

*JETWORKS*

*D.H. 110*  
*Sea Vixen*  
*Parkjet*



2nd Generation Fighter

**Construction Guide**

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# Sea Vixen History

The DH.110 Sea Vixen is a British twin-engine, twin boom-tailed, two-seat, carrier-based fleet air-defence fighter flown by the Royal Navy's Fleet Air Arm during the 1950s through to the early 1970s. The Sea Vixen was designed by the de Havilland Aircraft Company during the late 1940s at its Hatfield aircraft factory in Hertfordshire, developed from the company's earlier first generation jet fighters. It was later called the Hawker Siddeley Sea Vixen after de Havilland was absorbed by the Hawker Siddeley Corporation in 1960.

The Sea Vixen had the distinction of being the first British two-seat combat aircraft to achieve supersonic speed, albeit not in level flight. Operating from British aircraft carriers, it was used in combat over Tanganyika and over Yemen during the Aden Emergency. In 1972, the Sea Vixen was phased out in favour of the American-made McDonnell Douglas Phantom FG.1 interceptor. There have been no flying Sea Vixens since 2017.

The design of the DH 110 used the twin-boom-tail design layout of the de Havilland Vampire and de Havilland Venom. It had an all-metal structure, 45-degree swept wings, and an armament of four 30 mm ADEN cannons. The DH 110 was to be powered by a pair of Rolls-Royce Avon turbojet engines, each capable of generating 7,500 lbf (33 kN) of thrust, which would allow the aircraft to become supersonic in a shallow dive. The DH 110 had the distinction of being the first British two-seat combat plane to achieve supersonic speed.

On 26 September 1951, an initial prototype was completed and conducted its maiden flight from the Hatfield Aerodrome, flown by the test pilot John Cunningham. Early flight tests of the prototype demonstrated that the aircraft's performance exceeded expectations. By the following year, the prototype was regularly flying in excess of the speed of sound.

Production Sea Vixens were manufactured at first by de Havilland at its former World War II Airspeed Ltd. "shadow factory" at Christchurch near Bournemouth, starting in March 1957. In August 1962, all production was moved to another de Havilland factory located at Hawarden, near Chester.

Of the 145 Sea Vixens constructed, 55 were lost in accidents. Two DH.110 development prototypes were also lost. The 55 Sea Vixens lost represented a loss rate of almost 38%. 30 (54%) of these were fatal incidents, 21 of which involved the death of both pilot and observer.

Photo's used in this manual are copyright of their respective owners.

# Designers Notes

The Sea Vixen has a very unique shape amongst its contemporaries. and carries such an iconic planform it will really turn heads as you tear up the sky at your model club!!

The model can be powered with twin 50 or 64mm EDF, or a single pusher setup. The Twin 64mm will give an impressive turn of speed.

Can be made with or without 3D printed parts.



# Before you start.



## Adhesives

- > For the majority of construction :
  - UHU Creativ for Styrofoam (also called UHU POR)
  - 3M 77 Spray adhesive.
- > For wing spars and motor mounts :
  - Epoxy. (5 and 15mins cure times are the most convenient) micro-balloons can be added to reduce weight.
- > For servo's / and quick grab :
  - Hot melt glue gun - Caution if the glue gets too hot it will melt foam - test first!

## Tapes

- > For holding parts tightly together whilst glue sets
  - Low tack masking tapes
- > For leading edges, hinges, general strengthening
  - 3M Gift tape (Purple - not green one!) - I prefer lightweight plastic hinges.

## Cutting parts

1. Print the plans,
2. Cut around each part using scissors - allow a border of approx (1/4") 6mm
3. Use either 3M spray mount or a very light coat of 3M 77 to the back of the parts and stick in an economical layout on the Depron foam.
4. Using a safety rule and craft knife over a cutting mat - important! use a fresh blade otherwise it will drag and spoil the foam. (I find the stanley knife perfect) make the straight edge cuts, then the curved parts freehand.
5. Once the parts are cut-out, keep the template stuck to the part until just before needed to help identify the parts.
6. After use, I find it helpful to keep all the used tempates in case replacement parts need making. (the glue eventually dries and they don't stick together!)

**IMPORTANT** Wherever the plans call for marking guidelines onto the depron, please ensure that you do otherwise it can cause problems later on. I suggest you use a Sharpie Fineliner to transfer the lines.

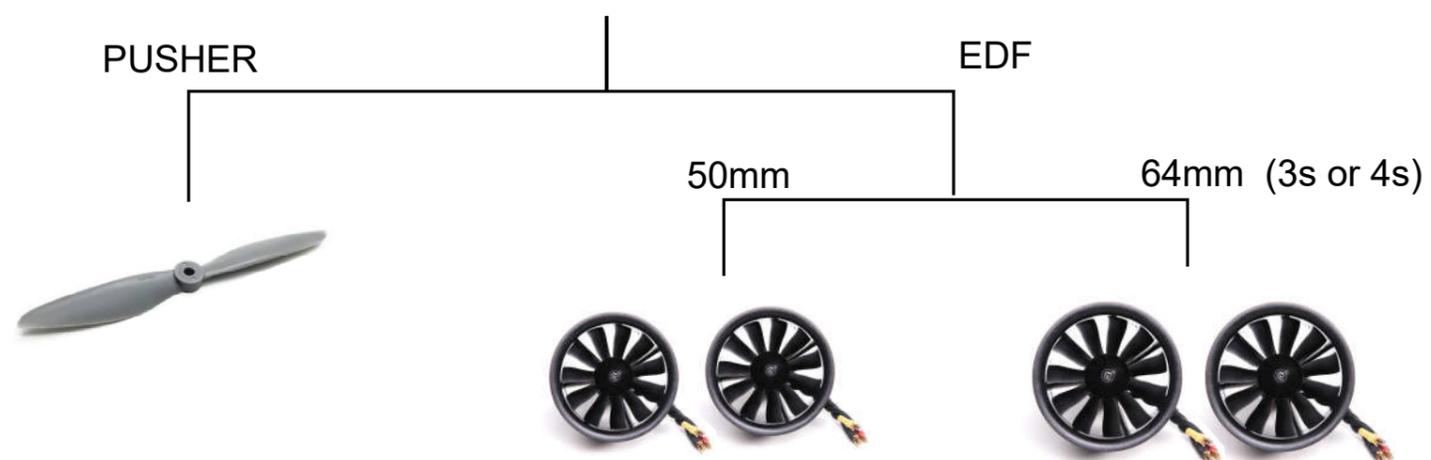
## Glueing parts together.

1. Ensure a really good fit - this will reduce the amount of adhesive used. The Bar Sander is a great tool for this.
2. Follow the adhesive instructions closely.
3. Use ordinary steel head pins to help keep the parts located whilst epoxy sets.
4. Use objects as weights such as paperweights to apply pressure whilst adhesive sets.
5. Use masking tape to apply pressure whilst adhesive sets. Also use masking tape to along the slots for the wing spars whilst gluing the carbon rod spars into the wings. This prevents the glue protruding and gives a nice finish.

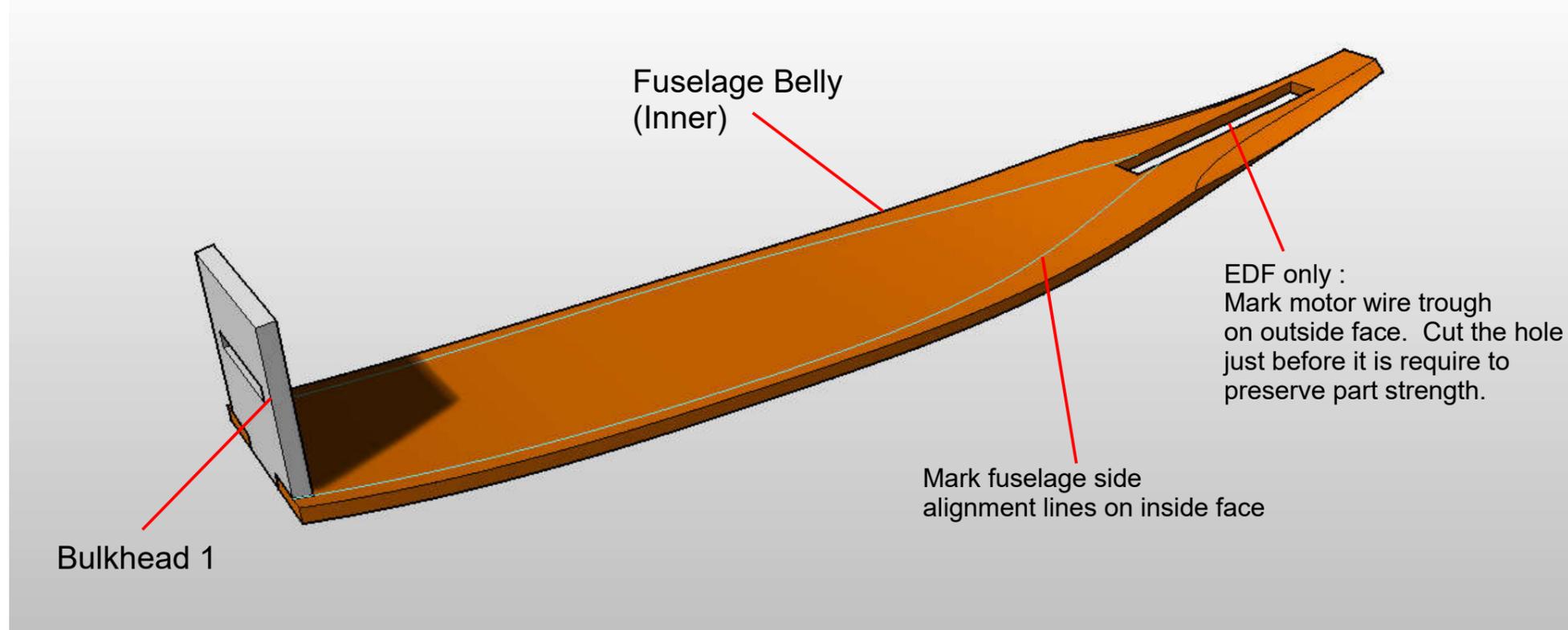


Choose your powertrain.

## CHOOSE POWERTRAIN



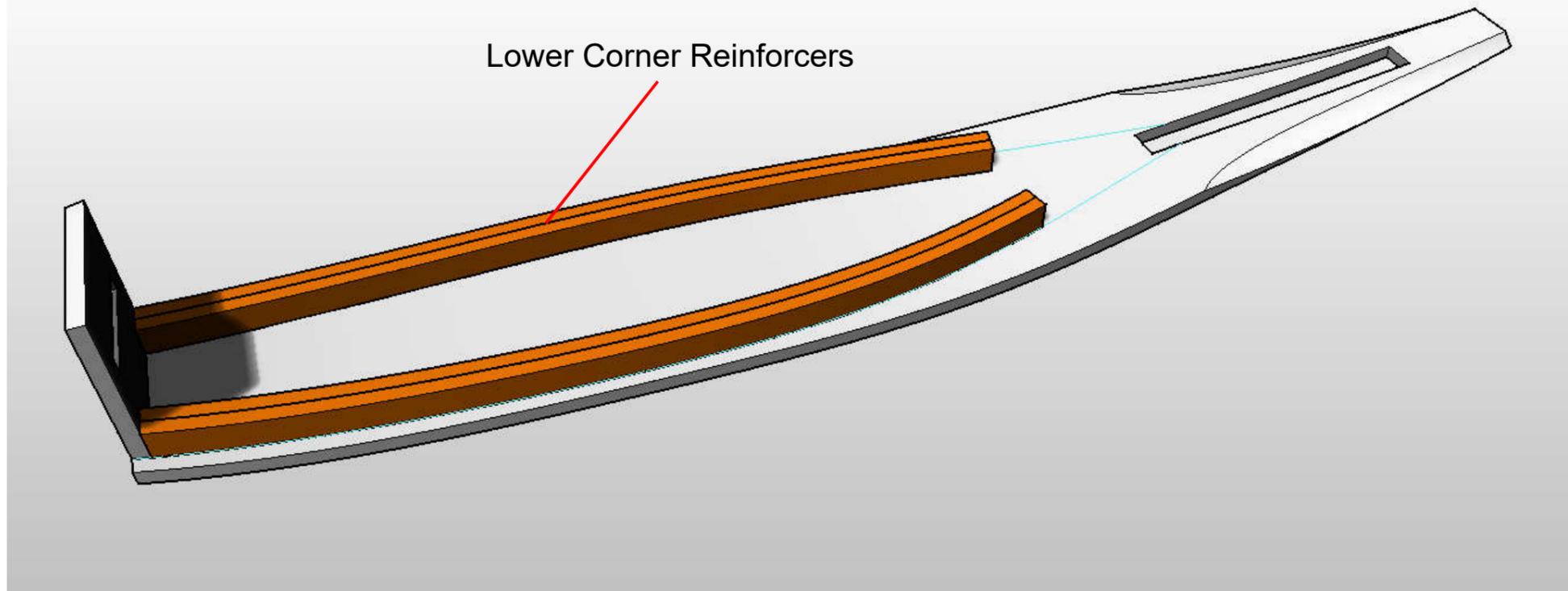
All versions



Glue **Bulkhead 1** to the **Fuselage Belly (Inner)**



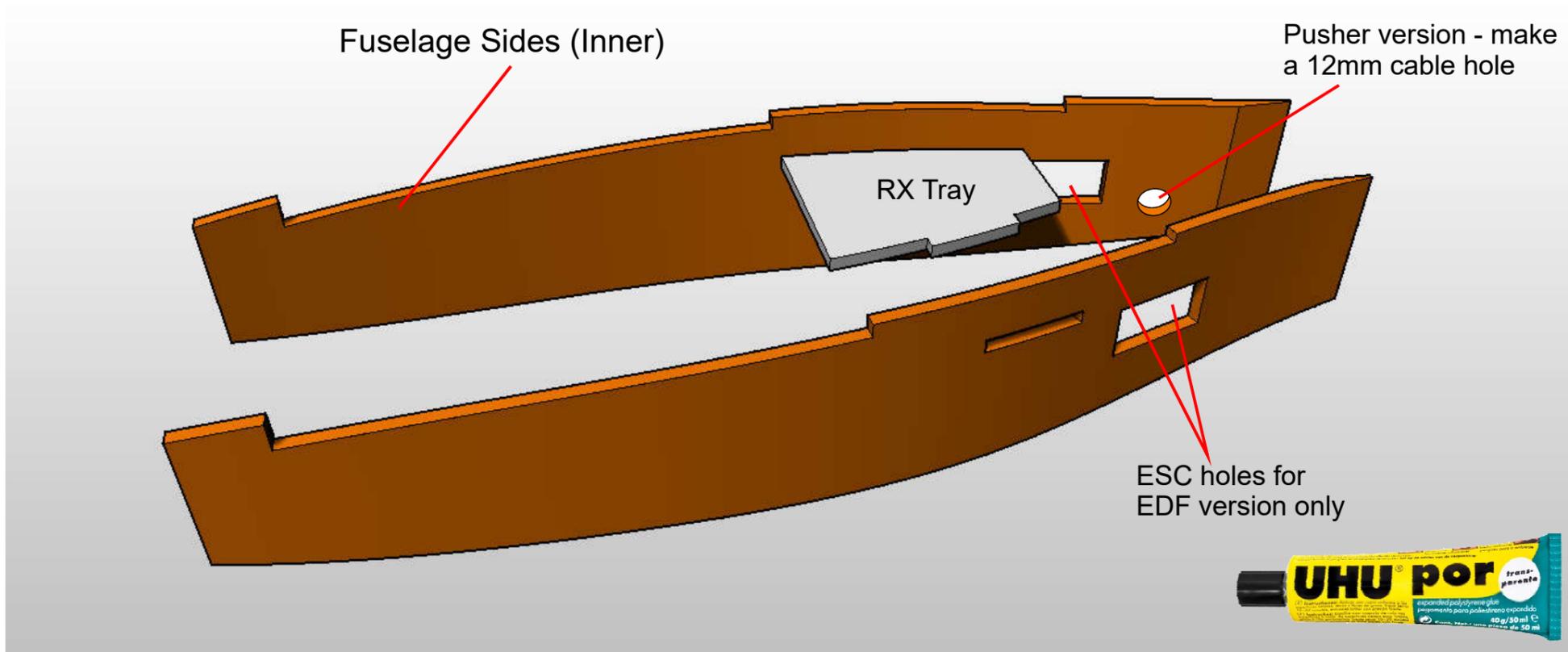
All versions



Glue the **Lower Corner Reinforcers (x4)** in place - aligned to the marked line.



All versions



Pre-shape the **Fuselage sides (Inner)**. If your model is EDF powered, then trim away the ESC holes.

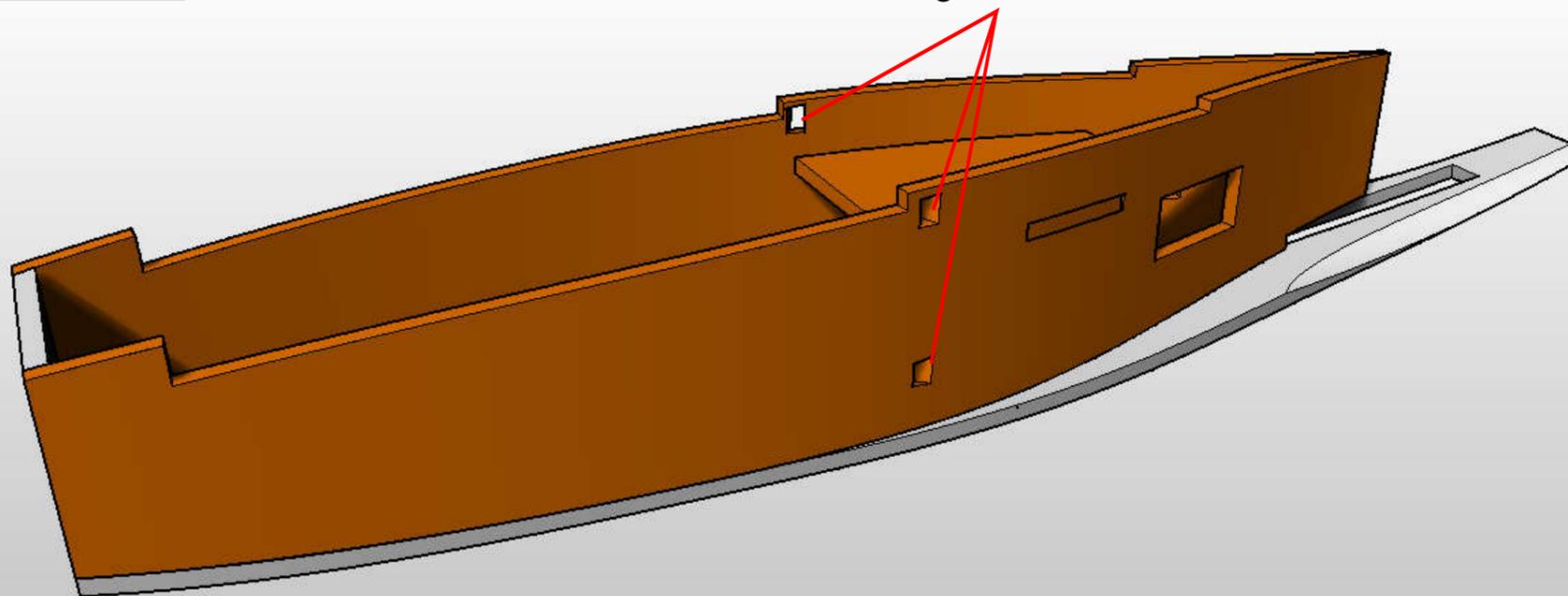
Test fit your ESC's into the holes and tweak if necessary to ensure a tight fit and the heat-sink side of your ESC's are aligned with the outer face of the Fuselage sides. Use a circular needle file to create space for the ESC cables.

Glue to the **RX tray**.



All versions

Alignment holes

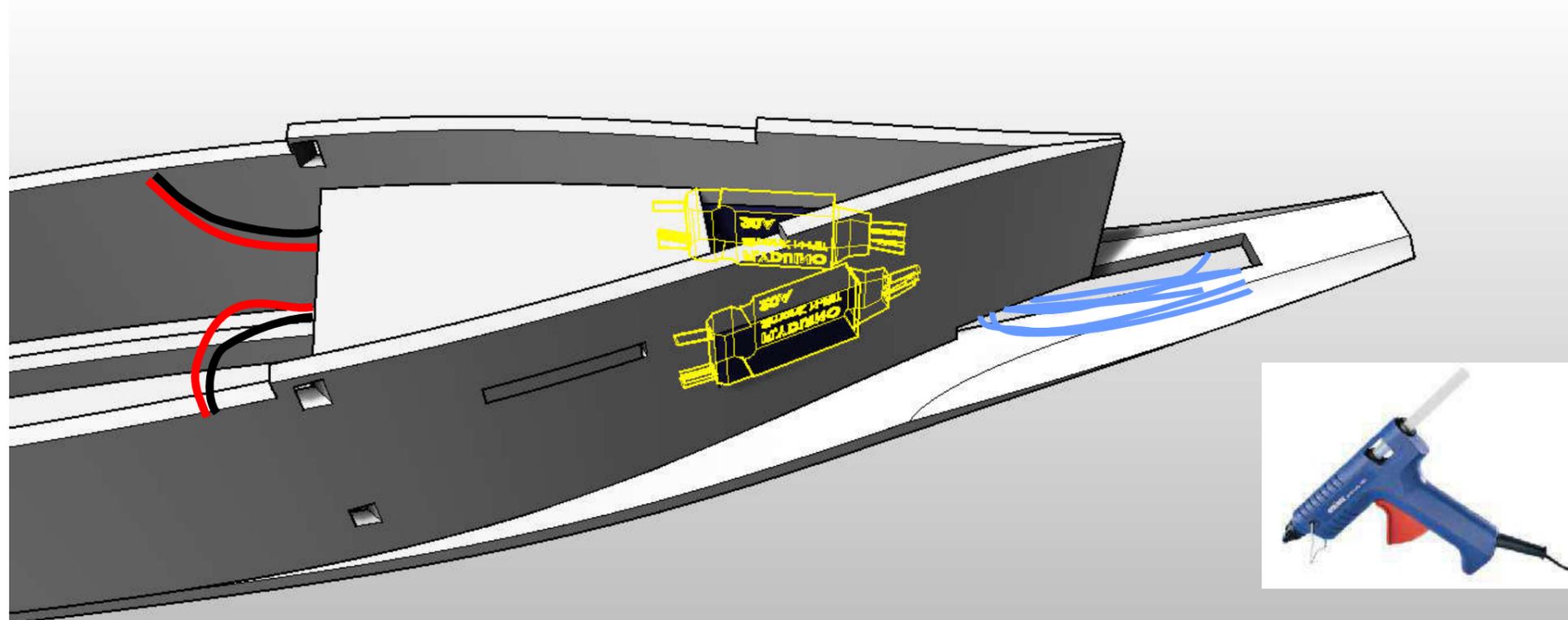


Glue the two sub-assemblies together.

Once in place, trim out the two alignment holes in the side using a needle files - ensuring the correct angle to match the mating part (see later on in the guide)



All versions

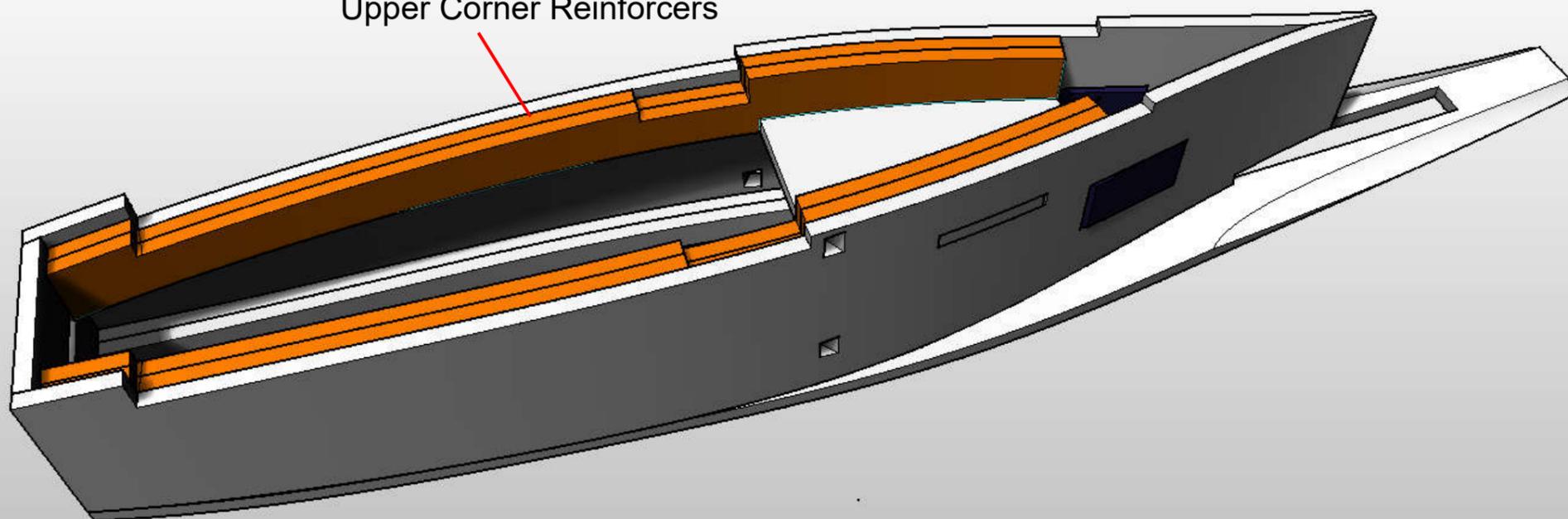


EDF VERSION ONLY :- Fit both ESC's to the assembly and run the motor cables through the gap at the rear of the fuselage sides (inner).  
Use hot melt glue to keep in place.



All versions

Upper Corner Reinforcers



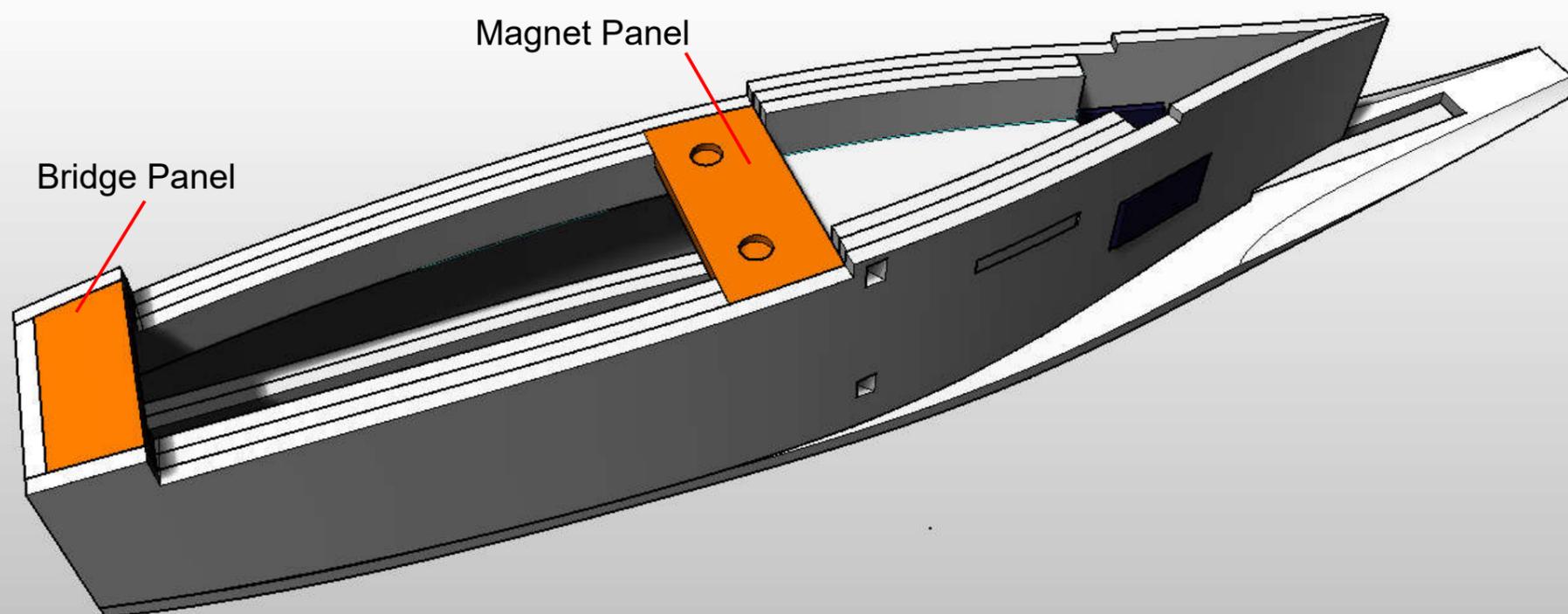
Glue the **Upper Corner Reinforcers (x4)** in place.



