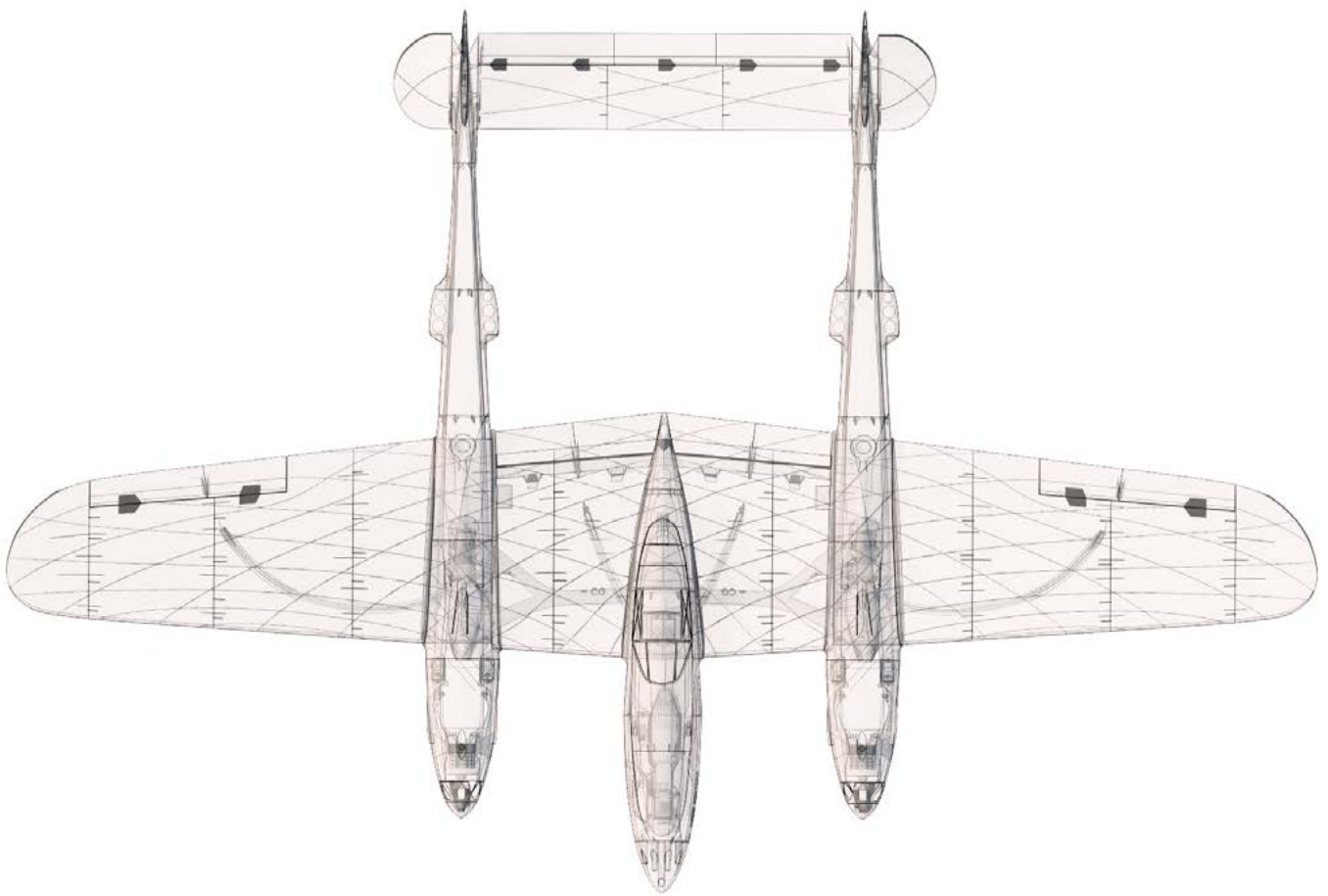




# User Guide

rev. 2016/10



Fully 3d printable

## Lockheed P-38 Lightning

scale 1:12, wingspan 1410mm (55.5in)

## Lockheed P-38 Lightning – 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 charecteristics 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 aditive 3dprinting technology. So welcome to the 21th century of model flying. Be The first at your airfield.

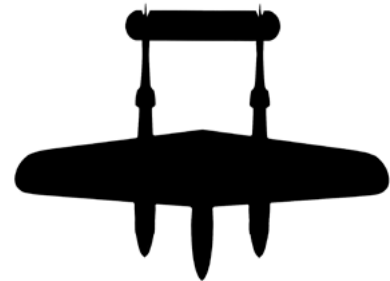
**Easy to assembly**, you do not need any extra tool or hardware, you only need to glue printed parts together and make pushrods for control. The rest of the assembly is very easy. Simply add brushless motor, ESC, servos and radio system. Don ´t worry, detailed step by step PDF/VIDEO is included.

