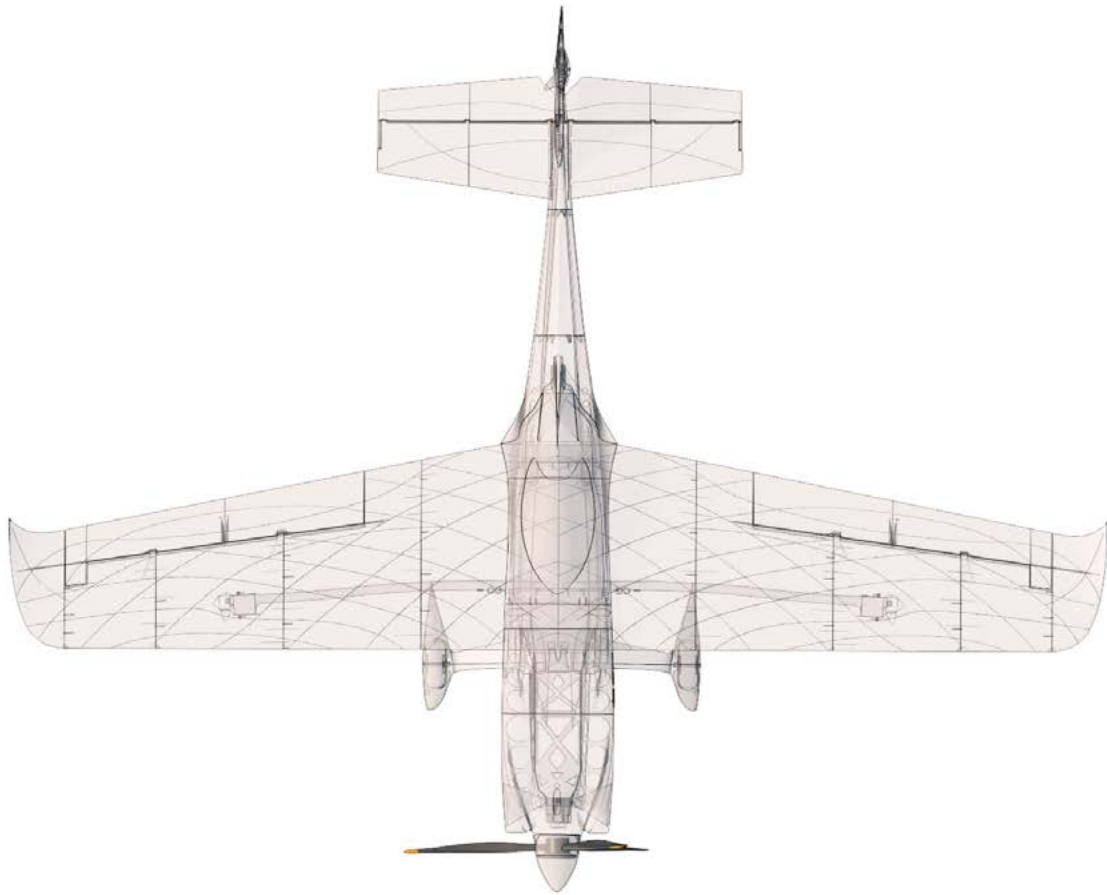




# User Guide

rev. 2018/4



Fully 3d printable

## Zivko Edge 540 v3 Hannes Arch replica

wingspan 1187mm (46.7in)

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

Future of flying - Print your own plane

We still trying move things further, so this project is again full of other improvements for better durability , easier assembly , better geometry solution and so on..., we hope you enjoy it, although this print may test your competencies to and quality of your printer (welcome to the thin wall printing)

**The first fully printable** airplanes with suitable files prepared for your 3Dprinter. Flight characteristics are comparable or even better than classic build model airplane. Simply download and then print it anytime you need only for \$18 (filament cost). This is not a dream, now you can print this HI-TECH .... at home, print spar parts, and so on...

**Extensive hi-tech 3d structural reinforcement** which makes the model very rigid while still maintaining lightweight airframe and exact airfoil even when it is made only from plastic. This perfect and exact 3d structure is possible only due to additive 3dprinting technology. So welcome to the 21th century of model flying. Be The first at your airfield.

**Easy to assembly**, you do not need any extra tool or hardware, you only need to glue printed parts together and make pushrods for control. The rest of the assembly is very easy. Simply add brushless motor, ESC, servos and radio system. Don't worry, detailed step by step PDF/VIDEO is included.

You will get superb performance airplane with High efficient powerplant which let you fly 7+ minutes at full throttle with the speed exceeding 165kph (HP setup). On the other hand low stall speed is achieved for easy landing.



## General specifications (HP setup):

Lenght:	1048mm (41.0in)
Wingspan:	1187mm (46.71in)
Height:	368mm (14.5in)
Wing area:	23.0 dm <sup>2</sup>
Wing loading:	50.8 g/dm <sup>2</sup>
Airfoil:	NACA sym. modified
Print weight:	780g
Empty weight (w/o battery):	990g
Takeoff weight (6s 1300 lipo):	1170g
Max takeoff weight:	1300g
Never exceed speed, VNE:	205 km/h
Design maneuvering speed, VA:	165km/h
Stall speed, VS:	30 km/h



### Powerplant

Propeller:	aeronaut ELP 11/5 or APC 9/6 - 11/5.5
Motor:	<a href="#">AX-4008Q/620KV</a>
ESC:	<a href="#">Castle Creations TALON 25</a>
Battery:	<a href="#">Turnigy nanotech 1300 mAh/6s/22.2V, 216g, 45C</a>