All versions

Magnet Panel

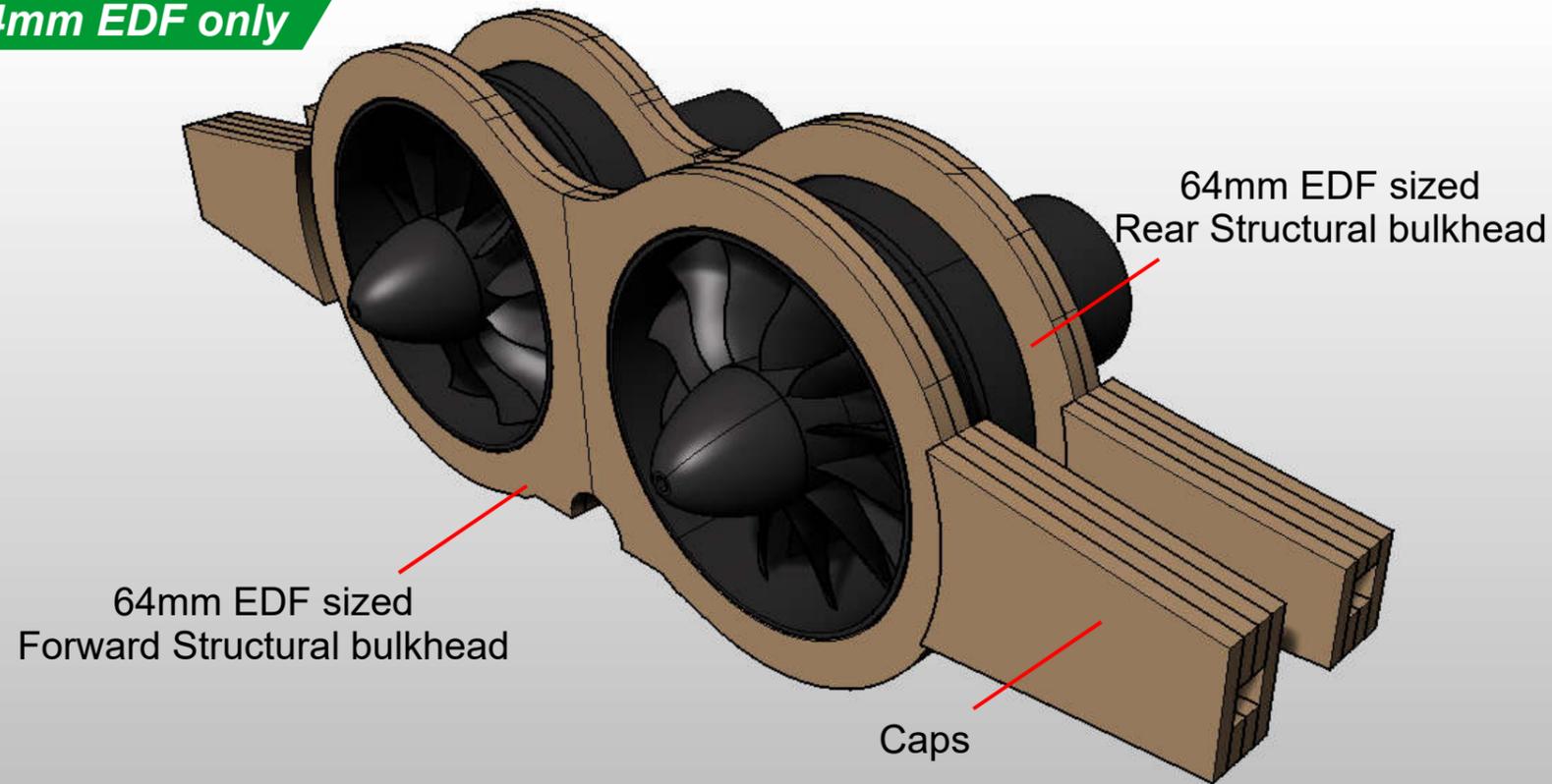
Bridge Panel



Glue the **Bridge Panel & Magnet Panel** in place.



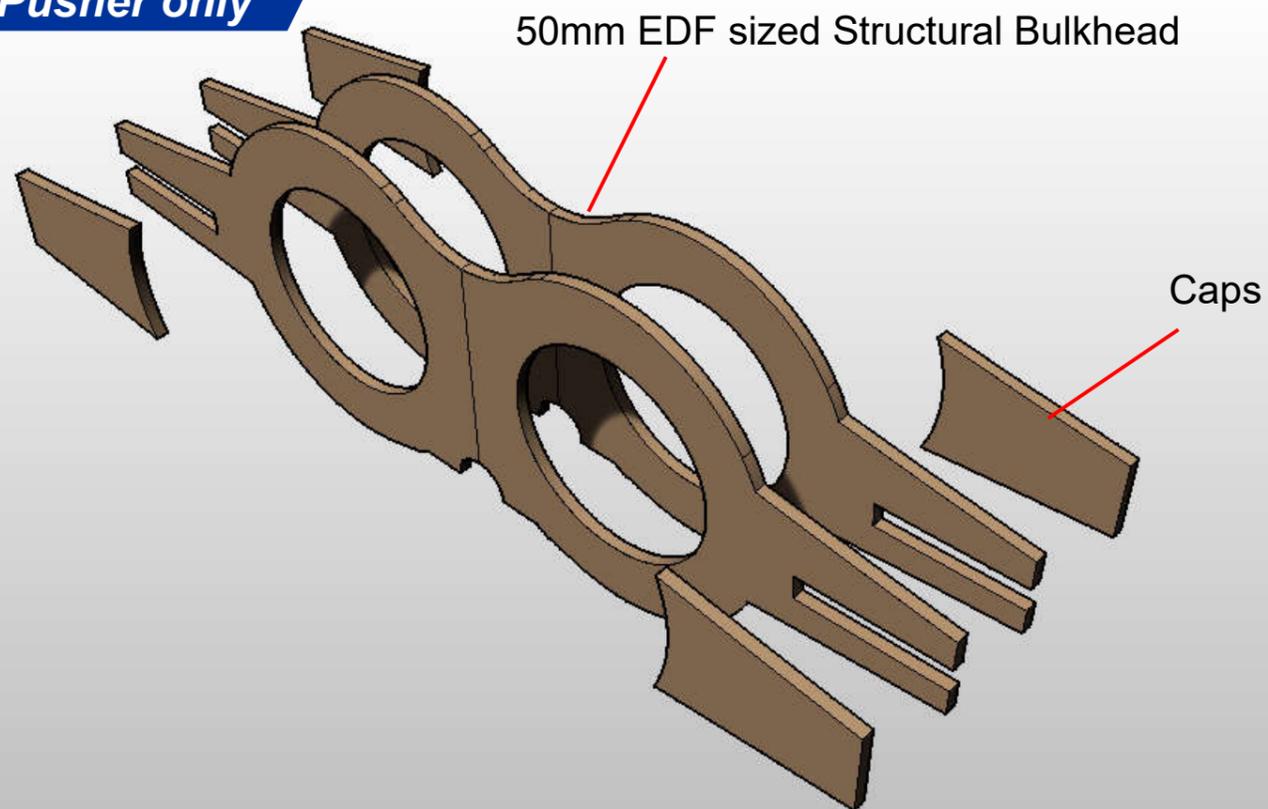
**64mm EDF only**



Cut and glue together the 64mm EDF size, 3mm Lite-ply parts to make these two **Structural Bulkheads**



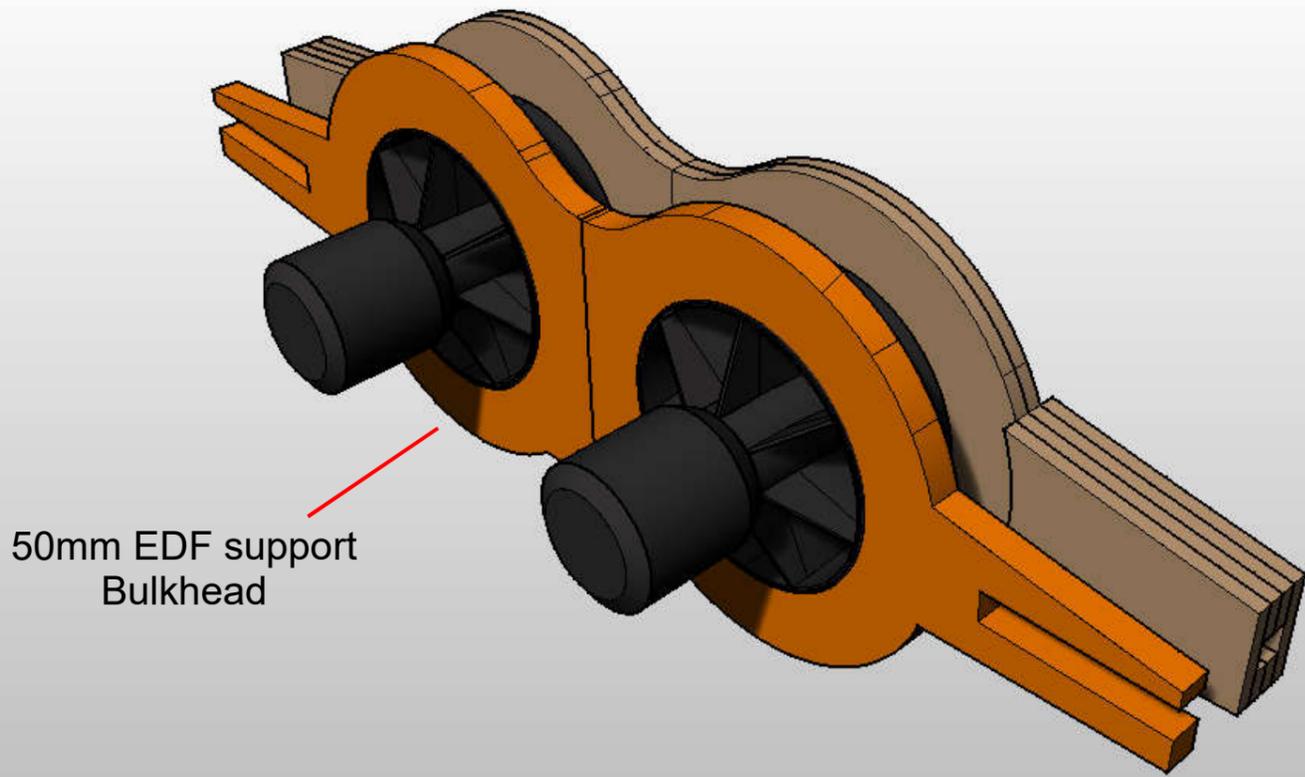
**50mm EDF & Pusher only**



Cut and glue together the 50mm EDF size, 3mm Lite-ply parts to make this single **Structural Bulkhead**



**50mm EDF only**



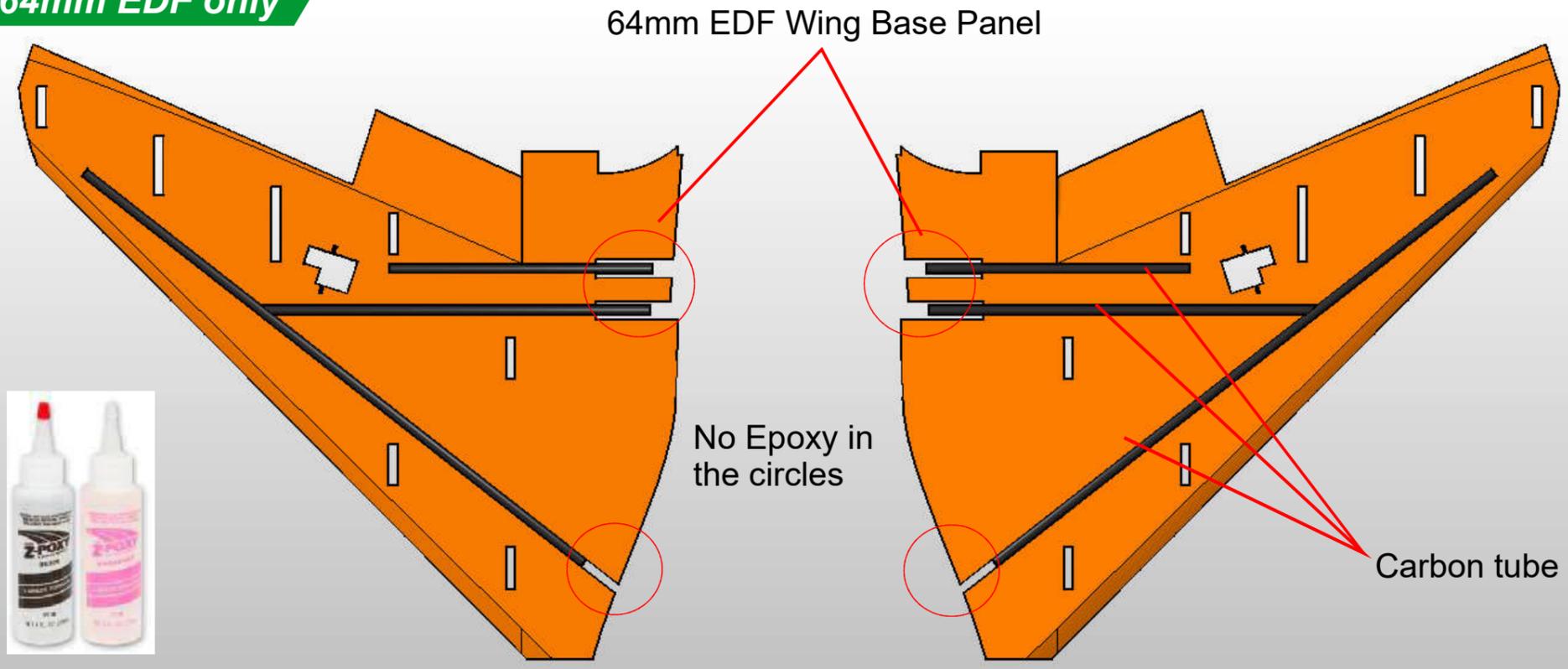
50mm EDF support Bulkhead

Cut the 50mm EDF support bulkhead from depron and and adjust to suit your chosen EDF brand.

Tack in place using drops of hot melt glue in between the two bulkheads onto the EDF 'can'.



**64mm EDF only**



64mm EDF Wing Base Panel

No Epoxy in the circles

Carbon tube

64mm EDF Version ONLY.

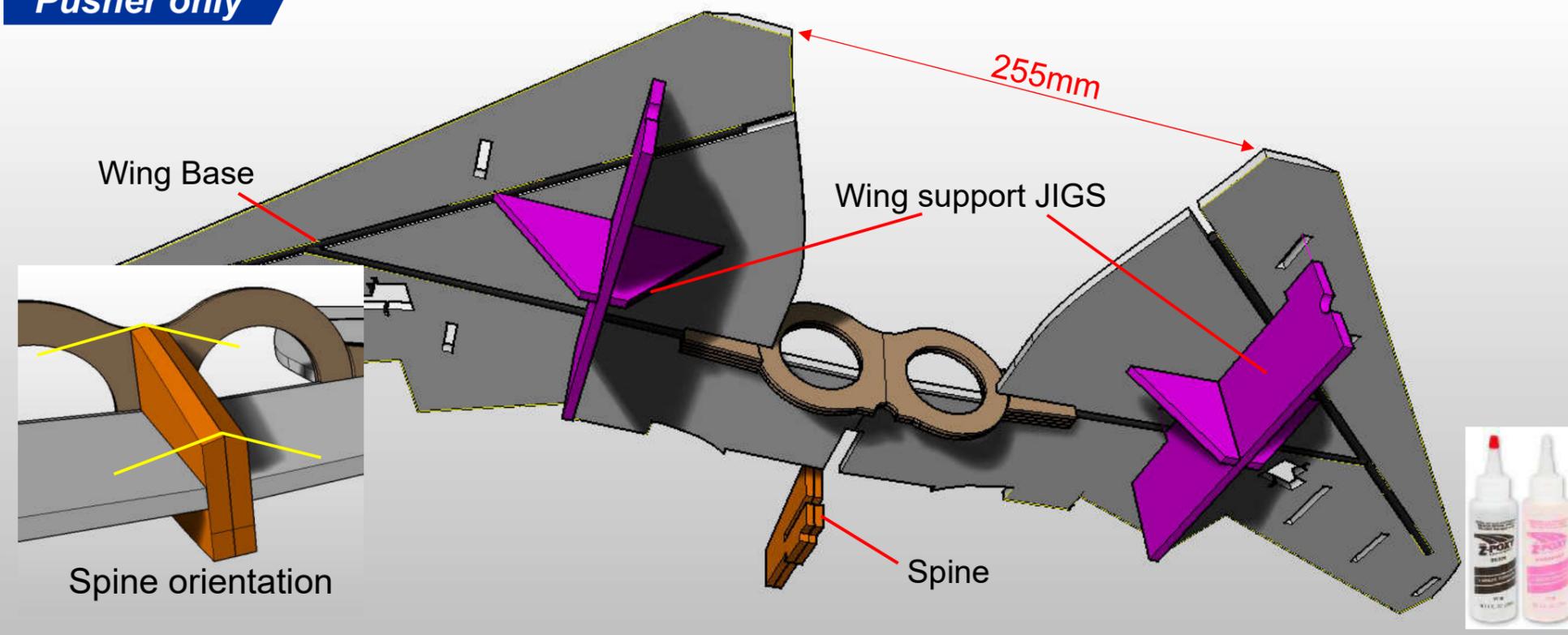
Glue the **5-6mm Carbon tube** in place - note that the carbon doesn't fit in the slots right to the end. Ensure no epoxy gets into the areas denoted with the red circles.

Use masking tape to contain the glue within the slots.





## Pusher only



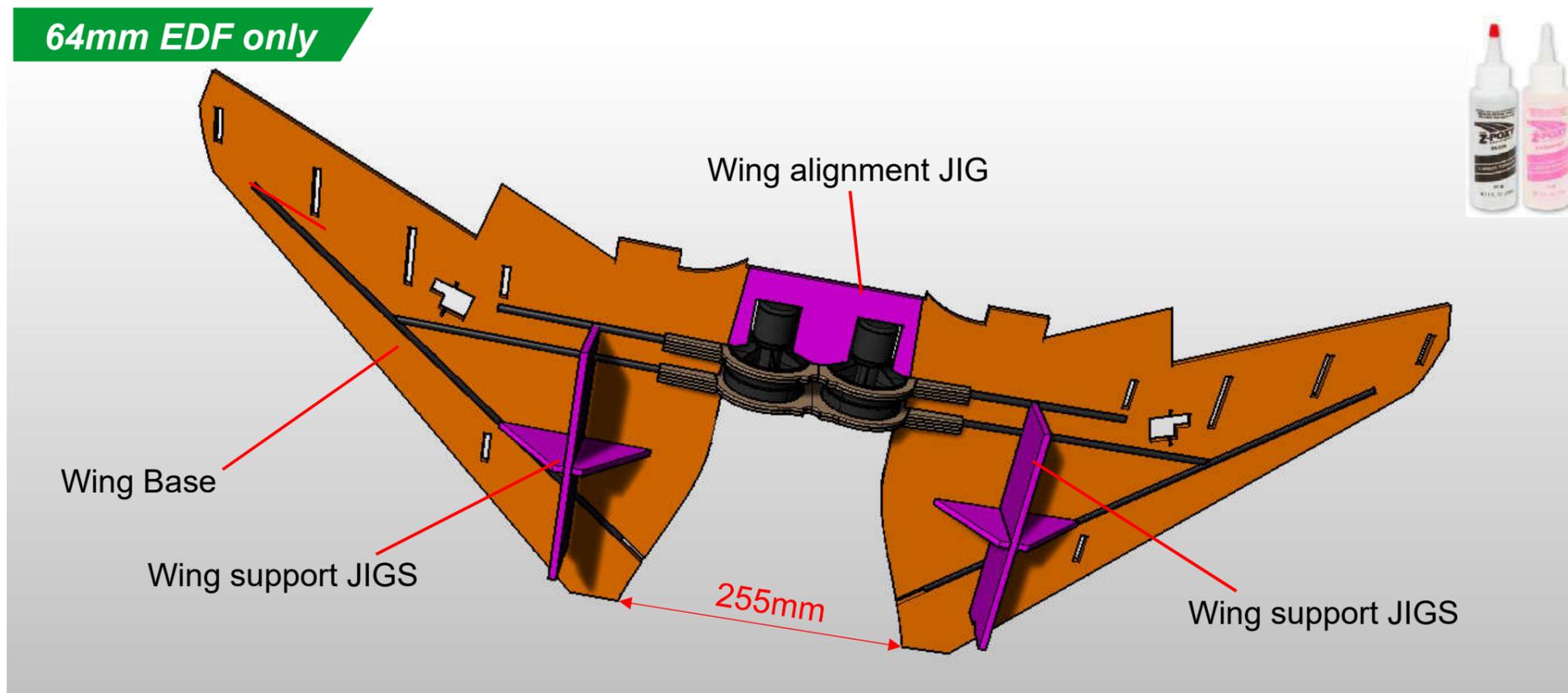
## PUSHER VERSION ONLY

On a flat surface, support the **Wing bases** using the **wing support Jigs** (no glue). Glue the two spine pieces onto the tabs using a little epoxy ensuring the correct edge orientation.

Apply epoxy onto the carbon spars and into the Liteply bulkhead as shown.

Bring the parts together to form a single wing part.

## 64mm EDF only



## 64mm EDF VERSION :

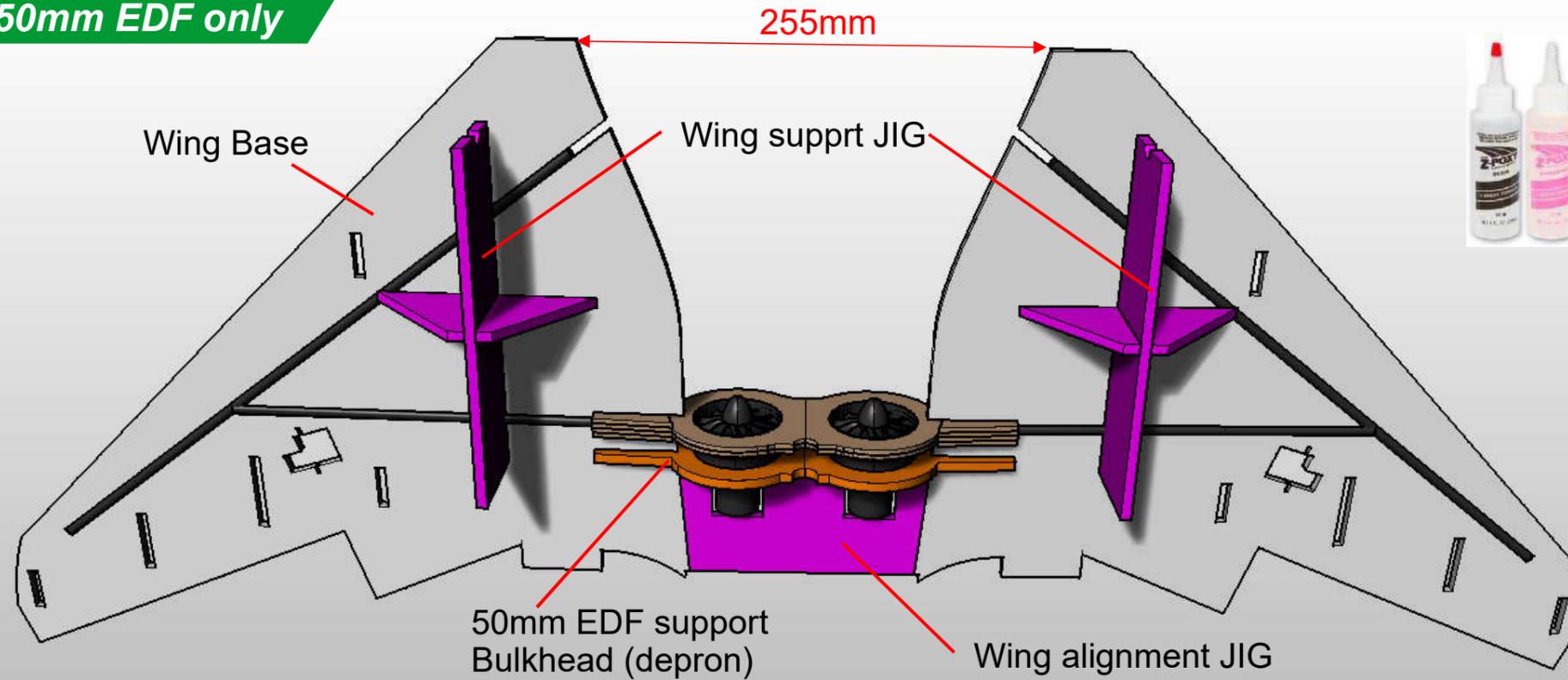
Using epoxy, glue the carbon spars within the **Wing bases** to the Lite-ply parts using the **wing alignment Jig** (no glue) to help space the parts accurately.

Use the **Wing Support Jigs** on a flat surface to support the assembly ensuring there is no twist.

The **Wing Support Jigs** slot (without glue!) into the the slots in the wing as shown.



