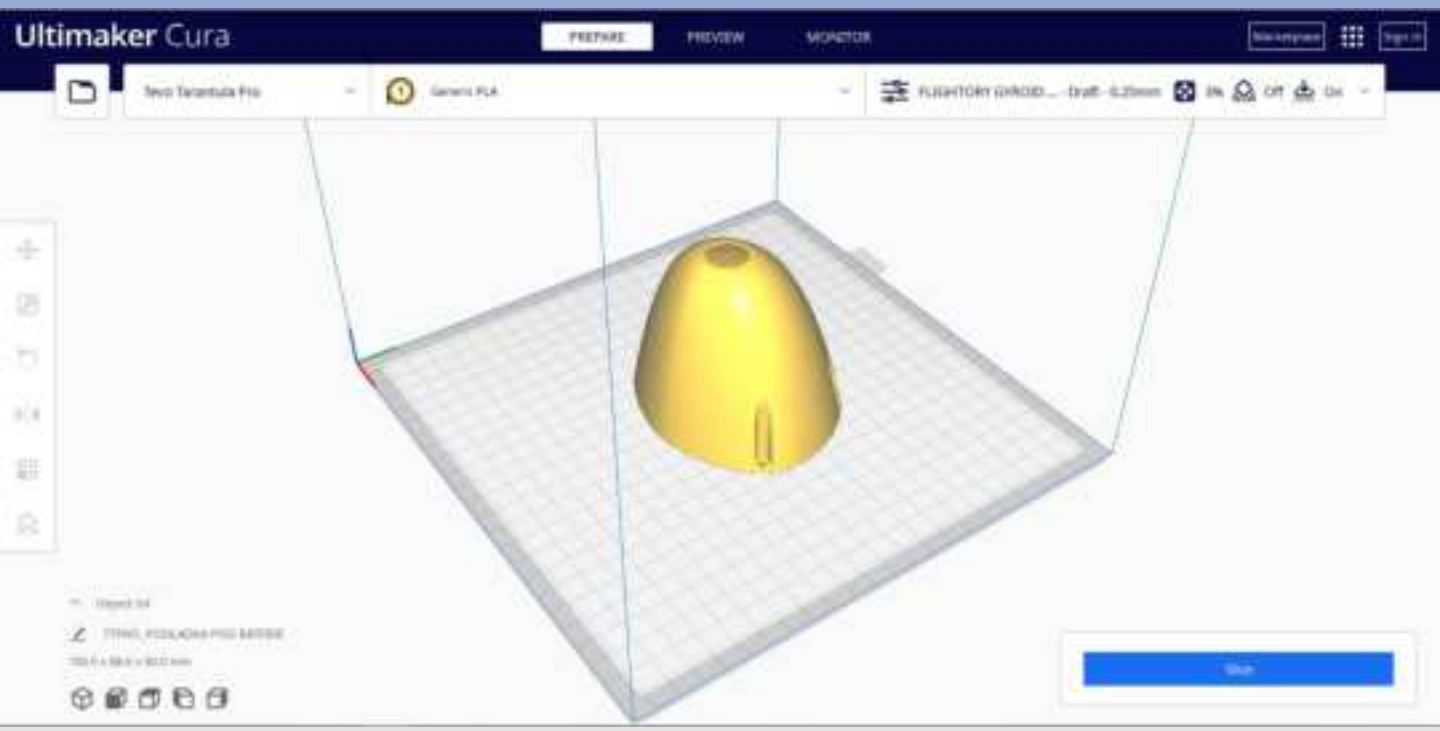
PARTS LIST - TAIL

PART	MATERIAL
V TAIL L / R	LW-PLA
V TAIL TIP L / R	LW-PLA
RUDDER L / R	LW-PLA

STEP FILES LIST

PART
HATCH FRONT
HATCH MID
NOSE / NOSE GIMBAL
NOSE TOP / NOSE TOP GIMBAL
NOSE CLEAN SOLID
4108 MOTOR MOUNT
FIREWALL / FIREWALL 4108 MOTOR
BATTERY PAD / BATTERY PAD SOLID
INNER REINFORCEMENT
FRONT REINFORCEMENT
AIL
FUS ROOT
WING ROOT
SERVO COVER
RUDDER

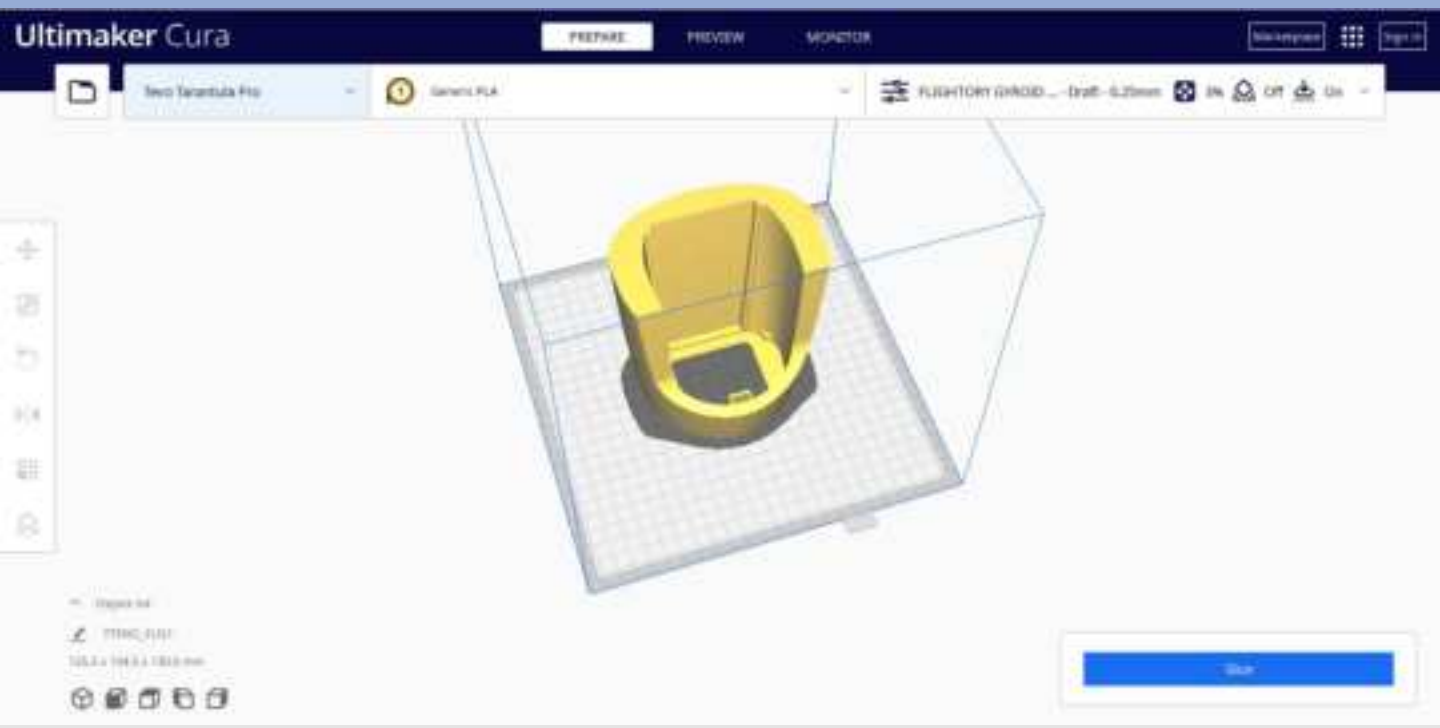
Print Settings



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



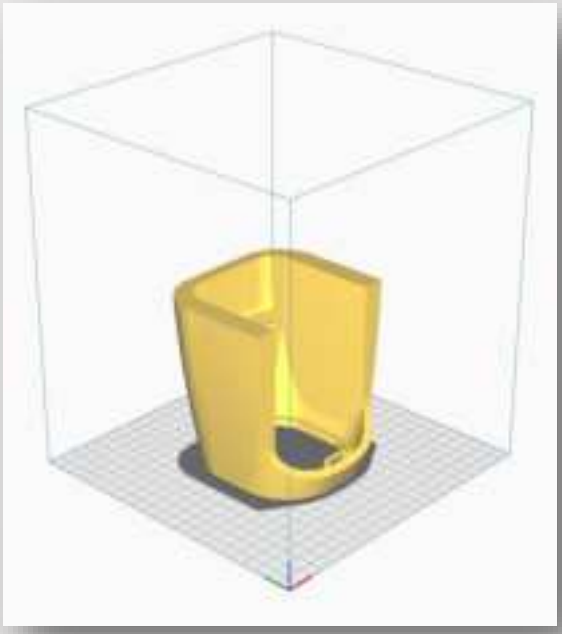
All parts are suitable for printing on any standard printer with a small working area. Whole aircraft were printed on a 220 x 220mm area. The settings are just a base that you can change and adjust as needed. The following pages will list recommended infill settings for each part.

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.

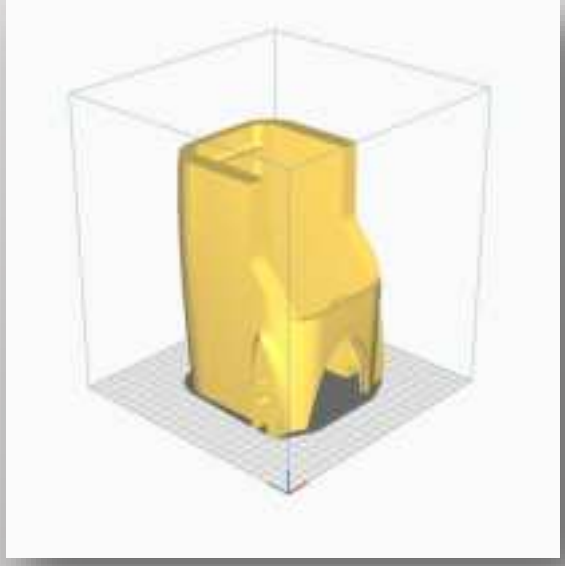
All elements can be printed without supports, but your printer may have a problem with some horizontal surfaces in some places. Depending on the effects, you may then consider turning on supports for these elements and cleaning the printed elements afterwards.

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.

