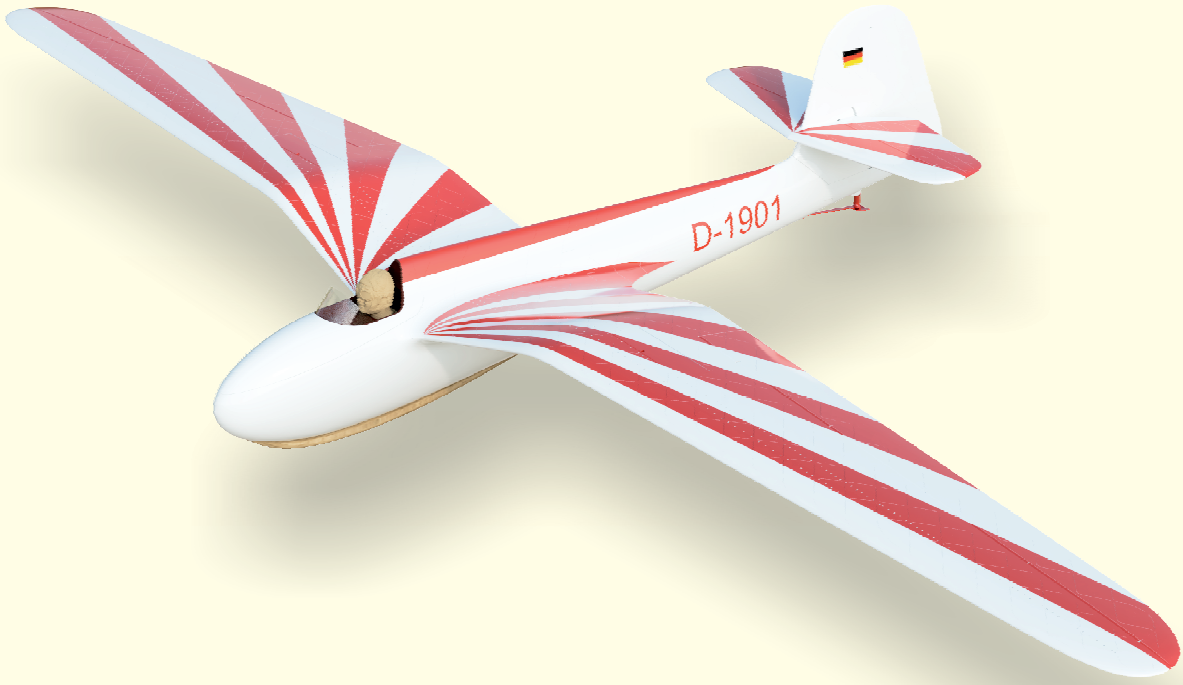
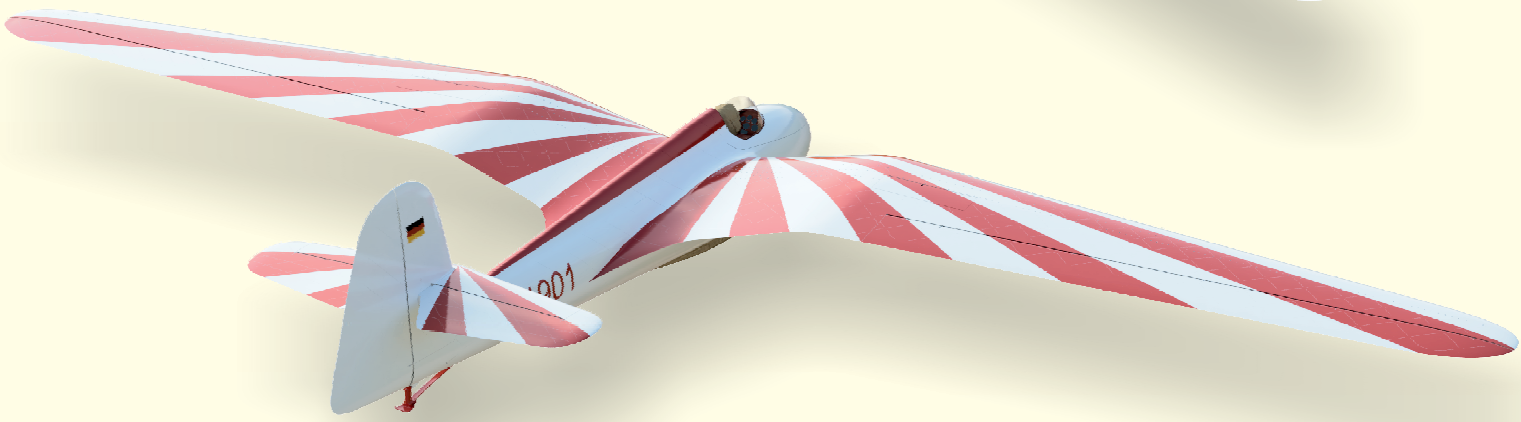
eMDe Model Development

1:6 SCALE LINE

DFS Habicht



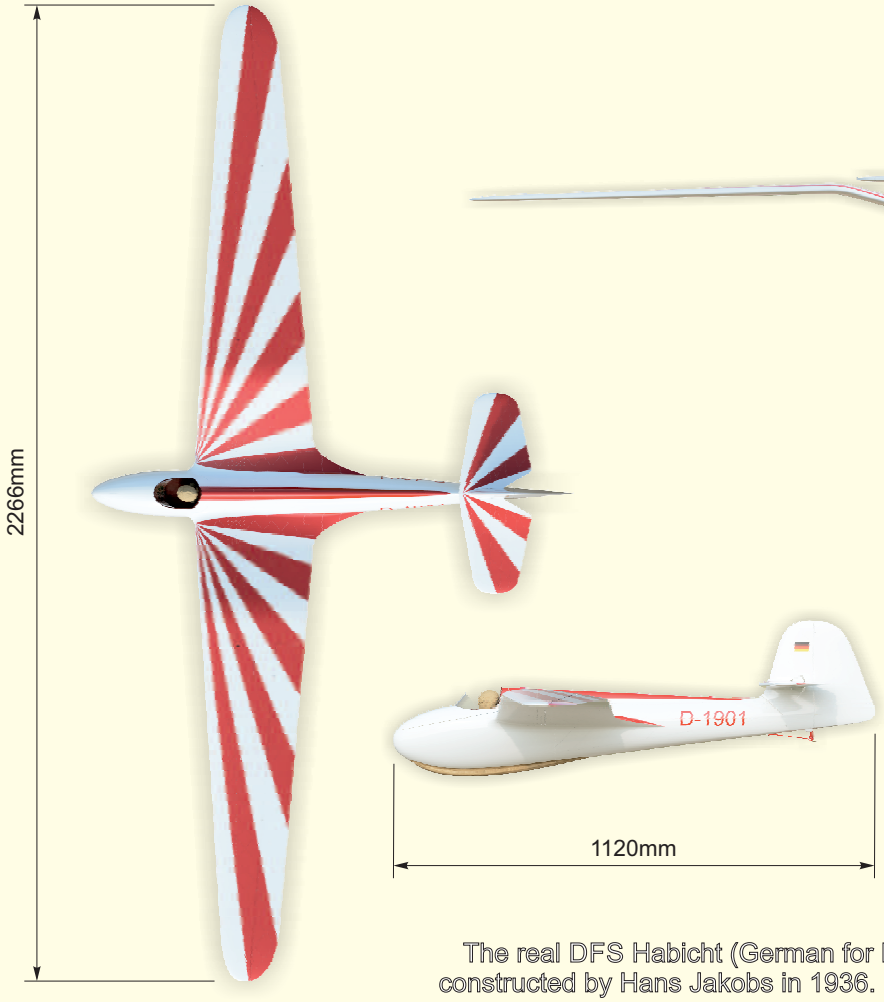


BUILD INSTRUCTION

Structure

Introduction

Specifications



Weight:	ca. 1000g
Glide Ratio (measured with GPS):	12 at 35kmh
Vmin:	20kmh
Vne:	120kmh
Max. G-loading:	8

The real DFS Habicht (German for Hawk) was the first fully aerobatic glider. It was constructed by Hans Jakobs in 1936. Right now, three flying replicas exist in Germany.

Features

- Scale replica of a legendary glider
- Smooth outer skin with no visible linkages, latches etc.
- Low retraction parts for extreamely low weight and reliable printing
- Working spoilers and print-in-place tow release
- Designed for thermal flying and scale aerobatics
- Quick wing release with optional automatic servo connections
- Lots of customisation possible
- Advanced, but rewarding build

Introduction

Options

Normal PLA

+ more inertia in aerobatics

- more brittle than LW PLA

- the higher weight of the fuselage reduces the maximum G-loading to 6!

**If you have access to LW PLA, use it!
If you want a higher wing loading,
build PLA wings with a LW PLA fuselage.**

Lightweight PLA

+ better slow flight characteristics

+ better for thermal flight

+ higher G-tolerance due to less weight

- LW PLA might not be available everywhere

- less inertia in aerobatics

LW PLA highly recommendet!

Pure glider

+ lowest weight

+ the most scale and pure

+ no motor needed

- requires a towplane or ridge lift to get airbourne

Front mounted propeller

+ the most versitile

+ ground takeoff possible with the includet wheels

+ allows you to save the plane if you drown at the slope

- the propeller does look a bit ugly

Retractable 64mm EDF

(available seperately)

+ absolute eye-catcher

+ great sound

- adds ~350 gramms to the fuselage which brings the maximum G-loading down to 6!

Internal aileron linkage

+ looks better, more scale

+ small reduction in drag

+ perfectly fine for thermal and scale flight

- a bit more play in the linkage

External aileron linkage

+ you can achive less play and delay aileron flutter

+ easier to maintain

+ recommendet for high speed flight above 120km/h

- does not look as good

Disclaimer

The purchase contains digital files that allow you to produce the parts for this airplane on your own 3D printer. No physical product is beeing shipped. The files are for personal use only. Please contact me if you want to use them in any commercial way.
The files may never be passed on to any third party. This is a remote controlled aircraft that requires skill, caution, and responsibility while building and while operating the aircraft. Always consider the safety instructions of any product, material or tool associated with the build and operation of this aircraft. Always be aware of possible dangers related to building or operating radio controlled aircraft. Always consider your local law when operating the aircraft.
Of course, we do not have any influence over what you, the user of this product, do with the product and can not be made liable for damages, injuries or violations of the law in association with our product.
If there are any unclaritys about the build, please feel free to contact me: emdemodeldevelopment@gmail.com

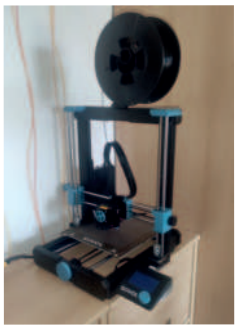
What you need

3D Printer / Filament

Min. Printer size: 220mm/220mm/210mm or
250mm/200mm/210mm or
310mm diameter/210mm

All metal hotend recommendet.
Removable flexible build plate highly recommendet. 4mm nozzle recommended.

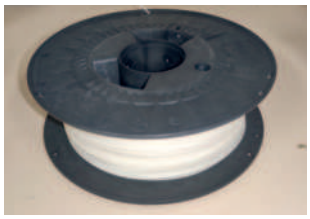
Recommendet printers:
Prusa i3 Mk3
Ender 3 S1
Sovol SV 06



When building with LW PLA:
750g LW PLA at 40% flow / 200g PLA

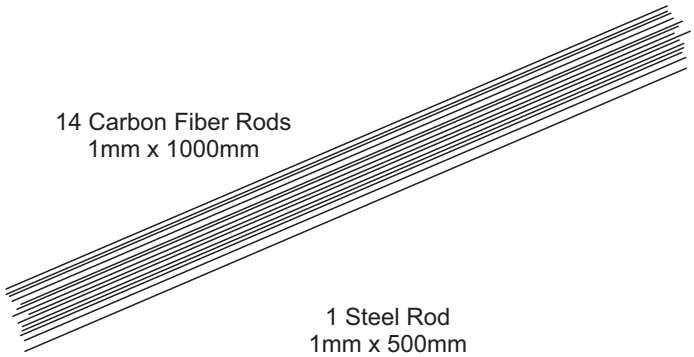
When building with PLA:
2000g PLA

Lighter colors / natural highly recommendet. Dark colors get hotter in the sun and are more likely to warp.

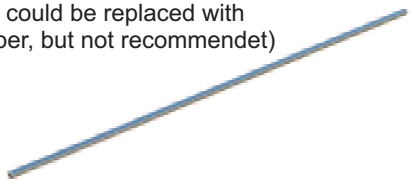


Carbon Fiber / Steel Rods

14 Carbon Fiber Rods
1mm x 1000mm



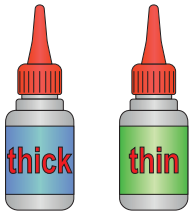
1 Steel Rod
1mm x 500mm
(these could be replaced with carbon fiber, but not recommendet)



Glue

Cyanacrylat (CA) glue with accellerator recommendet.
Most of them are available in different viskositys. I reccomend to get a thick or medium bottle and the thinnest bottle available.
The thin glue is used to hold the carbon fiber rods in the wings, and this is the most stressed part of the entire airplane.
Only use high quality glue that you trust!

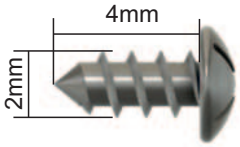
One 20gramm bottle of each viscosity is enough for the build.



Screws / Hardware

4 linkage connectors
(adjustable recommended)

50 self tapping screws



Optional 2 sets of 6 pin Multiplex plugs for automatic servo connection

RC Components

6-7
9-gramm servos
use play-free servos for ailerons

If build as a Motorglider:
Recommended Motor: 4023 / 850Kv
maximum bell diameter: 45mm
30 Amp ESC / 10" folding propeller

If build as a pure glider, use a BEC instead.

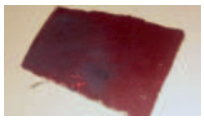
1200mAh 3S LiPo
or bigger

Tools

Screwdriver

Cutter knife

Sandpaper



Wire cutters

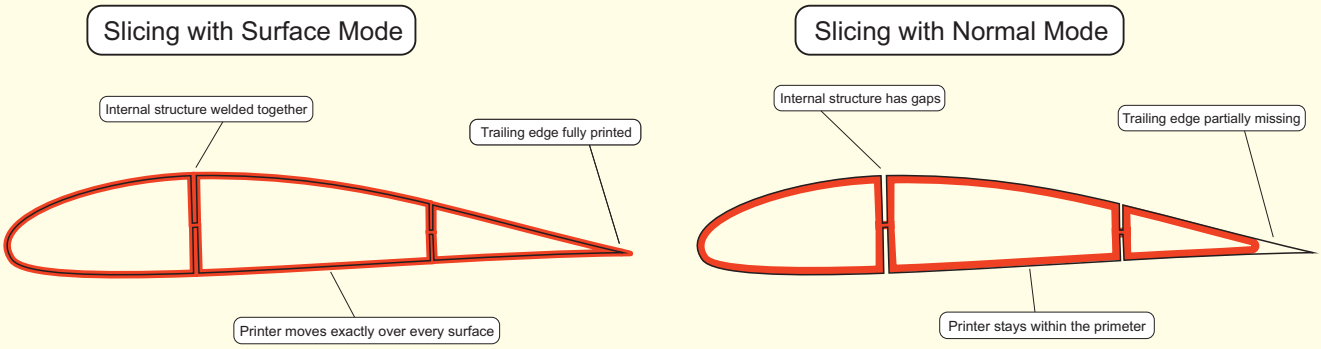
1mm drillbit (I put it in this screwdriver grip, works great)

Paper towel (or toiletpaper) to soak up unwanted glue. Very helpful to remove glue from places where it should not be.

Slicer settings

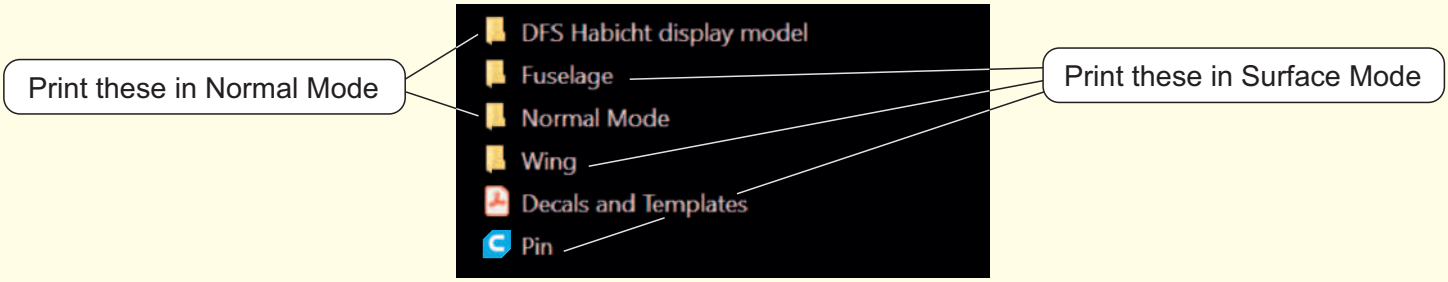
Which slicer? What is „Surface Mode“?

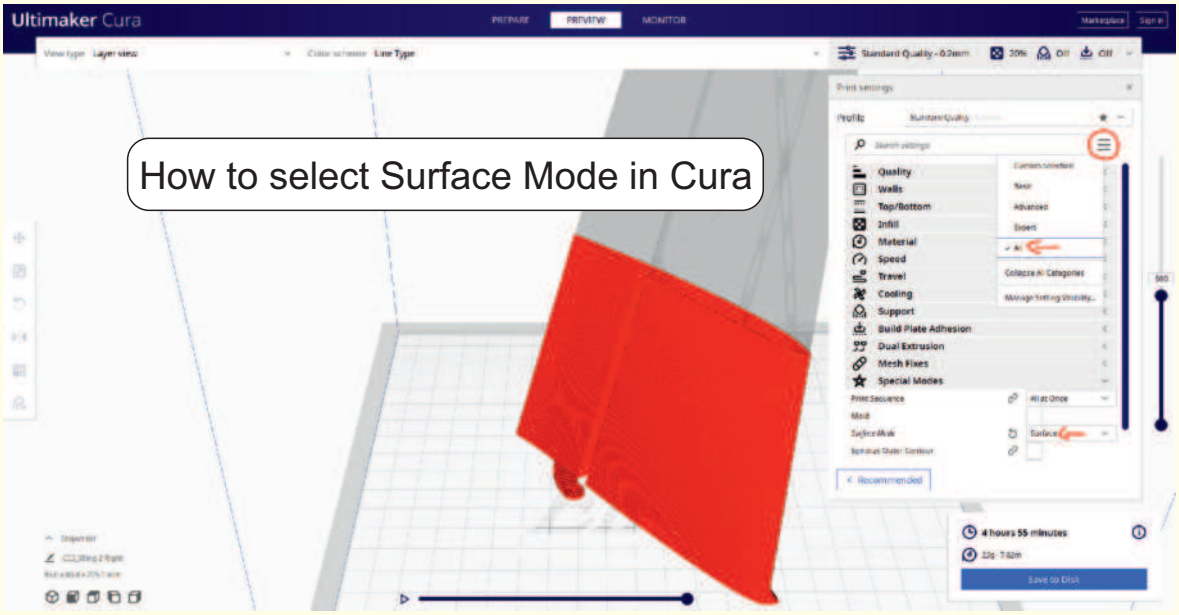
Most parts must be sliced in „Surface Mode“. Here you can see the differences between Surface and Normal Mode slicing:



In Surface Mode, the number of walls is always 1, the top and bottom layers are always 0 and there is no infill. Changing these settings has no effect.

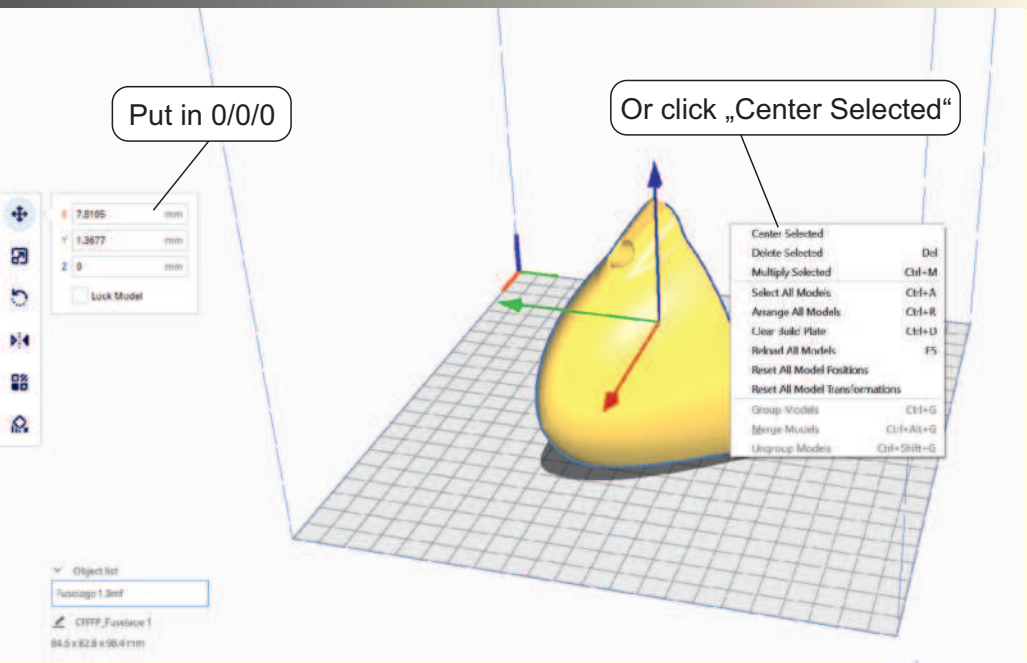
There are only two slicers I know that support Surface Mode. These are Ultimaker Cura and Raise3D ideaMaker. Both are free to download. I like Curas user interface more, but ideaMake is also worth checking out.





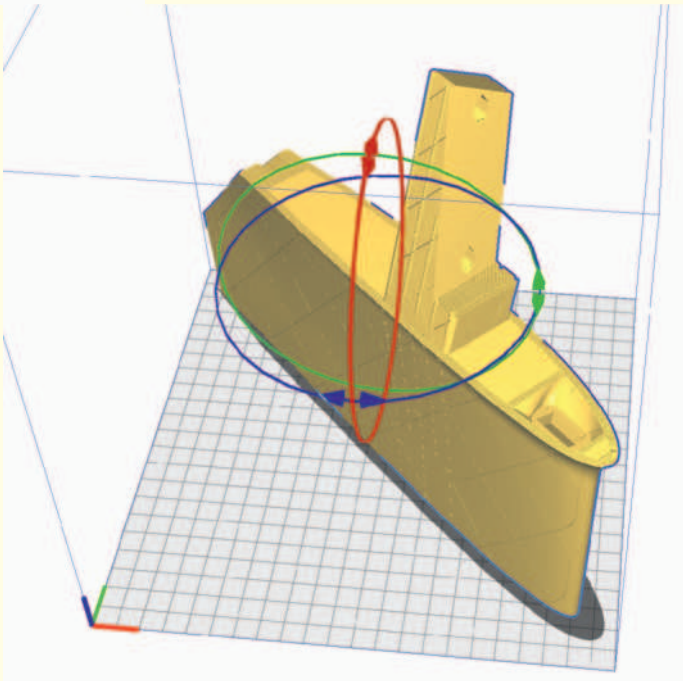
Slicer settings

Placing the parts on the build plate

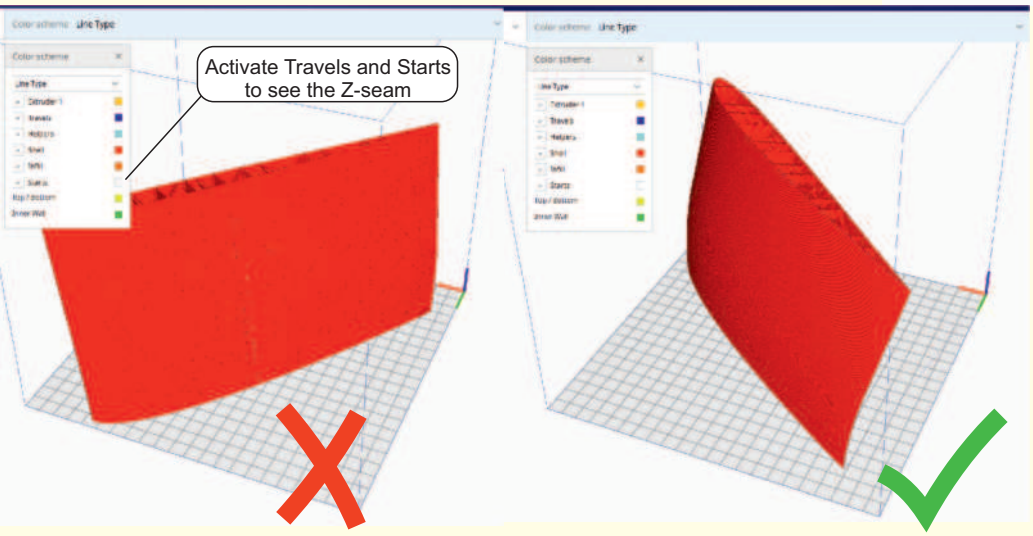


All parts are already oriented the right way by default. However, because of the .3MF file format they are not in the center, especially on larger printers. Center the parts, because the heating of the build plate is usually the most even in the center of the build plate.

The largest parts are oriented to fit the Prusa i3 Mk3. You may need to turn them in order to fit them on an Ender3 or similar.



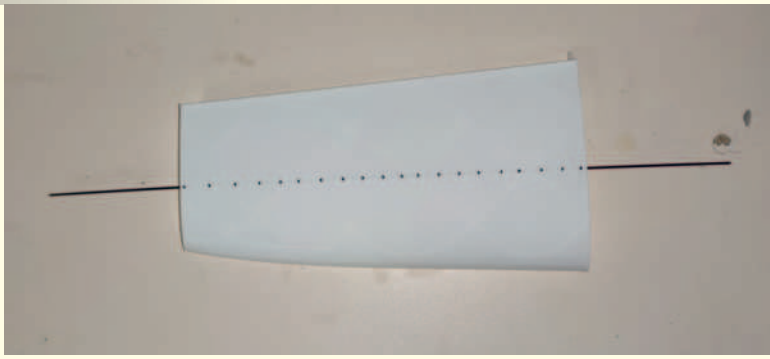
You can turn all parts around the Z-axis, for example to adjust the Z-seam location, but you should not turn them around any other axis.



Make sure that the Z-seam is on the trailing edge or on the underside.

Slicer settings

Calibrating the flow



The real extrusion width should be exactly 0.4mm to fit the carbon fiber rods. Print a test part (Wing 8 recommendet, this part is also available for free to try out the slicing) and insert your carbon fiber rods. Depending on your first layer, you may need to use the 1mm drill on the lower layers. The carbon fiber rods should go through with little efford. If the fit is too tight, reduce the flow. When using standard PLA, 100% flow should work fine, but on LW PLA, the real extrusion width depends on more factors. A higher rate of foaming increases the extrusion width. To get the lightest parts possible, you need a high rate of foaming and a low flow.

A higher temperature means higher rate of foaming.

Lower speed means more time in the nozzle and thus higher foam rate.

My flow setting is 40%.

My temperature is 260°.

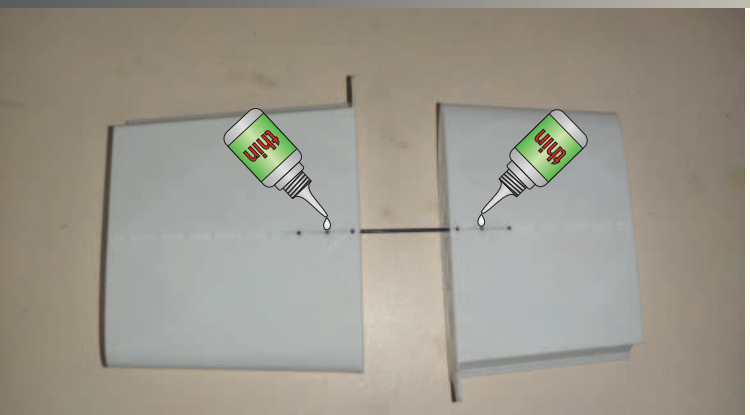
My speed is 40mm/s.

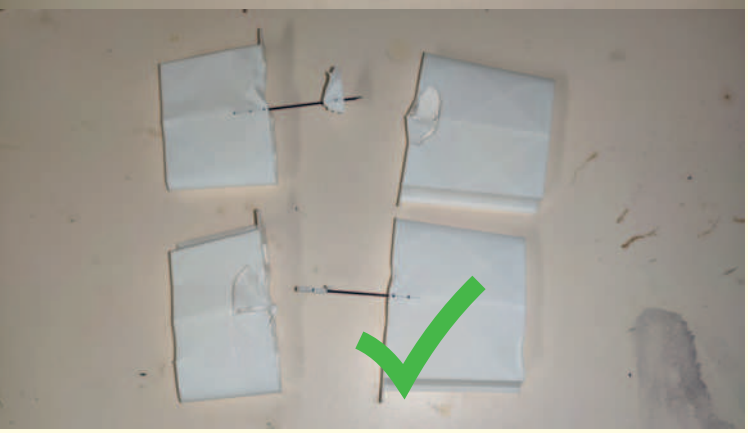
If you reduce the flow too much, you will get underextrusion and bad layer adhesion. If you are not able to make the carbon fiber rods fit inside the tubes with a 0.4mm nozzle, try out a 0.35mm nozzle.

Tip:
On some printer presets, the setting „Extrusion Width“ is not set to 0.4mm, but for example 0.44mm. Change it to 0.4mm for Surface Mode prints.

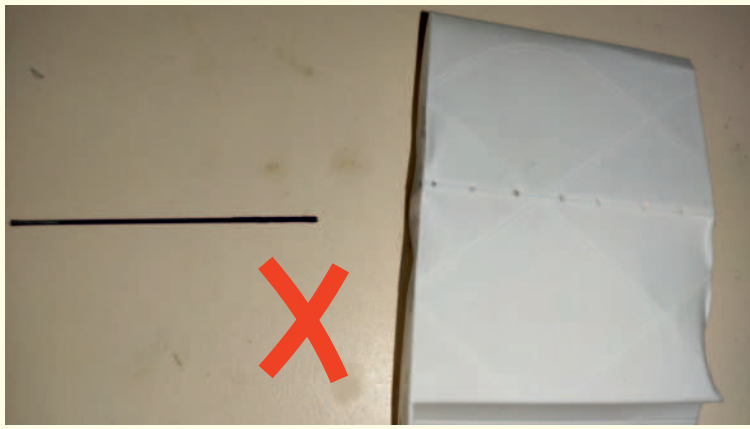
Tip:
You can achieve even more foaming by installing a longer nozzle. More time in the nozzle=more foaming. Just make sure that the threading fits and adjust the Z-Offset.

Testing the glue





In order to make the plane strong, you need glue that is able to withstand the extreme forces in the wing. Here is a simple test to validate if your glue is up to the task. Print your test part (Wing 8) two times out of LW PLA (you can stop the print in the middle to save filament), insert a small piece of carbon fiber and add ONE drop of glue on each sideas seen in the picture. Use the glue just as you would on the real wing and let the glue cure. Now pull on both parts until something fails. You can try out different glues and different methods.



LW PLA failed before the glue. Glue approved

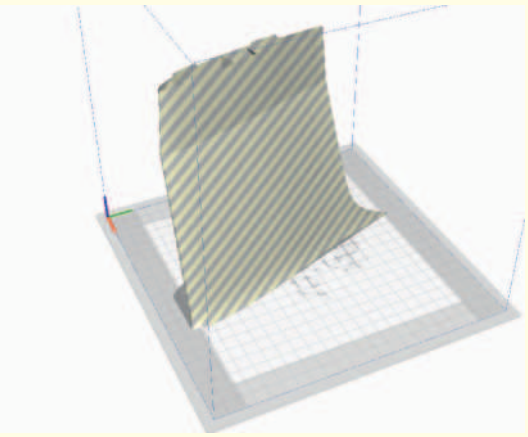
Glue failed before the LW PLA. Glue NOT approved

Slicer settings

Other settings

If your printer is able to produce a good Benchy,
it should not have any problems with printing planes.
You can keep all your settings except for those mentioned
in this manual.

All surface mode parts must be printed with a layer hight
of exactly 0.2mm! Otherwise, there might be unwanted
travel moves.



There is no support needed.

Usually, you wont need skirts, brims or rafts. The first layer
was specially designed for extra build plate adhesion.
If you are not able to slice a part, check if you have a
skirt, brim or raft activated. These take up a bit of space
and on larger parts, they might be too big for the build plate
and you can not slice (as seen in the picture).

All Surface Mode and LW PLA parts should be printed individually for the best quality.

Scaling the plane

If you want to print the plane in a different size, you can do that easily. Use the scaling feature of your slicer. Scale all parts by the same value. Just consider these things:

- Scale the real extrusion width by the same value. Use different nozzle sizes and play with your flow until you get a result that you like.

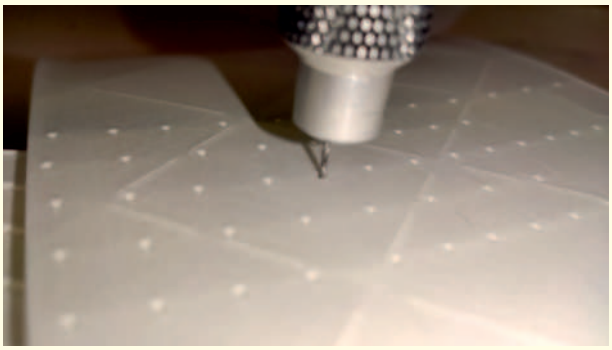
- The layer hight MUST be scaled by exactly the same value. Otherwise, there might be stringing.

