

Euro Airship rigid airships

Peter Lobner, 12 August 2019

Background

Euro Airship is based in Pau, France, where the company has carried out more than 15 years of engineering and architectural analysis and detailed studies on market requirements for modern airships. With this information, the company has prepared construction-ready designs for three rigid airships intended for operating with heavy loads in all weather conditions:

- Corsair:
 - 1 - 8 metric ton (1.1 - 8.8 short ton) payload, or
 - 50 passengers for the tourism version.
 - Available in standard, hybrid and solar-powered versions.
- DGPAAtt:
 - 30 - 50 metric ton (33 - 55 short ton) payload capacity, or
 - 150 passengers for the tourism version
- DGPAAtt 400:
 - 250 to 400 metric ton (275 – 440 short tons) and 6,000 m³ (212,000 ft³) payload capacity, or
 - 1,000 passengers

These airships are intended for use in a wide range of applications, including cargo delivery with precision positioning of the cargo, rescue and humanitarian missions on land or at sea, long-duration surveillance of land or sea, scientific missions, military missions, and tourism. Euro Airship holds international patents to key technologies incorporated in these airships.

The Euro Airship website is here: <http://www.euroairship.eu>

Euro Airship general features

Euro Airship's designs are founded on Zeppelin designs from the interwar period (1920s – 1930s). From this starting point, years of R&D and the introduction of new materials and technologies have resulted in rigid airship designs with significantly improved performance, maneuverability, reliability, stability and safety.

Common features of Euro Airship designs include:

- Rigid framework with double polylobed design envelopes
- Cigar shape, aerodynamic profile with low drag coefficient
 - Optimized for a low a drag coefficient (C_x) to reduce the airship's wind resistance and sensitivity to wind gusts.
- Patented variable buoyancy control system using air ballast:
 - Enables vertical takeoff and landing (VTOL) and hovering flight.
 - Manages airship buoyancy during load exchanges without the need for external ballast exchange.
- Water ballasting system can be used for point-to point transport.
- Patented anticipatory piloting system manages the helium gas volumes, automates airship stabilization and anticipates variations to be corrected.
- Powerful engines, but quiet operation.
 - Solar-electric propulsion is available on some models
- Designed for high-availability, all-weather operations, 365 days a year:
 - Designed to operate in the same weather condition as a fixed-wing cargo airplane.
 - Able to operate in weather conditions that might ground other airships.
 - Airships can withstand winds of 160 km/h (99 mph).
 - Automatic de-icing of the entire structure through reuse of warm air.
- Long operating range of several thousand kilometers.
- Largely independent of ground infrastructure; can load & unload anywhere, including at sea:
 - Airship can land to permit roll-on/roll-off (Ro-Ro) loading and unloading.
 - Airship can remain aloft, hovering over ships or other specific locations and conduct loading and unloading using airborne cranes.
 - Airship can land and pick up or deliver a detachable cargo pod.

- Capable of landing at unimproved sites; also capable of amphibious operations.
- Low operating cost, enabled by the expected high operational availability of the airship and its all-weather operating capability.
- Low environmental impact:
 - 6 to 10 times less carbon dioxide emissions than a fixed-wing airplane of comparable cargo capacity.
 - No emissions from solar-electric powered models
- Transformable into a drone for unmanned operations; low radar cross-section; capable of very long autonomous missions of over 15 days at 7,000 m (23,000 ft) altitude.

Implementing variable buoyancy control on a Euro Airship

One of the key technologies is a ballasting system that uses compressed air as the variable ballast. The operation of this system is described as follows:

“Euro Airship’s patented airship ballasting system uses the powerful on-board engines to manage compressed air stored in special containers. Ballasting can achieve airship weighting in seven minutes to one hour, depending on the size of the load to be discharged (from 10 to 400 metric tons).”

A separate patented “anticipatory piloting” system managed the volume of helium gas, which is held within separate containers. This automatic system improves the stability to the airship.