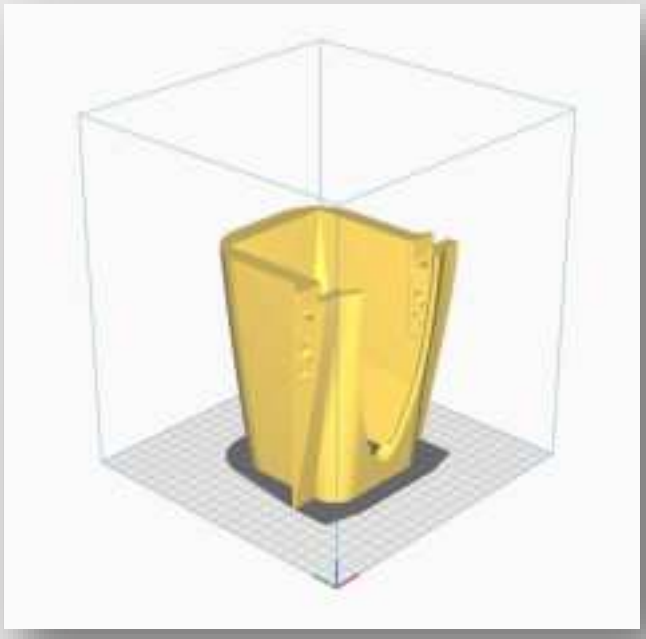


FUS 1 - 3% gyroid infill

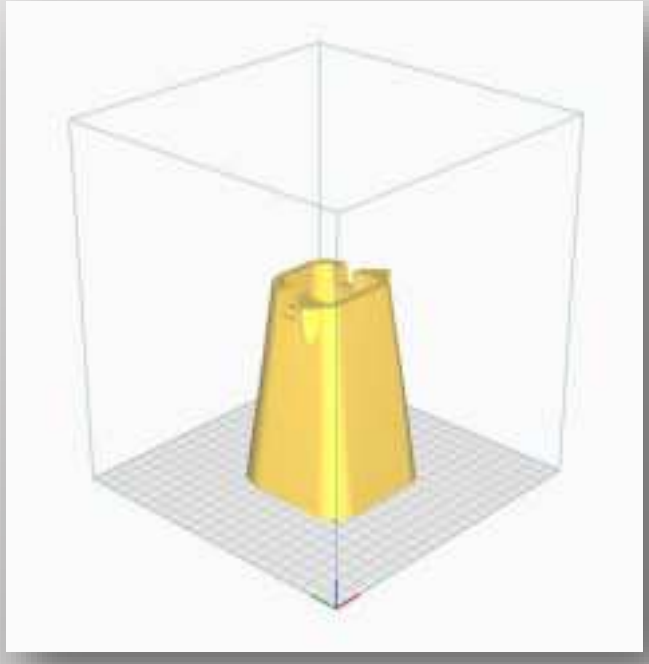


FUS 2 - 3% gyroid infill

Parts Orientation

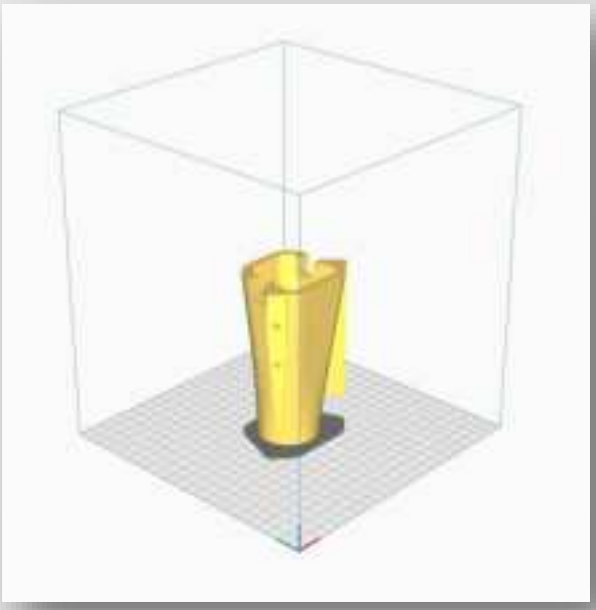


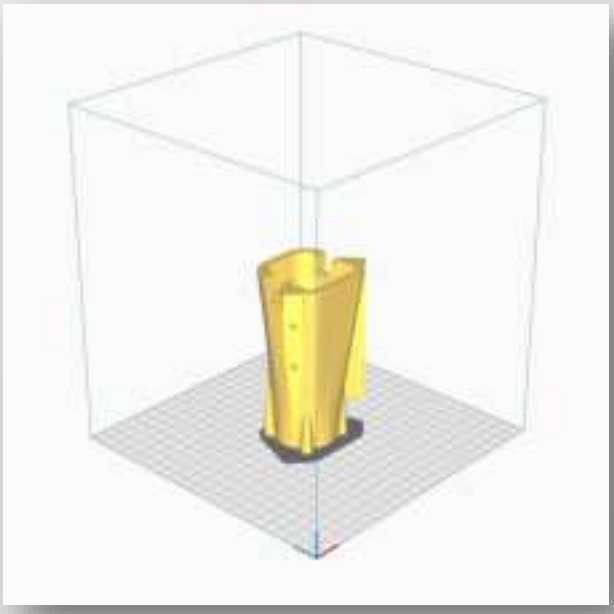
FUS 3 - 3% gyroid infill



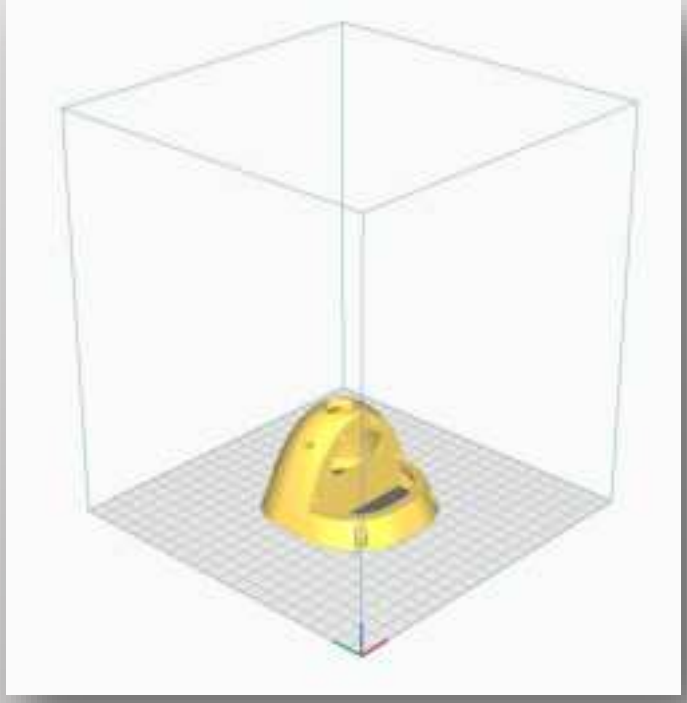
FUS 4 - 3% gyroid infill

Parts Orientation



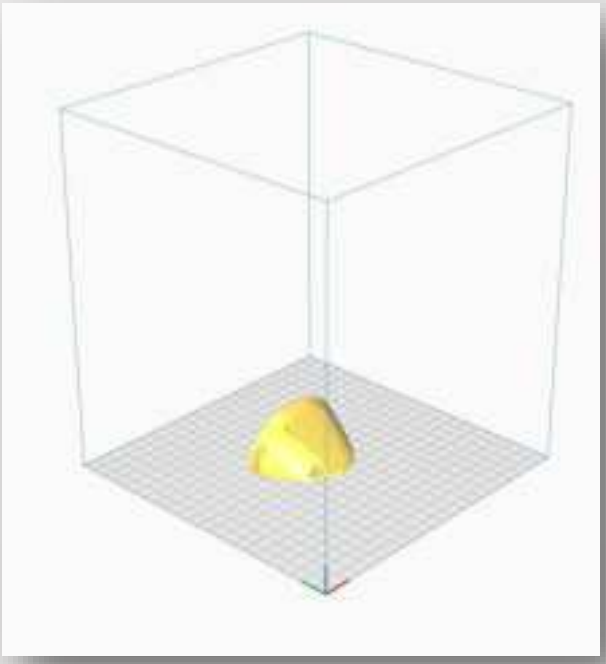


FUS 5 / FUS 5 4108 - 3% gyroid infill

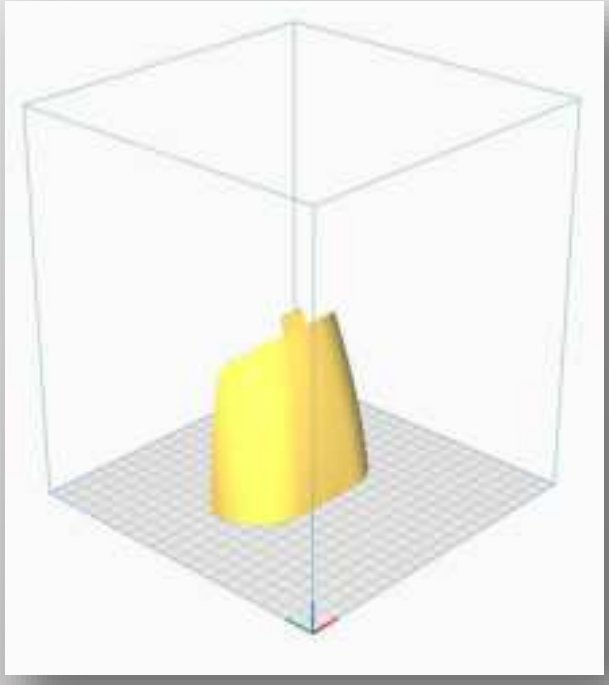


NOSE - 4% gyroid infill + 2 walls

Parts Orientation

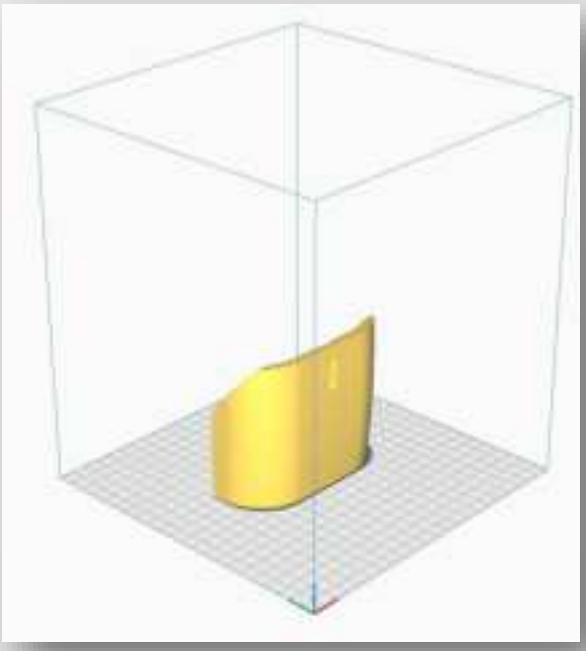


NOSE TOP - 4% gyroid infill + 2 walls

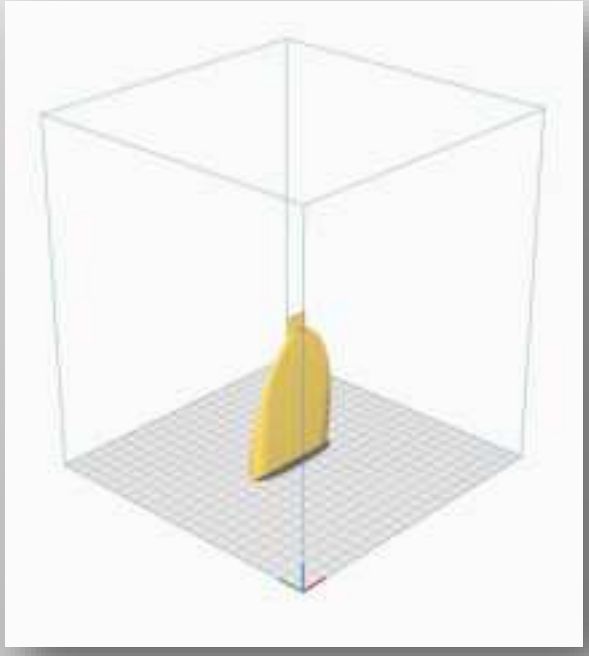


HATCH FRONT 1 - 3% gyroid infill

Parts Orientation

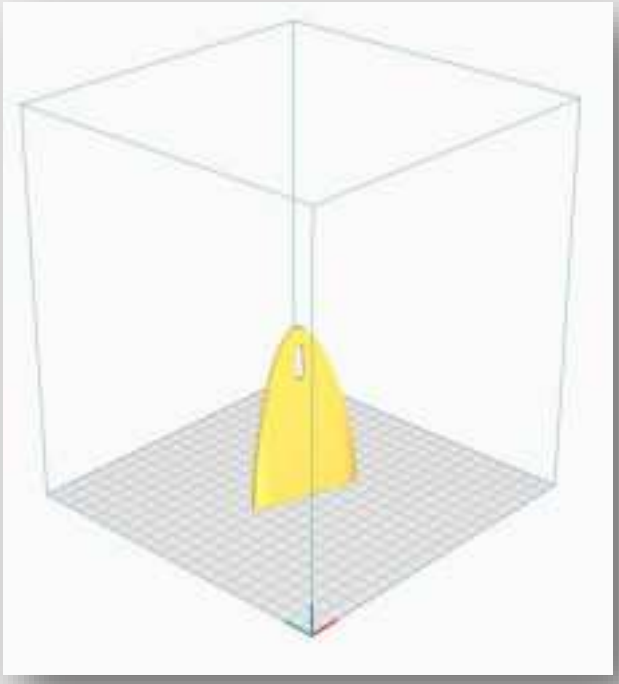


HATCH FRONT 2 - 3% gyroid infill

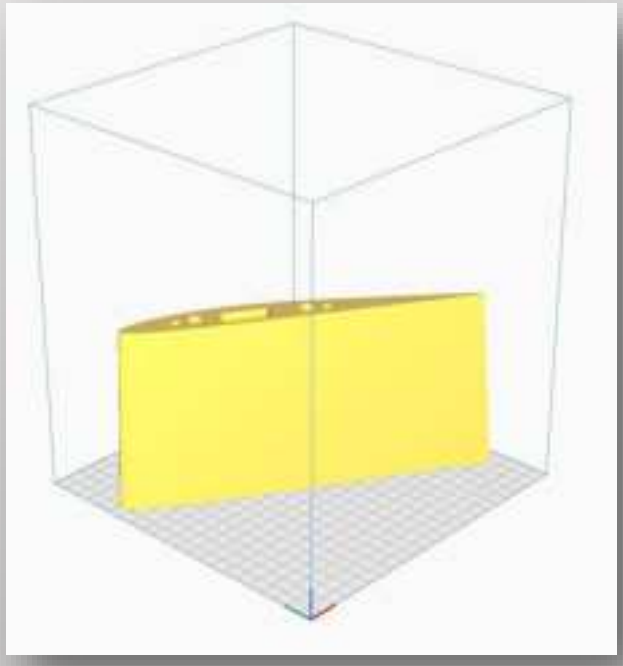


HATCH MID 1 - 3% gyroid infill

Parts Orientation

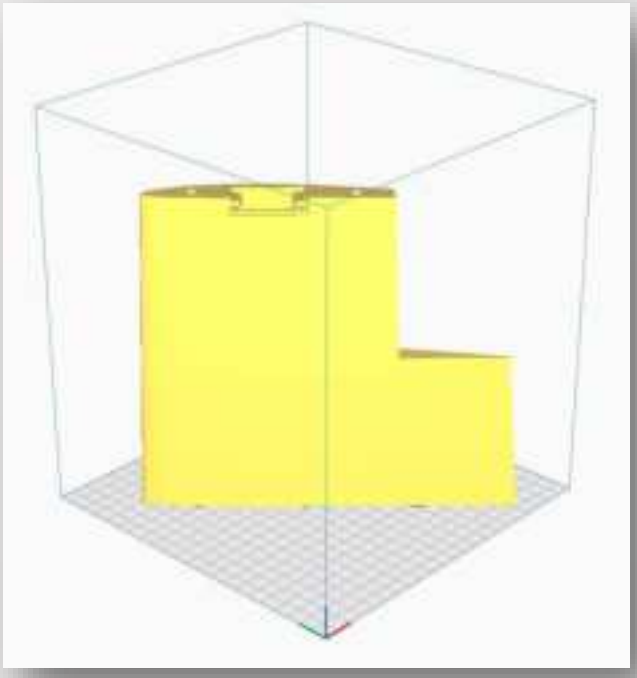


HATCH MID 2 - 3% gyroid infill

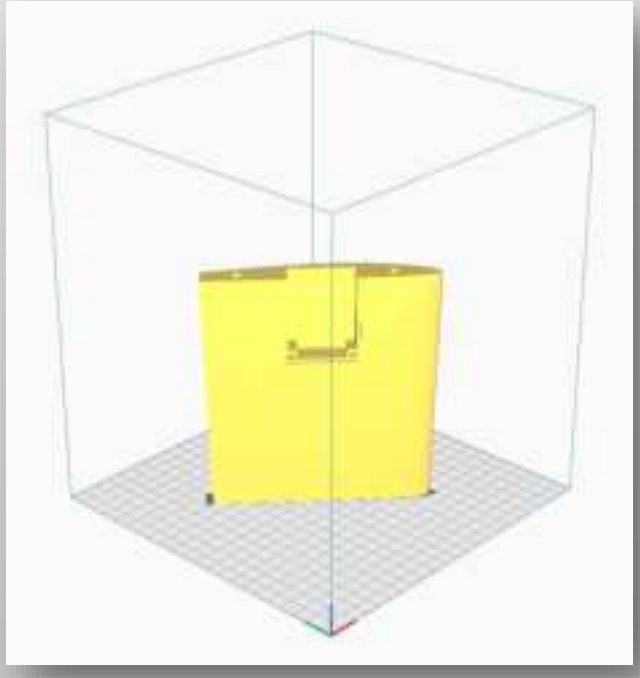


WING 1 - 3% cubic subdivision infill

Parts Orientation

