Challenger Aerospace Systems - unmanned airship systems (UAS) blimps

Peter Lobner, 29 October 2022

1. Introduction

Challenger Aerospace Systems (CAS) was founded by LeRoy Aday in 2009 in Reno, NV as a privately-held Nevada corporation. The firm offers a range of unmanned ground and aerial systems, including fixed-wing and multi-rotor heavier-than-air vehicles, and lighter-than-air unmanned airship systems (UAS). Their UAS blimp standard product line is available in a range of sizes, for use in applications such as mapping, aerial photography and electro optical / infrared (EO/IR) aerial surveillance. Challenger Aerospace also builds custom blimps, flight control and autopilot systems, camera systems and ground control stations. The company's website is here: http://challengeraerospace.com/innovations/unmanned-airship-systems-uas-2/

Their LinkedIn page is here: https://www.linkedin.com/company/challenger-aerospace-group/

This article focuses only on Challenger's UAS blimps.

2. Challenger Aerospace UAS blimps

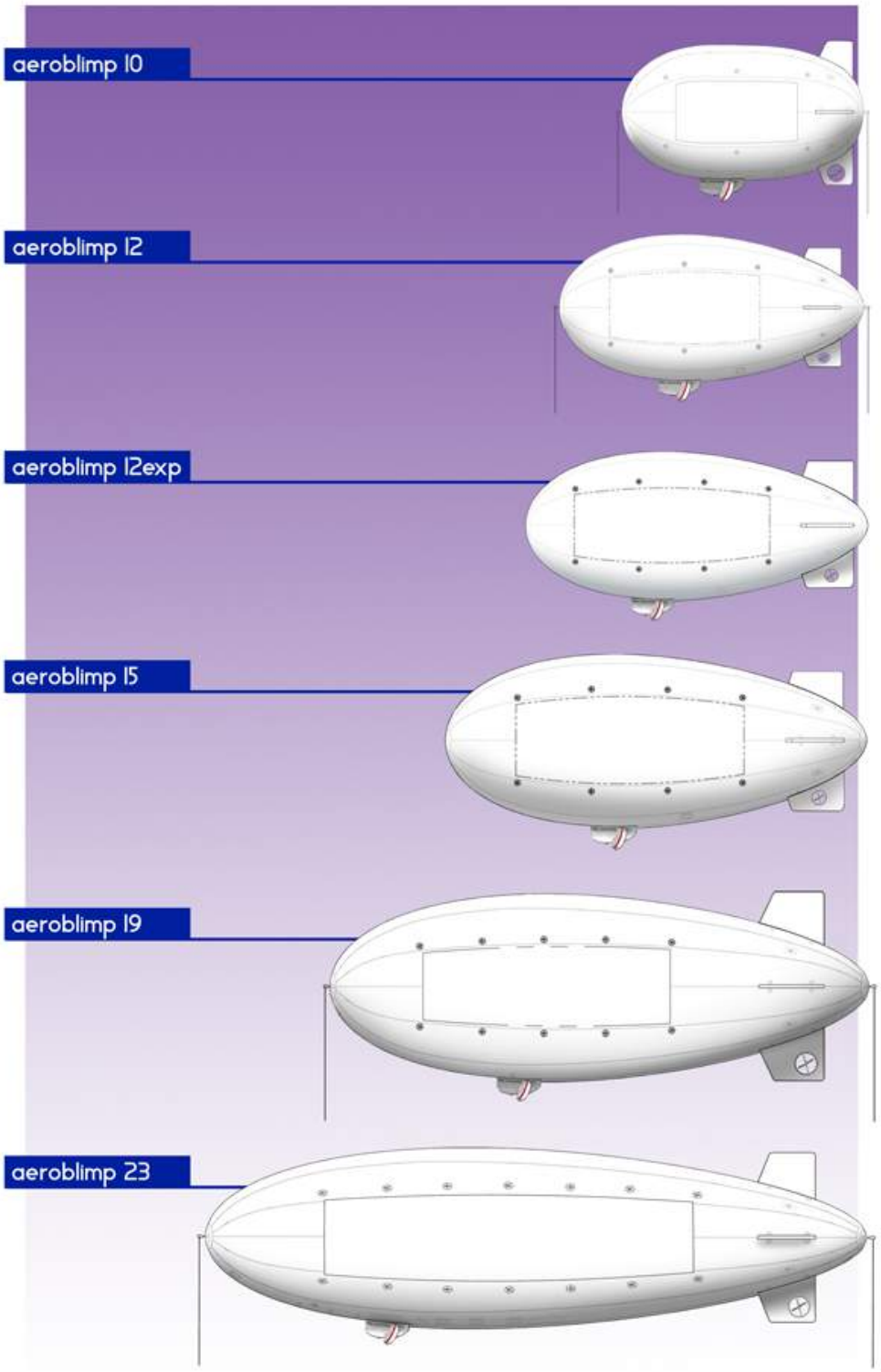
Challenger's UAS blimp standard product line includes vehicles ranging from 5 to 12 m (16.4 to 39.4 ft) in length with the following general characteristics:

- Non-rigid, two-ply gas envelope: Nylon with ThermoPlastic Urethane (TPU).
- Cruciform tail with composite fins and aileron and rudder aerodynamic control surfaces.
- One electric motor-driven lateral thrust propeller housed vertically in the lower tail fin for directional control at low speed.

