



Hawker
Sea Hawk
Parkjet

Photograph of actual aircraft.



1st Generation Jet Fighter

Seahawk History

The Hawker Sea Hawk is a British single-seat jet day fighter of the Fleet Air Arm - the air branch of the Royal Navy - the company's first jet aircraft. The Sea Hawk proved to be a reliable and sturdy workhorse. A considerable number were also produced for the export market. The last operational Sea Hawks, operated by the Indian Navy, were retired in 1983.

Towards the end of the Second World War, Hawker's design team took advantage of the newly developed jet propulsion technology. a single Rolls-Royce Nene turbojet engine, being fitted in a mid-fuselage position, along with lateral air intakes and a tailpipe which emerged beneath the tailplane. The jet exhaust was designed as two short split-lateral bifurcated exhausts (which gained the name "trouser legs"). The shorter unusual bifurcated jet pipe reduced pressure losses in the jet pipe and freed up space in the rear fuselage for fuel tanks, which gave the aircraft a longer range than many other early jets. The absence of wing fuel tanks also meant a thinner wing could be adopted without the penalty of reduced range; The fuselage fuel tanks, being fore and aft of the engine, also provided for a stable centre of gravity during flight. The tail plane was raised to clear the jet exhausts. The Sea Hawk also featured a nose wheel undercarriage arrangement, the first for a Hawker-built aircraft. The aircraft was built to accommodate four 20mm Hispano-Suiza Mk. V cannons.

The Sea Hawk saw extensive service during the Suez Crisis. The Anglo-French invasion being known as Operation Musketeer, beginning on 31 October 1956. Six Sea Hawk squadrons took part: two aboard the fleet carrier HMS Eagle and two each aboard the light fleet carriers HMS Albion and HMS Bulwark. The Sea Hawks were primarily used for ground attack. Due to aircraft such as the Hunter lacking the range or clearance to deliver munitions, the entire British ground attack capability during the conflict was delivered by the navy Sea Hawks - often in the face of heavy anti-aircraft fire. The military conduct of the Suez Campaign was successful, unlike the political disaster.

In Indian Navy service (beginning in 1960), Sea Hawks were used aboard the aircraft carrier INS Vikrant, and saw service during the Indo-Pakistani War of 1965 and 1971. In the latter war, Sea Hawks were used by the Indian Navy; these aircraft scored nearly a dozen "kills", mainly of Pakistan Navy gunboats and merchant navy ships and cargo ships in East Pakistan and emerged unscathed, achieving the highest kill ratio for any aircraft in the war. The Sea Hawk was withdrawn from Indian Navy service in 1983, being replaced by the far more capable BAE Sea Harrier.

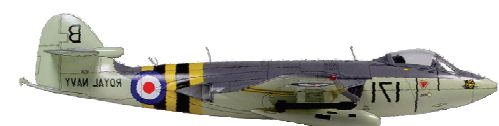
The Sea Hawk was a reliable and elegant aeroplane, though its cautious design meant it would only be attractive on the export market and be in production for only a short period before being superseded by more advanced aircraft.

Designers Notes

Although this aircraft was only in service for a brief period of time, Its elegant and attractive lines captured my interest whilst walking around Duxford Air Museum.

Its an unusual arrangement with the bifurcated jet pipe, which raises some difficulty for those without 3d printers.

As the main EDF unit is over the CG of the plane, it also provides some difficulty placing the batteries to establish achieve the CG position. this is achieved by moving as much weight aft to counter the weight of the battery.



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

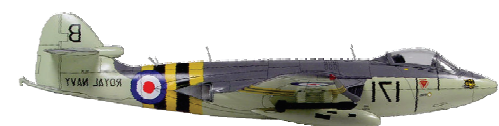
- > For holding parts tightly together whilst glue sets
 - Low tack masking tapes
- > For leading edges, hinges, general strengthening
 - 3M Gift tape (Purple - not green one!) - I prefer lightweight plastic hinges.

Cutting parts

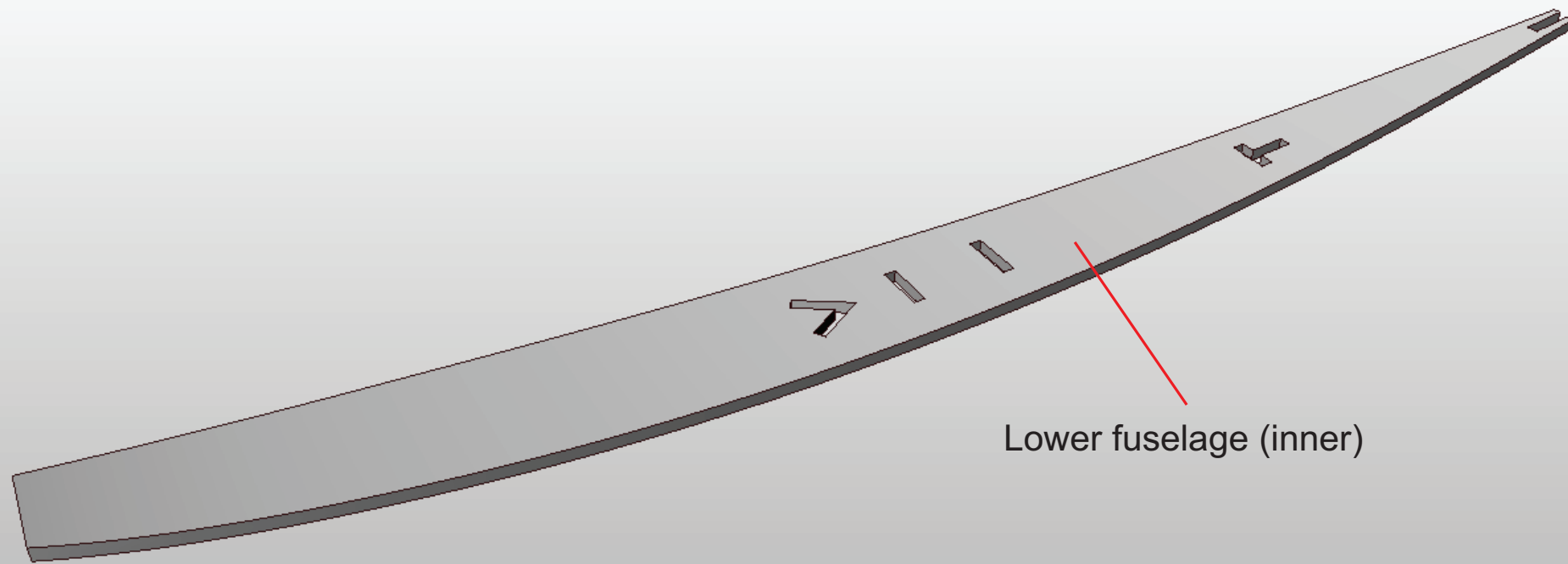
1. Print the plans,
 2. Cut around each part using scissors - allow a border of approx (1/4") 6mm
 3. Use either 3M spray mount or a very light coat of 3M 77 to the back of the parts and stick in an economical layout on the Depron foam.
 4. Using a safety rule and craft knife over a cutting mat - important! 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.

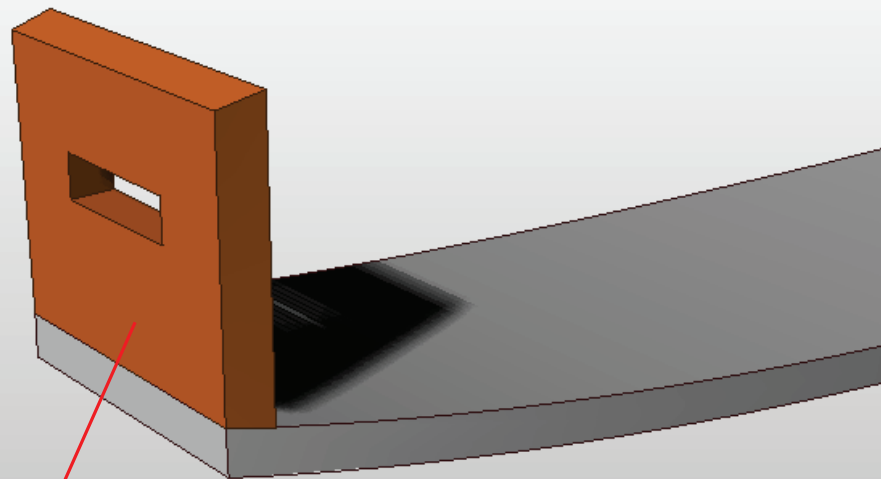


All versions



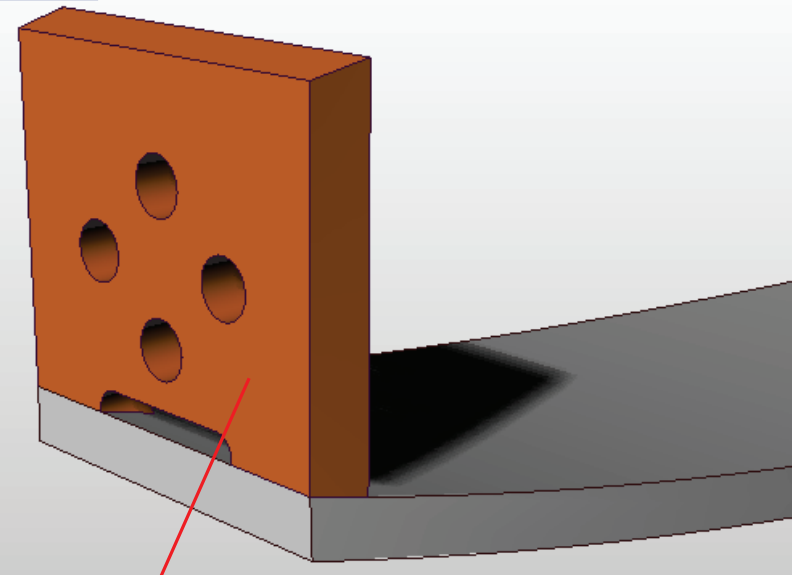
Gently curve the **Lower fuselage (inner)** to match the lower edge of the **Fuselage side (1)**.

EDF only



Bulkhead 1 (EDF)

Prop only

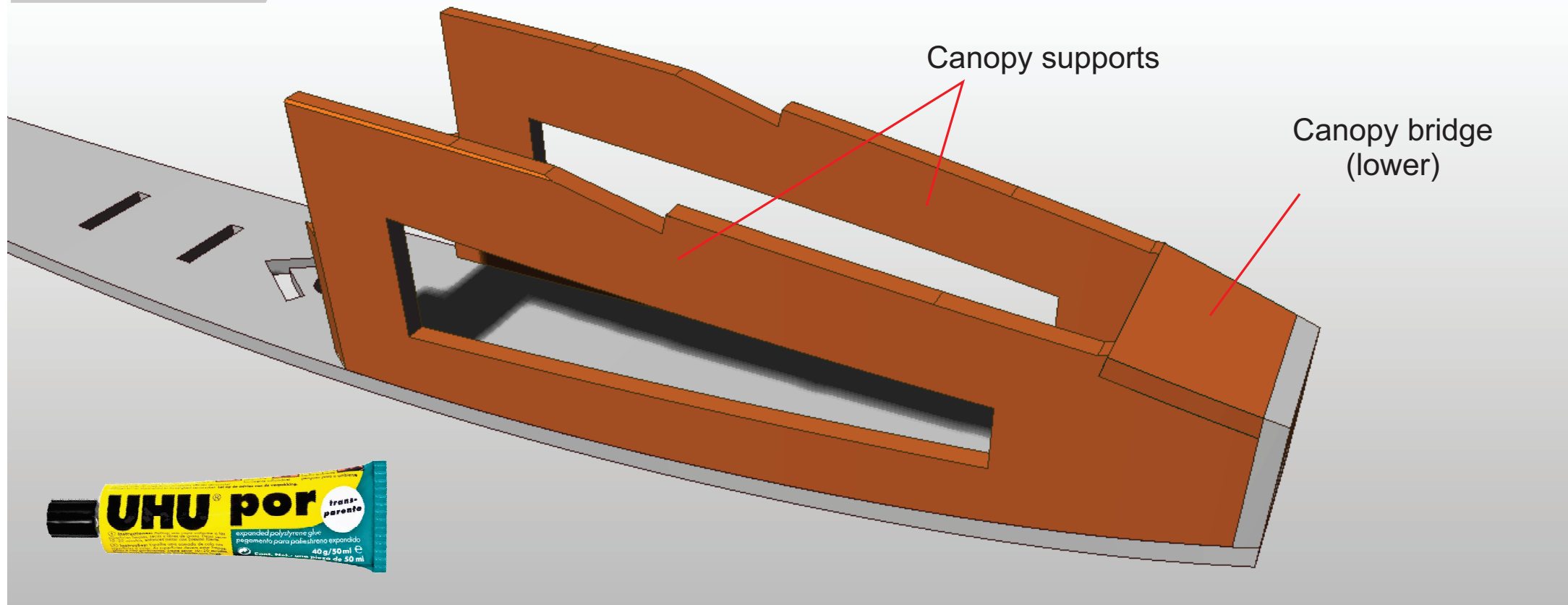


Bulkhead 1 (PROP)

Glue **Bulkhead 1** to the **Lower fuselage (inner)** panel

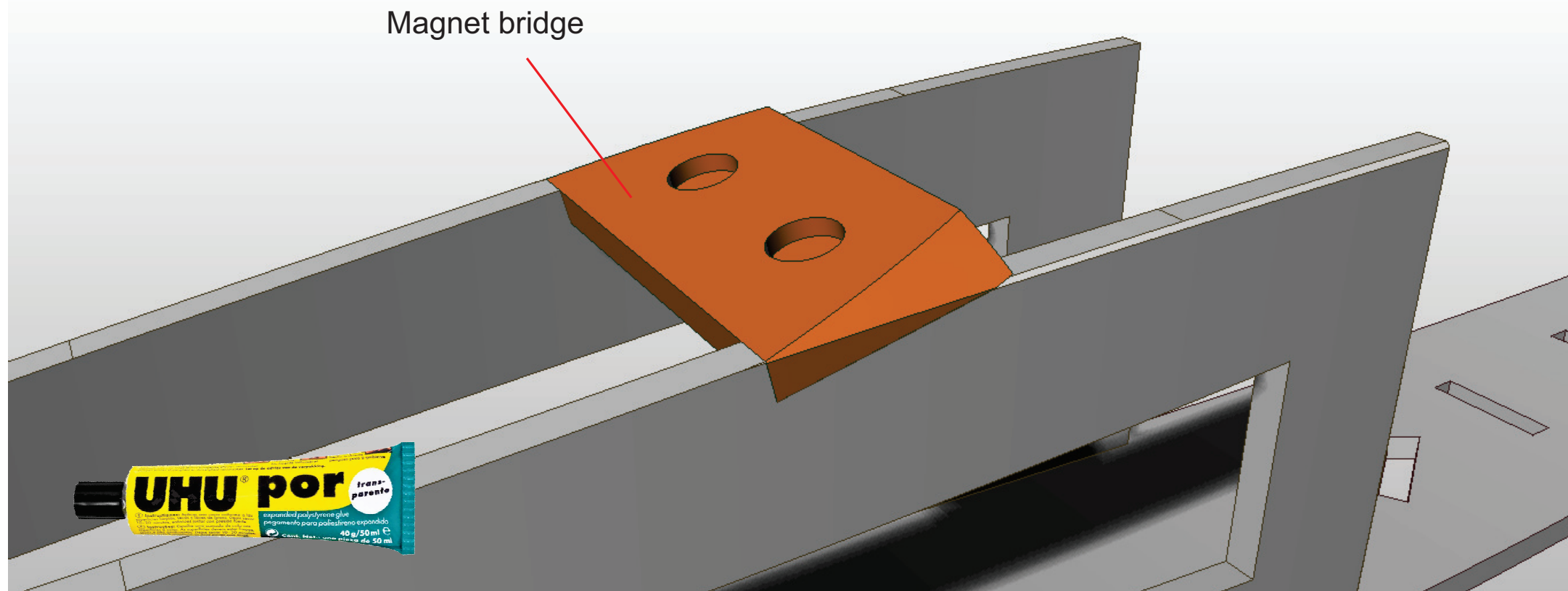


All versions



Glue the **Canopy supports** to the assembly along with the **Canopy bridge (lower)**

All versions

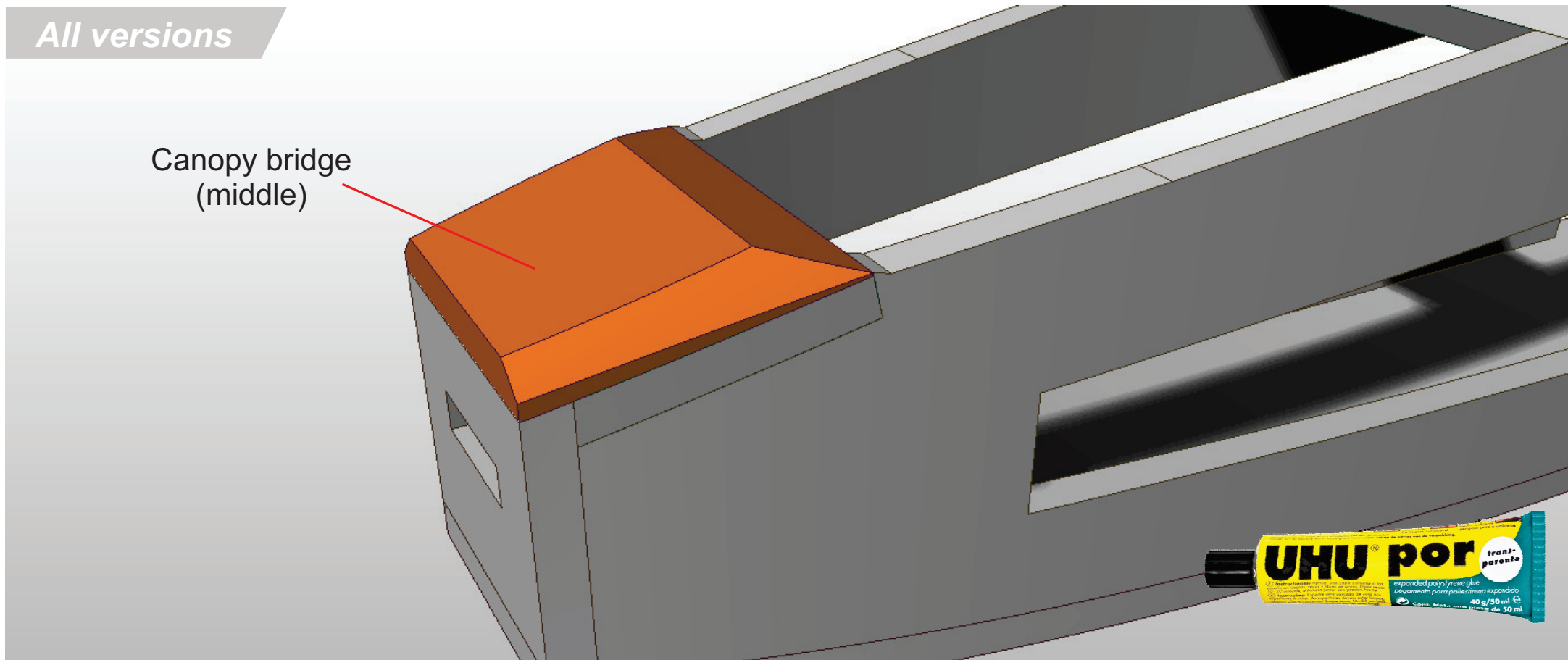


Glue the **Magnet Bridge** in place.



All versions

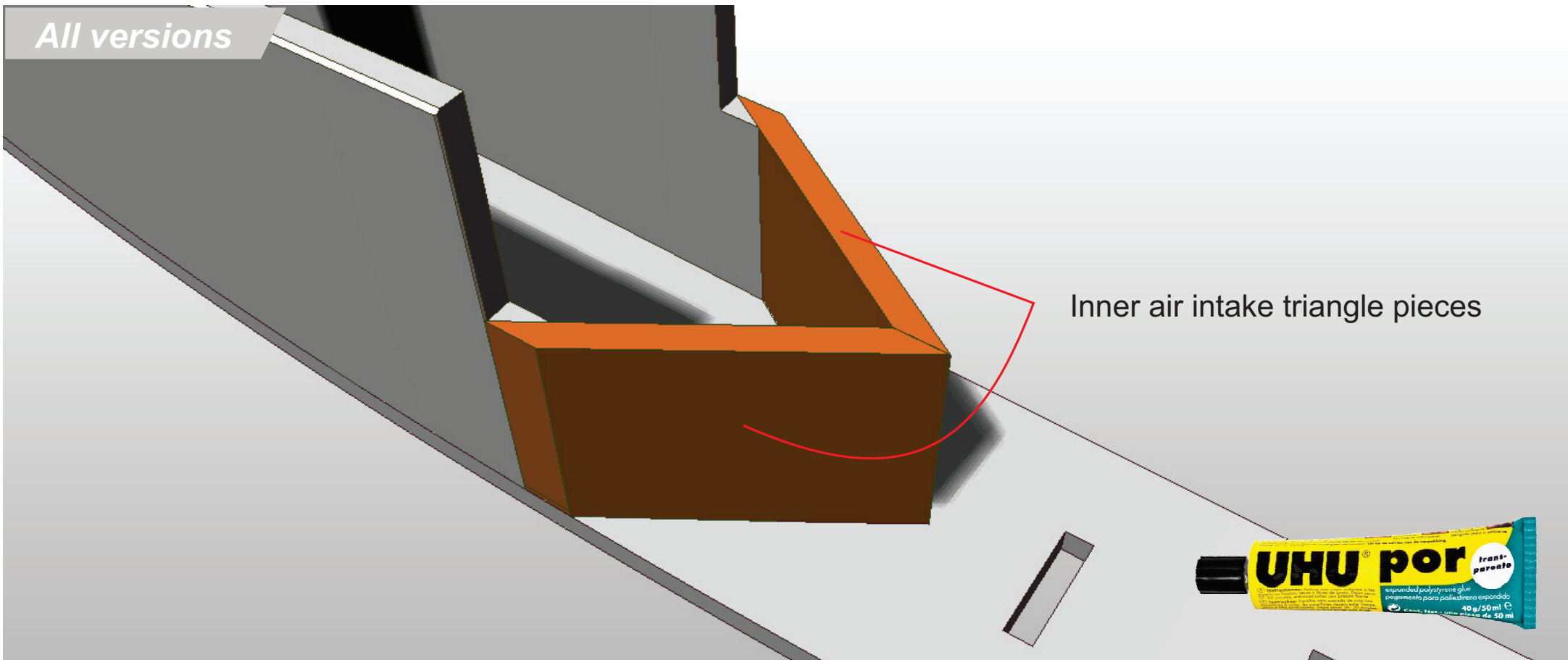
Canopy bridge
(middle)



Glue the **Canopy bridge (middle)** to the assembly

All versions

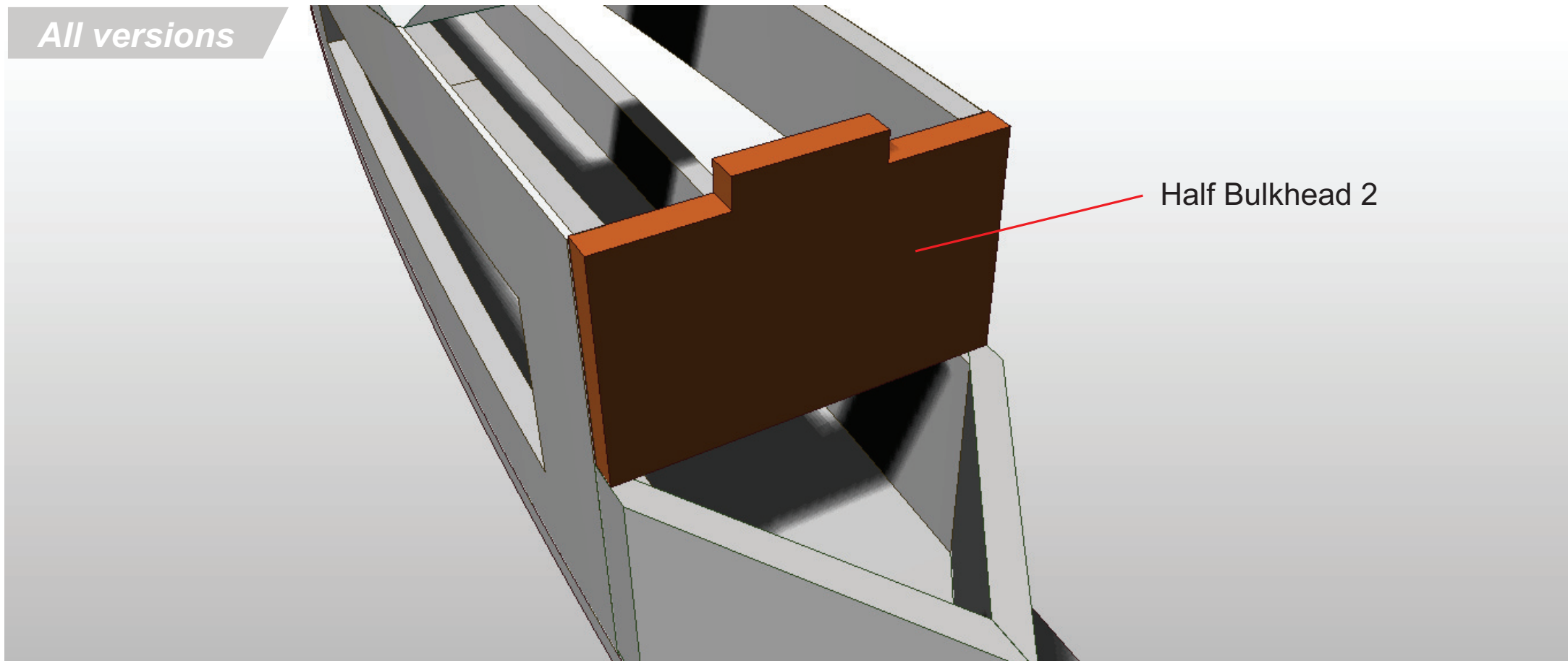
Inner air intake triangle pieces



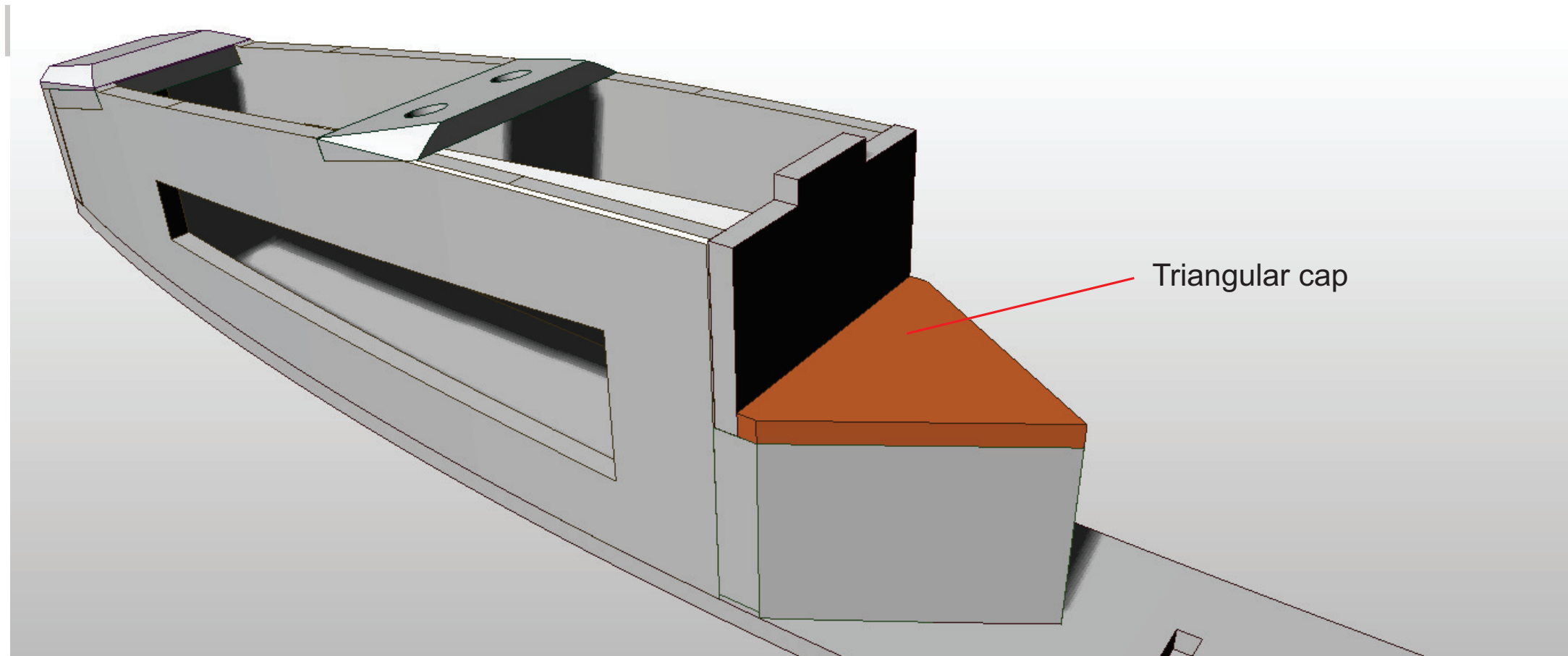
Glue **Inner air intake triangle pieces** together and to the assembly.



All versions



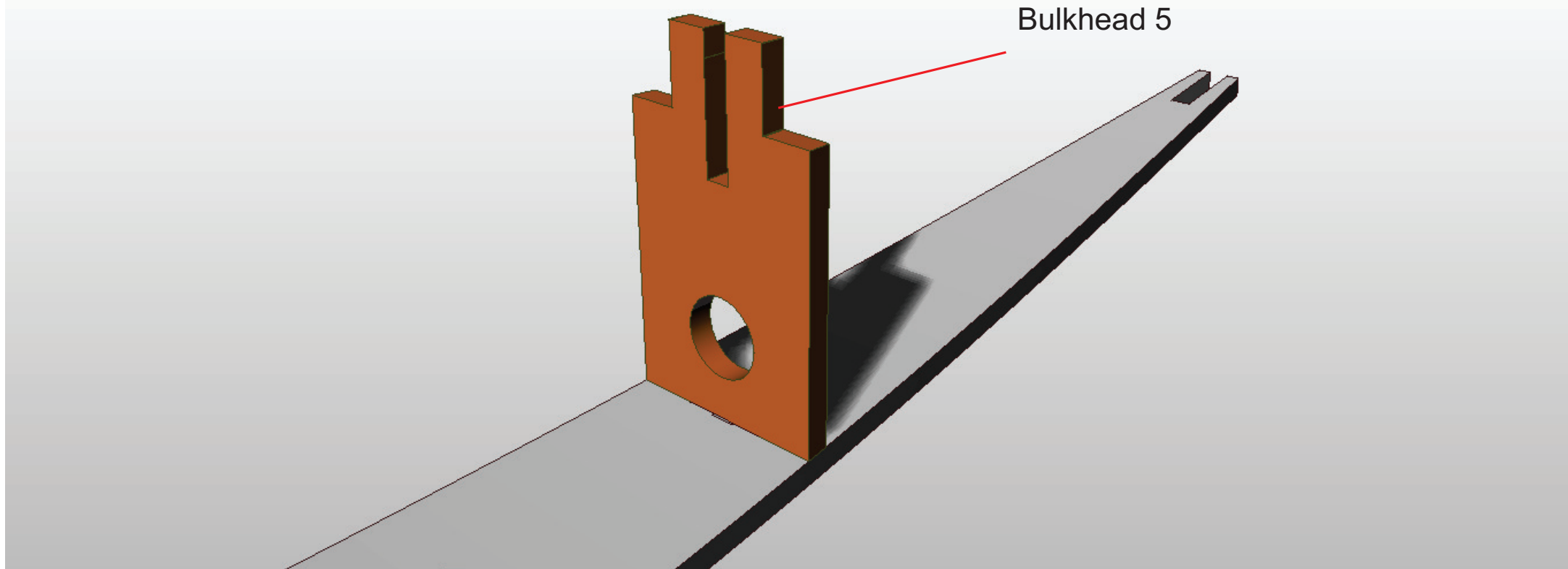
Glue **Half Bulkhead 2** to the assembly.



Glue the **Triangular cap** onto the assembly.