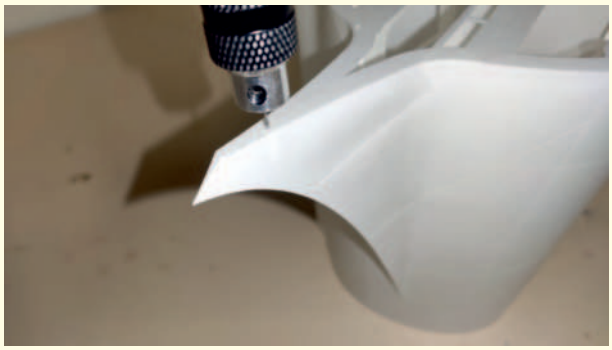
- Servos, carbon fiber rods etc. might not fit as well. Make sure to scale them too.

- You may need a larger printer.

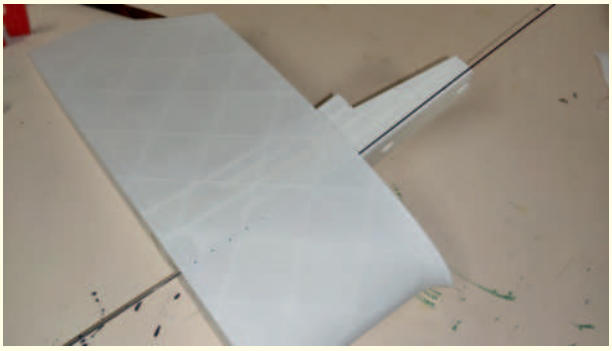
Part preperation

Step 1: Remove blobs, stringing and other print incorrections.
Use the 1mm drill to widen the holes in the wings.





Step 2: If there are channels for carbon fiber rods, test if they fit in.
If the fit is too tight, run a carbon or steel rod back and forth quickly through the tube.



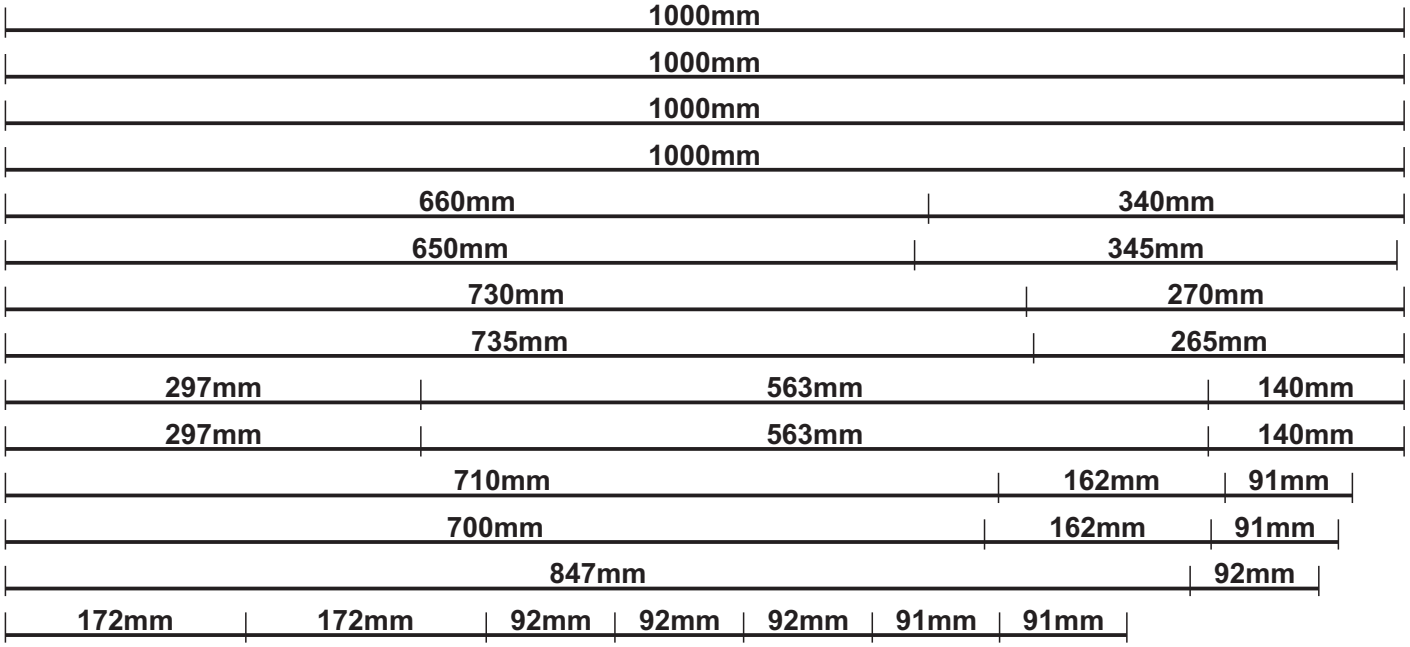
Step 3: Glue the pins into the parts as seen in the parts list.
(red=PLA, black=carbon)

Parts list

Carbon Fiber Rods

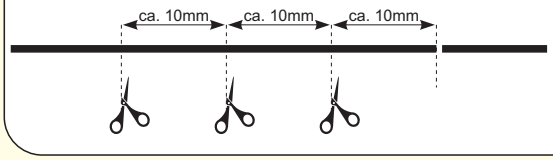
Material: 1mm diameter carbon fiber rod
Quantity: 14
Length: 1000mm each

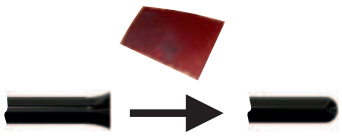
Use this cutting plan to cut the rods to the right length:



Pin Carbon Fiber

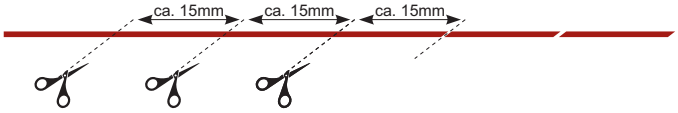
Material: 1mm carbon fiber rod (leftovers from cutting the larger parts)
Quantity: 28
Length: ca. 10mm





Pin 3D Print

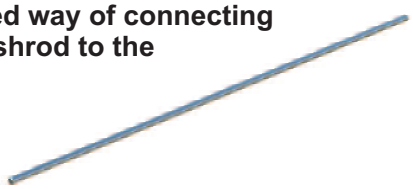
Slicing Mode: Surface
Material: PLA
Quantity: ca. 70
Length: ca. 15mm



Steel Rods

Material: 1mm steel rod
Quantity: 4-5
Length: < 100mm

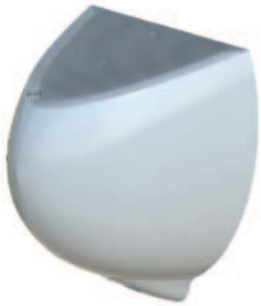
Adjust the length to fit your prefered way of connecting the pushrod to the servo.



Parts list

Fuselage 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



Note:

If you build with a front mounted propeller, use „Fuselage 1 Prop Version“ instead.

Fuselage 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Fuselage 3

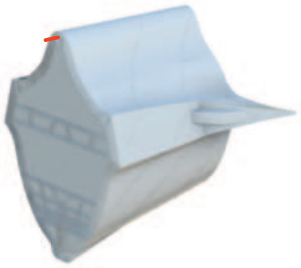
Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Fuselage 4

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

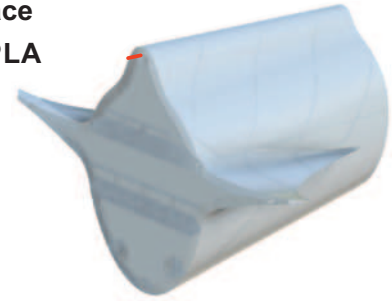
Fuselage 5

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



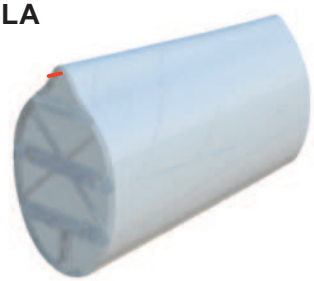
Fuselage 6

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



Fuselage 7

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



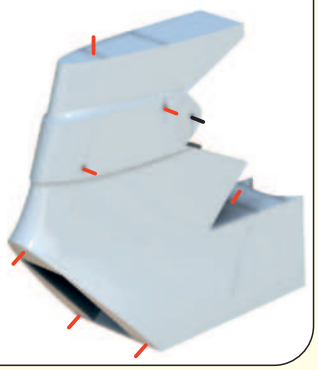
Fuselage 8

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Parts list

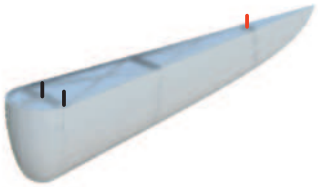
V Stab 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



Rudder 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

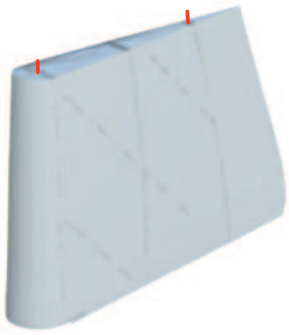


V Stab 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Rudder 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



V Stab 3

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Rudder 3

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

V Stab 4

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Rudder 4

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

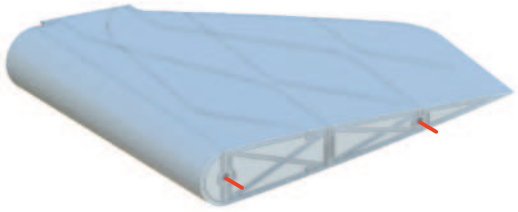
Parts list

Elevator Centerpiece

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

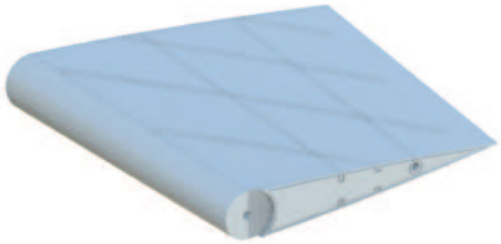
Elevator 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



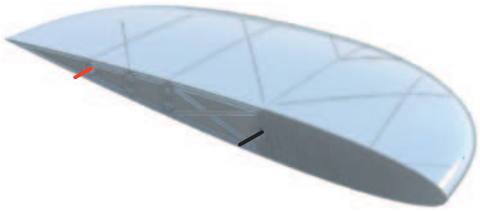
Elevator 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



Elevator 3

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



H Stab

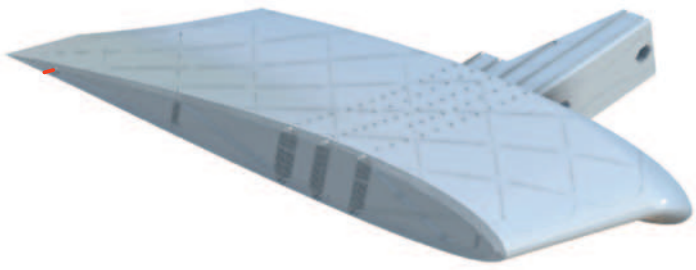
Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

Note:

Available as left / right combined and split.

Wing 1 Right

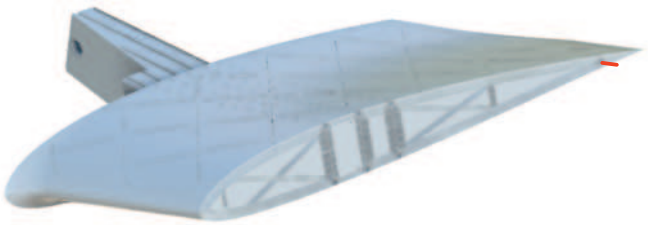
Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 of each



Parts list

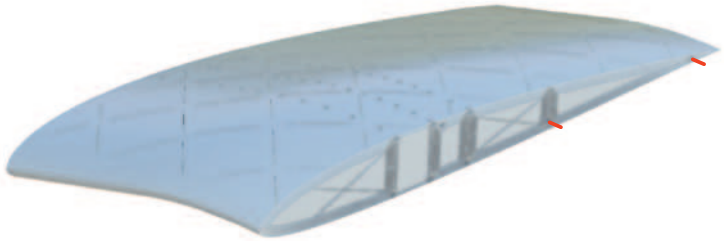
Wing 1 Left

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 of each



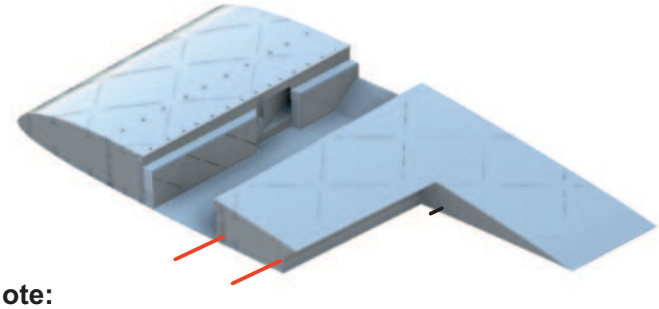
Wing 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



Wing 3

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored

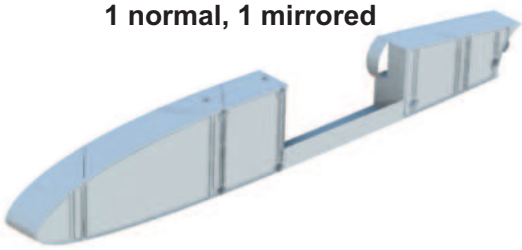


Note:

The printed pins should stick out about 15mm here.

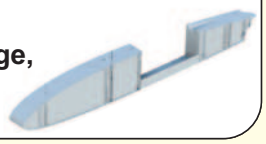
Wing 4

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



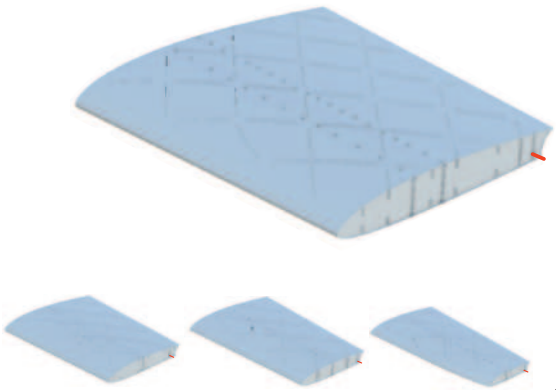
Note:

If you build with an external linkage, use „Wing 4 EL“ instead.



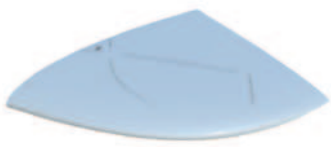
Wing 5-8

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored of each



Wing 9

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored



Parts list

Aileron 1

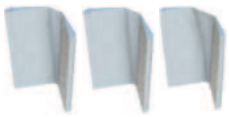
Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored

Aileron 2-5

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 of each

Note:

If you build with an external linkage, use „Aileron 2 EL“ instead of „Aileron 2".
All ailerons available as left / right combined and split.



Aileron 6

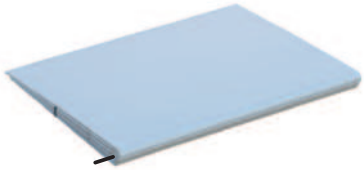
Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored

Spoiler Holder

Slicing Mode: Normal
Rec. Material: LW-PLA
Quantity: 2
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%

Spoiler 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored

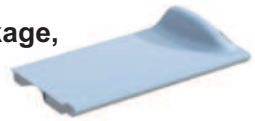


Spoiler 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1 normal, 1 mirrored

Note:

If you build with an external linkage, use „Spoiler 2 EL“ instead.



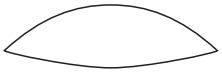
Parts list

Windshield

Slicing Mode: Surface
Rec. Material: Transparent PLA
Quantity: 1

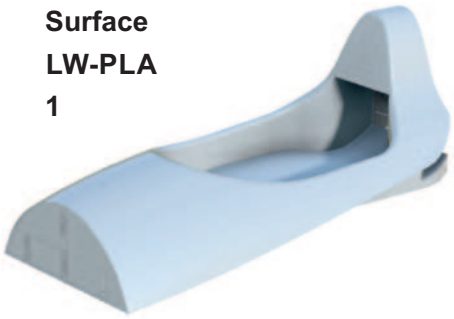
Note:

Alternativeley, you can cut the windshield out of clear plastic using the template in the „Decals and Templates“ file.



Canopy 2

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1

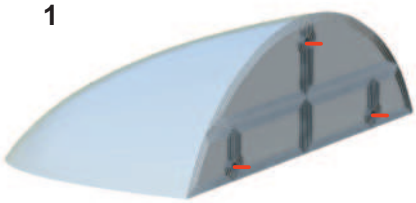


Note:

Alternatively, a closed canopy is available. Its not scale, but its an option.

Canopy 1

Slicing Mode: Surface
Rec. Material: LW-PLA
Quantity: 1



Pilot

Slicing Mode: Normal
Rec. Material: LW-PLA
Quantity: 1
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%

Canopy Holder

Slicing Mode: Normal
Rec. Material: PLA
Quantity: 1
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%

Electronics Tray

Slicing Mode: Normal
Rec. Material: PLA
Quantity: 1
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%

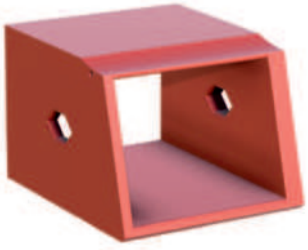
Sparbox Right

Slicing Mode: Normal
Rec. Material: PLA
Quantity: 1
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%

Note: 3 levels of tolerance available

Sparbox Left

Slicing Mode: Normal
Rec. Material: PLA
Quantity: 1
Walls: 2
Top/Bottom Layers: 4/3
Infill: 15%



Note: 3 levels of tolerance available

Parts list

Servo Holder

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	4
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Servo Holder Holder

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	4
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Tailskid Right

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Tailskid Left

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Wing Bolt

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Pushrodend

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	depends on type of control surface linkage
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Pushrod Coupler

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	2
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Spoiler Linkage

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	2
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Parts list

Plug Holder Fuselage

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1 normal, 1 mirrored
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Note: Only needed when building with automatic servo connection via Multiplex plugs.

Plug Holder Wing

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1 normal, 1 mirrored
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Note: Only needed when building with automatic servo connection via Multiplex plugs.

Takeoff Gear

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Tire

Slicing Mode:	Normal
Rec. Material:	TPU / PLA
Quantity:	2
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Wheel

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	2
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Washer

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	2
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Motor Mount

Slicing Mode:	Normal
Rec. Material:	PLA / ABS / PETG
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Note: Use a material that withstands the heat of your motor. PLA worked fine for me.

Tow Thing

Slicing Mode:	Normal
Rec. Material:	PLA
Quantity:	1
Walls:	2
Top/Bottom Layers:	4/3
Infill:	15%

Note: Attach this piece to the end of the tow string to reach the tow release.

Tips for glueing

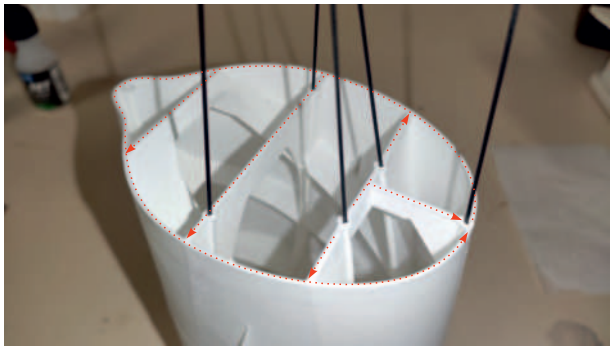
Test fit the parts before applying any glue.

Choose the right glue for the task.

Thick glue stays in place after it got layed down. It does not go into places it should not. It has slightly longer drying time and is not as aggressive. Use it to join two parts together.

Thin glue can get very deep into gaps, but it can also run into places where it should not get. It dries very fast. Use it to reinforce parts by pouring it into gaps.

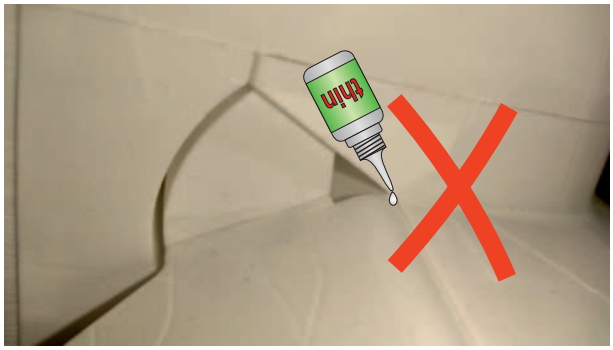
Plan out your glueing path. Start with the hard to reach places. Keep the drying time in mind.

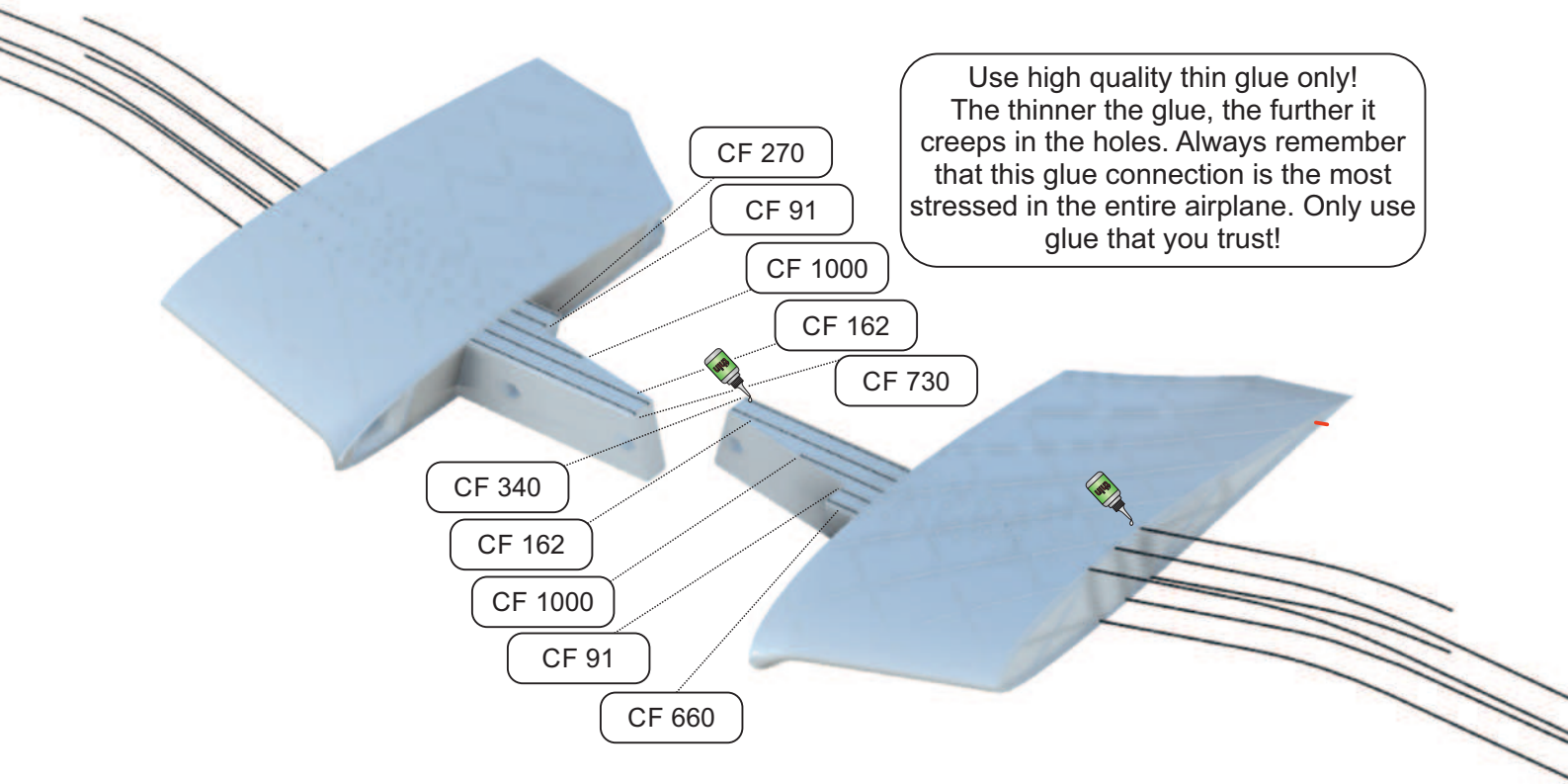


After joining the parts, you can put thin glue in the gaps between parts for a strong outer skin.

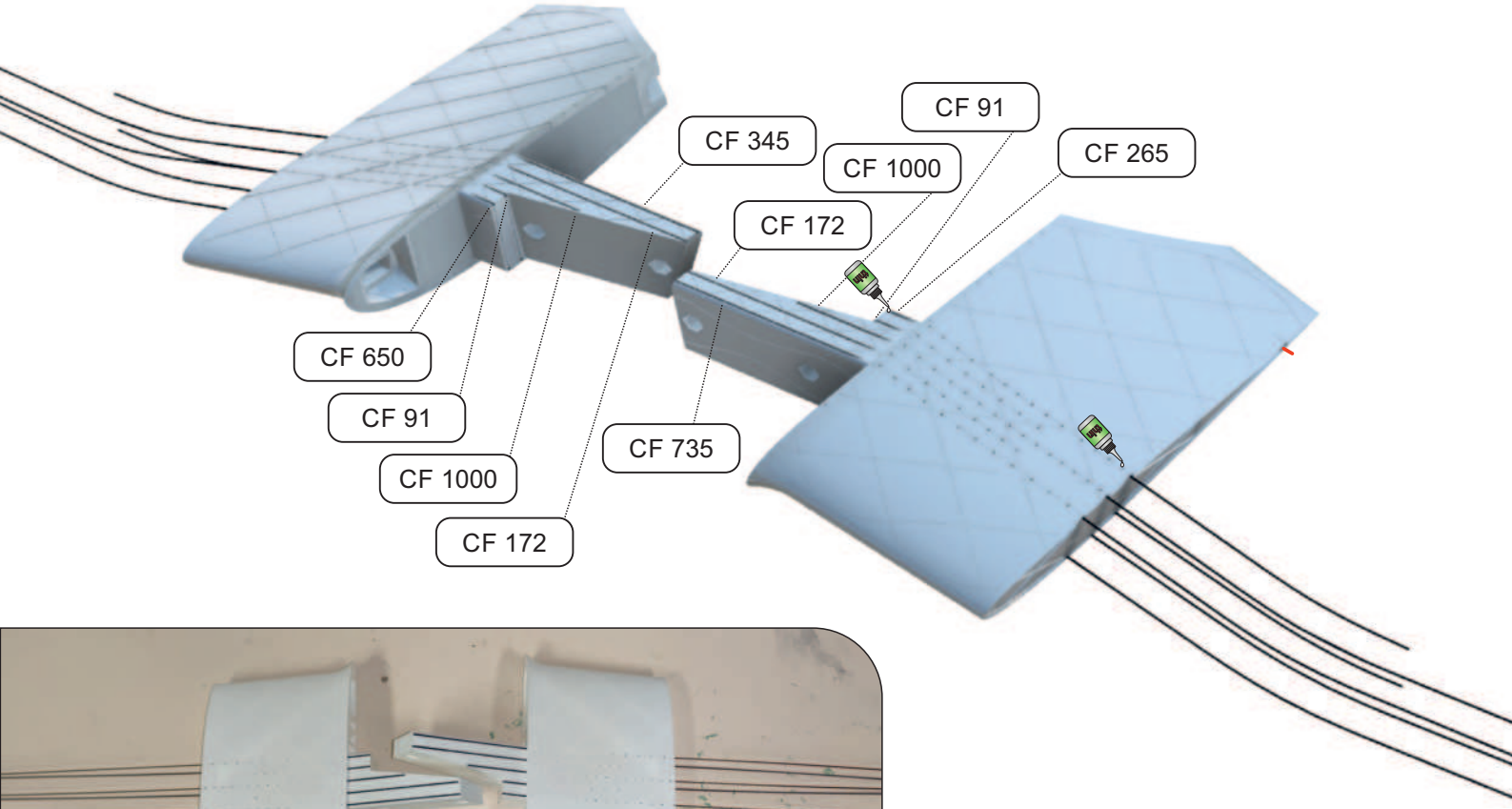
When using thin glue, use a paper towel to soak up excess glue.

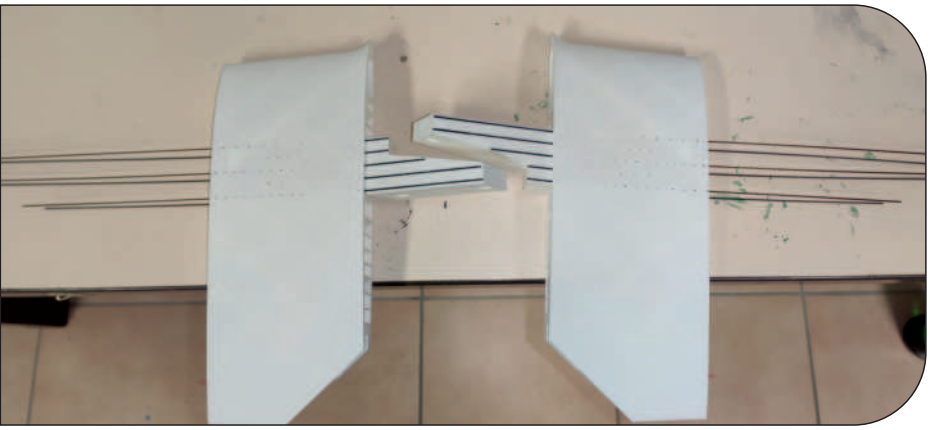
Always make sure that no moving parts are glued shut!

