



User Guide

rev. 2018/12



Fully 3d printable

EDGE 540 V3 Hannes Arch replica

22% scale ~ wingspan 1.62m/64in

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

Future of flying - Print your own plane. [speedy guide video](#)

Following our previously released EDGE 540, this brand new plane is not just scaled up version, but completely redesigned model from scratch.

Bigger scale allows for better weight/size ratio. Control surfaces deflection allows 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 links the control surfaces directly to the servos without any backlash with maximum precision and response to the sticks.

We hope you enjoy printing, building and flying, although this build will truly test your abilities and your printer quality.

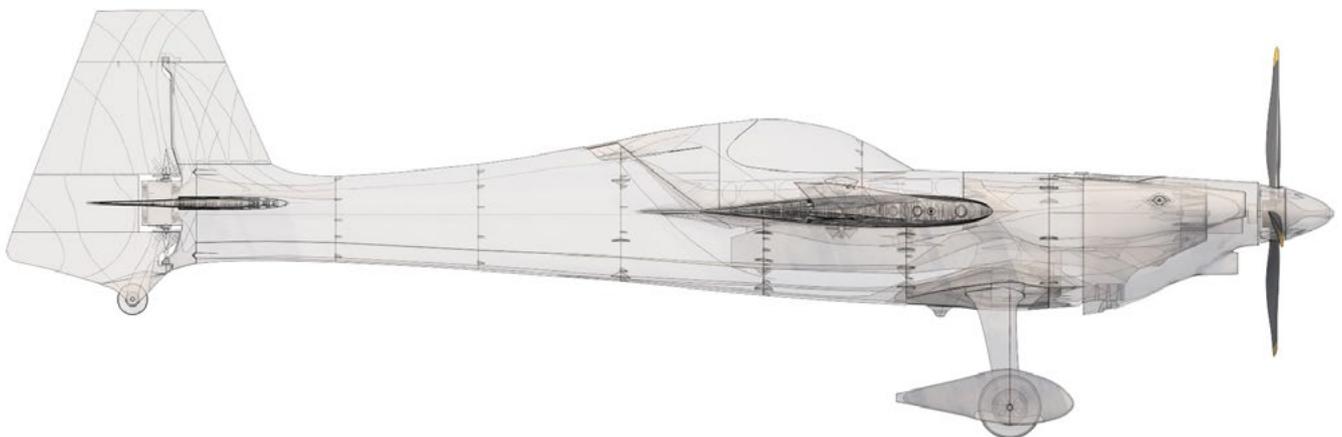
Welcome to the thin wall printing!

The first fully printable airplanes with files prepared for your 3Dprinter, with flight characteristics, comparable or even superior 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

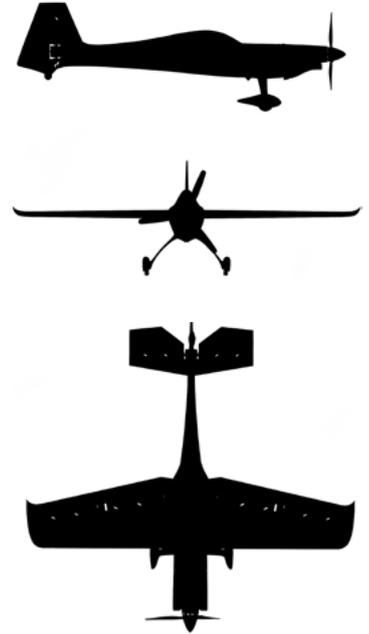
Extensive hi-tech 3d structural reinforcement making the model very rigid while maintaining a lightweight airframe and exact airfoil even it's just a plastic. This perfect and exact 3d structure is possible only thanks to additive 3dprinting technology. So welcome to the 21st century of model flying 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:	1620 mm / 64 inch
Wingspan:	1620 mm / 64 inch
Height:	548 mm / 21.6 inch
Wing area:	48dm ² / 5.2 sq ft
Wing loading:	75.3 g/dm ² / 28.6 oz at sq ft
Center of gravity:	95mm / 3.7 in from LE
Airfoil:	3DLabPrint symetric 02
Weight of printed parts (w/o wheels):	2115 g / 72.7 oz
Takeoff weight (6s 3300mAh Li-Pol):	3630 g / 130.5 oz
Max takeoff weight:	4100g / 148.2 oz
Never exceed speed, VNE:	170 km/h / 105 mph
Design maneuvering speed, VA:	120 km/h / 74.6 mph
Stall speed, VS(full flaps):	32 km/h / 20mph



Performance measurement:

Max speed VH (level flight):	140 km/h – 75.6kn – 87.0mph
Rate of climb:	31 m/s (6 100 ft/min)
Flight time (8s 3000mAh):	8:00 min (+30% 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

Hannes Arch

Hannes Arch was one of the most successful pilots in the history of the Red Bull Air Race. Up until the 2015 season Arch finished first or second overall in the last four World Championships. The first European to win the title in 2008, Arch was a creative force who pushed the world's fastest motorsport forward with innovative tactics and technology. Fiercely competitive, he was an accomplished adventurer who had climbed most of the world's highest mountains and thrown himself off many cliffs as a BASE jumper. The Austrian's fighting spirit made the last four Red Bull Air Race Championships thrilling battles to the final and with 11 victories he was second on the all-time race wins list. He won the 2008 title in only his second season with a determined and fearless style of flying that shook up his rivals and forever changed the dynamic of the sport.

Arch began flying at 16 after obtaining a Special Pilot's Licence in his native Austria. He first focused on hang gliding and at 19 became a state-approved mountain and ski guide. At one point, Arch was also ranked as one of the world's best mountaineers and climbers. He studied Sports Science and worked as a lecturer on sport climbing at Graz University but left just before

finishing to focus on his flying passion. He became an accomplished paragliding test pilot and is credited with being one of the world's first "aerobatic paragliders." He began experimenting with aerobatics in 1998 after making the crossover from free flying to motorised flying and joined the Swiss National Aerobatic Team.

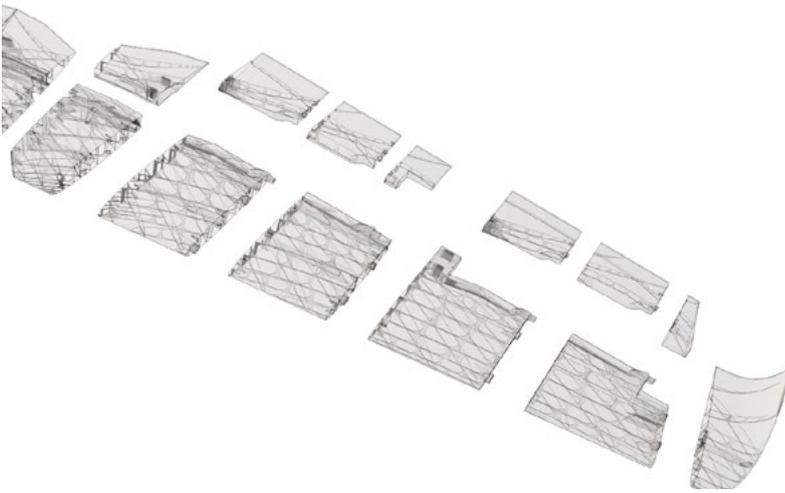
Arch made an indelible mark on the paragliding scene by organising a gruelling international competition that has become the popular Red Bull X-Alps event. He also made some of the most spectacular BASE jumps ever. He and Ueli Gegenschatz became the first to jump off the imposing 1800 metre north face of the Eiger, one of the most daunting Alpine peaks. In 2003 they became the first BASE jumpers to conquer the north face of the Matterhorn. Arch began performing in air shows across Europe in 2003.

