3D LabPrint

User Guide

rev. 2020/10

Fully 3d printable

Albatros D.Va

scale 1:8,
wingspan 1064 mm / 41.9 inch

LW planes

Albatros D.Va

fully printable R/C plane for your desktop 3Dprinter

Fully 3D printable RC model of the German WWI ace maker, higly detailed scale model, but also cheap and easy to build RC model for everyday flying. Many scale details such as Mercedes-Benz 6 cylinder engine, Spandau machineguns and fuselage plating encouraging to create realistic paint jobs. This plane has been designed for printing from foaming LW-PLA filament, that allow even the small printed planes to be as light as any other RC plane building technique. Get ready for battle with this great performing flying legend!

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 $25

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 pioneer at your airfield.

Easy to assembly, you don't need any extra tools or hardware, just glue printed parts together and make pushrods for control surfaces. 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'll get a highly detailed scale WWI fighter. Low wing loading, high lift producing wing for very low stall speed allows easy landing and scale performance and long flight times.

General specifications (HP setup):

Wingspan:	1064 mm / 41.9 inch
Lenght:	883 mm / 34.8 inch
Height:	322 mm / 12.7 inch
Wing area:	33 dm2 / 3.55 square foot
Wing loading:	27,5 g/dm2 / 9.0 oz/square foot
Center of gravity:	45 mm from leading edge of upper wing
Airfoil:	special LHK mod. by 3DLabPrint
Print weight (LW PLA):	578 g / 20 oz
Empty weight (w/o battery):	780 g / 27 oz
Takeoff weight (3s 1300 lipo):	910 g / 32 oz
Max takeoff weight:	990 g / 35 oz
Never exceed speed, VNE:	80 km/h / 49 mph
Design maneuvering speed, VA:	50 km/h / 31 mph
Stall speed, VS:	15 km/h / 9.4 mph

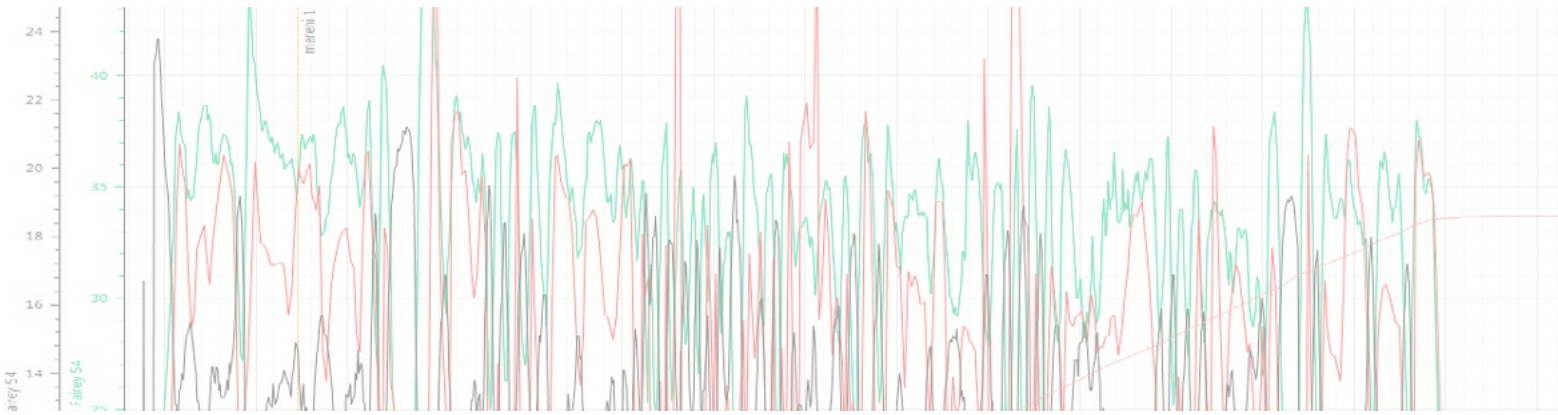
Recommended setup

Motor:	Leopard LC2830 980KV (for 3S setup)
ESC:	Turnigy 20A / 3S or similar
Propeller:	two blade slow flyer APC 10 x 4,7 SF
Battery:	LiPol 1800mAh / 3s

printed PET motor mount

Performance measurement

Max speed VH (level flight):	65 km/h – 35 kn – 40 mph with slow flyer APC 10 x 4,7 SF
Rate of climb:	5 m/s (960 ft/min) with slow flyer APC 10 x 4,7 SF
Flight time (3s 1500mAh/full):	12:30 with APC 9x6



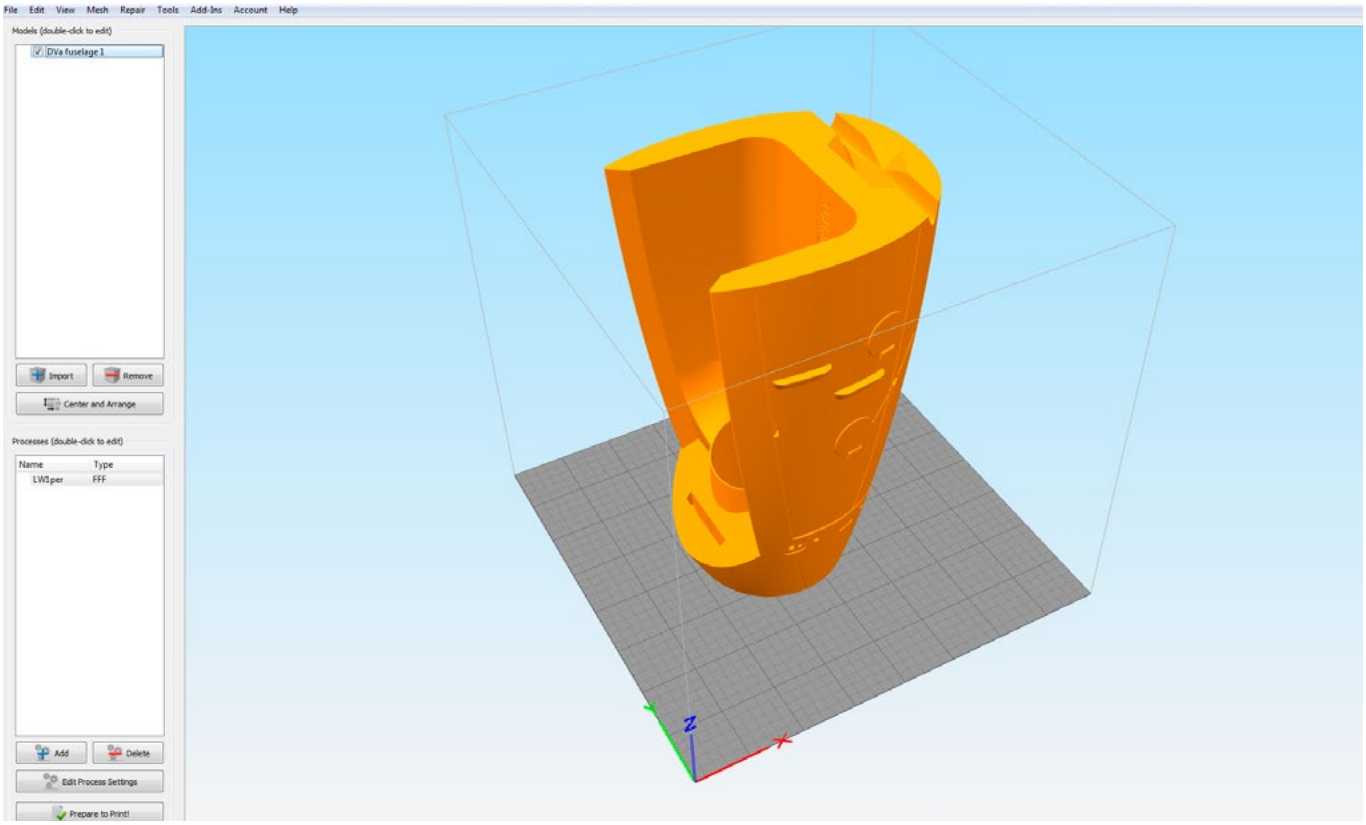
Albatros D.V / D.Va, History

The Albatros D.V was a fighter aircraft built by the Albatros Flugzeugwerke and used by the Luftstreitkräfte (Imperial German Air Service) during World War I. The D.V was the final development of the Albatros D.I family and the last Albatros fighter to see operational service. Despite its well-known shortcomings and general obsolescence, approximately 900 D.V and 1,612 D.Va aircraft were built before production halted in April 1918. The D.Va continued in operational service until the end of the war.
Over 4,600 Albatros D series fighting planes were built of which just two survive today, both D.Va's and these are to be found at the National Air and Space Museum in Washington D.C. and at the Australian War Memorial, Canberra.

Included:

1. STL 3d files

Universal STL files designed for vase mode to be used with desktop FDM 3d printers and slicer software as Simplify3D (recommended), CURA or MatterControl (these STLs are compatible with Slic3r).



