FLIGHTORY

MOOSE

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

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

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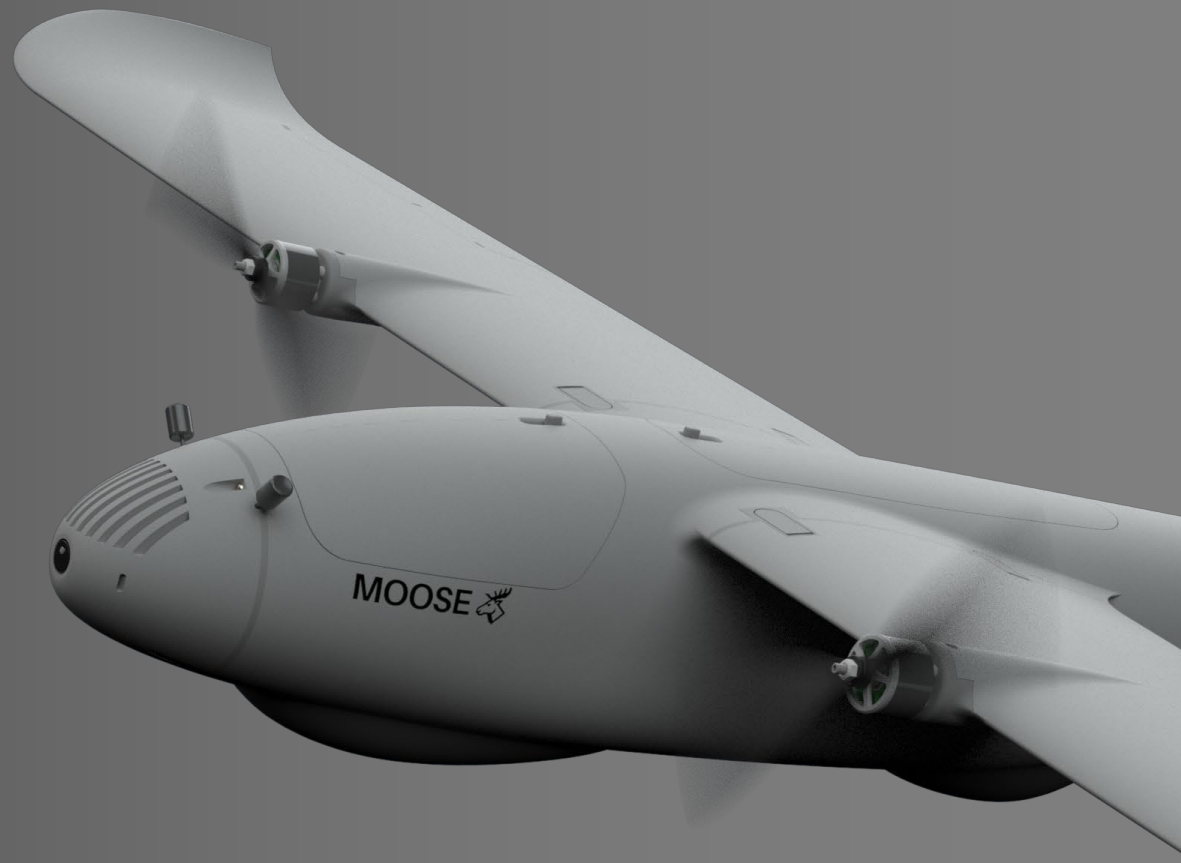
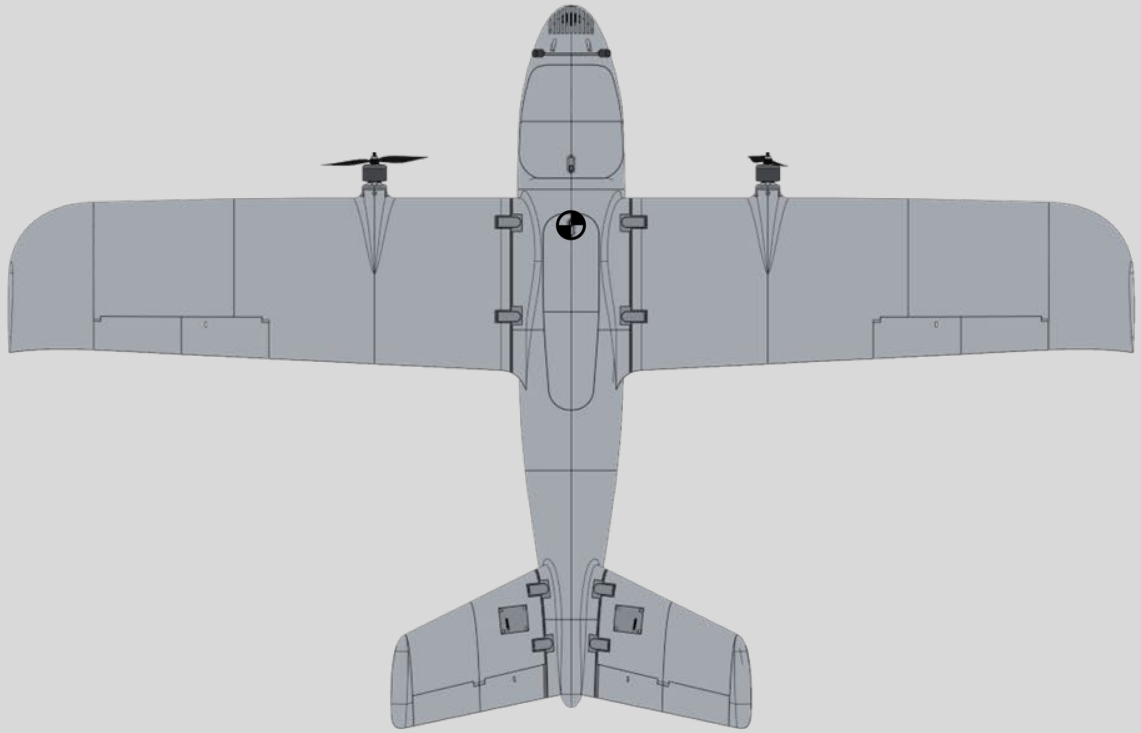
MOOSE

The MOOSE is a versatile UAV platform, designed with a classic layout featuring two tractor motors mounted on the wings and a V-tail configuration. Its hybrid construction is primarily designed for 3D printing using LW filaments, combined high-strength materials and reinforced with carbon rods to ensure structural integrity and durability. One of the features of this aircraft is its modular nose section, which can be easily swapped or customized to suit specific mission requirements, making it adaptable for a wide range of applications. Designed as an FPV aircraft, Moose also offers potential for aerial terrain mapping, with a dedicated compartment in the central fuselage optimized to accommodate mapping cameras and sensors. The design emphasizes quick assembly and maintenance, with wings and tail surfaces secured by snap-lock fasteners for fast, tool-free removal and installation. Despite its compact dimensions and a wingspan of 1600 mm, it offers ample capacity for additional payloads, balancing portability with functionality.



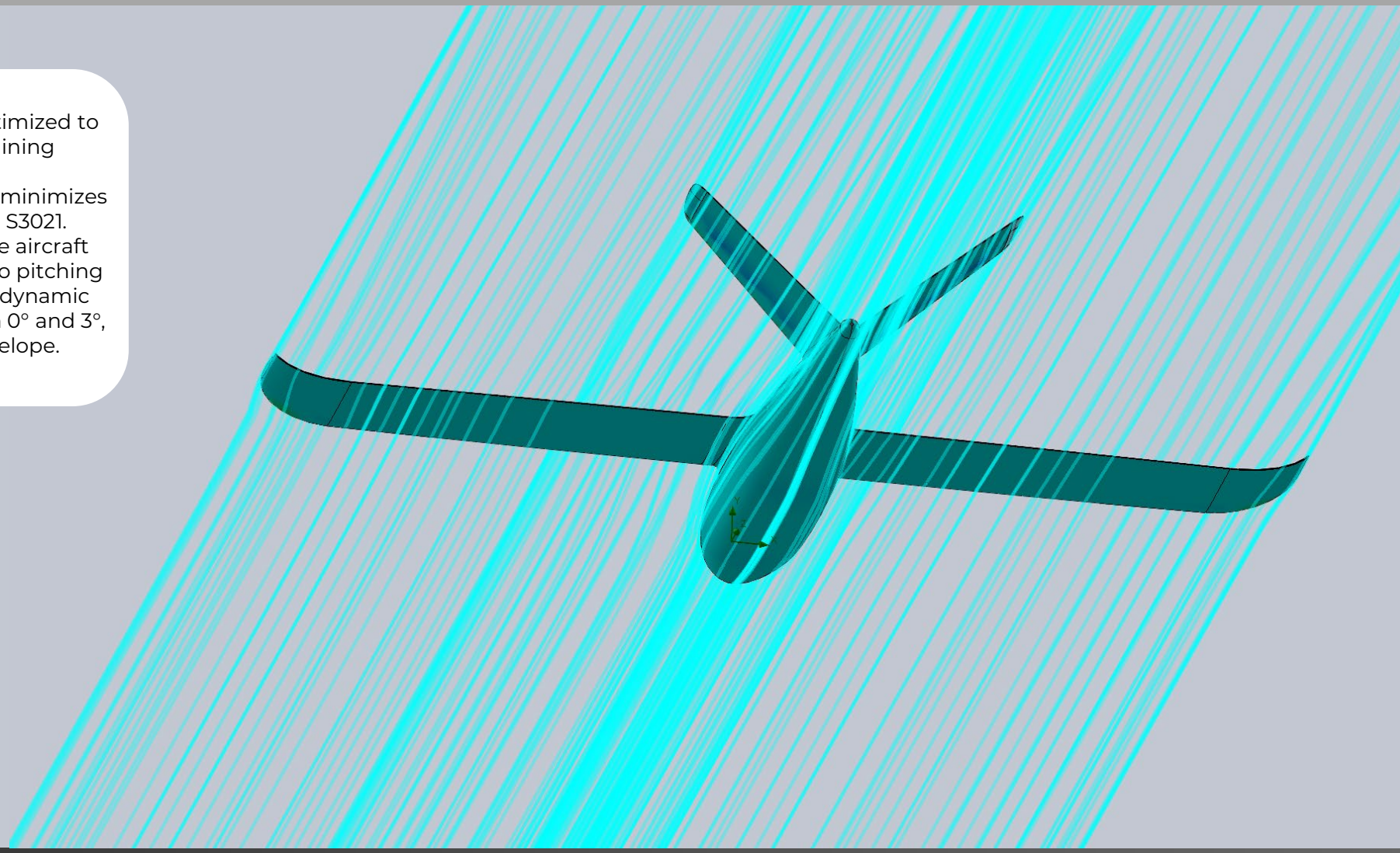
GENERAL AIRCRAFT DATA



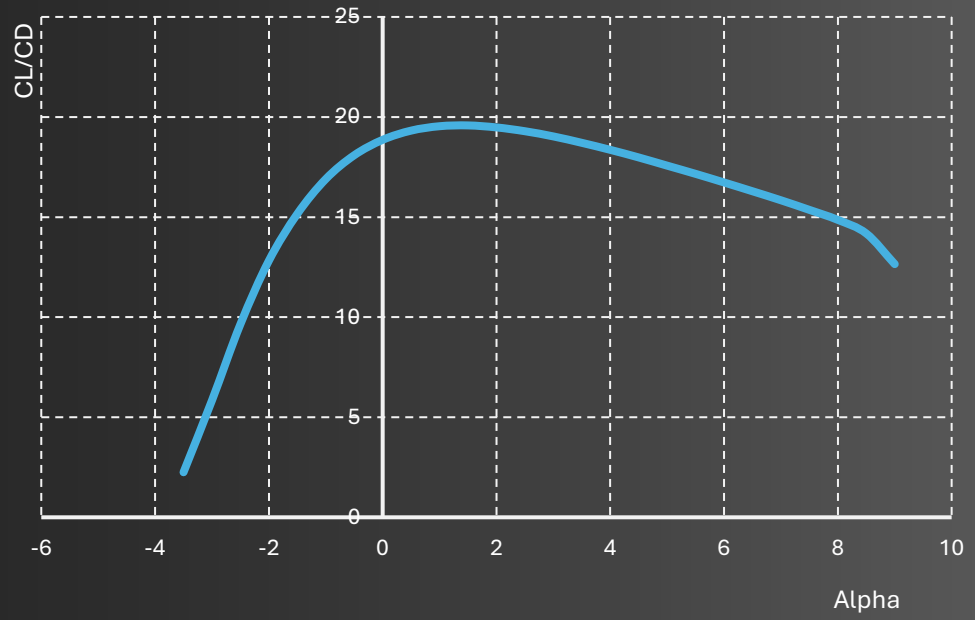
Wingspan	1600mm
Wing area	36.5 dm^2
Lenght	1000mm
Center of Gravity	48mm from leading edge (at wing root)
AUW	2000-4500g
Optimal Cruise Speed	60-70 km/h
Airfoil	S3021
Root Chord	250mm
MAC	230mm
Aspect Ratio	6,9
Wing load	55 - 120 g / dm^2

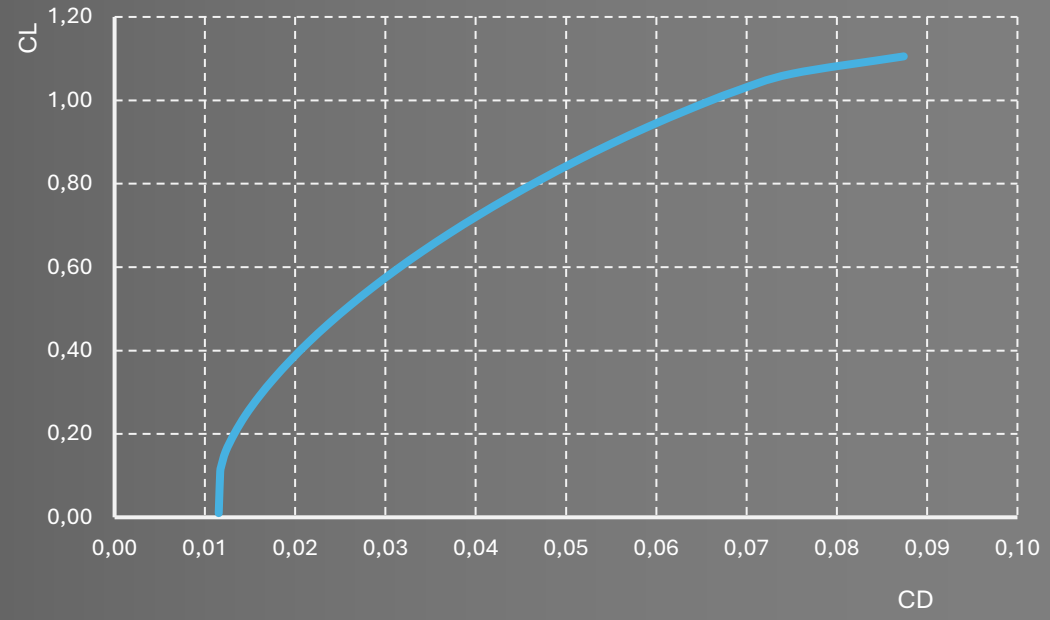
AERODYNAMIC DESIGN

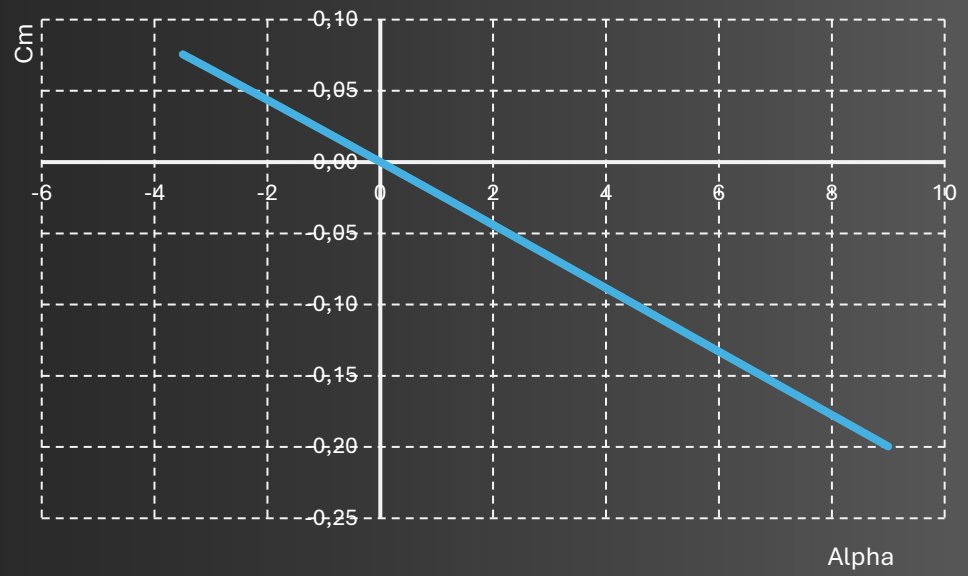
The aircraft geometry has been designed and optimized to ensure high aerodynamic efficiency while maintaining stability. The airframe features well-balanced lift distribution, along with a streamlined shape that minimizes aerodynamic drag. The selected airfoil is the Selig S3021. With the center of gravity correctly positioned, the aircraft exhibits longitudinal stability and maintains a zero pitching moment at zero angle of attack. The highest aerodynamic efficiency is achieved at angles of attack between 0° and 3°, which corresponds to the typical cruise flight envelope.

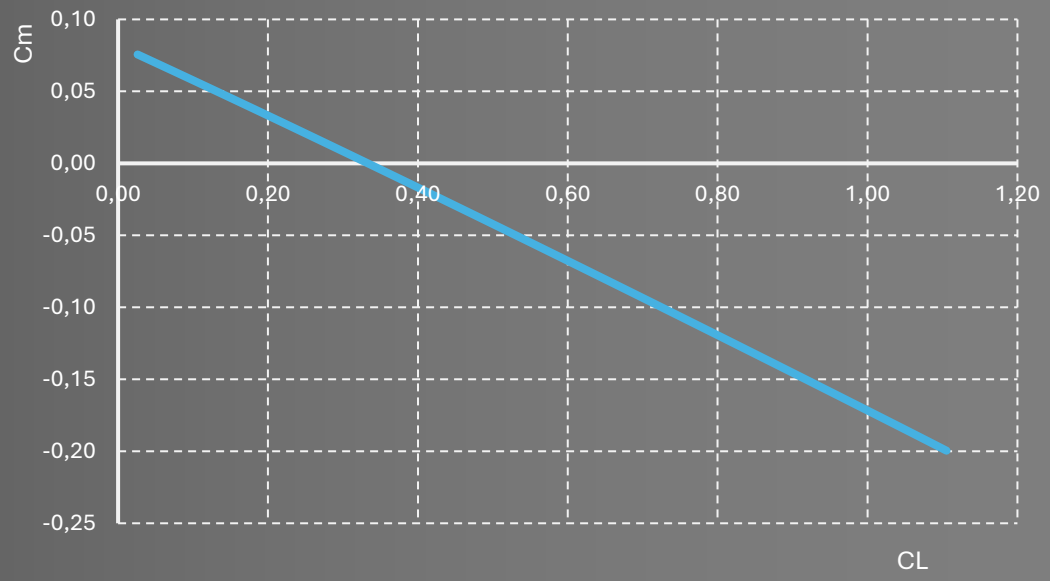


CFD CHARACTERISTICS



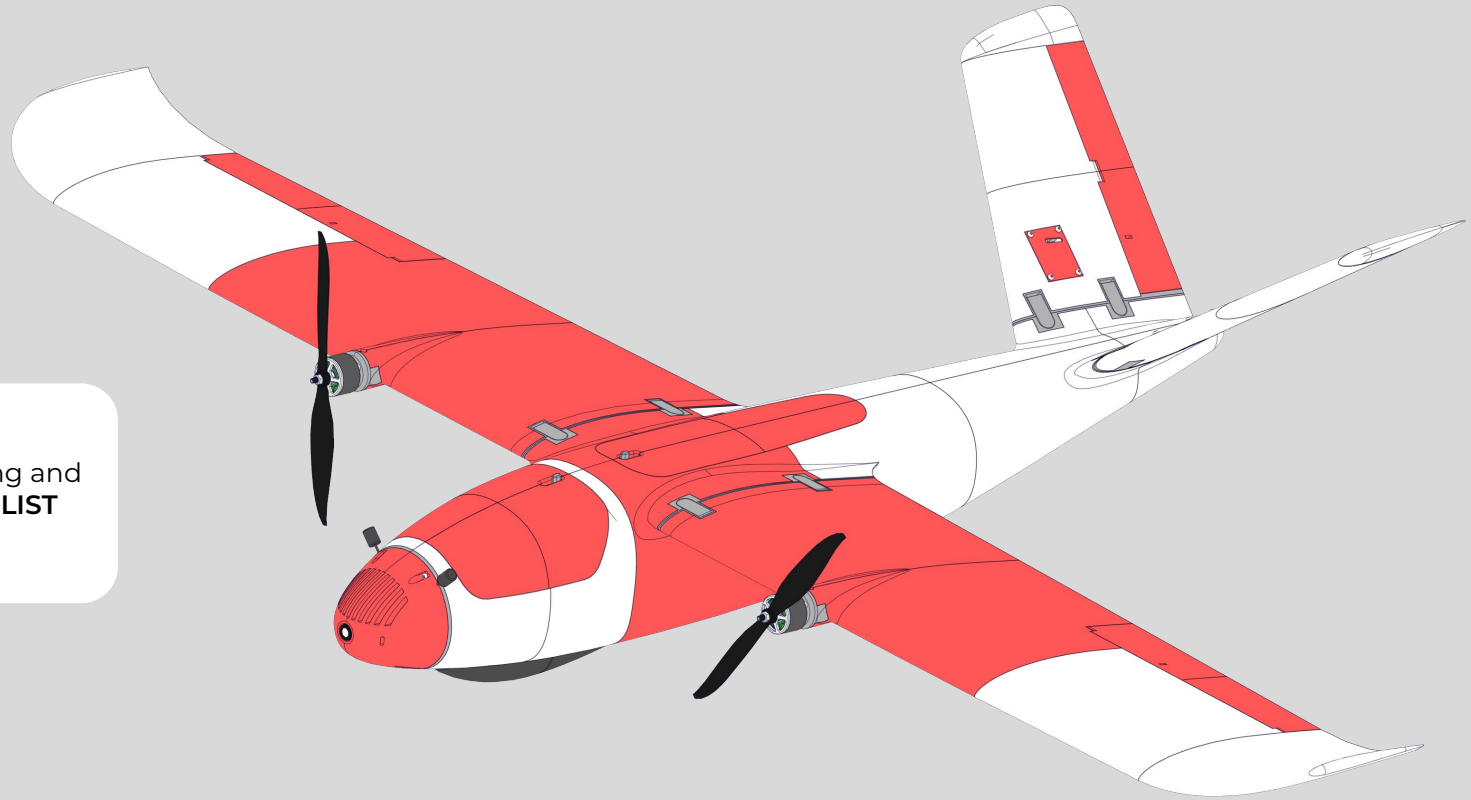






STEP FILES

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.



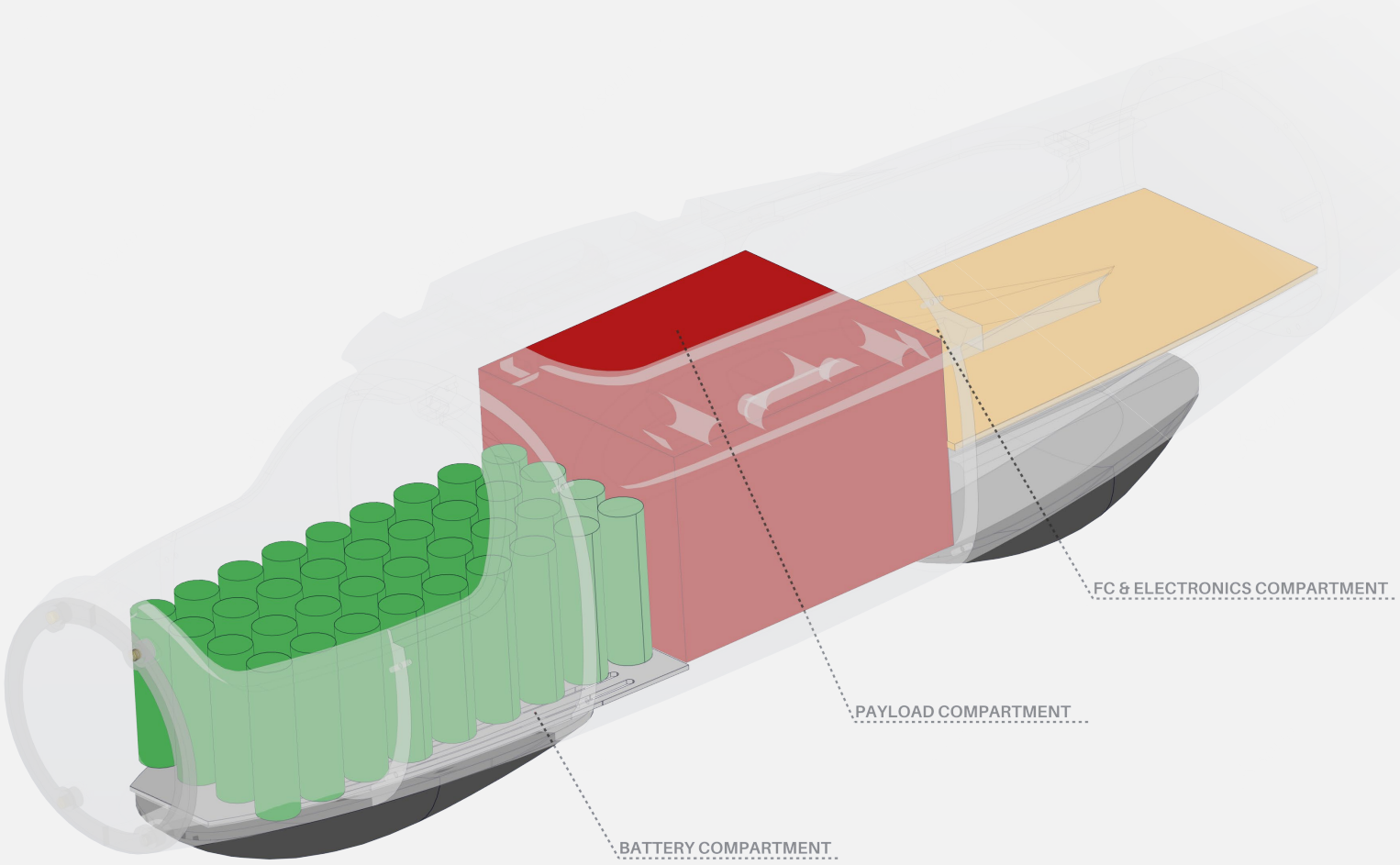
COMPARTMENT DIMENSIONS AND LAYOUT

The fuselage is divided into suggested compartments, each designed to optimally house specific equipment.

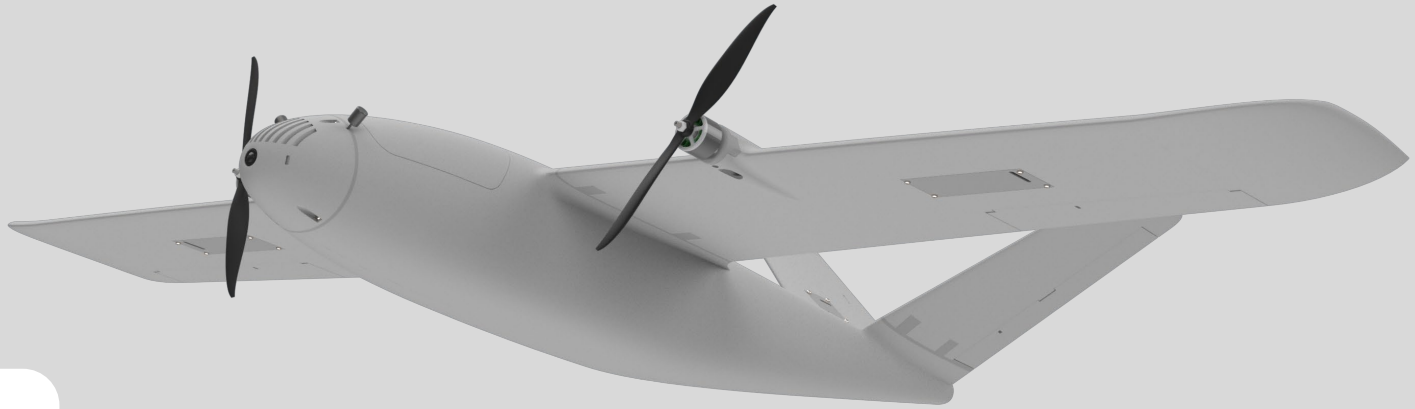
Battery Compartment:
Height: 90 mm
Length: 225 mm
Width: varies from 120 mm to 60 mm — the compartment narrows towards the nose of the fuselage.

Payload Compartment (Mapping Camera and Other Payload):
Height: 90 mm
Length: 140 mm
Width: 118 mm

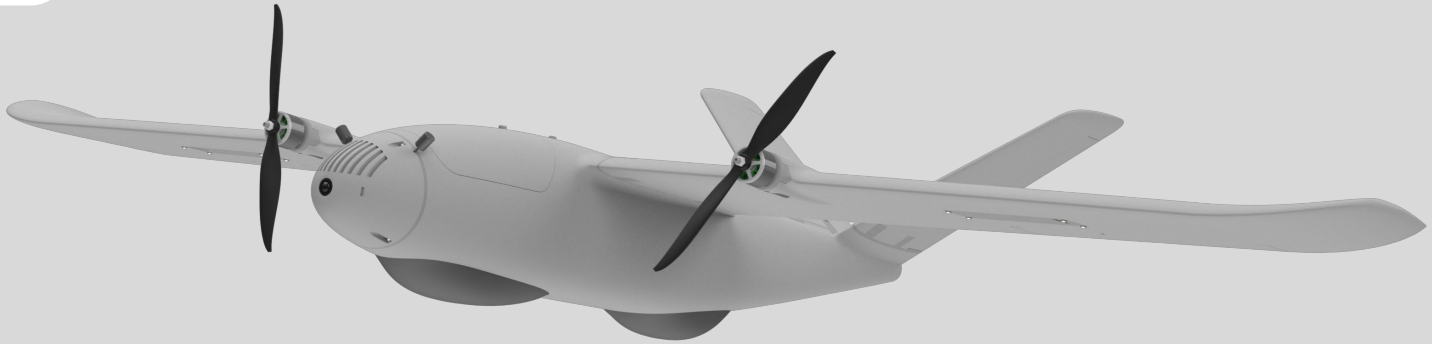
Electronics Compartment (Flight Controller and Other Electronics):
Height: 50 mm
Length: 200 mm
Width: 100 mm



FUSELAGE VARIANTS



The fuselage is available in two versions: with TPU-printed landing skids underneath, which help absorb impacts during landings in rough terrain, or without skids. All fuselage segment files that apply to the version with skids are appropriately labeled. Make sure to choose the correct version for your needs before printing.



RECCOMENDED EQUIPMENT

This section presents the recommended accessories and RC equipment needed to complete the entire aircraft. **This list, along with periodically updated store links, can also be found at the bottom of the aircraft description on the website.**

RECCOMENDED RC EQUIPMENT

COMPONENT	MODEL / SPECIFICATION
Motors	2x 28XX Motor e.g. BrotherHobby Avenger 2812 V5 910KV
Propellers	9-10 inch Propellers (one CW, one CCW)
Flight Controller	Speedybee F405 Wing or any other Mavlink FC
GPS	Matek M10Q or similar GPS with compass
Servos	4x EMAX ES08 MAII Metal Gear or similar
ESC	2x BlHeliS 35-60A
Battery	4S-6S Li-Ion / Li-Po
Receiver	Matek R24-D ELRS or similar
FPV Camera + VTX	Walksnail Avatar or any Digital or Analog VTX
FPV Goggles	Walksnail Goggles X or any other matching the chosen VTX

RECCOMENDED ACCESSPROES

ITEM	QUANTITY
10x1000mm Carbon Tube (MAIN SPAR)	1
8x1000mm Carbon Tube (SECONDARY SPAR)	1
6x500mm Carbon Tube (WING SPAR)	2
3x500mm Carbon Tube (AILERON HINGE)	2
8x285mm Carbon Tube (V TAIL SPAR)	2
6x130mm Carbon Tube(V TAIL SPAR)	2
3x270mm Carbon Tube (RUDDER HINGE)	2
Thick CA Glue	1-2 Tubes
CA Activator	1
M3 Threaded Insert (Outer Ø5mm, height 5mm)	20 (+ 8 optional)
M3x6mm Screw	20 (+ 8 optional)
M3x10mm Screw	4

ITEM	QUANTITY
Hot Glue (optional)	Small amount
Epoxy Glue (optional)	Small amount
LW-PLA / LW-ASA	1 roll
PC / PETG / other rigid material	Small amount
TPU (optional)	Small amount
Small Torsion Spring with Pin	8
Velcro Strap	2
Servo Extension Cable	4
Control Horn	4
Pushrod	4
MR60 Connector (optional)	2
MR30 Connector (optional)	2

POWERTRAIN SELECTION

There are multiple options for selecting the powertrain configuration, including the motor, propeller, and battery. Recommended motors are in the 28XX class, with propellers ranging from 9 to 10 inches, and batteries rated from 4S to 6S. The MOTOR MOUNT uses a 19x19 mm bolt pattern, which matches the recommended motor size. This component is also provided in STEP format for easy modification if a different bolt pattern is required.

EXAMPLE MOTOR AND PROP SETUP

A recommended motor for this aircraft is the BrotherHobby Avenger 2812 V5 910KV, which performs optimally with 9453 tri-blade or two-blade propellers and a 6S battery. According to the manufacturer's specifications, this setup delivers up to approximately 3800 g of thrust per motor at a maximum power of 1280W with a current draw of around 50A. This requires using an ESC rated at 60A (6S capable).
This setup fully utilizes the motor's performance potential and offers maximum available thrust for demanding applications.