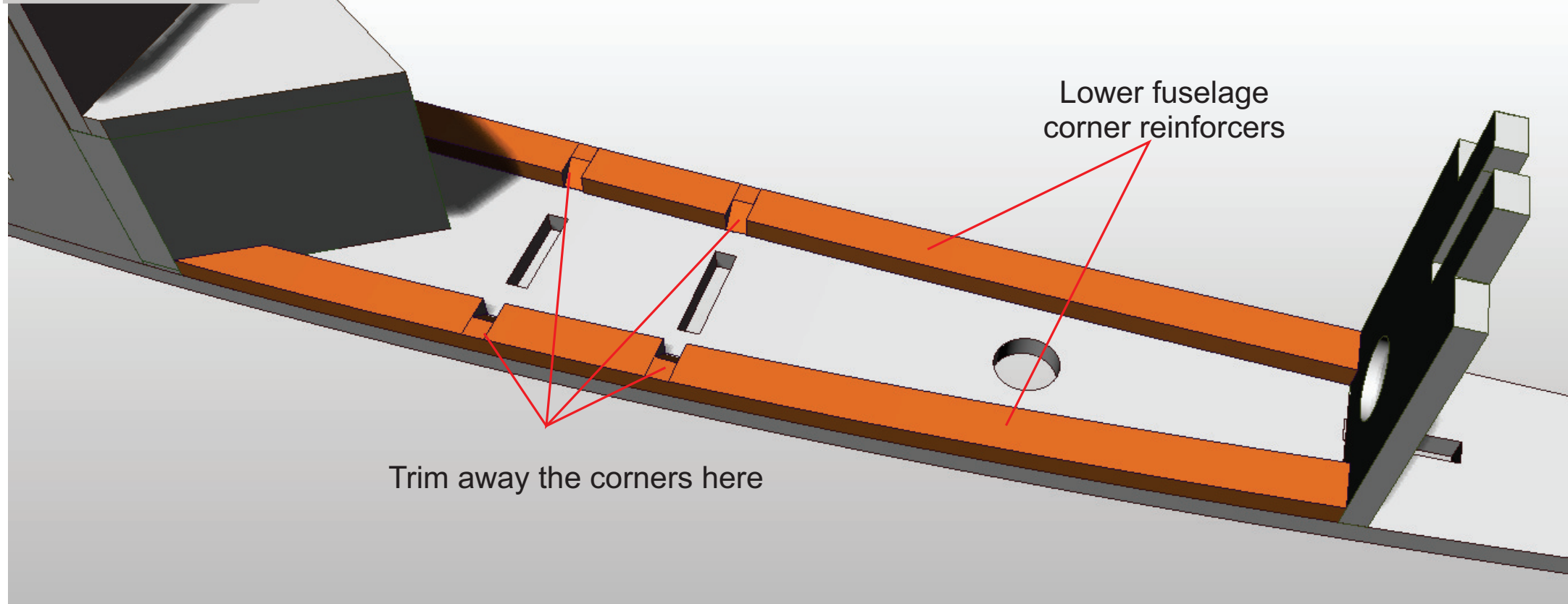


All versions



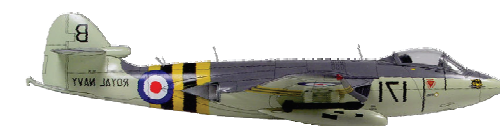
Glue **Bulkhead 5** to the assembly.

All versions

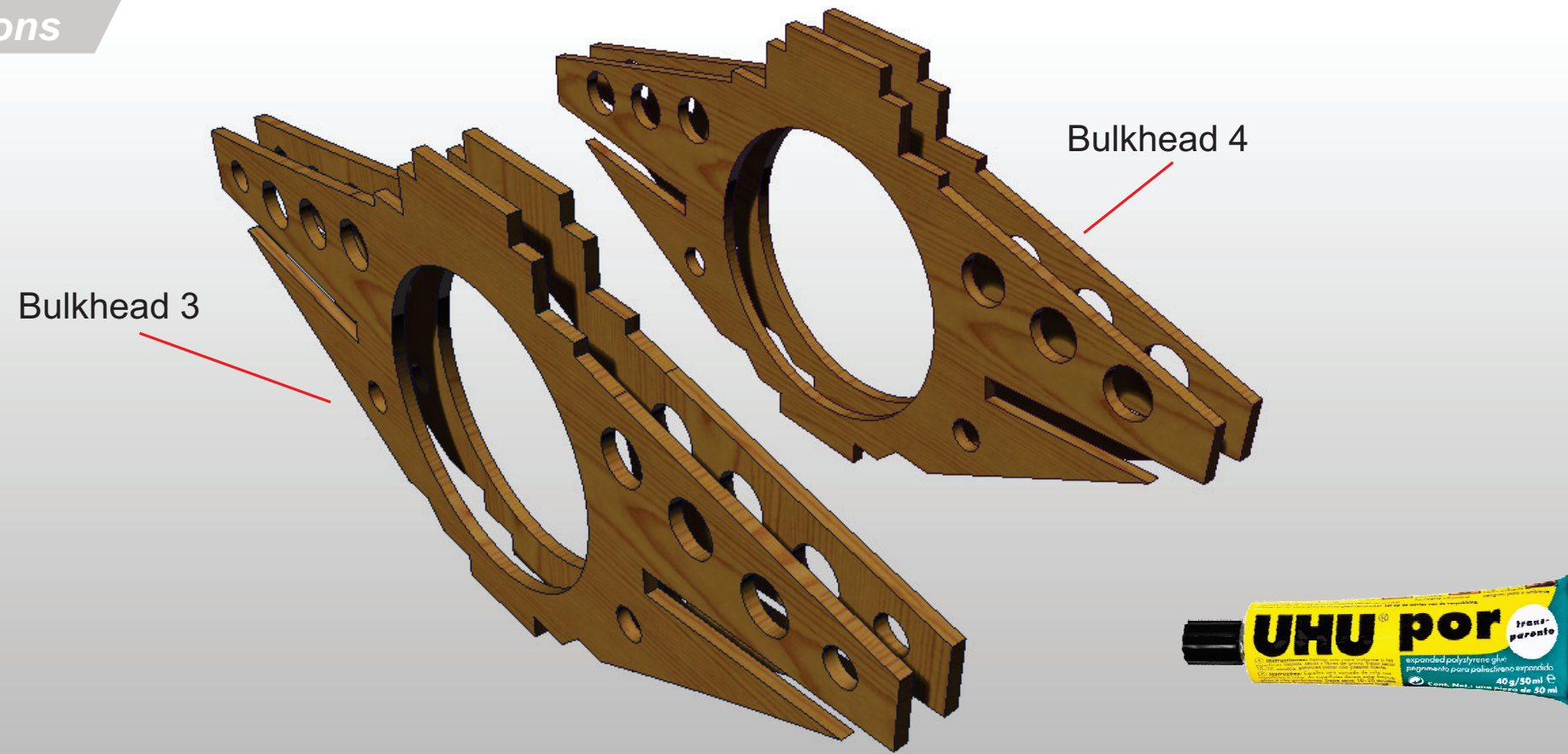


Glue the **Lower fuselage corner reinforcers** onto the assembly.

Using a knife, trim away a 6x6mm chamfer either side of the wing spar slots.

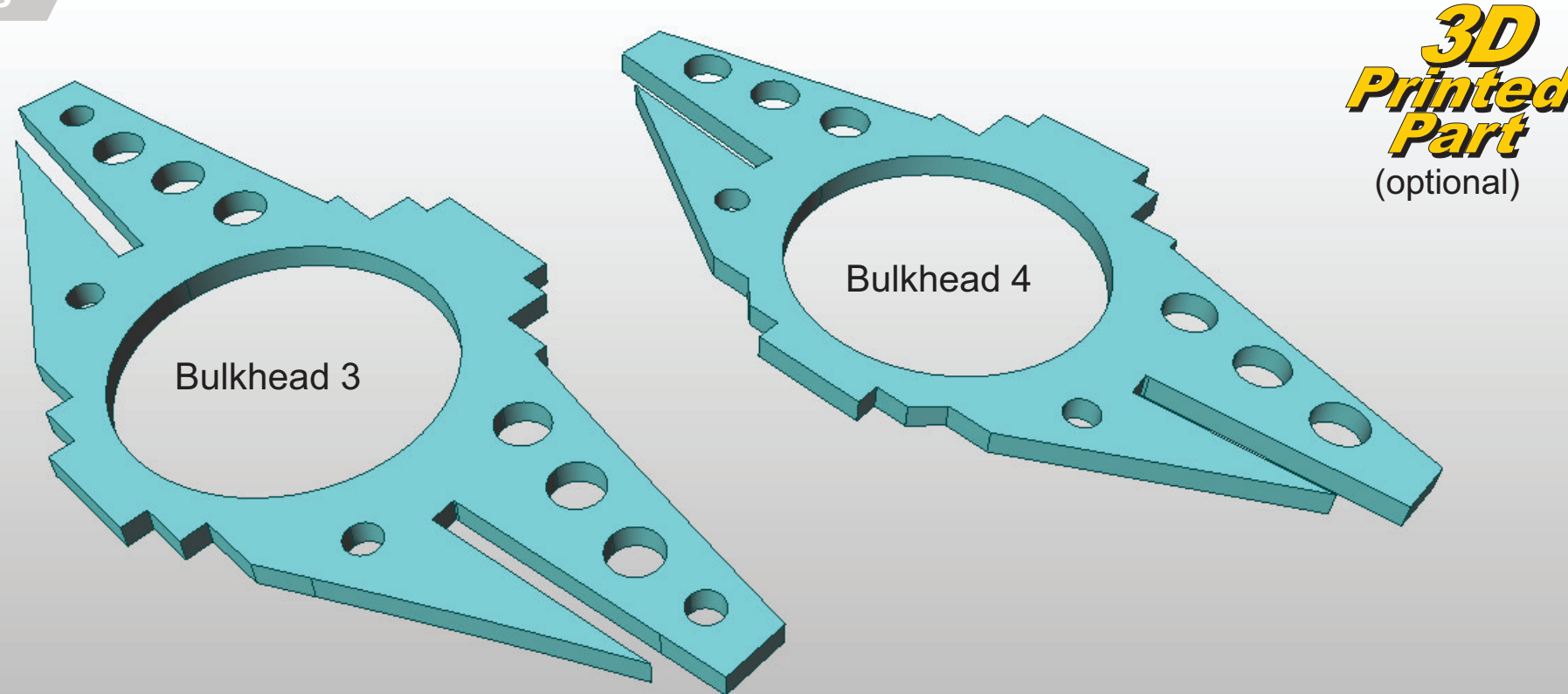


All versions

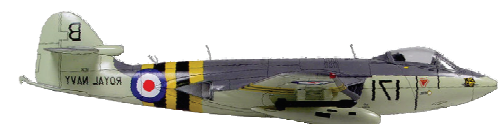


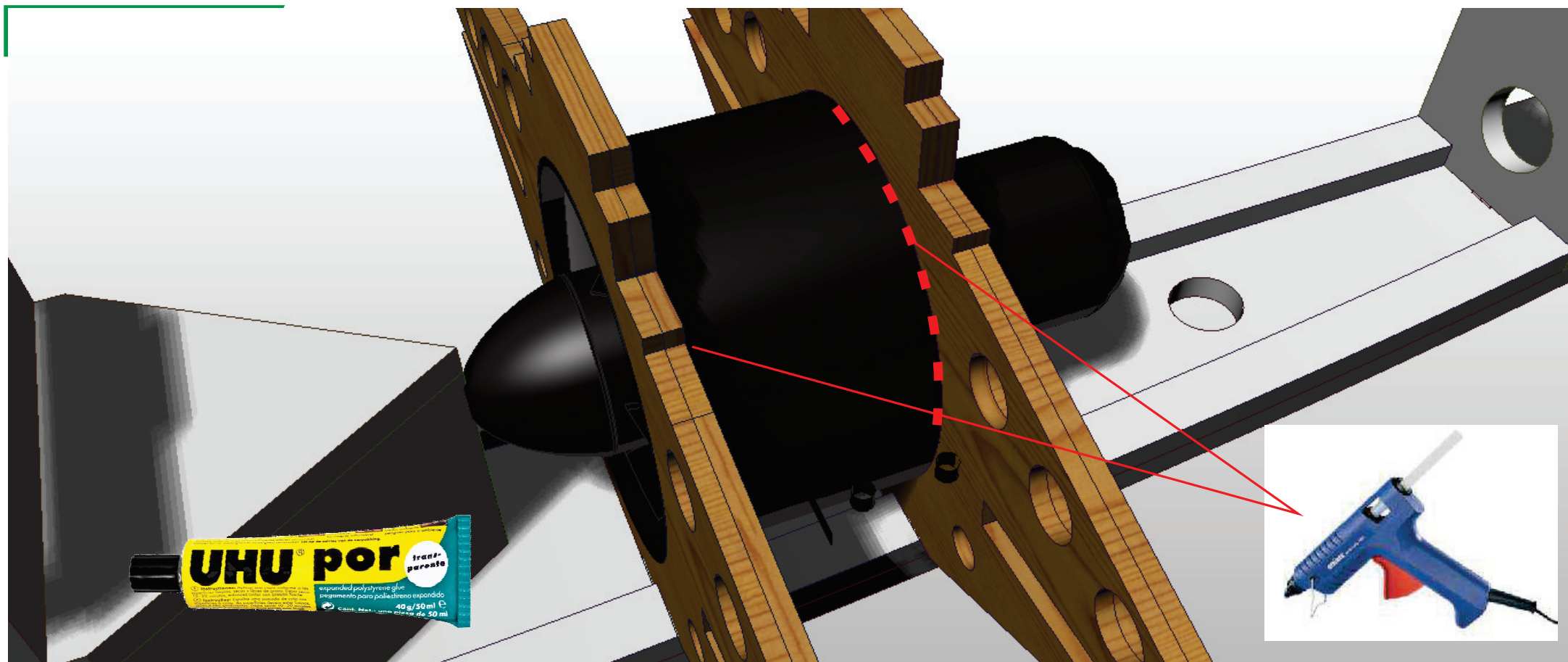
Create **Bulkhead 3** and **Bulkhead 4**, by glueing two identical 3mm liteply parts together.

All versions



Alternatively you can 3D print these parts.



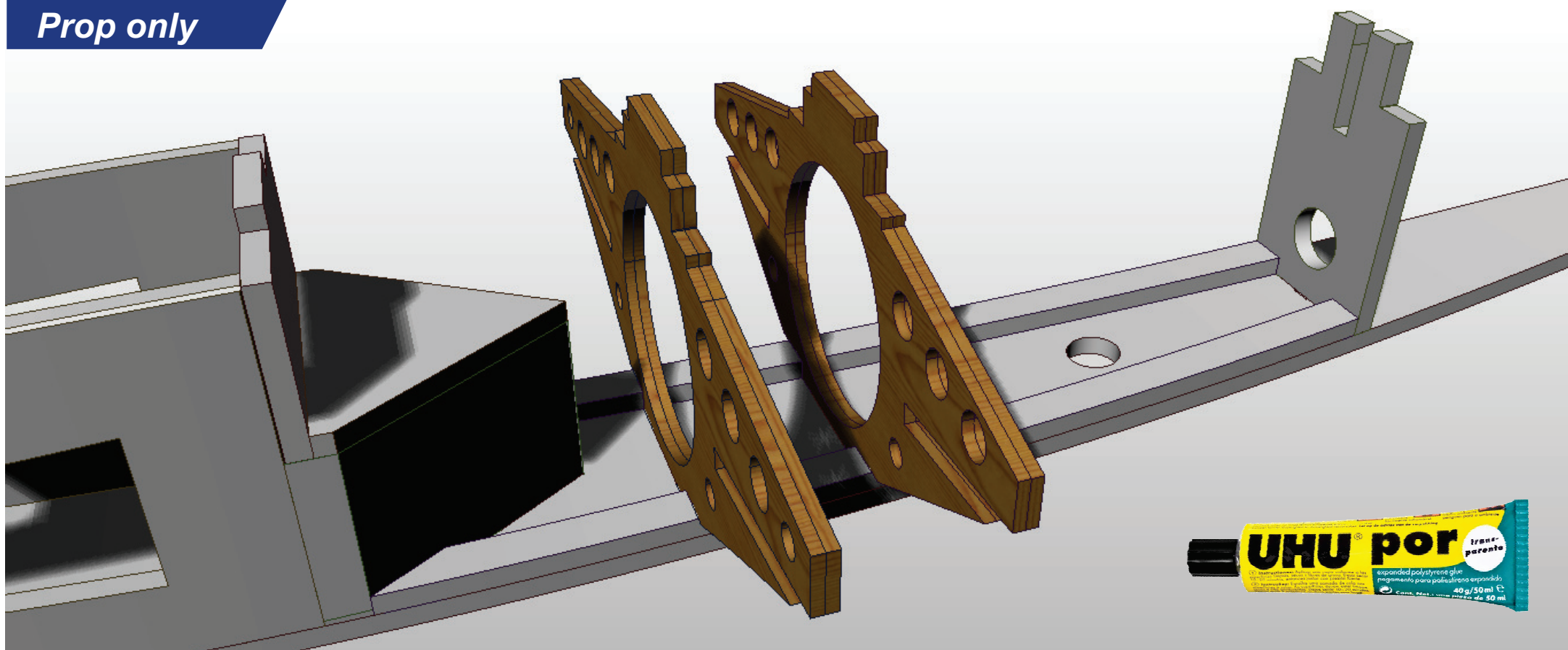


EDF version

Fit the EDF unit into the bulkheads, then glue in place using hot melt glue or silicone sealant for improved noise reduction.

Glue to the airframe using UHU Por.

Prop only

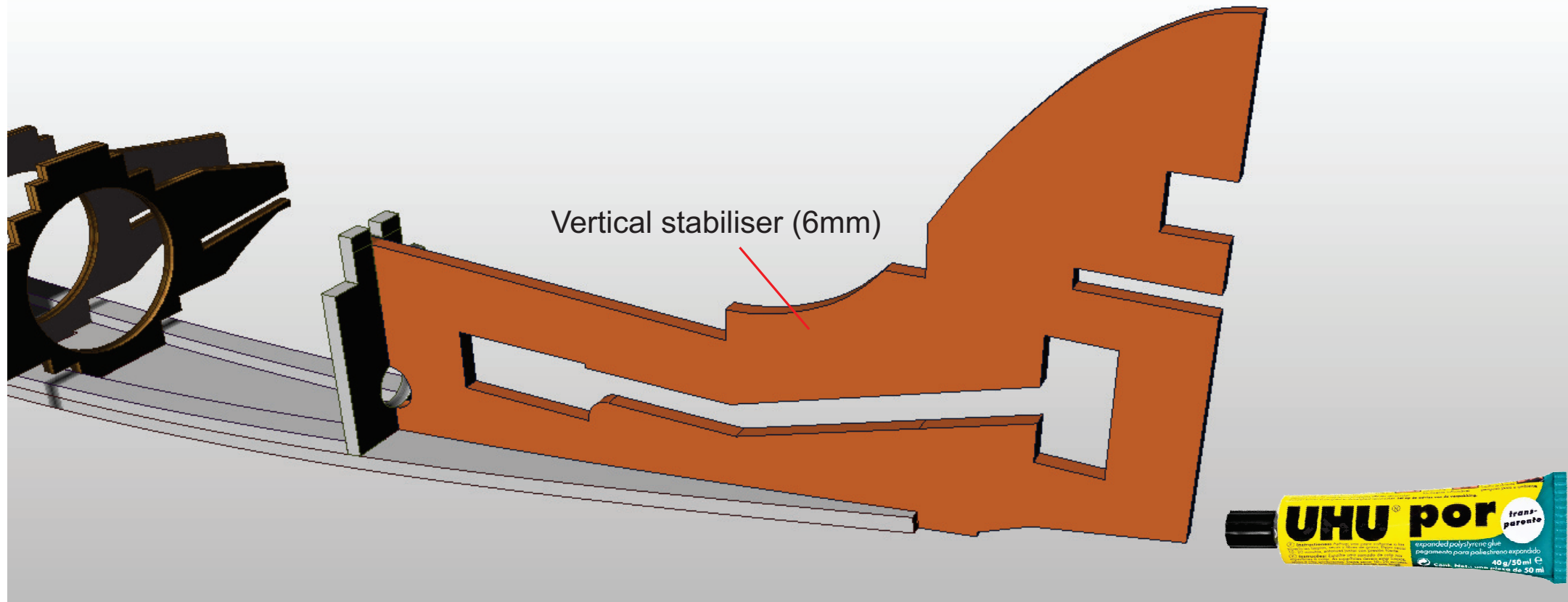


Prop version

Glue to the airframe using UHU Por.

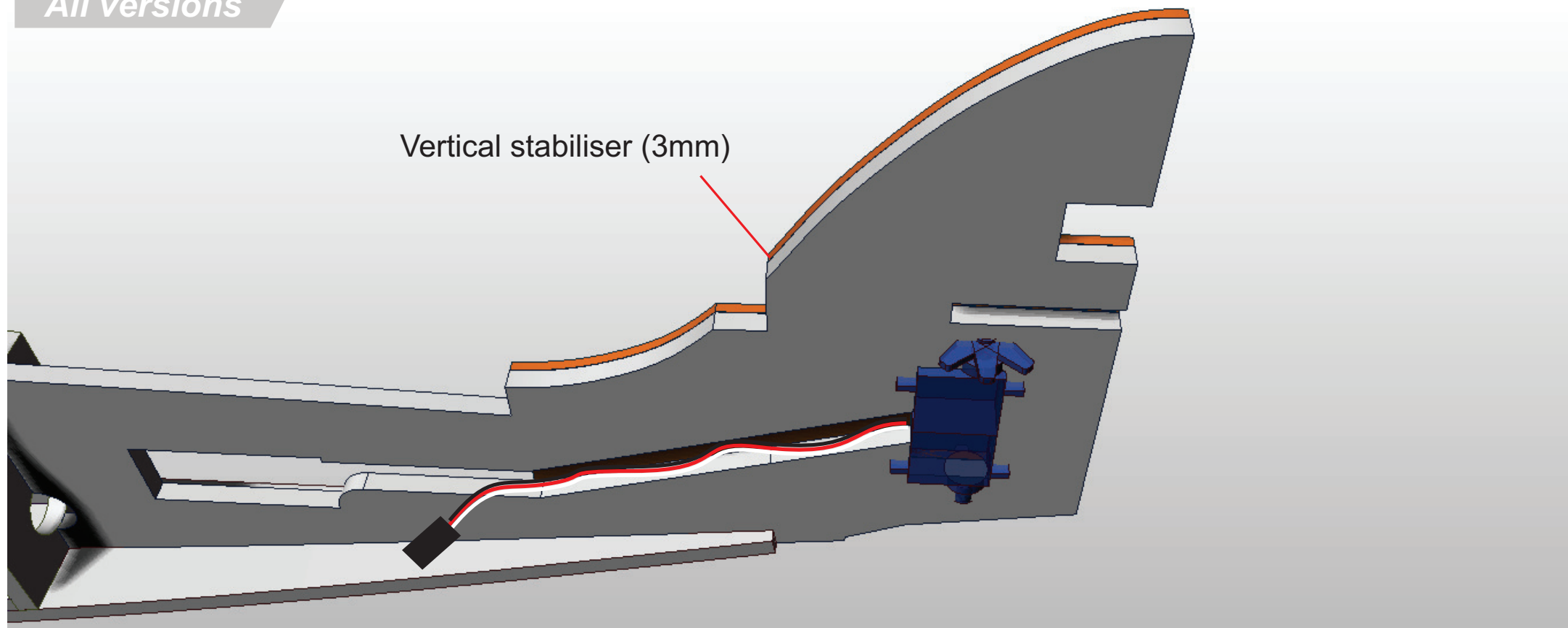


All versions



Glue the **Vertical stabiliser (6mm)** to the assembly, using the three slots as a guide.

All versions

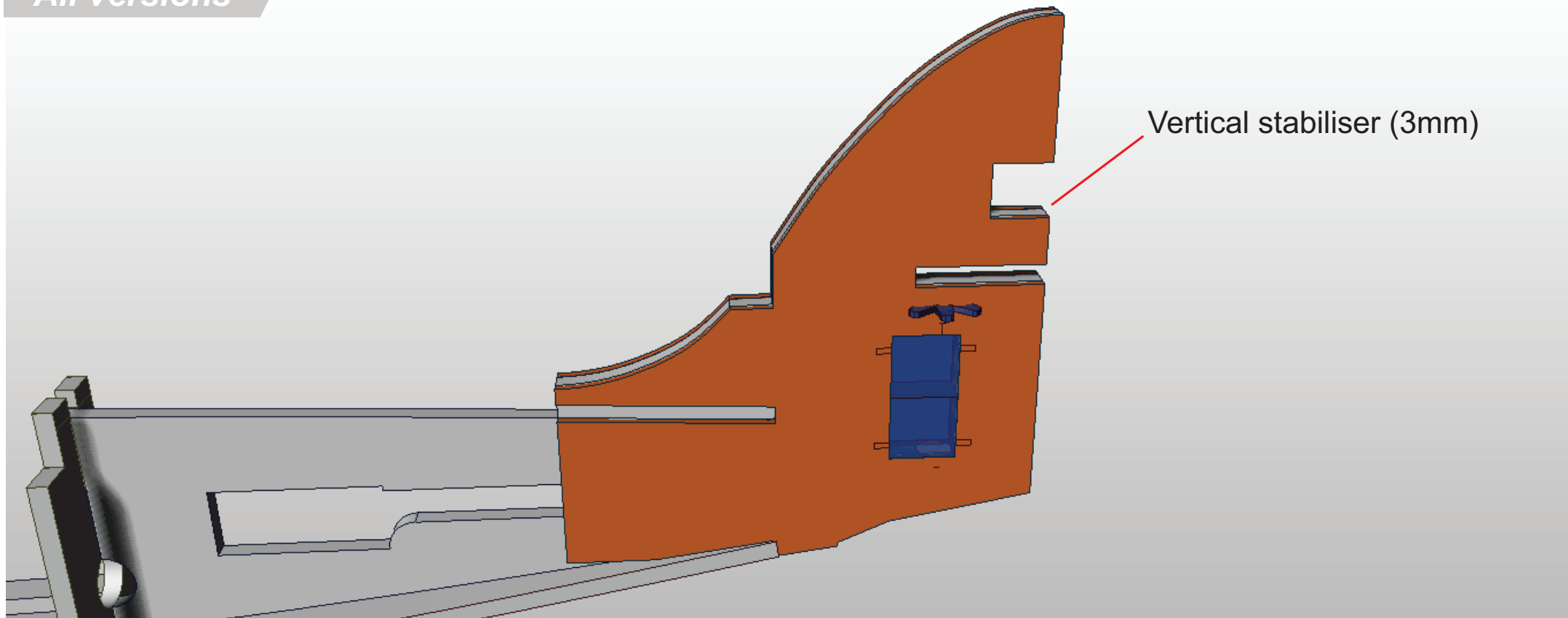


Glue one of the two Vertical Stabilisers (3mm) to the Vertical Stabiliser (6mm).

Ensure your servos are centred, then hot-glue the Horizontal stabiliser servo (top) and the Rudder servo (bottom) into the indicated holes, trimming to suit your servos and run the cables through the tunnel.

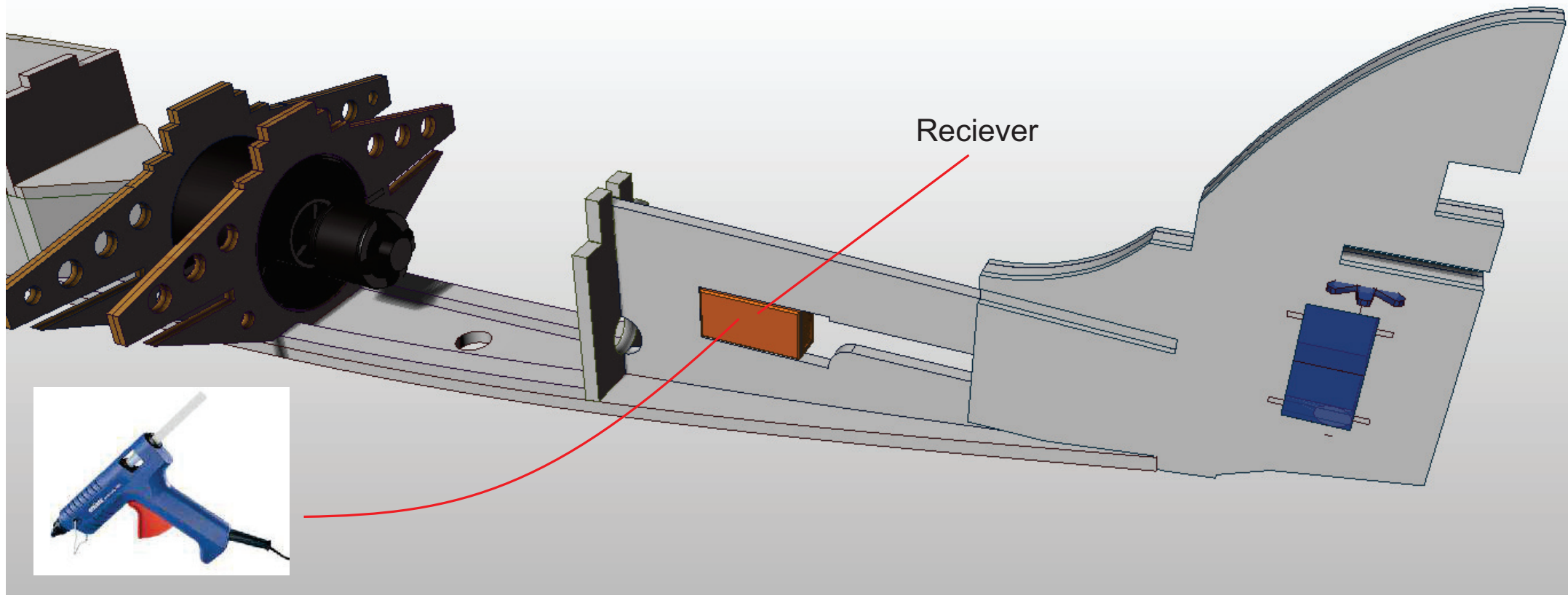


All versions

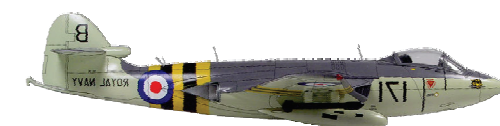


Glue the other of the two Vertical Stabilisers (3mm) to the Vertical Stabiliser (6mm).

Ensure your servo arms move freely, trim away the depron as required.

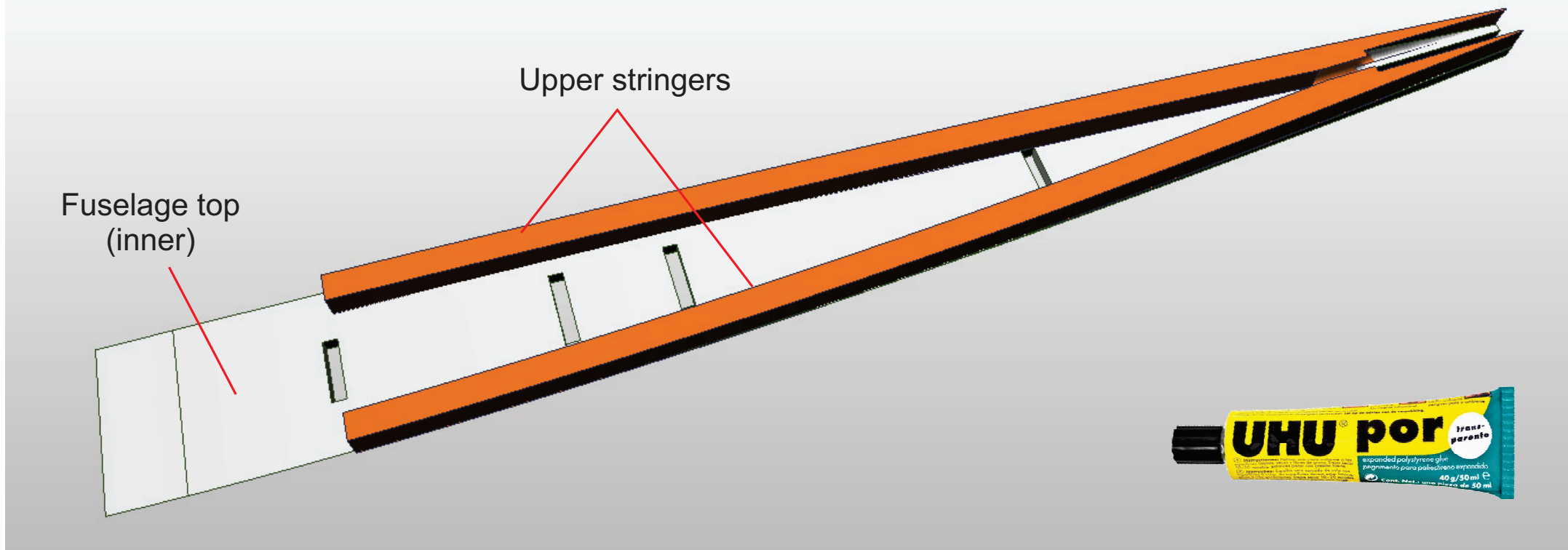


Trim the slot to match your receiver, then suspend it within the **Vertical stabiliser (6mm)** piece. Secure using Hot melt glue.