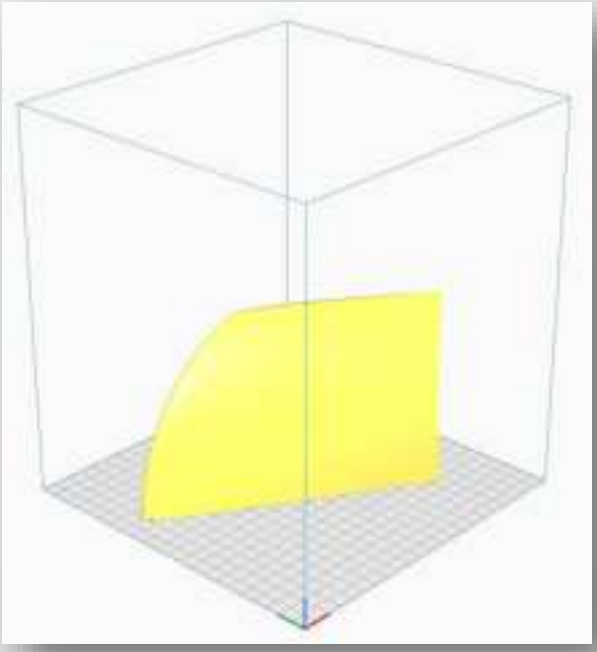


WING 2 - 3% cubic subdivision infill

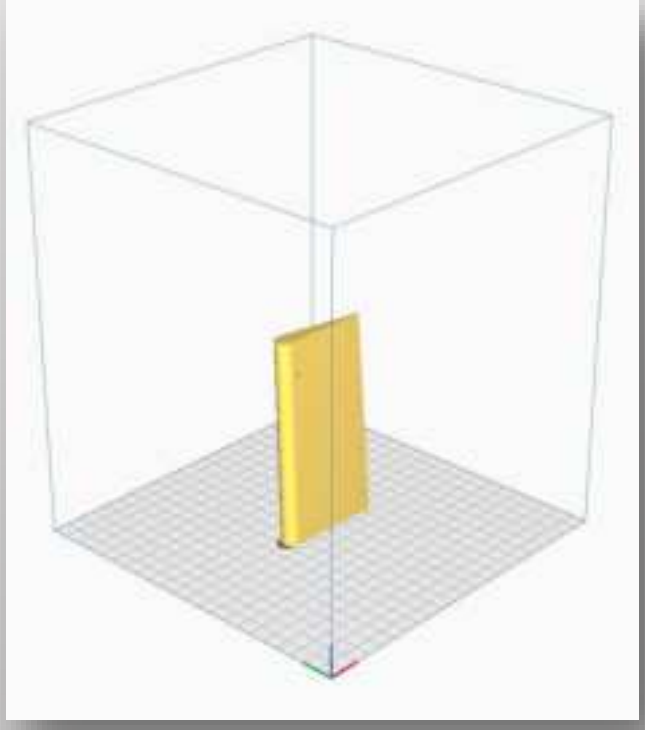


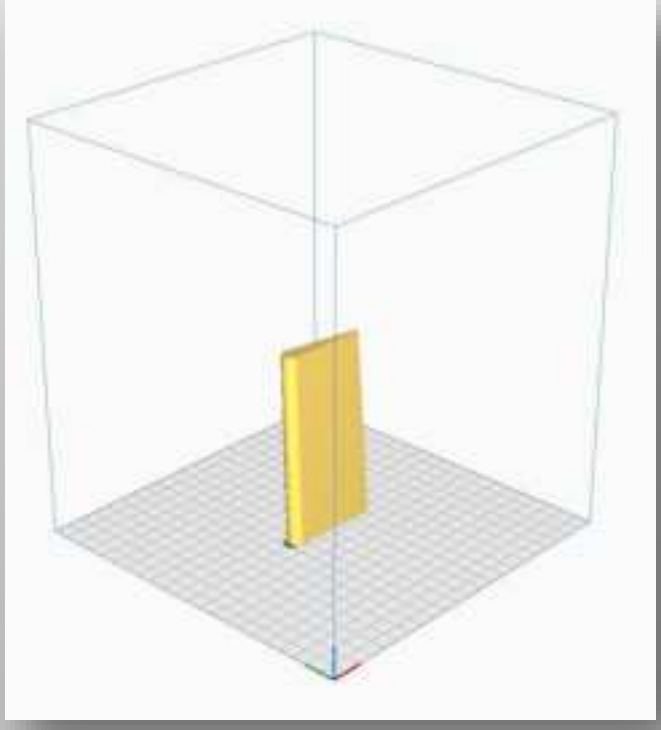
WING 3 - 3% cubic subdivision infill

Parts Orientation



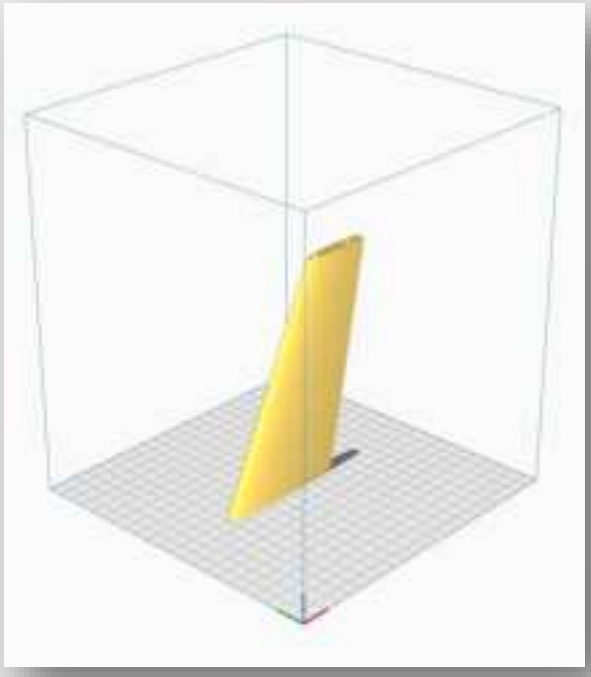
WINGTIP- 3% cubic subdivision infill



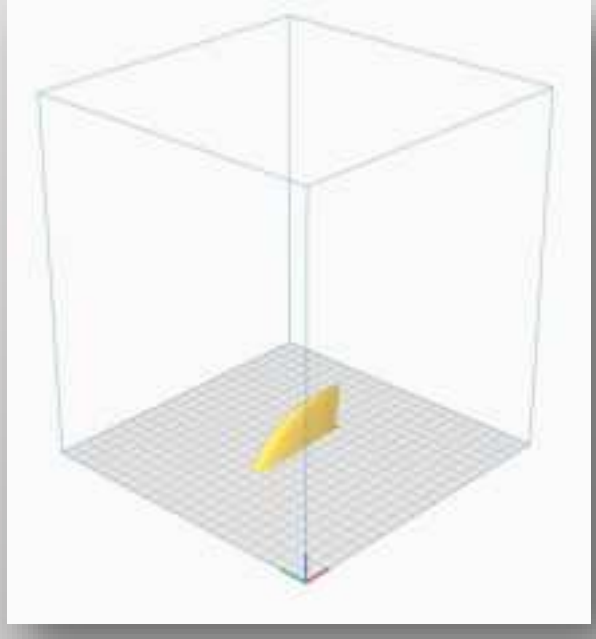


AIL 1 / 2- 4% gyroid infill

Parts Orientation

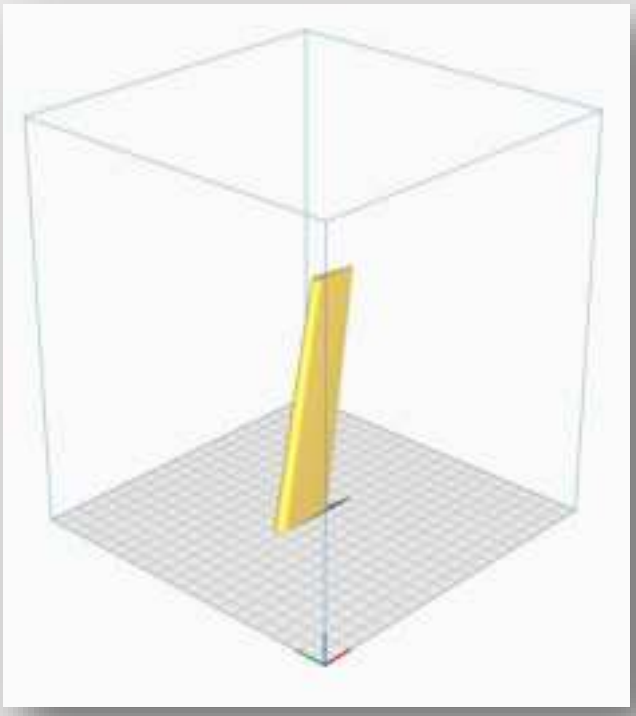


V-TAIL - 3% gyroid infill

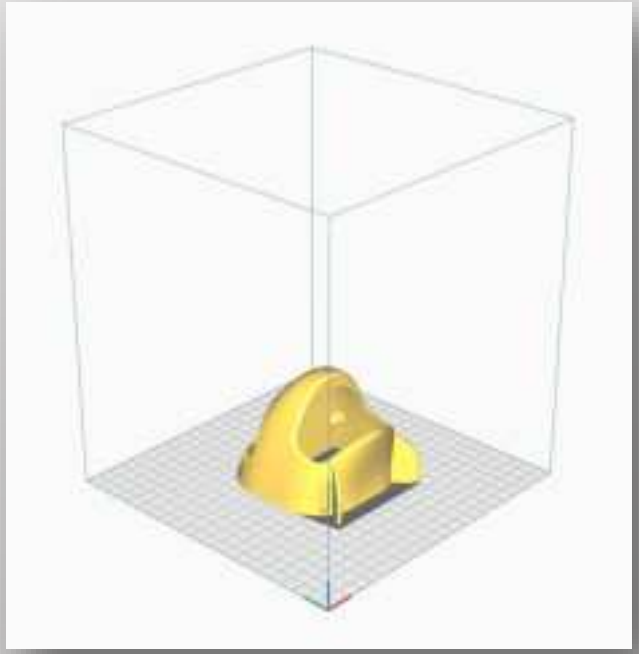


V-TAIL TIP - 3% gyroid infill

Parts Orientation

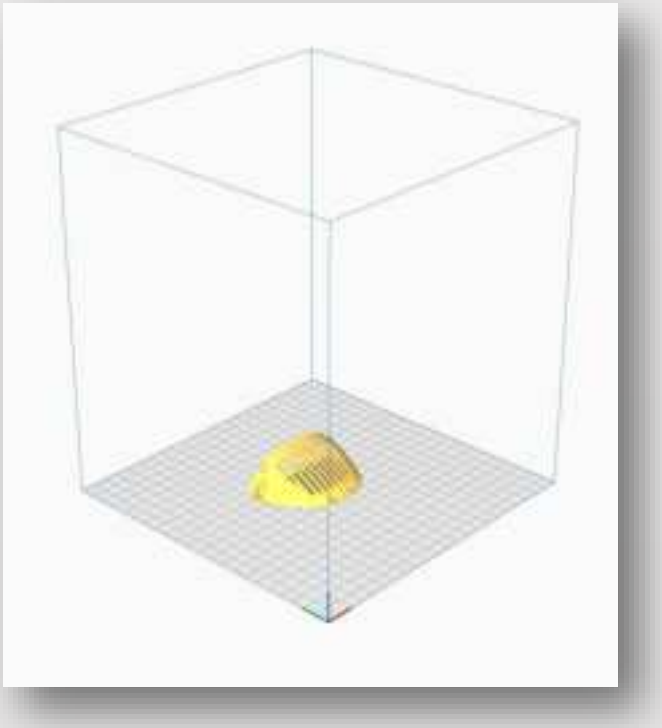


RUDDER - 4% gyroid infill

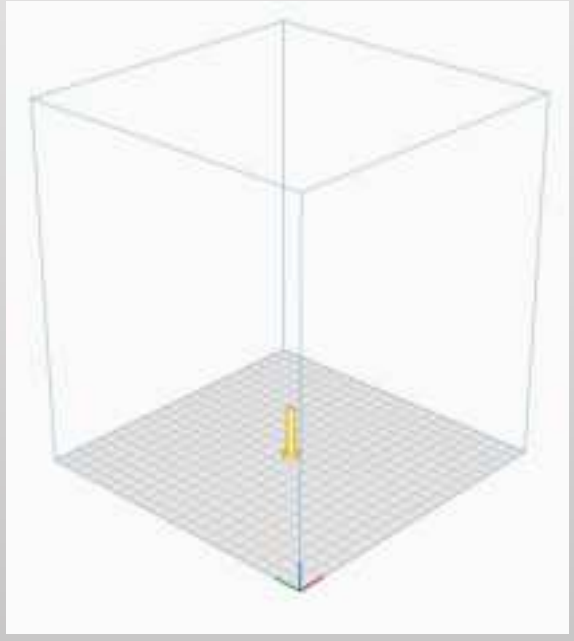


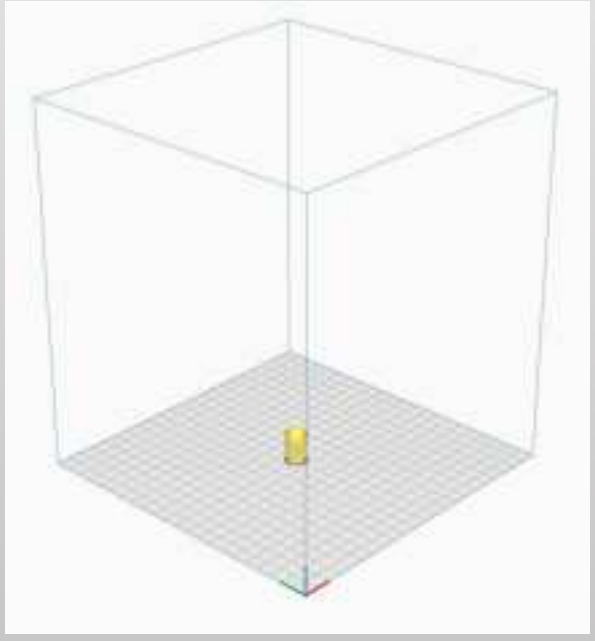
NOSE GIMBAL - 20 % grid infill + 3 walls

Parts Orientation



NOSE GIMBAL - 20 % grid infill + 3 walls





M6 BOLT / KNOB – 100% infill solid print

FUSELAGE VARIANTS

There are two fuselage variants to choose from, which differ in the way the segments are connected: classic flat connection of the elements or alignment pins.