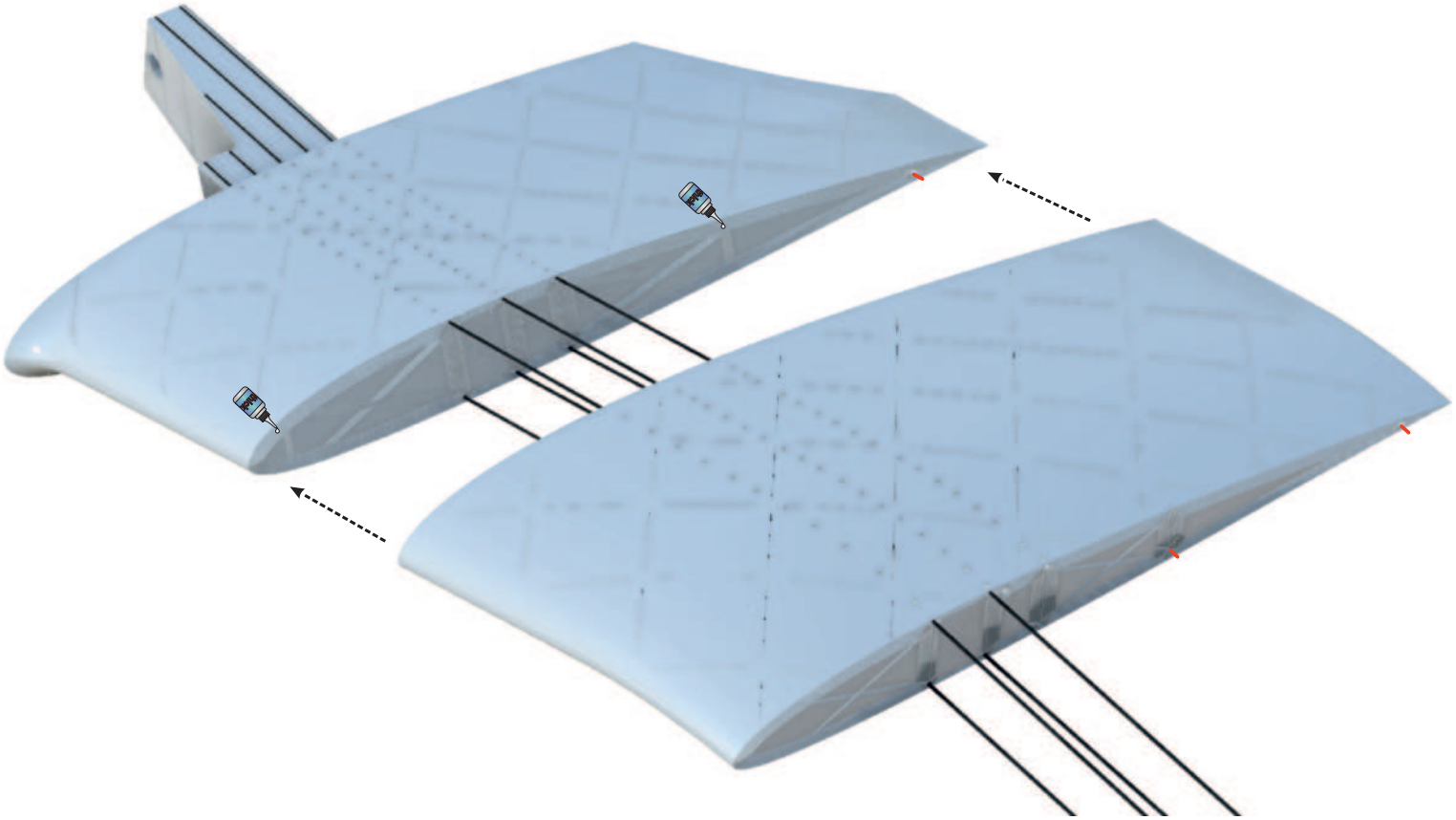


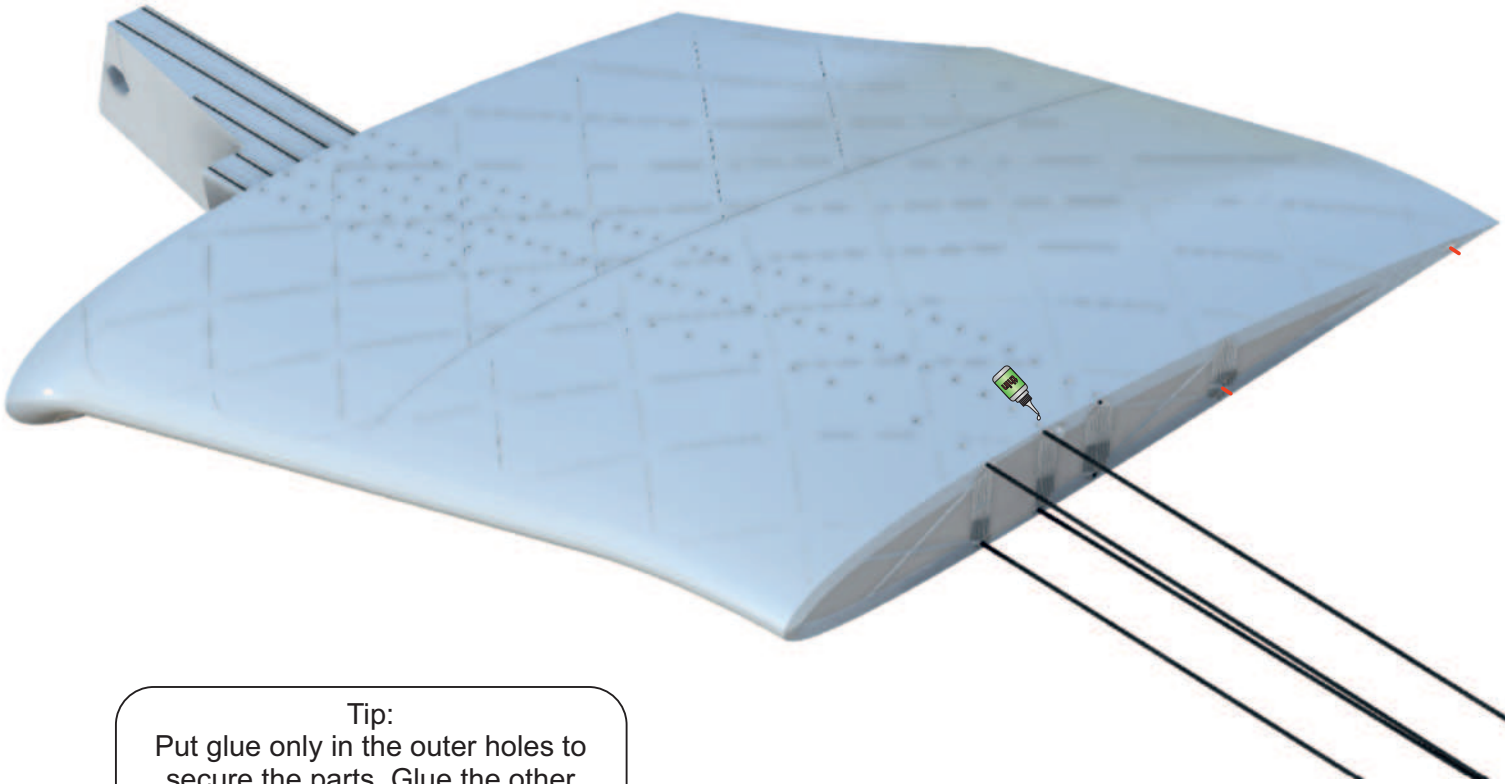


Use high quality thin glue only! The thinner the glue, the further it creeps in the holes. Always remember that this glue connection is the most stressed in the entire airplane. Only use glue that you trust!

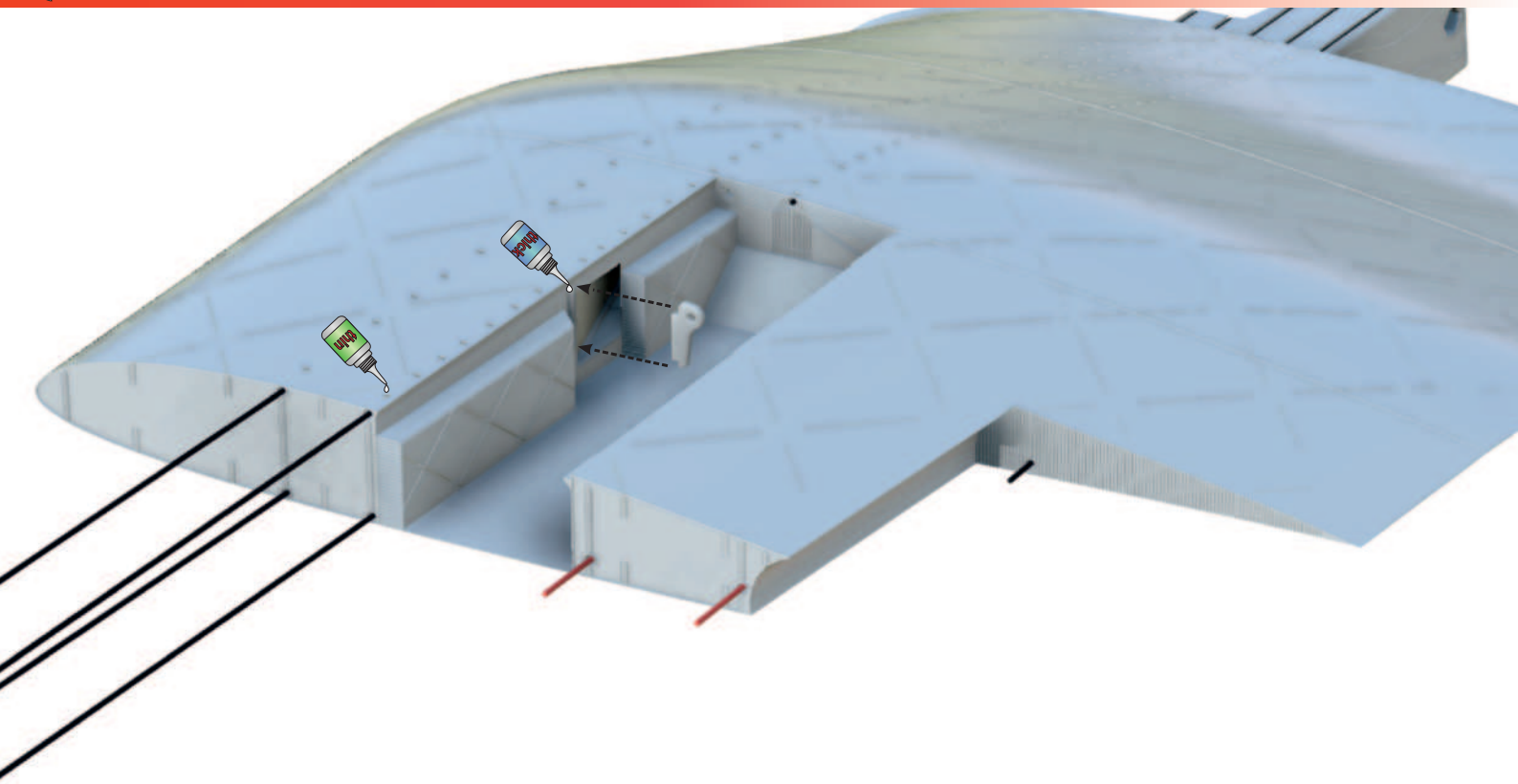


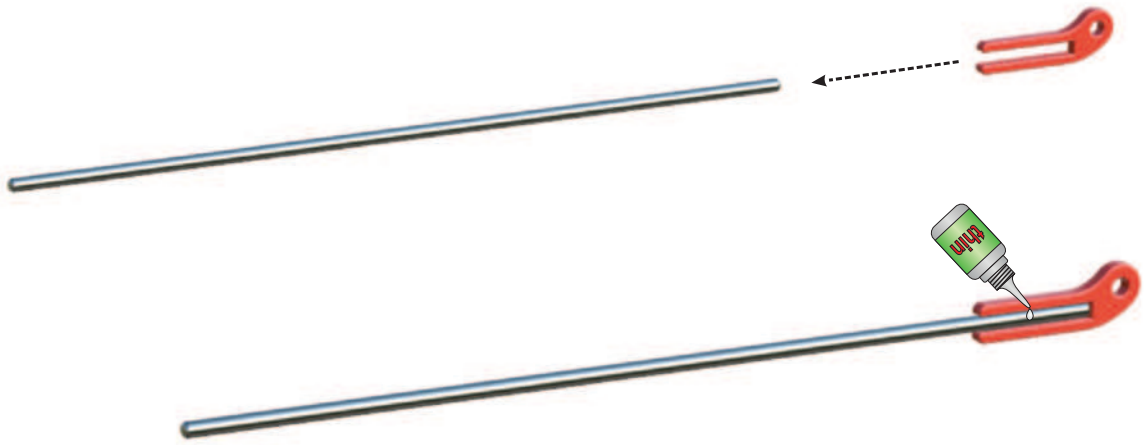




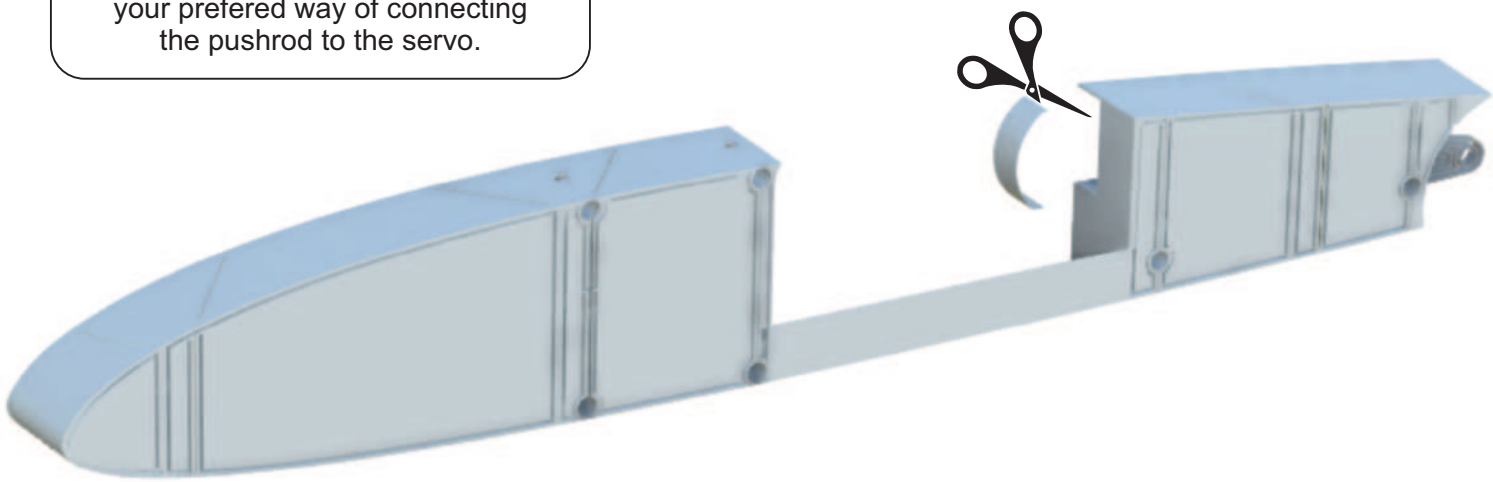


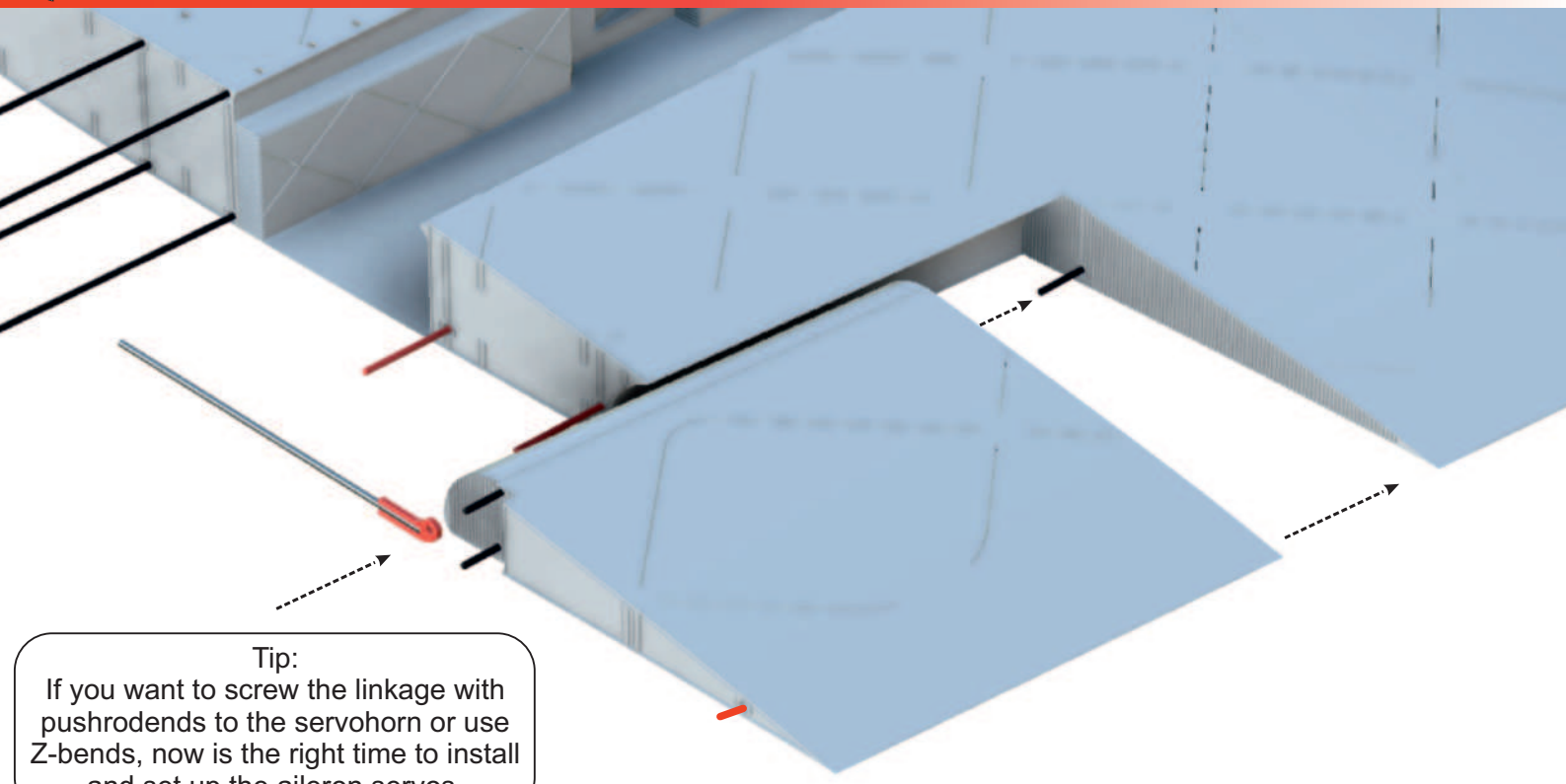
Tip:
Put glue only in the outer holes to secure the parts. Glue the other holes when the wing is finished.



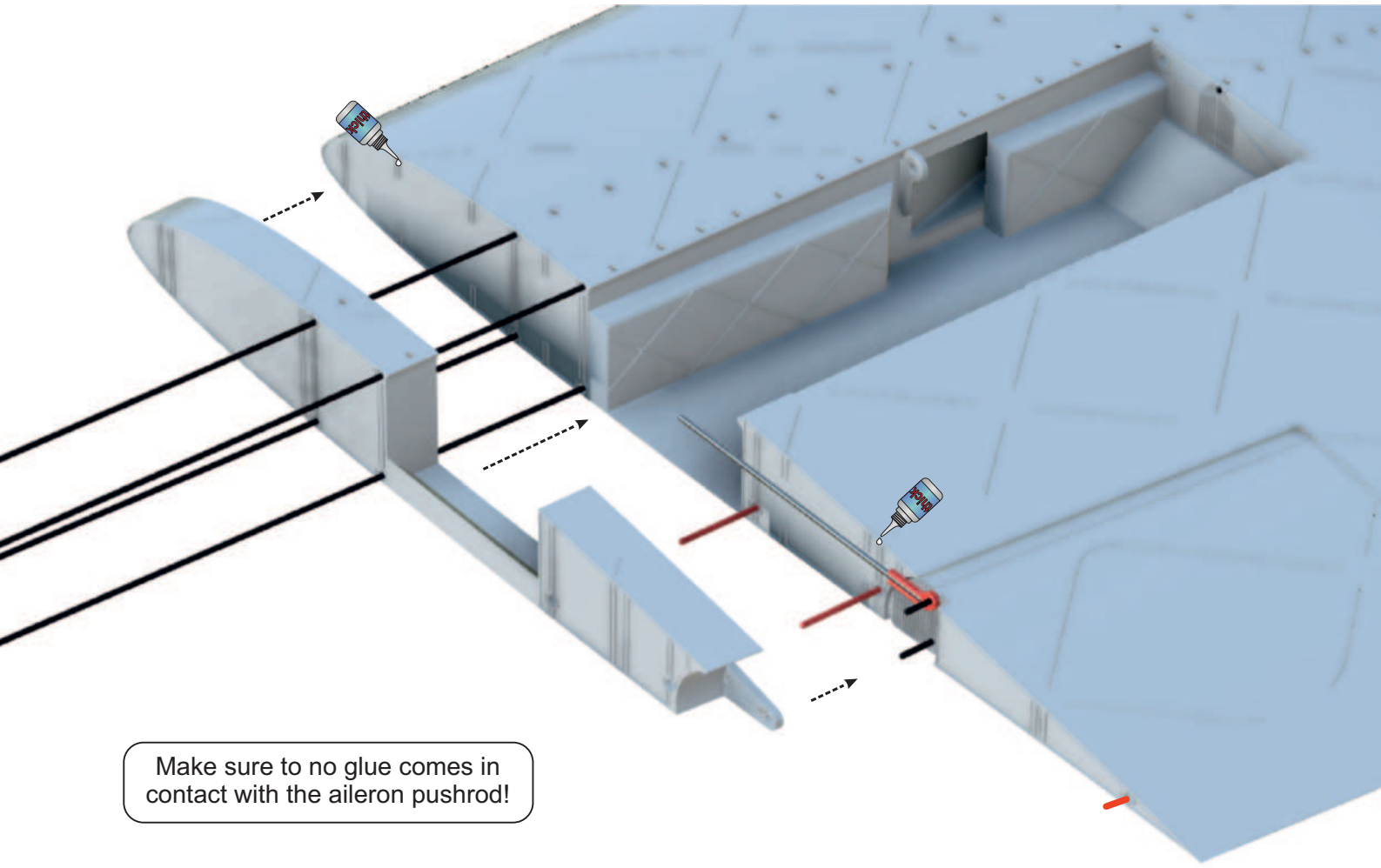


Adjust the length of the steel rod to fit your prefered way of connecting the pushrod to the servo.

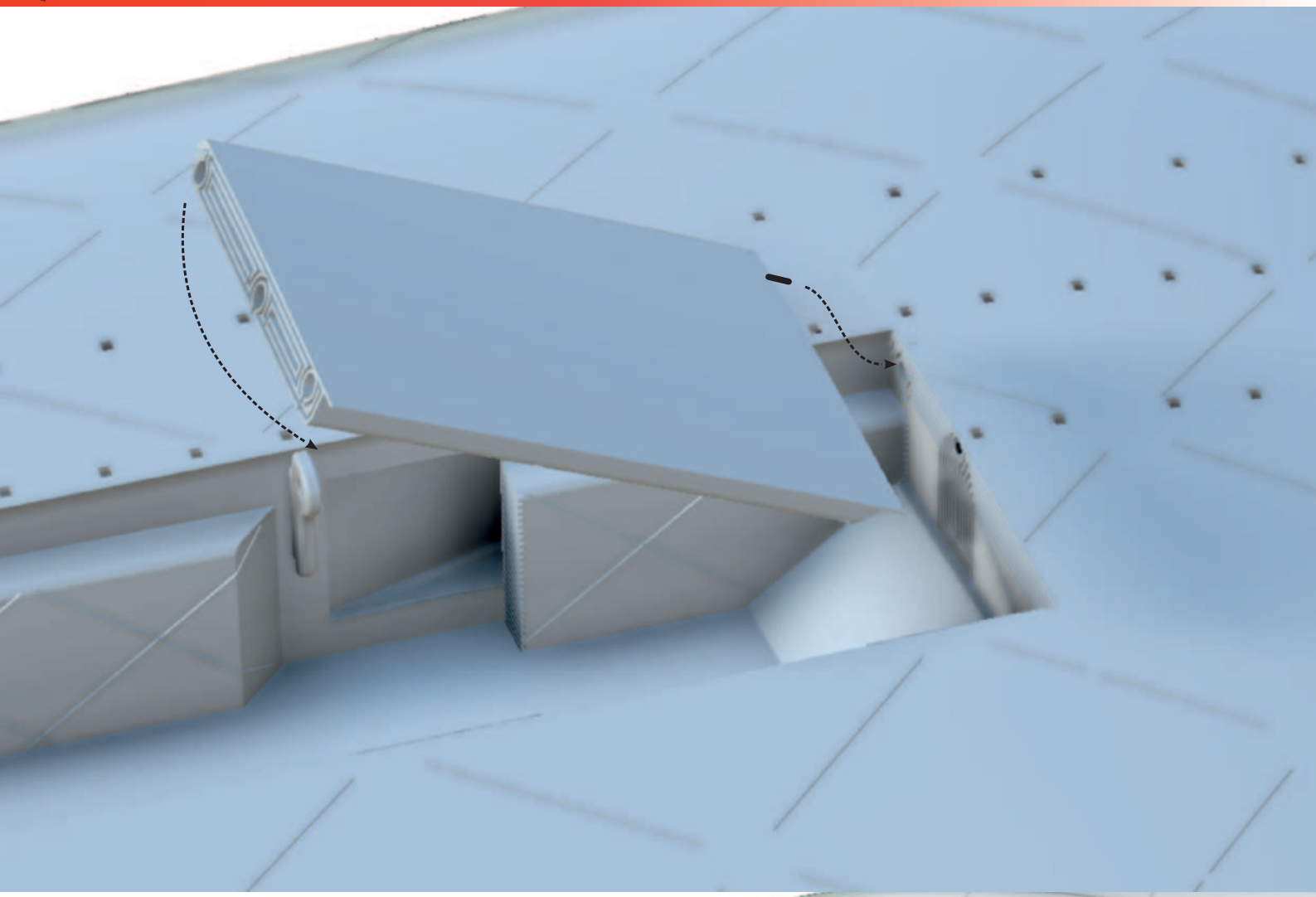


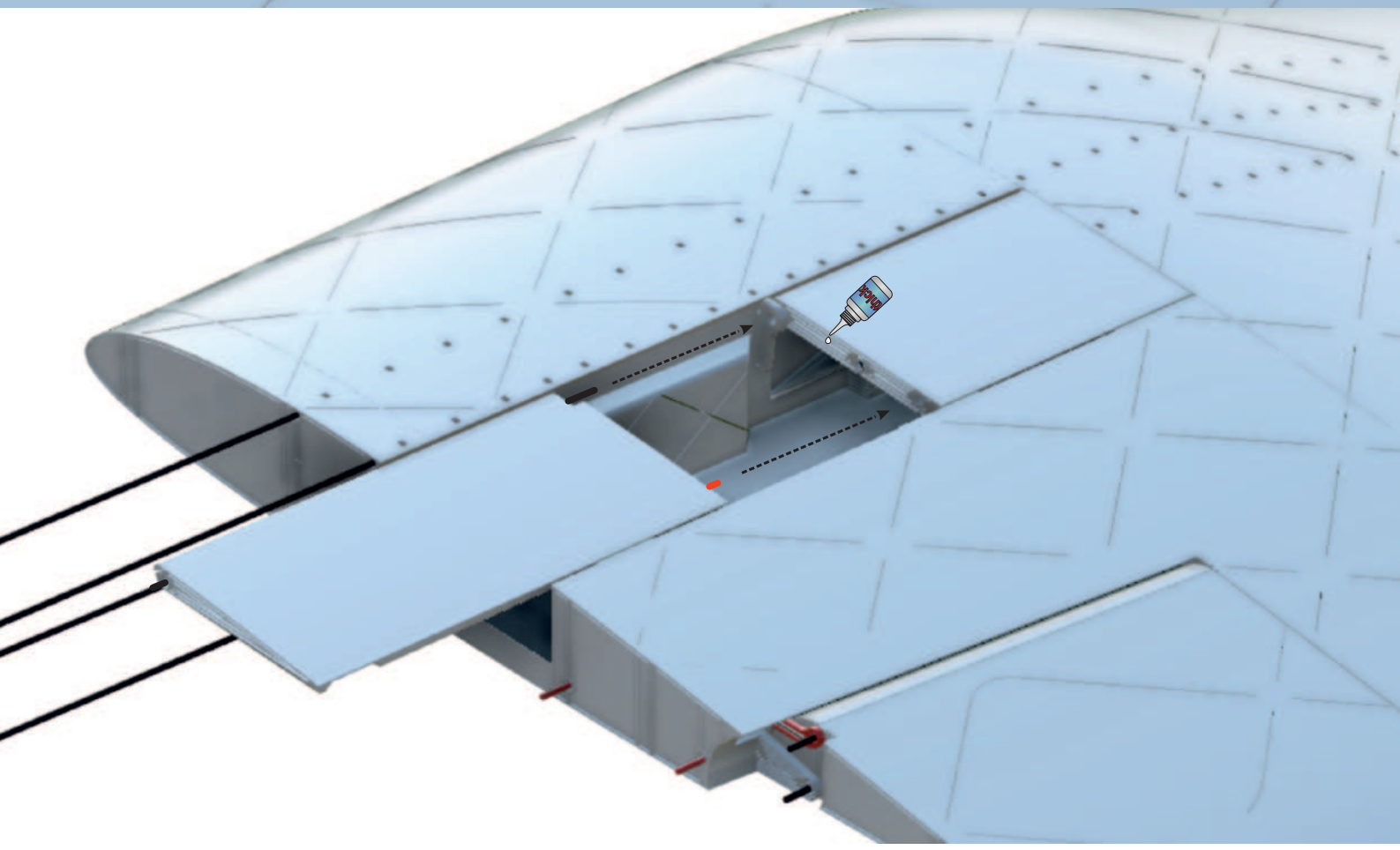


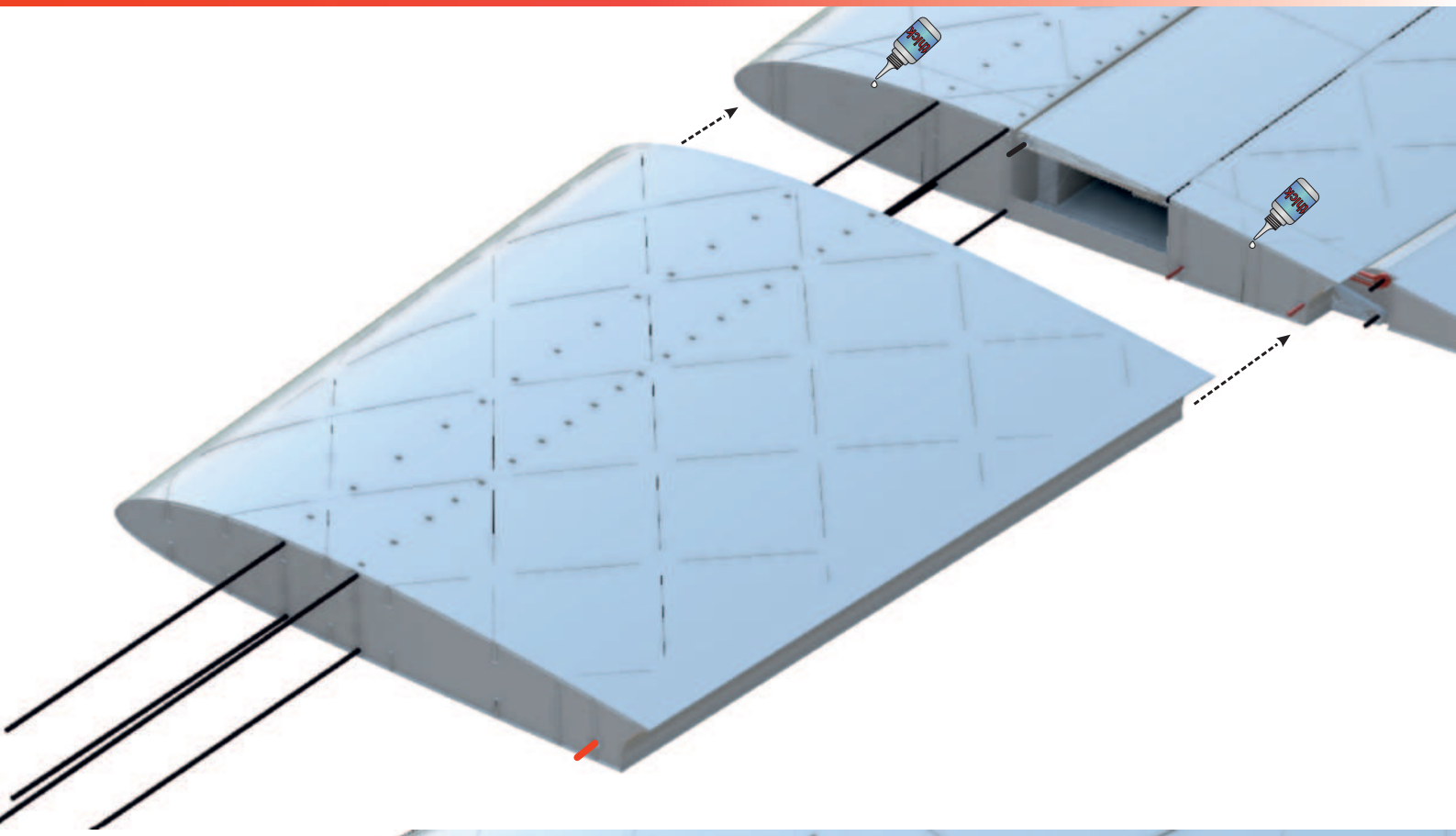
Tip:
If you want to screw the linkage with pushrodends to the servohorn or use Z-bends, now is the right time to install and set up the aileron servos.

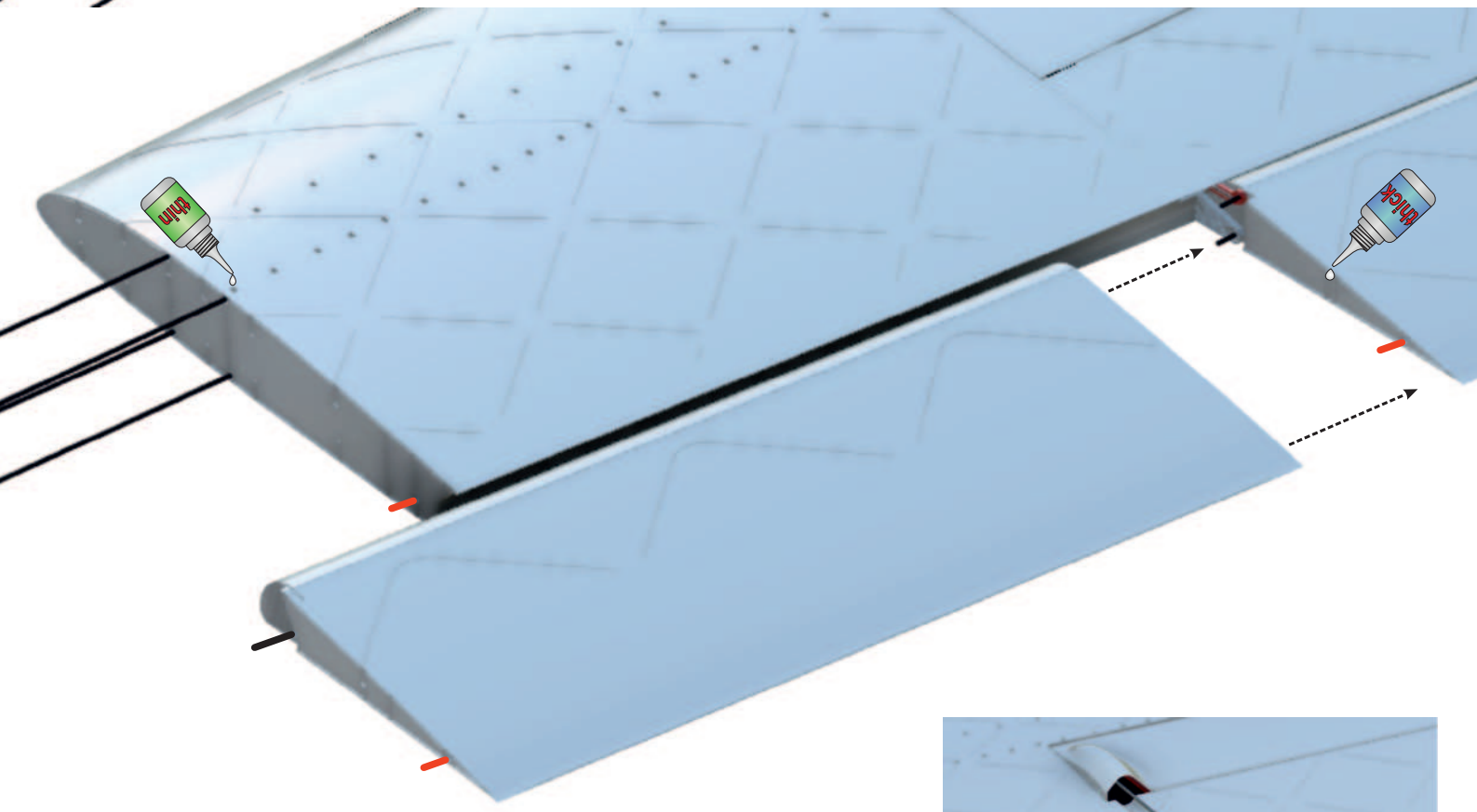


Make sure to no glue comes in contact with the aileron pushrod!