**50mm EDF only**

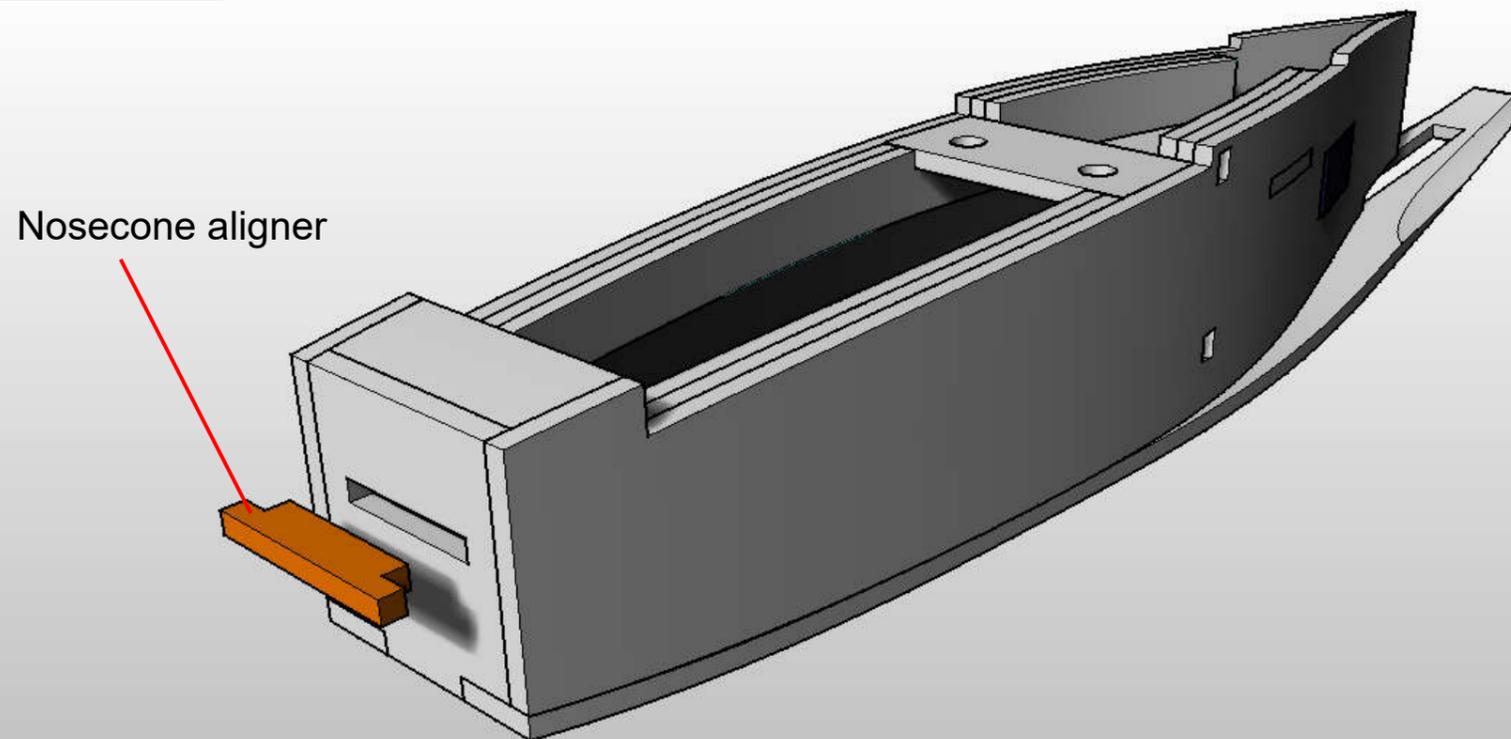


**50mm EDF VERSION :**

Using epoxy, glue the **Wing bases** to the Lite-ply/depron bulkheads using the **wing alignment Jig** to help accuracy.

Use the **Wing Support Jig** to ensure there is no twist. The wing support jig slots (without glue!) into the the slots in the wing as shown.

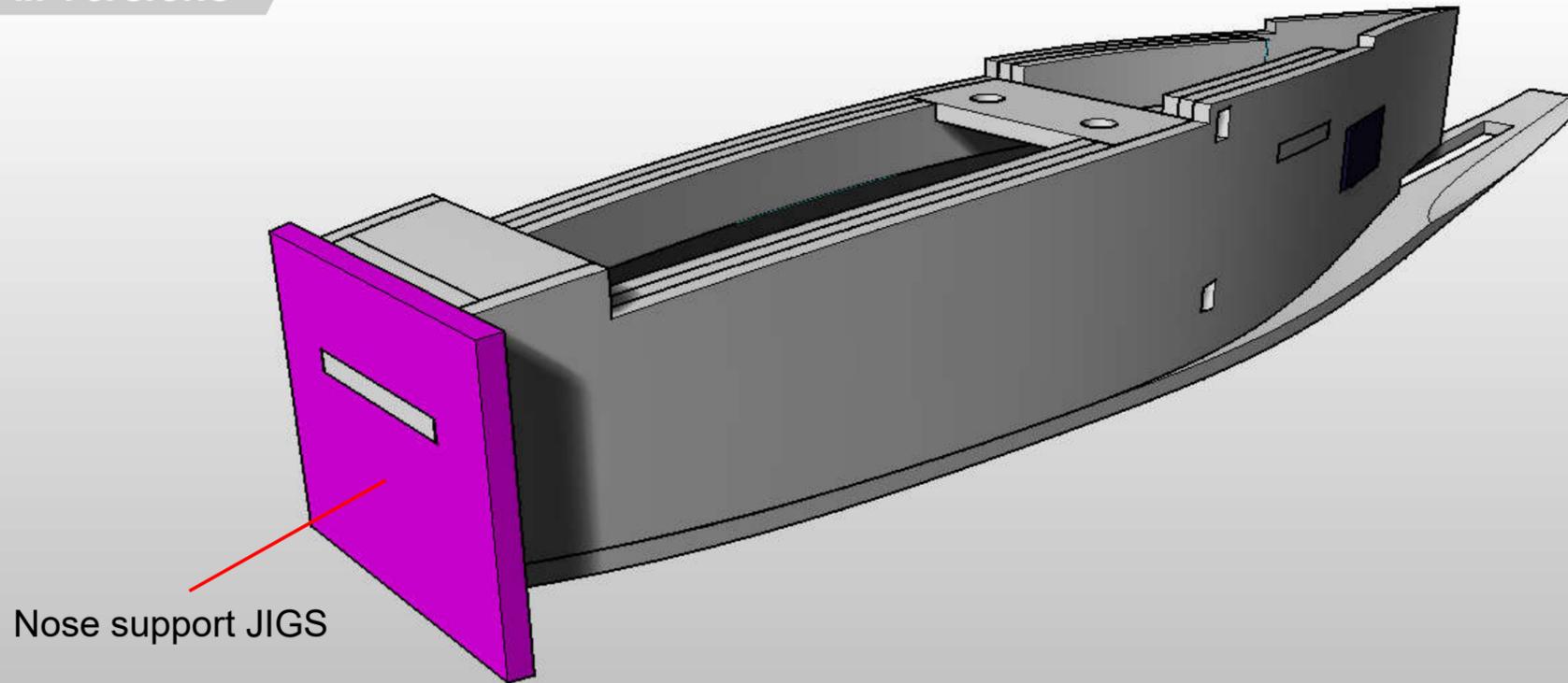
**All versions**



Glue the **Nosecone Aligner** onto the fuselage.



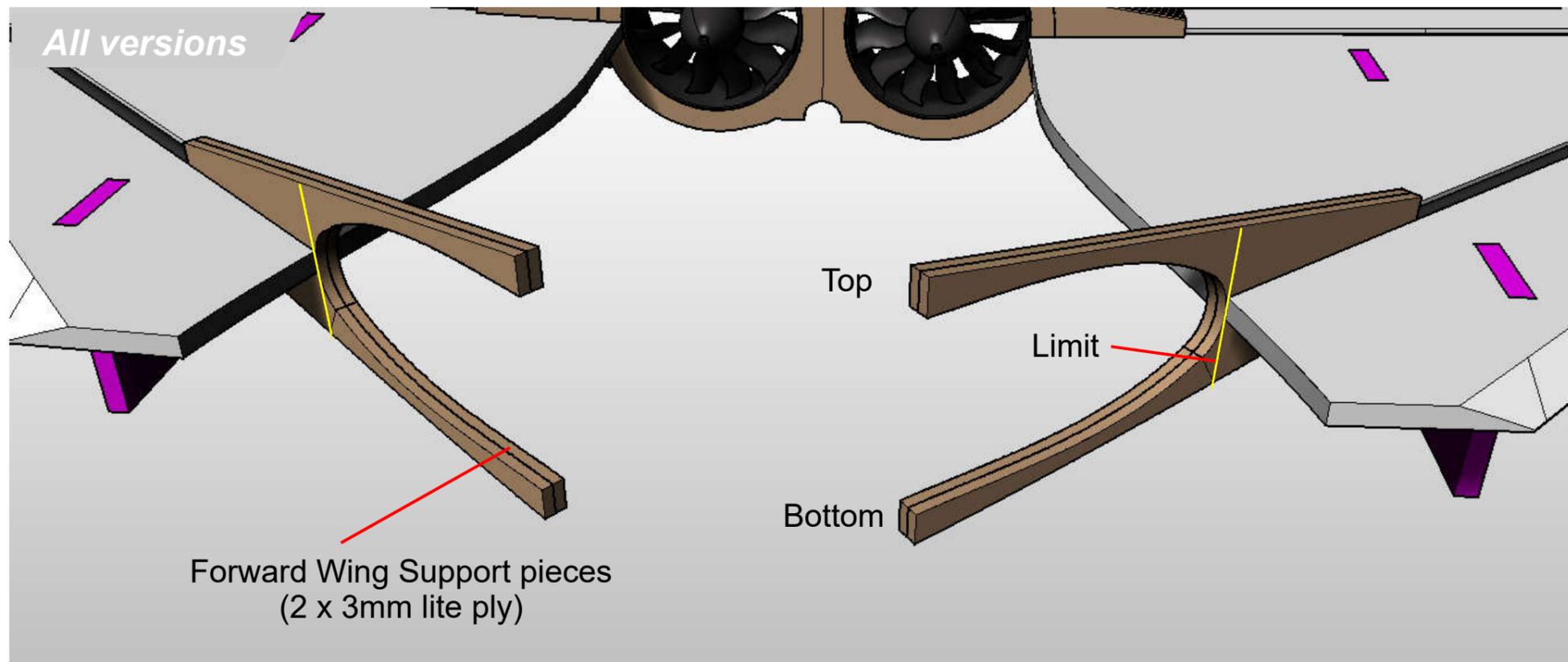
All versions



Temporarily attach the **Nose Support Jig** using masking tape, using the nosecone aligner to locate.



All versions



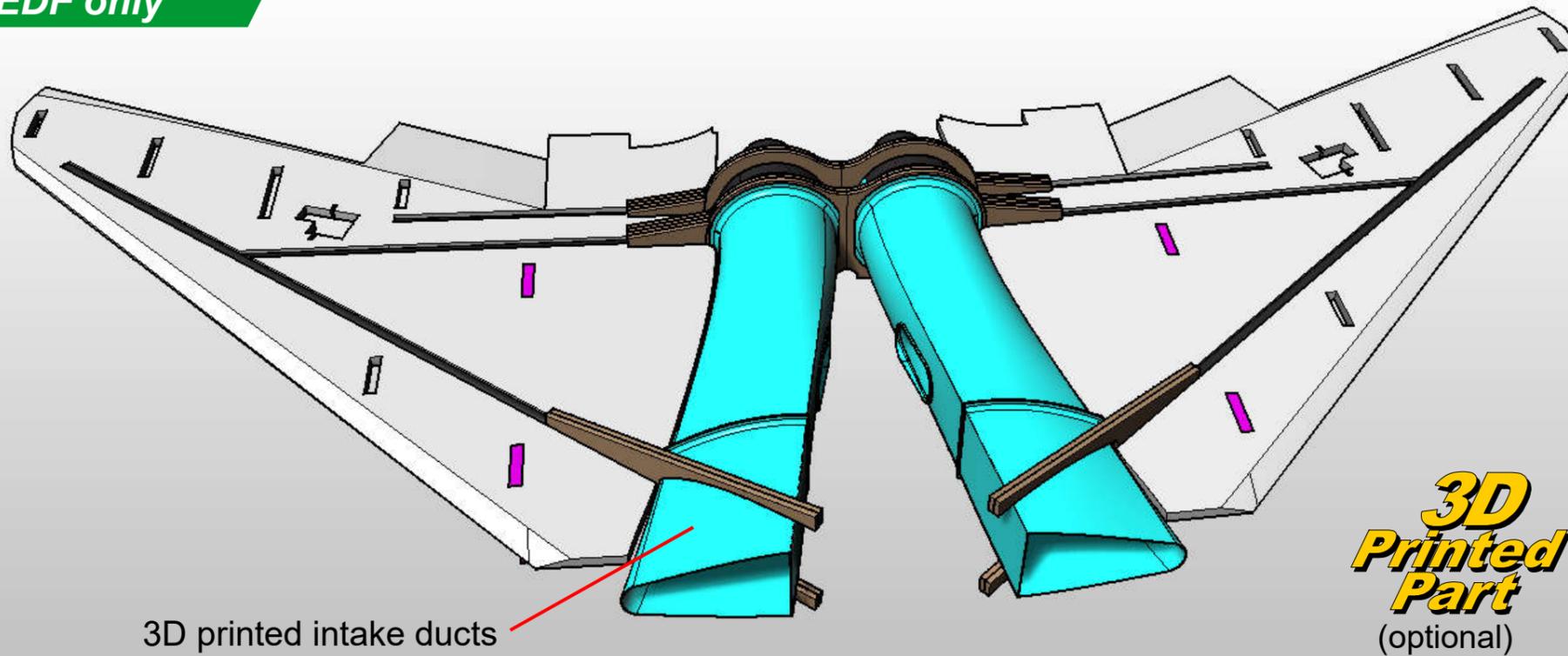
Glue the four 3mm Lite-ply **Forward Wing Support Pieces** together to make two 6mm parts.

While the wings are still supported by the jigs, use epoxy and glue the ply onto the wing spar assembly. Ensure they are pushed onto the spar until the curved edge meets the depron. (see yellow lines). **Ensure correct top/bottom orientation.**

Use a right angle (set square/book etc) from your flat surface to ensure that these are oriented vertically - not twisted.



EDF only



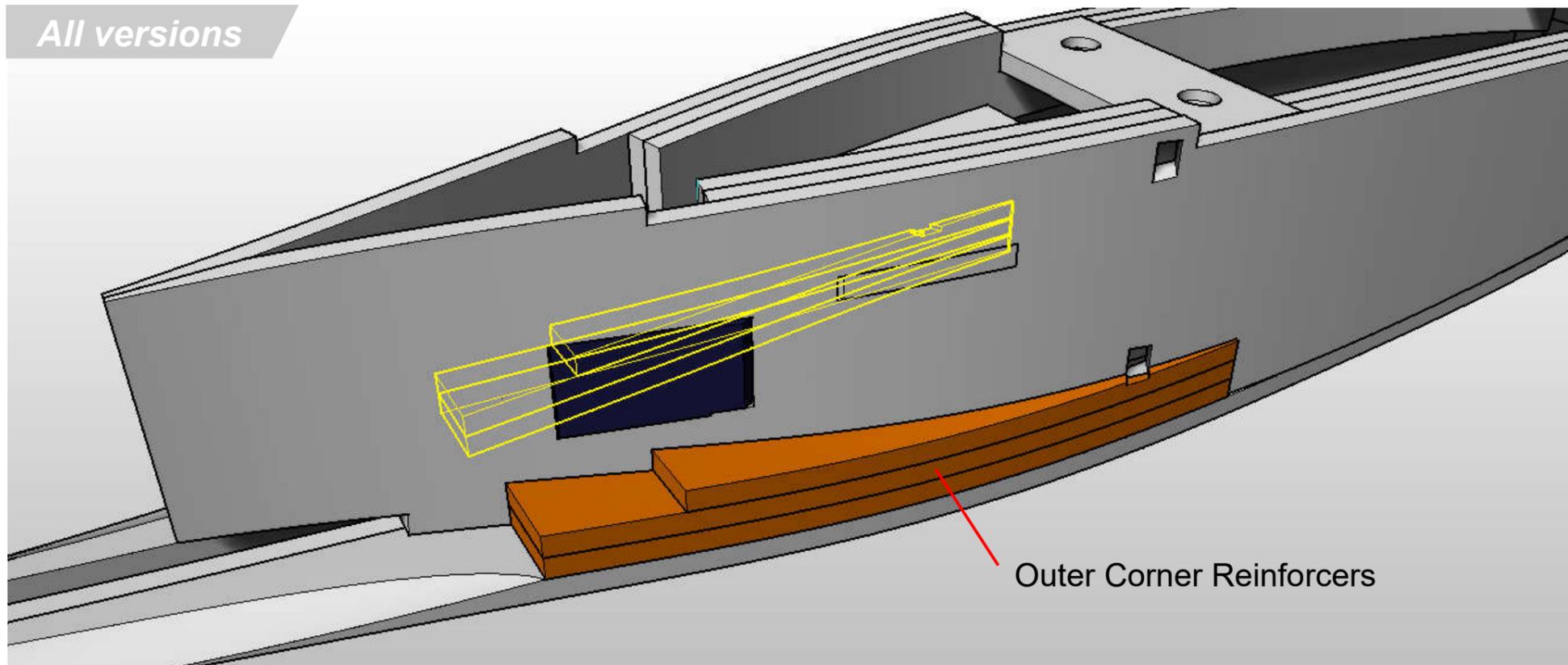
EDF VERSION ONLY :  
Leave the Inlet rings on your EDF units. You may need to cut the inlet ring edges into the Depron on the next stages.

3D PRINTED :  
Glue the two parts of the intake duct together using CA Gel glue.

Using UHU por, glue the intake ducts to the EDF structural bulkheads as shown.

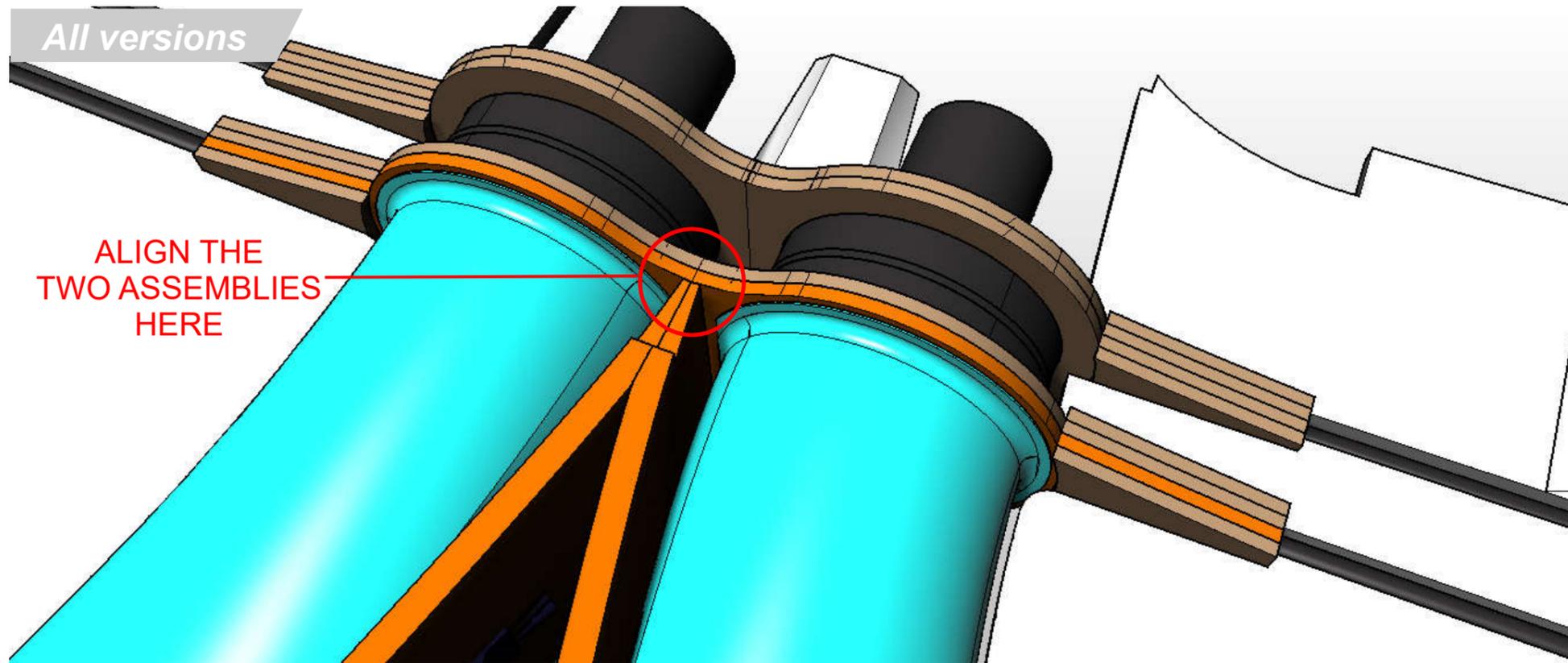


All versions



Glue the **Outer Corner Reinforcers** together then onto the forward fuselage assembly as shown.





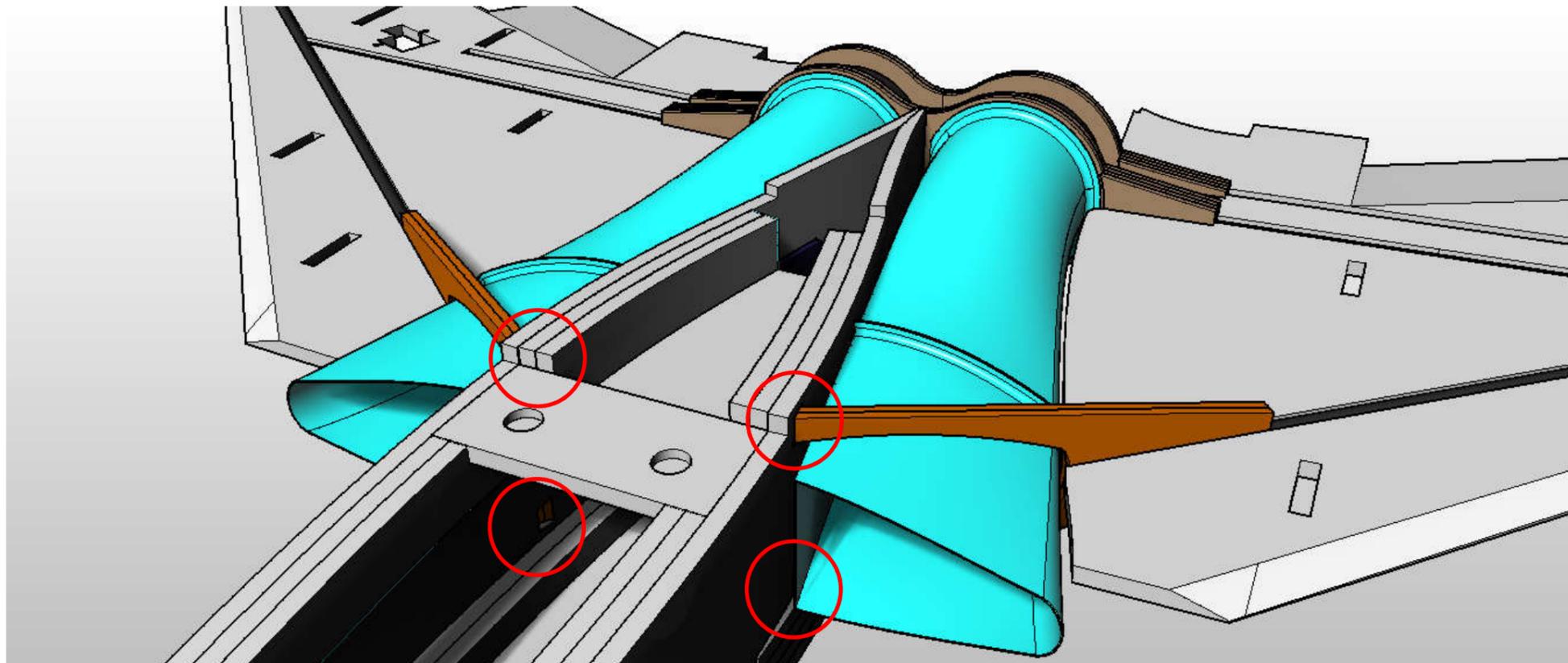
Carefully position the parts on a flat surface supported by the jigs.

Dry-fit to ensure you are comfortable with where to glue the mating surfaces together - indicated by the red rings.

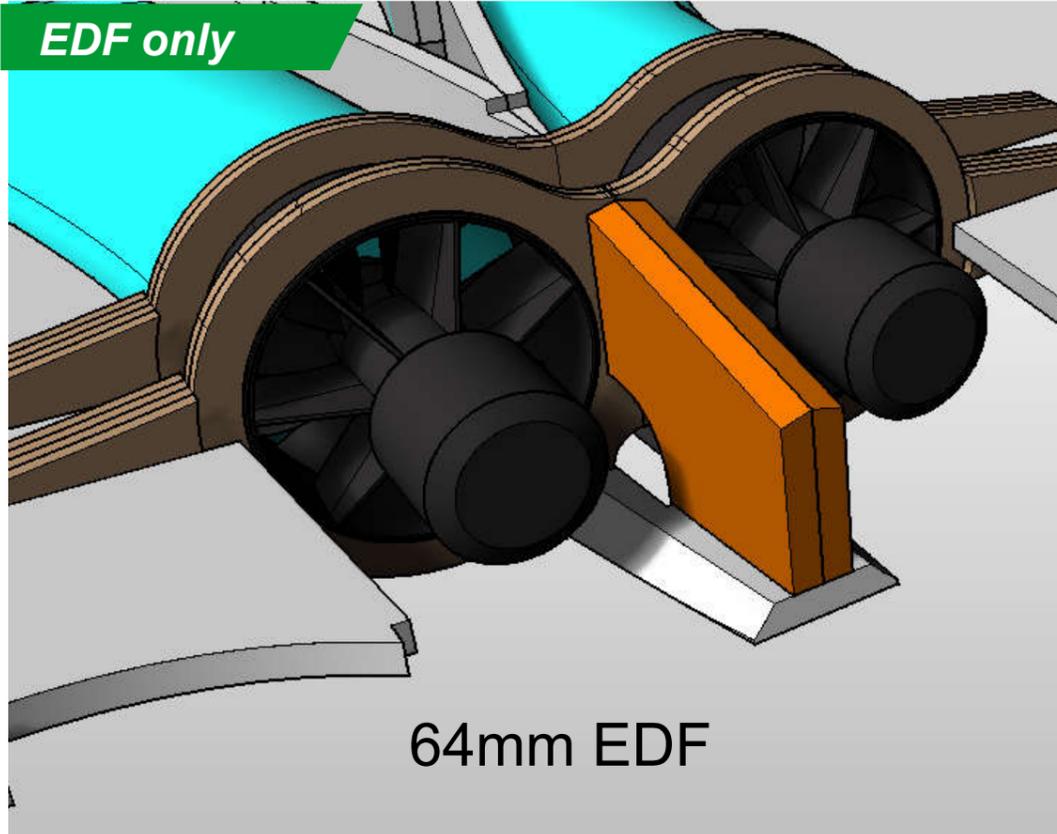
The forward mating points will need gently pulling apart a little to help them sit into the pockets on the forward fuselage.

Using epoxy, unite the forward fuselage assembly to the wing assembly as shown.

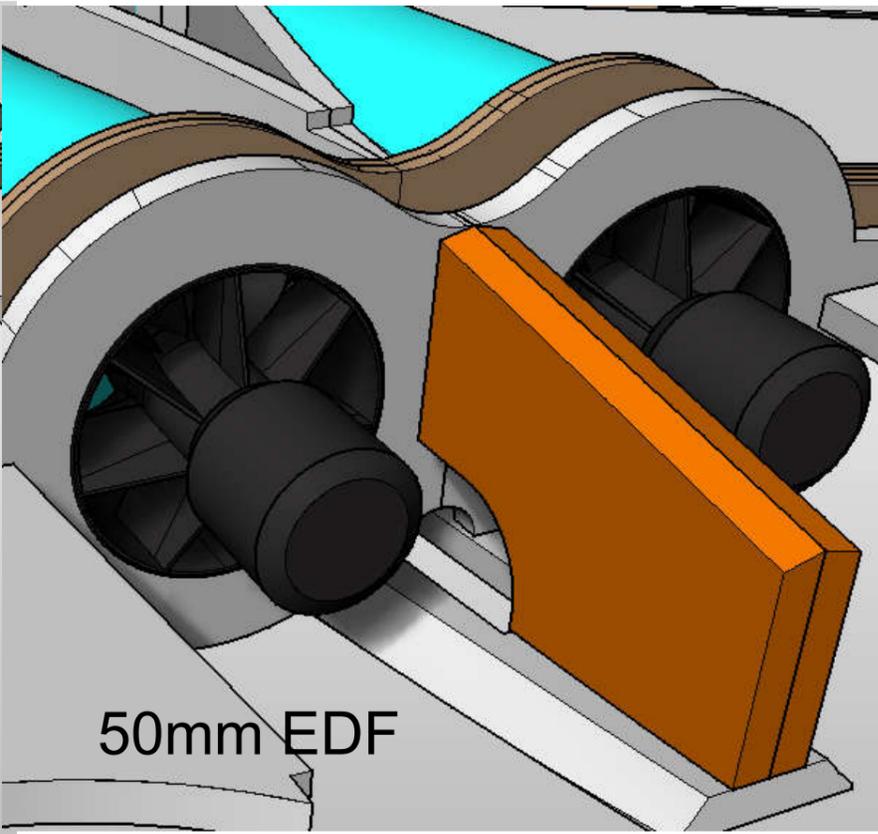
Pin in place to ensure perfect alignment until the glue sets.