The fuselage with alignment pins can be printed in two ways, either using supports or not. The supports are already designed in the file, so there's no need to generate them in the slicer. Printing without supports requires a printer that can handle bridging.

The fuselage file package is divided into three folders:
FUS FLAT, which contains flat elements, FUS PINS + SUPPORTS, which contains segments with pins and supports,
and FUS PINS NO SUPPORTS, which contains segments with pins but without supports. Of course, you can experiment with settings and use automatic supports in the slicer if you prefer.

TAIL VARIANTS

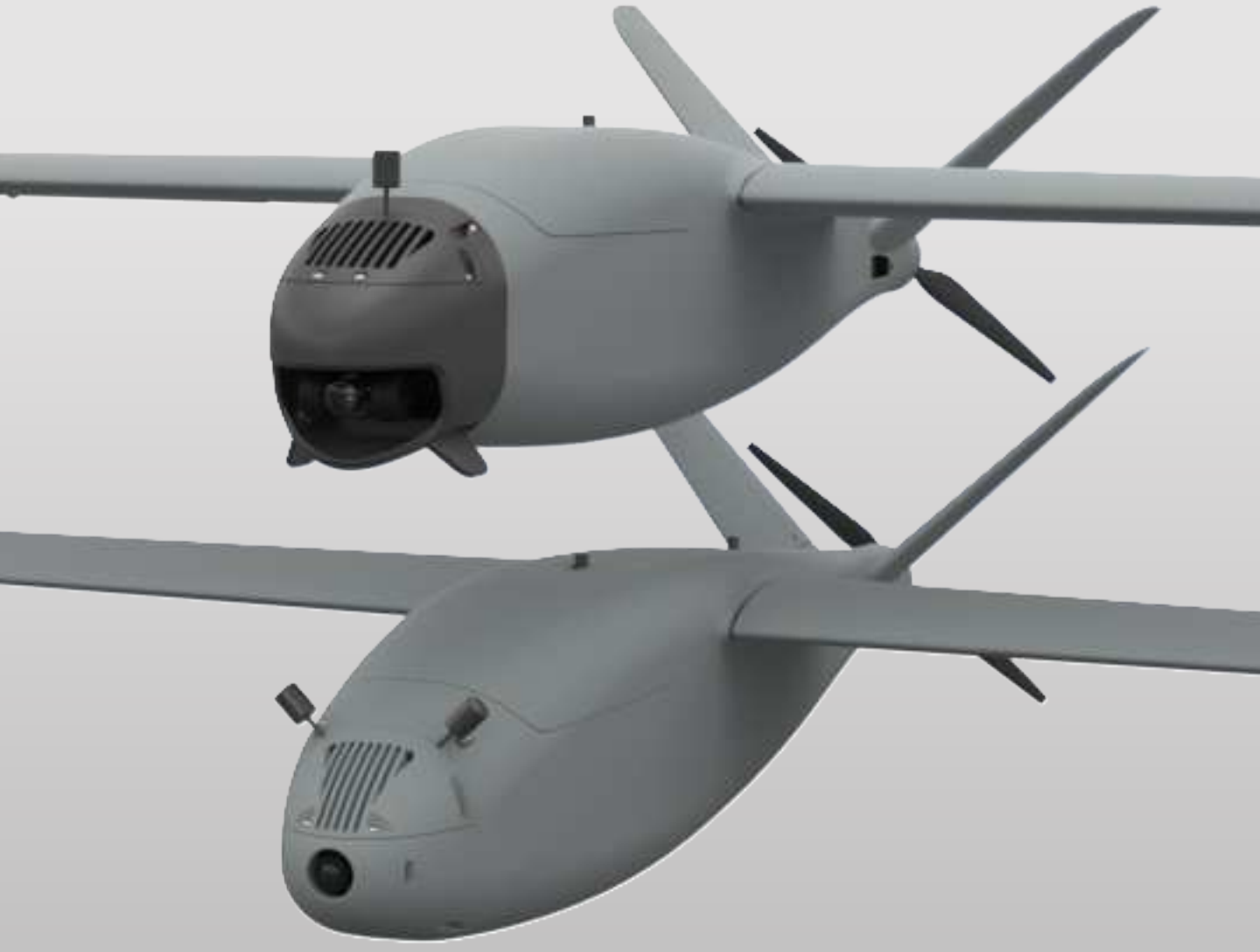
Before starting build, choose an option for mounting the motor. There are 2 options to choose from.

The first version is a tail adapted to the motor with a mounting bolt spacing of 34mm. Choose then the basic version of the FUS 5 and FIREWALL file.

The second option is to use a larger 4108 motor, for which a wider mount is needed. Choose the corresponding FUS 5 4108 and FIREWALL 4108 files. An additional 4108 MOTOR MOUNT part is also prepared for this motor, which you need to print too.

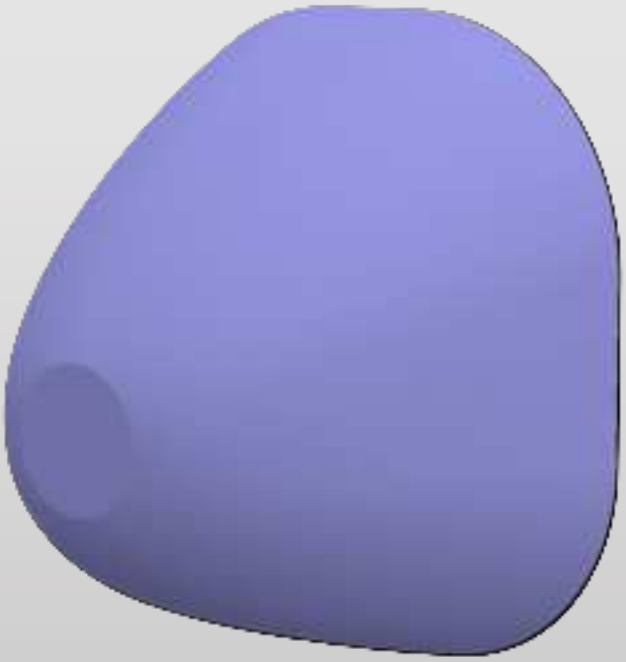
NOSE VARIANTS

There are also 2 variants of the nose. You can choose version with a VTX mounted inside and a 19x19mm FPV camera, or the version adapted for the GM3 Walksnail gimbal (or others with a similar design). 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 flight.



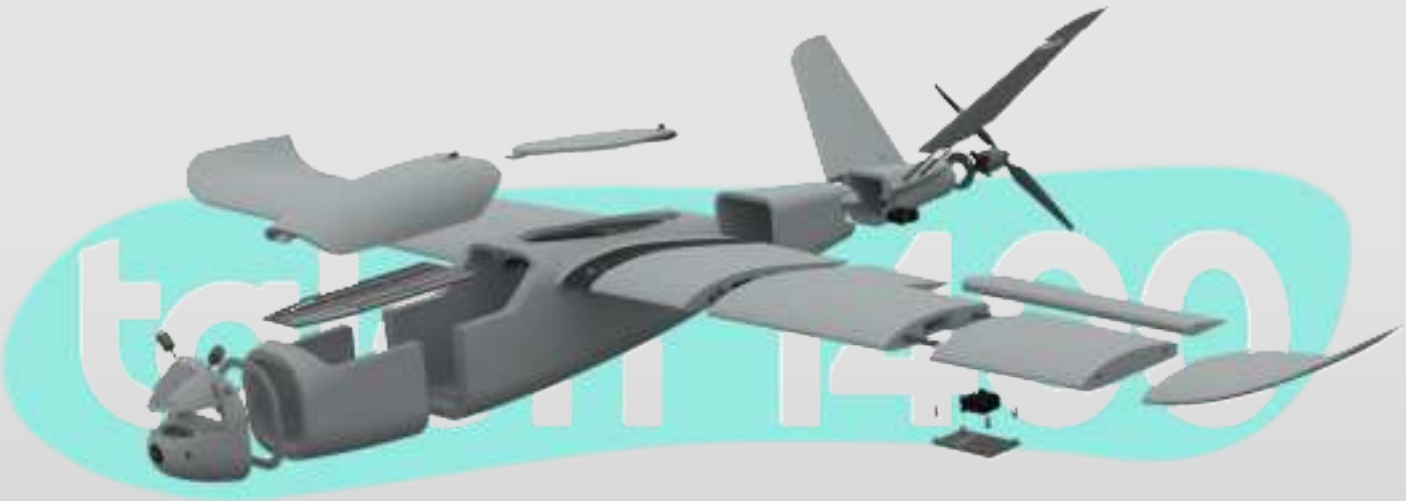
NOSE VARIANTS

In addition to the ready-made nose versions described earlier, there is also a CLEAN version of the nose available. This is a solid model in STEP format, ready for any modifications to accommodate a custom payload.



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. Check the full list of STEP files in the STEP FILES LIST section.