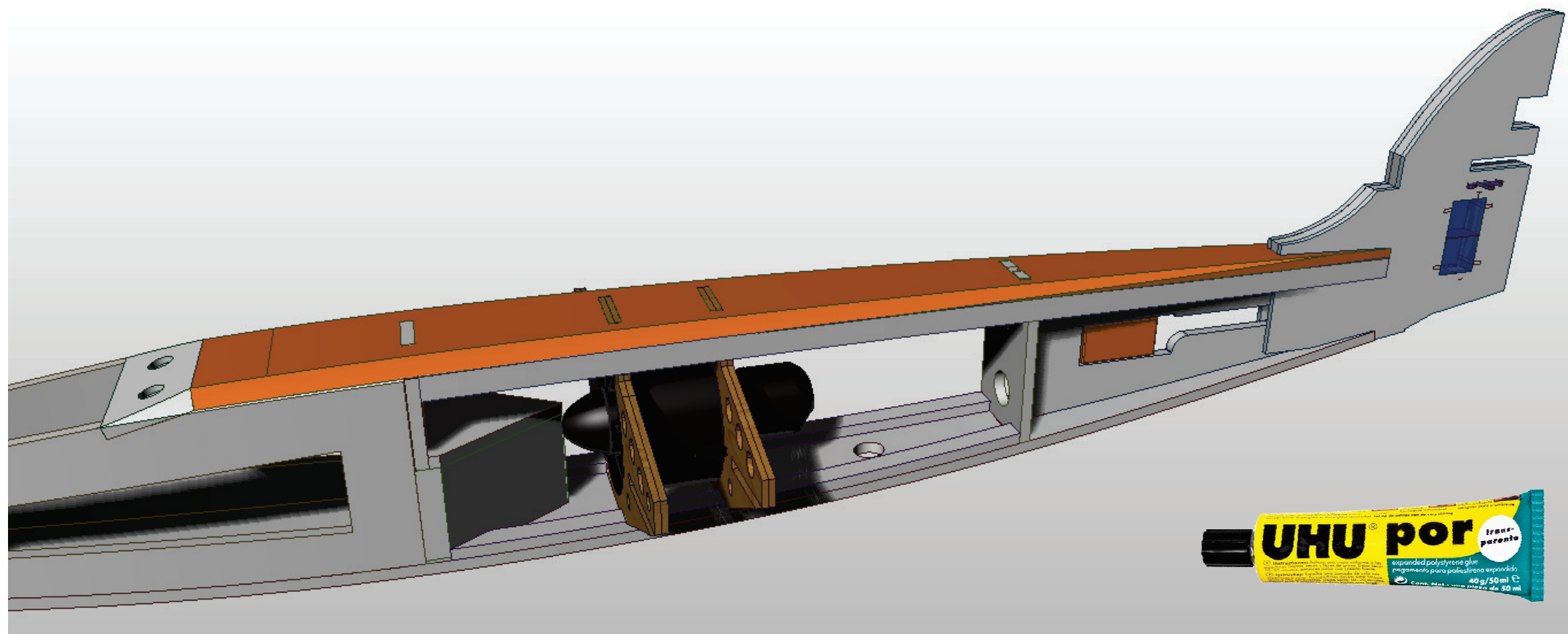
All versions

VIEW FROM UNDERSIDE

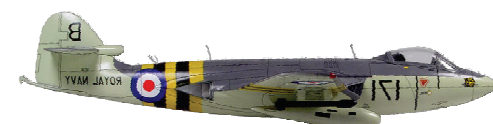


Glue the 4x6mm **upper stringers** together to make two parts.

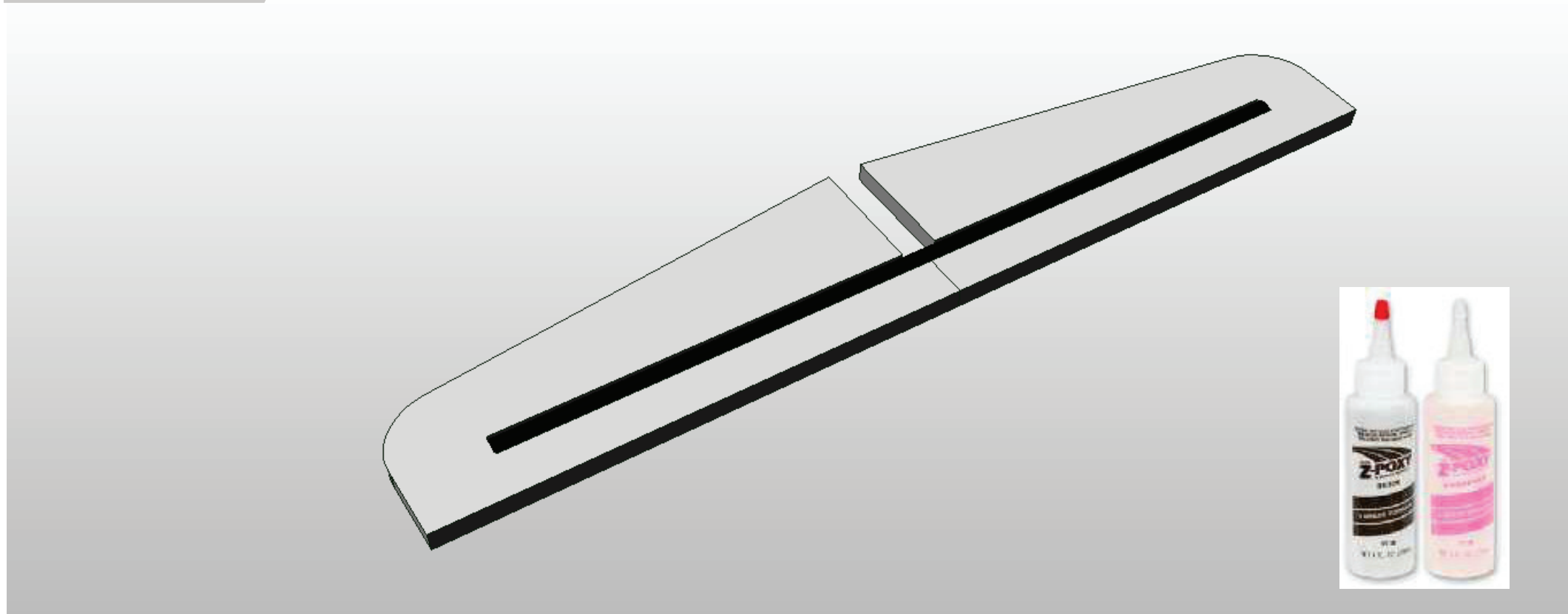
Glue the **Upper stringers** to the **Fuselage top (inner)**



Glue the fuselage top assembly to the main assembly.

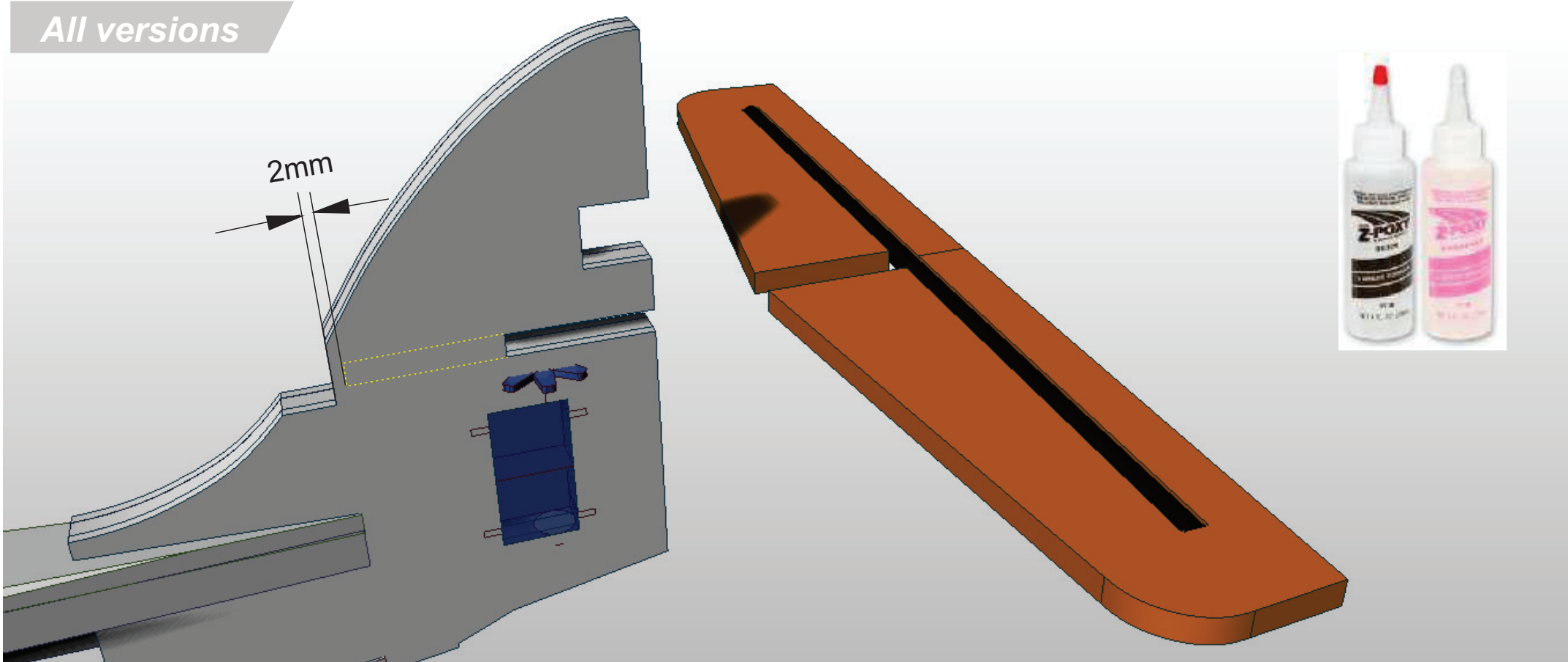


All versions



Using masking tape top and bottom to produce a smooth infill, glue the 6mm carbon spar into the **Horizontal stabiliser** using epoxy.

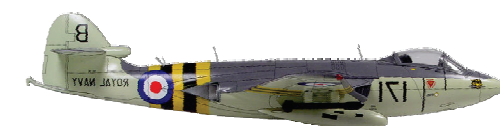
All versions



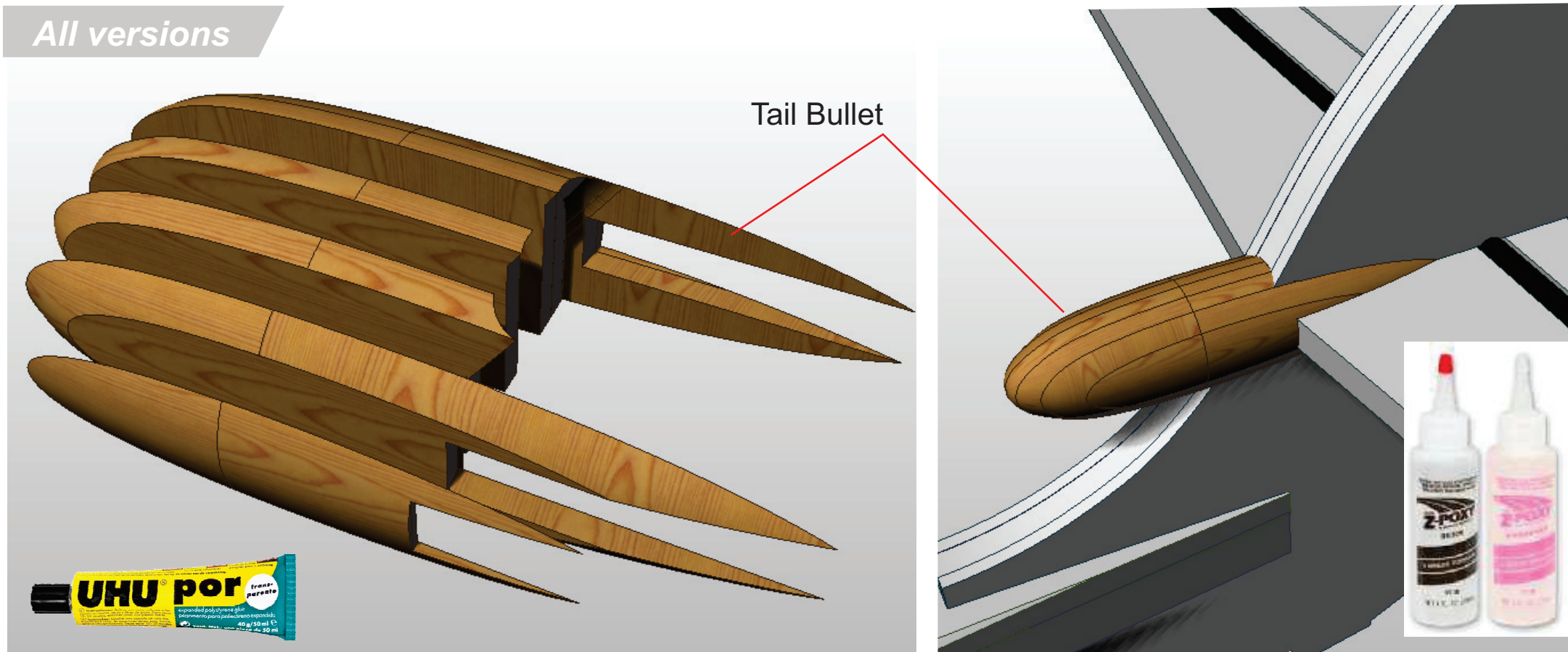
Glue the **Horizontal Stabiliser** into the vertical stabiliser slot using Epoxy.

Ensure a 90 degree angle.

The front edge of the **horizontal stabiliser** should be 2mm rearwards of the stabiliser bullet recess.



All versions

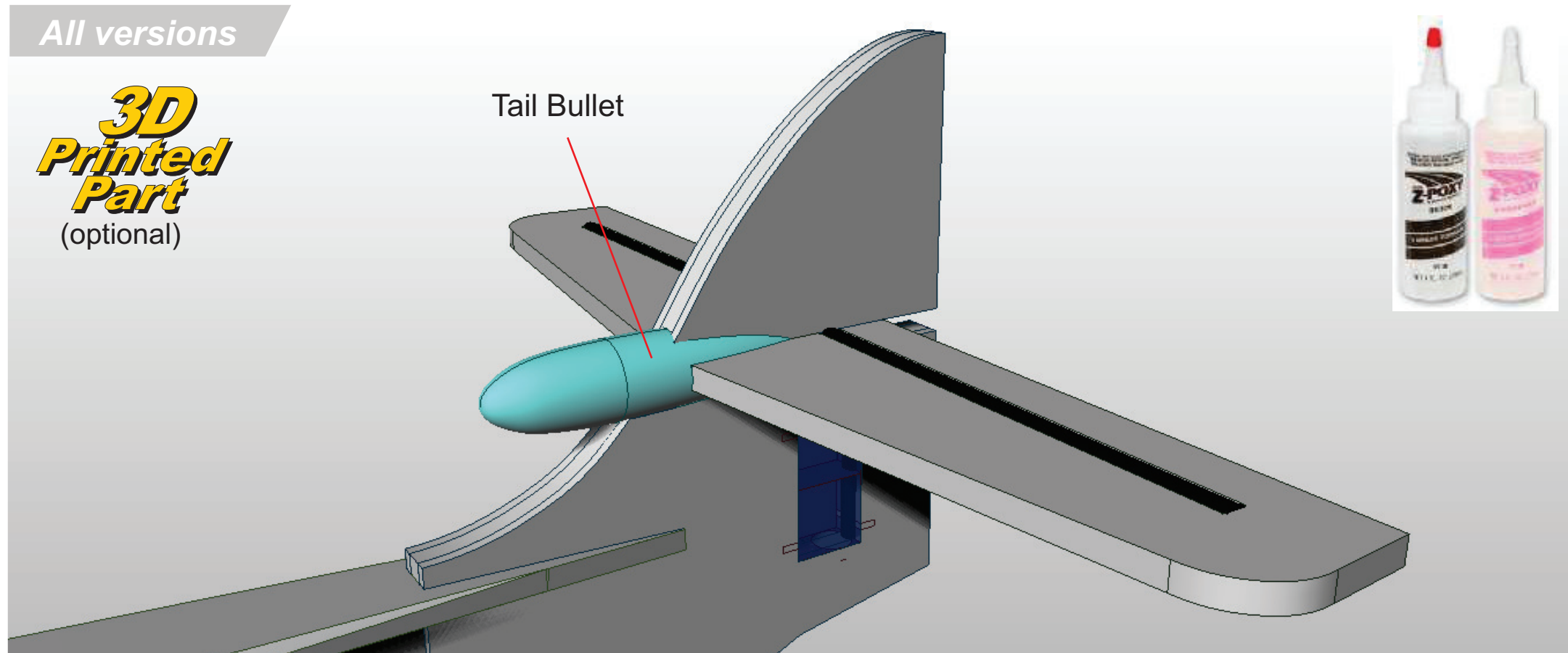


Laminate and shape the layers of the **Tail Bullet** from 3mm Lite Ply using UHU Por.

Glue in place using Epoxy.

All versions

3D Printed Part
(optional)

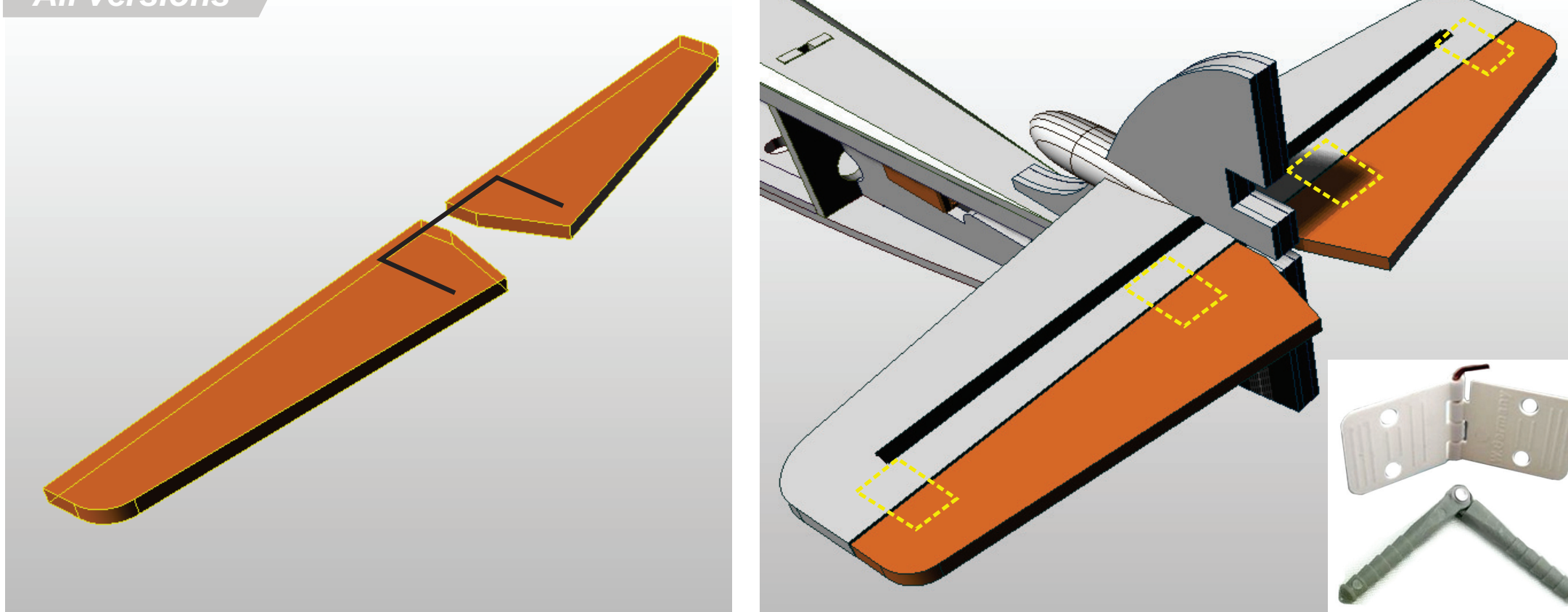


Alternatively, 3d print the two parts of the **Tail bullet** glue together using a light coat of epoxy.

Glue to the vertical stabiliser also using epoxy.



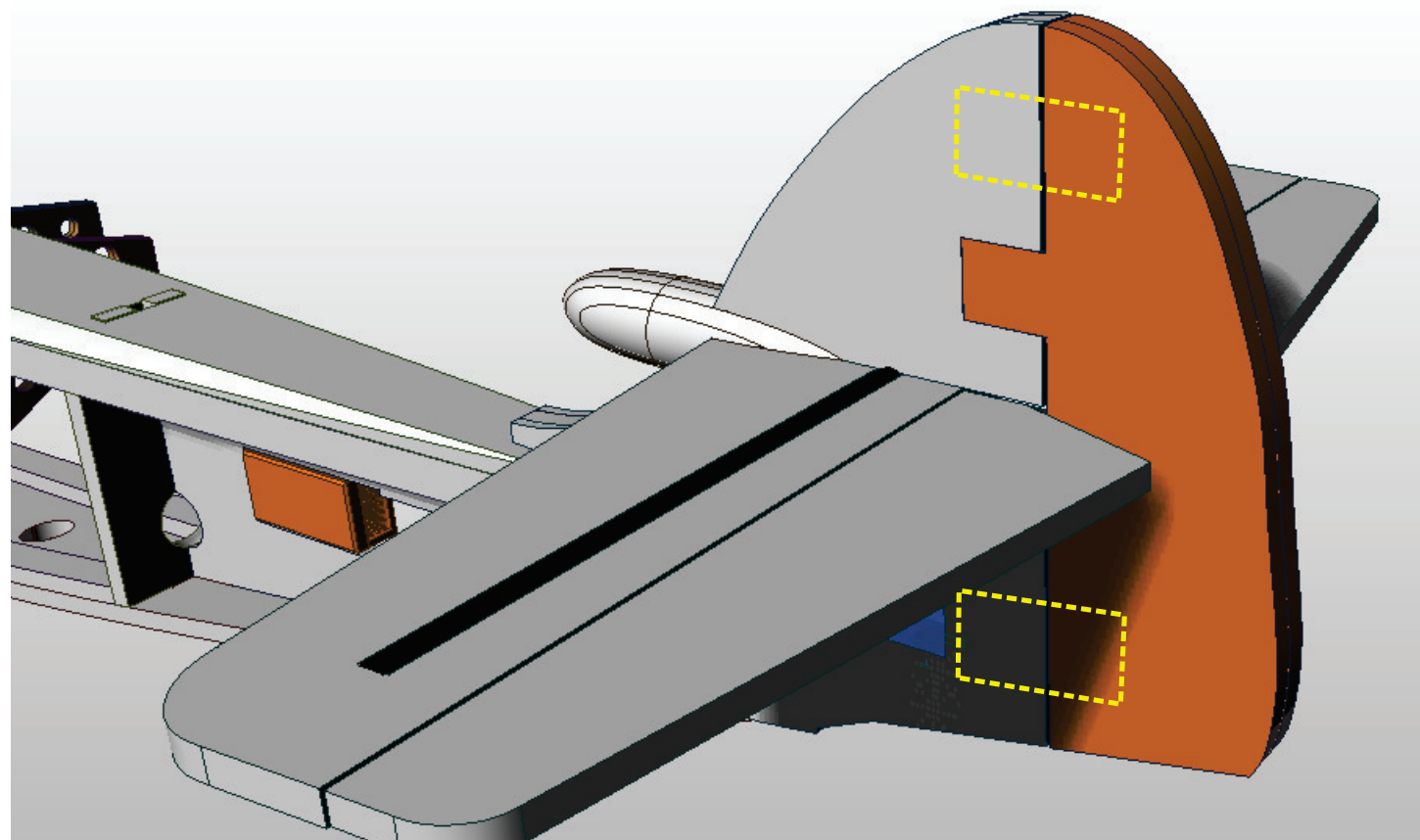
All versions



Bend Piano wire into a u-shape and push into the depron elevators to link them. Glue in place using epoxy.

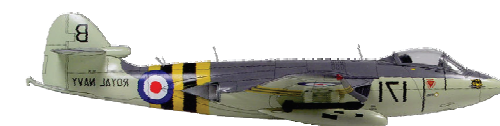
Then using your preferred hinge method, attach the elevators to the aircraft.

Create a control horn and connect to the upper servo arm.

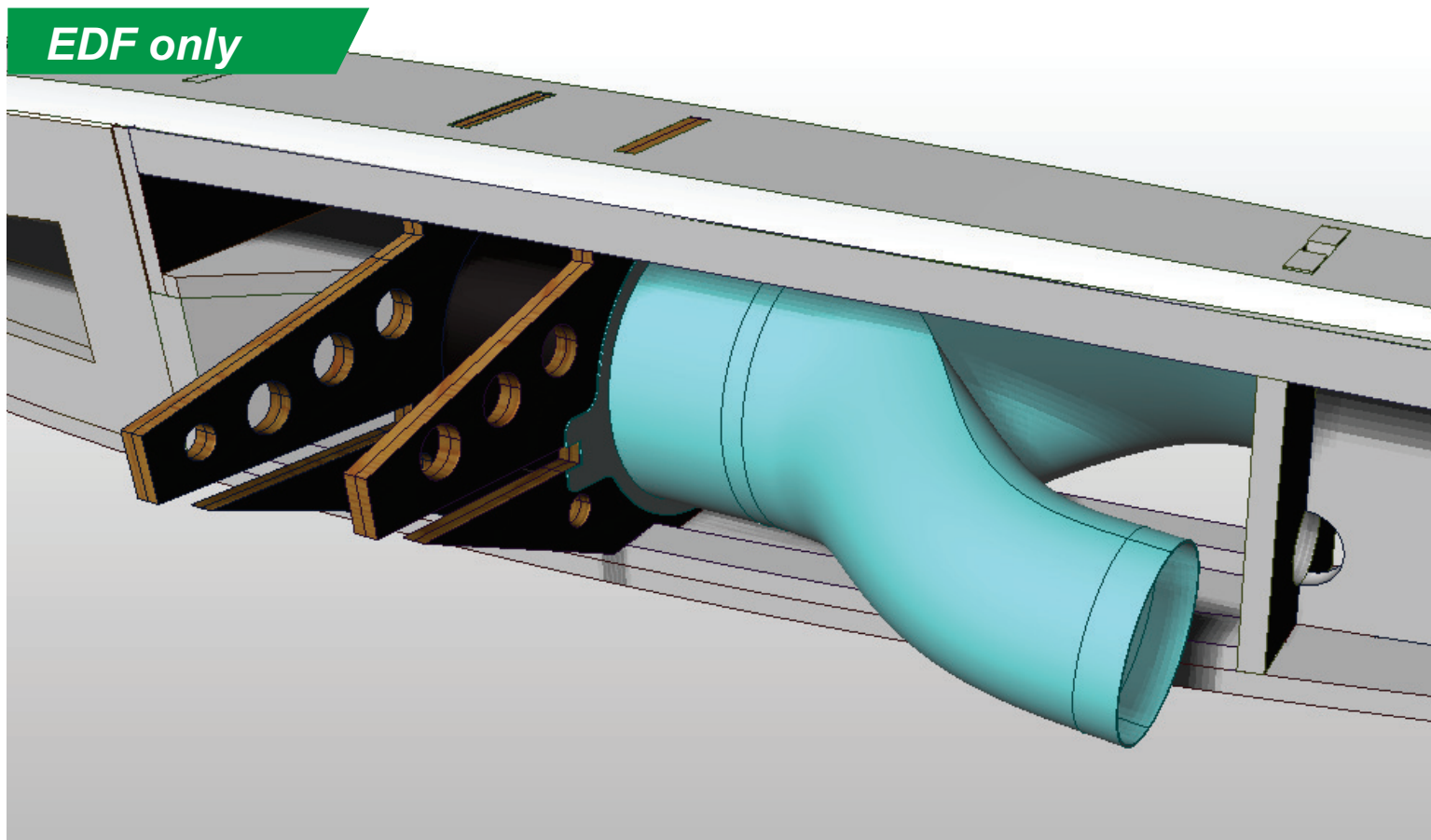


Sand the vertical stabiliser to shape representing this aerofoil shape, and attach to the assembly using your preferred hinge method.

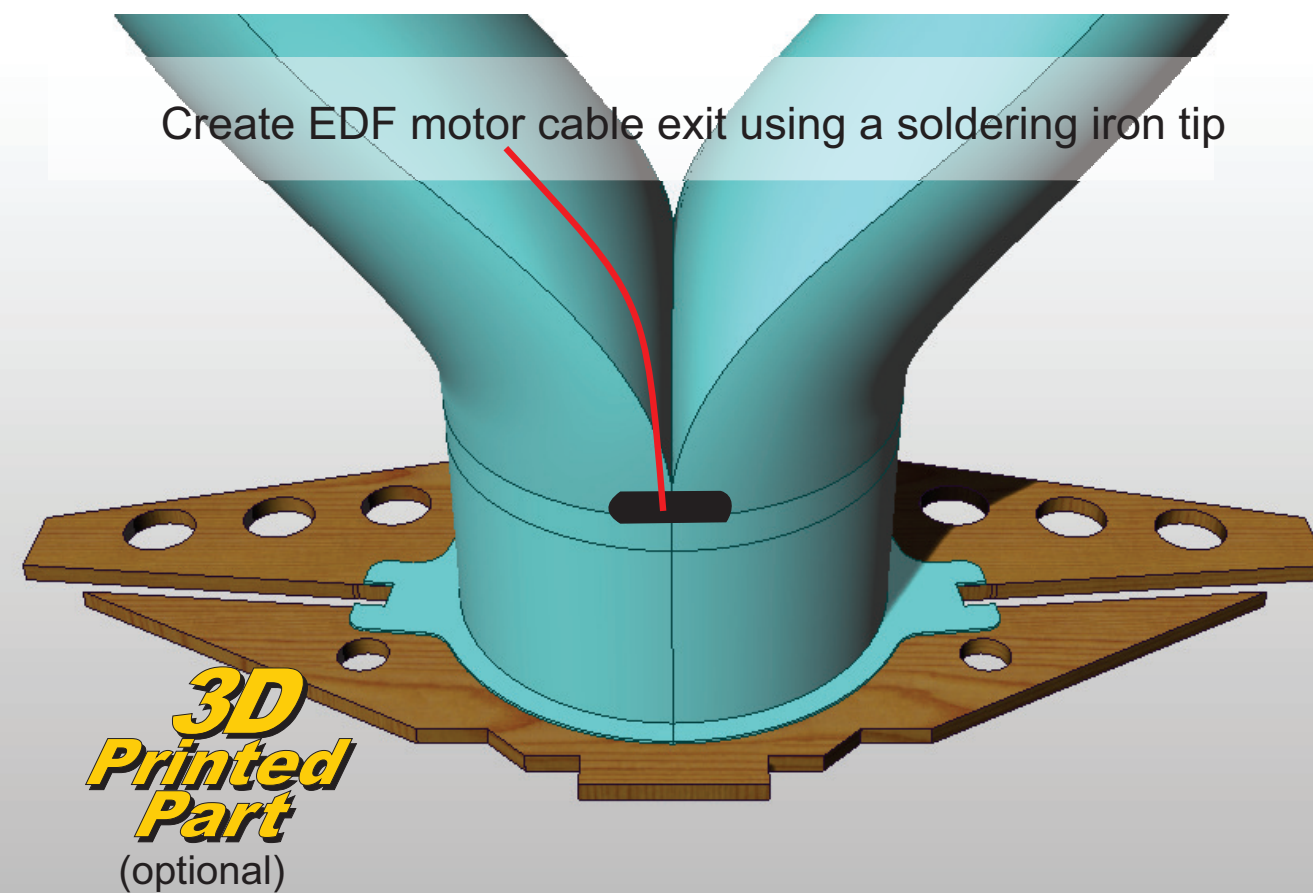
Connect the rudder to the the lower servo using a constructed control horn.



