



De Havilland
Swallow
Parkjet

Photograph of actual aircraft.



1st Generation Experimental Jet

Construction Guide

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De Havilland Swallow History

Three DH108 'Swallow' research aircraft were constructed to Air Ministry Specification E1/45 and E11/45 to investigate the low and high-speed characteristics of tailless, swept wing aircraft.

The first of these (TG283) made its first flight at Woodbridge on 15th May 1946. Designed by John Carver Meadows Frost (who went on to design the Avro-Canada CF-100), the layout of the 108 resembled the configuration of the Messerschmitt ME163 Komet, a rocket-powered interceptor designed during World War II.

This first aircraft was exclusively used for the investigation of low-speed flight characteristics and tested a range of leading edge slots, wing fences and other devices to determine their effects on stalling and low-speed handling.

The second aircraft (TG306) flew on 24th July 1946 and was used for the high-speed flight trials. It featured a 45 degree swept wing, modified leading edge slats as well as a De Havilland Goblin 3 engine. Tragically, on 27th September 1946, the aircraft broke up in the air at high-speed, killing the pilot (and son of Company Founder) Geoffrey R de Havilland. The De Havilland Company and of course the family were devastated by the loss and whilst many found it difficult to continue, they forged ahead with the third and final prototype (VW120).

This variant, is instantly recognisable by its 'cleaned up' more streamlined nose and cockpit canopy, made its maiden flight on 24th July 1947 with John 'Cats Eyes' Cunningham at the controls. On 12th April 1948, the aircraft gained a world-speed record for a 100 km closed circuit flight at 605.23 mph. De Havilland Chief Test Pilot John Derry then went on to exceed Mach 1 in the aircraft on 6th September 1948, this being the first British-designed aircraft to 'break the sound barrier'. In 1949, the aircraft appeared at the SBAC Farnborough Air Show before being handed over to the RAE at Farnborough.

Sadly, VW120 was also to crash following structural failure in flight on 15th February 1950 over Buckinghamshire, claiming the life of RAE Test Pilot Squadron Leader Stuart Muller-Rowland.

The final chapter in the DH108 story was when the first aircraft (TG283) was lost in a crash at Hartley Wintney on 1st May 1950, and in which Squadron Leader Eric Genders was killed whilst attempting to abandon the aircraft. The DH108 was instrumental in the development of modern jet aircraft of both military and civil design and was the epitome of an era when great advances were made through those brave men who were 'pushing the envelope'.

Designers Notes

I believe that the Swallow (VW120) has to be one of the most beautiful jet planes ever designed.

This design has been designed around a 64mm EDF or single pusher prop design.

Its not a simple shape to replicate, so I've designed some support jigs to help keep all the pieces aligned and true.

TG283



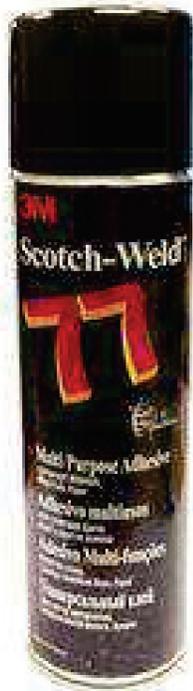
TG306



VW120



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.

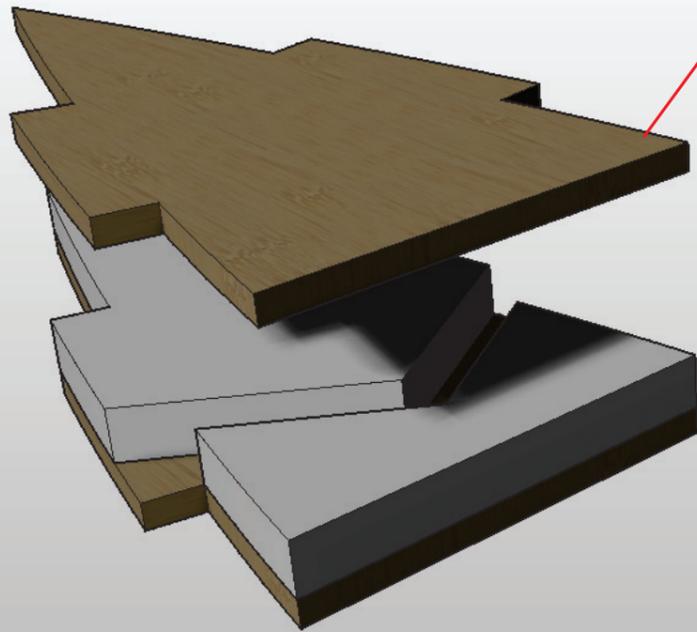
Glueing parts together.

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.

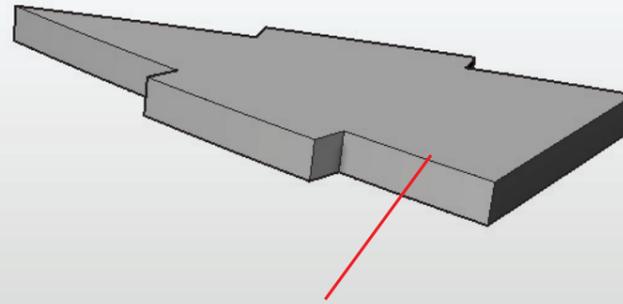


All versions

RX Shelf for plane without 3D printed parts



RX Shelf for plane with 3D Printed Parts



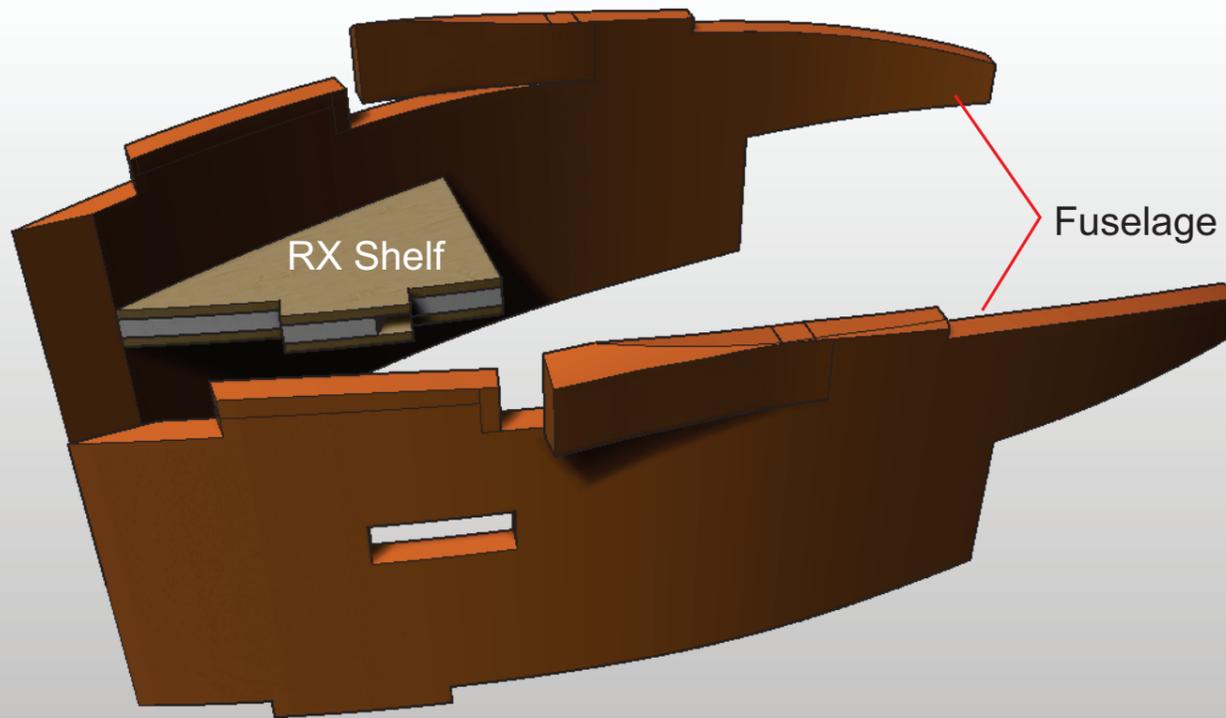
If you are not using 3d printed parts, then construct the RX shelf with the 3mm liteply reinforcers.

If you are building the plane with 3d printer parts cut out a simple RX shelf.



All versions

RX Shelf



Fuselage sides (Inner)

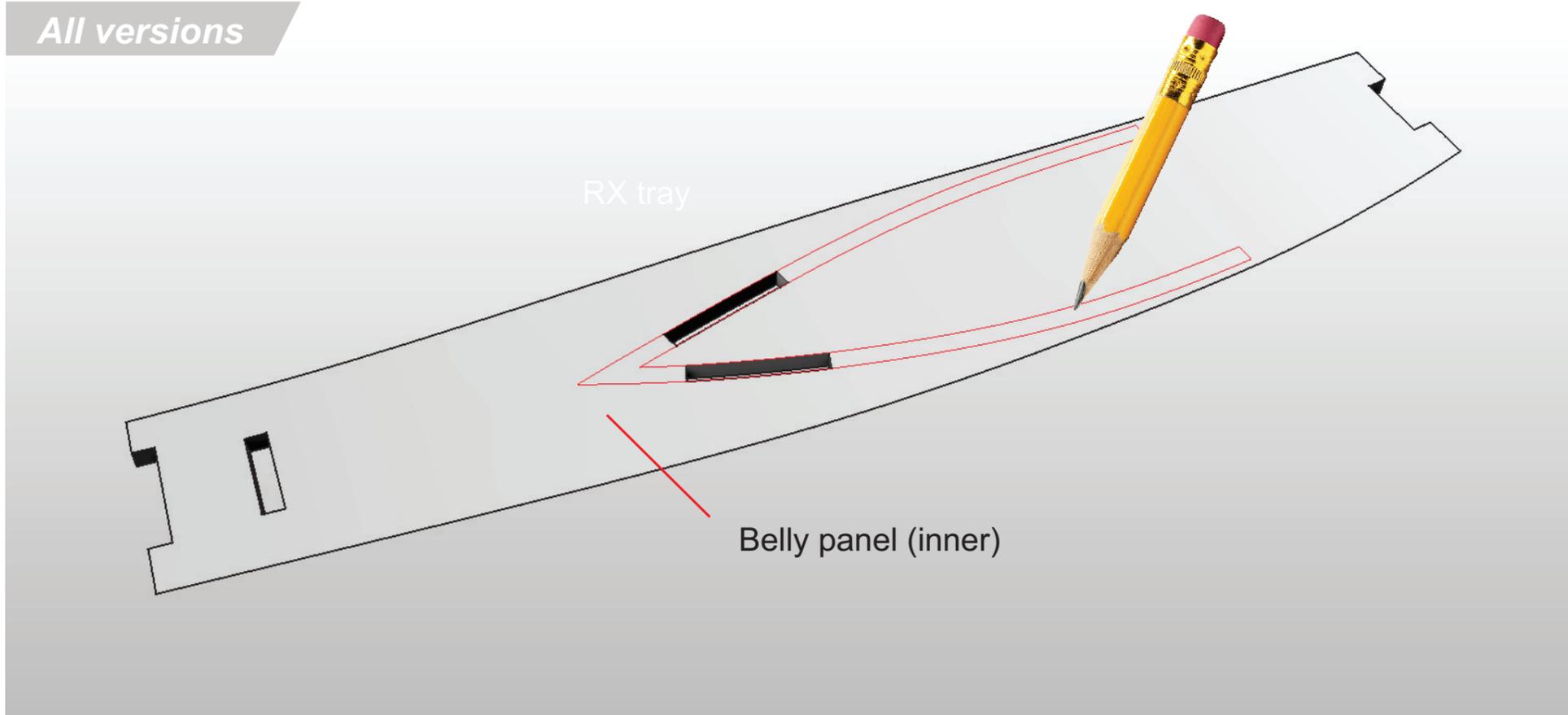
Cut the receiving slot to suit your chosen RX shelf.

Pre curve the **Fuselage sides (Inner)**.

Glue your chosen **RX shelf** and the two sides of the **Fuselage sides (Inner)** together as shown.



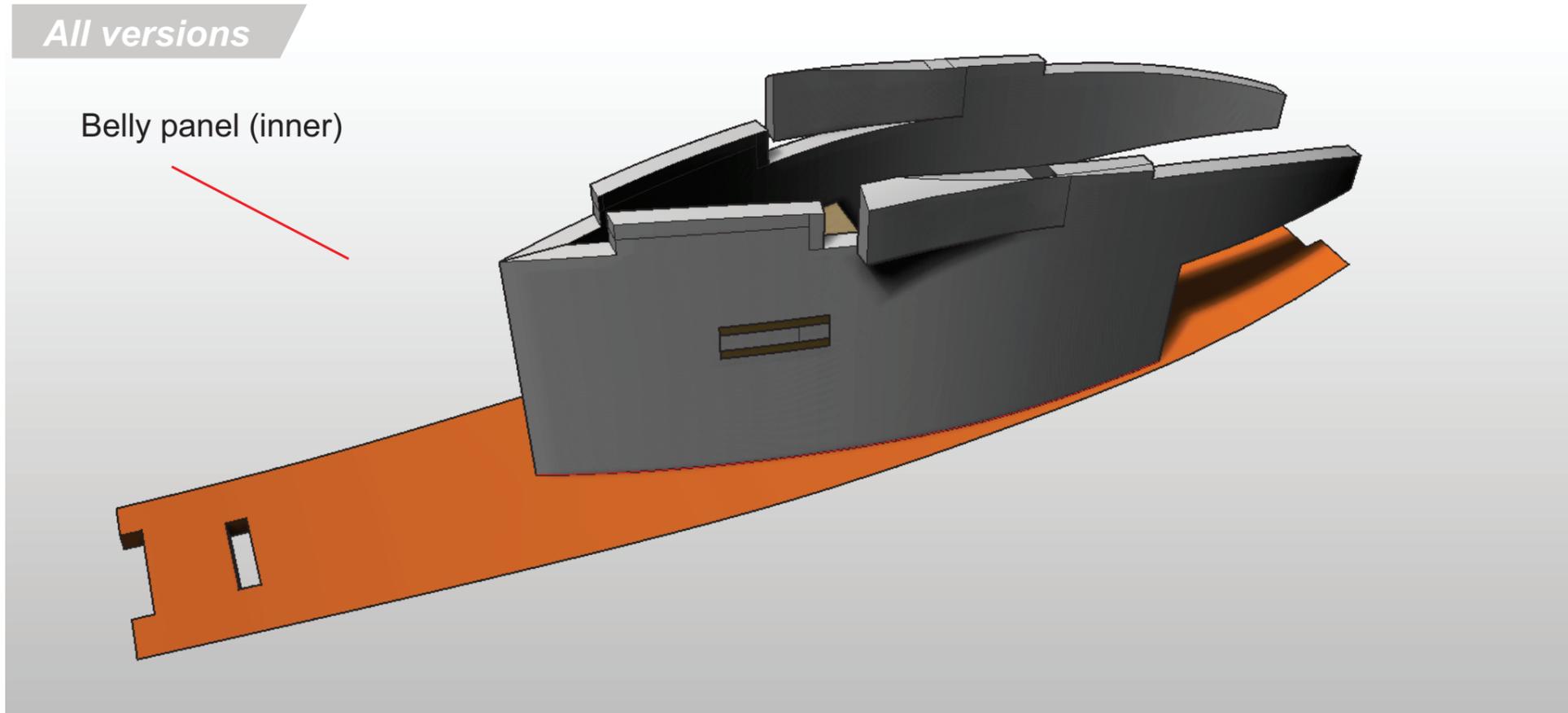
All versions



Pre-shape the **Belly Panel (Inner)** to match the **Fuselage Sides (Inner)**.

Mark the location position on the **Belly Panel (Inner)** from the plans.

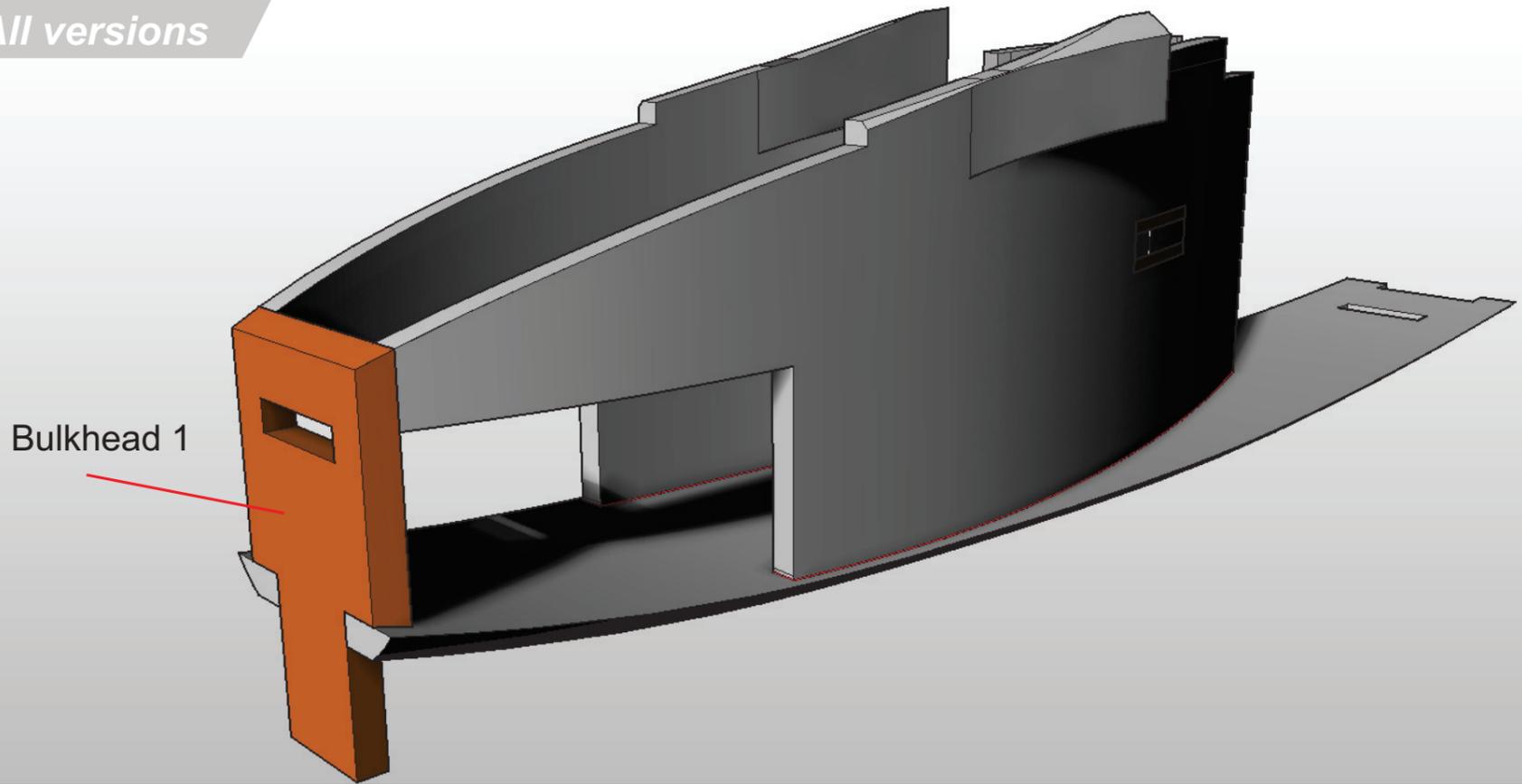
All versions



Glue the Inner fuselage assembly to the **Belly Panel (Inner)** as shown by the yellow line.



All versions

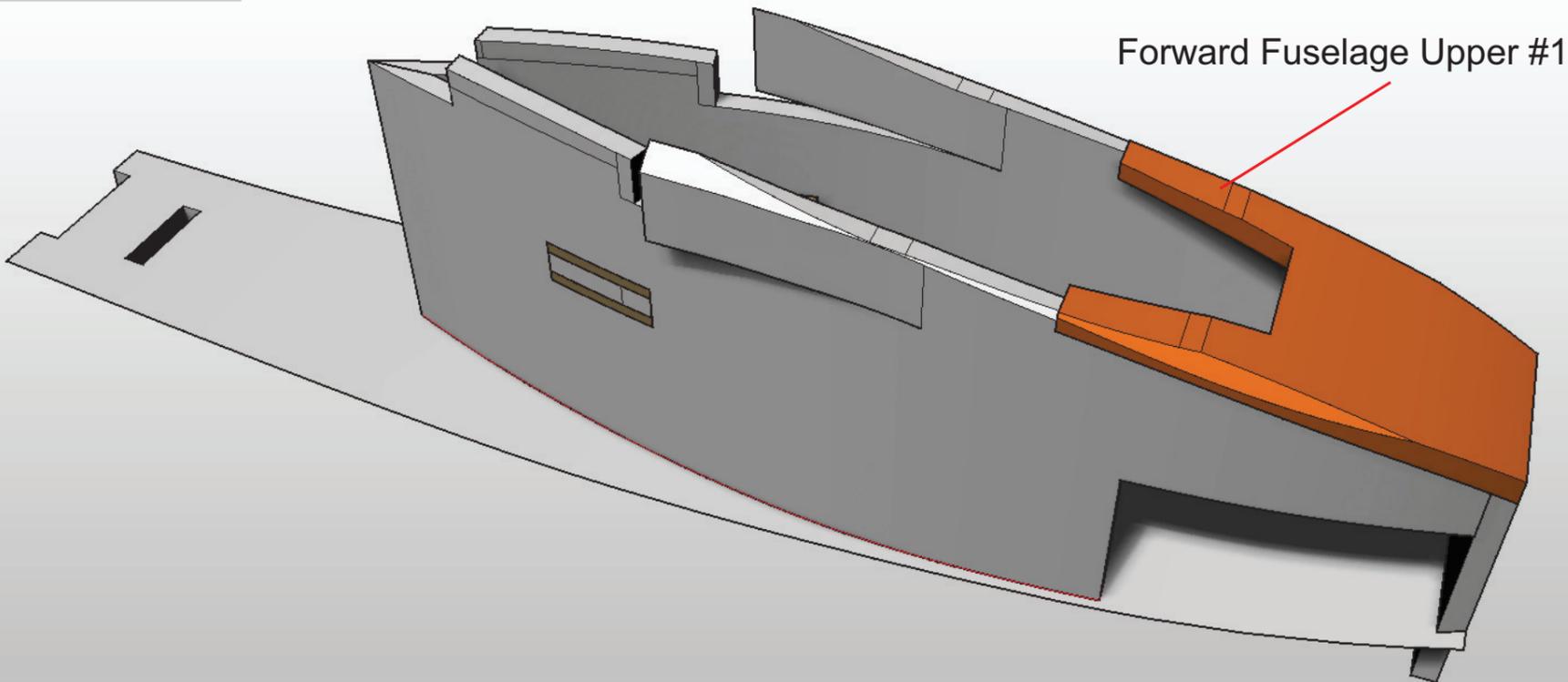


Glue **Bulkhead 1** onto the assembly.

