Airy-71

a lightweight 3D printable rubber engine / glider

User Guide

Figure 1: 3D-printed Airy-71 with rubber-band engine

Parameter	Airy-71
Wingspan:	706 mm
Length:	499 mm
Wing airfoil:	S4083
Weight (engine / glider):	80 / 70 g
Wing area:	6.2 dm^2
Wing load (engine / glider):	12.9 / 11.3 g/dm^2

Available here: https://cults3d.com/en/users/3dprcfun/
https://rc3dmarket.com/3dprcfun

Content

What you get

This is a thoroughly designed 3D printable lightweight rubber-band engine plane. I spent considerable amount of time with prototype testing and refinement to improve printability, flight characteristics, and rigidity. The latter is essential since harder landings are impossible to avoid.
Flexibility was a further design parameter. The Airy-71 can be used as rubber-band engine model and sailplane. Changing between these two modes of operation is possible within seconds.
Most components are designed for printing with Light Weight PLA. The propeller and some other small parts are printed in PLA to withstand stronger forces and to obtain the desired center of gravity position.

Flight video

3D print files

The package includes a complete set of STL files, a set of PrusaSlicer project files, and the hereof generated gcode. PrusaSlicer is a powerful open-source software that can be used for free. The project files were created with version 2.7.1 and contain all detailed print settings required to optimally print each airplane part.

STL	STL stands for Standard Tessellation Language, a file format that describes the surface geometry of a three-dimensional object. High resolution STL files are included for all printable parts.
Project files	Multiple STL files can be combined into a single project file (3mf) and “print job” (gcode). Specific slicer settings can be applied to e.g., increase the stability of a certain part area or improve the printability of an area with large overhang angle. The package includes 2 project files with full access to all component-specific slicer settings. All project files can be easily modified with the graphical user interface of PrusaSlicer to comply with your 3D printer in terms of print volume, parameters, and print material.
Gcode	For the PLA project file and each LW-PLA printable part, gcode files are provided to minimize your preparation time. Please note that these gcode files were generated for the Prusa i3 MK3S. For many 3D printers and filaments, the gcode should just work fine. If you experience issues with the print quality, just modify the slicer parameters in the project file to create the optimal gcode for your printer.

Figure 2 depicts an exploded view of the Airy-71 and provides an overview of all 3D printable parts. The color code of the index numbers shows to which project file the part belongs.