You will get superb performance airplane with High efficient powerplant which let you fly 7+ minutes at full throttle with the speed exceeding 110 kph (HP setup). On the other hand low stall speed is achived for easy landing.



## General specifications (HP setup):

Lenght:	1042mm (41.0in)
Wingspan:	1410mm (55.1in)
Height:	298mm (11.7in)
Wing area:	30.5 dm <sup>2</sup>
Wing loading:	65.9 g/dm <sup>2</sup>
Airfoil:	aircombat modified
Print weight:	1160g
Empty weight (w/o battery):	1750g
Takeoff weight (3s 3000 lipo):	1980g
Max takeoff weight:	2200g
Never exceed speed, VNE:	205 km/h
Design maneuvering speed, VA:	165km/h
Stall speed, VS:	34 km/h



### Powerplant

Propeller:	aeronaut ELP 9/6 or APC 9/6 – 9/7.5
Motor:	2x <a href="#">Turnigy D3530/14 1100KV</a> or similar 3530-35 1100kv
ESC:	<a href="#">30A Electronic Speed Controller</a> or similar 30-40Amps
Battery:	Turnigy nanotech 3000 mAh/3s/11.1V, 238g, 25C

### 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



## Lockheed P-38 Lightning , History

The Lockheed P-38 Lightning was a World War II American piston-engined fighter aircraft. Developed to a United States Army Air Corps requirement, the P-38 had distinctive twin booms and a central nacelle containing the cockpit and armament. The P-38 was used for interception, dive bombing, level bombing, ground attack, night fighting, photo reconnaissance, radar and visual pathfinding for bombers and evacuation missions and extensively as a long-range escort fighter when equipped with drop tanks under its wings.

The P-38 was used most successfully in the Pacific Theater of Operations and the China-Burma-India Theater of Operations as the aircraft of America's top aces, Richard Bong (40 victories), Thomas McGuire (38 victories) and Charles H. MacDonald (36 victories). In the South West Pacific theater, the P-38 was the primary long-range fighter of United States Army Air Forces until the appearance of large numbers of P-51D Mustangs, toward the end of the war.

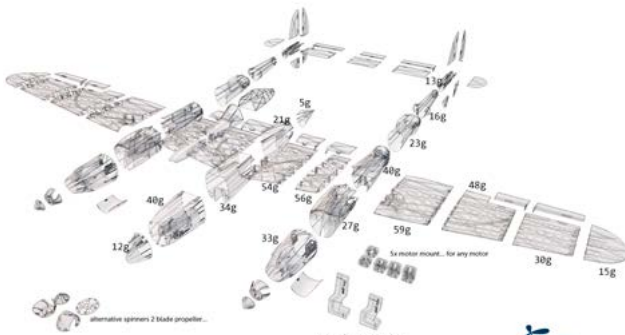
The P-38 was unusually quiet for a fighter, the exhaust muffled by the turbo-superchargers. It was extremely forgiving and could be mishandled in many ways but the rate of roll in the early versions was too slow for it to excel as a dogfighter. The P-38 was the only American fighter aircraft in production throughout American involvement in the war, from Pearl Harbor to Victory over Japan Day.[citation needed] At the end of the war, orders for 1,887 more were cancelled.