His raw talent, determination and skill propelled him to become the European Aerobatic Champion in 2006 and he joined the Red Bull Air Race a year later in 2007, where he promptly became rookie of the year. Arch was born in Trofaiach, Austria and lived in Salzburg

Included:

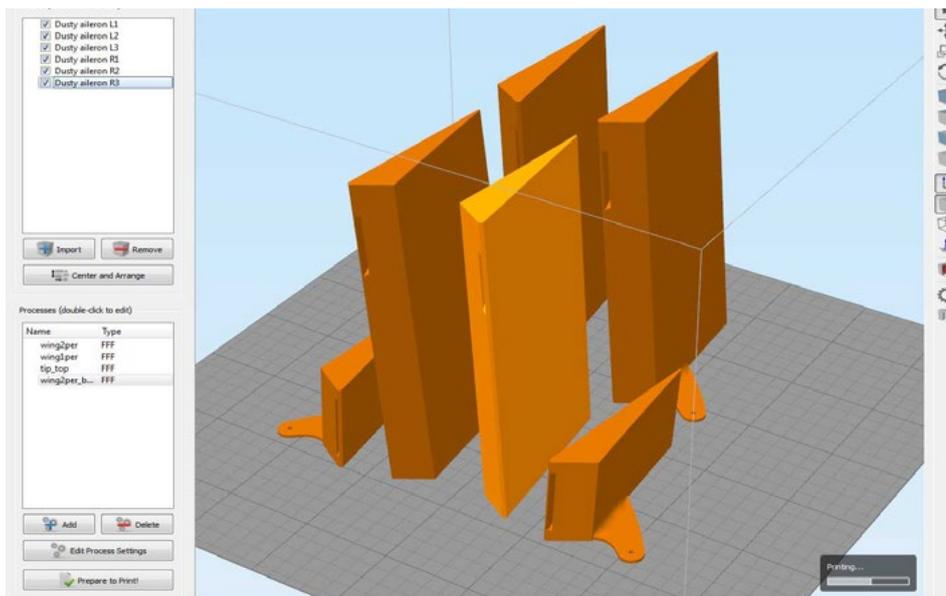
1. STL 3d files

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

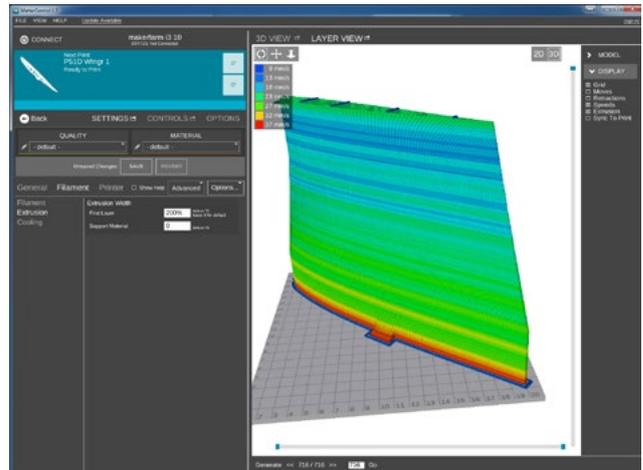
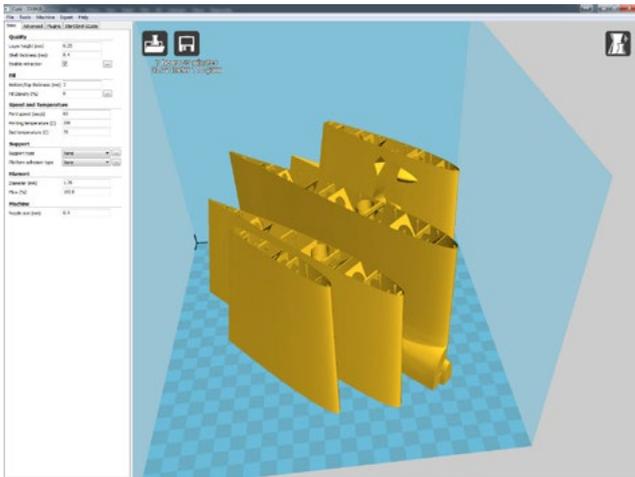
Please use this user guide along with the Printing Guide where you can find Tips and Advice for airplane printing (Thin Wall Printing).

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

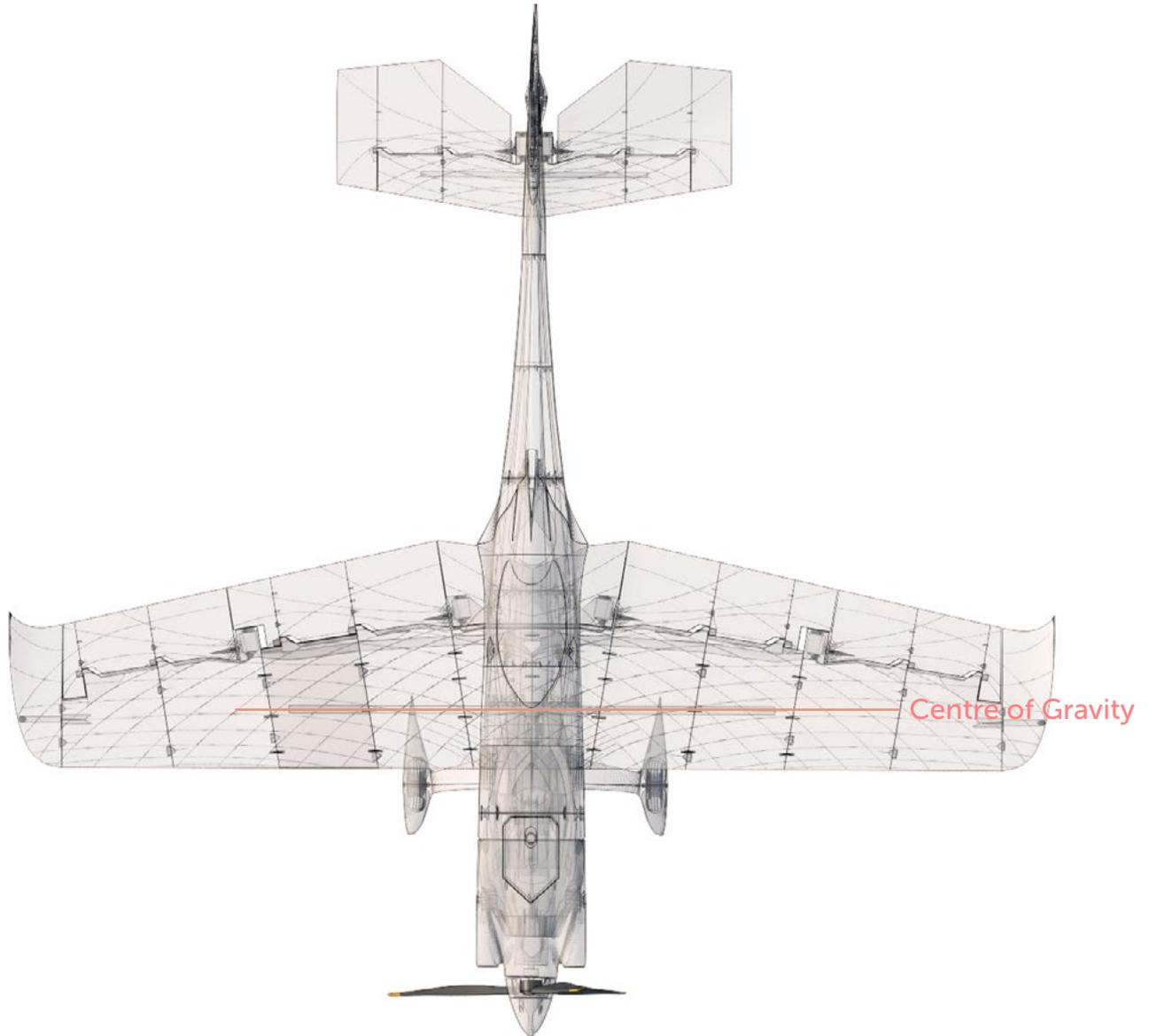
If you can't use Simplify3D for any reason, we provide our basic configuration files for free slicers CURA and MatterControl. Use these as a start point and amend as needed.