Note : The sticking out tab will be used later on in the build process to help position the wing.



All versions



Glue the **Forward Fuselage Upper #1** to the assembly as shown



All versions

Spar Bulkhead

**3D
Printed
Part**
(optional)

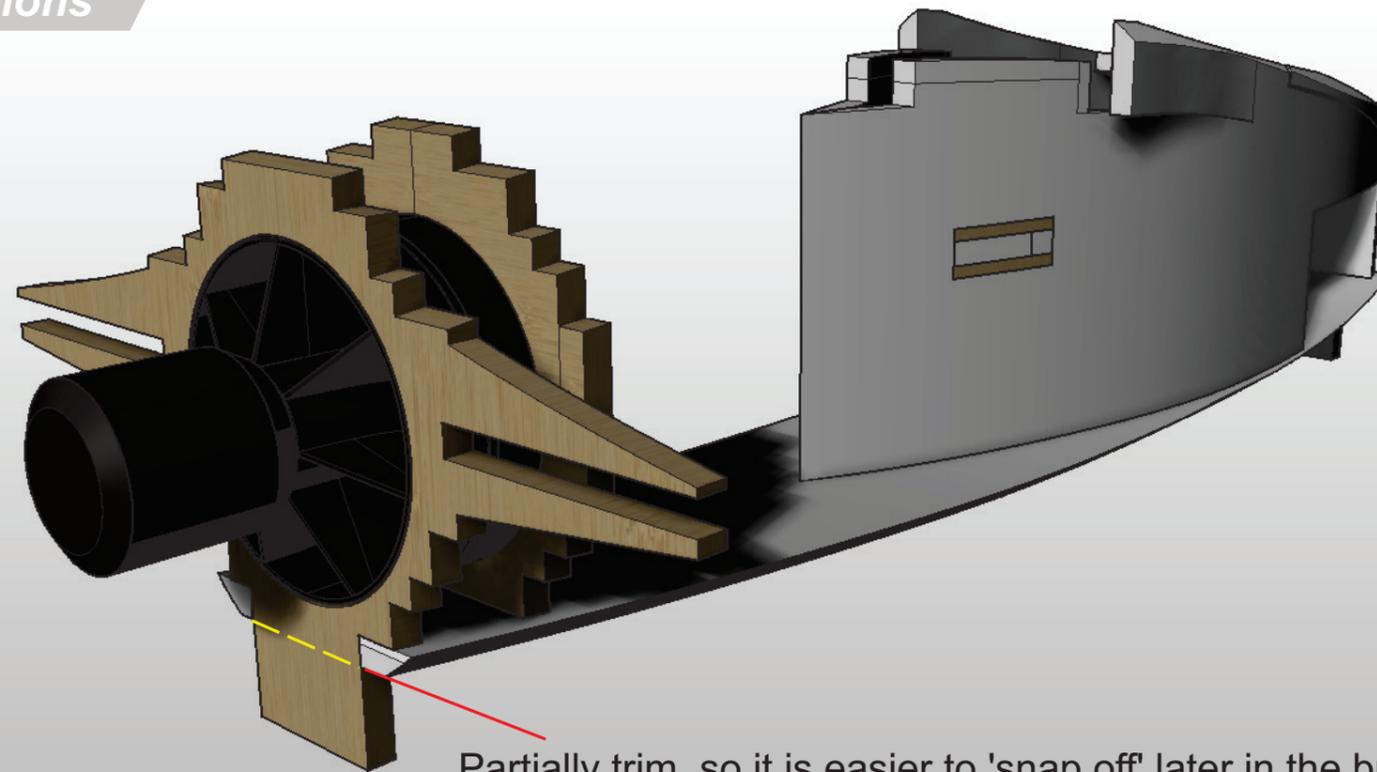
Forward Bulkhead

Create the Spar Bulkhead and Forward bulkhead from 3mm lite-ply (two pieces glued together). Alternatively you can 3d print these parts.

Use these parts with both Pusher and EDF versions.

With the EDF version, ensure that your chosen EDF unit will fit snugly within the holes as shown, and dry fit in place. It is designed for 64mm.

All versions



Partially trim, so it is easier to 'snap off' later in the build

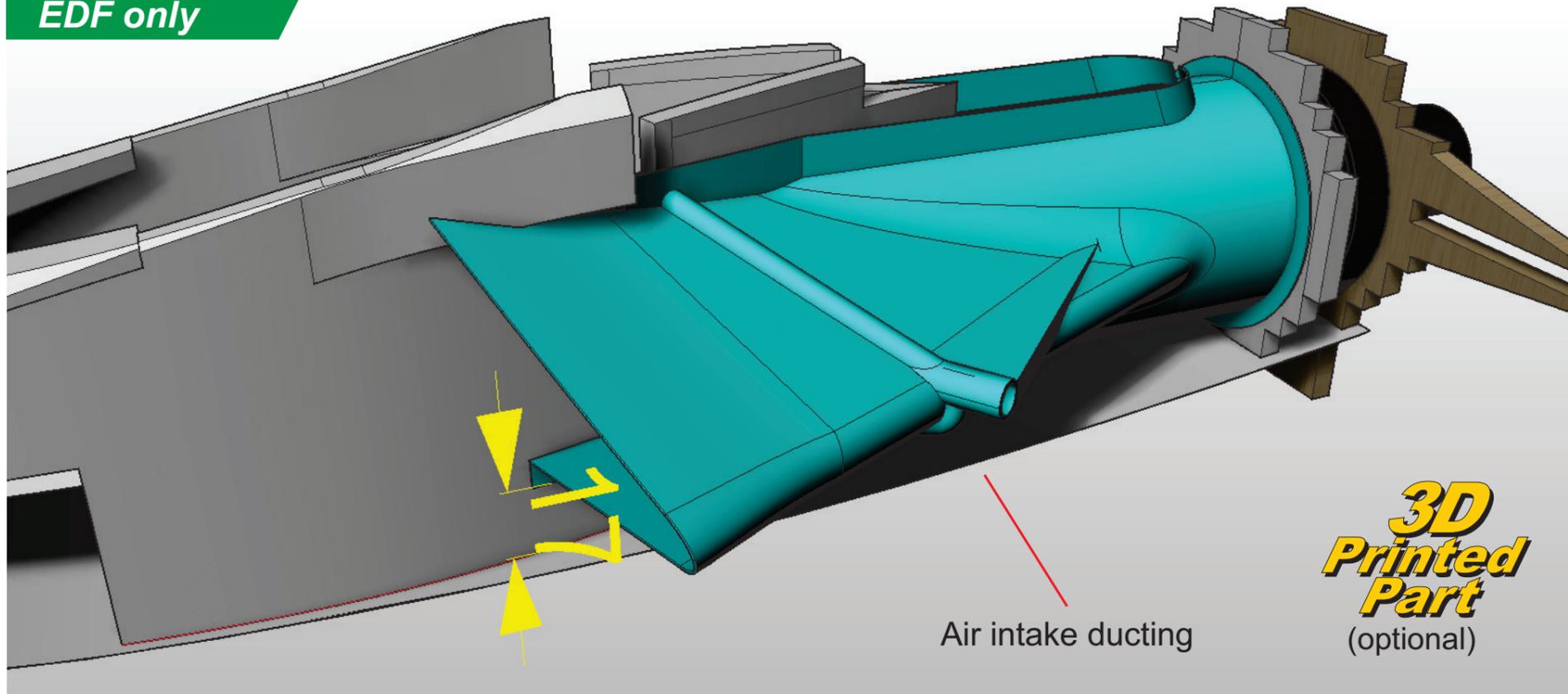
Partially cut the lite-ply aft bulkhead tab to help make removing it easier later on in the construction.

Glue the bulkheads to the assembly, but don't glue the bulkheads to the EDF (if chosen).

Create these bulkheads for both EDF or PUSHER variants.



EDF only



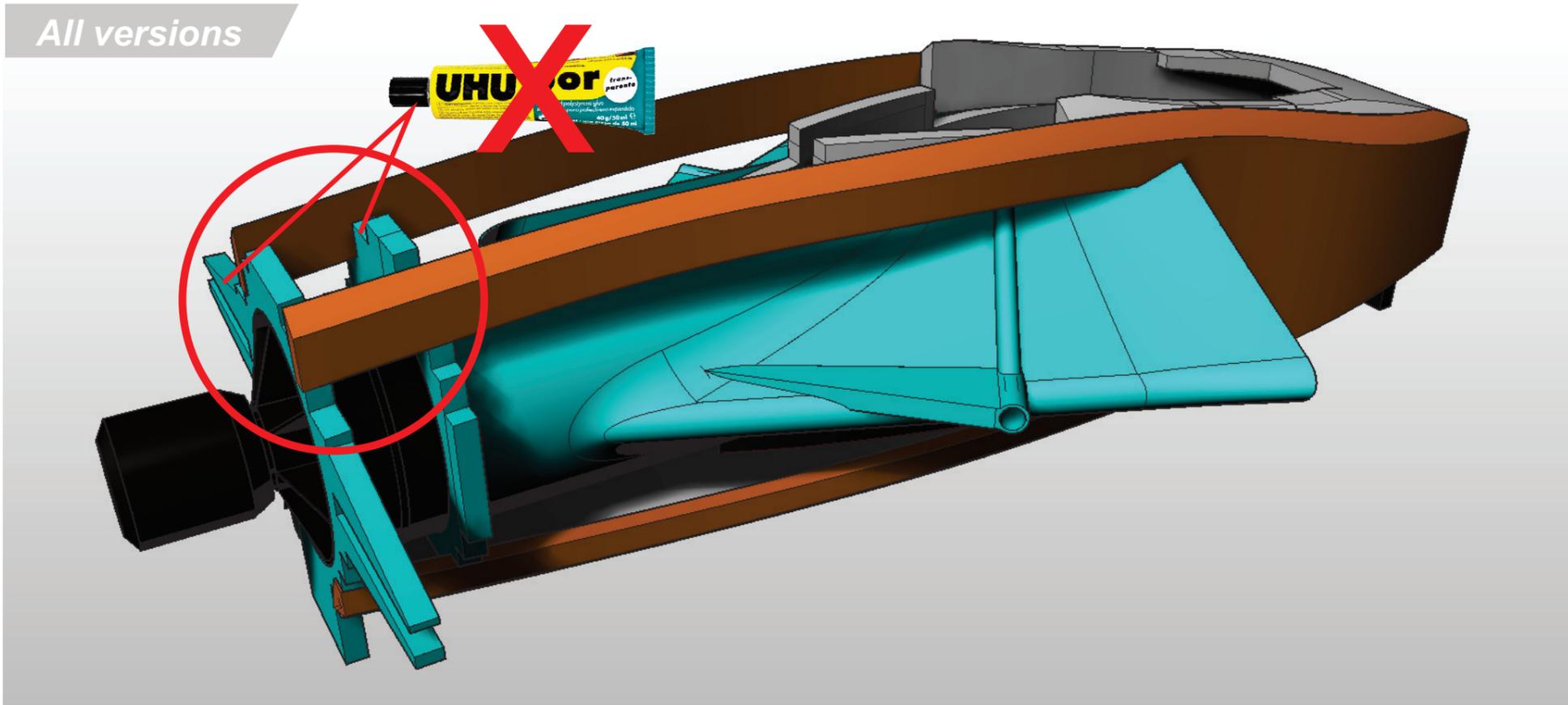
3D PRINTED

Print out the air intake ducting and glue to the **Spar bulkhead** - glue to the **fuselage Sides (Inner)** on the mating surfaces, 17mm above the belly panel as shown.

NON 3D PRINTED

If you don't have 3d printed parts, ensure you have the EDF bell-mouth ring fitted to your EDF.

All versions

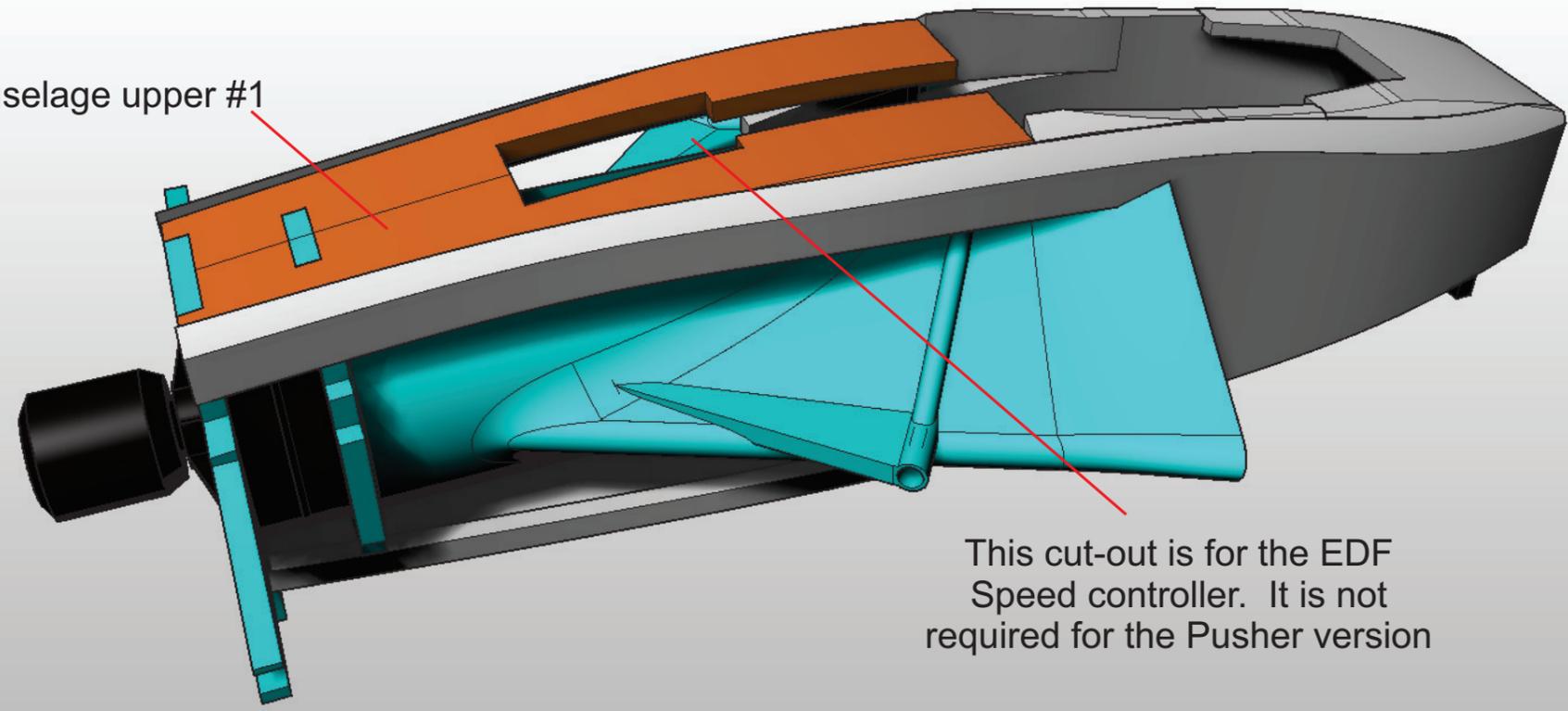


Glue the **Fuselage sides #1** to the assembly EXCLUDING the top of the rear bulkheads.



All versions

Fuselage upper #1



This cut-out is for the EDF Speed controller. It is not required for the Pusher version

Pre-curve the **Fuselage Upper #1**.

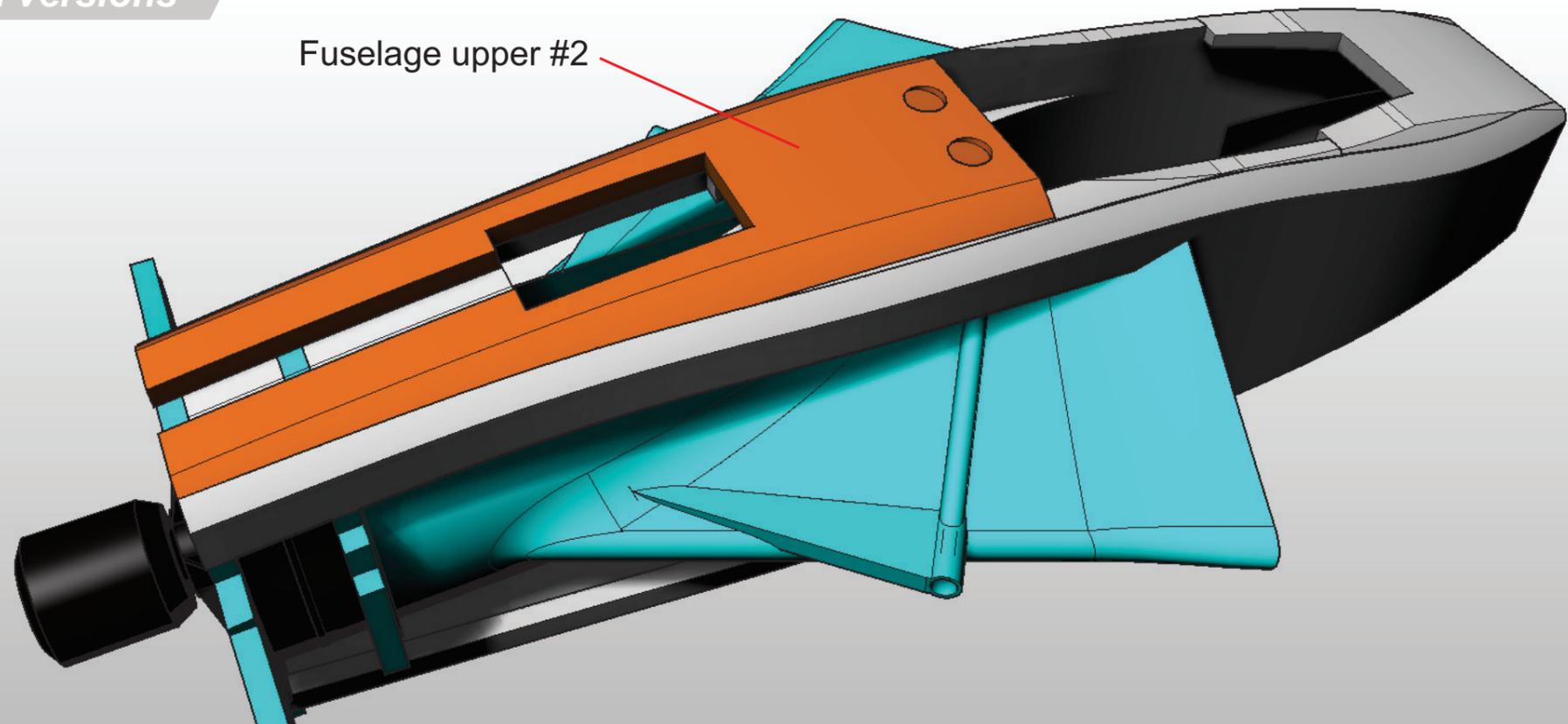
Pull apart the upper part of **Fuselage side #1** then glue **Fuselage Upper #1** to the rear bulkheads and Fuselage Inner.

Once set, glue the Fuselage Side #1 to the edges of the Fuselage Upper #1



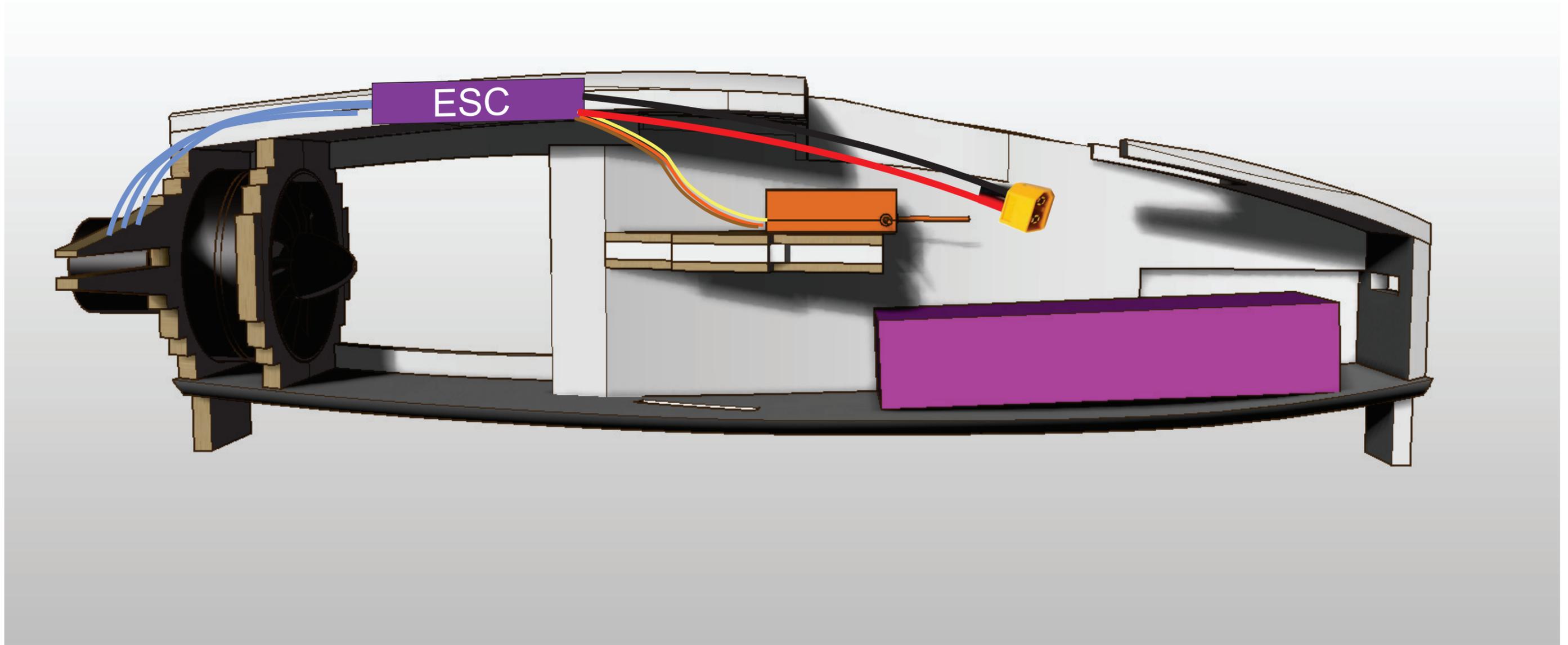
All versions

Fuselage upper #2



Before gluing **Fuselage Upper #2** into place, offer your Speed controller and cables into its intended position, and trim away the foam where required to make good cable runs etc.