## Included:

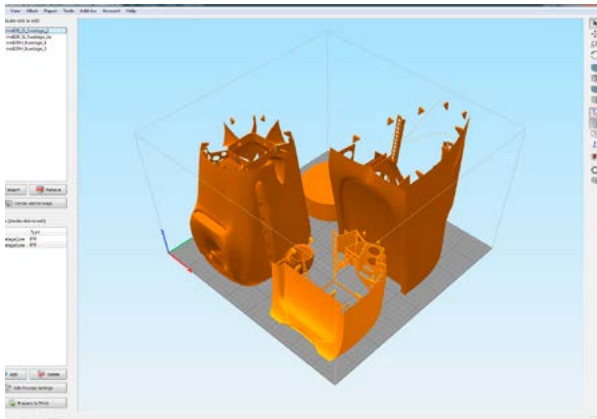
### 1. STL 3d files

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

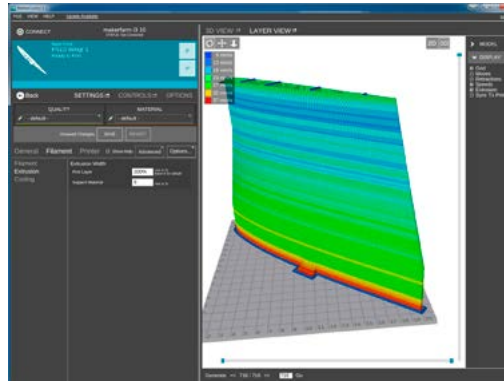
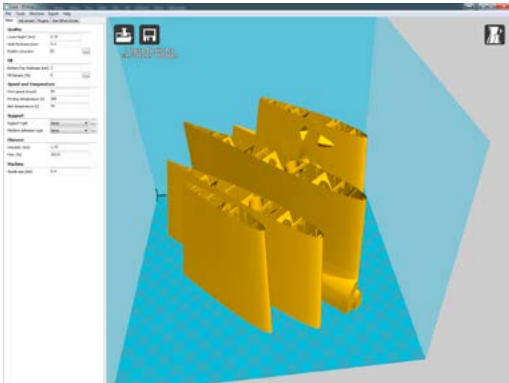
Apart from this userguide, please give a look to the Printing Guide with some Tips and Advices for airplane printing (Thin Wall Printing)

### 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

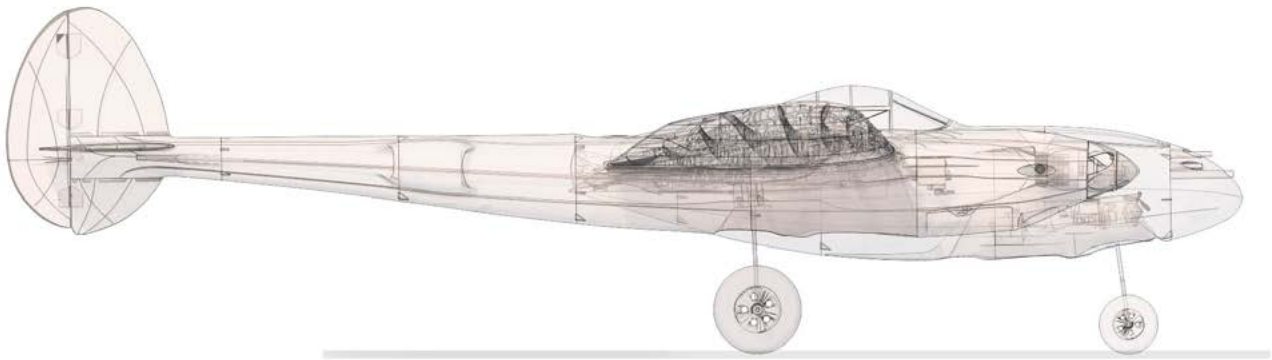
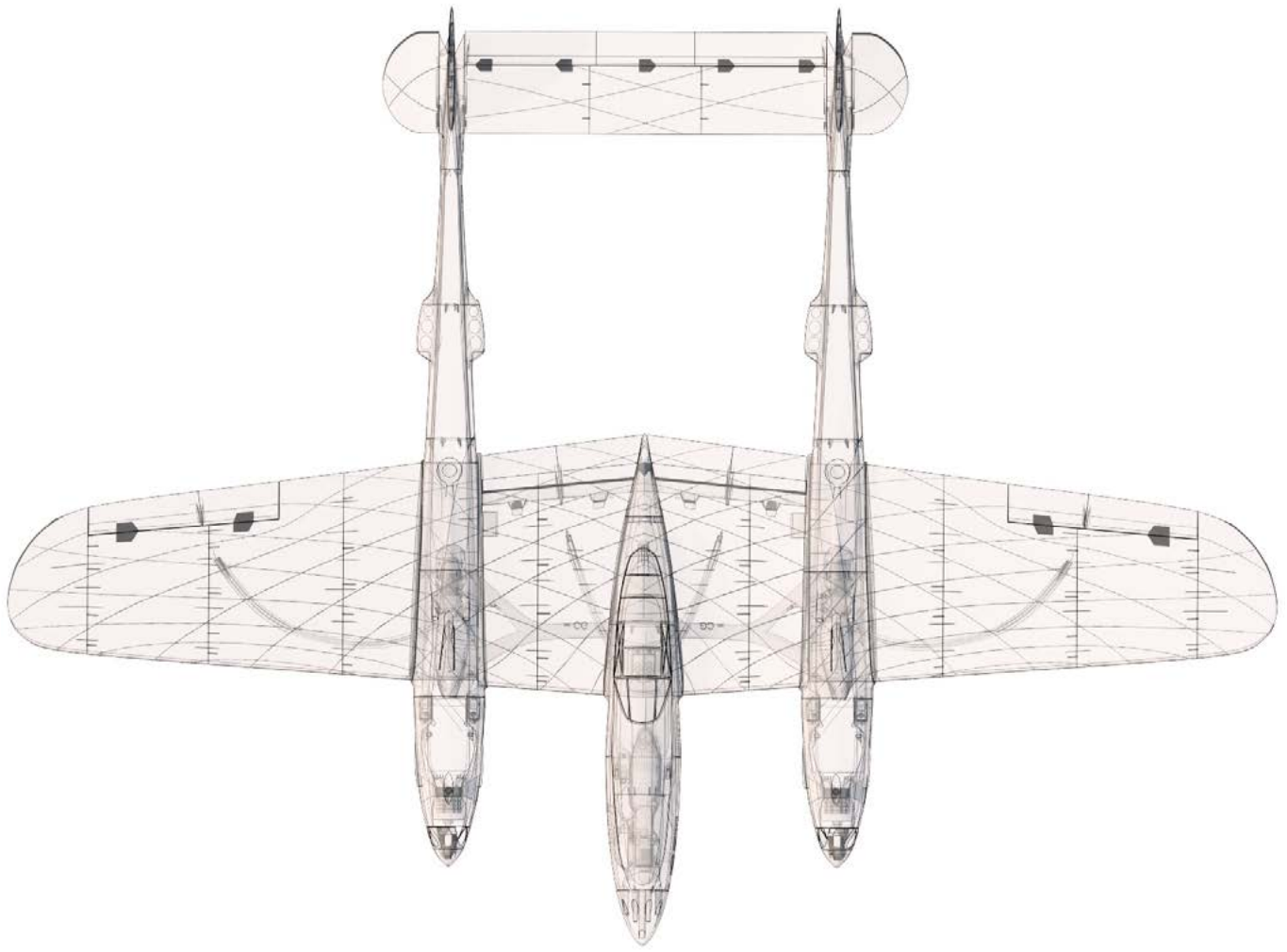
If you dont like Simplify3D for any reason, there is always possibility to use another free slicer you can use our basic setting (setting files) as a start point and edit it as you need.