EDF only



64mm EDF

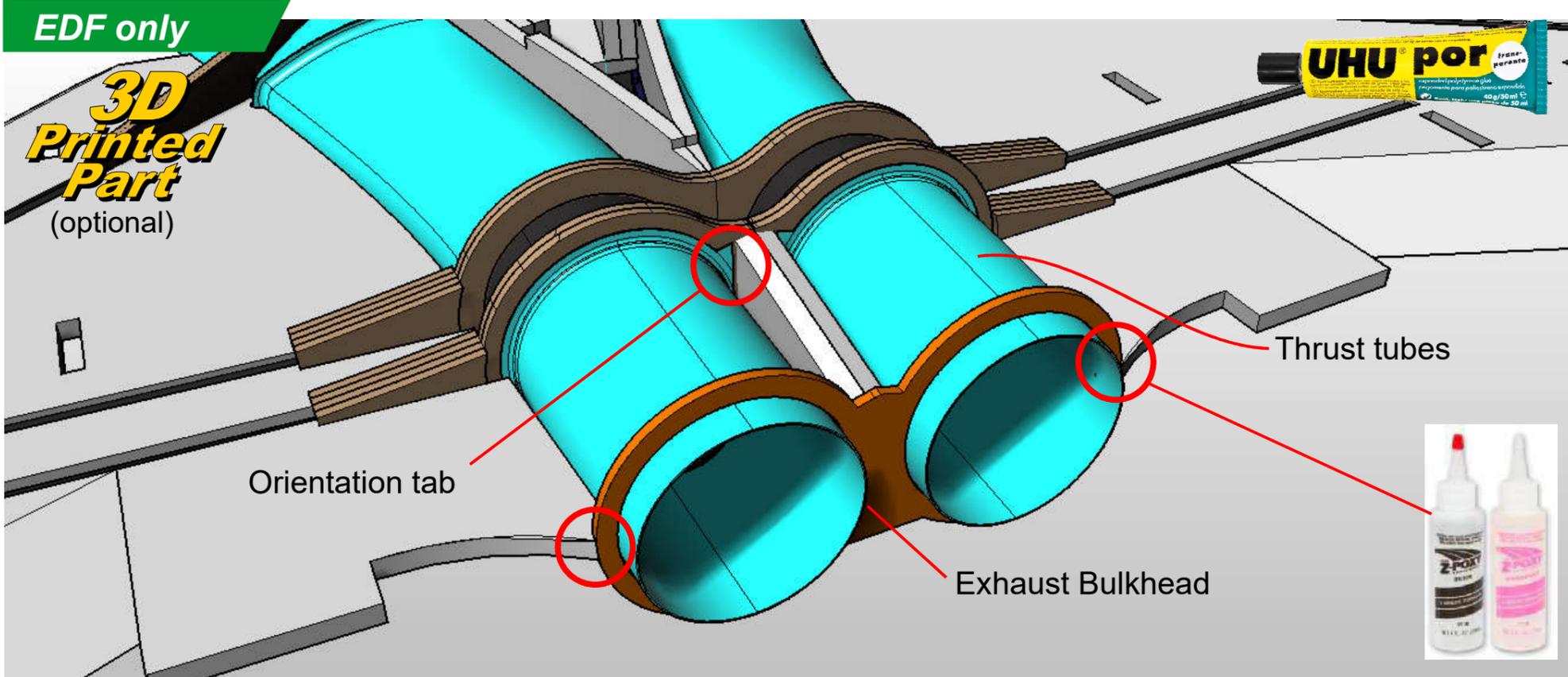


50mm EDF

Glue the two **Spine Pieces** together using UHU Por. Glue to the fuselage using Uhu por.



EDF only



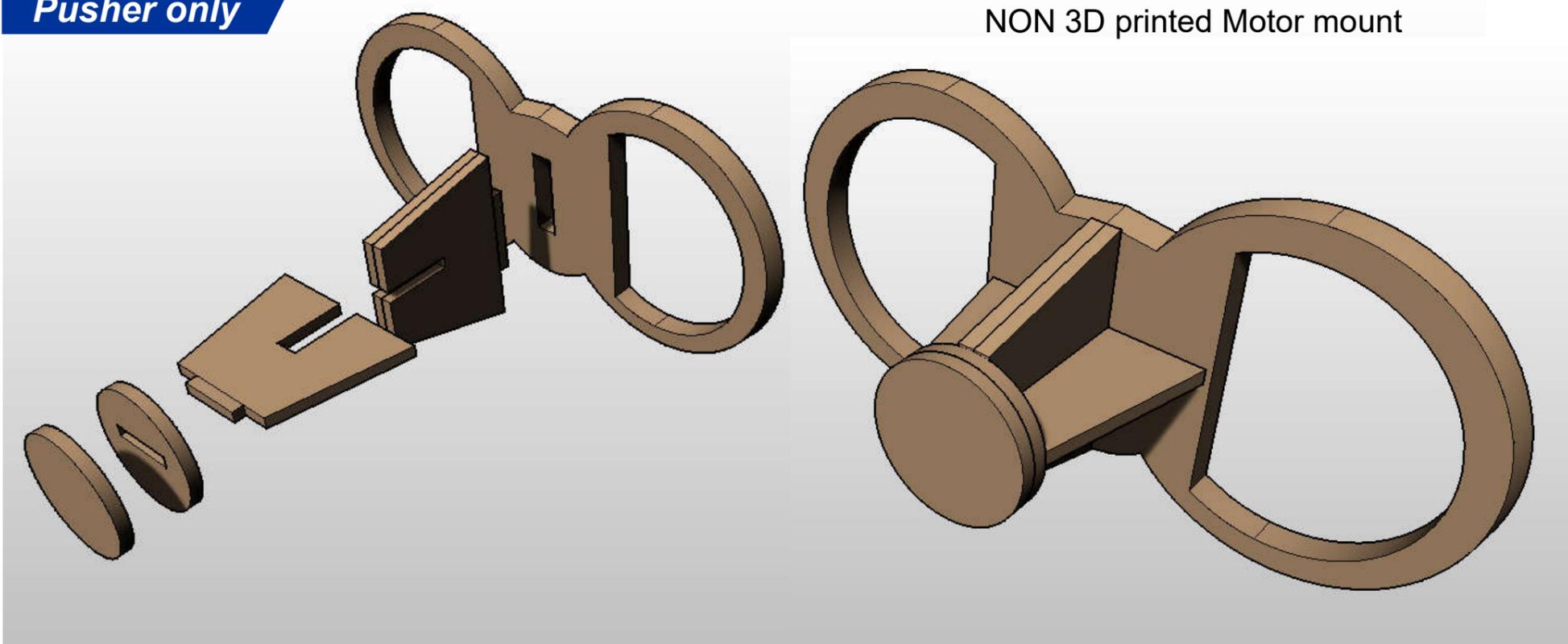
**EDF Only :-** Glue the 3D printed or fabricated (using < 0.4mm plastic sheet) **Thrust Tubes** in place using the 3d printed tab to aid orientation. Use UHU por.

**All Versions :-** Either 3D print or fabricate the **Exhaust bulkhead** using 3mm Lite-ply. Align and glue to the assembly carefully using the guidelines marked on the plans using epoxy.



**Pusher only**

NON 3D printed Motor mount

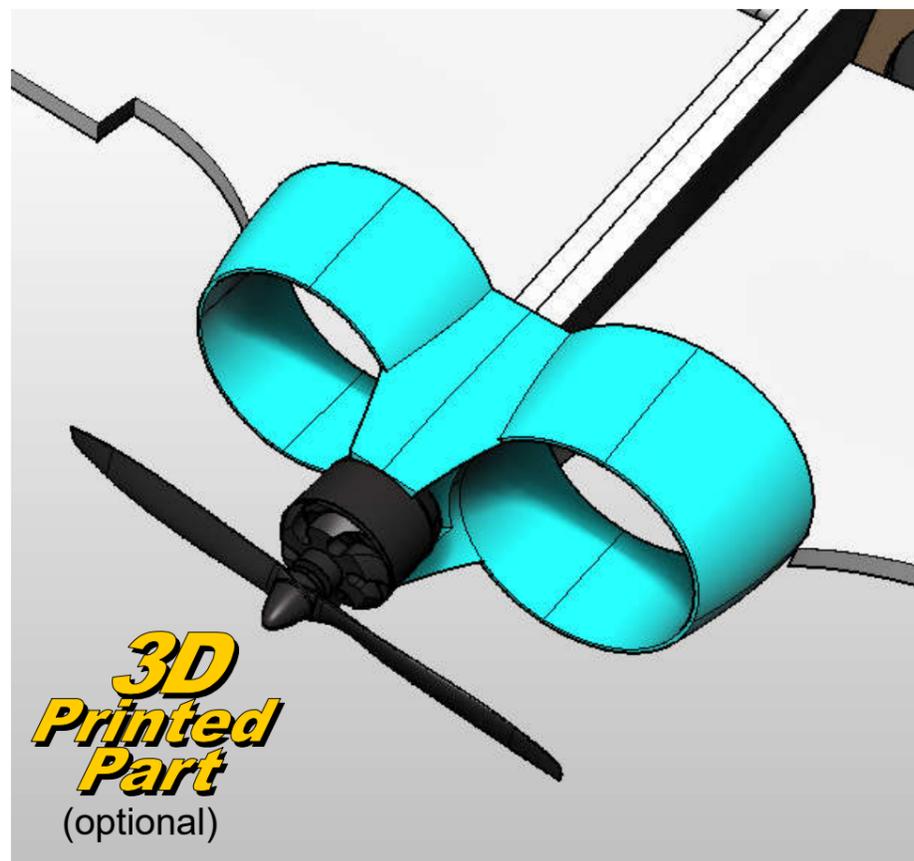


If you are not using 3D printed parts, construct the pusher motor bracket as shown using epoxy on all the joints.

Drill the circular disks to match the fixing holes on your motor.



**Pusher only**



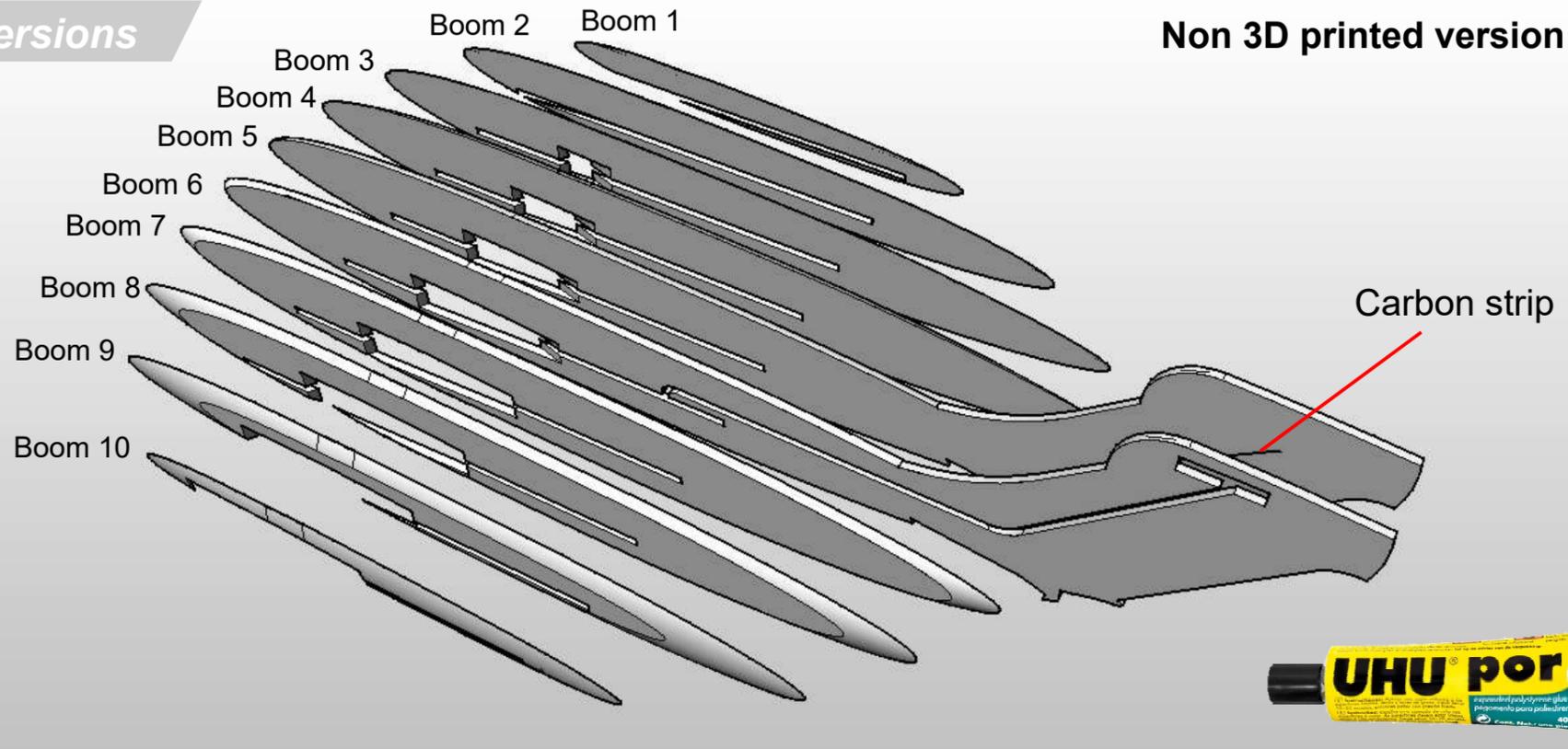
Glue the Pusher exhaust bulkhead onto the fuselage using epoxy.

If you prefer, you can 3D print one.

Fit the Motor to the mount.



All versions

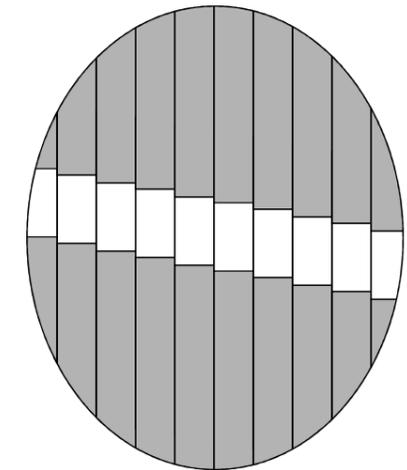


Non 3D printed version

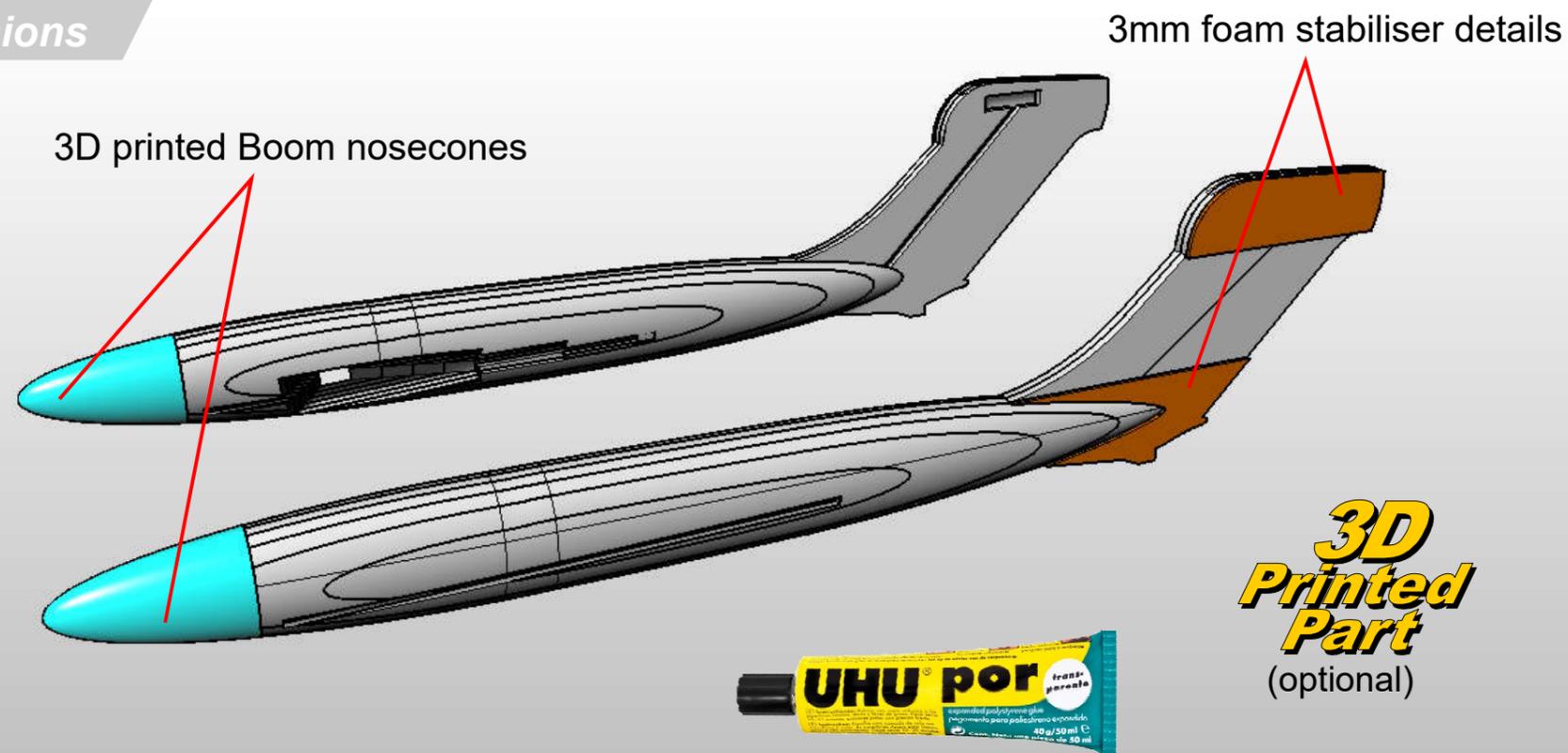
Run Elevator servo extension cables into the boom.

Glue the 1x6mm Carbon Reinforcer strip into **Boom 5**, using Epoxy.

Glue the layers together as shown using UHU por - aligning using the outer shape **NOT** the slots - as these are stepping down - to be sanded smooth (see diagram - exaggerated)



All versions



3mm foam stabiliser details

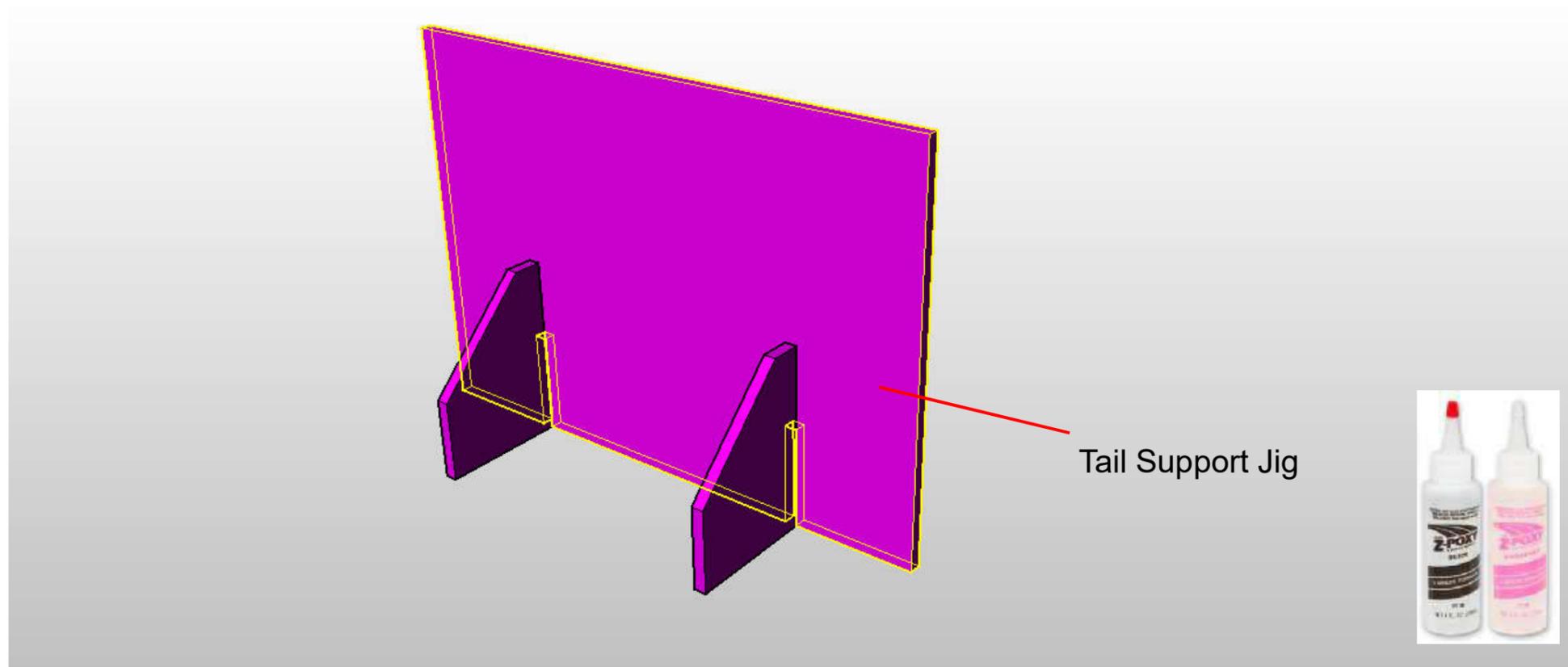
3D printed Boom nosecones

3D Printed Part (optional)

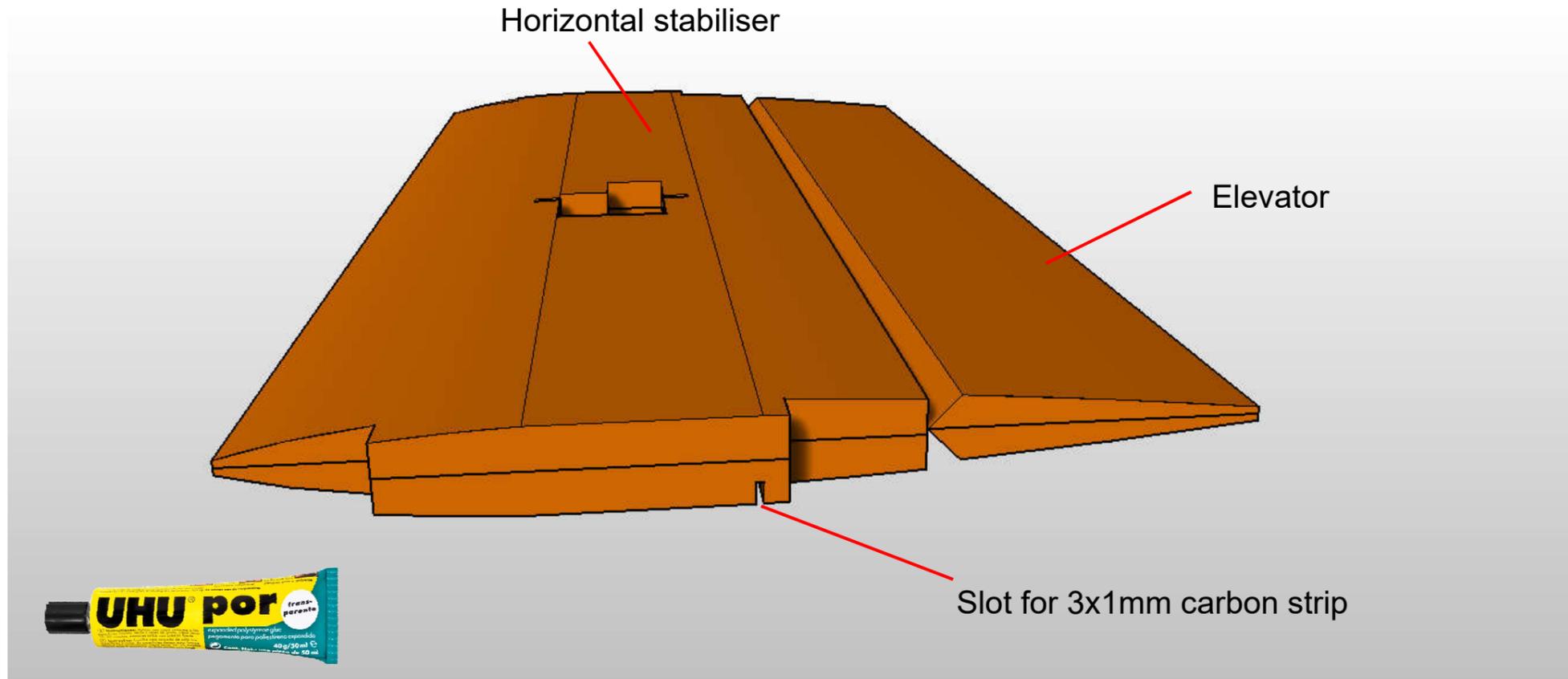
If you wish to use 3D printed boom nosecones, then construct the booms as per the non-3d printed version, trimmed short to accommodate the 3d printed part as shown. Glue in place.

Note that the Triangular marking on the nosecone points upwards, and the circular marking indicates inwards.





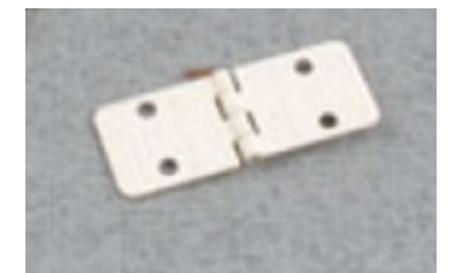
Construct the Tail support Jig glueing the 3 pieces together using a non-contact adhesive.



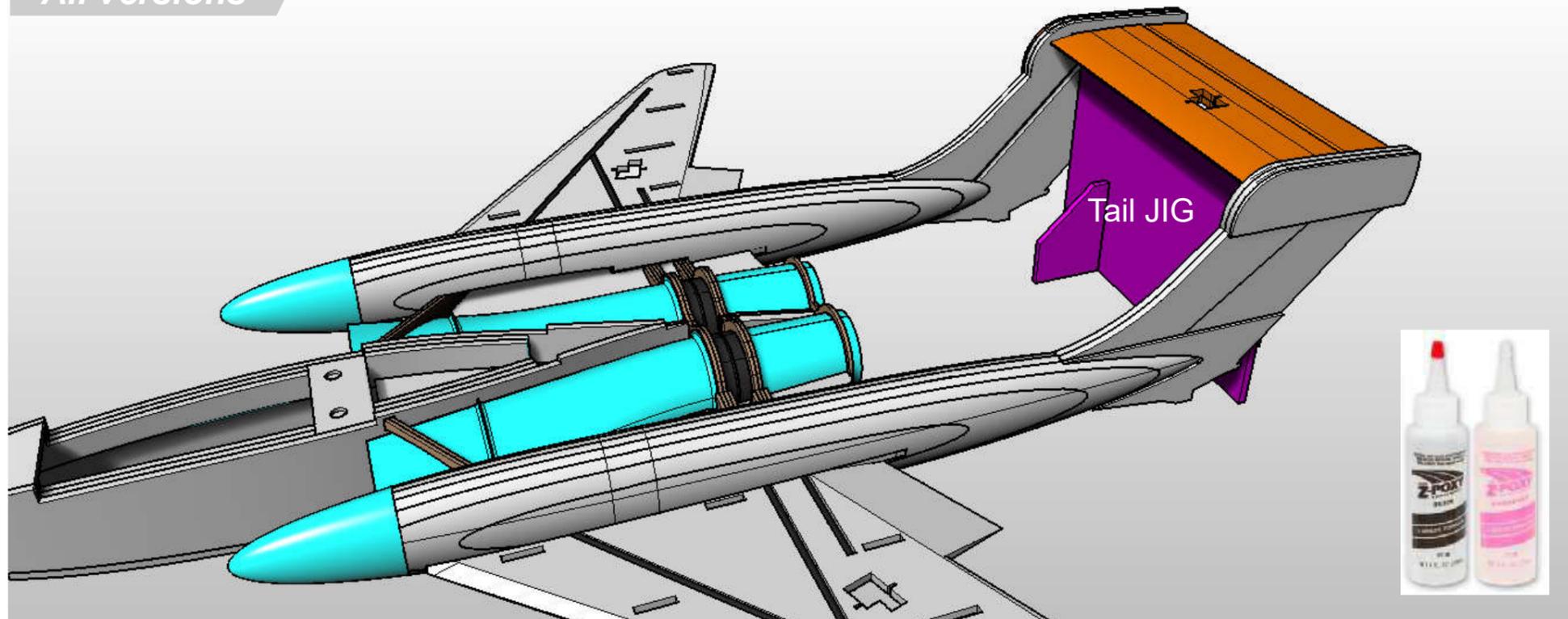
Glue the two pieces of the **Horizontal stabiliser/Elevator** together and sand to the correct aerofoil shape.