It is worth noting that in recent years, brushless motor technology has significantly improved. Modern motors in the 28XX class are capable of delivering over 1200W of power and exceptionally high thrust, which was not achievable with this motor size just a few years ago. This is a result of advancements in materials, winding efficiency, cooling design, and overall manufacturing quality.

As a result, the market trend has shifted towards motors optimized for higher voltage systems, particularly 6S setups, which now dominate availability in this size class. However, this does not limit the possibility of operating these motors effectively on 4S systems, depending on user preferences and mission requirements.

POWERTRAIN SELECTION

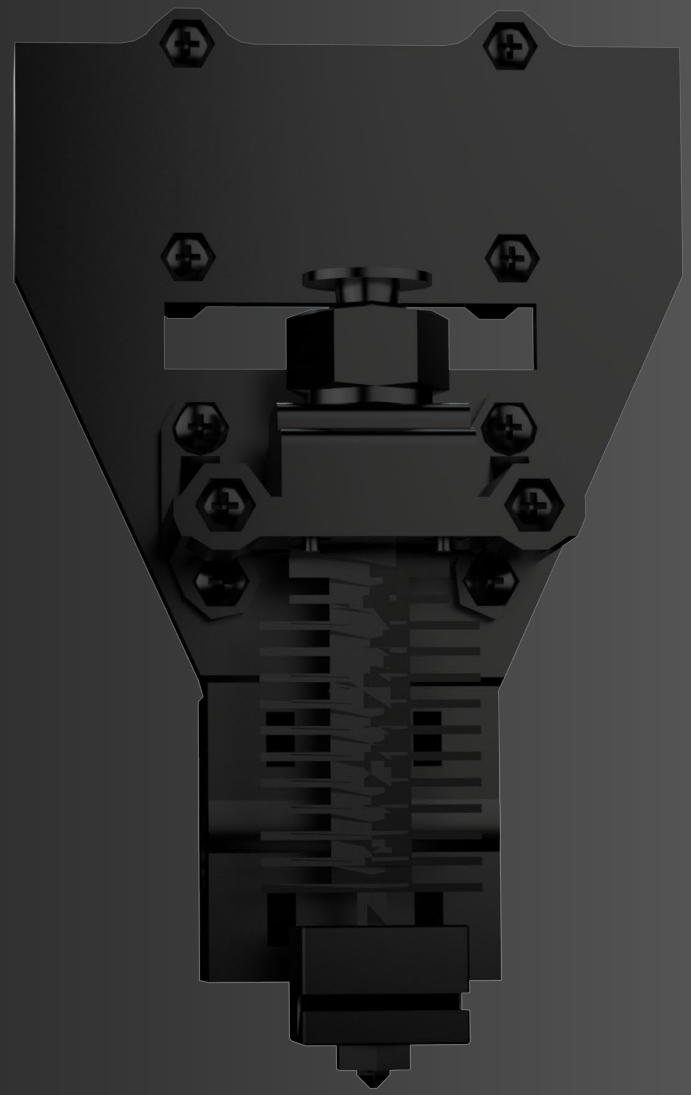
FLEXIBLE OPERATION WITH 4S

While the 6S configuration allows the motors to deliver maximum thrust and performance, the same setup can be operated very effectively with a 4S battery, offering a more efficient and lighter alternative without compromising flight capabilities. In this case, it is recommended to use a slightly larger propeller, such as a 10x6 two-blade, to compensate for the lower RPM resulting from the reduced voltage. This results in proportionally lower motor speed and a significantly reduced current draw, which allows for the use of smaller and lighter ESCs rated at 35–40A for 4S. At the same time, the overall system weight decreases, providing the option to use larger capacity 4S batteries. Despite the lower voltage, the total thrust generated by two motors remains around 4000 grams, which is fully sufficient for this aircraft's design and operational requirements.

Prototype testing confirmed that during cruise flight with a 4S battery and 10x6 propellers, the required throttle setting was below 50%, demonstrating efficient power utilization and good endurance potential.

The main reason for choosing 4S operation is the current state of the market, which is heavily saturated with high-performance motors optimized for 6S in this size class. Finding lighter motors designed specifically for 4S that could match or exceed this performance is challenging. For this reason, using a motor like the BrotherHobby 2812 V5 910KV, even when operating on 4S remains a practical and efficient solution. Although this setup does not fully utilize the maximum power capabilities of the motor, it offers several important advantages, including improved efficiency during cruise flight, a lower total system weight, the use of smaller and more cost-efficient ESCs, and the ability to select 4S batteries with higher capacity while maintaining similar weight compared to smaller 6S packs.

This flexible approach allows users to tailor the system to their needs. Whenever the mission demands higher thrust, greater payload, or higher airspeed, the same airframe can be seamlessly scaled by switching to 6S batteries and appropriate ESCs, immediately unlocking the full performance potential of the motors without requiring any changes to the mechanical setup.



PRINT SETTINGS

PRINT SETTINGS

This aircraft is designed with optimization for LW-PLA / LW-ASA filaments, reinforced with additional components printed from PC, PETG, or other rigid materials. All parts are designed to fit within a print volume of 220x220x200 mm. The entire design is tailored for printers equipped with 0.4 mm nozzles.

GENERAL GUIDLINES

- All airframe components should be printed using lightweight filaments (LW-PLA, LW-ASA) with single-wall construction.

- Fuselage sections: Recommended to print with gyroid infill between 3% and 6%.

- Wings: Use 2D Lattice infill, or optionally Cubic Subdivision, with an infill density between 3% and 4%.This approach ensures an optimal balance between strength and low weight while allowing flexibility for tuning print settings.

- For reinforcement parts that require higher strength, it is essential to use rigid and durable materials such as PETG, PC, ABS, or others . These components should be printed using the default print settings for the selected material and the standard strength profiles available in your slicer, ensuring reliable performance without the need for extra configurations.

SUPPORTS AND WALL SETTINGS

- All airframe parts are designed to be printed without supports and with a single wall. (This applies to LW components; reinforcement parts can have a higher wall count.) Some files include pre-designed supports, which is indicated in the file name.

- Some components may benefit from adding supports touching the build plate, or increased wall count for improved strength in specific areas. These exceptions are clearly marked and explained in the *Parts Orientation* section of this manual.

PRINT SETTINGS

PART LIST AND MATERIAL ASSIGNMENT

- The **PART LIST** section contains a complete list of all files required for assembly.

- Each file is accompanied by a clear recommendation regarding: The type of material it should be printed with (e.g. LW-PLA, LW-ASA, PETG, PC, etc.).

PRINT SETTINGS AND PROFILES

- Complete print settings, including filament breakdown and settings for Active Foaming and Prefoamed filaments, are available on our website under the **“PRINT SETTINGS”** tab.

- You will find: Pre-configured profiles for PLA Aero and ASA Aero for Bambulab printers - ready to use out of the box and general configuration templates for Active Foaming and Prefoamed LW-PLA for Cura, providing a reliable starting point for further tuning.

- Currently, we primarily focus on testing and validating settings in Orca Slicer, Bambu Studio and Cura.

PRINTING VARIABLES AND TUNING

Printing results may vary depending on several factors, such as the printer model, filament brand, filament moisture levels, ambient conditions like temperature and humidity, as well as whether the printer is equipped with an enclosed chamber. These variables can influence print quality, strength, and weight. Because of this, achieving optimal results often requires fine-tuning key parameters, particularly printing temperature, flow rate, and retraction settings. In most cases, only minor adjustments are necessary to reach excellent quality. It is strongly recommended to perform test prints when changing filaments, switching printers, or printing in different environmental conditions, in order to refine the settings for the best possible outcome.

PRINT SETTINGS

FINAL NOTES

Achieving optimal results is feasible on the majority of modern 3D printers, provided that appropriate calibration and parameter tuning are performed. Variability in printer hardware, filament manufacturers, material properties, and operating conditions such as ambient temperature, humidity levels, and the presence or absence of an enclosed build chamber, can all have a measurable impact on print quality. As a result, full standardization of print settings across all equipment and environments is not possible.

The provided print profiles and configuration guidelines serve as a reliable baseline; however, minor adjustments to parameters such as temperature, flow rate, or retraction may be required to achieve the intended balance of strength, weight, and surface quality specific to each user's setup.

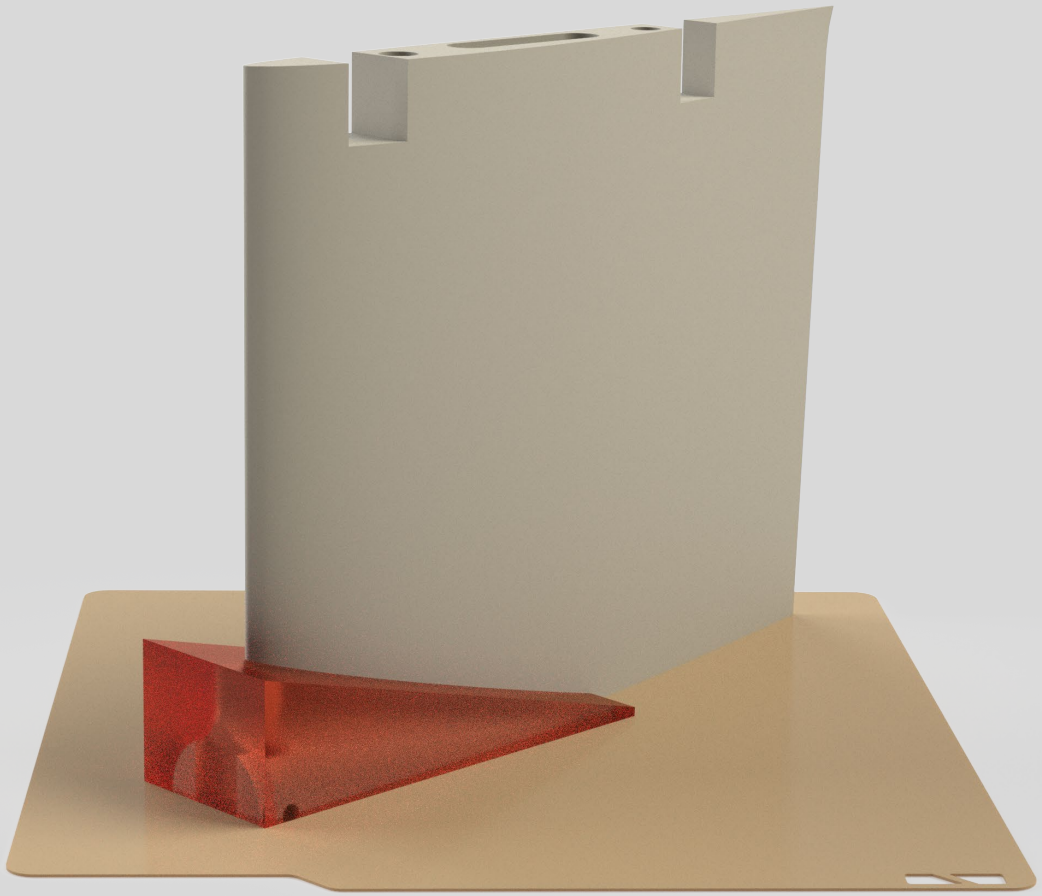
To facilitate consistency and knowledge sharing across different hardware configurations, an online user community is maintained via Discord. This platform serves as a technical resource where users can exchange verified print profiles, discuss material-specific settings, share build results, and troubleshoot technical challenges related to the printing process.

MOFIDIERS

USING FILES WITH MODIFIERS

The package includes WING1 MODIFIER and WING2 MODIFIER files in STEP format, which contain an additional solid in the motor mount area. This prepared file can be opened and sliced directly in the slicer by setting the additional solid as a modifier. This allows you to apply different print settings, such as increasing the number of walls to 2–3 and the infill density to 5–10%. These changes will only affect the overlapping volume between the wing and the modifier solid.

This method significantly strengthens the motor mount area, where higher forces are applied. You can also create your own modifiers directly in the slicer or in any CAD software and plan additional reinforcements if needed for your specific use case. This ready-made solution is provided in the package and can be used directly in the slicer.



PARTS LIST - FUSELAGE

PART	MATERIAL
FUS 1 / FUS 2 SKIDS	LW-PLA/ASA
FUS 2 / FUS 2 SKIDS	LW-PLA/ASA
FUS 3 / FUS 3 SKIDS / + SUPPORTS	LW-PLA/ASA
FUS 4 / FUS 4 SKIDS	LW-PLA/ASA
FUS 5 / FUS 5 SKIDS	LW-PLA/ASA
FUS 6 / FUS 6 SKIDS	LW-PLA/ASA
HATCH FRONT 1	LW-PLA/ASA
HATCH FRONT 2	LW-PLA/ASA
HATCH MIDDLE 1	LW-PLA/ASA
HATCH MIDDLE 2 / VENT	LW-PLA/ASA
NOSE / NOSE CLEAN	LW-PLA/ASA

PART	MATERIAL
BATTERY PAD	PC / PETG
FC PAD / FC PAD PATTERN	PC / PETG
FUS ROOT L / R	PC / PETG
TAIL ROOT L / R	PC / PETG
LOCK 1	PC / PETG
LOCK 2	PC / PETG
LOCK 3	PC / PETG
SKIDS FRONT 1	PC / PETG
SKIDS FRONT 2	PC / PETG
SKIDS REAR 1	TPU
SKIDS REAR 2	TPU

PARTS LIST - WINGS

PART	MATERIAL
WING 1 L / R	LW-PLA/ASA
WING 2 L / R	LW-PLA/ASA
WING 3 L / R	LW-PLA/ASA
WINGTIP L / R	LW-PLA/ASA
AIL 1 L / R	LW-PLA/ASA
AIL 2 L / R	LW-PLA/ASA
MOTOR MOUNT L / R	PC / PETG
WING SERVO PLATE L / R	PC / PETG

PART	MATERIAL
WING SERVO COVER L / R	PC / PETG
WING ROOT L / R	PC / PETG
WING LOCK BASE	PC / PETG
WING LOCK FRONT L / R	PC / PETG
WING LOCK REAR L / R	PC / PETG
WING CONNECTOR BASE	PC / PETG
WING CONNECTOR MR60 FEMALE	PC / PETG
WING CONNECTOR MR60 MALE	PC / PETG

PARTS LIST - VTAIL

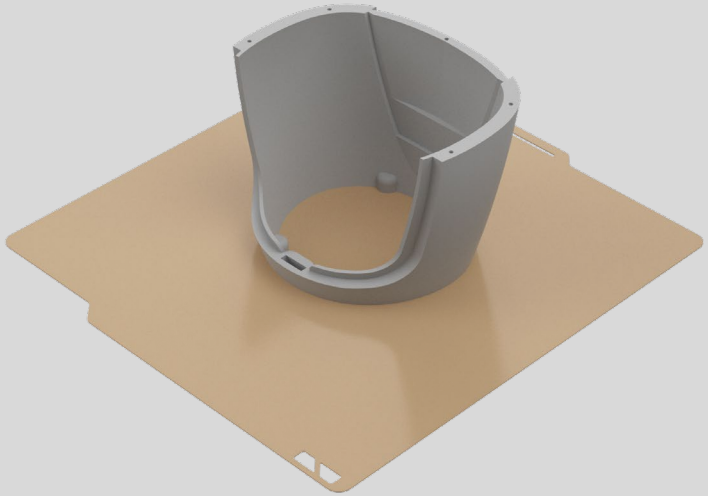
PART	MATERIAL
VTAIL 1 L / R	LW-PLA/ASA
VTAIL 2 L / R	LW-PLA/ASA
VTAIL 3 L /R	LW-PLA/ASA
RUDDER 1 L / R	LW-PLA/ASA
RUDDER 2 L / R	LW-PLA/ASA
VTAIL ROOT L / R	PC / PETG
VTAIL SERVO PLATE L / R	PC / PETG

PART	MATERIAL
VTAIL SERO COVER L / R	PC / PETG
VTAIL LOCK BASE	PC / PETG
VTAIL LOCK FRONT L / R	PC / PETG
VTAIL LOCK REAR L / R	PC / PETG
VTAIL CONNECTOR BASE	PC / PETG
VTAIL CONNECTOR MR30 FEMALE	PC / PETG
VTAIL CONNECTOR MR30 MALE	PC / PETG

STEP FILES LIST

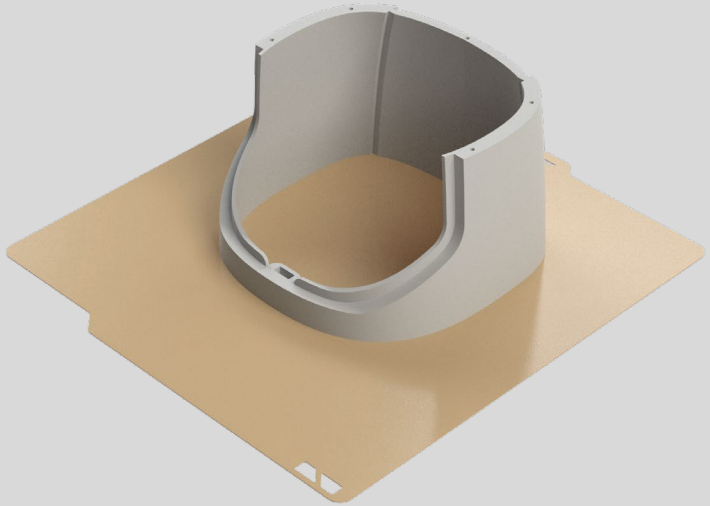
PART	PART	PART
FUS 3 / FUS 3 SKIDS	RUDDER 1 L	WING 2 L MODIFIER
NOSE / NOSE CLEAN / NOSE CUSTOM	RUDDER 2 L	WINGTIP L
HATCH FRONT 1	VTAIL SERVO PLATE V L	BATTERY PAD
HATCH FRONT 2	VTAIL SERVO COVER L	FC PAD
HATCH MIDDLE 1	VTAIL CONNETCTOR MR30 FEMALE	SKIDS FRONT 1
HATCH MIDDLE 2 / VENT	VTAIL CONNECTOR MR30 MALE	SKIDS FRONT 2
MOTOR MOUNT L	WING SERVO PLATE L	SKIDS REAR 1
AIL 1	WING SERVO COVER L	SKIDS REAR 2
AIL 2	WING 1 L MODIFIER	SKIDS FRONT 2

PARTS ORIENTATION



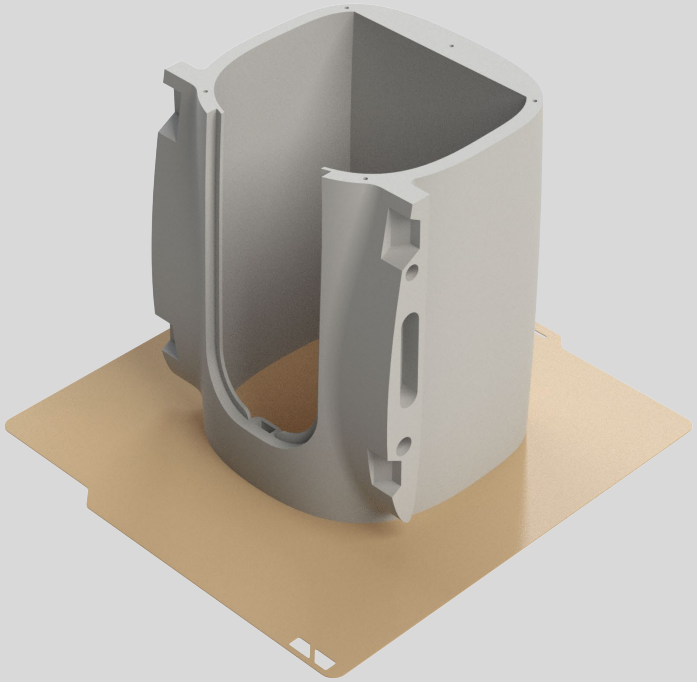
FUS1/FUS1SKIDS

3%-6% GYROID INFILL



FUS2/FUS2SKIDS

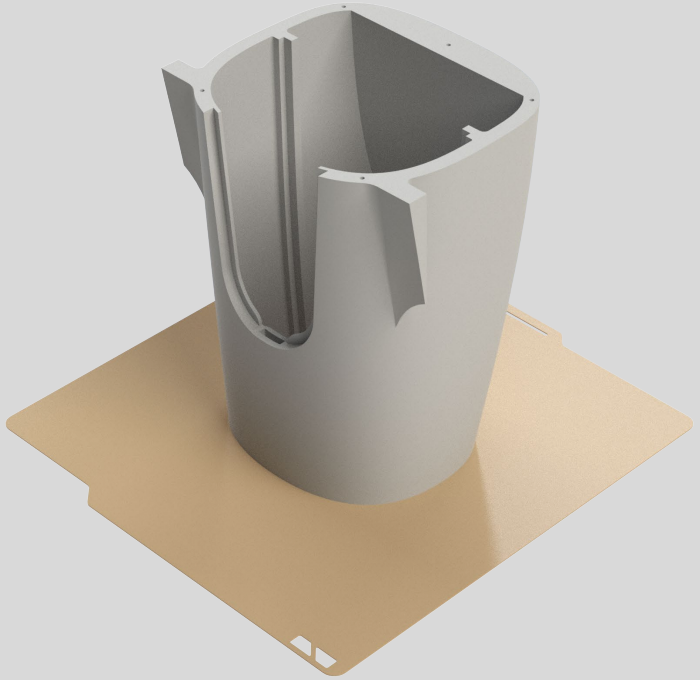
3%-6% GYROID INFILL



FUS3/FUS3SKIDS

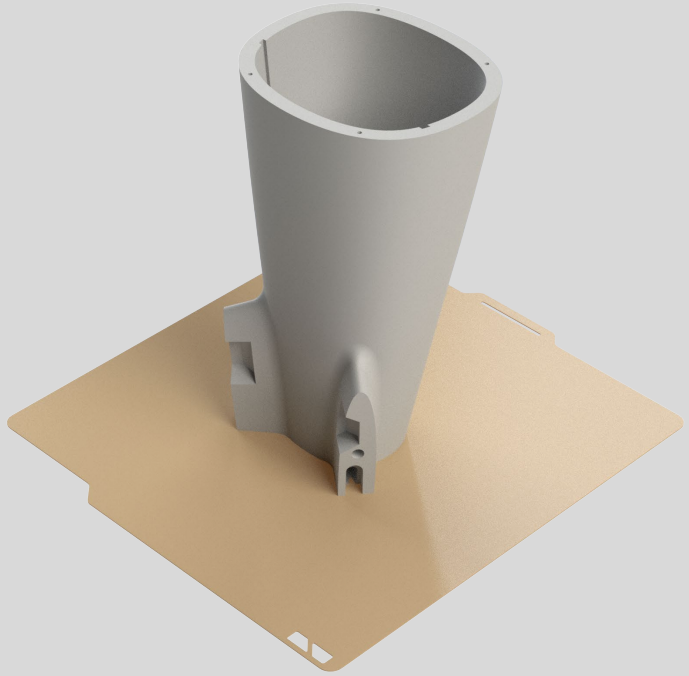
3%-6% GYROID INFILL

PARTS ORIENTATION



FUS4/FUS4SKIDS

3%-6% GYROID INFILL



FUS5/FUS5SKIDS

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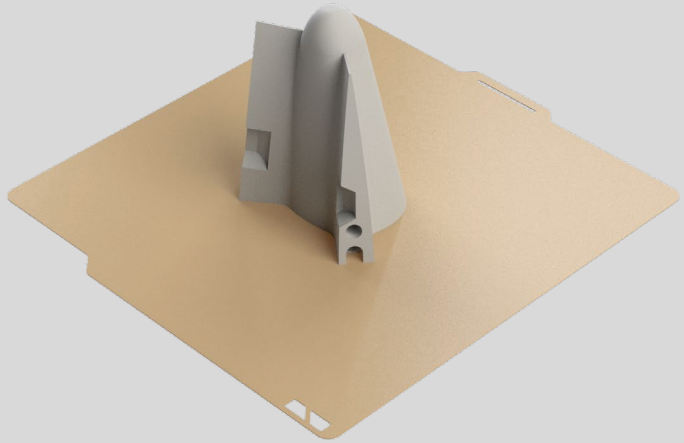
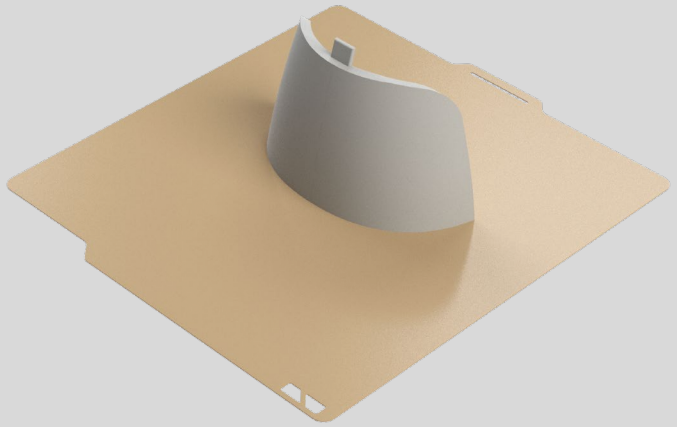


FUS6/FUS6SKIDS

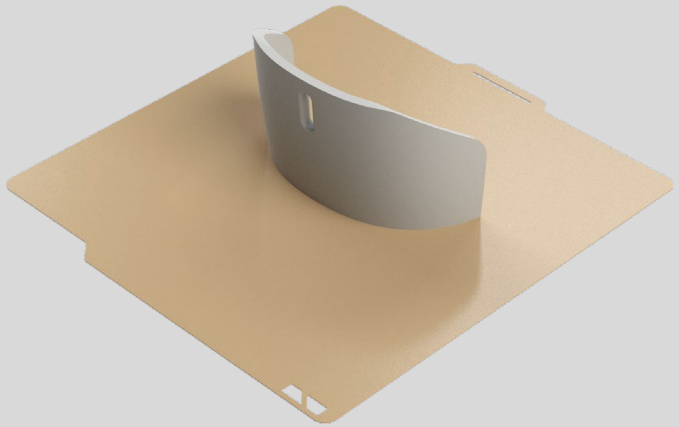
3%-6% GYROID INFILL

PARTS ORIENTATION



HATCH FRONT 1

3%-6% GYROID INFILL



HATCH FRONT 2

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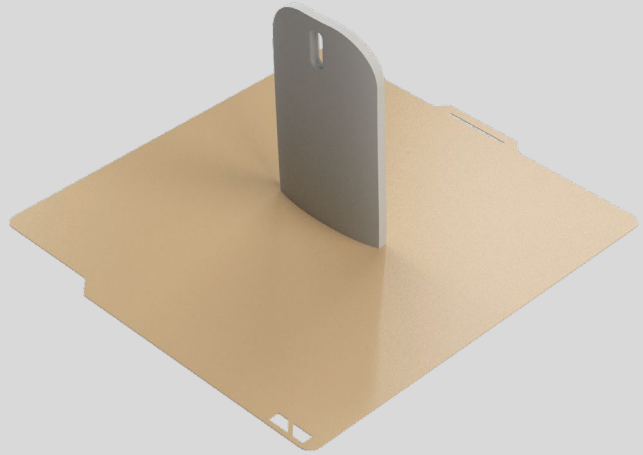
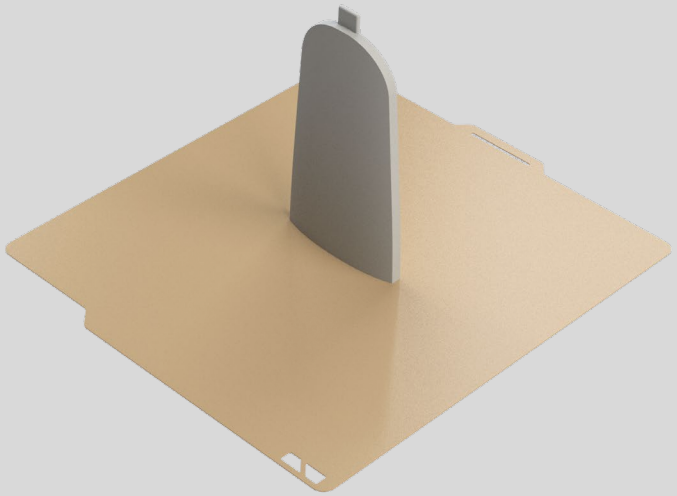


HATCH MIDDLE 1

3%-6% GYROID INFILL

PARTS ORIENTATION



HATCH MIDDLE 2

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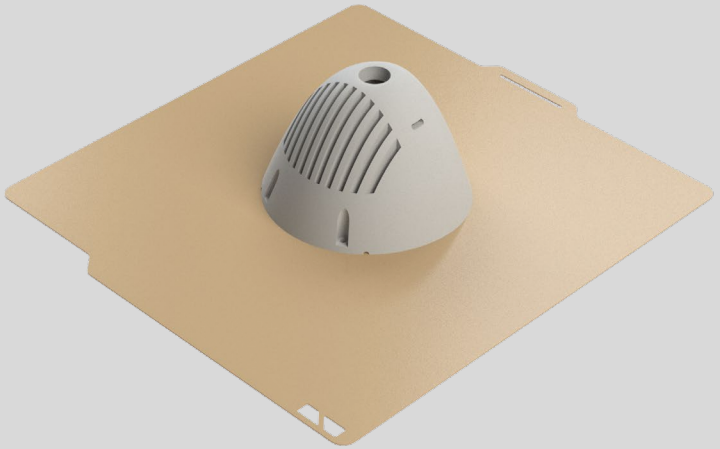
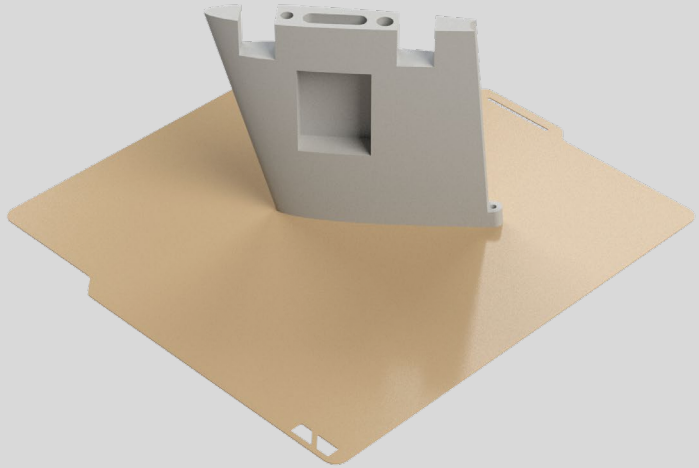