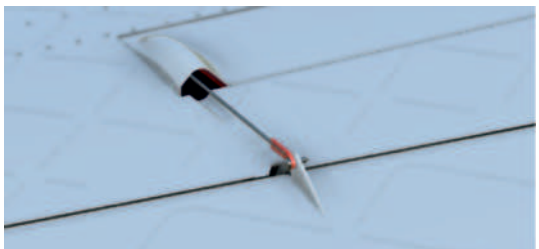




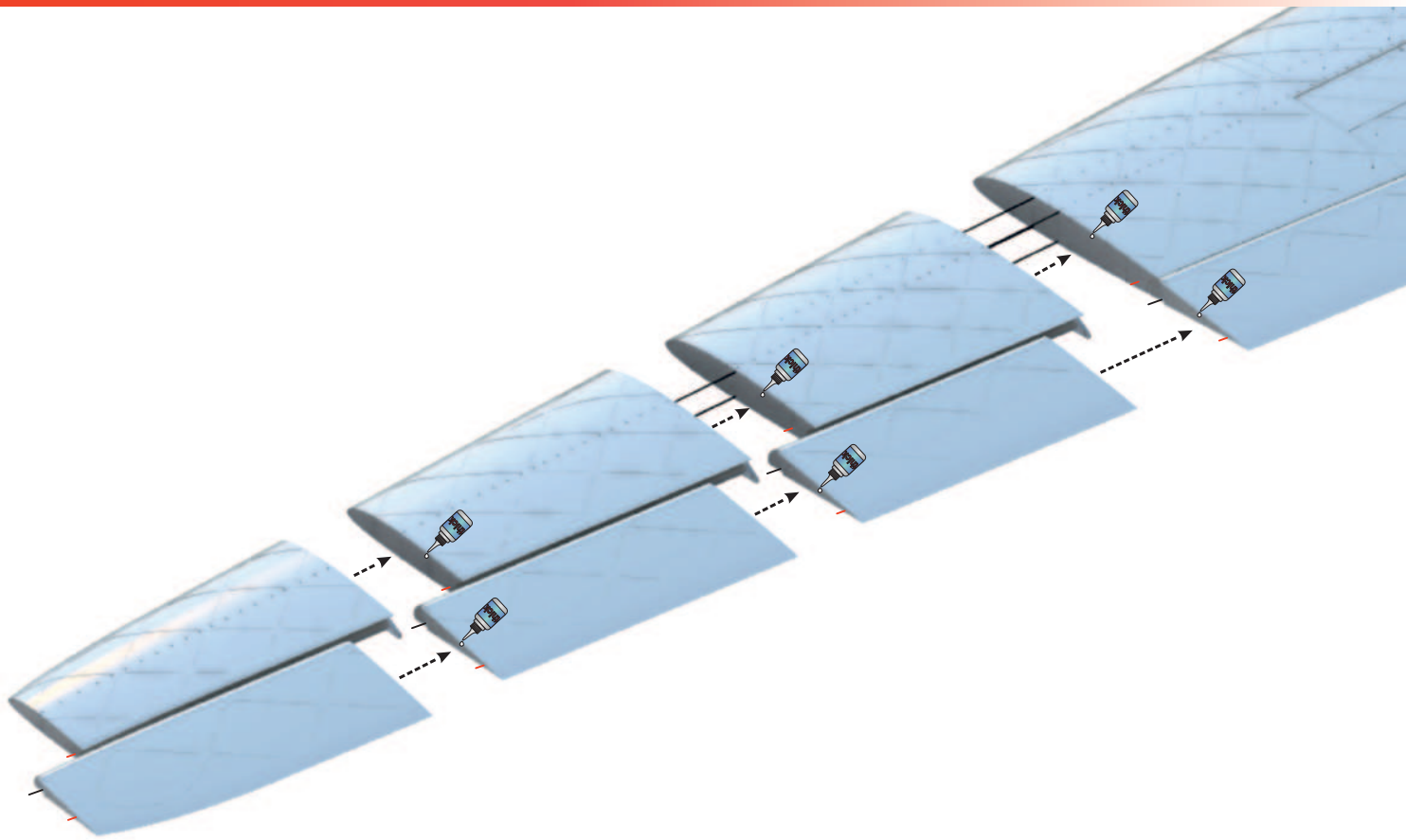


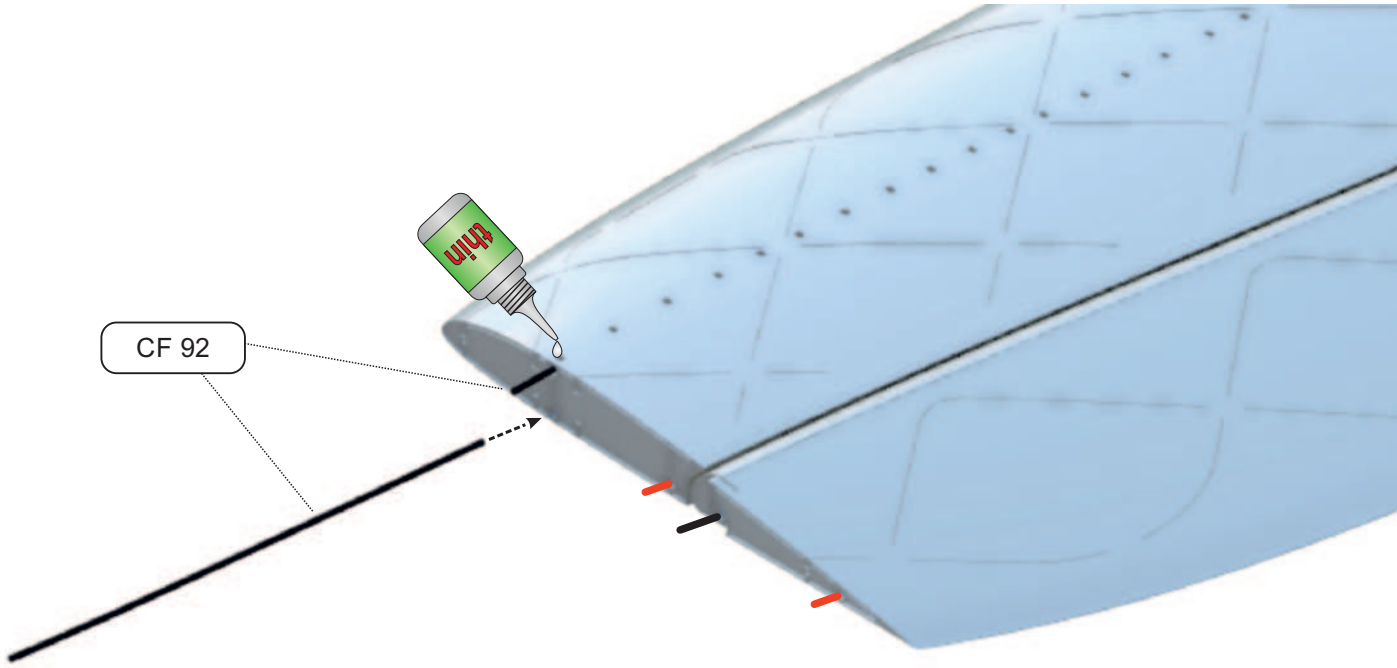


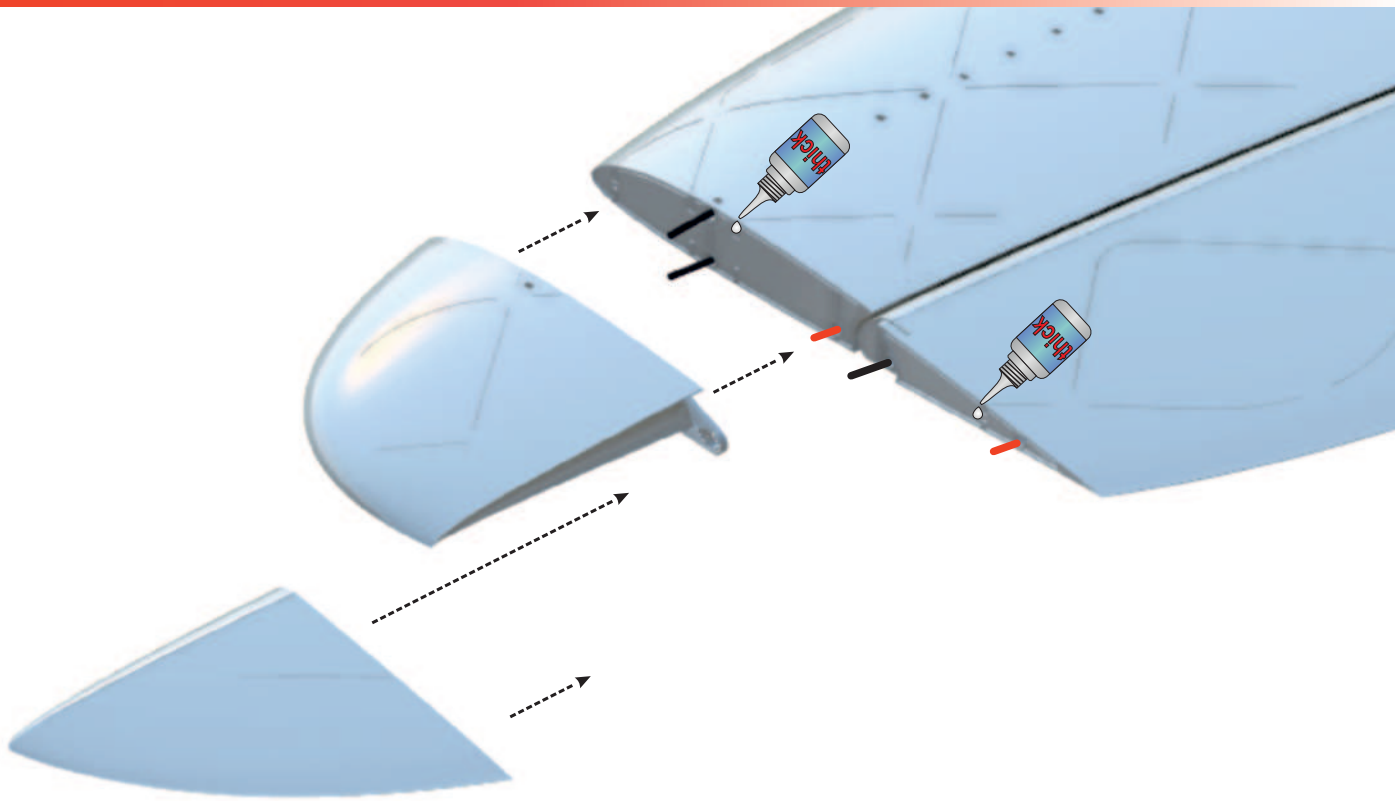
Tip:
When cutting the combined ailerons, leave a bit of extra material on the trailing edge. Cut it later when the whole wing is done to get an even trailing edge across all aileron parts.

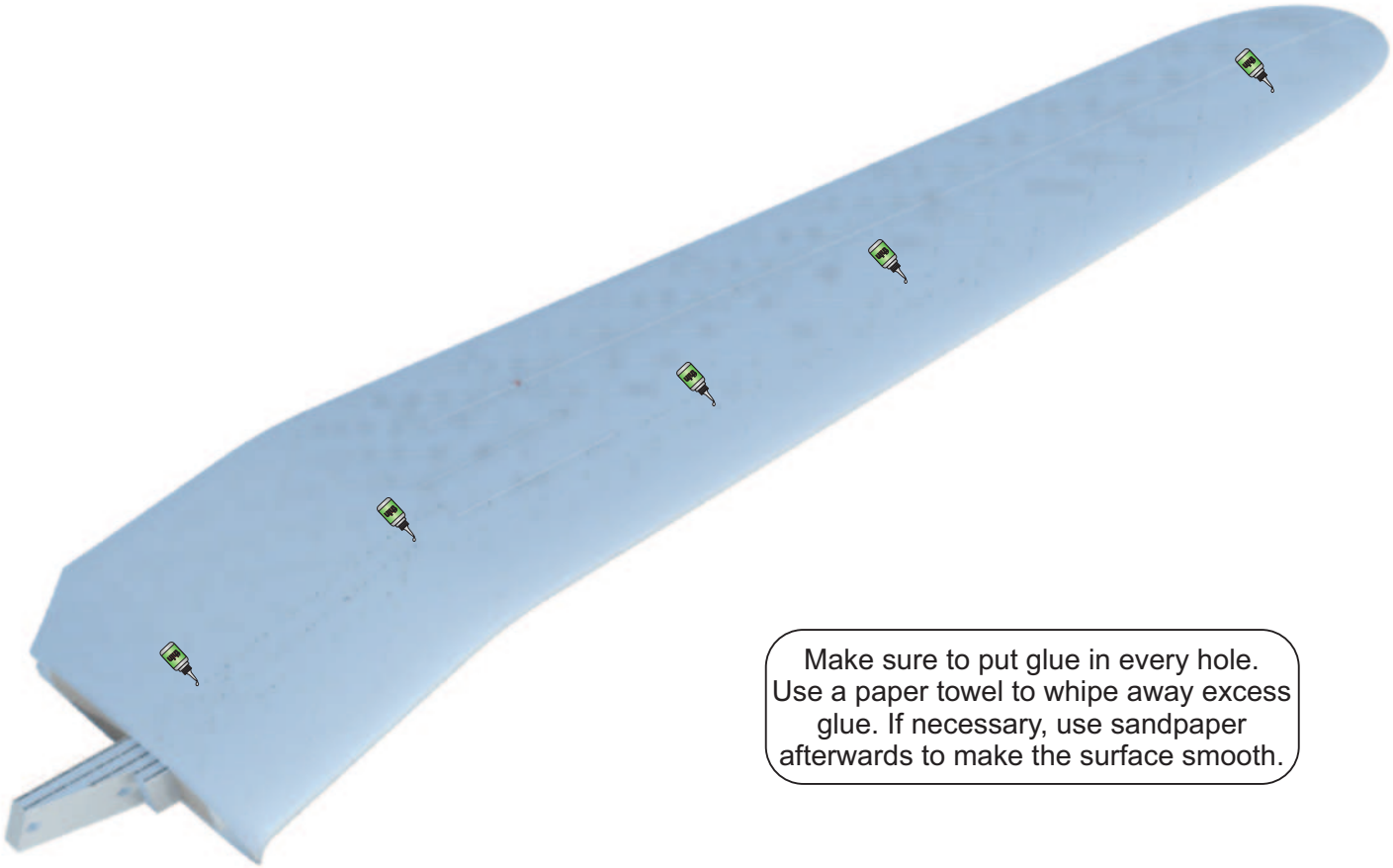


Alternative external linkage





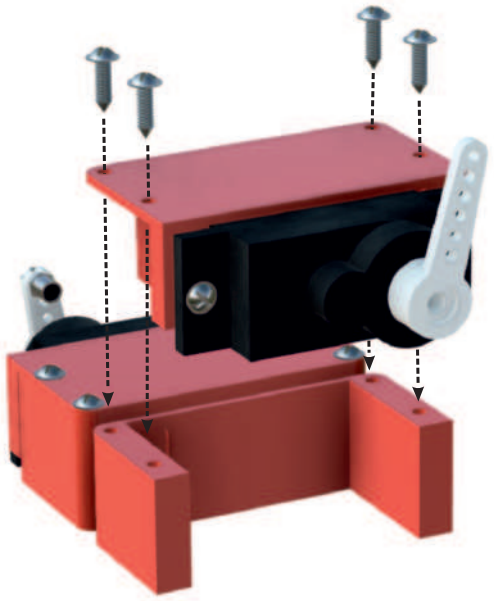


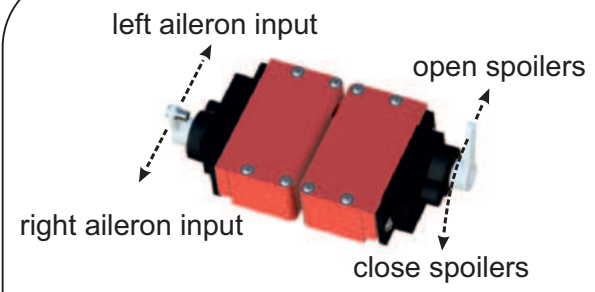


Make sure to put glue in every hole. Use a paper towel to whipe away excess glue. If necessary, use sandpaper afterwards to make the surface smooth.

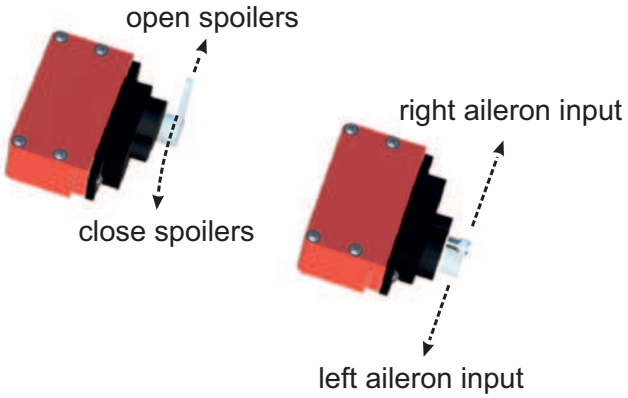
Mirror these steps to build the right wing

Set the servo mid point, set the right direction and range of motion. Set up the spoiler servos with a smaller range than needed, that way you dont overstress the servo. Then adjust your endpoints until the spoiler closes shut.

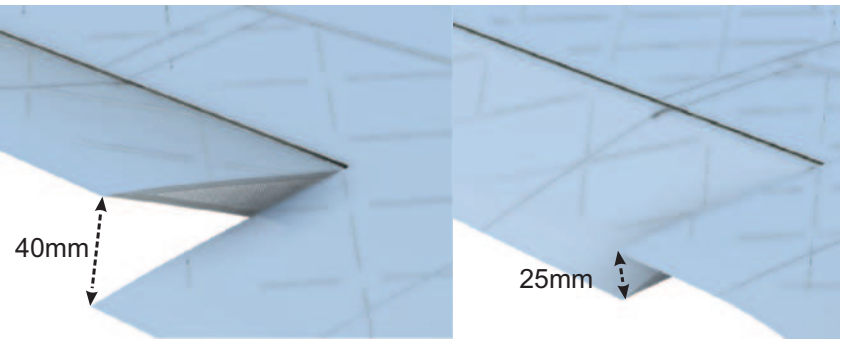


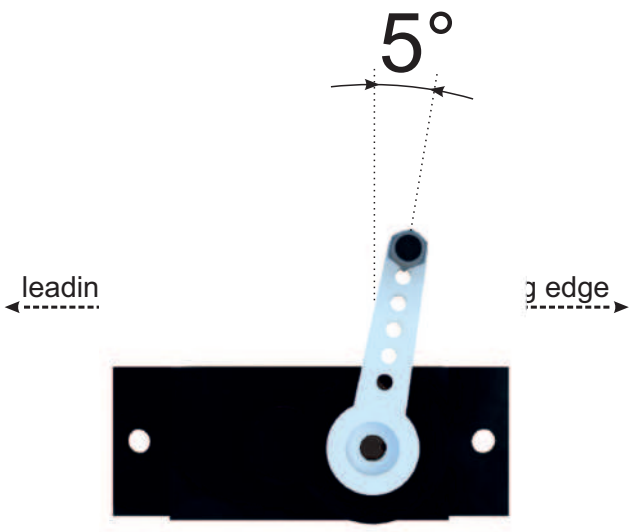


left wing



right wing

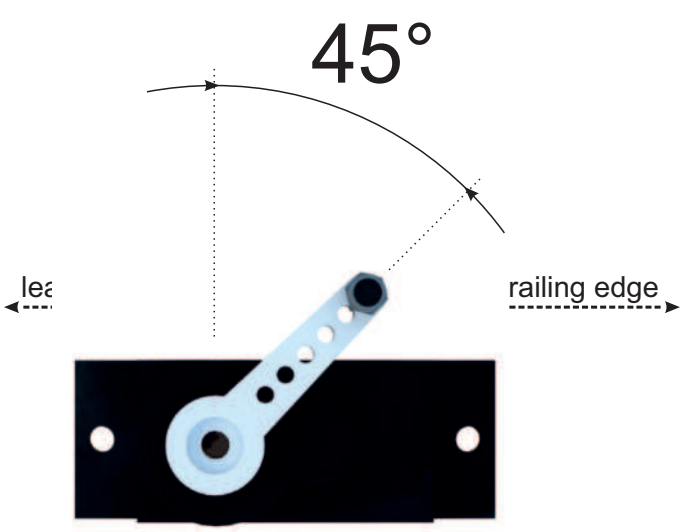




aileron servo center position

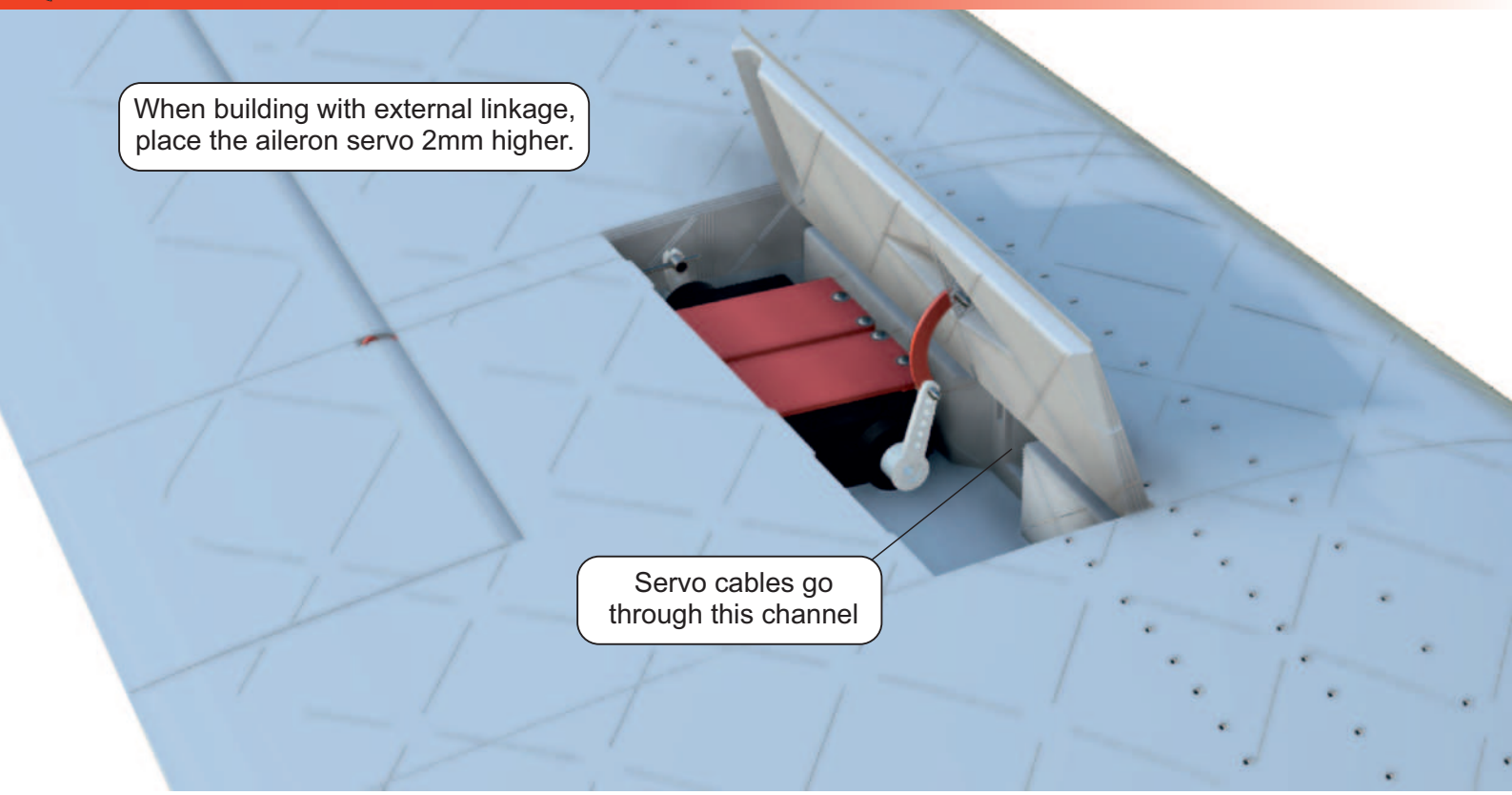
servo arm length internal: 9mm

servo arm length external: 15mm

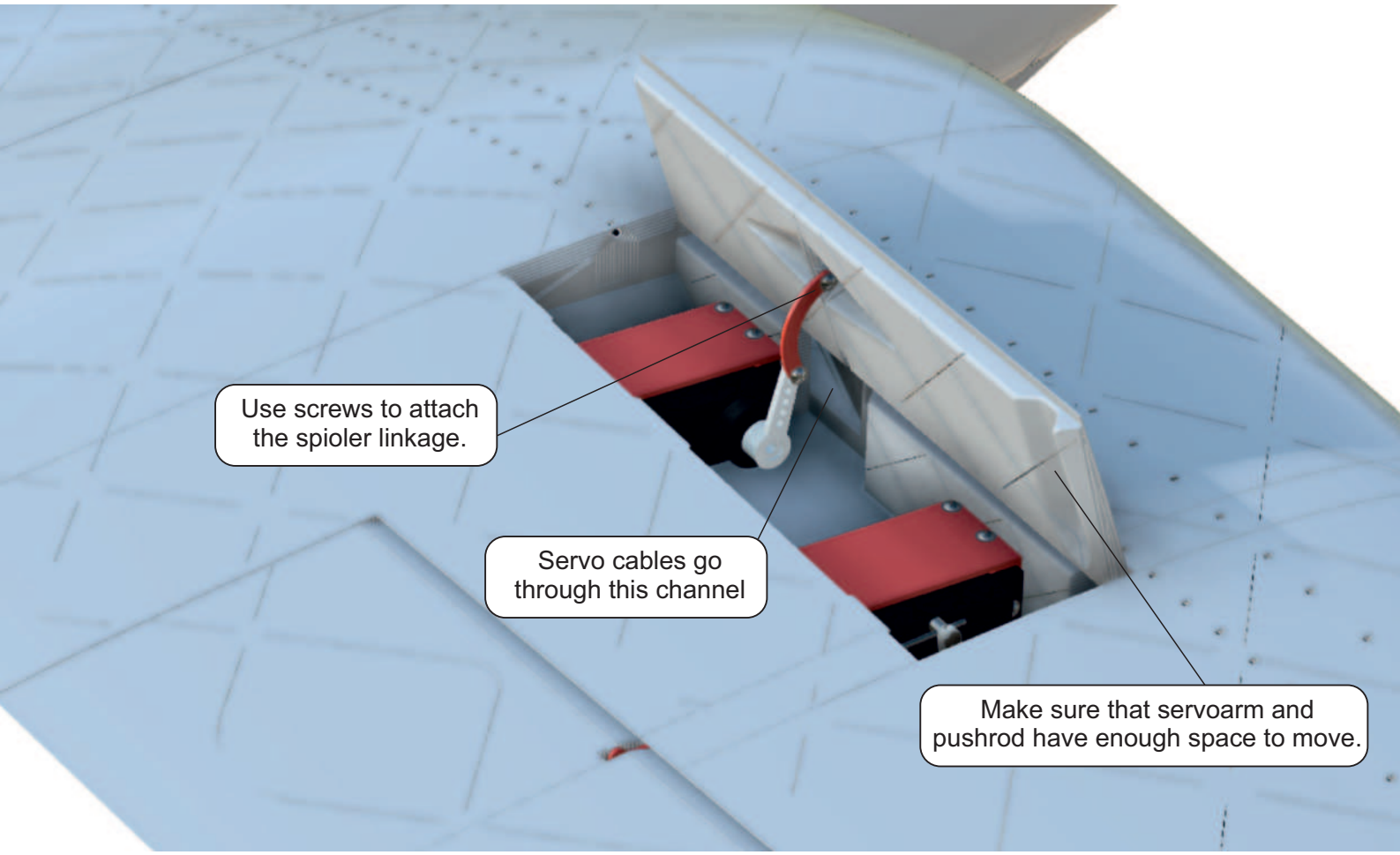


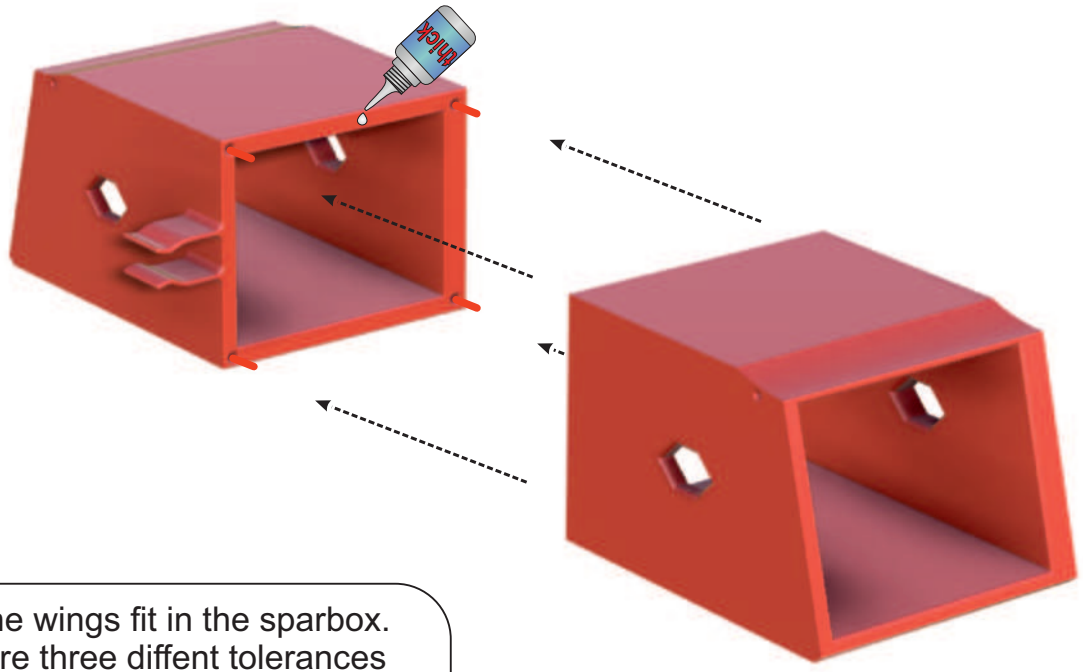
spoiler servo center position

servo arm length: 15mm

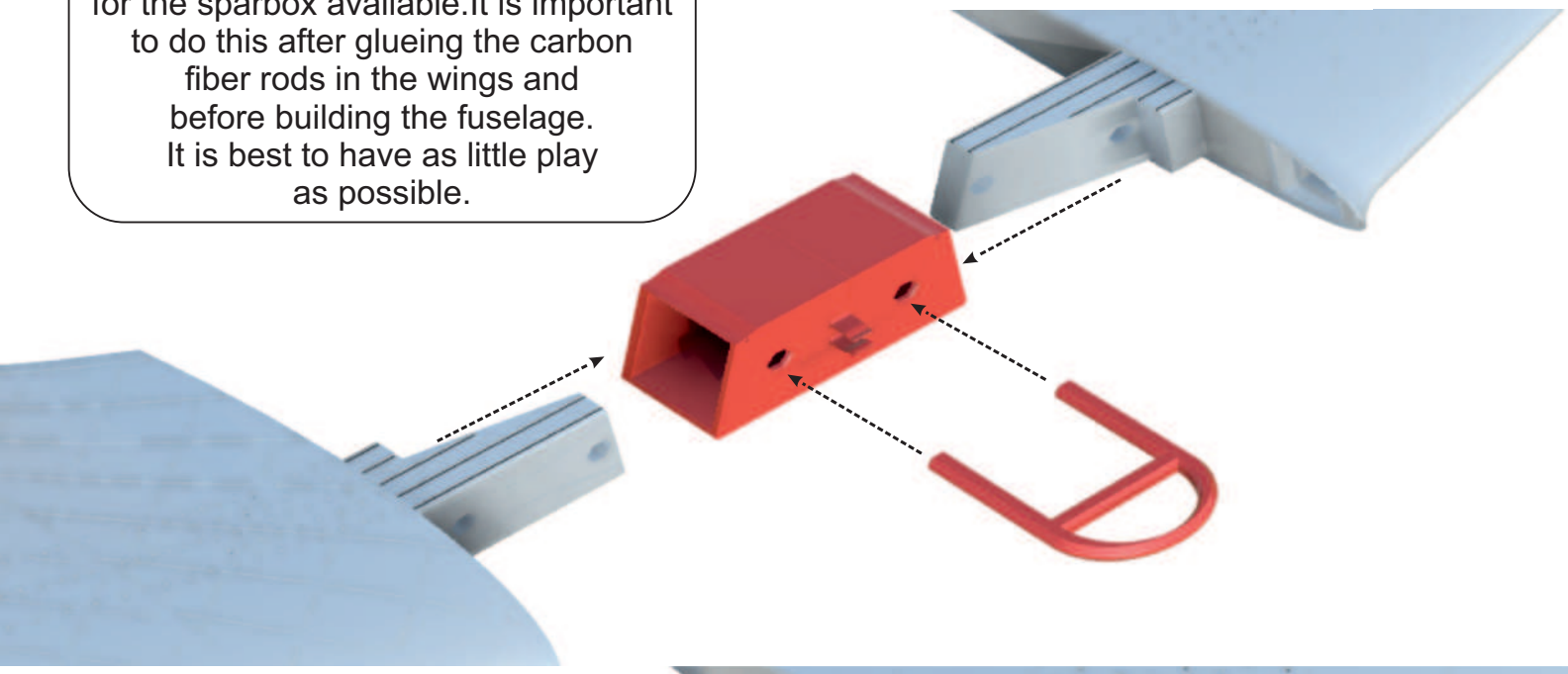


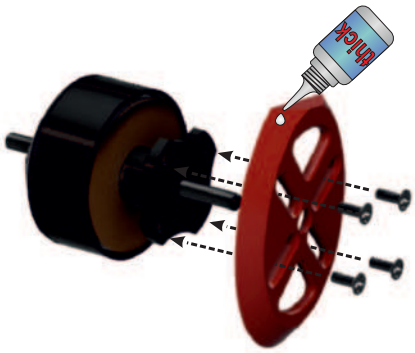
Only put glue on the “Servo Holder Holder“ so that you can still srew the servos out.