## 6.Scale markings PDF

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

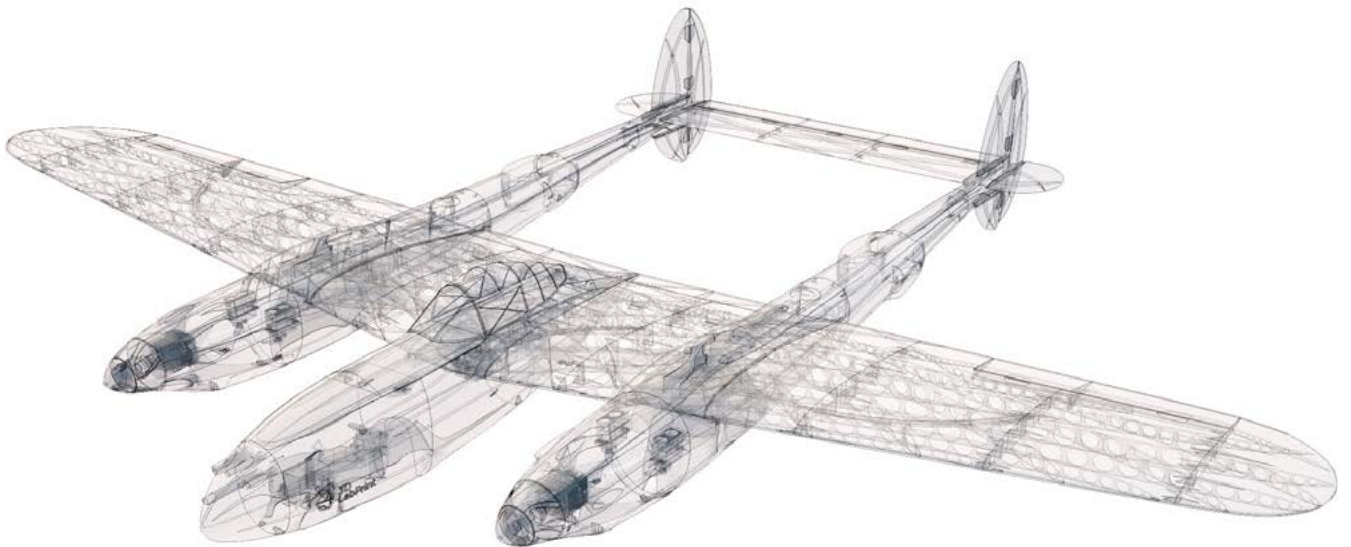




1042mm (41.0in)



1410mm (55.1in)





## 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

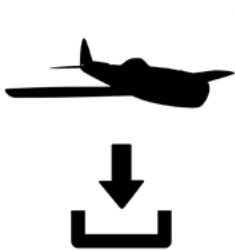
PLA filament (or PETG, APLA, htPLA, PC-max....) not ABS

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)