NOSE

2 WALLS

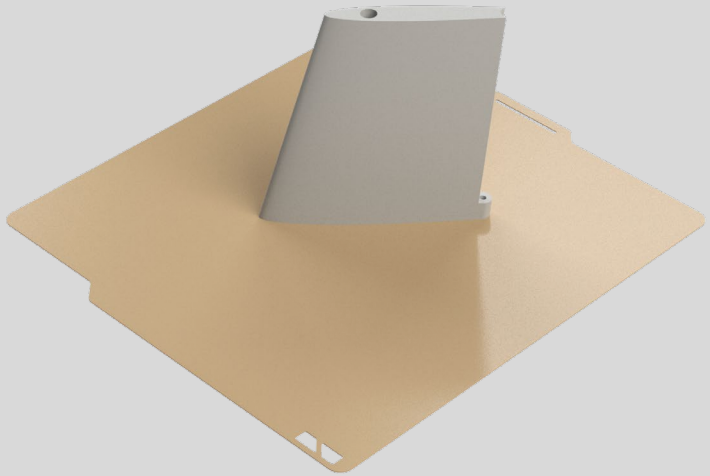
3%-6% GYROID INFILL



VTAIL 1

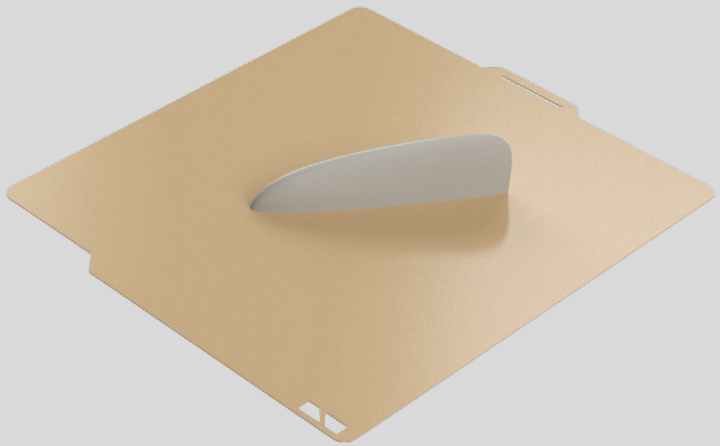
3%-6% GYROID INFILL

PARTS ORIENTATION



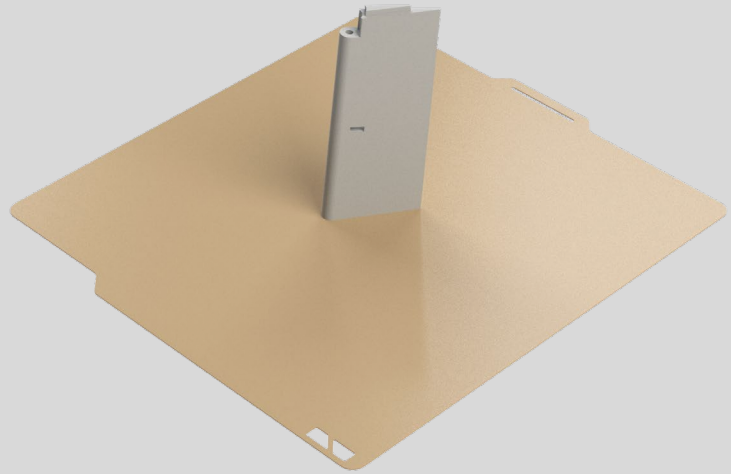
VTAIL2

3%-6% GYROID INFILL



VTAIL3

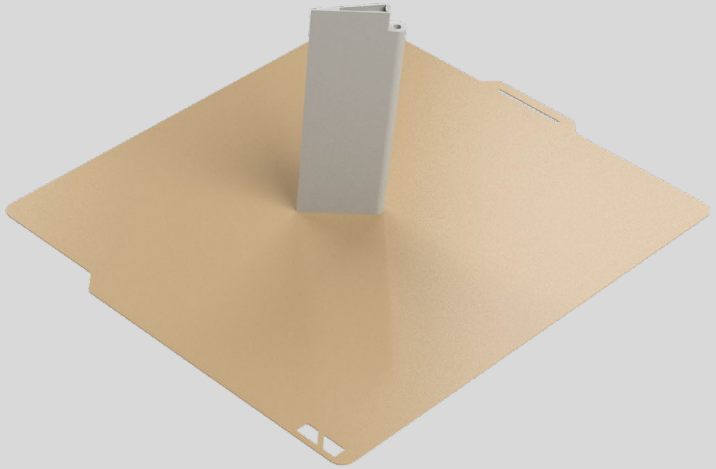
3%-6% GYROID INFILL



RUDDER1

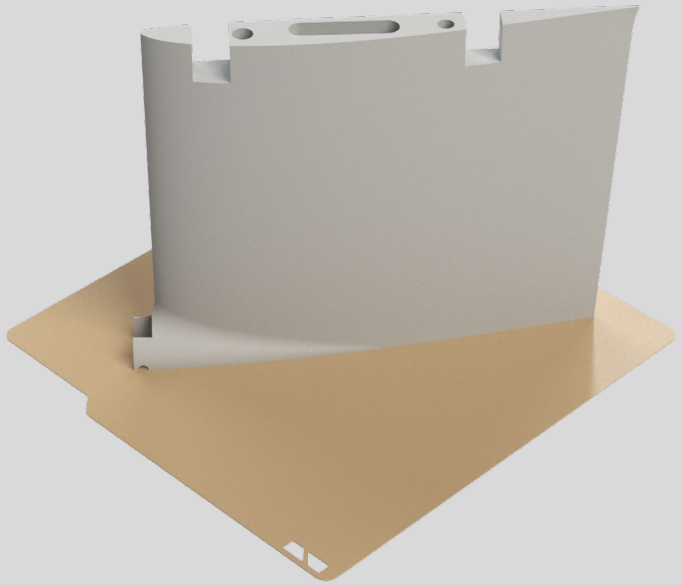
3%-6% GYROID INFILL

PARTS ORIENTATION



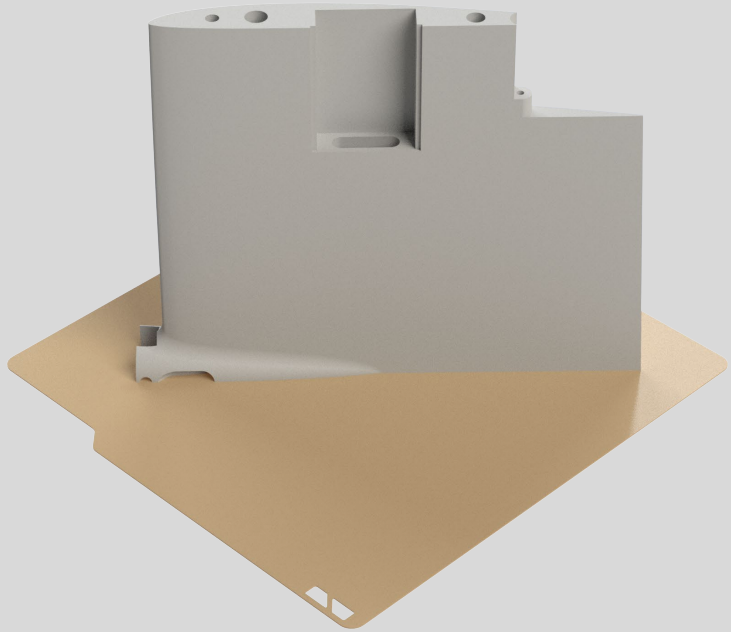
RUDDER 2

3%-6% GYROID INFILL



WING 1

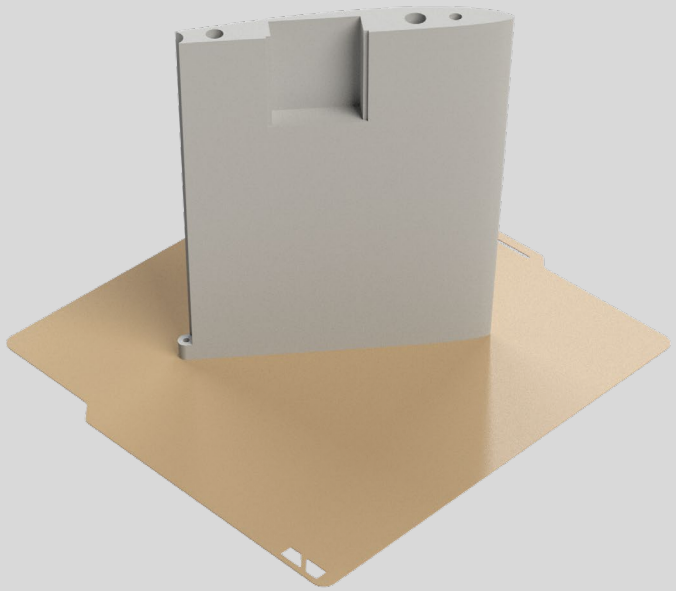
3%-4% 2D LATTICE INFILL



WING 2

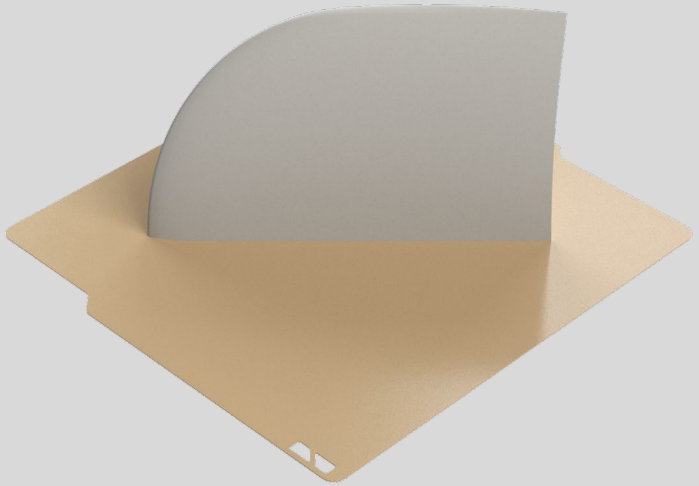
3%-4% 2D LATTICE INFILL

PARTS ORIENTATION



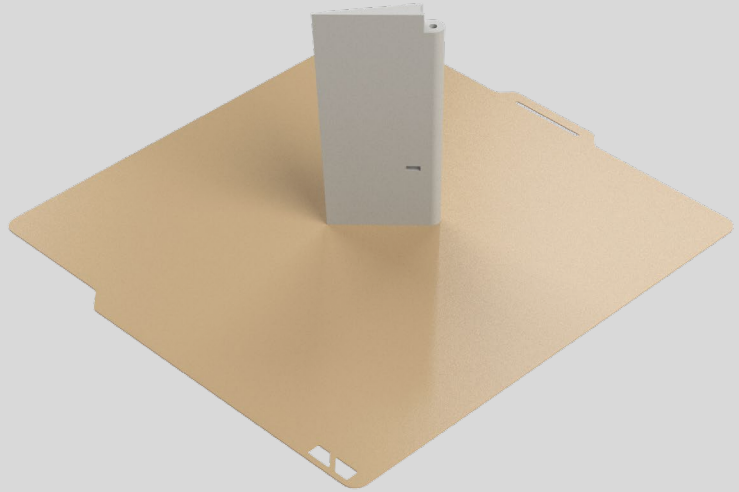
WING 3

3%-4% 2D LATTICE INFILL



WINGTIP

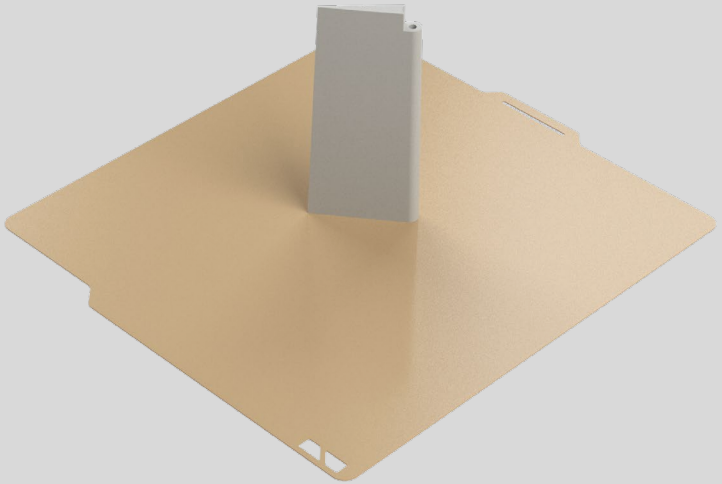
3%-4% 2D LATTICE INFILL



AIL 1

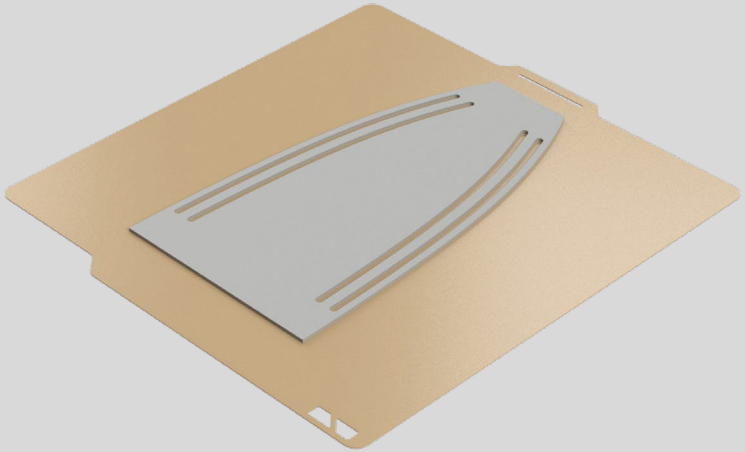
3%-6% GYROID INFILL

PARTS ORIENTATION



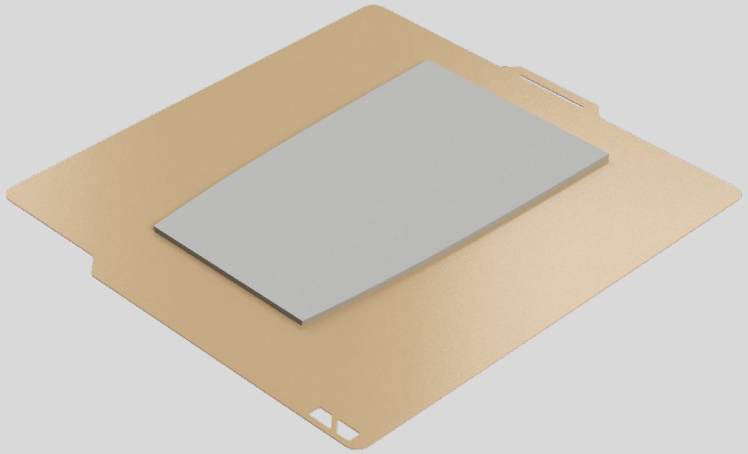
AIL 2

3%-6% GYROID INFILL



BATTERY PAD

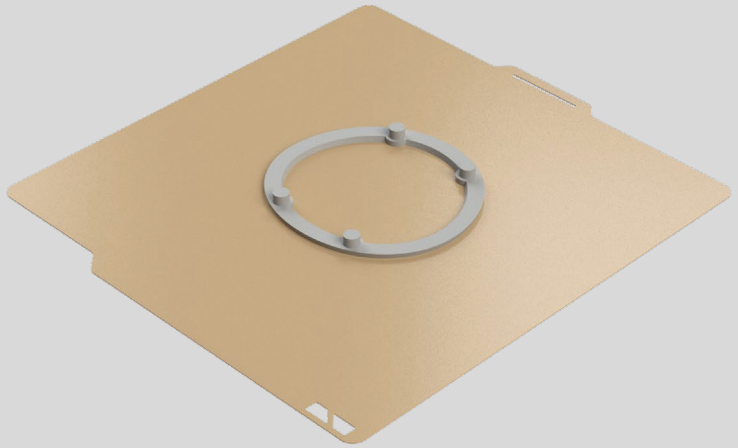
20%-100% GRID INFILL



FC PAD

20%-100% GRID INFILL

PARTS ORIENTATION



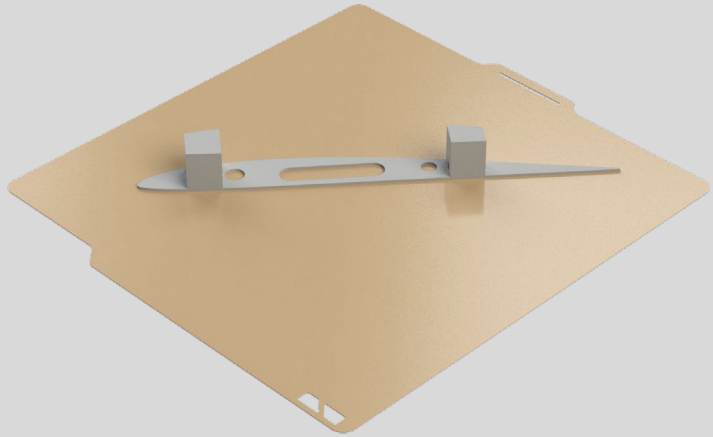
FRONT REINFORCEMENT

GENERATE SUPPORTS

20%-100% GRID INFILL

FUS ROOT

20%-100% GRID INFILL

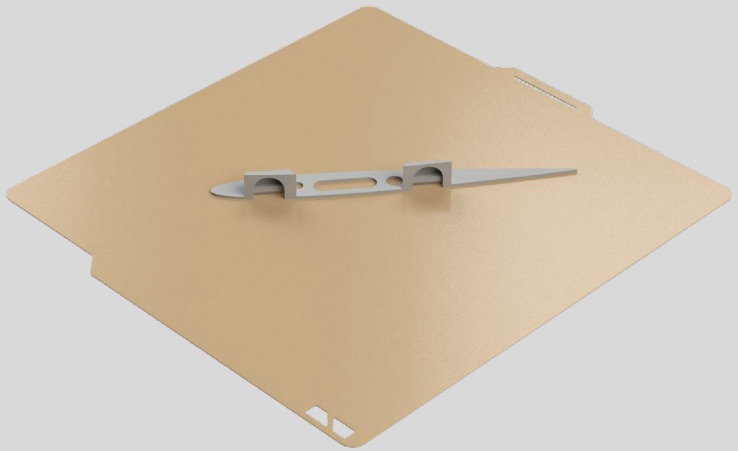


WING ROOT

GENERATE SUPPORTS

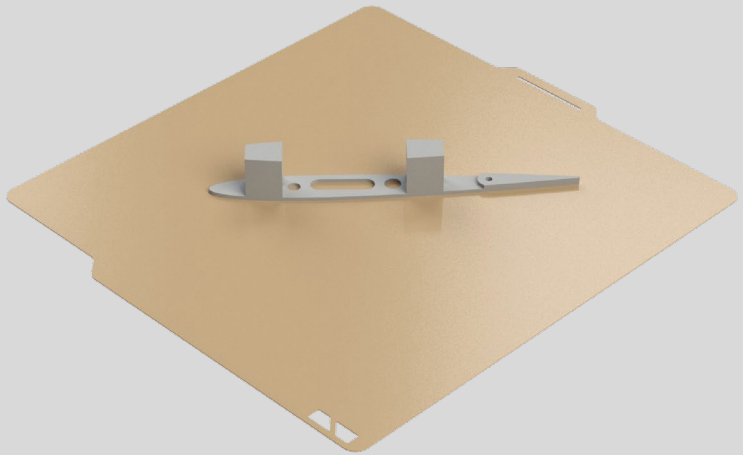
20%-100% GRID INFILL

PARTS ORIENTATION



TAIL ROOT

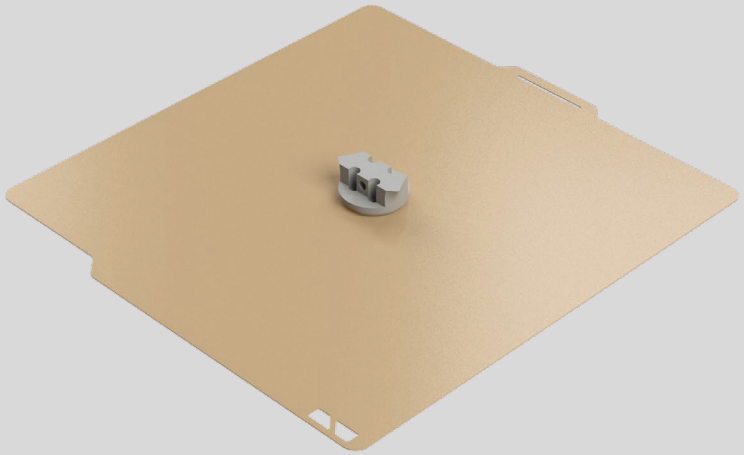
20%-100% GRID INFILL



VTAIL ROOT

GENERATE SUPPORTS

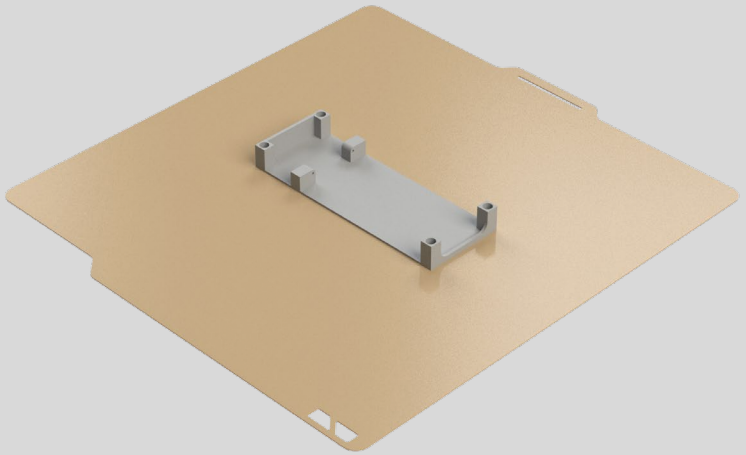
20%-100% GRID INFILL



MOTOR MOUNT

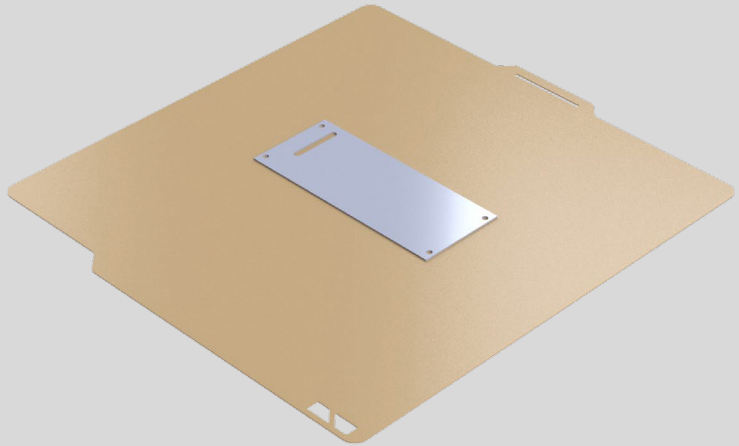
20%-100% GRID INFILL

PARTS ORIENTATION



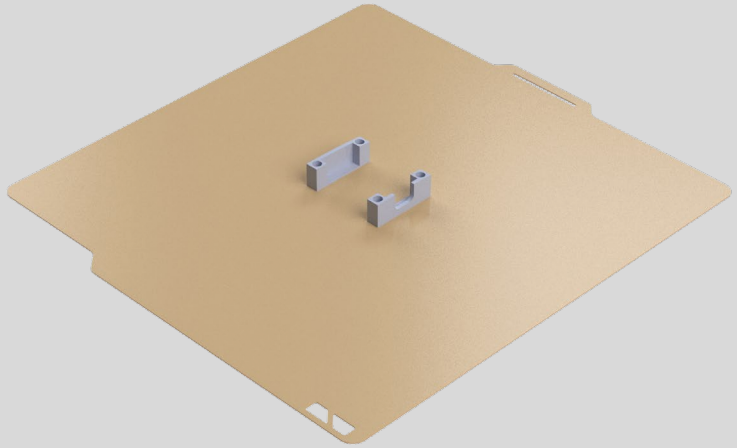
WING SERVO PLATE

20%-100% GRID INFILL



WING SERVO COVER

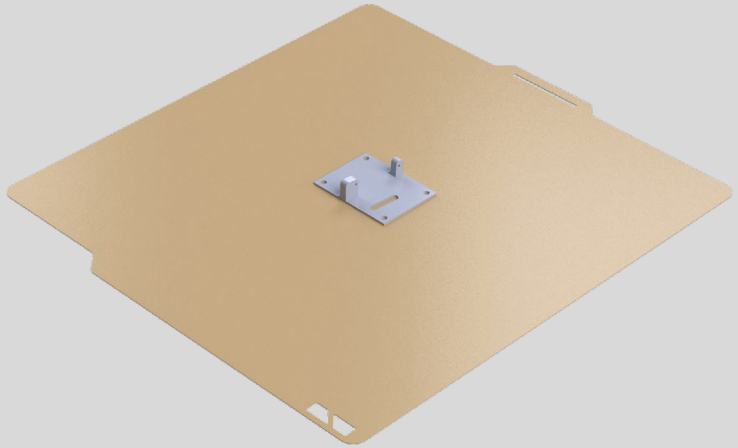
20%-100% GRID INFILL



VTAIL SERVO PLATE

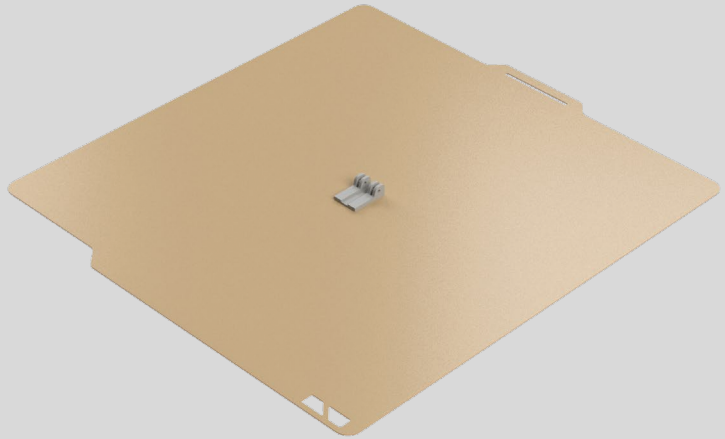
20%-100% GRID INFILL

PARTS ORIENTATION



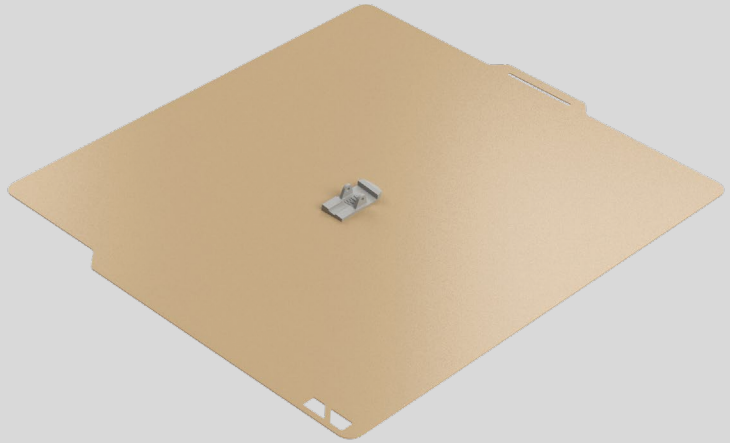
VTAIL SERVO COVER

20%-100% GRID INFILL



WING/VTAIL LOCK BASE

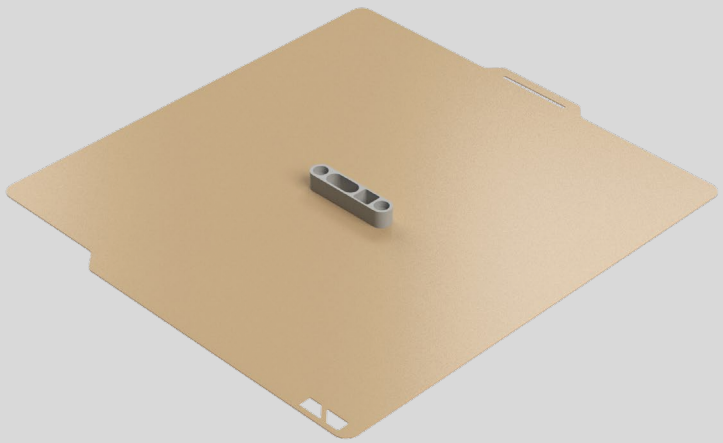
20%-100% GRID INFILL



WING LOCK

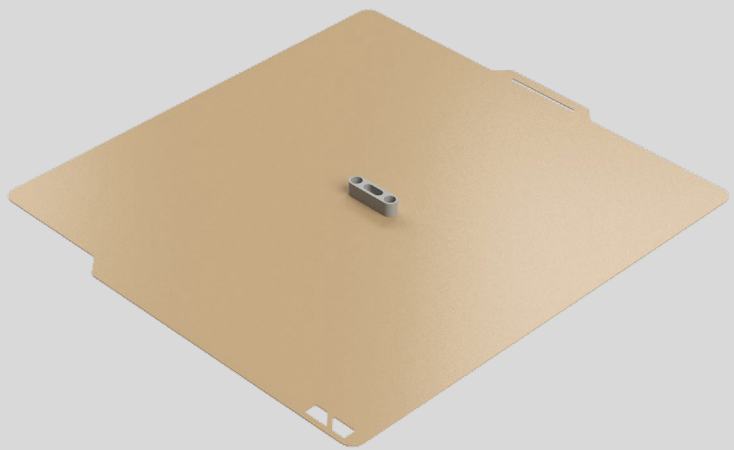
20%-100% GRID INFILL

PARTS ORIENTATION



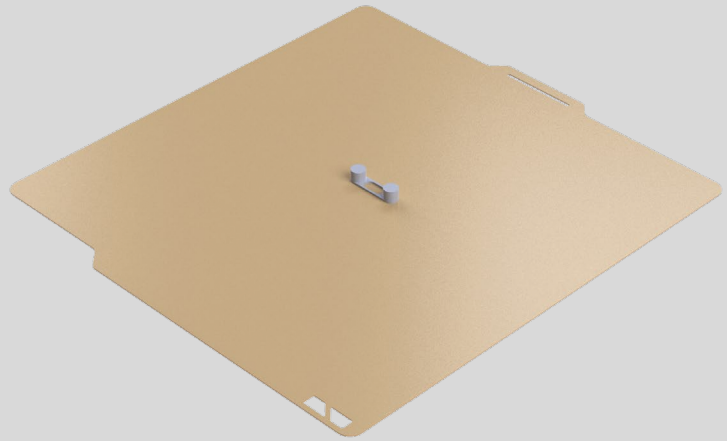
WING CONNECTOR MALE/FEMALE

20%-100% GRID INFILL



VTAIL CONNECTOR MALE/FEMALE

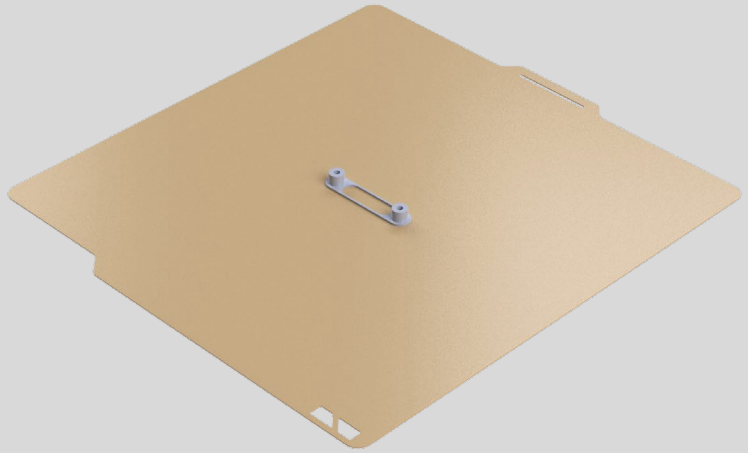
20%-100% GRID INFILL



VTAIL CONNECTOR BASE

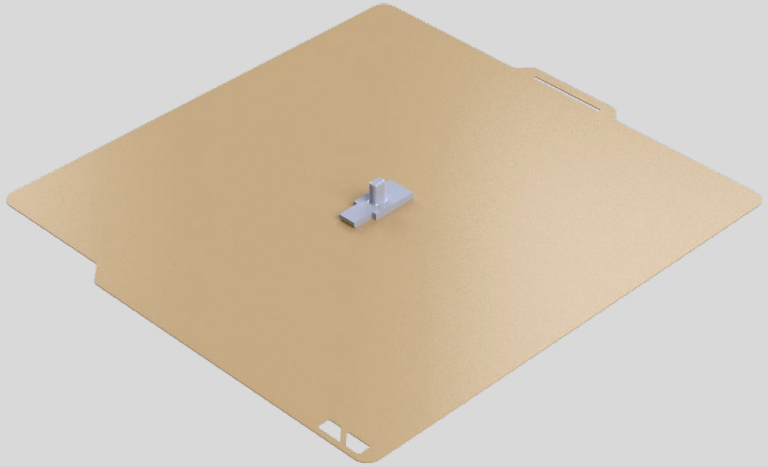
20%-100% GRID INFILL

PARTS ORIENTATION



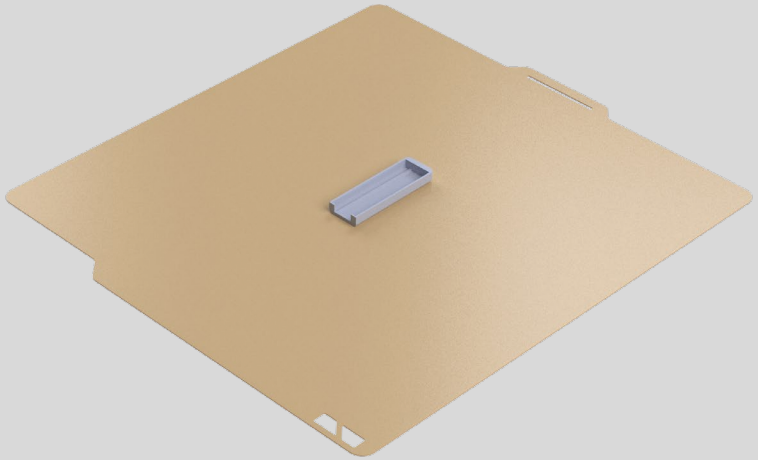
WING CONNECTOR BASE

20%-100% GRID INFILL



LOCK 1

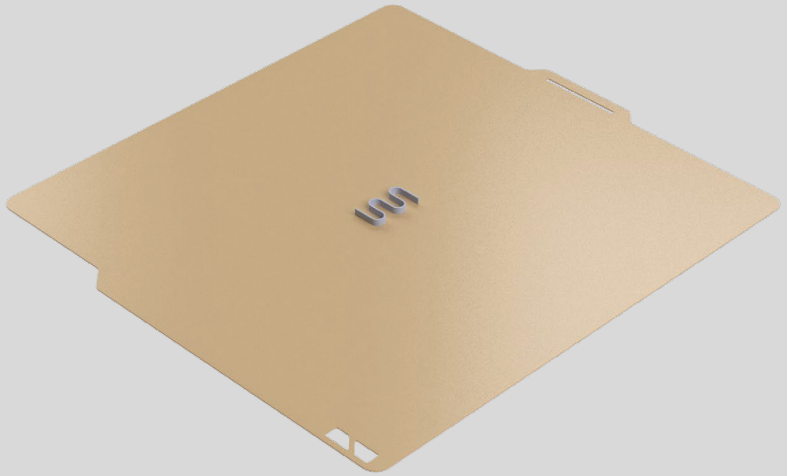
20%-100% GRID INFILL



LOCK 2

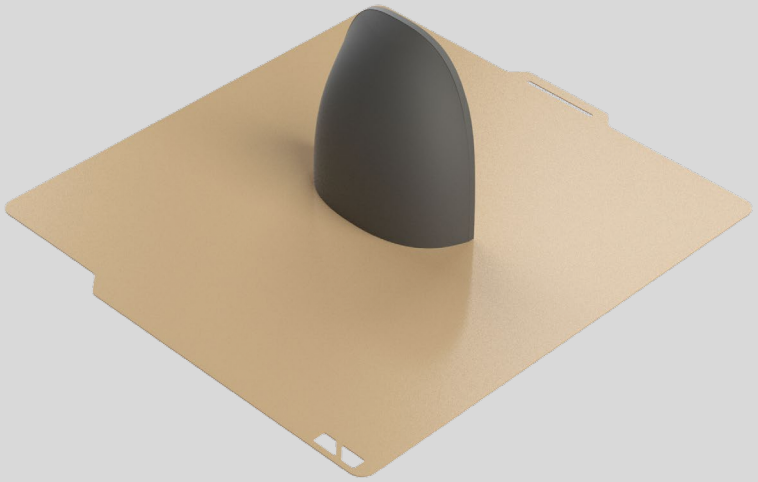
20%-100% GRID INFILL

PARTS ORIENTATION



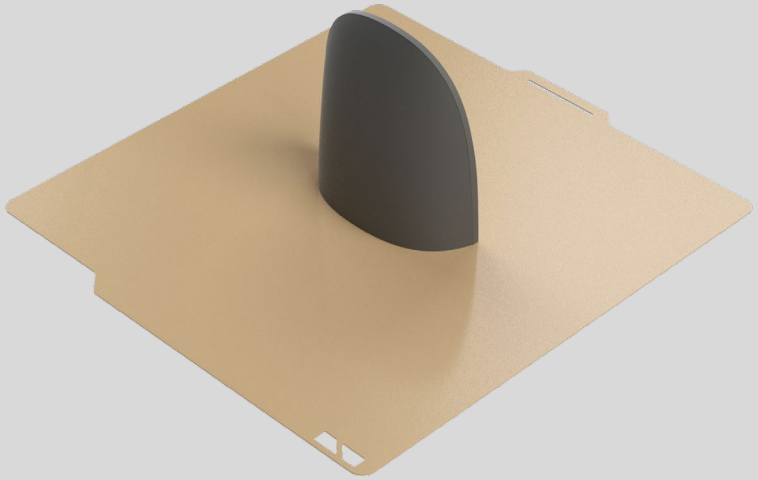
LOCK 3

20%-100% GRID INFILL



SKIDS FRONT 1

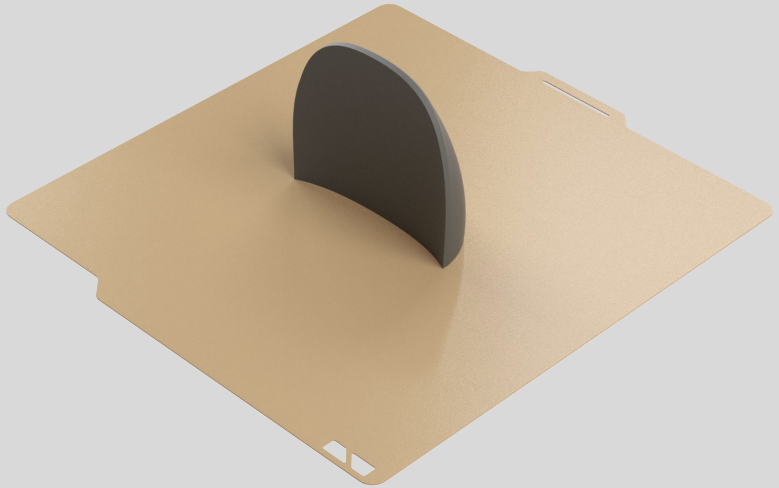