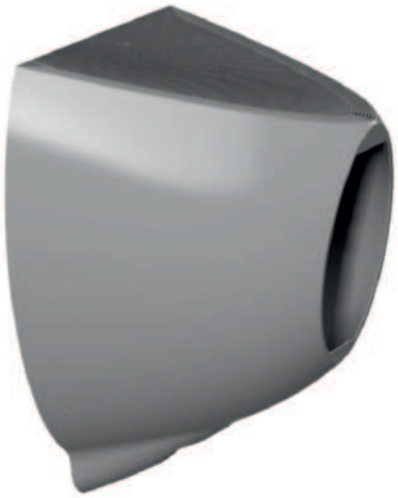




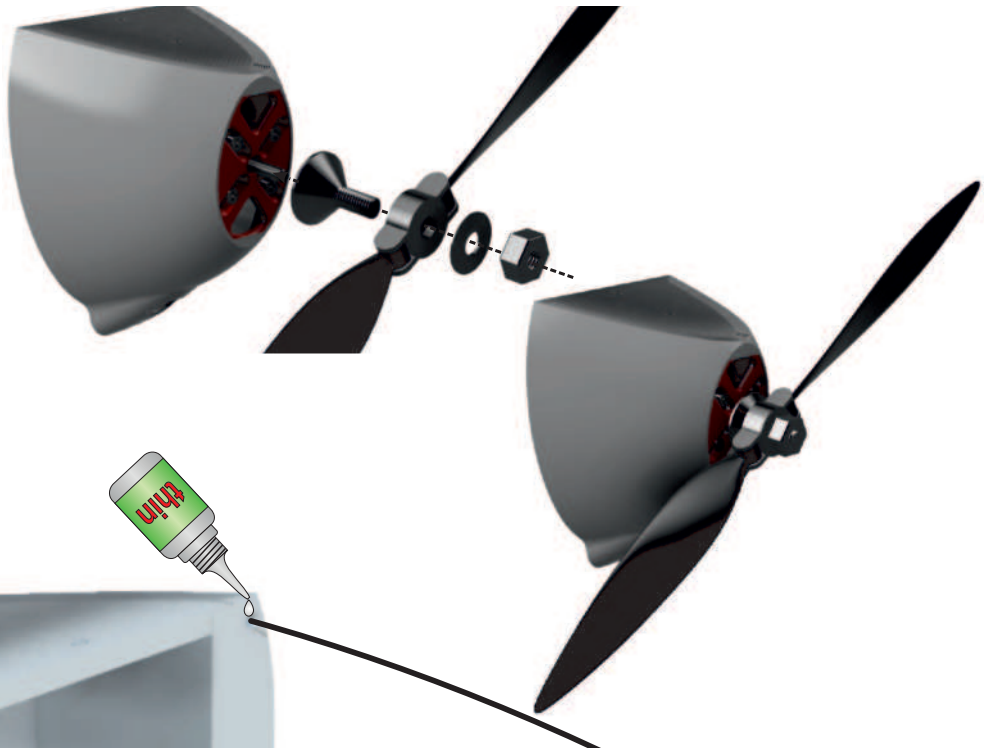
Test if the wings fit in the sparbox. There are three diffent tolerances for the sparbox available.It is important to do this after glueing the carbon fiber rods in the wings and before building the fuselage. It is best to have as little play as possible.

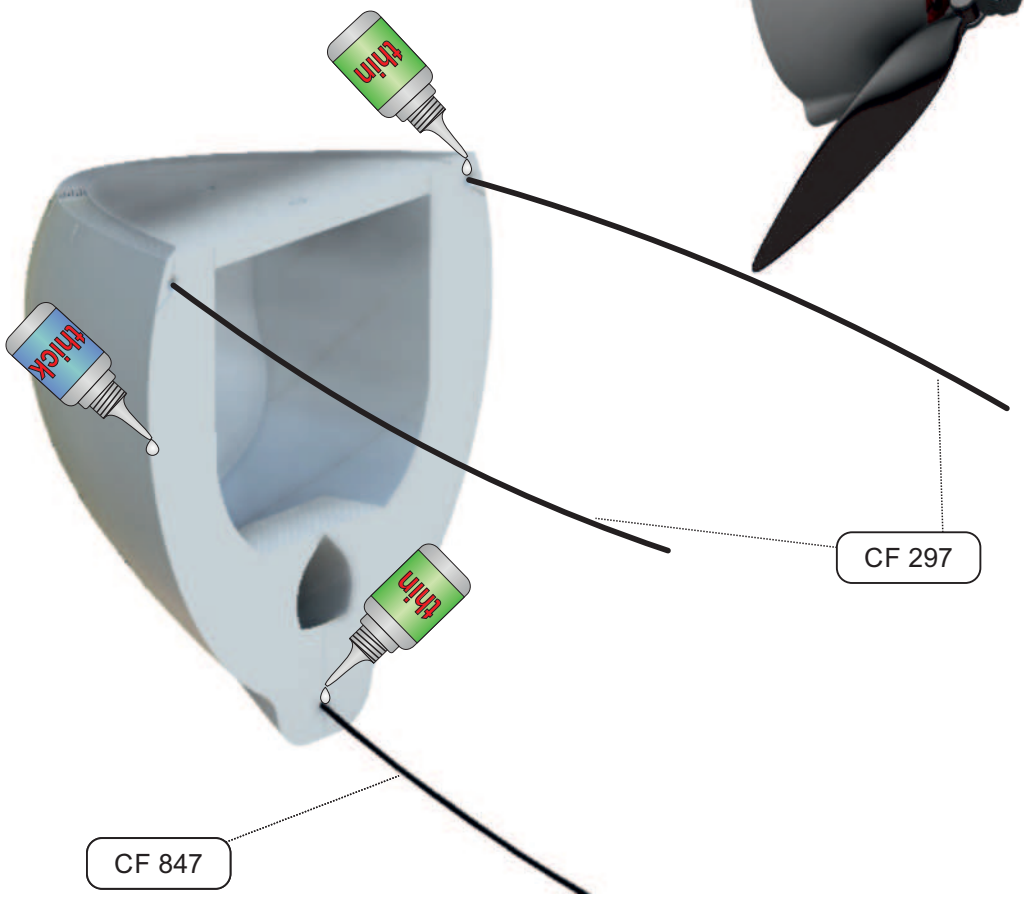




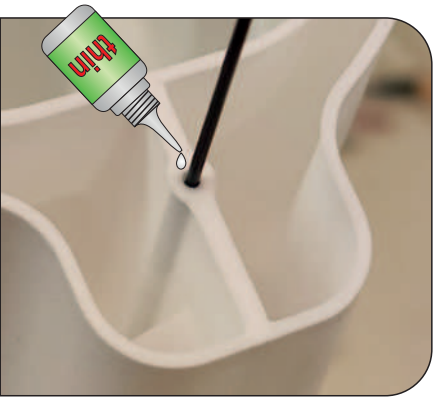


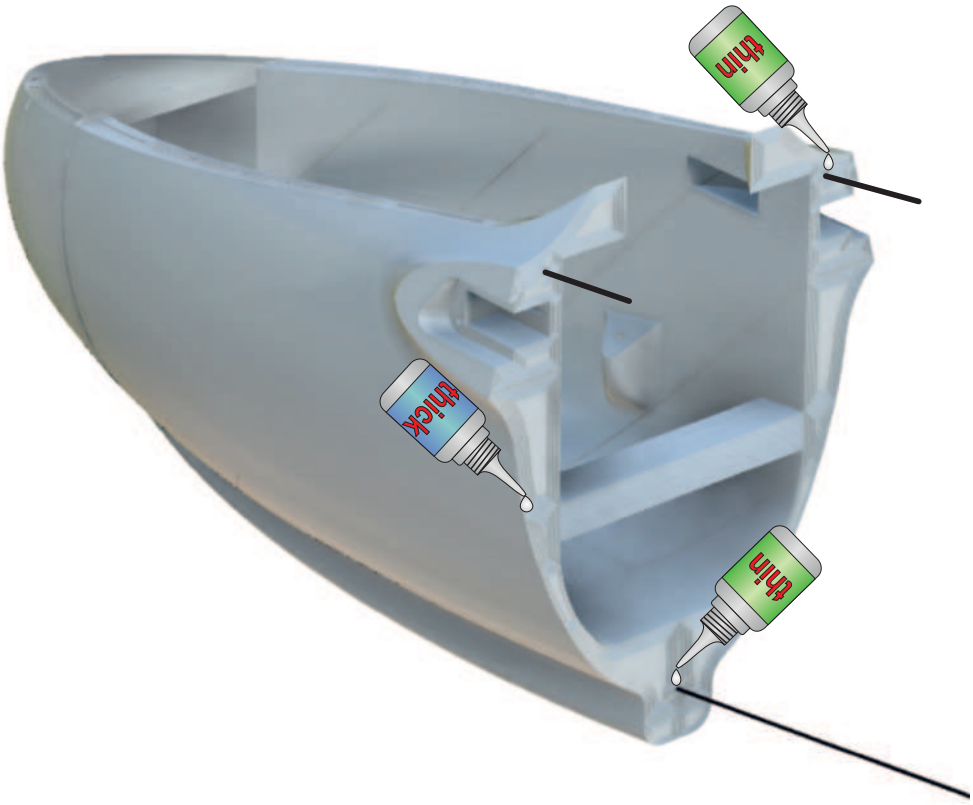
Optional front mounted propeller

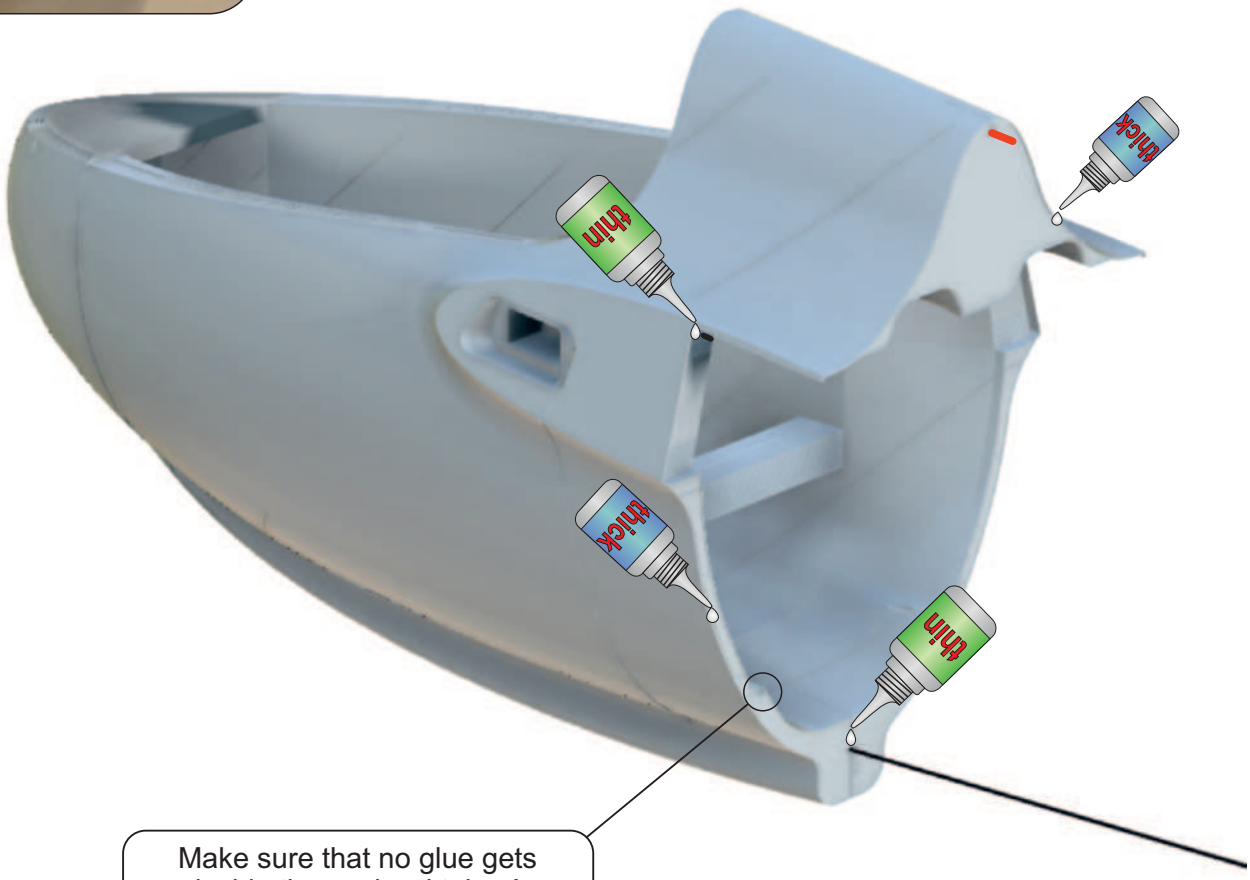




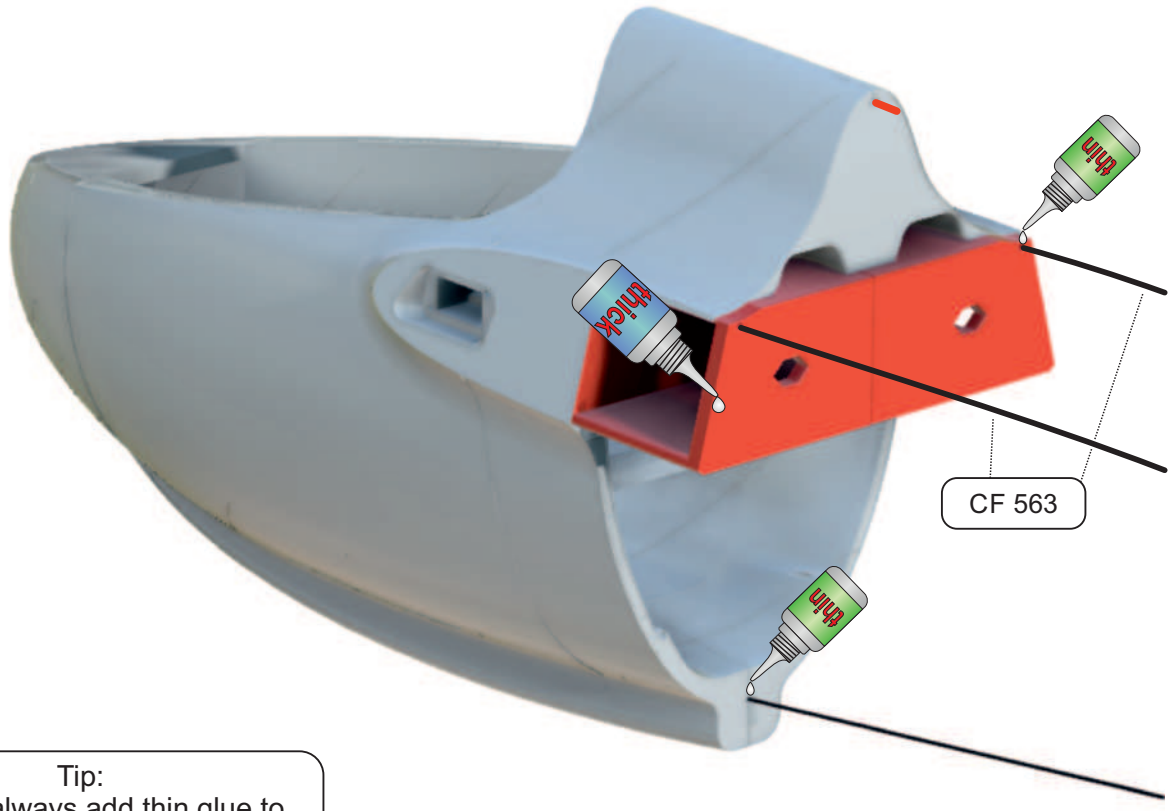
First, glue two parts together with thick glue. Then secure the parts with a drop of thin glue on the carbon rods. The thin glue should travel down the hole as seen on the picture. Use a paper towel to soak up any excess glue.



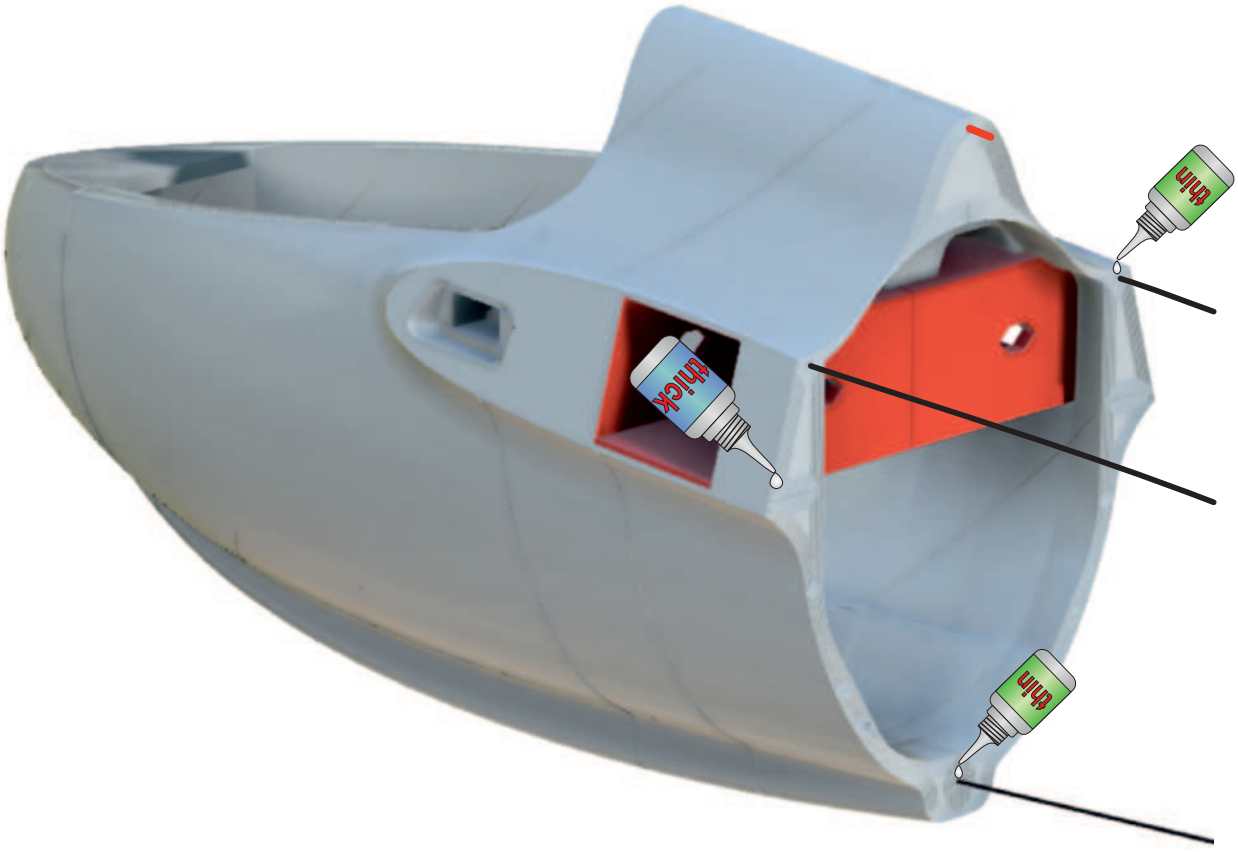




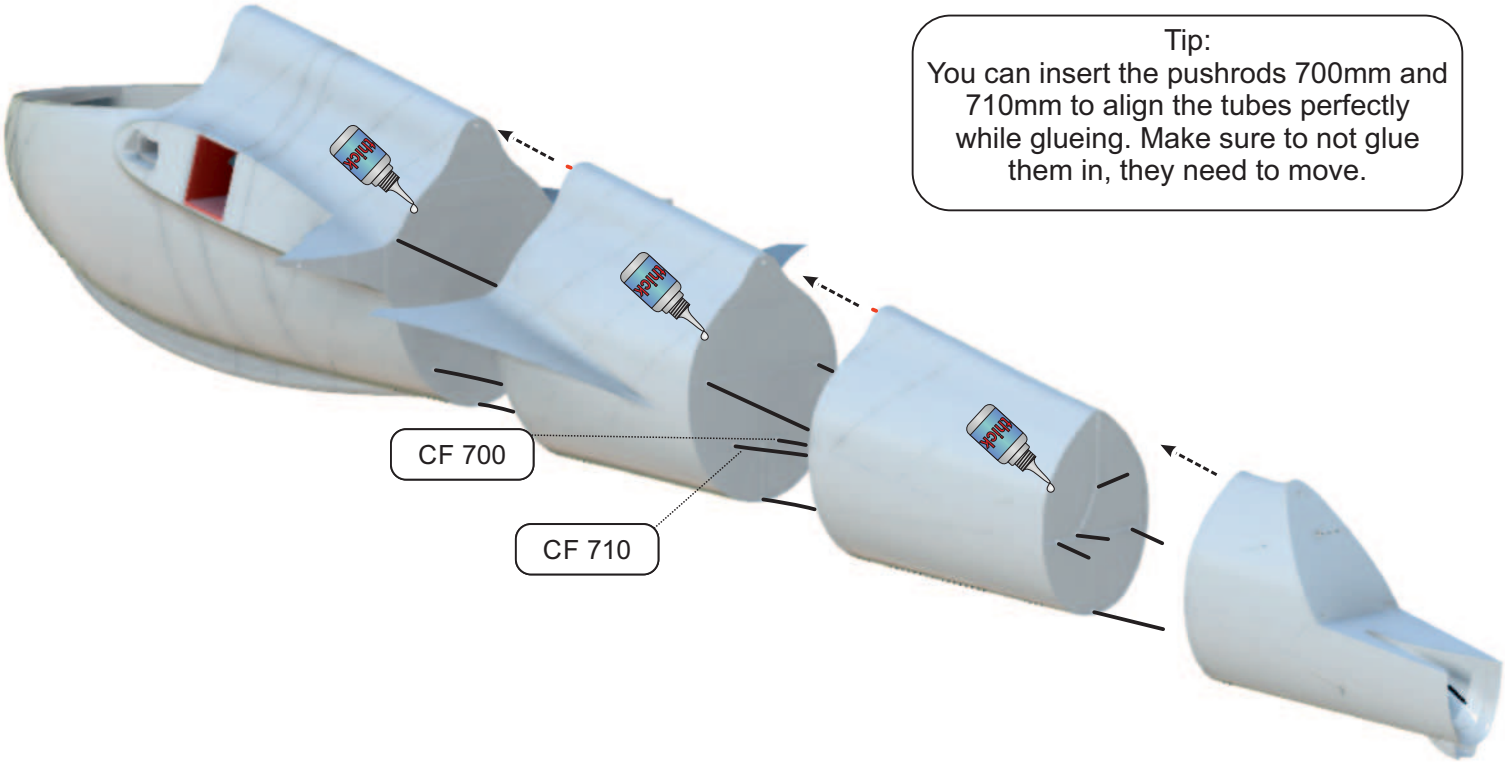
Make sure that no glue gets inside the pushrod tubes!

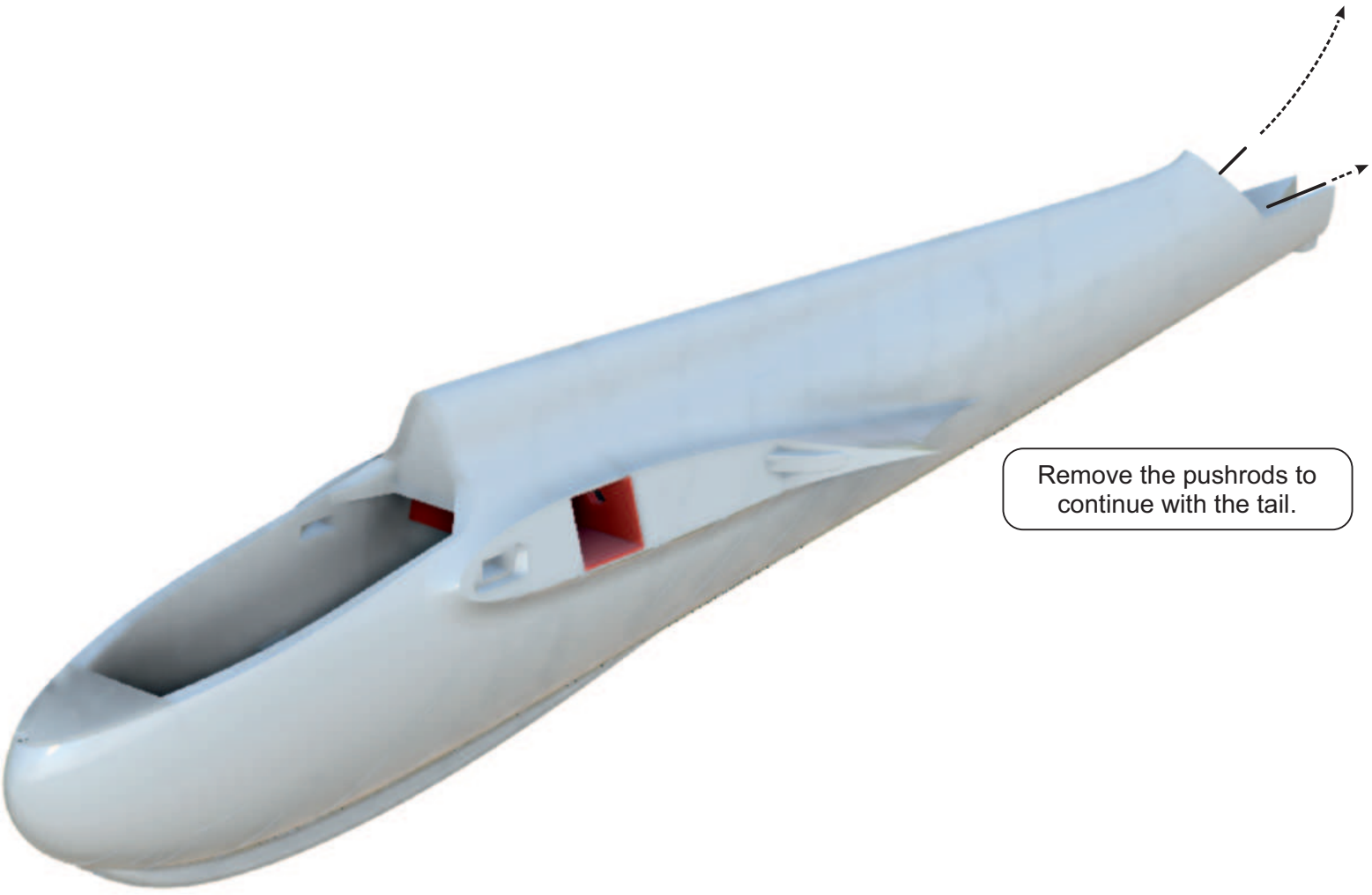


Tip:
You can always add thin glue to the gaps between parts later.

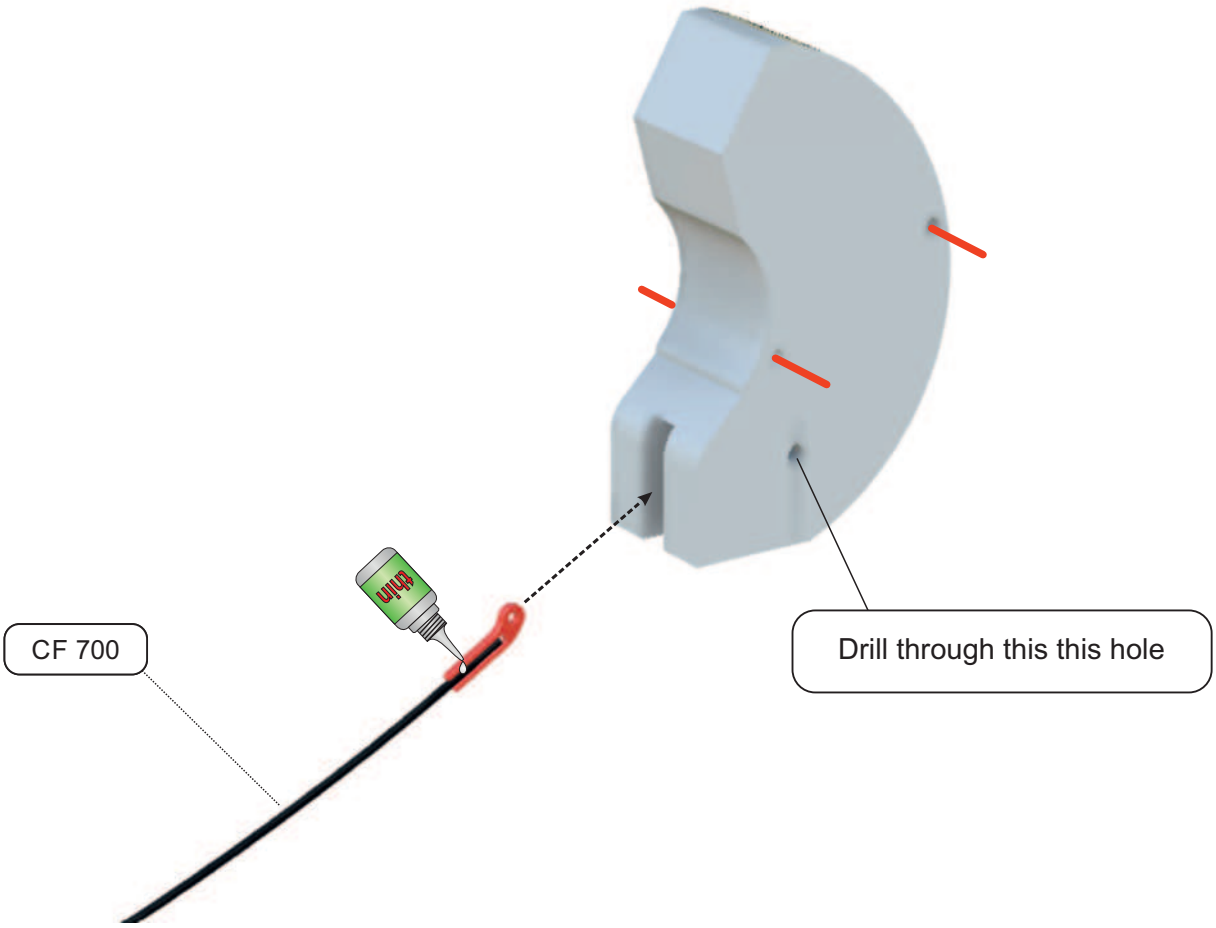


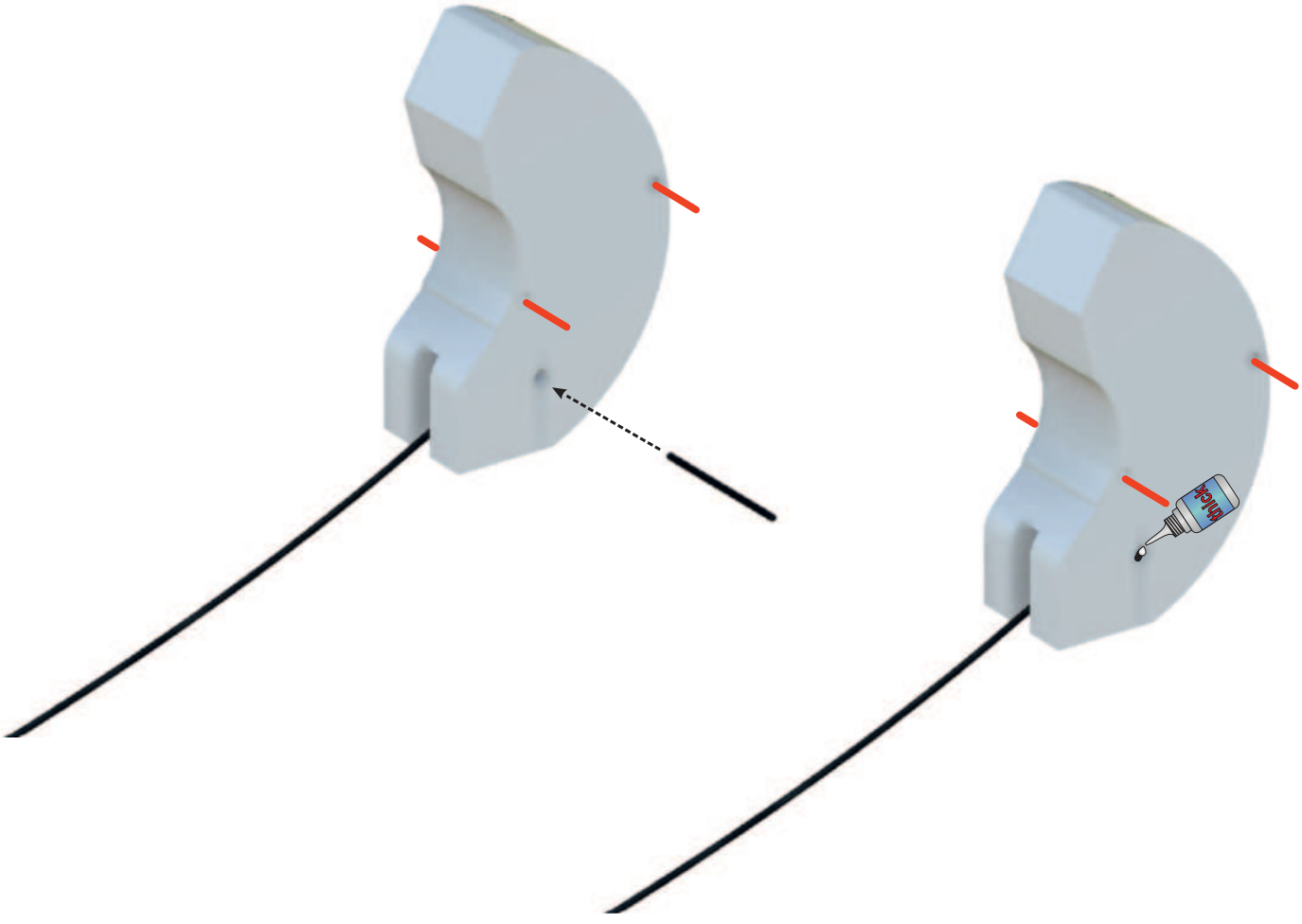
Tip:
You can insert the pushrods 700mm and 710mm to align the tubes perfectly while glueing. Make sure to not glue them in, they need to move.