Glue the 1x3mm Carbon Reinforcer strip into the underside of the **Horizontal stabiliser**.

Attach the parts together using hinges.



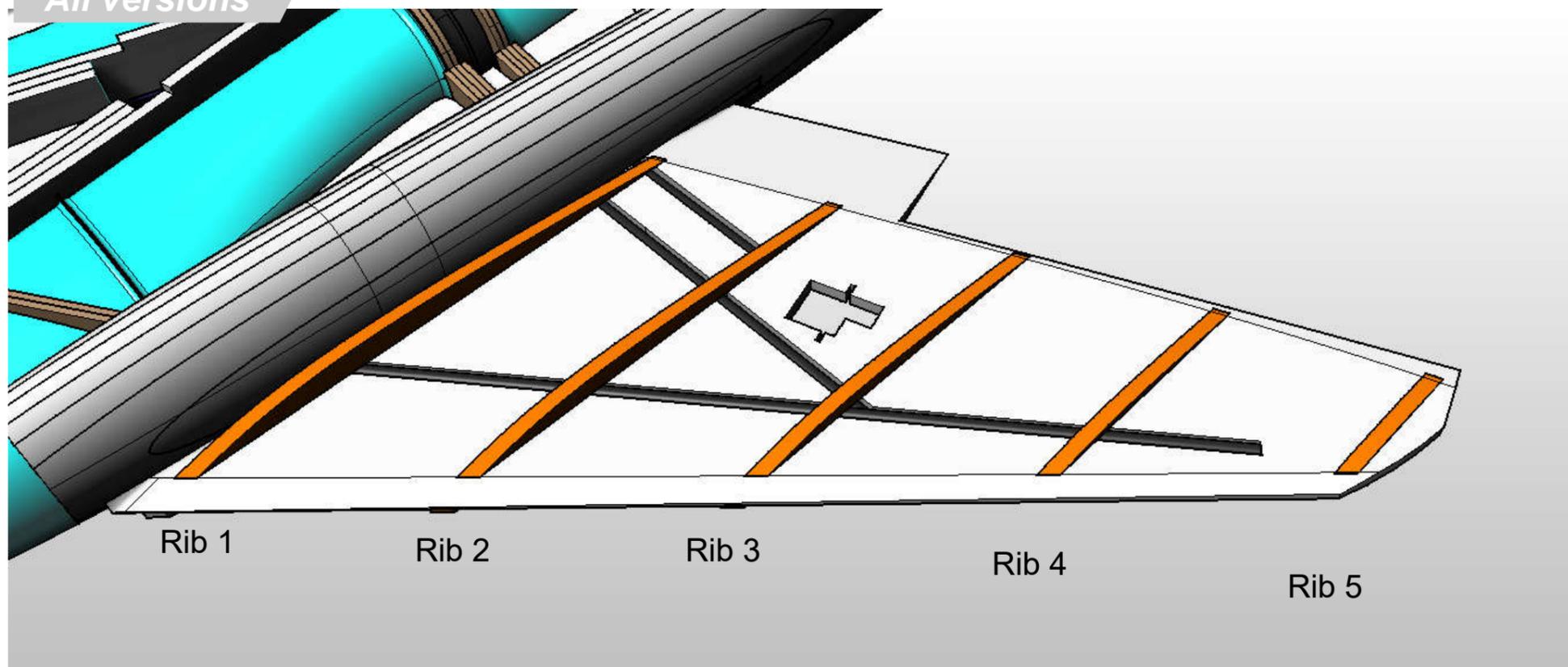
All versions



Using the guides drawn on the wings, along with the **Tail Support Jig**, dry fit the **Tail booms** and **Elevator** assembly together on the model.

Ensure that it is not twisted / skewed either horizontally or vertically. It may require some minor adjustments to get it perfect. Once you have achieved a good fit, glue in place using Epoxy.

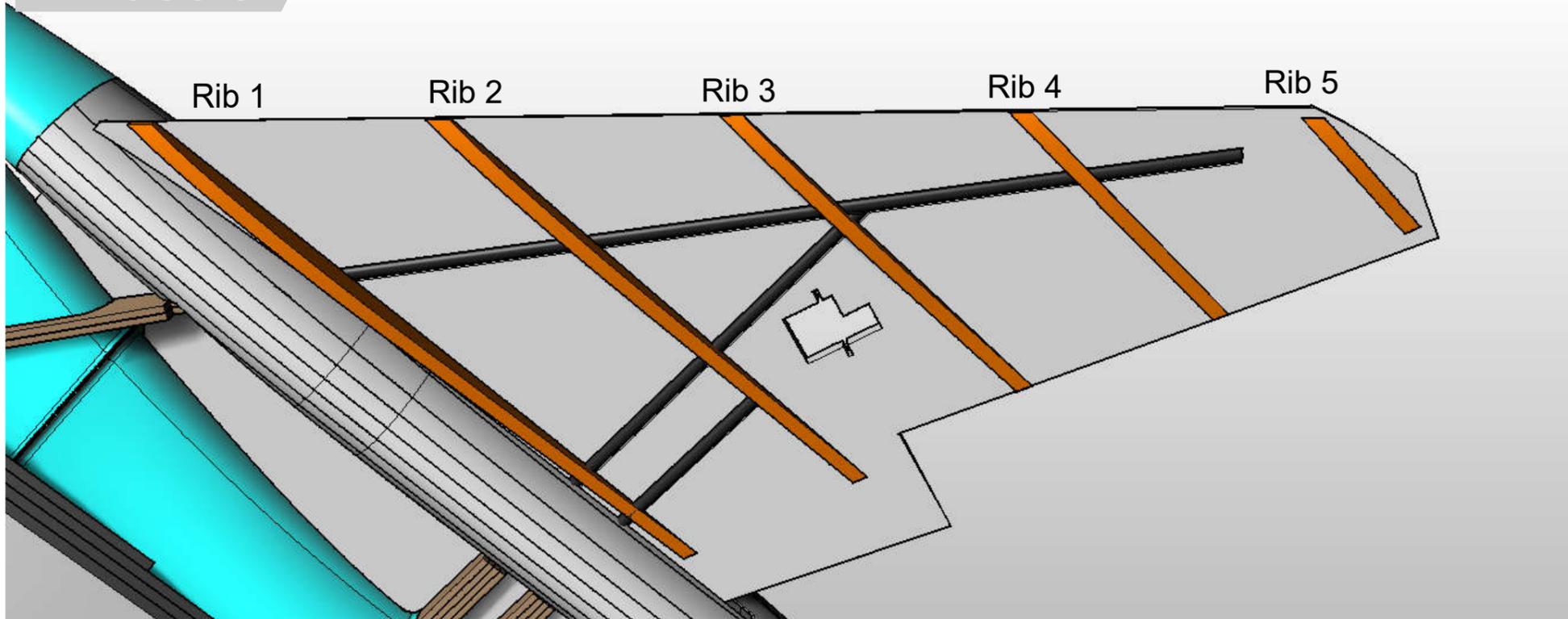
All versions



Glue the **Upper Wing Ribs** in place.



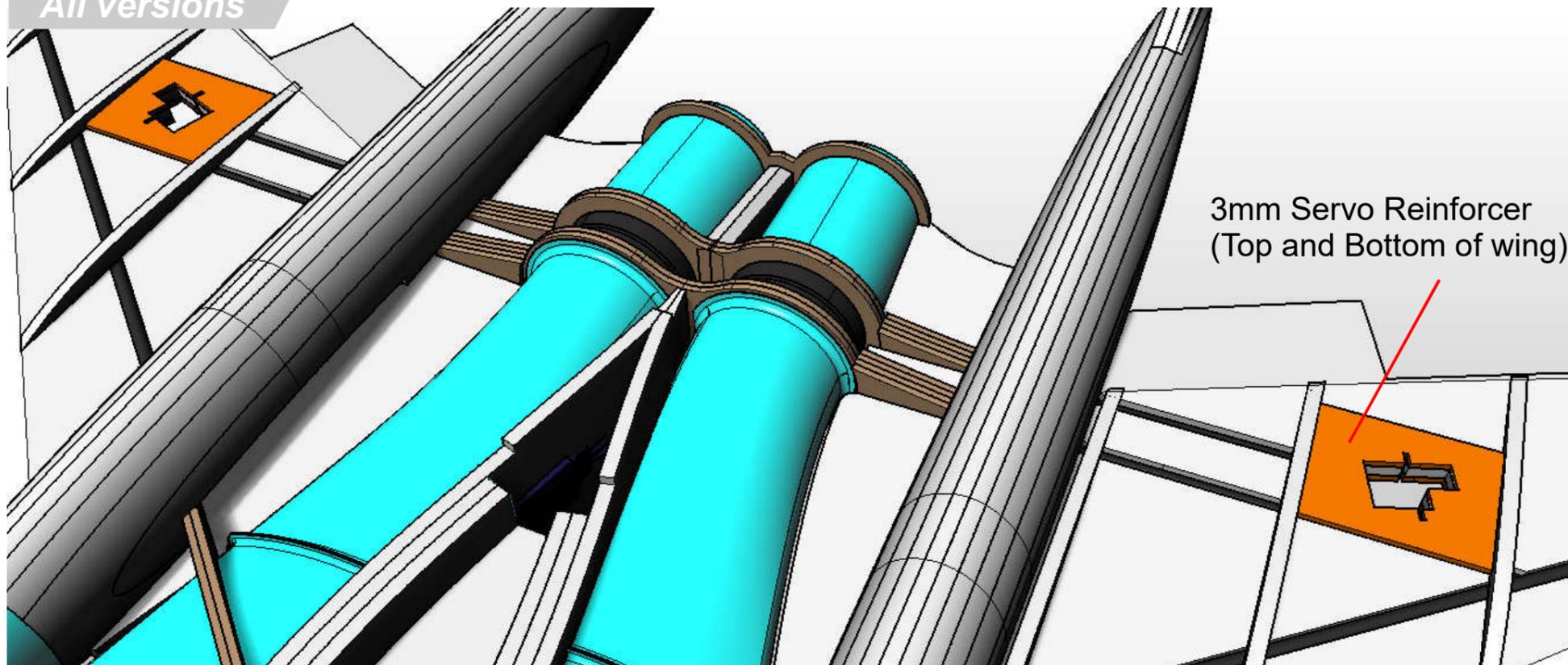
All versions



Glue the **Lower Wing Ribs** in place.



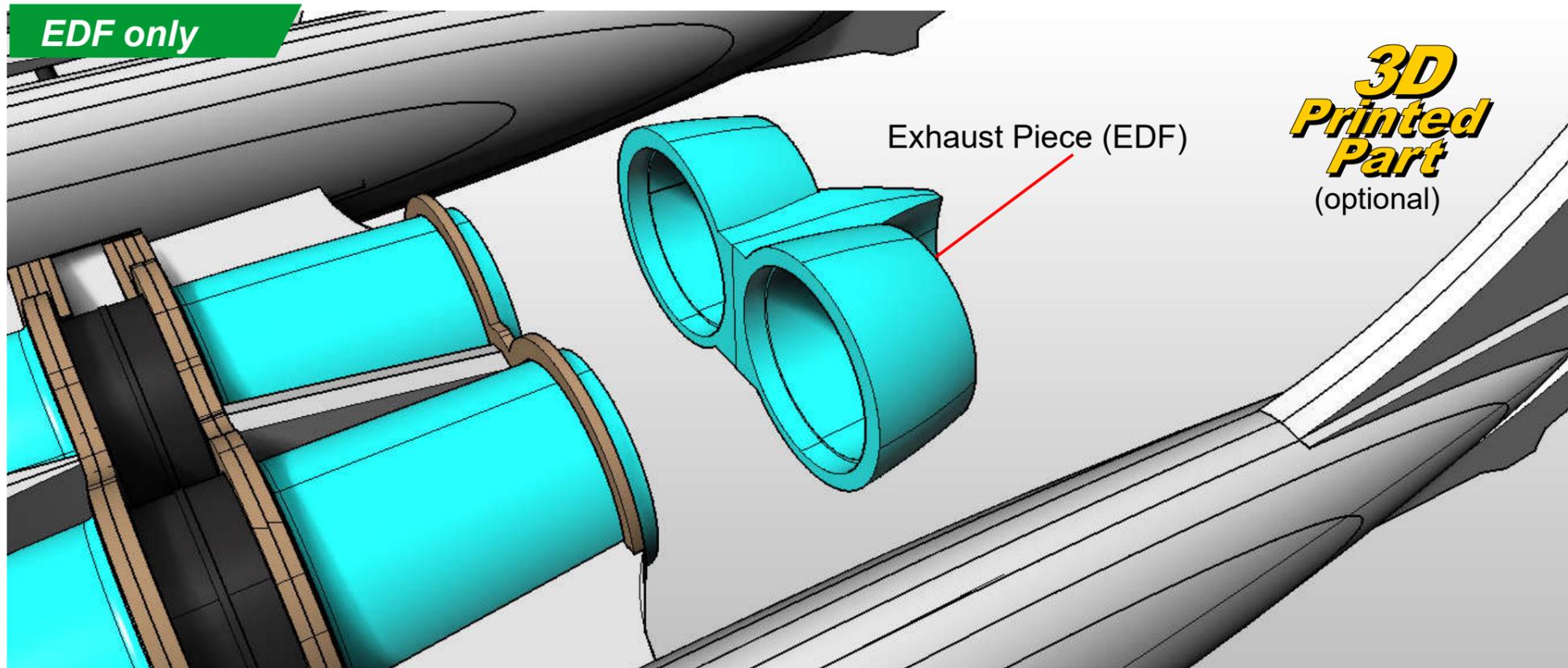
All versions



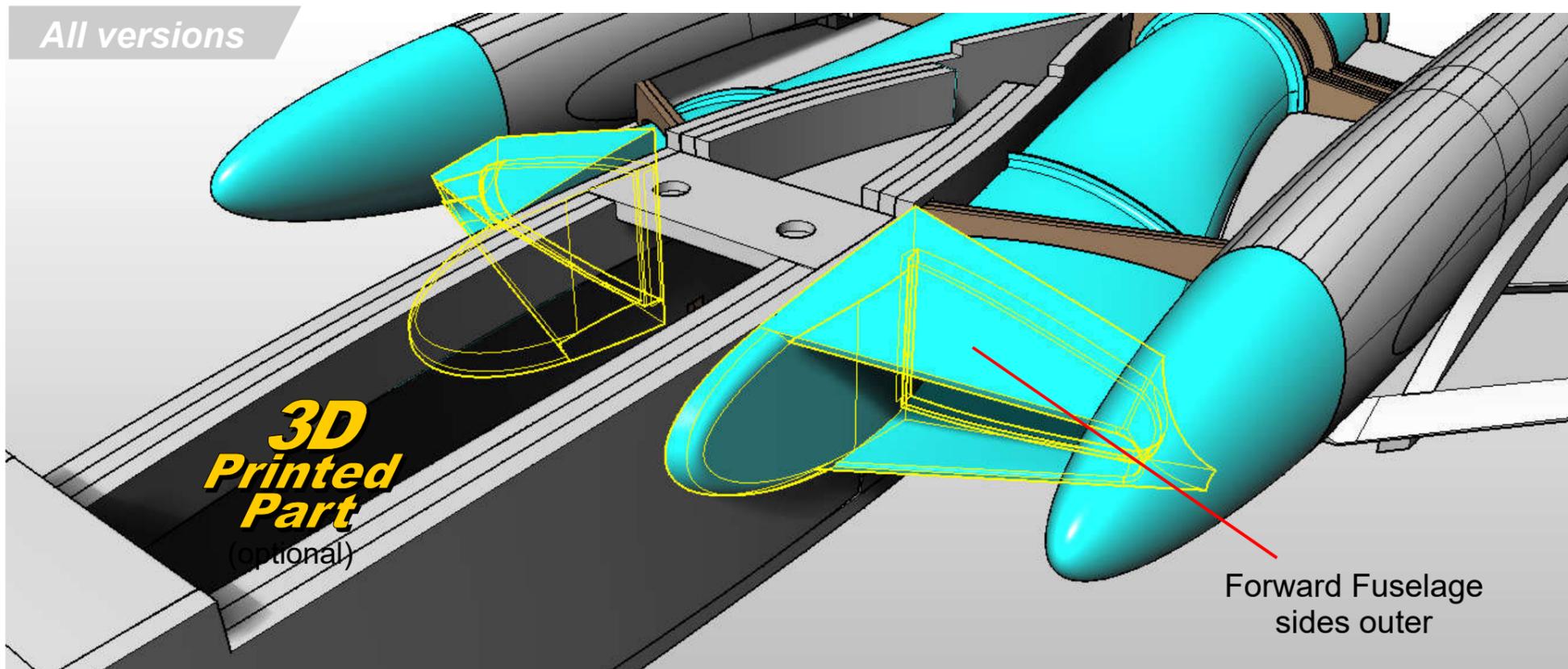
Glue the **4 Servo reinforcement pieces** in place, two on top, and two on the underside of the wing.

Sand to sit flush with the wing ribs.





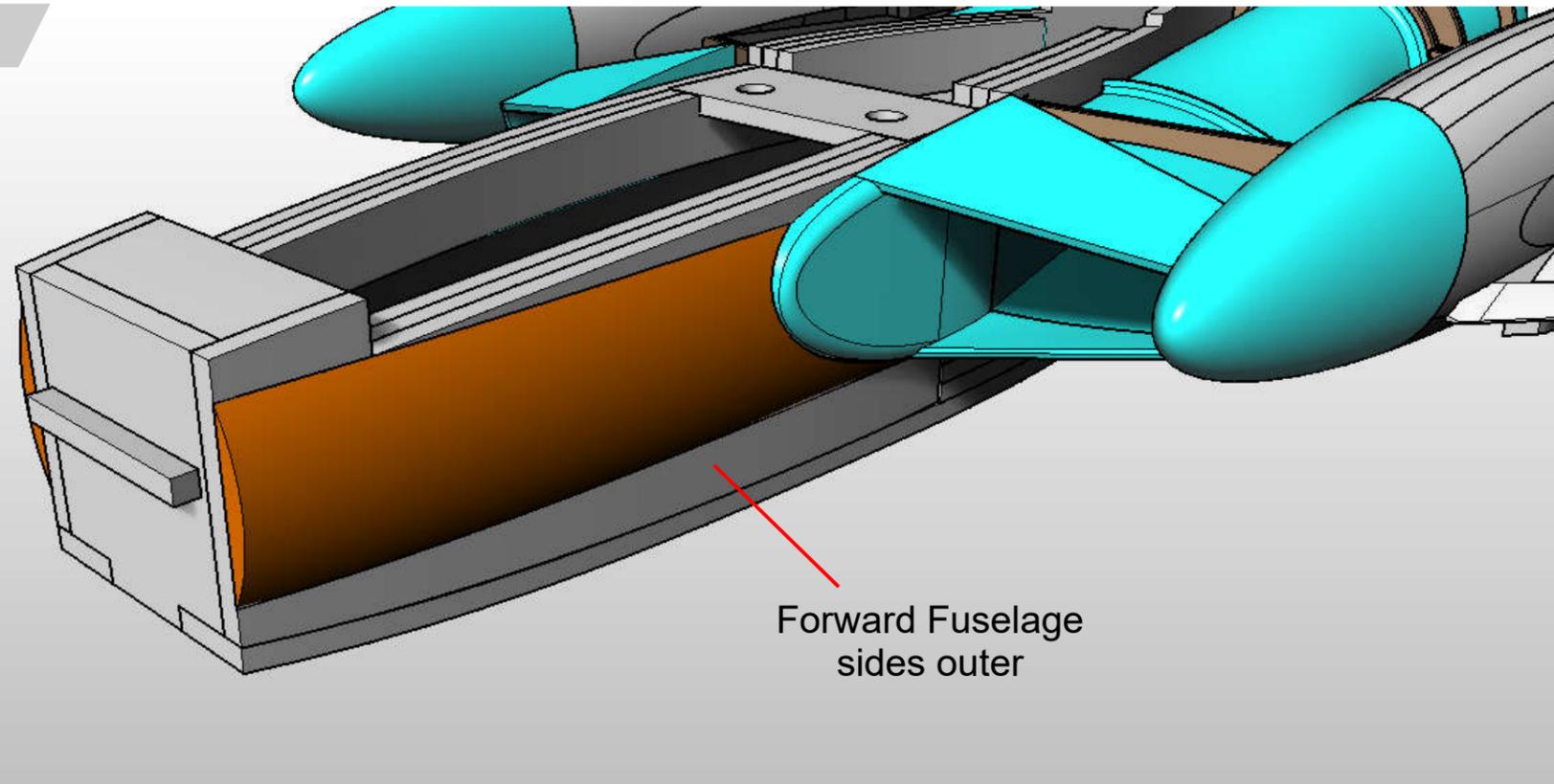
Glue the **Exhaust Piece** in place.



Glue the **Intake Cowlings** in place - 3D Printed version only at this stage.



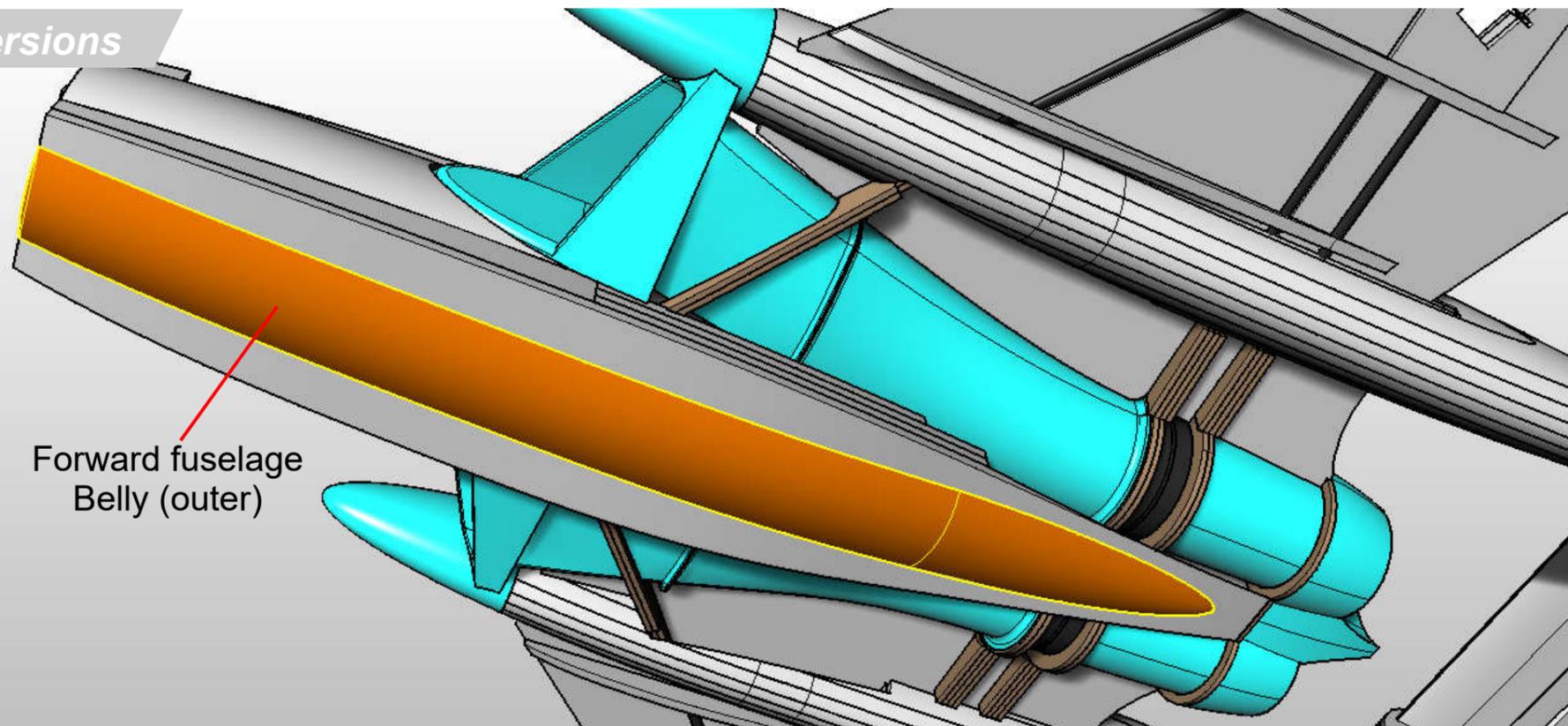
All versions



Glue the **Forward Fuselage sides (outer)** in place.



All versions



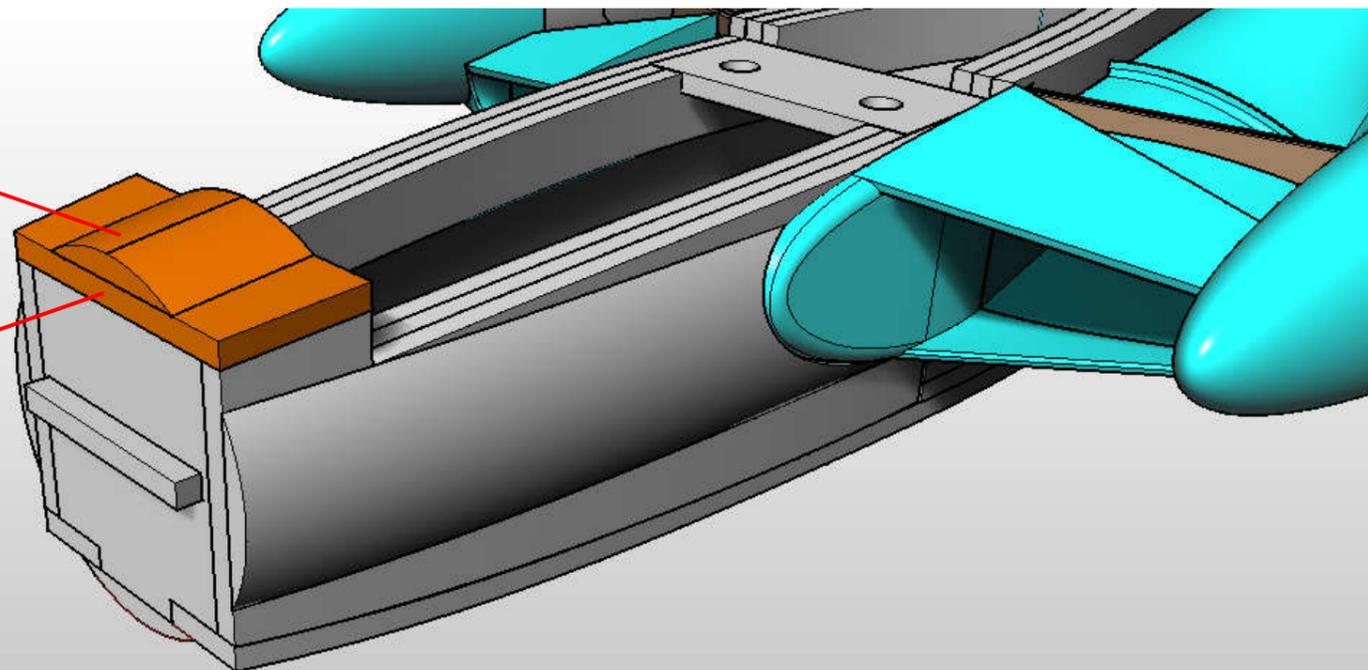
Connect the EDF to the ESC's and test for correct motor spinning direction, then glue the **Forward Fuselage Belly (Outer)** in place.