The Corsair airship – 8 metric tons

The Corsair rigid airship is targeted for tourism, military surveillance and civil security missions. It also can be use for logistics purpose. The airship has a crew of two (pilot, co-pilot or engineer) and can be configured to operate unmanned as a drone. Corsair has a length of 139 meters (456 ft) and a gas envelope diameter of 23 meters (75.5 ft) in the standard version.



Rendering of a Corsair airship in flight. Source: Euro Airship

Corsair is available in three versions, Standard, Hybrid and Solar-powered.

A. Standard version

Two small turboshaft engines, each rated at 800 shp, driving two propellers mounted amidships, provide propulsion. Corsair has a cruising speed of 108 kph (67 mph) and a maximum speed of 130 kph (81 mph). Operational range is about 2,000 km (1,243 miles). With a 1 metric ton cargo, Corsair can operate at an altitude up to 7,000 m (22,966 ft). With its maximum 8 metric ton (8.8 short ton) cargo, maximum altitude is reduced to 2,000 m (6,561 ft).

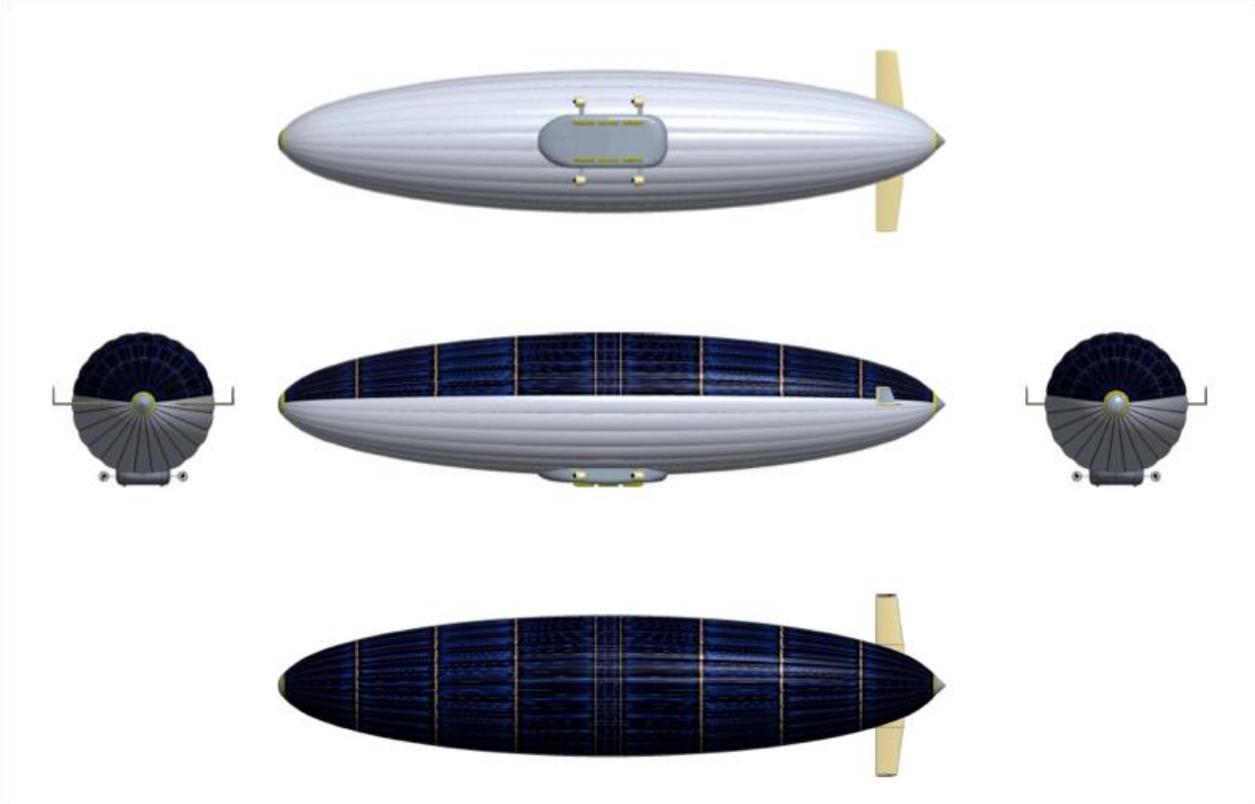
Two air pumps (ballasting engines) in the variable buoyancy control system are powered by 100 kW microturbines