2. Factory files for Simplify3D slicer - preffered

contains all the necessary settings to slice the models along with suggested bed layout. We're using PRUSA i3 ORIGINAL printers so you may need to adjust the basic printing parameters to match your printer or use these files as a start point for you. Please see the Simplify3D for more details

3. Step By Step PDF/VIDEO userguides

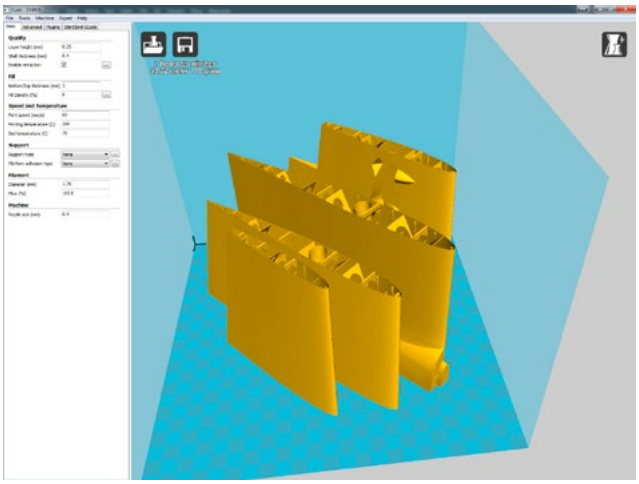
Please use this user guide along with the website Help section where you can find Tips and Advice for thin wall airplane printing, material guide, slicing info and more.

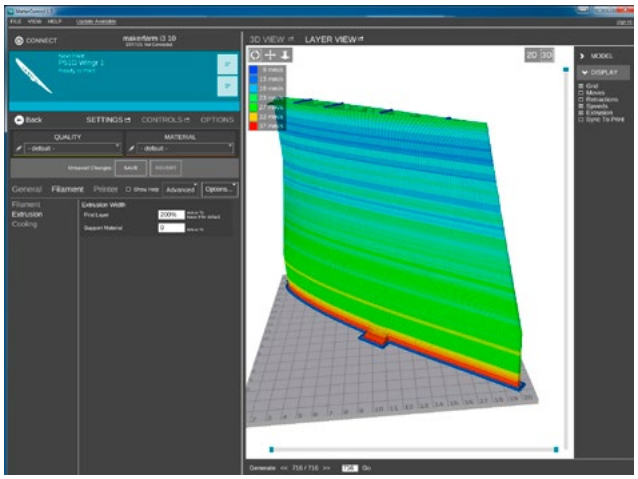
4. Gcodes

Basic Gcodes prepared for direct use. We made it as universal as possible. 100% compatible with PRUSA MK3 and most direct drive i3 style printers, Feel free to try it out, but we're not able to guarantee it's gonna work with your printer.

5. Slice on your own with CURA or MatterControl slicers

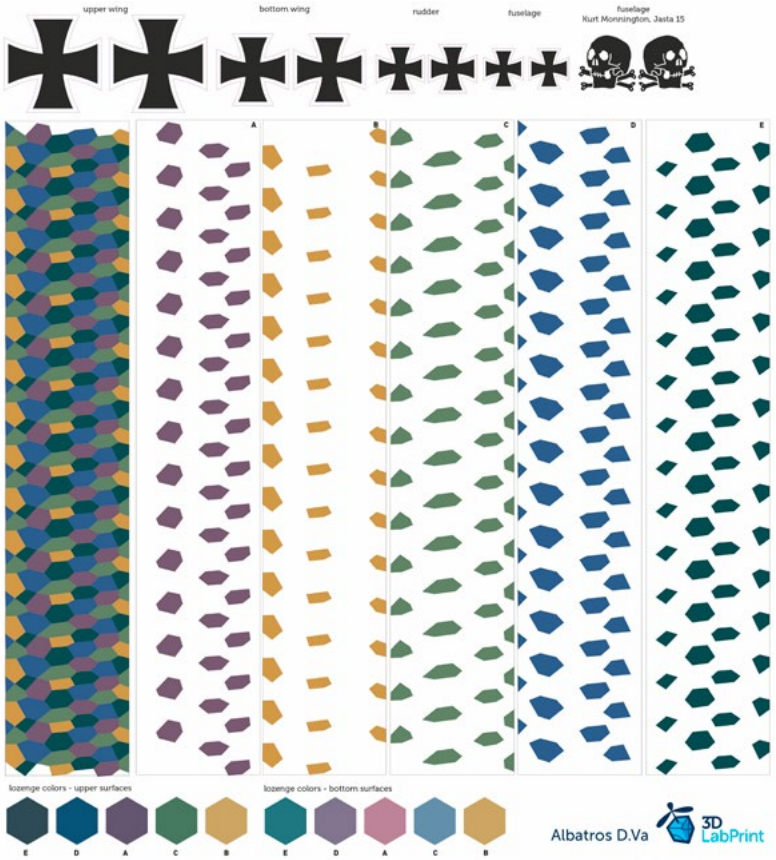
If you don't like Simplify3D for any reason, there is always option to use another free slicer Please follow our Cura guide in the Help section of the website where you can find the basic single-wall profile. Remember: We're using 0 mm retraction with LW-PLA.