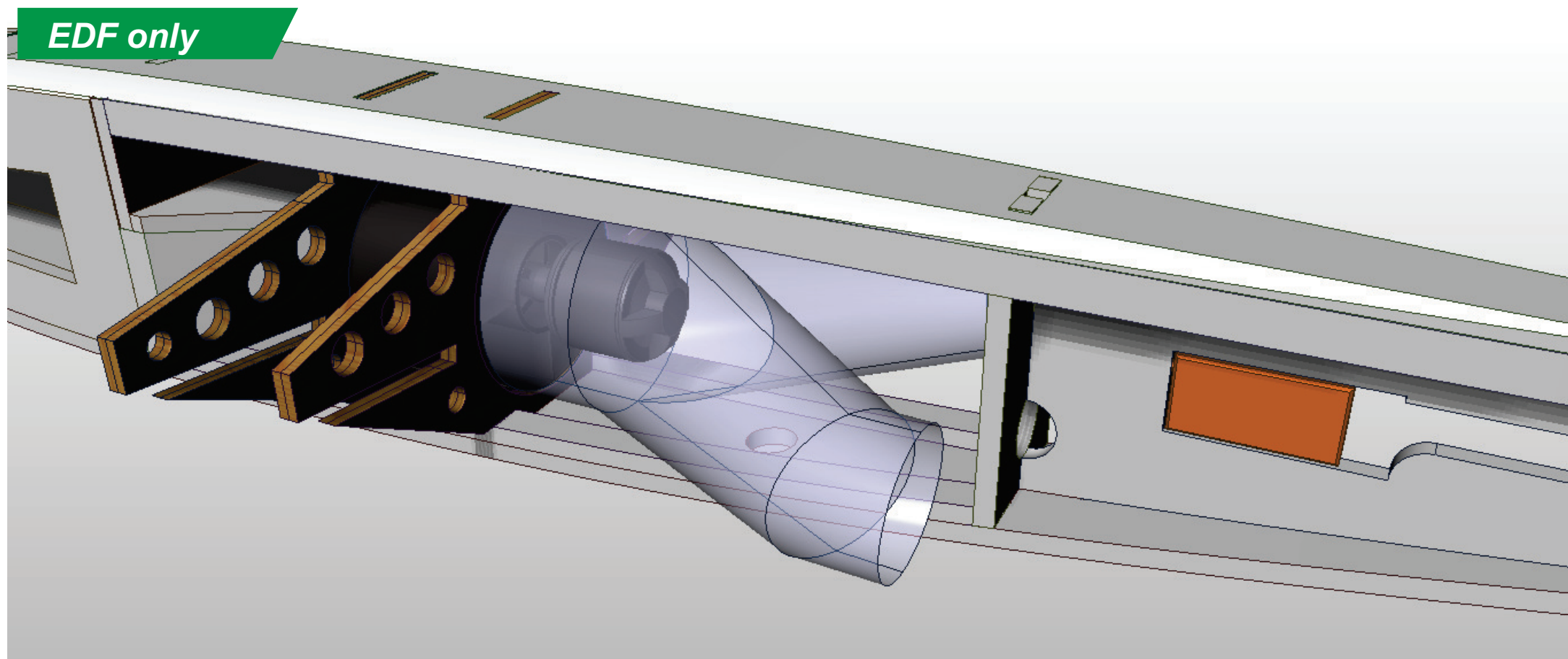
EDF only



Create EDF motor cable exit using a soldering iron tip



EDF only

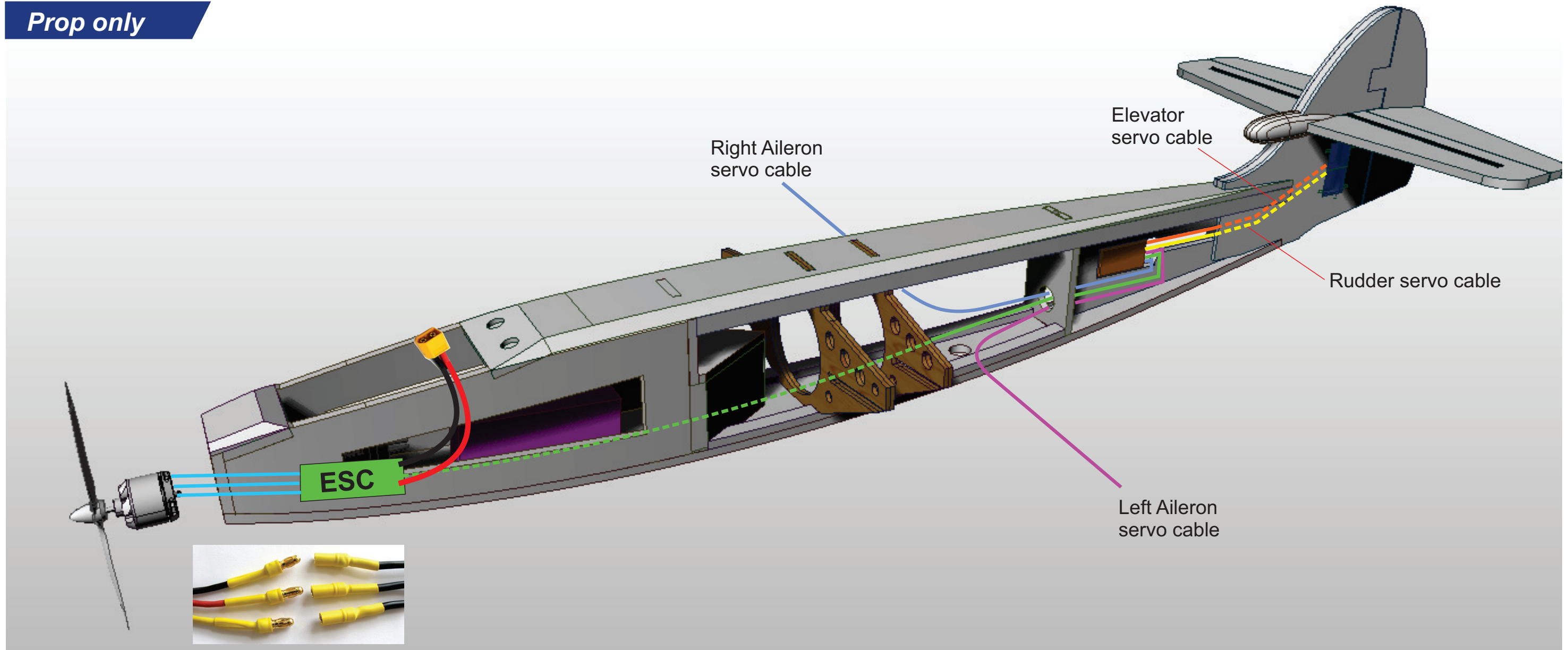


Either make a 3D printed bifurcated thrust tube, or fabricate one using plastic sheet.

3D Printed version :
align the print to the bulkhead using the indicators shown.
Glue using UHU por.

Fabricated version :
Refer to drawings for details





PROP VERSION :

Wire up the fuselage as shown. Use bullet connectors on the motor as it is not the current stage to fix the motor to the fuselage yet.

Create a hole in the triangular bulkheads for the ESC servo cable to pass through. Use servo extension cables where necessary.

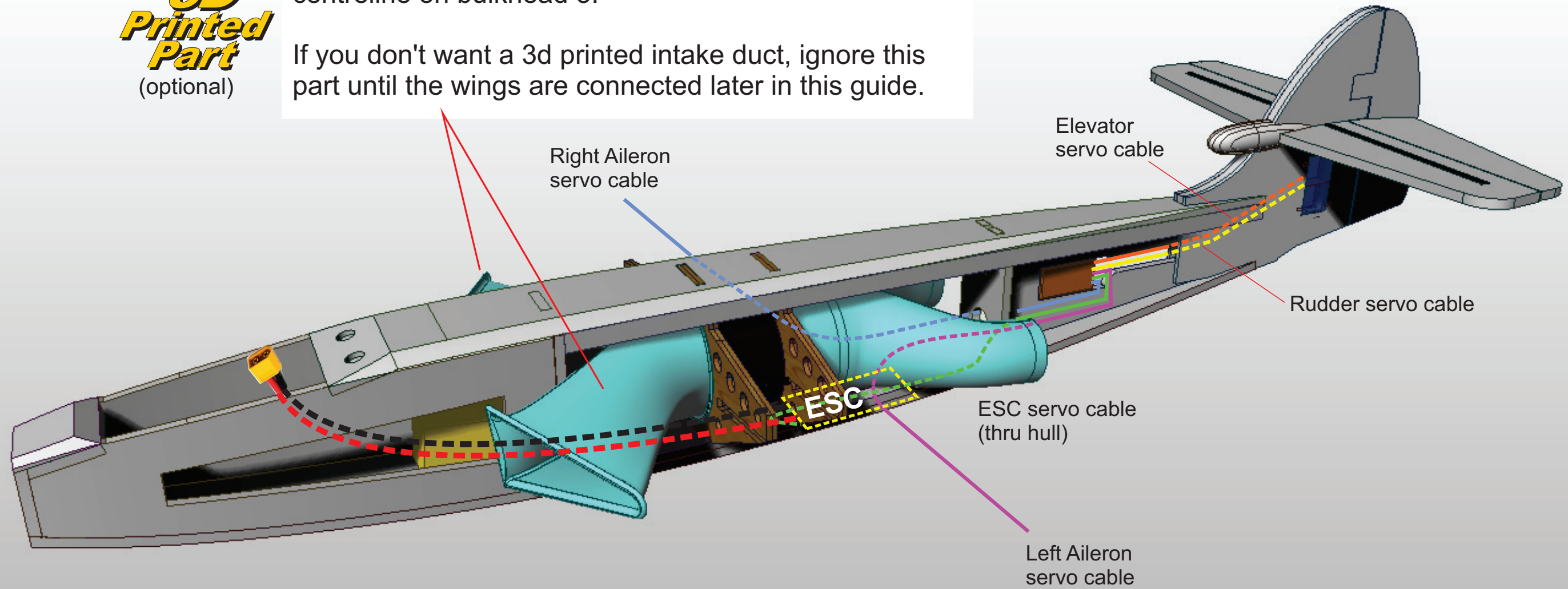


EDF only

**3D
Printed
Part**
(optional)

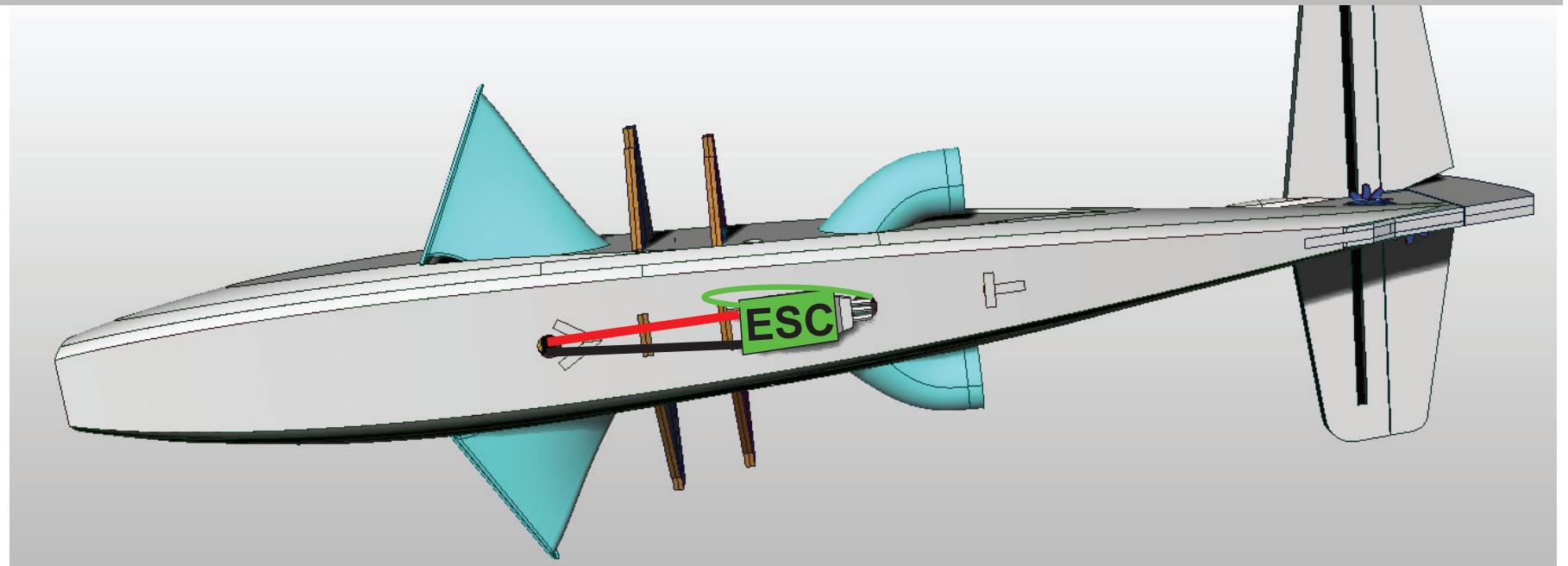
3D printed intake ducts - Glue carefully on a marked centreline on bulkhead 3.

If you don't want a 3d printed intake duct, ignore this part until the wings are connected later in this guide.

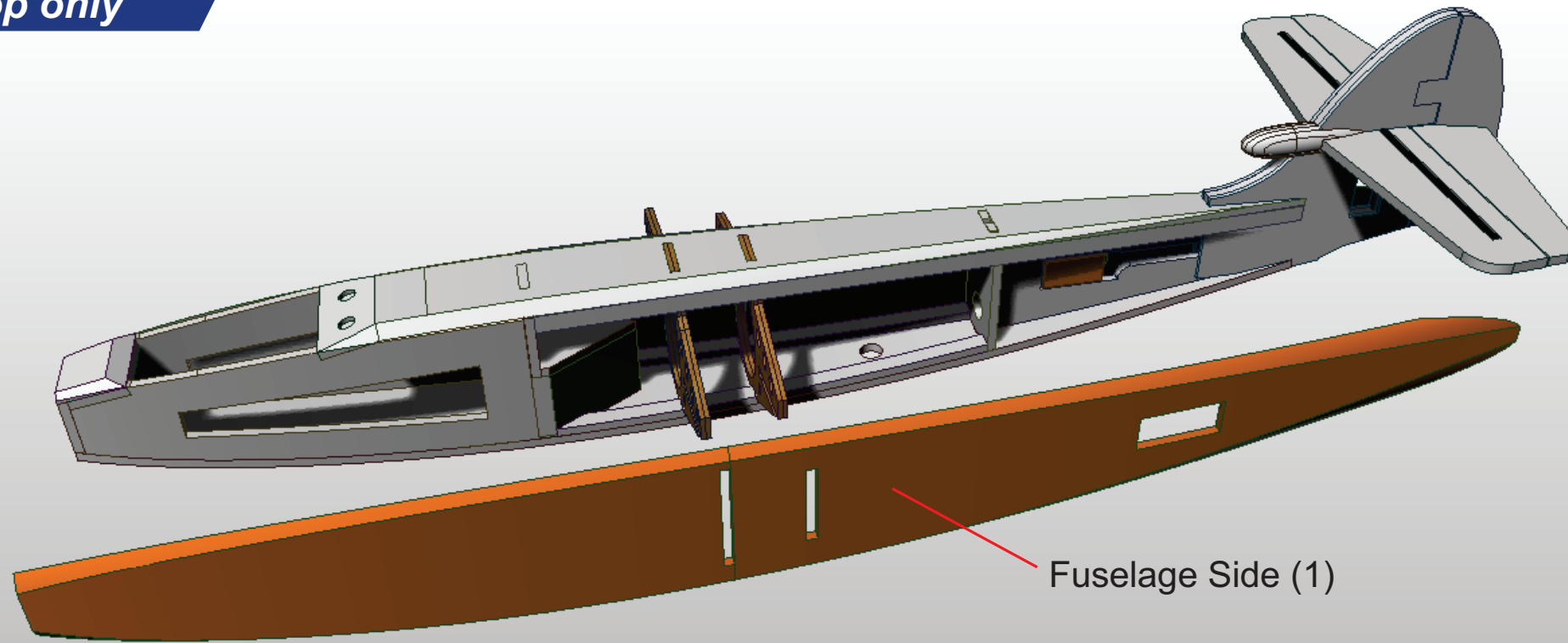


EDF Version :
Connect the servo cables as shown, using servo extension cables where required.

Run the ESC under the belly. If you have a chunky ESC, then cut it into the belly to prevent damage on landings.



Prop only

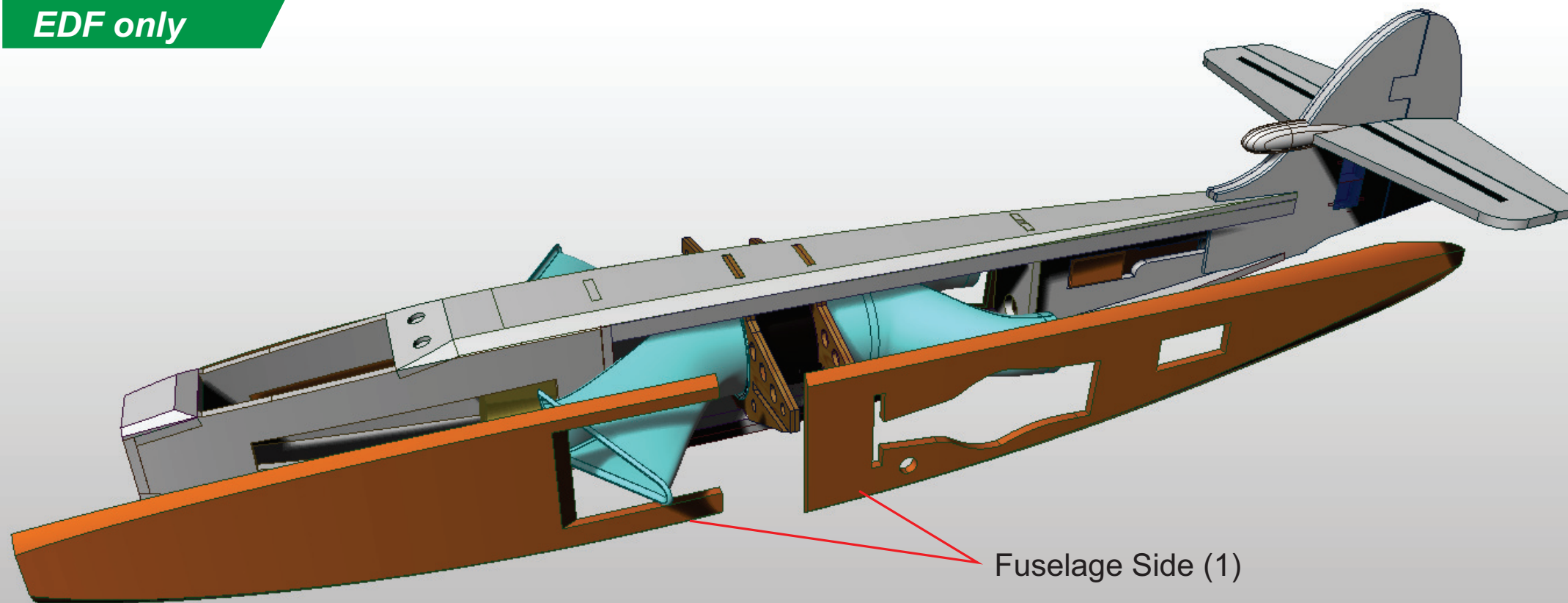


Prop version :

Slide the **Fuselage side (1)** over bulkheads 3 & 4 and glue into place



EDF only

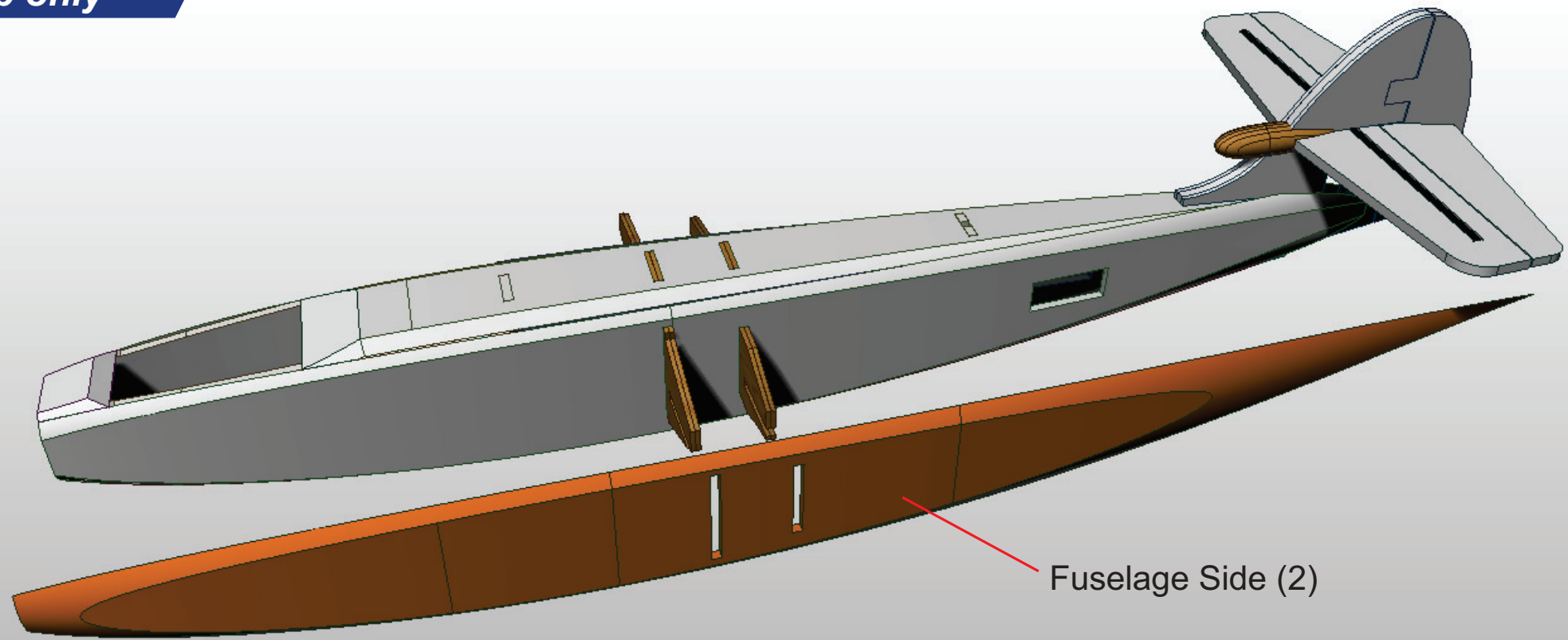


EDF version :

Split the **Fuselage side (1)** into two pieces and fit over bulkheads 3 & 4 and glue into place



Prop only

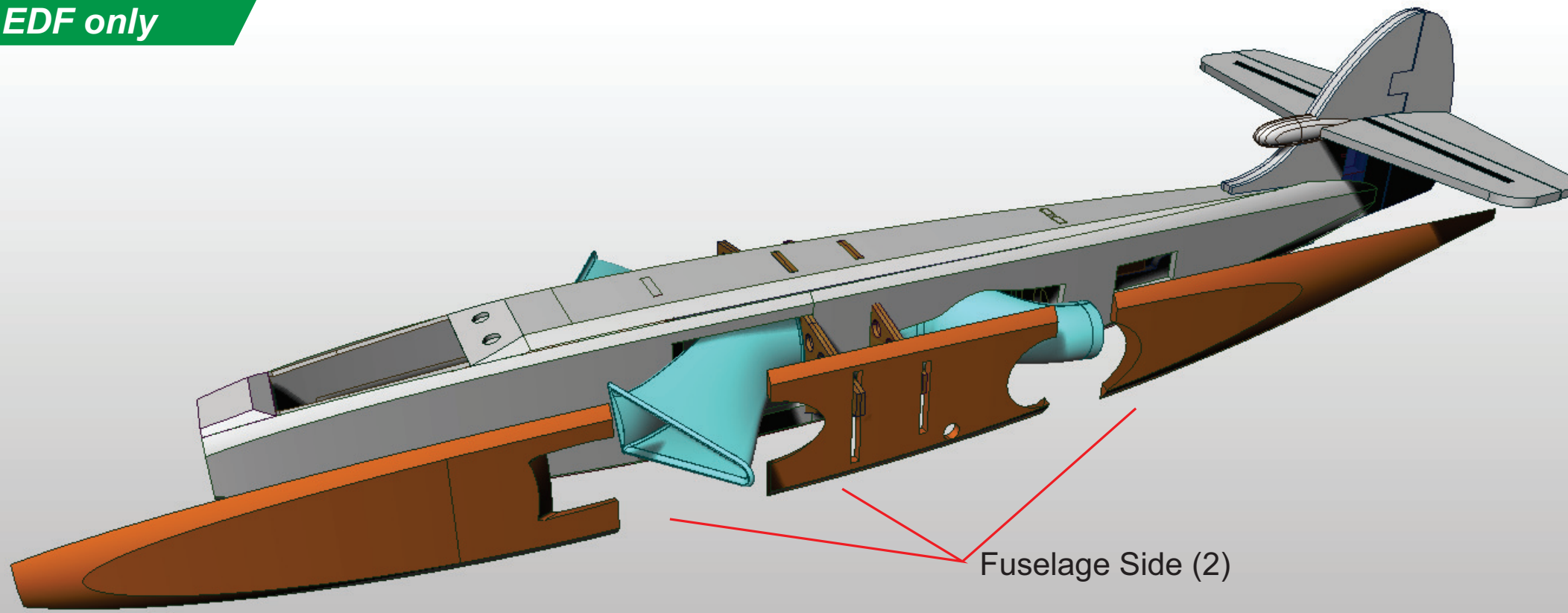


Prop version :

Slide the **Fuselage side (2)** over bulkheads 3 & 4 and glue into place

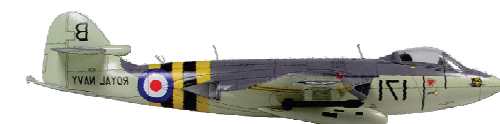


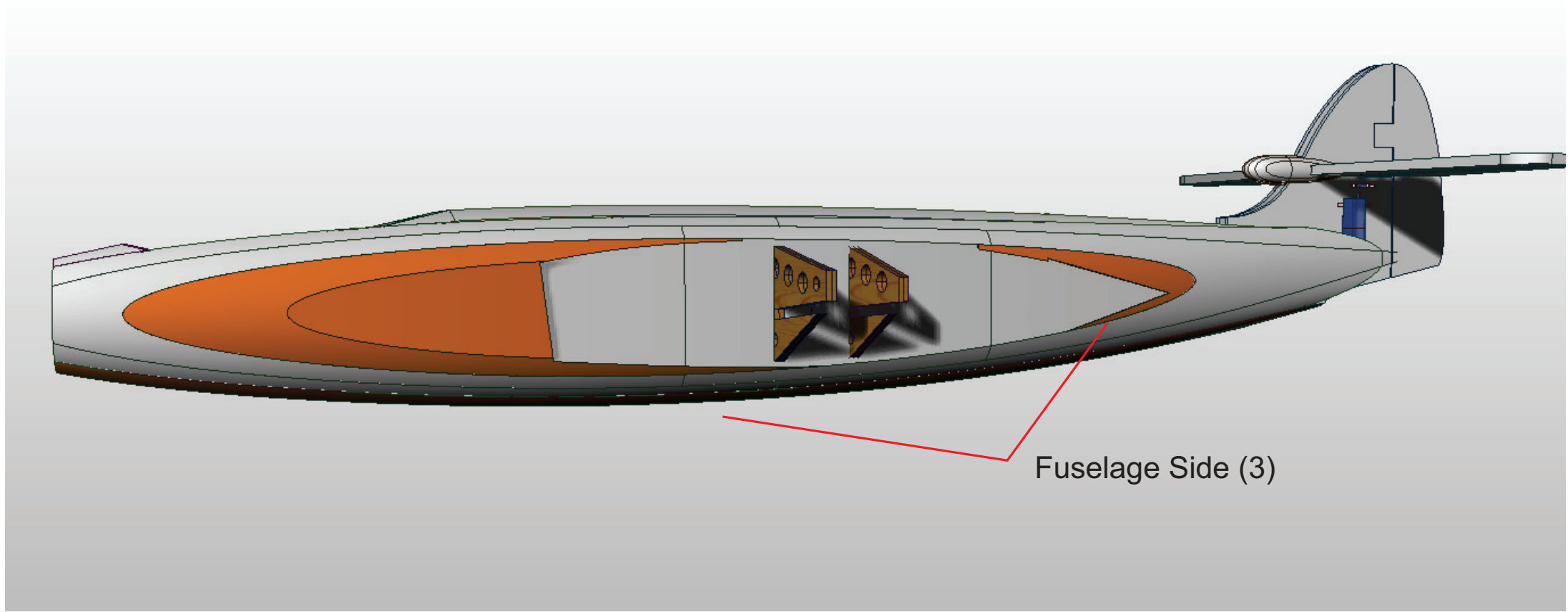
EDF only



EDF version :

Split the **Fuselage side (2)** into three pieces and fit over bulkheads 3 & 4 and glue into place



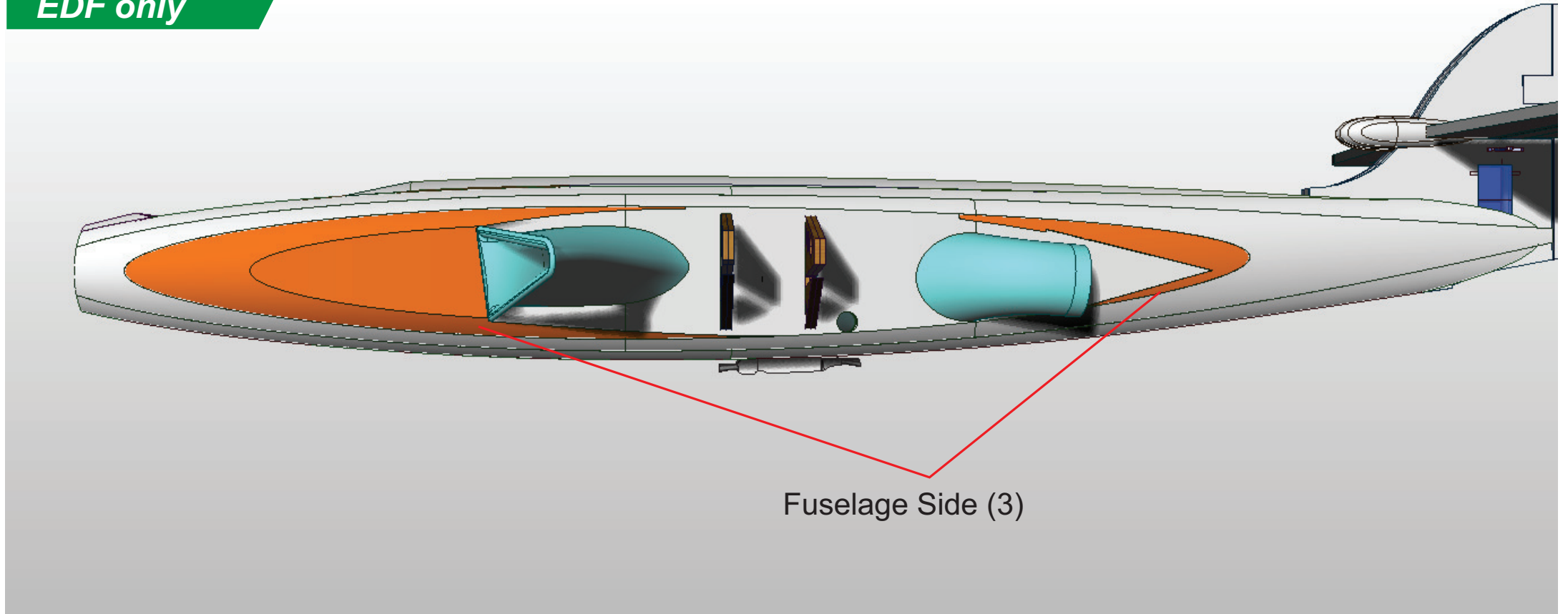


Prop version :

Align the **Fuselage side (3)** to the marked edge of the previous panel and glue in place.



EDF only



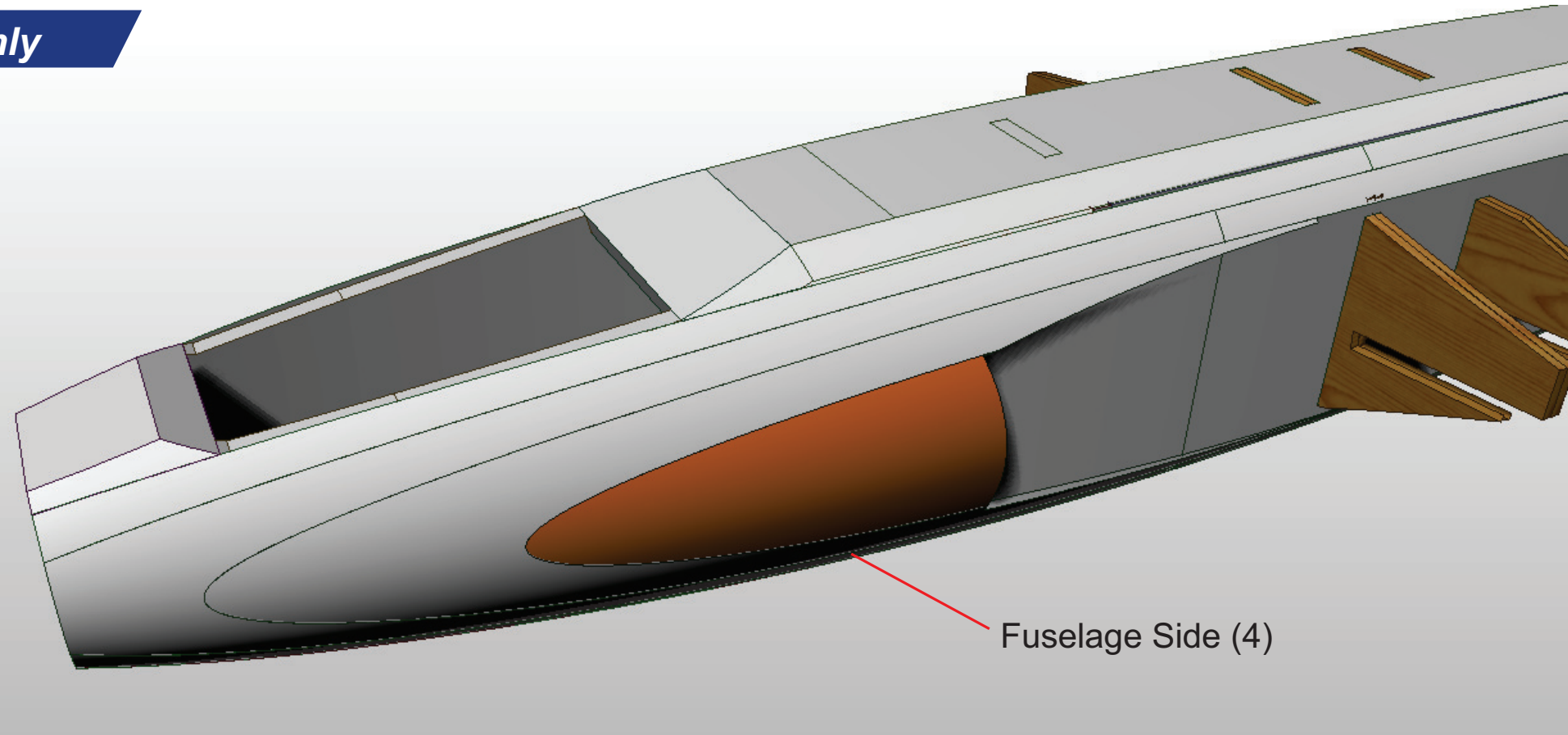
EDF version :

Align the **Fuselage side (3)** to the marked edge of the previous panel and glue in place.