2%-4% GRID INFILL



SKIDS FRONT 2

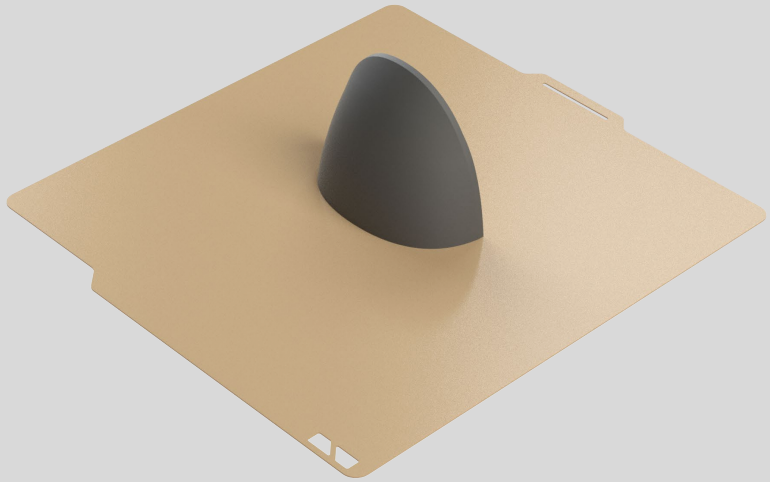
2%-4% GRID INFILL

PARTS ORIENTATION



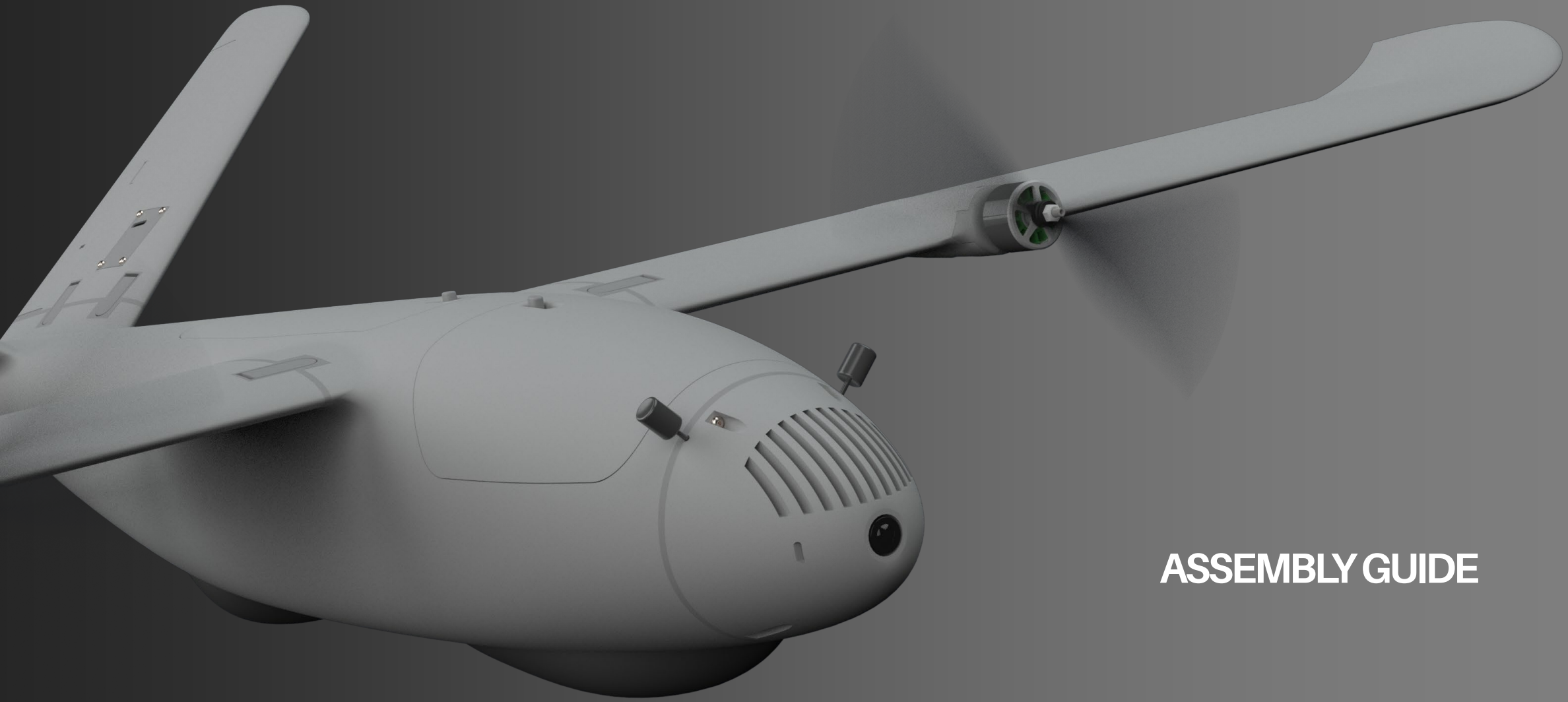
SKIDS REAR 1

20%-100% GRID INFILL



SKIDS REAR 2

2%-4% GRID INFILL

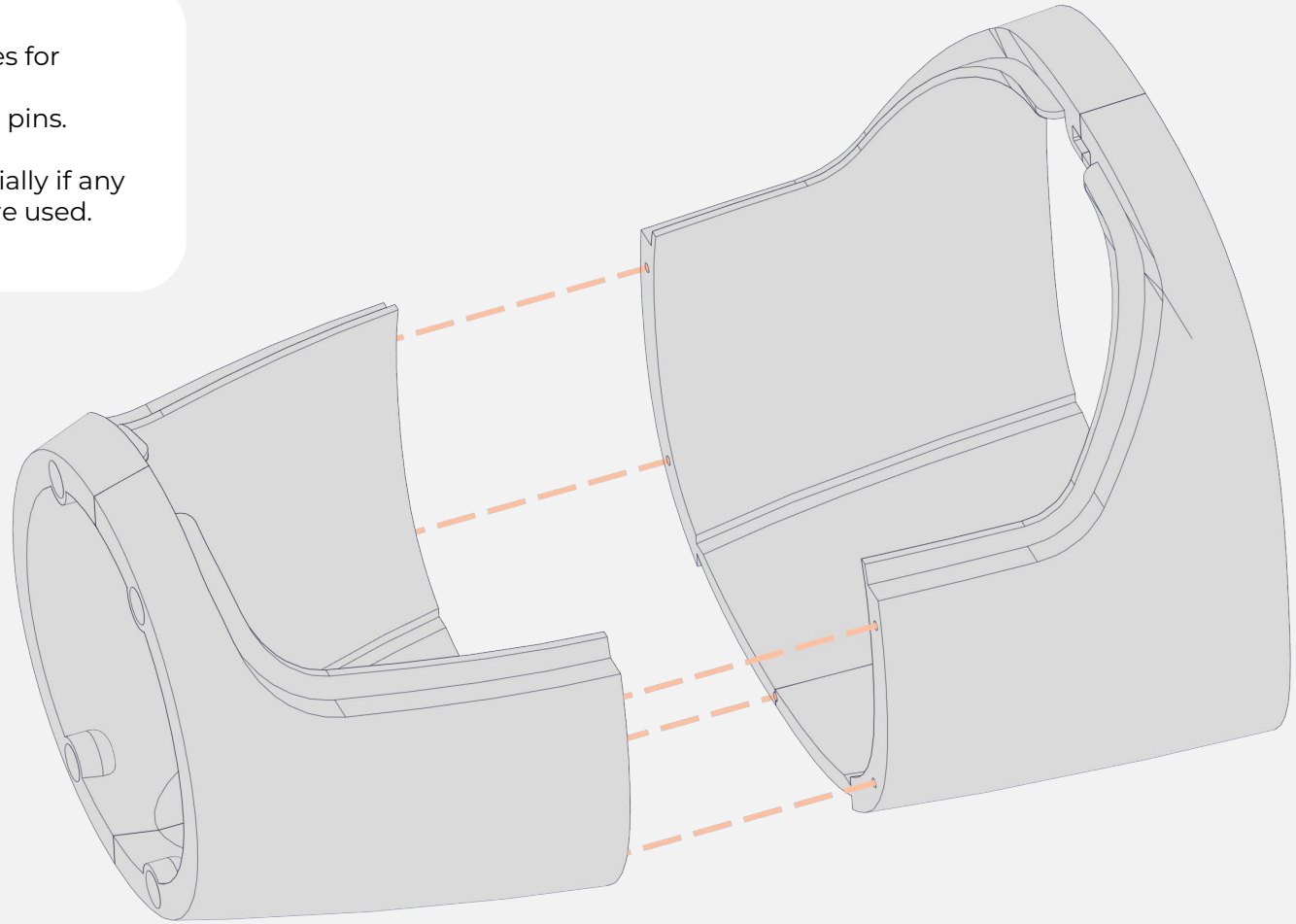


ASSEMBLY GUIDE

FUSELAGE ASSEMBLY

The fuselage segments are designed with small 2 mm holes for alignment pins, which help align the parts during gluing.
The best option for this is to use short pieces of filament as pins.

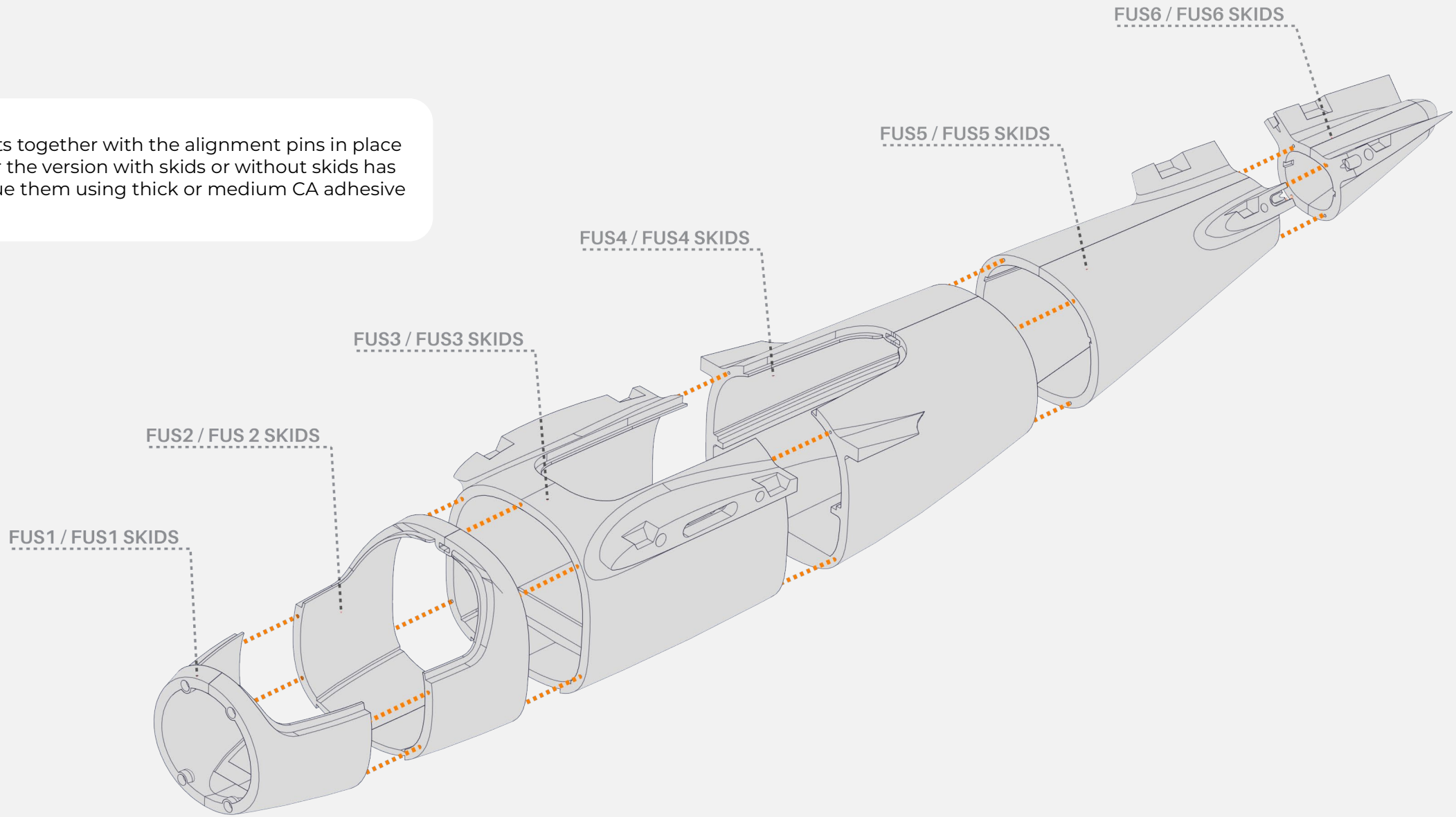
Before gluing, it is recommended to clean the parts, especially if any stringing occurred, and to remove any supports if they were used.



FUSELAGE ASSEMBLY

Fit all fuselage segments together with the alignment pins in place (depending on whether the version with skids or without skids has been selected), then glue them using thick or medium CA adhesive

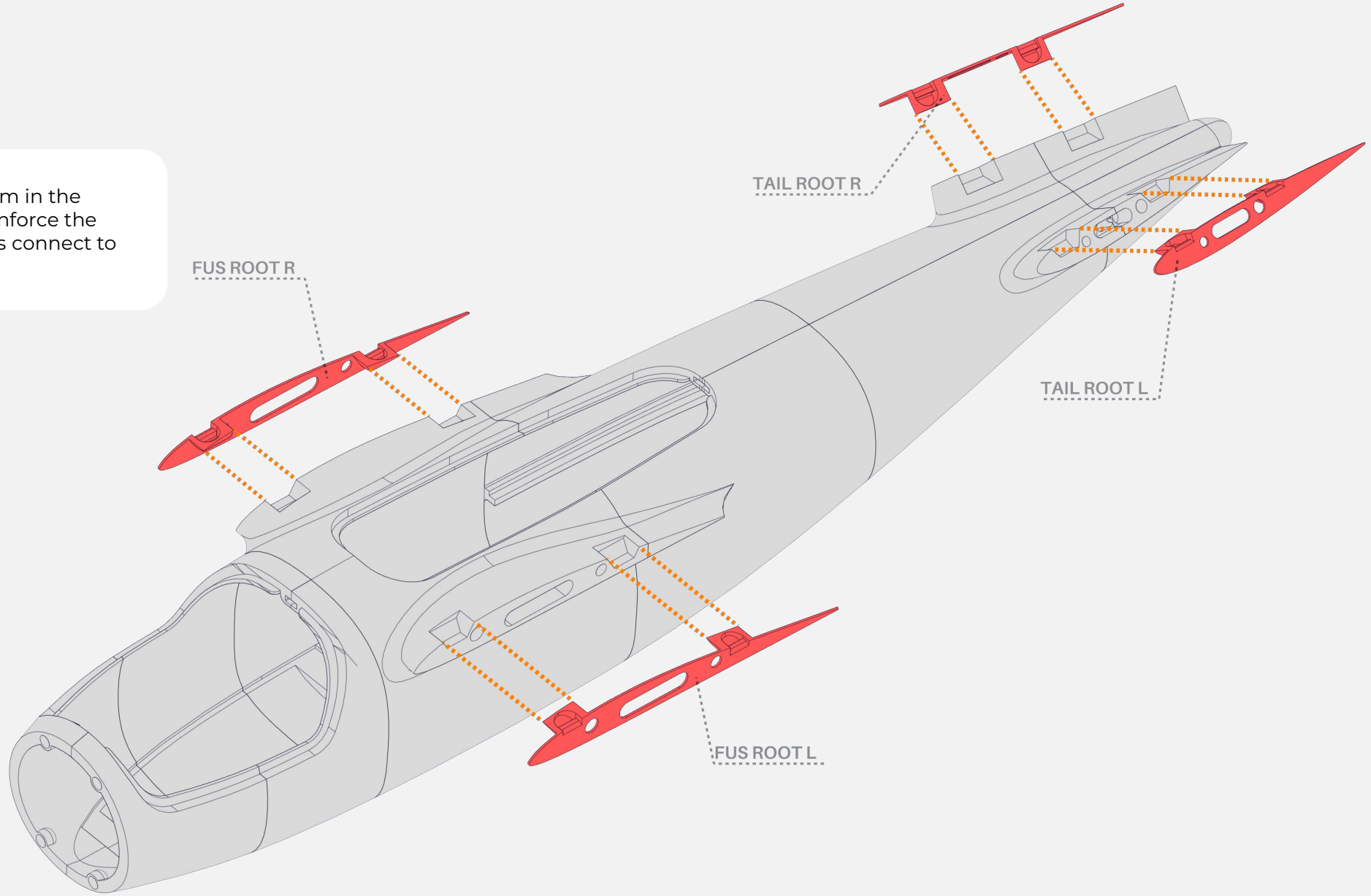
CA GLUE



FUSELAGE ASSEMBLY

Prepare the FUS and TAIL ROOT. Glue them in the designated places. These components reinforce the joint areas where the wings and stabilizers connect to the fuselage.

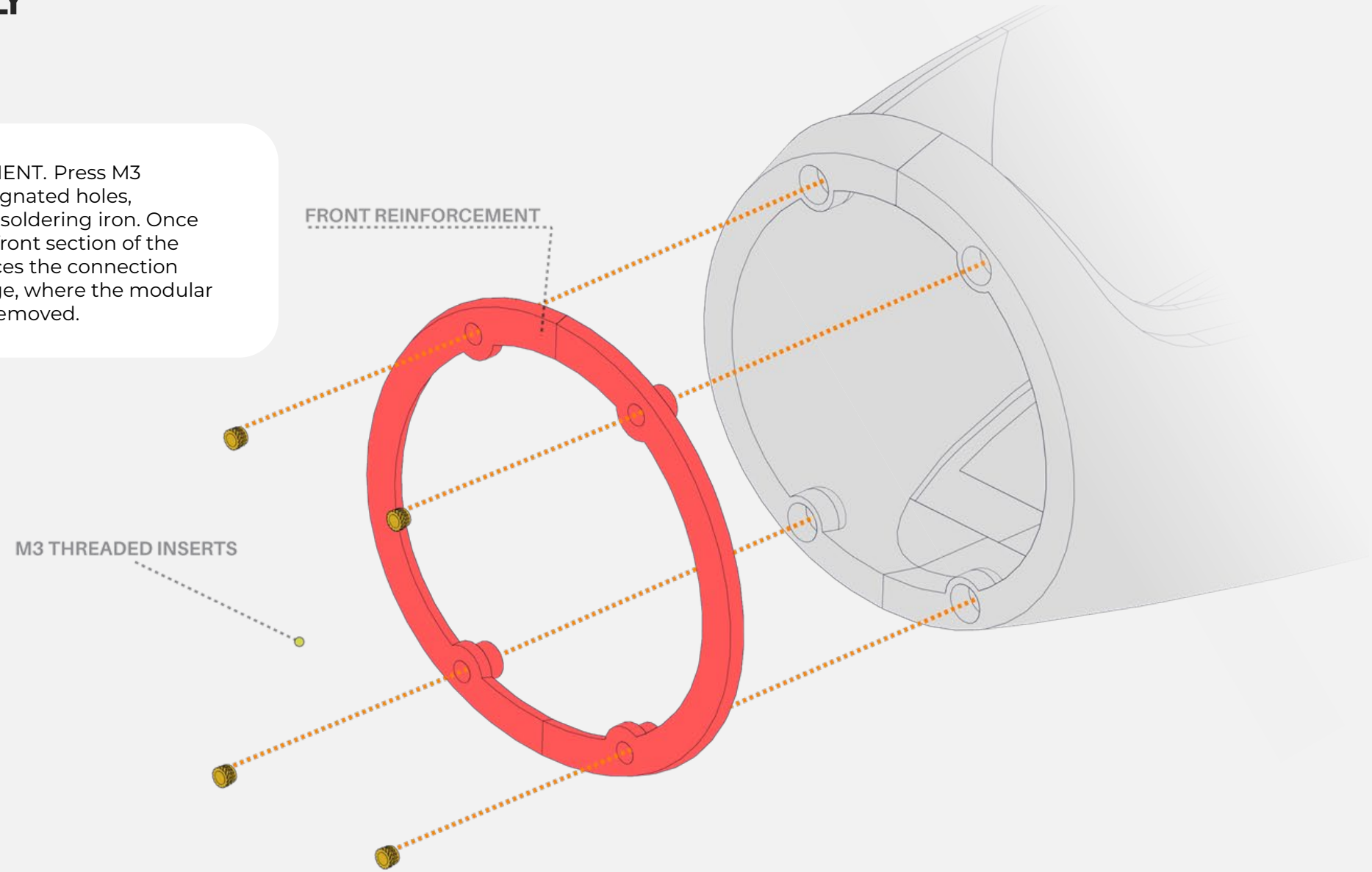
CA GLUE



FUSELAGE ASSEMBLY

Prepare the FRONT REINFORCEMENT. Press M3 THREADED INSERTS into the designated holes, preferably using a slightly heated soldering iron. Once prepared, glue this part onto the front section of the fuselage. This component reinforces the connection between the nose and the fuselage, where the modular nose can be easily attached and removed.

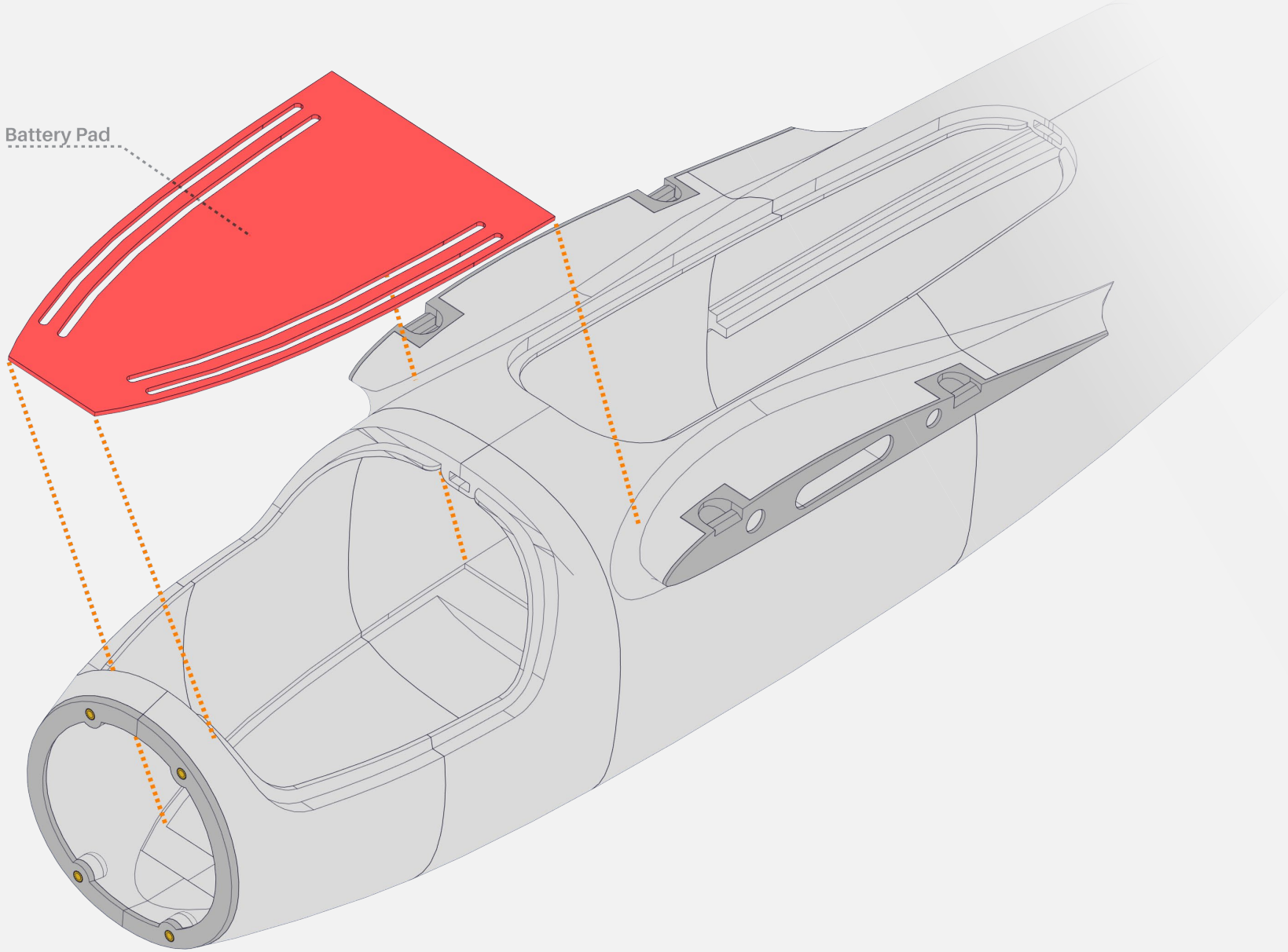
CA GLUE



FUSELAGE ASSEMBLY

Prepare the BATTERY PAD. This part serves as the battery mounting base. The designed holes can be used to route velco ties for securing the battery. This part is also available in STEP format to facilitate customization of the hole pattern or mounting options if needed.

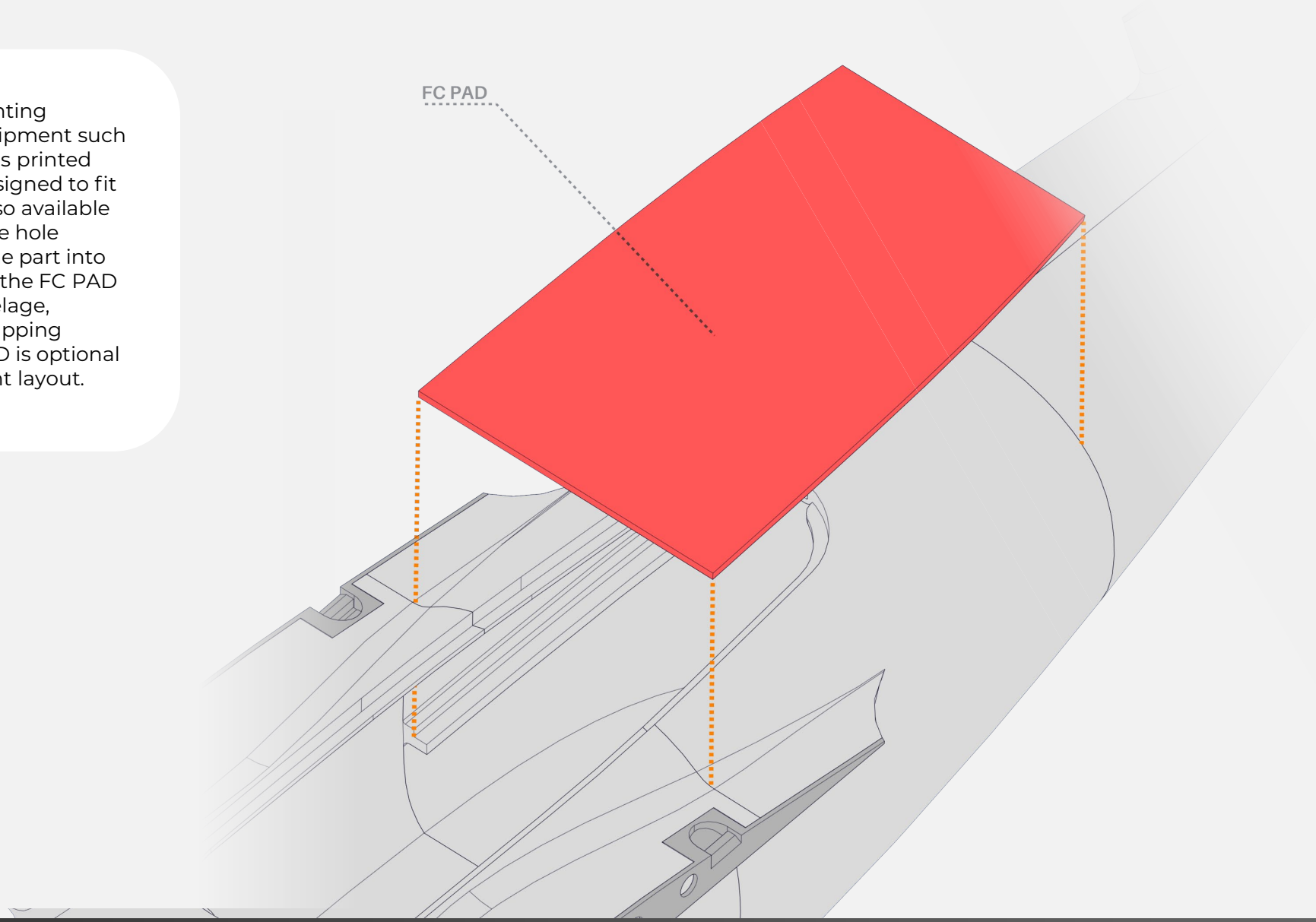
CA GLUE



FUSELAGE ASSEMBLY

Prepare the FC PAD. This part serves as a mounting platform for the flight controller and other equipment such as GPS, receiver, ESCs, and more. By default, it is printed either as a solid plate or with a hole pattern designed to fit the recommended components. This part is also available in STEP format to facilitate customization of the hole pattern or mounting options if needed. Glue the part into its designated place inside the fuselage. Using the FC PAD frees up space in the central section of the fuselage, making it easier to install equipment like a mapping camera or other payload. The use of the FC PAD is optional and depends on the user's needs for equipment layout.

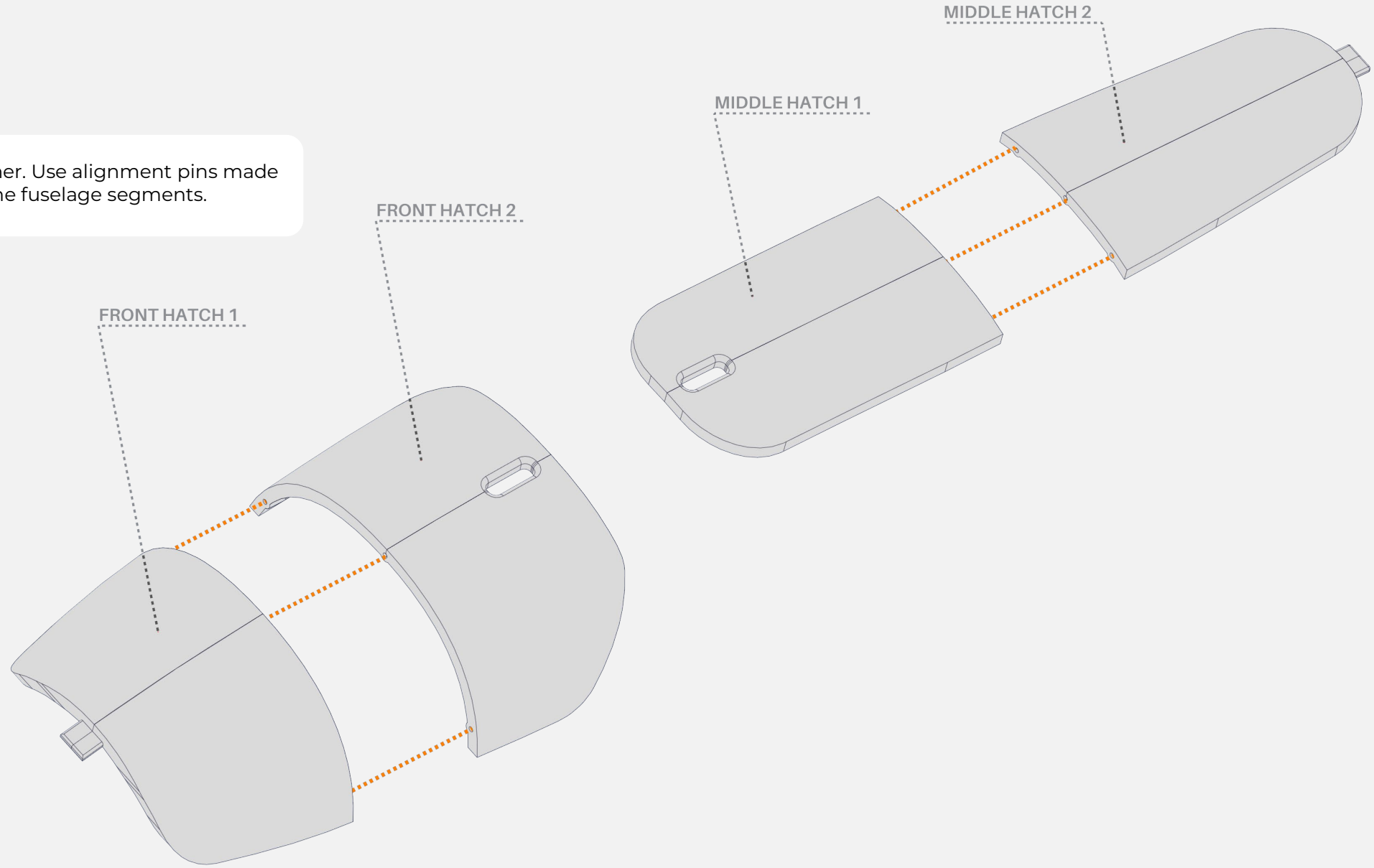
CA GLUE



FUSELAGE ASSEMBLY

Glue the front and middle hatch together. Use alignment pins made from short pieces of filament, as with the fuselage segments.