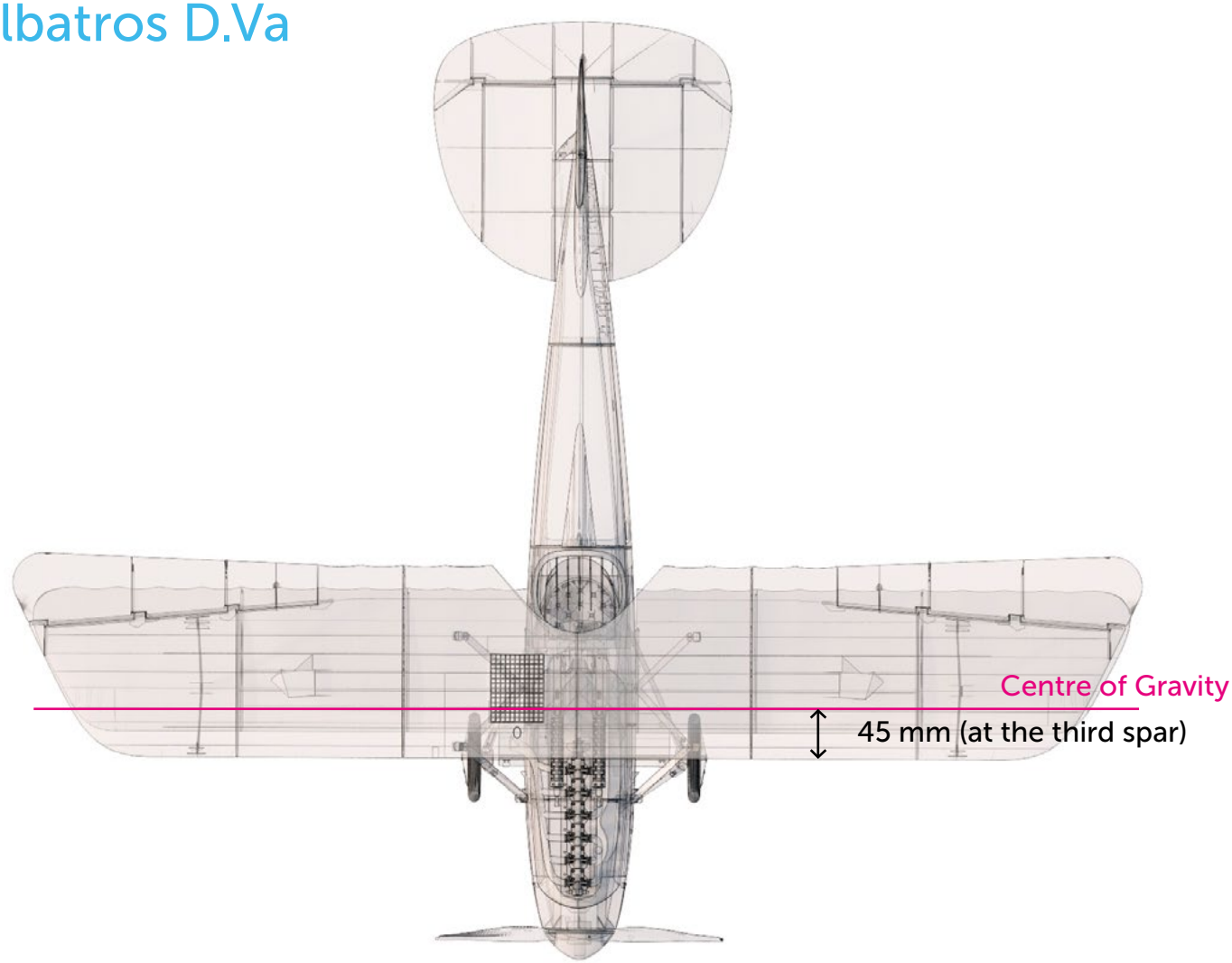


6. Scale markings PDF

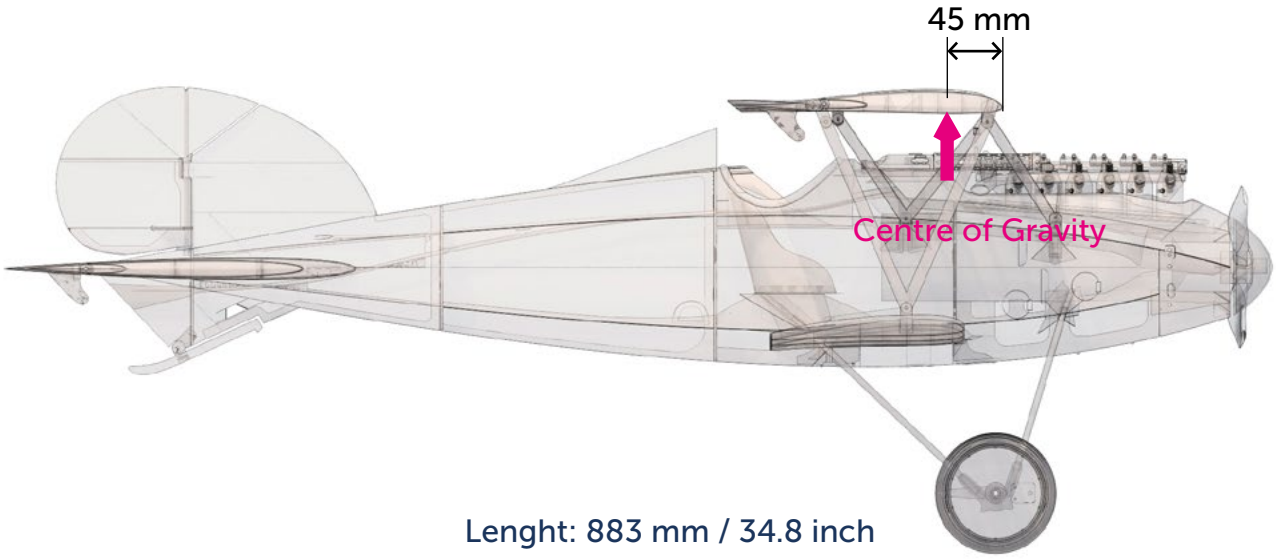
Lozenge patterns and markings mask for easy airbrush painting. You could cut this PDF in scale from thin self adhesive advertisement foil and place it on the model as required.



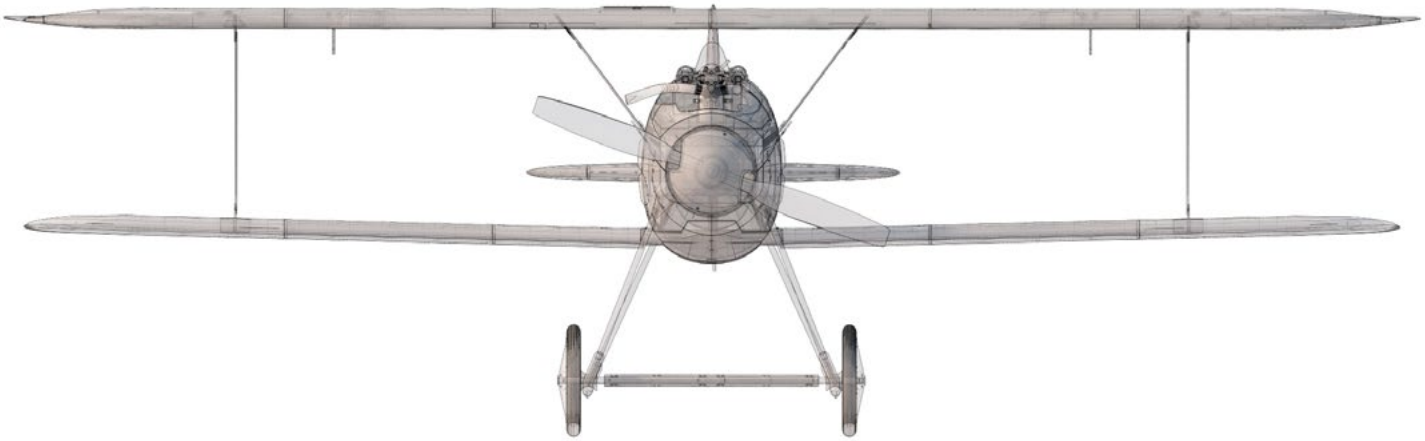
Albatros D.Va



Wing area: 33 dm2 / 3.55 square foot



Lenght: 883 mm / 34.8 inch



Wing span: 1064 mm / 41.9 inch

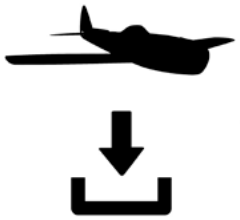
Step By Step PDF/VIDEO userguide

1. Choose airplane at www.3Dlabprint.com, visit our Facebook for latest info.

Basic requirments for Albatros D.Va are 195/195/195 mm volume, nozzle 0.4mm recommended (0.35 or 0.5mm alternativelly). Heated bed recommended. Designed to be printed in vase mode with LW PLA filament by Colorfabb.
Contact: support@3dlabprint.com

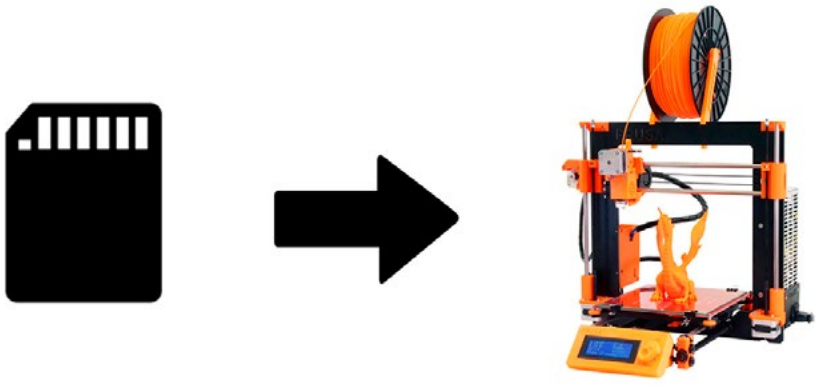
2. Create account, download

You will receive download link to all the zipped files to your email (please check your spam folder if not) or you can log in to your account and download directly from our websites.



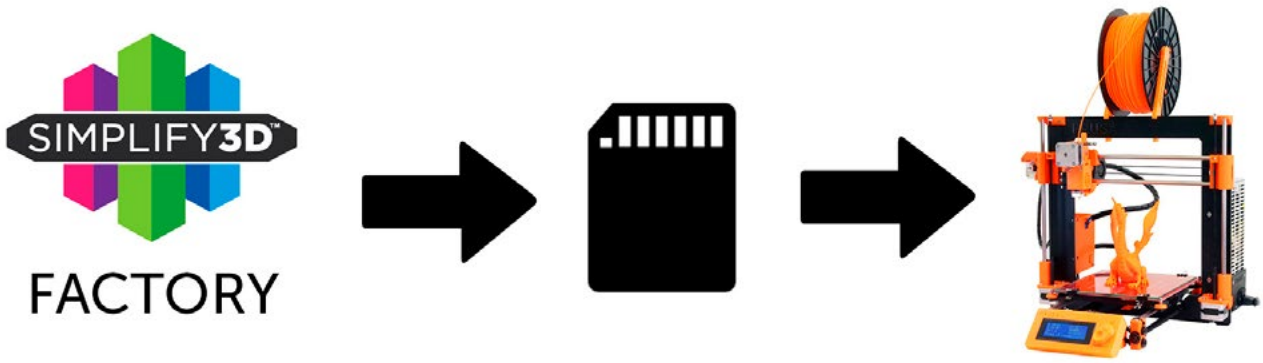
3. Gcodes preparing

option A Gcodes:
if your printer is i3 comptatible you can use prepared gcodes directly. Just save them to the SD card and let the 3d printer do it's job. HE temperature is set to 230°C so the layers fuse together well, you can adjust speed and temperature only through your printer's LCD. If these Gcodes does not work for you, please proceed to the next options.