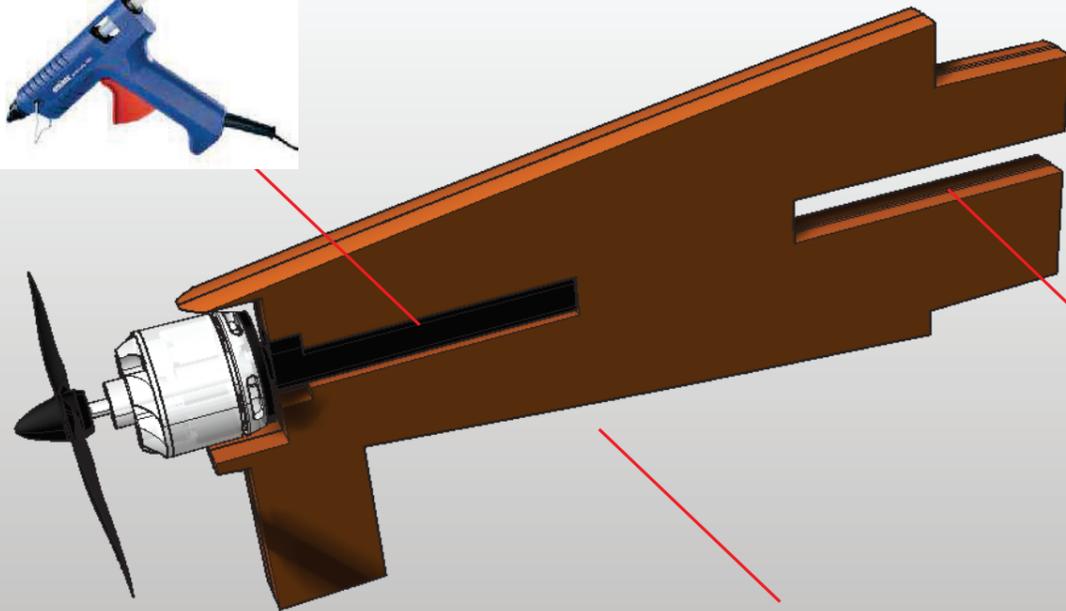


This cutaway schematic shows the intended run of the EDF powertrain. The ailerons and Elevator servo cables will enter in to the RX tray area from the sides.

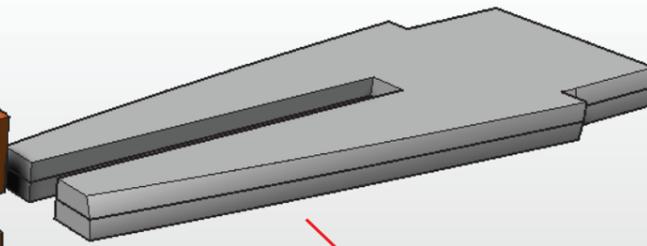


Pusher only

NON 3D PRINT METHOD



Pusher motor mount panel (x2)



Pusher motor mount support panel (x2)



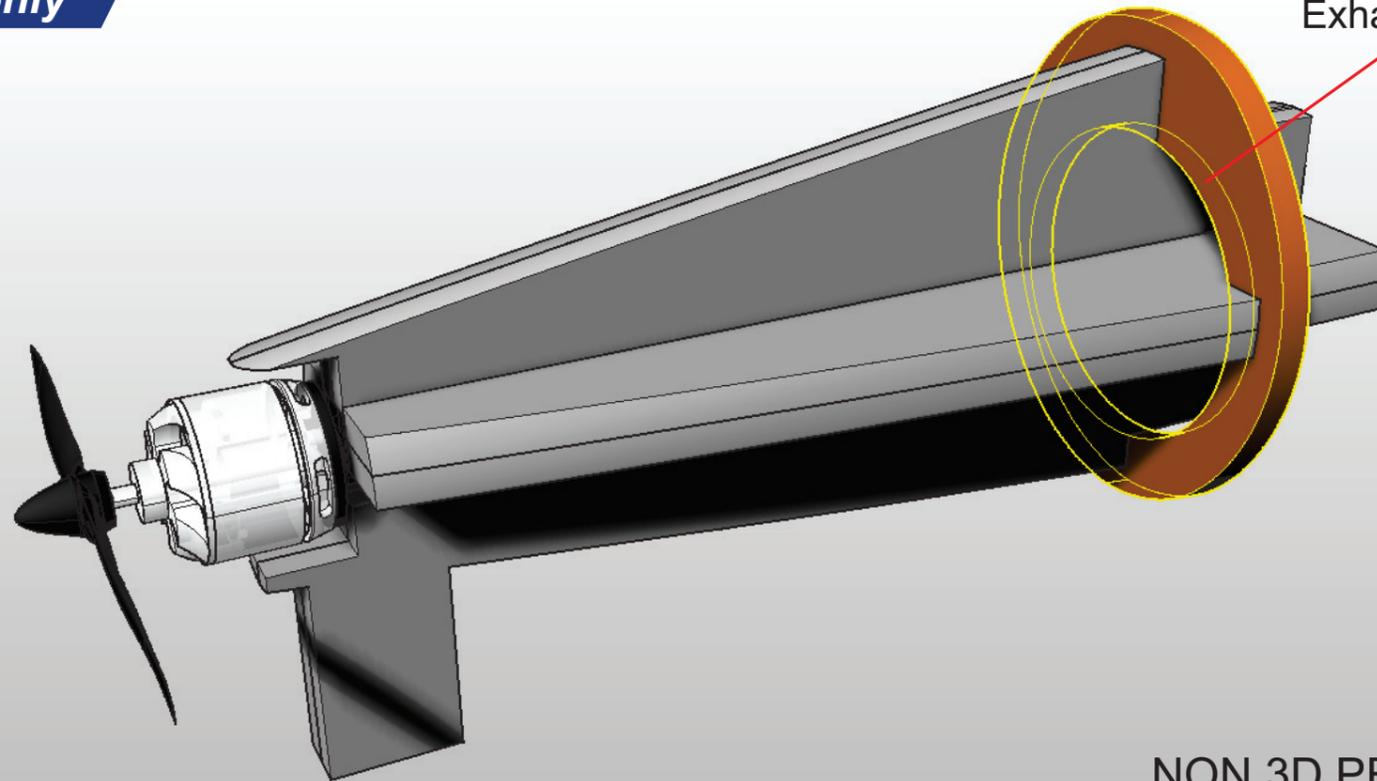
Glue together the two **Pusher Motor Mount Panel** pieces together using UHU Por, and mount your motor stick mount to it using Hot Melt Glue.

Glue the **Pusher Motor Mount Support Pieces** together using UHU Por, then onto the assembly and glue in place using epoxy.



Pusher only

Exhaust Bulkhead



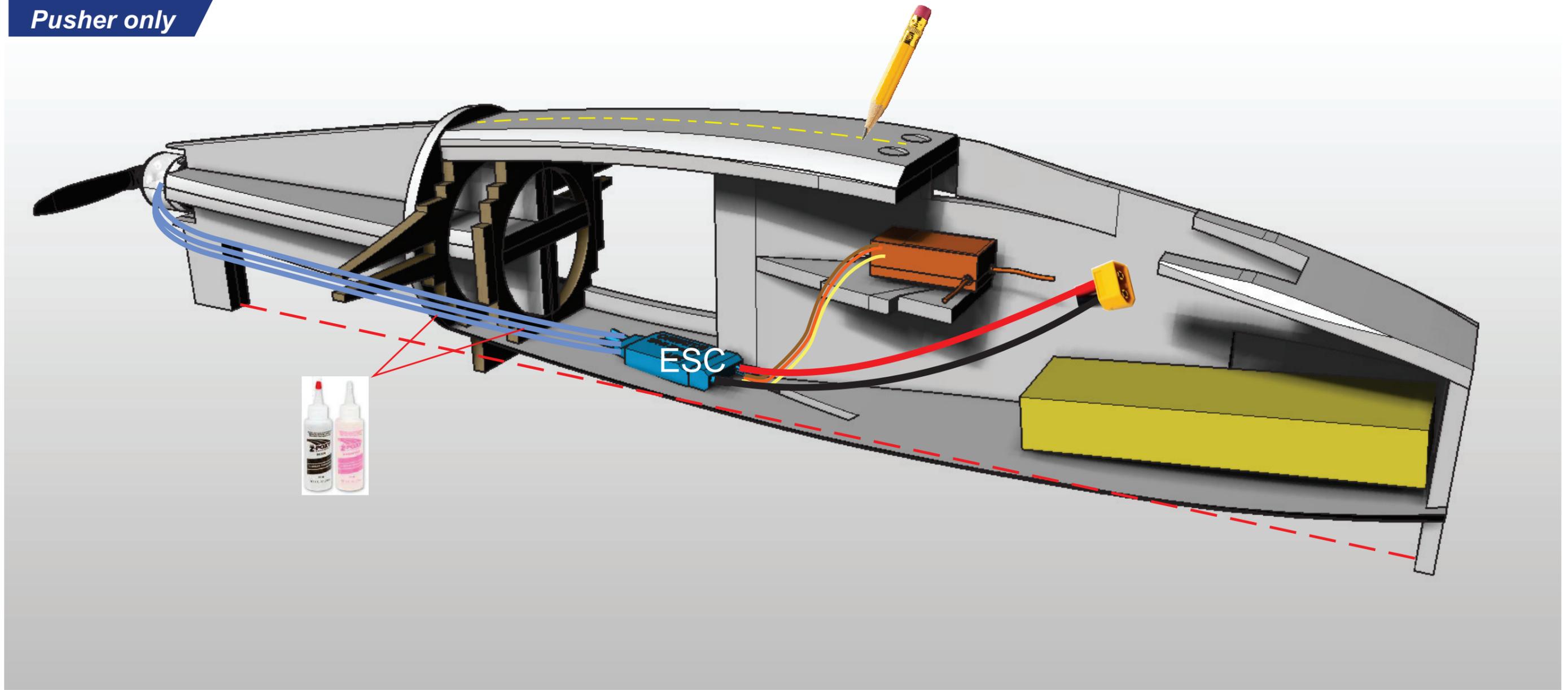
NON 3D PRINT METHOD

Mark the centreline position on the **Exhaust Bulkhead**.

Ensure you don't have it fitted upside down!

Glue to the bulkheads where the parts meet using epoxy.





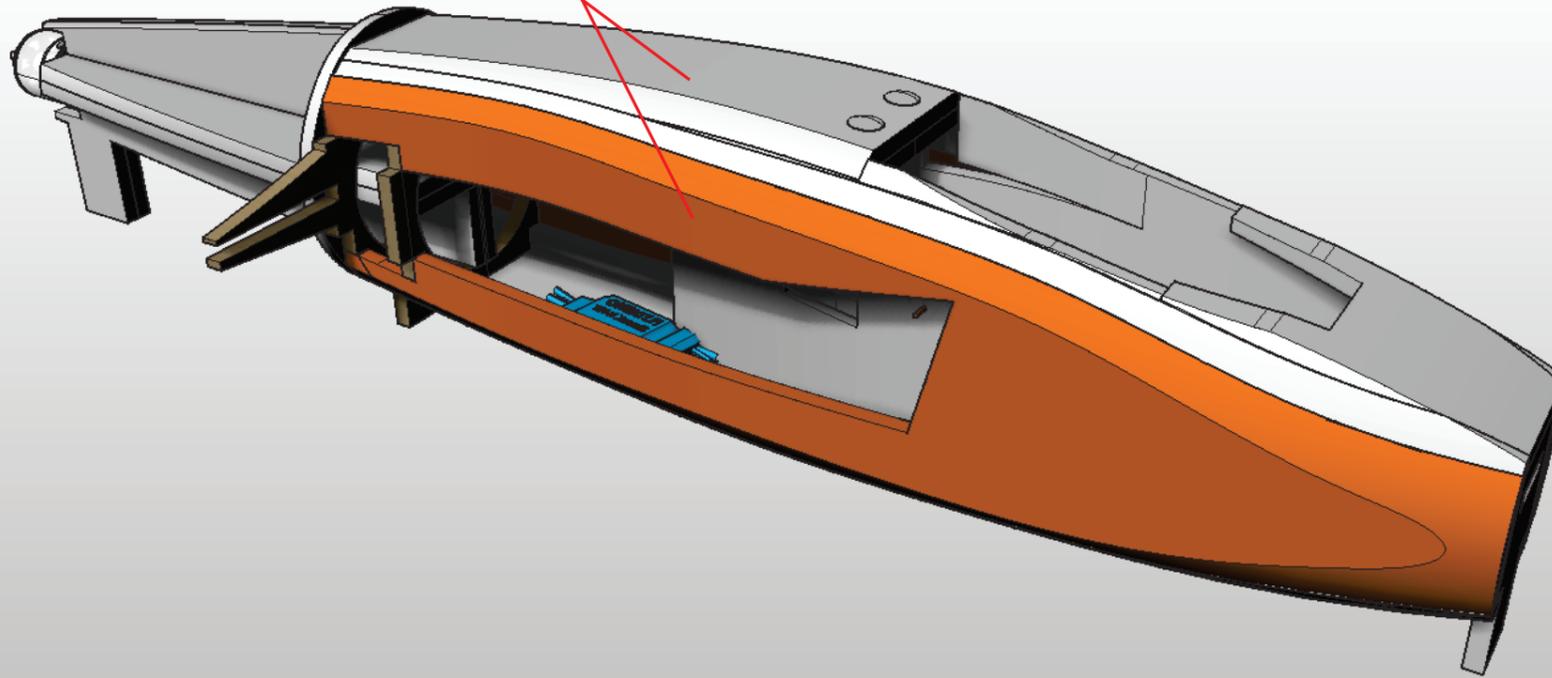
Mark a centreline on the fuselage. Using epoxy, Glue the Pusher motor assembly onto the main fuselage paying careful attention to the centreline position. Also check in plan view that the fuselage is straight by drawing a straight line and aligning all the support tabs.

This cutaway schematic shows the intended run of the Pusher prop powertrain. The ailerons and Elevator servo cables will enter in to the RX tray area from the sides.



All versions

Fuselage side #2

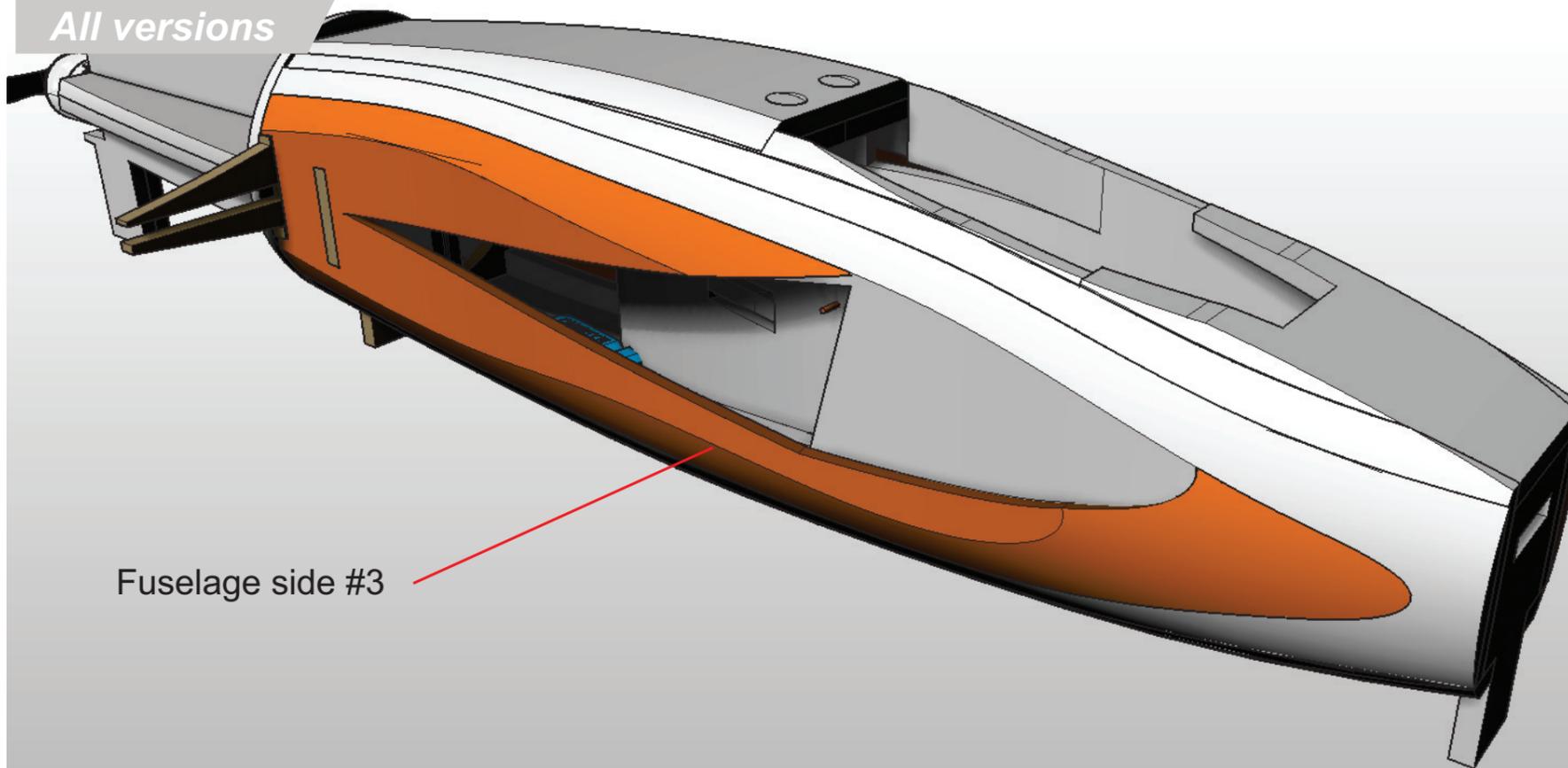


Glue **Fuselage Side #2** to the assembly. If the 3D EDF intake gets in the way, split the part locally around the intake.



All versions

Fuselage side #3



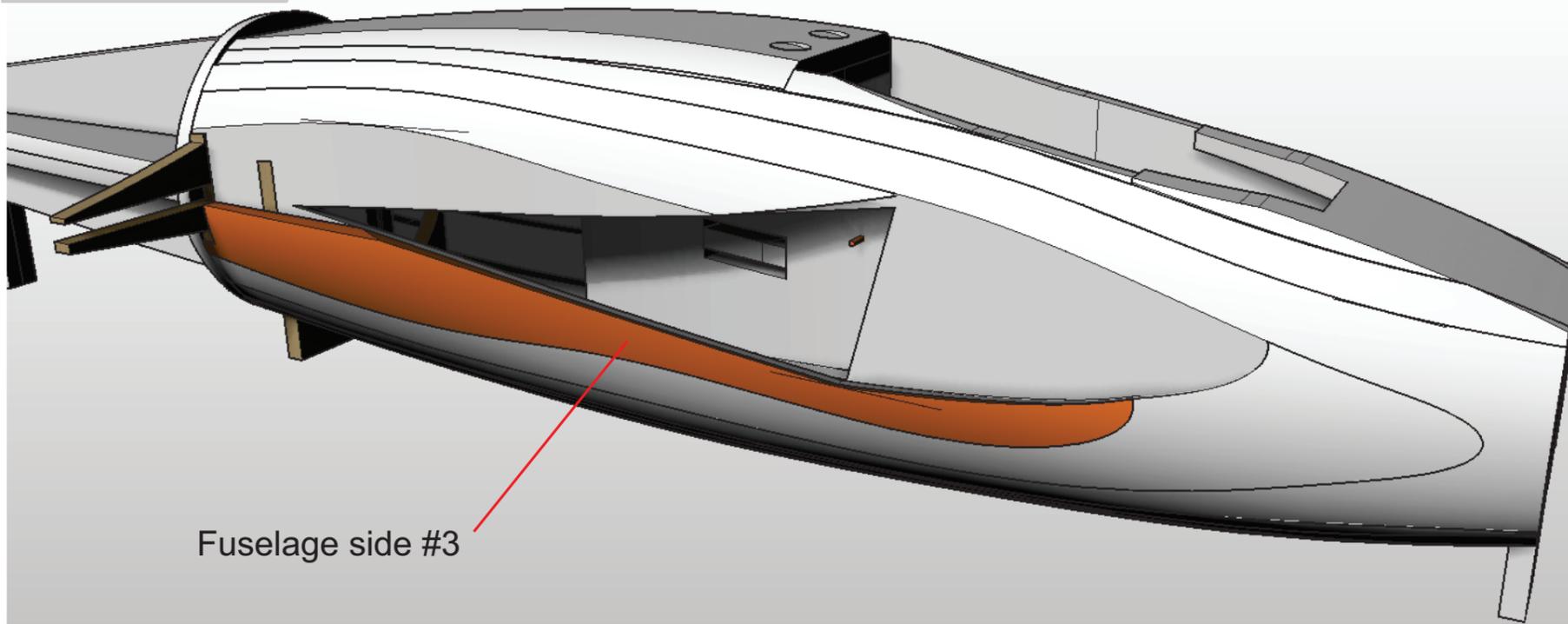
Glue **Fuselage Side #3** to the assembly. Please note there are two versions :-

V1 - 3d printed EDF intake

V2 - non 3D printed.



All versions



Fuselage side #3

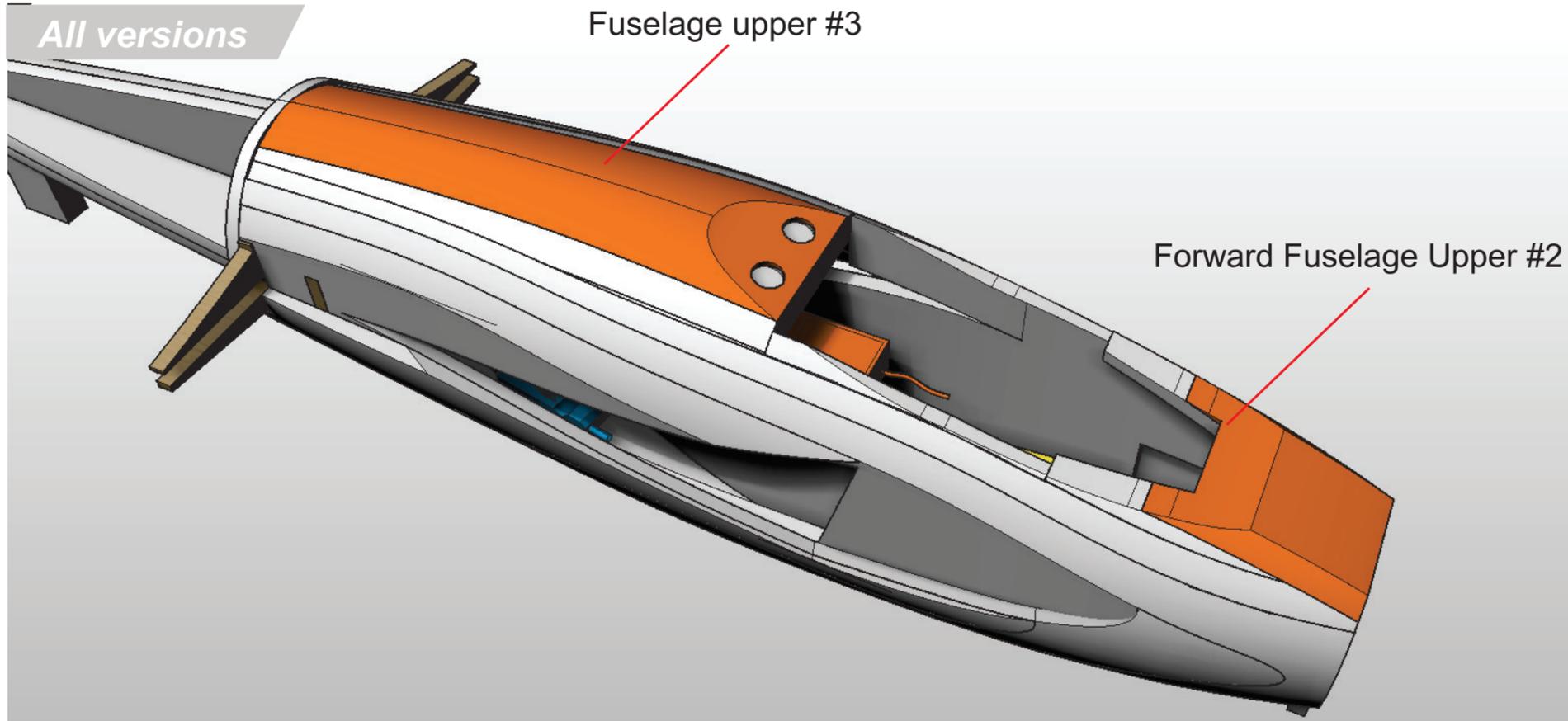
Glue **Fuselage Side #3** to the assembly. Please note there are two versions :-

V1 - 3d printed EDF intake

V2 - non 3D printed.



