3D LabPrint

User Guide

rev. 2024/06

Fully 3d printable

Douglas DC-3 / C-47 Dakota

scale 1:18, wingspan 1570 mm / 62.0 inch

Douglas DC-3 / C-47 Dakota
## fully printable R/C plane for your desktop 3Dprinter

Fully 3D printable RC model of the classic plane, specially designed as a cheap and easy to build Stable RC model for everyday flying. Many scale details such as airframe plating encourages to create realistic paint jobs. This plane has been designed for printing from PolyLight 1.0 LW-PLA active foaming filament, that allow even the small printed planes to be as light as any other RC plane building technique. Get ready for flying with this great performing flying legend!

The first fully printable airplane 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.

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 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 superb performing airplane with highly efficient powerplant capable of flying 20+ minutes at some throttle with scale flying speed. Low stall speed is achieved for easy landing on the other hand.
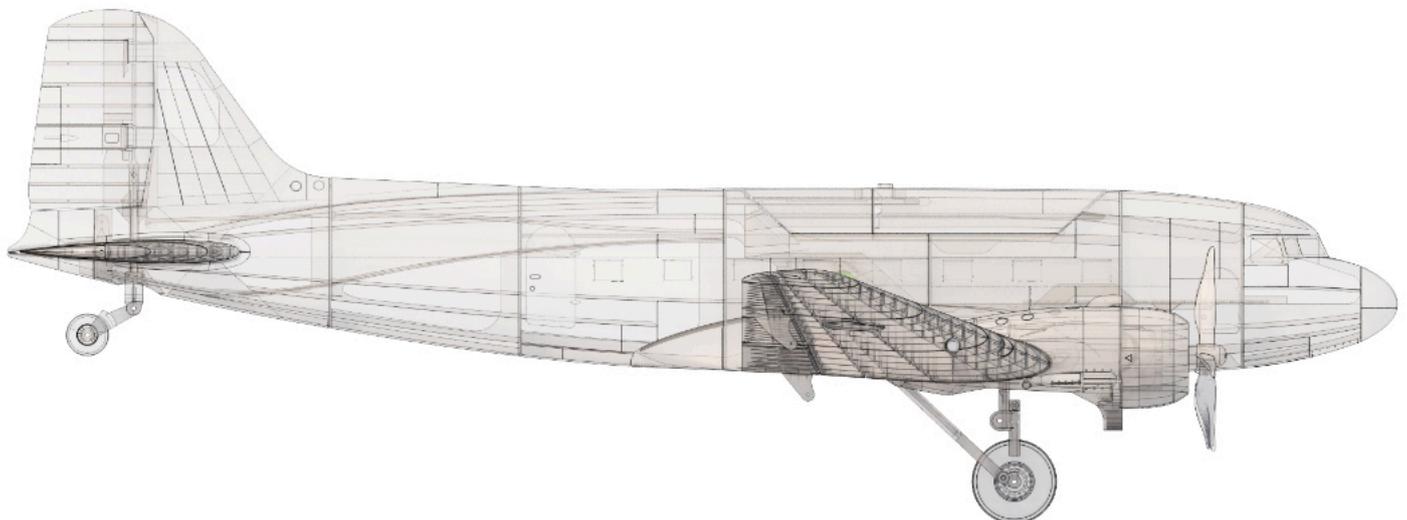
General specifications:

Wingspan:	1570 mm / 61.8 inch
Lenght:	1074 mm / 42.3 inch
Height:	330 mm / 13.0 inch
Wing area:	28 dm2 / 3.0 sq ft
Wing loading:	67 g/dm2 / 22.3 oz/sq ft
Center of gravity:	60 mm / 2.36 inch from leading edge
Airfoil:	LHK508 modified by 3DLabPrint
Print weight (LW PLA):	1000 g / 35.35 oz
Empty weight (w/o battery):	1600 g / 56.44 oz
Takeoff weight (4s 1550 lipo):	1900 g / 67.00 oz
Max takeoff weight:	2100 g / 74.00 oz
Never exceed speed, VNE:	100 km/h / 62 mph
Design maneuvering speed, VA:	60 km/h / 37 mph
Stall speed, VS:	18 km/h /11.2 mph

Recommended setup

Motor:	2x Leopard LC2830 / 980KV (for 4S setup)
ESC:	20A/4S
Propeller:	three blade 8 x 6 CW & CCW
Battery:	Li-Pol 2700mAh / 4S
	printed PET motor mount
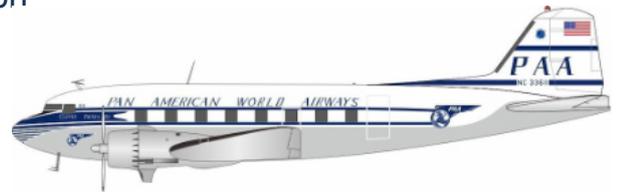
Performance measurement

|	
Max speed VH (level flight):	100 km/h – 56.7kn – 65.2mph with GWS 8x6
Rate of climb:	20 m/s (5 373 ft/min) with GWS 8x6
Flight time (4s 2700mAh):	15 min

Douglas DC-3 / C-47 Dakota

The Douglas DC-3, unquestionably one of the most significant aircraft of the 20th century, left an indelible mark both in the realm of civil aviation and military usage. Its development and design revolutionized aviation, making air travel more efficient, safer, and accessible to the public.

In civil aviation, the Douglas DC-3 became synonymous with reliability and efficiency. Its maiden flight took place in 1935, and since then, it has become a cult classic in aviation history. With the ability to carry up to 21 passengers over significant distances, the DC-3 opened up air travel to the masses. Its capabilities made it an indispensable tool for airlines worldwide, leading to the establishment of the first regular air routes and reduced travel times.

However, its use in military aviation represents another fascinating chapter. During World War II, the DC-3, known as the C-47 Skytrain in the U.S. Air Force and Dakota in the British RAF, became an essential link for military operations. Adapted for military needs, it served as a troop transporter, cargo hauler, and even a tow plane for airborne operations. Its robust construction and reliability, coupled with powerful engines, made it a vital component in the logistical chain associated with military operations.

Despite the end of World War II, the Douglas DC-3 continued in active service around the world. Its versatility and reliability allowed it to serve as a cargo aircraft, reconnaissance plane, and even as a firefighting and rescue craft.