## 2. Create account, download

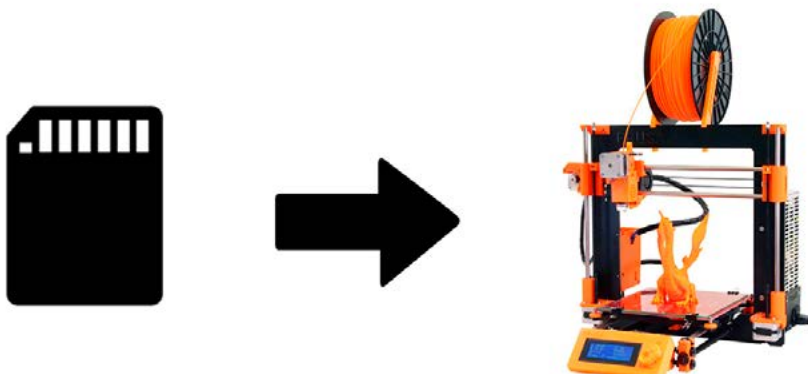
You will get download link for all files to your email (zipped) or you can log in to your account and download directly from our websites.



## 3. Gcodes preparing

### options A Gcodes:

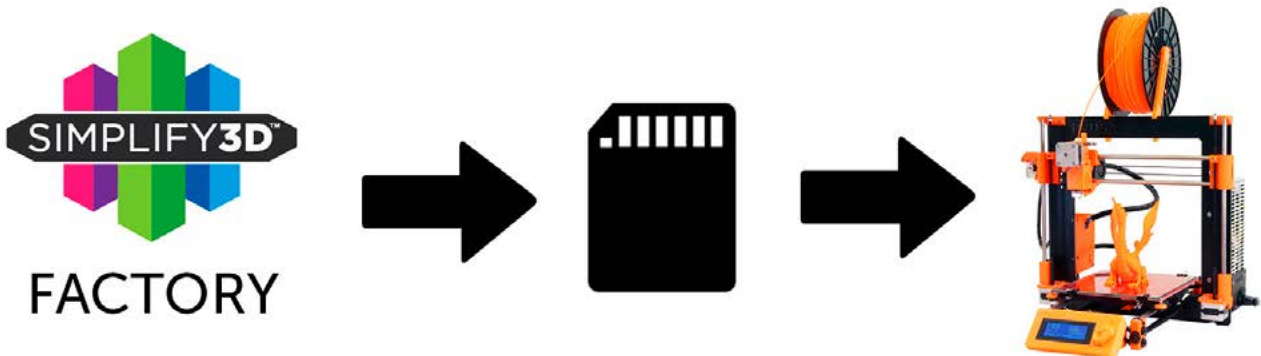
if your printer is i3 compatible you can directly use [prepared gcodes](#), simply save each to SD card and let 3d printer do his job, HE temperature is set to 230 for best layer bonding, you can edit speed and temperature on your printer LCD only. If Gcodes does not work please proceed to the next options.



[options B Factory files Simplify3D \(recommended\)](#)

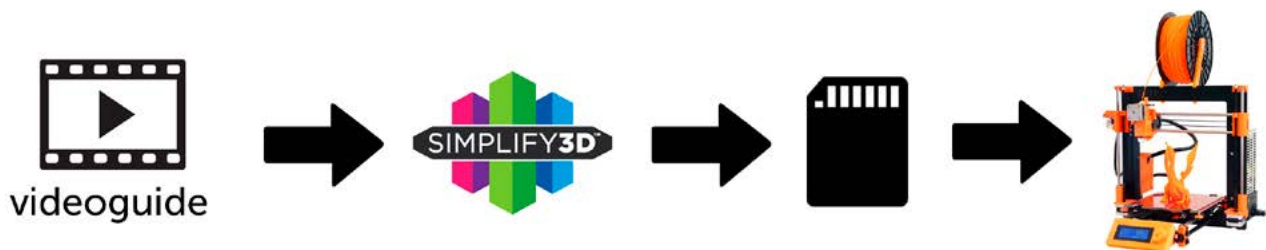
We prepare all you need in this files (basic FFF, parts arranged and so on...)

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.



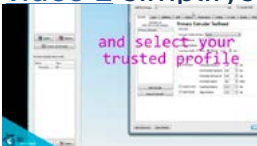
[options C Simplify3D manual setting \(watch and learn\)](#)

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.

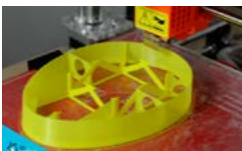


AND... please give a look to VideoGuides:

[video 2 Simplify3D setting](#)



[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!!!):

[CURA\\_wing\\_fuse.ini](#) (wing and fuselage and so on... parts)

[CURA\\_ailer\\_elev.ini](#) (only ailerons, elevator and rudder parts)