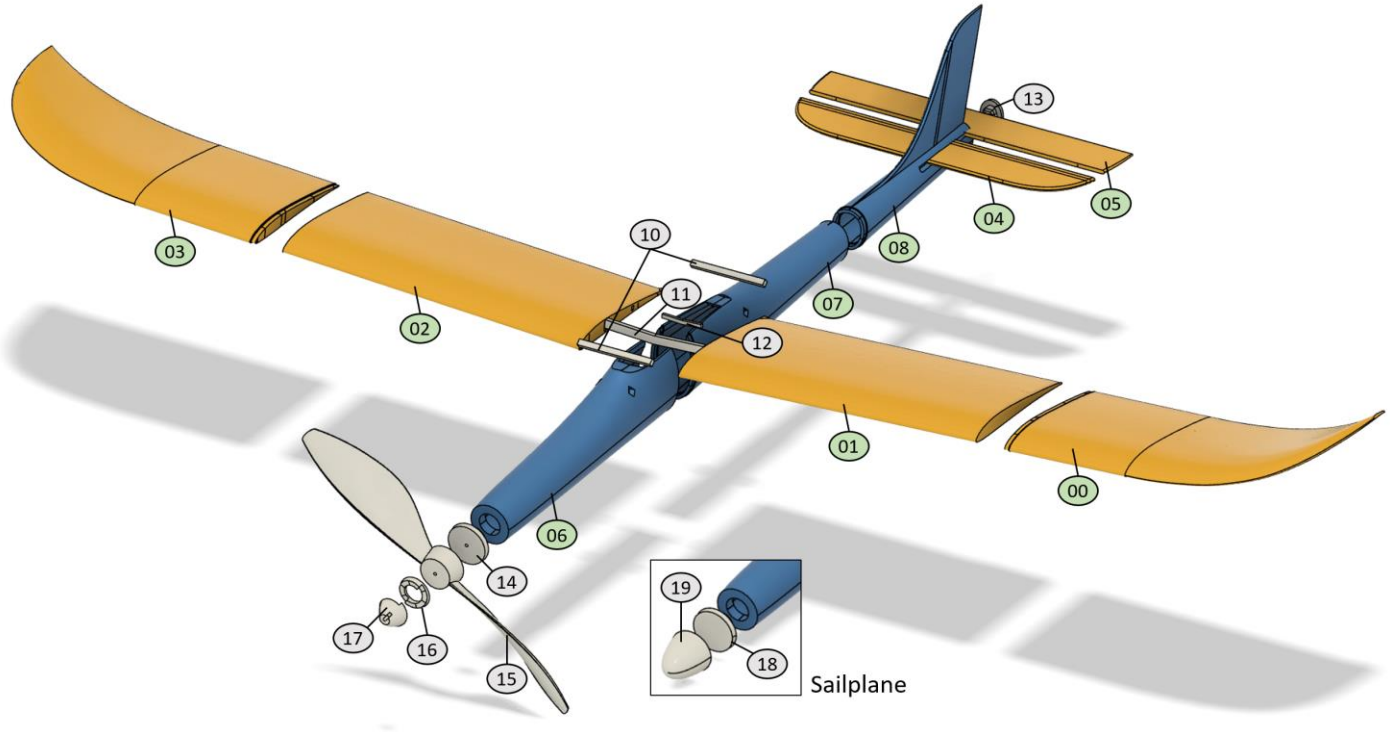
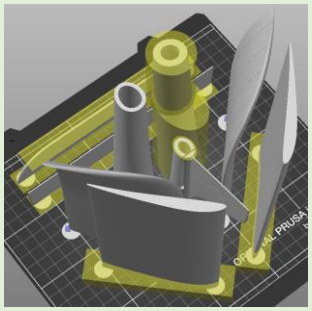
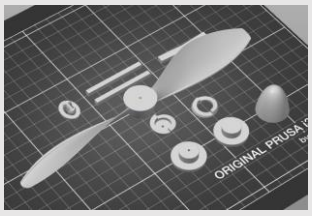


Figure 2: Exploded view with labeled parts

Project (.3mf)	STL name	Index	Weight	Comment
LW-PLA  weight: 66g	wing-2-l	00	8.9 g	extrusion mult.: 0.45; nozzle temp.: 250°C
	wing-1-l	01	10.2 g	extrusion mult.: 0.45; nozzle temp.: 250°C
	wing-1-r	02	10.2 g	extrusion mult.: 0.45; nozzle temp.: 250°C
	wing-2-r	03	8.9 g	extrusion mult.: 0.45; nozzle temp.: 250°C
	horistab-front	04	1.8 g	extrusion mult.: **0.35**; nozzle temp.: 250°C
	horistab-back	05	1.8 g	extrusion mult.: **0.35**; nozzle temp.: 250°C
	fuselage-1	06	14.4 g	extrusion mult.: 0.45; nozzle temp.: **240°C**
	fuselage-2	07	6.1 g	extrusion mult.: **0.40**; nozzle temp.: 250°C
	fuselage-3	08	3.4 g	extrusion mult.: **0.35**; nozzle temp.: 250°C
PLA  time: 3h 52m, weight: 23g	rod (2x)	10	1.0 g	
	wing-connector-f.	11	0.6 g	
	wing-connector-b.	12	0.2 g	
	rubber-end-holder	13	0.6 g	
	fuselage-connector	14	2.3 g	
	propeller	15	9.1 g	
	locking-ring	16	0.4 g	
	spinner	17	1.0 g	
	nose-part1	18	2.0 g	connector for glider (no drilling)
	nose-part2	19	6.5 g	glider fuselage nose

Note: If you want to use a different slicer software, please make sure to check and reapply all part-dependent print settings provided in the PrusaSlicer project files. Otherwise, some parts may not print as desired.