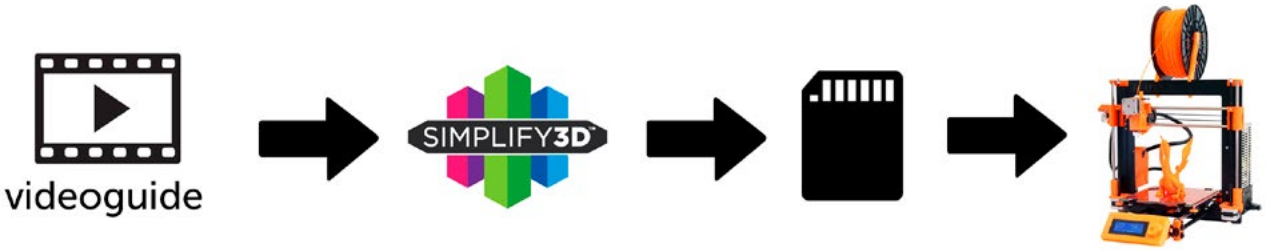
option B Factory files Simplify3D (recommended):

We prepared all you need in these files (FFF process settings, parts layout on bed, etc...) You can use these settings as a start point. Adjust according to your need (adapt for your printer), print single parts and so on... Most 3d printers should work just with these settings, but please go through the settings and amend if necessary, we are not liable for any damage resulting from using our settings. If this still does not work for you, please proceed to the next option.

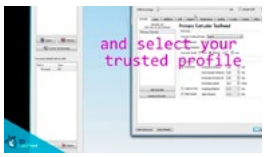


option C Simplify3D manual setting (watch and learn):

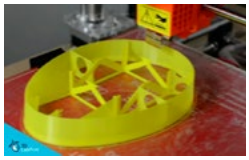
Use our video guide 2 and check our Simplify3D reference guide for proper setting... this is very good option and you will learn a lot about Simplify3D and become an 3d printing expert. Remember: We're using 0 retraction with LW-PLA (extra restart distance still active).



AND... please watch our VideoGuides:



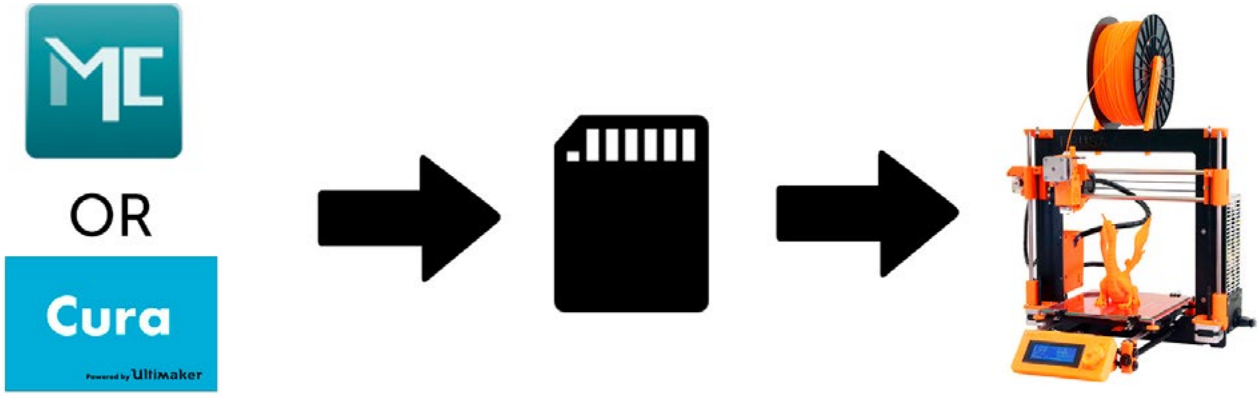
video 2 Simplify3D setting



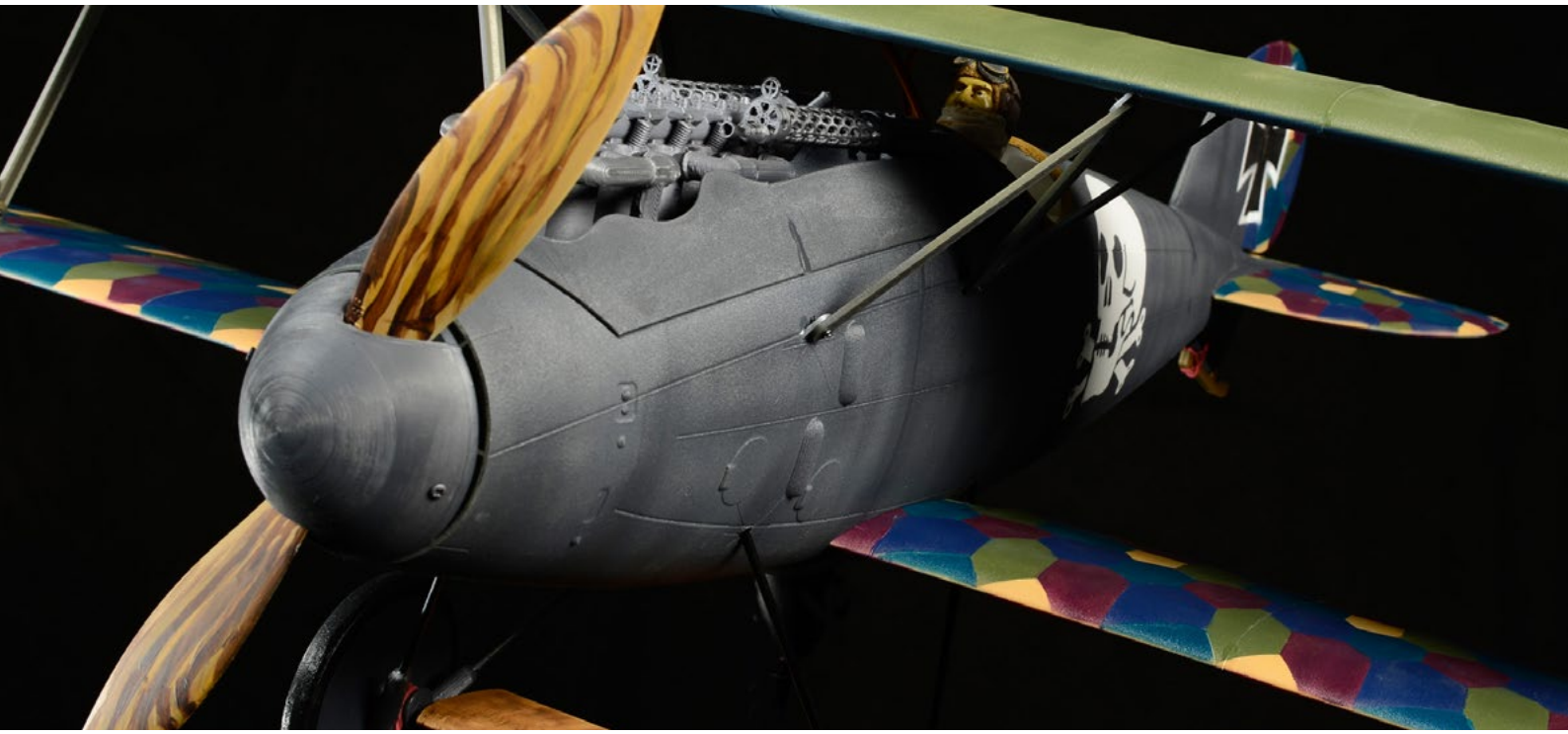
video about Thin Wall Printing (normal PLA)

option D CURA or MatterControl

MatterControl and CURA are free and provide satisfactory 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.
As a starting point you can use our predefined CURA or MC slicer setting file - see below (always adapt it for your printer, change build volume, filament diameter, etc... according to your printer!!!)
Please check our CURA guide on the website for the latest basic profile. Please visualise our presliced gcodes to see how the result should look like and try to achieve the same in your slicer. Remember: We use 0 retraction with LW-PLA.



Please watch our VideoGuides...



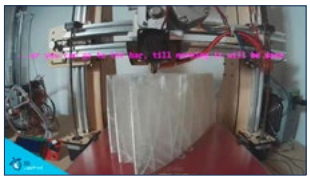
4. Print it

Save the Gcodes to the SD card and insert into your printer. Prepare your printer and start printing, we prefer to use SD card rather than direct USB connection. Scaling the model will lead to unusable result!

you will need: LW PLA filament - (by ColorFabb)
3DLac, Strong hair spray, PEI or your favorite adhesive bed surface
Razor blade

AND... please watch our VideoGuides:

video printing guide



LW planes

Basic Tips and Advice

While stadard PLA filament could possibly be used, this plane has been designed to be printed from foaming LW-PLA by ColorFabb that means about 50% weight reduction on printed parts.

Please Experiment with temperature and extrusion multiplier. Hotend temperature is very important (220° up to 260° celsius). The temperature determines, how much the LW-PLA foams while printing. Cranking up temperature means, you can go lower on multiplier as the material will gain on volume. Turn OFF cooling fan for better layer adhesion (HE fan should be ON). We dont need it for thin wall printing. Heated bed is very recommended, 55-60° Celsius (to prevent warping ends).

Price of the LW-PLA may look a bit steep at first glance, but since we're using 50% less material thanks to the foaming feature, the cost difference is not so high as it looks.

LW-PLA by ColorFabb comes in two colours. White and Black. We found no difference in printing of both colours, but the black colour will probably attract the sunrays more, causing warping of the thin wall surface. There are many 3d printers on the market, most of them are capable of printing our airplanes (specific thin wall printing...) suficient volume, heated bed, 0.4mm nozzle.