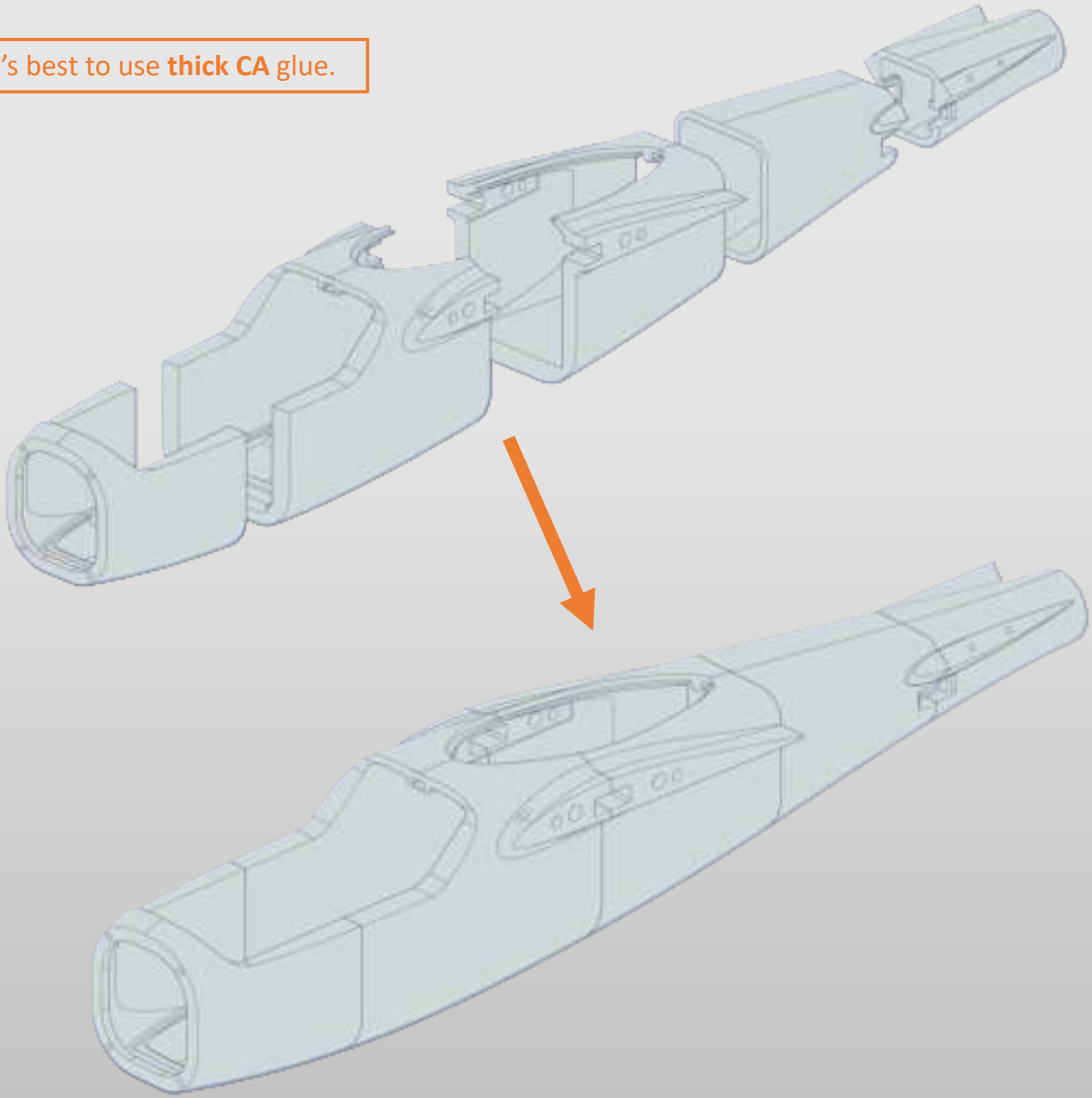


You can find these files in folders labeled STEP

Fuselage assembly

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

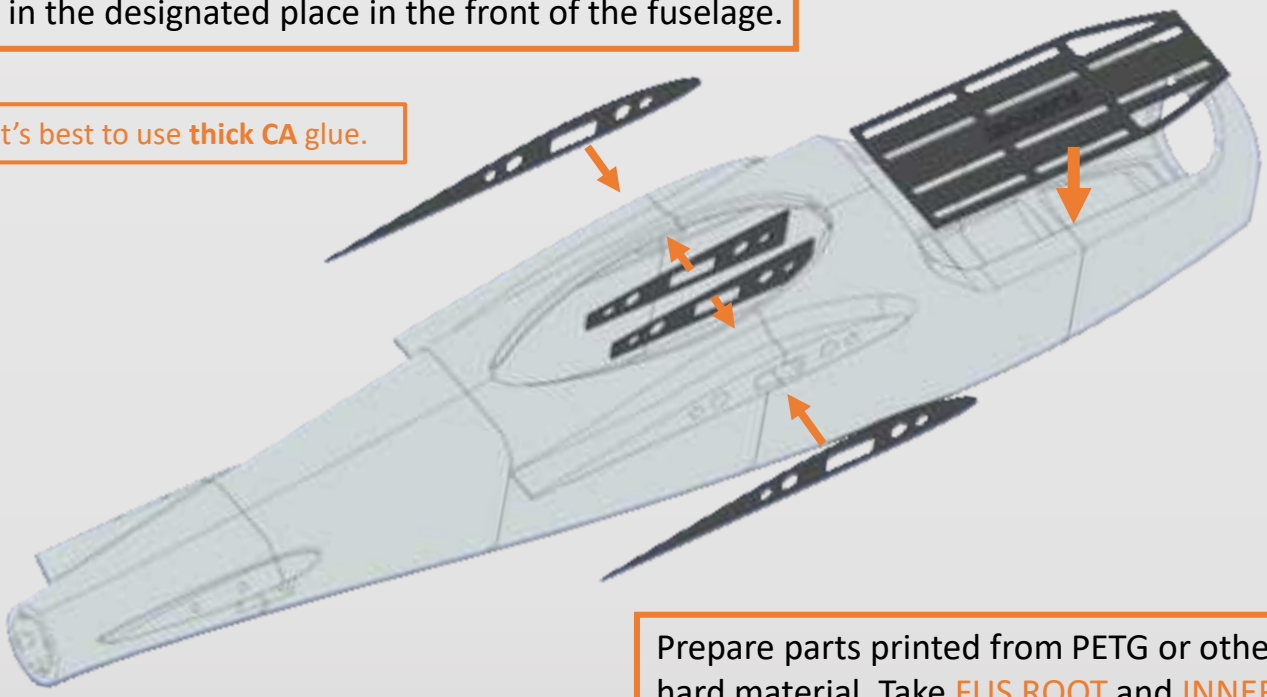
It's best to use **thick CA** glue.



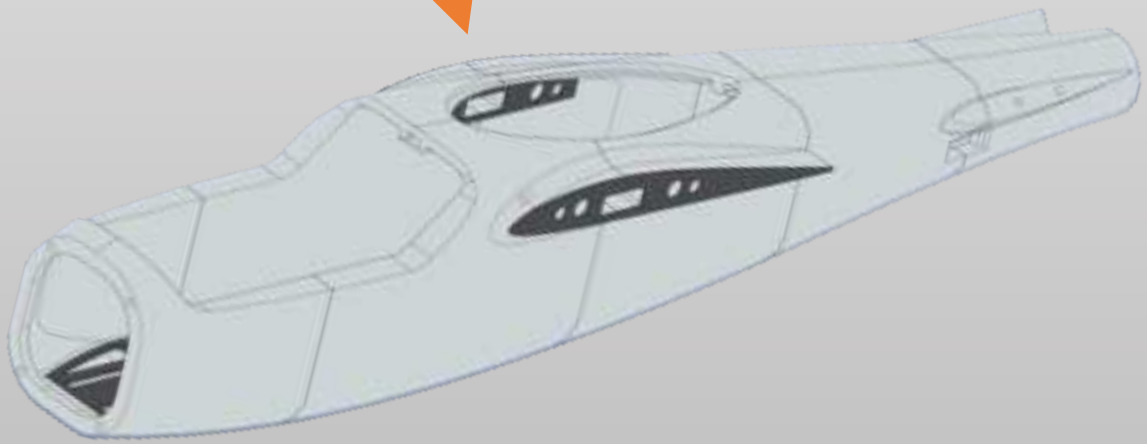
Fuselage assembly

Prepare parts printed from PETG or other hard material. Take the BATTERY PAD and paste it in the designated place in the front of the fuselage.

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



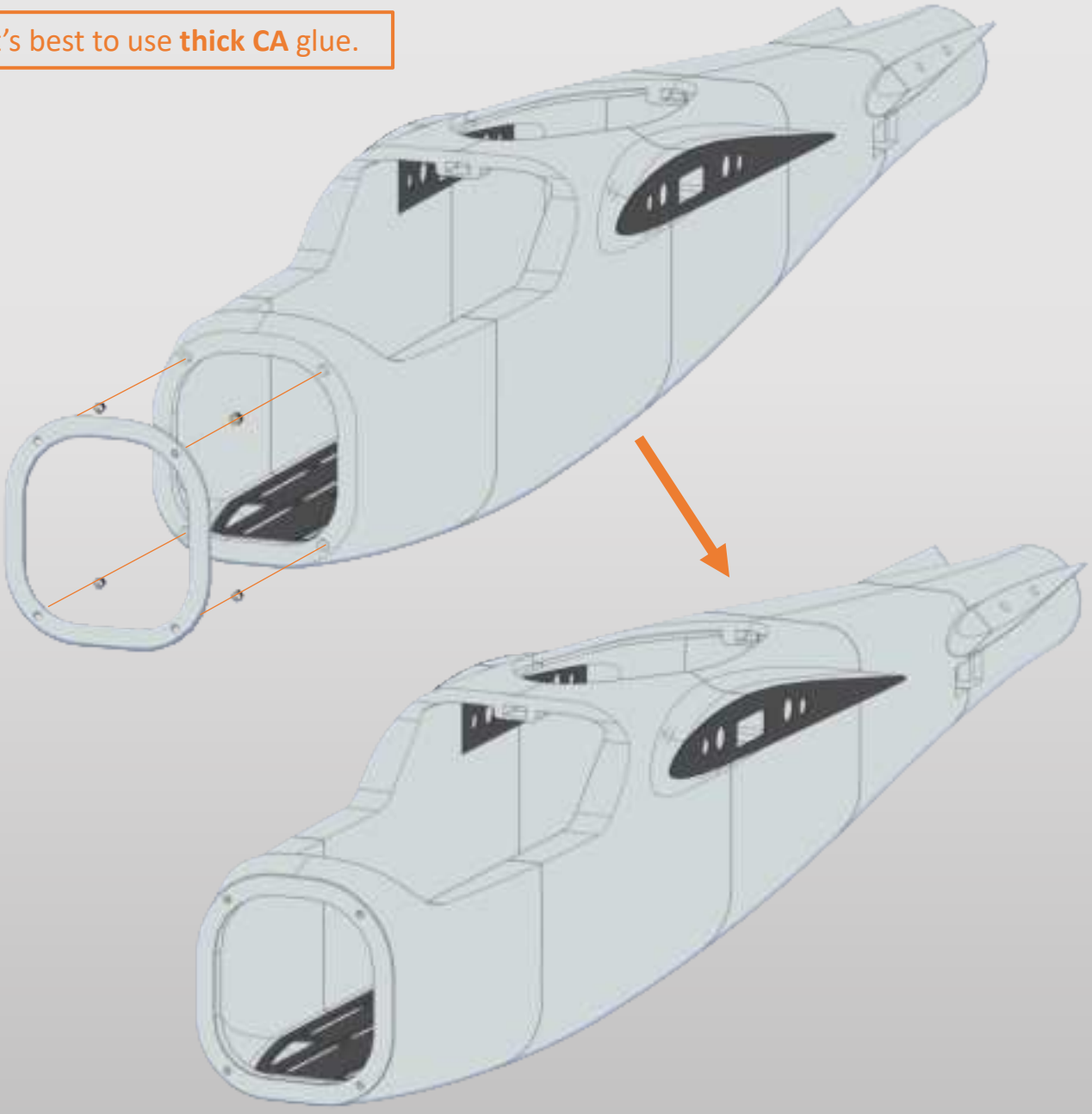
Prepare parts printed from PETG or other hard material. Take FUS ROOT and INNER REINFORCEMENT and glue with CA to the fuselage in the corresponding places.



Fuselage assembly

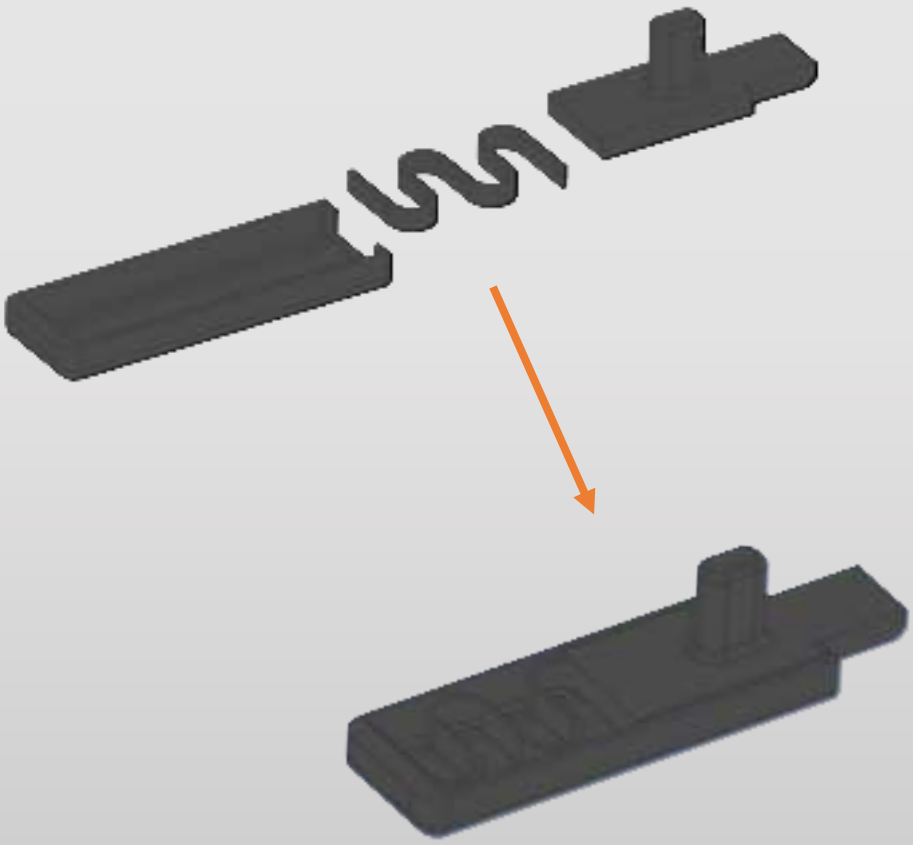
Now take M3 threaded inserts with an outer diameter of 5mm.
Put them into the designated places in the front part of the fuselage.
You can use a slightly heated soldering iron for this. Then glue FRONT REINFORCEMENT printed from PLA or other hard material. This noticeably increases the strength of the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

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



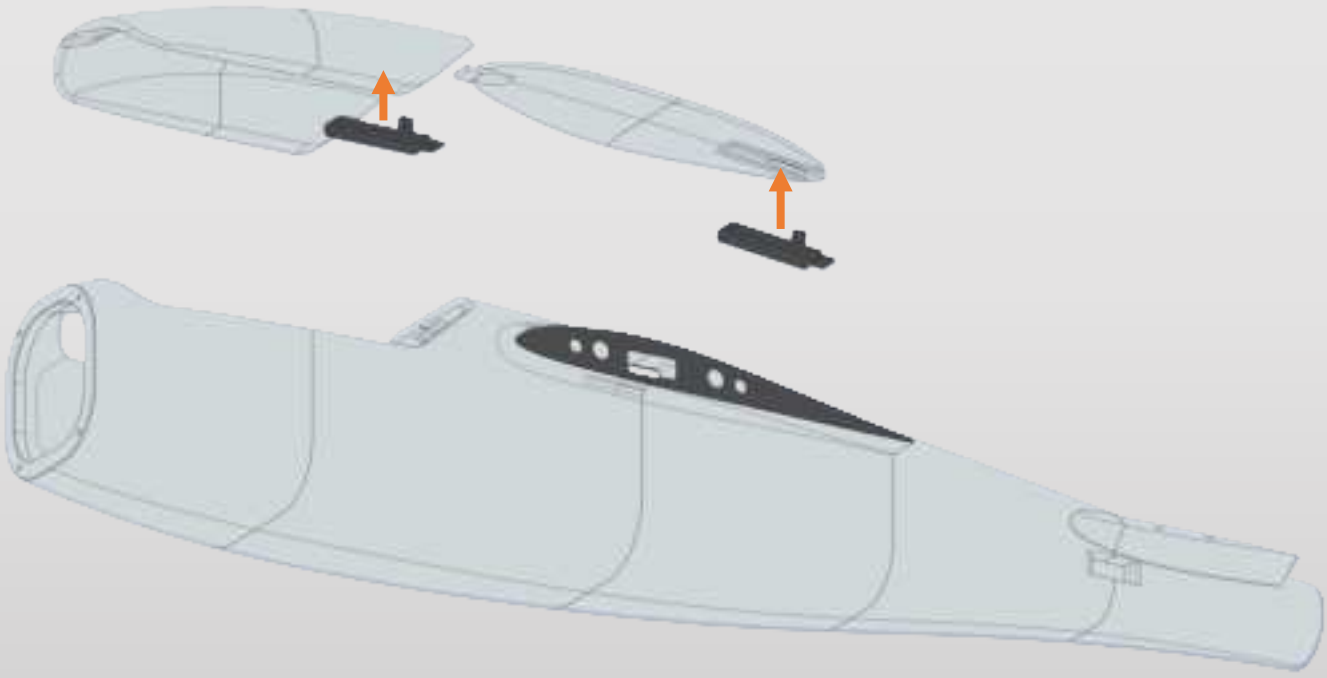
Hatches

Prepare the locks, consisting of 3 elements: LOCK 1, LOCK 2, and LOCK SPRING. Assemble them as shown in the diagram.