### Performance measurment

Max speed VH (level flight): 105 km/h – 56.7kn – 65.2mph with APC 9/6



Rate of climb: 20 m/s (5 373 ft/min) with APC 9/6

Flight time (3s 3000mAh/full):  
 7:40 with APC 9/6  
 5:30 with APC 9/7.5  
 7:40 with aeronaut ELP 9/6



## 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.

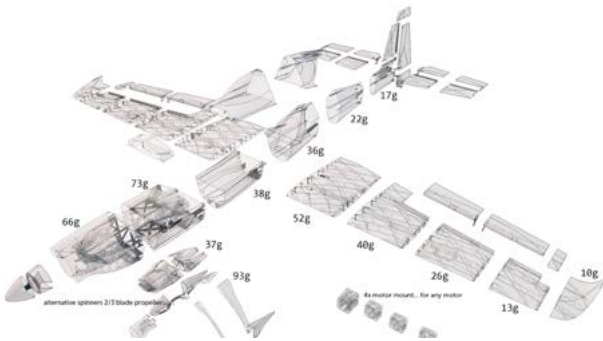
Arch made an indelible mark on the paragliding scene by organising a gruelling international competition that has become the popular Red Bull X-Alps event. He also made some of the most spectacular BASE jumps ever. He and Ueli Gegenschatz became the first to jump off the imposing 1800 metre north face 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:

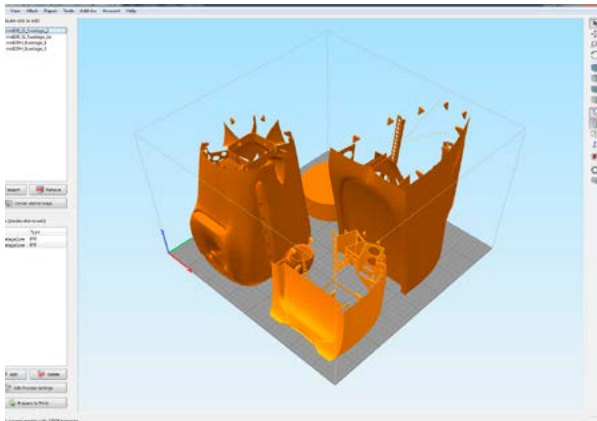
### 1. STL 3d files

universal STL files designed for use with desktop FMD 3d printers and slicer software as Simplify3D (recommend) CURA or MatterControl (this STLs are not compatible with Slic3r).



### 2. Factory files for Simplify3D slicer

with all our setting, this Factory files included all you need, note: we use PRUSA i3 ORIGINAL printers so you may need adjust the basic printing parameters to match your printer or use it



as a start point for you, please give a look to [Simplify3D](#)

### 3. Step By Step PDF/VIDEO userguides

Apart from this userguide, please give a look to the Printing Guide with some Tips and Advices for airplane printing (Thin Wall Printing)

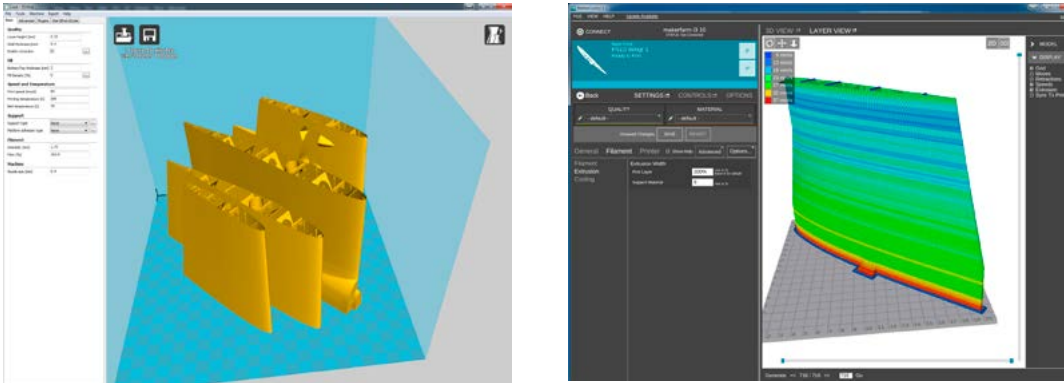
### 4. Gcodes

Basic Gcodes prepared for direct use, so universal as is possible. Should work with i3 style printers, you can try it out, but We can not guarantee that it will work with your printer.

100% works with PRUSA i3 ORIGINAL 3d printers...

## 5.Prepared settings for CURA and MatterControl slicers

If you dont like Simplify3D for any reason, there is always possibility to use another free slicer