All versions

Bridge Panel #3

Bridge Panel #2



Glue **Bridge Panel #2** in place.

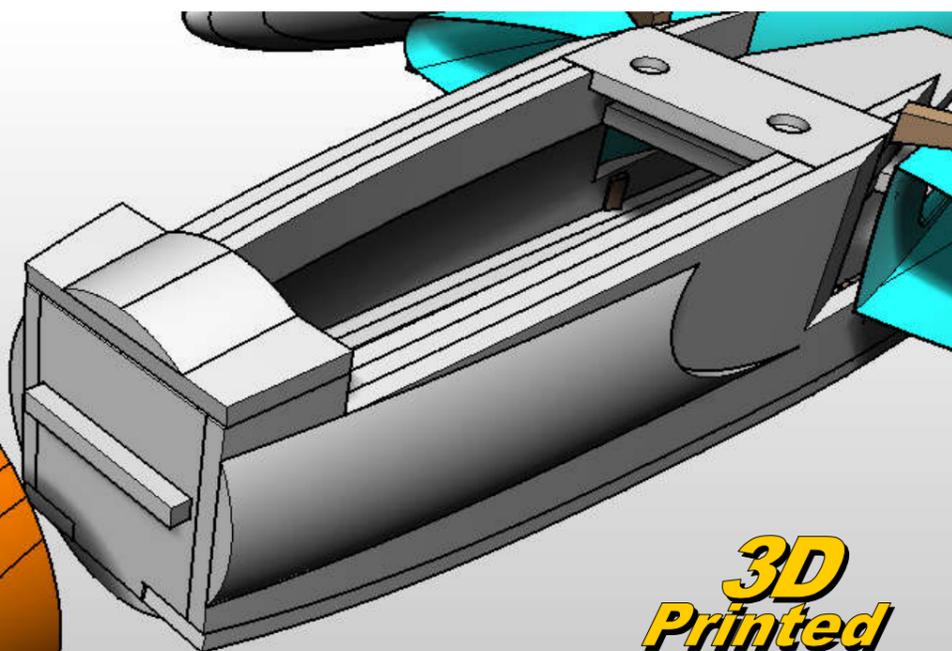
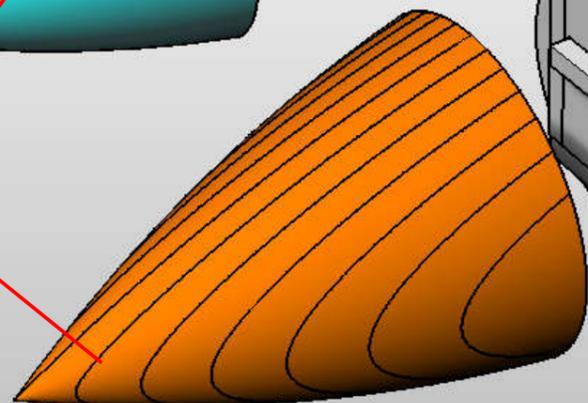
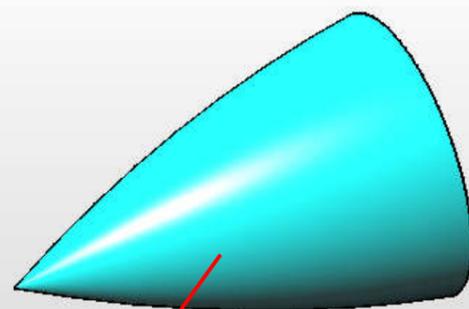
Glue **Bridge Panel #3** in place.



All versions

Nosecone

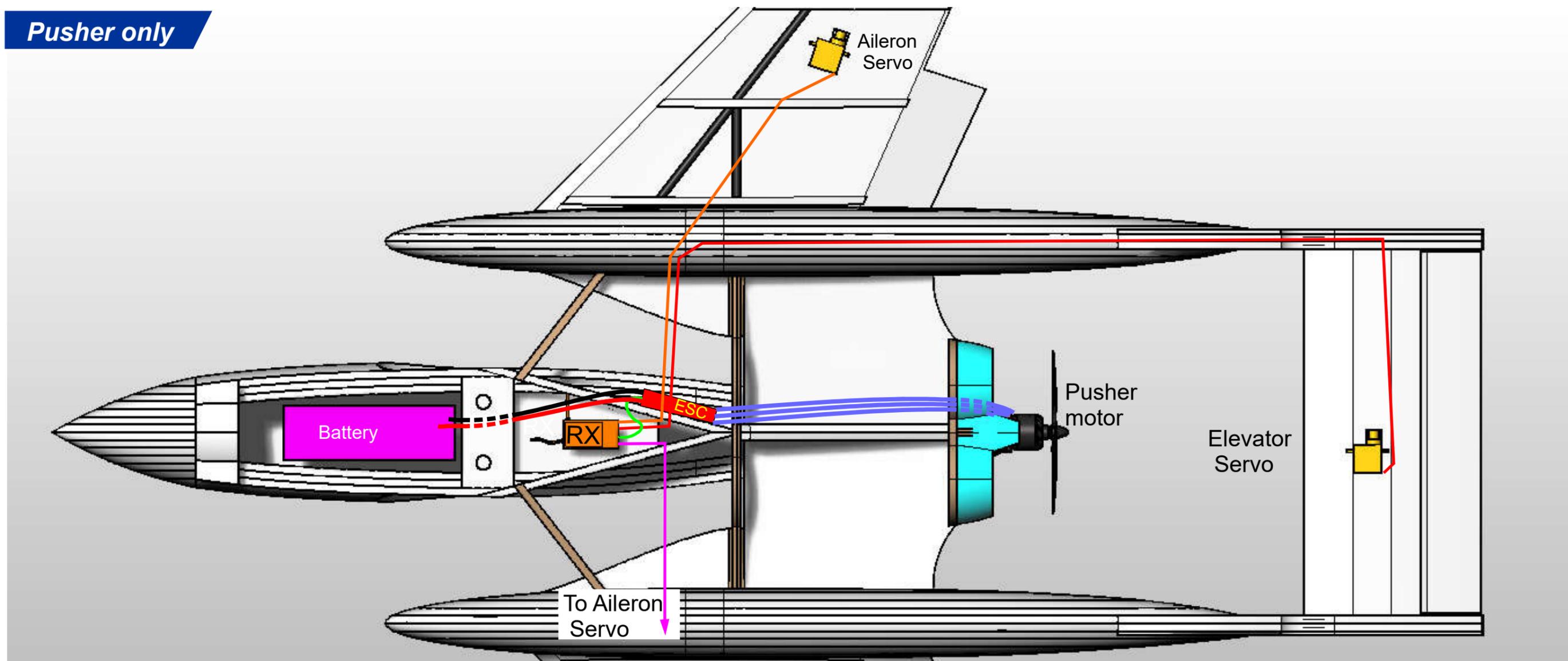
**3D  
Printed  
Part**  
(optional)



Glue the **Nosecone** in place -  
either 3D printed or laminated  
depron.



## Pusher only



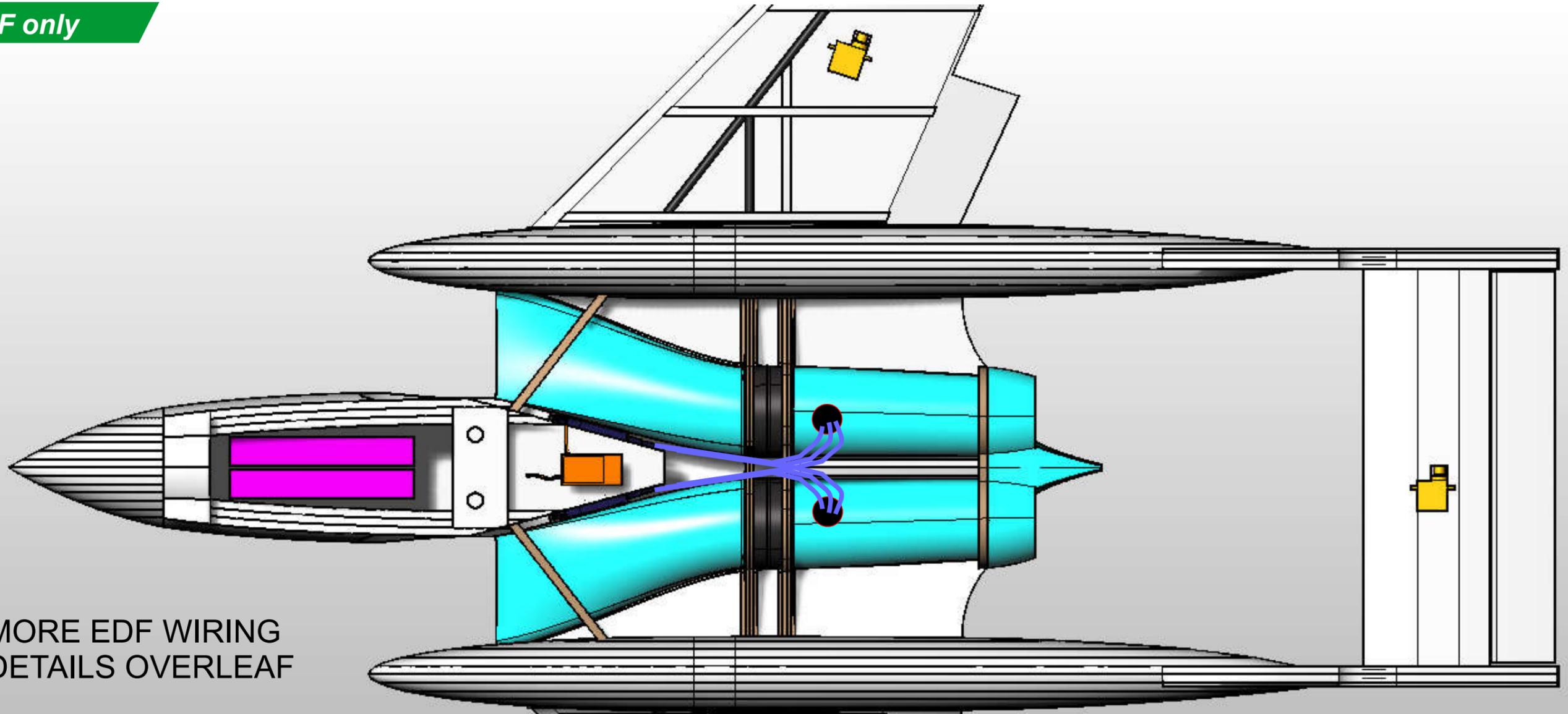
### PUSHER VERSION :

Run the ESC battery cables into the forward fuselage battery area to a battery connector. Run the Servo cable from the ESC to the RX.

Run **all** servo cables to the RX, using servo extension cables and Y leads if required. Cut slots in the wing ribs and bulkheads to pass the cables through. Connect the motor cables to the motor and check its spinning the right way around.

Once wired up, thoroughly test all electronics to ensure they function correctly, making sure there are no loose connections anywhere or dry solder joints.





MORE EDF WIRING  
DETAILS OVERLEAF

#### EDF VERSION :

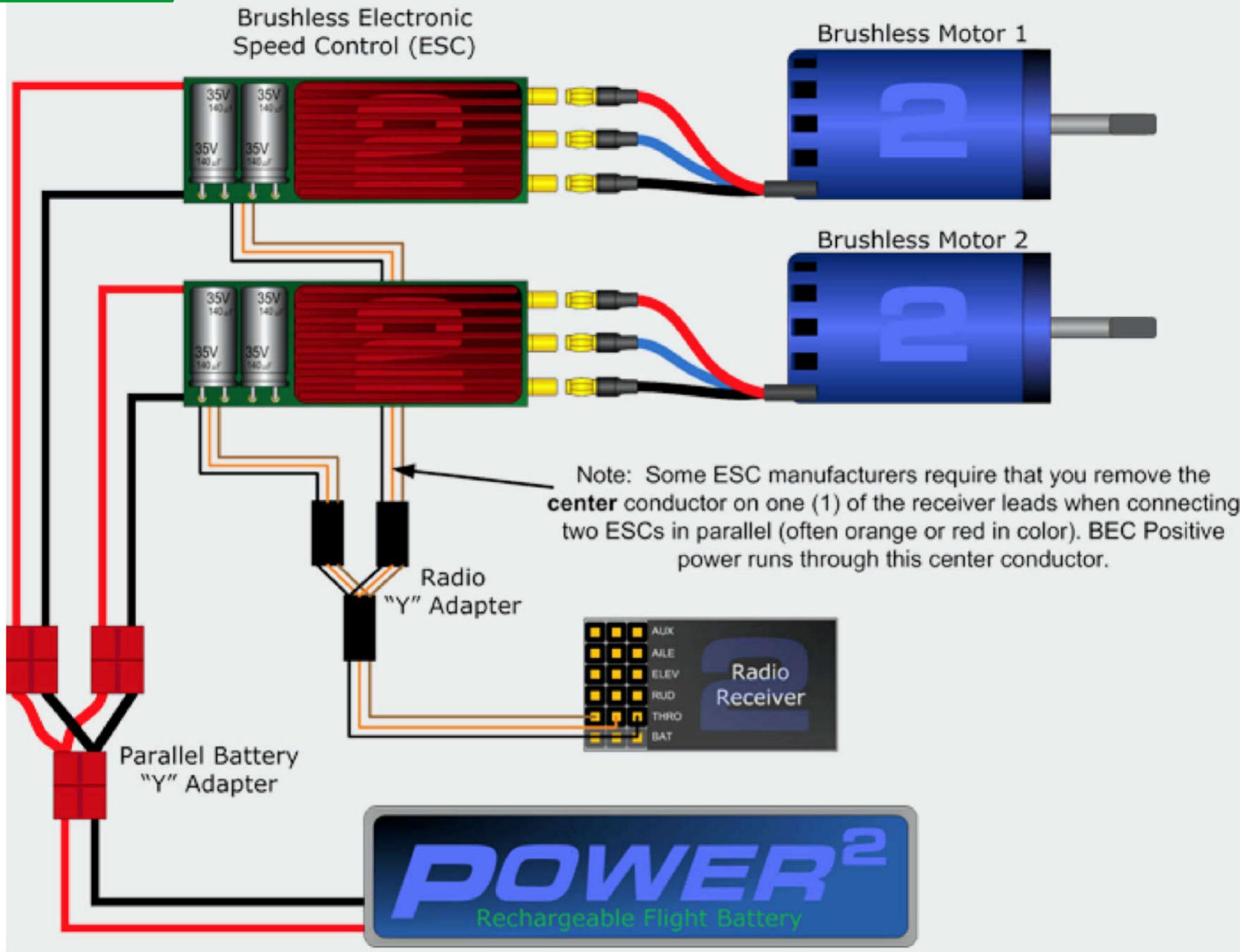
There are a lot of wires to show on the EDF version, so for the sake of ease of communication it has been simplified.

- Copy the pusher version wiring diagram for the servos. Run **all** servo cables to the RX, using servo extension cables and Y leads if required. Cut slots in the wing ribs and bulkheads to pass the cables through.
- Trim holes in the Thrust tubes, then connect the motor cables to the motors and check they are spinning the right way around.
- Set the ESC's into the V-Bulkhead sides so that they provide a flat surface in the air intakes for cooling with minimal drag.
- Run the ESC battery cables into the forward fuselage battery area to a battery connector. Run the Servo cable from the ESC to the RX.

Once wired up, thoroughly test all electronics to ensure they function correctly, making sure there are no loose connections anywhere or dry solder joints.



EDF only



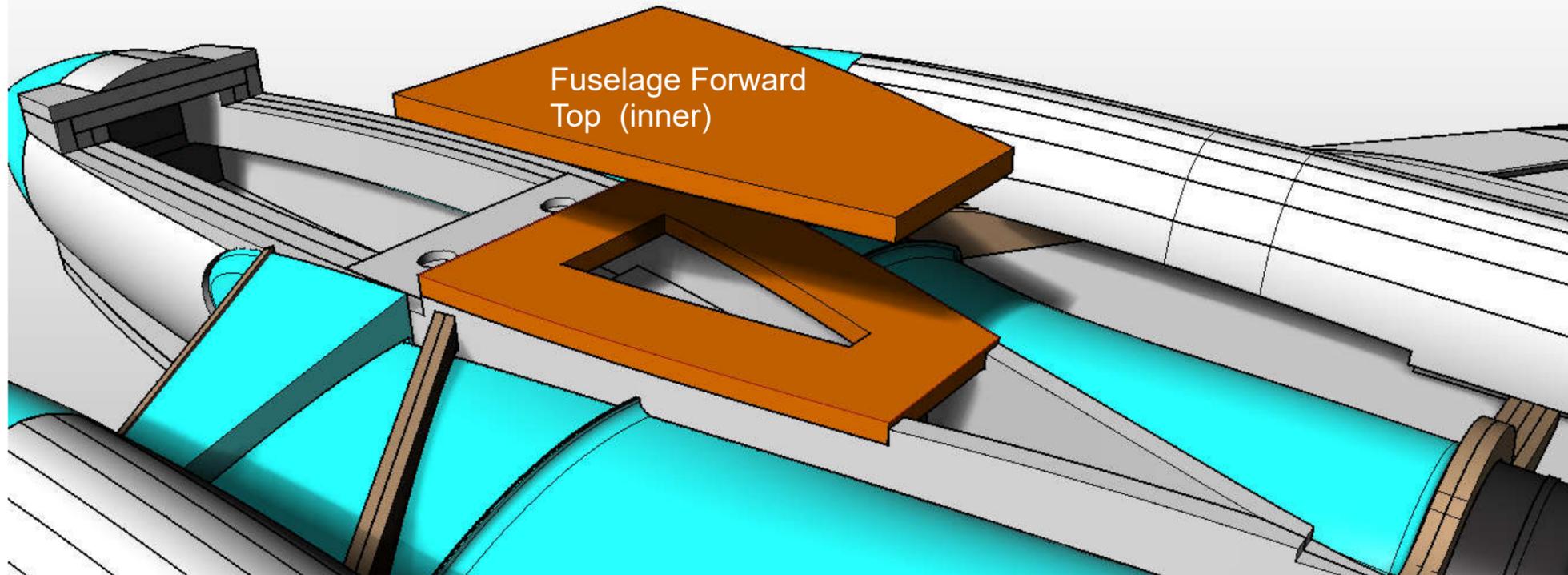
I found this image on the internet - I am not sure who created it, but it is a clear diagram of how to set up a single battery / twin motor setup.

Be sure to investigate with your RX manufacturer whether you need to have a single or can have dual power feeds from your ESC's.

If in any doubt, remove one red wire terminal from the ESC and tape it to prevent it touching anything.



All versions

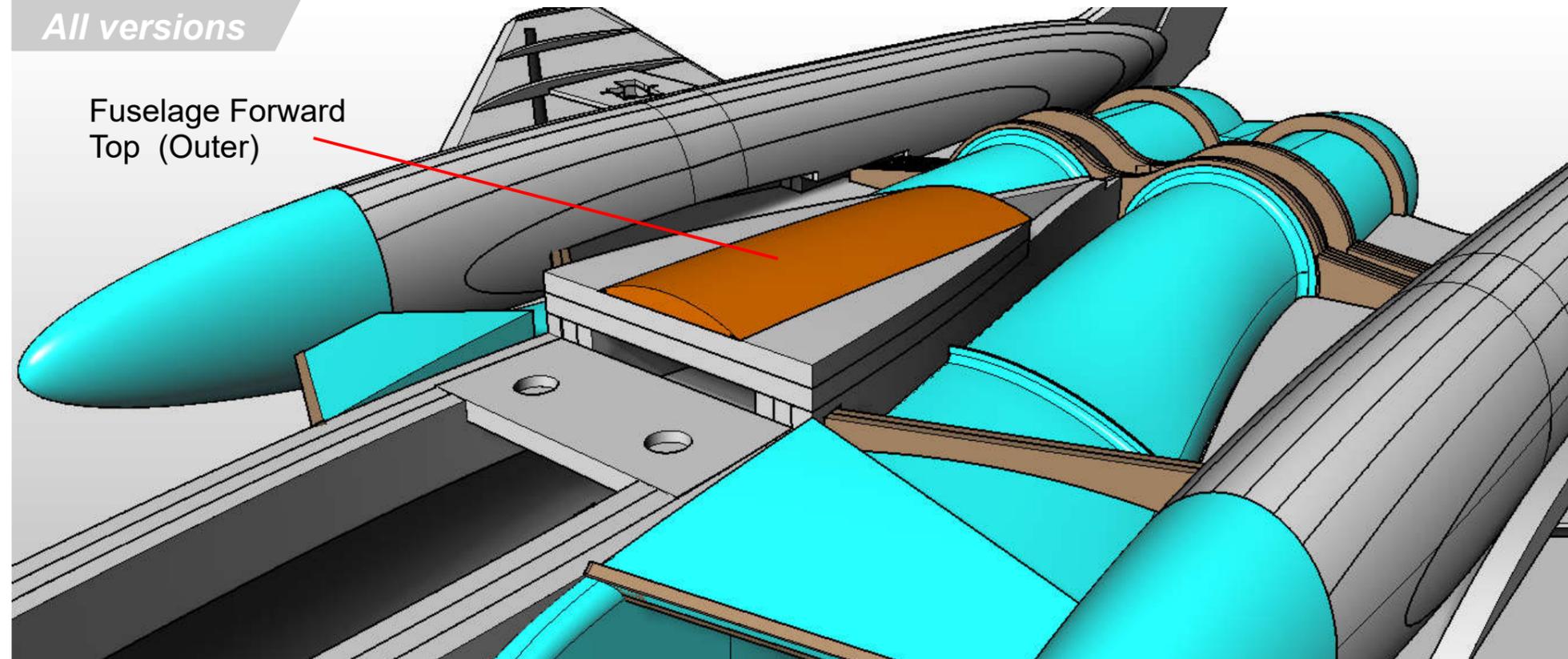


Glue the two pieces of the **Fuselage forward top inner** in place.

Trim the lower one to save a little weight.



All versions



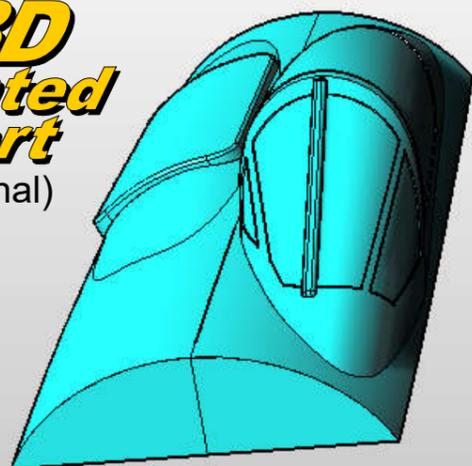
Glue the **Fuselage forward top Outer** in place.