Please see the Printing Guide (FAQ):

Albatros D.Va
weights of printed parts

Albatros D.Va is another member of LW Planes series designed for easy and cheap flying. The build is simple even for a beginner. Its very low weight, easy assembly and fantastic flight characteristics makes this model an ideal plane for beginner RC pilots.

Very suitable for dads and kids. Children will learn some modern building skills and technology and most of all have fun. This is the reason, why every dad should have a 3D printer at home.

This model has been completely designed with a new LW PLA material by ColorFabb in mind.

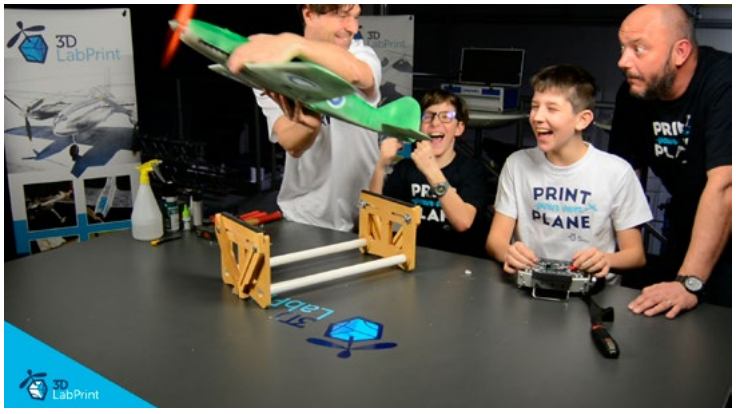
Parts printed from this LW PLA are light, easily sanded and glued together. This model requires only about 400 g of this material, that means it's a very cheap build. In case of accident, parts can be easily reprinted for just a filament cost.

The LW material is using an active foaming technology to achieve lightweight, low-density PLA parts. At around 230°C this material starts foaming, increasing its volume by nearly 3 times.

All parts of this plane should be printed from LW-PLA as written in table.

Enjoy the fun together!

LW planes



material:	LW PLA	PLA
F1	36 g	
F2	44 g	
F3	23 g	
F4	20 g	
F5	5 g	
fuselage cover 1	8 g	
fuselage cover 2	10 g	
fuselage cover motor arm		32 g
fuselage struts (pair)		12 g
fuselage struts pins		5 g
wing upper L1	22 g	
wing upper L2	21 g	
wing upper L3	17 g	
wing upper L4	0,5 g	
wing upper R1	22 g	
wing upper R2	21 g	
wing upper R3	17 g	
wing upper R4	0,5 g	
wing bottom 1	10 g	
wing bottom L2	11 g	
wing bottom L3	16 g	
wing bottom L4	16 g	
wing bottom R2	11 g	
wing bottom R3	16 g	
wing bottom R4	16 g	
aileron L1	1,6 g	
aileron L2	1,6 g	
aileron L3		3 g
aileron L4	4,5 g	
aileron R1	1,6 g	
aileron R2	1,6 g	
aileron R3	3 g	
aileron R4	4,5 g	
wing struts (pair)		11 g
wing struts pins		3 g
stabiliser L1	7,5 g	
stabiliser L2	3 g	
stabiliser R1	7,5 g	
stabiliser R2	3 g	
elevator L1	1,5 g	
elevator L2	3 g	
elevator L3	1 g	
elevator R1	1,5 g	
elevator R2	3 g	
elevator L3	1 g	
rudder 1	2 g	
rudder 2	3 g	
rudder 3	3 g	
gear parts (axle)		3,3 g
gear junction (pair)		6 g
gear axle cover	6 g	
gear disc (pair)		24 g
gear tyre (pair) FLEX		34 g
tail skid		3,5 g
motor mount		9,5 g
spinner plate		4,5 g
spinner top		4,5 g
engine exhaust		18 g
seat	8 g	
Spandau guns (pair)		14,5 g
water cooler		0,5 g
printed weight		**579 g**

How to print LW-PLA?

The basic print setup is almost the same as we use for standard PLA. The only difference is in extrusion multiplier set to 0.5 and turning off the retractions completely.
This results in parts with half the weight and still suitable mechanical properties. All LW parts of our Albatros are designed to be printed in vase mode!
The nozzle is permanently pressurized, so it's less prone to print failures. This method works fine even for bowden printers. Extrusion multiplier 0,5 has been tested for easy print with massive weight saving around 50%. Feel free to experiment with extrusion multiplier and temperatures to achieve the best results on your printer.
Cosmetic printing issues are easily fixed with snap knife or sand paper, as the LW is easily sanded and cut.

Official guide by ColorFab - How to print LW-PLA

colorFabb

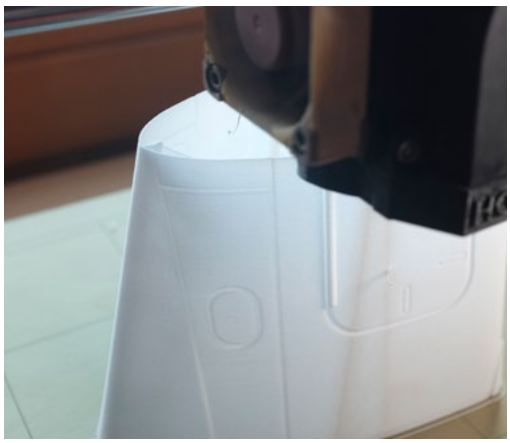
colorFabb B.V.
The Netherlands

LW-PLA
shop:
https://colorfabb.com/lw-pla-natural

email sales:
sales@colorfabb.com
email support:
support@colorfabb.com

How to glue LW-PLA?

The new 3DLabPrint locking system allows a new method of glueing using thin CA. Dry assemble parts together and align them. Add few drops of thin CA glue using needle applicator and let it pour into the joint. Wipe any excess glue with a napkin, then apply activator for instant curing. The result is strong, clean, perfect joint.



5. Assembly of printed parts

5.1 Wing assembly Albatros D.Va

Glue wing parts L1-L4 together using thin CA glue method (with needle applicator). Repeat for the right side. Glue both halves of the wing together. Repeat the procedure for bottom wing. Use the activator for instant curing the glue. You can use aslo clasic medium CA glue (also shown in the video)

Assemble and glue the ailerons L1-L4 on a flat surface (pay attention for negatives, tips should point upwards!) and repeat for the right side. Use a suitable 0,8mm - 1,2mm carbon rod or wire as a hinge for the ailerons. Just slide it in, there's no need to glue the hinge for easy aileron or servo replacement.

See video guide #4

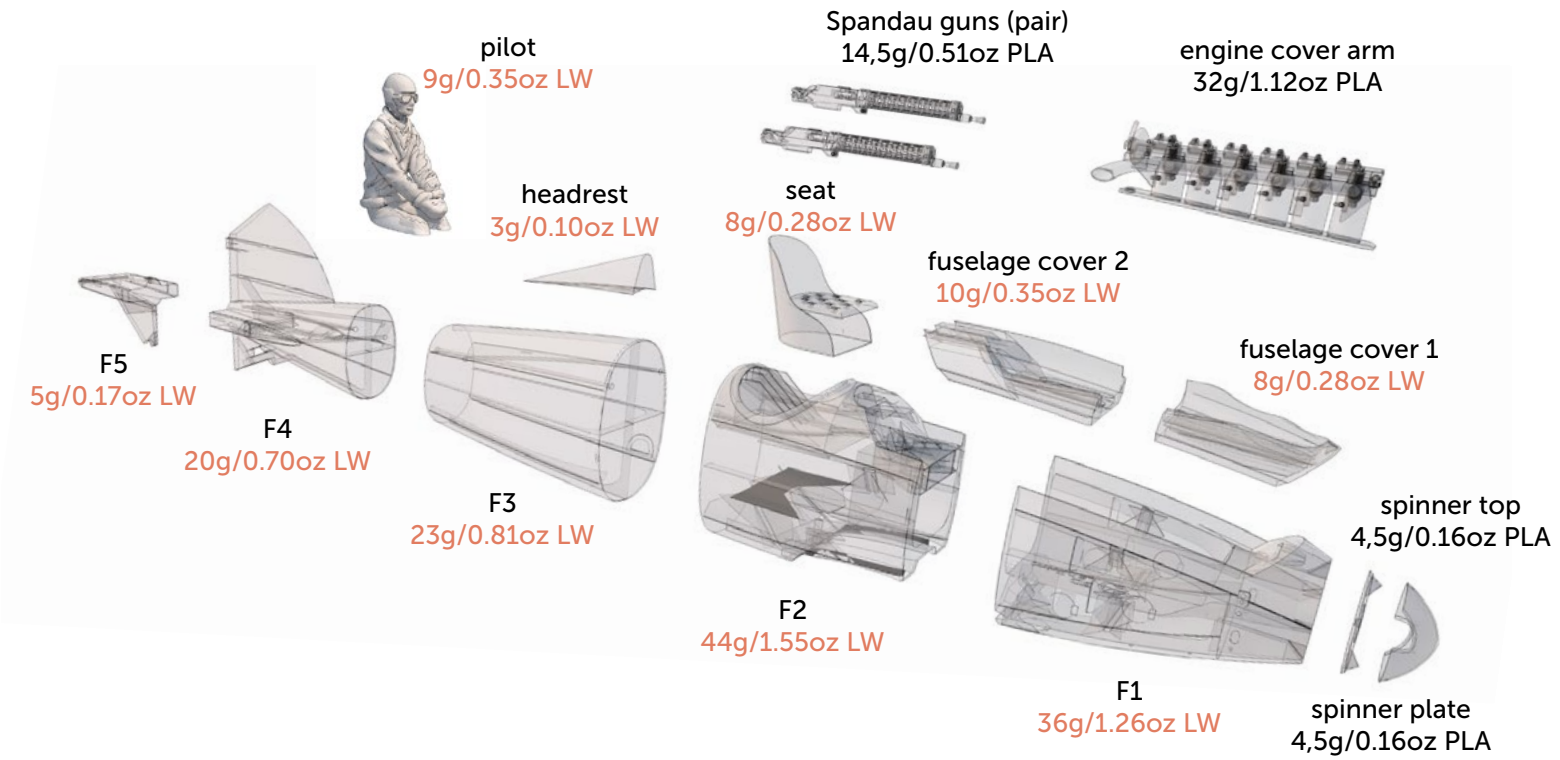
you will need: CA Glue thin viscosity + activator (or medium CA glue)
needle applicator (needed for thin CA glue)
0,8 - 1,2 mm carbon, fiberglass or steel wire for aileron hinge
Snap knife, Some cloth for wiping CA glue...