6. Scale markings PDF

Print this PDF on self adhesive foil, cut it and put it on the model according to your preferences.

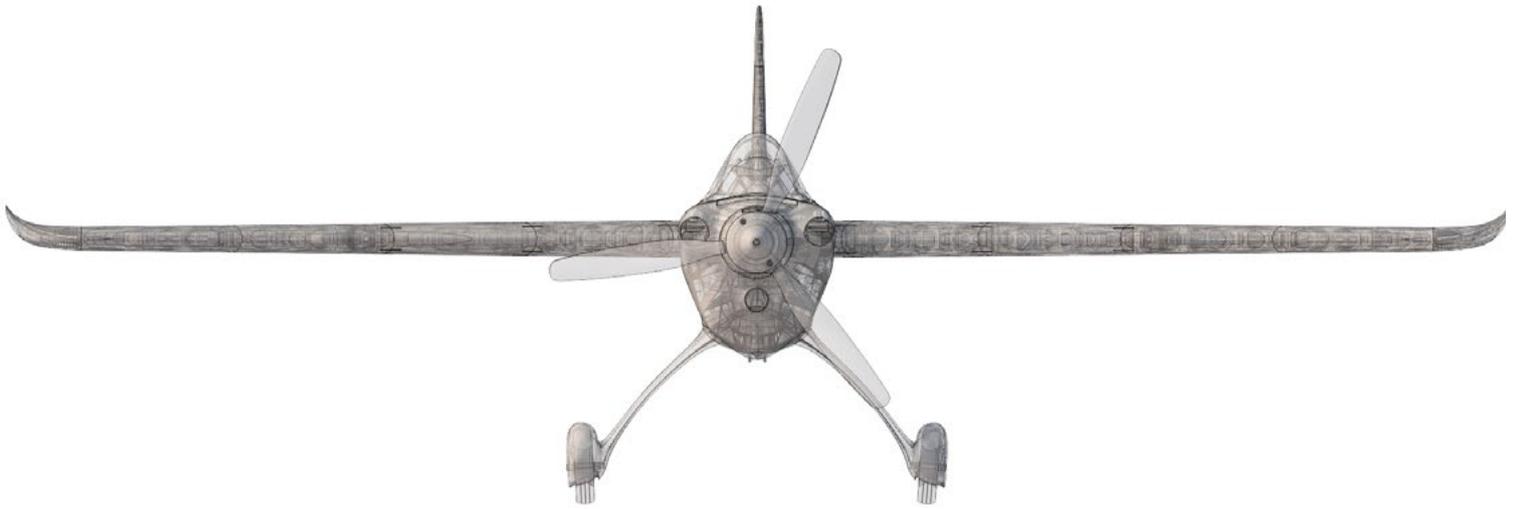




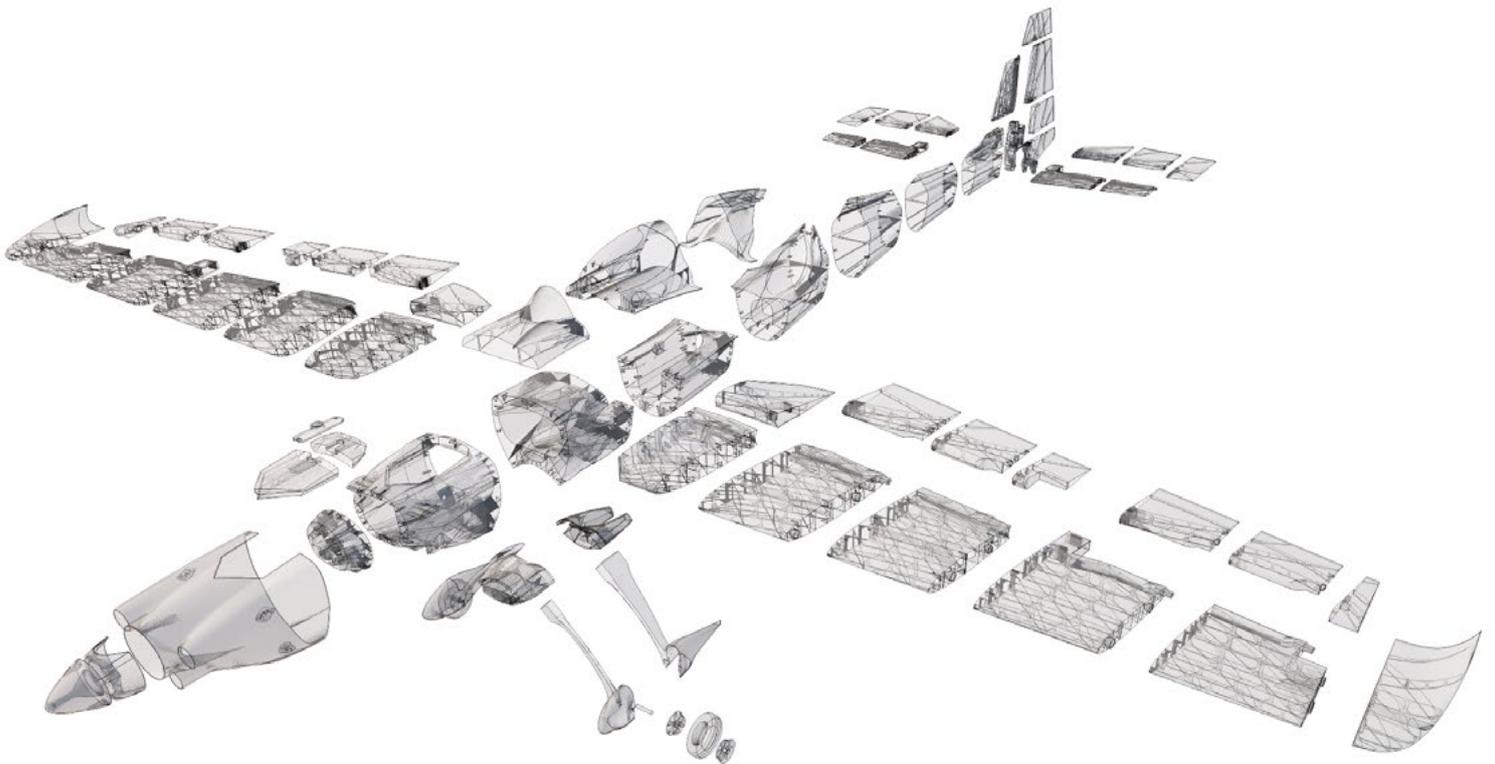
Wing area: 48 dm² / 5.2 sq ft / CoG is 95mm / 3.7 in from LE



Length: 1620 mm / 64 inch



Wing span: 1620mm / 64 inch



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

1. Choose airplane at www.3Dlabprint.com. Our [Facebook](#) for live information.



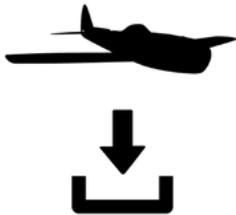
Basic requirements for EDGE 64" are: 195/195/175mm build volume. Nozzle 0.4mm recommended (0.35 or 0.5mm alternatively). Heated bed highly recommended.