Today, more than eighty years after its first flight, the Douglas DC-3 remains a living symbol of aviation and technological progress. Its design and legacy continue to inspire subsequent generations of aircraft and pilots, while some still fly as historical relics, reminiscent of an era when aviation became a primary symbol of human progress and courage.
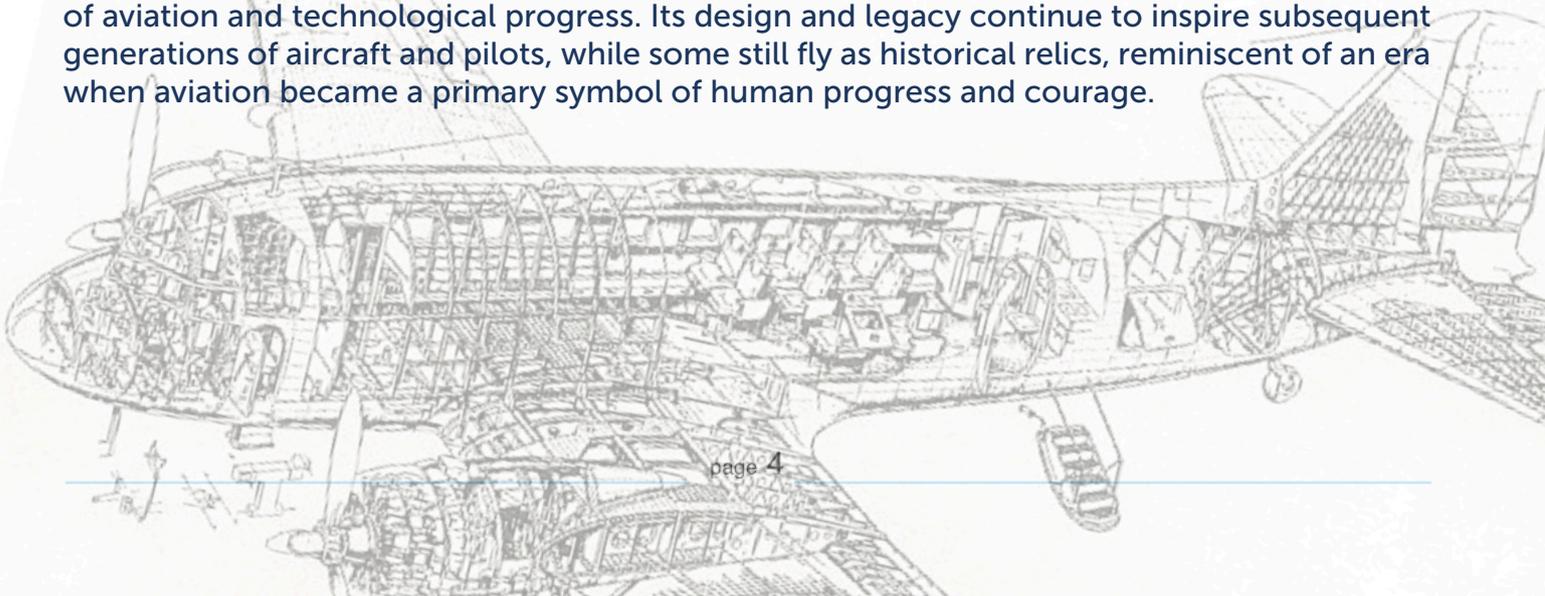
Included:

1. 3MF 3D files (primary)
Used instead of STL files

3MF files can be used instead of standard STL files, but also include information about slicing in the new version of Prusa Slicer (since version 2.4). Open them directly in the Prusa Slicer as a project or import to the slicer of your choice. The files contain settings for printing on a direct drive printer with dimensions 200x200x200 mm, that can be further adapted to suit your printer. The generic settings are compatible with Prusa MK2/3/3S printers.
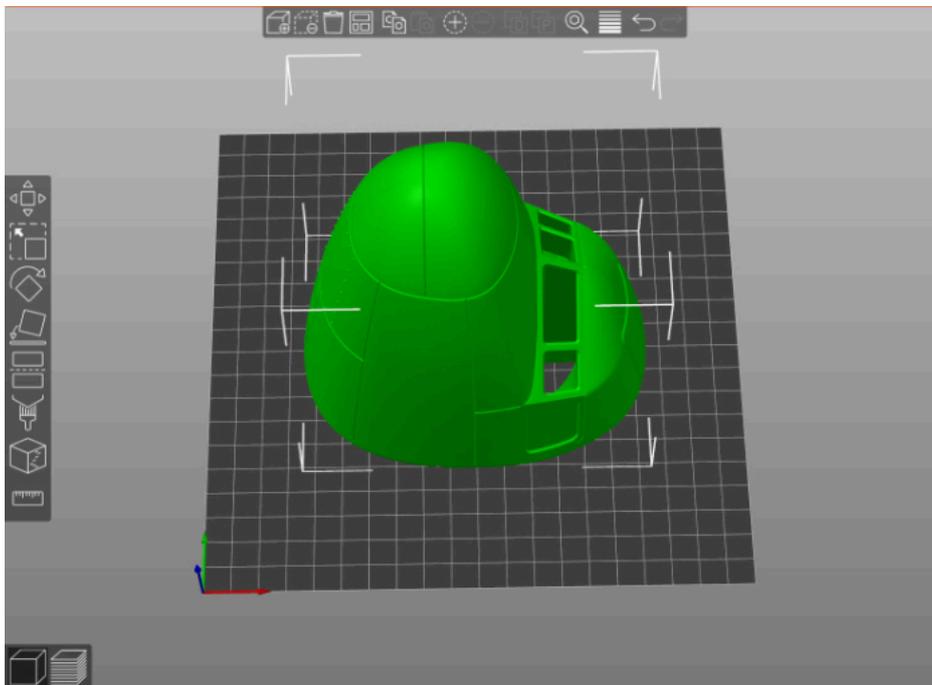
2. STL files - universal for all slicers
STL files are no longer necessary, as 3MF files can be imported to any slicer (Cura, Simplify3D) same as the STL files. Please use the 3MF files instead which contain more information than plain STL.

3. Printing Guide in our Help Section
Apart from this userguide, please see the Printing Guide for PrusaSlicer, Simplify3D or Cura to find some Tips and Advice for airplane printing (Thin Wall Printing).Remember: We use 0 retraction and 0.4-0.5 flow with LW-PLA.

4. Gcodes
Basic Gcodes prepared for direct use, as universal as possible. Should work on i3 style printers, Give it a try, but we can't guarantee it will work on your printer. Wall thickness should be 0.55-0.67mm.
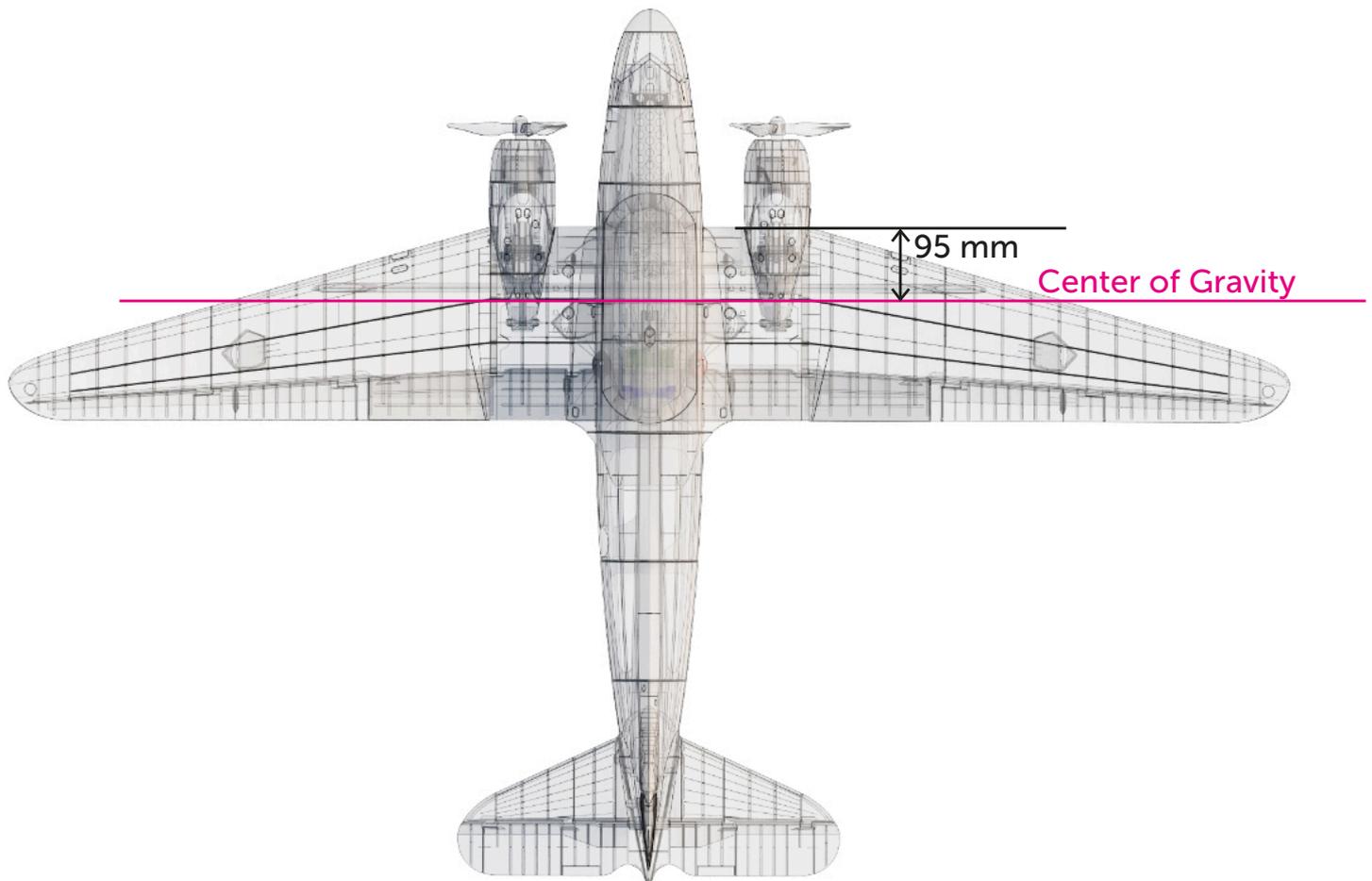
5. Scale markings PDF