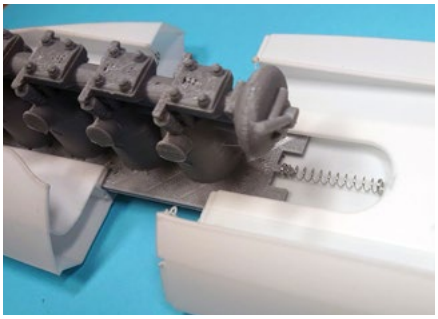
5.2.1 Fuselage assembly Albatros D.Va

Assemble all the fuselage parts F1-F5 using thin CA glue. The new 3DLabPrint lock system will help you. Pay attention to align all the parts properly before applying the glue, especially the part F4, so the stabilizers are perpendicular to the wing.
Insert a ball pen spring for a cover latch (the engine replica) before glueing the fuselage cover parts. Add all the optional scale accessories, such as Spandau machine guns, seat, headrest, exhaust, intake and a pilot...

See video guide #5

you will need: CA Glue thin viscosity + activator (or medium CA glue)
needle applicator (needed for thin CA glue)
Snap knife, Some cloth for wiping CA glue...
1x ball pen spring



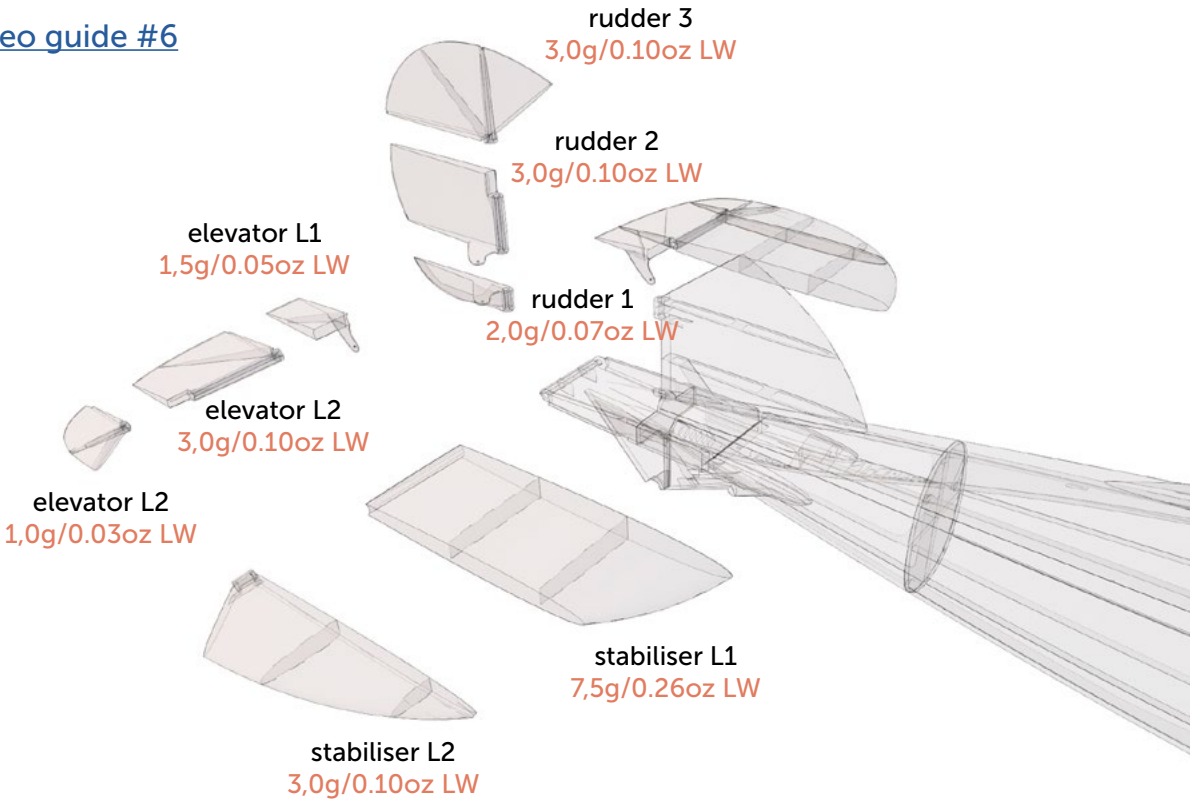

ball pen spring

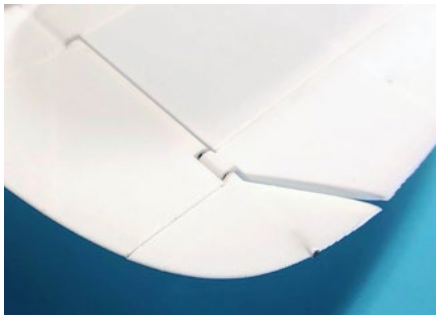
5.2.2 Fuselage tail - elevator pushrods and servos

Glue L1 and L2 parts of the stabilizer and elevator. The profile is symmetric, so the left and right sides are identical. Pay attention to alignment of the stabilizers against the fuselage. Make a Z bend on the elevator and rudder 0,8 mm pushrod wire. Mount the elevator assembly to the stabilizer using the 0,8 - 1,2 mm carbon rod or steel wire. Just slide it in, there's no need to glue the hinge for easy aileron or servo replacement. Elevator and rudder should move freely, controlled by the pushrod and servo. Check the functionality of the elevator and rudder assembly.

you will need: CA Glue thin viscosity + activator (or medium CA glue)
needle applicator (needed for thin CA glue)
0,8 - 1 mm steel wire for elevator pushrod
0,8 - 1 mm carbon or steel wire for elevator and rudder hinge
Snap knife, Some cloth for wiping CA glue...