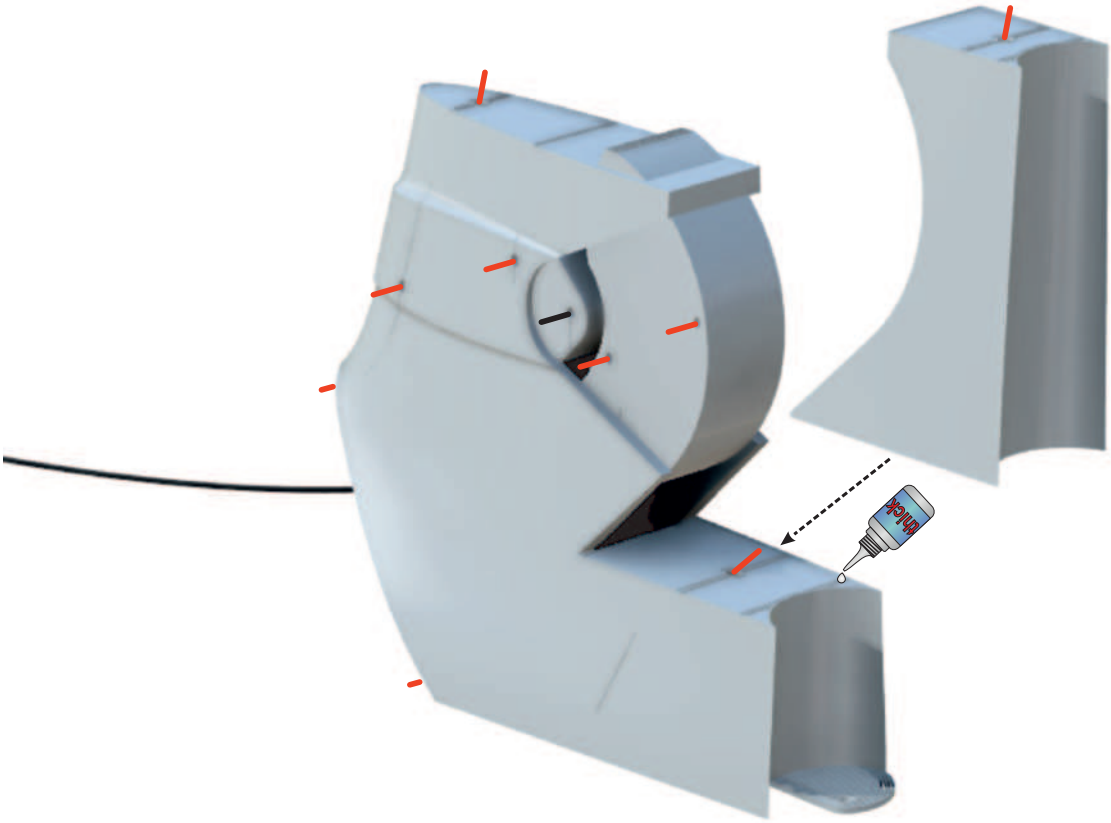




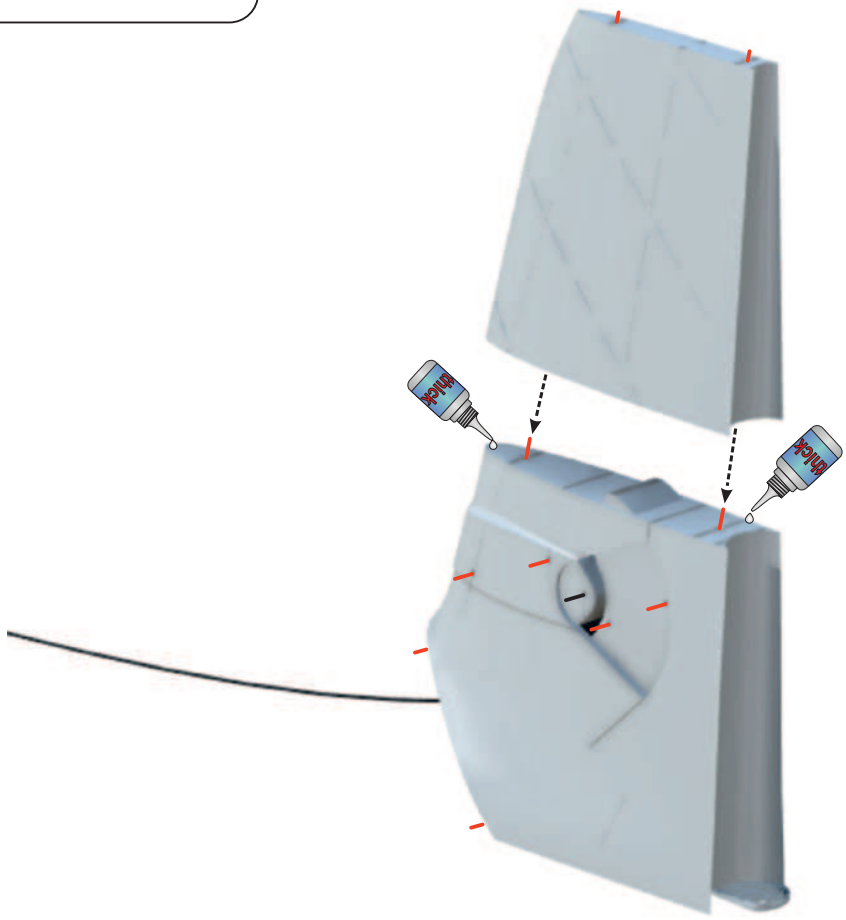
Remove the pushrods to continue with the tail.

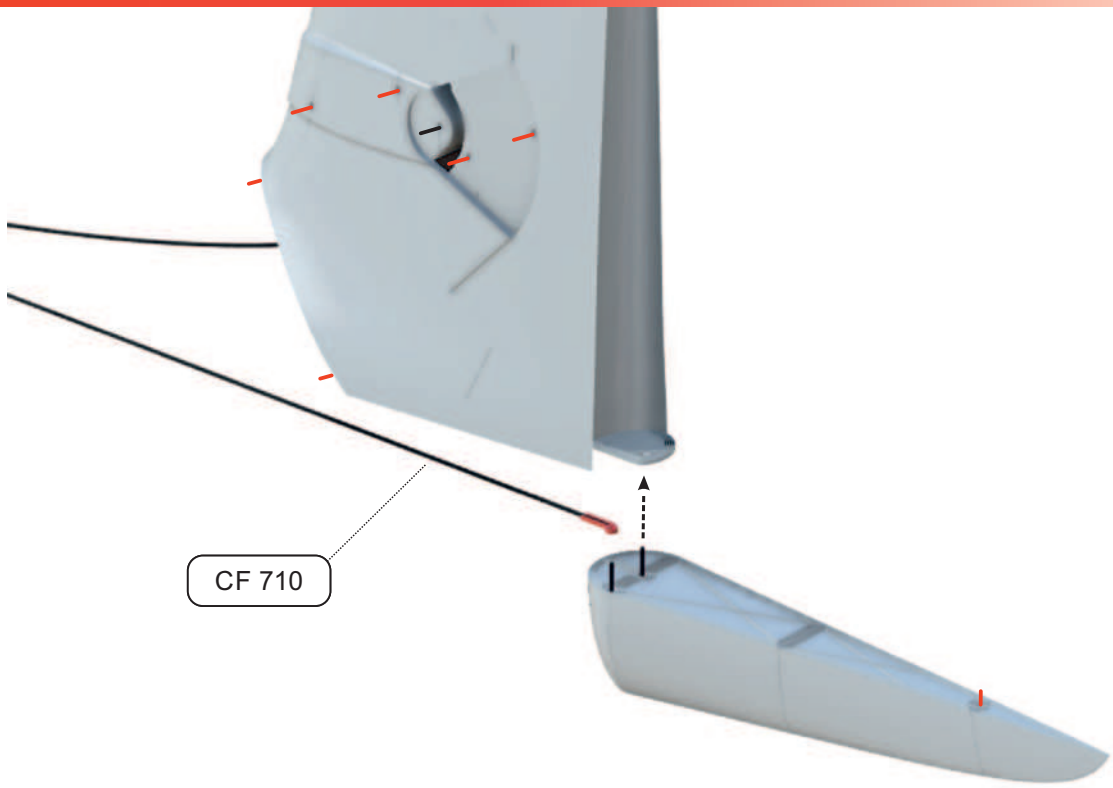


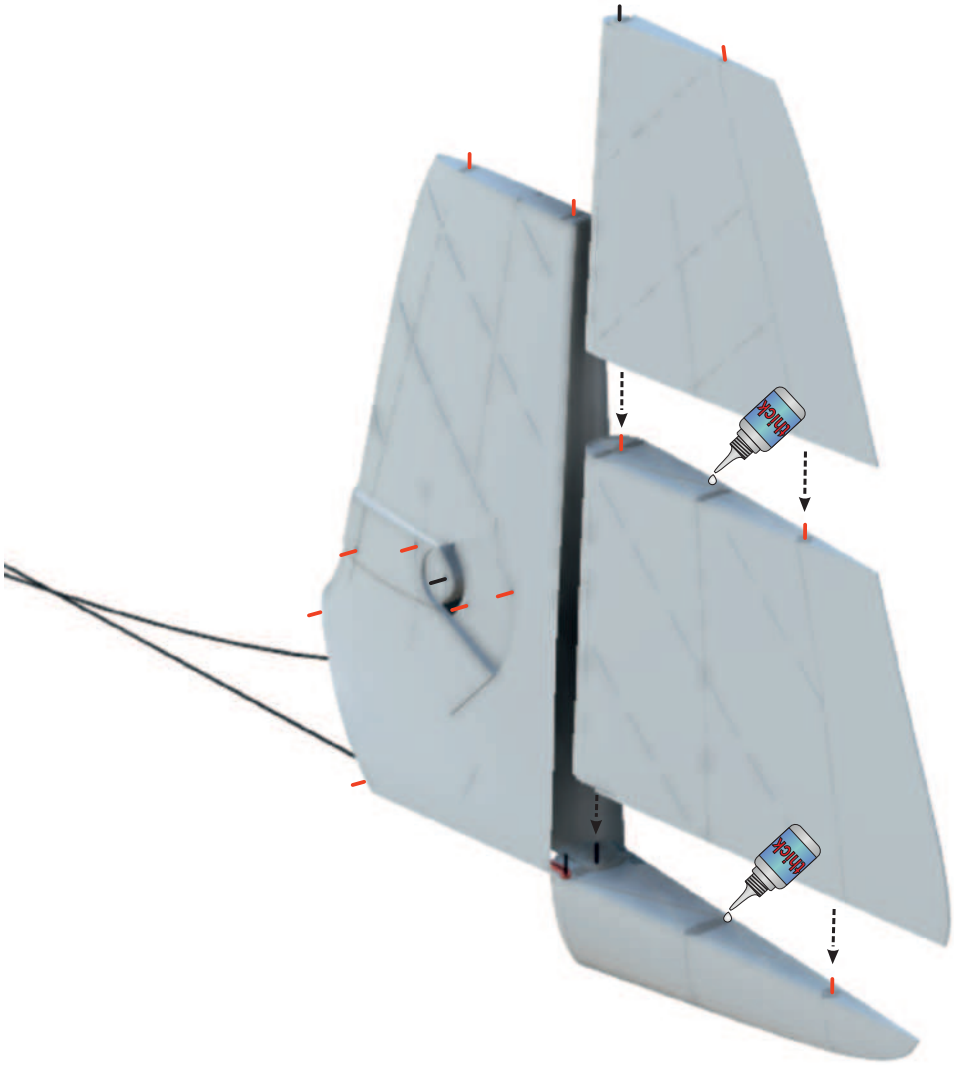


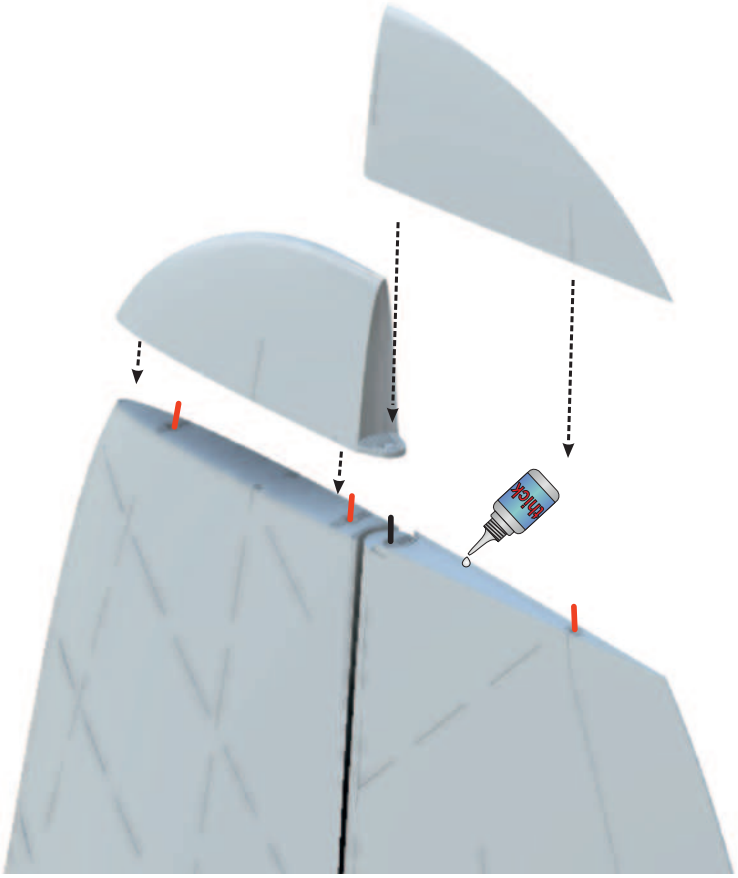


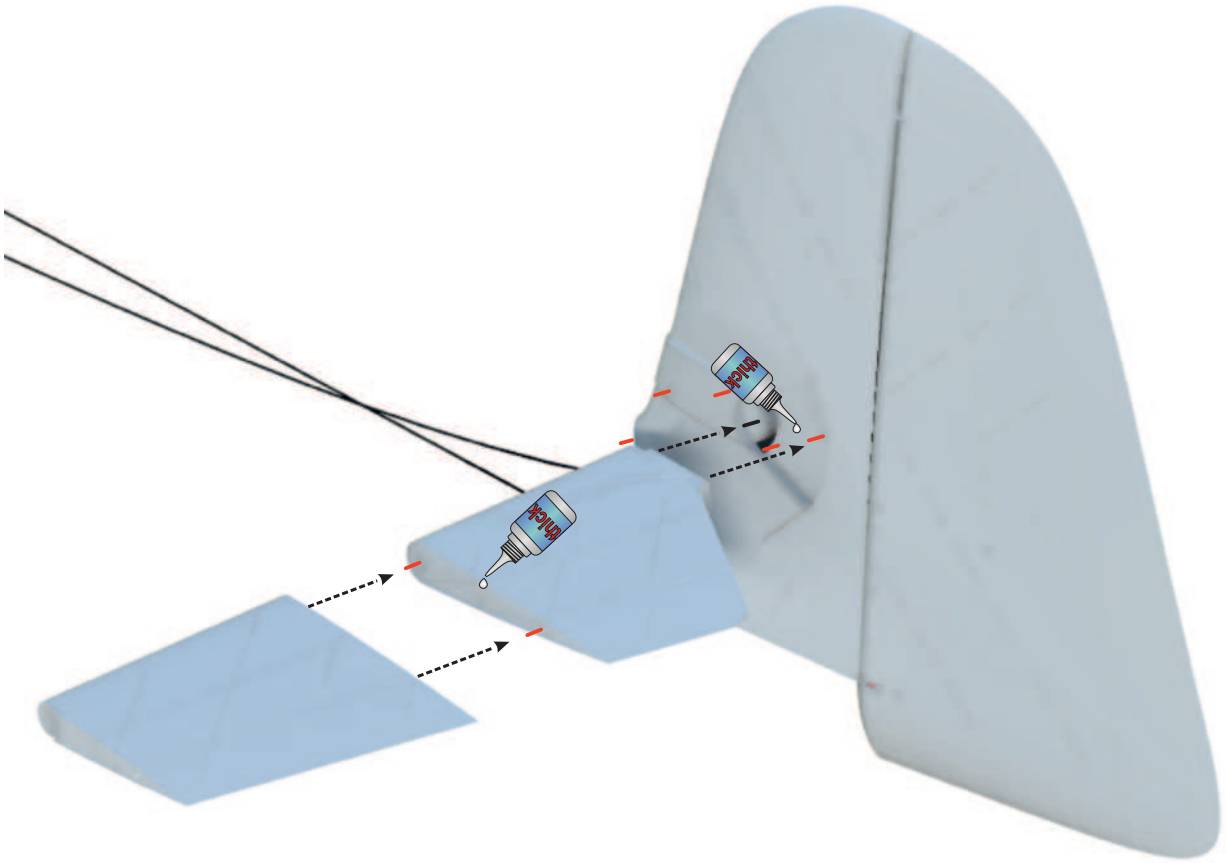
The elevator centerpiece must move freely at all times.