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)

2. Create account, download

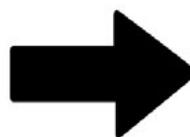
You'll get the download link for all zipped files to your email, or log in to your account and download directly from our website. If you don't receive the link right on checkout, please contact us on support@3dlabprint.com mentioning the order number. (WC-XXXXX on PayPal receipt)



3. Gcodes preparing

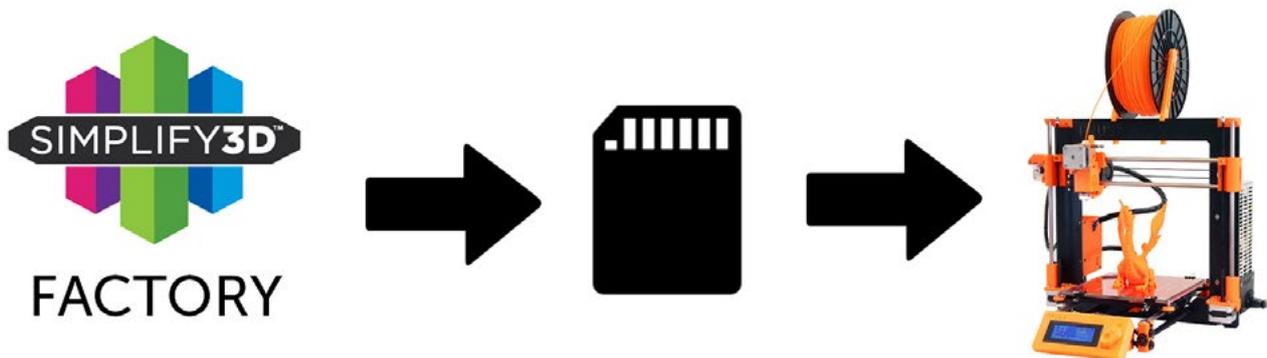
option A Gcodes:

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...



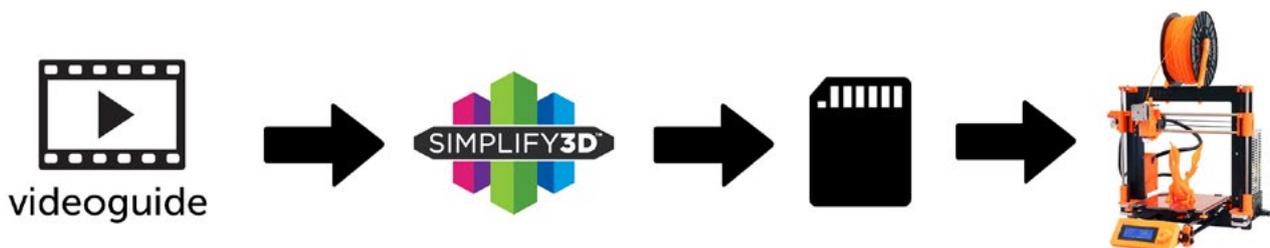
option B FACTORY files for Simplify3D (recommended)

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 difficulties, 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:

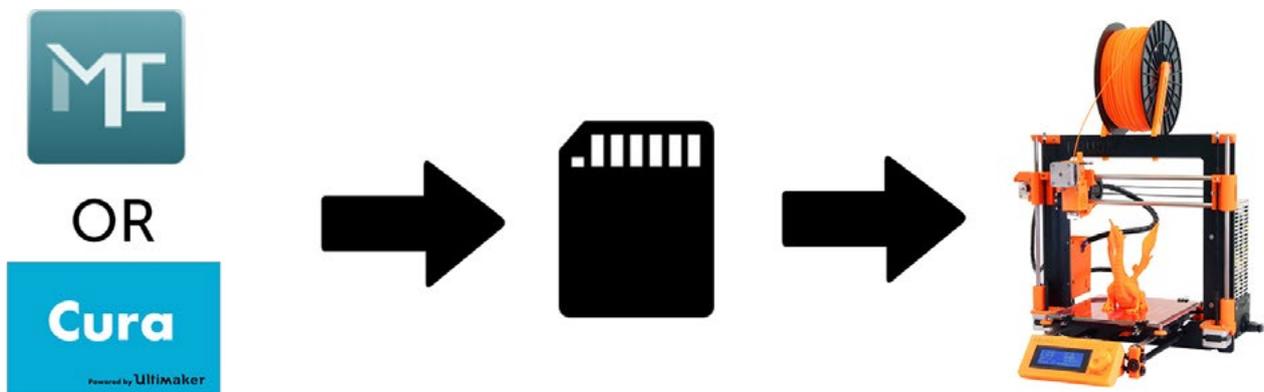
[video 2 Simplify3D setting](#)

[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.

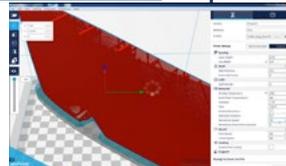
As a starting point you can use our predefined CURA profile. Always adapt the settings for your printer, change build volume, filament diameter, etc. according to your printer. Please be aware some parts require different settings of perimeters, top/bottom layers and infill. For some thick part you'll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



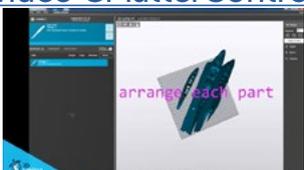
AND... please watch the VideoGuides:

[video CURA slicer setting](#)

[CURA 2.3.1 import setting an newest](#)



[video CMatterControl slicer setting](#)



4.1 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 similar 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)