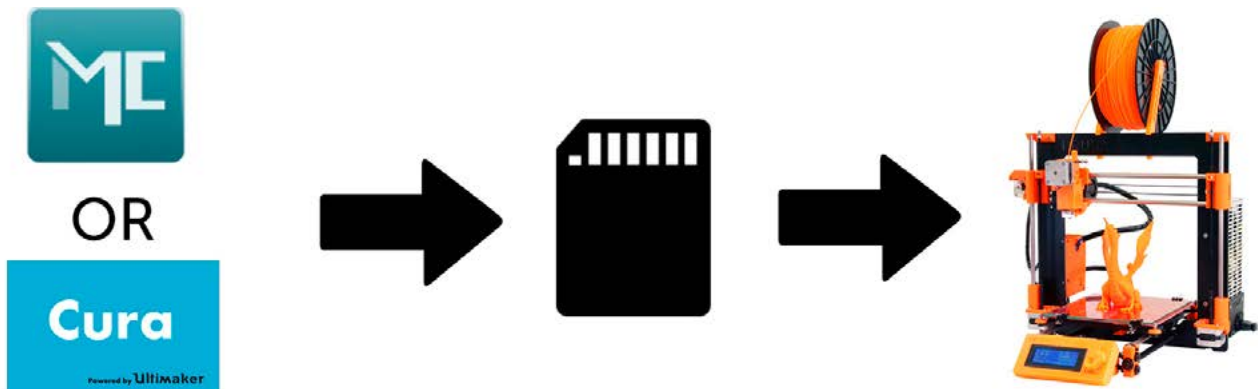
[CURA\\_thick.ini](#) (motor mount, battery holder, spinner)

OR

[MC\\_wing\\_fuse.slice](#) (wing and fuselage and so on... parts)

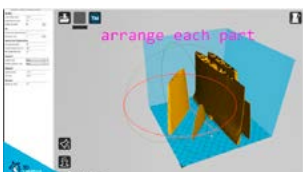
[MC\\_ailer\\_elev.slice](#) (only ailerons, elevator and rudder parts)

[MC\\_thick.slice](#) (motor mount, battery holder, spinner)

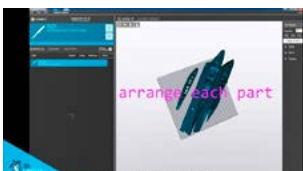


AND... please give a look to [VideoGuides](#):

### [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](#)

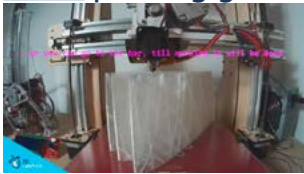
you will need: PLA filament - good quality and strong PLA (we need good layer bonding)

Strong hair spray (or your favorite adhesive bed surface)