All versions

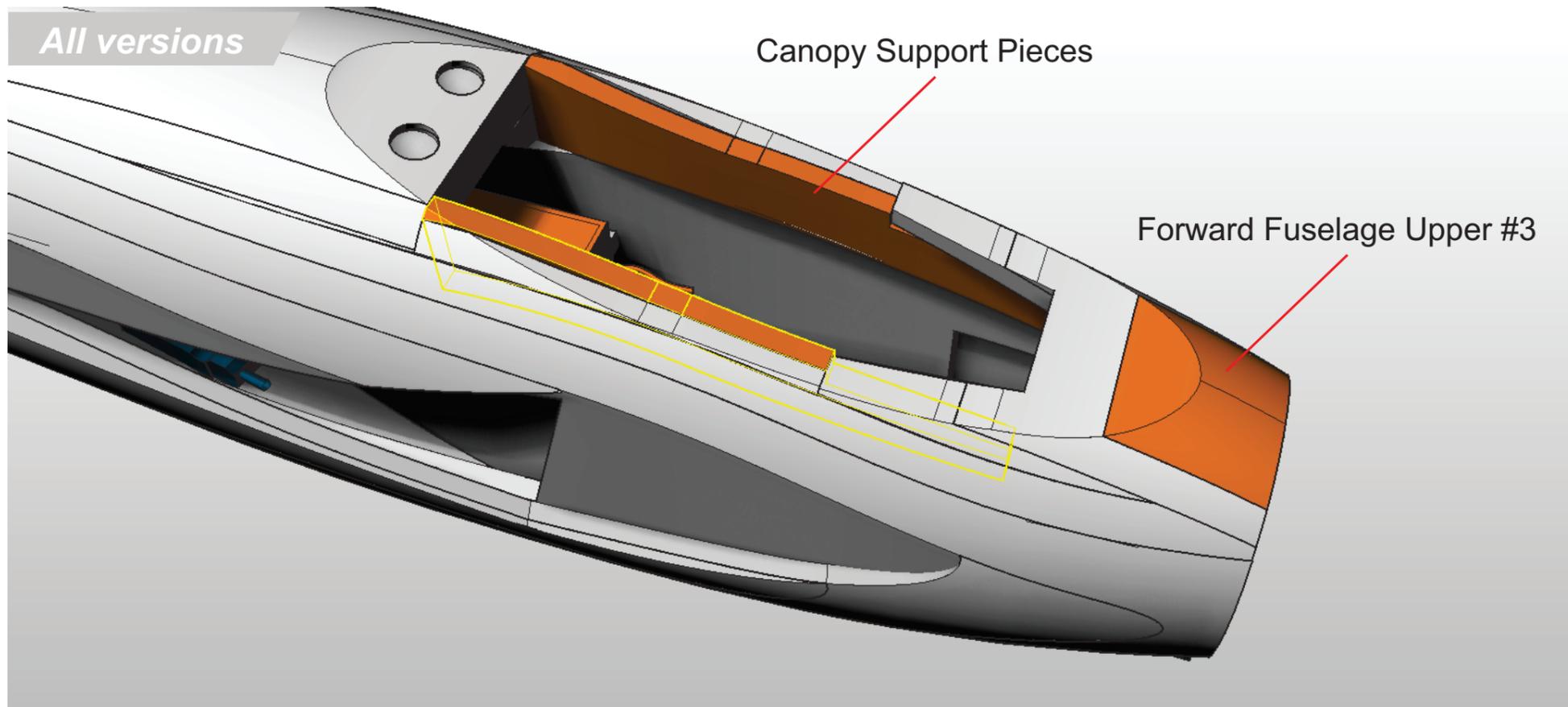


Fuselage upper #3

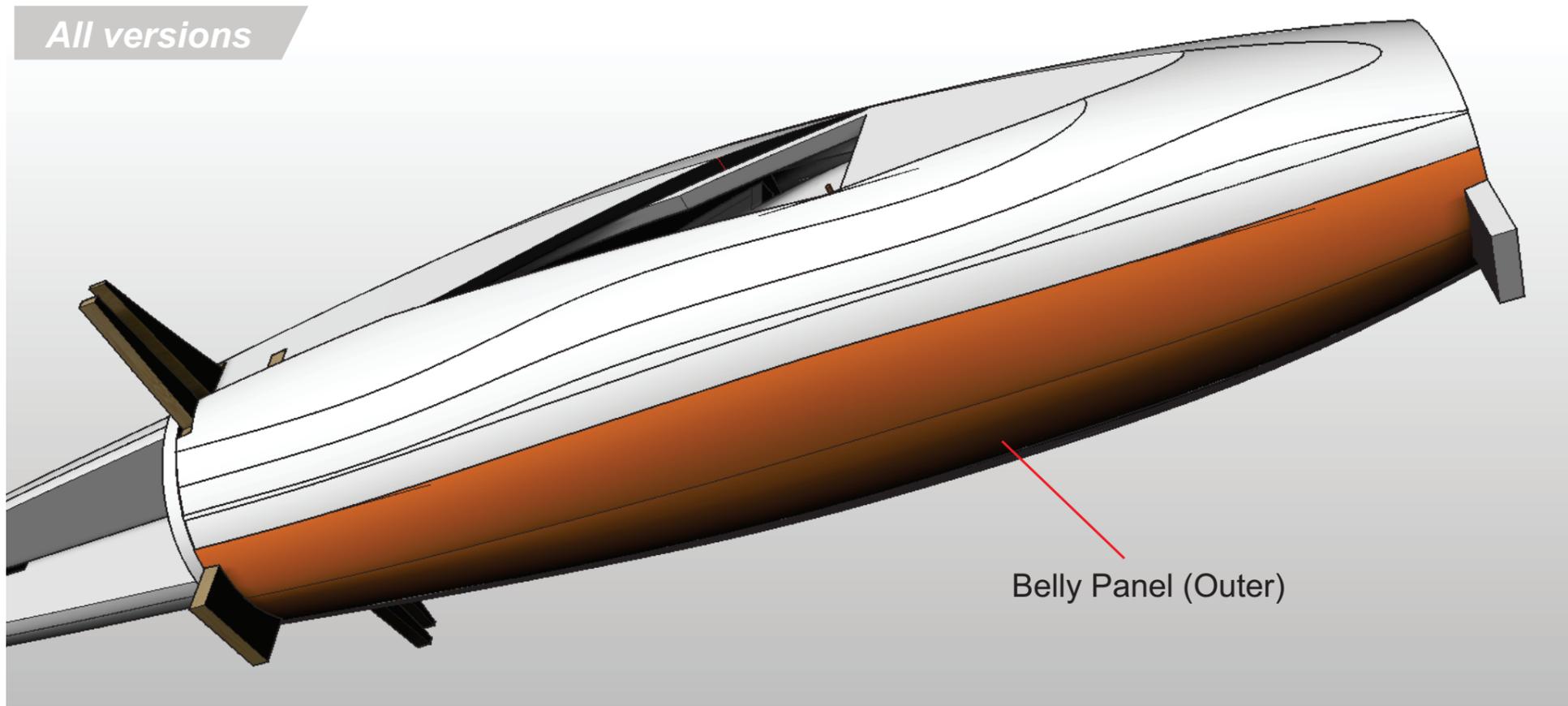
Forward Fuselage Upper #2

Glue **Fuselage Upper #3** and **Forward Fuselage Upper #2** in place.





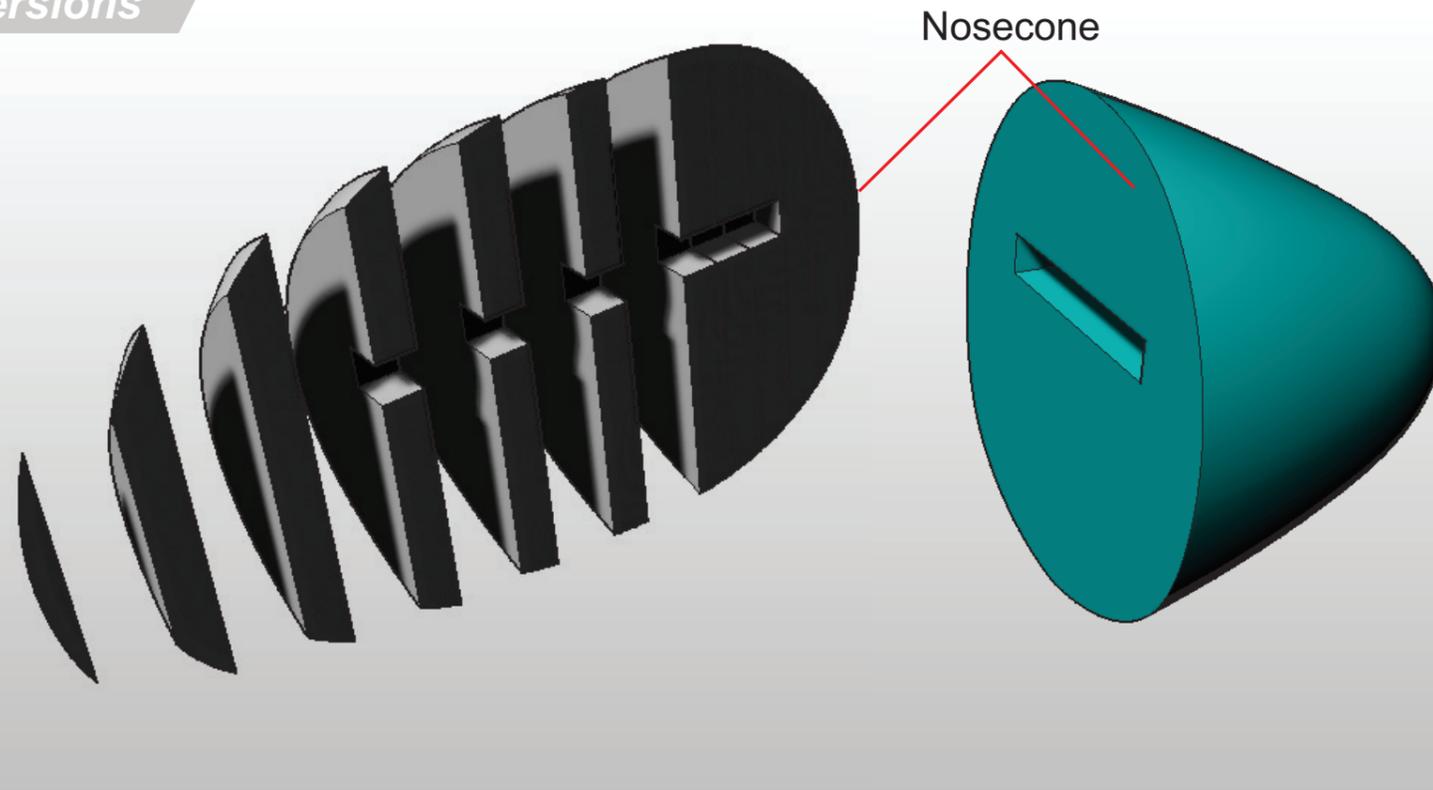
Glue the **Canopy Support Pieces** and **Forward Fuselage Upper #3** in place.



Glue the **Belly Panel (Outer)** in place.



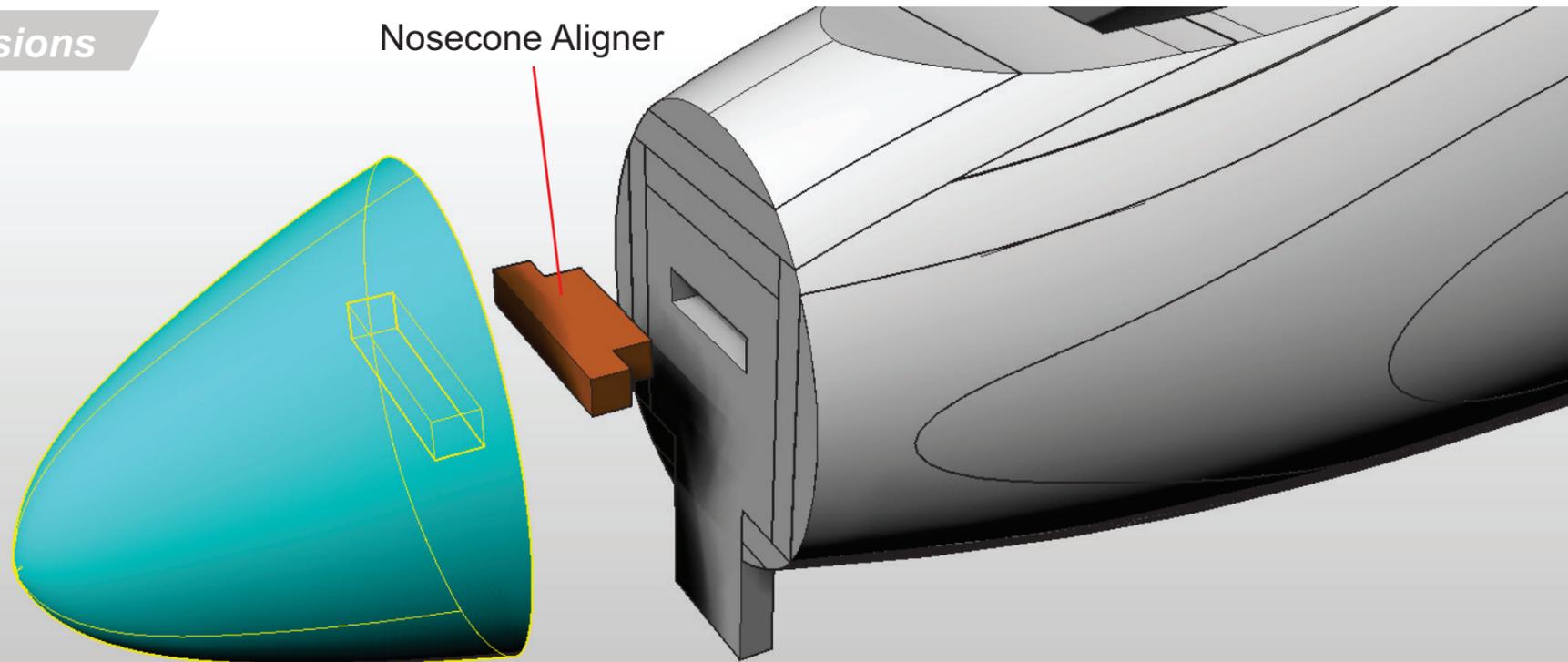
All versions



Laminate foam sheet to make the **Nosecone**, alternatively 3D print one.



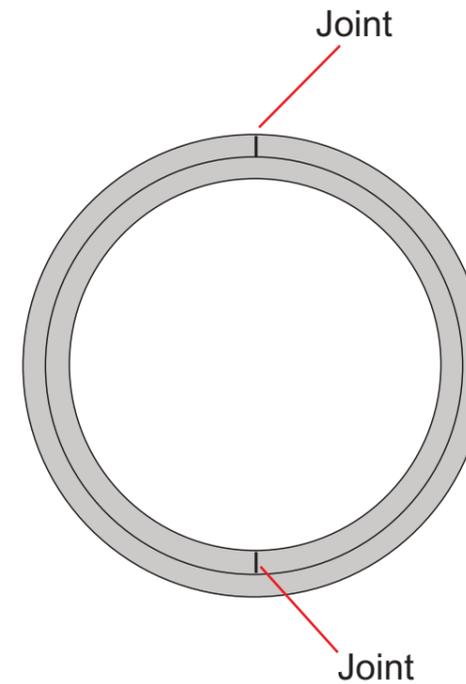
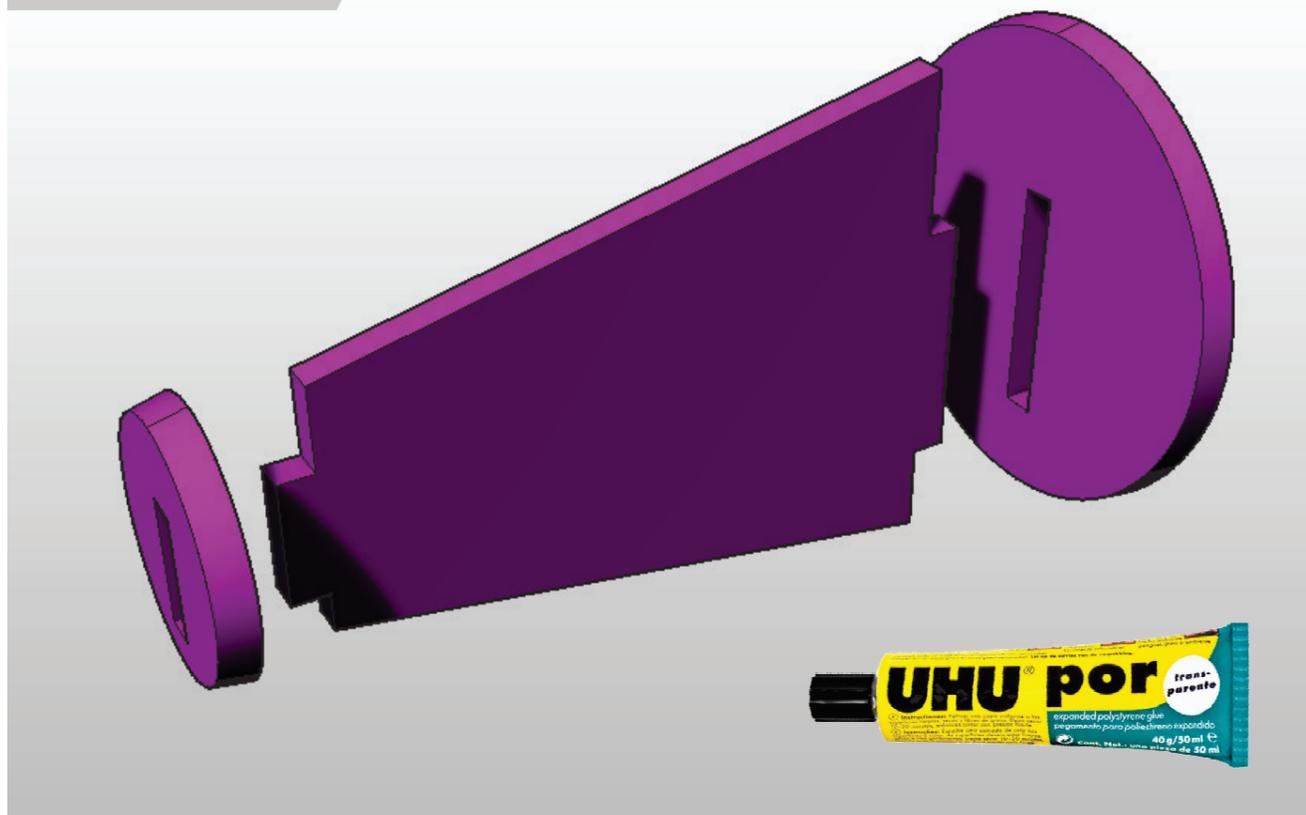
All versions



Glue the **Nosecone Aligner** to the Fuselage, then Glue the **Nosecone** in place.



All versions



NON 3D PRINTED TAIL

Construct the **Tailcone Jig**, choose the parts for either Pusher or 64mm EDF.

Create paper templates first, then curve 3mm depron around the jig to create the cone.

Ensure that the joints are opposite each other as shown on the diagram.

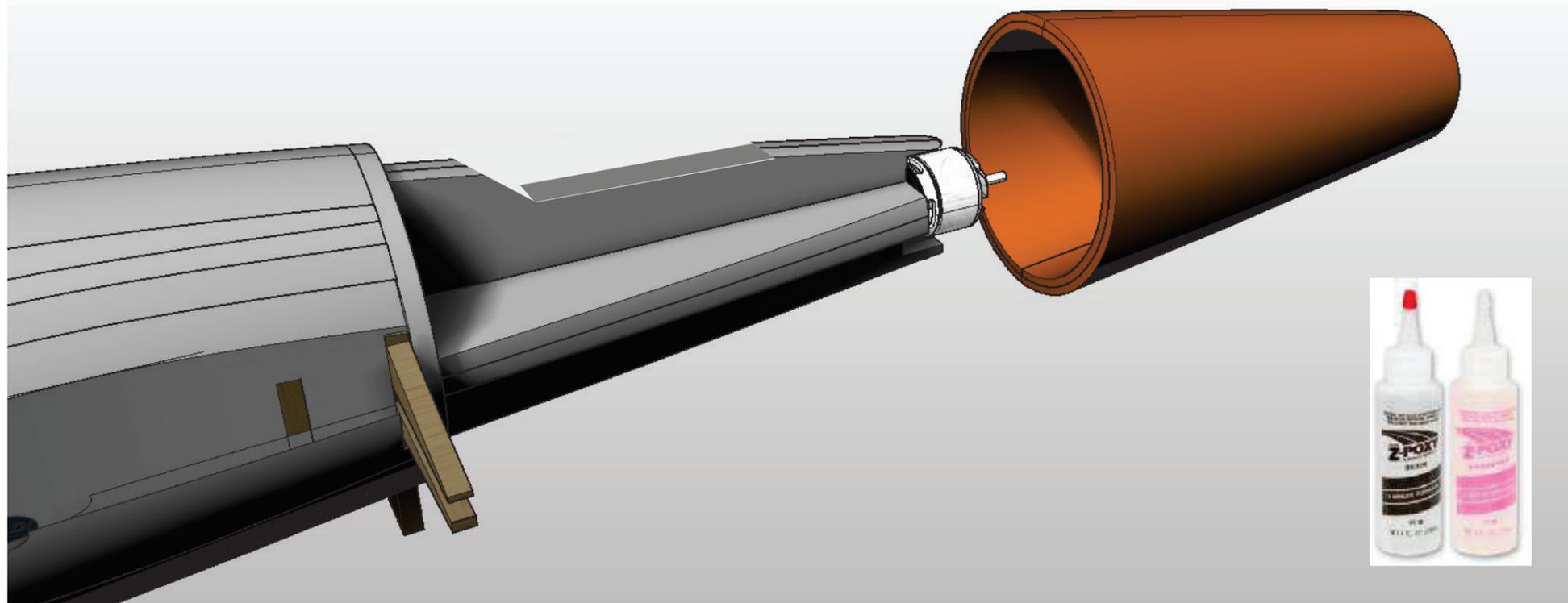
Trim off the edges to match the edge of the circular parts.