It should align with the 3d printed air intakes



Prop only

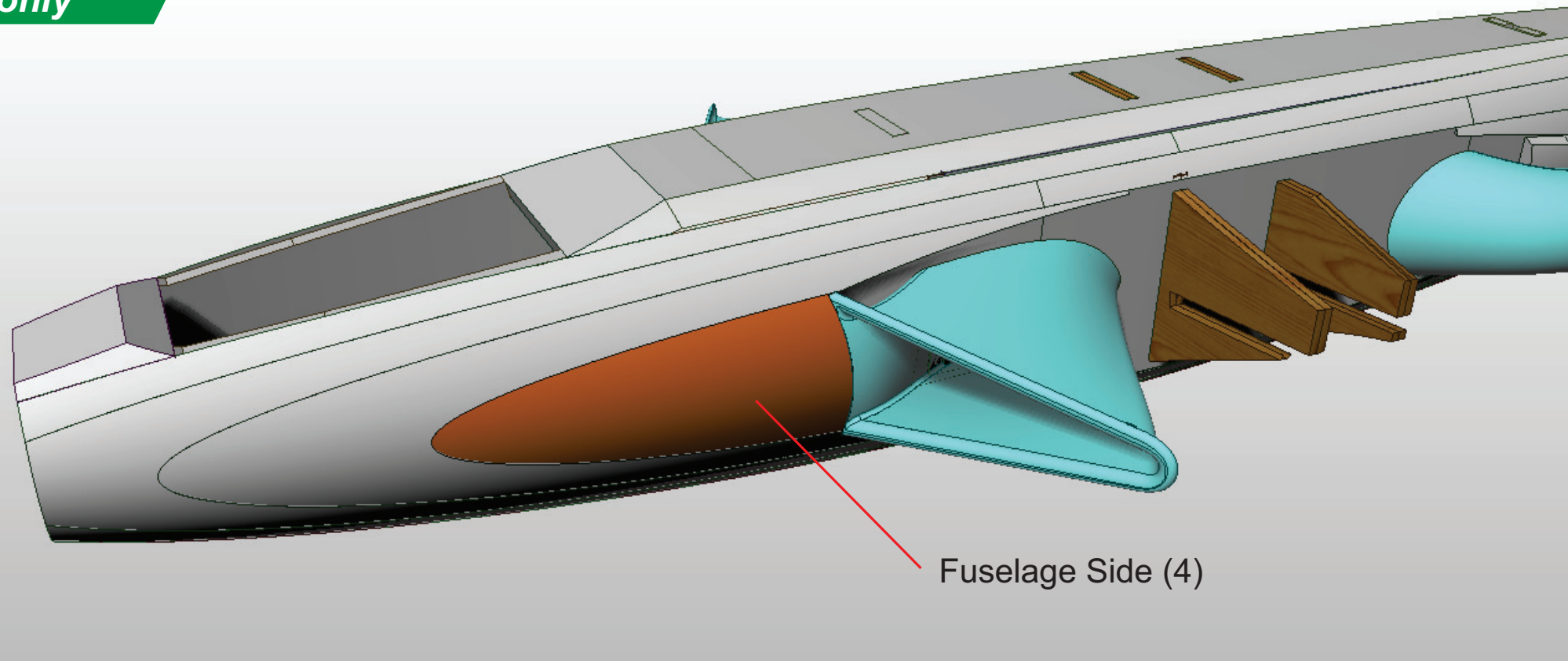


Prop version :

Glue the **Fuselage side (4)** into place



EDF only



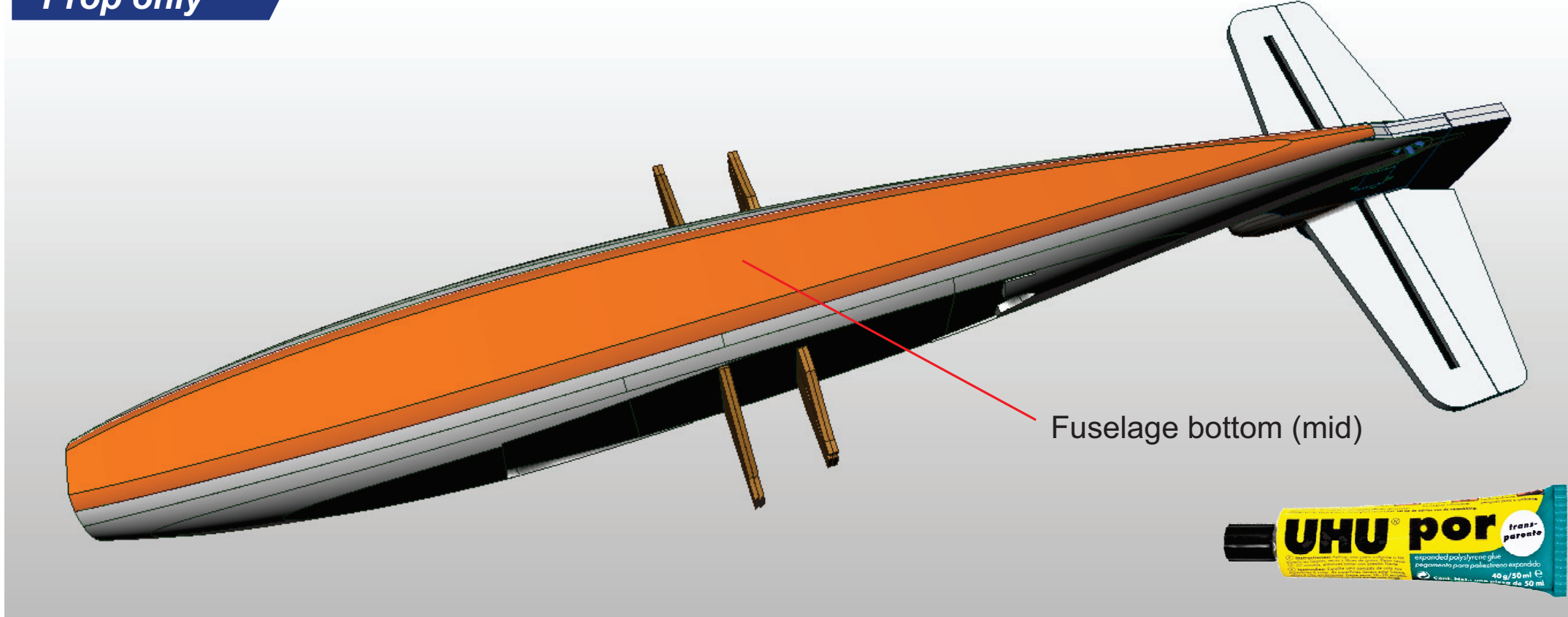
EDF version :

Glue the **Fuselage side (4)** into place.

It is designed to align (when sanded to shape) with the 3d printed air intake.



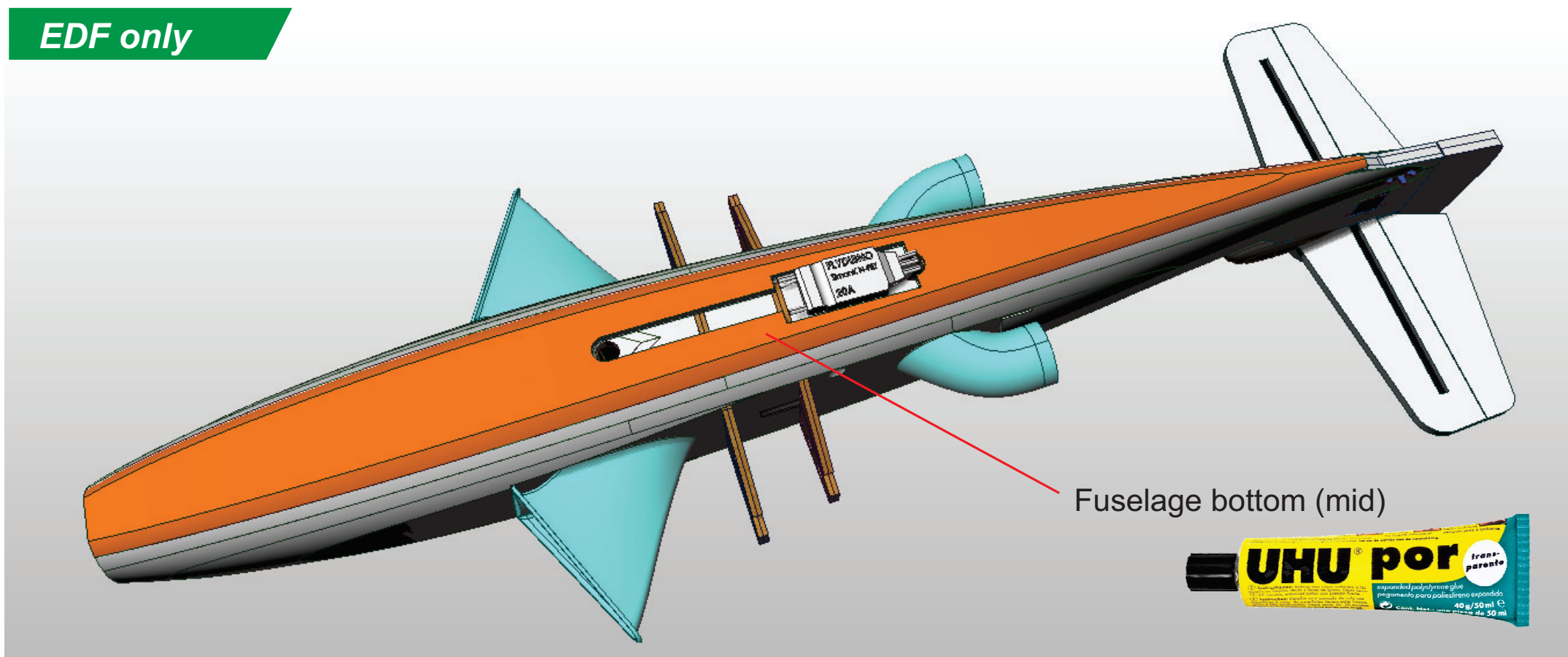
Prop only



Prop version :

Slide the **Fuselage bottom (Mid)** onto the bottom aligned from the front.

EDF only



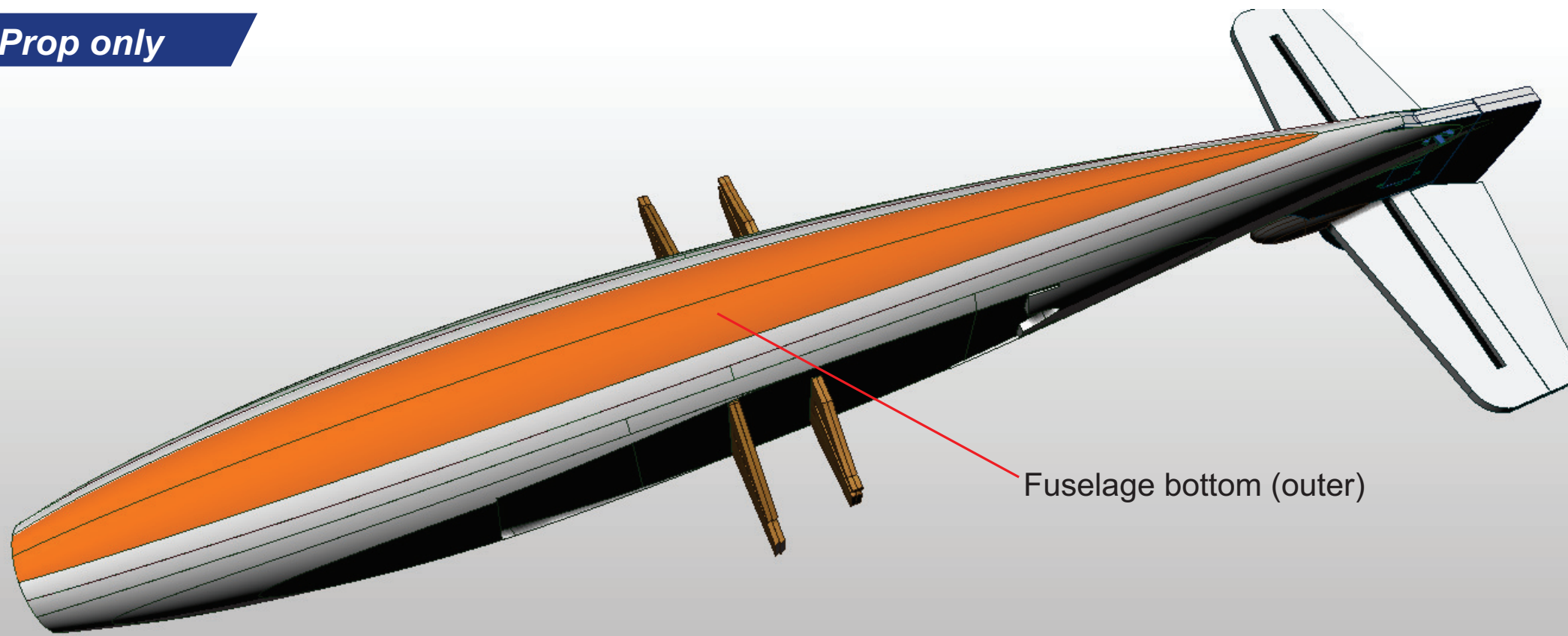
EDF version :

Trim away the channel along the **Fuselage Bottom (mid)** to allow your esc to fit neatly into the recess.

Your ESC needs to be sunken into the fuselage to protect it on landings. If your ESC is very chunky, you can sink it into the belly further into the void directly below the bifurcated duct.



Prop only

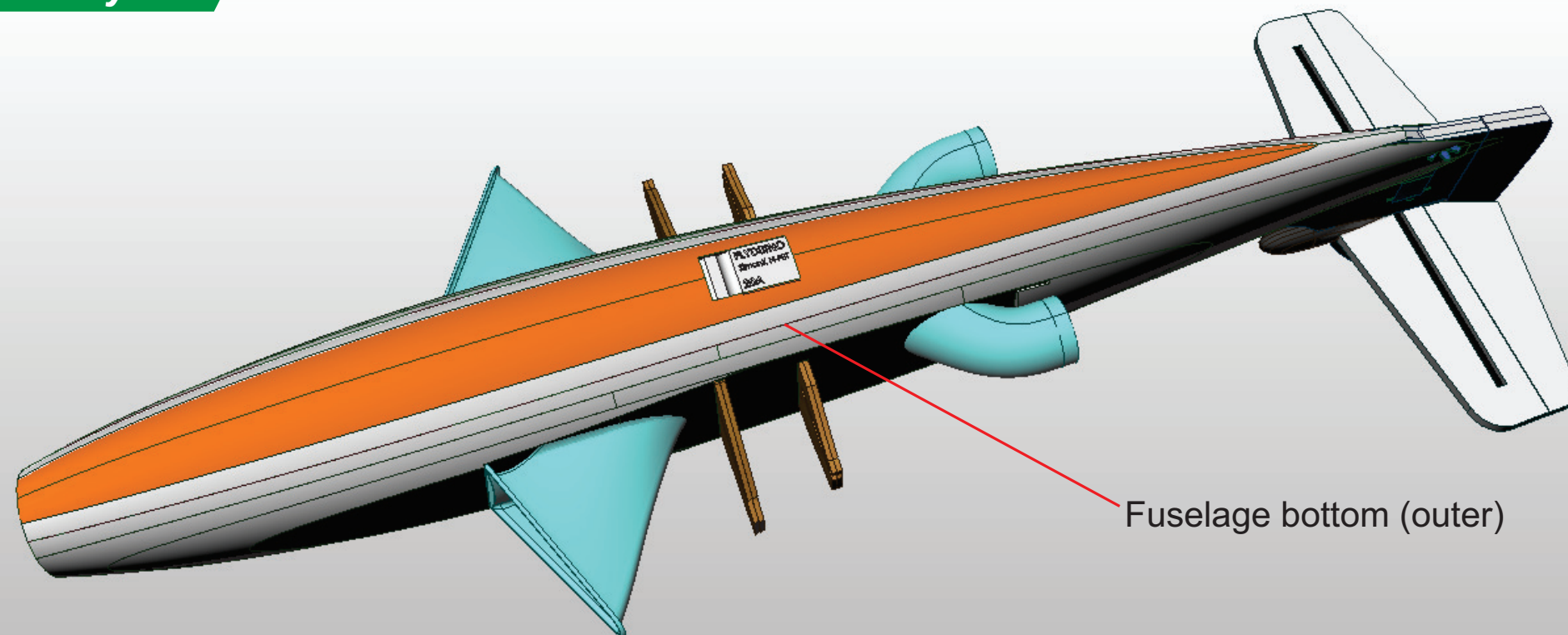


Prop version :

fit the **Fuselage bottom (outer)** onto the bottom aligned from the front.



EDF only

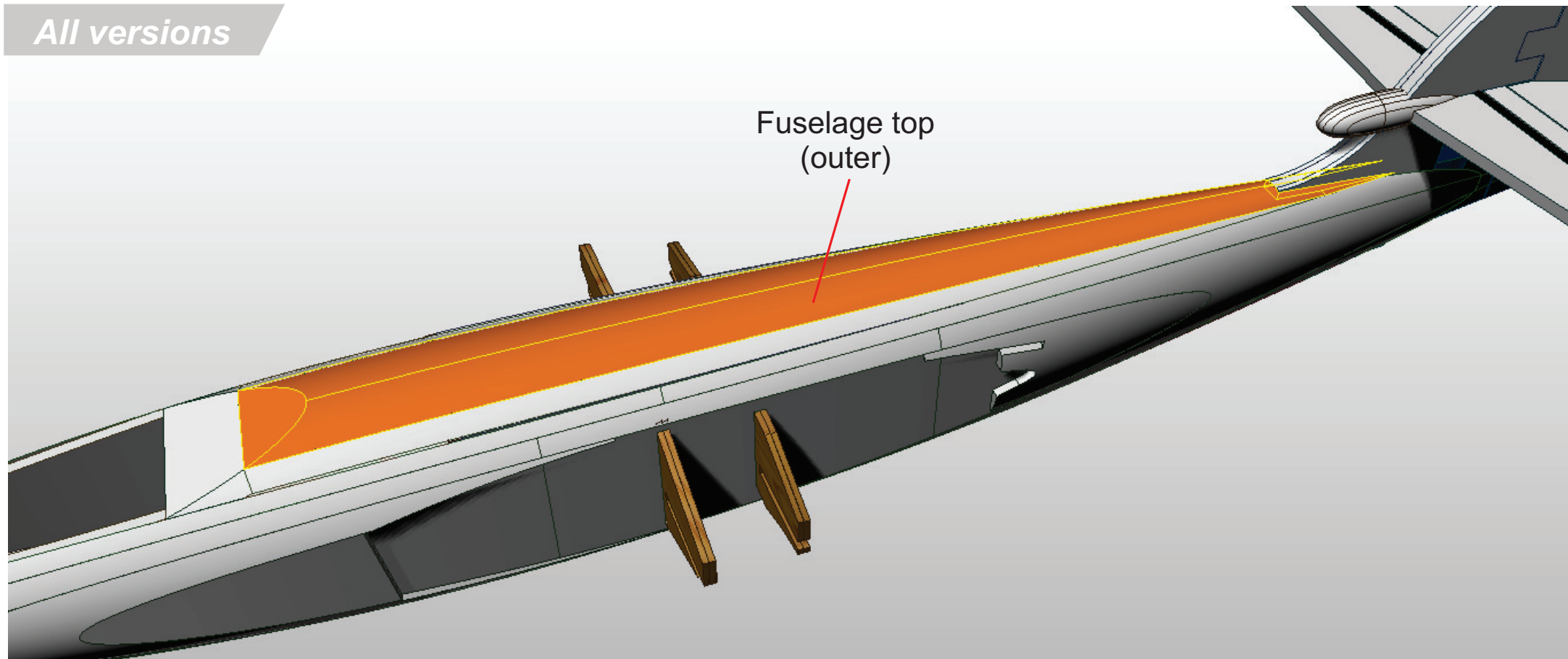


EDF version :

Trim away the **Fuselage Bottom (outer)** to fit around your esc so that only the heat-sink part of the ESC is visible.



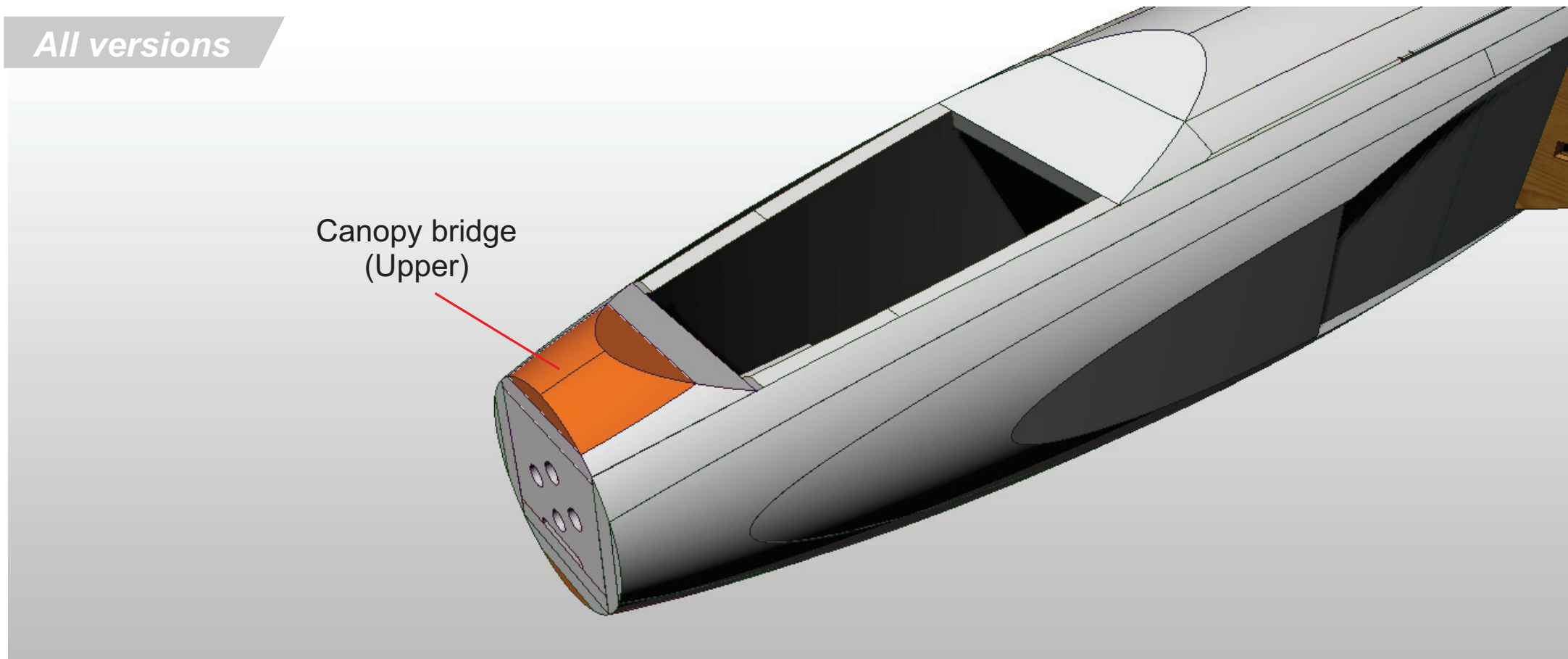
All versions



Glue the **Fuselage top (outer)** in place



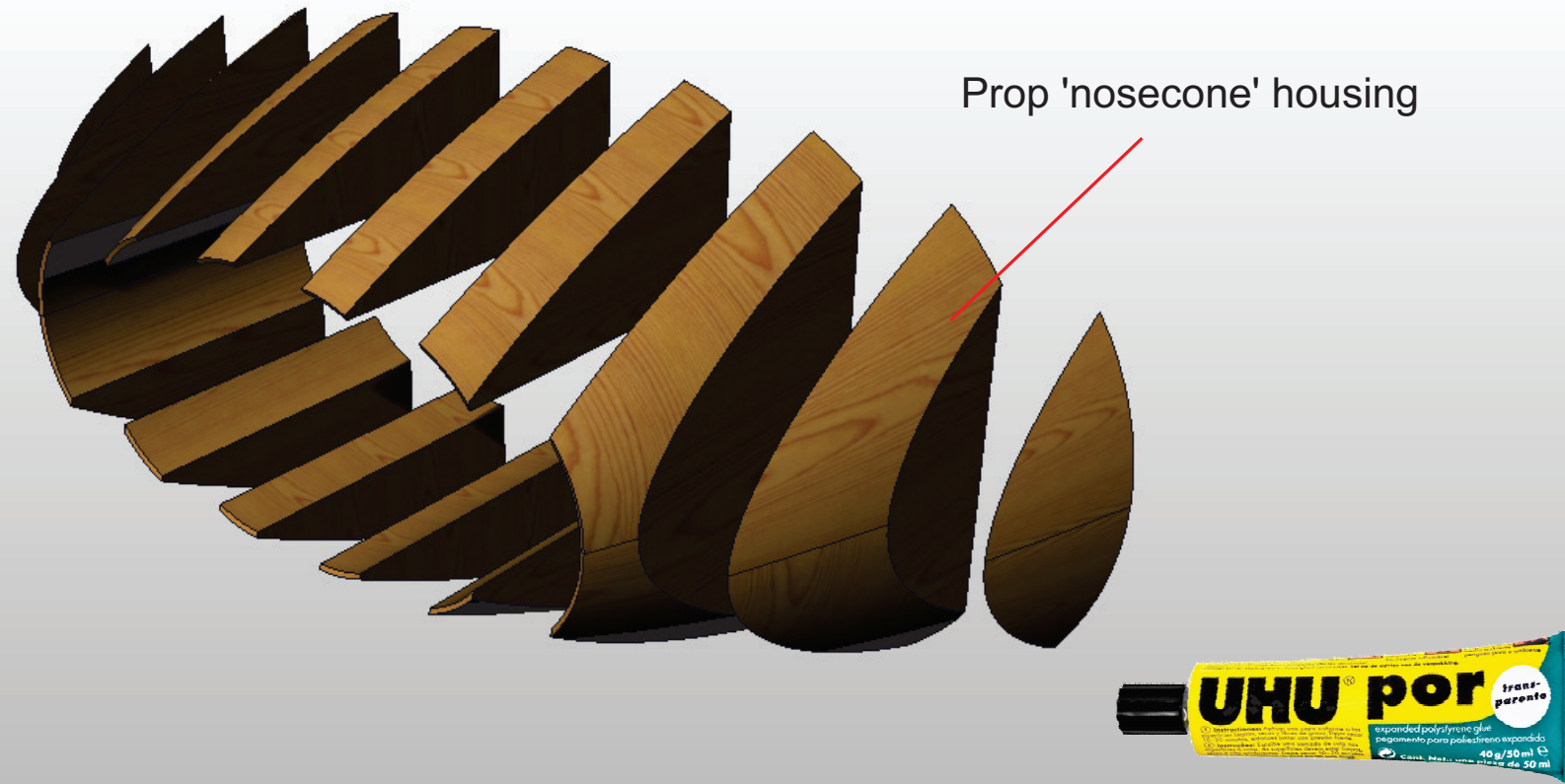
All versions



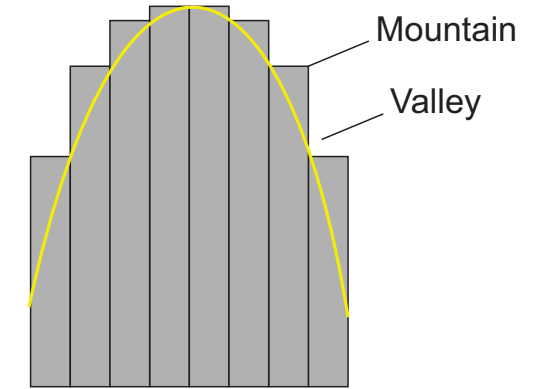
Glue the **Canopy bridge (outer)** in place



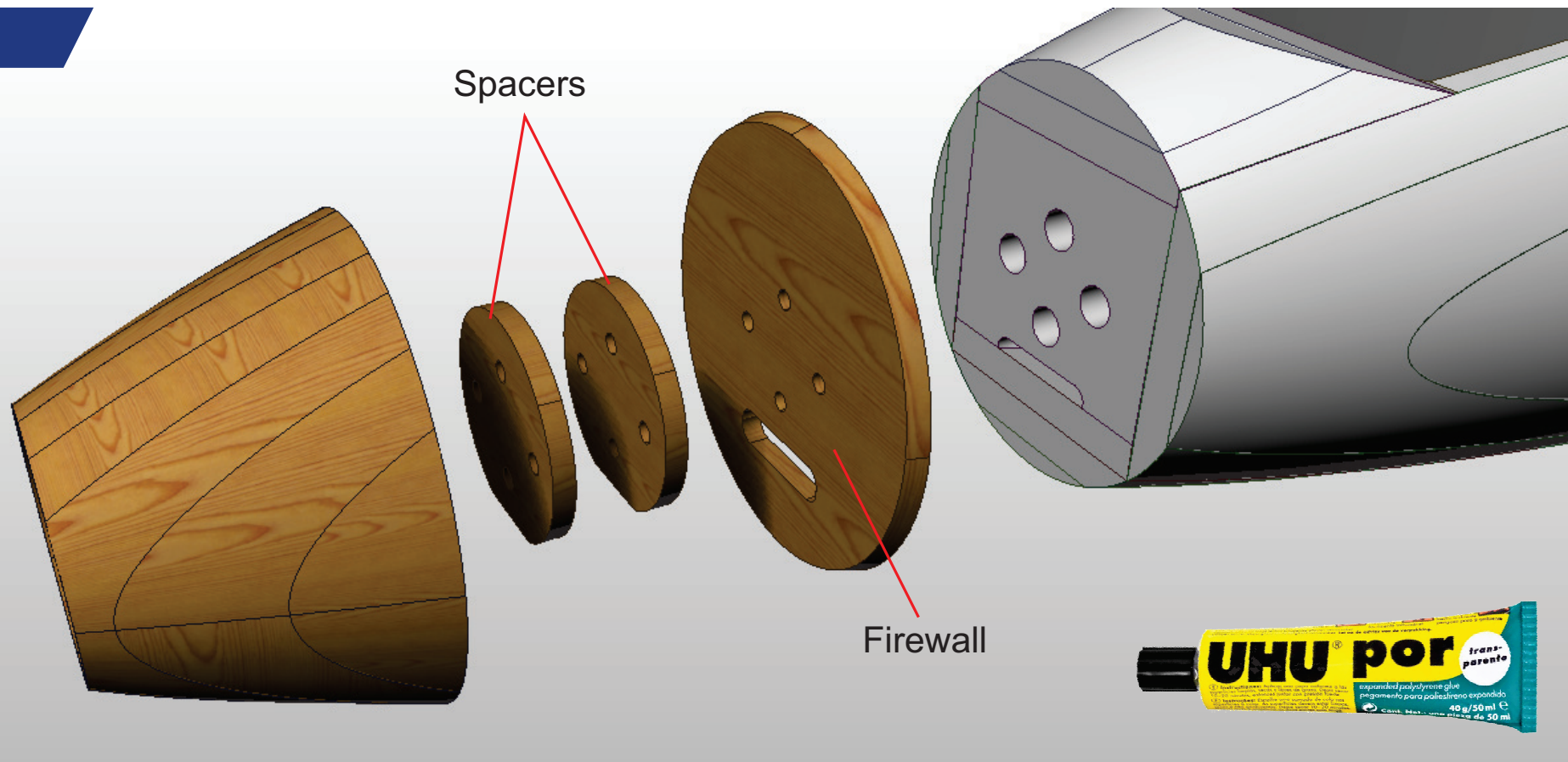
Prop only



Create either a 3d printed Nosecone or a nosecone consisting of layers of balsa sanded to get the right shape, by removing the 'mountains' until the 'valleys' are no more.