You could print and cut the PDF in scale from thin self adhesive advertisement foil and place it on the model as needed.
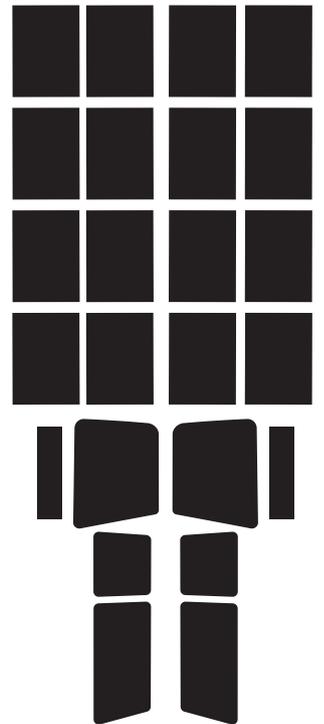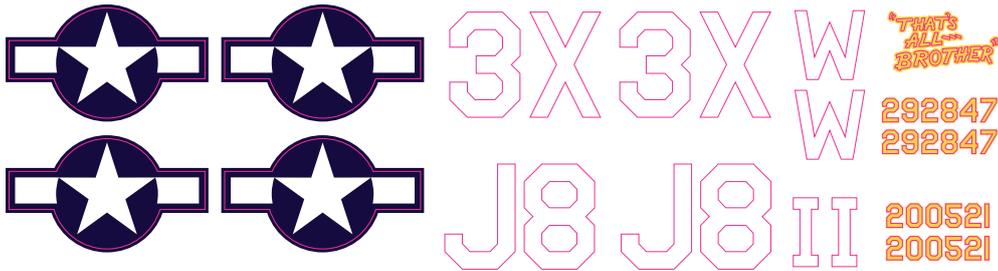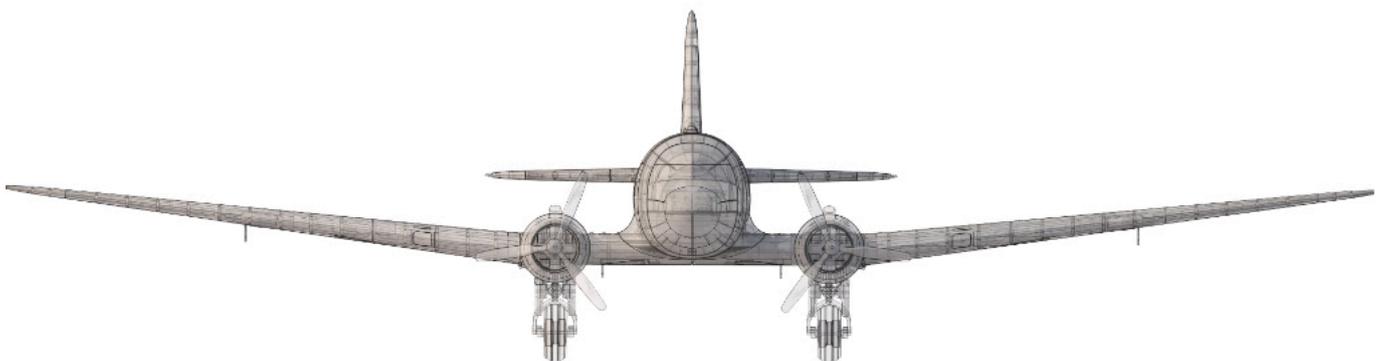
Douglas DC-3 / C-47 Dakota

95 mm

Center of Gravity
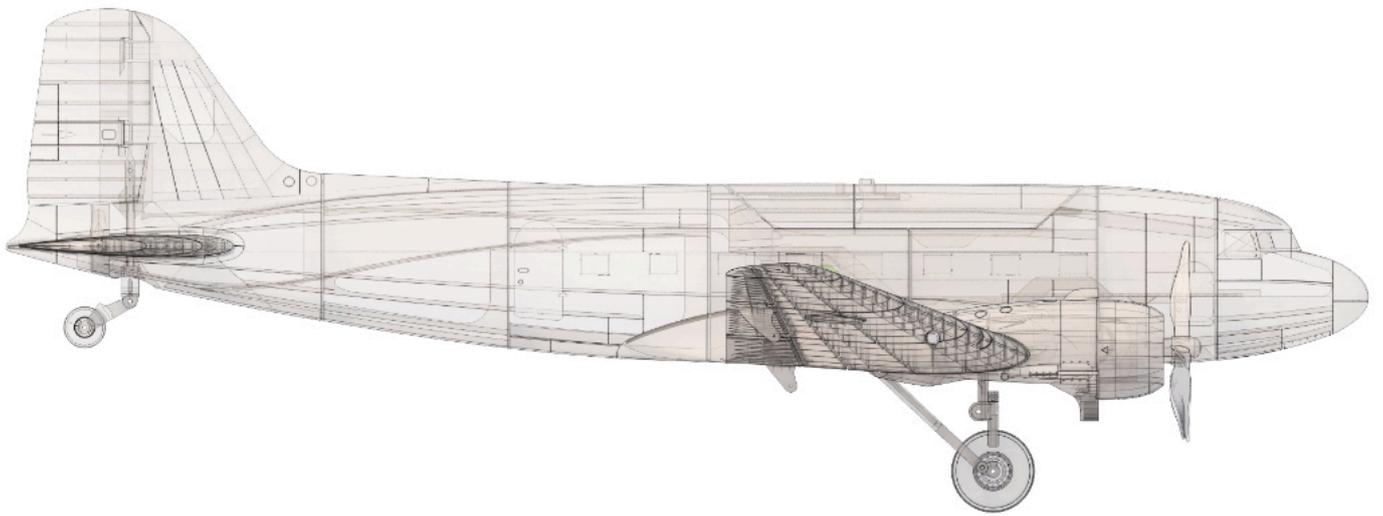
Wing area: 28 dm2 / 3.0 sq ft