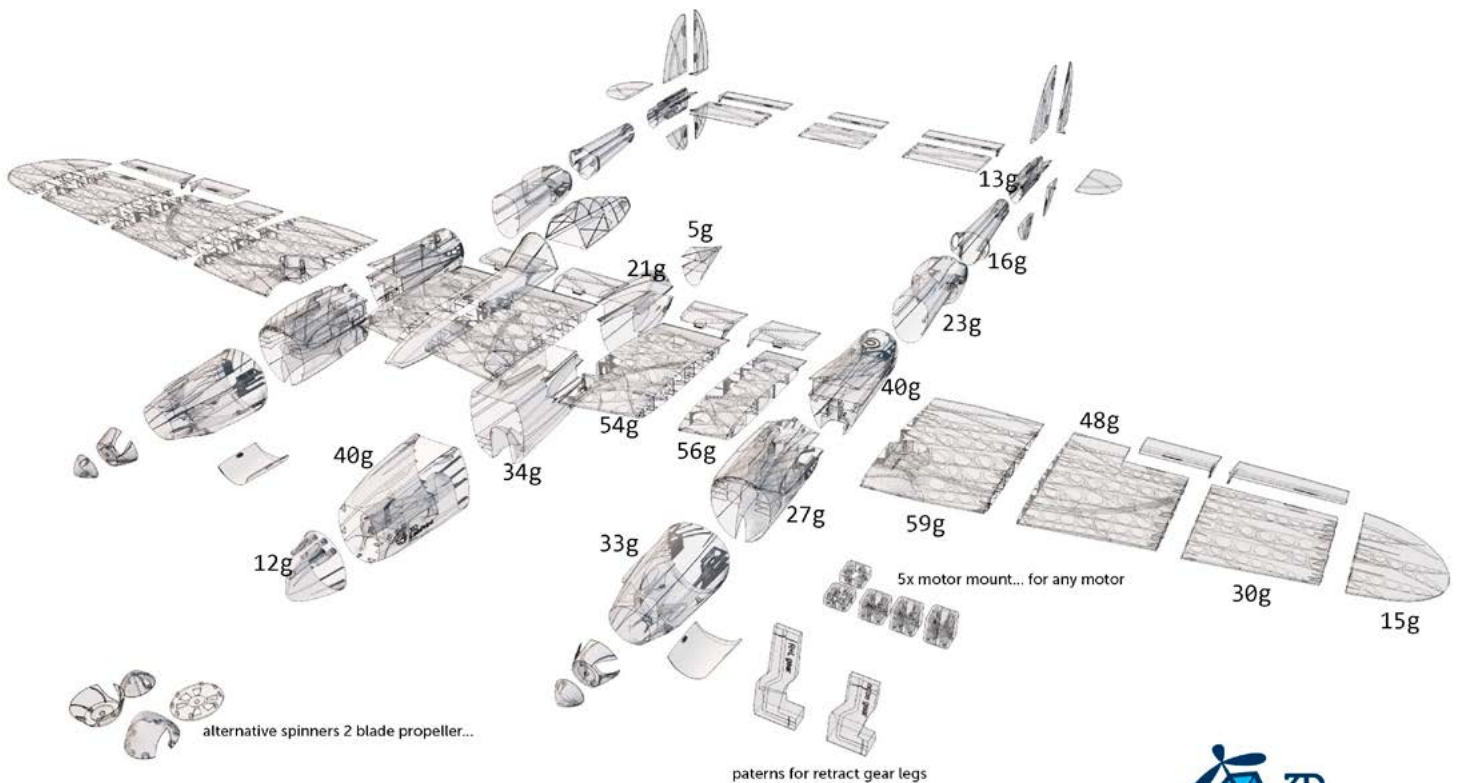
Razor blade

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...

Please, ailerons and elevator may differ from videoguide, simple glue them together..

[See video guide #4](#)

you will need: [CA Glue - medium](#) or similar medium viscosity CA glue

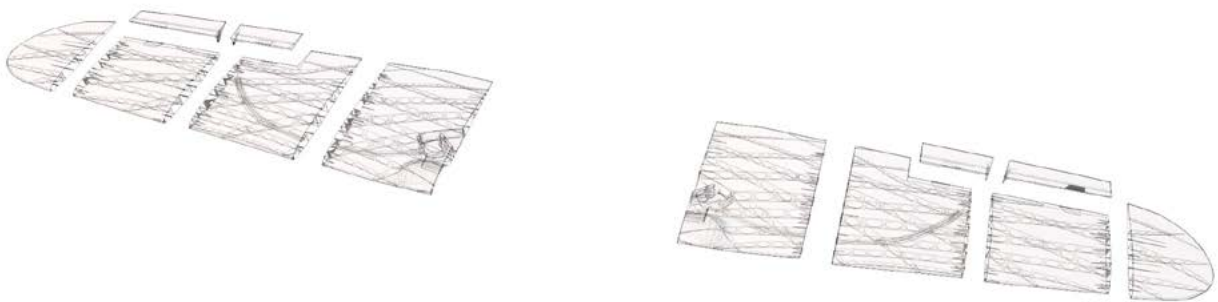
[Activator for CA Glue](#) or similar, but not-mechanical is better

[AC Hinge Sheet](#) or similar

Scissors

Snap knife

Some cloth for wiping CA glue...



### 5.2 Fuselage assembling

Glue with CA glue fuselage parts together, use activator, instal elevator, instal peg, fine tune parts shape with knife or sandpaper f.e. when assembling slots for wing and fuselage, first! fine-tune peg with a hole!!!

[See video guide #5 part1](#) [See video guide #5 part2](#)

you will need: [CA Glue - medium](#) or similar medium viscosity CA glue

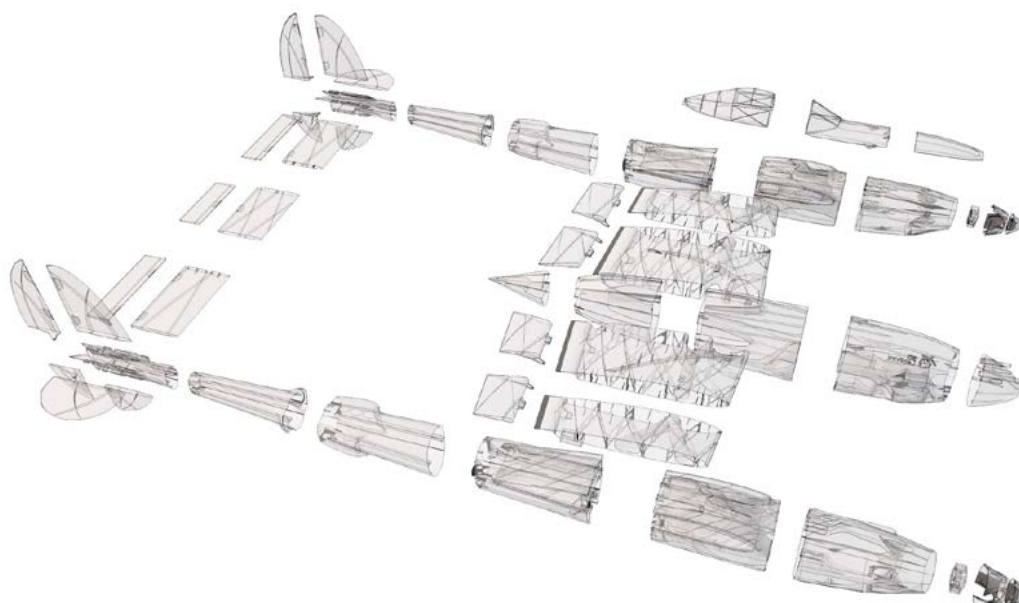
[Activator for CA Glue](#) or similar, but not mechanical is better