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Figure 3: All print parts fresh from the printer before post-processing.

What you need

3D printer specification

All STL files have been successfully tested with my Prusa i3 MK3S.

3D print volume	Minimum requirement for single STL file (ensures printability of all plane parts): X=145mm; Y=145mm; Z=180mm. Requirement for provided gcode: X ≥ 200mm; Y ≥ 200mm; Z ≥ 180mm.
Nozzle diameter	0.4mm
Filament support	PLA / LW-PLA

Required materials

Almost all plane parts are printable except for the rubber bands and some metal parts.

Filament	Light-Weight PLA: ~70g (e.g., 3DLabPrint PolyLight 1.0) PLA: ~25g (e.g., Overture PLA Professional)
Spring steel wires	Ø 1.5mm, 100mm (to connect propeller with rubber band)
Metal washer	2 small metal washers: inner Ø ≈ 1.5-2mm, outer Ø ≈ 5-6mm, thickness ≈ 0.3-0.8mm
Metal spring	Metal spring from a ballpen
Rubber band	Rubber band for the engine e.g., Flight-Depot Sport Gummi 4.8 X 2000mm Rubber bands to attach the wing to the fuselage.
Basic tools	Cutter knife, file, pliers, drilling machine and drill Ø 1.6mm
CA glue	Medium viscosity e.g., Hobbyking Super Glue CA (50g / 1.7oz) Medium
CA accelerator	Recommended e.g., Hobbyking Insta-Set CA Accelerator 2. Oz

Assembly

Main video assembly guide

This Airy-7 assembly guide provides all required hints for a successful assembly of the Pilatus B4.

Chapters:

00:00 > Intro
00:26 > Wing
03:45 > Fuselage
07:34 > Glider nose & rubber engine

Pre-flight setting & check

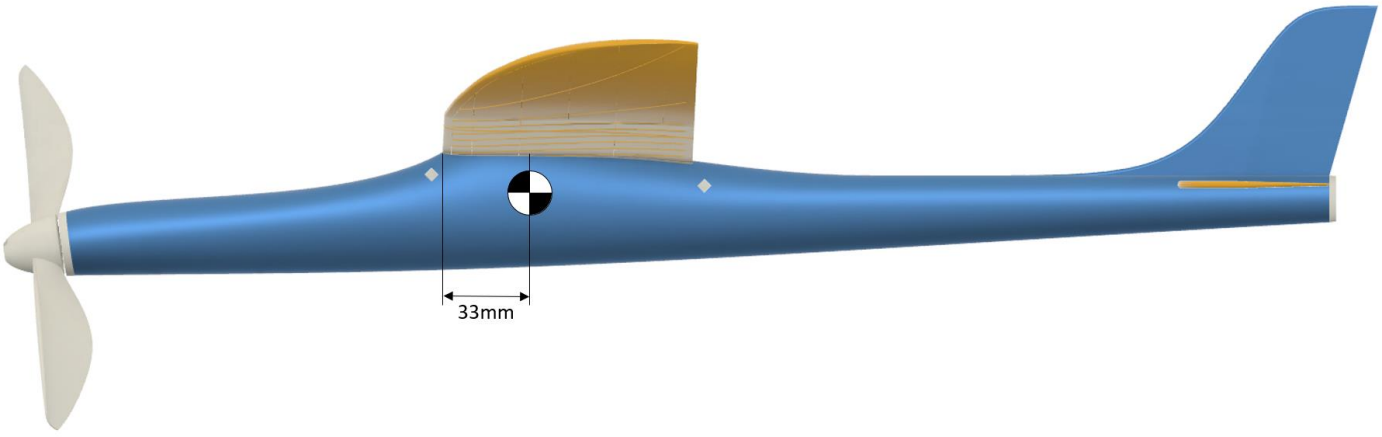

Figure 4: Center of gravity (CoG)