Wingspan: 1570 mm / 61.8 inch

**Lenght: 1074 mm / 42.3 inch**

Step By Step PDF/VIDEO userguide

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

Basic requirments for Hurricane MkII are 200/200/195 mm volume, nozzle 0.4mm recommended (0.35 or 0.5mm alternativelly). Heated bed recommended. Designed to be printed with Polylight LW-PLA filament by 3DLabPrint. Contact: support@3dlabprint.com

2. Create account, download

You will receive download link to all the zipped files to your email right after the checkout (please check your spam folder if not). If you are logged in with your account while purchasing the model, you will find the download link in your account's Downloads section on our website. Please contact support@3dlabprint.com if you have trouble getting the files.
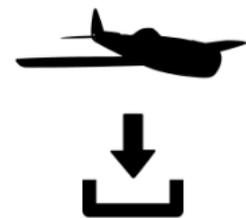
3. Prepare Gcodes
option A Gcodes:
if your printer is i3 comptatible you can use prepared gcodes directly. Just save them to the SD card and let the 3d printer do it's job. HE temperature is set to 240°C so the layers fuse together well, you can adjust speed and temperature only through your printer's LCD. If these Gcodes does not work for you, please proceed to the next options.
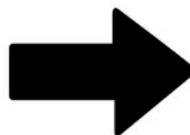
option B Prusa Slicer 3mf files (recommended)

Please follow the guide in the Help section of our website about Prusa Slicer setup.
Drag and drop the 3mf file to the Prusa Slicer window and open it as a Project. It will create a Generic 3DLabPrint printer, printing profile and materials. Please use these as a starting point instead of your printer profiles provided by your printer manufacturer. Strong thin-wall printing is a different discipline than printing Benchys what are the stock profiles usually optimized for. Once you tweak your profiles (retractions, etc.) you can easily switch the profile everytime you open the 3mf file. All the slicing tweaks, such as added top/bottom layers etc. are stored in the models below, so it won't be overwritten.
Remember: We are using 0.5 multiplier and 0 retraction with LW-PLA.

3MF
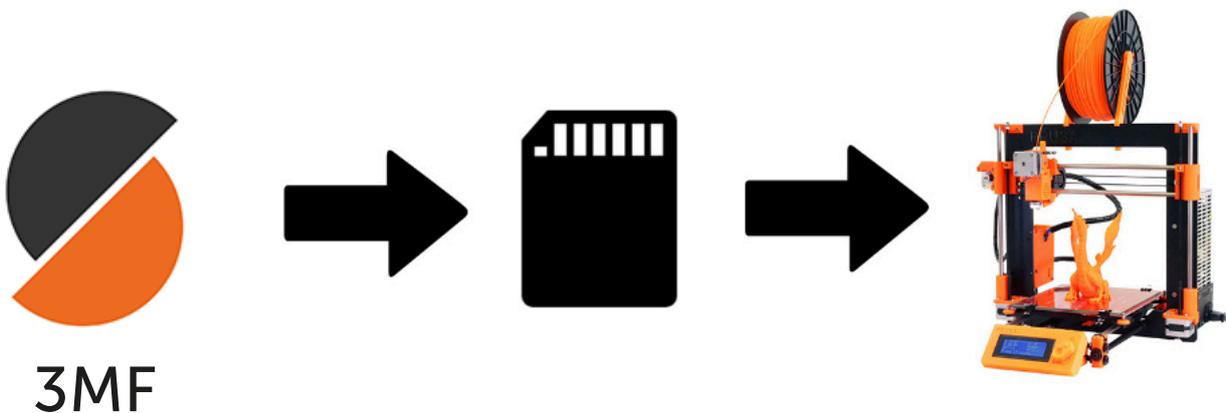
This method is also suitable for other common brands of printers, such as Creality (Enders), BambuLab and other. Prusa Slicer provides all the features we need and the settings are preconfigured in the 3mf files. Use the Print Settings and Filament profiles from our 3mf files and your Printer profile to ensure the compatibility.

Note: Simplify3D factory files are no longer provided as 3mf files are full substitute for them.

option C CURA or Simplify3D

CURA and Simplify3D option is for advanced users who insist on using it. There's no advantage compared to Prusa Slicer option but it still remains available. If you struggle with setting up Cura or Simplify3D, please use the option above which provides better results by default. You can import the Prusa Slicer 3mf files just like any other STL files but it won't import any print settings.

Please check our CURA guide or Simplify3D guide. Please visualise our presliced gcodes to see how the result should look like and try to achieve the same in your slicer.
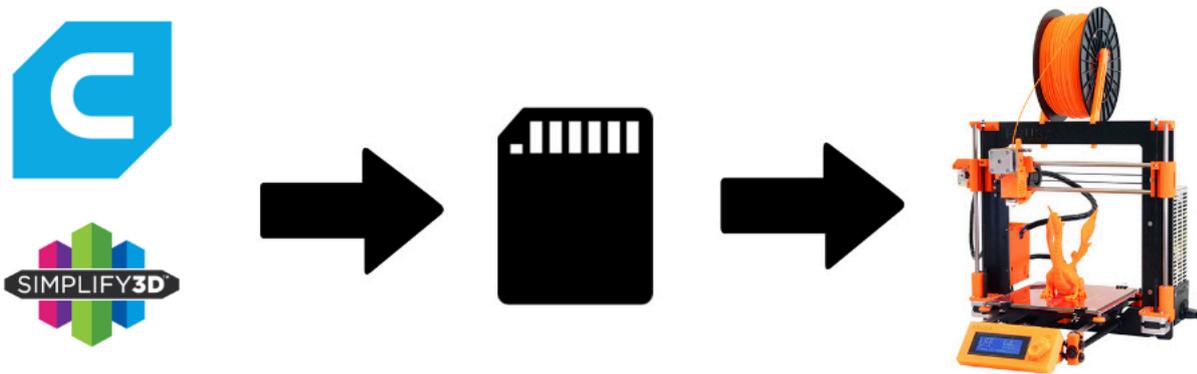
Remember: We are using 0.5 extrusion multiplier and 0 retraction with LW-PLA.

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 - (Polylight LW-PLA)
　　　　　　　3DLac, Strong hair spray, PEI or your favorite adhesive bed surface
　　　　　　　Razor blade

AND... please watch our VideoGuides:

LW planes

Basic Tips and Advice

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

Please Experiment with temperature and extrusion multiplier (0.55-0.67mm Wall thickness). 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.