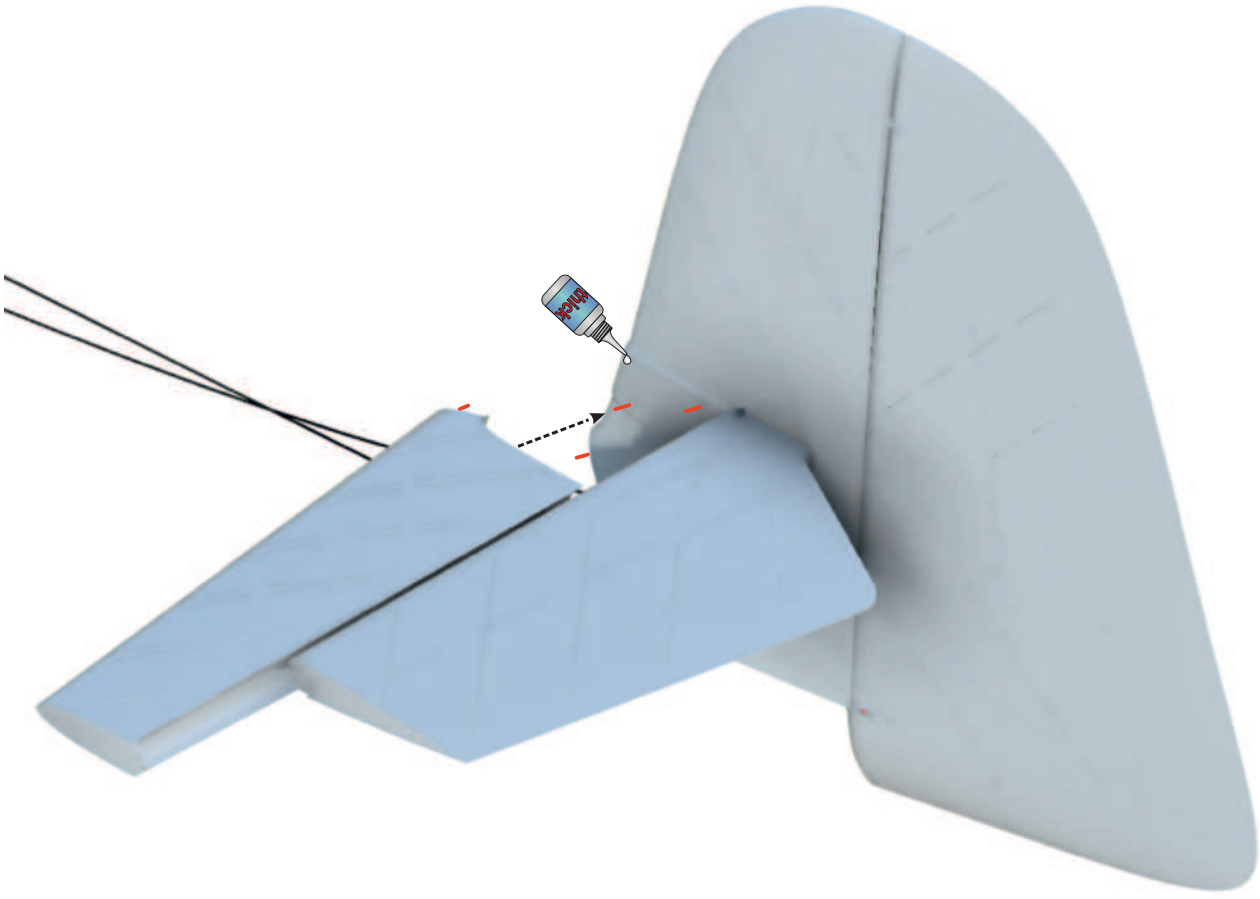


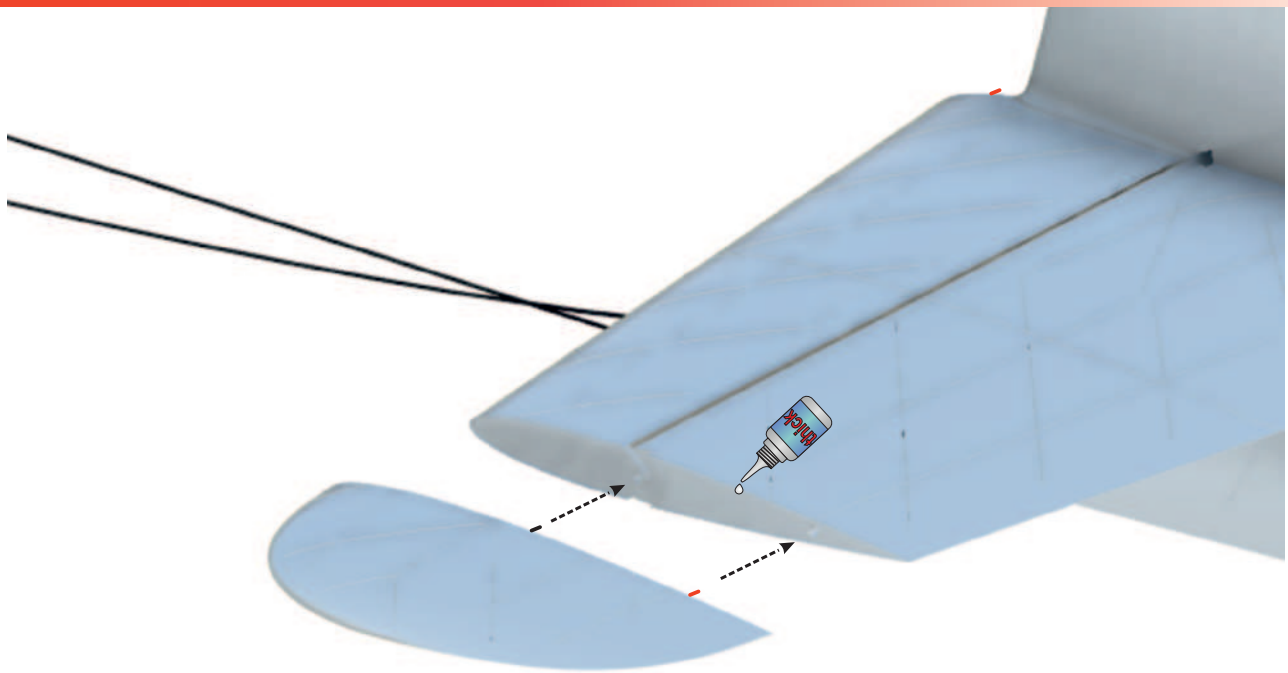


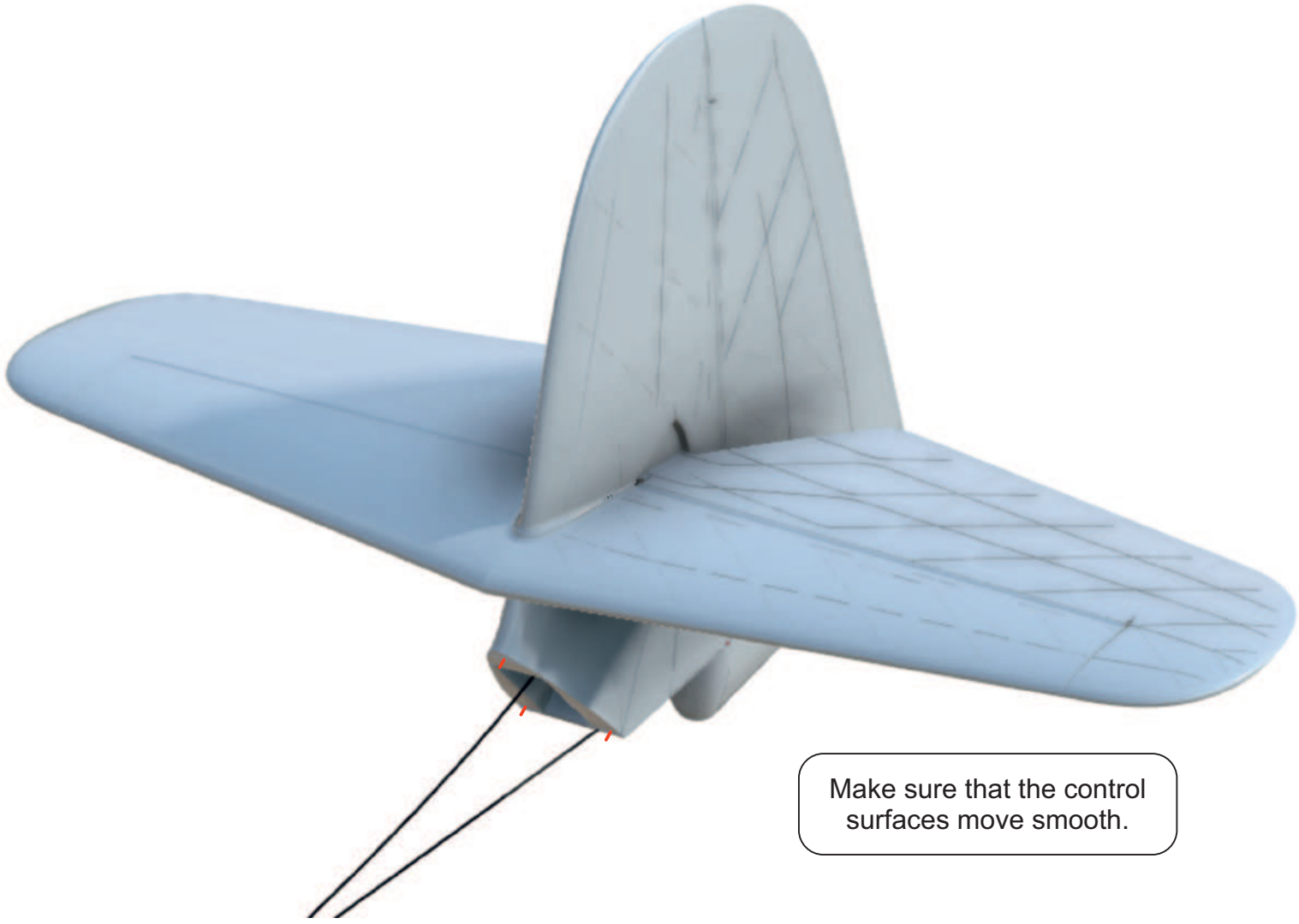




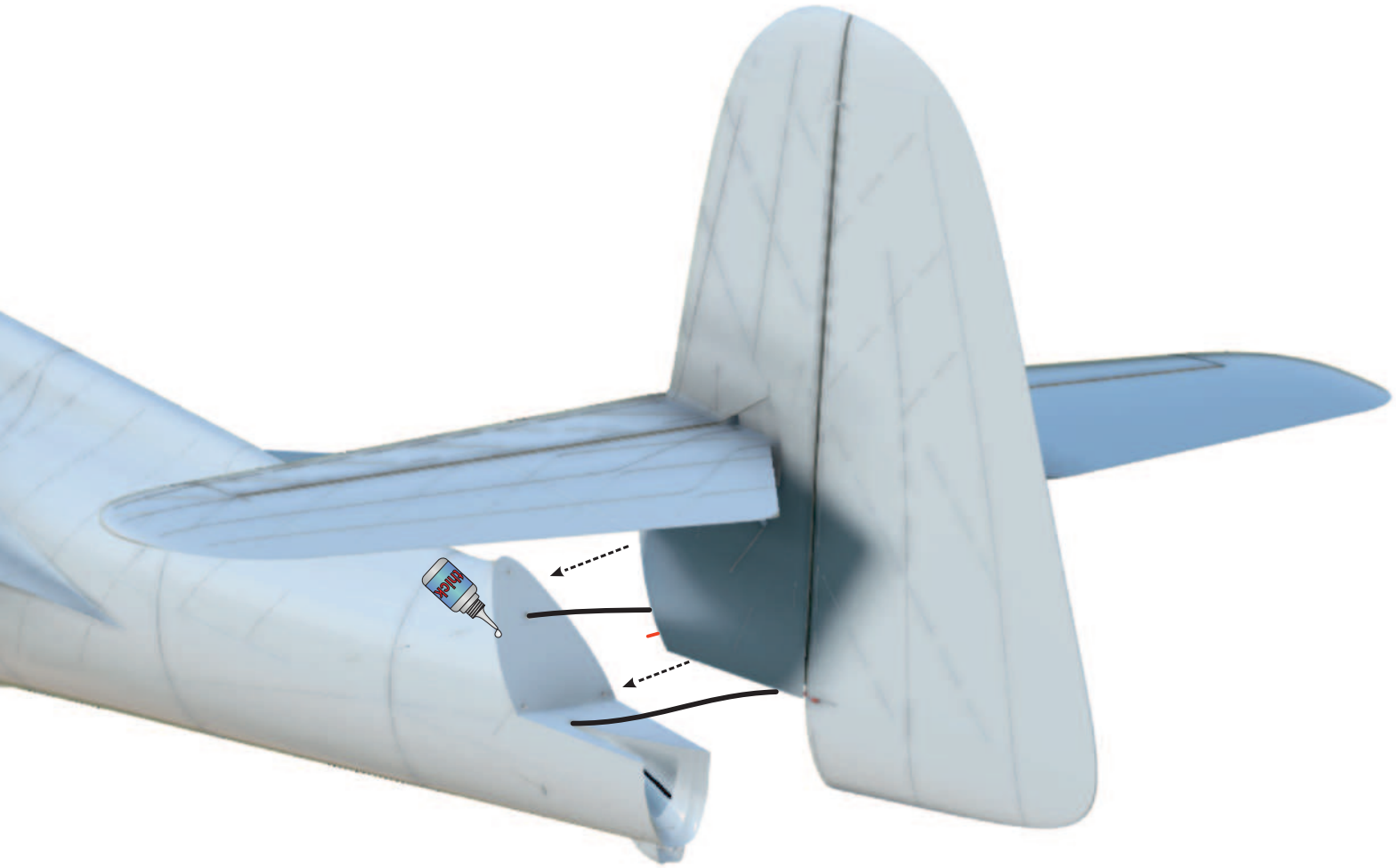


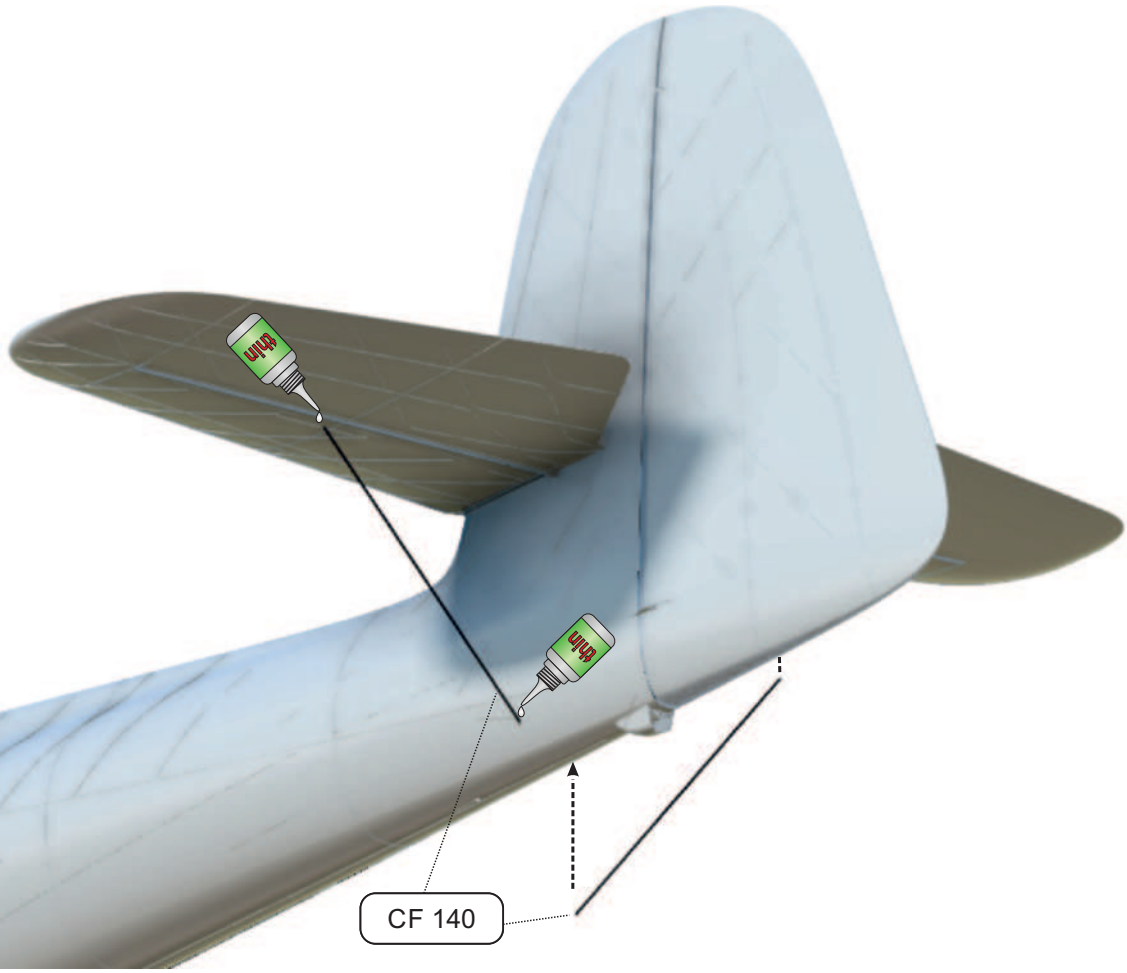


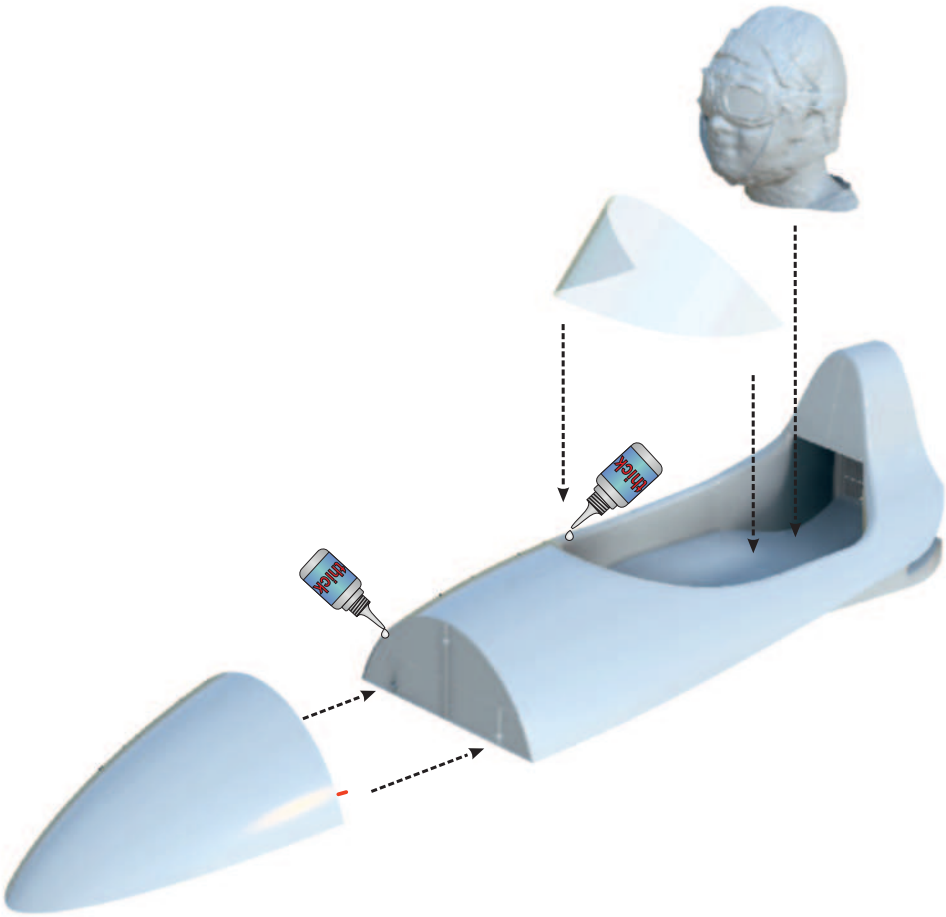


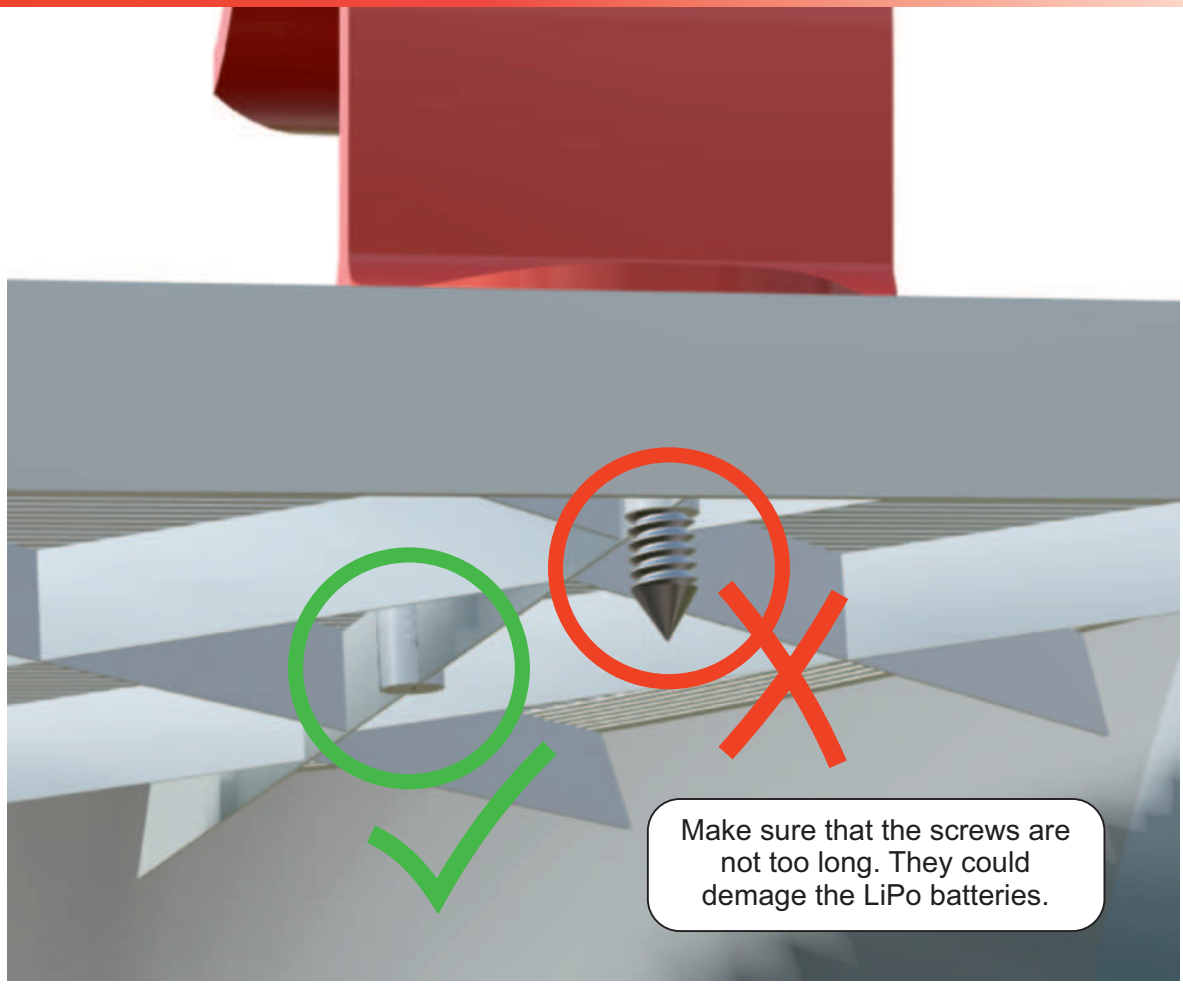


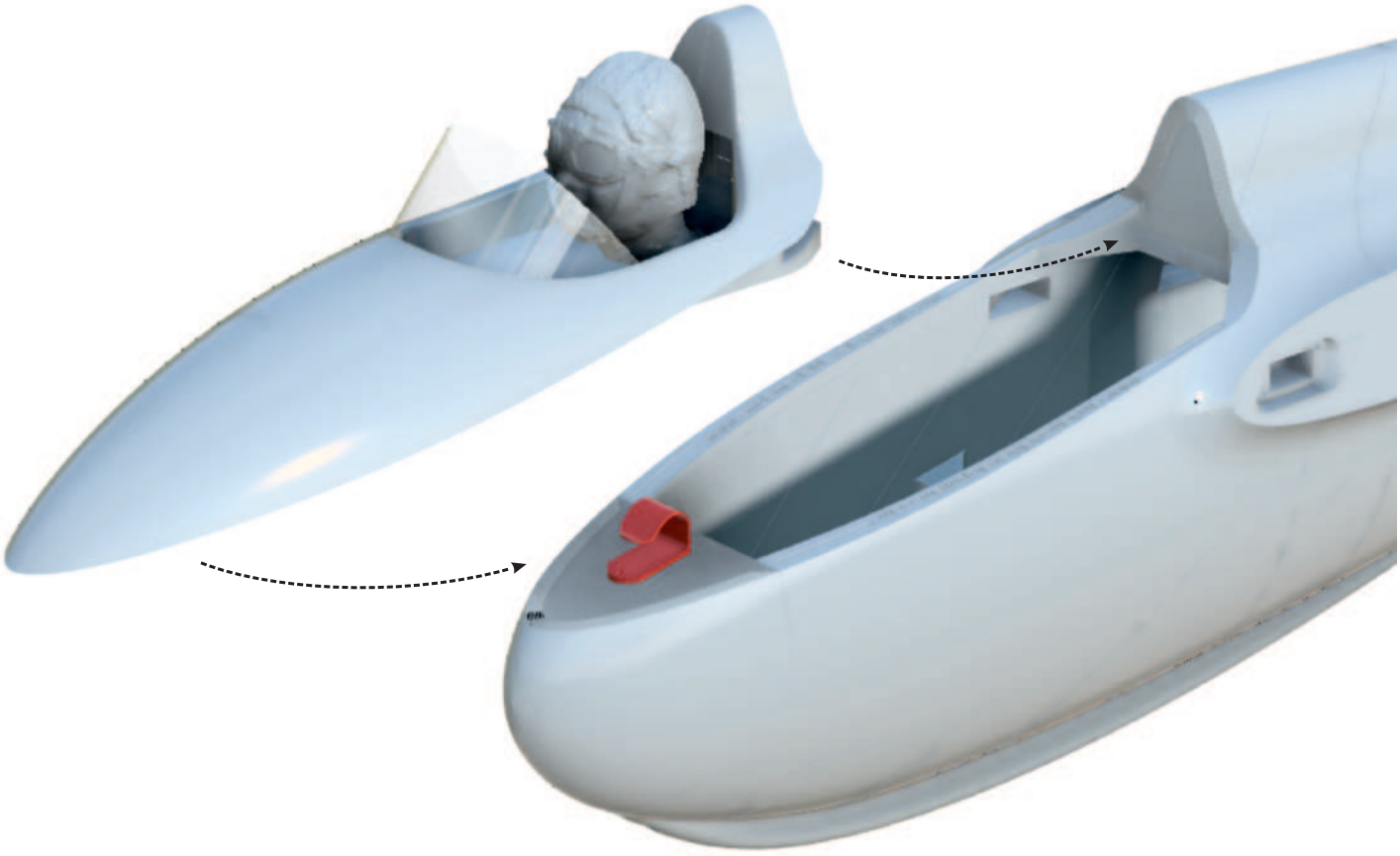
Make sure that the control surfaces move smooth.

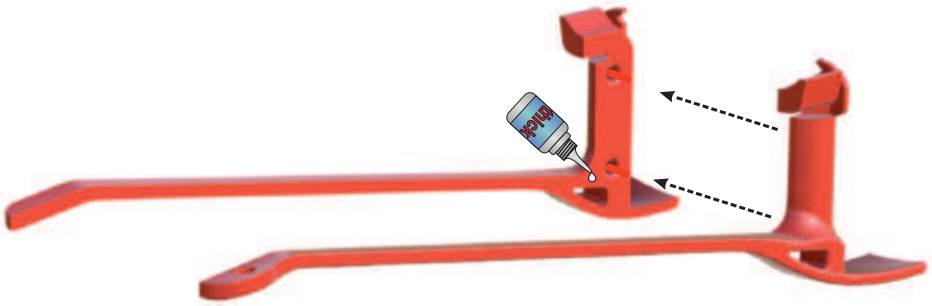


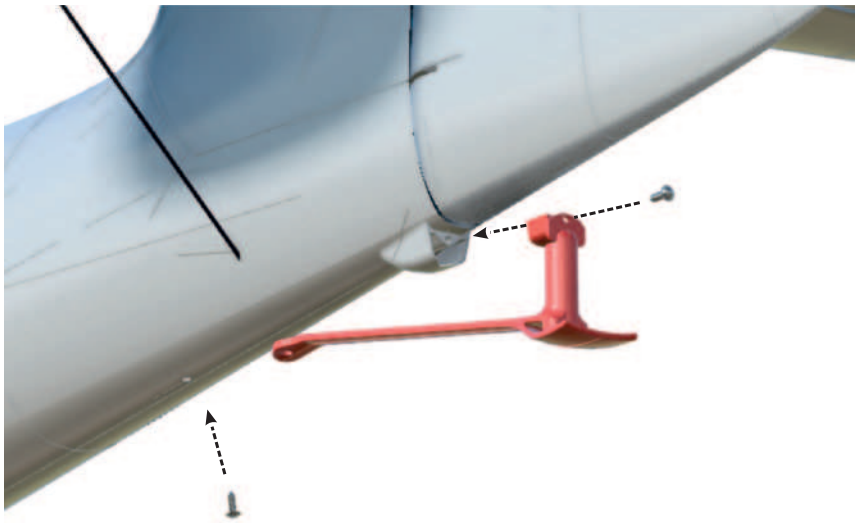


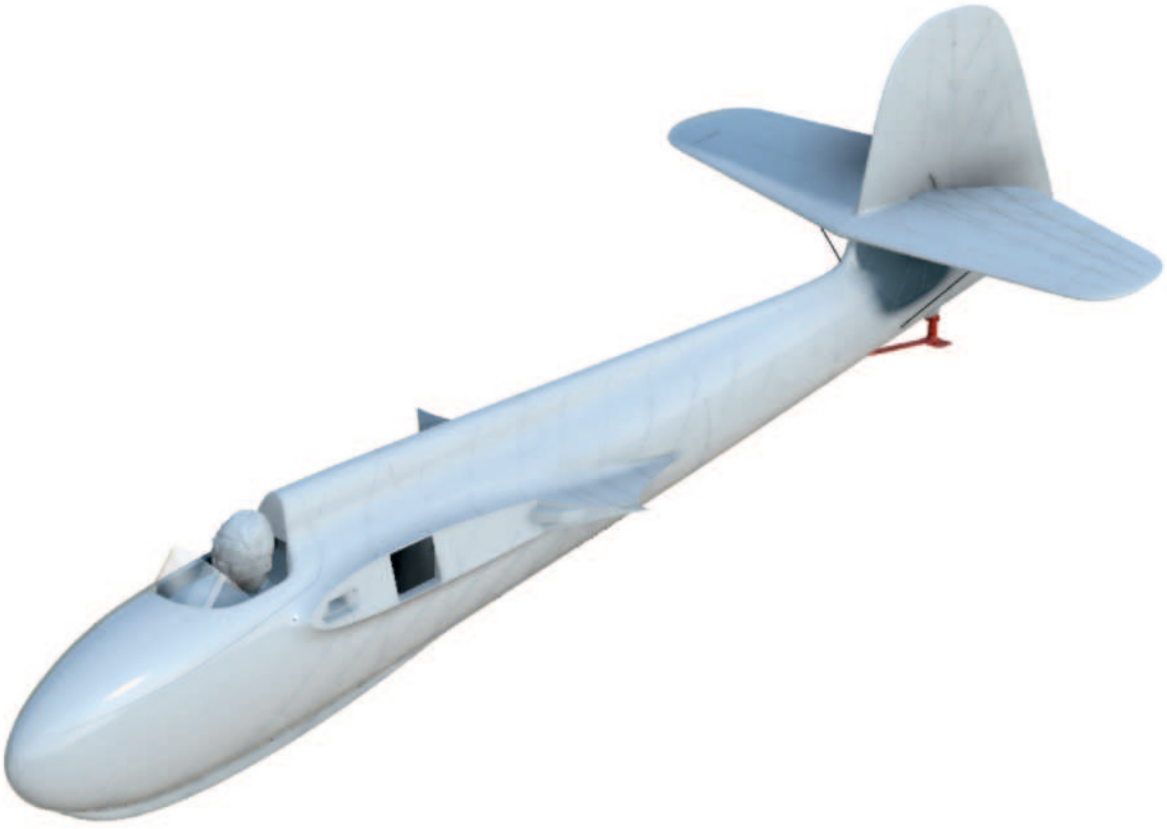


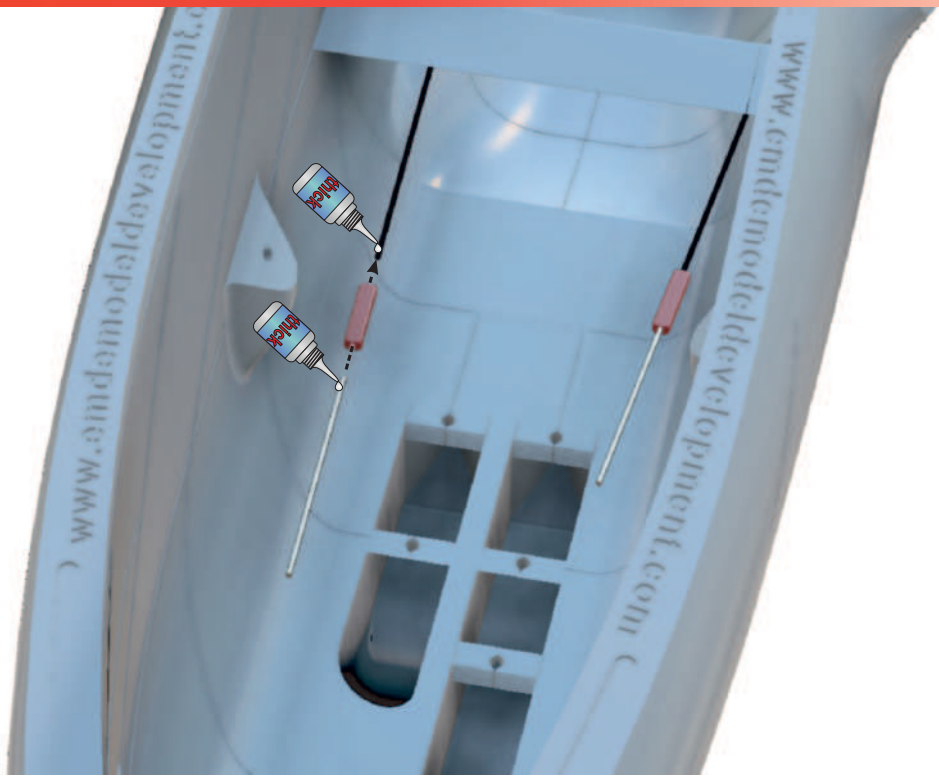


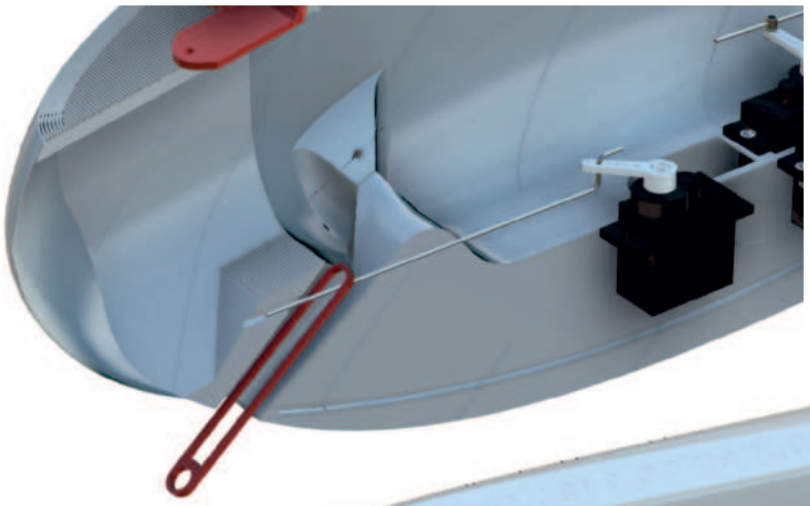






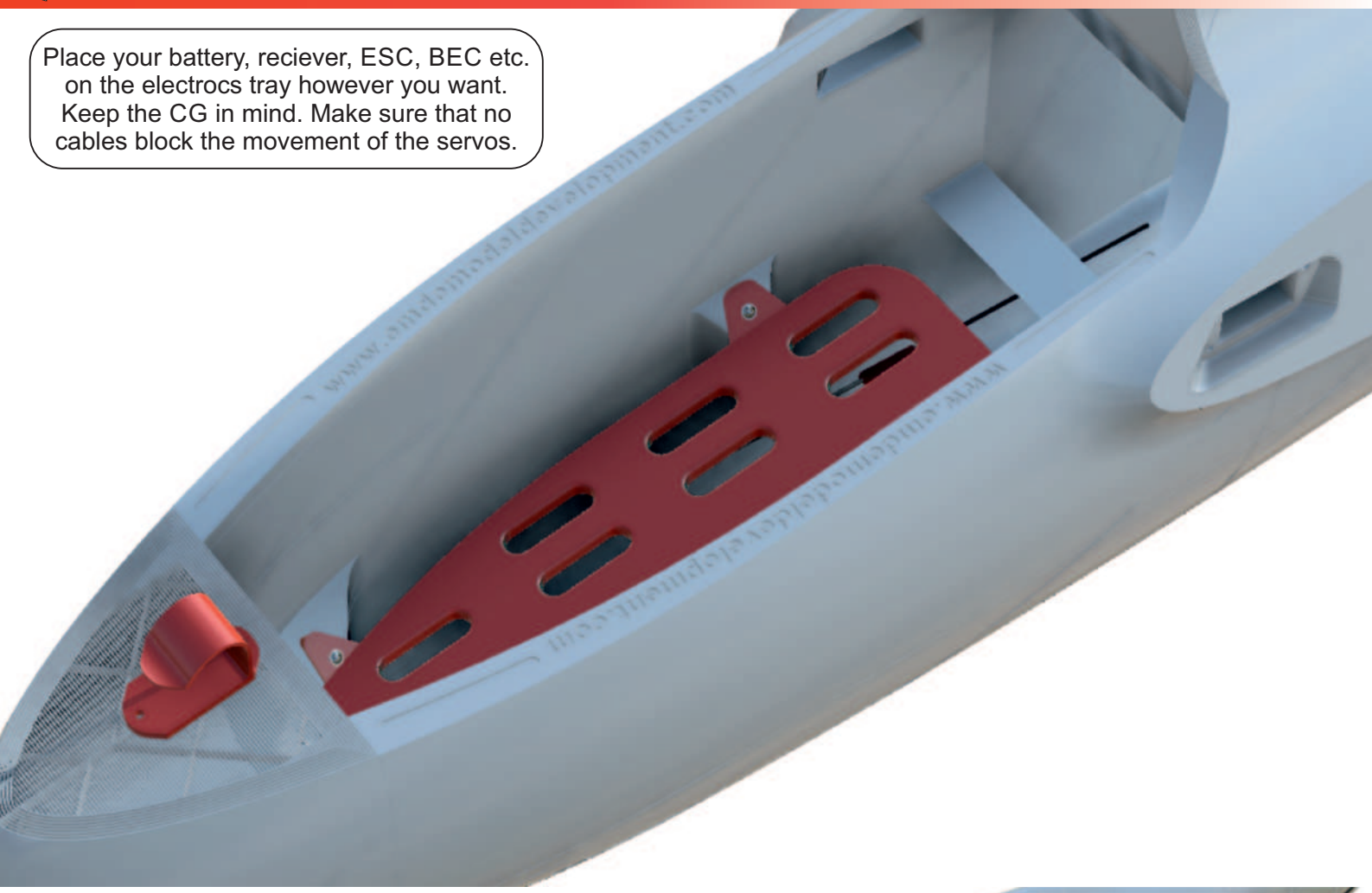


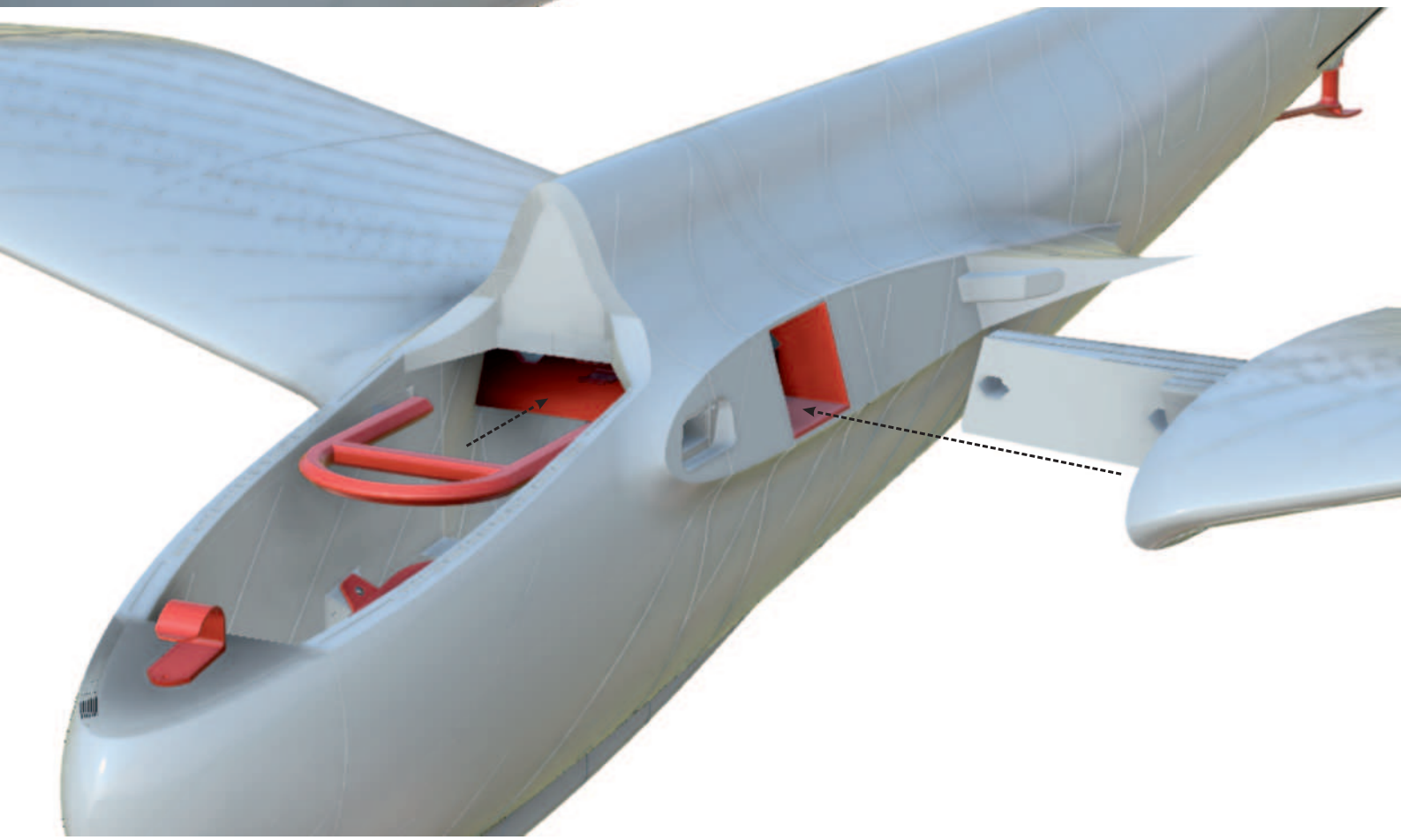




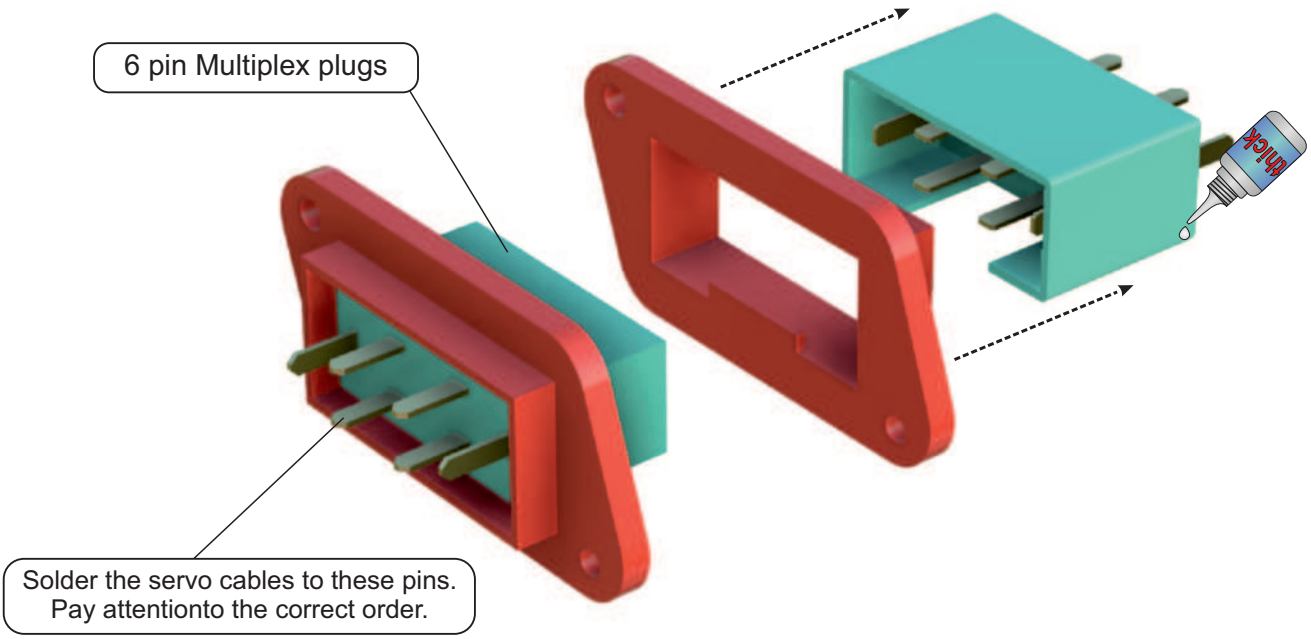
Adjust the length of the steel rod to fit your prefered way of connecting the pushrod to the servo.