B. Hybrid version

Two hybrid generators provide electric power for propulsion and airship systems, each consisting of a gas turbine driving an electric generator rated at 600 kWe. Propulsion is provided by four vectorable propellers, each driven by a 350 kW (469 shp) electric motor. One back-up lithium battery can provide power for fans, two lateral thrusters (front and rear) or 100 kW of additional power for landing and takeoff assistance.

C. Solar version

A solar-electric version of the Corsair is available with thin-film solar panels on the upper half of the envelope. The configuration of this airship is shown in the following graphics.



*The solar-electric powered Corsair airship.
Source: Euro Airship*



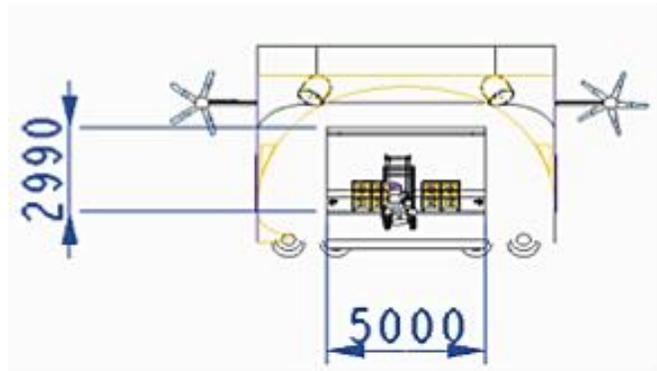
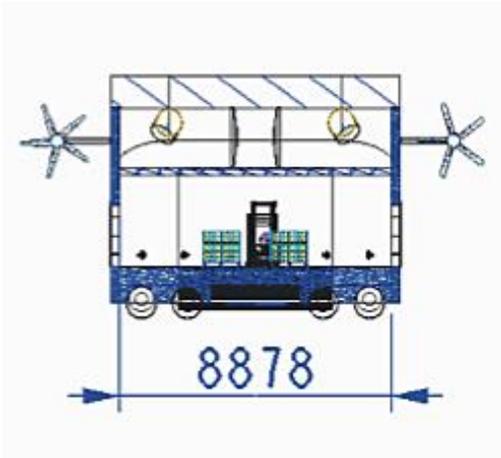
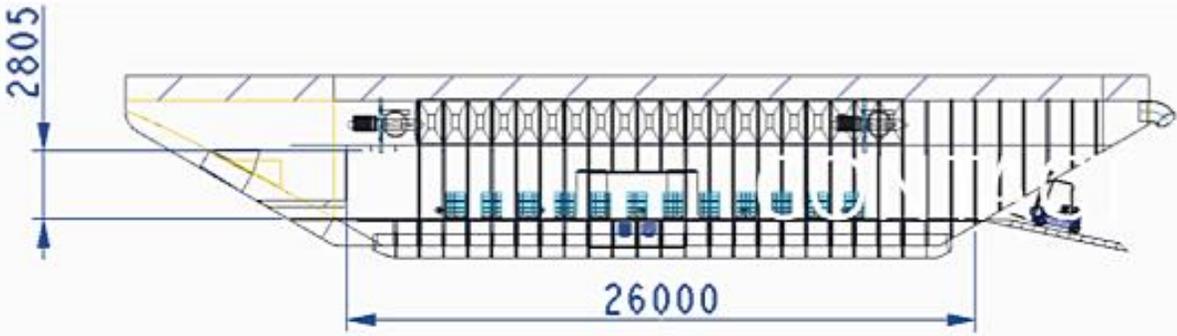
The DGPAtt 50 airship – 50 metric tons