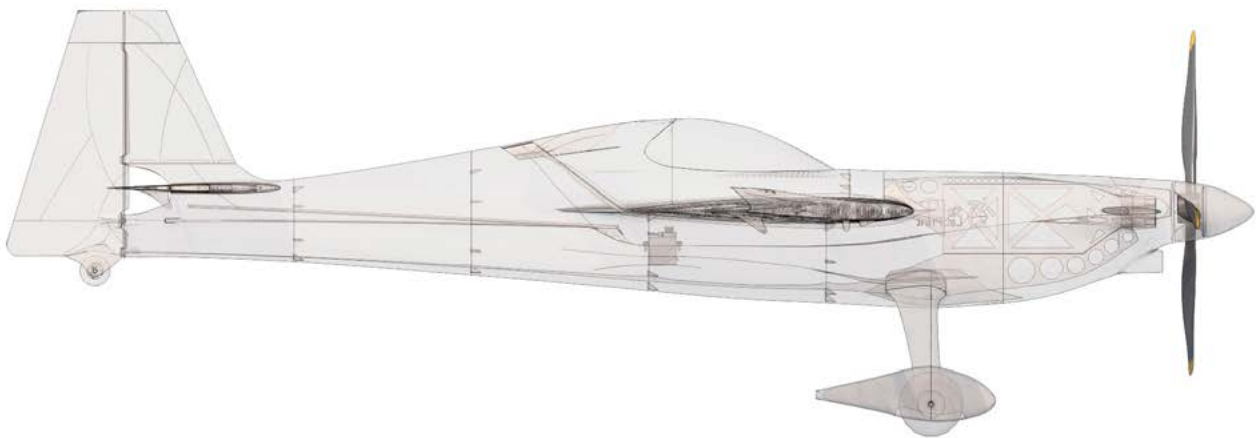
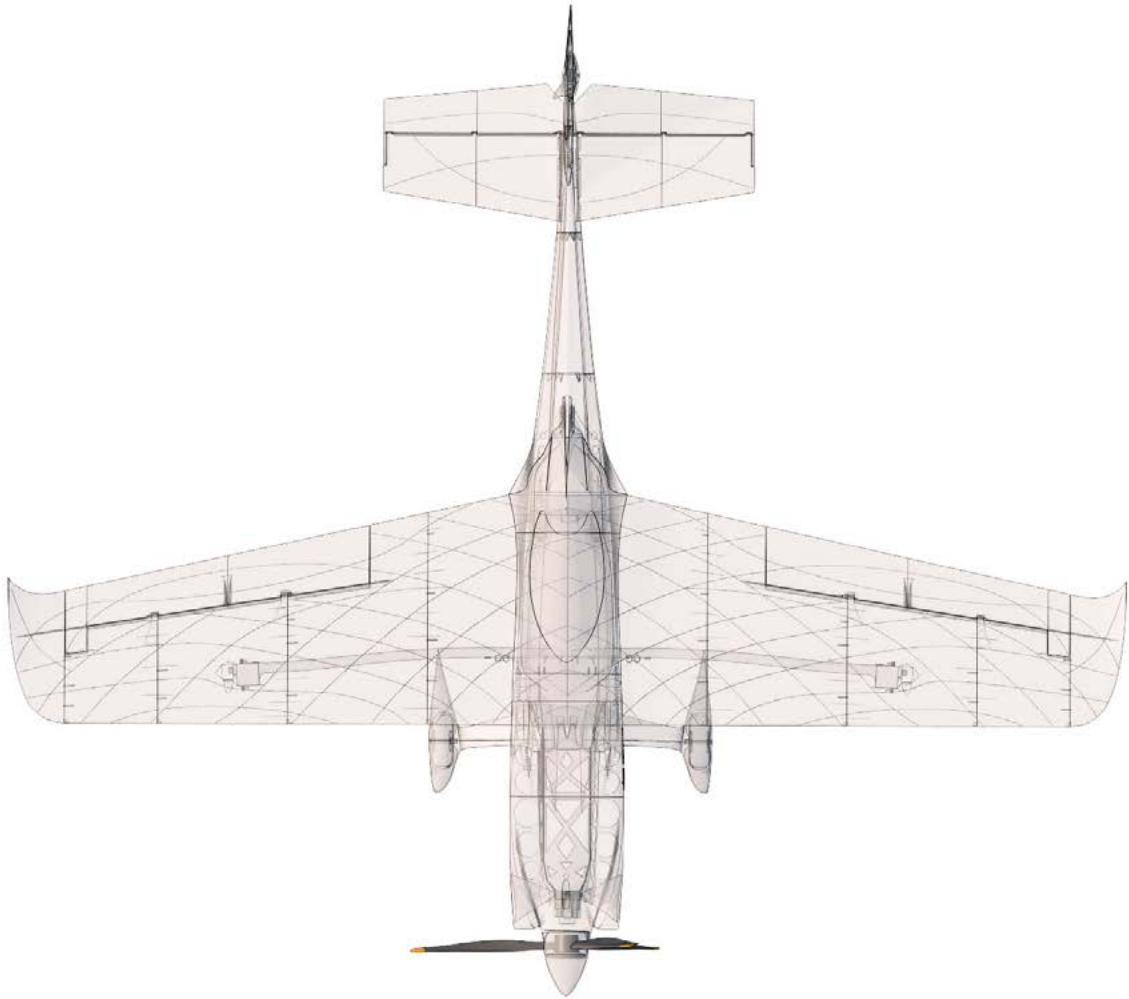


you can use our basic setting (setting files) as a start point and edit it as you need.