## Please see the Printing Guide (Help Section)

How to print PolyLight 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, this model is designed mainly in VASE mode, even that expect some stringing inside and outside in some inpossible spots. Of course you can try to tweak the retractions for less stringing inside the parts, but there's a high risk of clogging the nozzle or throat. Increasing the retraction distance above 1 mm is not recommended at all and leads to nozzle clogs caused by foaming. Cleaning the hairy, but functional parts after printing with retractions completely disabled seems to be more efficient method. The nozzle is permanently pressurized and you don't need to worry about 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 at will for the best results on your printer. This airplane is designed for **0.55 - 0.67mm** Wall thickness.
Cosmetic issues of the prints are easily fixed with snap knife or sand paper, as the LW is easily sanded and cut.
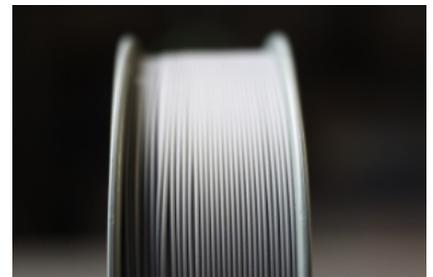
Douglas DC-3 / C-47 Dakota weights (LW-PLA)

fuselage

F1	18,6 g	0,66 oz
F2	24,2 g	0,85 oz
F3	47,1 g	1,66 oz
F4	58 g	2,05 oz
F5	37,4 g	1,32 oz
F6	27,9 g	0,98 oz
F7	41,3 g	1,46 oz
F8	2,8 g	0,10 oz
fuselage cover 1	19,25 g	0,68 oz
fuselage cover 2	10,21 g	0,36 oz
fuselage cover lock	2,6 g	0,09 oz

wings

wing mounted pod L1	53 g	1,87 oz
wing mounted pod R1	53 g	1,87 oz
engine cowl	8 g	0,28 oz
wing L1	42 g	1,48 oz
wing L2	33,5 g	1,18 oz
wing L3	17,9 g	0,63 oz
wing L4	10,3 g	0,36 oz
wing L5	3,6 g	0,13 oz
wing R1	42 g	1,48 oz
wing R2	33,5 g	1,18 oz
wing R3	17,9 g	0,63 oz
wing R4	10,3 g	0,36 oz
wing R5	3,6 g	0,13 oz
aileron L1	1 g	0,04 oz
aileron L2	6 g	0,21 oz
aileron L3	2 g	0,07 oz
aileron L4	4,1 g	0,14 oz
aileron R1	1 g	0,04 oz
aileron R2	6 g	0,21 oz
aileron R3	2 g	0,07 oz
aileron R4	4,1 g	0,14 oz
flap L1	4 g	0,14 oz
flap L2	4,7 g	0,17 oz
flap L3	6,6 g	0,23 oz
flap R1	4 g	0,14 oz
flap R2	4,7 g	0,17 oz
flap R3	6,6 g	0,23 oz

tail

horizontal stabiliser L1	3,8 g	0,13 oz
horizontal stabiliser L2	5,1 g	0,18 oz
horizontal stabiliser L3	1 g	0,04 oz
horizontal stabiliser R1	2,9 g	0,10 oz
horizontal stabiliser R2	1,9 g	0,07 oz
horizontal stabiliser R3	1 g	0,04 oz
elevator L1	4,1 g	0,14 oz
elevator L2	4,2 g	0,15 oz
elevator L3	1,1 g	0,04 oz
elevator R1	4,1 g	0,14 oz
elevator R2	4,2 g	0,15 oz
elevator R3	1,1 g	0,04 oz
rudder 1	4,4 g	0,16 oz
rudder 2	1 g	0,04 oz
rudder 3	4,4 g	0,16 oz
rudder 4	1,38 g	0,05 oz
elevator junction	7,64 g	0,27 oz

accessories

motor mounts (pair)	24,8 g	0,87 oz
battery holder	2,2 g	0,08 oz

gear

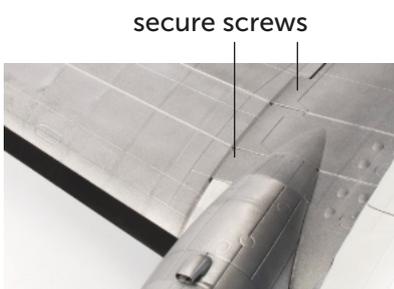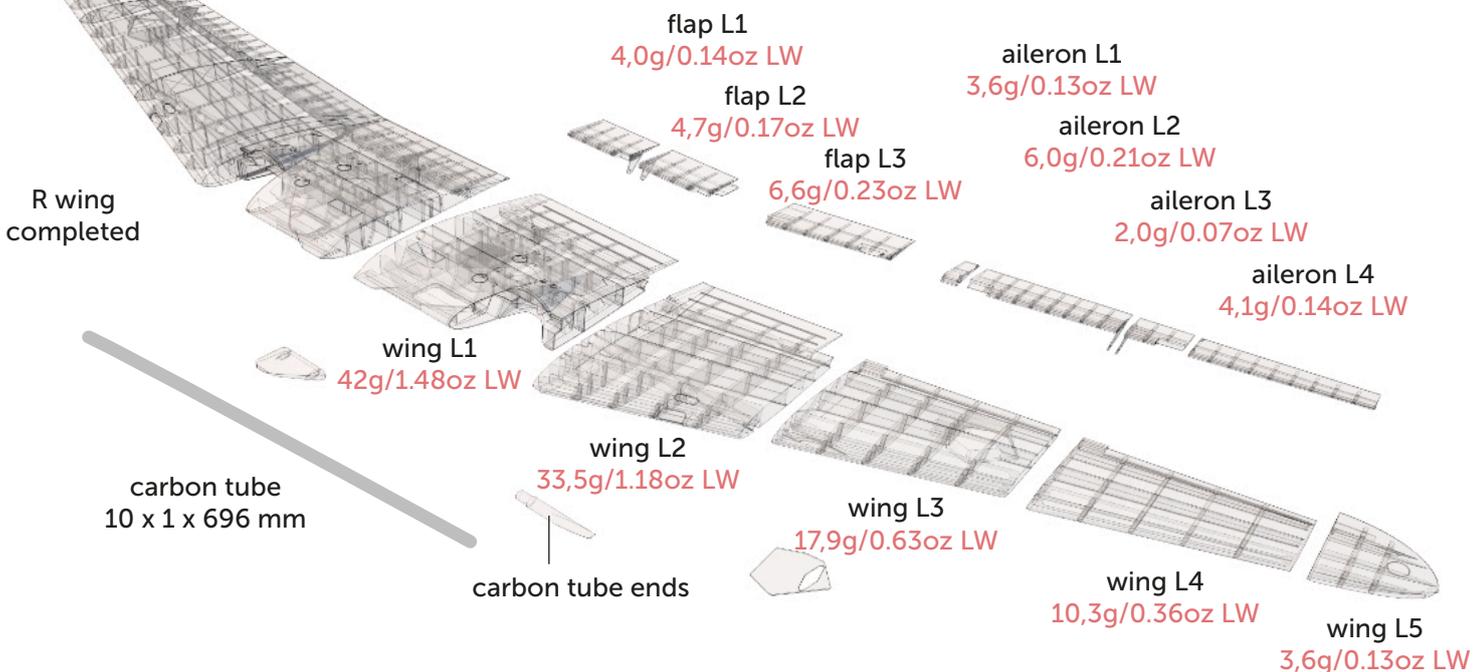|		
upper leg	18,5 g	0,65 oz
lower leg	9,9 g	0,35 oz
leg pistons	5 g	0,18 oz
gear disc	12 g	0,42 oz
gear tyre - FLEX	17 g	0,60 oz
tail axle	8,5 g	0,30 oz
tail arm	7,9 g	0,28 oz
tail wheel disc	3,4 g	0,12 oz
tail wheel tyre FLEX	3,7 g	0,13 oz
printed weight	**807 g**	28,49 oz

5. Assembly of printed parts

5.1 Wing assembly Douglas DC-3 / C-47 Dakota

The wing is designed as a centroplane with sliding ends. A central carbon tube spar runs through the entire centroplane including motor and landing gear pods. Glue wing parts L1 and R1 together. The new 3DLabPrint lock system will help you. Glue wing parts L2-L5 together. Repeat for the right side. Press in and glue a piece of PolyAir, PLA, PETG or 1.5 mm carbon rod into the top and bottom openning to create a wing spar and improve the rigidity of the wing.