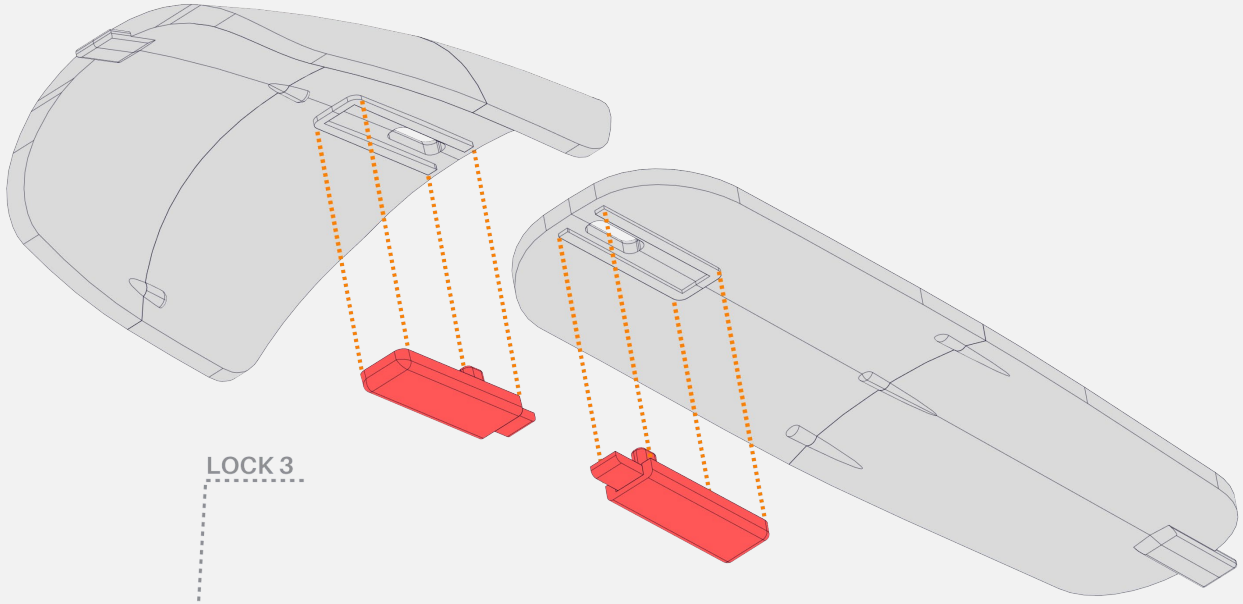
CA GLUE

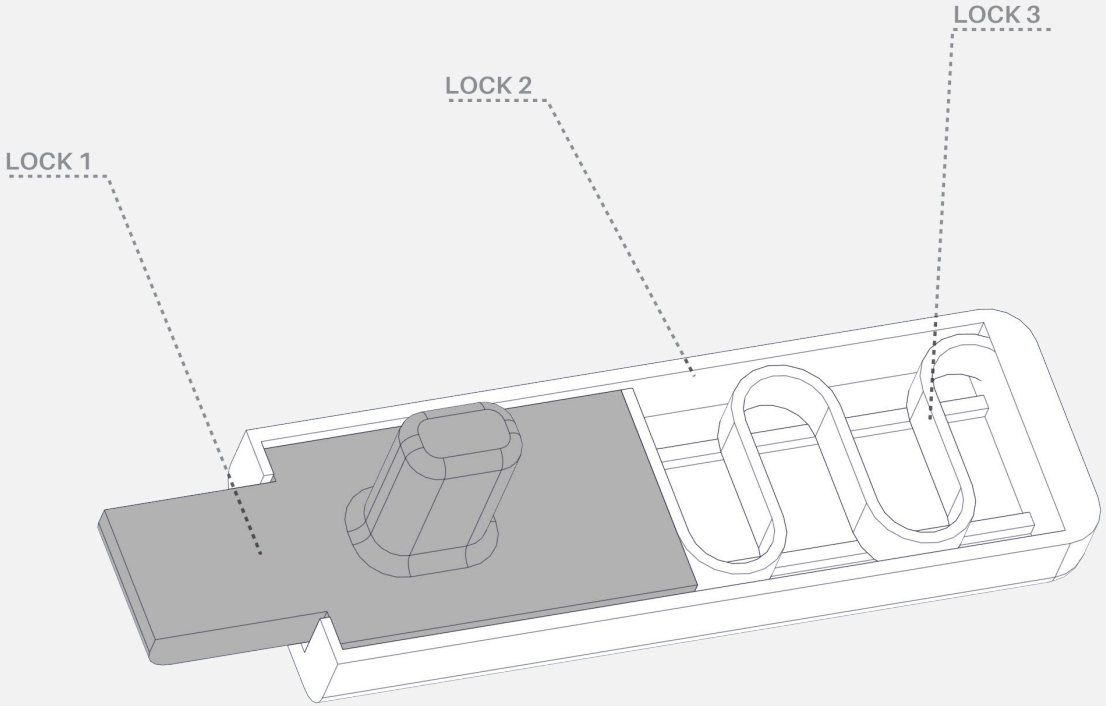


FUSELAGE ASSEMBLY

Assemble the lock, which consists of three parts. Glue the completed locks into the designated slots in the hatches. A thin layer of CA glue applied from the outside along the joint line is sufficient after the parts are properly fitted.

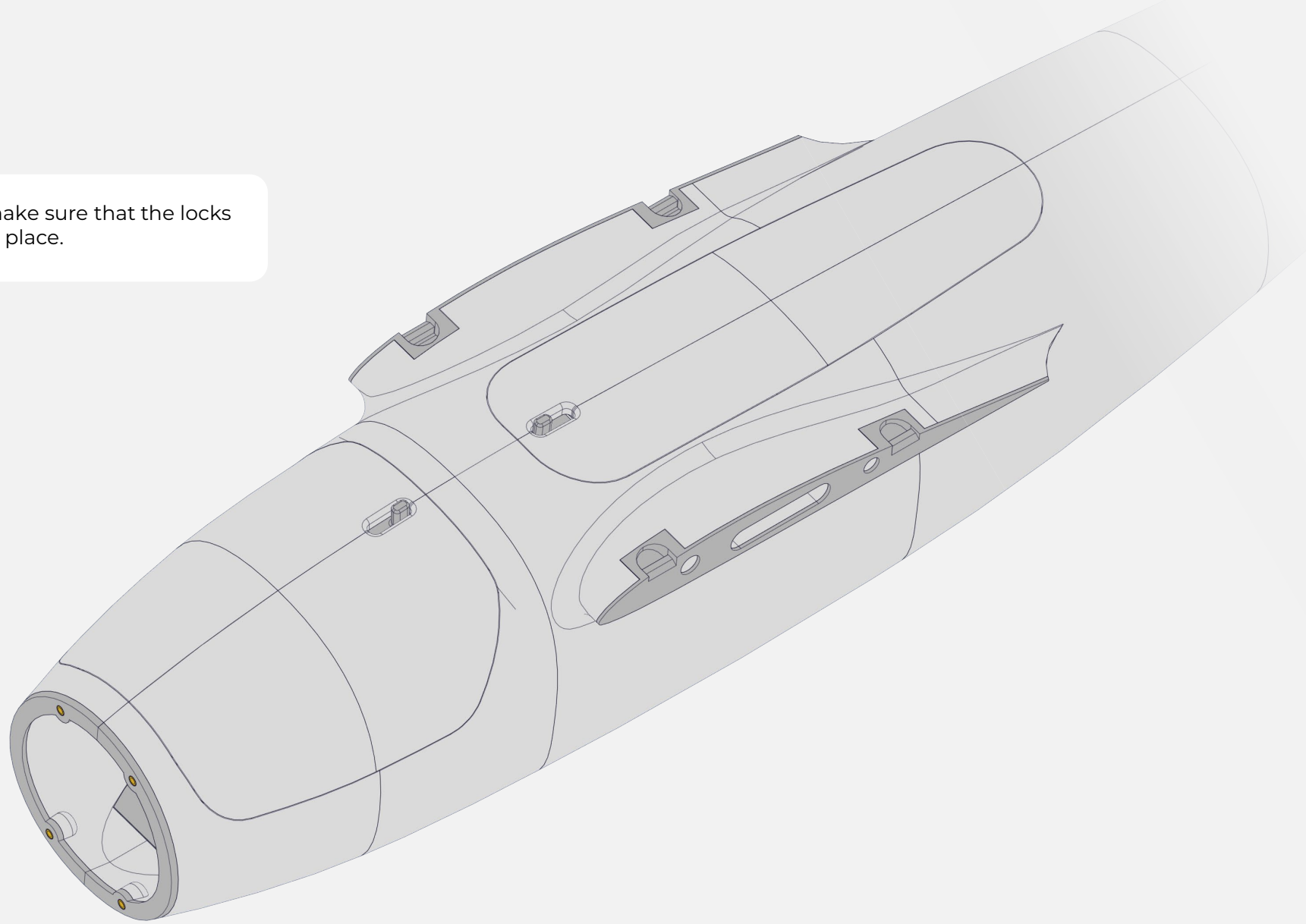
CA GLUE





FUSELAGE ASSEMBLY

Fit the prepared hatches to the fuselage and make sure that the locks work properly and securely hold the hatches in place.



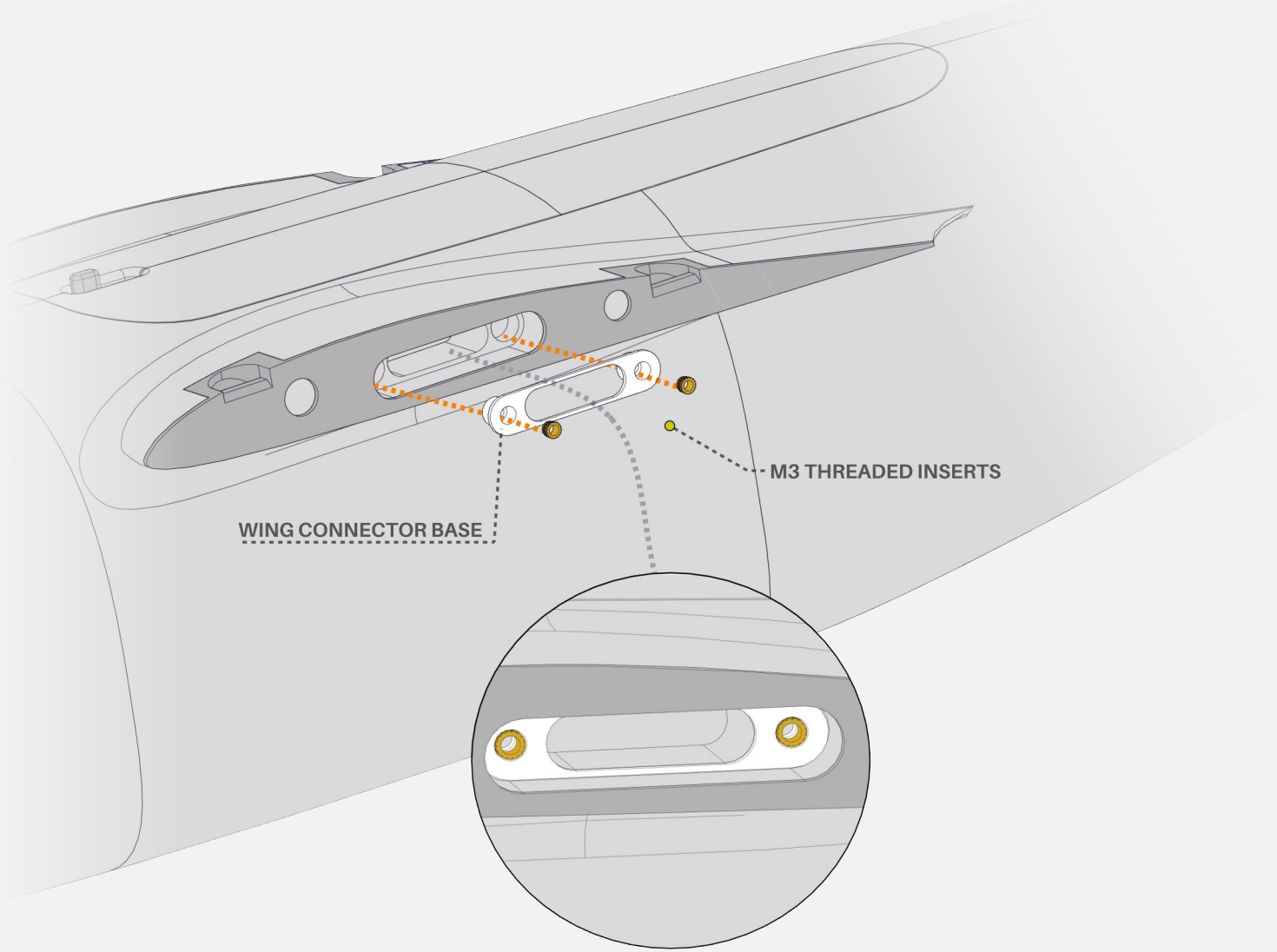
FUSELAGE ASSEMBLY

OPTIONAL

If you want to use WING CONNECTORS, which can carry motor wires, servo cables, and any other connections, complete this step. It is also possible to skip it and manually connect and disconnect the cables when installing or removing the wings.

Prepare the WING CONNECTOR BASE. Press M3 THREADED INSERTS into the designated holes, and then glue the prepared part into the dedicated slot in the fuselage.

CA GLUE



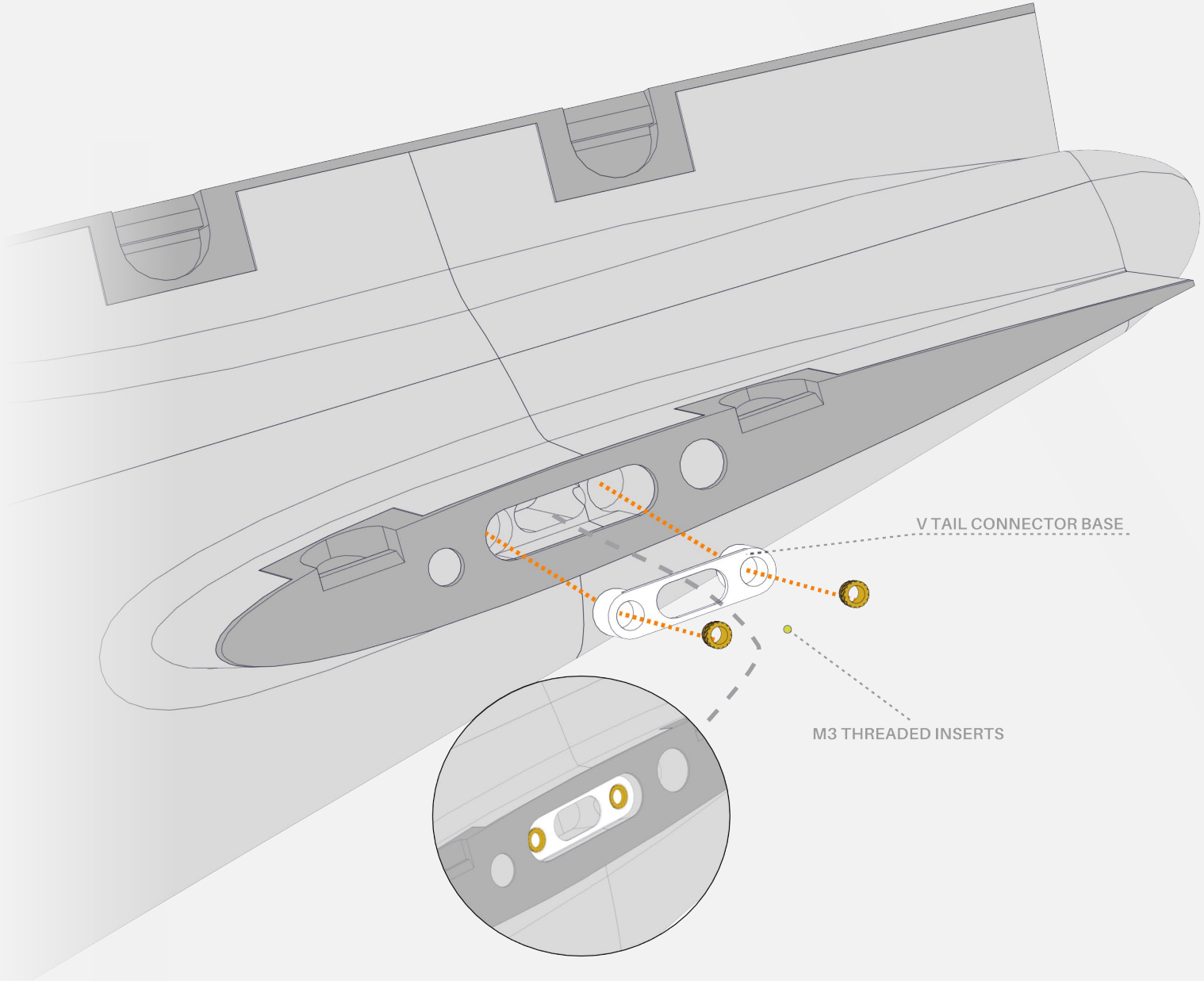
FUSELAGE ASSEMBLY

OPTIONAL

If you want to use VTAIL CONNECTORS, which can carry servo cables, complete this step. It is also possible to skip it and manually connect and disconnect the cables when installing or removing the stabilizers.

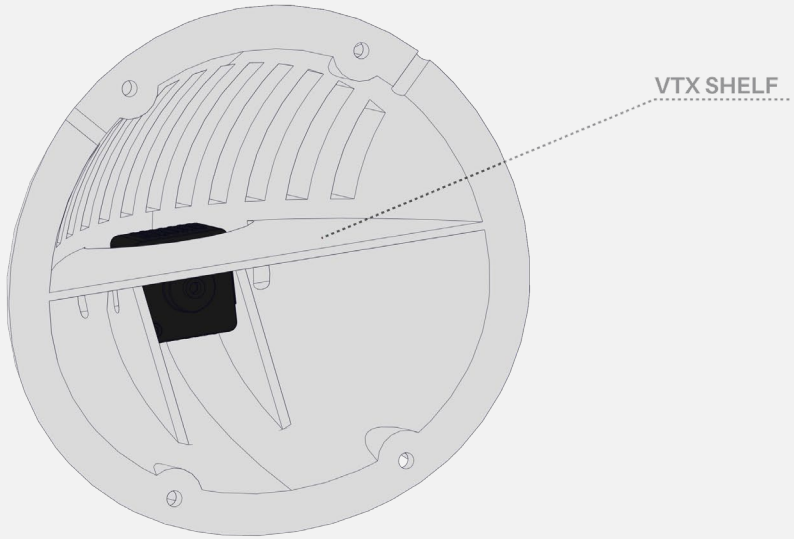
Prepare the VTAIL CONNECTOR BASE. Press M3 THREADED INSERTS into the designated holes, and then glue the prepared part into the dedicated slot in the fuselage.

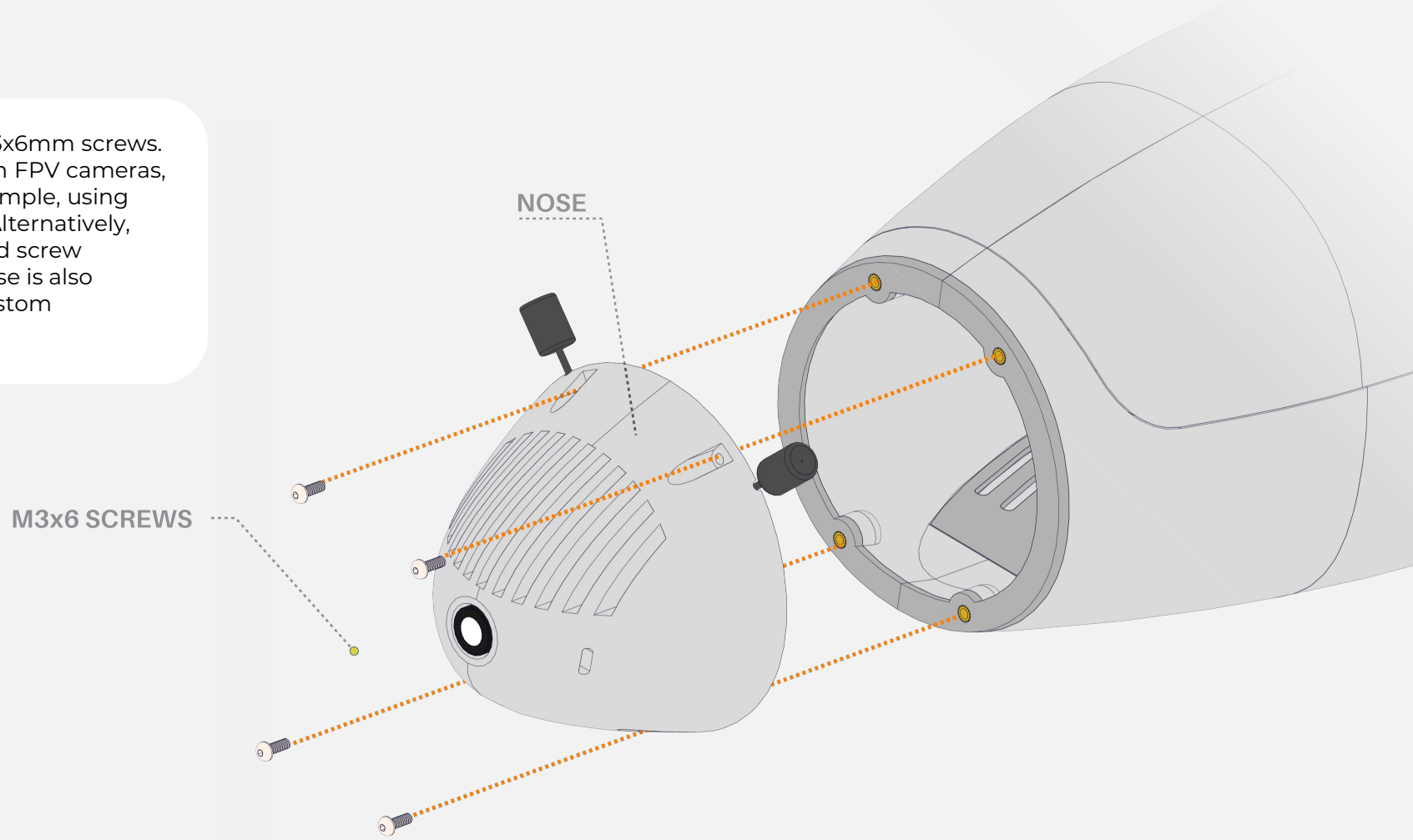
CA GLUE



FUSELAGE ASSEMBLY

Prepare the nose and attach it to the fuselage using M3x6mm screws. The nose is designed by default to fit standard 19x19mm FPV cameras, with a shelf for any VTX, which can be mounted, for example, using foam double-sided tape — this is a sufficient solution. Alternatively, you can add holes to match the desired dimensions and screw it in place. There are also slots for VTX antennas. The nose is also available as a STEP file to make it easier to adapt for custom equipment, different cameras, antennas, or sensors.

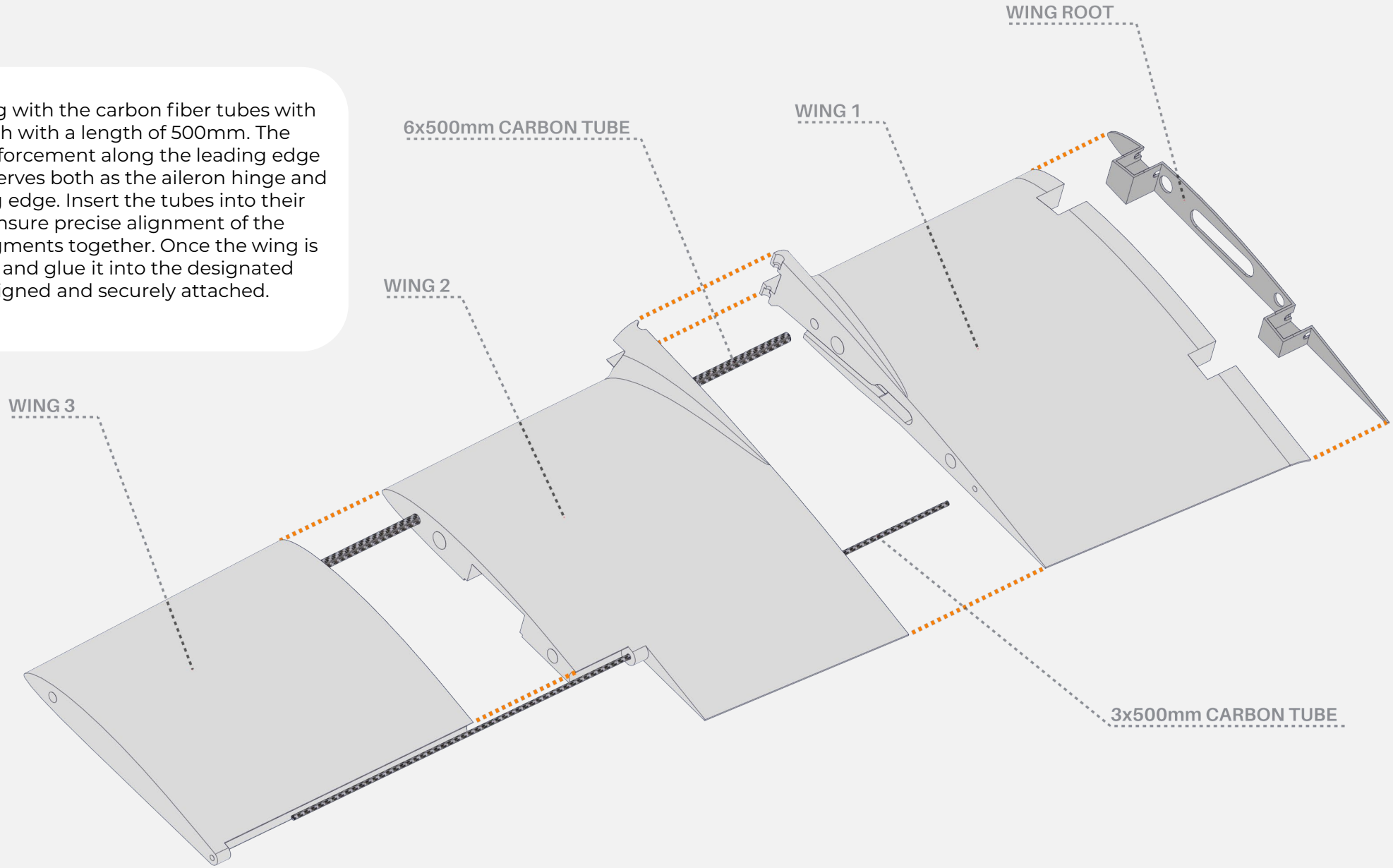




WING ASSEMBLY

Prepare the wing segments along with the carbon fiber tubes with diameters of 6mm and 3mm, each with a length of 500mm. The 6mm tube acts as additional reinforcement along the leading edge of the wing, while the 3mm rod serves both as the aileron hinge and as reinforcement near the trailing edge. Insert the tubes into their dedicated slots, which will help ensure precise alignment of the parts, and then glue the wing segments together. Once the wing is assembled, take the WING ROOT and glue it into the designated location, ensuring it is properly aligned and securely attached.

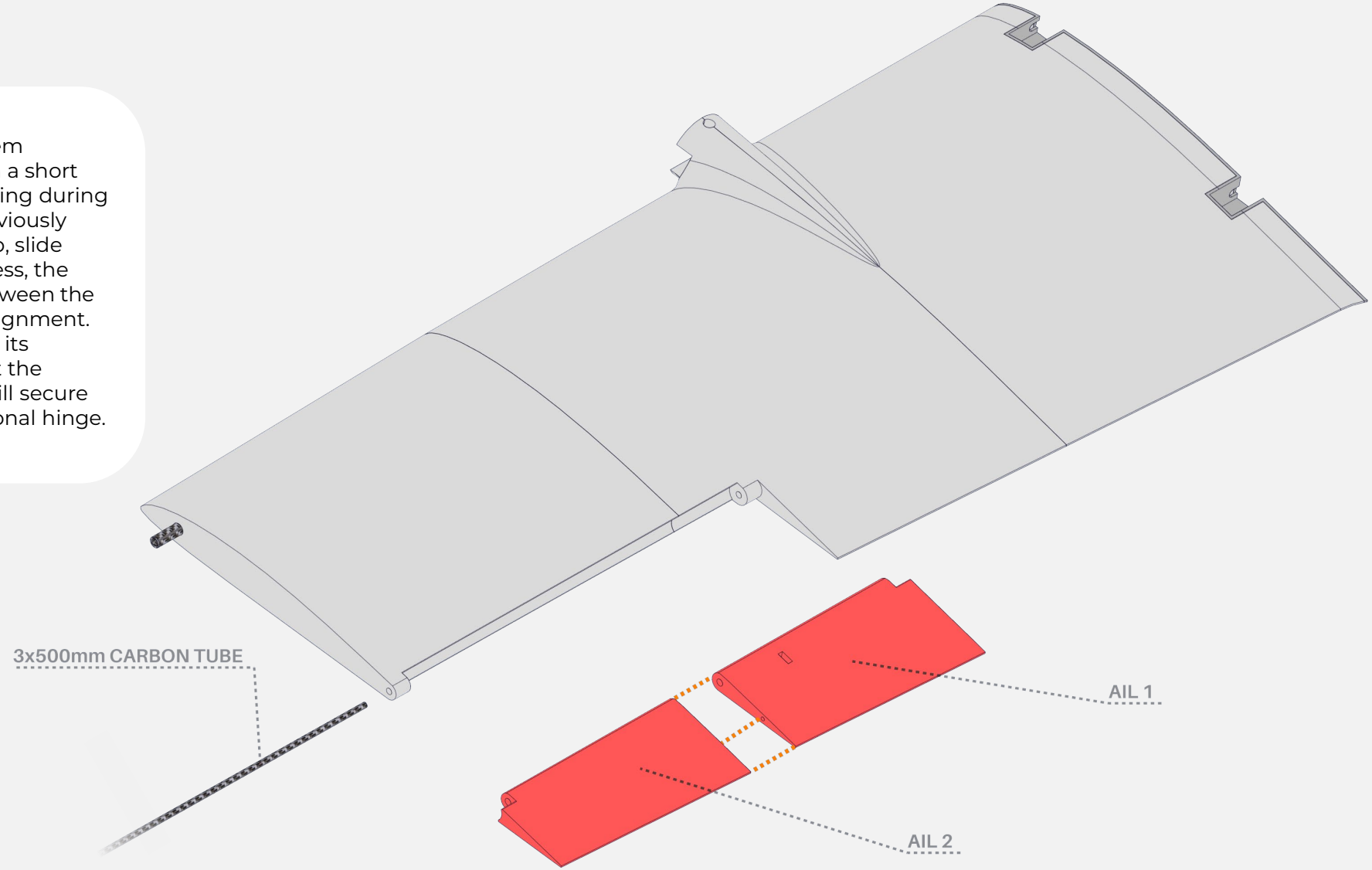
CA GLUE



WING ASSEMBLY

Prepare the aileron segments and glue them together. Use an alignment pin made from a short piece of filament to ensure proper positioning during assembly. If the 3mm carbon tube was previously inserted into the wing during previous step, slide it out at this stage. During the gluing process, the 3mm tube can be temporarily inserted between the aileron segments to assist with accurate alignment. Once the aileron is assembled, place it into its designated position on the wing and insert the carbon tube into the dedicated slot. This will secure the aileron to the wing, forming the functional hinge.