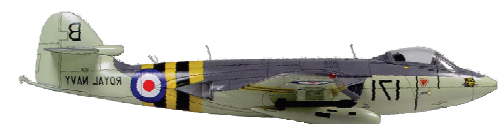


Prop only

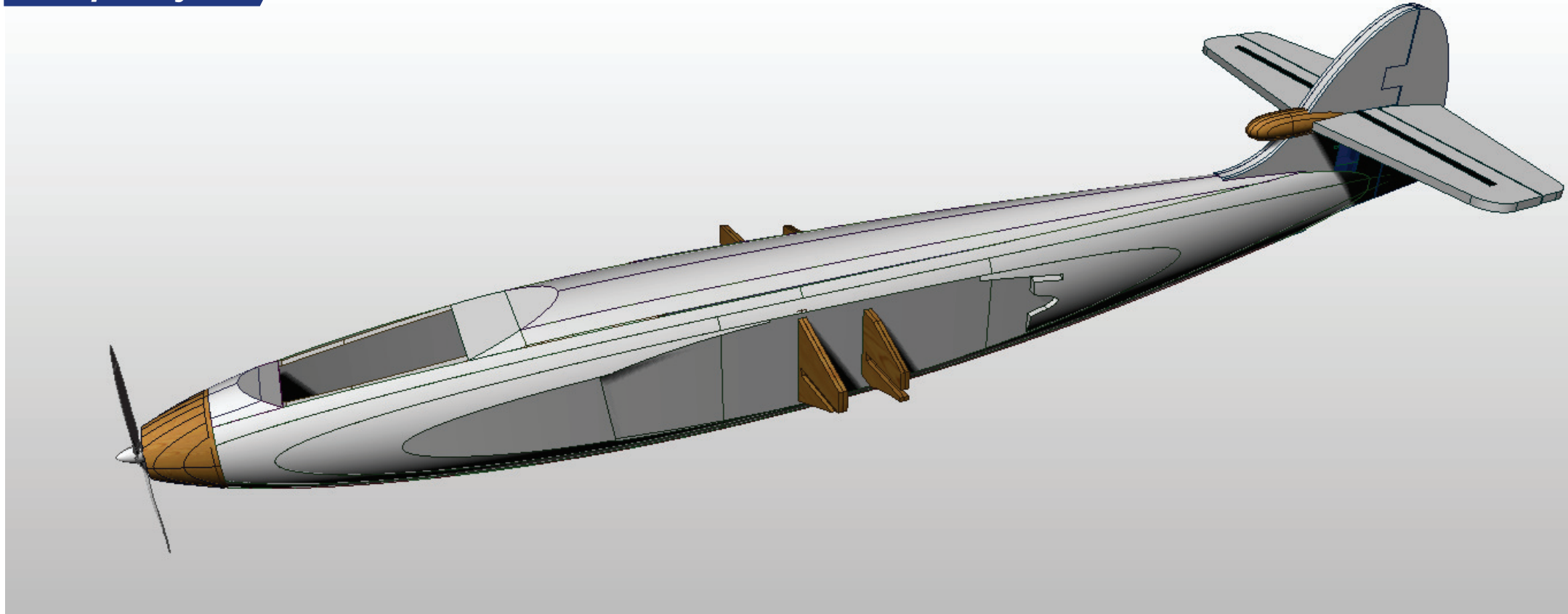


Use dowels with sandpaper wrapped around them with a drill to help get the correct internal shape.

Cut the spacers and firewall from 3mm liteply.



Prop only

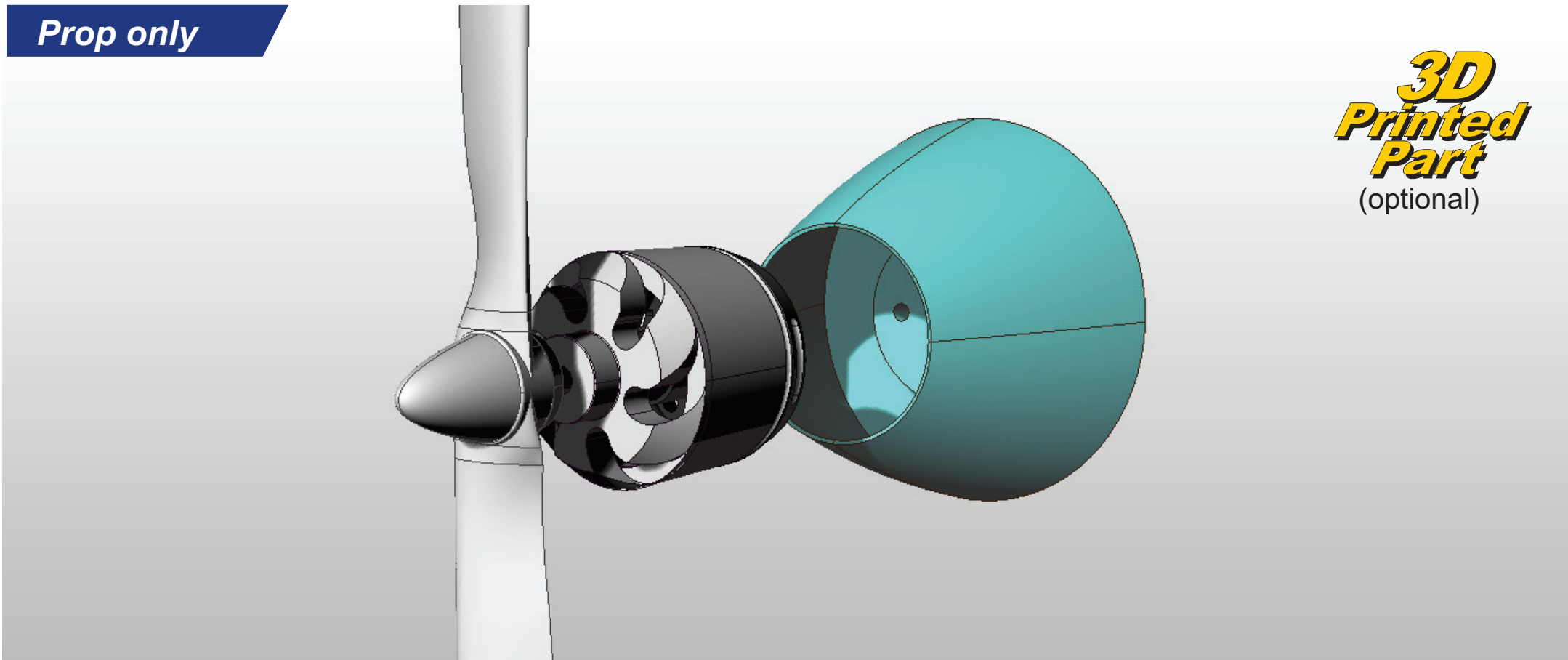


Glue the assembly onto the fuselage, and mount the motor to the firewall.

Hunt around to find a prop spinner that will suit the shape to get a more realistic look.



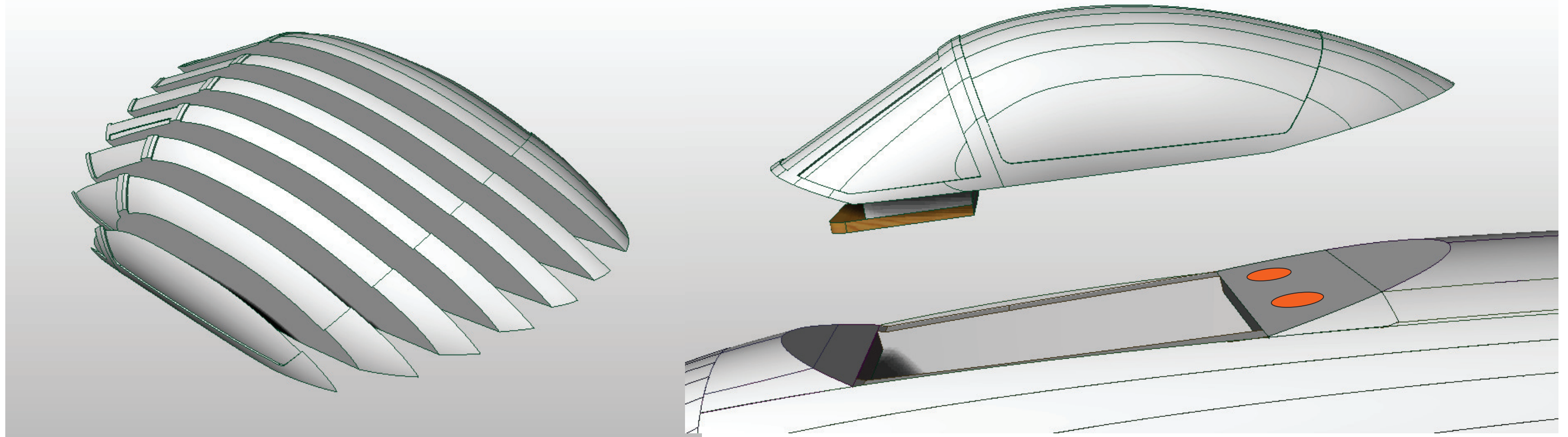
Prop only



If you have a 3d printer then print out the nosecone motor mount, along with the spinner.

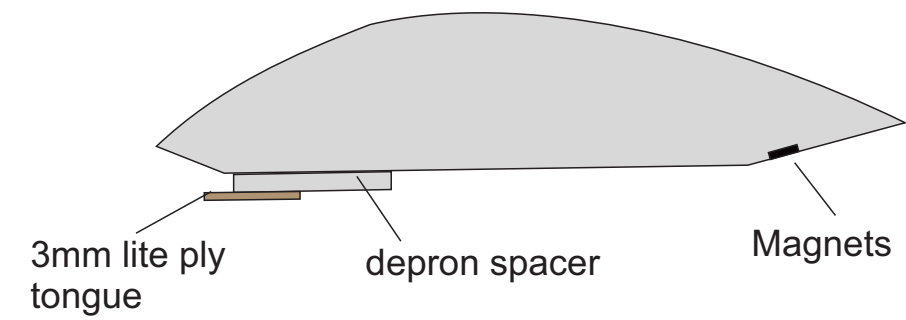
Assemble and glue to the assembly using UHU por.



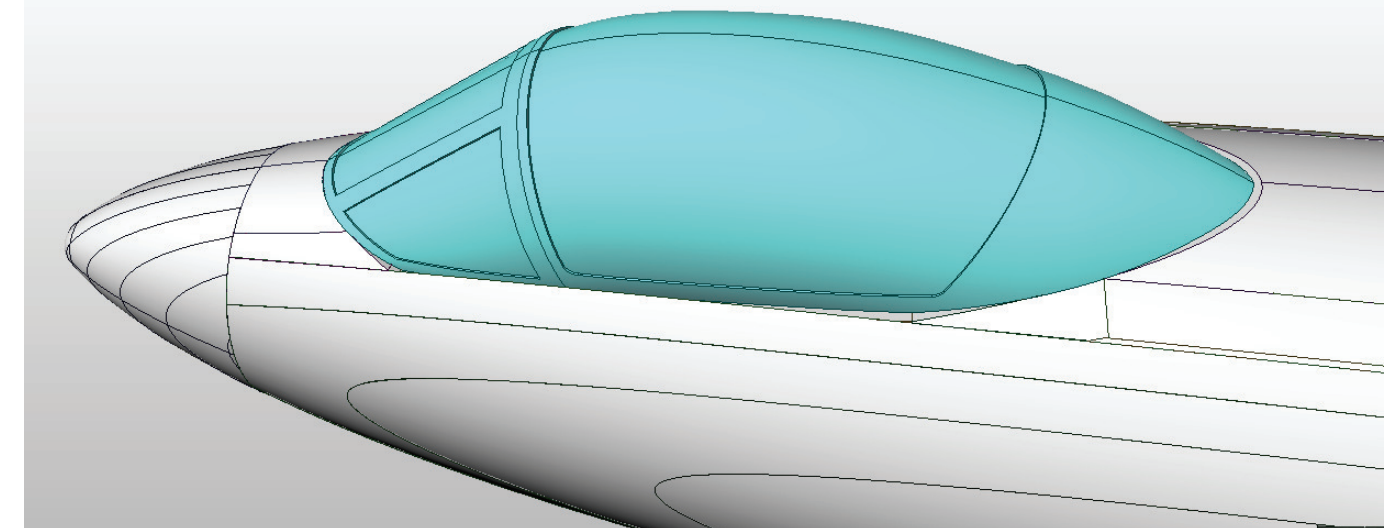


Create the canopy in the same way as the nosecone, or 3d Print one, and add a tongue and magnets as shown.

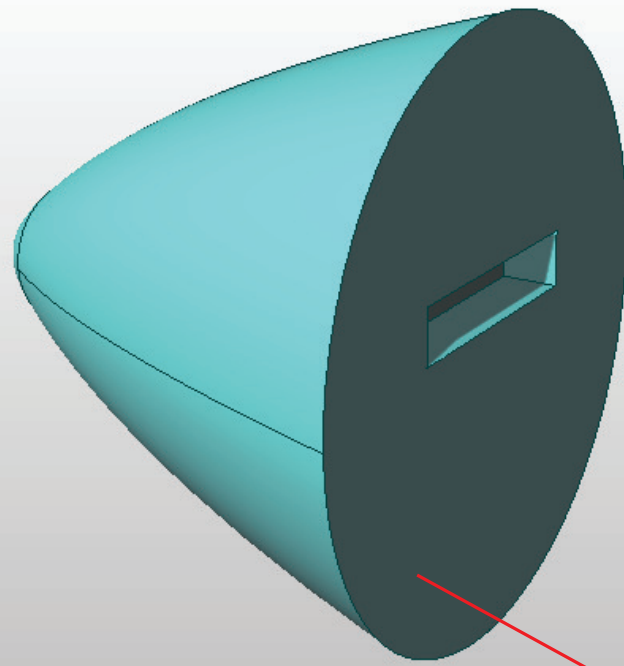
-
1. press magnet into depron to impress shape.
 2. Dig out a recess for the magnet using a sharp knife.
 3. Apply glue into recess and push magnet into it.
 4. Whilst still wet, lay masking tape over the area.
 5. When fully cured, remove tape and put adjoining magnet on top
 6. When correctly aligned, press adjoining depron onto the sticking up magnet to impress shape.
 7. Repeat steps 2-4 for the upper part.
- IMPORTANT.**
Before glueing the upper magnet in, check that the magnet is the right way around!



**3D
Printed
Part**
(optional)

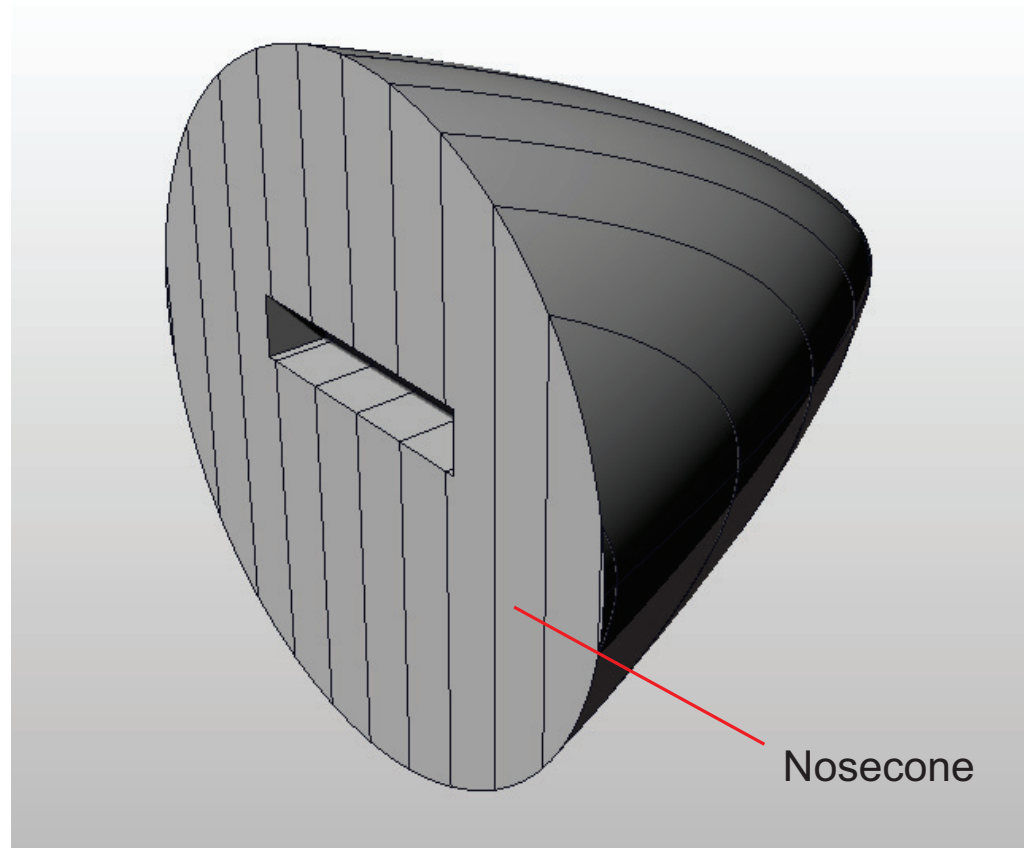


EDF only



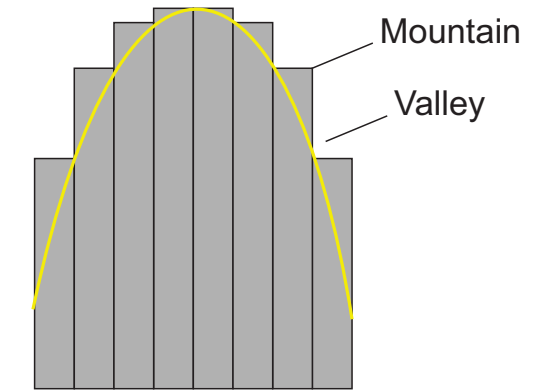
**3D
Printed
Part**
(optional)

Nosecone

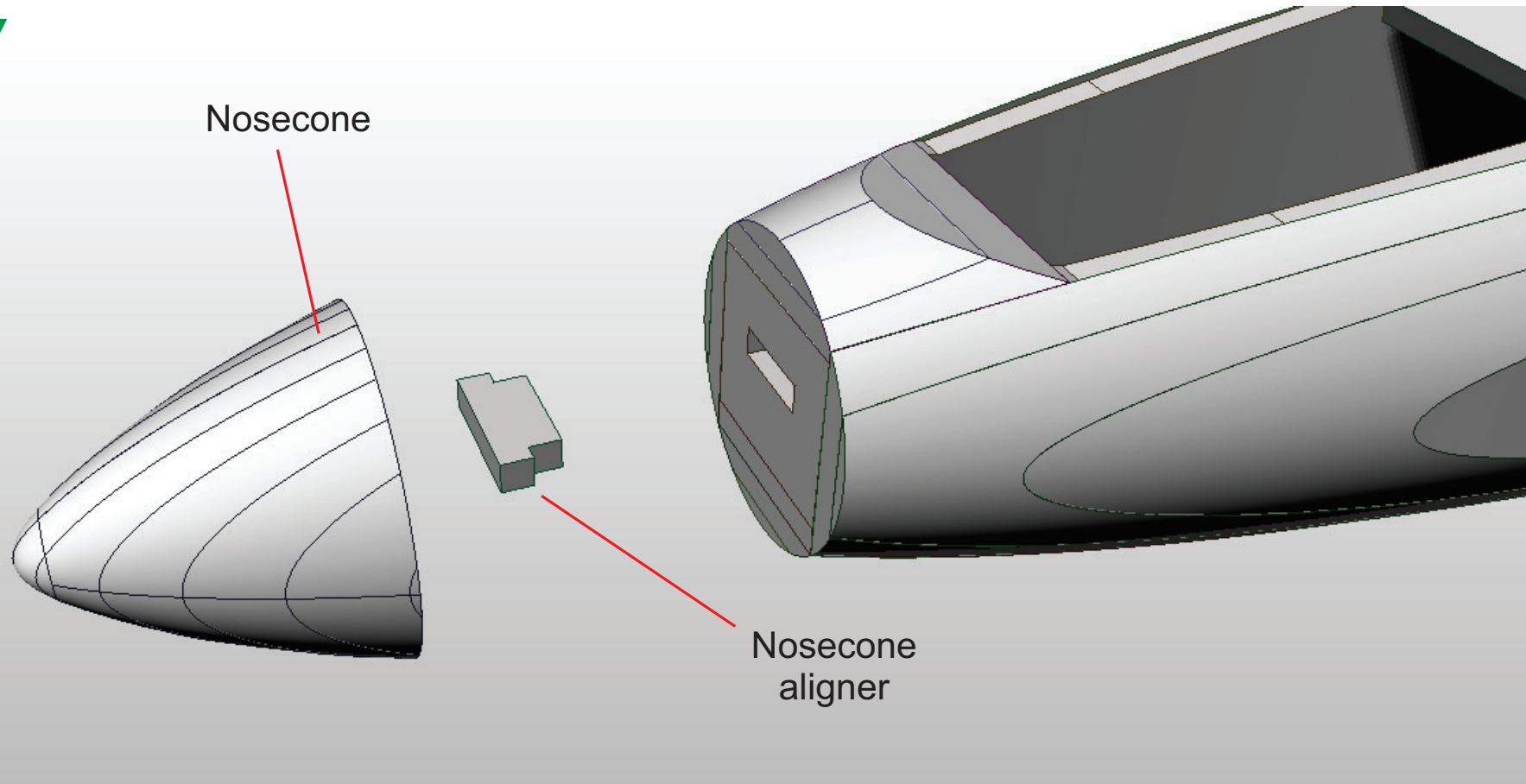


Nosecone

Create either a 3d printed Nosecone or a nosecone consisting of layers of foam sanded to get the right shape, by removing the 'mountains' until the 'valleys' are no more.



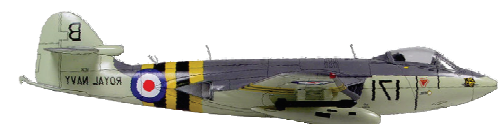
EDF only



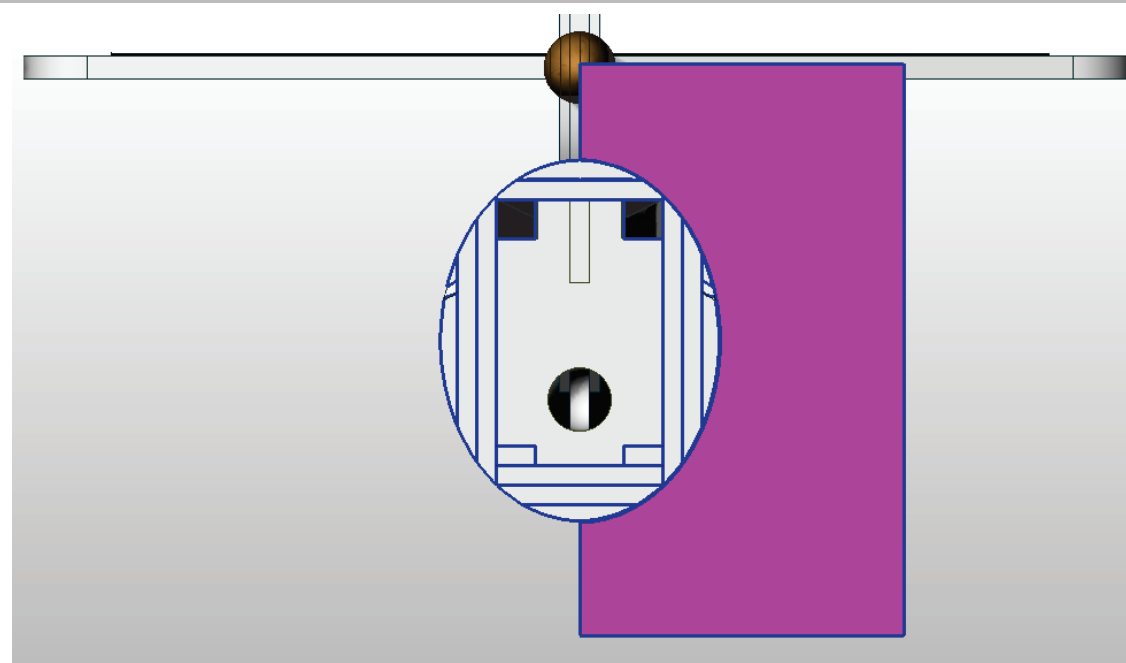
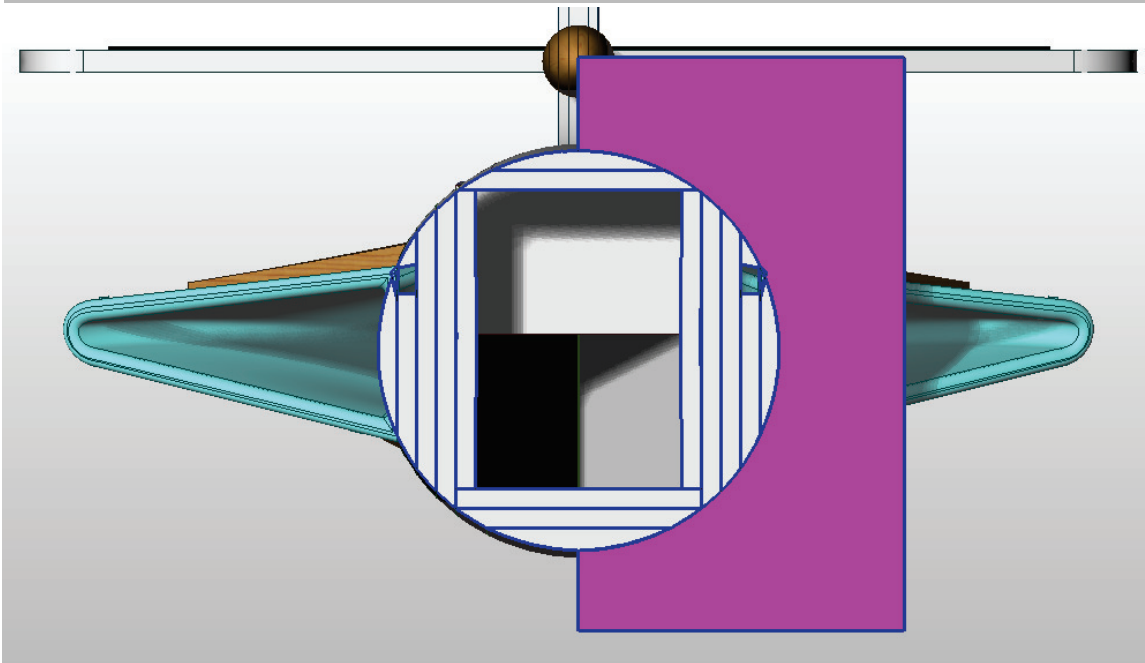
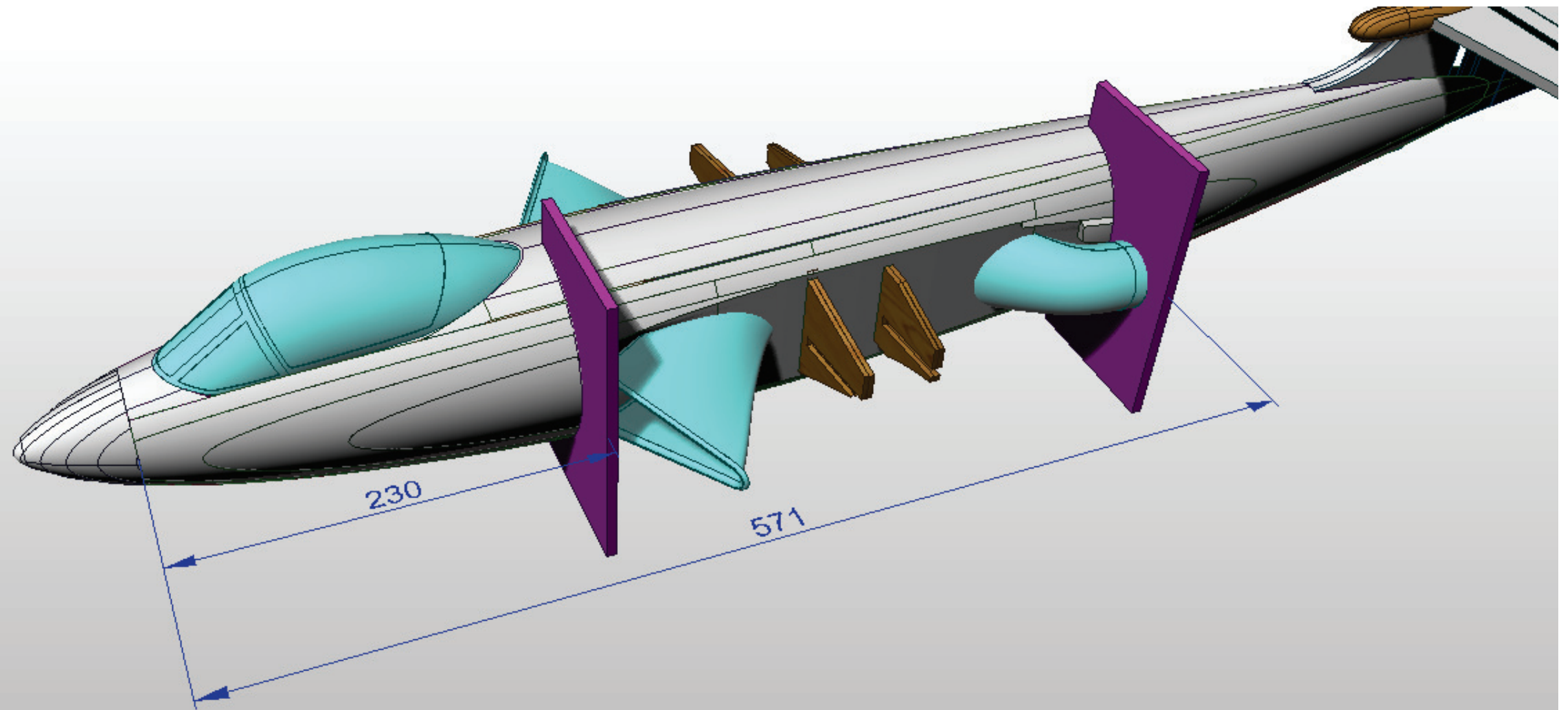
Nosecone

Nosecone aligner

Glue the **Nosecone Aligner** in place, then the **Nosecone**

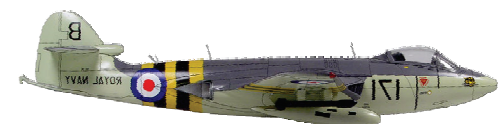


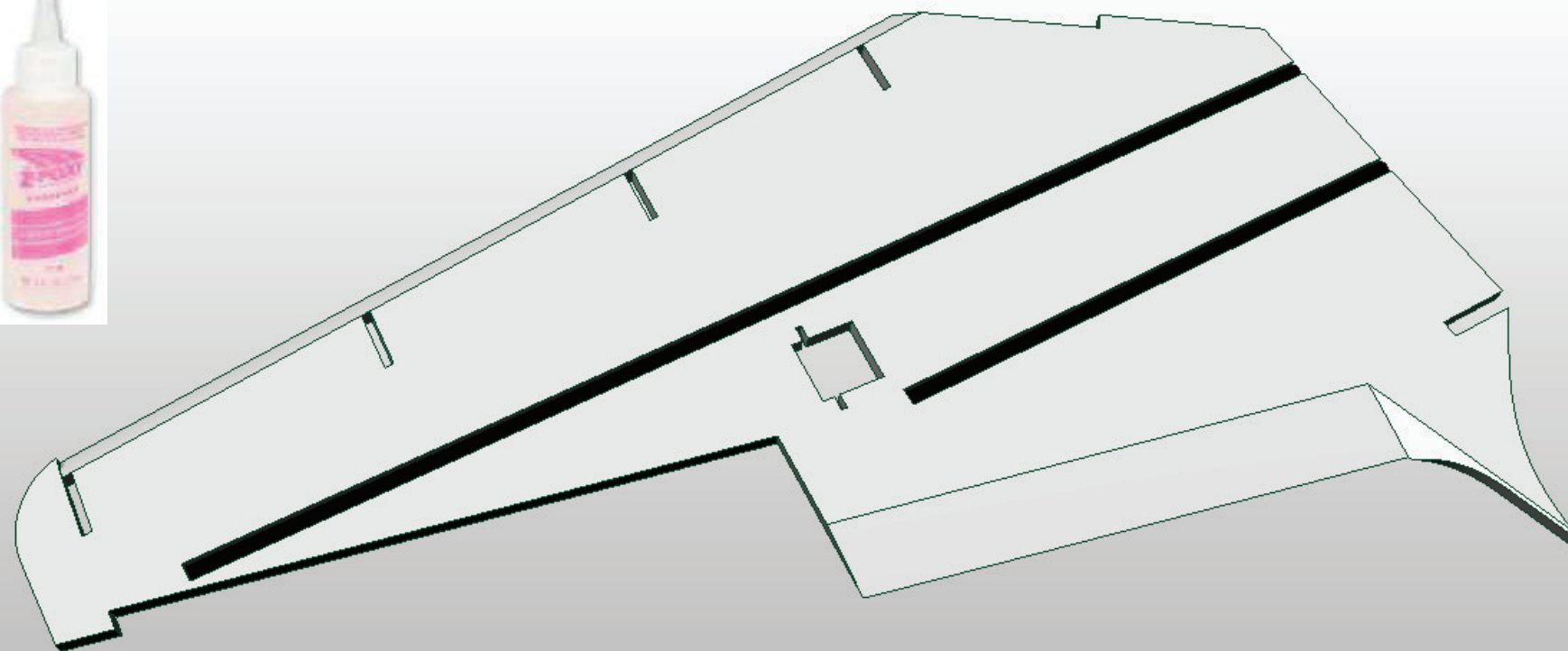
All versions



Using the Sanding Jigs in the places marked above,

Sand the fuselage to shape. Look at photos of the real aircraft on the internet to help get the details just right.