On a flat surface glue the ailerons L1-L4 and repeat for the right side. Use a filament or suitable 0,8mm - 1,5mm carbon rod as a hinge for the ailerons. Just slide it in, there's no need to glue the hinge for easy aileron or servo replacement. Wall thickness should be 0.55-0.67

Video guide Douglas DC-3 / C-47 Dakota wing assembly

you will need: 10 x 1 x 680 mm carbon tube
CA Glue - medium + Activator for CA Glue
PolyAir or PLA filament (alt. carbon, fiberglass, Al or steel wire)
Snap knife, SandPaper Some cloth for wiping CA glue...

R wing completed

carbon tube
10 x 1 x 696 mm

wing L1
42g/1.48oz LW

carbon tube ends

wing L2
33,5g/1.18oz LW

wing L3
17,9g/0.63oz LW

wing L4
10,3g/0.36oz LW

wing L5
3,6g/0.13oz LW

flap L1
4,0g/0.14oz LW

flap L2
4,7g/0.17oz LW

flap L3
6,6g/0.23oz LW

aileron L1
3,6g/0.13oz LW

aileron L2
6,0g/0.21oz LW

aileron L3
2,0g/0.07oz LW

aileron L4
4,1g/0.14oz LW

secure screws

servo bay

5.2.1 Fuselage assembly Douglas DC-3 / C-47 Dakota

The fuselage is ready for both transport and military variants. Different parts are F2, F3, F5, F6, F8 and C1 cowling. Glue fuselage parts F1-F5 with CA glue together. The new 3DLabPrint lock system will help you. Do not glue back part F8 before tail and elevator assembly. Wall thickness should be 0.55-0.67.
For fuselage cover arm use a ball pen spring. Put it to the part 2 and glue with part 1 together.

Video guide Douglas DC-3 / C-47 Dakota fusselage assembly

you will need: CA Glue - medium + Activator for CA Glue
                        Snap knife, SandPaper Some cloth for wiping CA glue...
                        BallPen Spring

F8
2,8g/0.1oz LW

cover 2
10,21g/0.36oz LW

cover lock
2,6g/0.09oz LW

F7
41,3g/1.46oz LW

cover 1
19,25g/0.68oz LW

F6
27,9g/0.98oz LW

F5
37,4g/1.32oz LW

F4
58g/2.05oz LW

F3
47,1g/1.66oz LW

F2
24,2g/0.85oz LW
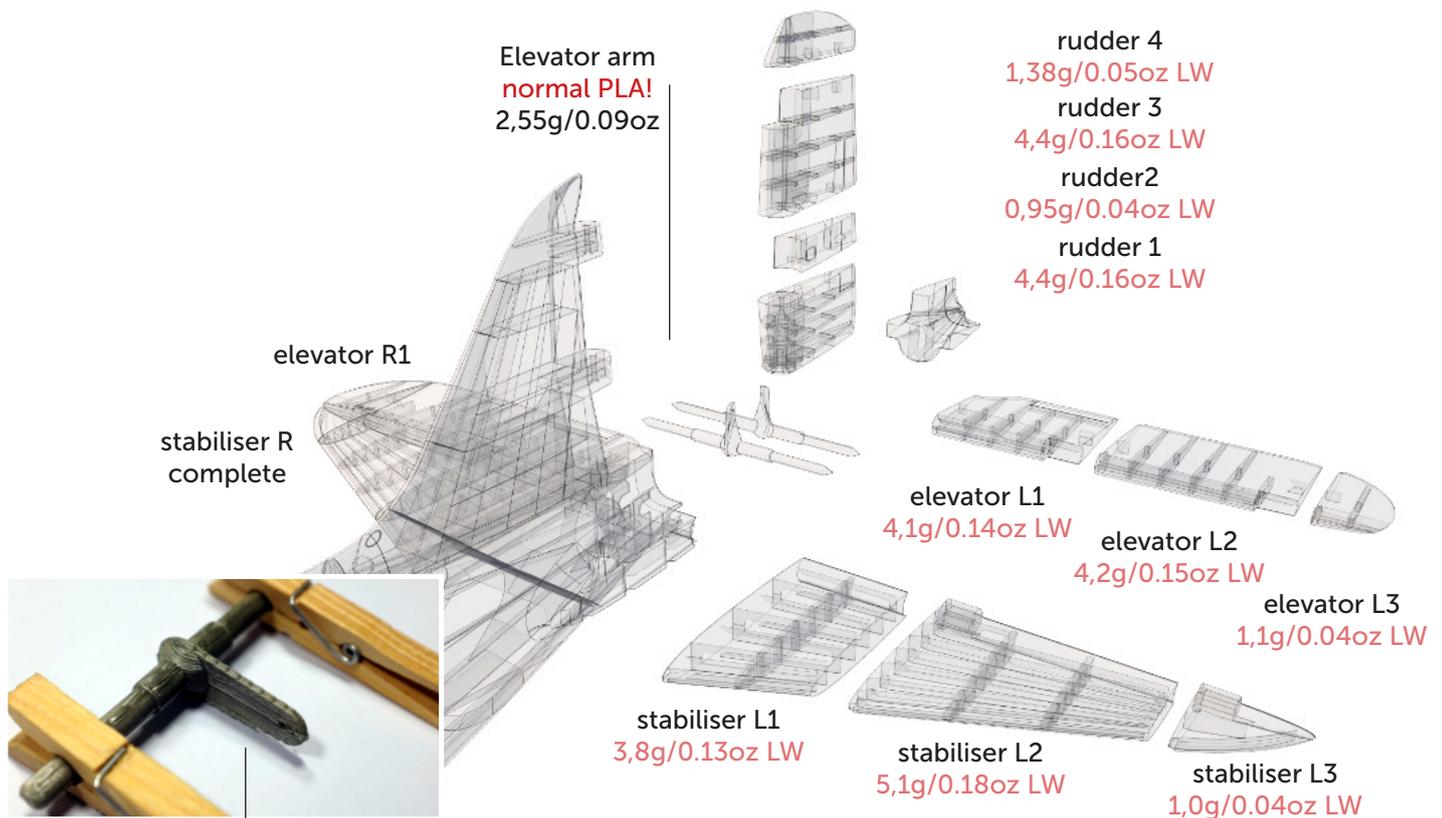
F1
18,6g/0.66oz LW

ball pen spring

5.2.2 Tail assembly Douglas DC-3 / C-47 Dakota

Glue L1-L3 parts of the stabilizer and elevator. Glue the stabilizers perfectly perpendicular to the fuselage. Assemble both sides of the elevator with the elevator arm on a flat surface. Make a Z bend on the elevator and rudder 0,8 mm pushrod wire. Mount the elevator assembly to the stabilizer using the piece of PET filament. Elevator should move freely controlled by the pushrod and servo. Push and bend prepared wire for tail drag between R1 and R2 parts of rudder. Glue rudder part together and mount to the fuselage by piece of PET filament. Check the functionality of the elevator and rudder assembly carefully.