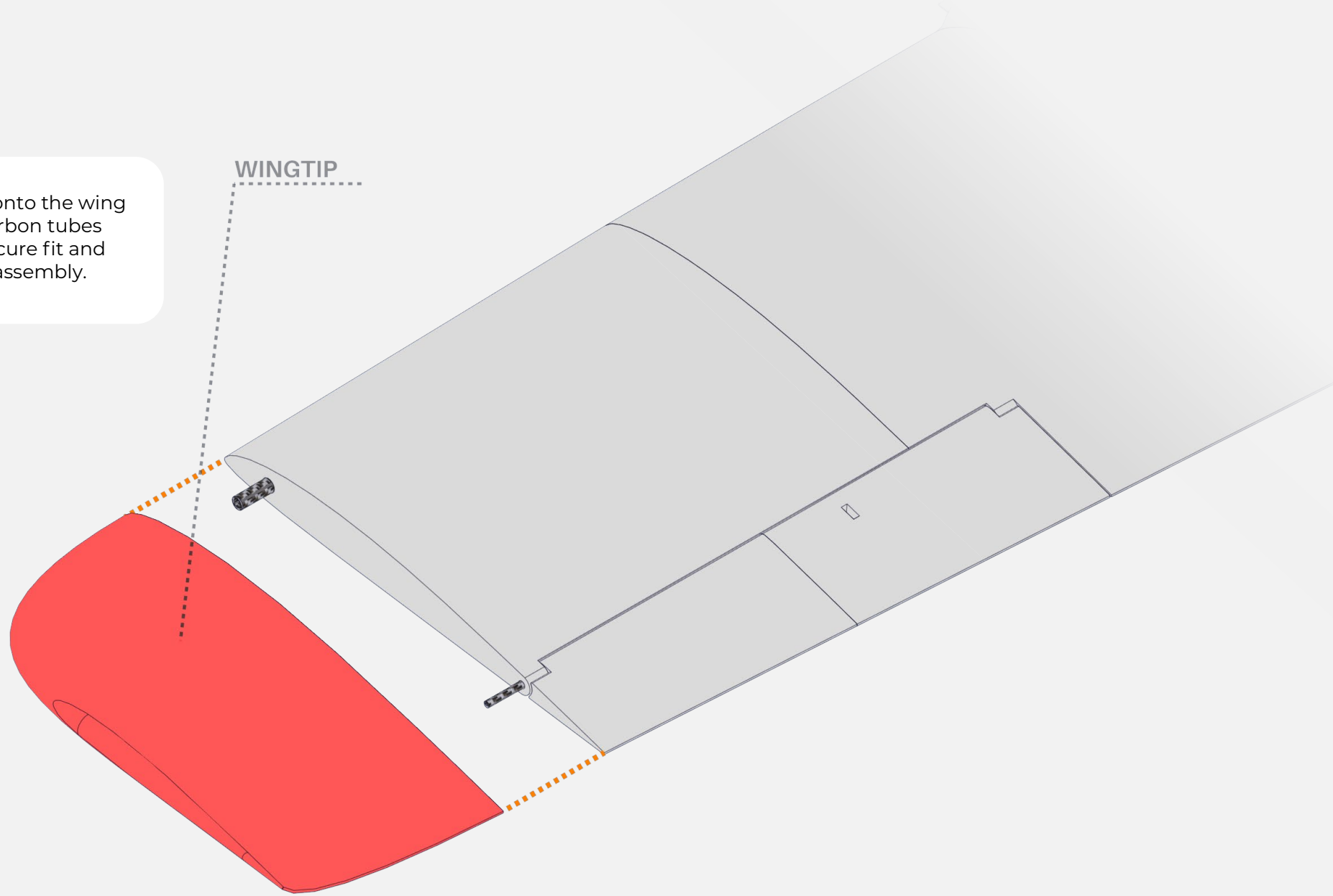
CA GLUE



WING ASSEMBLY

At this stage, take the WINGTIP and glue it onto the wing by sliding it over the exposed ends of the carbon tubes protruding from the wing. This ensures a secure fit and proper alignment with the rest of the wing assembly.

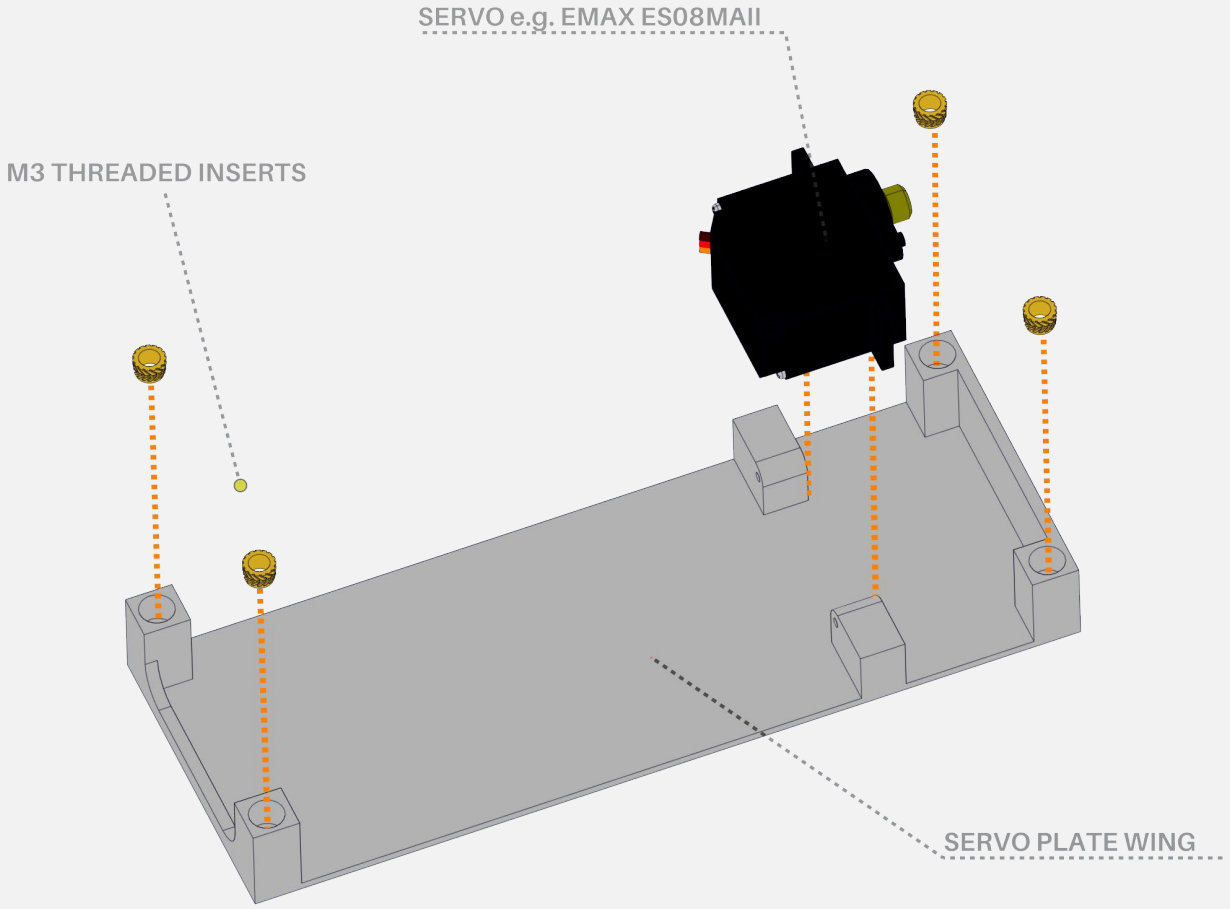
CA GLUE



WING ASSEMBLY

Take the SERVO PLATE WING and insert the M3 threaded inserts into their designated holes. Prepare the micro servo and mount it in the assigned position. Besides securing it with the small screws included with every servo, you may apply a small amount of hot glue to enhance the servo's adhesion to the surface. At this stage, also attach the servo horn and center it. It's best to connect the servo now, either to a servo tester or directly to the receiver and ensure that its range of motion is properly centered once powered. This part is also available in STEP format in case you need to adapt it for servos of different sizes or to add additional equipment to the bay, which has extra free space.

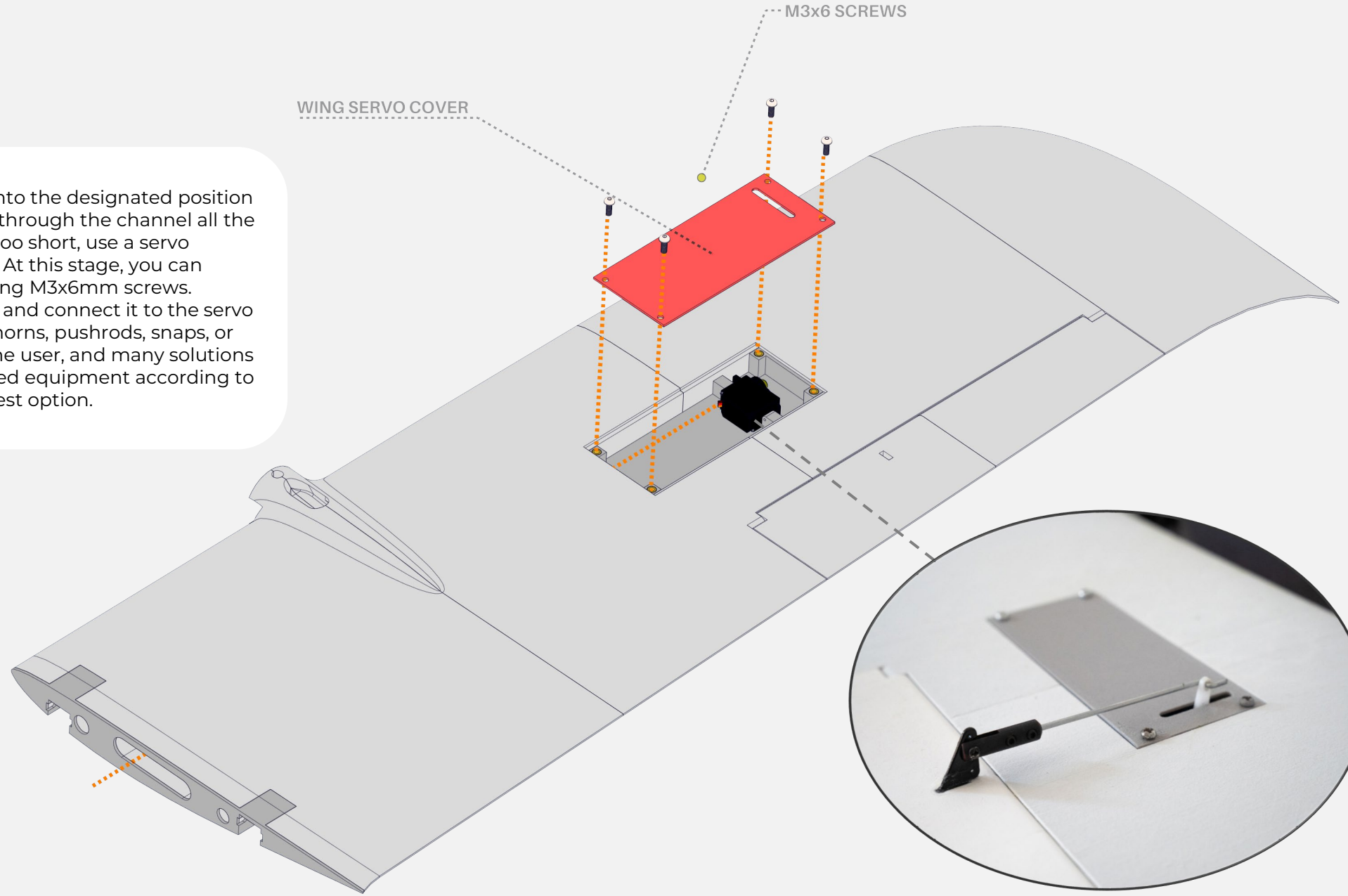
HOT GLUE
OPTIONAL



WING ASSEMBLY

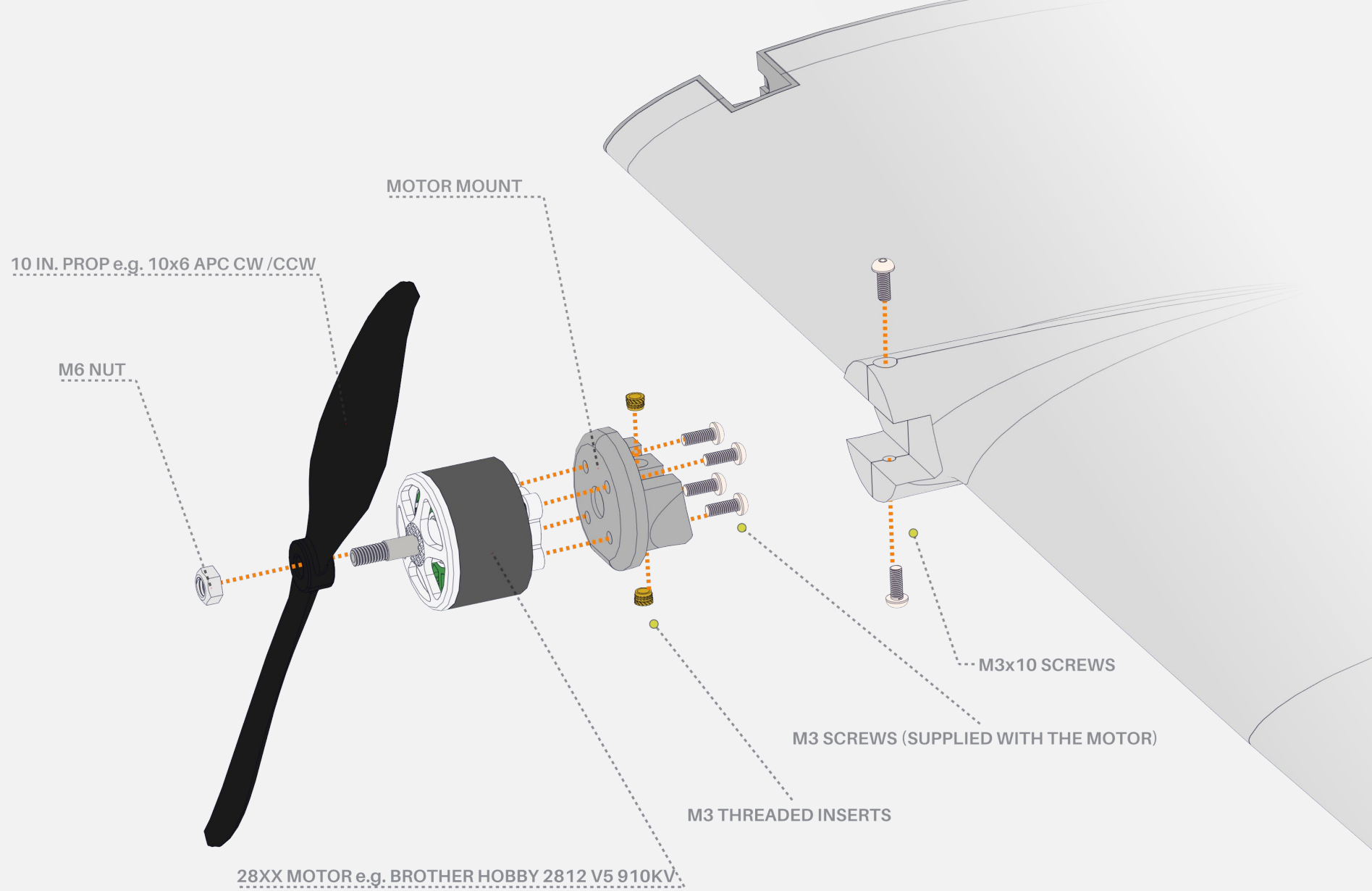
Take the prepared part and glue it into the designated position in the wing, routing the servo wires through the channel all the way to the wing root. If the cable is too short, use a servo extension or solder additional wires. At this stage, you can secure the WING SERVO COVER using M3x6mm screws.
You can also install the control horn and connect it to the servo horn with a pushrod. The choice of horns, pushrods, snaps, or other connection systems is up to the user, and many solutions are possible. Using the recommended equipment according to the suggested parts list is the simplest option.

CA GLUE



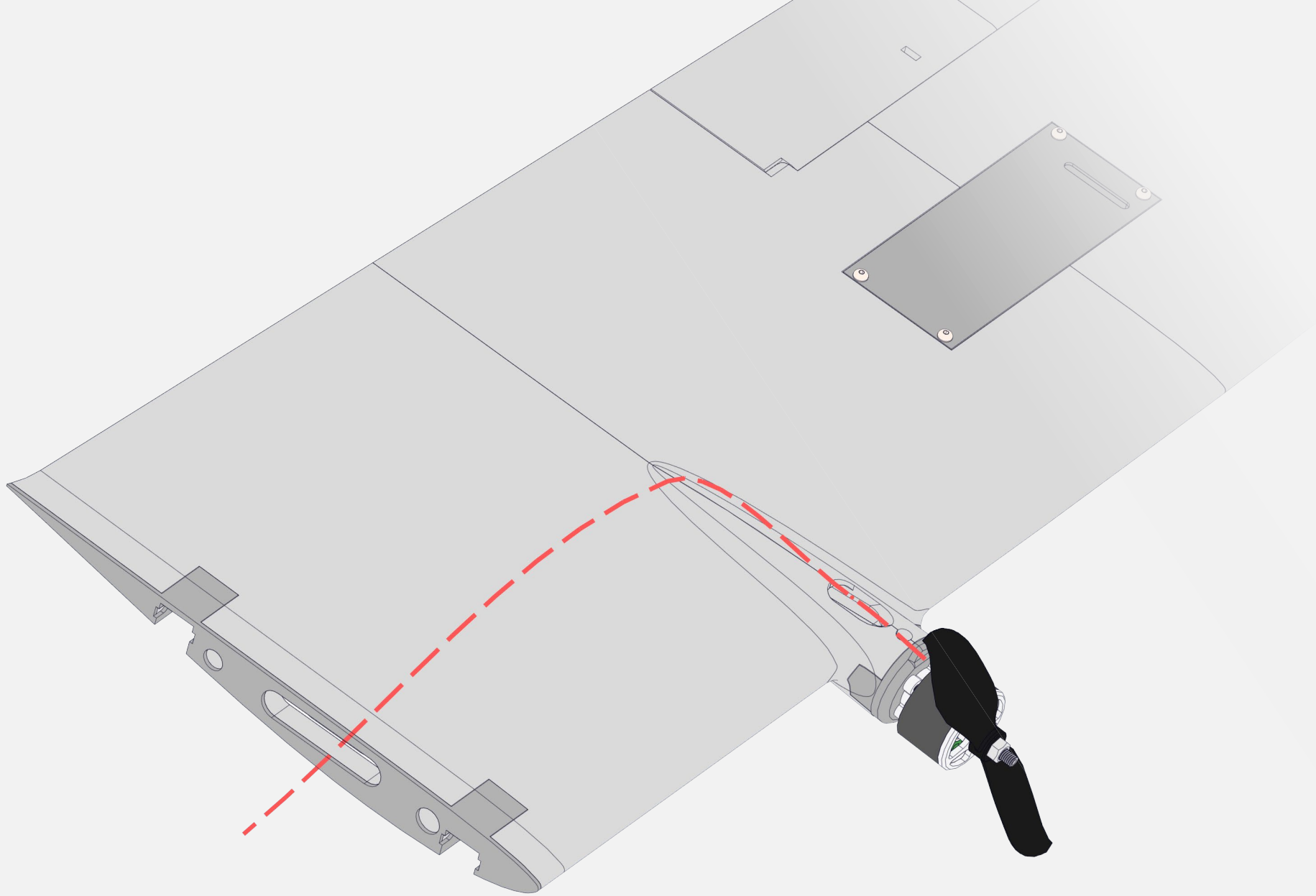
WING ASSEMBLY

Prepare the MOTOR MOUNT. Press the M3 threaded inserts into the top and bottom holes. Assemble the motor and attach it to the motor mount. The mounting hole spacing is 19x19mm. This part is also available in STEP format in case you need to adapt it for different motors.
Insert the assembled unit into the designated position in the wing and secure it with M3x10mm screws from both the top and bottom. The motor's tilt angle is built into this design, so be sure to mount everything straight.



WING ASSEMBLY

Insert the motor wires into the opening at the bottom of the wing and route them through the channel to the exit at the wing root. If the wires are too short, extend them before this step. It’s best to feed the wires individually, and if they get stuck along the way, you can easily pull them out using a wire bent into a hook at the end.



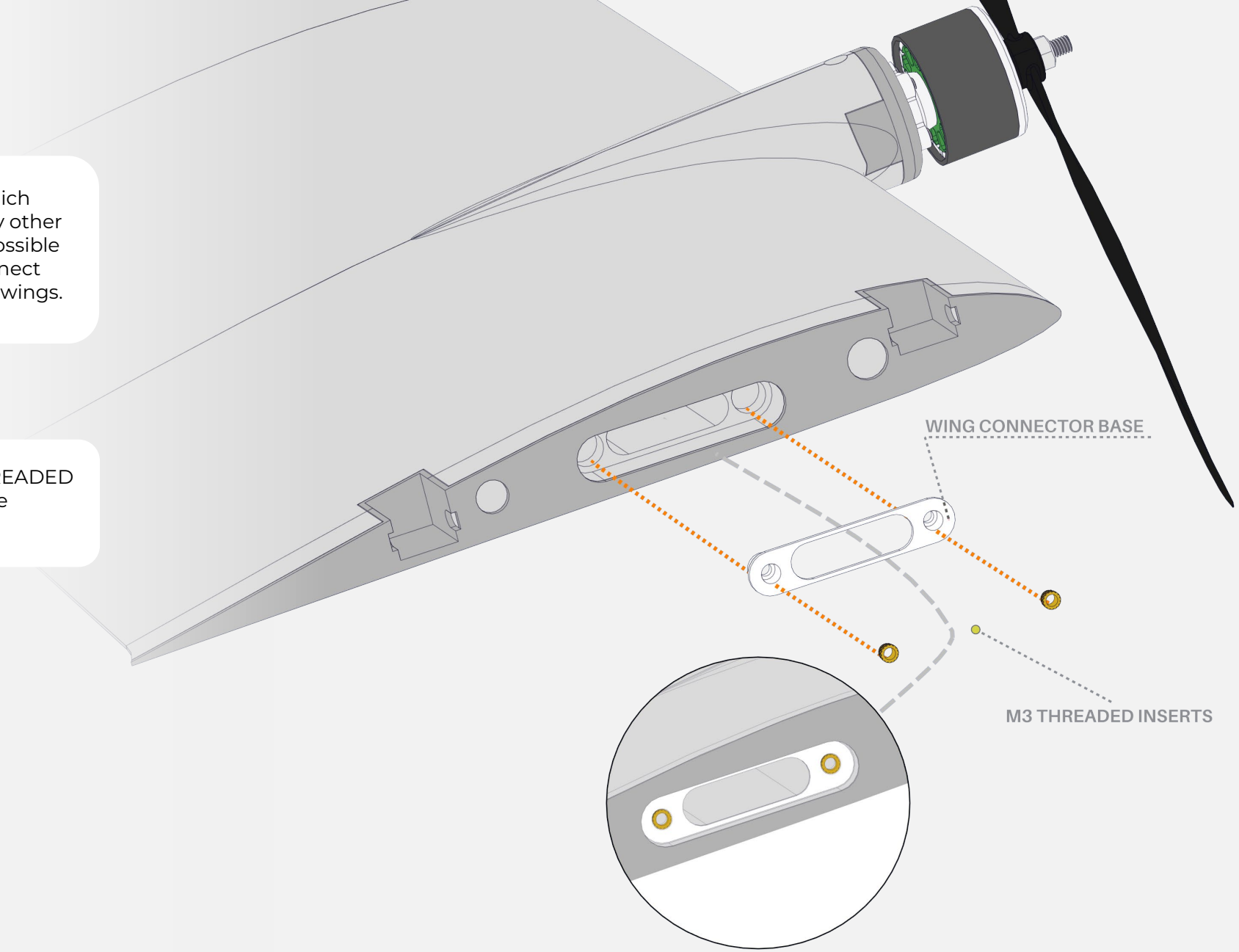
WING ASSEMBLY

OPTIONAL

If you want to use WING CONNECTORS, which can carry motor wires, servo cables, and any other connections, complete this step. It is also possible to skip it and manually connect and disconnect the cables when installing or removing the wings.

Prepare the WING CONNECTOR BASE. Press M3 THREADED INSERTS into the designated holes, and then glue the prepared part into the dedicated slot in the wing.

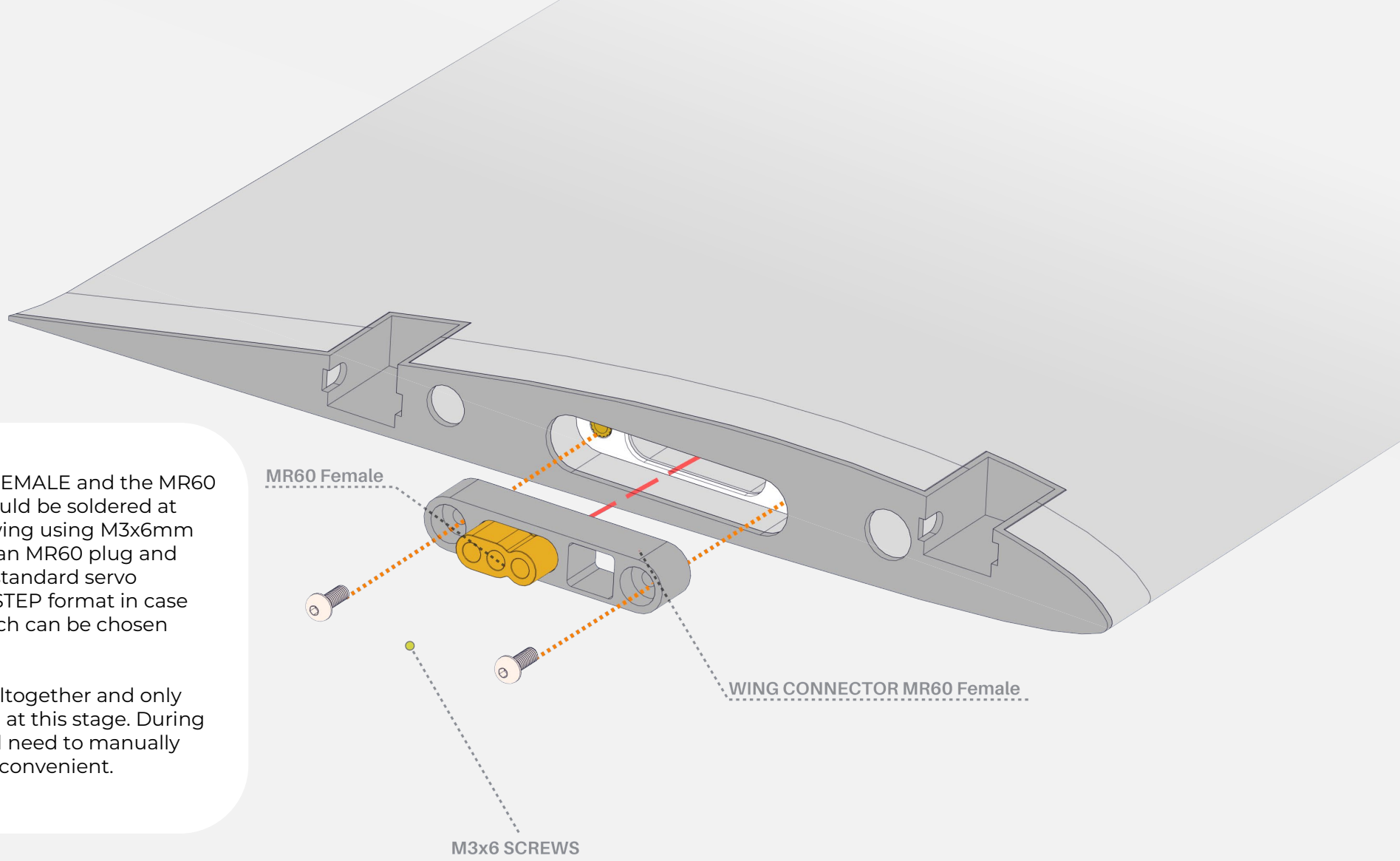
CA GLUE



WING ASSEMBLY

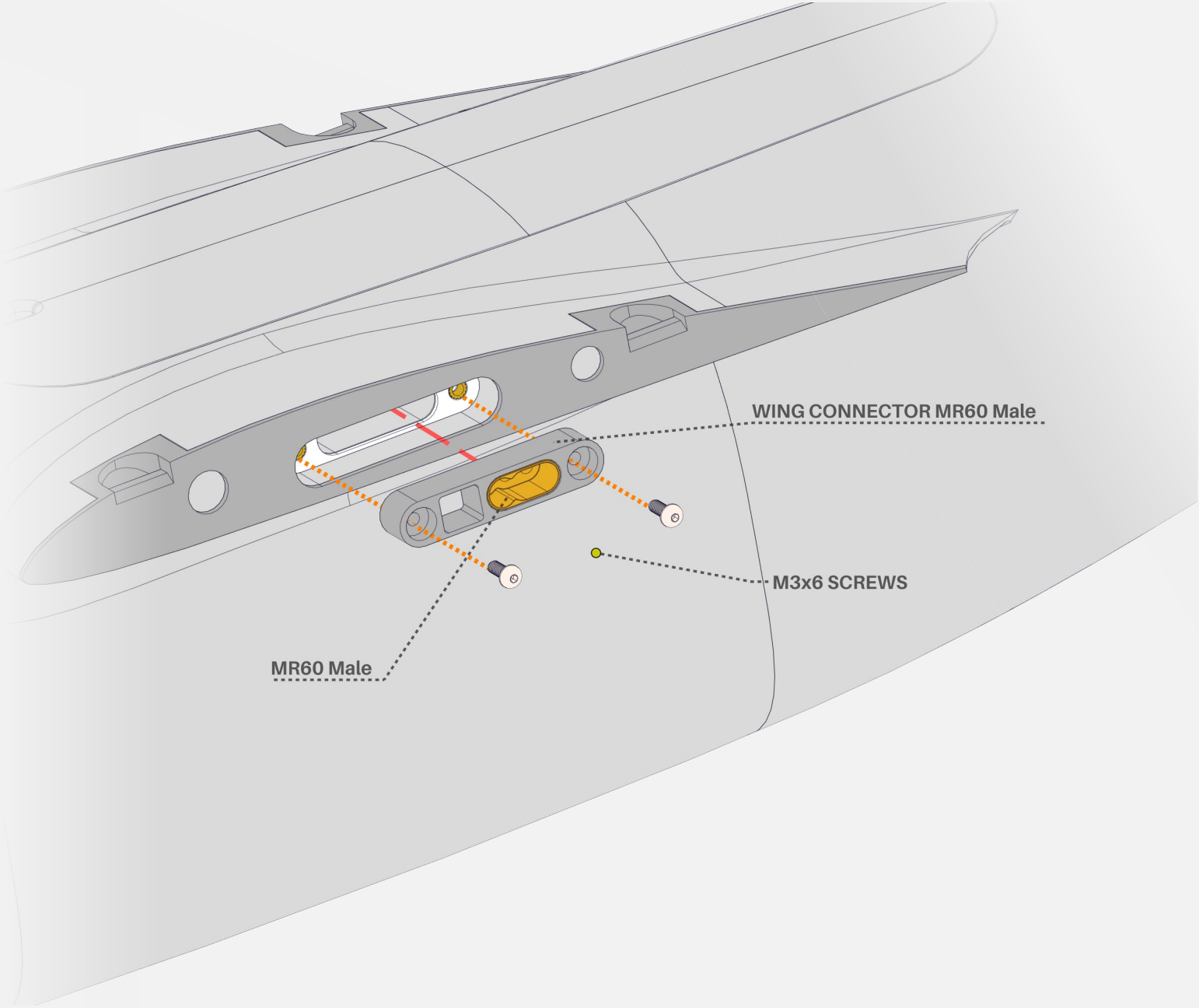
Prepare the WING CONNECTOR MR60 FEMALE and the MR60 connector, to which the motor wires should be soldered at this stage. Attach the connector to the wing using M3x6mm screws. The connector is designed to fit an MR60 plug and includes a hole that can accommodate standard servo connectors. This part is also available in STEP format in case you need to adapt it for other plugs, which can be chosen freely depending on your needs.

Alternatively, you can skip this solution altogether and only solder the motor wires to the MR60 plug at this stage. During wing assembly and disassembly, you will need to manually disconnect this plug, which is also not inconvenient.