“DGPAtt” is the French acronym for “autonomous jumbo all-weather airship”. The DGPAtt 50 airship has a length of 169 meters (554 ft) and a gas envelope diameter of 33 meters (108 ft). Propulsion is provided by four turboshaft engines, each rated at 2,700 shp, driving four (or six) propellers mounted amidships, two (or three) on each side of the gondola. Directional control is provided by an all-moving rudder and, for low-speed maneuvering, by lateral thrusters located in the bow and stern.



Two views of the DGPAtt airship. Source: Euro Airship

A DGPAtt airship can be equipped with standard or specialized cargo bays. A “standard” cargo bay measures 26 L x 8 W x 4 H meters (85 x 26 x 13 ft). With a 50 metric ton (55 short ton) load, the airship can operate at an altitude up to 3,000 meters (9,842 feet), at a cruising speed of 130 kph (81 mph), with an operational range of 2,800 km (1,740 miles). Maximum speed is 180 kph (112 mph). Ferry range with no cargo is more than 10,000 km (6,214 miles).



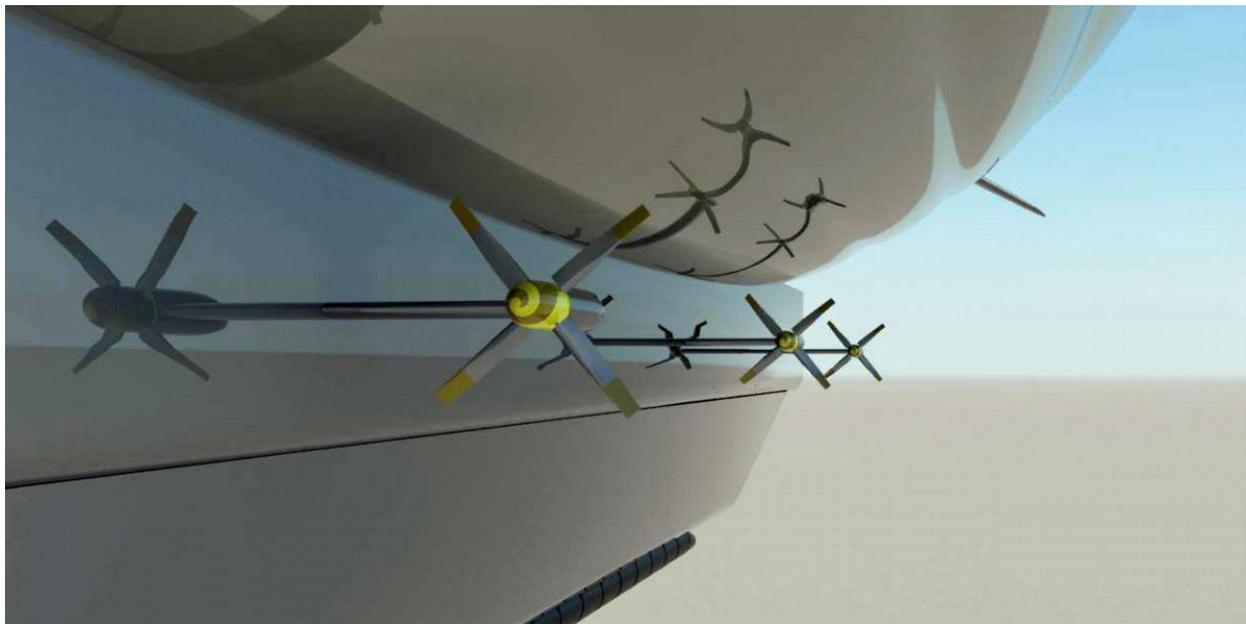
The DGPAtt cargo hold. Source: Euro Airship