Video guide Douglas DC-3 / C-47 Dakota MkII Tail assembly

you will need: CA Glue - medium + Activator for CA Glue
                     Snap knife, SandPaper Some cloth for wiping CA glue...
                     2x 500mm of 0,8 mm steel wire for pushrods

Elevator arm
normal PLA!
2,55g/0.09oz

rudder 4
1,38g/0.05oz LW

rudder 3
4,4g/0.16oz LW

rudder2
0,95g/0.04oz LW

rudder 1
4,4g/0.16oz LW

elevator R1

stabiliser R
complete

elevator L1
4,1g/0.14oz LW

elevator L2
4,2g/0.15oz LW

elevator L3
1,1g/0.04oz LW

stabiliser L1
3,8g/0.13oz LW

stabiliser L2
5,1g/0.18oz LW

stabiliser L3
1,0g/0.04oz LW

elevator arm – normal PLA!
Tip: After gluing, the elevator coupling is smoothed into a perfect shape using a drill and sandpaper.

5.2.3 Main landing gear assembly

Complete all printed parts by M3 screws and short 3mm carbon rods. Mount all landing gear parts to the LG bay as first before glue. Check the functionality of the landing gear assembly carefully.

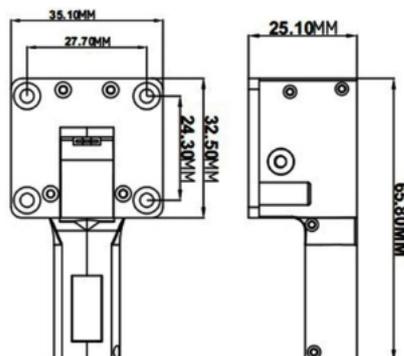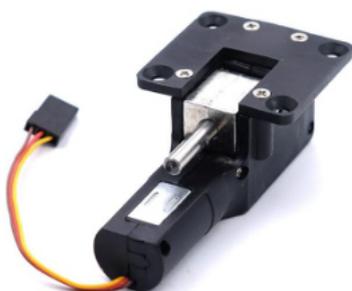Video guide Douglas DC-3 / C-47 Dakota Landing gear assembly

you will need:
- 4x 67mm of 3 mm carbon rod
- 1x 46mm of 3 mm carbon rod
- 2x M3x50mm for axle
- 4x M3x30mm for side fix
- 4x M3x14mm
- 4x M3x10mm
- 8x 3,2x15mm screws

3mm carbon rod

ball pen spring
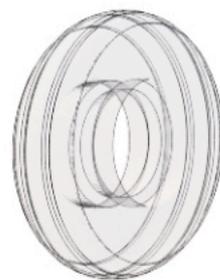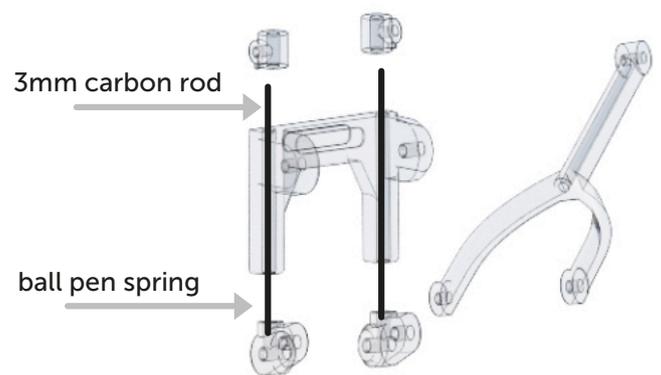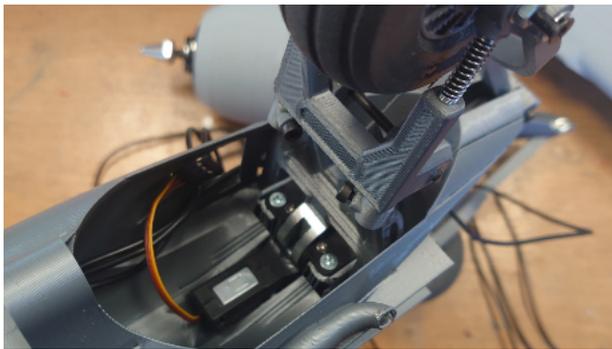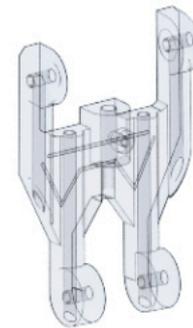
gear tyre (pair)
11,6g/0.41oz FLEX

main gear disc (pair)
7,6g/0.27oz PLA

40g retracts

Servoless Electric Retractable Landing Gear with steering

Dimension: 65.8 x 35.1 x 25.1 mm
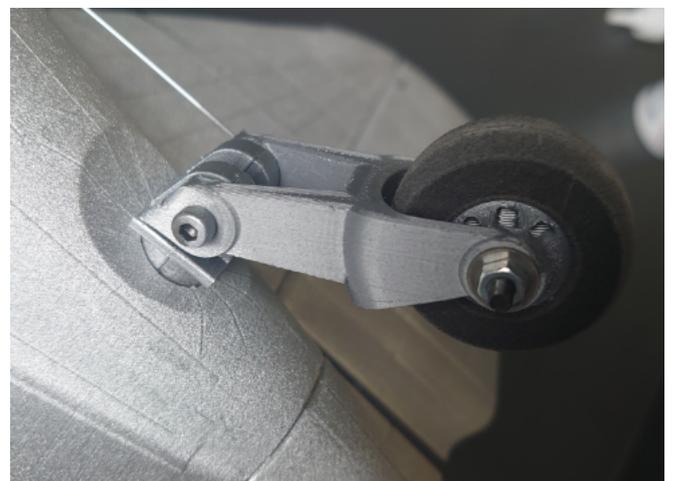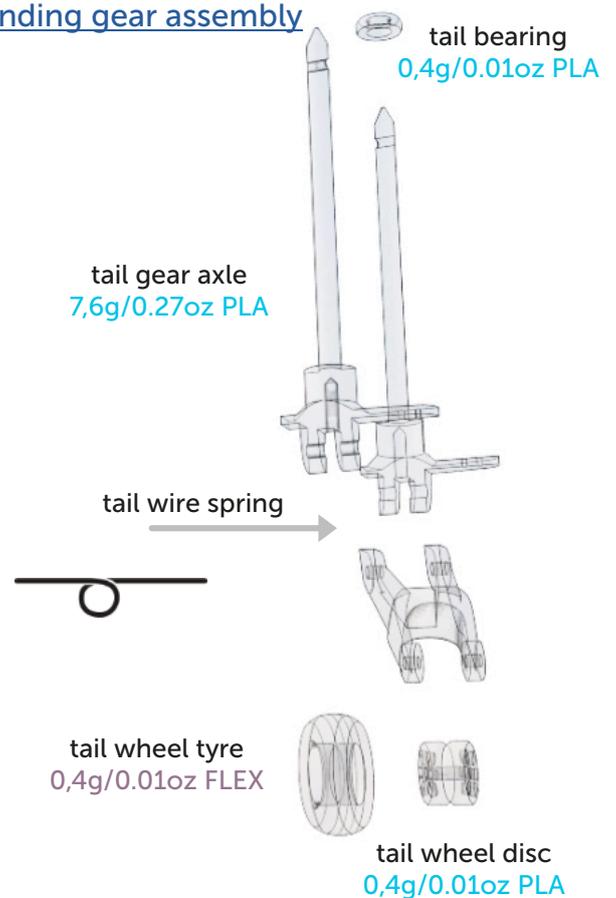2.59 x 1.38 x 1.0 inch
Travel: 90°
Voltage: 4.8V – 6V
Shaft: 4 mm

5.2.4 Tail landing gear assembly

Put gear tyres on the rims. Glue the axis halves together. It is a good idea to work the surface of the axis to roundness with sandpaper. Use a piece of spring wire to make the rear chassis spring. Assemble the whole tail landing gear using M3 screws. Slide the assembly into the fuselage, ideally with the rudder control wire. Secure the axle with an M3 bolt through the rudder. Check the functionality of the landing gear assembly carefully.

