3D LabPrint

User Guide

rev. 2019/05

Fully 3d printable

EDGE 540 V3 73“Martin Sonka replica

25% scale ~ wingspan 1.85m/73in

Zivko EDGE 540v3 Martin Sonka replica– fully printable R/C plane for your desktop 3Dprinter

Future of flying - Print your own plane. flight video

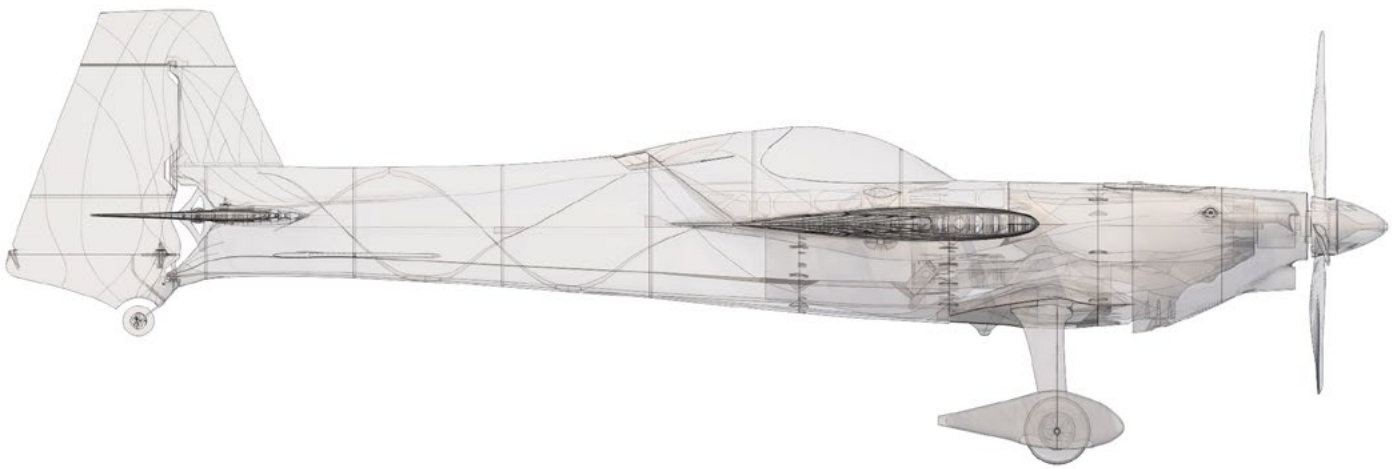
You simply have to try this one, our very best and most advanced plane so far. Using all the experience gained from our previously released EDGE 540 and its 64" version we designed this even bigger evolution including some revolutionary features. For the first time this model presents a brand new method of joining parts - stronger, easier to assemble and more precise.
And again, the flight characteristics have improved not only by lowering the overall wing loading, but also by better weight distribution, and improved aerodynamics. Large control surfaces with allows for performing extreme 3D maneuvers, while precision and symmetry of the wing profile predetermines this RC model plane to flying scale precision aerobatics. The unique servo direct drive technology used for ailerons links the control surfaces directly to the servos without any backlash with maximum precision and immediate response to the sticks.
According to the settings and equipment this plane can be recommended to both medium skilled, and even highly experienced 3D aerobatics pilots. We hope you enjoy printing, building and flying it, although this build will truly test your abilities and quality of your printer.

Welcome to the thin wall printing!

The first fully printable airplanes with files prepared for your 3Dprinter, with flight characteristics, comparable or even supperior to classic build model airplane.
This is not a dream, now you can print this HI-TECH at home. Simply download and print the whole plane or spare parts anytime you need just for a cost of filament only about $30

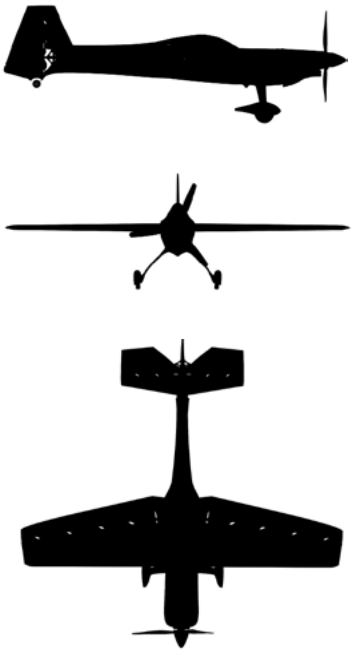
Extensive hi-tech 3d structural reinforcement making the model very rigid while maintaining a lightweight airframe and exact airfoil even it's just a plastic. This perfect and exact 3d structure is possible only thanks to additive 3dprinting technology. So welcome to the 21st century of model flying and be the first at your airfield.

Easy to assemble, you don't need any extra tools or hardware. Just glue the printed parts together. The rest of the assembly is very easy. Simply add brushless motor, ESC, servos and radio system. Detailed step by step PDF/VIDEO is included. You will get a superb performing precise and 3D aerobatic capable plane.



General specifications:

Length:	1835 mm / 72,2 inch
Wingspan:	1850 mm / 73 inch
Height:	636 mm / 25 inch
Wing area:	62 dm2 / 6.7 sq ft
Wing loading:	73.4 g/dm2 / 23.9 oz at sq ft
Center of gravity:	98mm / 3.85 in from LE
Airfoil:	3DLabPrint symetric 02
Weight of printed parts (w/o wheels):	2415 g / 72.7 oz
Takeoff weight (12s 2650mAh Li-Pol):	4550 g / 160.5 oz
Max takeoff weight:	5500 g / 194 oz
Never exceed speed, Vne:	150 km/h / 93 mph
Design max maneuvering speed, Va:	75 km/h / 46 mph
Stall speed Vs:	28 km/h / 17mph



Performance measurement:

Max speed VH (level flight):	140 km/h – 75.6kn – 87.0mph
Rate of climb:	33 m/s (6 500 ft/min)
Flight time (12s 2650mAh):	7:00 min (+20% reserve)

Zivko EDGE 540v3, History

The Edge 540, manufactured by Zivko Aeronautics, is as precise and controllable as it is aggressive. The small, one-seater aircraft is a favourite amongst Red Bull Air Race pilots, largely due to its fuselage.

The computer optimised, steel tube frame makes the Edge 540 an extremely light, very durable and easily repairable raceplane.

Using an unconventional straight-edged wing, the Edge 540 sparked much interest in flying circles around the world, particularly after Kirby Chambliss began using it for aerobatic competitions. The aircraft has since evolved into the highly refined and technologically advanced version of the original prototype, with the radical wing now acknowledged as a pioneering feat of design.

Martin Sonka

Martin Šonka (born March 26, 1978 in Dvůr Králové nad Labem) is a Czech aerobatics (unlimited) and a former fighter pilot in the Czech Air Force. He has raced in Red Bull Air Race World Championship since 2010,[1] becoming the World Champion in the 2018 Red Bull Air Race World Championship season.

Martin Šonka began his aviation career in 1997. In this year he flew a glider for the first time and started his studies at University of Defence in Brno as a pilot. In 1999 he gained his Private Pilot Licence. Between 2001 and 2005 he attended Jan Perner Transport Faculty at University of Pardubice (Department of Transport Management, Marketing and Logistics). He finished his studies with a master's degree in 2005.

His military career started in 2000 in Pardubice. Two years after he moved to the air base in Náměšť nad Oslavou and in 2006 to 21st Tactical Air Force Base at Čáslav where he began flying L-159 Alca. In 2012 he has finished the type rating for the Saab JAS 39 Gripen. In 2014 he was forced to leave the army due to his busy racing schedule.

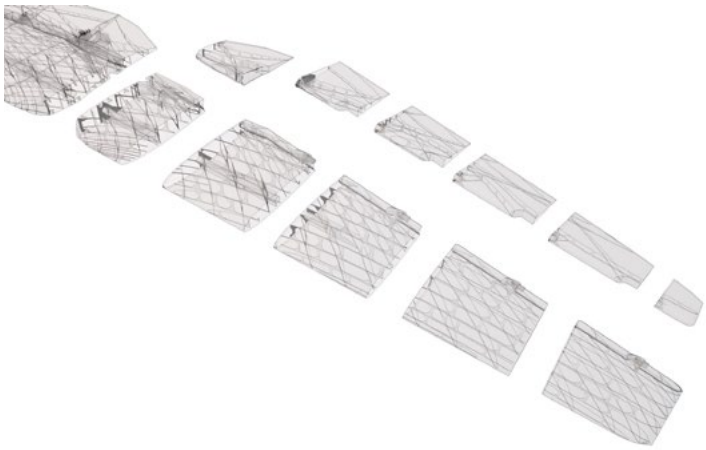
In 2005 he became a member of the Czech national aerobatic team. He used to fly Su-31, however in the past few years he is training and competing with Extra 300SR.

In 2009 Šonka passed all Red Bull Air Race qualifying camps and gained The Red Bull Air Race Super Licence. Then he was nominated for a 2010 season rookie.

Included:

1. STL 3d files

Universal STL files designed for use with desktop FDM 3D printers and slicer software such as Simplify3D (recommended) CURA or MatterControl (these STLs are not compatible with Slic3r or Makerware slicers).

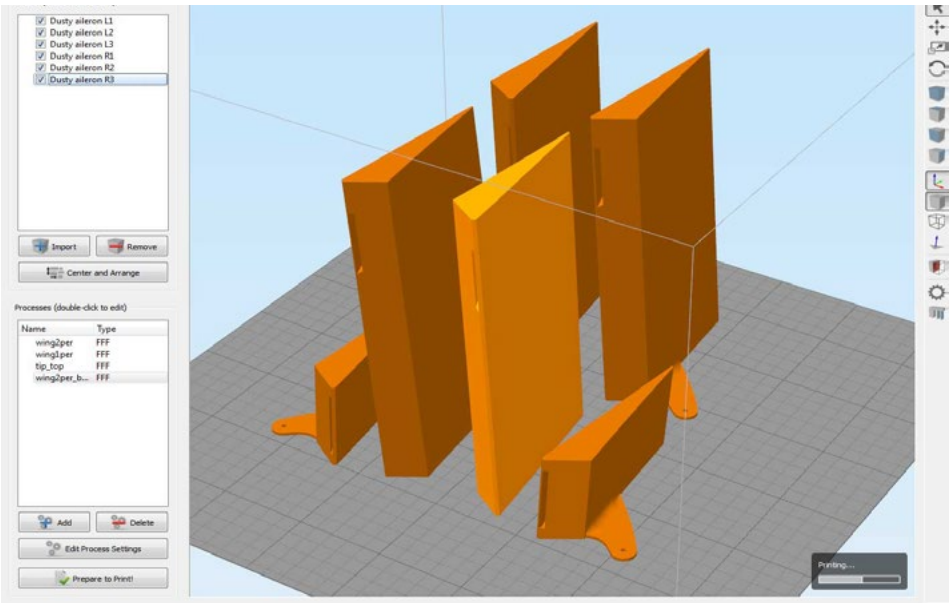


2. Factory files for Simplify3D slicer

with all our settings, these Factory files include all you need. Note: we use PRUSA i3 ORIGINAL printers so you may need to adjust the basic printing parameters to match your printer or use it as a starting point for you. Please look at Simplify3D

3. Step By Step PDF/VIDEO userguides

Please use this user guide along with the Printing Guide where you can find Tips and Advice for airplane printing (Thin Wall Printing).

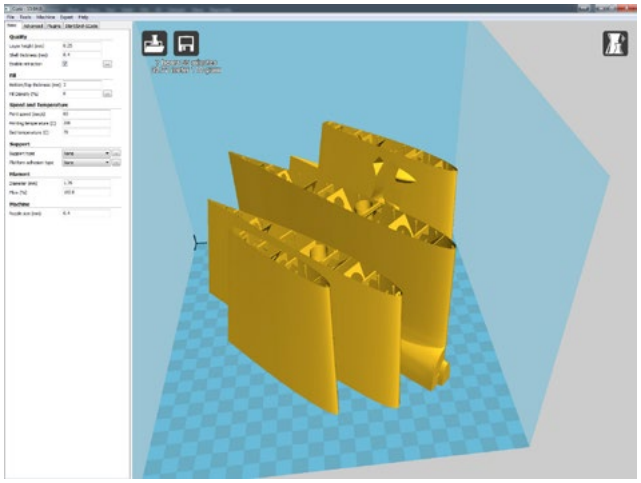


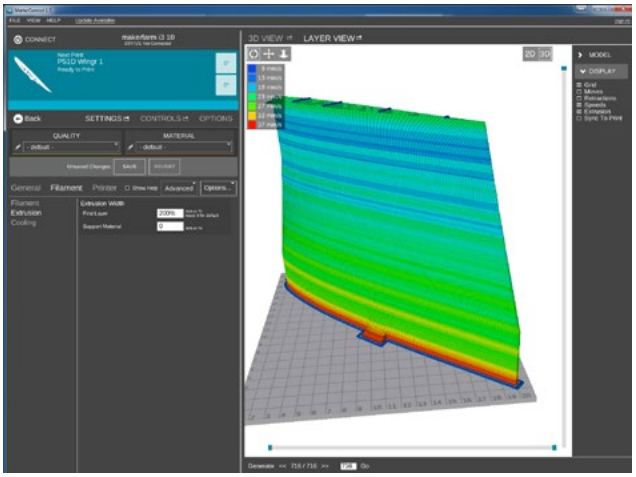
4. Gcodes

Basic Gcodes prepared for direct use. We made it as universal as possible, 100% compatible with PRUSA i3 ORIGINAL and most i3 style printers. Feel free to try it out, but we're not able to guarantee it's gonna work with your printer.

5. Prepared settings for CURA and MatterControl slicers

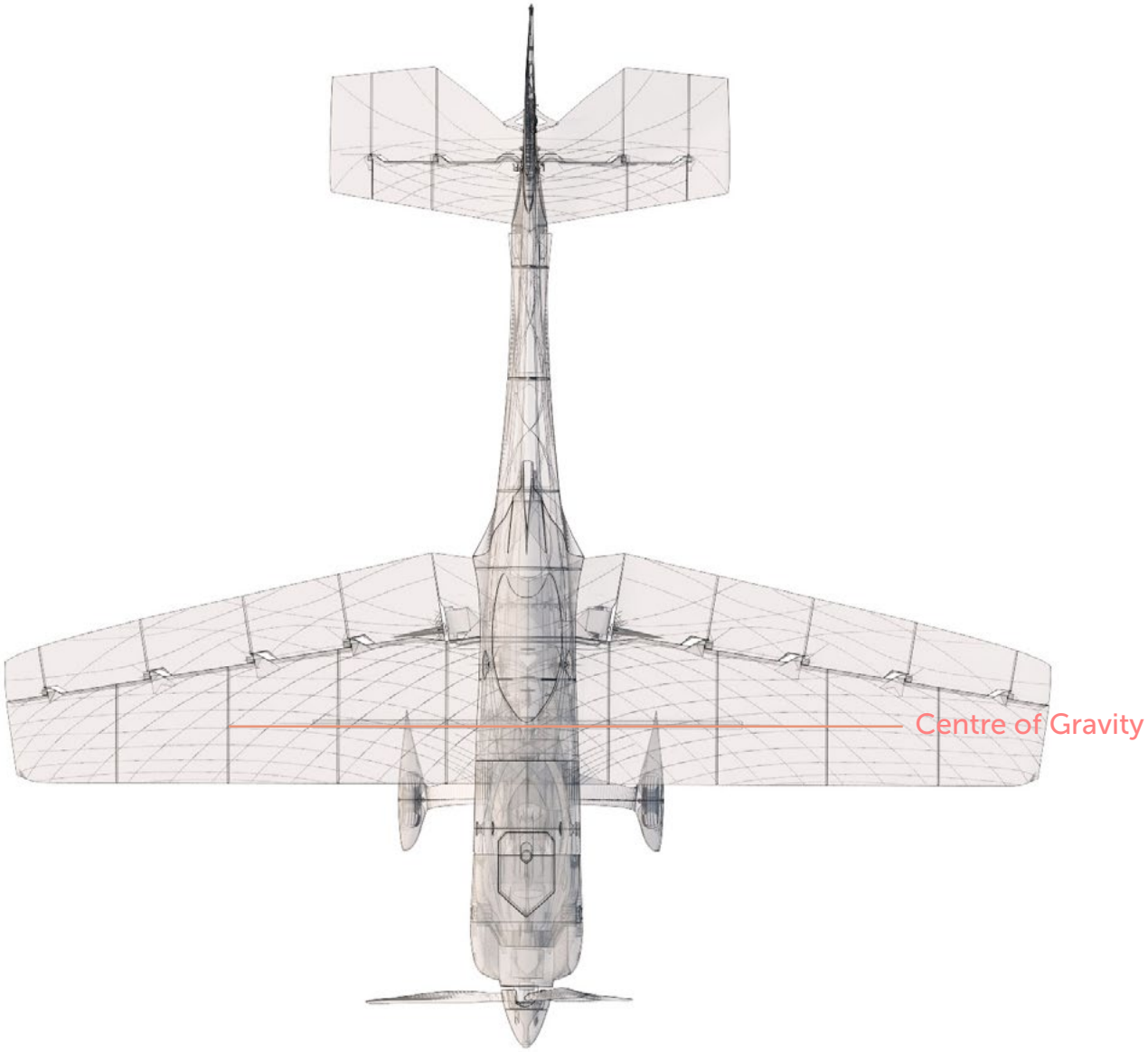
If you can't use Simplify3D for any reason, we provide our basic configuration files for free slicers CURA and MatterControl. Use these as a start point and amend as needed.