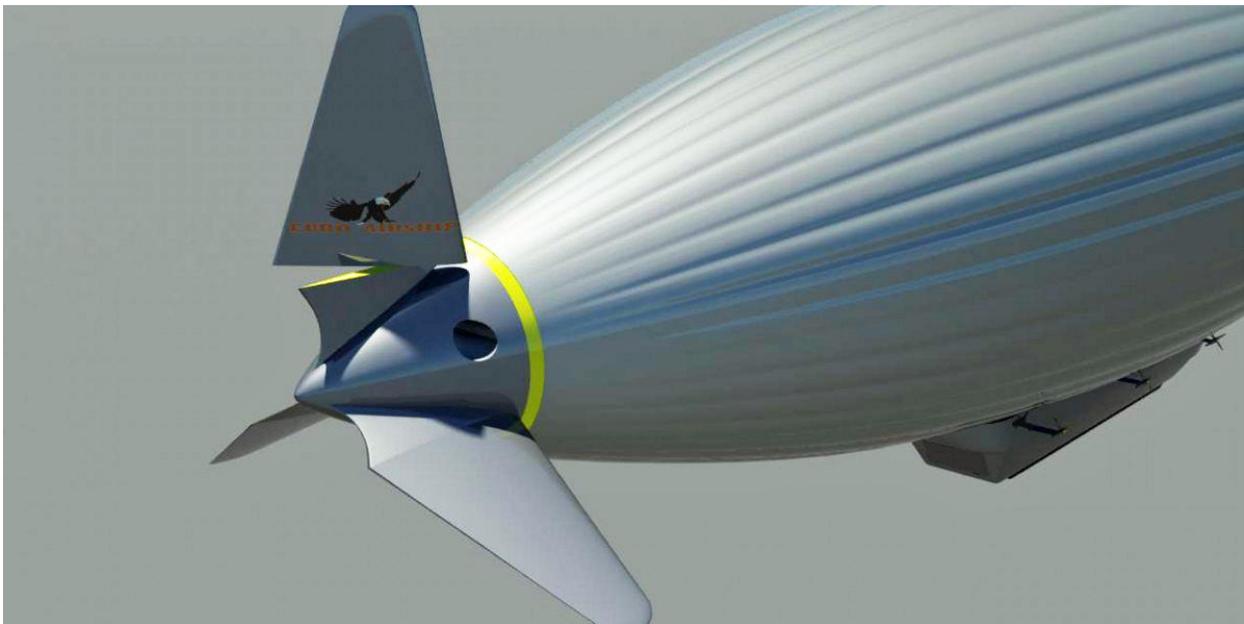
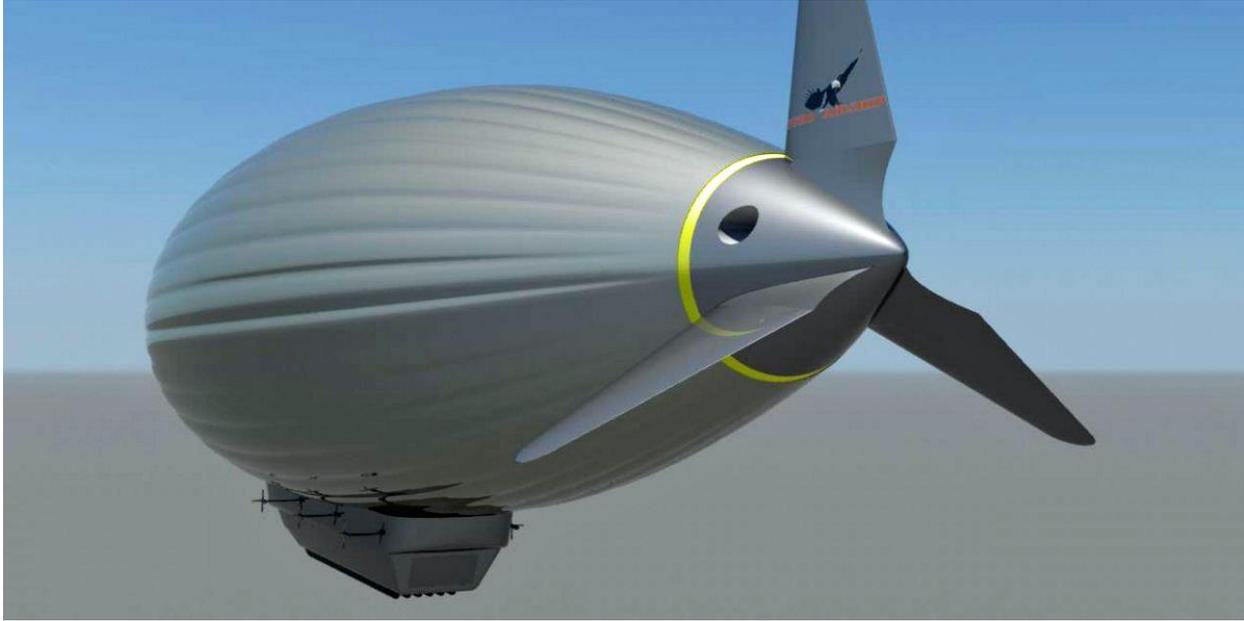
Rendering of a DGPAtt airship in flight. Source: Euro Airship