See video guide #6



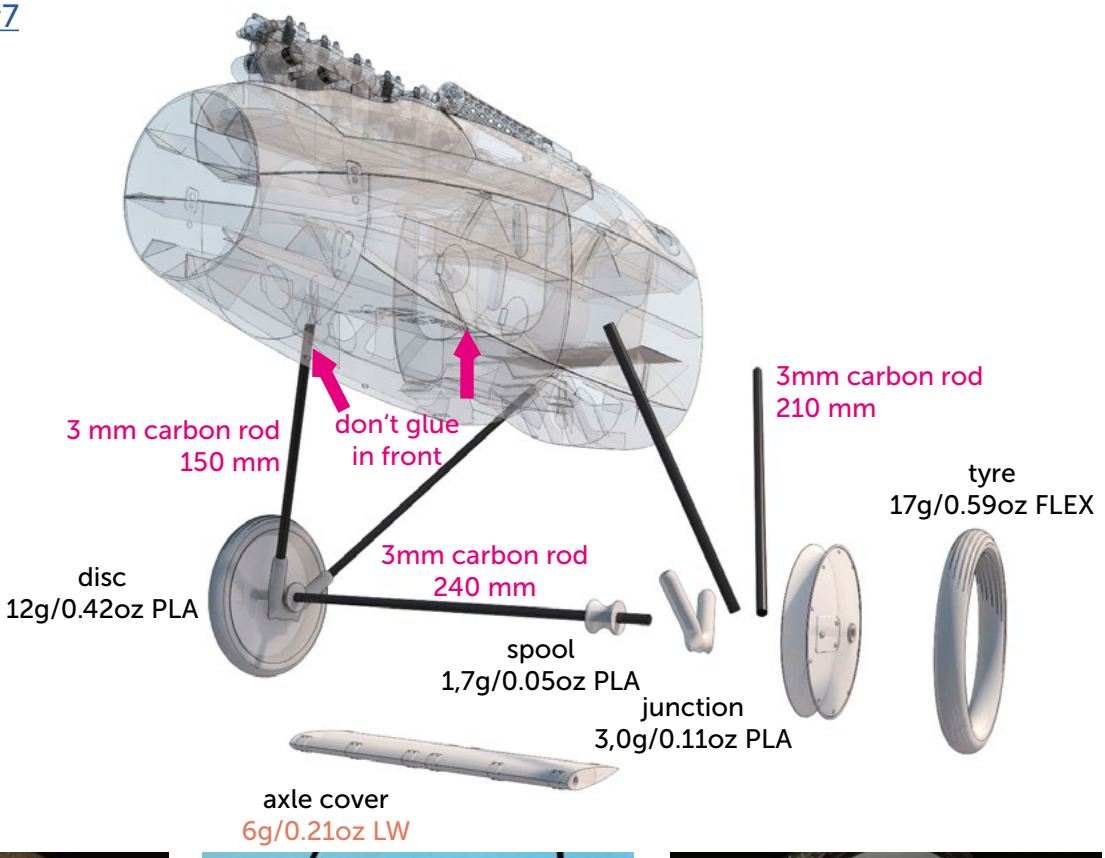


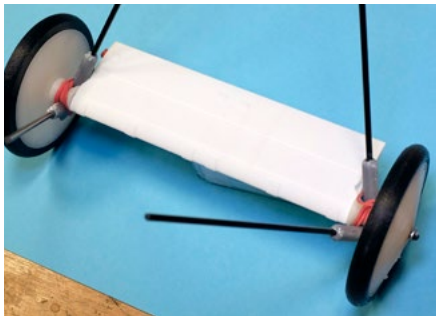
5.2.3 Fuselage gear

Slide the 240 mm long 3 mm carbon rod into the axle cover and fix it with CA glue followed by glueing both axle rollers (keep a small gap between the roller and axle cover). Assemble left and right side of the landing gear using carbon fibre rods and junction parts. Fix the rollers to the junctions using rubber rings. Practice the rubber ring joint and make it reasonable soft for smoother landings. Install tyres on disks and secure the wheels on axle using collars.Make sure the wheels rotate freely. Slide in the landing gear to the fuselage. Don't glue the rods in for easy replacement. If you decide to glue the gear in the fuselage, do it only on the rear side, or you won't be able to install bottom wing.
Note: if your flex material for printing tyres is too thick, cut the disk STLs in half and print separately. You can also use off the shelf 60x10 mm rubber O rings as tyres.

you will need: CA Glue thin viscosity + activator (or medium CA glue)
3 mm carbon rod, 1pc 240mm, 2pcs 150mm, 2pcs 210mm
2x office rubber band

See video guide #7



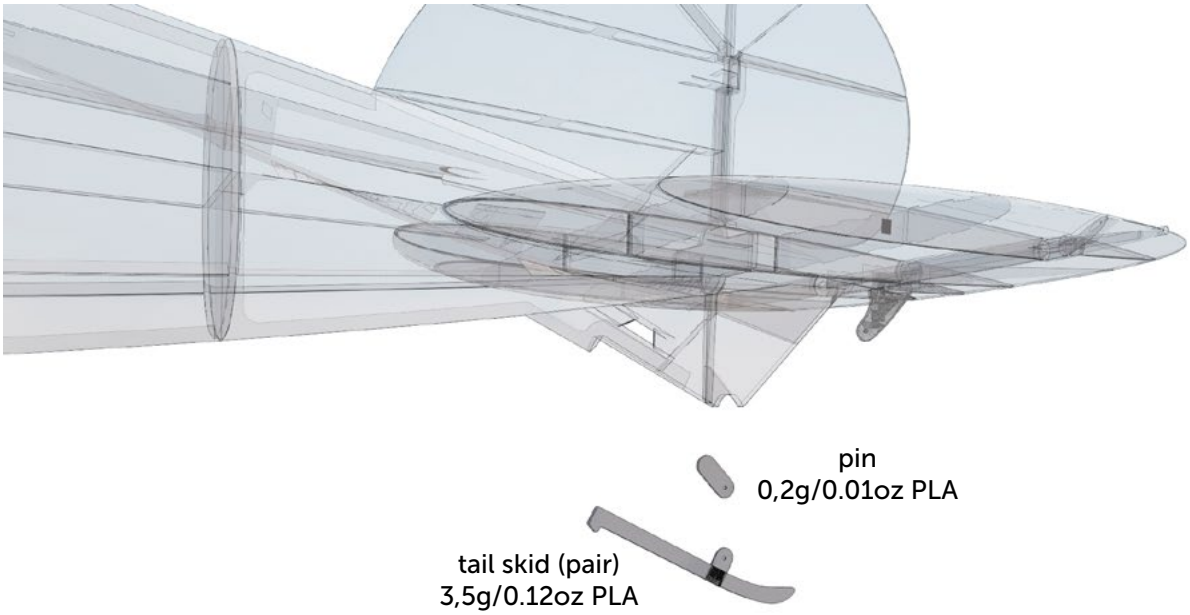


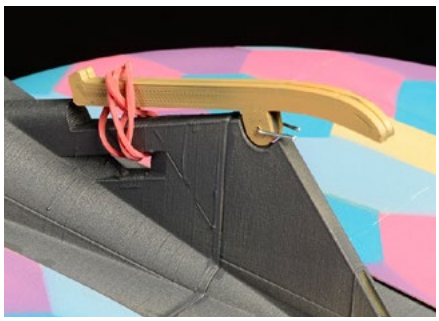
5.2.4 Fuselage tail skid

Glue L and R parts of the tail skid together. Glue pin (from wing or fuselage pin pack) to the fuselage. Hinge tail skid by wire from office pin. Band a rubber band around tail skid. Tail skid should move freely. Check the functionality of the tail skid assembly.

you will need: CA Glue thin viscosity + activator (or medium CA glue)
0,8 - 1 mm steel wire or office pin
1x office rubber band

See video guide #7





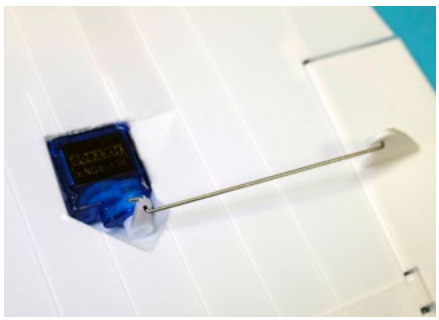
6. Servo installation

Cut loose the servo holder ears on aileron servos. Install the prepared servos to wing servo bays. Use a 1mm steel wire with Z bends as a linkage between the servos and aileron control horns. Elevator and rudder servo will be fixed directly to the fuselage by included screws.

See video guide #8

you will need:

4x HXT900, or opt1, opt2, opt3
or any similar sized servos
23x12x26 mm / 0.74x0.42x0.78 inches
2x servo extension cables 300mm / 12 inch
Snap knife, Z pliers
medium CA glue or hot glue
servo tester or your RC system

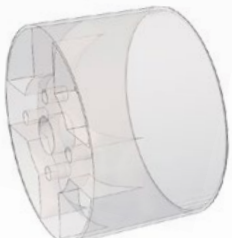


7.2 Fuselage - motor mount & ESC & battery holder

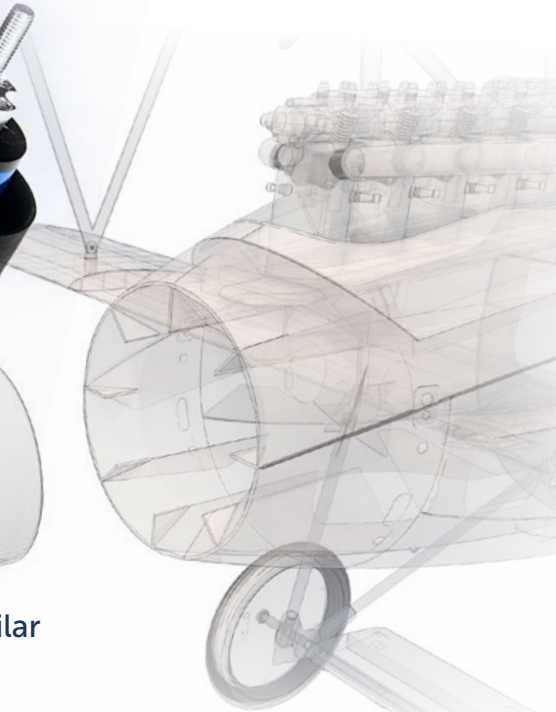
Mount the motor using 4x M3 screws and nuts to the printed universal motor holder 16 x 19mm. For long motors you can flip the holder to the front (as at picture). The whole set push to the fuselage, check the gap between fuselage and spinner. Simply glue it from back side. Glue universal motor mount with motor into the fuselage in right position. Glue battery holder in front of fuselage. Fix the battery (150-180g pack needed) by velcro tape and mount it in the front of the fuselage, find the perfect balance and CG position by moving it.