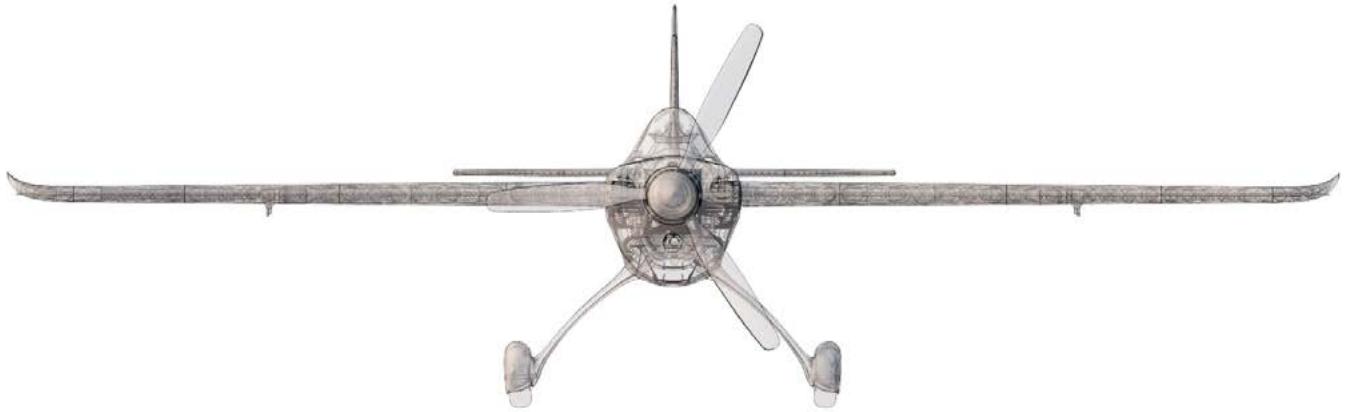


## 6.Scale markings PDF

Let print on thin adhesive foil and place on the model as needed, violet cut lines included...



1048mm (41.0in)



1187mm (46.7in)





## Step By Step PDF/VIDEO userguide

1. Choose airplane at [www.3DLabprint.com](http://www.3DLabprint.com), our [Facebook](#) for live information...



### Basic requirments (P-38 Lightning):

min volume 195/195/150mm (250/120/150)

nozzle 0.4mm recommended (0.35 or 0.5mm alternatively)

Heated Bed recommended

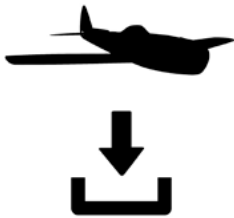
PLA filament (or PETG, APLA, htPLA, PC-max....) not ABS

If you feel a little bit confused you can [download wing test part](#) from our websites or thingiverse, (the biggest part). Or contact [support@3dlabprint.com](mailto:support@3dlabprint.com)

**It is good idea to print LG legs from PETG (more flexible)**

## 2. Create account, download

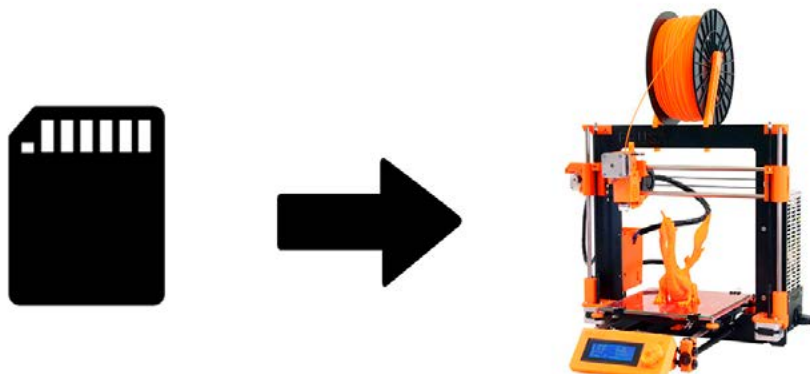
You will get download link for all files to your email (zipped) or you can log in to your account and download directly from our websites.



## 3. Gcodes preparing

### options A Gcodes:

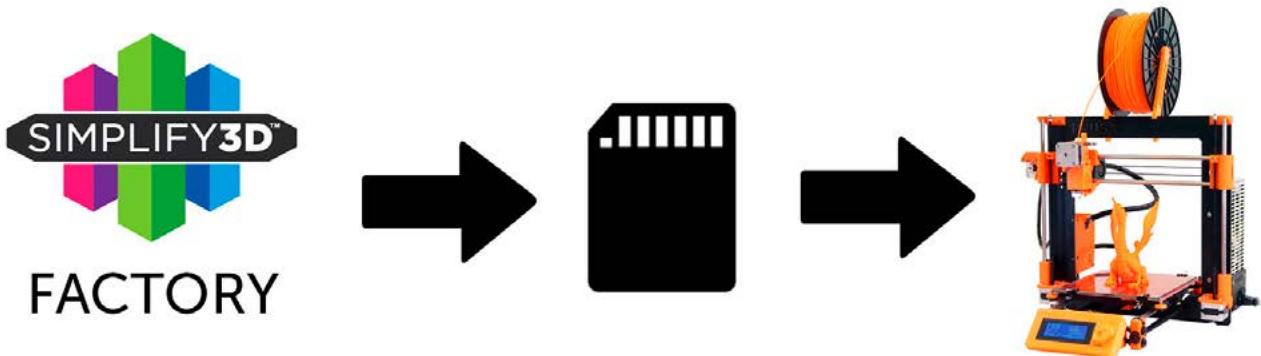
if your printer is i3 compatible you can directly use [prepared gcodes](#), simply save each to SD card and let 3d printer do his job, HE temperature is set to 230 for best layer bonding, you can edit speed and temperature on your printer LCD only. If Gcodes does not work please proceed to the next options.



options B Factory files Simplify3D (recommended)

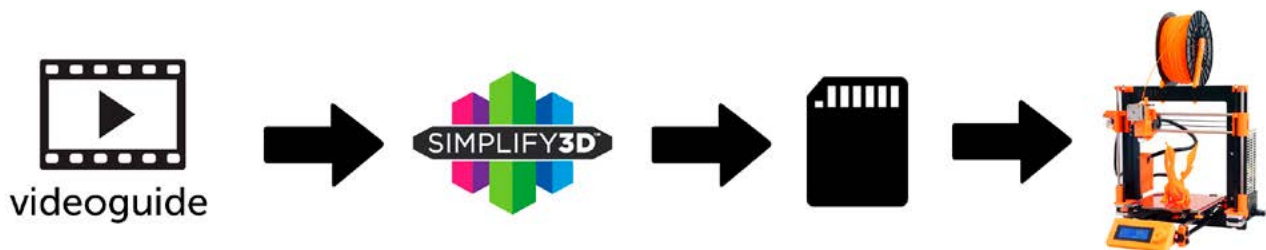
We prepare all you need in this files (basic FFF, parts arranged and so on...)