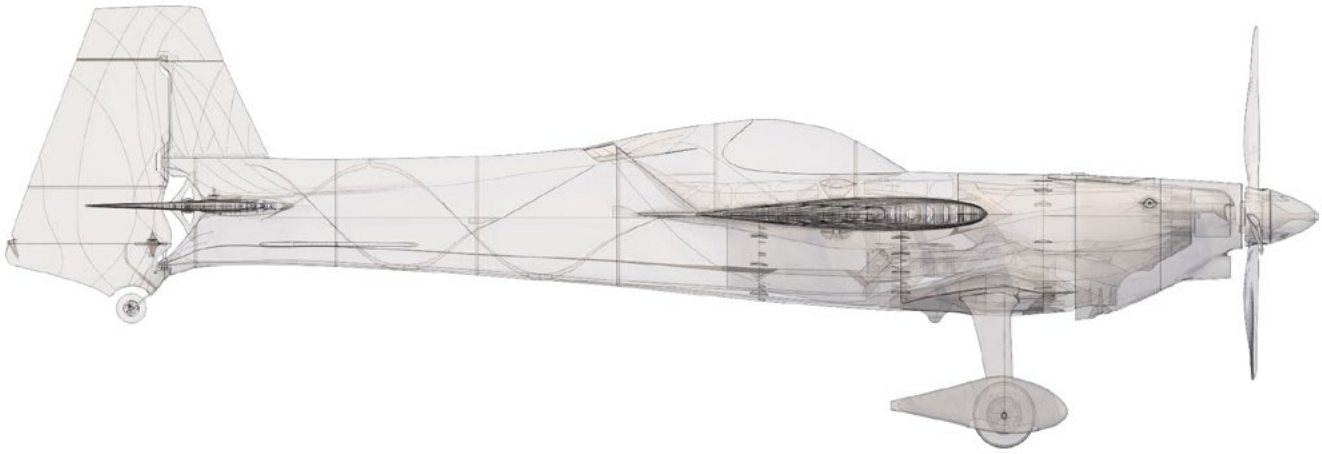


6. Scale markings and masking patern in PDF

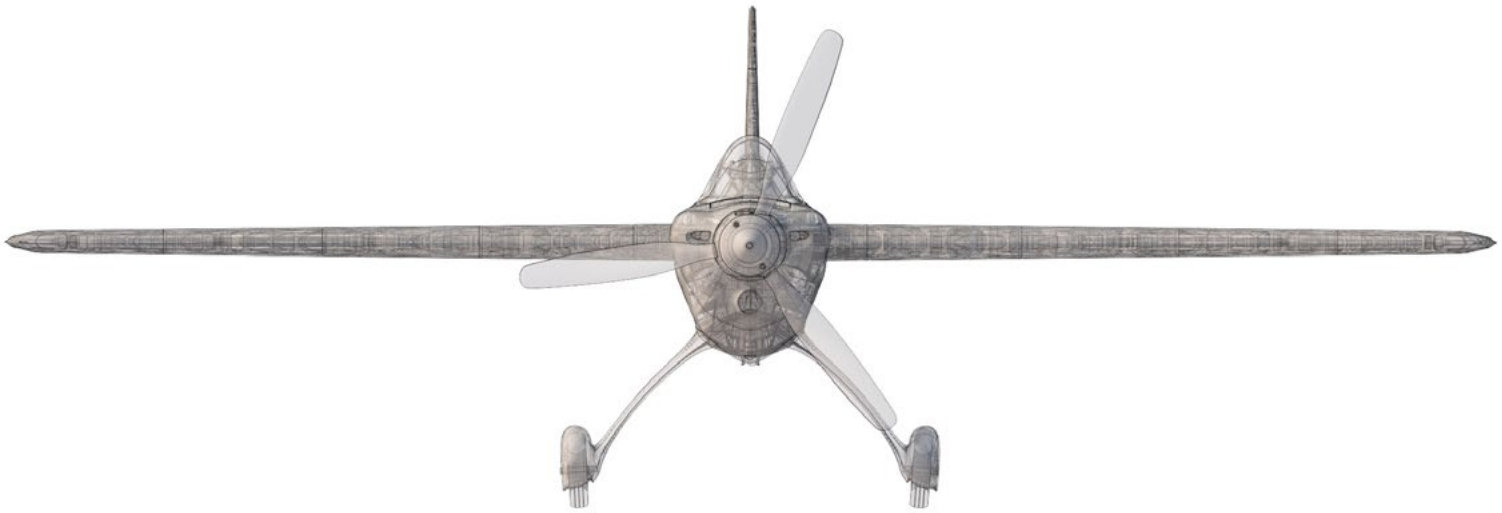
Print this PDF on self adhesive foil, cut it and put it on the model according to your preferences. Martin Sonka marking or alternatively Hannes Arch marking.



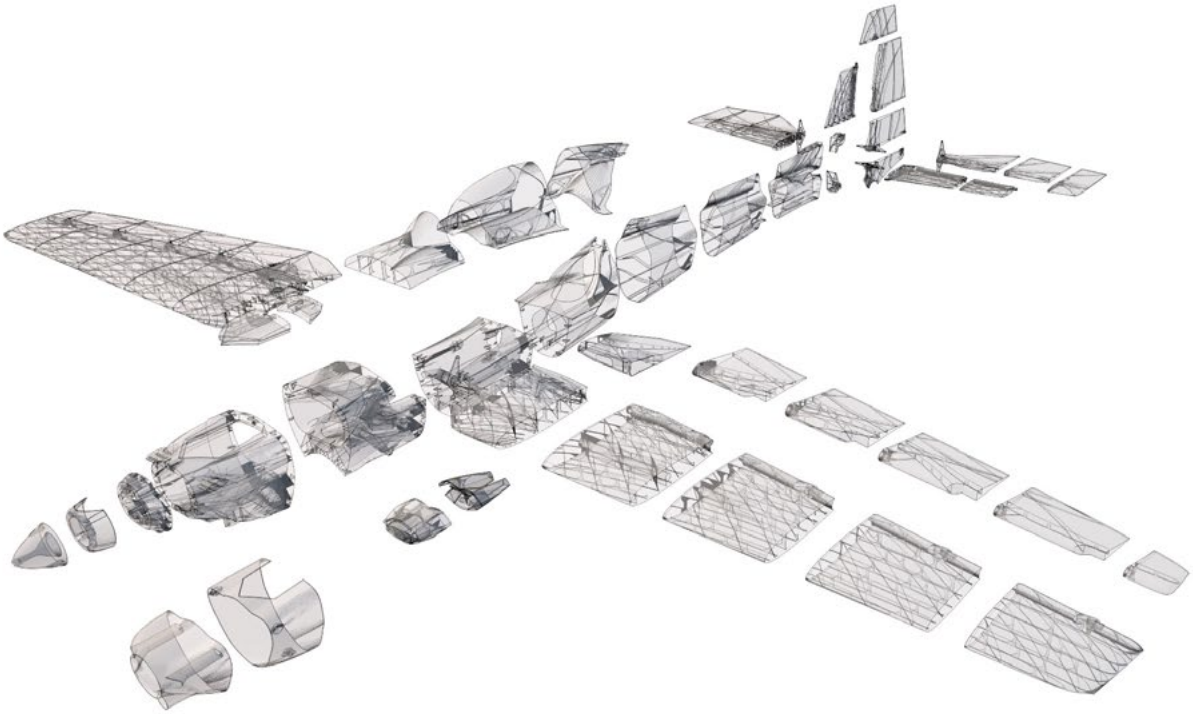
Wing area: 62 dm2 / 6.7 sq ft / CoG is 104mm /4.09 in from LE



Lenght: 1835 mm / 72.2 inch



Wing span: 1850mm / 73 inch



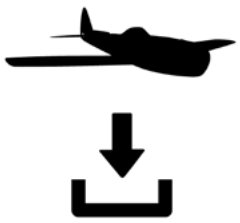
Step By Step PDF/VIDEO userguide (please go through all videos)

Choose airplane at www.3Dlabprint.com. Our Facebook for live information.

Basic requirements for EDGE 73" are: at least 200/200/200mm build volume. Nozzle 0.4mm recommended. Heated bed highly recommended.
PLA filament (or PETG, APLA, htPLA, PC-max.... not ABS) and some flex for tires...
If you're unsure your printer can handle this project, download the test part from our FORUM (usually the largest part)

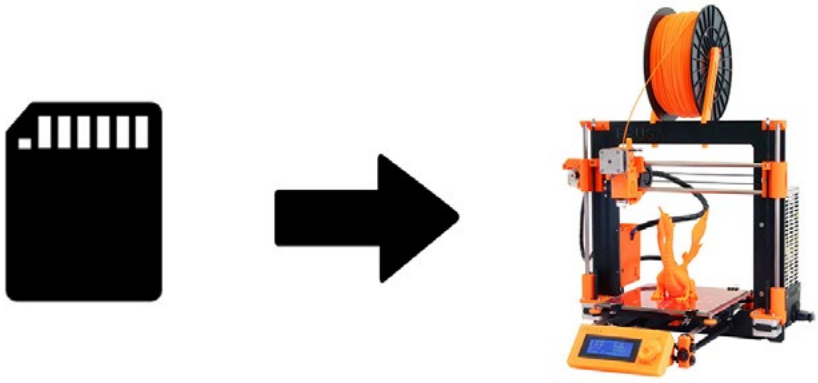
1. Create account, download

You'll get the download link for all zipped files to your email, or log in to your account and download directly from our website. If you don't receive the link right on checkout, please contact us on support@3dlabprint.com mentioning the order number. (WC-XXXXX on PayPal receipt)



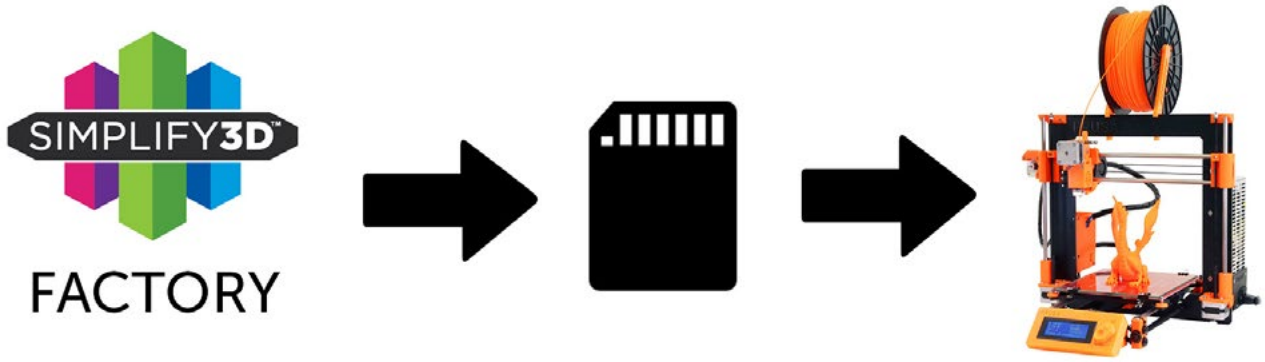
2. Gcodes preparing

option A Gcodes:
If your printer is i3 compatible you can directly use the prepared gcodes. Simply save each to an SD card and let 3d printer do his job. The HE temperature is set to 225°C for the best layer bonding. You can edit speed and temperature on your printer LCD only. If prepared gcodes doesn't work for you, please proceed to the next options...



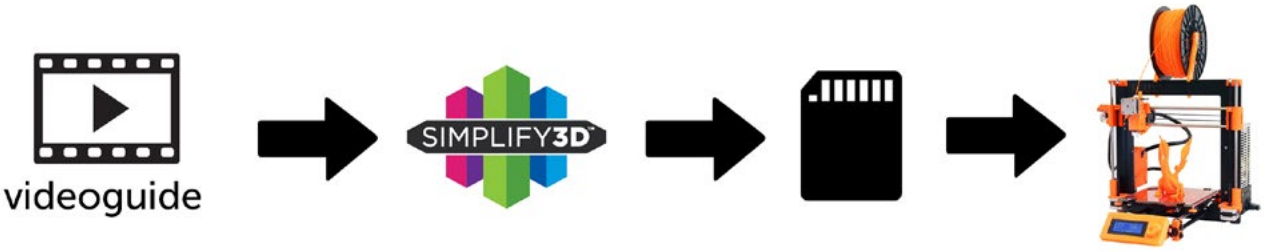
option B FACTORY files for Simplify3D (recommended)

We prepared all you need in the factory files (basic FFF profiles, parts arranged on the bed, etc.) Use our settings as a starting point and edit according to your needs (adapt it for your printer), choose the parts to print etc. Most 3d printers should be ok with files as they are, however if you need some customization, please do so. We are not liable for any damage resulting from the use of our settings. If you still encounter any dificulties, please proceed to the next option.

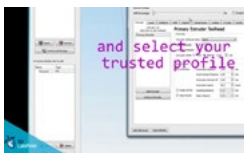


option C Simplify3D manual setting (watch and learn)

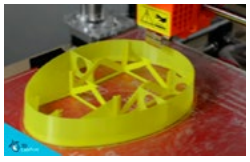
Use our VIDEOGUIDE and how-to to find explanation of proper settings. This is great option to learn a lot about Simplify3D and become a 3D expert. Of course you spend a lot of time and the youtube pause button will become your friend. For simplification we explain only our basic settings for wings and fuselage, please consult our prepared Factory files for the right settings of other parts like motor mounts, landing gears etc.



AND... please watch the VideoGuides:



video 2 Simplify3D setting

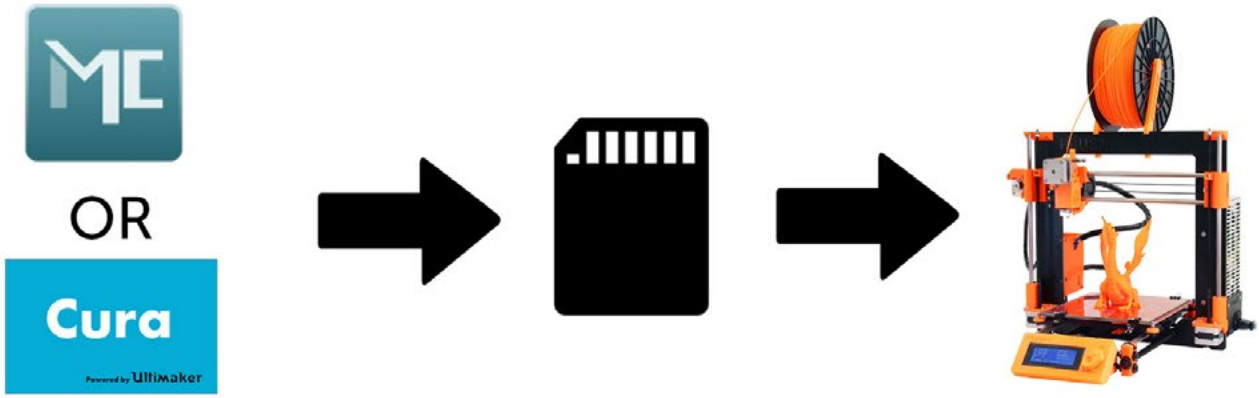


2.1 video about Thin Wall Printing

option D CURA or MatterControl (considered as the last resort, we recommend Simplify3D)
MatterControl and CURA are free and provide good results. The airframe is still strong enough, but don't expect the best quality. Both slicers lacks some very useful features, and finer settings, like multiple processes according to Z height, retraction options, layer start, etc. Please try to find the best extrusion multiplier and temperature for good weight and best possible layer bonding. Look at parts weight list for proper multiplier settings.

Please check the Cura setup guide in the Help section.

As a starting point you can use our predefined CURA profile. Always adapt the settings for your printer, change build volume, filament diameter, etc. according to your printer. Please be aware some parts require different settings of perimeters, top/bottom layers and infill. For some thick part you'll need to use support structure. Check our gcodes in printing simulation for more details about how the result should look like.