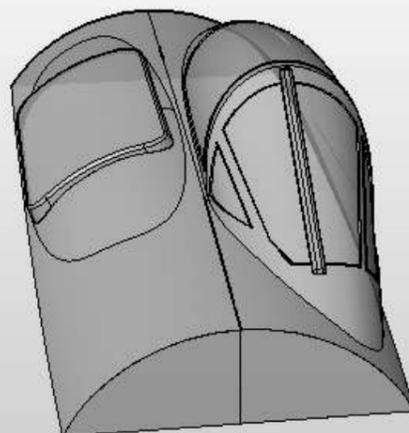
All versions

**3D Printed Part**  
(optional)

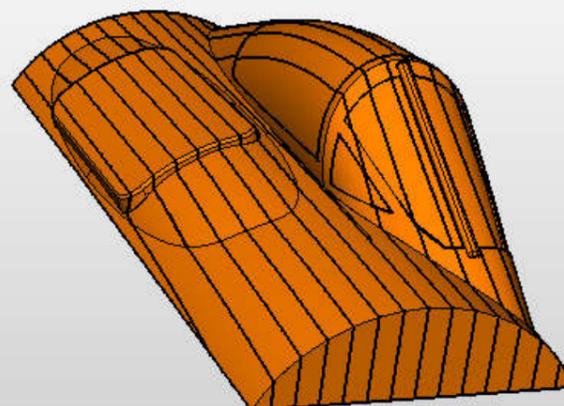
3D Printed Canopy



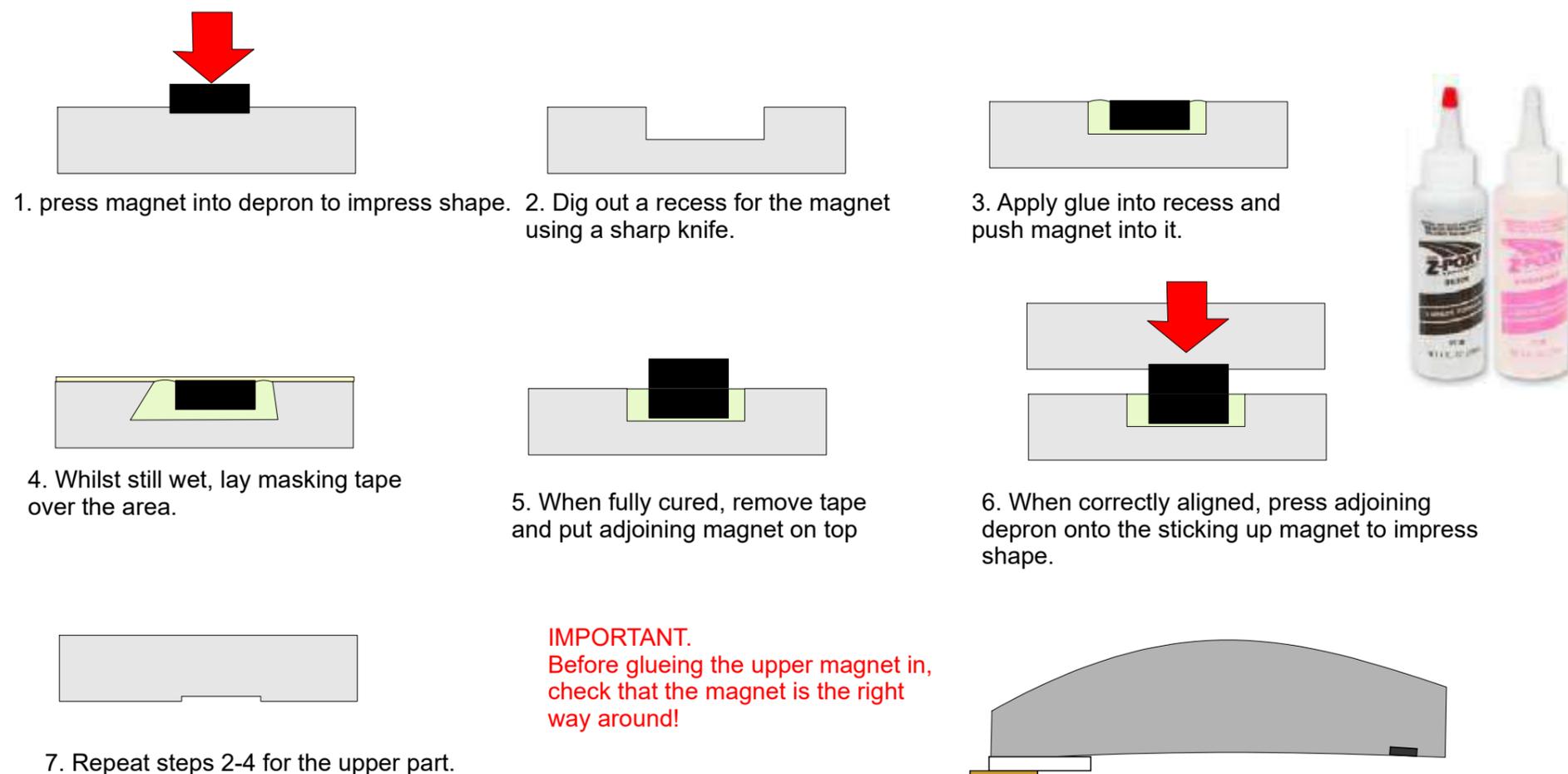
Vacuum formed Canopy



Laminated Canopy



Prepare the **Canopy / Cockpit** either using laminated 6mm foam sheets, Vacuum formed with a constructed base/ cockpit or 3D printed - (Suggest Clear PLA)



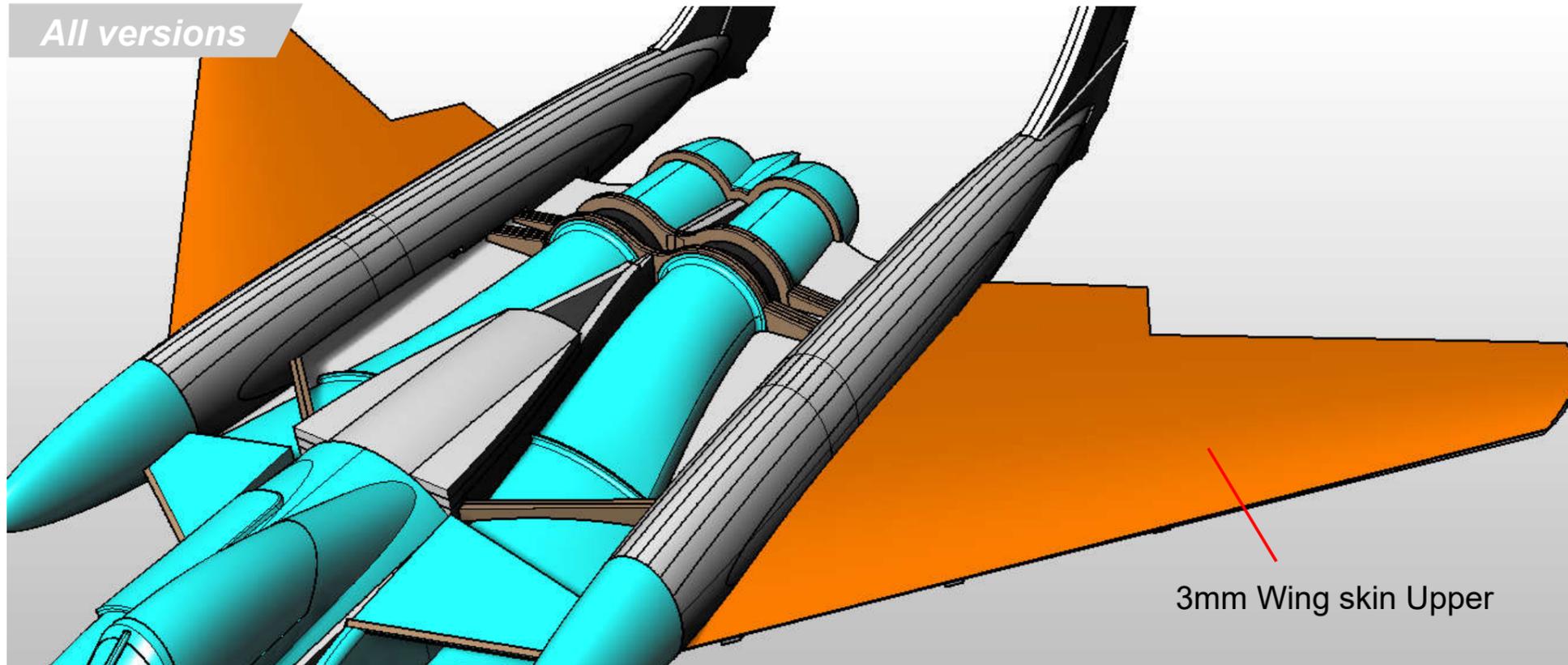
Build a tongue using a piece of scrap 6mm foam and 3mm liteply at the front of the canopy.

Attach the magnets to the magnet panel

Epoxy the magnets to rear of the canopy so that the canopy is removable but holds firmly in place when mounted.



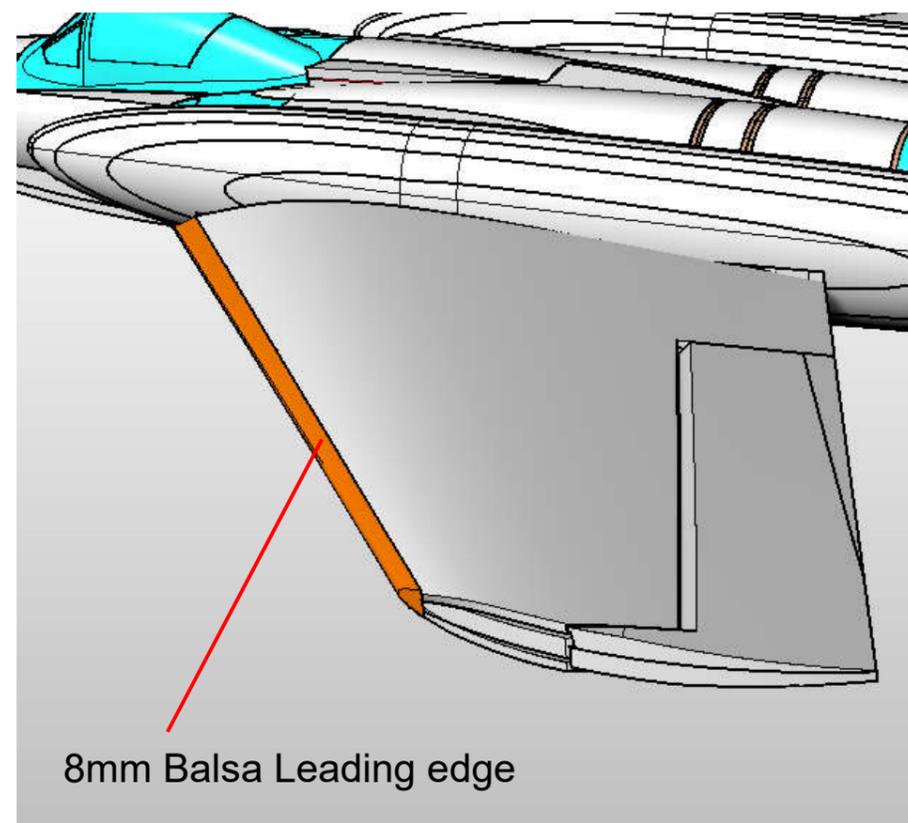
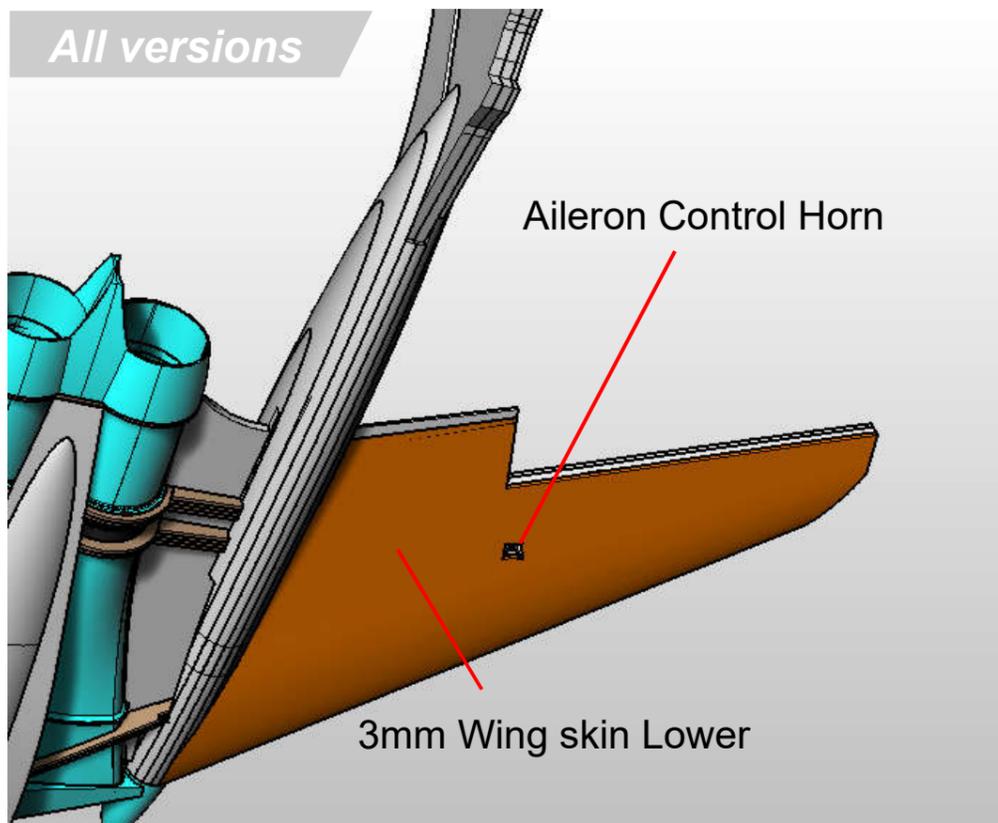
All versions



Sand the mating faces to shape then glue the **Wing Skin (Upper)** to the assembly.



All versions

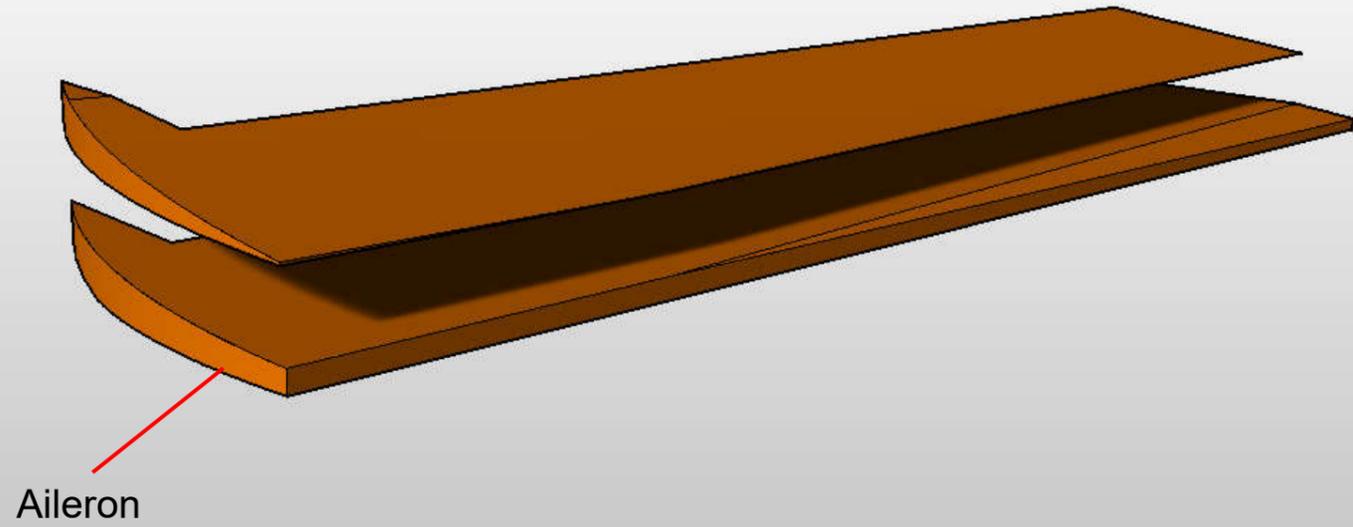


Sand the mating faces to shape then glue the **Wing Skin (Lower)** to the assembly.

Sand a flat edge on the Leading edge of both wings, and glue a balsa protective edge, sanded to a rounded shape.



All versions

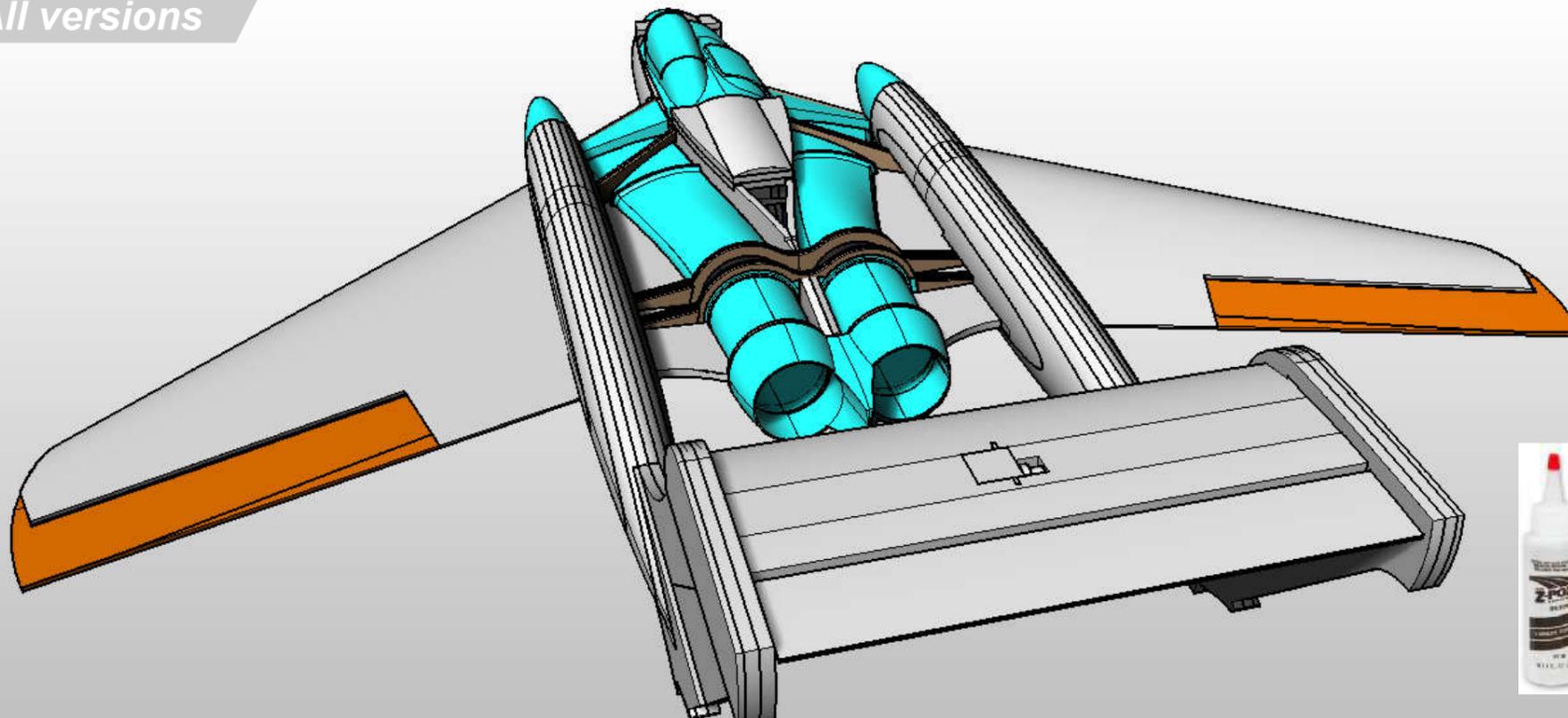


Glue the two 6mm pieces of the Ailerons together, then sand to shape to match the wing airfoil shape.

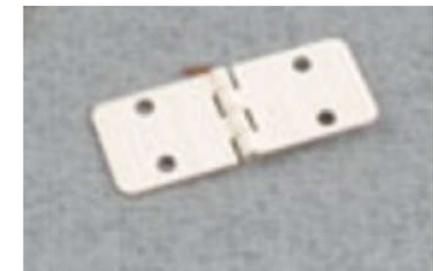
Do the same for the other wing



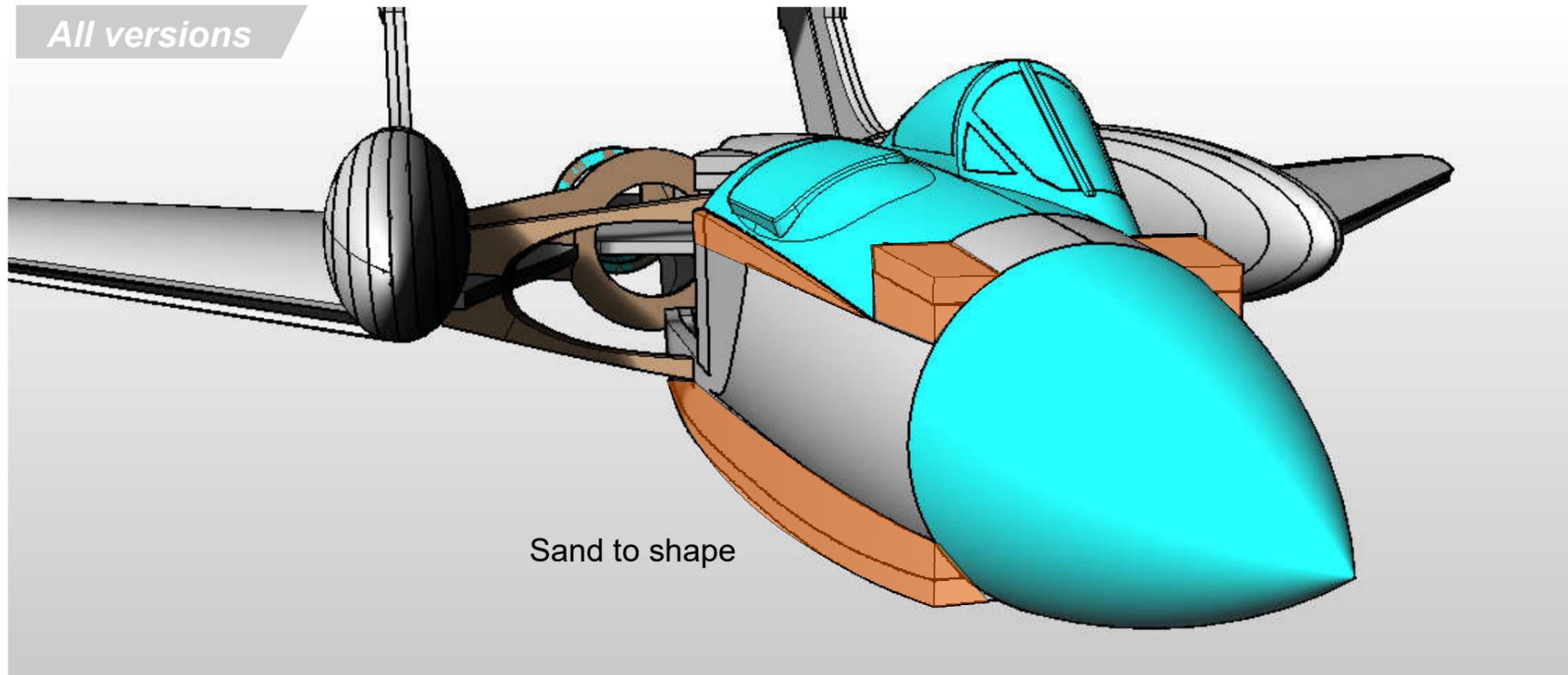
All versions



Glue the two Ailerons to the assembly using hinges

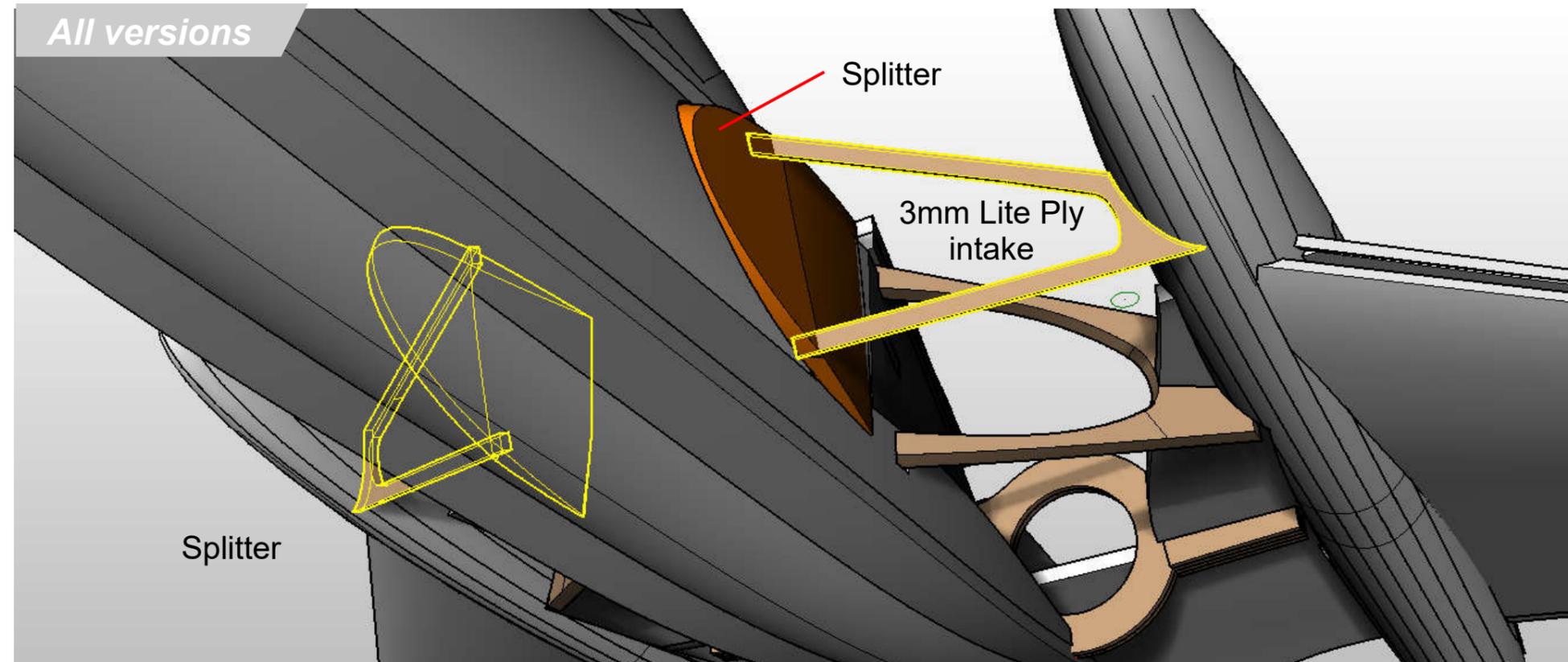


All versions



Sand the Forward fuselage to shape using the canopy and nosecone to help guide the correct shape.

All versions



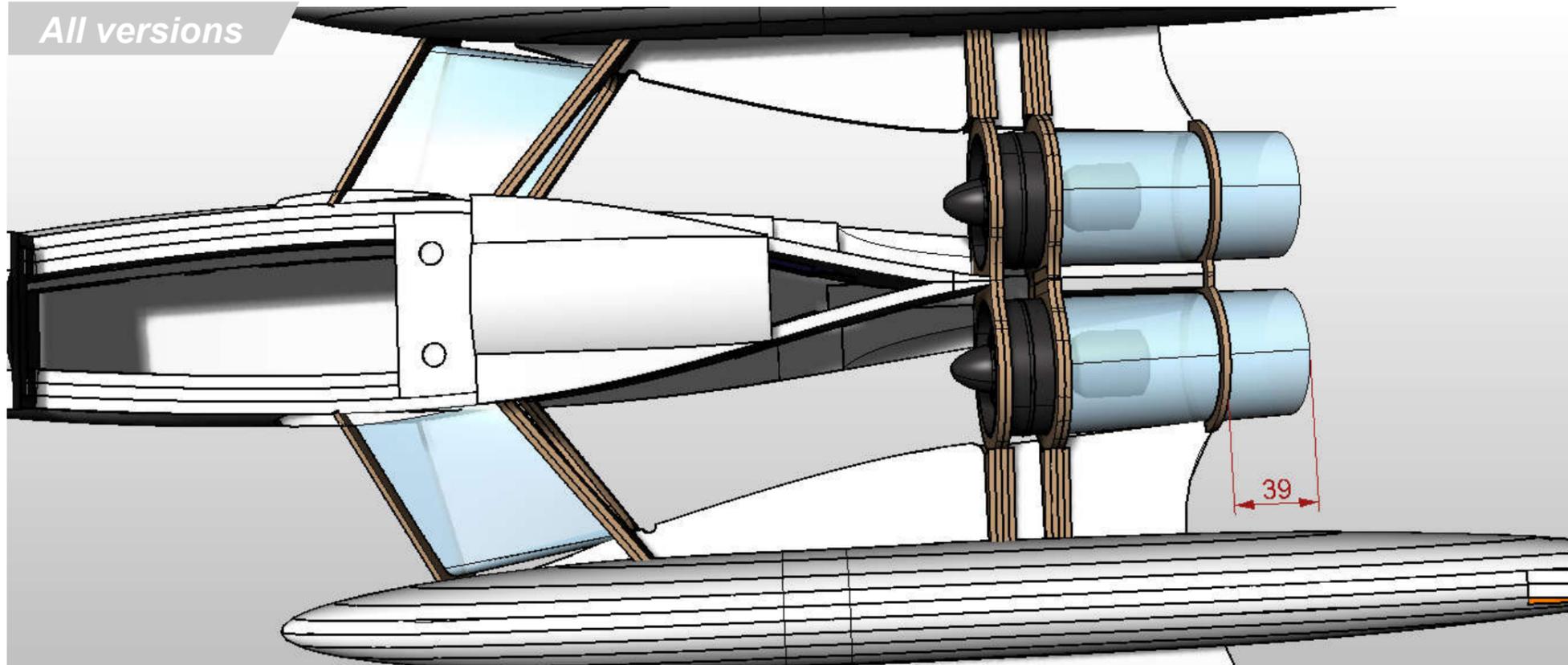
### NON 3D PRINTED VERSION

Glue the **Splitter** into the recess on the fuselage side using UHU por.

Glue the **3mm Lite-ply intake** pieces into the slots in the splitter and also to the marking on the twin booms. Use Epoxy.