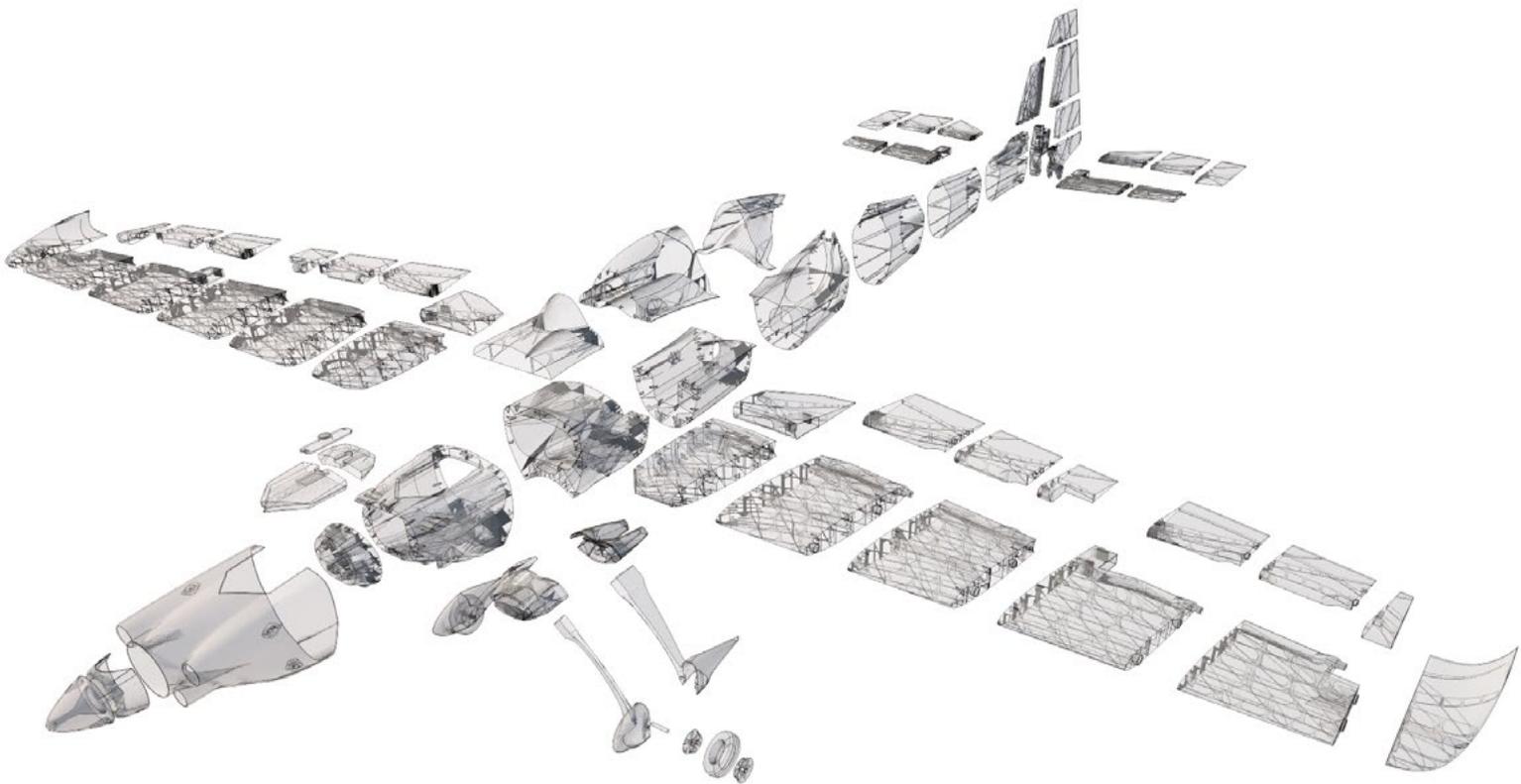
(disregard with PEI or similar bed surface, Mk2/3...)

Razor blade

AND... please look at VideoGuides:

[video printing guide #3](#)

EDGE 540v3 HA replica - parts diagram:



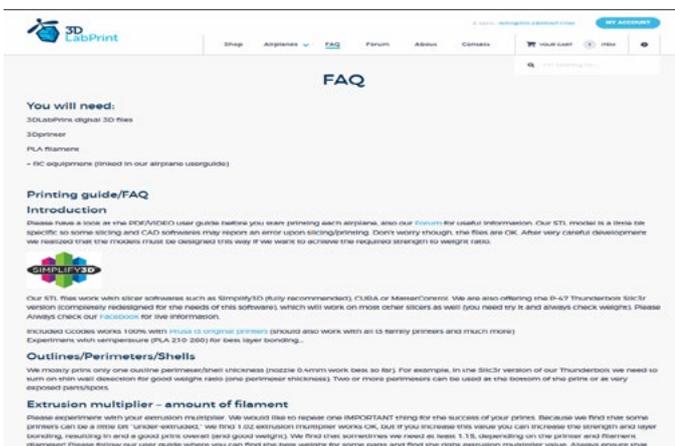
Basic Tips and Advice

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...

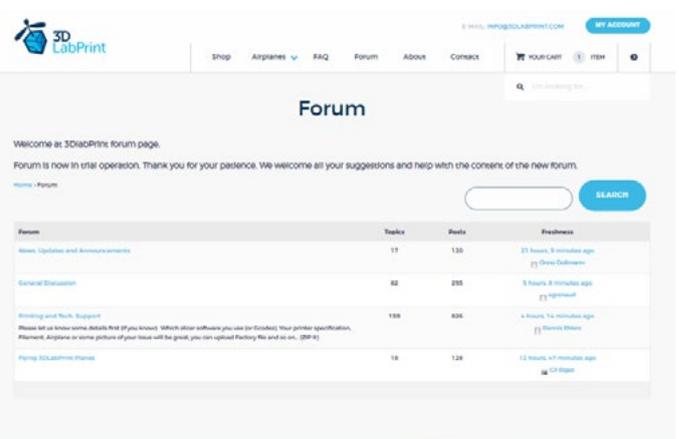
Heated bed is very recommended, use 50-60° Celsius to print without warping ends. Any standard quality PLA is suitable to print our planes, but the result depends on combination of PLA vs. Extruder vs. HotEnd.

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](#)



The screenshot shows the FAQ page on the 3D LabPrint website. It includes sections for 'You will need', 'Printing guide/FAQ Introduction', and 'Extrusion multiplier - amount of filament'. The 'Extrusion multiplier' section advises experimenting with the multiplier to achieve the correct weight, noting that a multiplier of 1.0 is often used but may need adjustment based on the printer and filament.



The screenshot shows the Forum page on the 3D LabPrint website. It features a search bar and a table of forum posts. The table has columns for 'Topic', 'Replies', and 'Freshness'. The posts listed include 'News, Updates and Announcements', 'General Discussion', 'Printing and Tech. Support', and 'Flying 3D LabPrint Planes'.

Topic	Replies	Freshness
News, Updates and Announcements	17	21 hours, 3 minutes ago
General Discussion	82	3 hours, 3 minutes ago
Printing and Tech. Support	199	4 hours, 14 minutes ago
Flying 3D LabPrint Planes	16	12 hours, 47 minutes ago



Some advice for rubberlike filament 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...

5. Assembling printed parts

5.1 Wing assembly

Glue Left and Right wing parts with CA glue together (position locks will help you), use activator, then insert Carbon Tube and glue both sides together or use it without tube, the wing is strong enough even without a carbon tube (if it is well printed and glued).

Glue „sure bonds“ (small triangle parts) to wing joints.

Then glue ailerons parts together.

NOTE:

Don't glue R6 and L6 parts.