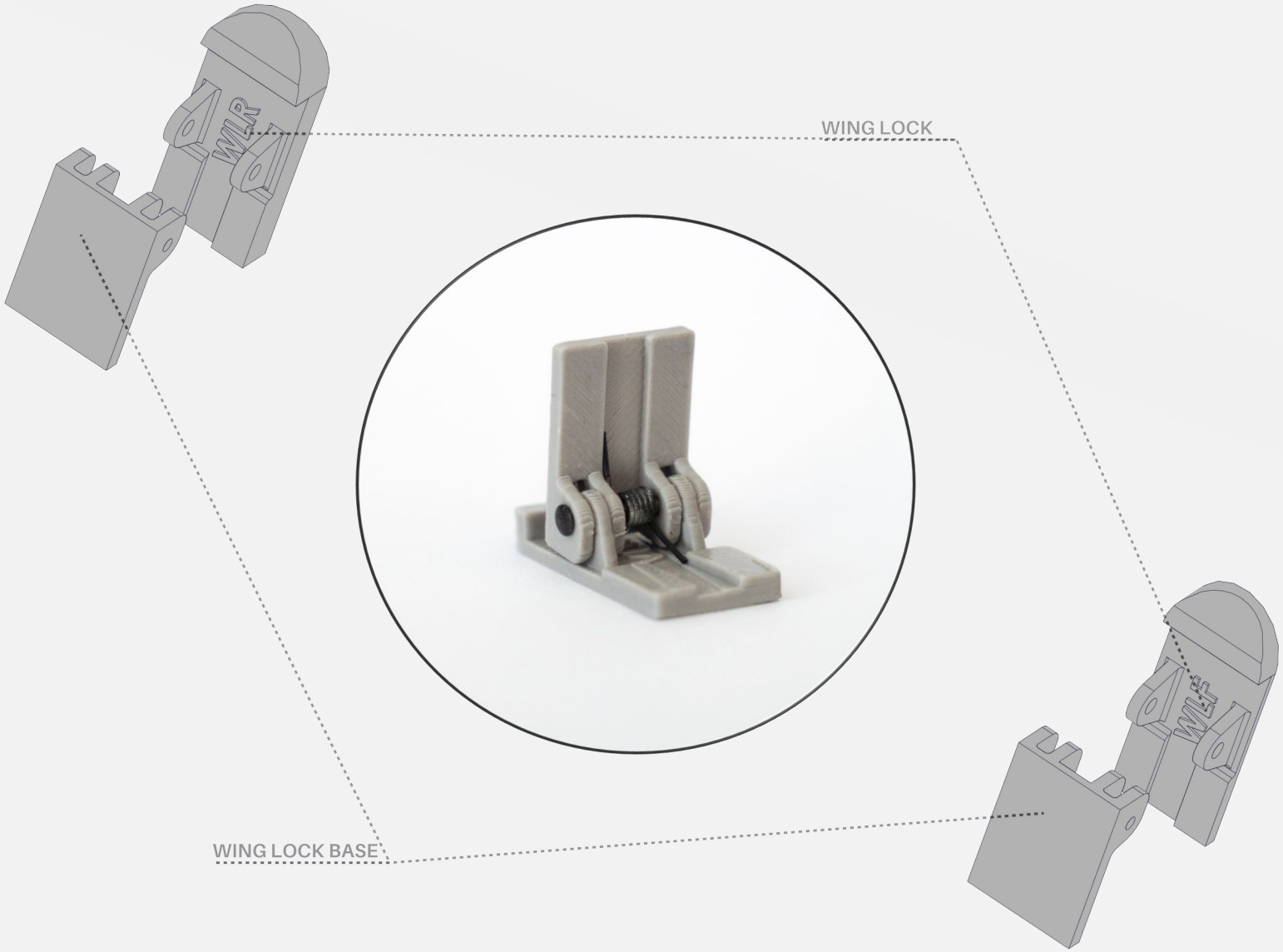
WING ASSEMBLY

The situation on the fuselage side is identical. If you choose to use the connector, take the WING CONNECTOR MR60 MALE along with the MR60 male plug, and at this stage solder it to the ESC wires, as the ESC will be placed inside the fuselage. If you decide to skip the connector, the MR60 male plug alone is sufficient. You can prepare it now or leave this step for later when assembling the rest of the electronics.



WING ASSEMBLY

The locks consist of the WING LOCK BASE and the top part WING LOCK. The base is identical for all locks, but the WING LOCK parts differ and are marked according to their position, for example WING LEFT REAR / WLR, WING LEFT FRONT / WLF and so on. To assemble the lock, you will need a pin and a small torsion spring. The simplest and proven solution is to use the pins and springs from small hair clips, as they work on the same principle. The locks provide quick and secure wing attachment.



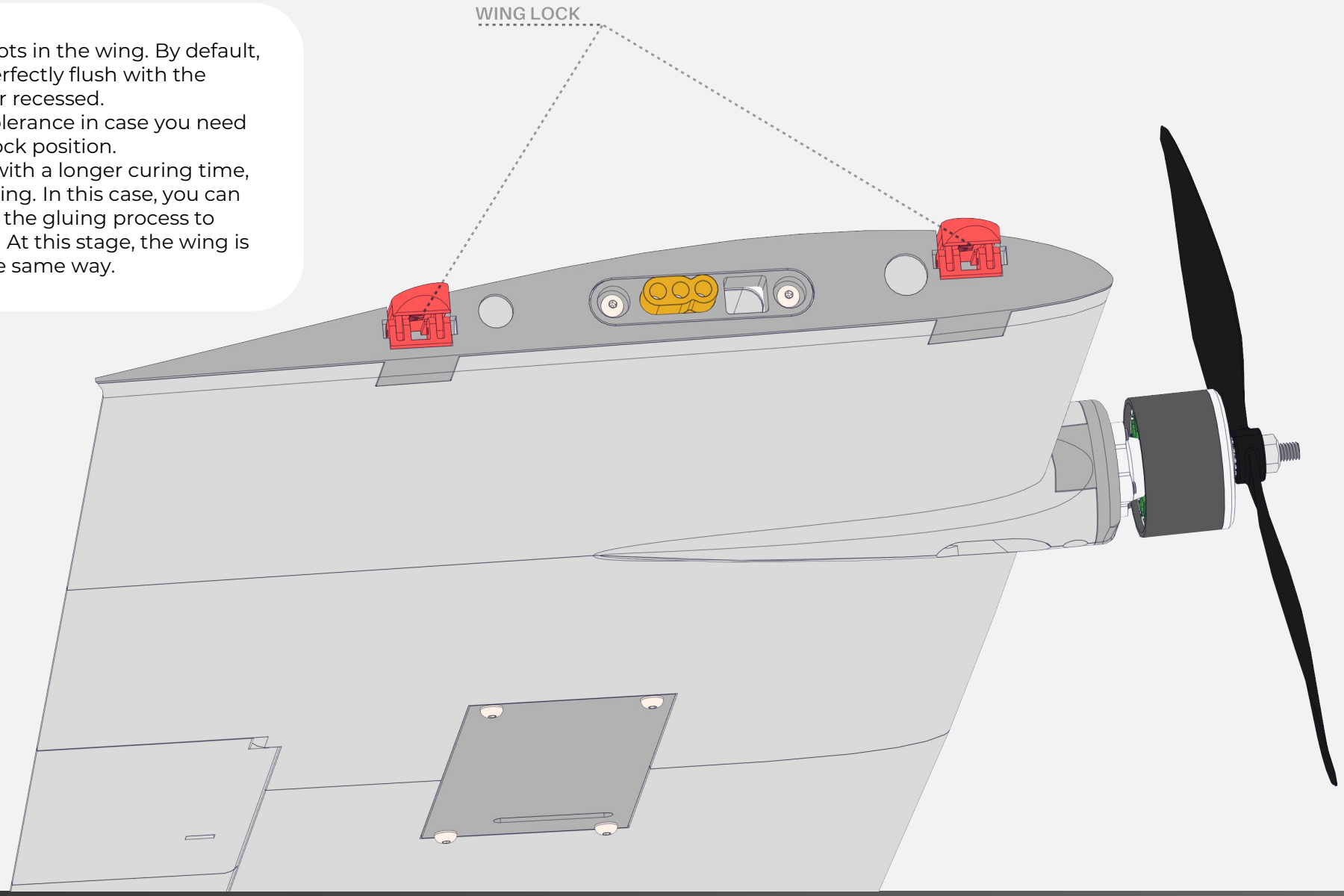
WING ASSEMBLY

Glue the finished locks into their designated slots in the wing. By default, it's best to position the lock base so that it is perfectly flush with the surface of the wing root, neither protruding nor recessed.
However, the design includes about 2mm of tolerance in case you need some slight adjustment or fine-tuning of the lock position.
The locks can be glued with CA glue or epoxy with a longer curing time, which gives more flexibility for precise positioning. In this case, you can temporarily fit the wing to the fuselage during the gluing process to check how the locks engage with the fuselage. At this stage, the wing is complete. The second wing is assembled in the same way.

CA GLUE

OR

EPOXY

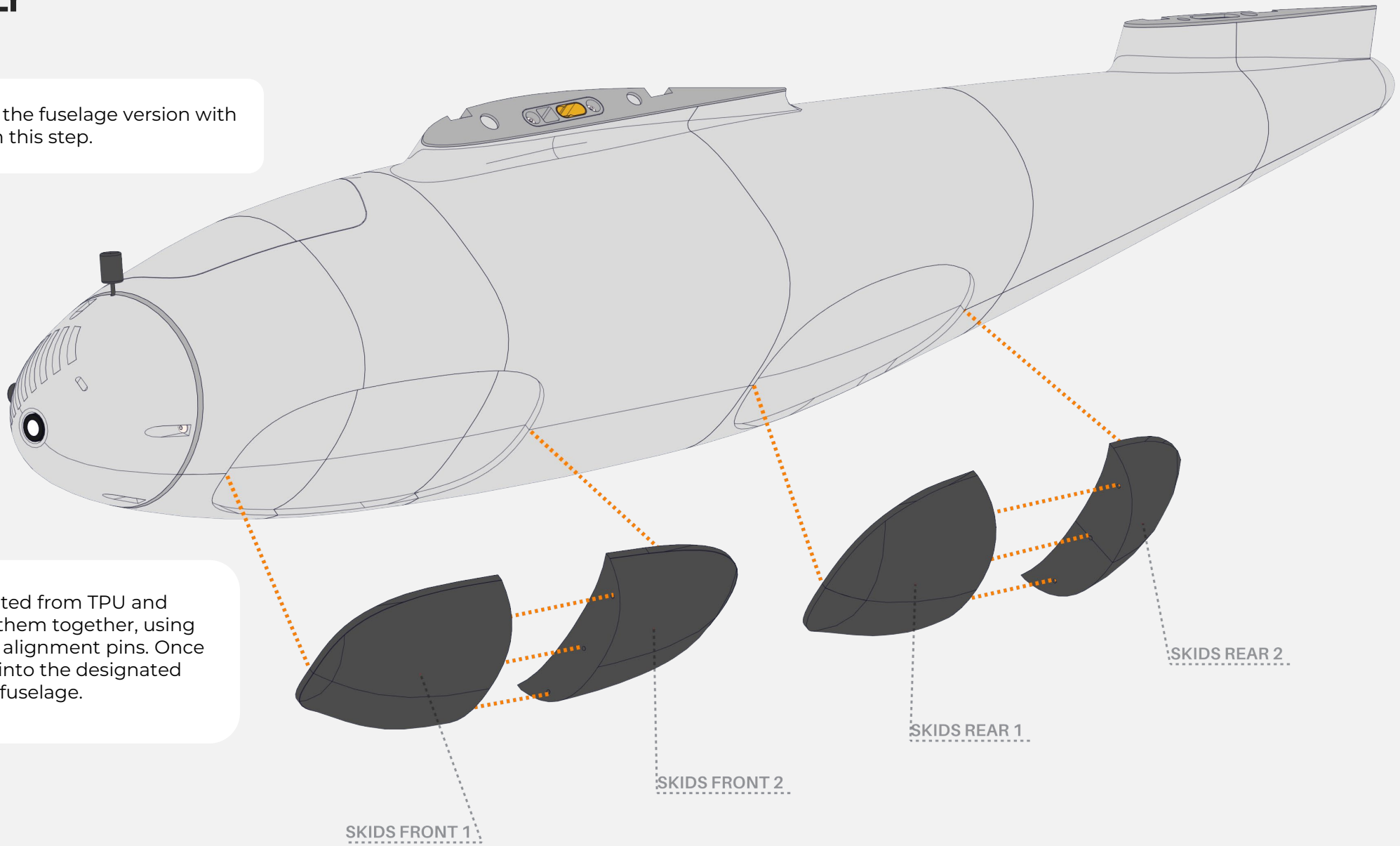


WING ASSEMBLY

If you have chosen the fuselage version with skids, proceed with this step.

CA GLUE

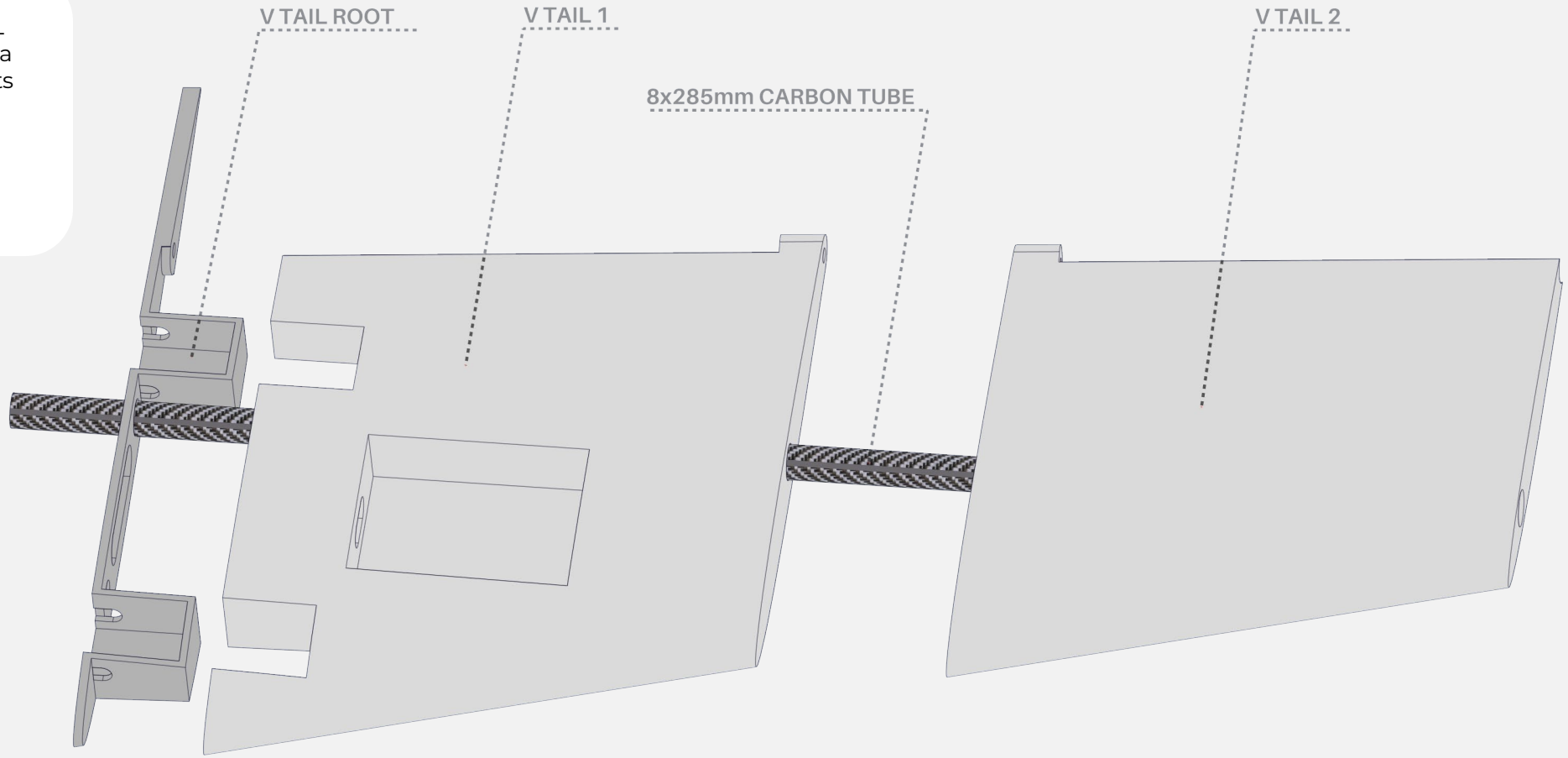
Prepare the skid parts printed from TPU and assemble them by gluing them together, using short pieces of filament as alignment pins. Once assembled, glue the skids into the designated slots on the bottom of the fuselage.



TAIL ASSEMBLY

Prepare the V-Tail segments, the V TAIL ROOT and an 8mm carbon tube cut to a length of 285mm. Assemble all the parts together with the tube inserted into its designated slot, which will help with proper alignment during gluing

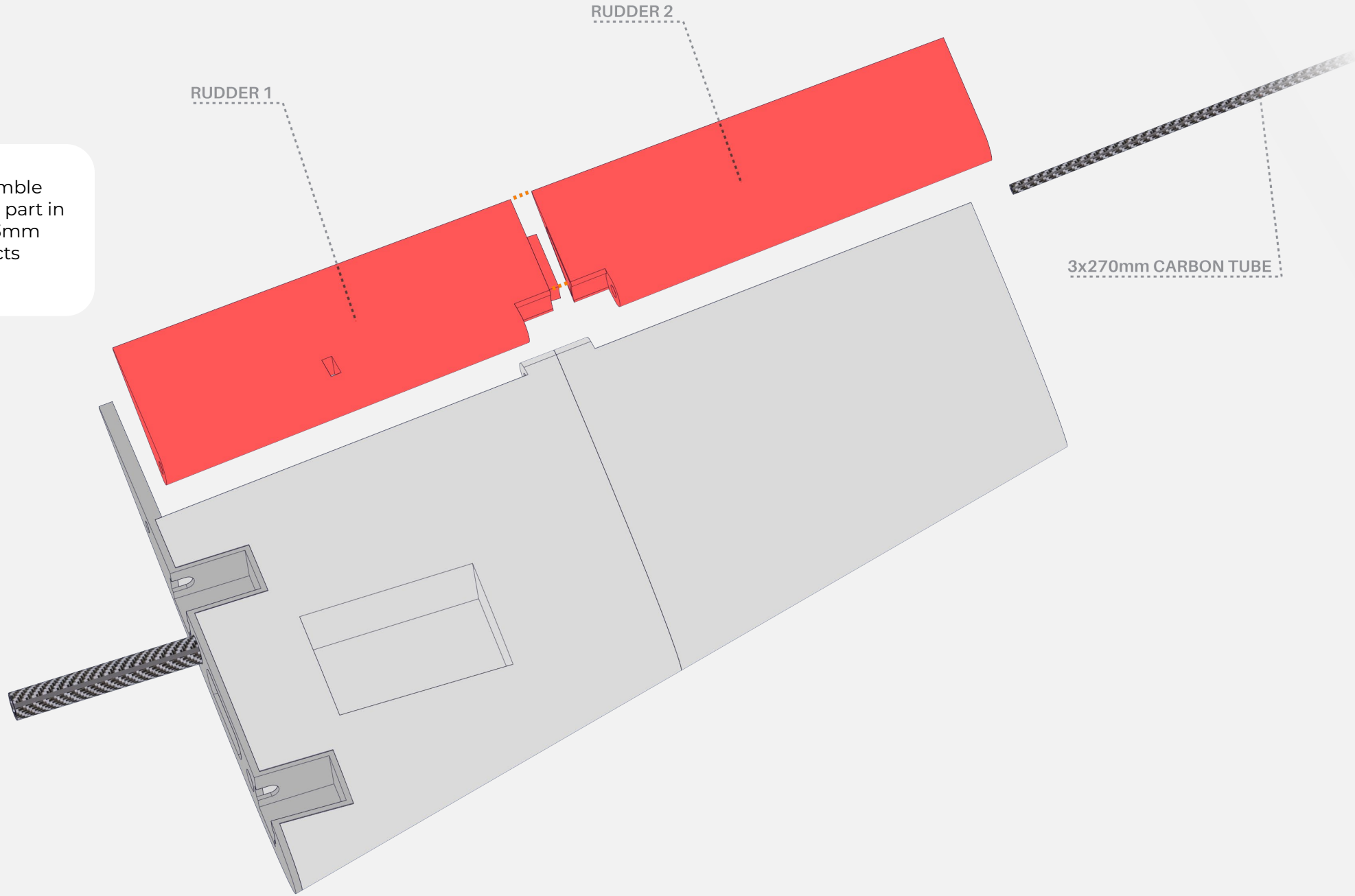
CA GLUE



TAIL ASSEMBLY

Take the ruddervator parts and assemble them together. Place the completed part in its designated position and insert a 3mm carbon tube cut to 270mm, which acts as the control surface hinge.

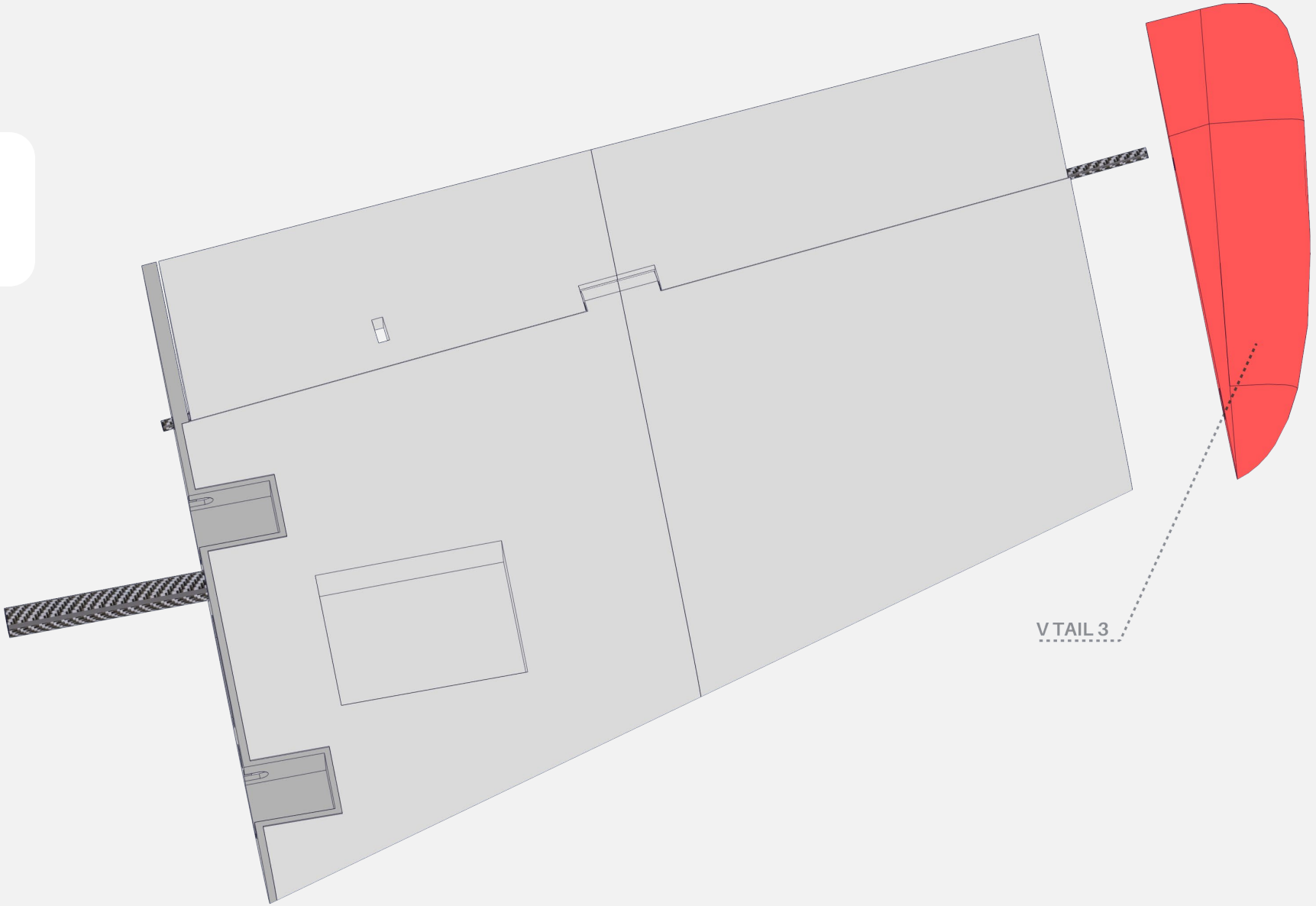
CA GLUE



TAIL ASSEMBLY

Take the last V-tail segment and glue it in place by sliding it onto the exposed end of the carbon tube at the tip of the stabilizer.

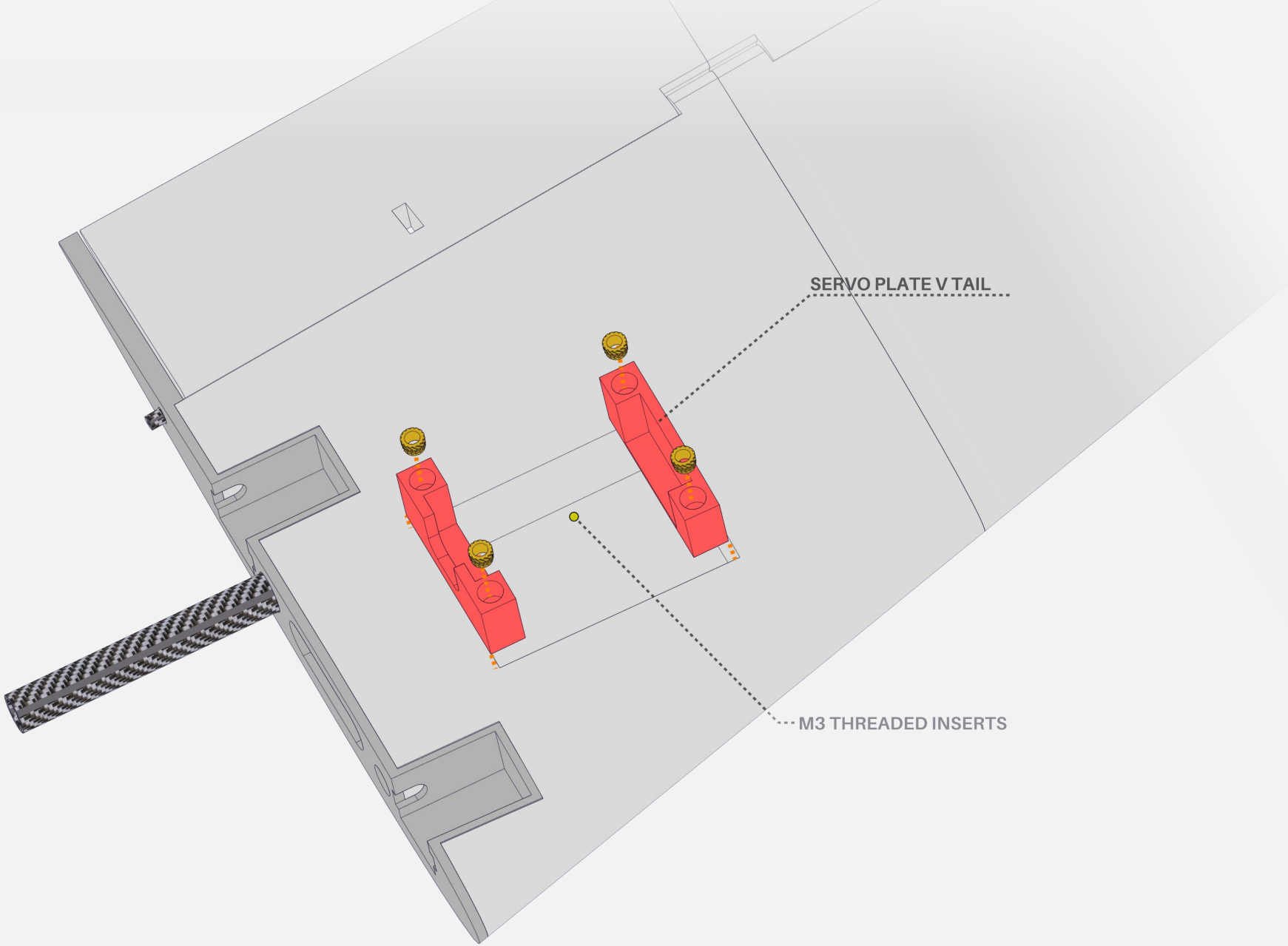
CA GLUE



TAIL ASSEMBLY

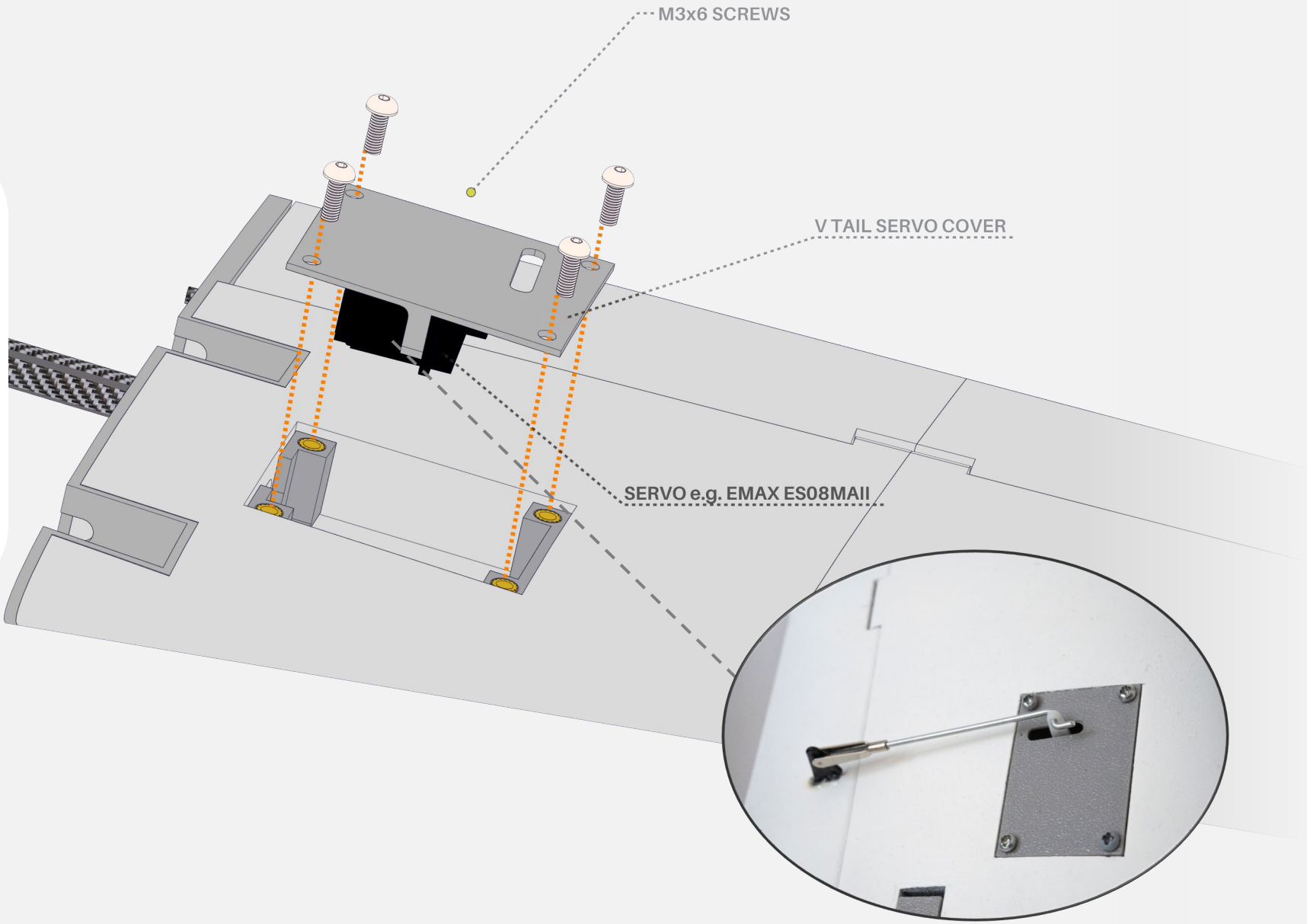
Prepare the SERVO PLATE V TAIL Press M3 THREADED INSERTS into the designated holes, and glue the assembled parts into the recess in the tail.

CA GLUE



TAIL ASSEMBLY

Take the VTAIL SERVO COVER and mount a micro servo to it. Besides securing it with the small screws included with every servo, you may apply a small amount of hot glue to enhance the servo's adhesion to the surface. Route the servo cable through the channel to the outside. At this stage, also attach the servo horn and center it. It's best to connect the servo now, either to a servo tester or directly to the receiver and ensure that its range of motion is properly centered once powered. This part is also available in STEP format in case you need to adapt it for different servos. Finally, attach the assembled part using M3x6mm screws.



HOT GLUE
OPTIONAL

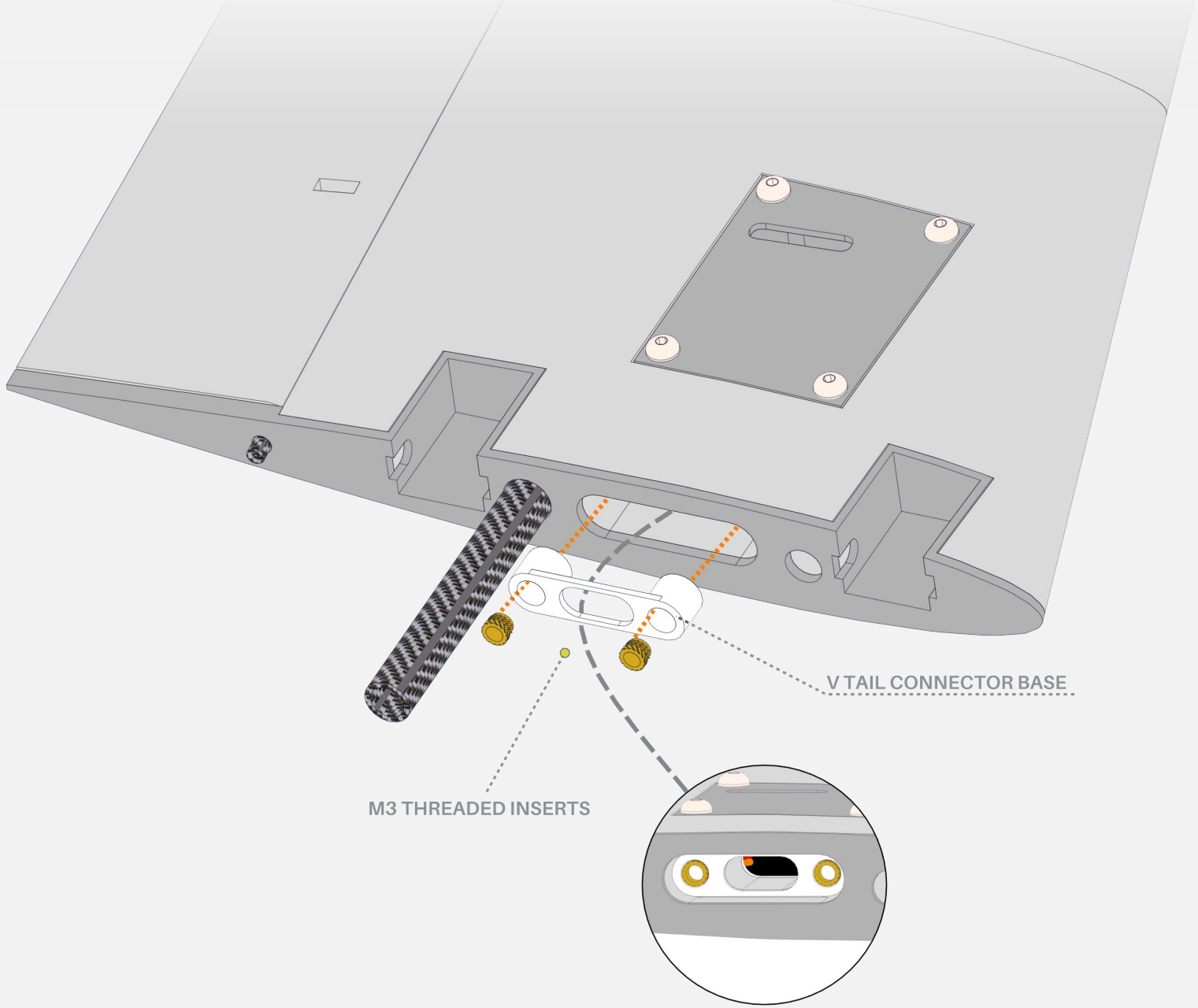
TAIL ASSEMBLY

OPTIONAL

If you want to use VTAIL CONNECTORS, which can carry servo cables, complete this step. It is also possible to skip it and manually connect and disconnect the cables when installing or removing the stabilizers.