You can use this our setting as a start point and edit it as you need (adapt it for your printer), print only parts you need and so on... On moust 3d printers it should work as it is, but please give a look to the setting and edit it if is different to your printer, we are not liable for damages resulting from the use of our settings. If this does not work please proceed to the next option.



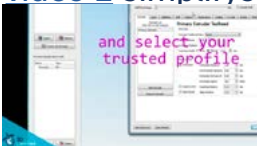
options C Simplify3D manual setting (watch and learn)

Use our [video guide 2](#) for proper setting... this is very good option and you will learn a lot about Simplify3D and become an 3d expert. Of course you spend a lot of time and youtube pause button will become your friend.

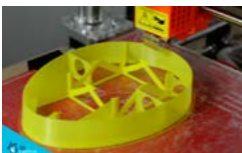


AND... please give a look to VideoGuides:

[video 2 Simplify3D setting](#)    [video3](#)



[video about Thin Wall Printing](#)



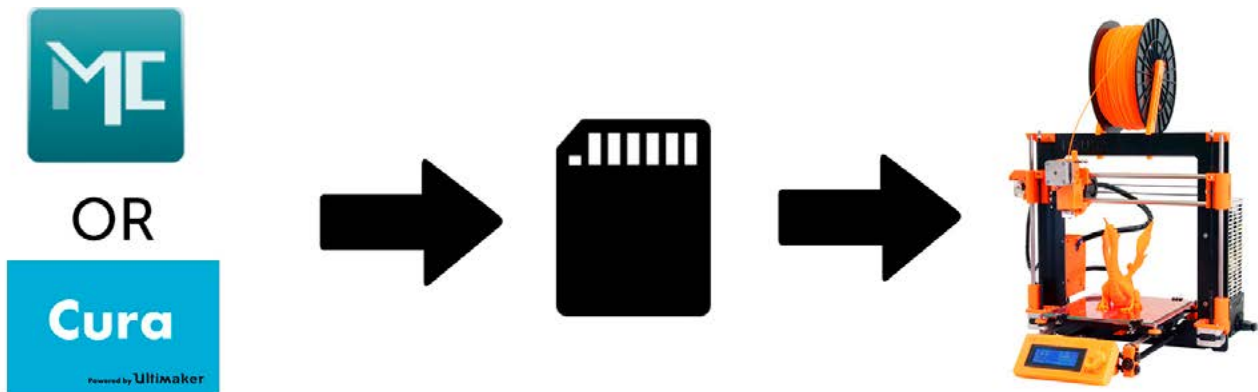
options D CURA or MatterControl

MatterControl and CURA are free :-)) and also gives very good results and airframe is still strong enough, slicer setting is very easy.

Please try [find right extrusion multiplier and temperature](#) for good weight and bets layer bonding, give a look to parts weight list for proper multiplier setting.

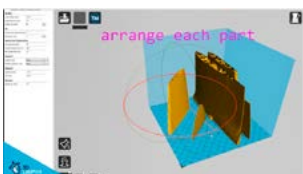
You can also use our [predefined](#) CURA or MC slicer setting file included in package (always adapt it for your printer, change build volume, filament diameter and so on... depends on your printer!!!):

- |                                     |  |
|-------------------------------------|--|
| <a href="#">CURA_wing_fuse.ini</a>  | (wing, fuselage, battery holder parts)     |
| <a href="#">CURA_ailer_elev.ini</a> | (only ailerons, elevator and rudder parts) |
| <a href="#">CURA_thick.ini</a>      | (motor mount, spinner)                     |
| <a href="#">CURA_wing_tip.ini</a>   | (only wing tip)                            |
| OR                                  |  |
| <a href="#">MC_wing_fuse.slice</a>  | (wing, fuselage, battery holder parts)     |
| <a href="#">MC_ailer_elev.slice</a> | (only ailerons, elevator and rudder parts) |
| <a href="#">MC_thick.slice</a>      | (motor mount, spinner)                     |
| <a href="#">MC_wing_tip.slice</a>   | (only wing tip)                            |

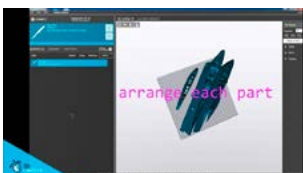


AND... please give a look to [VideoGuides](#):

[video CURA slicer setting](#)



[video CMatterControl slicer setting](#)



## 4. Print it

Save generated Gcodes and insert SD card to your printer, prepare your printer and start printing, we prefer to use SD than direct connection via USB Note: ABS filament is not suitable for this...

Scaling the model will lead to unusable result!