3. Print it

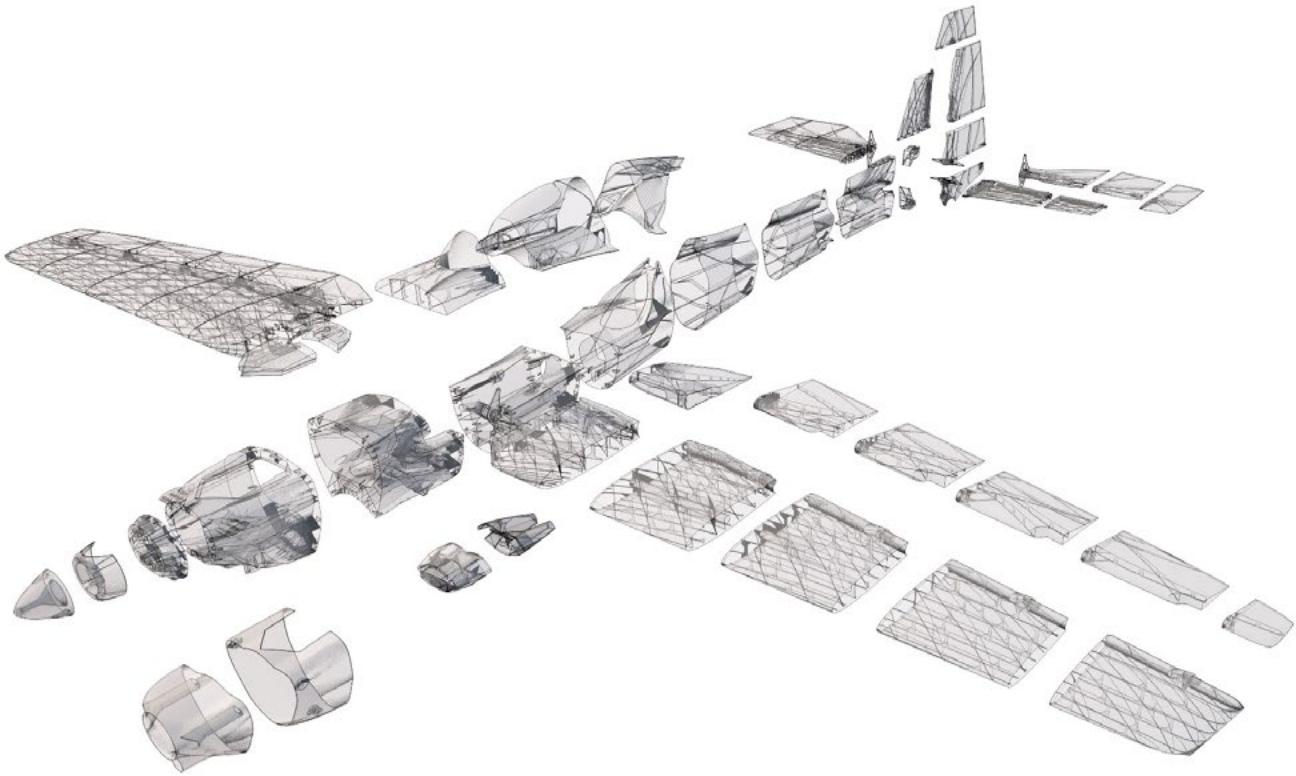
Save generated Gcodes and insert SD card to your printer, prepare your printer and start printing. We prefer to use SD rather than a direct connection via USB
Note: ABS filament is not suitable for this. Scaling the model will lead to unusable result!
Note: ninja flex or simmilar fillaments can stick very hard to PEI based surfaces be careful...

You will need: PLA filament - good quality (we need good layer bonding)
Strong hair spray (or your favorite adhesive bed surface)
(disregard with PEI or similar bed surface, Mk2/3...)
Razor blade

AND... please look at VideoGuides:

video printing guide #3

EDGE 540 V3 73“ MS replica - parts diagram:



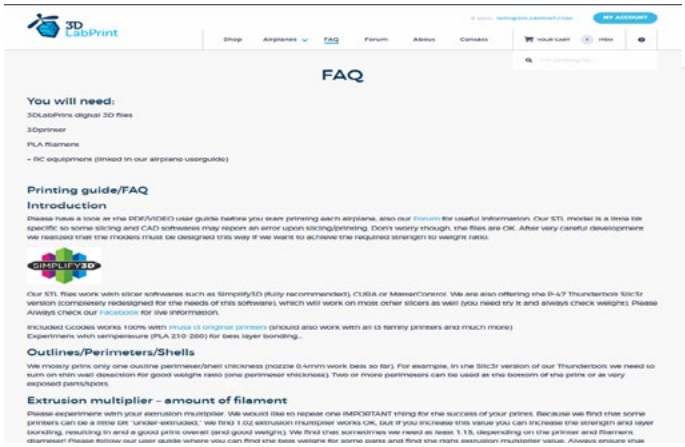
Basic Tips and Advice

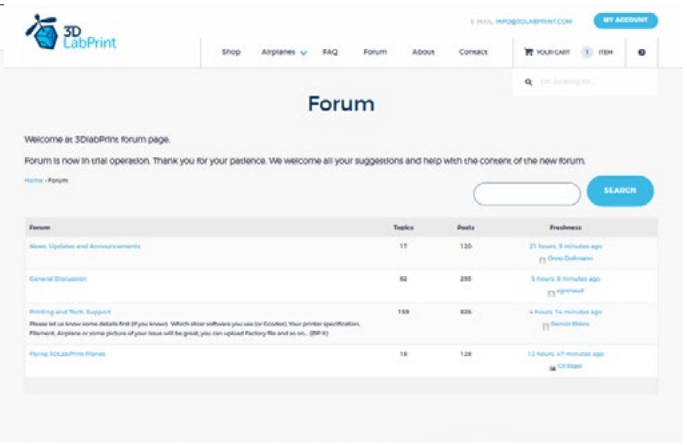
Please experiment with your extrusion multiplier to achieve the same weights as in the list. HotEnd temperature is very important for a strong result. The reason is the plastic leaving the nozzle has to melt the previous layer to create solid joint. Please try increasing the temperature to find the best value (215° up to 260° Celsius). Turn OFF cooling fan (Heatbreak fan of course has to be left ON). Thin walls easily cools down on its own and the cooling fan worsens the layer bonding. You can use cooling fan for thick parts if needed...

Heated bed is very recommended, use 50-56° Celsius to print without warping ends.
Any standard quality PLA is suitable to print our planes, but the result depends on combination of PLA vs. Extruder vs. HotEnd.
Some colors and brands of filament has lower layer adhesion, please do experiment with it.
There are a lot of 3dprinters on the market, most of them are OK for printing our aircraft (specific thin wall printing...) with sufficient volume, heated bed, 0.4 mm nozzle.

Please look at FAQ and our Forum for further information:

or RCGroups 3Dprinted planes Forum





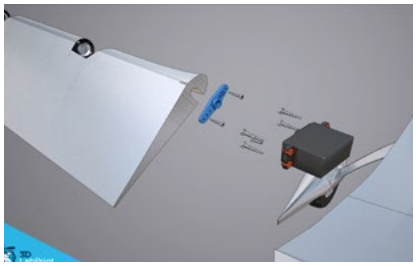
Some advice for rubberlike fillament printing (printable tyre): it is a good IDEA to use some adhesive tape or foil... first layer bonding could be too strong or on the other hand too weak depends what filament is used... (picture:RubberJet - TPE32 245/30 print temperature)

After printed, heat up bed to 80 Celsius and remove tape along with printed tyre, clear the bed with isopropylalcohol...

4. Assembling printed parts

4.1 Wing assembly (option 1 - Direct Servo Drive)

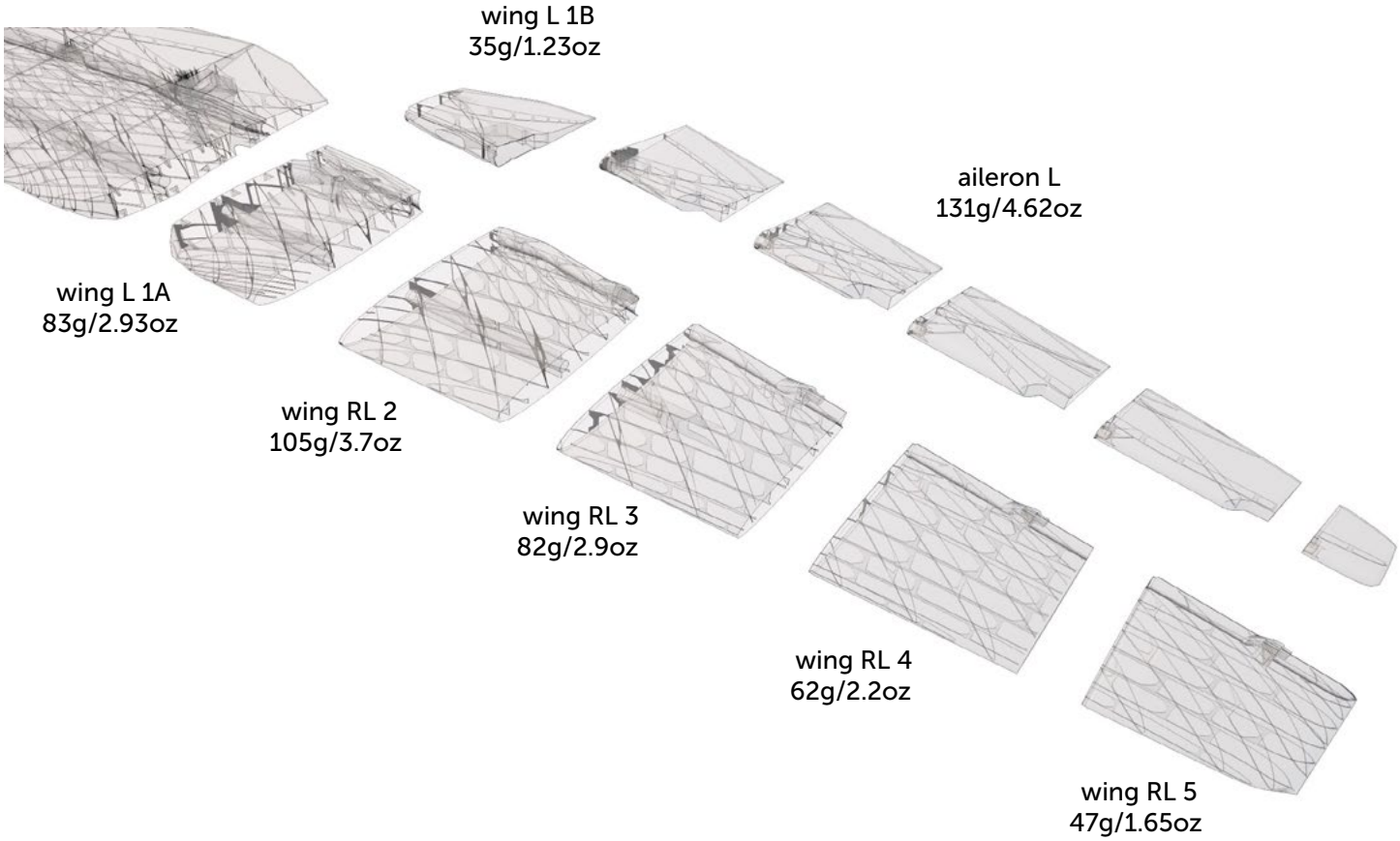
See video guide - aileron option 1



Thanks to rigid 3d construction we can finally offer this direct servo drive option. You dont need aditional linkage/ pushrods/arms anymore. Simply use self-tapping screws and included servo arm. This option allows rotation of up to 65 degrees and is aerodynamicaly very clear. If you use a good quality standard servos (18+kg) this solution is suitable for all flying styles from beginner to 3D extreme

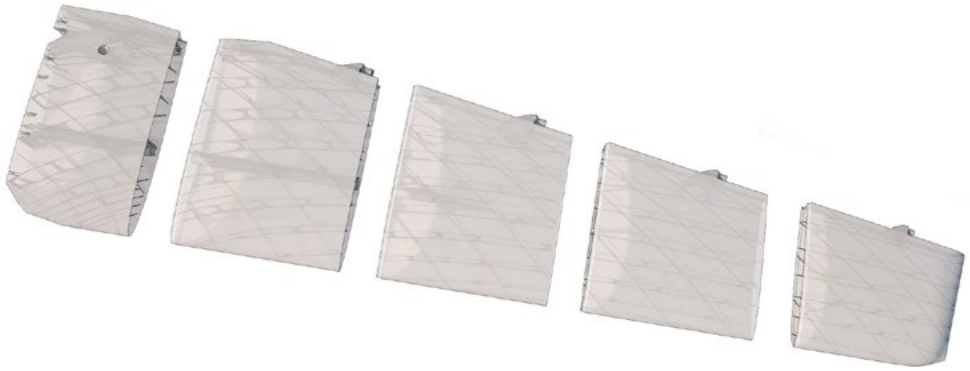
you will need:
CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
Carbon Fiber Tube (hollow) 14x750mm or any 750x14

Proceed the way shown in videoguide:
See video guide #4.1

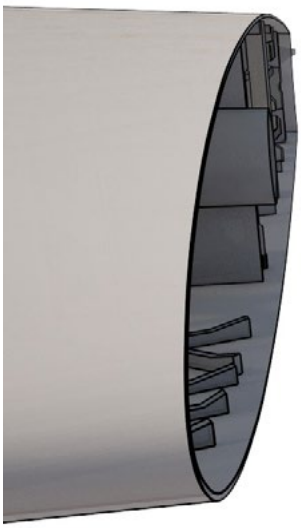


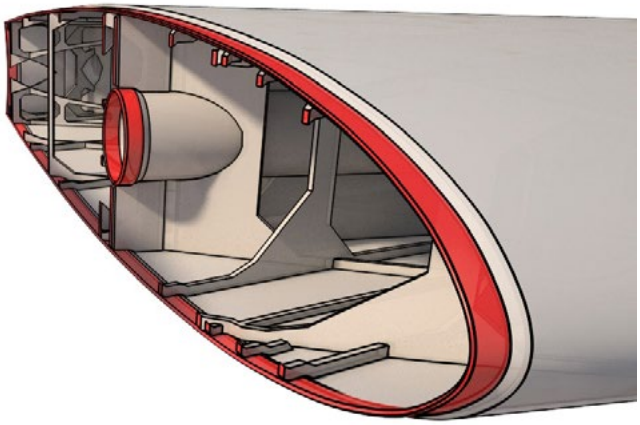
Proceed the way shown in videoguide:
See video guide #4.1

Start with glueing main wing parts (shown in the picture below):

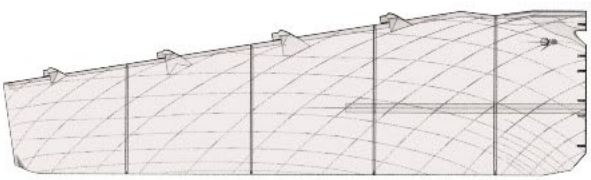


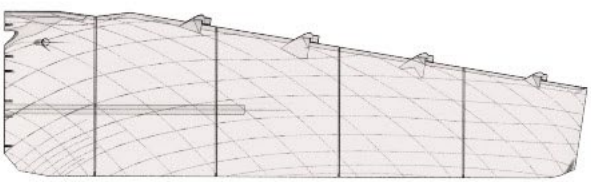
Apply CA glue to the contact surfaces (marked red in the picture) and assemble together, then apply the activator:



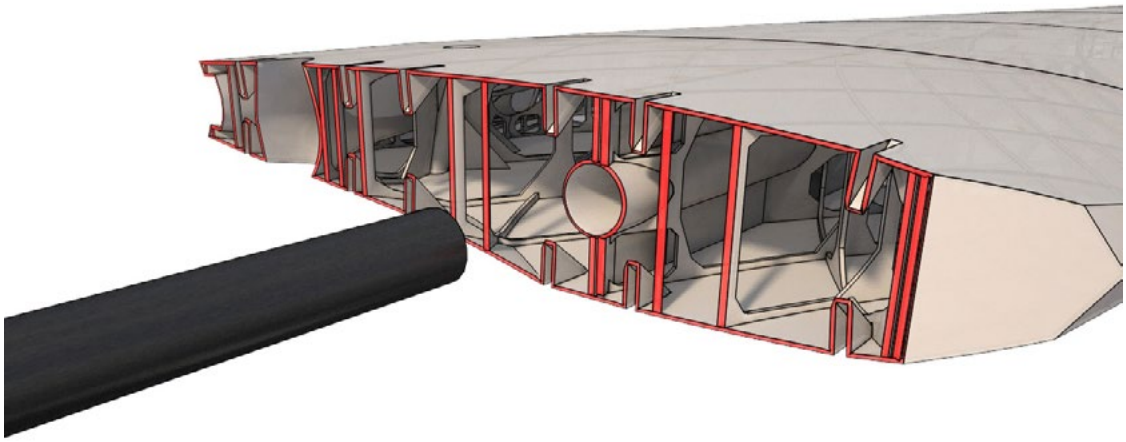


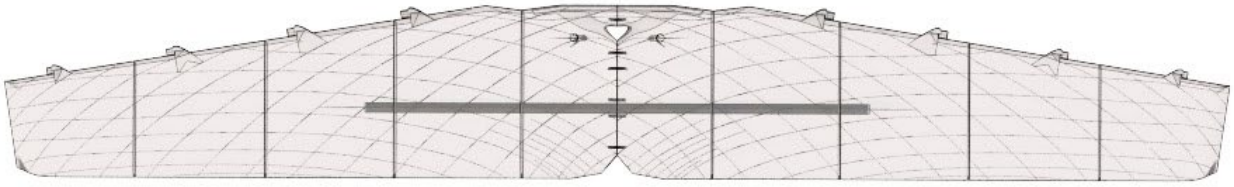
Go ahead and complete both wings sides (don't glue them together now):



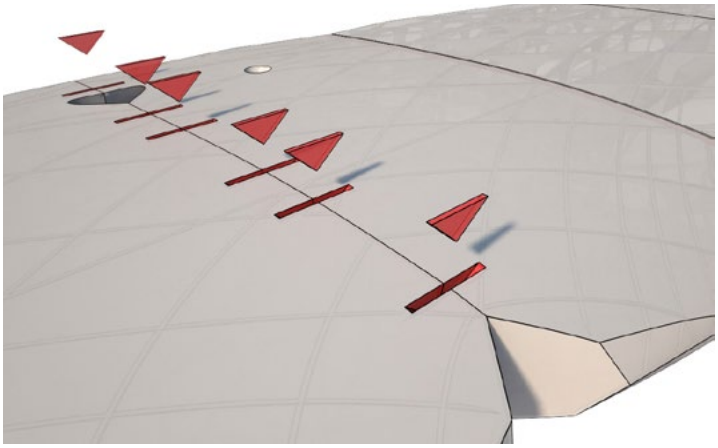


Now you can insert the carbon tube spar... apply CA glue to the contact surfaces (marked red in the picture) and insert carbon tube, press both sides of the wing together, then apply the activator:

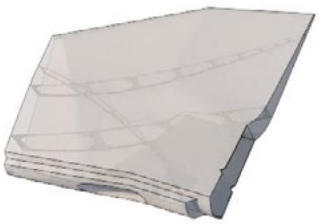


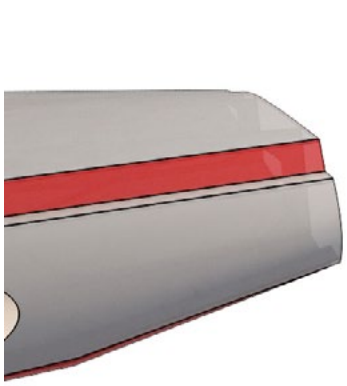


Glue „sure bonds" (small triangle parts) to wing joints (centerwing):

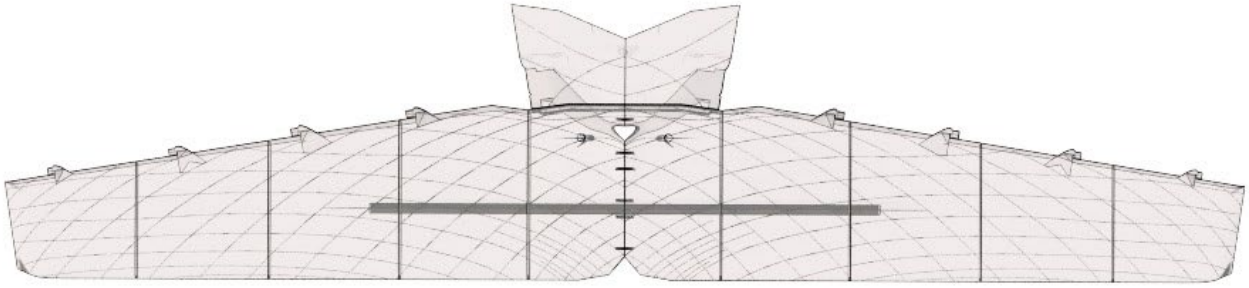


Now apply glue (marked red in the picture) and assemble together L1B and R1B parts:



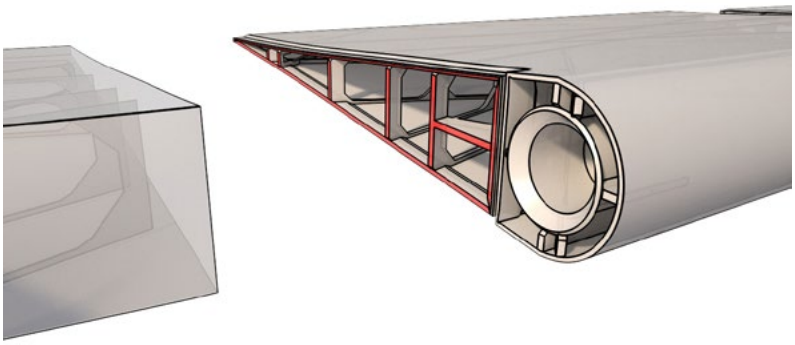


Then glue it to the main wing part:

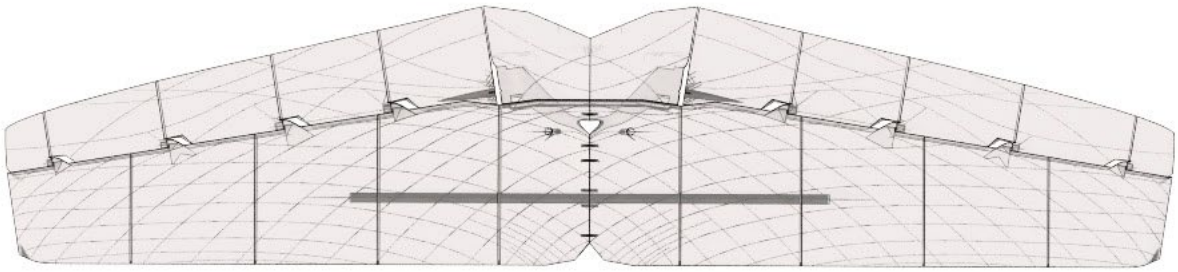


Glue ailerons parts together:

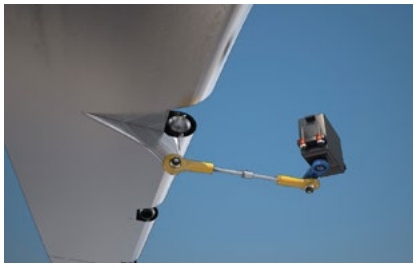
Apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:



Now you can slide both ailerons to the main wing hinges and aplly some oil for better movement:



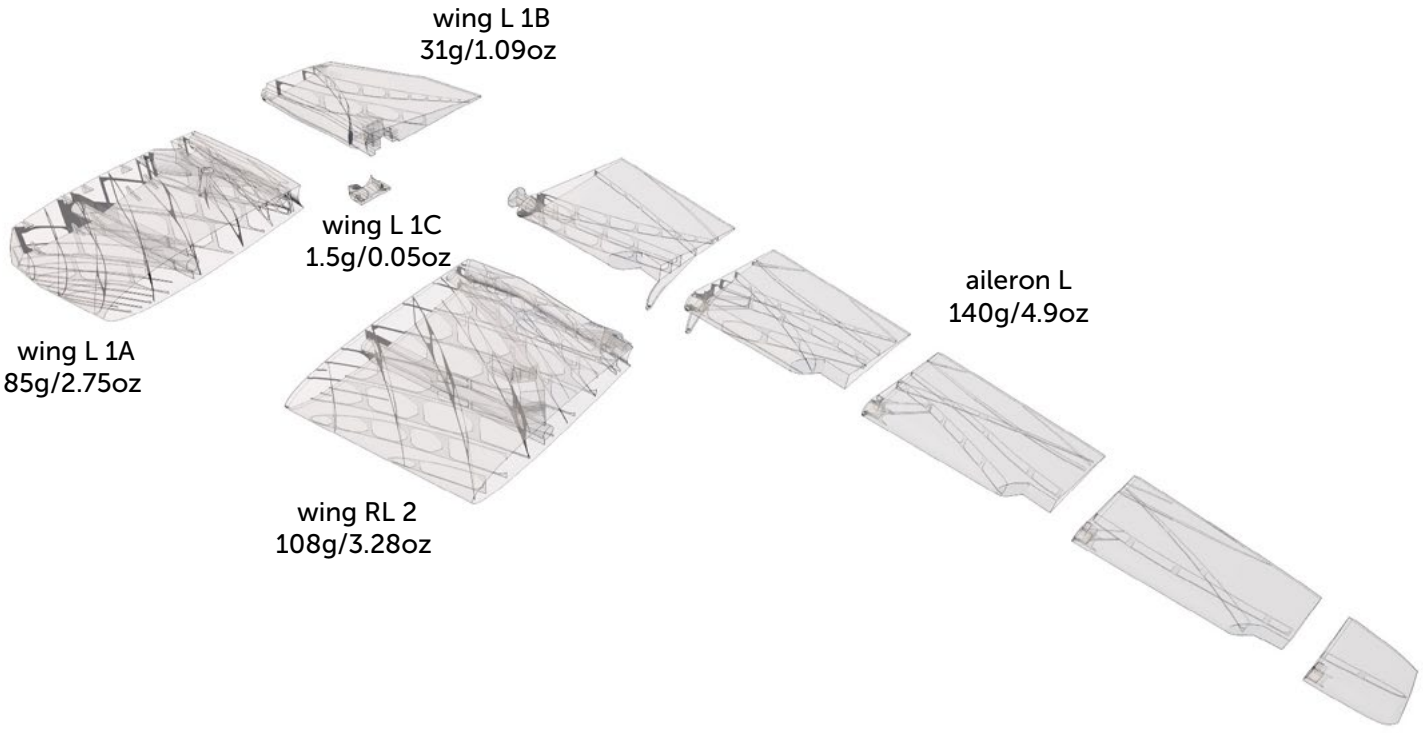
4.2 Wing assembly (option 2 - old school)



We also offer this classic, option 2 (old school), it is suitable for cheaper servos where you can use full servo travel for smaller deflection and so on...
Asembly proces is quite the same as with option 1, there is only a slight difference in ailerons assembling.

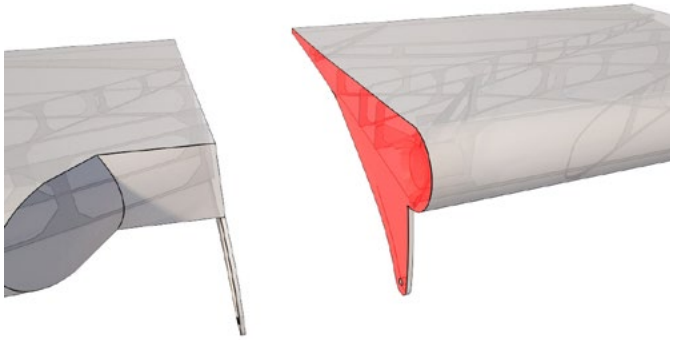
Proceed the way shown in videoguide:
Note: Asembly proces is quite the same as with option 1, there is only a slight difference in ailerons assembling.
See video guide #4.1

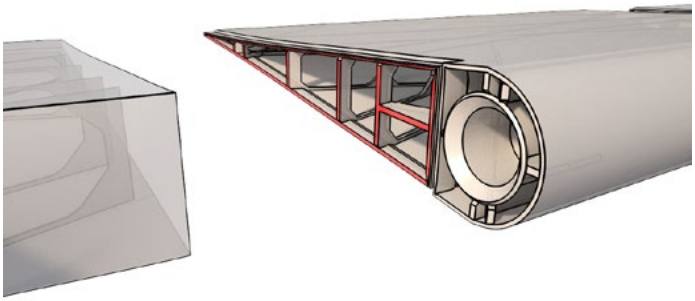
you will need: CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
Carbon Fiber Tube (hollow) 14x750mm



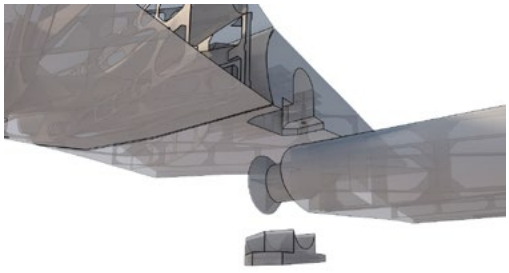
Proceed the same way as with option 1 for main wing parts, there is only a slight difference with ailerons...
Glue ailerons parts together:

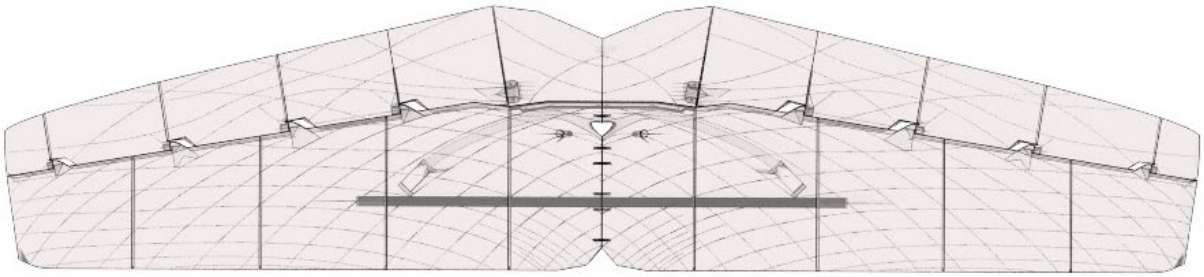
Apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:





Now you can slide both ailerons to the main wing and apply oil to the hinges for better movement:



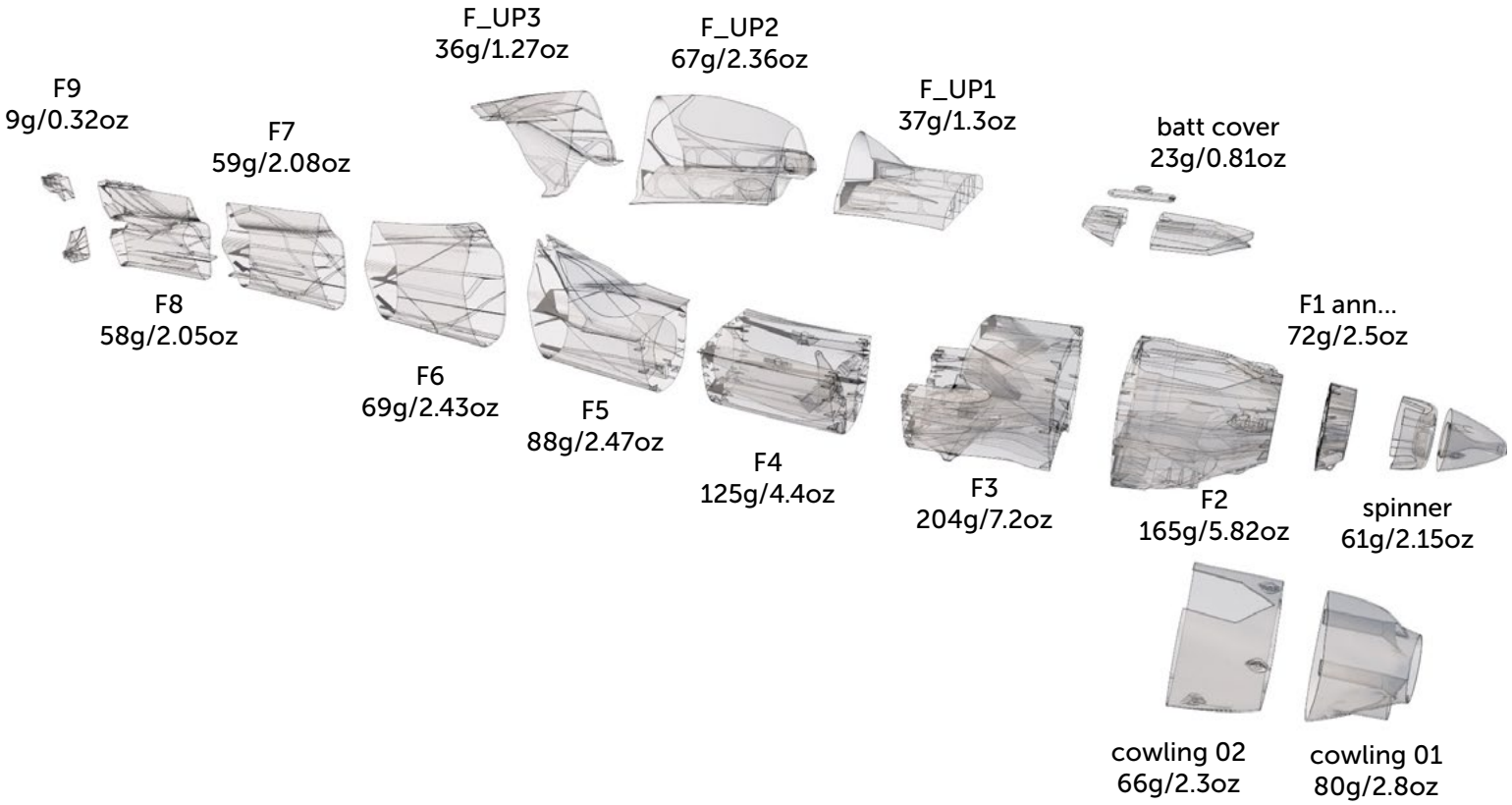


4.3 Fuselage assembly

You will need:

CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
1x ballpoint pen spring (a old ballpoint pen spring will work fine)
Soldering Iron or any hot tool
7x 3.5/20mm (max 4/25mm) self tapping screw for F1 part and cowling
nylon nuts and screws or similar 5-6/60-70mm
oil/vaseline

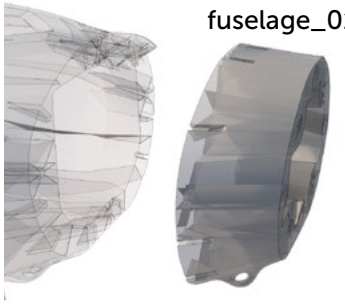
Proceed the way shown in videoguide:
See video guide #4.3



Proceed the way shown in videoguide:
See video guide #4.3

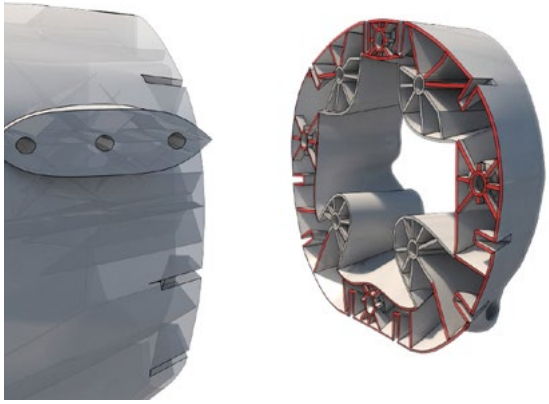
Start with motor mount (fuselage 1) !ANNEALING!
We suggest to anneal the PLA motor mount. You can use this procedure: submerge in boiling water, heat it in owen or simply cover with a lid on your heatbed and heat it up to 100°C for more than 30 minutes.
Because PLA shrinks when annealed (about 2%) it is good idea to use EDGE_73_ fuselage_01_annealing compensated for this effect, you can adjust scale exactly for your PLA brand in Simplify3D or any next slicer:

fuselage_01

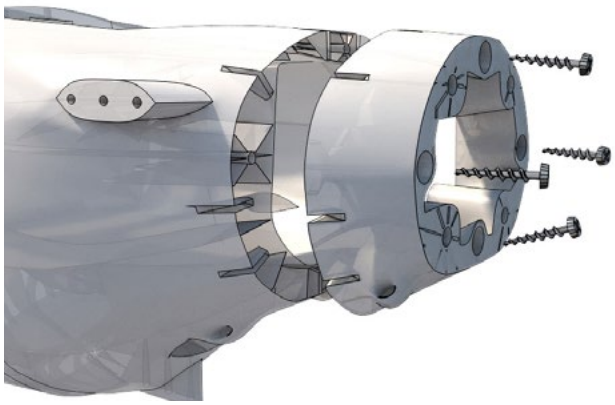


Glue the fuselage parts F1-F9 with CA glue together. You can use snap knife to clear the shape of printed parts, but mostly this is not necessary.
Glue the „sure bonds" (small triangle parts) to the slotes in fuselage (F1-F5 parts):