*Front quarter view of a DGPatt airship. Note the placement of the bow lateral thruster and the propulsion propellers along the side of the gondola.
Source: Euro Airship*



*Placement of the propellers along the side of the gondola.
Source: Euro Airship*



Two stern views of the DGPatt concept. Note the all-moving rudder design and placement of the stern lateral thruster. Source: Euro Airship

In 2014, The European Union's Heli4Rescue (H4R) Project evaluated the future needs of a proposed trans-European emergency response infrastructure. Part of that infrastructure would be an airborne response service that could perform a wide range of important functions, including delivery of bulk supplies and evacuation of large numbers of people in heavy-lift airships. The Euro Airship DGPatt was the heavy-lift airship included in the H4R evaluation.



Elements of a proposed EU airborne response service includes a DGPAtt heavy-lift airship. Source: screenshot from EU H4R video

The H4R Final Report states:

“As reference for Large Sized Airship (LSA) the rigid airship from the Euroairship project has been considered. This project is under funding phase with patent technology for automatic ballasting system. Thanks to new technology applications in structure, membrane and to its natural aerostatic lift and automatic ballasting system, LSA is very efficient for autonomous heavy lift transport and firefighting and Civil Security missions. LSA is also very cost efficient and environmentally friendly with regards to other aerial or terrestrial means.”

You can view the EU’s Heli4Rescue (H4R) “dissemination video” at the following link. This video illustrates how a heavy lift airship could be integrated into an airborne response service that includes other aircraft types (helicopters and drones) that have unique roles in the response.

<https://www.youtube.com/watch?v=ZEmcr-mYgZM>

You can read the H4R report here:

<https://cordis.europa.eu/docs/results/284/284658/final1-d1-5-public-report-final.pdf>

The DGPAtt can transport and dump tons of water at a rate faster than current fire-fighting tanker aircraft. Euro Airship estimates that it would take four to five fire-fighting planes to match the air-drop capacity of one 30-T (30 metric ton) DGPAtt; about 90 metric tons/hour. With its VTOL and variable buoyancy capabilities, a fire-fighting DGPAtt can hover and fill its cargo hold with water from any nearby water body (lake, large or small rivers, etc.) and then return to continue fighting the fire.



DGPAtt dropping water on a forest fire. Source: Euro Airship

DGPAtt 400

The very large DGPAtt 400 will be a scale-up of the basic DGPAtt design implemented in the DGPAtt 50 airship. The DGPAtt 400 is designed to handle payloads in the 250 to 400 metric ton (275 – 440 short tons) range with an internal cargo bay volume of 6,000 m³ (212,000 ft³). This airship also could operate in a passenger configuration capable of transporting 1,000 passengers.

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