[video guide about printing](#)

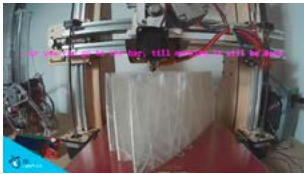
you will need: PLA filament - good quality and strong PLA (we need good layer bonding)

Strong hair spray (or your favorite adhesive bed surface)

Razor blade

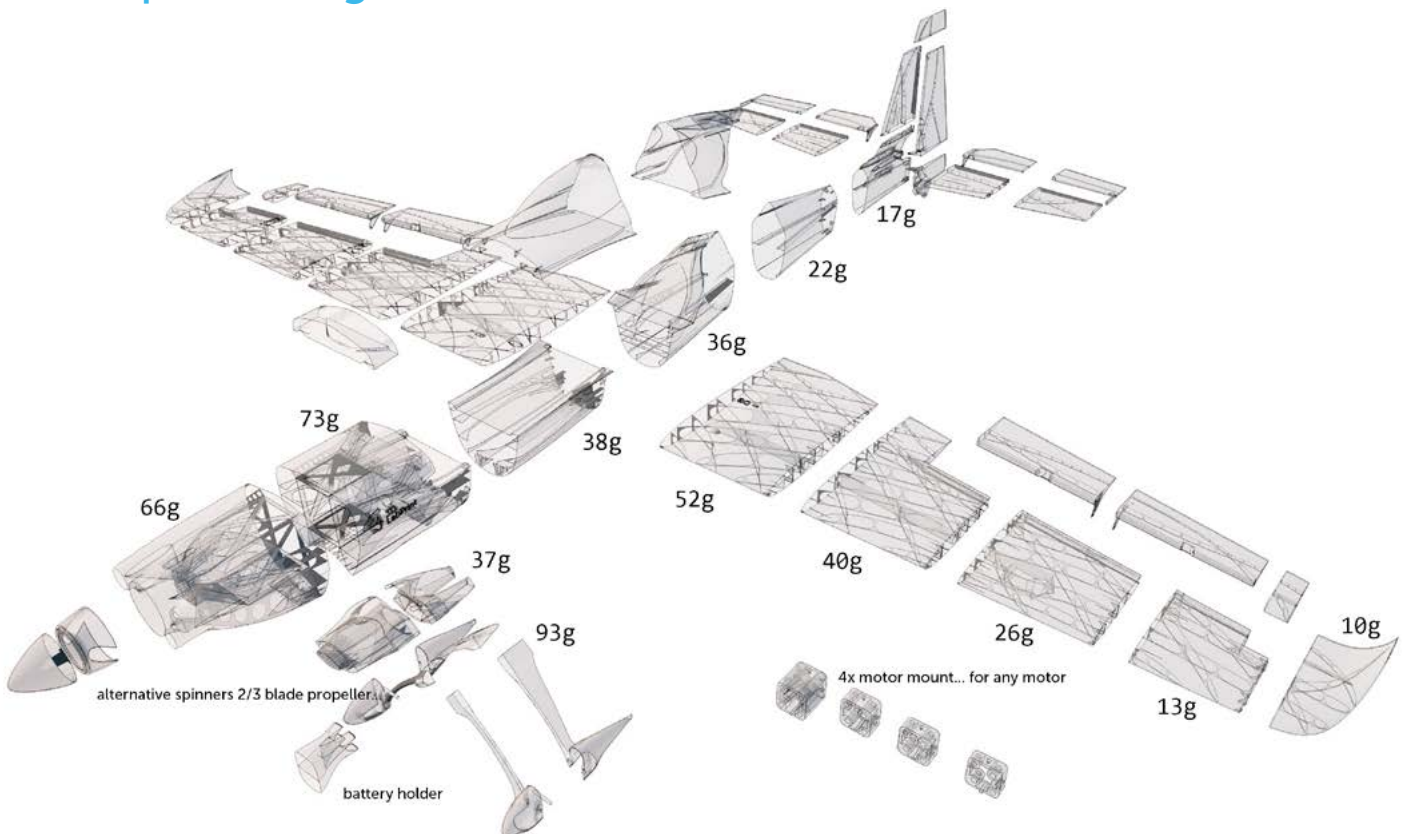
**It is good idea to print LG legs from PETG (more flexible)...**

AND... please give a look to VideoGuides:



[video printing guide](#)

## Main parts weight list:



## Basic Typs and Advices

Plese Experiment with your [extrusion multiplier](#)...

Also [HotEnd temperature](#) is very important for strong result, please try increase temperature to find the best value ([200 up to 260 celsius](#))

Turn [OFF cooling fan](#) for better layer adhesion ([HE fan of course ON](#)) we dont need it for our thin wall printing...

We try lot of filaments and so far PLA is still the best for our models (2016).

You can try aslo PETG and PC-max from polymaker is very promising filament.

HEATED BED is very recommended, 60-70celsius (print without warping ends)

Looks like any standard quality PLA is OK for our planes, BUT it always depends on combination PLA vs. Extruder vs. HotEnd.

We find that some color of filament has lower layer adhesion also.

Nowadays there is lot of 3dprinters on the market, very most of them is OK for printing our aircrafts (specific thin wall printing...) suficient volume, heated bed, 0.4mm nozzle.

## Please give a look to Printing Guide:



### printing guide rev. 2016/06



Some Tips and Advices for airplane printing

#### [Printing fully printable 3dLabPrint Airplanes](#)

... If we want print aircraft there always be demand on low weight and enough strenght, with Thin Wall Printing we can achieve it ...

## 5. Assembling printed parts

### 5.1 Wing assembling

Glue wing parts with CA glue together, use activator and instal ailerons...