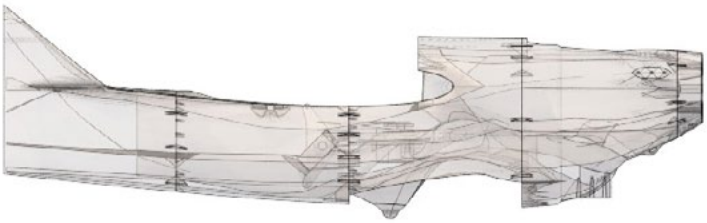
Apply CA glue to the contact surfaces F1 part (marked red in the picture) and atach them together:



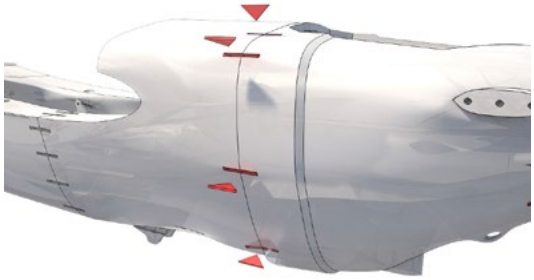
Simulatenously screw in four self-tapping screws, then apply CA activator:



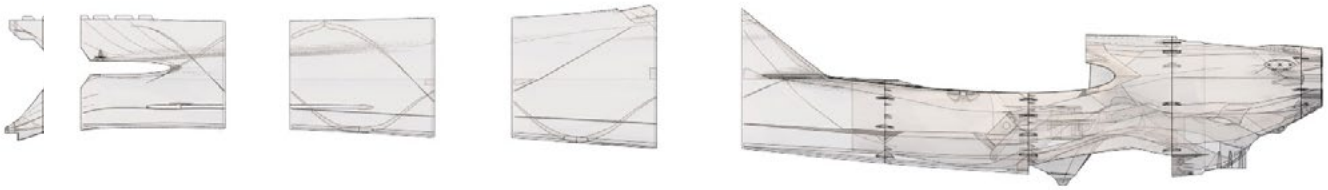
Go ahead and glue next F1 -F5 parts:



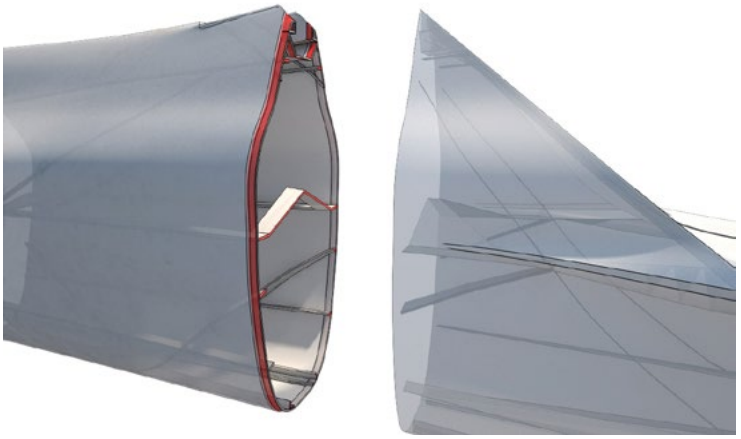
Glue „sure bonds" (small triangle parts) to uselage joints:



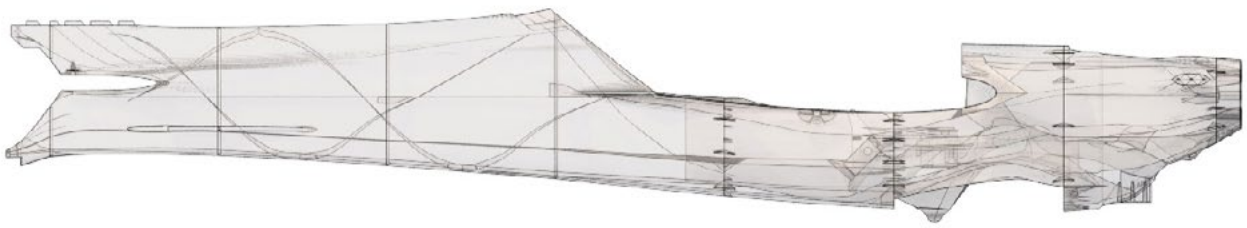
Now you can proceed with next F6 -F9 parts, there is a bit different coupling system (bayonet coupling) proceede the way like with wing assembly:



Apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:

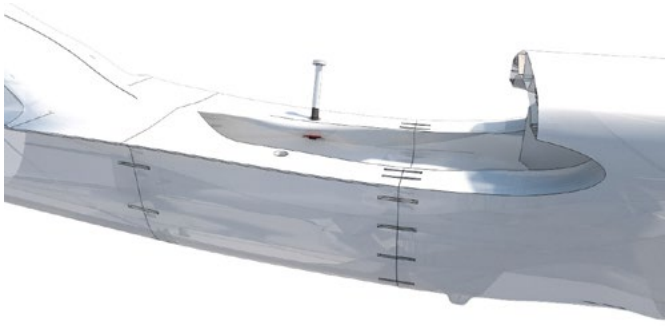


Now main fuselage is completed:

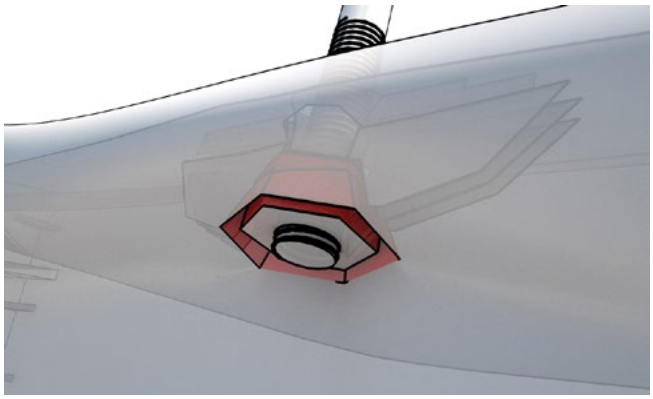


Apply CA glue to the contact surfaces (marked red in the picture), insert pen spring to battery cover part, insert cover lock, glue both canopy parts together and test a cover lock functionality (adding a oil/vaseline drop to moving parts before is a good idea to prevent gluing/block this part).

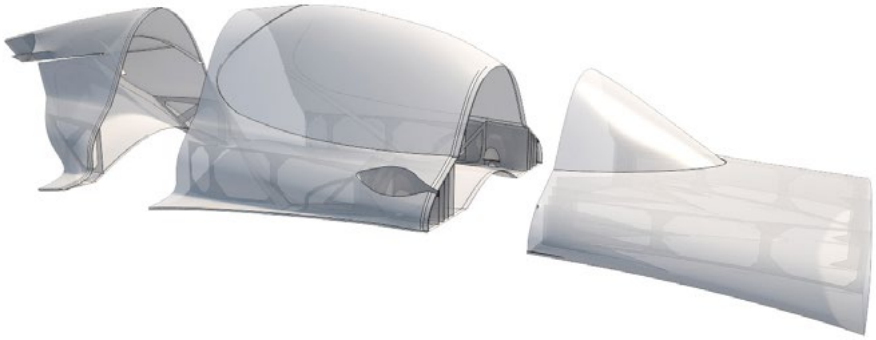
Please watch our videoguide (at least for this step as this is a bit complicated)
Glue in to fuselage two nuts for wing screws, at first we need to apply few drops of oil/ vaseline to screws thread and screw it to nut (it will avoid glue in to the nut thread):



Apply CA glue to the contact surfaces (marked red in the picture) and immediately apply activator as we dont want to CA Glue leak to nuts thread anywhere.

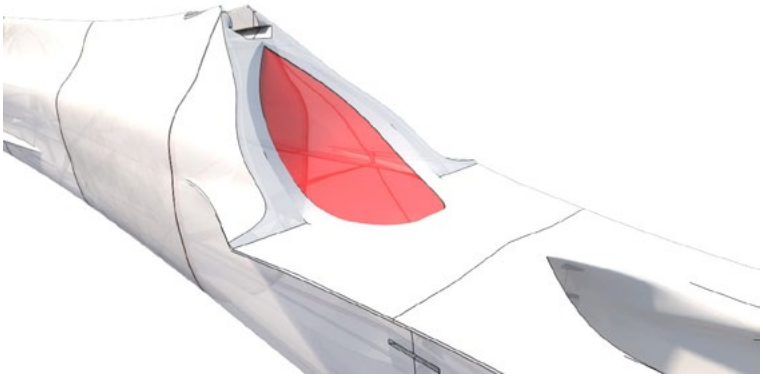


Now you can proceed with UP fuselage parts UP_F1 - UP_F3, glue it exactly the same way as with previous bayonet coupling wing or fuselage system:

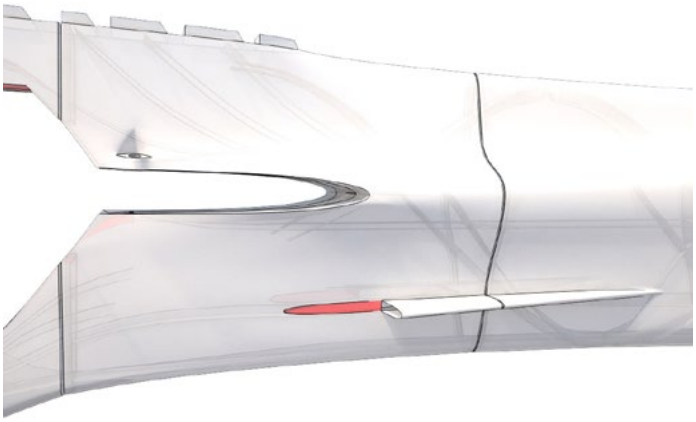


Proceed with fuselage cowling parts 01 and 02, glue it the exactly same way as with previous bayonet coupling wing or fuselage system (alternatively you can use Hannes Arch style cowling):

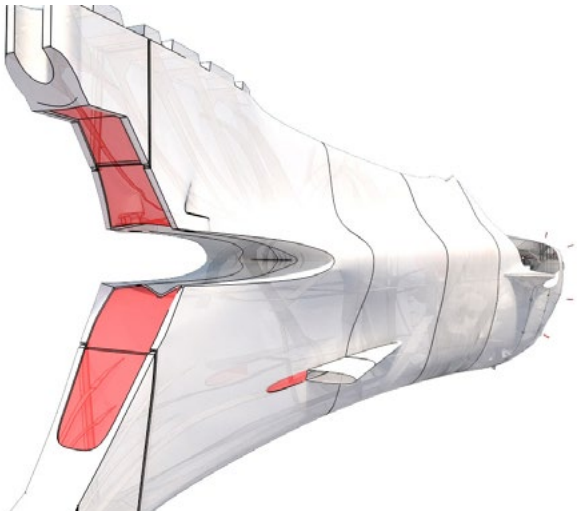
Cut and remove plastic from internal side of fuselage marked in red (use any hot tool).



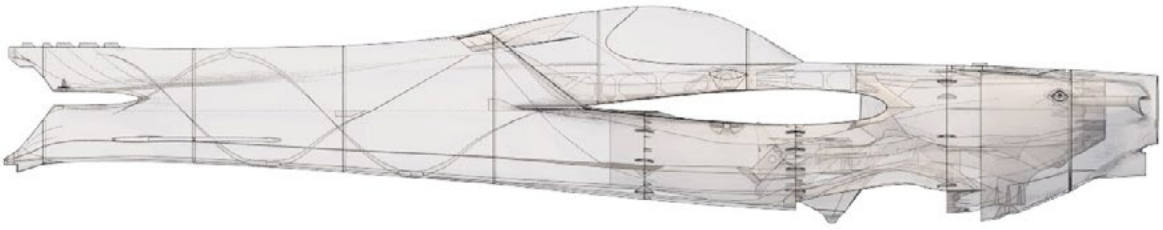
Cut and remove plastic from internal side of fuselage marked in red (use any hot tool).



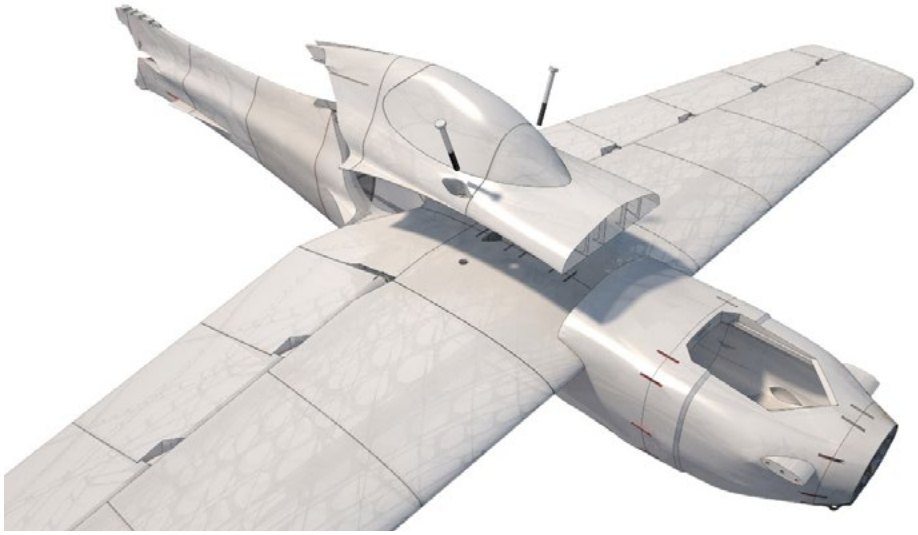
Cut and remove plastic from internal side of fuselage marked in red (use any hot tool).



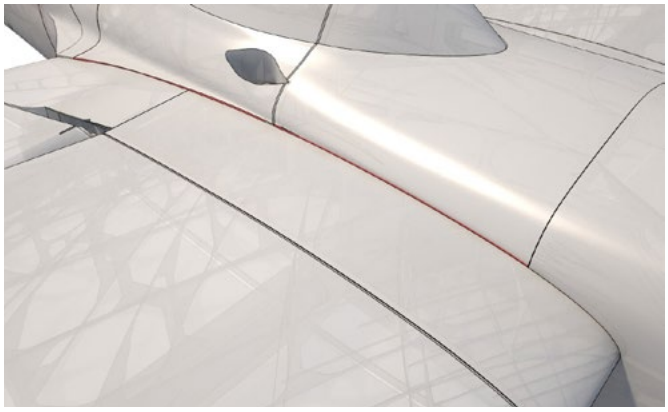
Now all fuselage parts are ready:



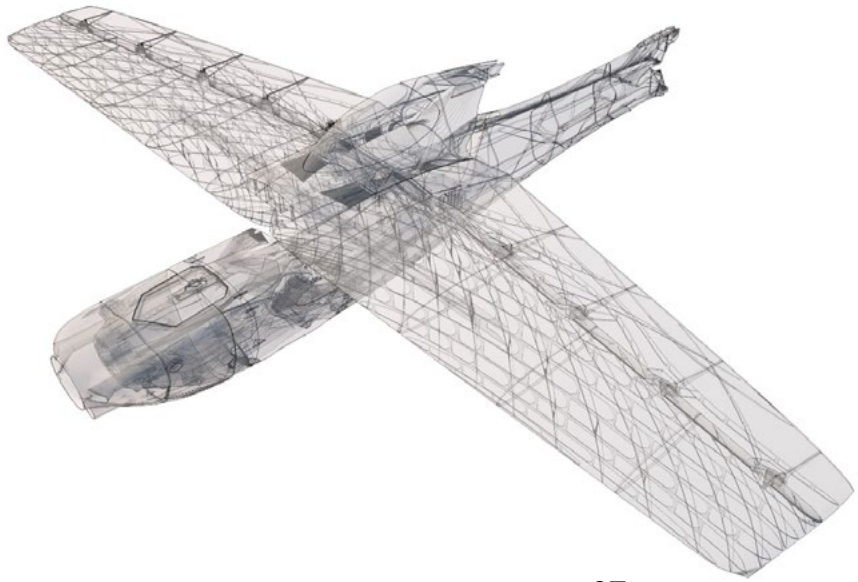
Now is time to attach and glue together wing and UP fuselage part:



Apply CA glue in the edge between wing and UP fuselage parts NOTE: don´t glue wing with main fuselage:



Now all main fuselage/wing parts are ready:



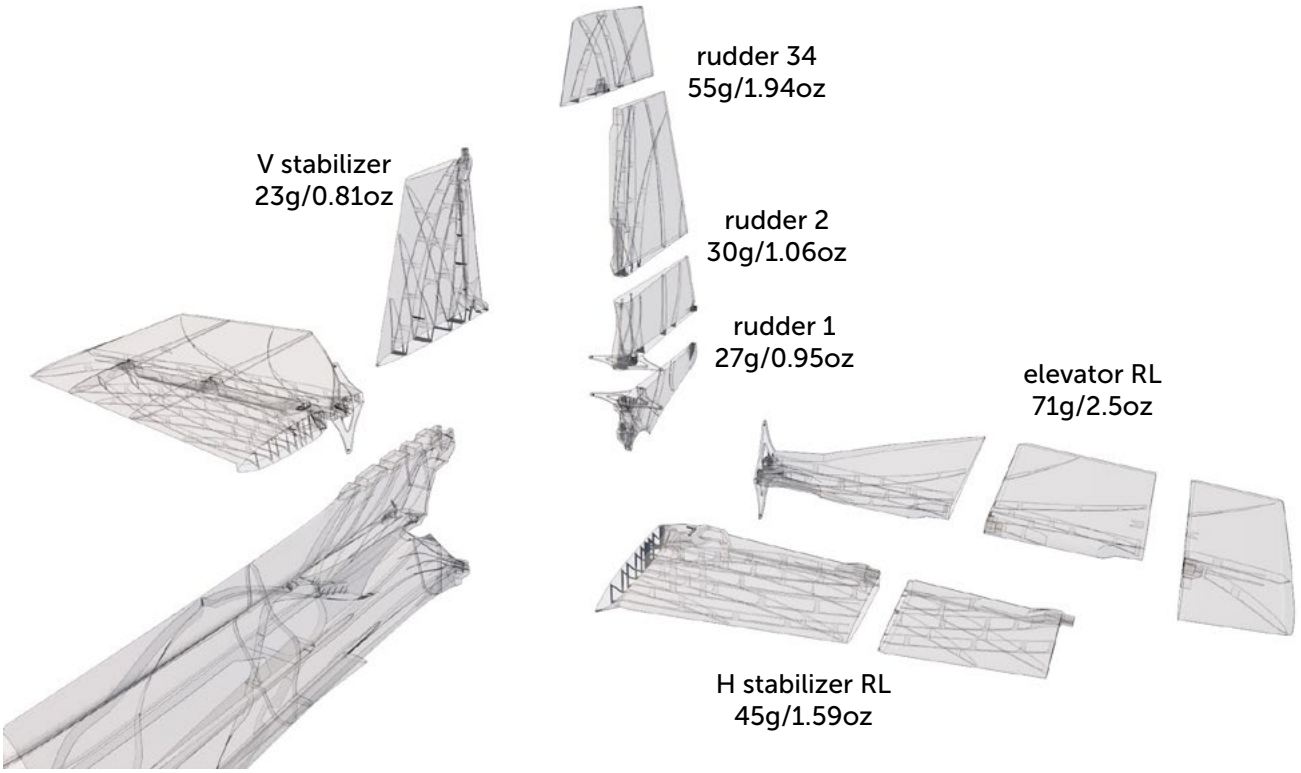
4.4 Fuselage tail

Now it's a good time to install tail stabilizers, elevator and rudder.

Proceed the way shown in videoguide:
See video guide #4.4

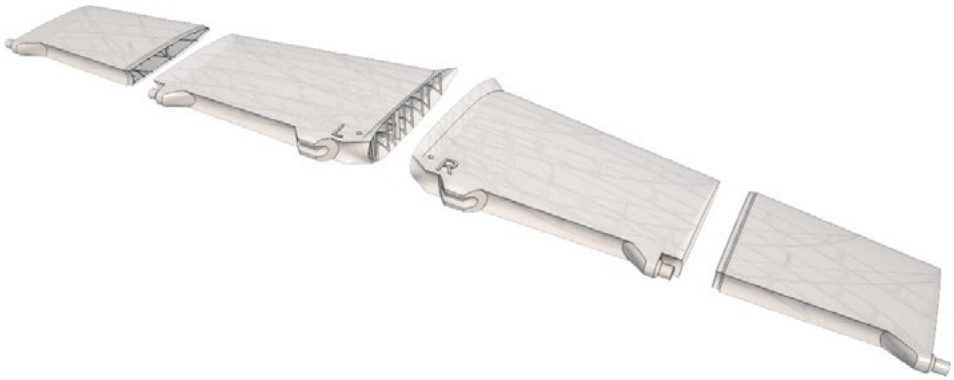
You will need:

CA Glue - medium or similar medium viscosity CA glue
Activator for CA Glue or similar, but gas presurized aerosol is better
9x 3.5/20mm self-tapping screws

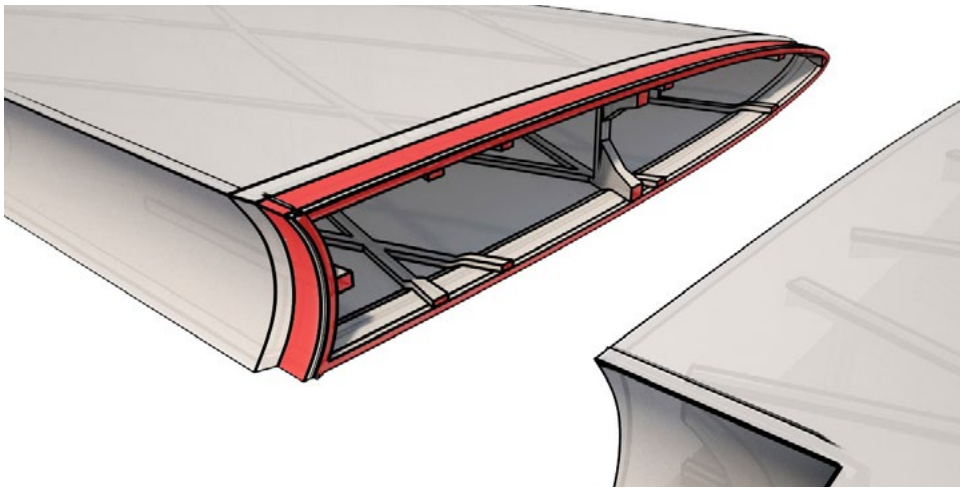


Proceed the way shown in videoguide (pictures will help you):
See video guide #4.4

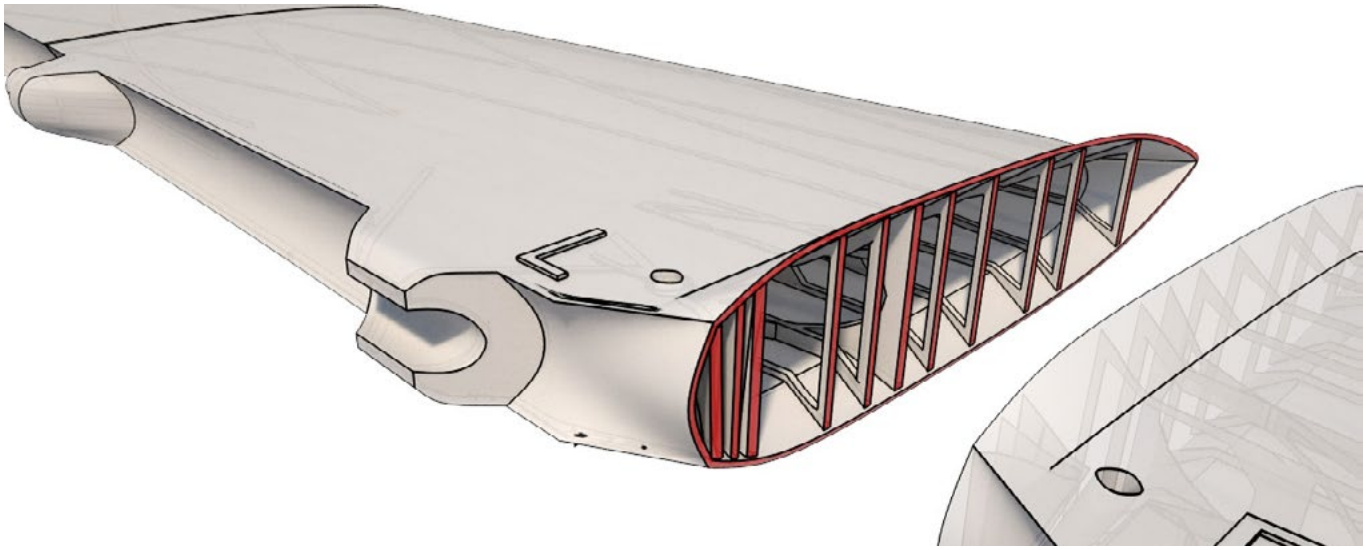
At first glue horizontal stabilizer parts (proceed the same way like with previous wing parts):



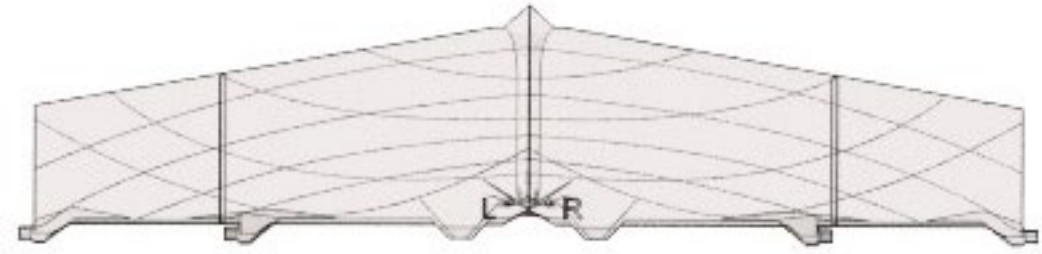
Apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:



Go ahead and complete both stabilizer sides and glue them together now:

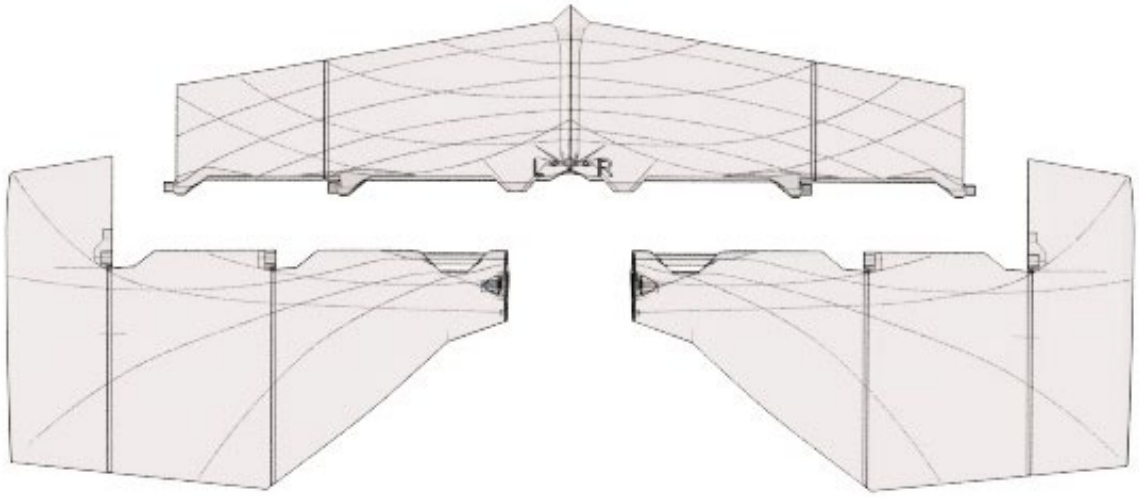


Well, horizontal stabilizer is completed now:



For elevator, proceed the same way like with previous wing parts. NOTE: do not glue both elevators together:

Both elevators and horizontal stabilizer are done now :



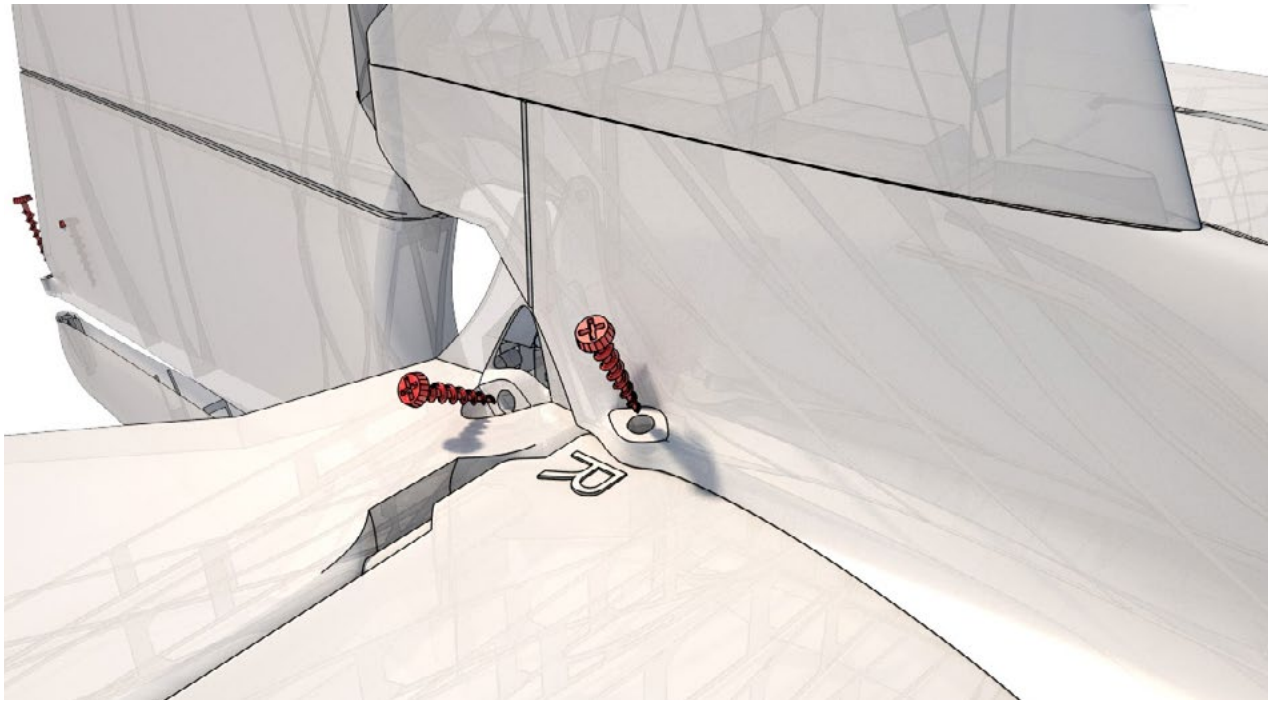
Glue vertical stabilizer to fuselage, apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:

For rudder, proceed the same way like with previous wing parts (RUDDER 2, 3, 4). NOTE: do not glue both Rudder parts together (RUDDER 1):

Rudder 1, cut and remove plastic marked in red (use any hot tool):

Now tail parts are ready, use 9 self-tapping screws to complete the whole tail section:

Do not forget the two screws on the bottom side of horizontal stabilizer...:



5. Servo installation

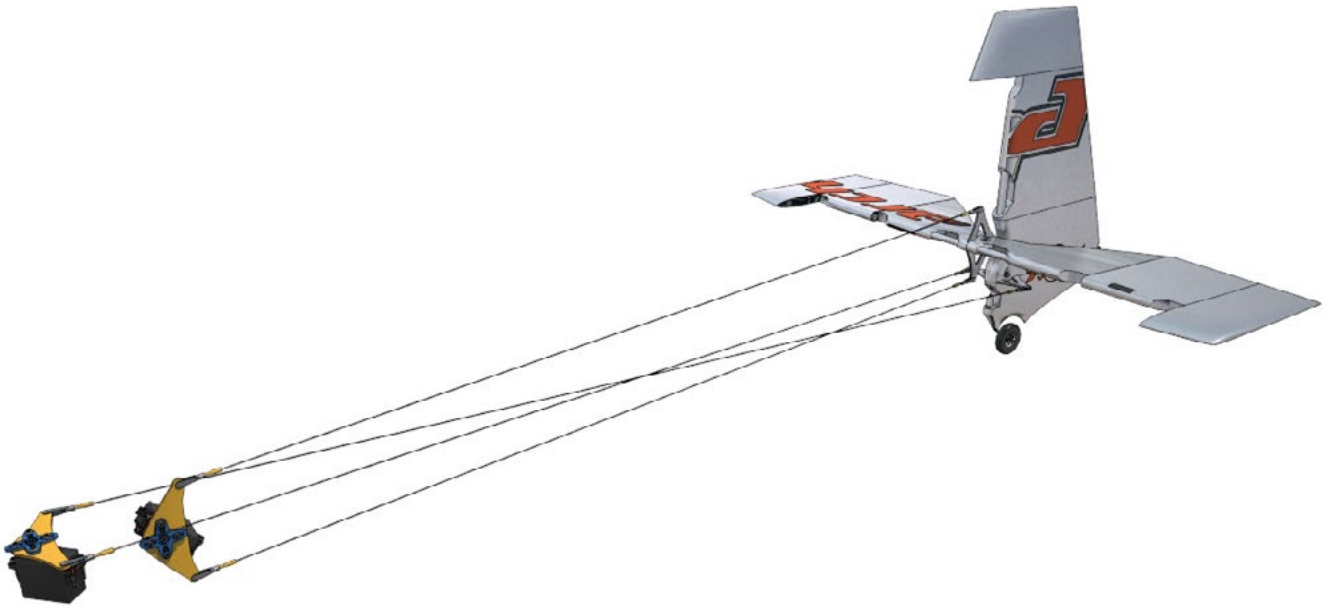
Our EDGE 73" was designed for 4pcs of standard size servos (approx. 40x38x20mm).