you will need: CA Glue thin viscosity + activator (or medium CA glue)
4x M3 screws

See video guide #10



motor mount
9,5g/0.33oz
PLA or PETG



LW planes setup - (230W)

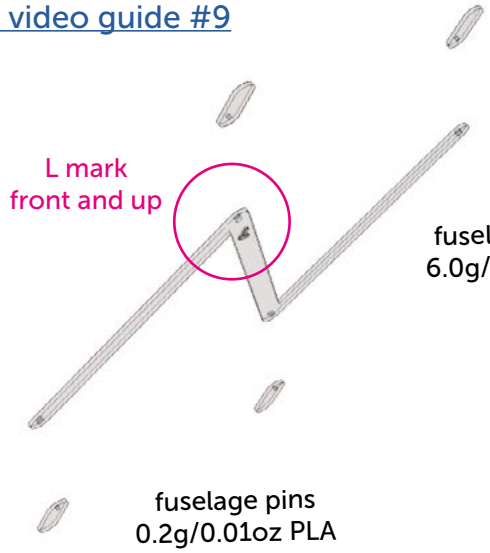
Motor: any 2830 1000KV, opt1, opt2, opt3, opt4... or similar
ESC: any 20A/3s, opt1, opt2, opt3, opt4... or similar
Propeller: two blade slow flyer APC 10 x 4,7 SF
Battery: 1800mAh/3s, opt1, opt2, opt3, opt4
Batt. connector: XT60 or Gold Conn
printed PLA or PETG mount 16 x 19 mm

7.3 Fuselage and Wing struts - Final assembly/setting

Mount all pins to the fuselage and wing struts. All pins are the same. Use 2 x 8 mm screws. You can find suitable screws in each HXT900 servo package. You can use wire from office pin too but there will be a slight play in the joint. Push M4 nut to the prepared slot in the fuselage. Fix the lower wing using M4 nylon screw. Left and right wing struts are symetrical. Fuselage struts are marked by L and R letters. Letters should be visible in front and up when assembled. Push completed struts with pins to the fusellage and wings. Double check the wing and fuselage position and glue all pins using thin CA.

you will need: 14x 2x8mm screw
1x M4 nut & nylon screw M4

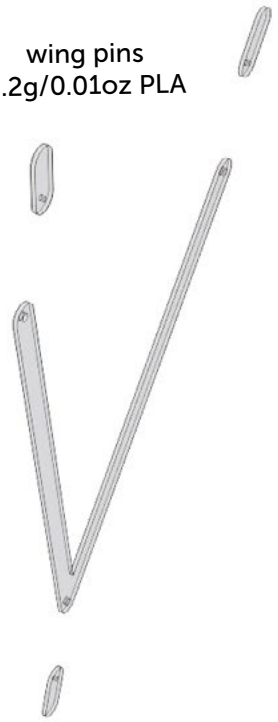
See video guide #9



fuselage strut L
6.0g/0.20oz PLA

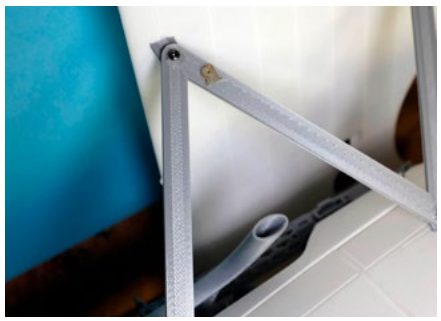
fuselage pins
0.2g/0.01oz PLA

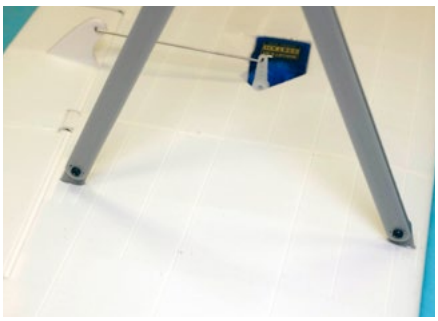
wing pins
0.2g/0.01oz PLA



wing strut
6.0g/0.20oz PLA

M4 nut & nylon screw





8. Final setup & Painting/marking

Paint the plane with your favourite livery. You can find inspiration at http://www.wingnutwings.com/ww/ You can use our scale PDF for making painting templates for easy paint job.

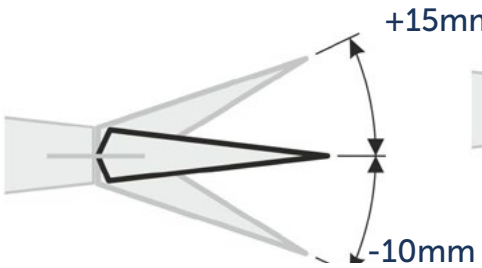
Refer to your R/C system userguide for setup information.

Install your reciever, connect battery, setup servos etc. with your trasmitter, check servo throws, then install propeller. Make sure the battery is positioned properly and secured with wing battery holder, if battery moves during flight it can shift the center of gravity backwards and aircraft will become uncontrollable!
Never set ESC with propeller installed, this could be very dangerous!

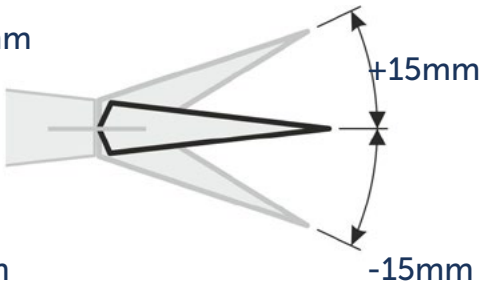
you will need: Your own Rx/Tx system

See video guide #11

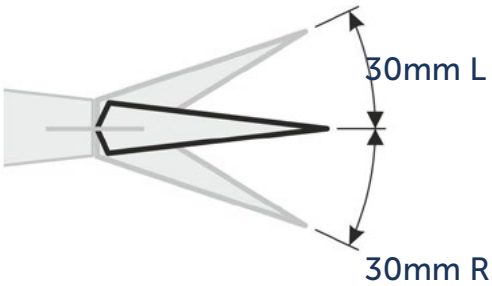
aileron



elevator



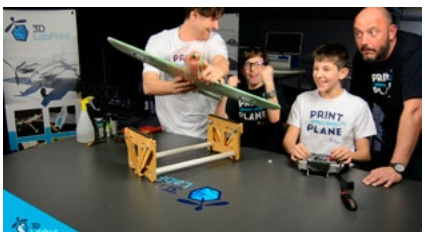
rudder



9. Go flying

Pre-flight check center of gravity is very important (move it 5mm forward for the first flights), battery properly charged, ailerons and elevator deflection check, your own flying skills or RC simulator training ...
NOTE: this is biplane so use also rudder controll...

Flight video of Albatros D.Va



10. Pilots Please Attention!

For the first flights we recommend setting the center of gravity to around 5 mm forward of the CG tag - nose heavy, this increases the stability (you can use heavier battery). Increasing expo settings on your transmitter for elevator and ailerons to 80 % calms response from your stick inputs. Also you can decrease elevator and ailerons deflection to calm down the plane. Make sure the battery is well fixed in proper possition. If it moves during flight it will cause shifting of CoG aft and will result in uncontrolable flight behavior.

After gaining some confidence you can balance the plane to the Center of Gravity marks and set Expos to 60 % as shown in the video/instructions... this gains back extra maneuverability.

Never fly aft positioned Center of gravity.

Please, use these files only for your own purpose, do not redistribute or publish. Thank you very much.
Enjoy your flight.

Shopping list

Printing material:	0,60 kg of LW-PLA by ColorFabb a little piece of PLA or PETG (for motor, guns, wheels, struts, motor mount, spinner, ...)
RC:	R/C system, Tx (EU) (GLOBAL) + compatible Rx 5ch, or opt1 we use JETI
Motor:	any motor 2830 size for 3S Li-Pol with weight up to 80-60g opt1, opt2, opt3, opt4... or similar Leopard LC2830 980KV (for 3S setup)
ESC:	20A/3s, opt1, opt2, opt3, opt4... or similar
Battery:	1800mAh/3s, opt1, opt2, opt3, opt4 weight around 150-180g or use 1300/3s + nose ballast to achieve proper CG
Servos:	4x HXT900, or opt1, opt2, opt3 or any similar sized servos 23x12x26 mm / 0.82x0.47x0.86 inches
Glue:	CA Glue - medium & thin Activator for CA Glue
Other:	2x servo extension cables 300mm / 12 inch 1x 1m of 1 - 1,2 mm / 14 AWG pushrod wire or carbon rod 1x 1,3m of 3 mm carbon or fiberglass rod 1x 1m of 0,8 mm pushrod wire 4x M3 screws 1x M4 nut & nylon screw 14x 2x8 screws