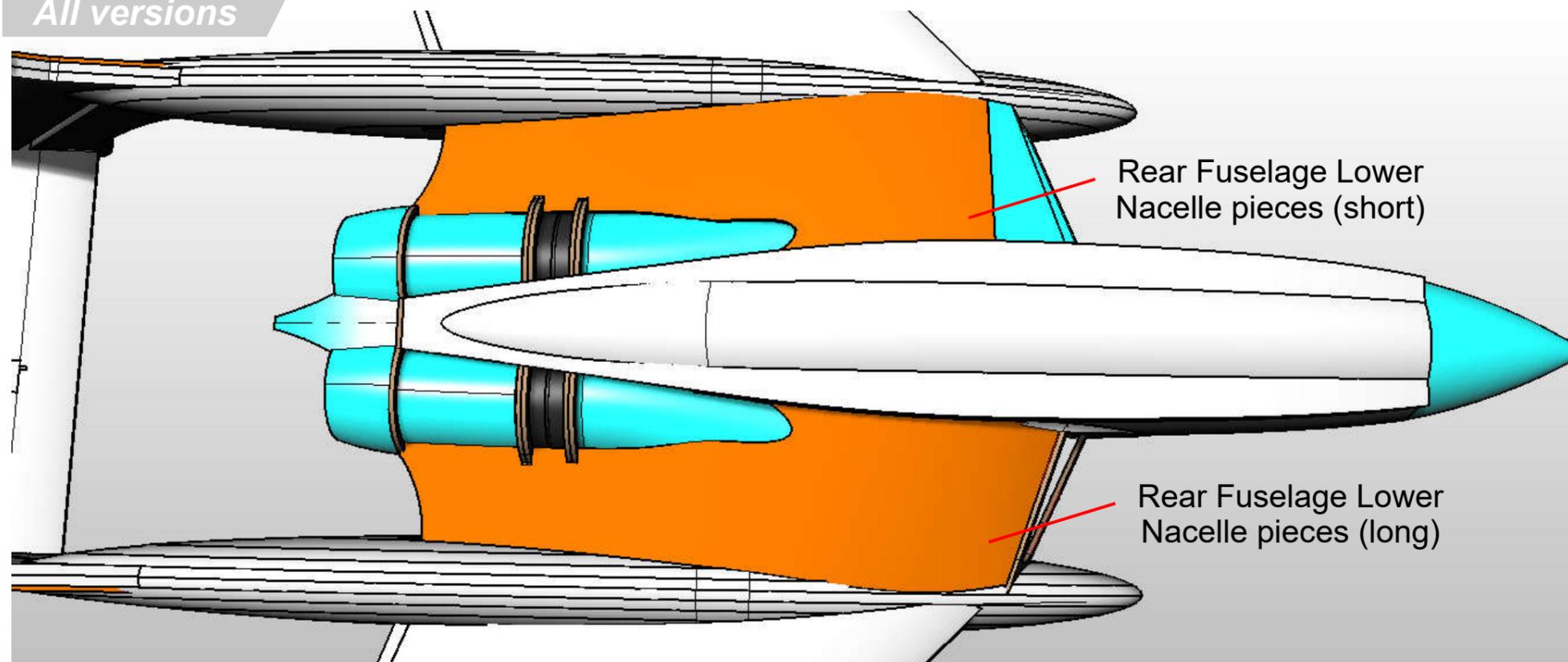
All versions



## NON 3D PRINTED VERSION

Use < 0.4mm plastic sheet and line the two intake 3mm lite ply pieces, and create the thrust tubes - extending past the exhaust bulkhead 39mm

All versions



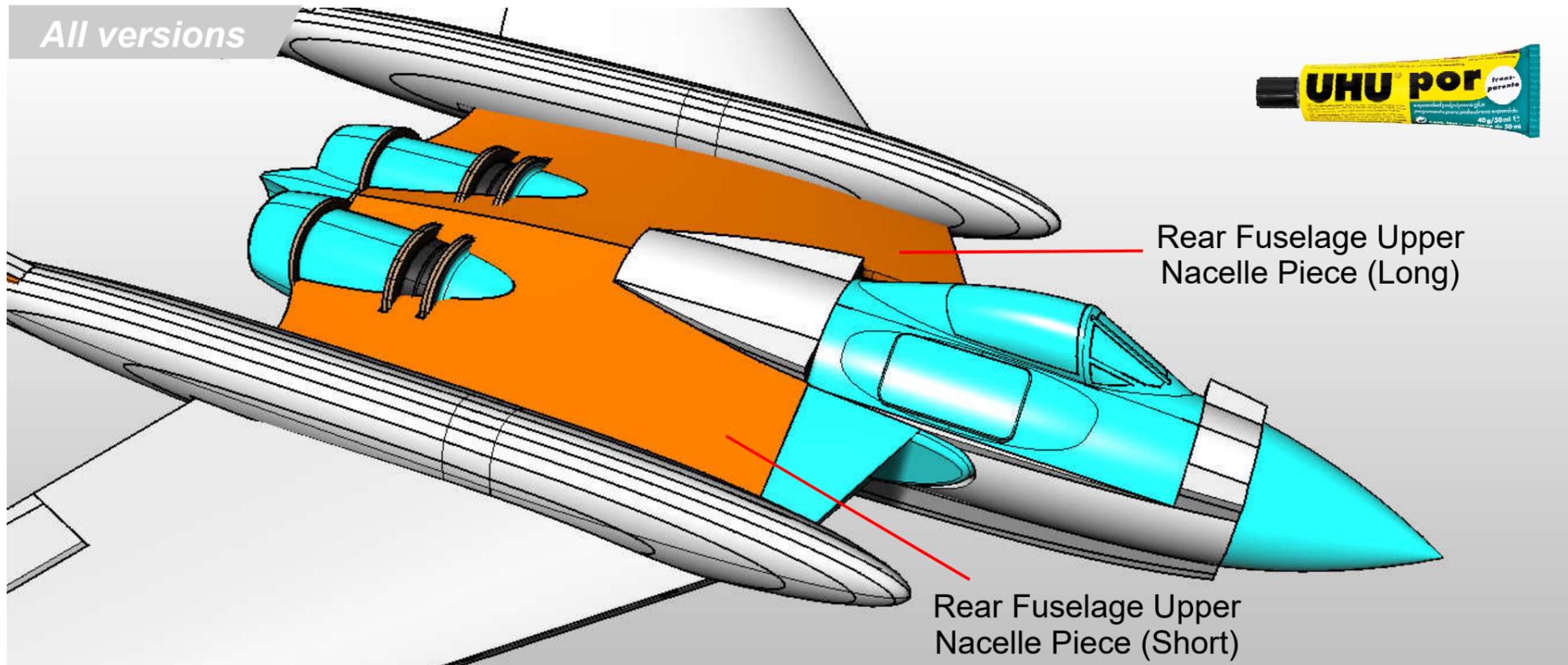
Glue the 3mm **Rear Fuselage Lower Nacelle Pieces** in place using UHU Por.

Carefully sand to make it fit at the edges, and along the Lite-ply bulkheads.

Trim it short if you are using the 3D printed intakes otherwise leave it long.



All versions



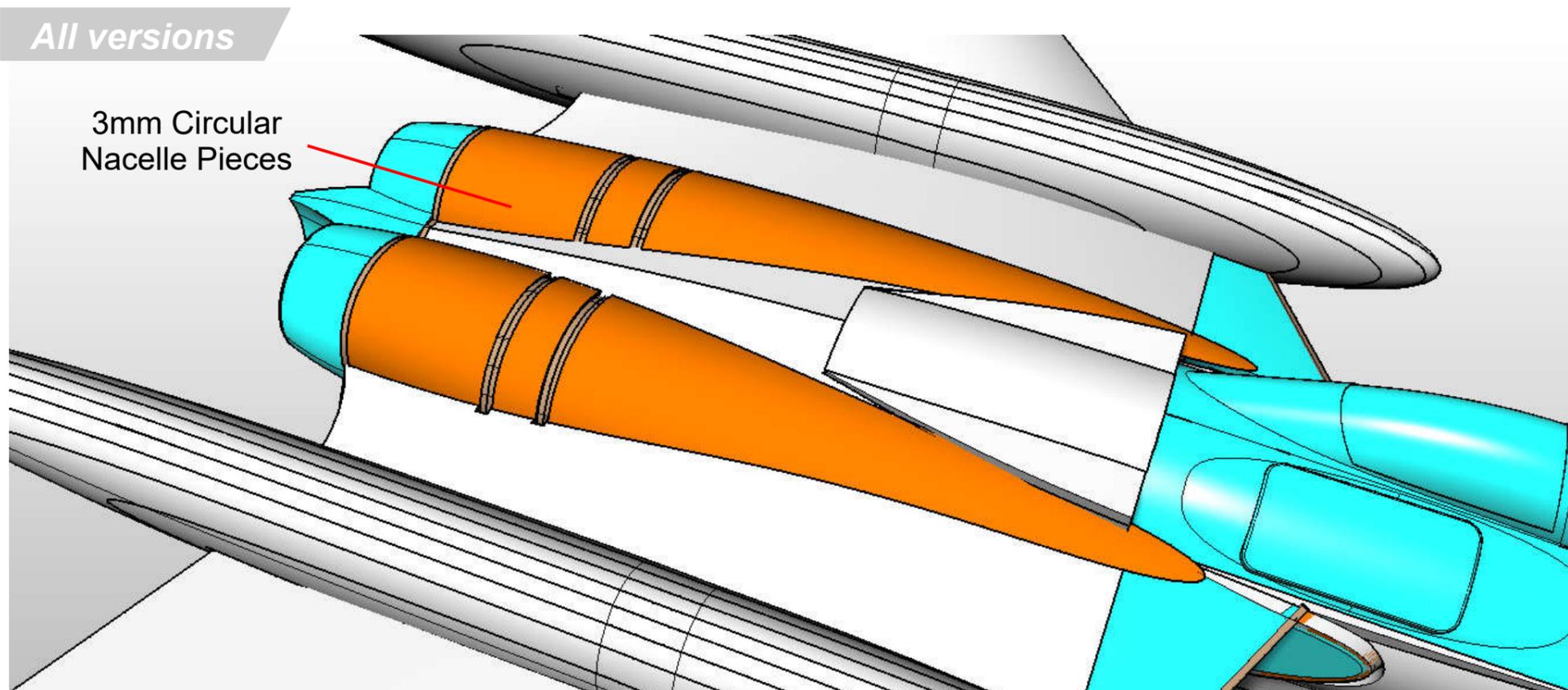
Glue the 6mm **Rear Fuselage Upper Nacelle Pieces** in place using UHU Por.

Carefully sand to make it fit at the edges, and along the Lite-ply bulkheads.

Trim it short if you are using the 3D printed intakes otherwise leave it long.

Blend the turtledeck area into the Upper nacelle pieces and sand the crease away between the two pieces.

All versions

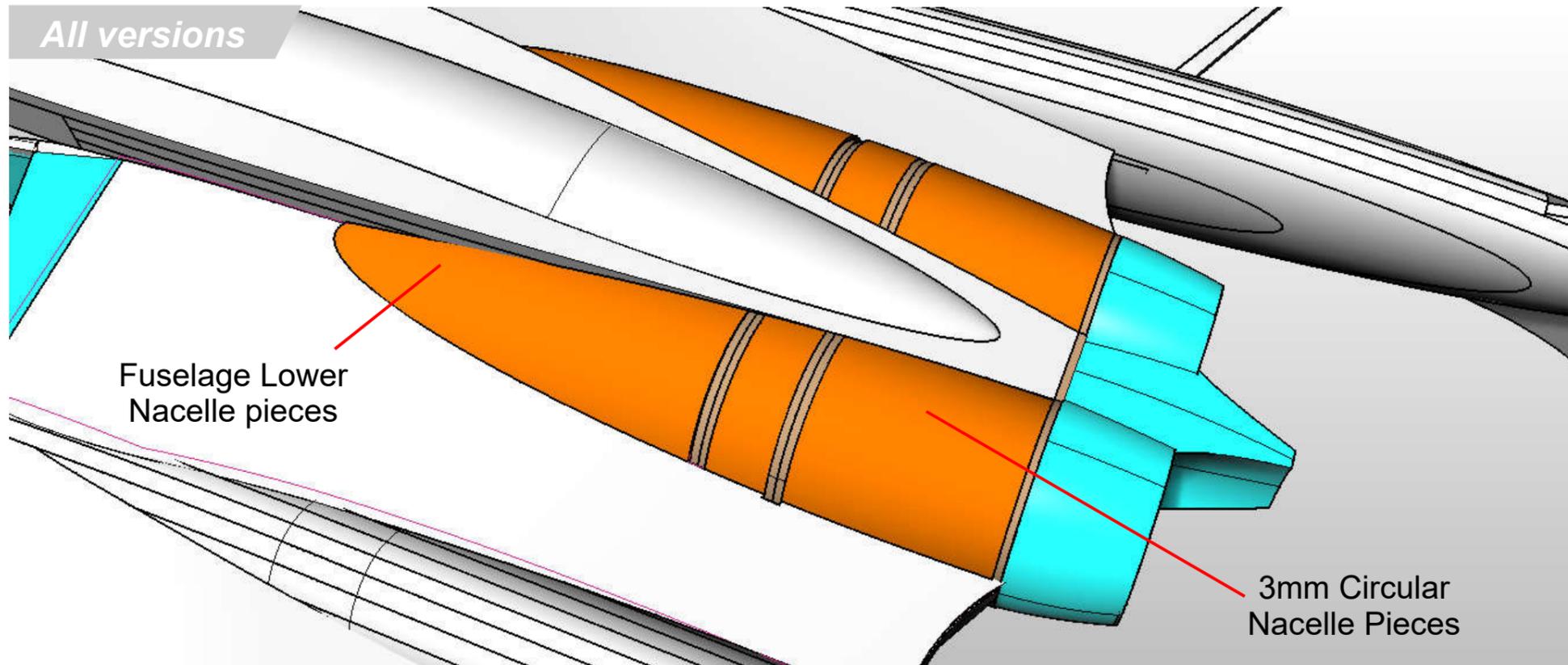


Using the markings on the Upper nacelle pieces and the shape of the exhaust bulkhead, Carefully roll 3mm foam sheet to form the circular nacelle shape as shown. Glue in place using UHU Por.

Trim around the Structural bulkhead rather than covering over it, using its shape to help you achieve the right shape.



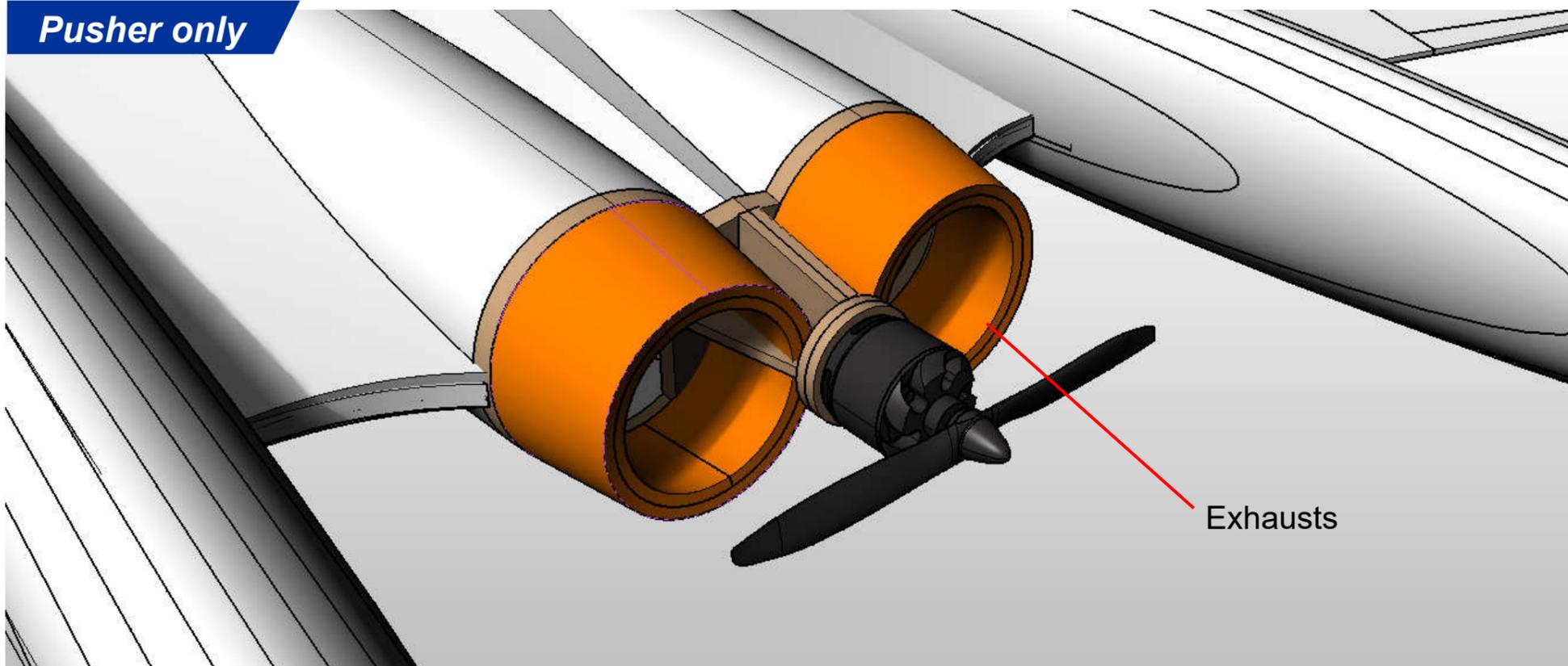
All versions



Using the markings on the Lower nacelle pieces and the shape of the exhaust bulkhead, Carefully roll 3mm foam sheet to form the **Circular Nacelle Pieces** as shown. Glue in place using UHU Por.



Pusher only



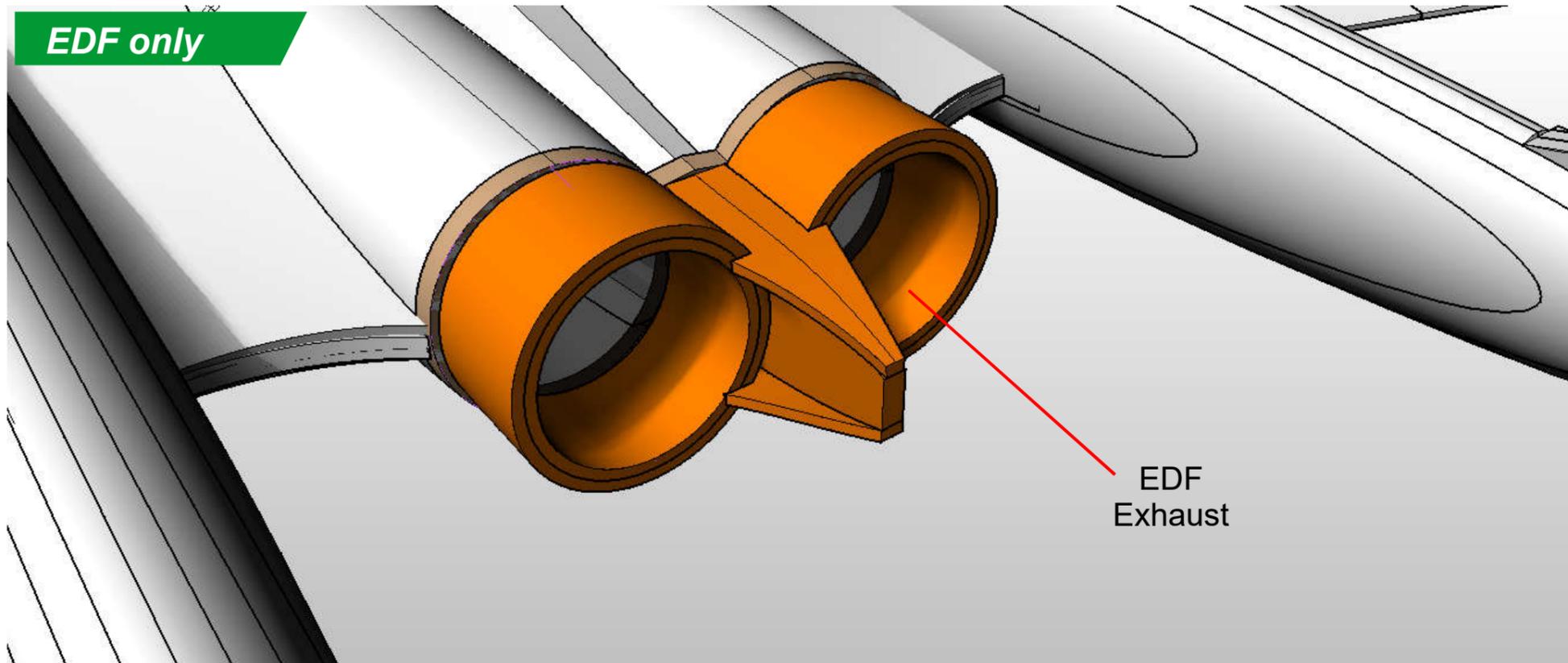
### NON-3D Printed exhausts

Using the **Exhaust JIG**, Fabricate the **PUSHER Exhausts** using two layers of 3mm foam. Join with the each seam on opposing sides.

Trim away a 3mm channel to allow for fitting around the Pusher mount.



EDF only



EDF  
Exhaust

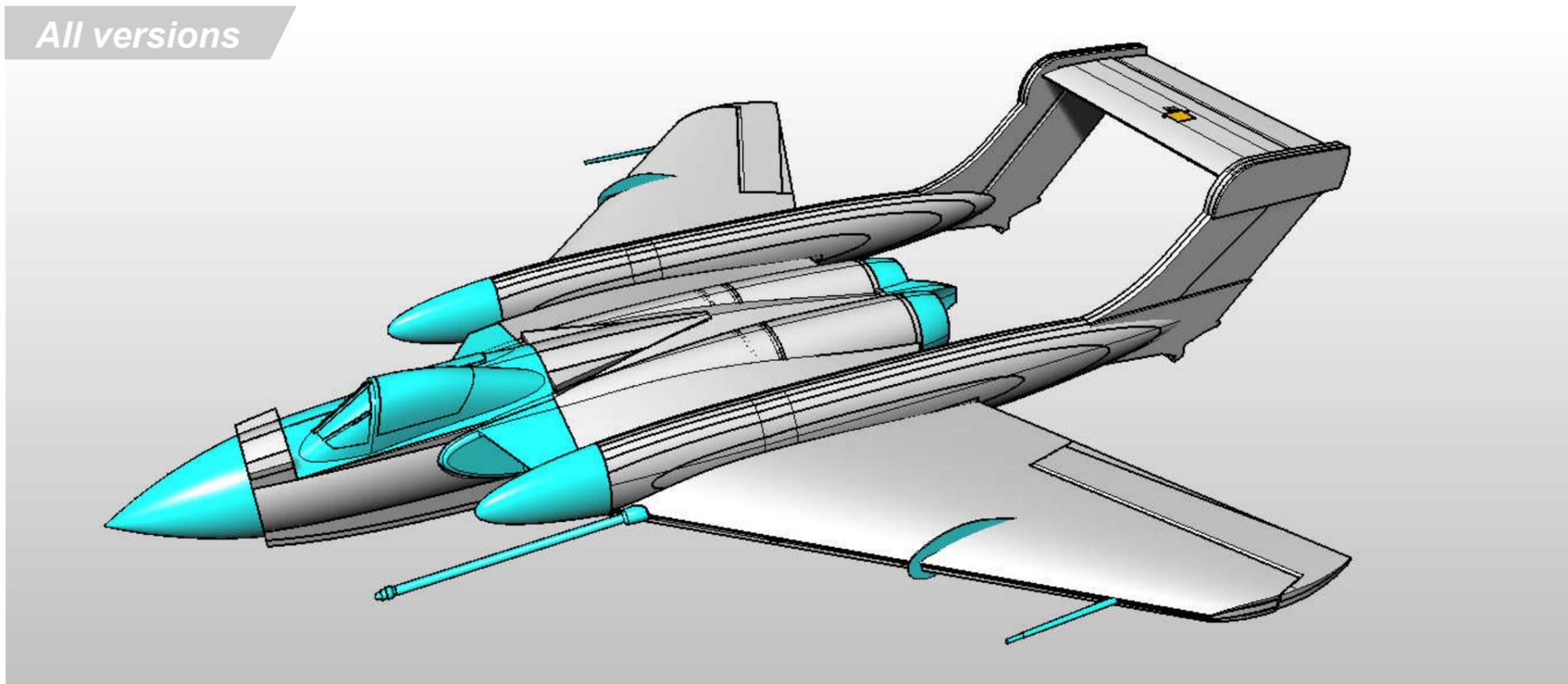
## NON-3D Printed exhausts

Using the **Exhaust JIG**, Fabricate the **EDF Exhausts** using two layers of 3mm foam. Join with the each seam on opposing sides.

Construct the middle section and glue in place.

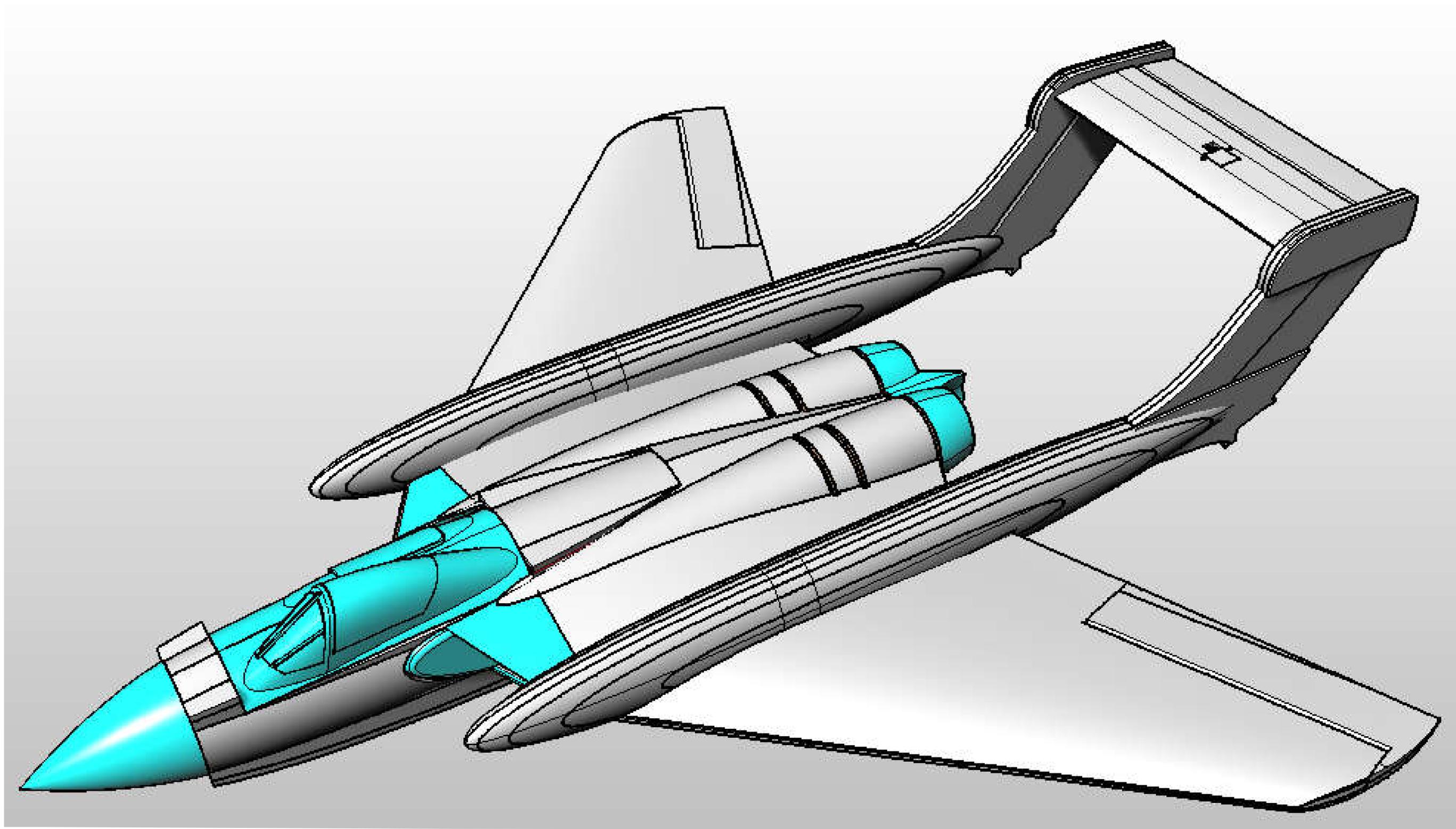


All versions



Either Fabricate or 3D print the Wing fences, Pitot tubes and Refuelling nozzle and glue to the assembly.





Congratulations! Your Sea Vixen is complete! Either fly it as it is, or go ahead and paint it.



Use images of the real plane to help you get the right scale details