Mark the top of the cone from the top of the jig, and offer the cone onto the fuselage.

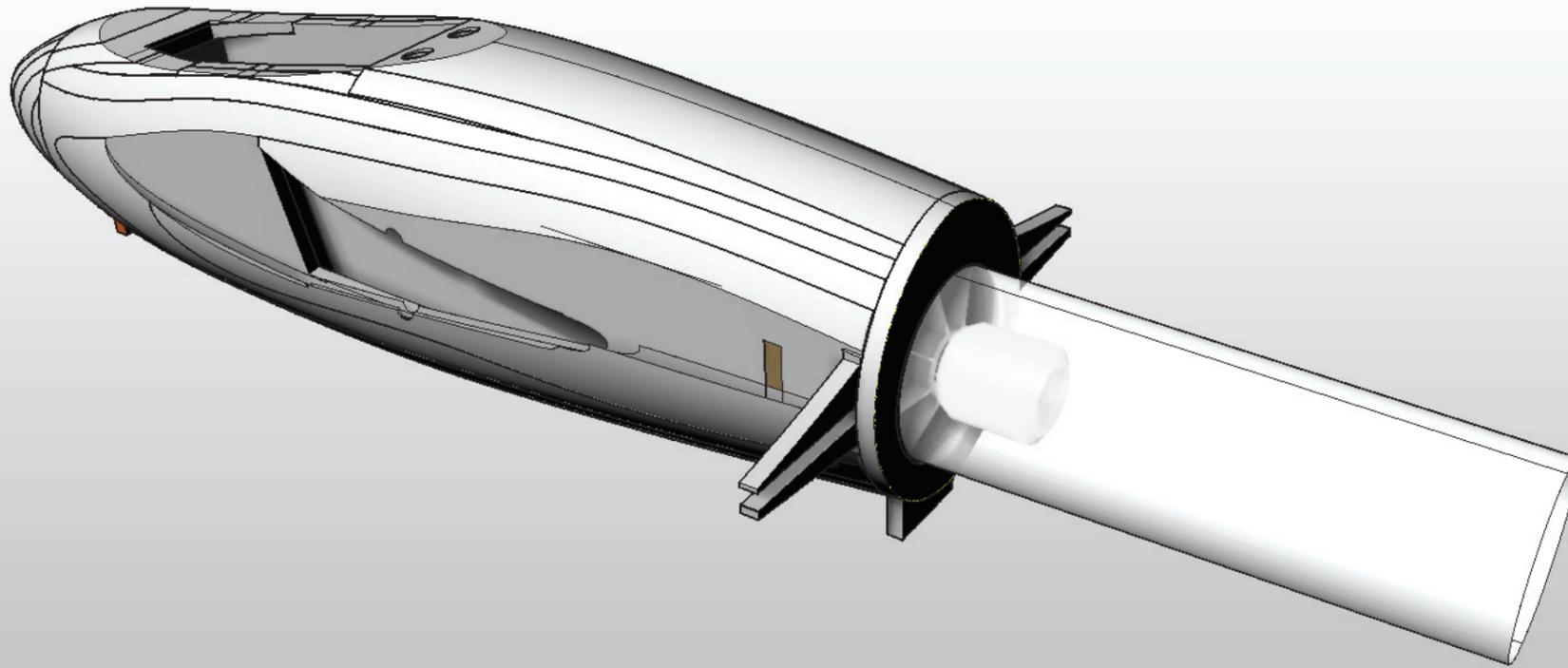
If necessary sand the motor mount pieces and also the front edge of the cone to get a good fit.

Glue together using epoxy.

Pusher only



All versions



NON 3D PRINTED TAIL

Cut the 0.5mm Thrust tube to the template. Use Nylon reinforced tape along the seam to hold it all together.

Fit the tube to the fuselage, consider making a depron ring to reinforce the joint.

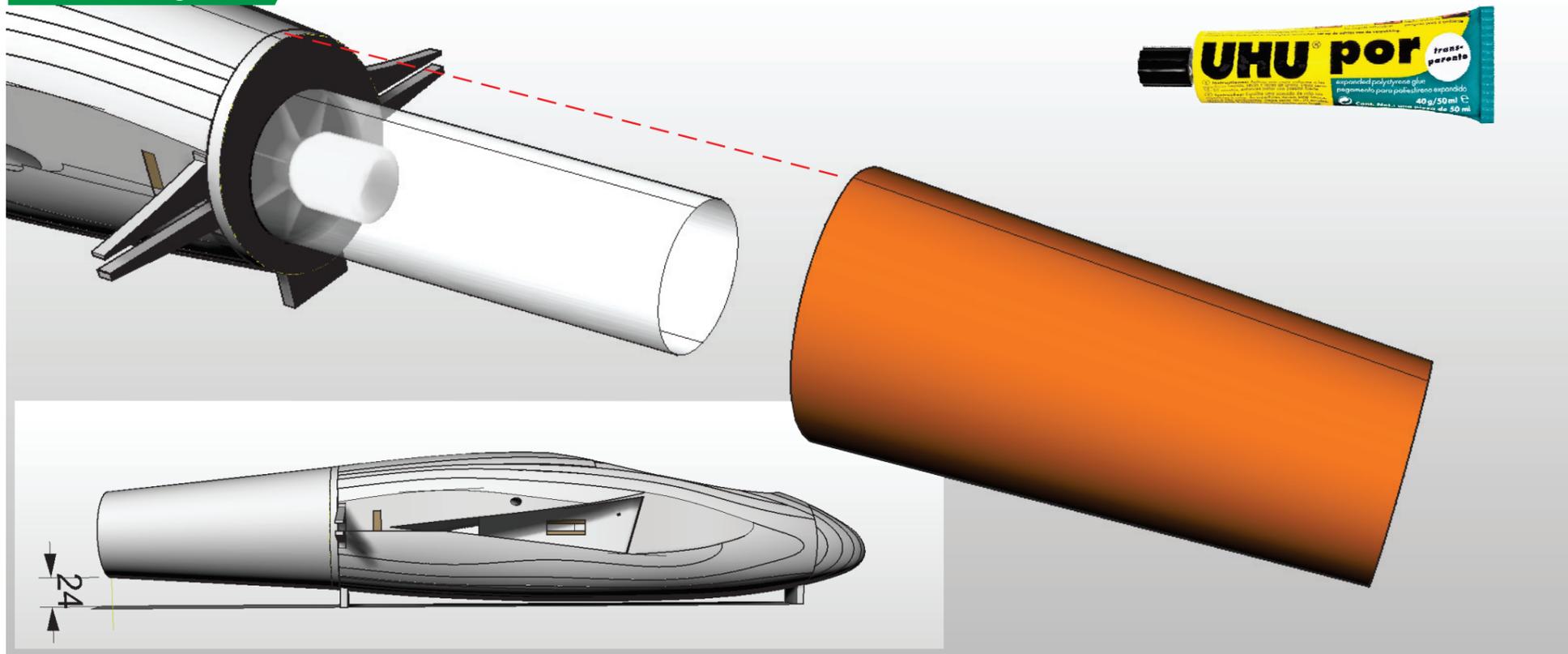
Mark the top of the cone from the top of the jig, and offer the cone onto the fuselage.

Smooth the front edge of the cone to get a good fit. The tail cone end should sit 24mm above the flat surface.

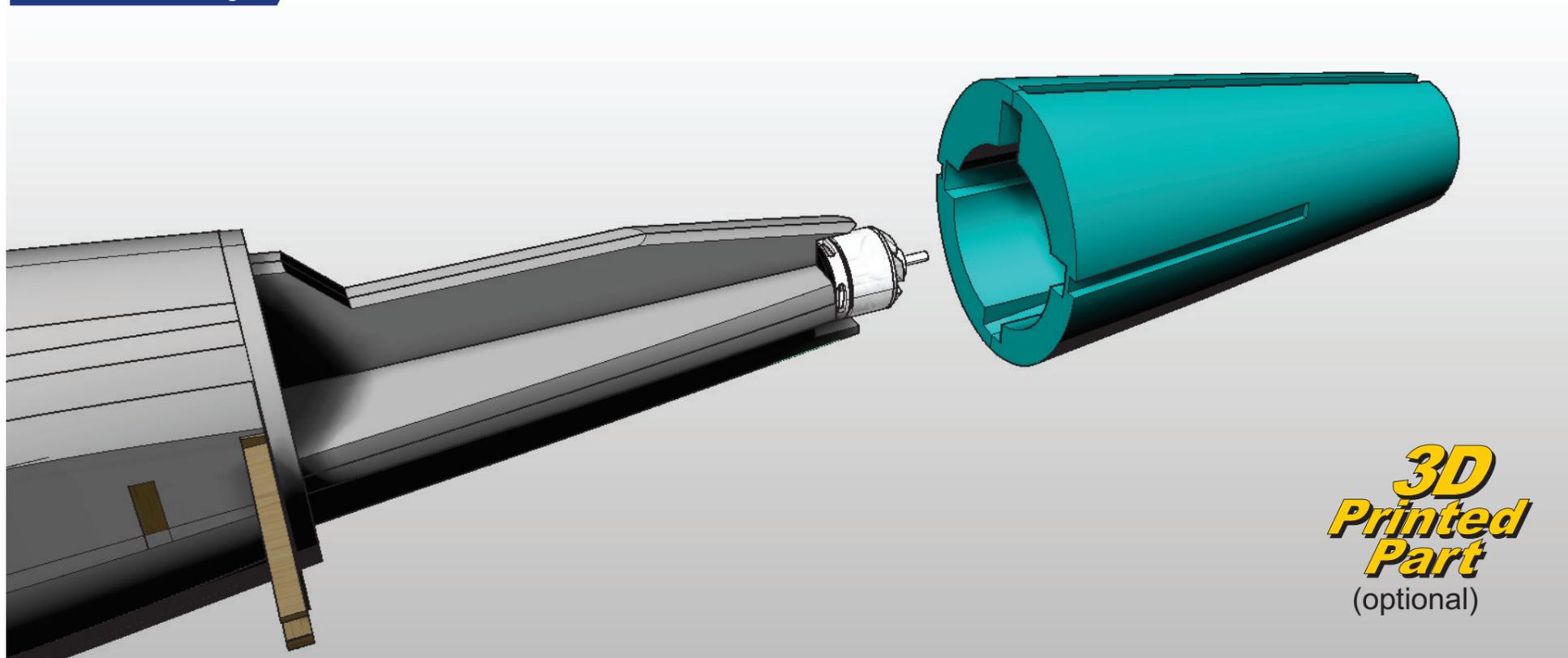
Glue the thrust tube to the end of the tube using hot melt glue.

You may wish to add 0.6oz fibreglass over the joint upon completion of the plane to reinforce it further. Use Water based Polyurethane varnish as the resin.

EDF only



Pusher only



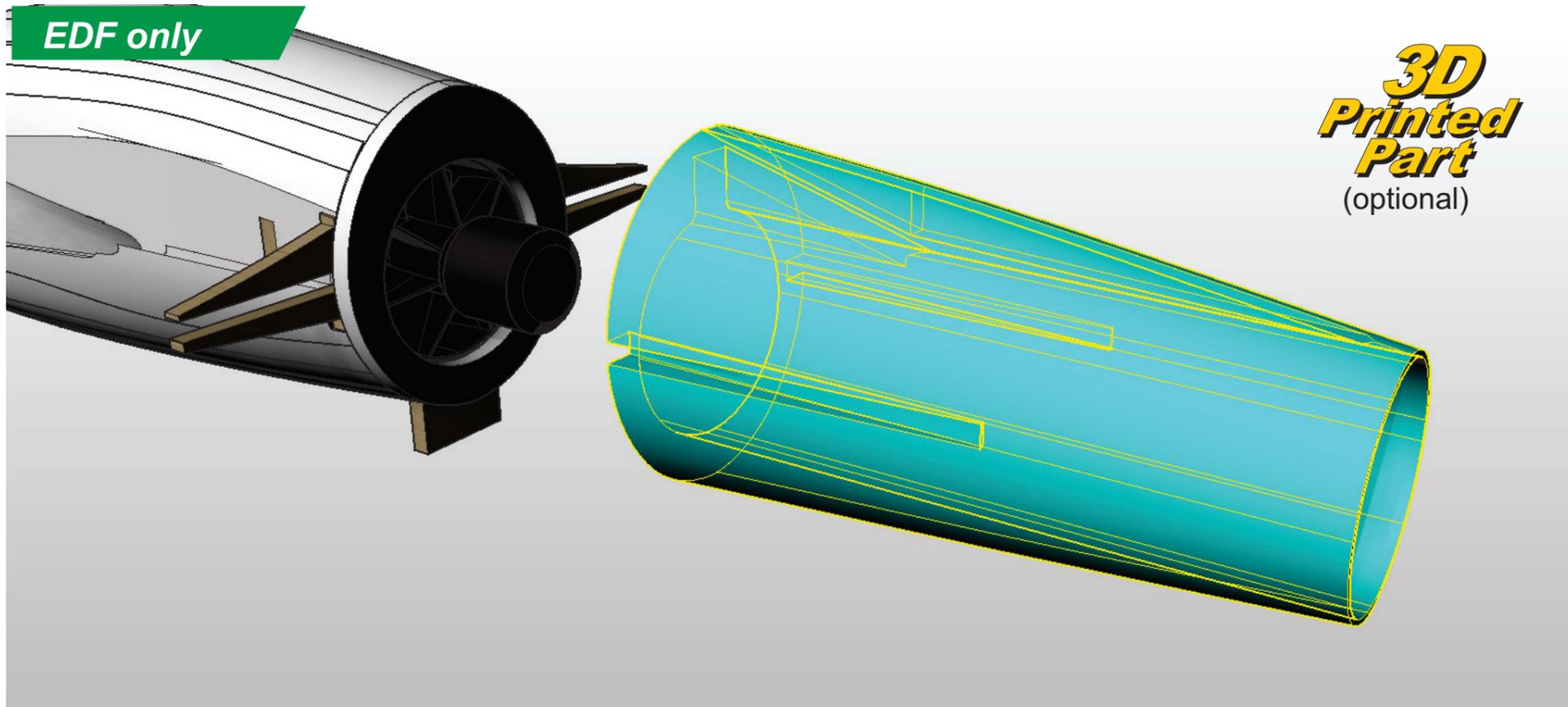
3D Print the Pusher Tailcone.

Sand the fuselage if required to ensure a good fit.

Glue to the fuselage using epoxy.



EDF only

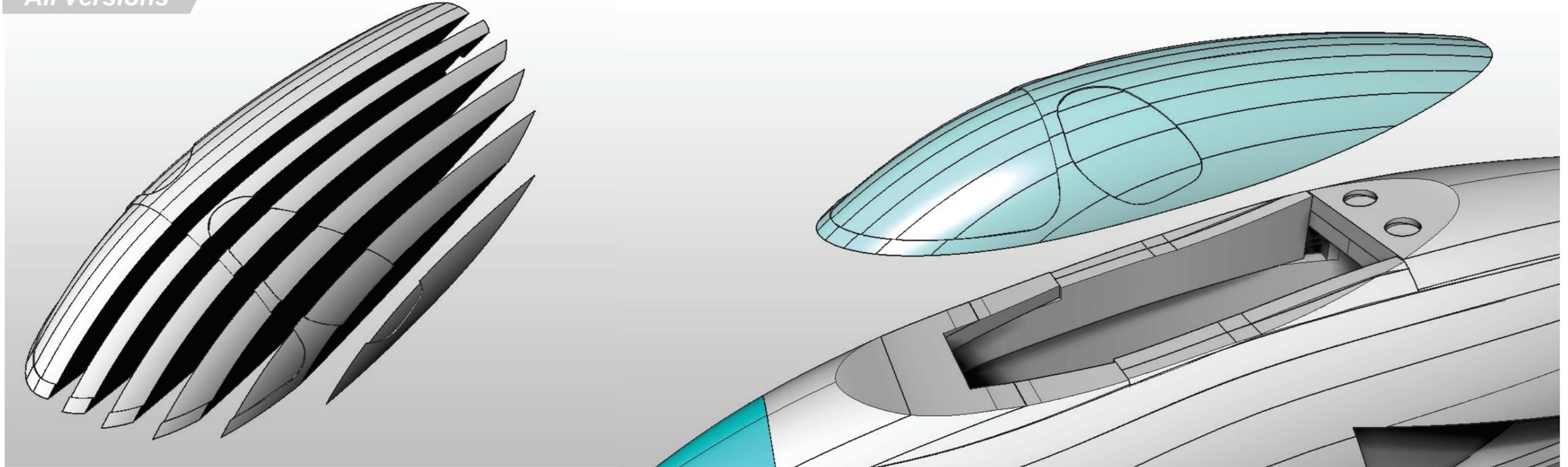


3D Print the EDF tailcone.

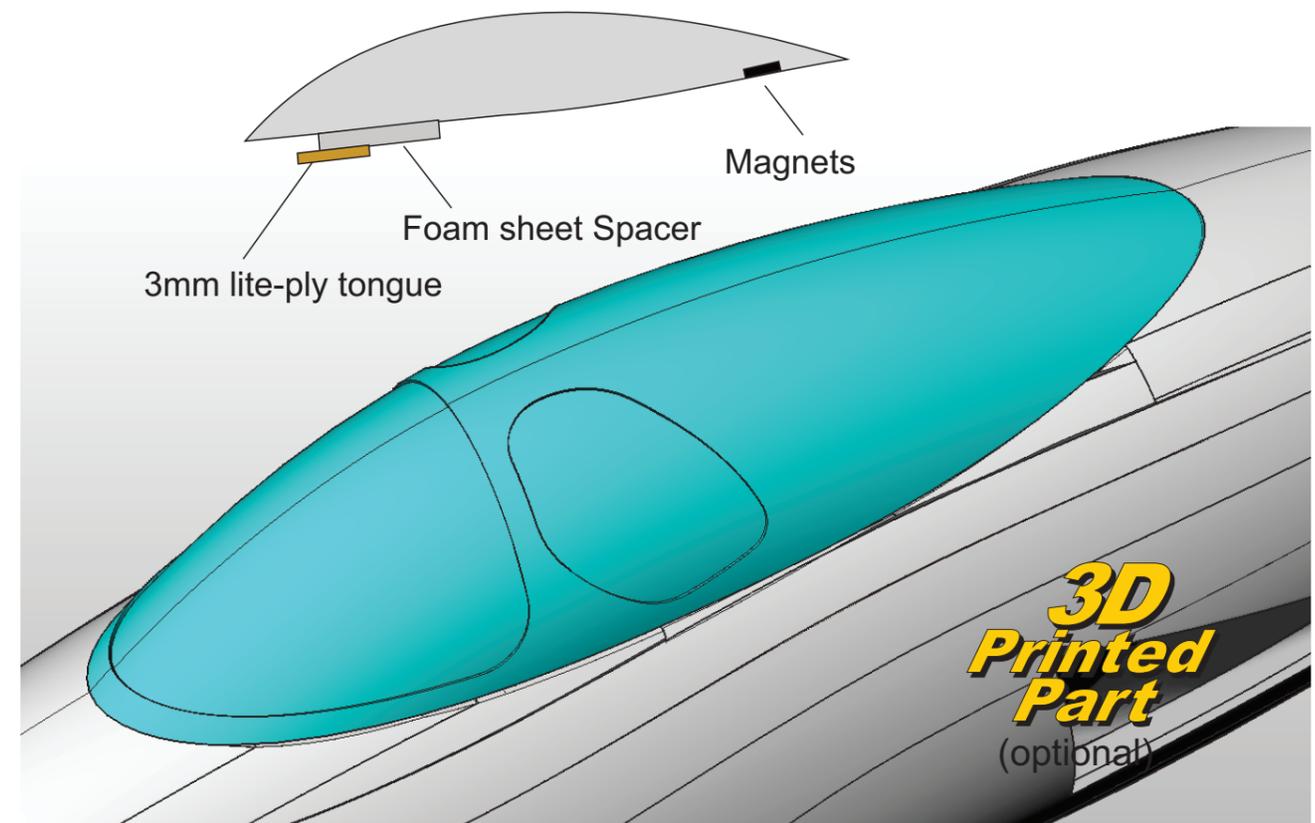
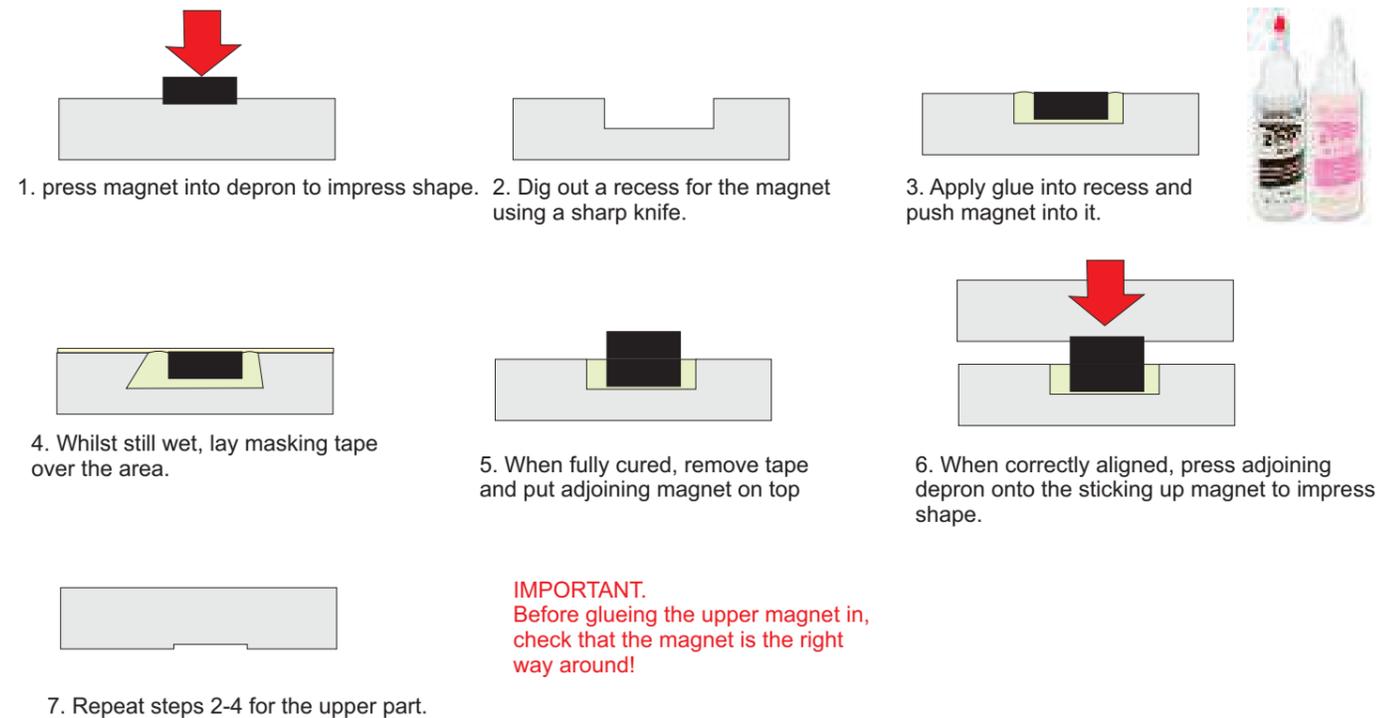
Glue to the fuselage using UHU Por. Making sure it is aligned very well.