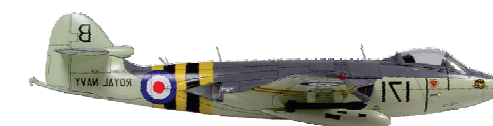
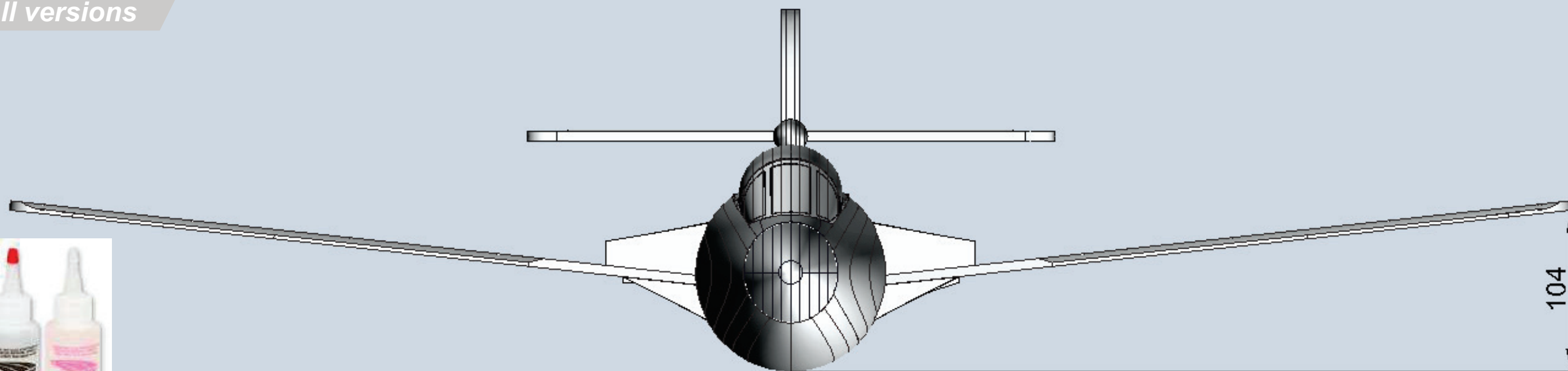


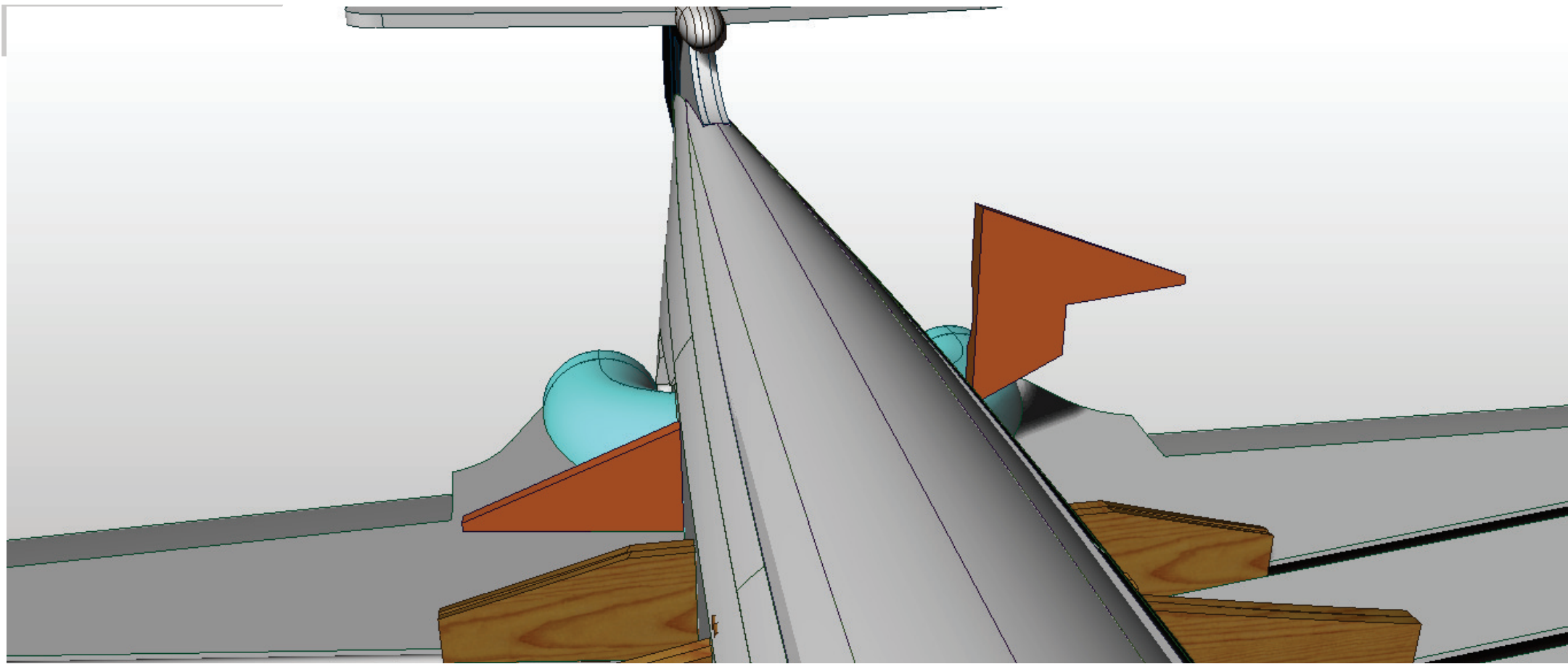
Using Masking tape to prevent leakage, glue the two carbon spars into the wing.

Ensure a good fit against the fuselage, aligning the carbon spars directly into the slots in bulkheads 3 and 4.

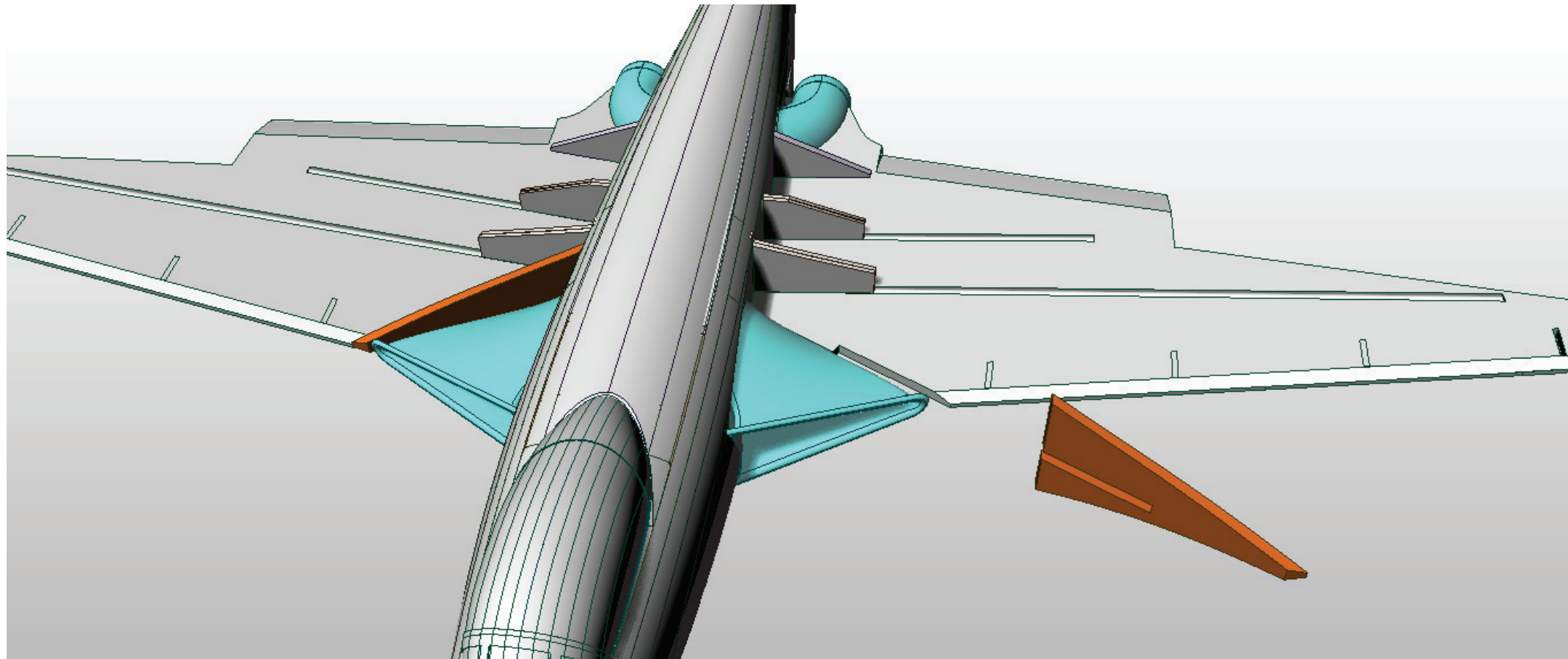
Ensure the angles are maintained below. Glue in place.

All versions





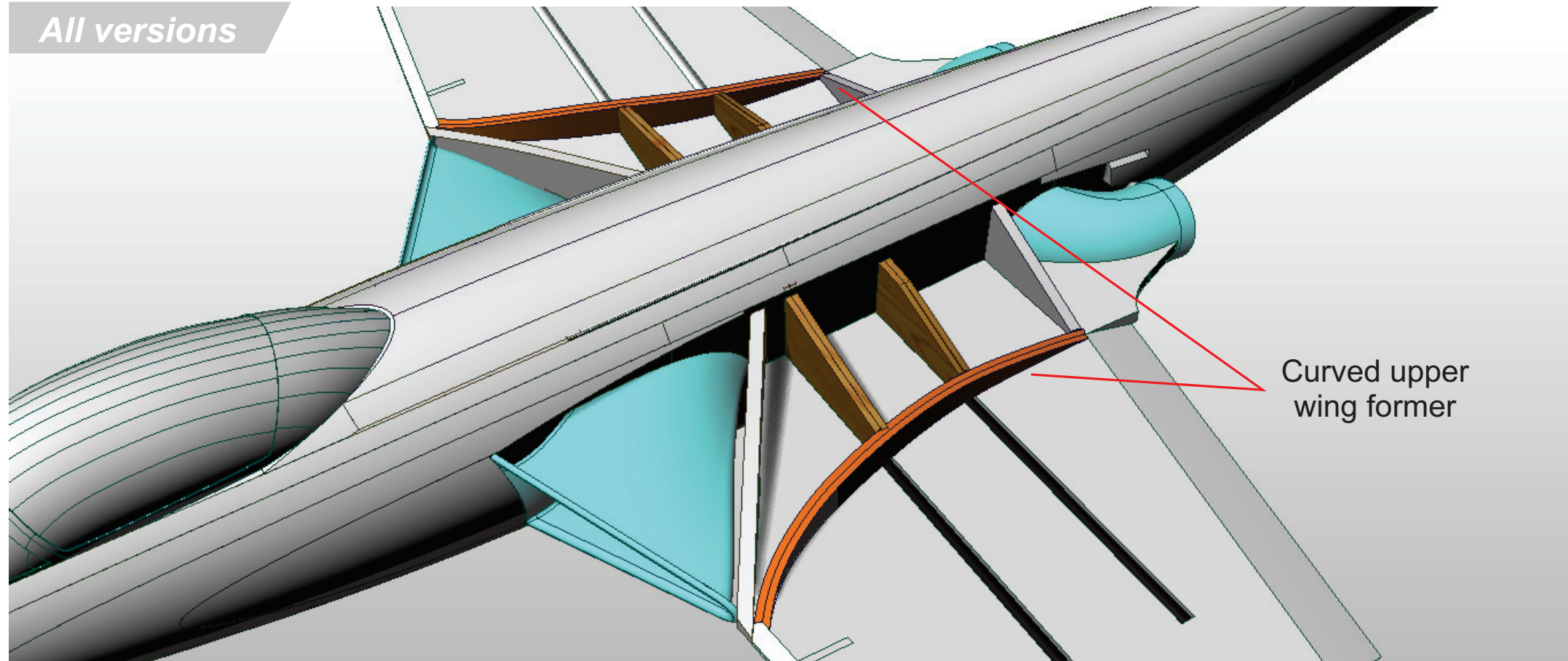
Glue the **Wing Aft triangular former** in place.



Glue the **Wing Forward triangular former** in place.

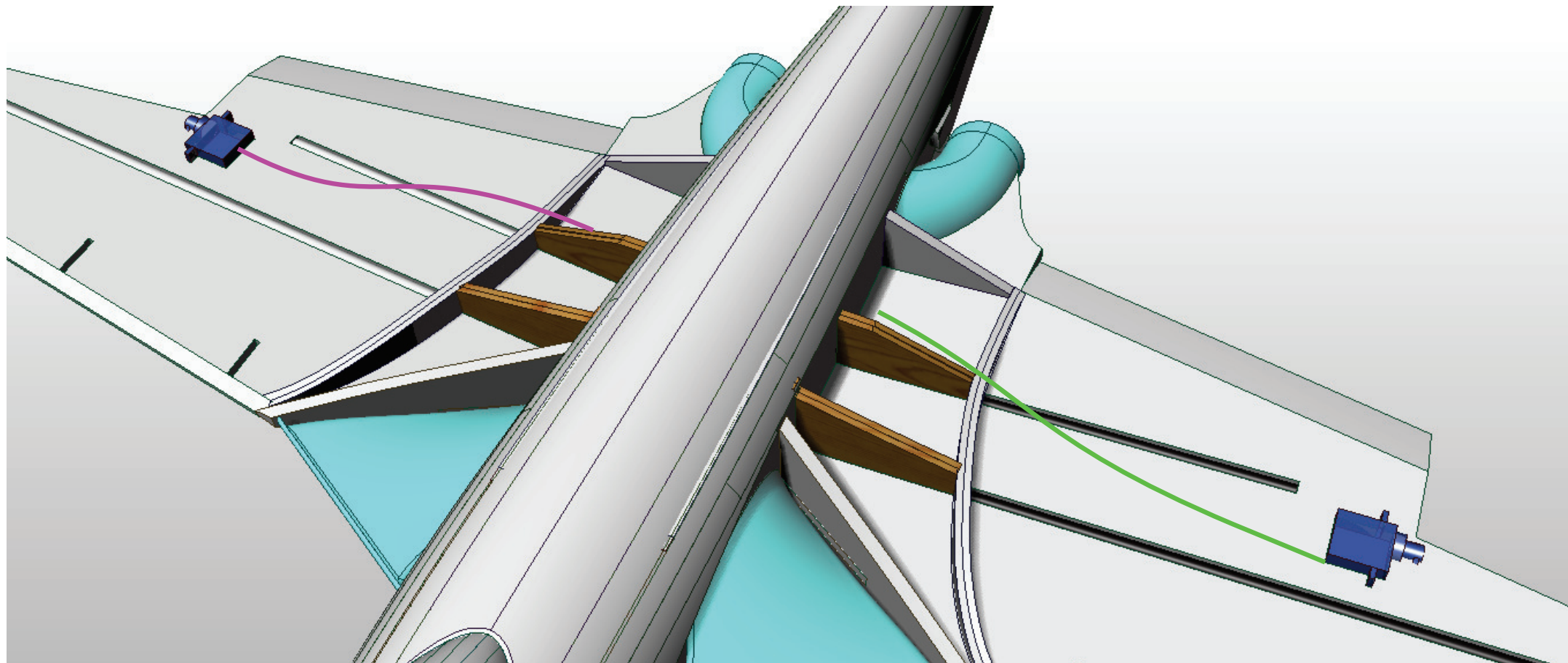


All versions



Curved upper wing former

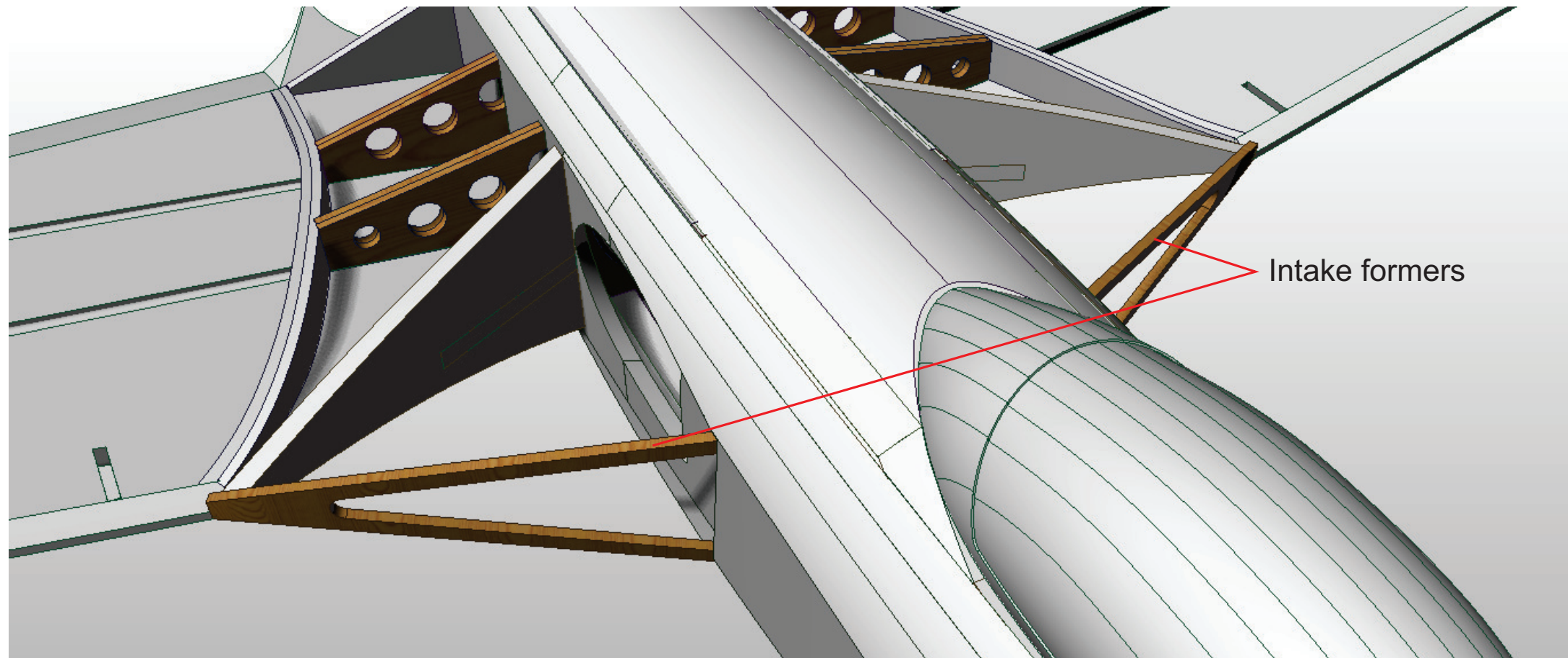
Using the marked line on the wing, create the **Curved upper wing former** as shown with two 3mm depron pieces.



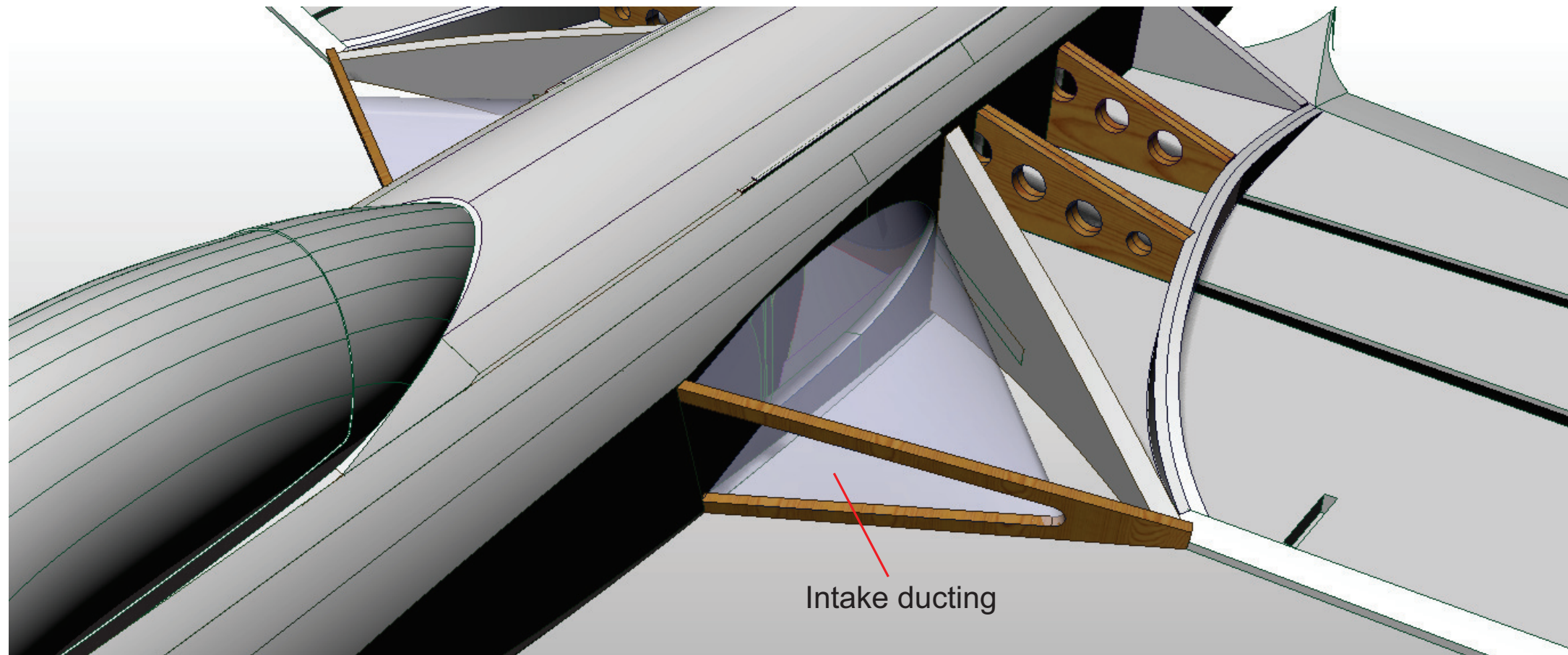
Trim away a notch in the curved upper wing former and connect the aileron servo cables to the servo extension cables protruding out.

Glue the servos into the wing using hot glue





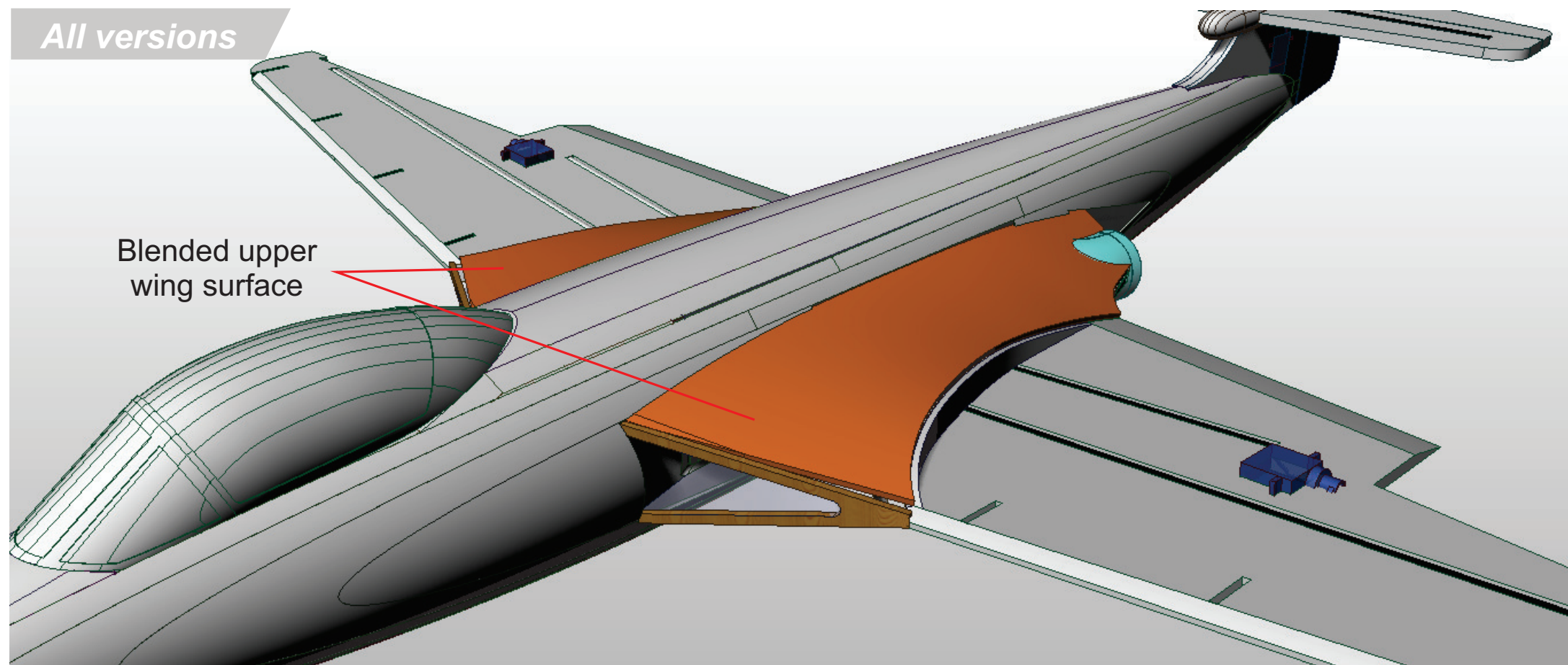
Non 3d Print version
Glue the two 3mm liteply
Intake formers in place.



Trim some thin plastic sheet
to shape and glue in place
as indicated.



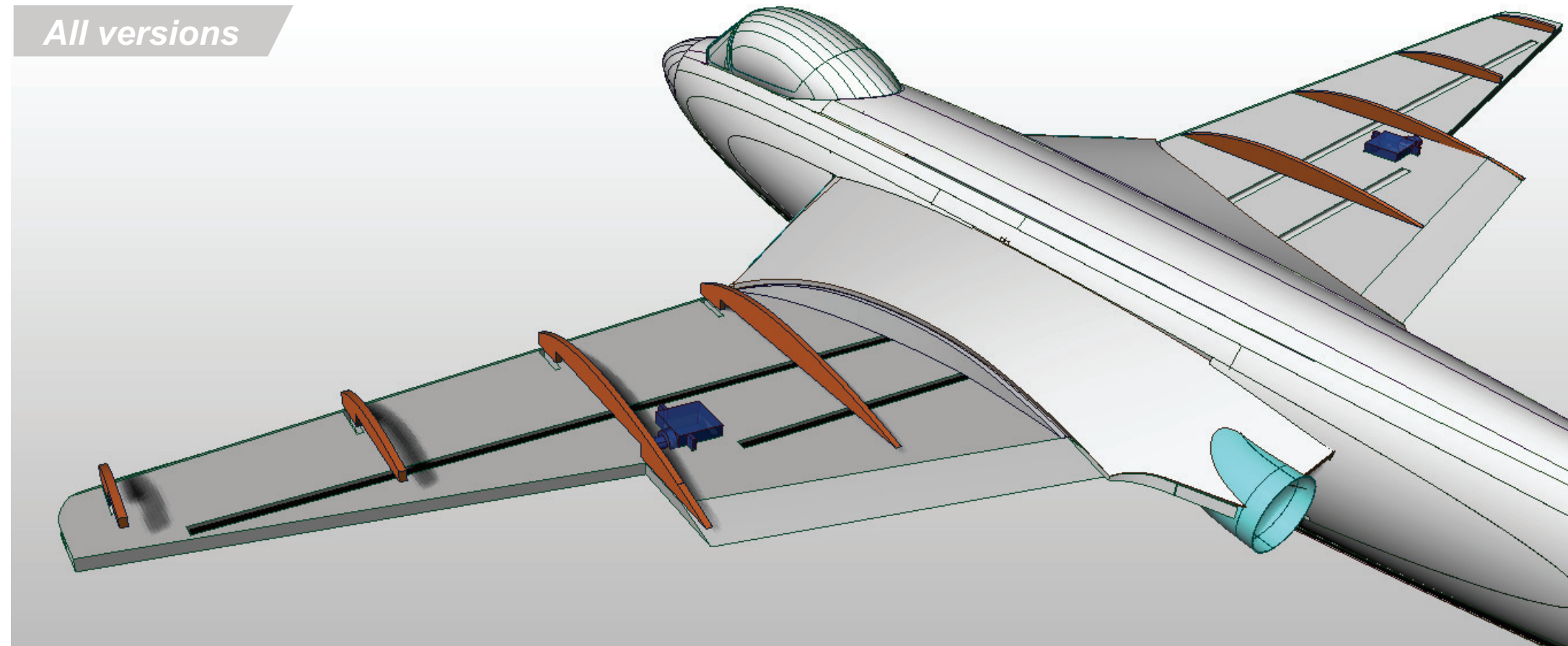
All versions



Glue the **Blended upper wing surface** in place.



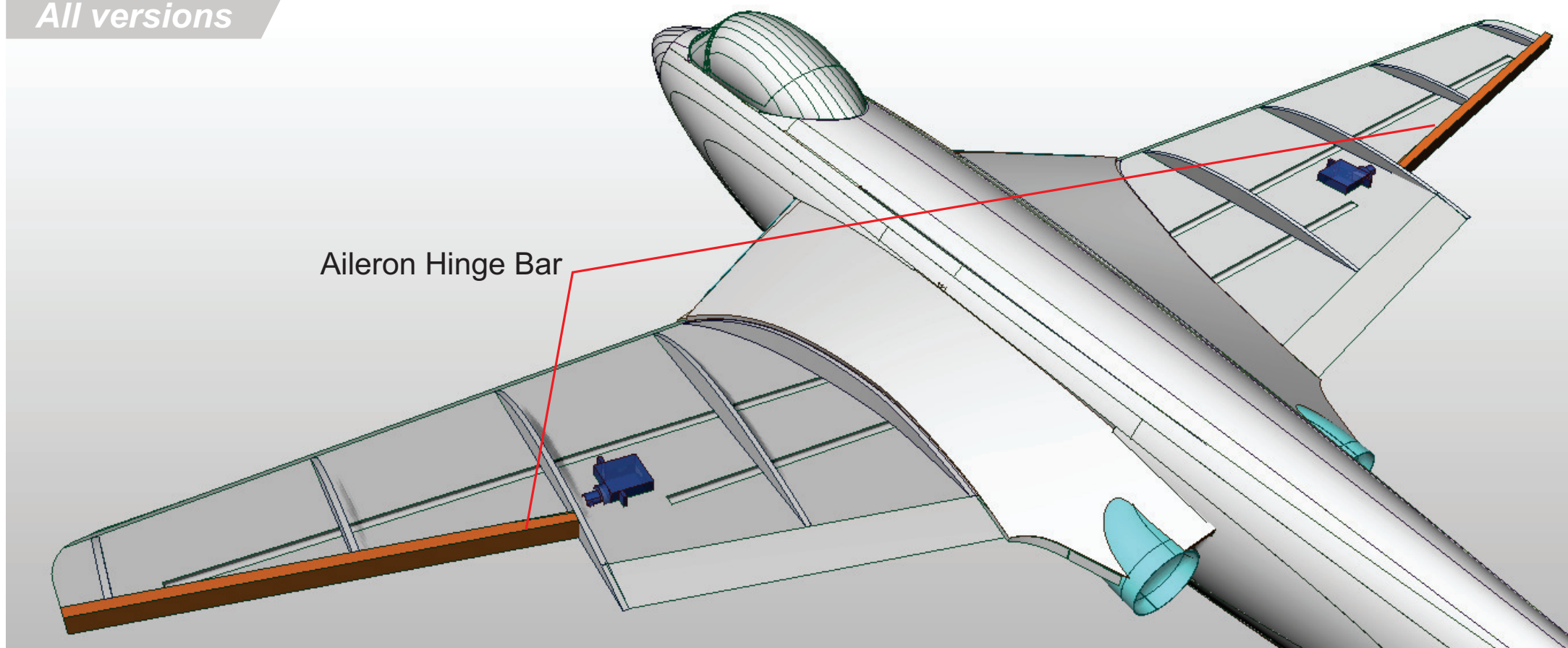
All versions



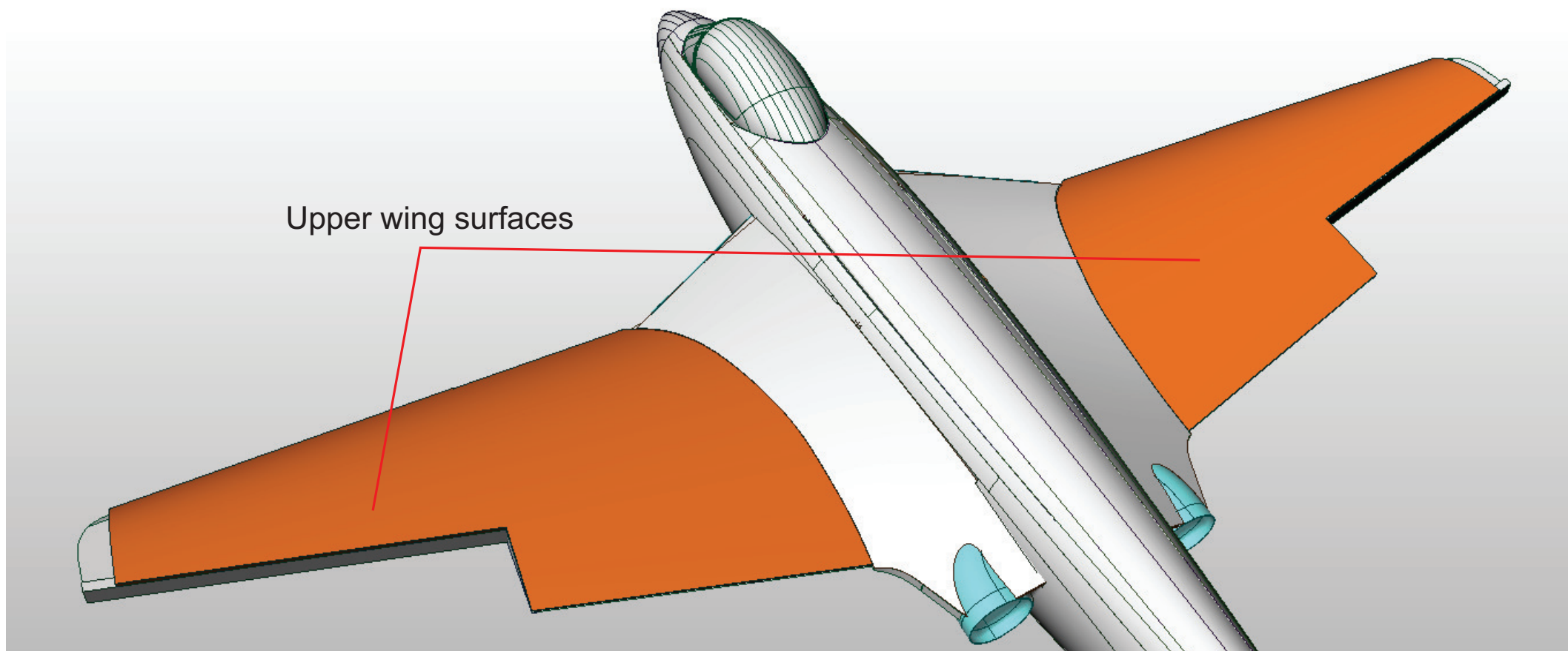
Using the slots on the wings, glue the 3mm depron upper wing formers in place.