[See video guide #4](#)

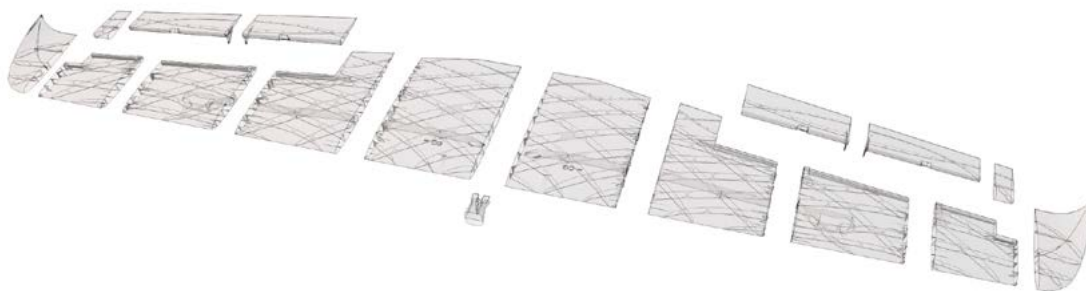
you will need: Steel wire/pushrod, diameter 1.0mm

Carbon rod, diameter 1.0mm

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

[Activator for CA Glue](#) or similar, but not-mechanical is better

Snap knife



### 5.2 Fuselage assembling

Glue with CA glue fuselage parts together, use activator, instal elevator and so on...

Glue changeable LG parts ([updated see video 5.2](#))

[See video guide #5](#)

[See video guide #5.1](#)

[See video guide #5.2 \(updated version\)](#)

you will need: Steel wire/pushrod, diameter 1.0mm

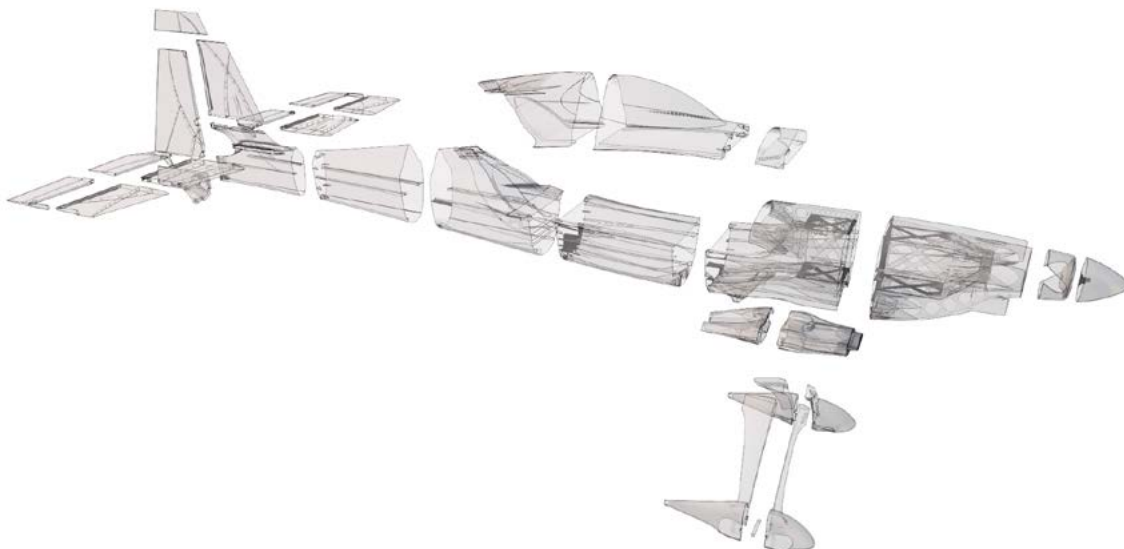
Carbon rod, diameter 1.0mm

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

[Activator for CA Glue](#) or similar, but not mechanical is better

Snap knife or Sandpaper

Soldering Iron or any hot tool



## 6. R/C equipment

### 6.1 motor setup

**HIGH PERFORMANCE SETUP** (recommended) propeller 11/5.5:

[See video guide #6](#) (for HP setup)

you will need: [Motor – AX-4008Q-620KV](#)

[Speed controler \(ESC\) – CC Talon 25](#) or similar 30-40A/6s

[3x PAIRS, 3.5mm Gold Connectors](#) - optional

[Battery 1300mAh/6s](#) up to [2200/6s](#) or 2x 1300-2200/3s, better (use 2to1 serial connector)

**Note: bigger battery leads to nose heavier plane which is more stable and easier to control... (for firts 10mm forward from CG tags, never aft)**

[Male XT60 connector](#)

[Shrink Tube black](#)

Solder wire and Soldering Iron

[Hands free Holder](#) - optional

printed motor mount (25/25)

**ECO PERFORMANCE SETUP**(spent only 30 bucks without any soldering)prop 11/5.5:

you will need: [Turnigy D3530/14 1100KV](#) or similar 3530-35 1100kv

[40A Electronic Speed Controller](#) or similar 40Amps

[Turnigy nano-tech 2200mAh 4S 25C](#) or similar 2000-3000/4s

**Note: bigger battery leads to nose heavier plane which is more stable and easier to control... (for first flight 10mm forward from CG tags, never aft)**

printed motor mount, find the one which fits... (25/19)

### 6.2 servos

Test and center all servos with servo tester or transmitter, then instal horns in midle position and cut wing Servos mount... use HXT900 or any 21x21x23mm

[See video guide #7](#)

you will need: 4x [9g Servo HXT900](#)

2x [Servo Lead Extension](#) or similar

Snap knife

Soldering Iron or Small handsaw or Dremel

## 7. R/C Equipment installing

Instal prepared RC equipment: Motor, ESC, Servos. Made steel pushrod for ailerons, elevator, rudder and connect within servo arms...