Prepare the VTAIL CONNECTOR BASE. Press M3 THREADED INSERTS into the designated holes, and then glue the prepared part into the dedicated slot in the stabilizer.

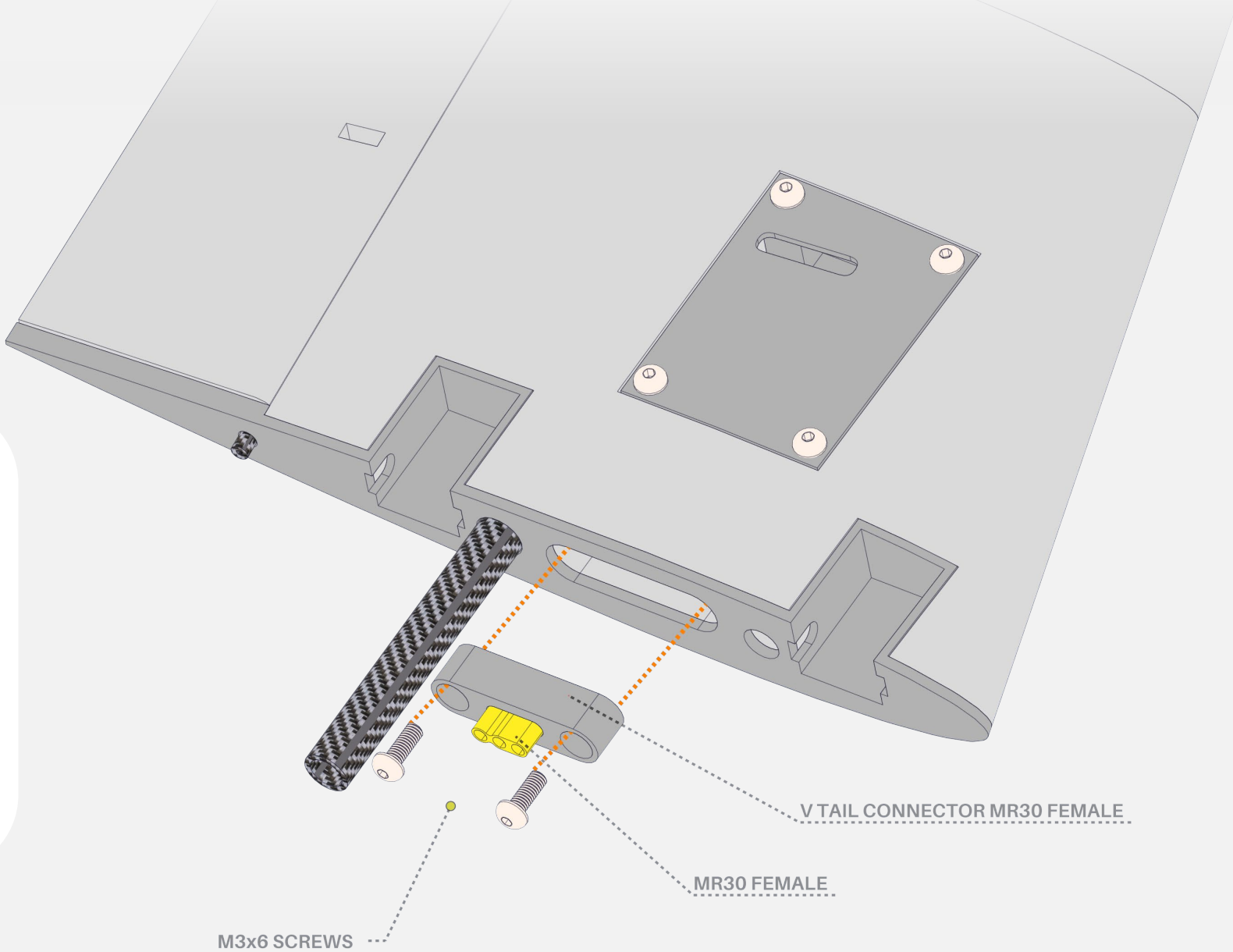
CA GLUE



TAIL ASSEMBLY

Prepare the V TAIL CONNECTOR MR60 FEMALE and the MR30 connector, to which the servo wires should be soldered at this stage. Once prepared, attach the connector to the wing using M3x6mm screws.The connector is designed to fit an MR30 plug. The MR30 is originally intended for connecting small motors with low current and thin wires, but it also works well as a connector for a servo. This part is also available in STEP format in case you need to adapt it for other plugs, which can be chosen freely depending on your needs.

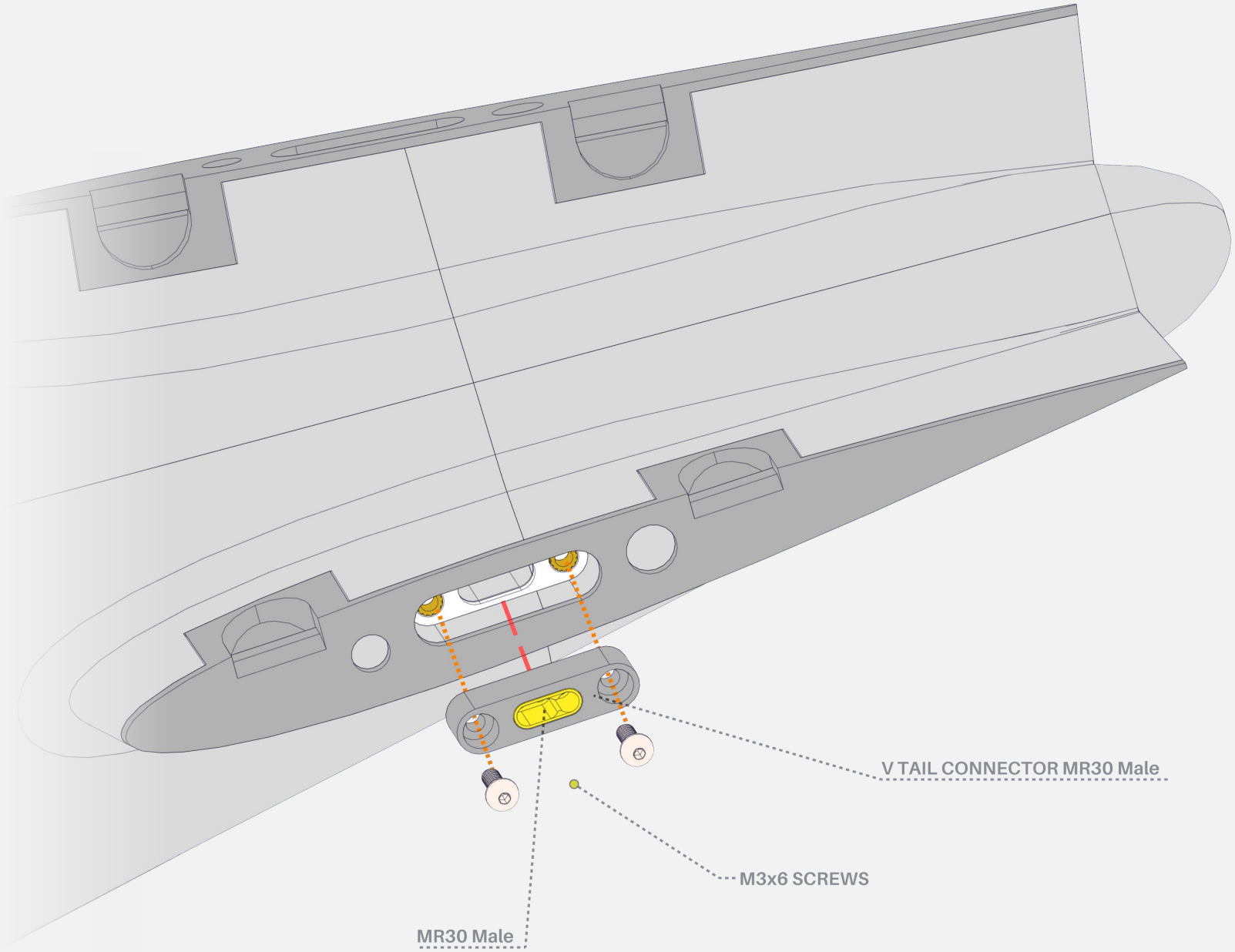
Alternatively, You can also skip this solution and simply use the standard servo plug or choose a different connector depending on your setup. During wing assembly and disassembly, you will need to manually disconnect the plug, which is also not inconvenient.



FUSELAGE ASSEMBLY

The situation on the fuselage side is identical. If you choose to use the connector, take the VTAIL CONNECTOR MR30 MALE along with the MR30 male plug, and at this stage solder it to the servo extension wires.

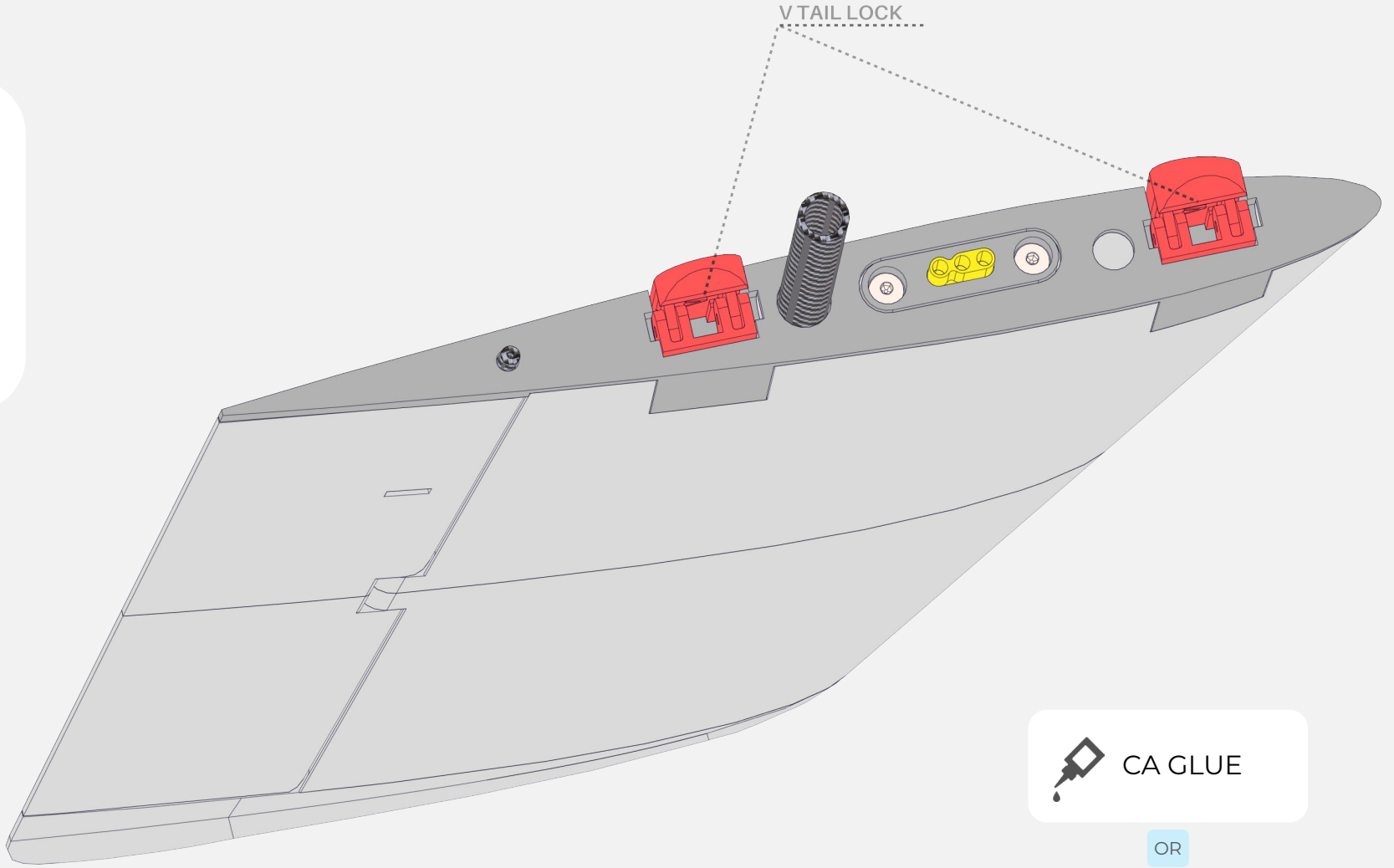
If you decide to skip the connector, the standard servo plug or other connector is sufficient. You can prepare it now or leave this step for later when assembling the rest of the electronics.



TAIL ASSEMBLY

The locks consist of the VTAIL LOCK BASE and the top part VTAIL LOCK. The base is identical for all locks, but the VTAIL LOCK parts differ and are marked according to their position, for example VTAIL LEFT REAR / VLR, VTAIL LEFT FRONT / VLF and so on. To assemble the lock, you will need a pin and a small torsion spring. The simplest and proven solution is to use the pins and springs from small hair clips, as they work on the same principle. The locks provide quick and secure wing attachment.

Glue the finished locks into their designated slots in the stabilizer. By default, it's best to position the lock base so that it is perfectly flush with the surface of the root, neither protruding nor recessed. However, the design includes about 2mm of tolerance in case you need some slight adjustment or fine-tuning of the lock position. The locks can be glued with CA glue or epoxy with a longer curing time, which gives more flexibility for precise positioning. In this case, you can temporarily fit the stabilizer to the fuselage during the gluing process to check how the locks engage with the fuselage. At this stage, the stabilizer is complete. The second one is assembled in the same way.



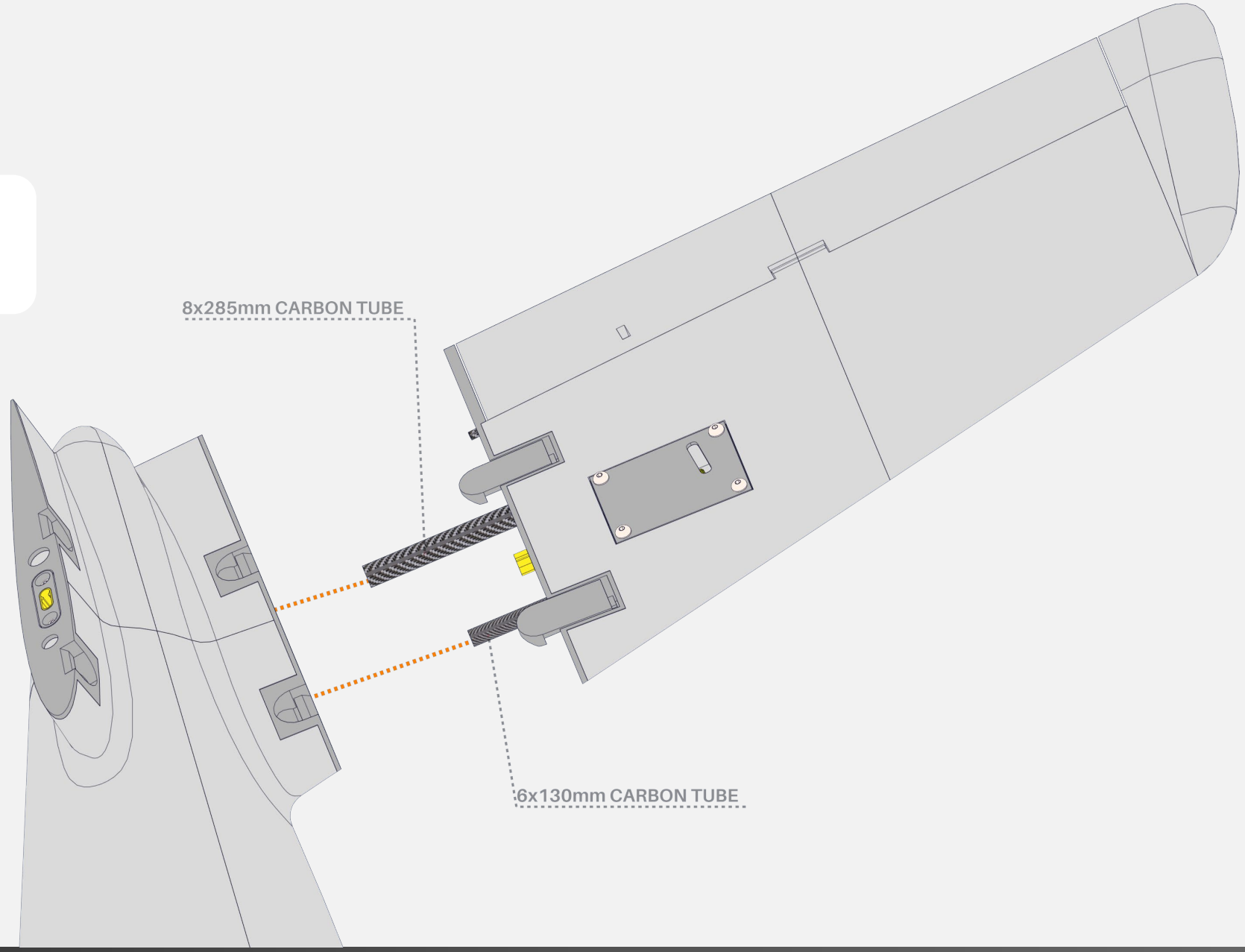
CA GLUE

OR

EPOXY

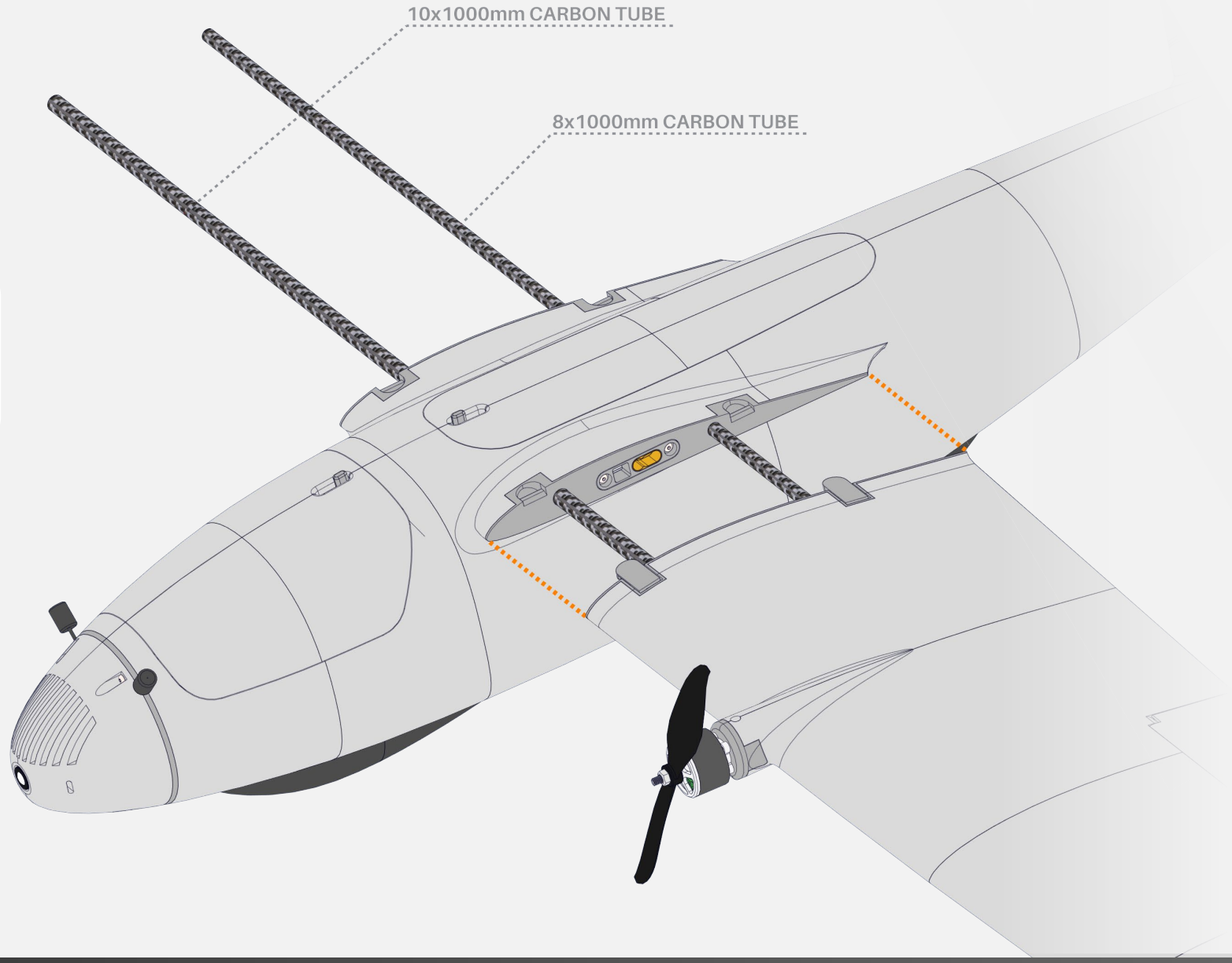
FINAL ASSEMBLY

Prepare a 6mm carbon tube cut to a length of 130mm, which serves as the second spar for the stabilizer. Insert it into its designated slot on the tail.



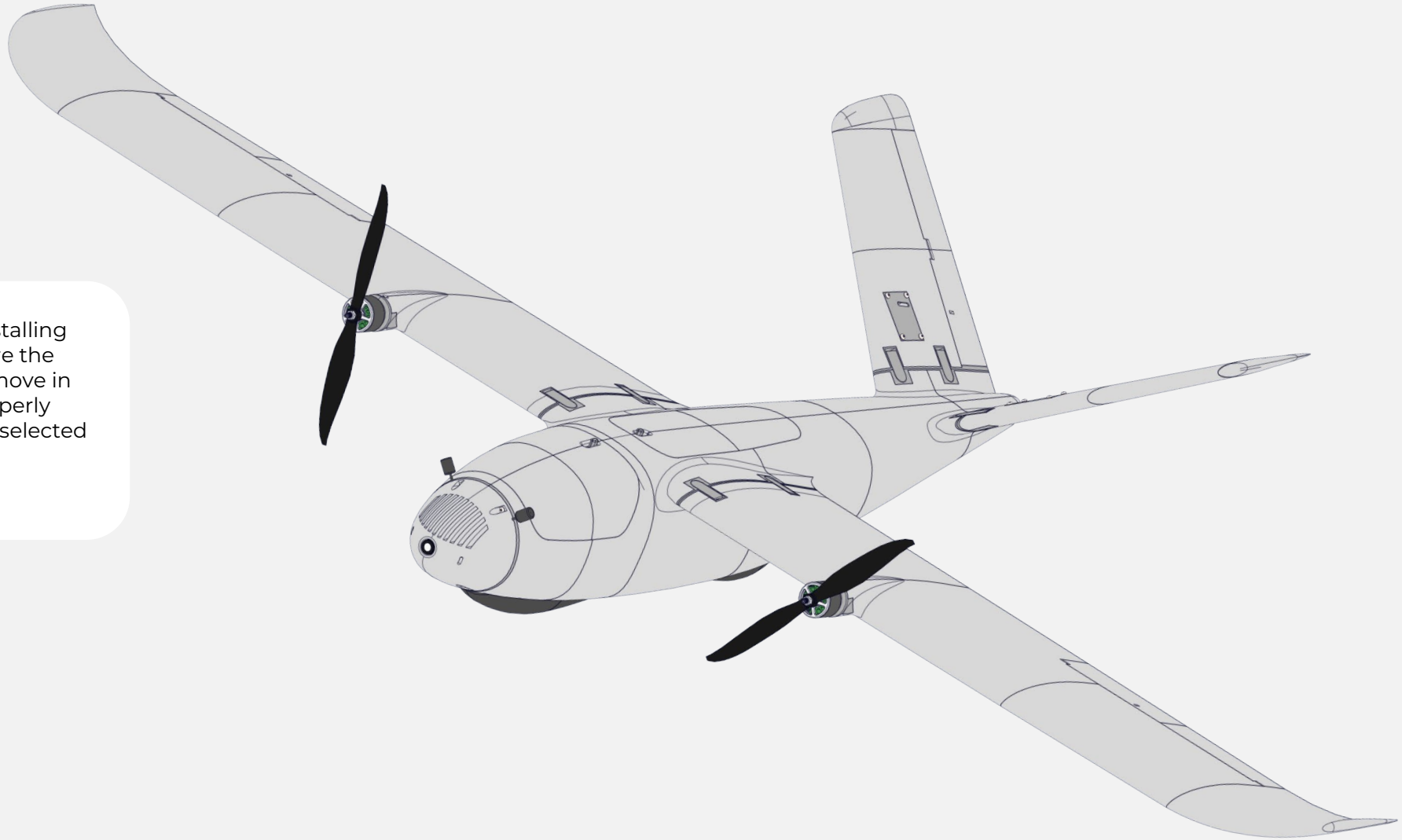
FINAL ASSEMBLY

Take the 10mm and 8mm carbon tubes, each 1000mm long, which serve as the main wing spars. Insert them into the designated slots in the fuselage. Then slide the wings onto the spars and push them firmly against the fuselage, securing them in their final position.

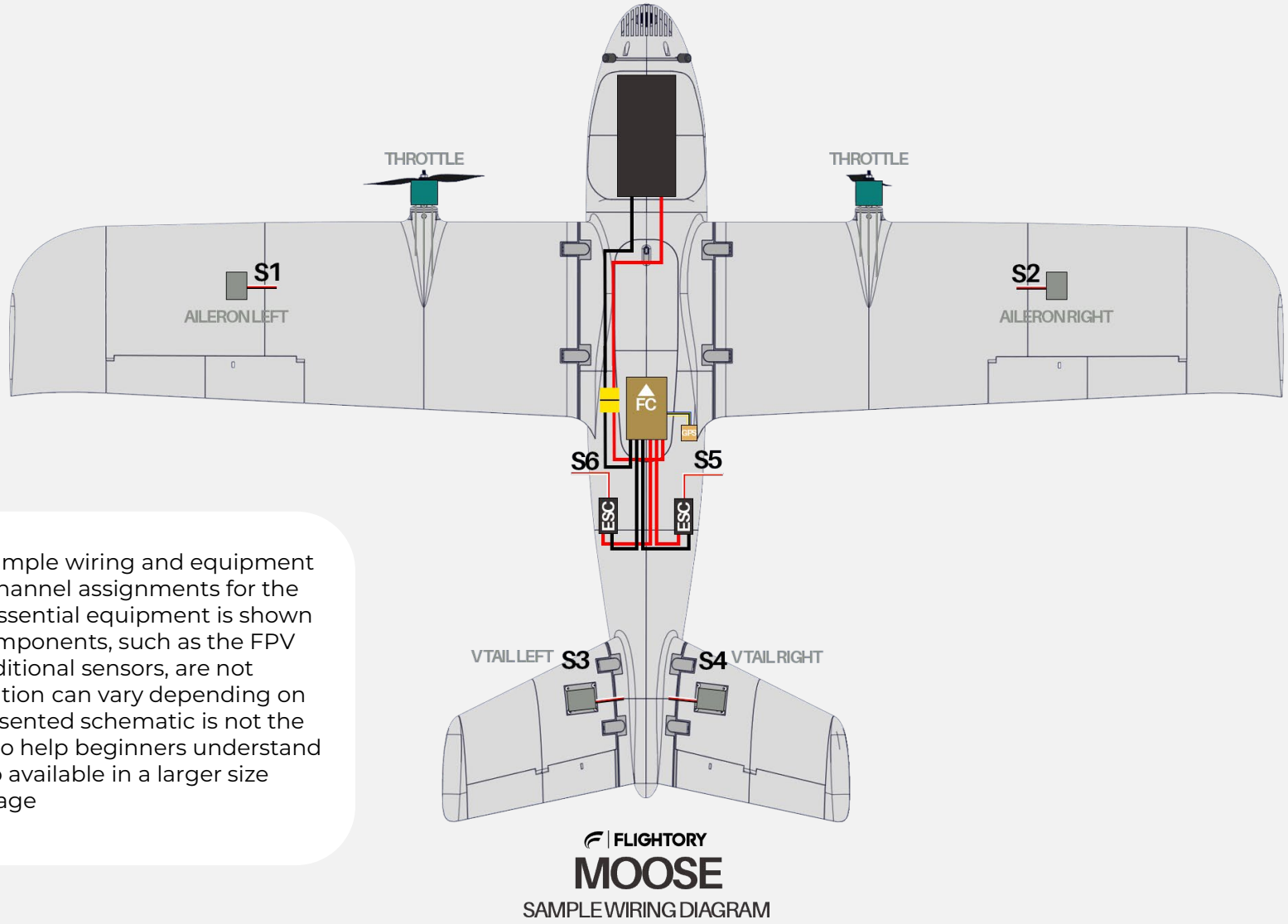


FINISHING BUILD

At this stage, the entire airframe is ready for installing and arranging the remaining electronics. Before the first flight, make sure that all control surfaces move in the correct directions, the propellers rotate properly (one CW and the other CCW- according to the selected propellers in order to balance the prop torque). Ensure that the center of gravity is correcly set.



WIRING DIAGRAM



The diagram illustrates an example wiring and equipment layout, including suggested channel assignments for the servos and motors. Only the essential equipment is shown in the schematic. Optional components, such as the FPV camera, VTX, receiver, and additional sensors, are not included, as their implementation can vary depending on the chosen hardware. The presented schematic is not the only solution but is intended to help beginners understand the setup. This diagram is also available in a larger size in PDF format in the file package

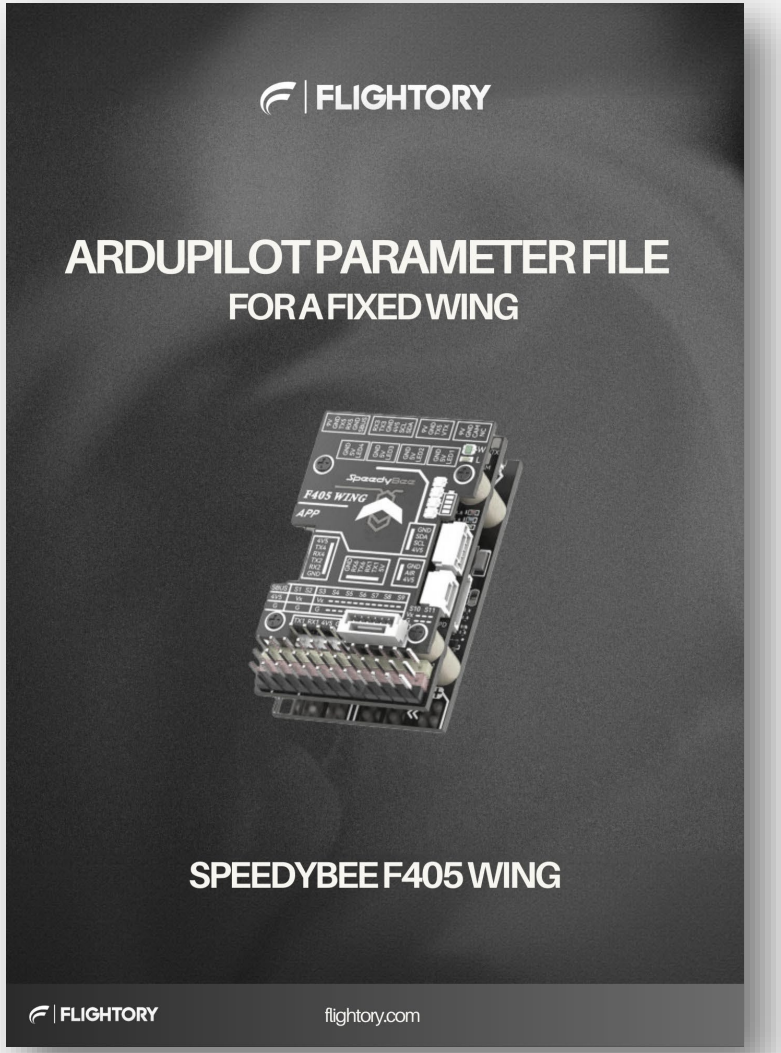
ARDUPILOT CONFIGURATION

For beginners, a document with a preconfigured param. file is also available.
The document outlines the key parameter settings of a .param file for ArduPilot, which can serve as guidance and a foundation for further configuration and tuning of a fixed-wing aircraft.
The file pertains to the Speedybee F405 Wing flight controller used with an ELRS receiver, GPS, Walksnail FPV, and the Yaapu telemetry script option. This is not a ready-to-use configuration and should not be implemented without proper verification. Before flying, you must configure the appropriate servo outputs for your aircraft's setup and perform the necessary compass and accelerometer calibrations. The following sections will present the main parameters and explain their functionality.

All information, as well as the firmware, is available onthe ArduPilot website. It is also recommended to review the user manual of the flight controller for configuration.

https://ardupilot.org/plane/docs/common-speedybeef405wing.html

The document is available for free download from the Flightory Discord server in the #free-files channel.



FLIGHTORY

MOOSE