5.1 Elevator and Rudder

Instal all servos (use any hot wire) then install rudder, elevator and pull pull servo system.
NOTE: apply Loctite thread locker 243 (blue) to all bolts thread - this is very important if you don't want to lose your plane.

Proceed the way shown in videoguide:
See video guide #5.1

You will need:
2x standard size servo
1.5/12mm self tapping screws
any fire source and wire 1-1.5mm (hot wire)
2x pull-pull rudder and elevator system or similar
8x (Clevis+treaded brass wire end 2mm+crimp tube, 6 m wire 0.5-0.8mm)
pliers



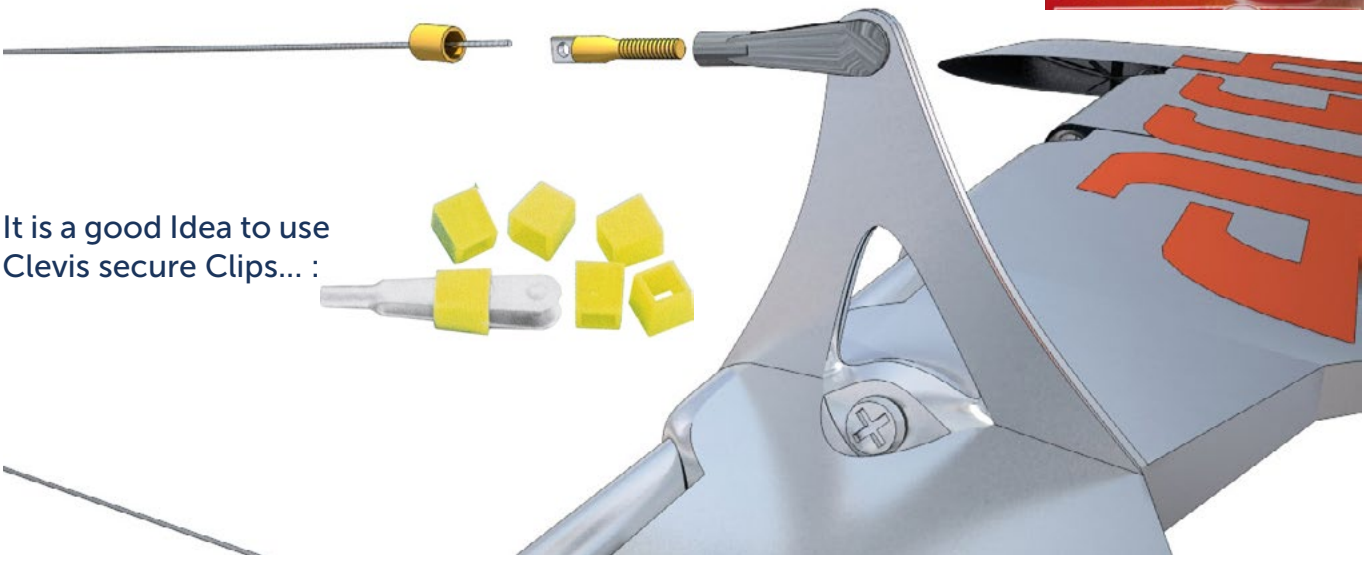
High rates servo arms:

Low rates servo arms:

Proceed the way shown in videoguide (this pictures will help you):
See video guide #5.1

At first decide if you will use High or Low rates servo arms, when you use a good quality and strong servos (18+kg) we recommend High rates servo arms, in case you are using only cheaper servos then rather go with Low rates servo arms (the smaller ones). Join printed servoarms with included servo arms, use any hot wire for making holes as you need, then screw in at least four self-tapping screws (shorten the other side screws):

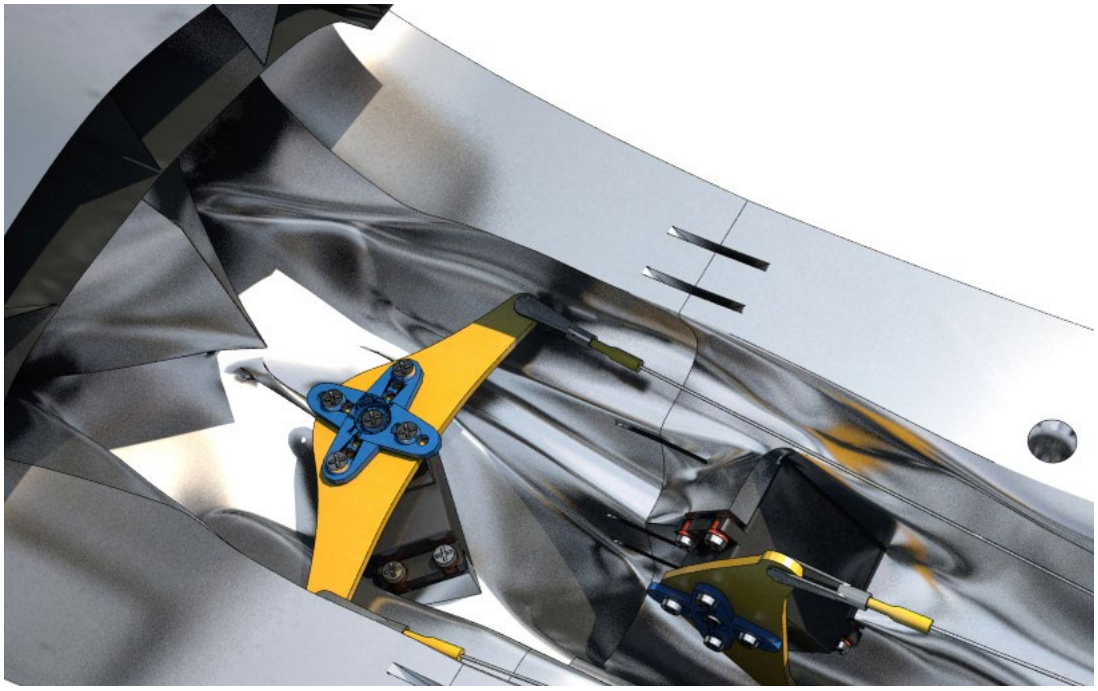
Now assemble the pull-pull linkage as shown on the picture, start with tail side, CLEVIS+THREADED WIRE END (brass)+WIRE+CRIMP TUBE. Install the pull-pull rudder cables. Assemble one end of the linkage by inserting the pull-pull cable into one of the aluminum crimp tube, through the hole in the brass pull-pull fitting and back through the crimp tube. Loop the cable backthrough the crimp tube a second time and crimp with side cutters
Inser clevis on elevator arm, proceed the same way for next side and rudder:



It is a good Idea to use Clevis secure Clips... :

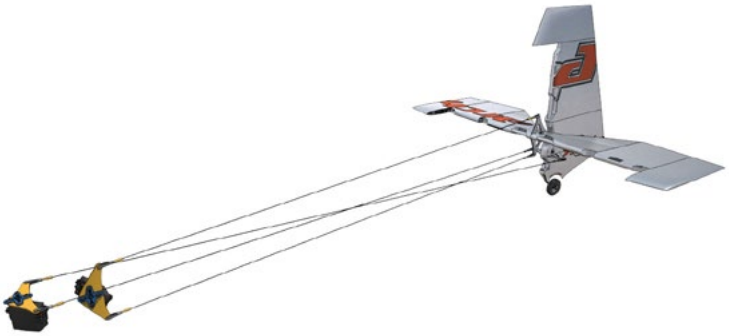
Insert servos into slots in fuselage, use any hot wire and included self-tapping screws:

Center servo to its neutral position (use your RC system or servo tester). Put on prepared servo arms, one is suitable for elevator and the other one for rudder (you can find this info on both servo arms):

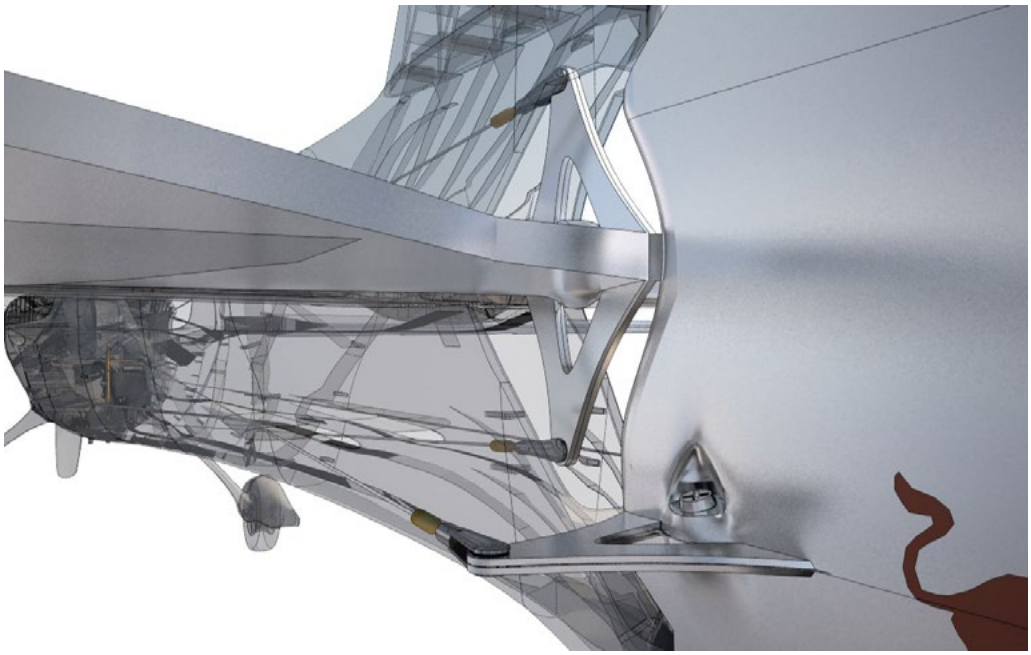


Now finish pull-pull linkage as shown on the picture (servo side), Note: we need light tension in rudder and elevator wires and possibility to tighten up the brass linkage ends in the future. When routing the RUDDER pull-pull wires/linkage through the fuse, they should cross like an "X", but the ELEVATOR should be parallel (as shown on the picture)

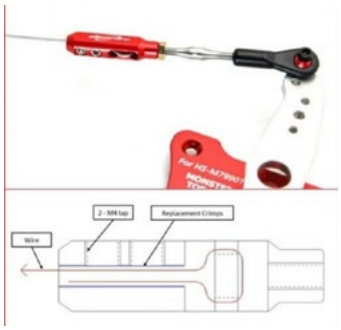
Check linkage and apply Loctite to the thread of the brass end and to the servo arm nut:

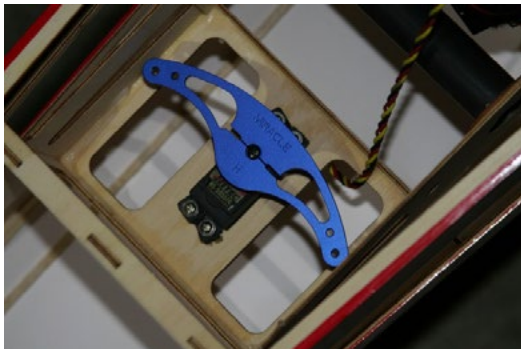


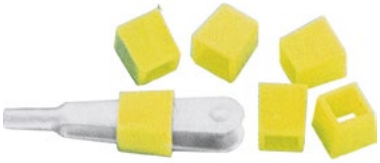
We highly recommend to test the power and function of the rudder and elevator linkage, use your hands to load both surfaces, do not worry to use abrupt power, it is better if something goes wrong now..., and again use Loctite to both servo arms bolts and all brass ends:

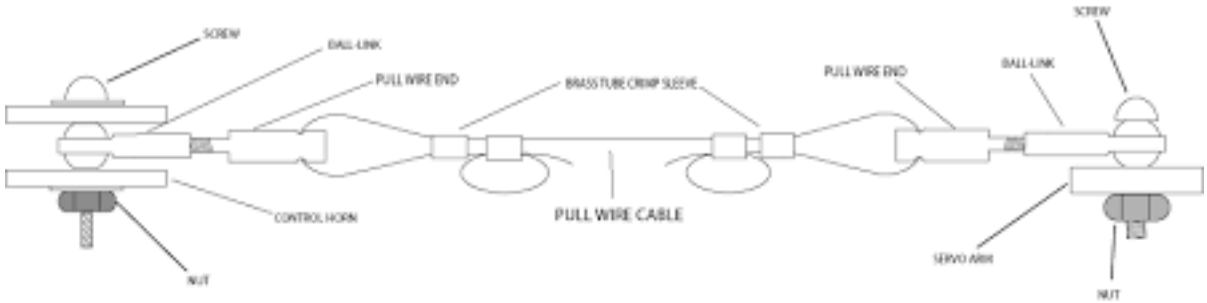


Of course you can use your trusted solution for rudder and elevator pull-pull linkage, we just add some pictures to show you some other options. Always use some thread-locker (Loctite and so on...) and check the function thoroughly on the ground :









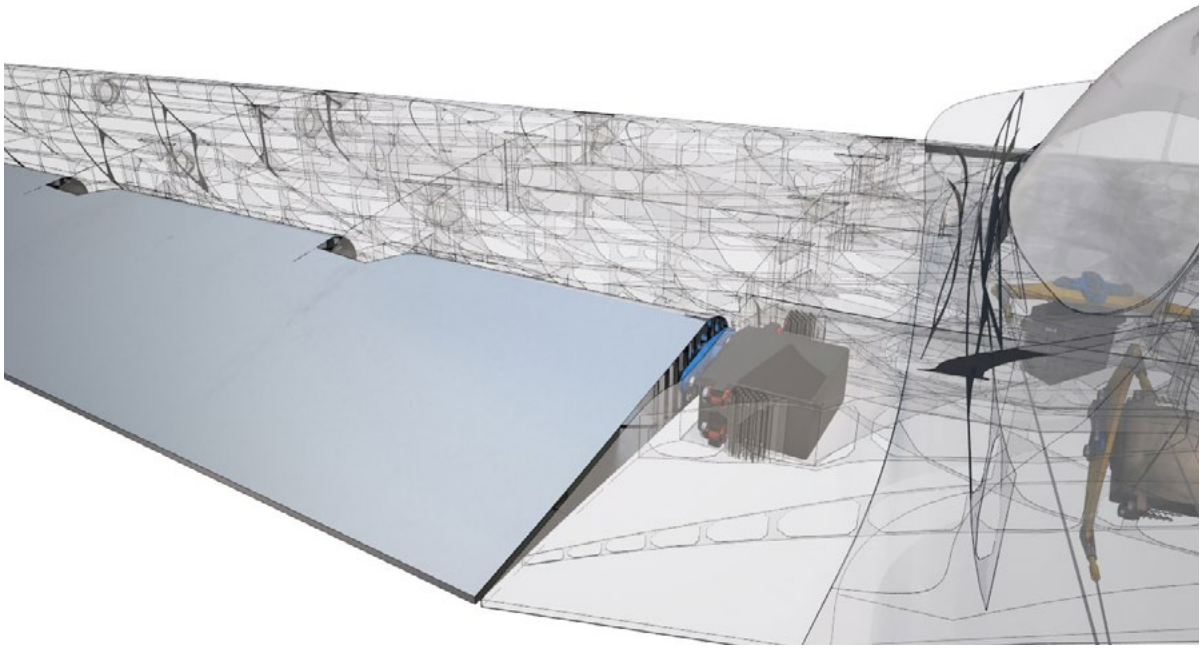
5.2 Ailerons servos - option 1

Instal aileron servo (use hot wire) then install ailerons.

Option 1 - Thanks to rigid 3d construction we can finally offer this direct servo drive option. You dont need additional linkage/pushrods/arms anymore. Simple use self-tapping screws and included servo arm. This option allows rotation of up to 65 degrees and is aerodynamicaly very clear. If you use a good quality standard size servos (18+kg) this solution is suitable for all flying styles from beginner to 3D extreme experts.