- Modular gondolas with options for an all-electric power system rated from 50 watts up to 2,200 watts, or an engine-driven power system with engine displacement from 28 cc to 62 cc.
- Two shrouded, vectored thrust main propellers, each driven by its own small electric motor or gas engine. The propellers are cantilevered from the modular gondola on a common shaft that controls their pitch angle for thrust vector control.
- The combination of envelope size and modular gondola can be selected to best match mission requirements.
- Reinforced “rail system” under the gas envelope for attaching the modular gondola and a payload package while allowing the loads to be positioned longitudinally to optimize the blimp’s center-of-gravity.
- Reinforced mounting points along the sides of the gas envelope for mounting banners.
- Redundant flight controls.

Representative modular gondolas, each with twin thrust vectoring propellers. Source: Challenger Aerospace

A Challenger Aerospace UAS standard blimp showing placement of a modular gondola with main propulsors positioned for vertical thrust, a single main landing wheel, and the cruciform tail with aerodynamic control surfaces and lateral thruster.
Source, both photos: Challenger Aerospace



UAS blimp standard product line. Source: Challenger Aerospace

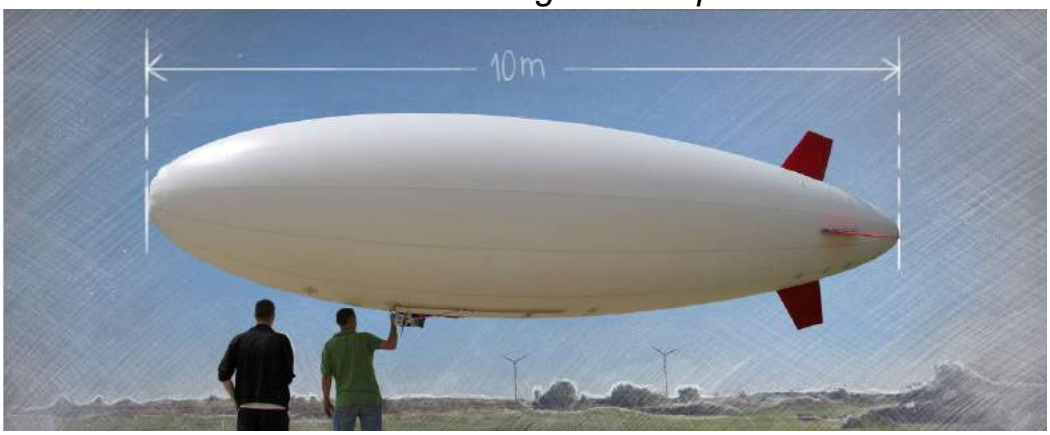
Challenger's smallest model, the 5-meter (16.4-ft) blimp, has an envelope volume of 10.4 m^3 (367 ft^3). Equipped for outdoor use with an all-electric 1,000 watt modular gondola, this UAS can operate in moderate wind and lift a payload of up to 1.2 kg (2.6 lb).

Specifications for other Challenger standard blimp models are not available.

3. Aerial photography blimps

Challenger Aerospace offers UAS blimps as aerial photography platforms. In addition to their standard line of small blimps, it appears that Challenger Aerospace also offers small blimps manufactured by Aero Drum Ltd., as shown in the following photos.

10-meter Aero Drum aerial photography blimp.
Source: Challenger Aerospace



10-meter Aero Drum aerial photography blimp.
Source: Aero Drum Ltd. &
Challenger Aerospace via aeroexpo.online

7-meter Aero Drum aerial photography blimp.
Source: Aero Drum Ltd. &
Challenger Aerospace via aeroexpo.online

Minimal "gondola" on the Aero Drum aerial photography blimp. The array of reinforced mounting pads on the Aero Drum blimp allows the gondola and payload package to be positioned longitudinally to manage the center of gravity of the blimp. Source: Aero Drum Ltd. & Challenger Aerospace via aeroexpo.online

4. Drone blimp operator training

Challenger Aerospace offers a UAS blimp operator course that is designed to prepare beginning students to become Commercial Blimp Drone operators in compliance with the Federal Aviation Regulation (FAR) Part 107.

5. For additional information

- Dylan Malyasov, "Interview: Challenger Aerospace Group CEO LeRoy D. Aday talks company's programs and plans," DefenceBlog, 28 August 2017: https://defence-blog.com/interview-challenger-aerospace-group-ceo-leroy-d-aday-talks-companys-programs-and-plans/
- "Aerial photography airship," Challenger Aerospace Systems: https://www.aeroexpo.online/prod/challenger-aerospace-systems/product-186947-56033.html

Video

- "Blimp Training," (0:15 min, provides a quick look at a highly-maneuverable small UAS blimp in flight), posted by Challenger Aerospace Systems, 26 September 2016: https://m.facebook.com/Chall"enger-Aerospace-Systems-611556322350428/videos/blimp-training/625264817646245/

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- *Modern Airships - Part 1*: https://lynceans.org/all-posts/modern-airships-part-1/
- *Modern Airships - Part 2*: https://lynceans.org/all-posts/modern-airships-part-2/
    - Aero Drum Ltd.
- *Modern Airships - Part 3*: https://lynceans.org/all-posts/modern-airships-part-3/