You may wish to add 0.6oz fibreglass over the joint upon completion of the plane to reinforce it further. Use Water based Polyurethane varnish as the resin.

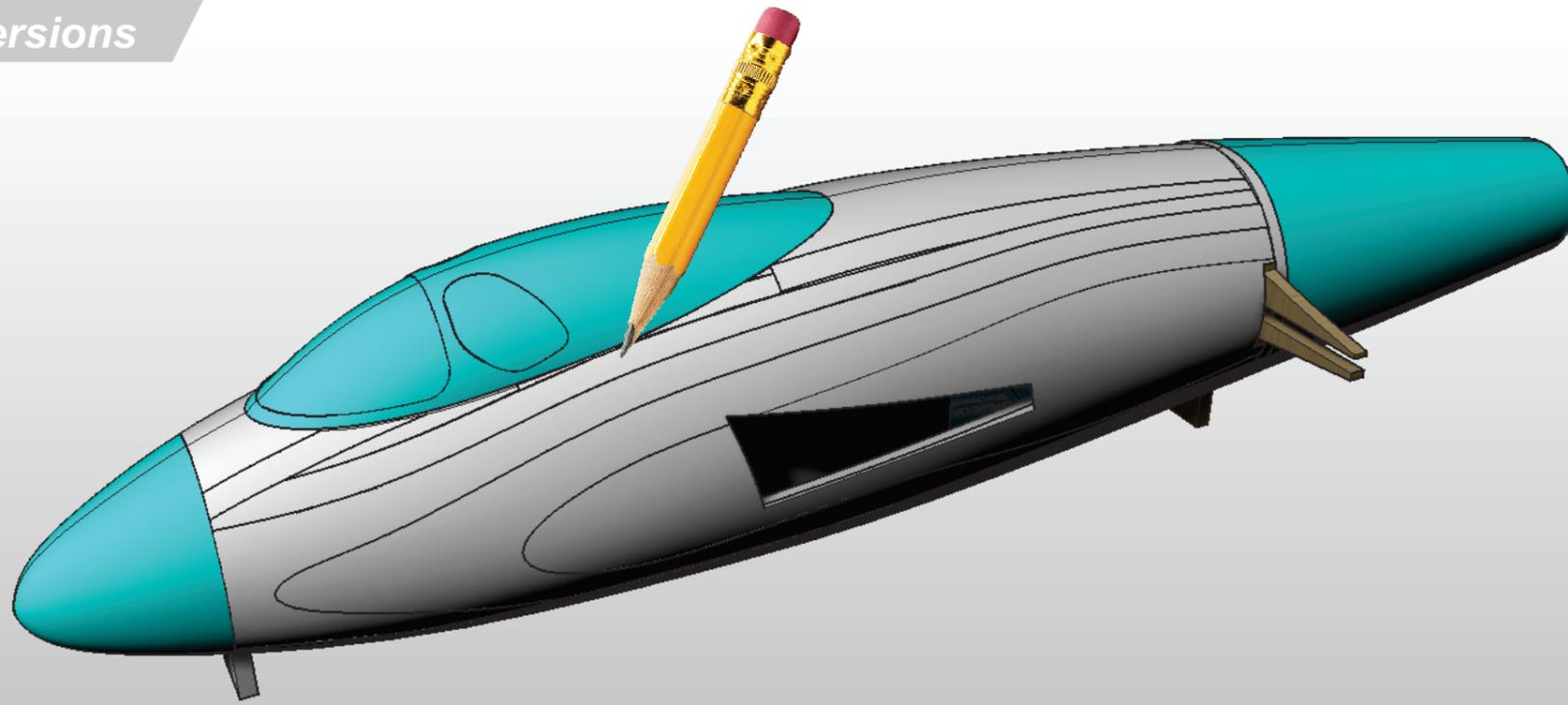




Create the canopy in the same way as the nosecone, or 3d Print one and add magnets as shown.



All versions

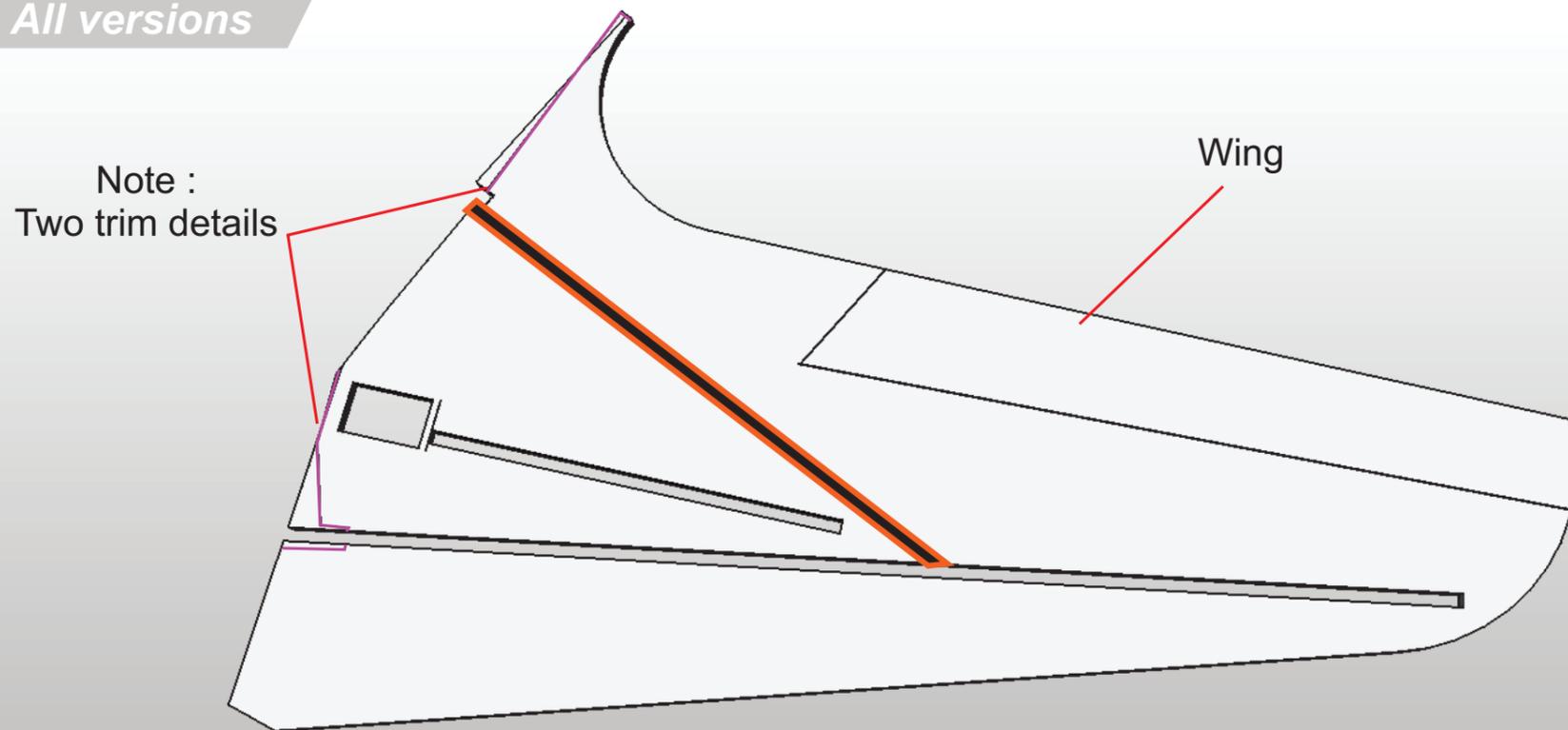


Draw around the canopy onto the fuselage to mark the extents of the mating surface.

Sand the fuselage to shape without sanding into this area.



All versions

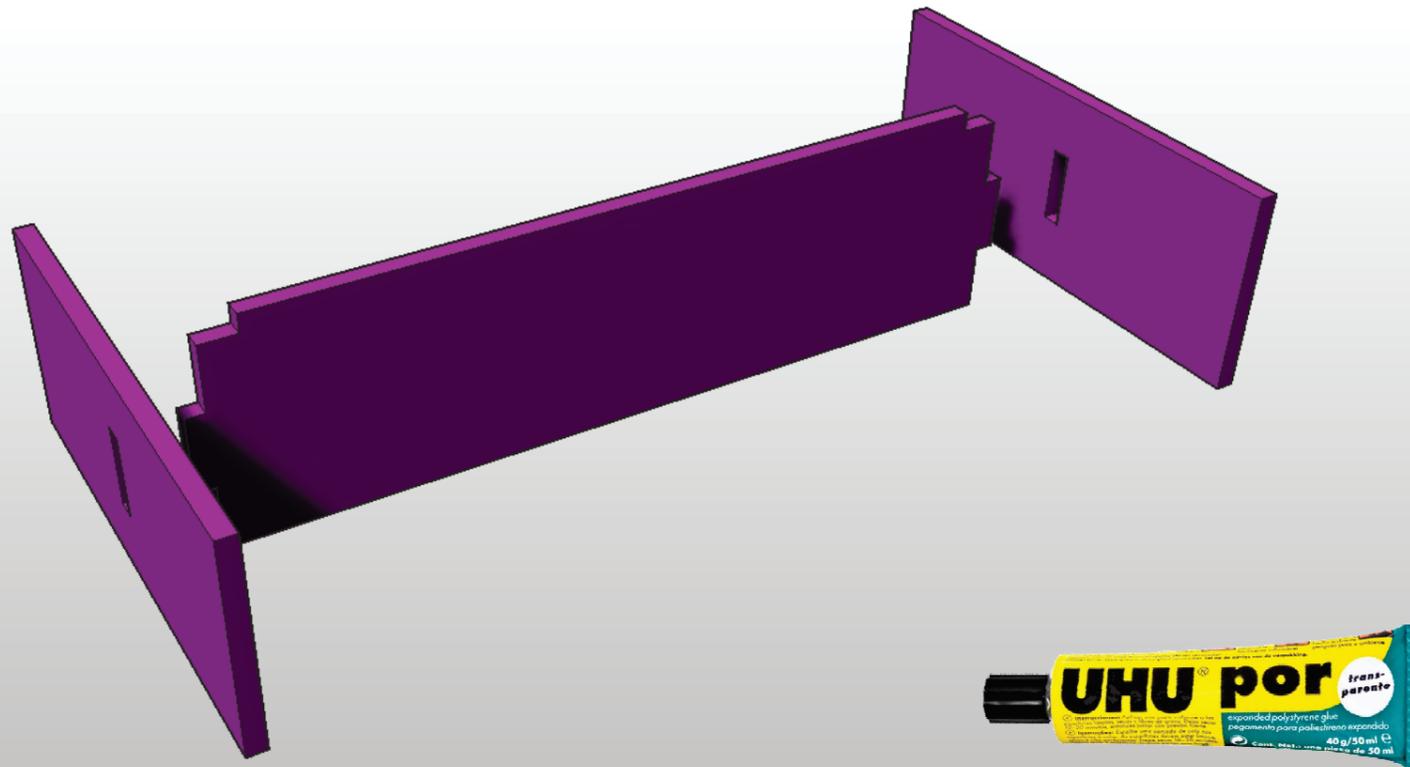


Cut out both wings according to whether you are fitting a 3d printed air intake or not.

Glue the pre-shaped 6mm Carbon tube into the rear slot as shown using epoxy held in place with masking tape.



All versions



Glue together two wing support jigs as shown

NON 3D PRINTED INTAKE

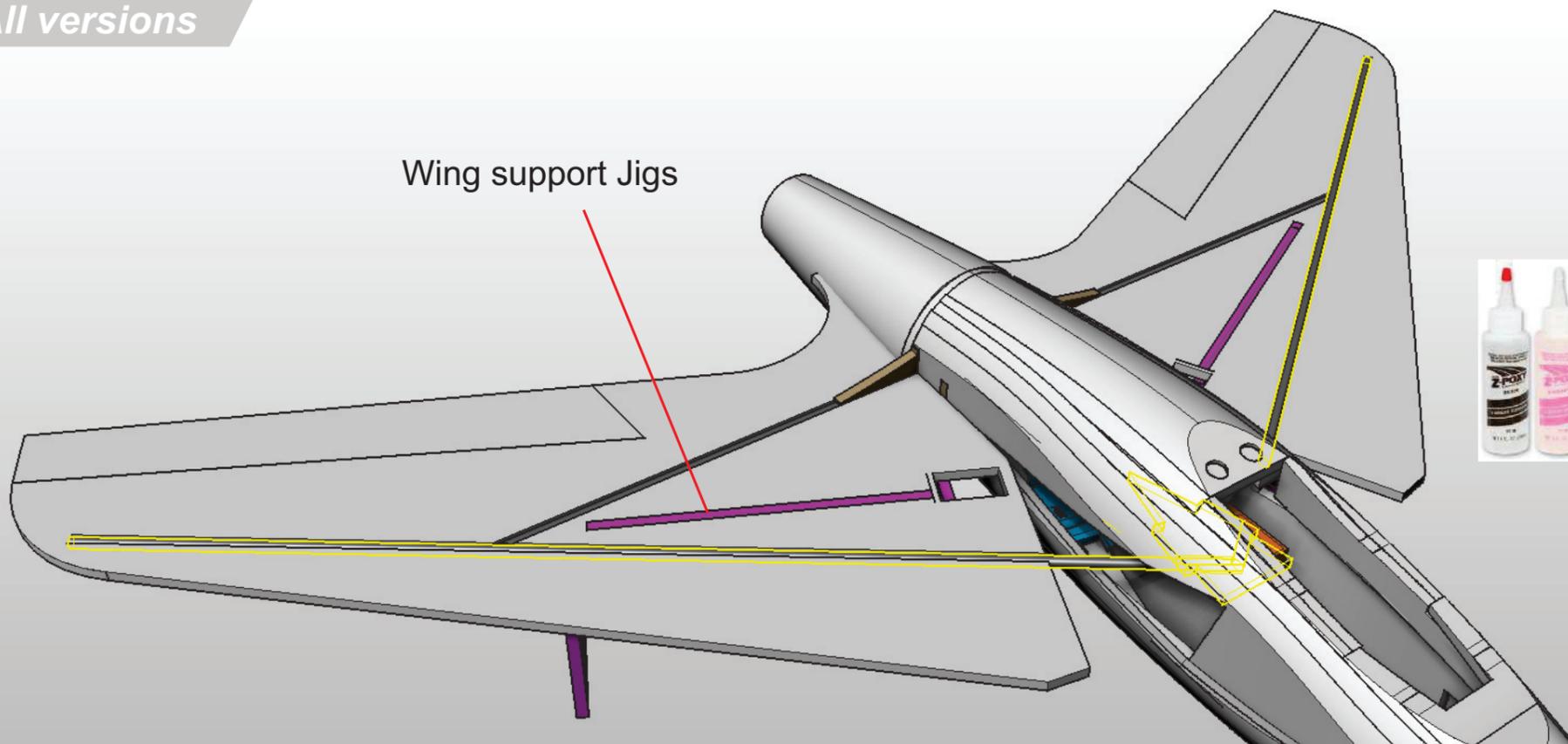
Push fit the two support jigs into the wing middle slot as shown. (do not glue to the wing)

Slide the wing rear spar into the spar bulkhead, sanding the mating face of the foam wing against the fuselage to ensure a good fit.

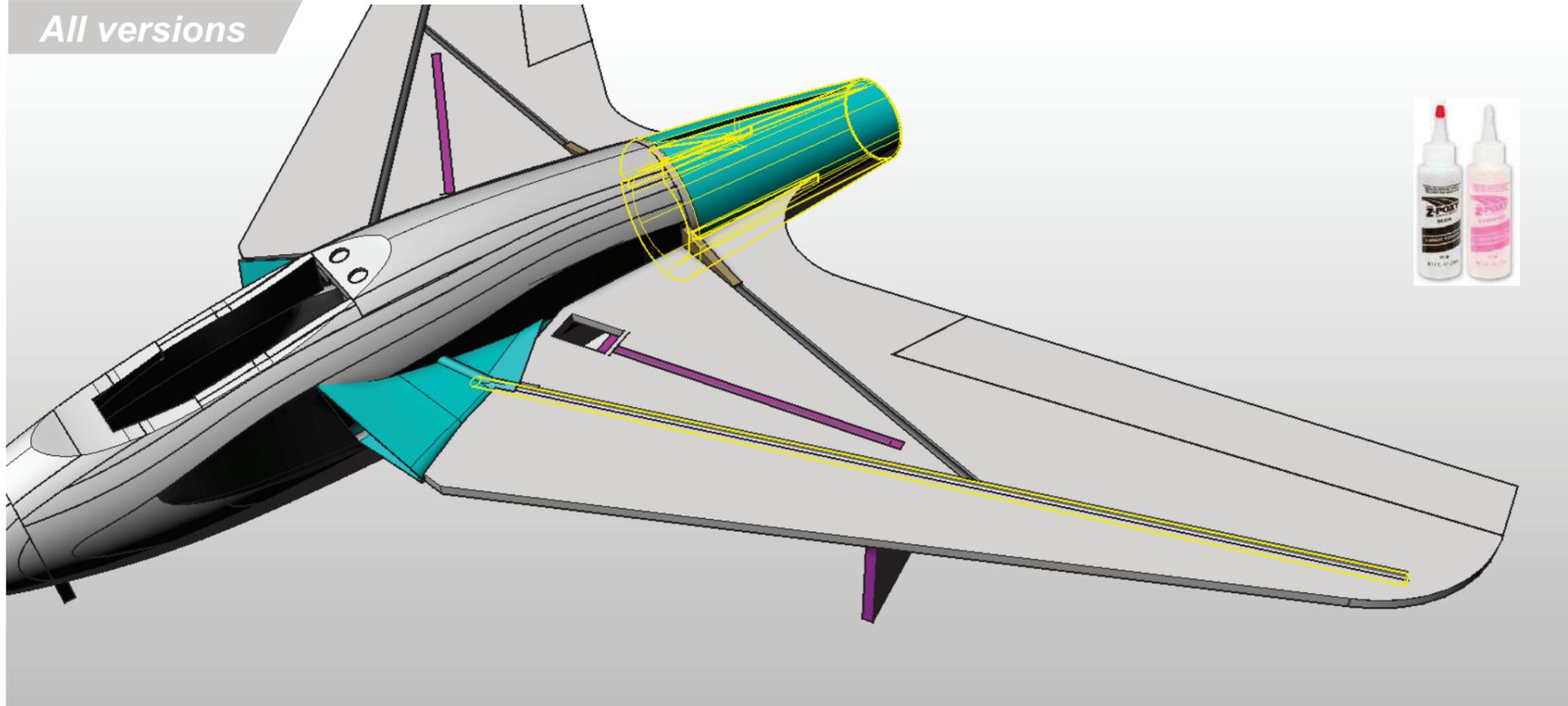
Slide the forward carbon wing 6mm carbon spar into the RX shelf slot, then lay it into the wing slot.

Glue both carbon spars in place using 20m epoxy along with the mating foam surfaces

All versions



All versions



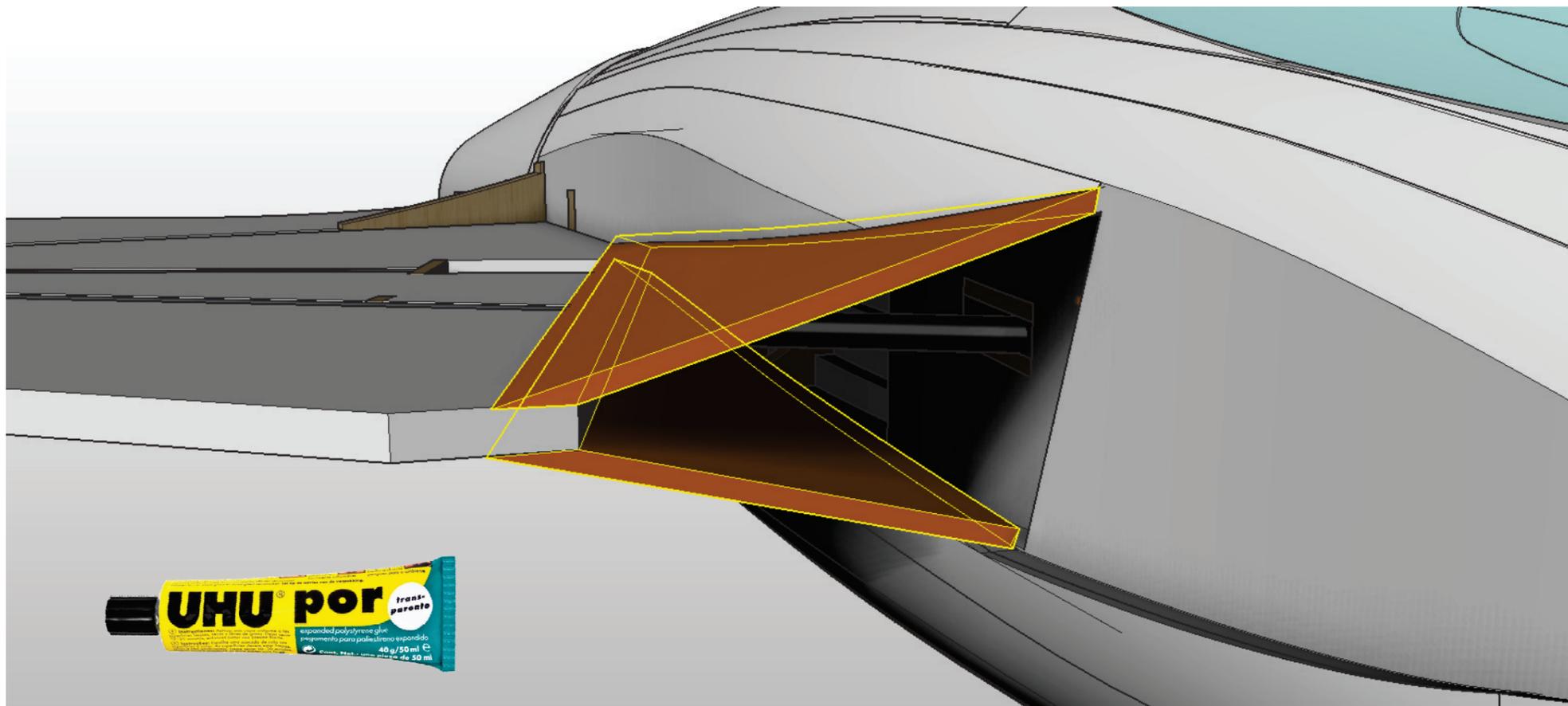
3D PRINTED INTAKE

Push fit the two support jigs into the wing middle slot as shown. (do not glue to the wing)

Slide the wing rear spar into the spar bulkhead, sanding the mating face of the foam wing against the fuselage to ensure a good fit.