Nose and motor mount are already in angle for compensating rotating propeller stream.

[See video guide #8](#)

you will need: Steel pushrod, diameter 1.0mm

- Pliers and optionaly Z Pliers

- Printed motor mount, find the one that fits for your motor...

- 4x Screw 3/12mm depends on motor-mount

- Small screwdriver+

- Your earlier prepared R/C equipment

- 3x Self Tapping Screw M3x8mm or similar

## 8. Decals/Marking

Print pdf decal sheat to adhesive foil (pdf already include violet cut lines for cut machine)

Apply to airplane surface...

[See video guide #9](#)

you will need: PDF scale markings printed to adhesive foil

- Snap knife

## 9. Finalization

Instal your reciever, connect batery, setup servos and etc. with your trasmitter, lock servo position, then instal propeller...

**!!!Make sure that the battery is placed properly and secured with wing battery holder, if battery moves during flight it can shifts the center of gravity backwards and aircraft will be uncontrollable!!!**

[See video guide #10](#)

you will need: Your own Rx/Tx system

- Battery for your setup...

- Foam strip for Li-Pol battery

- Printed spinner

- [Propeller](#) + printed spinner (use 9-12/4-6 depends on your setup and needs)

- Small screwdriver+

- [CA Glue](#) - medium + [activator](#)

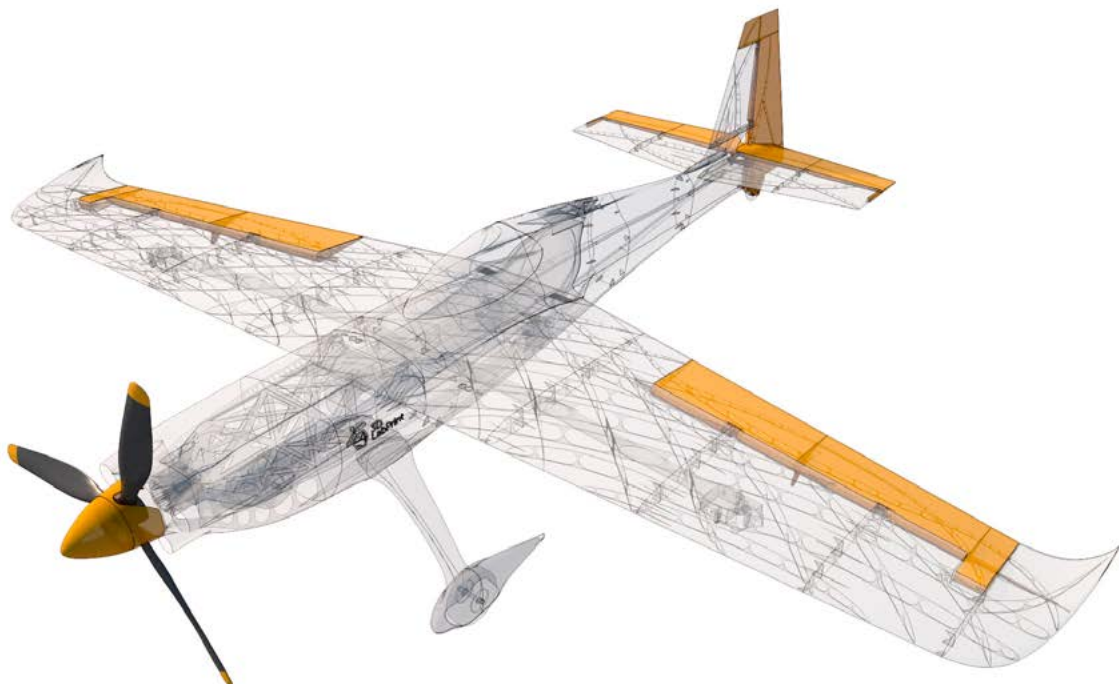
**!!!Never set ESC with instaled propeller, this is very dangerous!!!**



## 10. Go flying

Before flight check: **center of gravity is very important** (move it forward 10mm for the first flights see CG markings and chapter 11 bellow), battery properly charged, ailerons and elevator deflection check, your own flying skills or RC simulator training...

Accelerate gradually and keep the direction during taxiing by using the rudder, try it first without taking off a few times ( taxiing on the runway ) Then gain speed until the plane move up tail part , then pull the elevator gently and you're in the air.



## 11. Pilots Please Attention!!!

For the first flights we recommend set **center of gravity** of the airplane by about **10 mm forward** of the CG tag - nose heavy, this increases the stability (you can use heavier battery). Also you can decrease elevator and ailerons deflection.

Make sure the **battery is well fixed** in proper position if it moves during flight it will cause move CoG aft and will lead to uncontrollable flight behavior...

You can then return to the center of gravity (balance aircraft) the CoG points and expo set to 60 % as stated in the video/instructions... this gain back extra maneuverability when you will be sure with flying your airplane.

**!!!Never fly aft positioned CoG!!!**

**And Please, use this files only for your own purpose, do not send further... Thank you very much**

## 12. Updated version 2018/4

NOTE: This is updated version with changeable landing gear, reinforced fuselage parts, reinforced motor mount housing and edited ECO setup for better performance (4s battery instead the 3s)

Prusa i3 MK3 compatibility