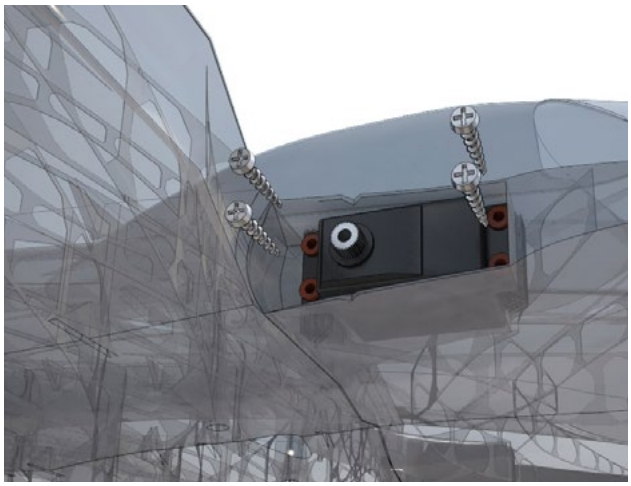
Proceed the way shown in videoguide:
See video guide #5.2

You will need: 2x standard size servo
servo extension cables 300mm / 12 inch or thicker
1.5/12mm self tapping screws
any fire source and wire 1-1.5mm (hot wire)



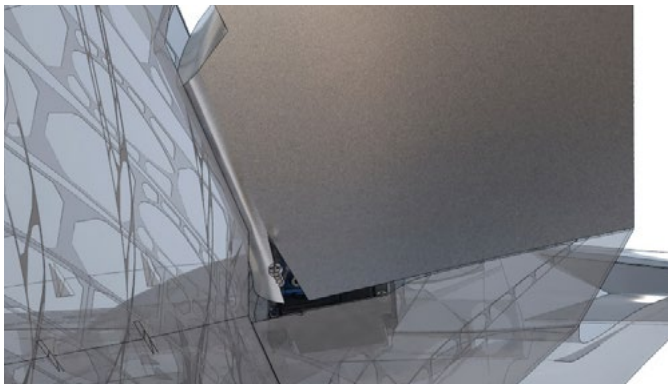
Proceed the way shown in videoguide (this pictures will help you):
See video guide #5.2

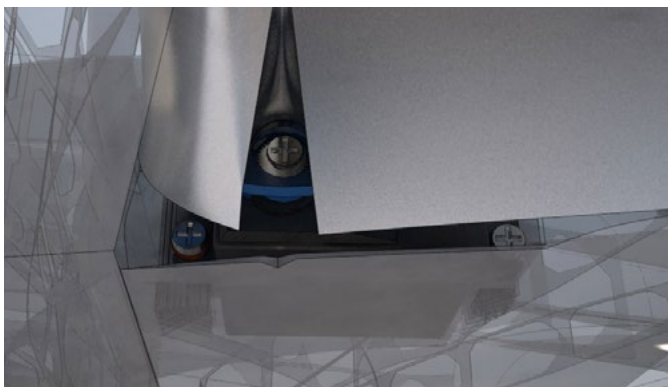
Insert servo into slot, then prepare holes for four self-tapping screws with hot 1-1.5mm wire, you can use any steel wire and any source of fire (firestarter, dremel and so on...) then screw the four screws in. Center servo to its neutral position (user your RC system or servo tester):



Now attach servos arm to aileron and prepare holes for self-tapping screws with hot 1-1.5mm wire, then screw this screws in. Note: you can use more screws, you know, feeling confident...:

Center servo to its neutral position (user your RC system or servo tester). Attach aileron to axle of servo and again apply Loctite to servo arms bolts,then screw it in properly. We highly recommend to test the power and function of the ailerons, use your hands to load it, do not worry use abrupt power, it is better if something goes wrong now...:

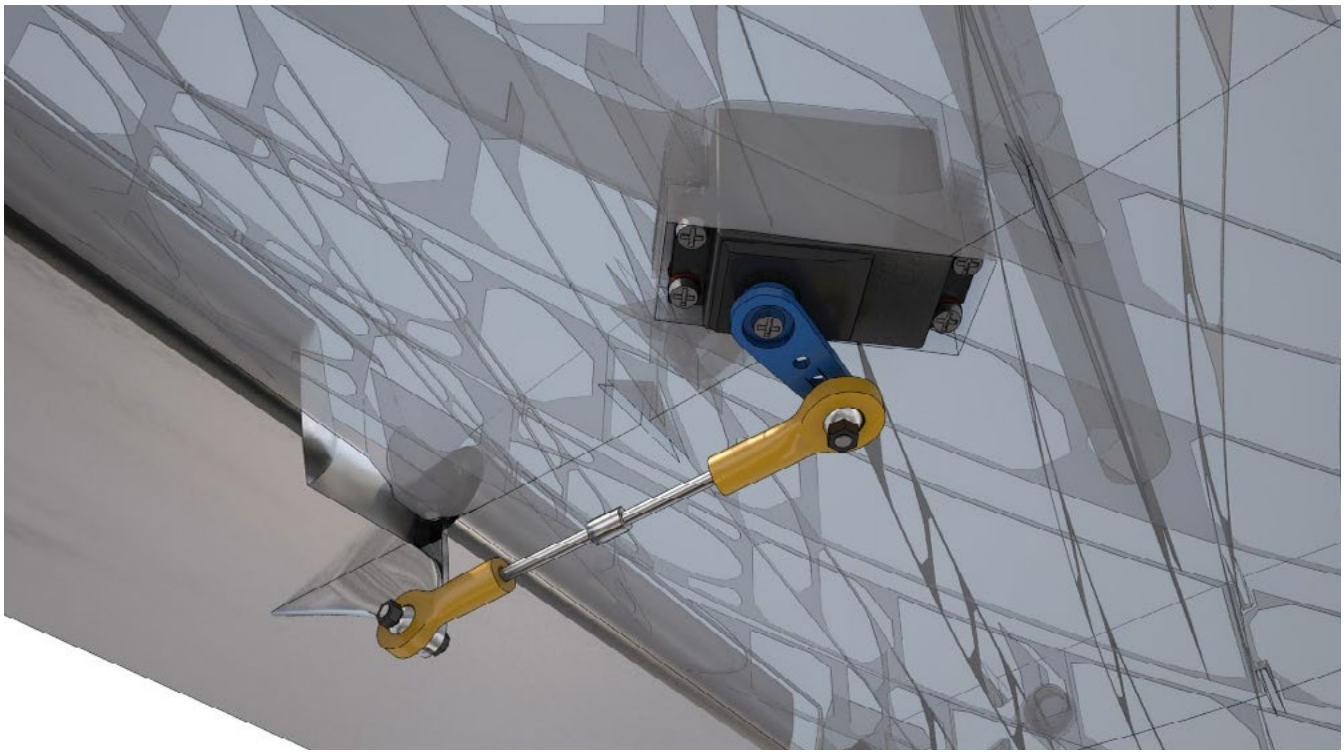




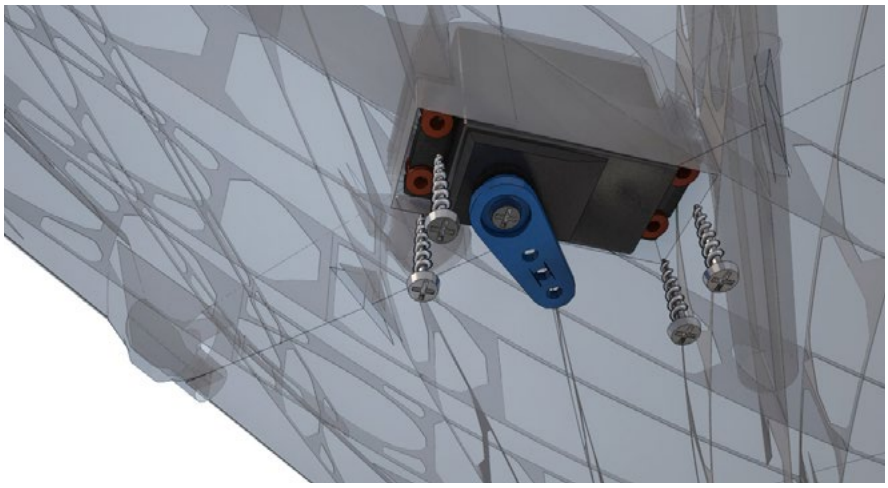
5.3 Ailerons servos - option 2

Option 2 - We also offer this classic option 2 (old school), it is suitable for cheaper servos where you can use full servo travel for smaller deflection and so on...

You will need:
2x standard size servo
2x pushrod (total length 96mm axle to axle)
4x ball-Link
4x suitable bolt+washer+nut (servo arms)
4x 1.5/12mm self tapping screws
servo extension cables 300mm / 12 inch or thicker
any fire source and wire 1-1.5mm (hot wire)
Loctite 243

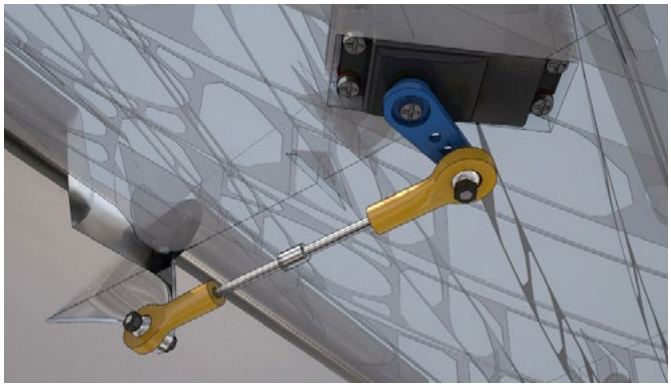


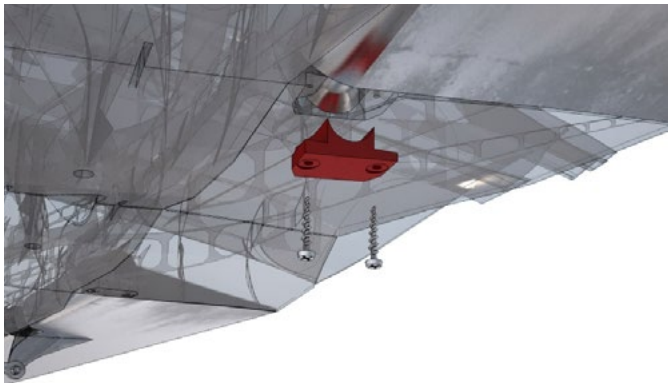
Insert servo into slot, then prepare holes for four self-tapping screws with hot 1-1.5mm wire, you can use any steel wire and any source of fire (firestarter, dremel and so on...) and screw the four screws in. Center servo to its neutral position (user your RC system or servo tester):



Asemble the pushrod and ball-link, axle to axle lenght should be 96mm :

Atach pushrod to servo arm and aileron arm, set proper lenght and apply Loctite to all nuts threads, secure ailerons (the red part shown on the picture) with two self-tapping screws. We highly recommend to test the power and function of the ailerons, use your hands to load it, do not worry to use abrupt power, it is better if something goes wrong now...:





6.1 Landing gear

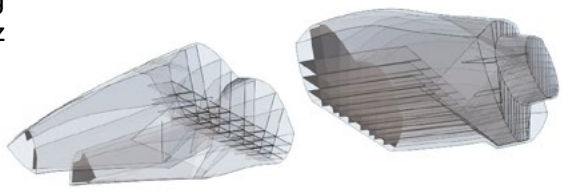
Glue LG fuselage housing, make 6 holes to the Carbon Fiber Landing Gear center parts and use hot wire to make the same holes to the printed LG fuselage housing...

NOTE:
You can use fully printed LG legs, BUT for display purpose only, or you can reinforce this with some inner wire..., in other cases use carbon LG.

Proceed the way shown in videoguide.
See video guide #6.1

You will need:
Carbon Fiber Landing Gear 170mm or any similar
Lightweight Wheel 90-120mm (2pc) or any similar
40mm Tail Wheel or printed one or any similar
4mm Steel Axles w/M5 Thread or any similar
Hex locknuts M5 + washers or any similar
Landing Gear Wheel Stop Set Collar 9x4.1mm or any similar
Landing Gear Wheel Stop Set Collar 6x2.1mm or any similar
6x 3.5/20mm (4/25mm) self tapping screw
2 mm wire for tail wheel suspension
dremel or any drilling-machine
pliers
any fire source or hot tool (hot wire)

LG housing
99g/3.49oz



tail wheel suspension patern

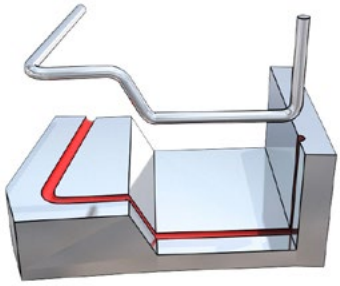
Proceed the way shown in videoguide (this pictures will help you):
See video guide #6.1

Apply CA glue to the contact surfaces (marked red in the picture) and insert them together, then apply the activator:

Now assemble the main landing wheel- lock nut+washer+axle+Landing Gear+wheel+stop collar:

Drill 6 symetric holes in carbon LG then attach to LG socket and prepare six holes for self-tapping screws with hot 1-1.5mm wire, you can use any steel wire and any source of fire (firestarter, dremel and so on...) then screw the six screws in:

Now make tail wheel suspension use 2mm wire, printed patern will help you achieve the right shape:



Inser tail suspension to rudder and apply CA Glue, then assemble wheelwheel+stop collar:

We highly recommend to test the power and function of the tail wheel/rudder, use your hands to load it, do not worry use abrupt power, it is better if something goes wrong now...:

7.1 Decals

Use our prepared PDF marking - Cut decals from thin advertisement foil or use any local advertisement or graphic company. Apply it to your model by your choice. You can use also use our prepared shapes/patern (PDF) and make own paint work. This aircraft can be painted with any waterproof acrylic colours. Please use your favorite procedure there is too much options that it is hard to recommend any exact solution.

8.1 Motor Setup installing

Important:
Use only annealed PLA for motormount. PLA printed parts without annealing can NOT withstand the motor heat.
Ensure your ESC bec/sbec is strong enought for all servos, or use separate battery...

See video guide #8.1

You will need: 4x 3/40bolt+washer+M3 nut (locknut or Loctite)

High Performance Setup (recommended) or similar:

Motor: Xpwr 30CC Motor v2
ESC: MEZON 90-120 lite with full telemetry (JETI Duplex) or CC...
Battery: 2x ZIPPY Flightmax 2650mAh 6S1P 40C in serial (12s) or similar (weight 2x 421g)
+ XT 60 2in1 series adaptor
Propeller: Mejzlik Propeller 20"x8" E-L or any good

ECO Setup (old school and clasic precision aerobatics) or similar:

Motor: Turnigy Aerodrive SK3 - 6354-260KV Brushless Outrunner Motor or similar
ESC: MEZON 120 lite or similar at leats 90A/8s
Battery: 2x 4000-5000/4s in serial (8s) (weight 2x 450-550g)
+ XT 90 2in1 series adaptor
Propeller: Turnigy Type A Beech Wood 3-Blade Propeller 18x8
alternatively 2- blade 20x8

Important:
check motor mount and screws before each flight, don NOT use PLA motor mout without annealing!!!



9.1 Final completion and setting

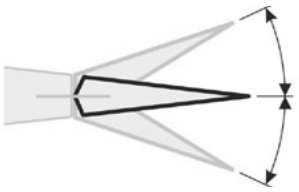
Install your receiver, connect battery, setup servos and etc. with your trasmitter, check servo position. Set recommended deflections. Check CoG point CoG is 104mm /4.09in from the Leading Edge of the wing (exactly carbon tube position). As the last step install propeller.
You can set the CoG forward by 12mm, for calmer response during the first flights. Our ECO setup is set to use 5000mA batteries so that the center of gravity should be just 12mm forward, this is beneficial for the start.
It is generally ideal to correct the center of gravity by the weight of the batteries and not by adding lead to the nose or tail of the aircraft.

Make sure the battery is placed properly and secured in position. If battery moves during the flight it can shift the center of gravity backwards and the aircraft becomes uncontrollable!

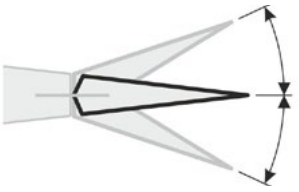
See video guide #9.1

You will need:
your own Rx/Tx system, 9channel
adhesive velcro strip for Li-Pol battery, ESC and Receiver
battery strap and zip
2x 1.5/12-18mm self tapping screws

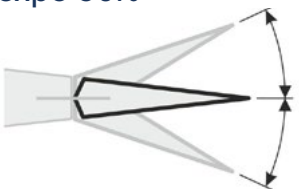
aileron - low rate
expo 50%



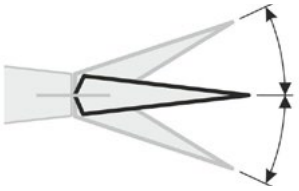
aileron - high rate
expo 70%



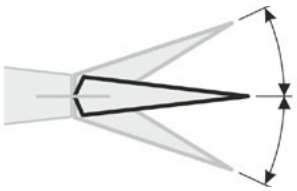
elevator - low rate
expo 50%



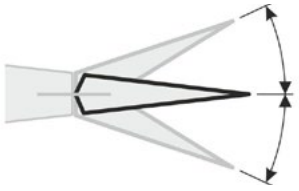
elevator - high rate
expo 80%



rudder - low rate
expo 50%



rudder - high rate
expo 80%



NOTE: do not use full deflection at high speed (above Va speed) especialy with ailerons, and of course you can use your own values to your liking.

10. Pilots Please Attention!

For the first flights we recommend to increase expo settings on your transmitter for elevator and aileron to 70 % (this calms the response from your stick inputs) and you can decrease elevator, rudder and ailerons deflection to .
Make sure the battery is well fixed in proper position. If it moves during flight it will cause the CoG move aft and can lead to uncontrollable flight behavior.
Once you become experienced, you can increase the control surface deflections up to the maximum of 60°+ and move the CoG a bit backwards. Standard CoG is 104mm /4.09in from the Leading Edge of the wing (exactly the carbon tube position). Plane tuned like this is capable of flying all elements of extreme 3D aerobatics.
NOTE: do not use full deflection at high speed (above Va speed) especialy ailerons, and of course you can use your own values to your liking.

PLEASE MAKE PRE-FLIGHT CHECK motor mount, screws, ailerons, Rudder and Elevator linkage before each flight (use Loctite), this is not a Toy...
Do NOT leave this PLA plane on direct summer sun or in car. (max. PLA temp is about 60C)
Spend at leats 10 hours with RC flight simulator before you go out for the first time.

fligh video

Recommended:

Flite test: RC Planes for beginners

Never fly aft (out of recommended) positioned Center of gravity.