Slide the forward carbon wing 6mm carbon spar into the 3d printed receiving hole

Glue both carbon spars in place using 20m epoxy along with the mating foam surfaces



NON 3D PRINTED INTAKE

Glue the upper and lower 3mm foam intakes as shown.

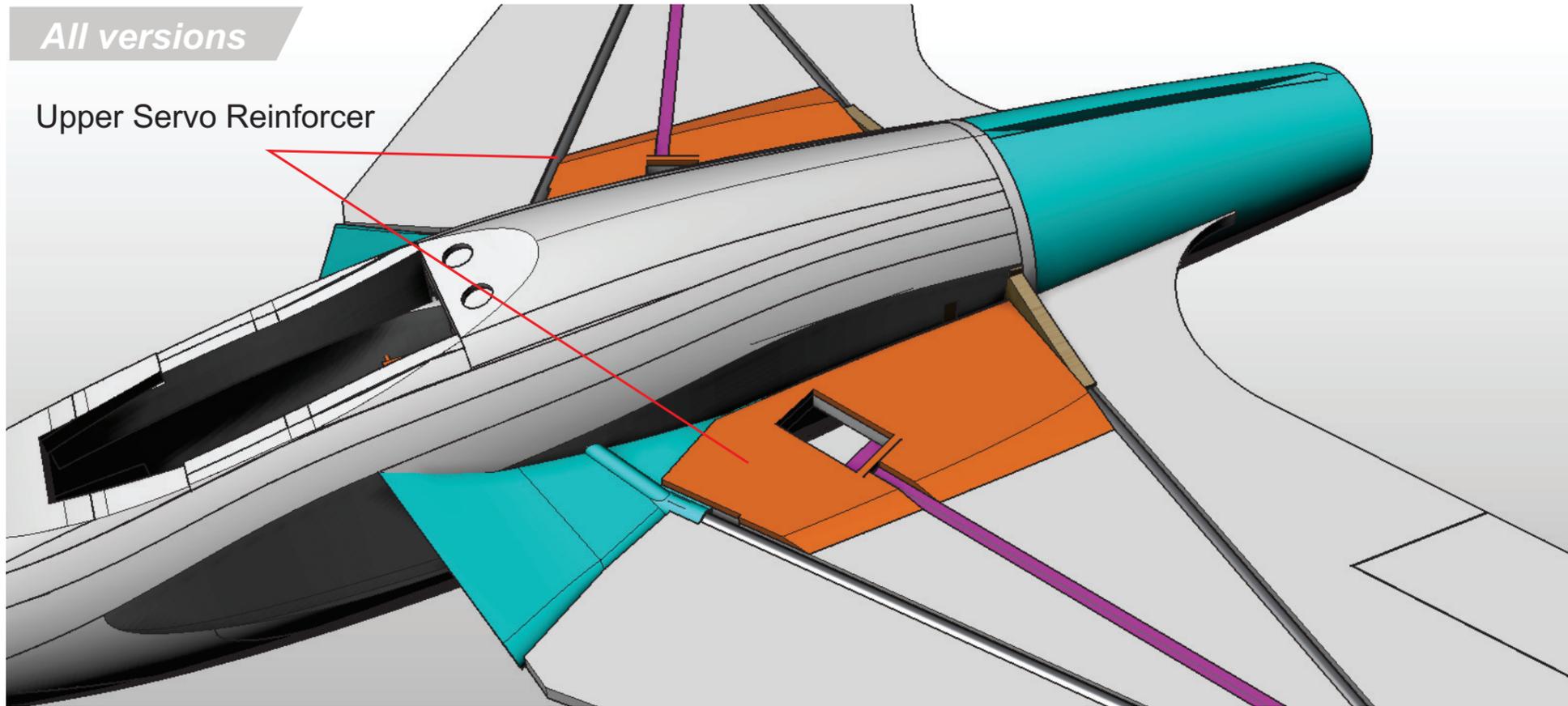
Glue the inboard edges to the inside of the fuselage cut-out.

Glue the outboard edges to the wing edge.



All versions

Upper Servo Reinforcer



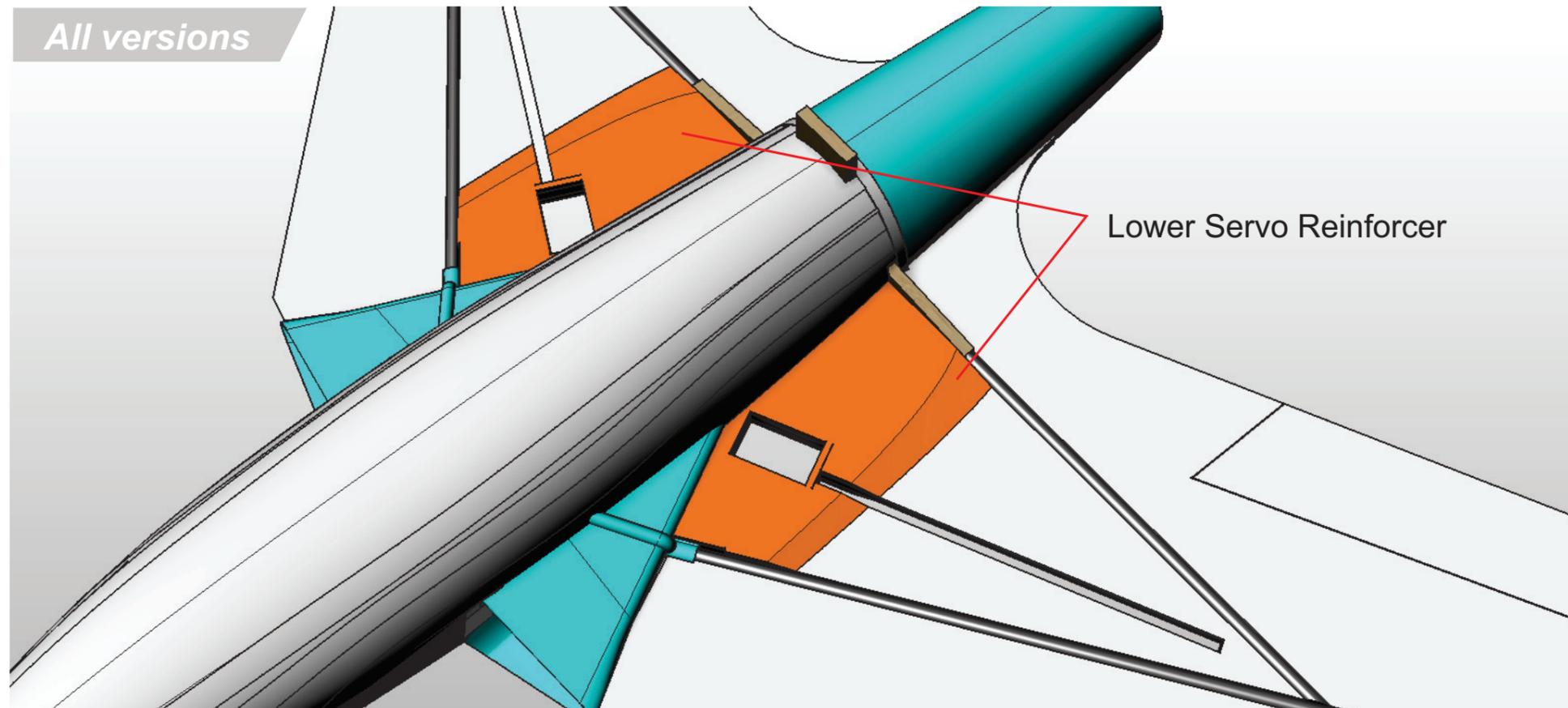
Glue the upper servo reinforcer(3mm) to the assembly as shown. Use epoxy on the inboard face, UHU por along the flat face.

For the non-3d printed version you will need to sand the edge to fit the intake triangles properly.



All versions

Lower Servo Reinforcer

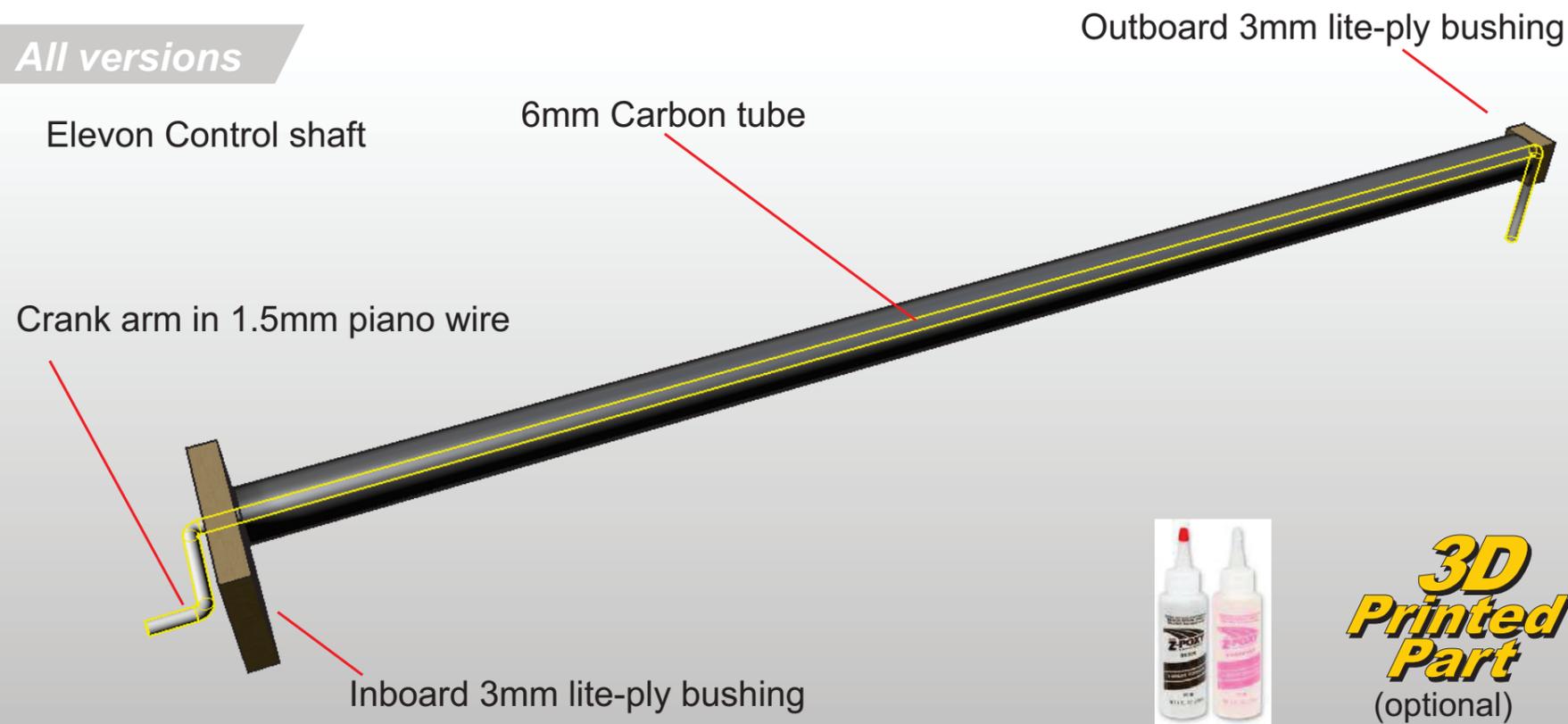


Glue the lower servo reinforcer(3mm) to the assembly as shown. Use epoxy on the inboard face, UHU por along the flat face.

For the non-3d printed version you will need to sand the edge to fit the intake triangles properly.



All versions

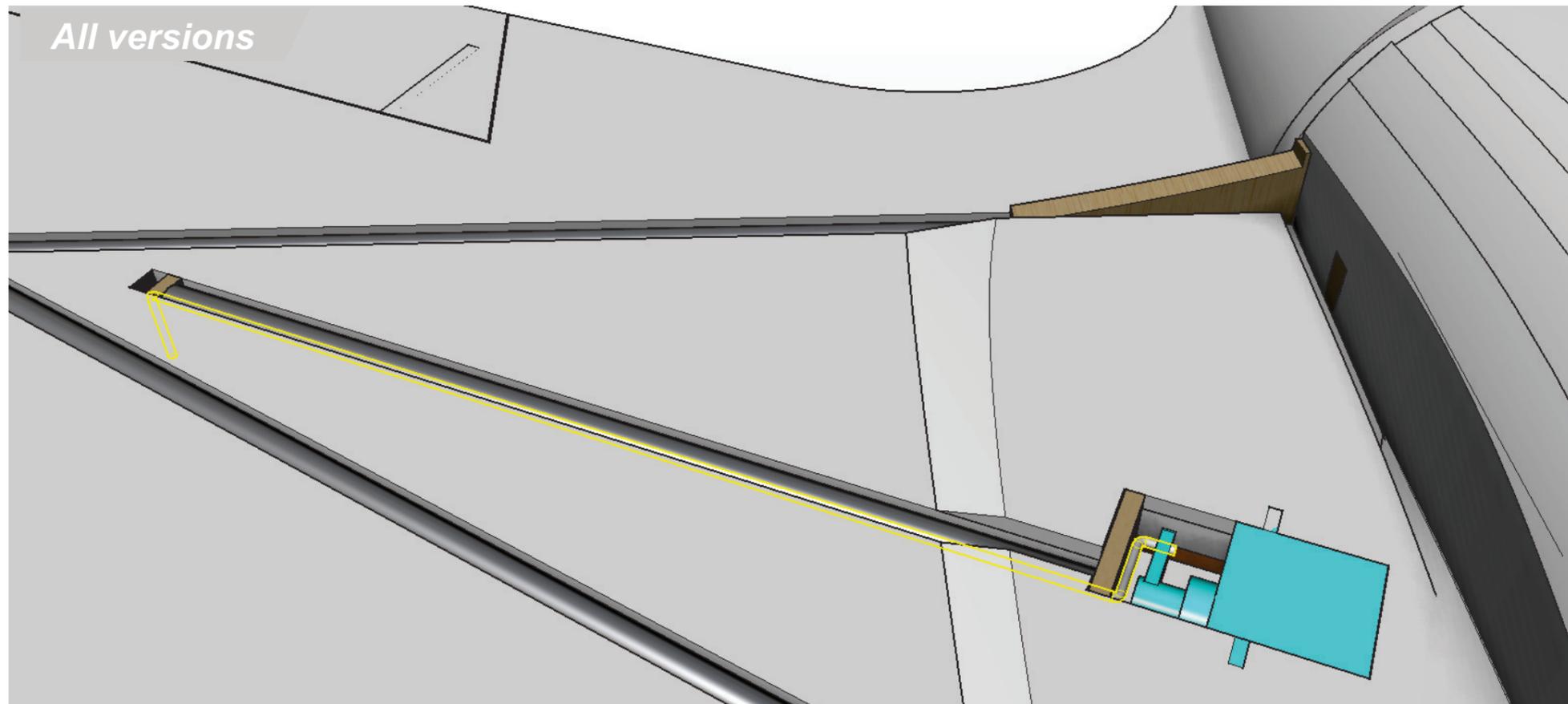


Carefully construct the elevon control shaft as shown. Use liteply at each end and ensure that the spacing of the crank-arm matches the spacing of the servo horn

Carefully glue the liteply parts to the tube using epoxy without affecting the shaft.

Alternatively, there is a 3D printable version available

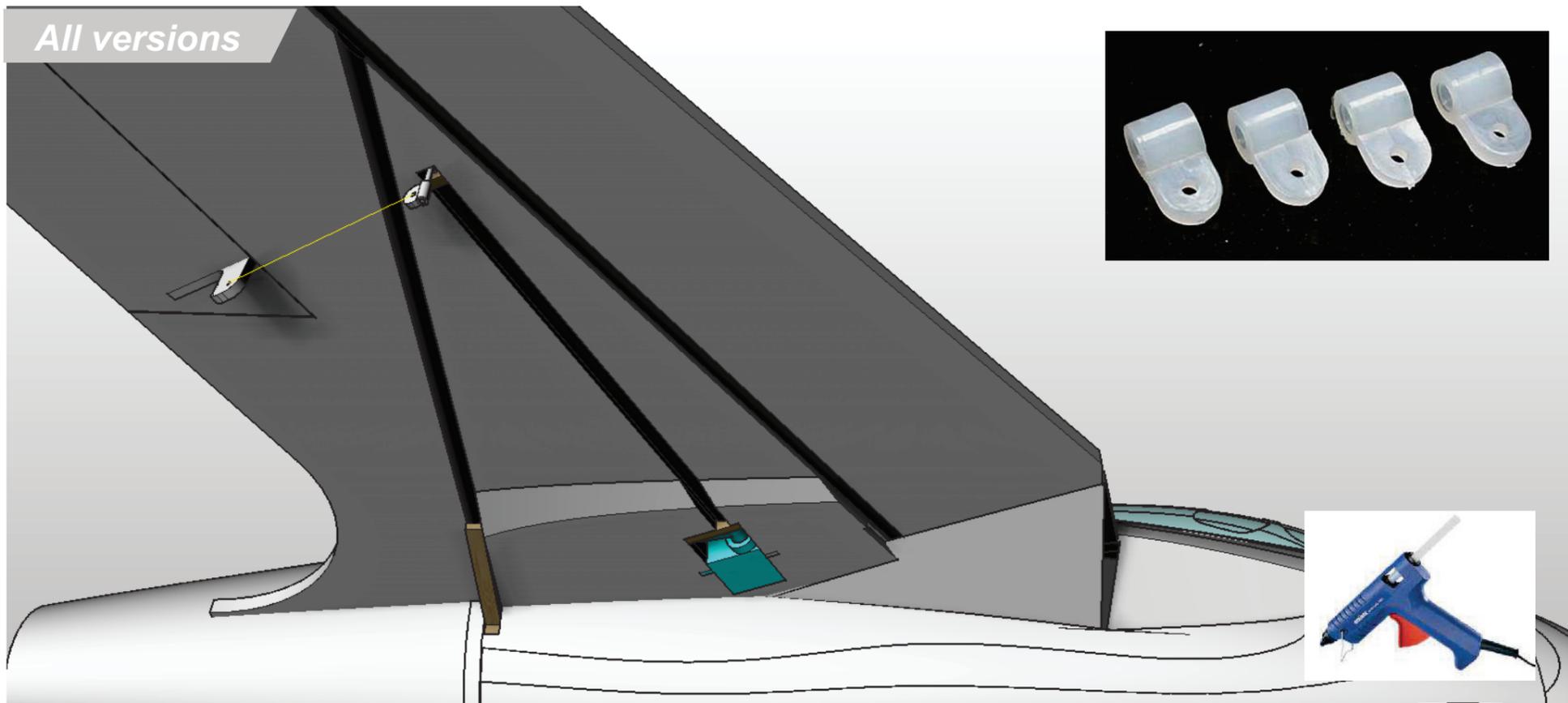
All versions



Position into place in the wing slot. Test the servo operation before committing to glue the assembly into the wing. Position the aileron control arm to point downwards.



All versions



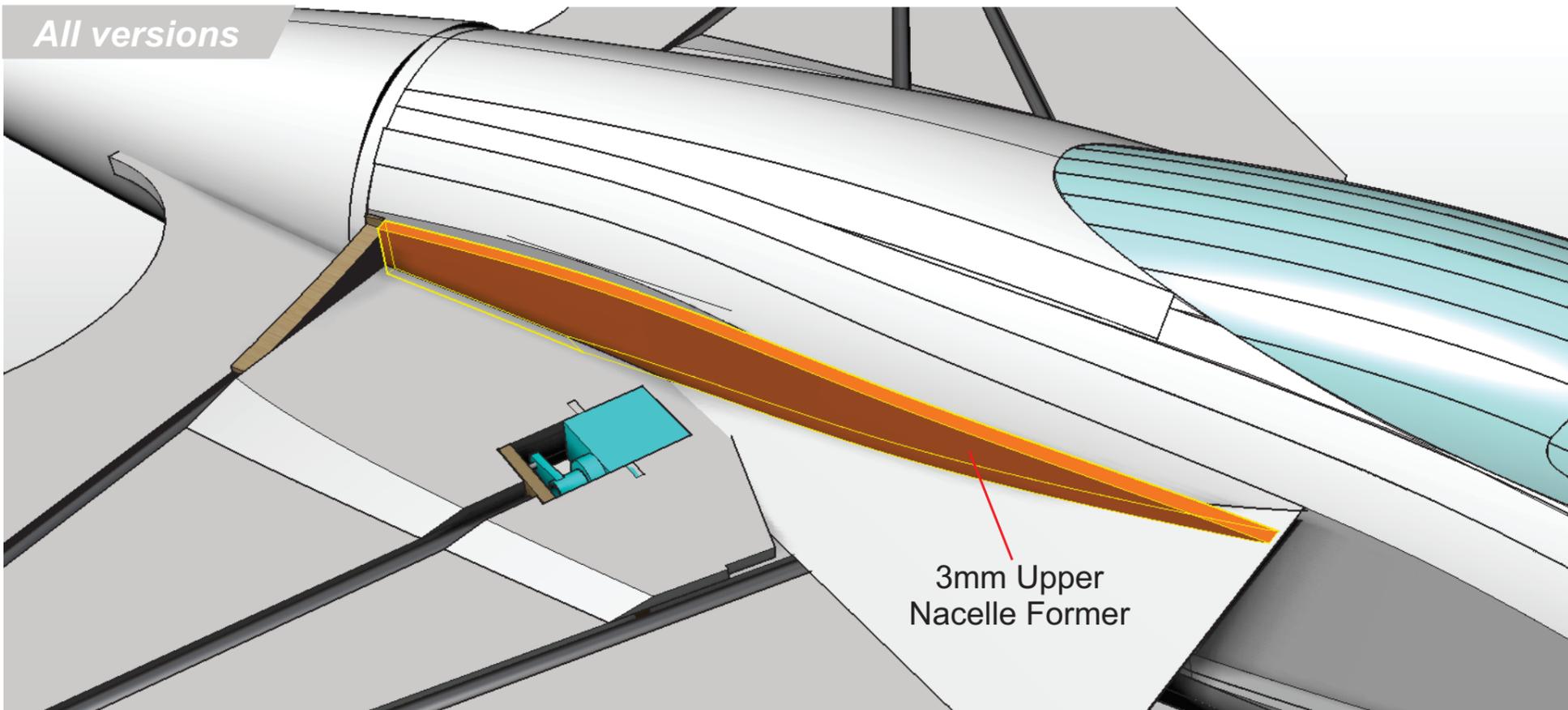
Glue the Elevon control horn into the Elevons using hot melt glue.