Proceed the way shown in videoguide:

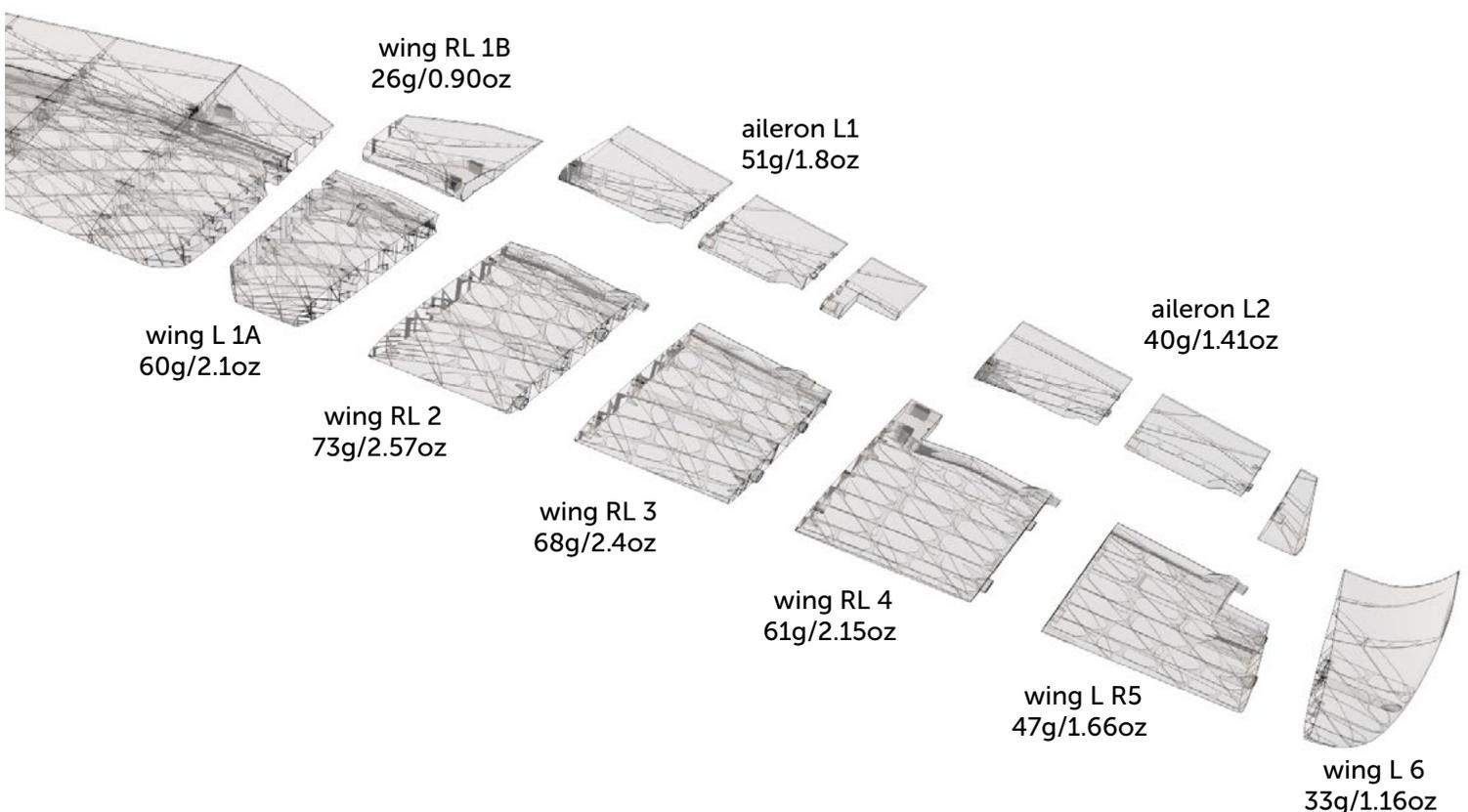
[See video guide #5.1](#)

you will need:

[CA Glue - medium](#) or similar medium viscosity CA glue

[Activator for CA Glue](#) or similar, but gas pressurized aerosol is better

[Carbon Fiber Tube \(hollow\) 11x750mm](#) or any similar optional...



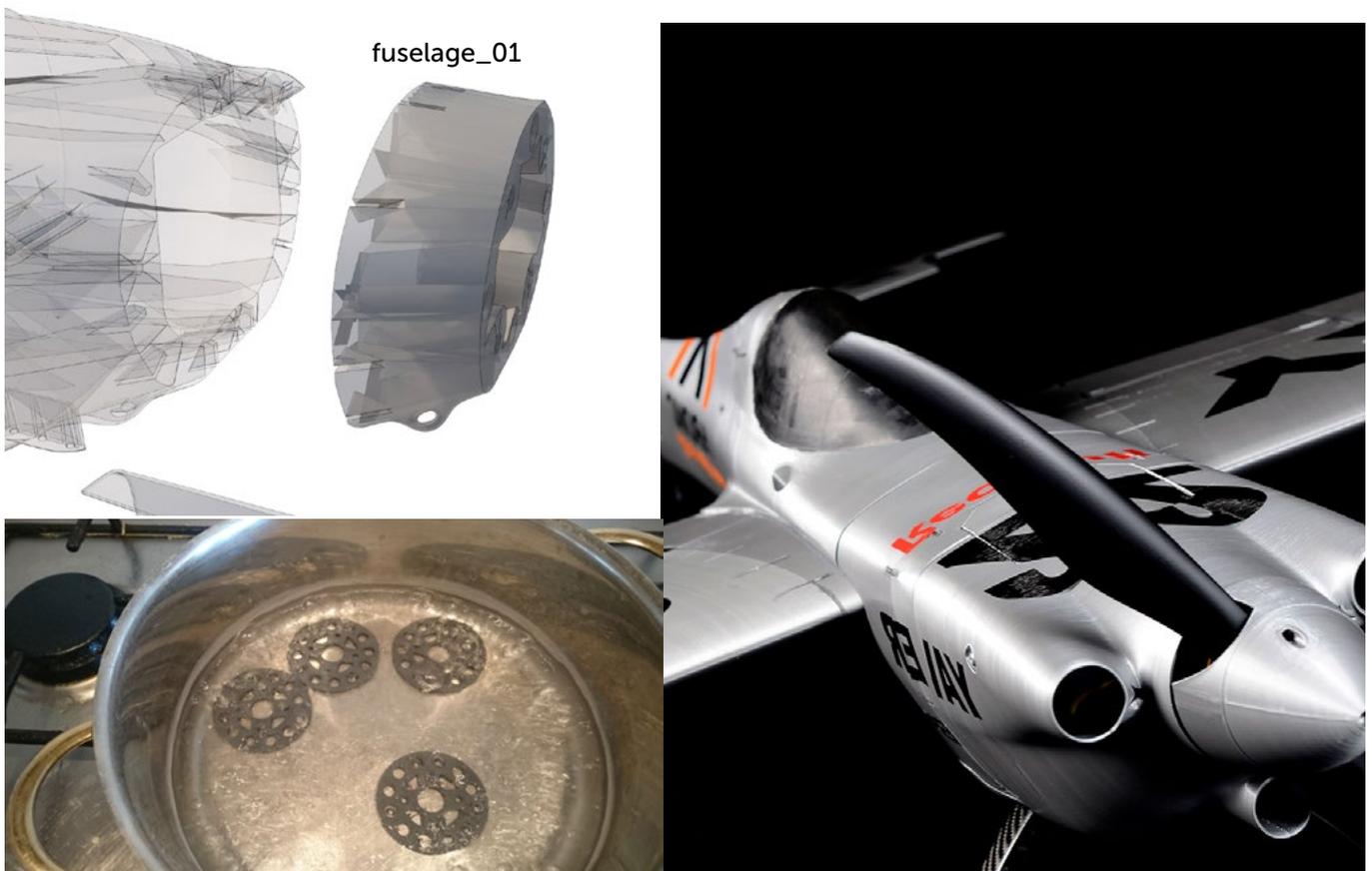
5.2 Fuselage assembly - motor mount annealing

You can also adjust the gap between propeller and engine cowling in three positions (or with longer spinner).

NOTE:

1. USE ANNEALING for front mount part just heat it for 30+min. in boiling water (or oven). This process increases thermal resistance of this part (heat from motor). [see this video](#)
2. Don't use overloaded setups with low efficiency overheating and melting printed parts.
3. Keep the front fuselage free for cooling air.
4. Fuselage1 must be printed with 2 shell/perimeters (use our Gcode or Factory file setting)
5. Because PLA shrinks when annealed (about 2%) it is good idea to use `EDGE_162_fuselage_01_annealing` compensated for this effect.