[AC Hinge Sheet](#) or similar

Scissors

Snap knife or Sandpaper

Soldering Iron or any hot tool



## 6. RETRACTABLE LANDING GEAR preparing

[See video guide #6](#)

you will need: [Main Landing gear servoless Retract](#)  
[Nose Landing gear servoless Retract](#)  
[2x main LG wheel + nose LG wheel](#)  
3mm quality LG spruts (spring steel), please ask in local hobby shop or any [LG wheel stoper](#)  
Tube clutch 3 to 4mm for steerable nose gear, please find any will fit...  
12 x Self Tapping Screw M3x12mm or similar  
2x [Servo Lead Extension](#) or similar  
[Y servo cable](#) or similar  
Screwdriver +  
Hex screwdriver 1.5mm  
Dremel or any steel handsaw  
Soldering Iron or any hot tool

Some recommended motor setups (or use your own with sufficient thrust and weight):

### ECO PERFORMANCE SETUP

you will need: 2x [Turnigy D3530/14 1100KV](#) or similar 3530-35 1100kv  
[2x30A Electronic Speed Controller](#) or similar 30-40Amps  
[Male XT60 connector](#)  
[Turnigy 3000mAh 3S 20C](#) or similar 3000-3300/3s  
or 2x 2000/3s (use 2to1 parallel connector)  
[16AWG Wire red and black](#)  
propellers, [scale 3 blade](#) or more efficient two blade 9/6 CW/CCW  
Solder wire and Soldering Iron  
printed motor mount, find the one which fits... (25/19)

**OR HIGH PERFORMANCE SETUP** (if you like it hot, yeah)prop 9/6, 9/7 fast:

you will need: 2x [Motor – AX-4008Q-620KV](#)  
2x [Speed controler \(ESC\) – CC Talon 25](#) or similar 25A/6s  
[6x PAIRS, 3.5mm Gold Connectors](#) - optional  
[Battery 1550mAh/6s](#) – or 2x 1550/3s better (use 2to1 serial connector)  
[16AWG Wire red and black](#)  
[Male XT60 connector](#)  
[Shrink Tube black](#)  
Solder wire and Soldering Iron  
[Hands free Holder](#) - optional  
propellers two blade 9/6 CW/CCW  
printed motor mount (25/25)

## 7. R/C Equipment and servo pushrods installing

Instal prepared RC equipment: Motor, ESC, Servos...

Nose and motor mount are already in angle for compensating rotating propeller stream. Test and center all servos with servo tester or transmitter, then instal horns in midle position... use HXT900 or any 21x21x23mm

[See video guide #7](#)

you will need: 9x 9g Servo HXT900

12x Servo Lead Extension or similar

Snap knife

8x Screw 3/12-30mm depends on motor-mount

Small screwdriver+

Your earlier prepared R/C equipment

6x Self Tapping Screw M3x8mm or similar

6x Steel pushrod, diameter 1.0-1.2mm

Pliers

CA Glue - medium

Activator for CA Glue or similar, but not mechanical is better

## 8. Receiver installing and LG retracts check

Refer to your R/C system userguide for installing information, check if Landing Gear Retracts work OK or if there is some blockage with LG spruts (too deep)

[See video guide #8](#)

you will need: Your own Rx/Tx system

Battery for your setup...

Velcro strip for Li-Pol battery

Scissors

Small screwdriver+

CA Glue - medium + activator



## 9. Final Completion

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 #9](#)

you will need: Your own Rx/Tx system

Battery for your setup...

Foam strip for Li-Pol battery

Scissors

[Propeller](#) + printed spinner

Small screwdriver+

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

Scale markings printed to adhesive foil



**!!!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 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.

Big But, it is very useful spend some time in this discusion, very very recommend:

[Basic to advanced ground handling take-off's and landing for warbirds](#)

## 11. Pilots Please Attention!!!

For the first flights we recommend set **center of gravity** of the airplane by about **5 mm forward** of the CG tag - nose heavy, this increases the stability (you can use heavier battery). Also is good to **increase expo** settings on your transmitter for elevator and ailerons to **80 %** (this calms response from your stick inputs)

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**