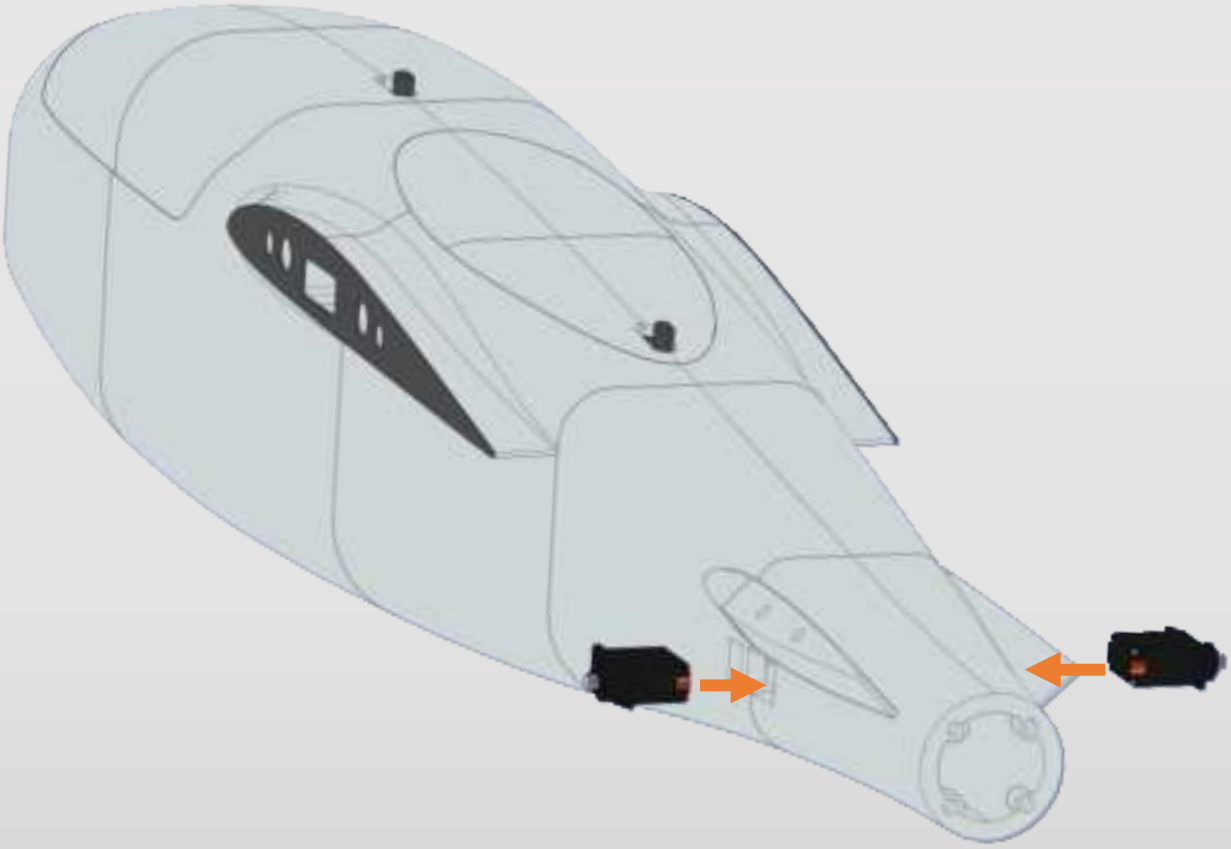
Hatches

Prepare the front and middle hatch. Assembled locks paste into the designated places. Glue locks into the hatches using CA, but carefully so that the glue does not spill and block the lock.



It’s best to use **thick CA** glue.

V-TAIL servos



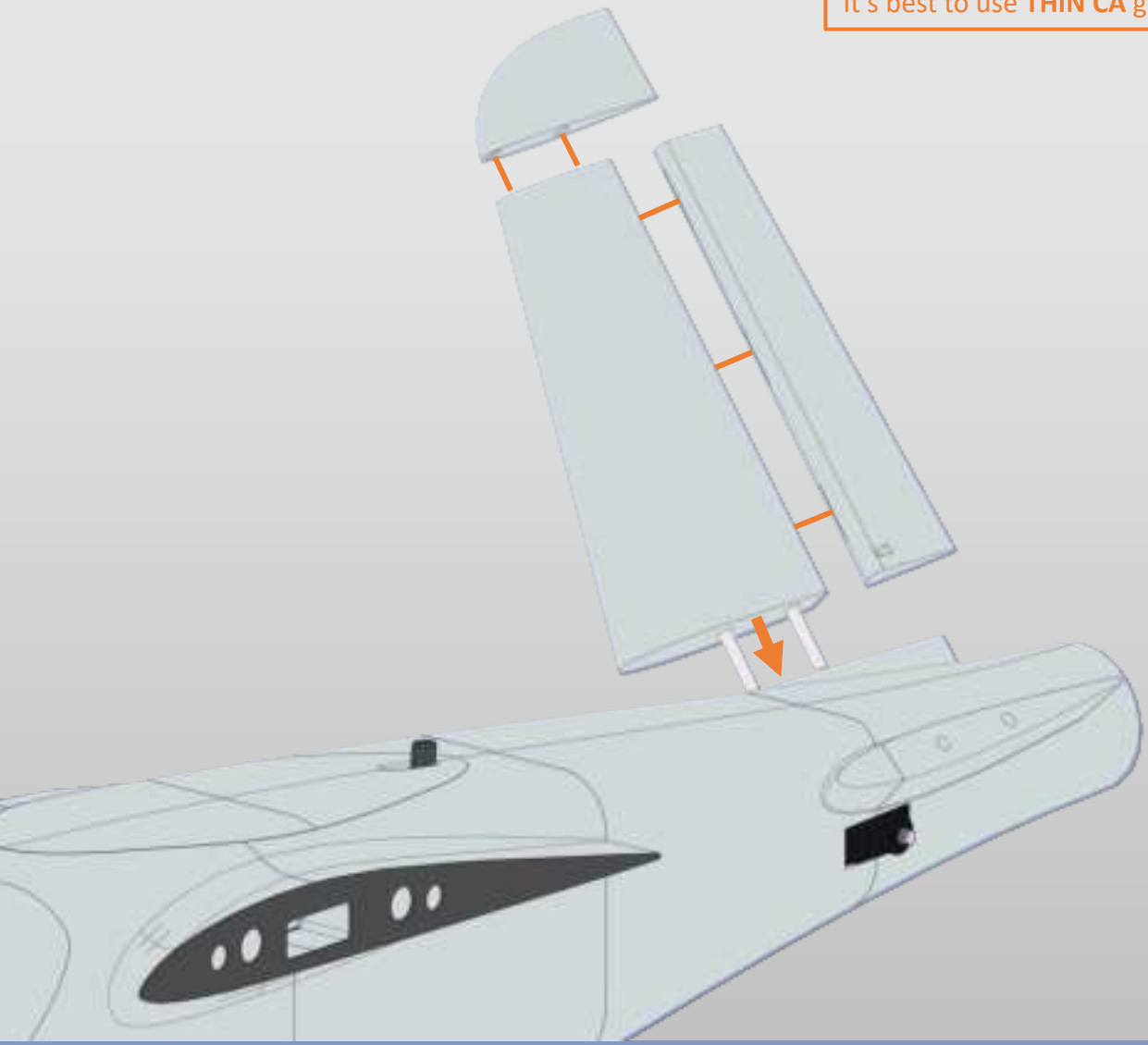
It's best to use **HOT GLUE**

Now insert the V-tail servos into the designated places on the back of the fuselage. Micro servos of standard 9-12g weight will fit. Use a small amount of hot glue to secure them.

V-TAIL

Take V tail parts. Glue them together and use 4mm carbon tube cut to 170mm for reinforcement. Use 20x25mm polyester hinges to assemble the rudder by gluing them into the prepared places. Secure them with a drop of thin CA glue. You can also use thin hinges made of other thin materials.

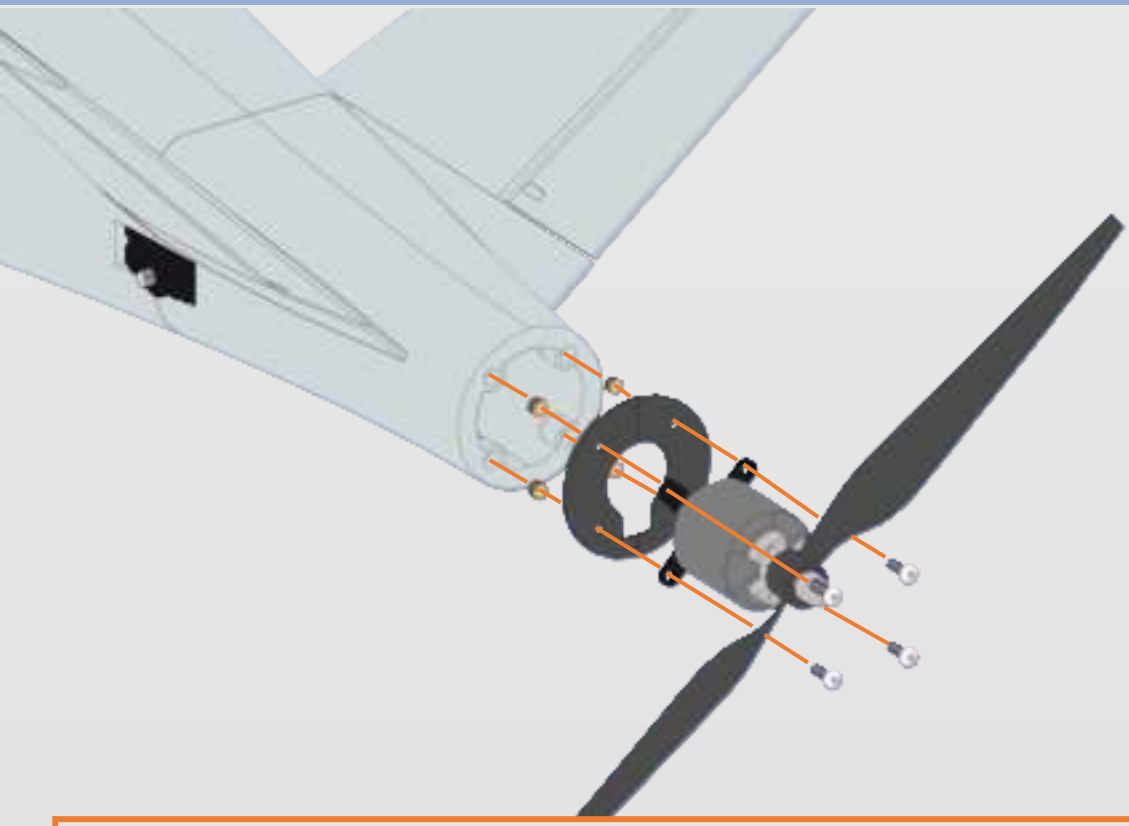
It's best to use **THIN CA** glue.



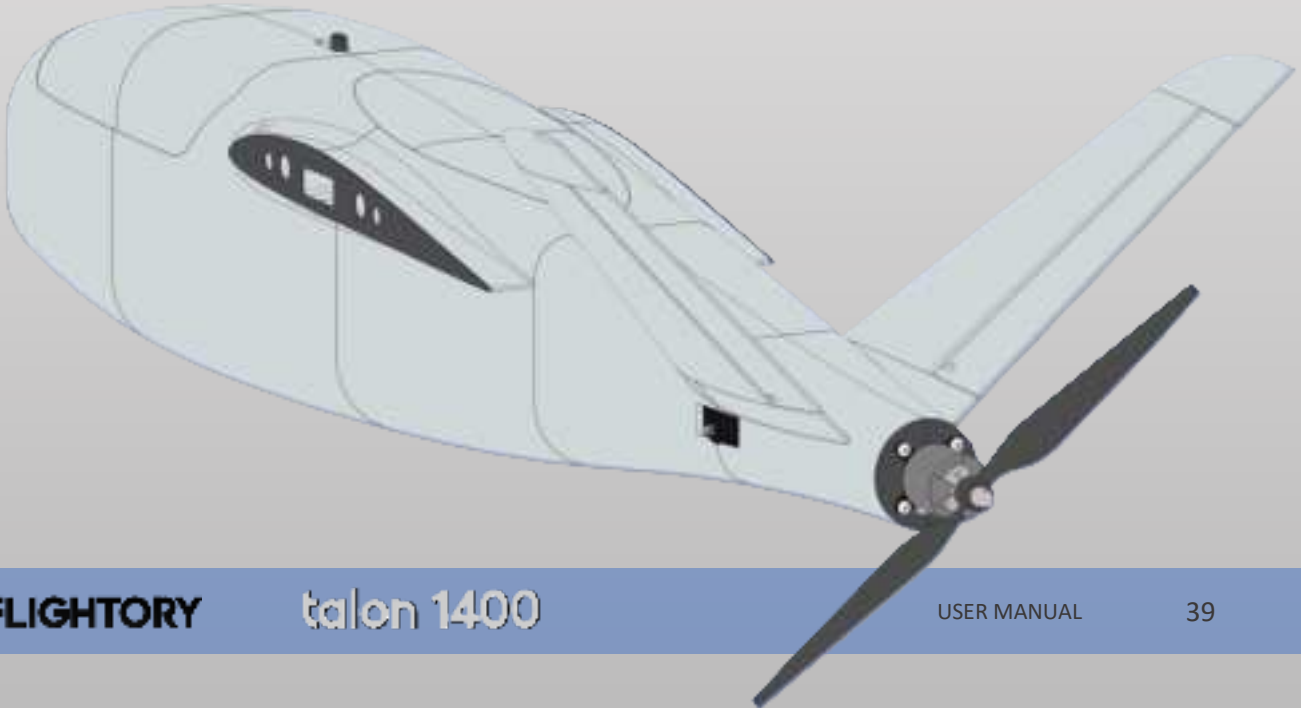
V-TAIL

Glue the plastic horns into the designated places in the rudders. It is best to do it with thick CA glue. You can make the pushrods yourself using a thin wire and bend it into a Z shape, or use snaps or another pushrod mounting technique.