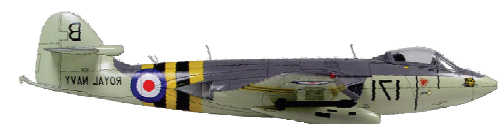
All versions



Glue the **Aileron hinge bars** in place so the bottom edge is flush to the underside of the wing.

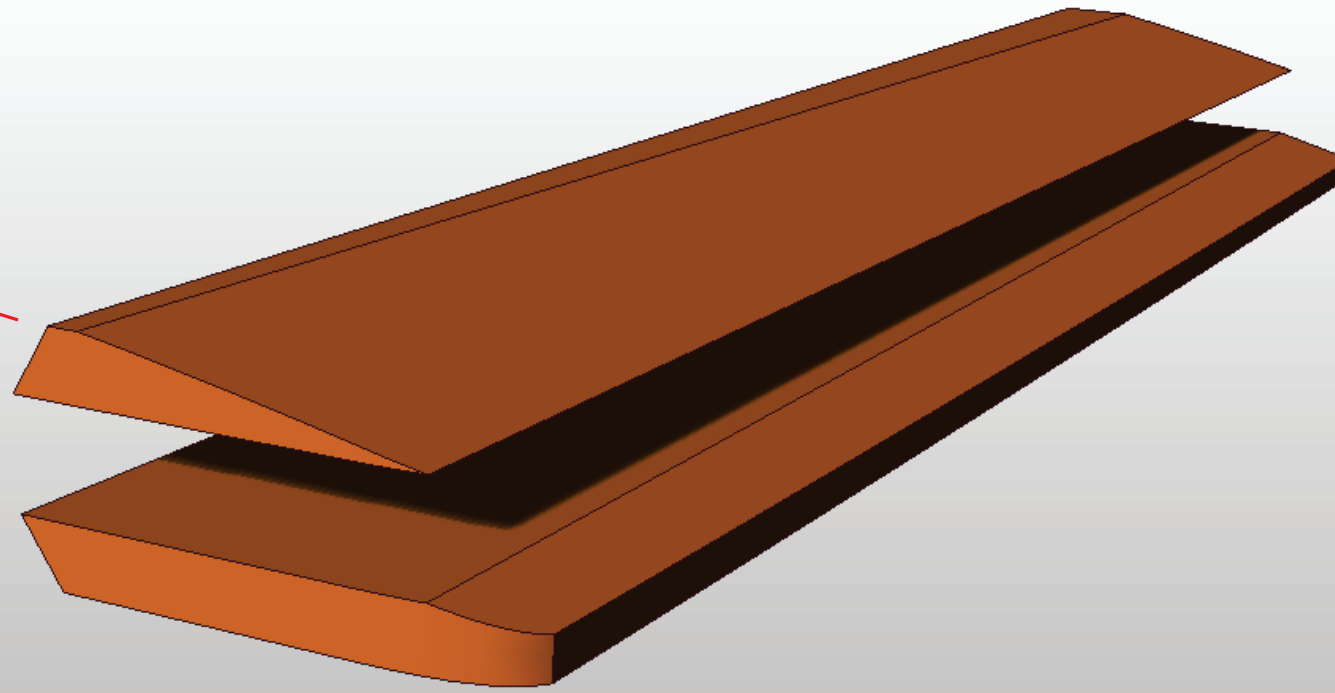


Gently sand over the wing formers and wing to provide a good bonding surface and glue the **3mm upper wing surfaces** in place.

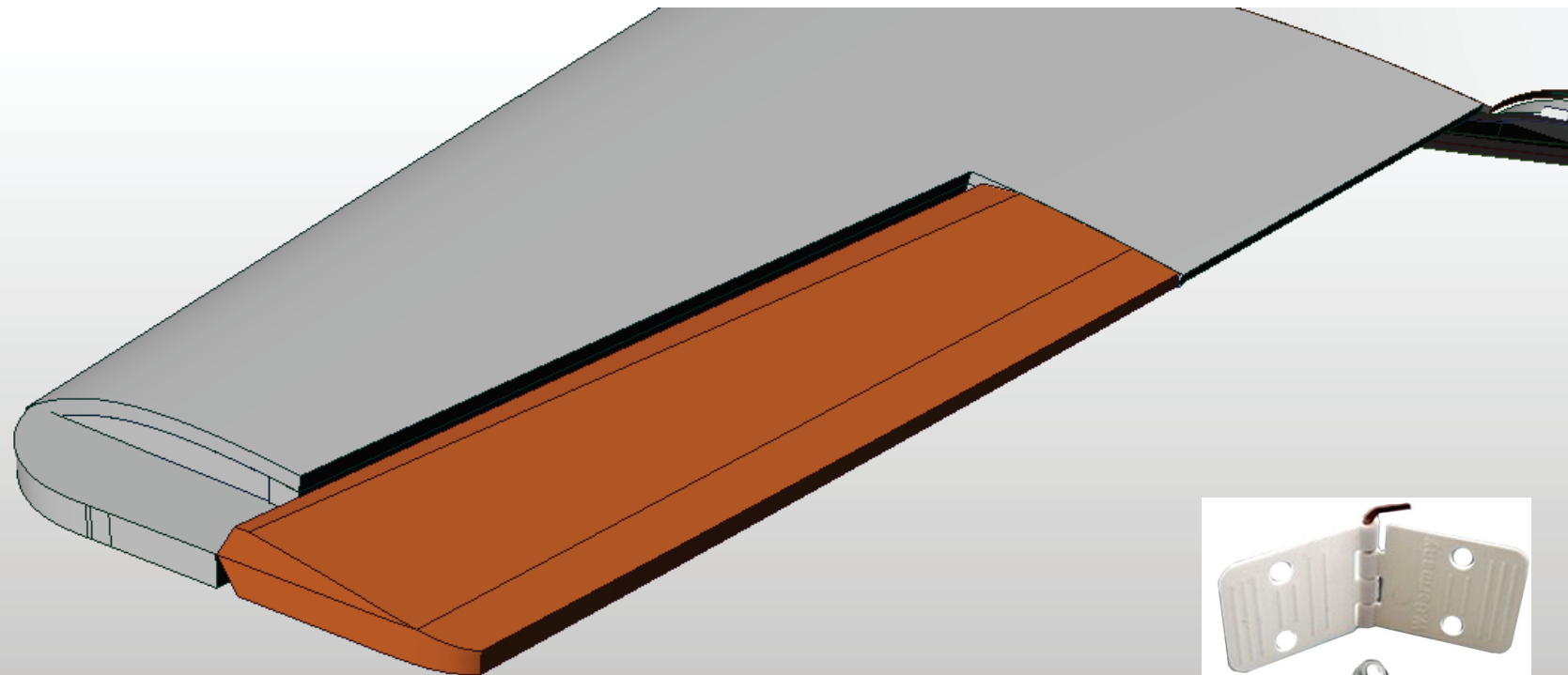


Glue the **Aileron** parts together and sand to shape.

Aileron (2 parts)

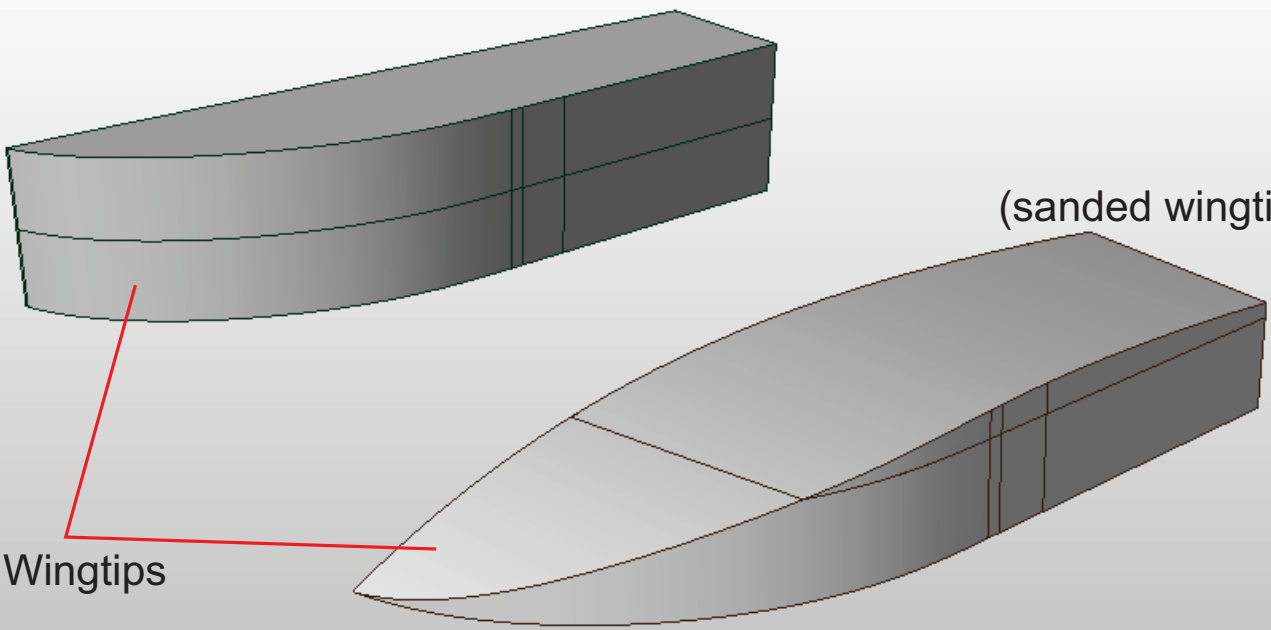


Using your preferred hinge method, add the ailerons to the wings, along with control horns, and connect the servos and test correct operation



(unsanded wingtip)

(sanded wingtip)



Wingtips

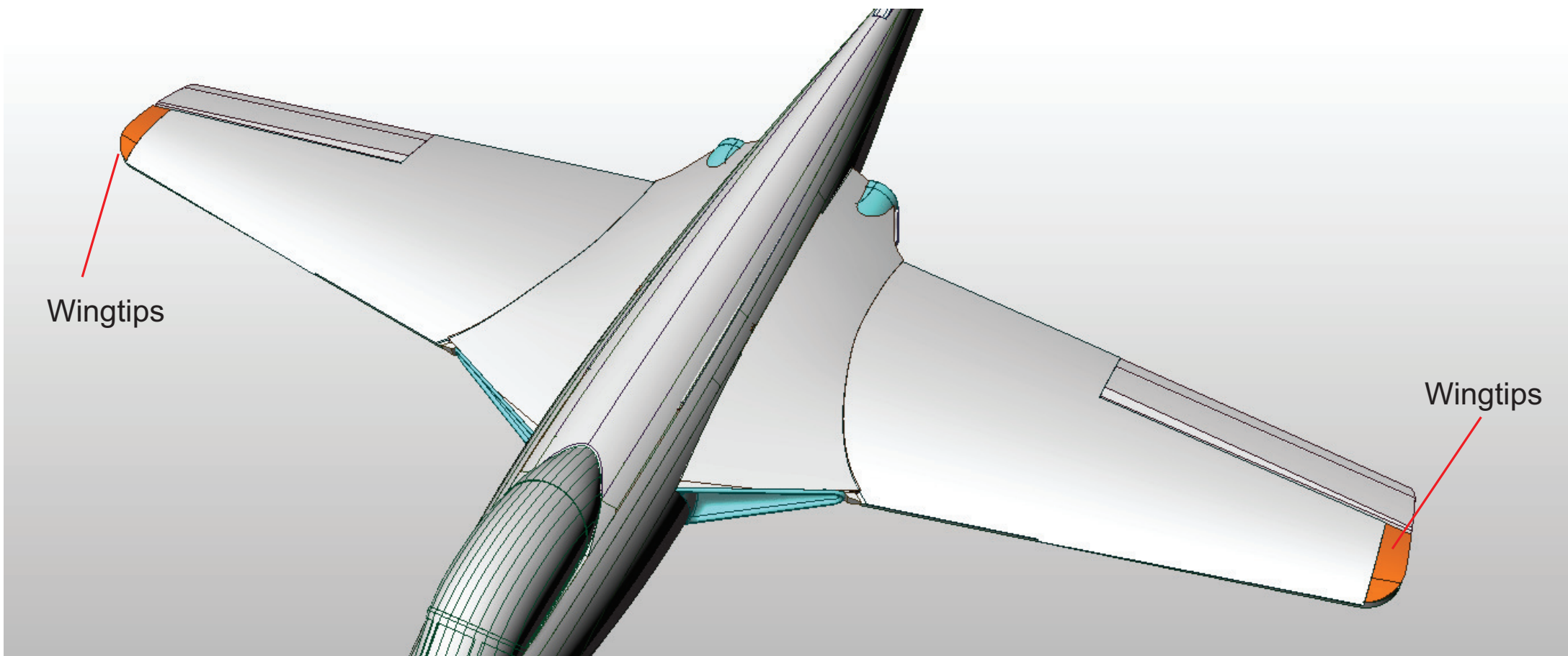
Glue together the **Wingtips**, and then sand to shape.

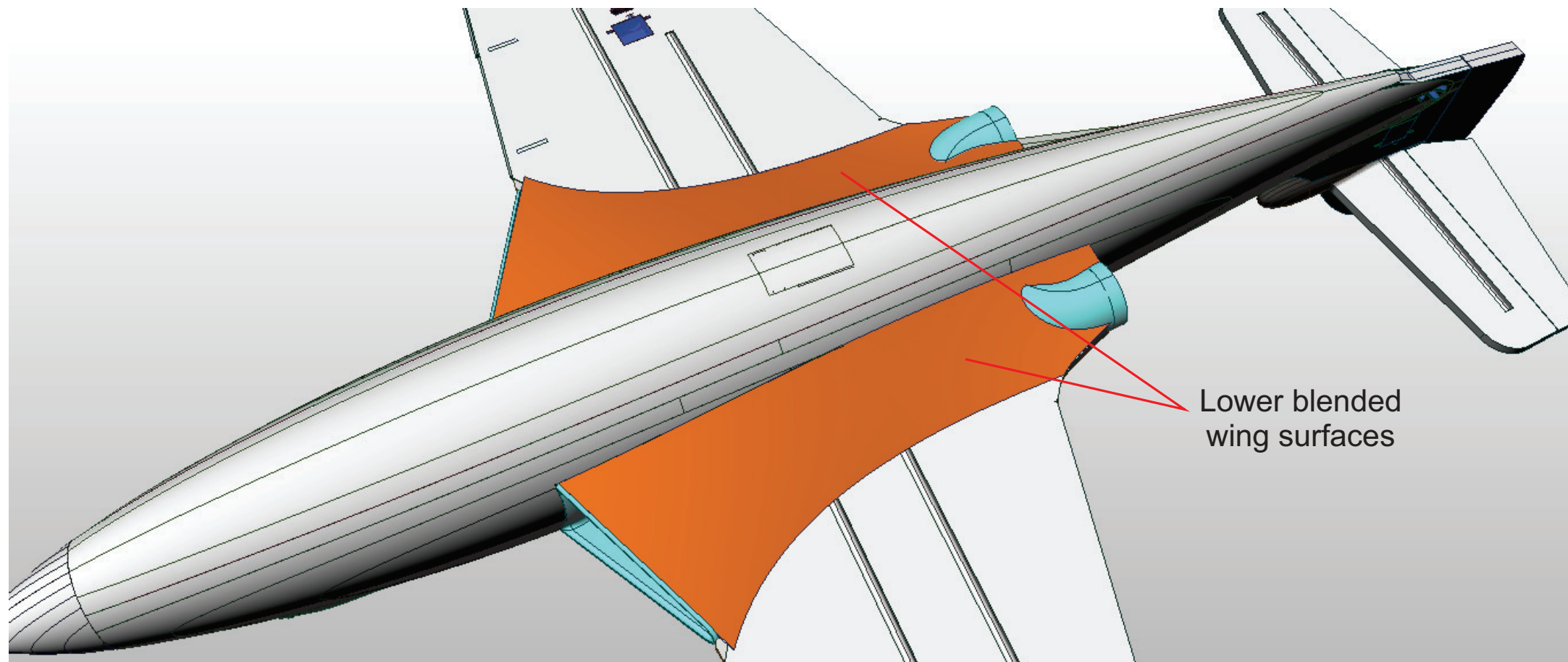


Glue the **Wingtips** onto the wing

Wingtips

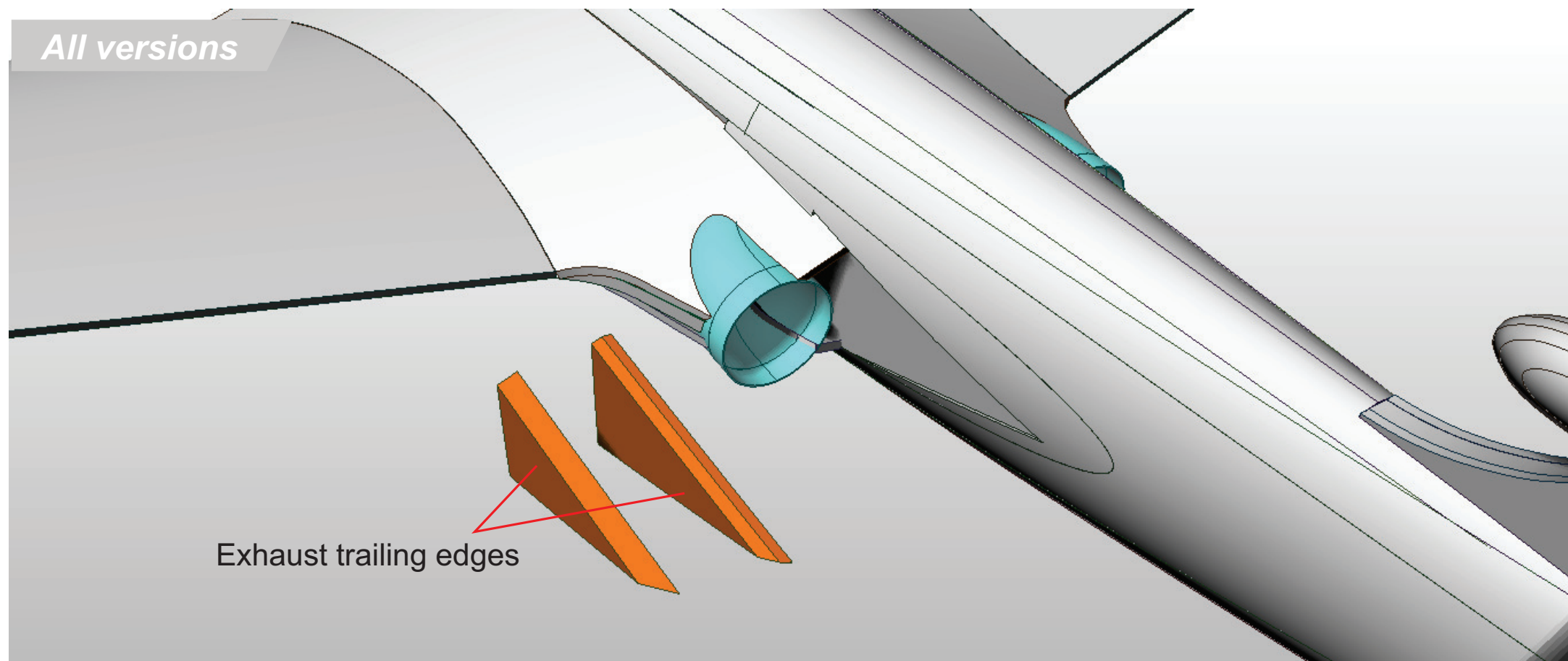
Wingtips





Using the marked lines on the underside of the wing, glue the **Lower blended wing surfaces** to the fuselage.

For the fake exhausts on the prop version, fabricate some tubes 38mm diameter x 75mm and trim the wings until they fit. Glue in place using UHU por.



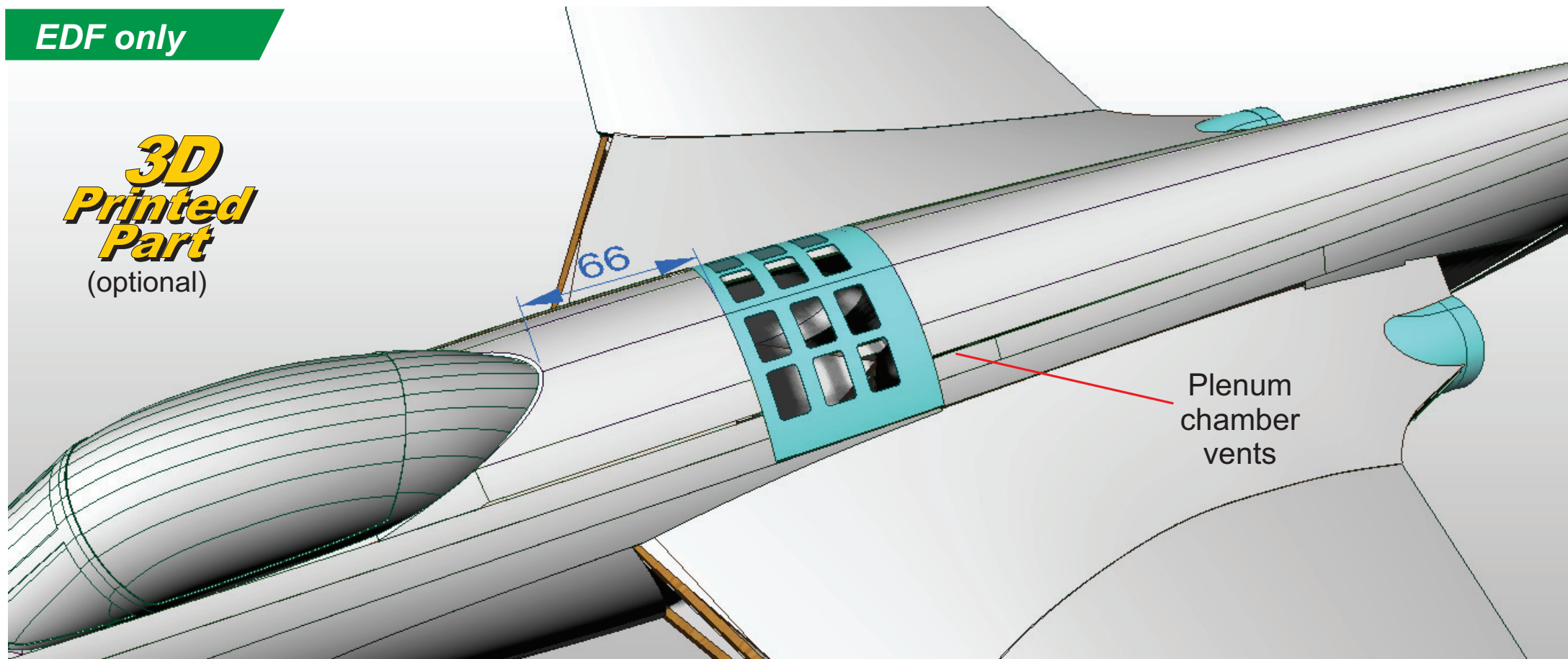
Glue the **Exhaust trailing edges** together then onto the fuselage in the indicated spot.

Using a dowl wrapped with sandpaper, shape the outside face to emulate the exhaust duct.

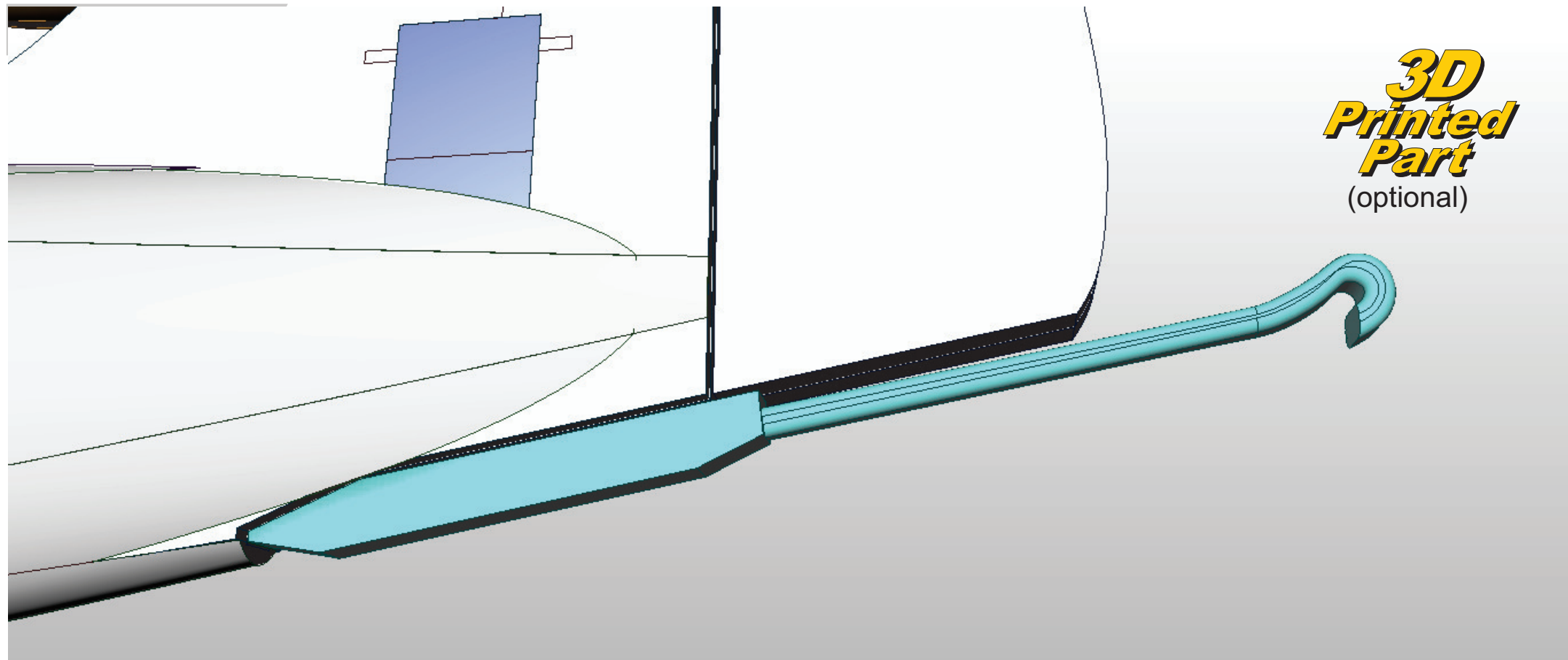


EDF only

**3D
Printed
Part**
(optional)

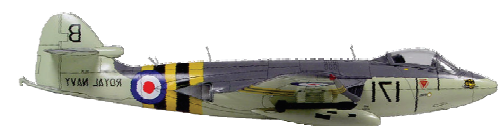


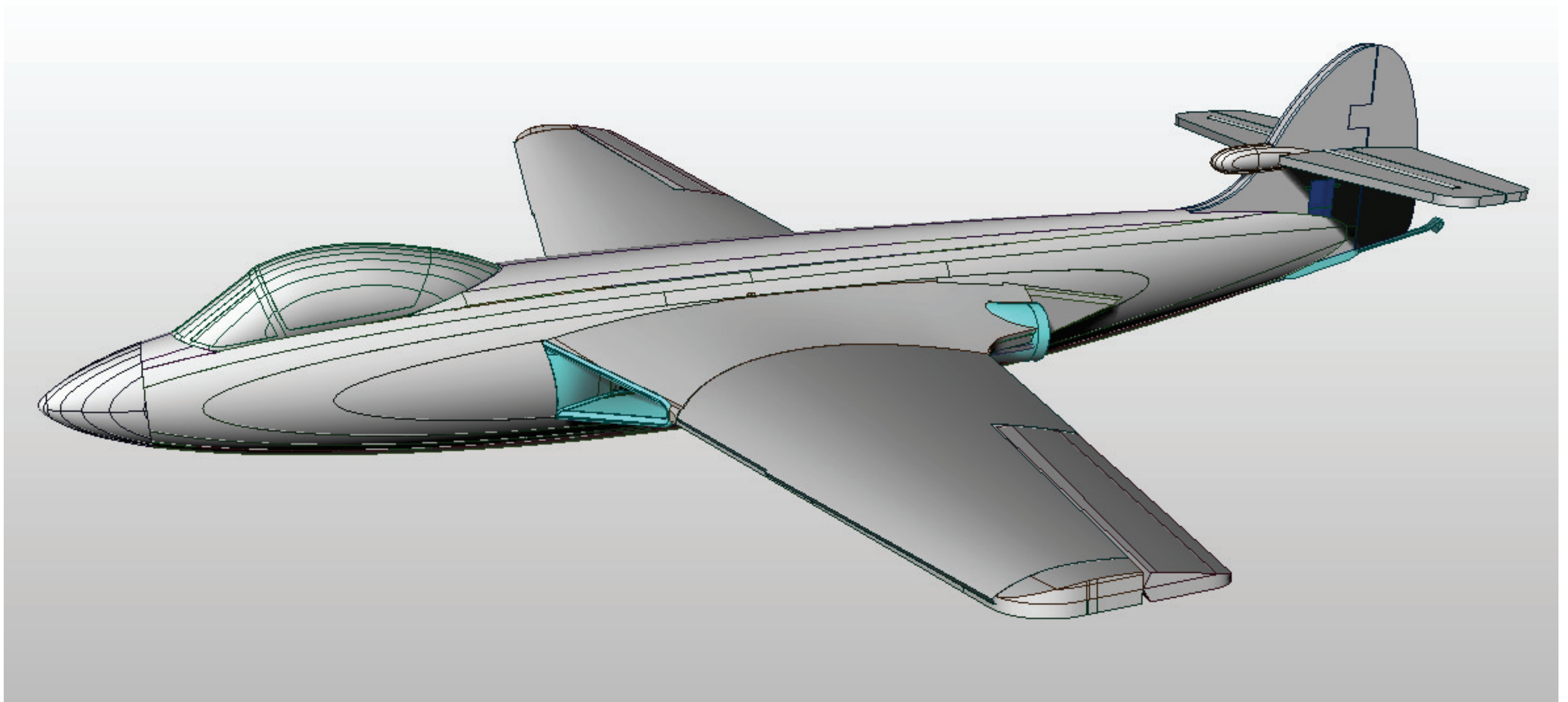
To increase air volume into the EDF, you can cut away the upper fuselage area and replace it with the 3d printed **Plenum chamber vents**.



Glue the **Arrestor hook** onto the fuselage using UHU por lightly.

If it is snagged on the ground then it should pull away without breaking the fuselage.





Congratulations! your model is now complete!

You can fly it as it is or paint it.





Use photos from the internet of the real plane to help shape and paint your model.

Photo copyright Joerg Amann