See video guide Douglas DC-3 / C-47 Dakota Tail landing gear assembly

you will need: 2x M3x30mm for axles
                      1x M3x30mm for rudder fix
                      piece of 0,75mm spring wire

tail bearing
0,4g/0.01oz PLA

tail gear axle
7,6g/0.27oz PLA

tail wire spring

tail wheel tyre
0,4g/0.01oz FLEX

tail wheel disc
0,4g/0.01oz PLA

6. Servo installation

Install the prepared servos to wing servo bays. Use a 0,8 mm steel wire with Z bends as a linkage between the servos and aileron and flap control horns. Elevator and rudder servo will be fixed by servo holder or directly glued in the fuselage.

See video guide Douglas DC-3 / C-47 Dakota servo assembly

you will need: 6x Corona CS238MG or any similar sized servos
                  13 x 30 x 30 mm / 0.51 x 1.18 x 1.18 inches
                  Servo cable extension
                  Snap knife, Z pliers

7. Motor & ESC & battery holder

Fix the battery by velcro tape and mount it in the front of the fuselage, find the perfect balance and CG position by moving it. 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. Glue universal motor mount with motor into the fuselage in right position.

See video guide motor setup

you will need:
8x M3 x 12mm screws + washers

Power towing setup (2x 480W)

Motor: 2x Flash Hobby D4215 RC / 650KV
            (weight: 83g)
            or similar
ESC: 2x CC Talon 25A/6s or similar
Propeller: three blade GWS 9 x 5
            (cutted to 8 inch) CW & CCW
Battery: 2700mAh / 6s
printed PET mount 16 x 19 mm

LW plane setup (2x 230W)

Motor: any 2830 / 1000KV, opt1, opt2 or similar
ESC: any 20A/3-4s, opt1, opt2 or similar
Propeller: three blade 8 x 6 CW & CCW
Battery: 3000mAh / 4s
Batt. connector: XT60 or Gold Conn
printed PET mount 16 x 19 mm

8. Final assembly/setting

See video guide Final setting

Refer to your R/C system userguide for setup information.
you will need: Your own Rx/Tx system
             Velcro strip

Install your reciever, connect battery, setup servos and etc. with your trasmitter, check servo position, then install propeller.
Make sure the battery is positioned properly and secured with velcro or 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!
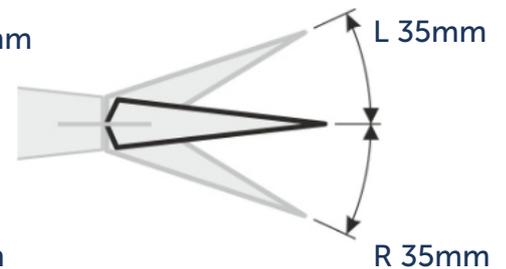
aileron

+15mm

-12mm

elevator

+15mm

-15mm

rudder

L 35mm

R 35mm
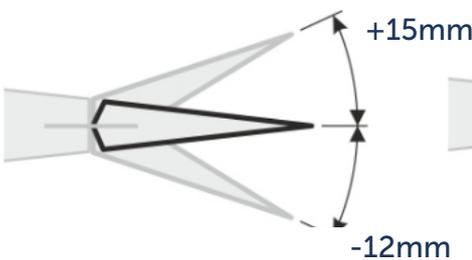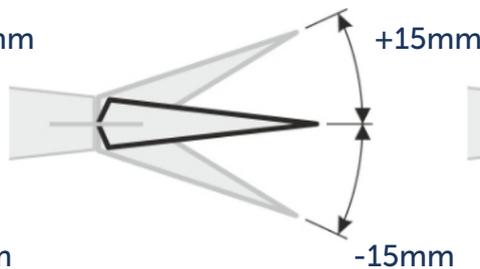
9. Go flying

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 ...

Flight video of Douglas DC-3 / C-47 Dakota

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, rudder 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.
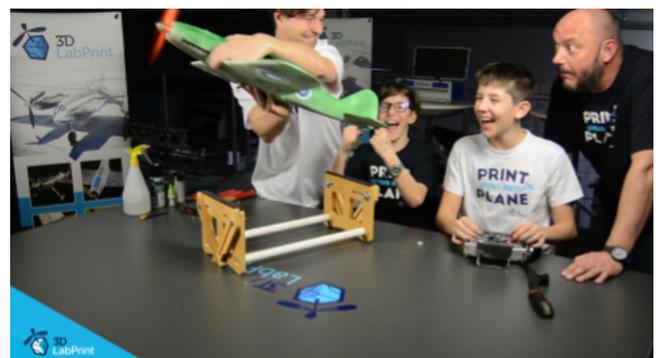
Enjoy the fun together!

Douglas DC-3 is the next of new LW Planes series designed for easy and cheap flying. The build is simple even for a beginner. It's 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 the new PolyLight LW-PLA material in mind.

Parts printed from this LW-PLA are light, easily sanded and glued together. This model requires only about 300g of this material, that means it's a very cheap build. In case of accident, parts can be easily reprinted with just a filament cost.

We've been testing this material for a years before this plane was released... The material is using an active foaming technology to achieve lightweight, low density PLA parts. At around 230°C this material will start foaming, increasing its volume by nearly 3 times.

Almost all parts of this plane should be printed from LW-PLA (some specific parts needs PLA or PETg).

Shopping list

Printing material:	Polylight LW-PLA a few of PLA or PETg (elevator arm, motor mount, landing gear, …)
RC:	R/C system, 9-10 or more chanels
Motor:	2830/1000KV, opt1, opt2 or similar
Propeller:	three blade 8 x 6 CCW & CW
ESC:	any 20A / 4s, opt1, opt2 or similar
Battery:	2700mAh/ 4s + connectors XT60 or Gold Conn
Servos:	6x Corona CS238MG or any similar sized servos 13 x 30 x 30 mm / 0.51 x 1.18 x 1.18 inches 1x HXT900 or any similar sized servo for towing hook 23x12x26 mm / 0.82x0.47x0.86 inches Servo cable extension Snap knife, Z pliers
Glue:	CA Glue - medium + Activator for CA Glue
Retractable gear:	40g Retractable Landing Gear with metal shaft with JR Plug for RC Fixed-wing airplane DIY parts (ALIEXPRESS)
Other:	2x 1mm or 0.8 mm pushrod wire 8x M3x4mm screws + washers (motor) 1x 10x1x696 mm carbon tube 4x 67mm of 3 mm carbon rod 1x 46mm of 3 mm carbon rod 2x M3x50mm for axle 4x M3x30mm for side fix 4x M3x14mm 4x M3x10mm 8x 3,2x15mm screws Small piece of 1.2 mm steel wire for tail drag wheel axle 8x Self-tapping screw 3x10mm 2x M5 screw and nut, nylon (wing)