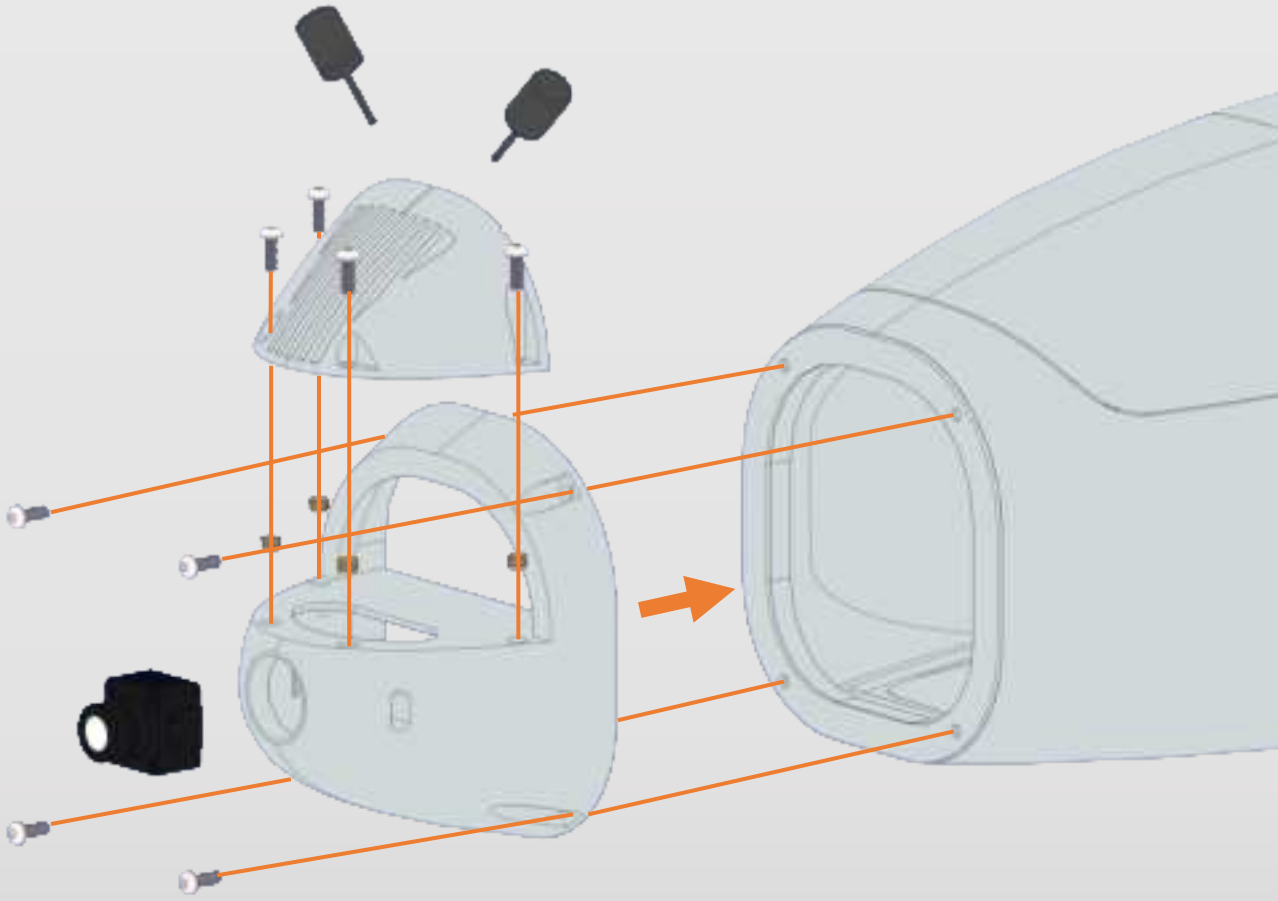
Motor mount



Paste the M3 threaded inserts into the designed places. Then glue the firewall. Finally, screw the motor with M3 screws. The graphic shows the assembly of the 2830 motor with 34mm bolt spacing. For the 4108 motor, the process looks exactly the same, only the firewall and tail are in slightly different shape.

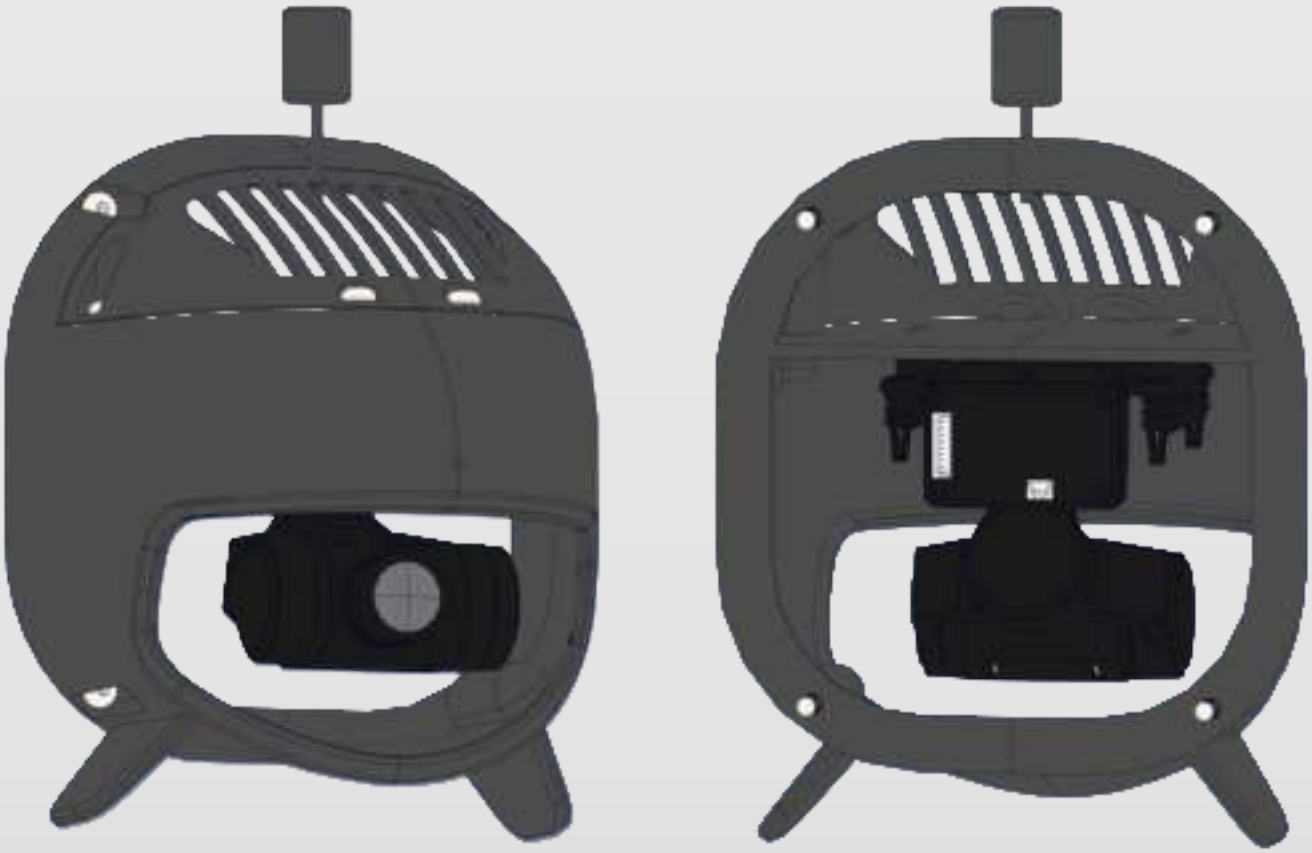


Nose mount



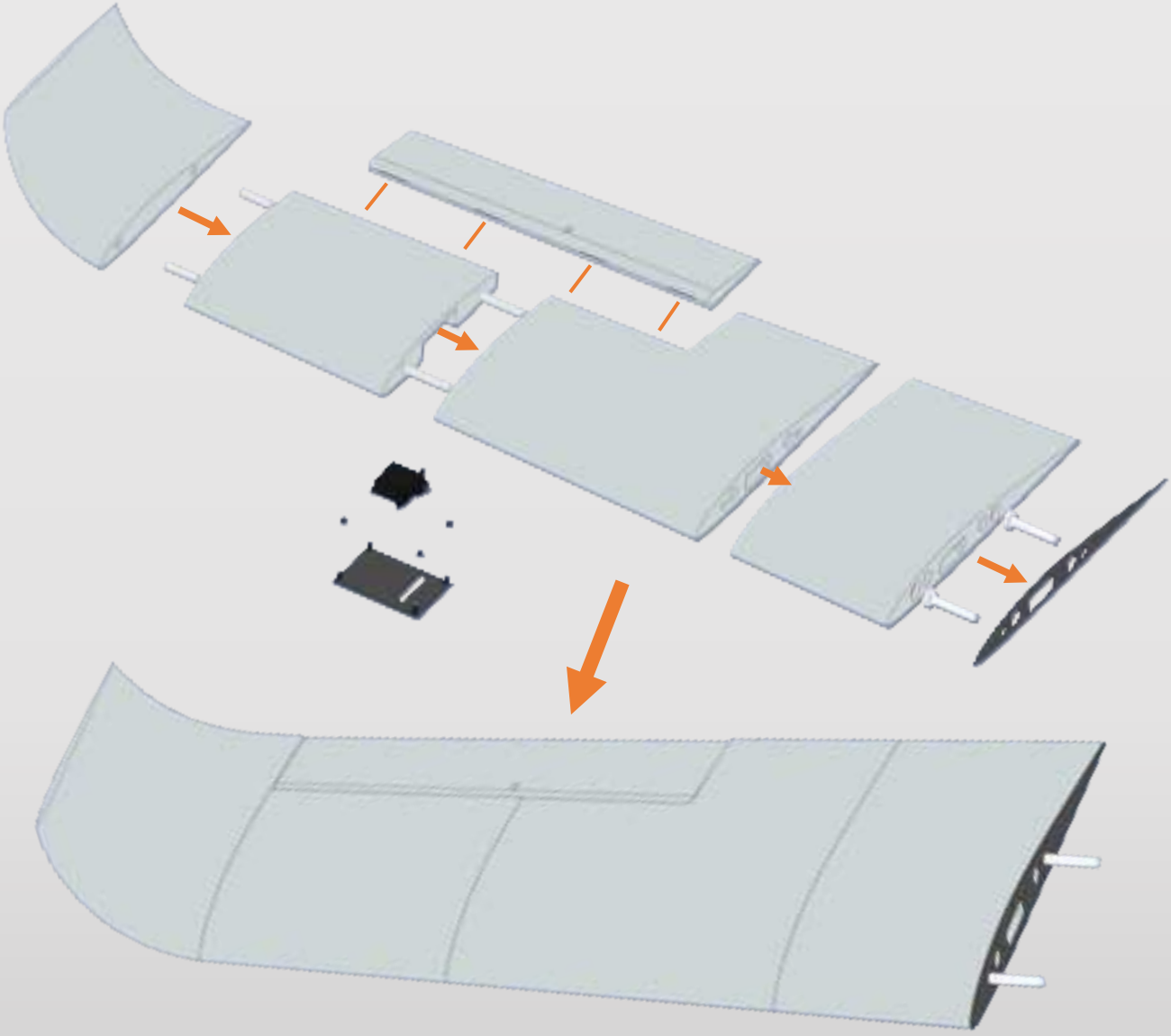
Now you can mount the nose with short M3 screws. If you are using version with VTX, you can put your VTX on the "shelf" and cover it with NOSE TOP and secure the antennas.

Nose mount



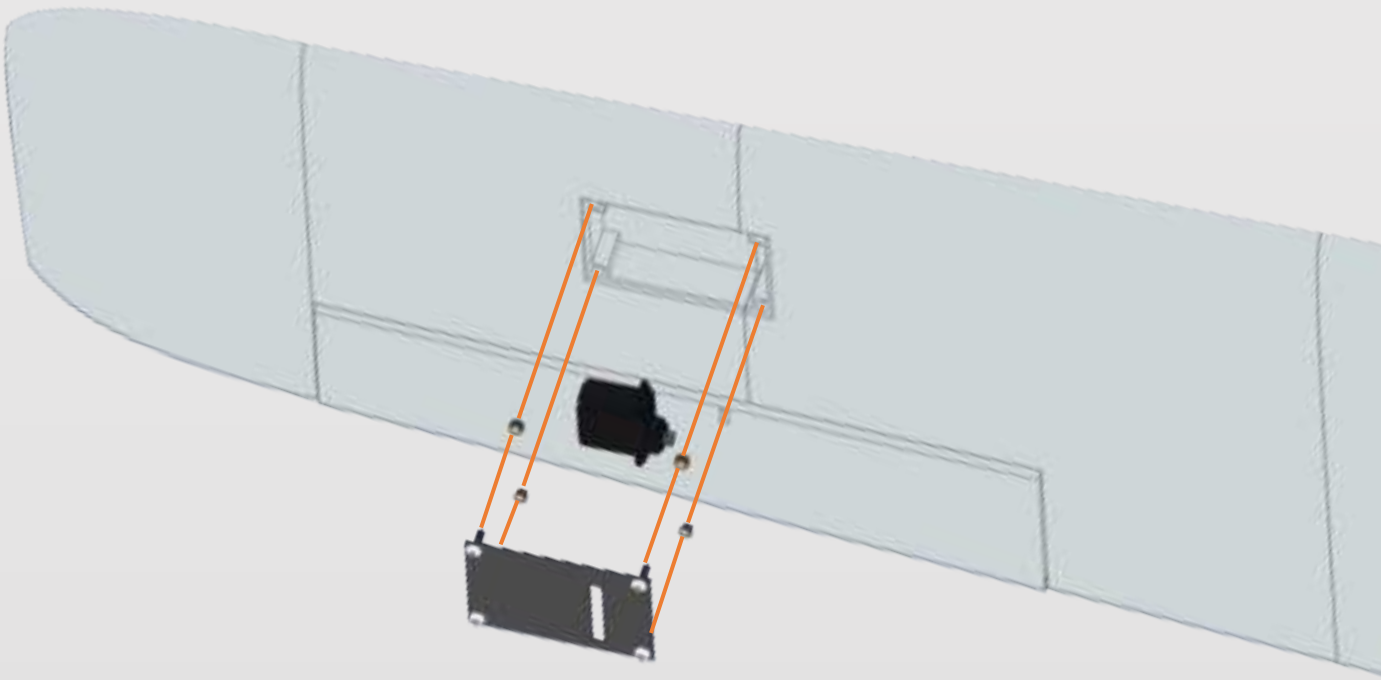
The assembly of the nose with the gimbal is similar. The GM3 gimbal is mounted to the shelf from below using 4 M2 screws included with the gimbal set. Gimbals from other manufacturers with a similar design, also compatible with the DJI system, follow the same structure. References to specific gimbals can be found in the "Recommended Electronics" section.