We suggest to anneal the PLA motor mount. You can use [this procedure](#): submerge in boiling water, heat it in oven or simply cover with a lid on your heatbed and heat it up to 100°C for more than 30 minutes.



Glue the fuselage parts F1-F8 with CA glue together (position locks will help you). You can use snap knife to clear the shape of printed parts, but mostly this is not necessary. Insert pen spring to battery cover part, insert cover lock, glue both canopy parts together and test a cover lock functionality (adding a oil drop to moving parts before is a good idea to prevent gluing this part). Cut and remove plastic from internal side of fuselage (use any hot tool).

Glue the „sure bonds“ (small triangle parts) to the holes in fuselage.

NOTE:

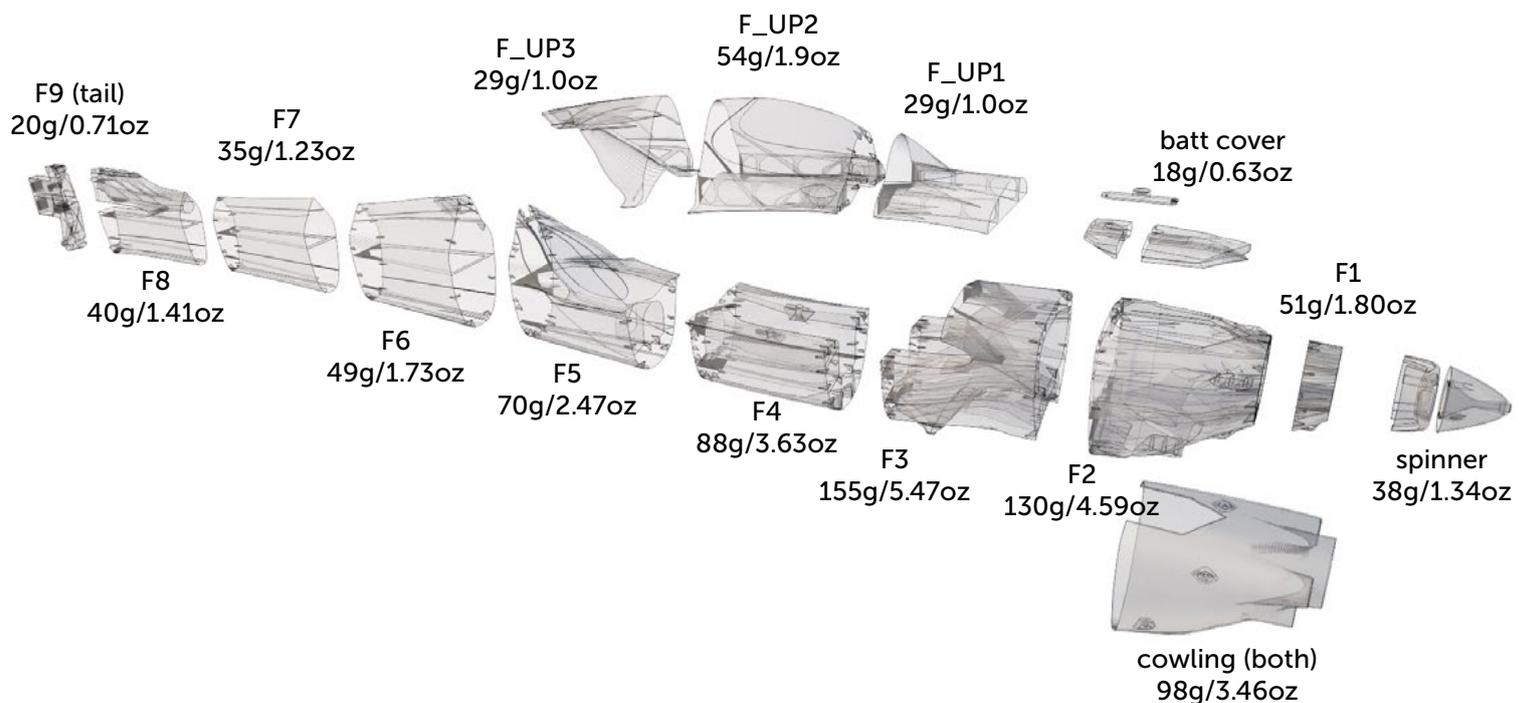
1. Don't glue the F9 and other tail parts yet!!! (for rudder, elevator and horizontal stabilizer proceed to the next step)

Proceed the way shown in videoguide:

[See video guide #5.2](#)

You will need:

[CA Glue - medium](#) or similar medium viscosity CA glue
[Activator for CA Glue](#) or similar, but gas pressurized aerosol is better
 1x ballpoint pen spring (a old ballpoint pen spring will work fine)
 Soldering Iron or any hot tool
 4x 4/30mm self tapping screw for F1 part
[nylon nuts](#) and [screws](#) or any 5-6/60mm



5.3 Fuselage tail - rudder, elevator pushrods and servos

Now it's a good time to install tail stabilizers and glue elevator and rudder. Glue H and V stabilizers to the fuselage.

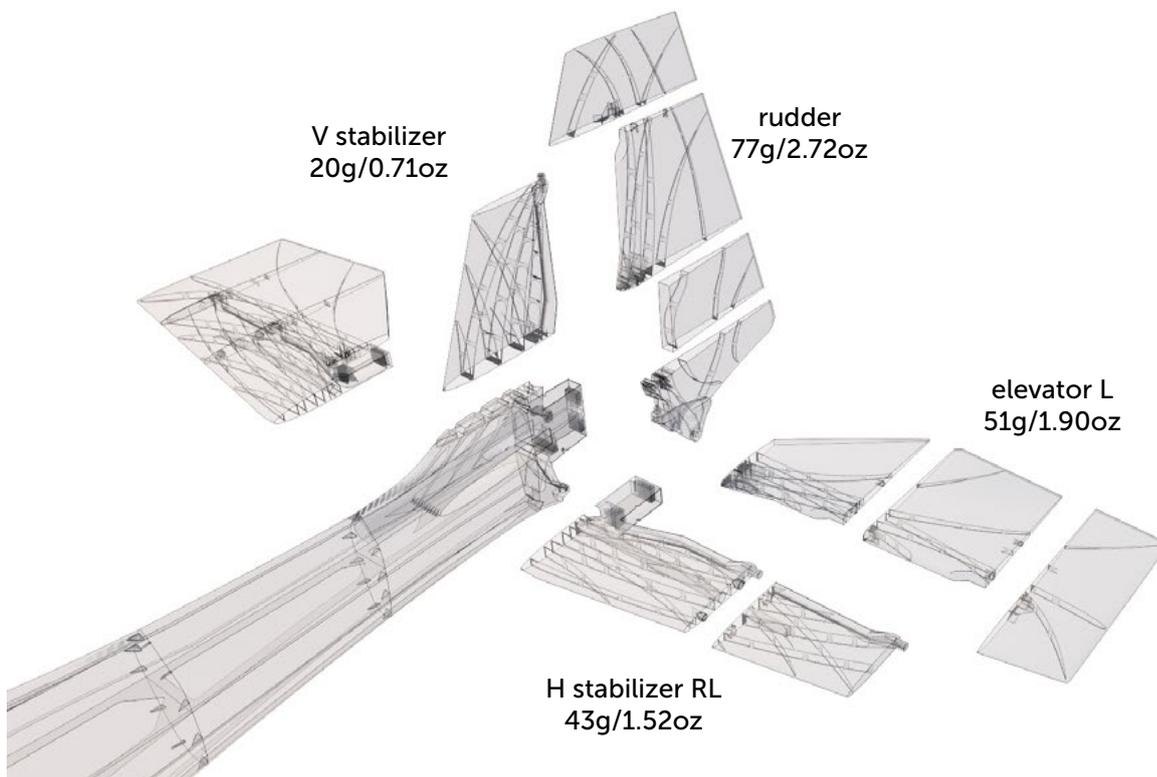
Proceed the way shown in videoguide:

[See video guide #5.3](#)

You will need:

[CA Glue - medium](#) or similar medium viscosity CA glue

[Activator for CA Glue](#) or similar, but gas pressurized aerosol is better



6.1 Servo installation

Our EDGE 64" was designed for 8pcs of High Performance mini servos 30x30x12mm. **We recommend to make your own servo cable extensions as we need small crosssection for instalation all servos especially in tail part, you can use soldering iron or [this way](#).**

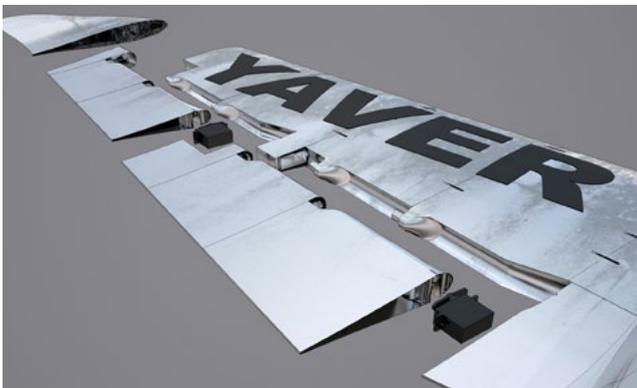
If you use standard servo extension leads, instalation will be difficult due to not enough space in the tail.

Instal all servos (use hot wire) then install ailerons, rudder and elevator, then attach the RL6 wing parts (use two screws for each side).

Proceed the way shown in videoguide:

[See video guide #6.1](#)

You will need: 8x [Turnigy™ TGY-390DMH](#) High Performance DS/MG Servo 5.4kg / 0.11sec / 22.5g or any similar servo, [this](#) or [this](#) for easy flying...
 [servo extension cables 300mm / 12 inch \(only for ailerons\)](#)
 16x 1.5/12mm self tapping screw (servo arm to aileron, elevator, rudder)
 any fire and wire 1.5mm (hot wire)
 thin wire (1mm) with loop on both ends will helps you with servo cable



7.1 Landing gear

Glue LG fuselage housing, make 4-6 holes to the Carbon Fiber Landing Gear center parts and use hot wire to make the same holes to the printed LG fuselage housing.

Proceed the way shown in videoguide.

[See video guide #7.1](#)

You will need:

[Carbon Fiber Landing Gear 150mm](#) or any similar

[Lightweight Scale Wheel 83mm \(2pc\)](#) or printed one

[40mm Wheels](#) or printed one

[4mm Steel Axles w/M5 Thread](#)

[Hex locknuts M5](#)

[Landing Gear Wheel Stop Set Collar 9x4.1mm](#)

6x 4/30mm self tapping screw

3-4mm axle for tail wheel (printed or any light -wood, carbon...)

any fire and wire 1.5mm (hot wire)



NOTE:

You can use fully printed LG legs for (display purpose only)



8.1 Decals

Cut decals from thin advertisement foil or use any local advertisement or graphic company. Apply it to your model by your choice.

This aircraft can be painted with any waterproof acrylic colours.

[See video guide #8.1](#)

9.1 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 enough for all servos, or use separate battery.

[See video guide #9.1](#)

High Performance Setup:

Motor: [AXI 4130/20 GOLD LINE V2](#)
ESC: [MEZON 90 lite with full telemetry \(JETI Duplex\)](#)
Battery: [2x Turnigy nano-tech 3000mah 4S 25~50C Lipo Pack](#)
+ XT 60 2in1 series adaptor
Propeller: [Mejzlik Propeller 18"x8" E-L](#)

ECO Setup (or similar):

Motor: [Turnigy Aerodrive SK3 - 5055-430KV](#)
ESC: [YEP 120A LV \(2-6S\) Brushless Speed Controller with Selectable SBEC](#)
Battery: [3300mAh 6S 35C Lipo Pack](#) or [4500mAh 5s for easy flying](#)
Propeller: [Turnigy Ultra-Light Wood Propeller 18x8](#)

Important:

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



9.2 Final completion and setting

Install your receiver, connect battery, setup servos and etc. with your transmitter, check servo position. Set recommended deflections. Check CoG point (CoG is 90-105mm / 3.54-4.138 in from the Leading Edge of the wing). As the last step install propeller.

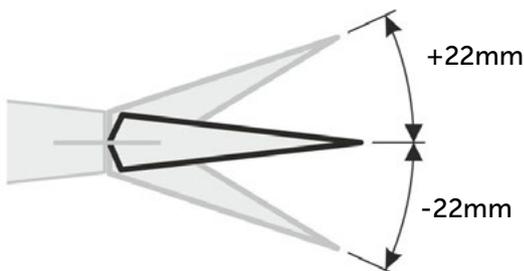
You can set the CoG to 80-90mm/3.14-3.54in, for calmer response during the first flights.

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!

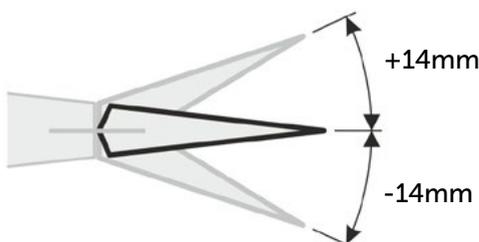
[See video guide #9.2](#)

You will need: your own Rx/Tx system, 9channel
 adhesive velcro strip for Li-Pol battery, ESC and Receiver
 battery strap nad zip
 some gauge (f.e. ruler)

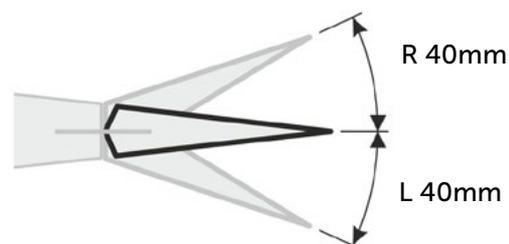
aileron



elevator



rudder



NOTE: this is only basic deflection setting... for extreme 3D flying use full deflection (60°), BUT only if you are experienced aerobatic pilot!!!

10. Pilots Please Attention!

For the first flights we recommend to increase expo settings on your transmitter for elevator and aileron to 60 % (this calms the response from your stick inputs) and you can decrease elevator and ailerons deflection a bit.

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 backwards **to 105mm/4.138in** (standard CoG is 90-105mm /3.54-4.138 in from the Leading Edge of the wing). Plane tuned like this is capable of flying all elements of **extreme 3D aerobatics**.

Check motor mount and screws before each flight...

Do NOT leave this PLA plane on direct summer sun or in car. (max. PLA temp is about 60C)

Spend at least 10 hours with RC flight simulator before you go out for the first time.

[Speedy guide video](#)

Recommended:

[Flite test: RC Planes for beginners](#)

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

Please, use these files only for your own purpose, do not