Use a horn bracket glued onto the end of the piano wire to attach your Linkage connector to.

Connect the Elevons and test / adjust as necessary.

Program for 40% Expo, +/- 20 degrees.

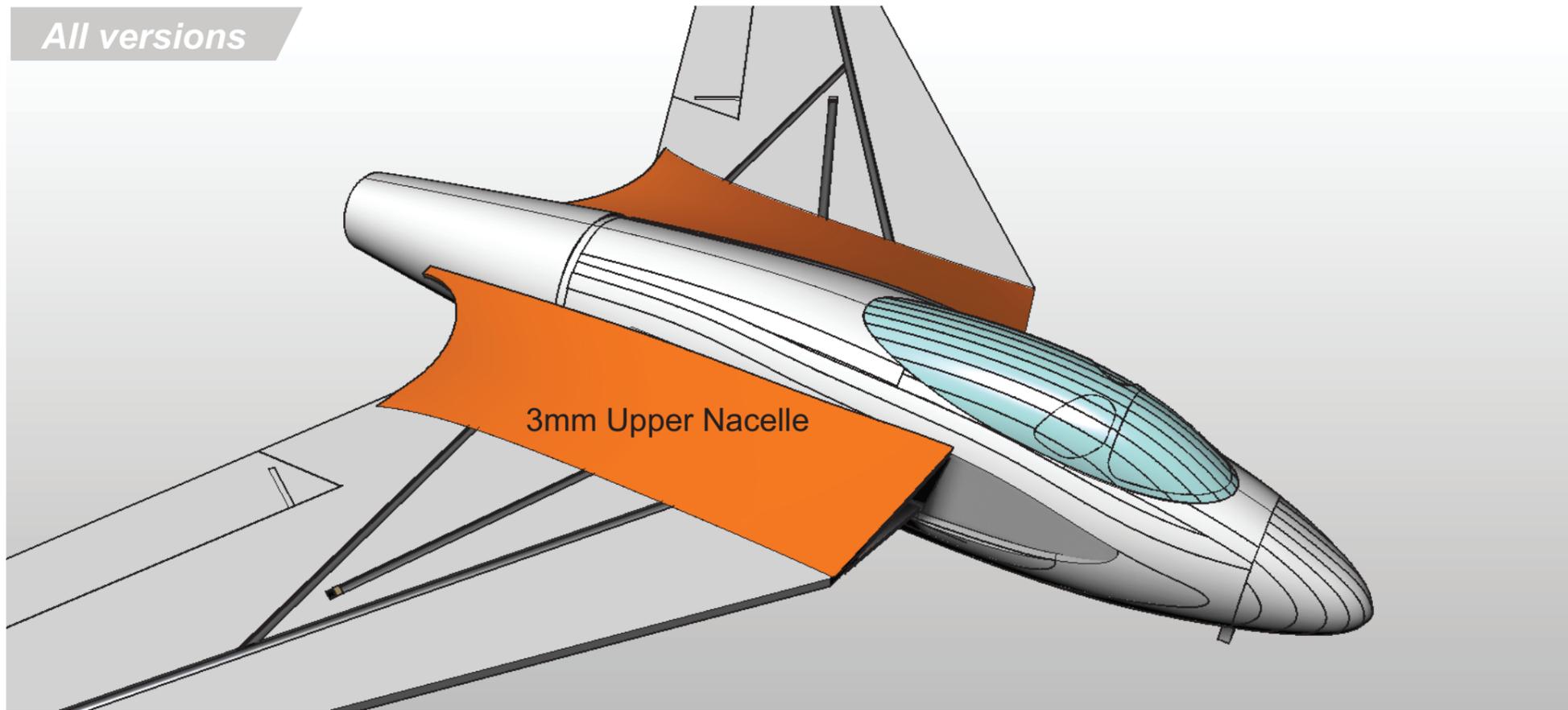
All versions



Glue the **3mm Upper Nacelle Former** in place as shown (both sides)



All versions

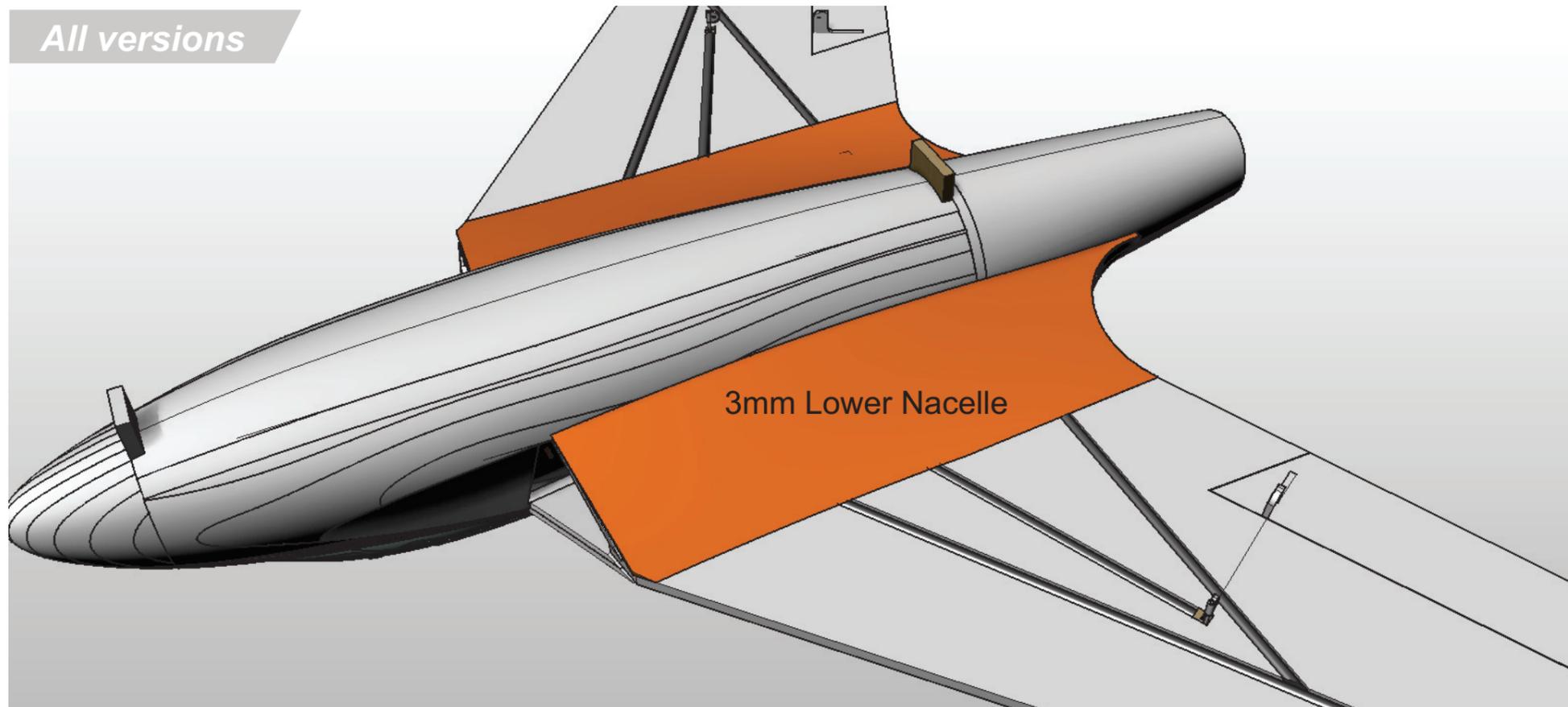


Carefully sand and shape the **3mm Upper Nacelle** to be a good fit. Feathering out where it touches the wing.

Glue in place.



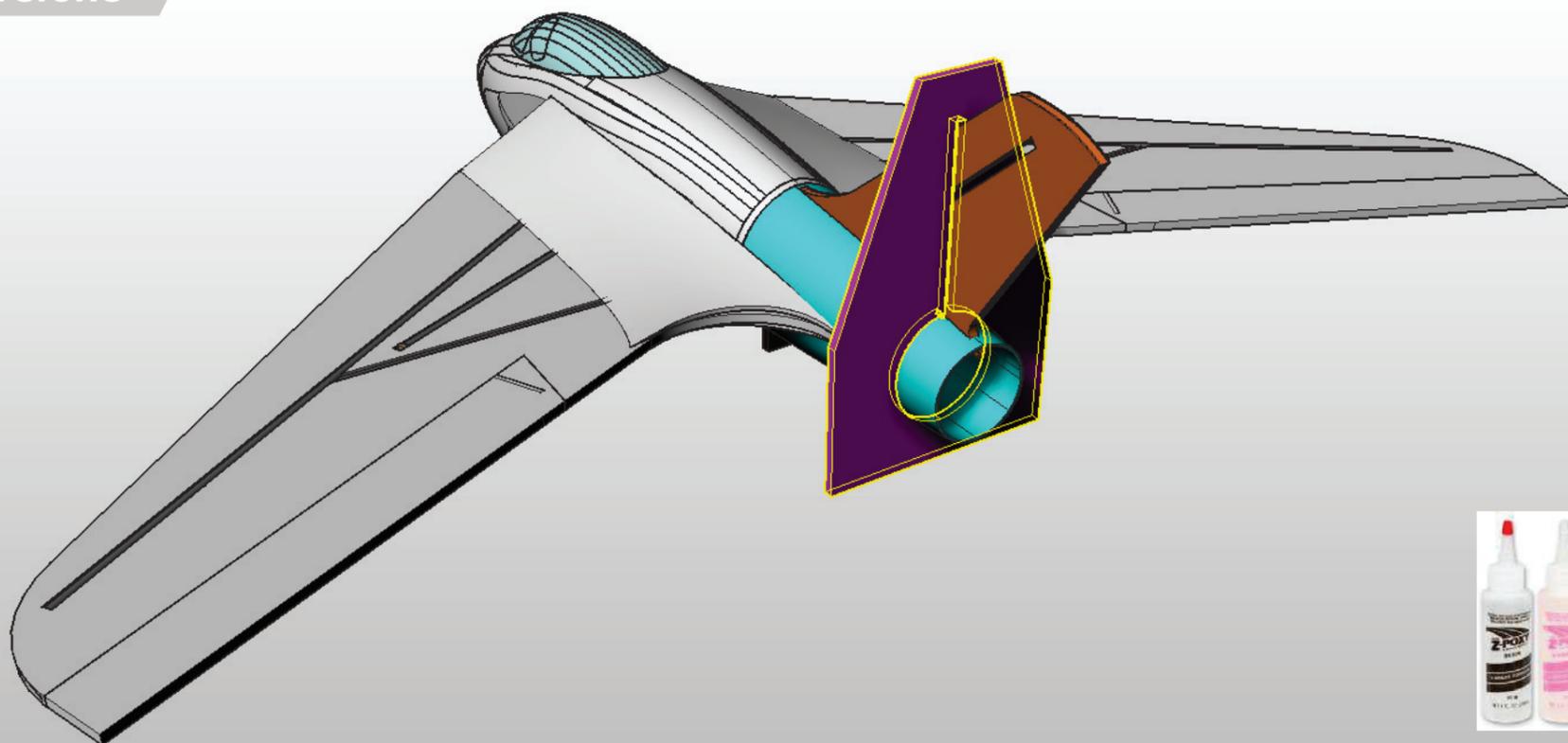
All versions



Do the same on the **3mm Lower Nacelle** parts.



All versions



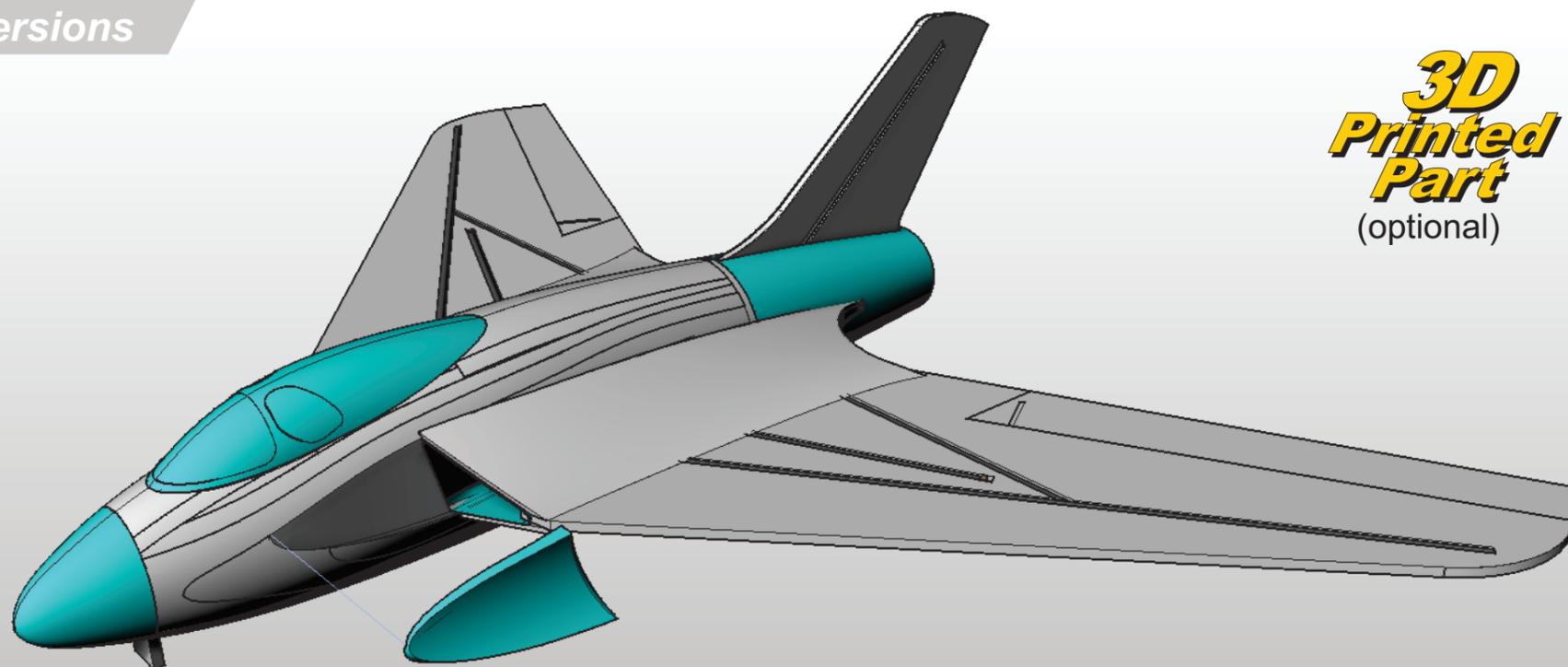
Cut out the vertical stabiliser to suit the exhaust cone you have chosen.

Glue the carbon spar into it using epoxy and masking tape (as per the wing). Once it has set, use the stabiliser jig to hold it vertically.

Cut a slot in the Pusher non-3d printed exhaust cone version to receive it.

Glue in place using Epoxy. Ensure a good bond.

All versions

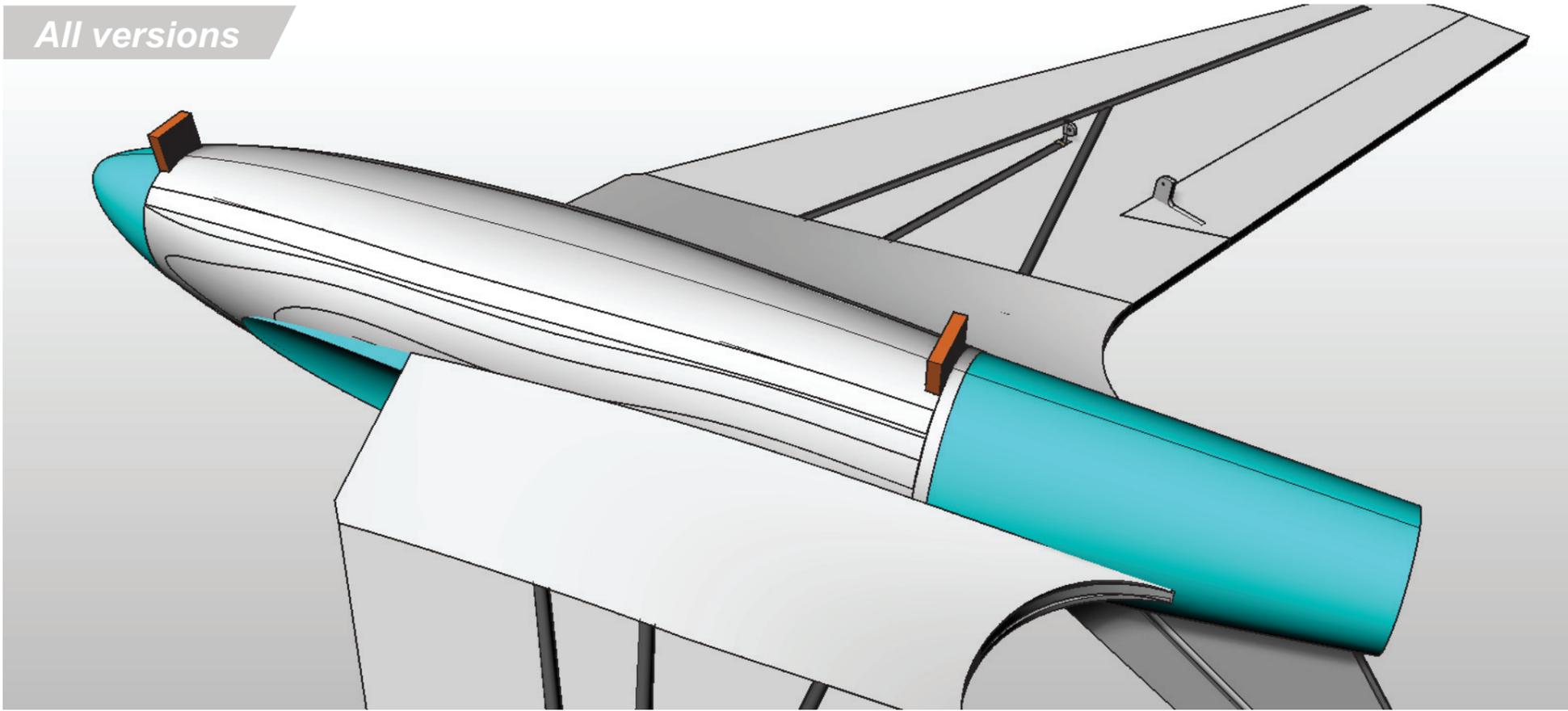


**3D
Printed
Part**
(optional)

Either 3D Print or fabricate the Intake fairings and glue to the fuselage as shown.

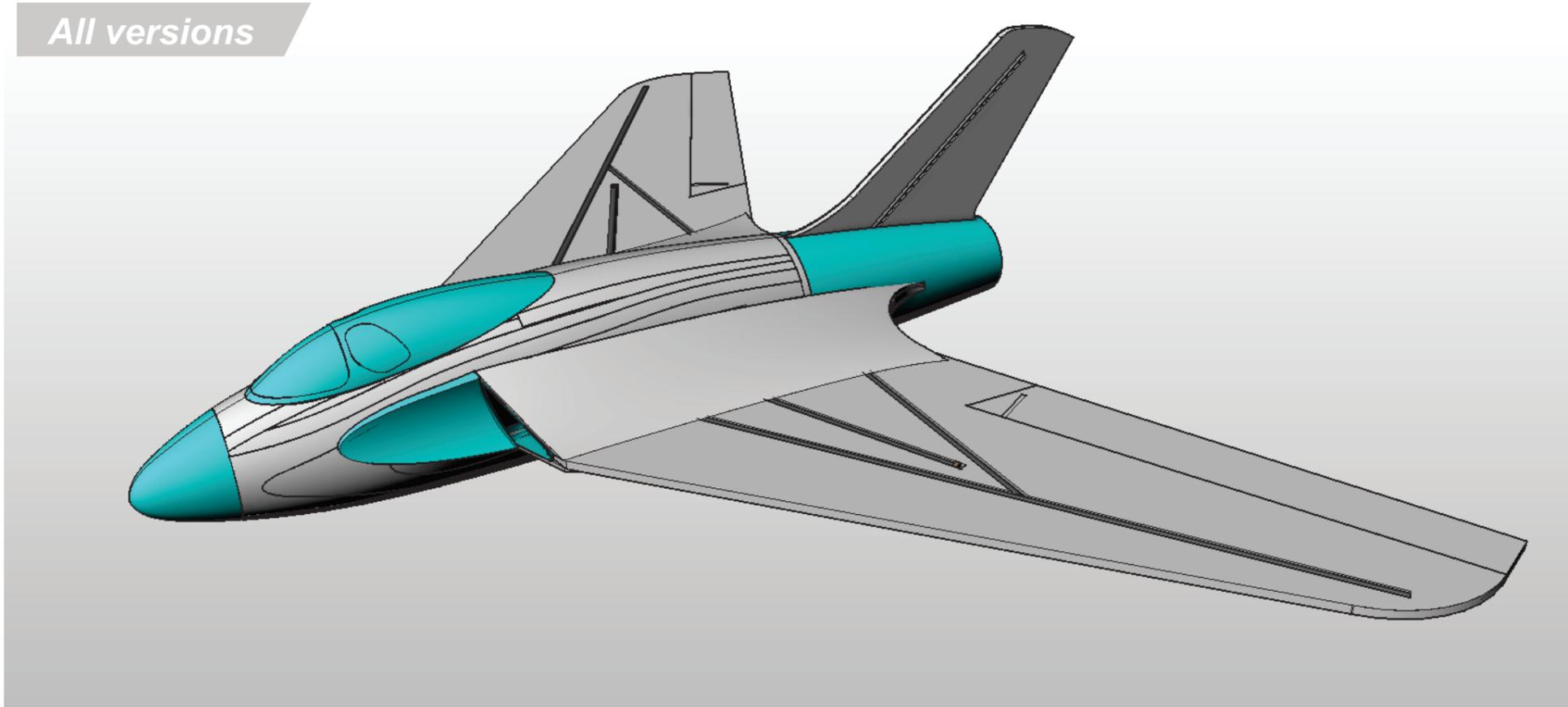


All versions



Remove from the support Jigs and trim away all the protruding tabs. Sand smooth.

All versions



Congratulations! Your Swallow is Complete. You can fly it as it is, or you can paint it!



There are various photos of the Swallow available on Google images to help you with the shaping and details.





Swallow