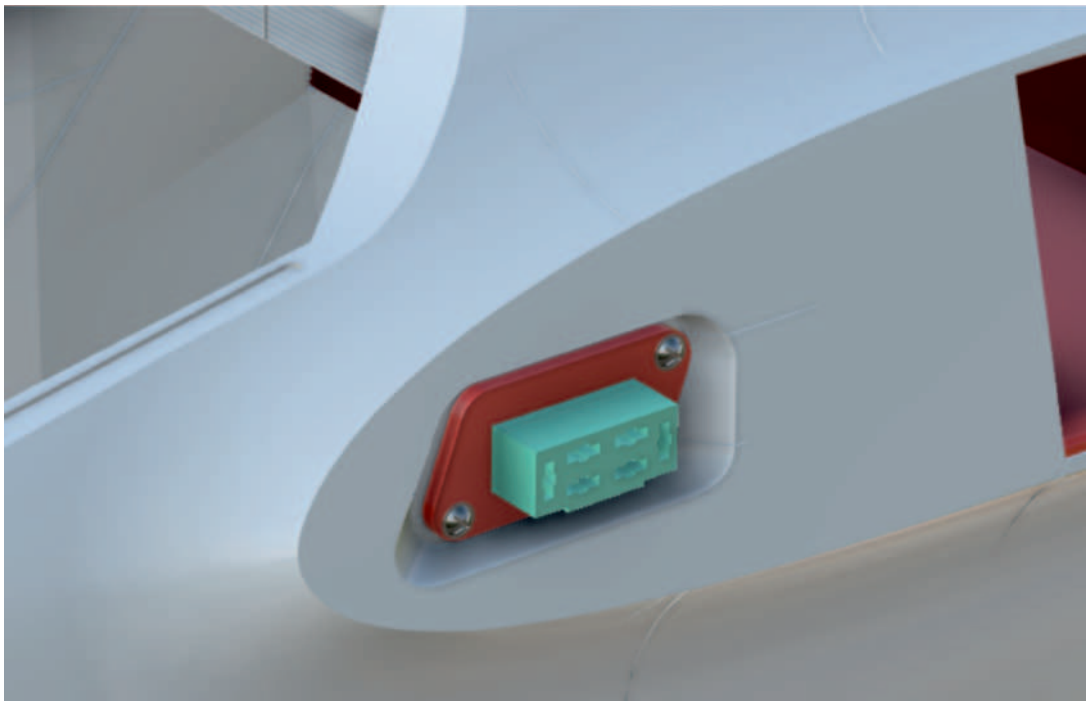
Place your battery, reciever, ESC, BEC etc. on the electrocs tray however you want. Keep the CG in mind. Make sure that no cables block the movement of the servos.

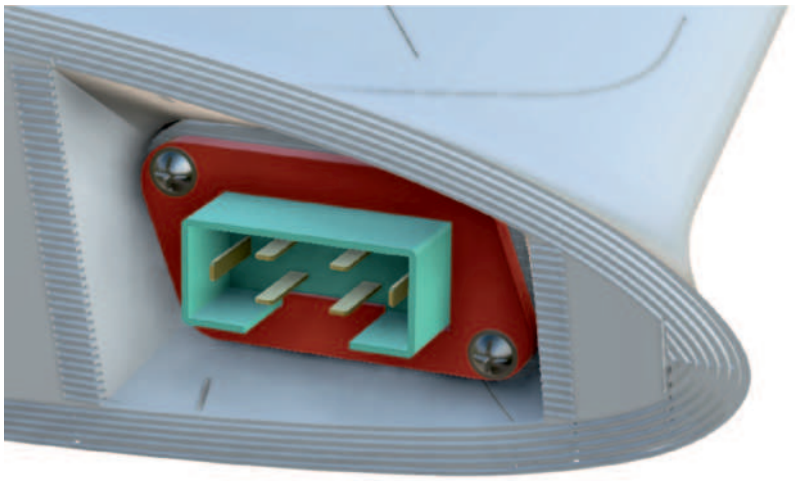


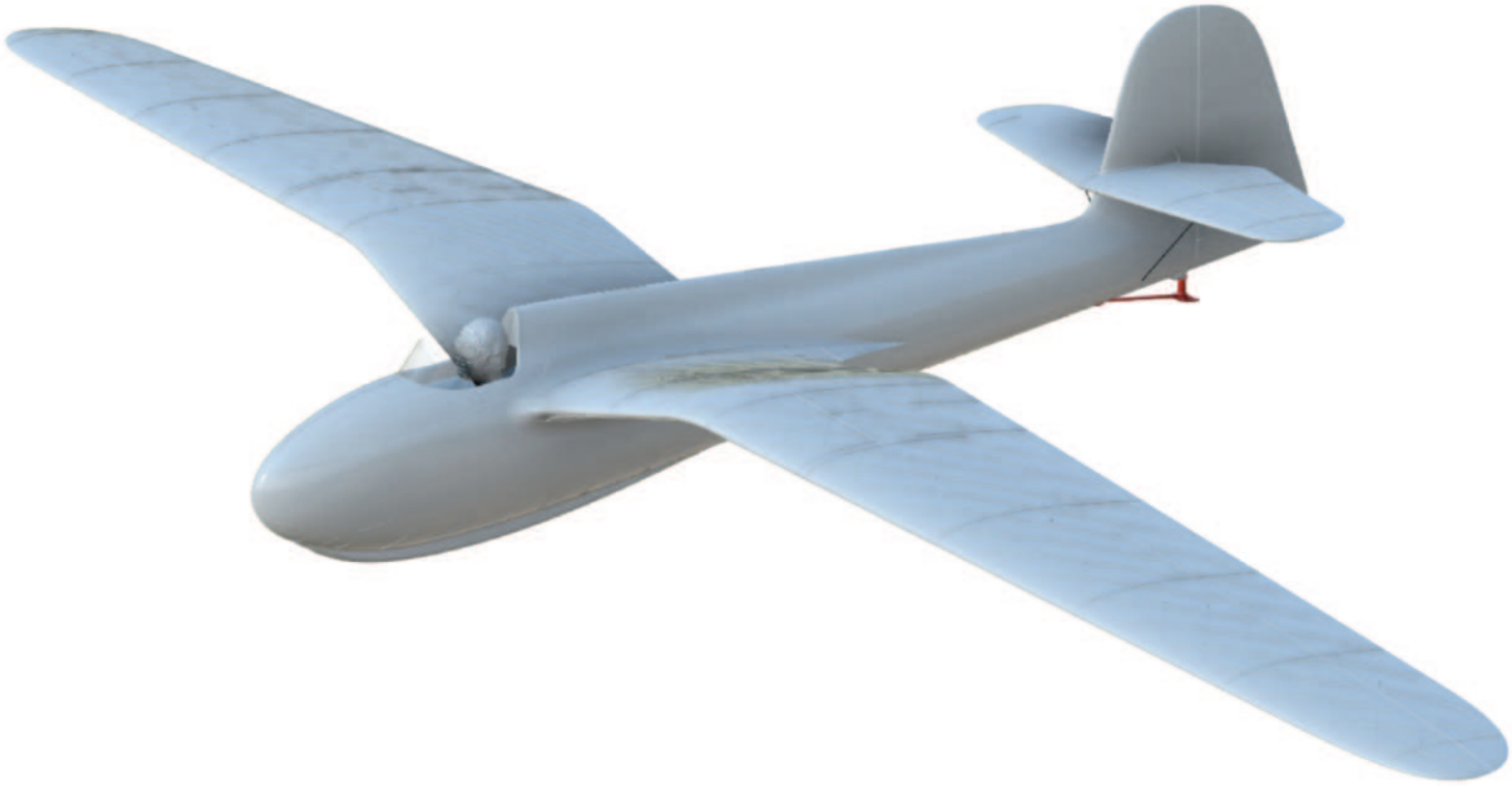


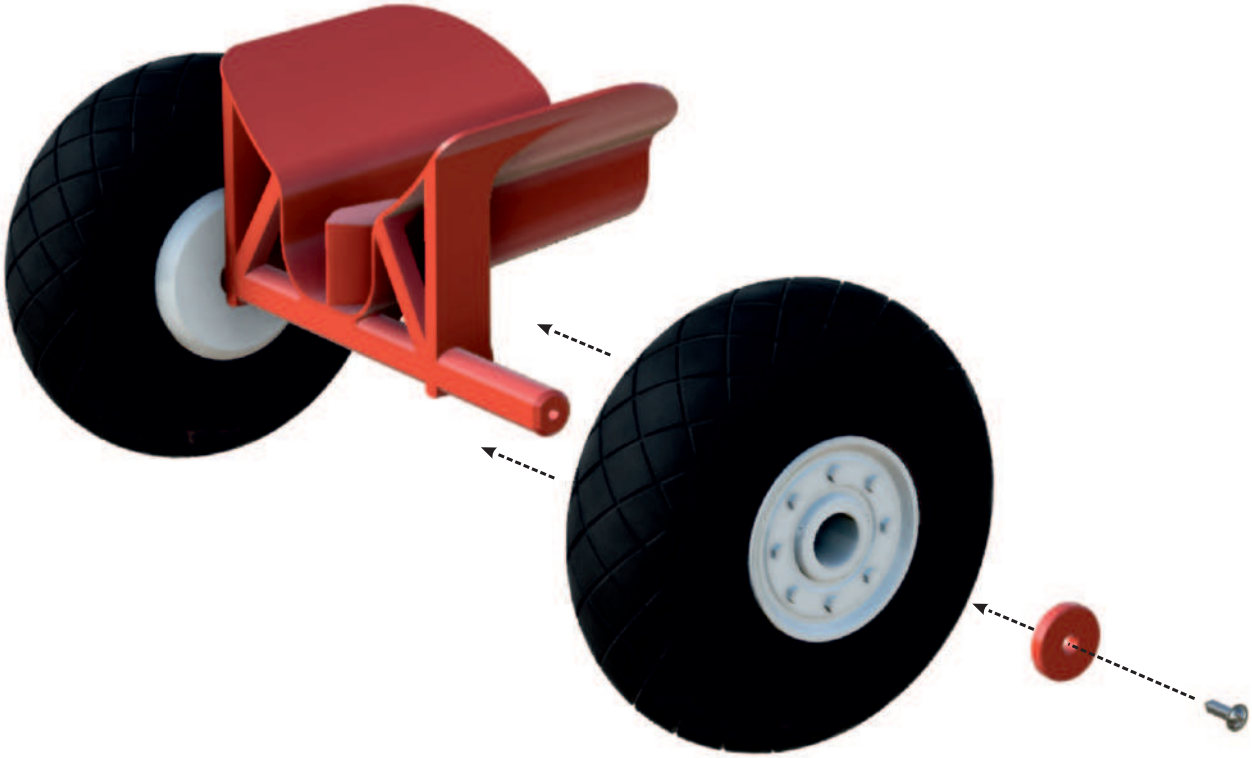
Optional automatic servo connections

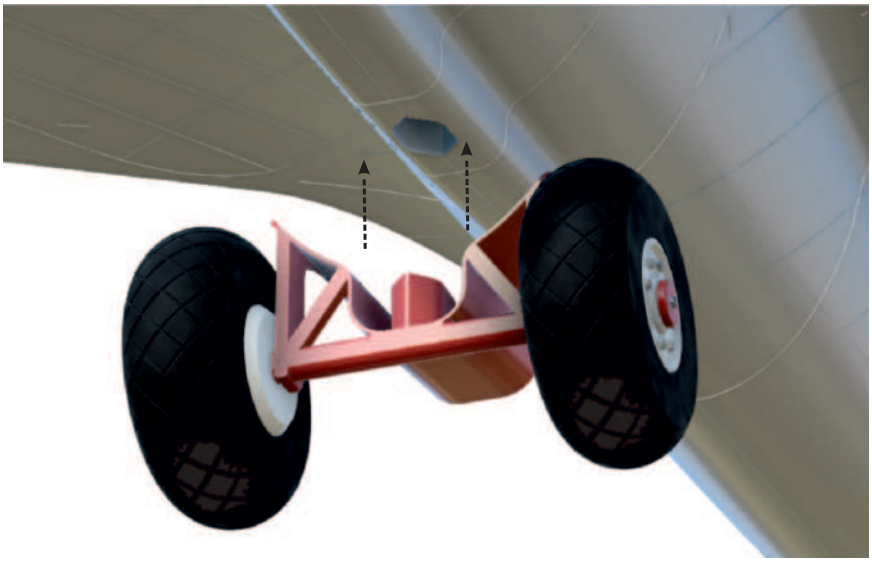




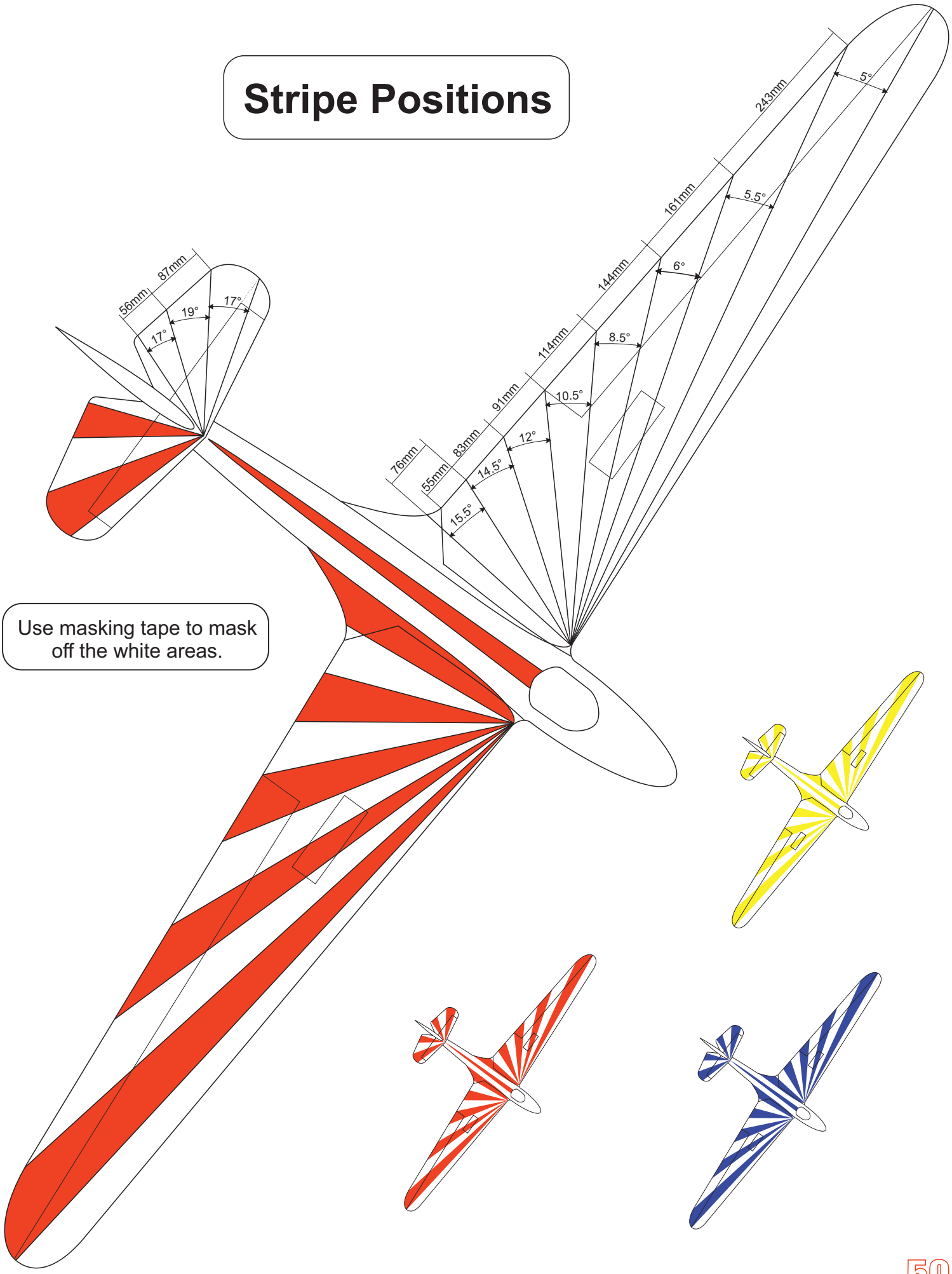








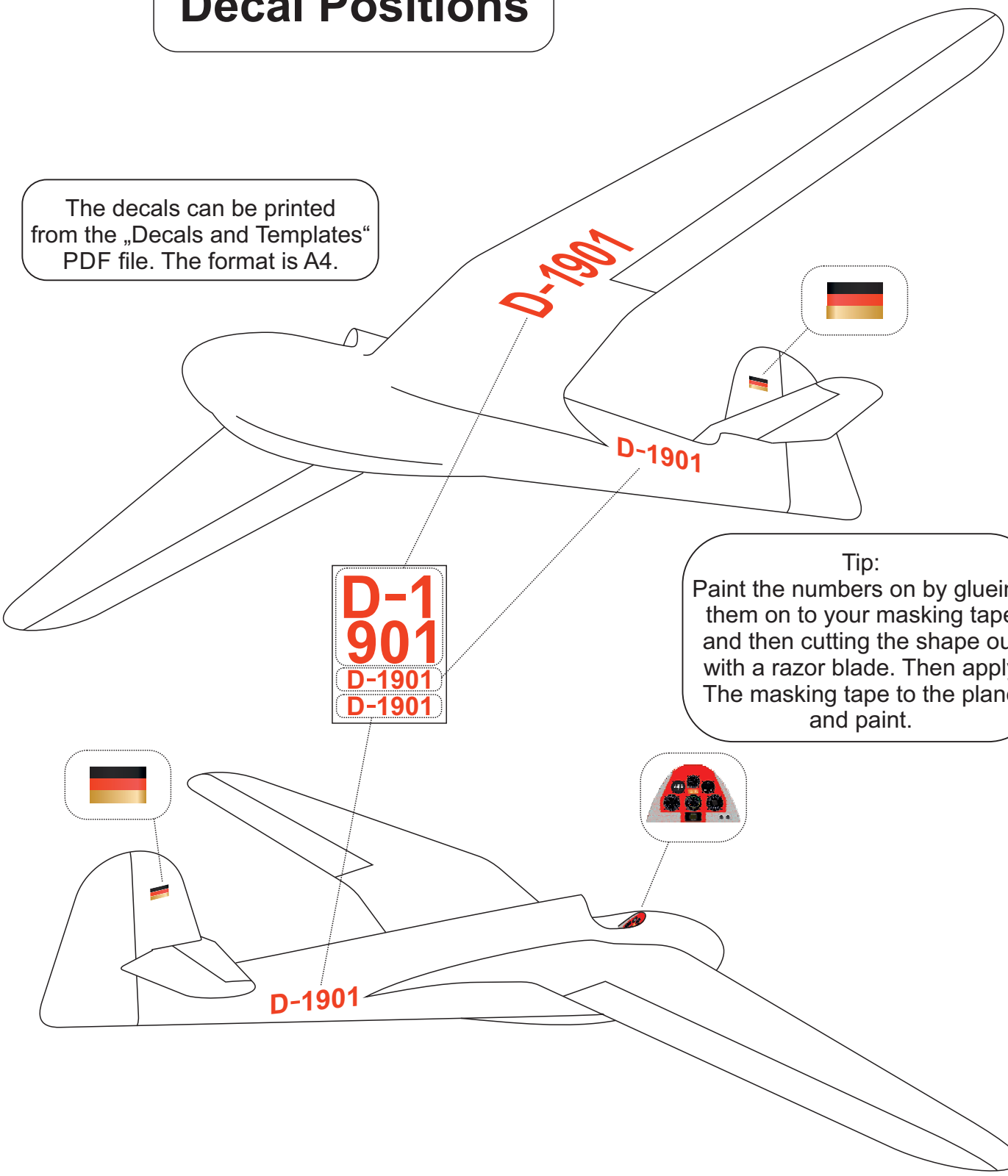
Stripe Positions



Use masking tape to mask off the white areas.

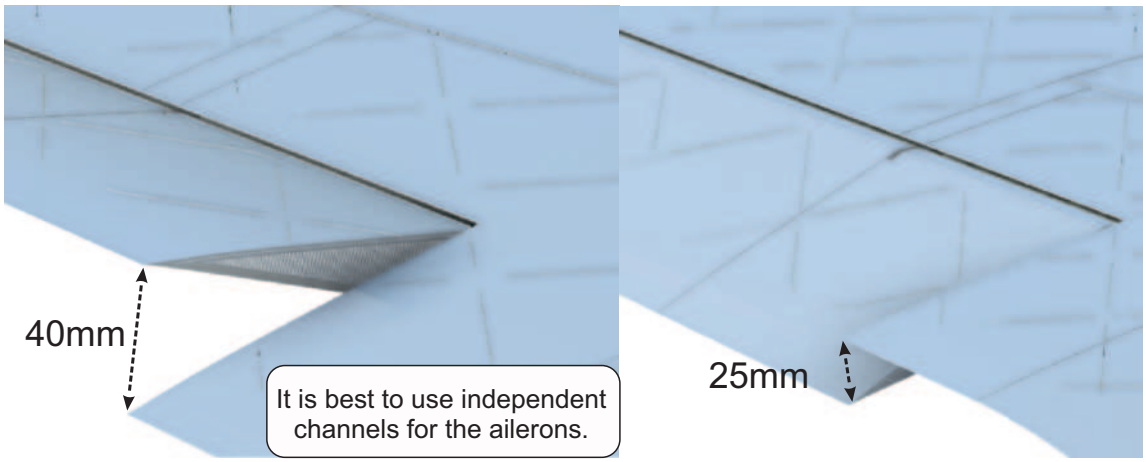
Decal Positions

The decals can be printed from the „Decals and Templates“ PDF file. The format is A4.



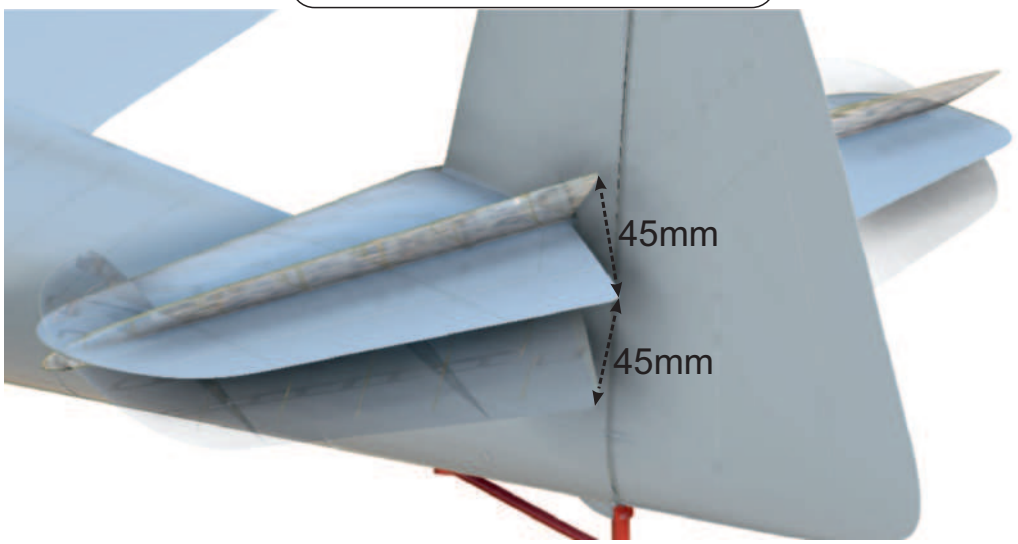
Tip:
Paint the numbers on by glueing them on to your masking tape and then cutting the shape out with a razor blade. Then apply The masking tape to the plane and paint.

Aileron Travel

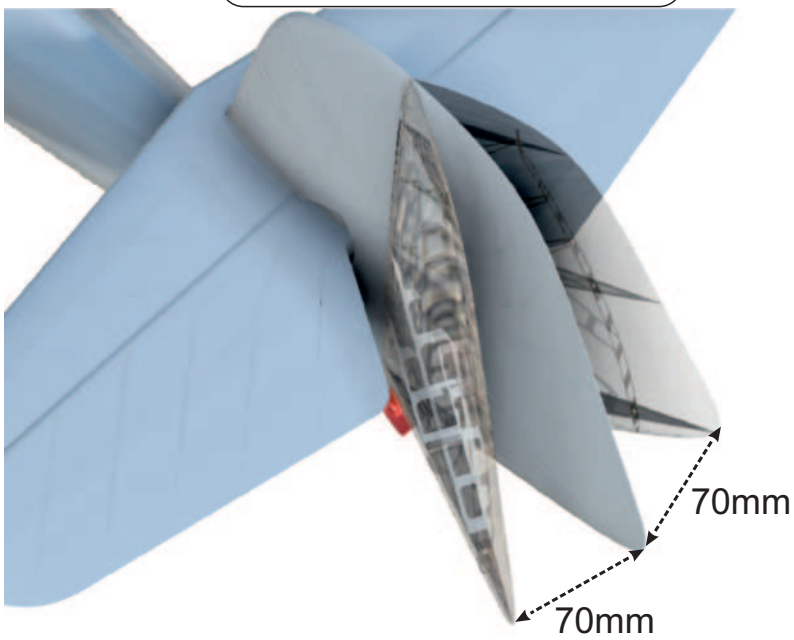


It is best to use independent channels for the ailerons.

Elevator Travel

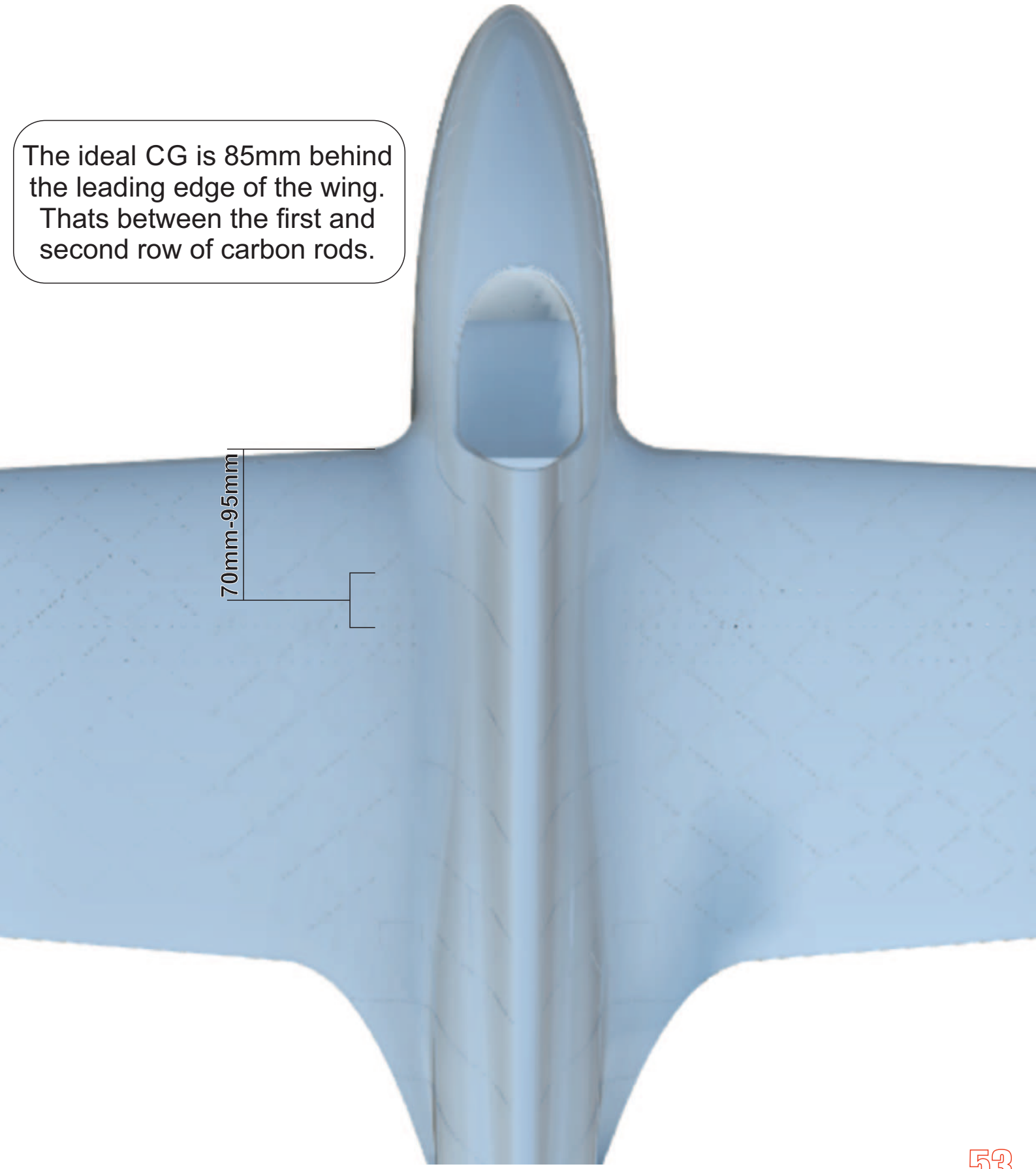


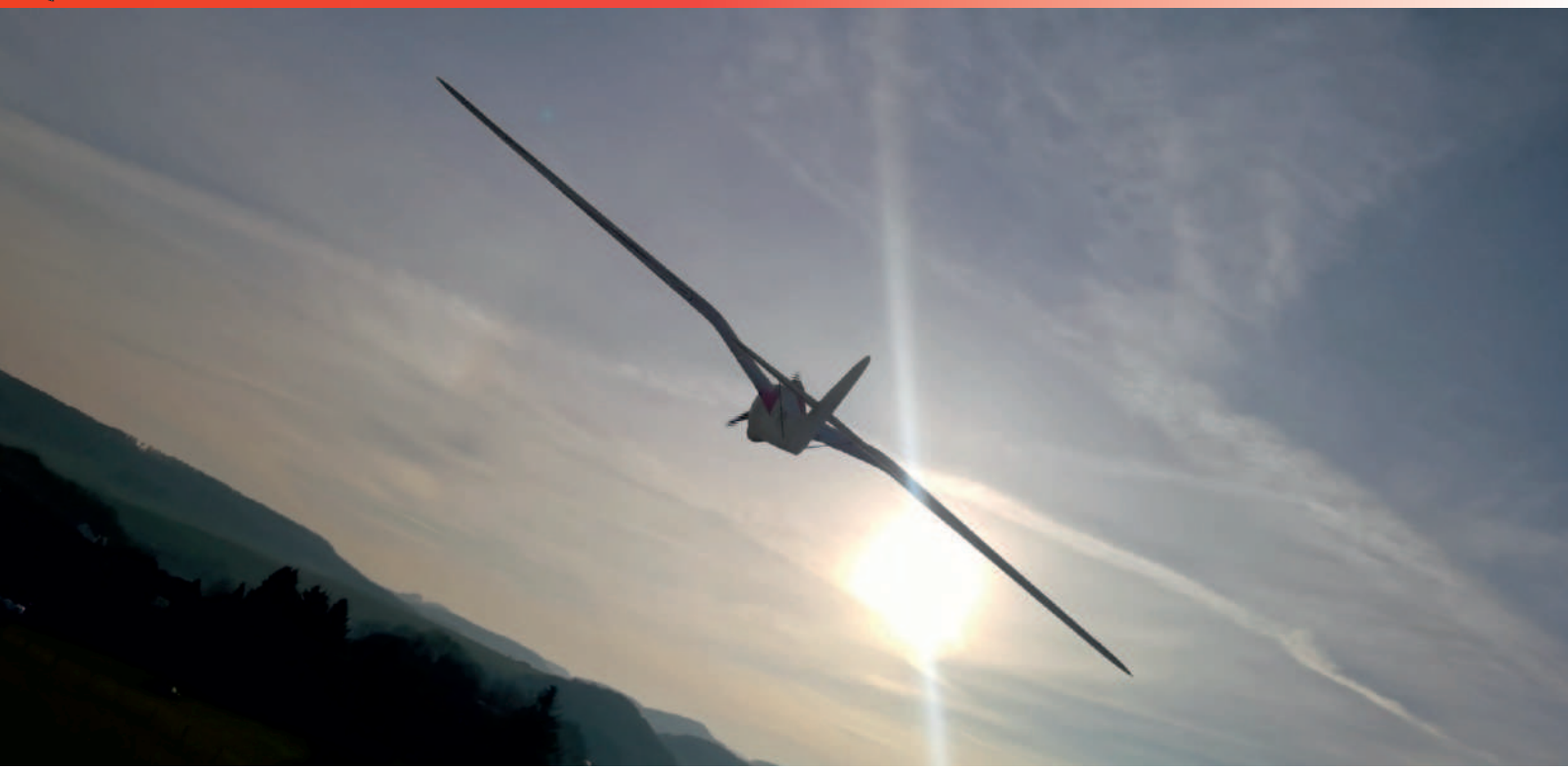
Rudder Travel



Center of Gravity

The ideal CG is 85mm behind the leading edge of the wing. Thats between the first and second row of carbon rods.





Tips for flying

The Habicht is very easy to control and flies much like a full scale glide. But there are a few things to watch out for:

- Just like all full scale planes, this plane does have limits of operation. The combination of low drag, high lift and a high aspect ratio wing means that the plane can generate higher G-forces than the wings can hold up. But that does not mean that the plane can not do aerobatics, it just means that you have to fly careful, just like real aerobatic pilots have to do. Watch the videos to see what the plane is able to do.

- The ailerons are huge and might flutter at speeds above 120km/h. A play free aileron connection can reduce fluttering.

- The plane stalls apruptly. This is great for snaps, but beginners might get surprised by a sudden stall. All control surfaces still work when the wing is fully stalled. You can prevent a tipstall or spin by applying opposite aileron. However, you should still watch out when low to the ground.

And now ***GO FLYING!!!***