Wings assembly



Glue the wing segments together. Insert two 6mm carbon tubes cut to a length of 400mm. It's not necessary to glue the tubes, just press them tightly into the designated holes. Also insert the 3D printed M6 screws and glue the WING ROOT. These screws are responsible for mounting the wing to the fuselage. You can also use ready-made plasic screws. Finally, insert the aileron using four 20x25mm polyester hinges, or made of another thin material.

Wings assembly



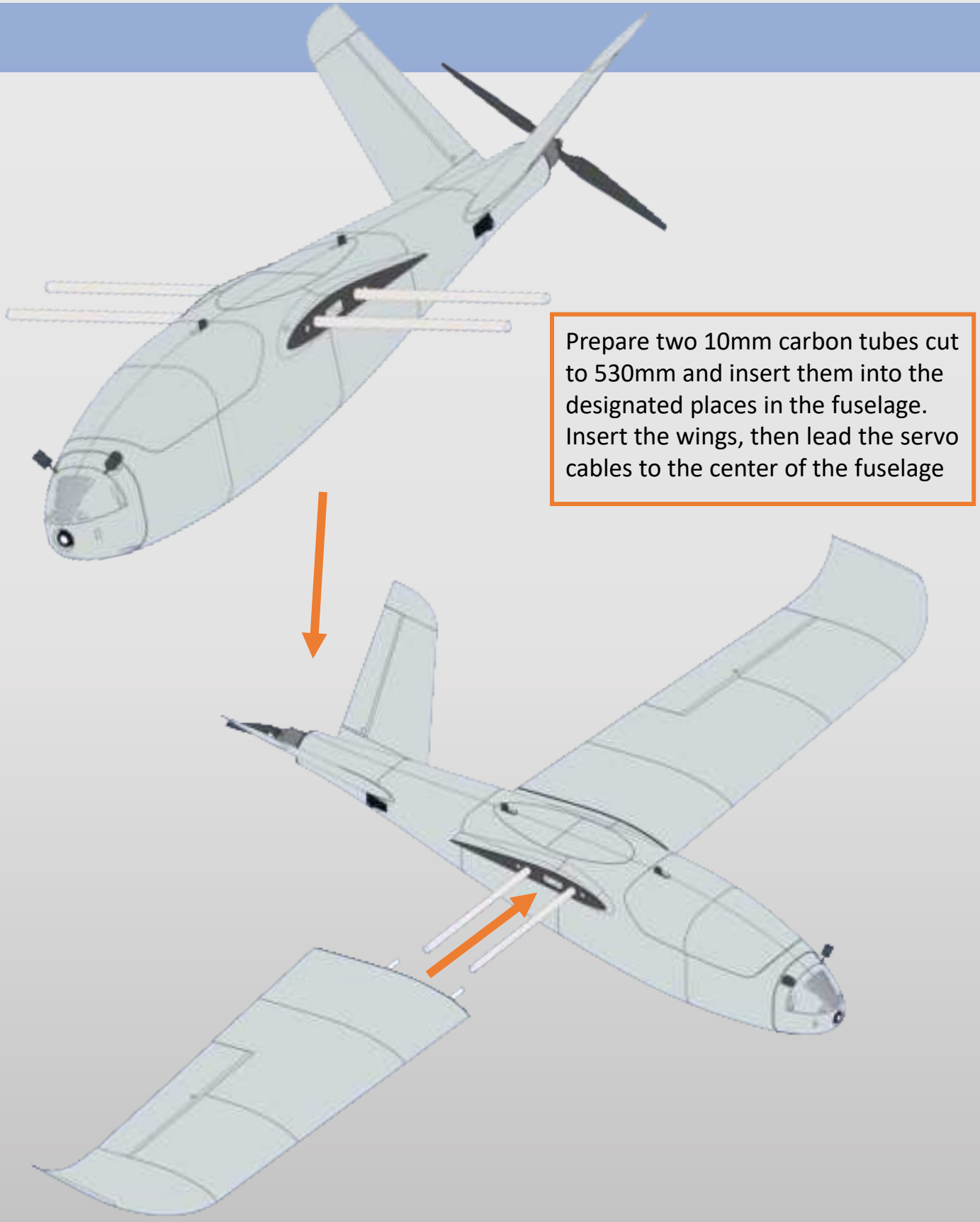
Now mount the servo. Servo bay is spacious and there is no specific position of the servo. You can glue it and secure with hot glue. Use the SERVO COVER part so that you place it in the right place and bring the servo arm outward.

Paste the M3 threaded inserts into the designated places and finally cover the servo with SERVO COVER fastening it with M3 screws. Then, guide the servo cable through the channel that leads up to the wing root.

Wings assembly

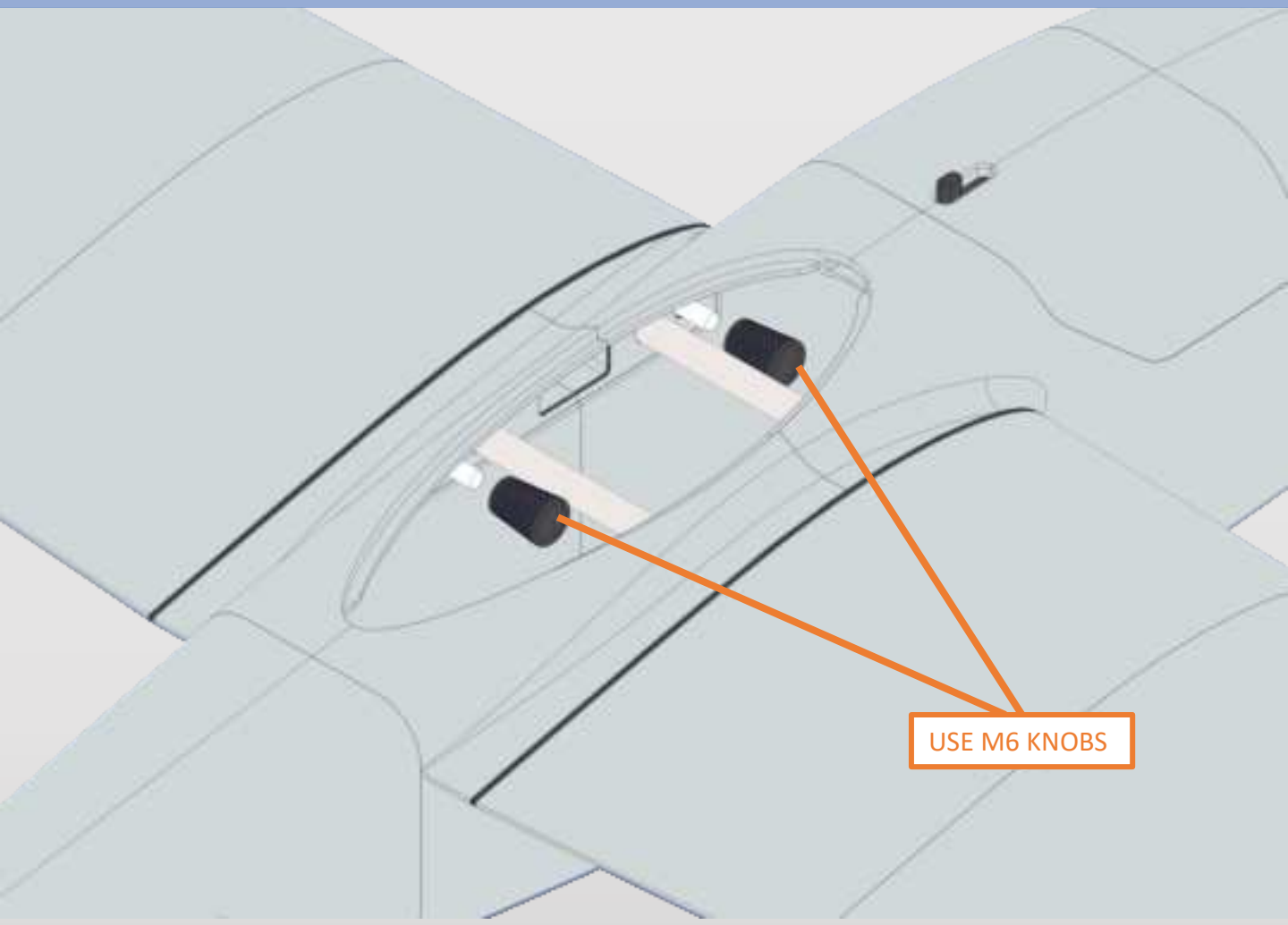
Finally, paste the aileron horns and fix the pushrods the same way as for the V-Tail. You can bend the wire into a Z shape, or use snaps or other pushrod mounting technique.

Wings mount



Prepare two 10mm carbon tubes cut to 530mm and insert them into the designated places in the fuselage. Insert the wings, then lead the servo cables to the center of the fuselage

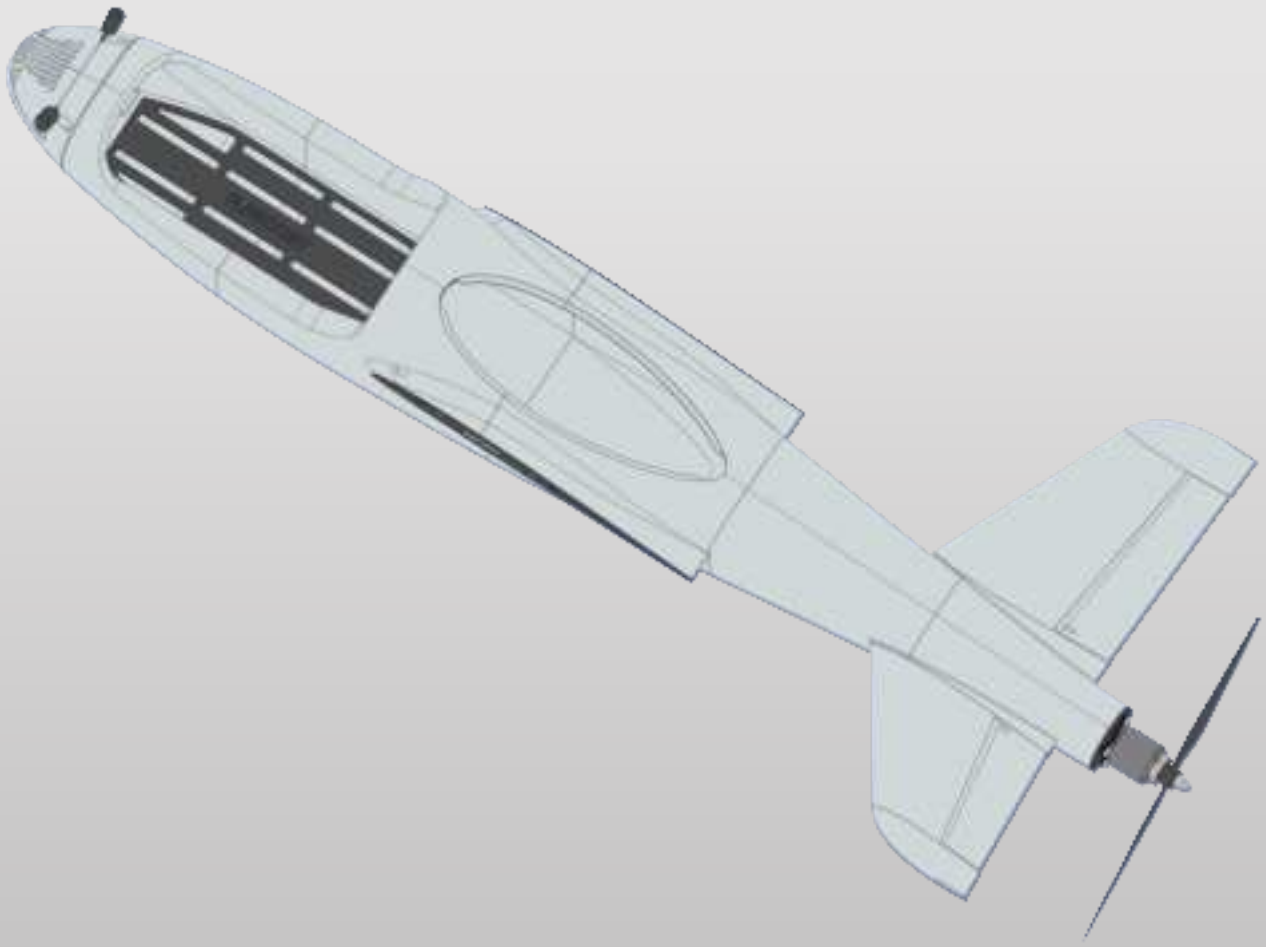
Wings mount



Secure the M6 screws with knobs from inside the fuselage.
This method of fastening is durable, secure and resistant to repeated disassembly of the wings.

Equipment layout

The fuselage of the aircraft is very spacious. The front part of the fuselage will accommodate a very large battery even Li-Ion 4S6P 21Ah pack. The BATTERY PAD is designed so that Velcro straps can be inserted between the holes to tighten the battery. The central part, accessed through the middle hatch, is designed to accommodate the rest of the equipment such as flight controller, receiver etc. There is an large flat surface that will fit everything you need. You can also place the GPS there next to the FC, or bring it outside the fuselage.



Finishing build

The model is ready to fly. Before flying, take care of the correct balance, which is 63mm from the leading edge. Check the correct operation of the ailerons and rudders and the direction of propeller rotation. 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

talon 1400