

Aeros - Aeroscraft airships

Peter Lobner, updated 8 March 2022

1. Introduction

Igor Pasternak established a volunteer airship design bureau at Lviv Polytechnic University in Ukraine in 1981. His firm, Aeros, became one of the first private aerospace companies permitted under Mikhail Gorbachev's Perestroika reforms in 1986. In 1994, he relocated to the U.S. and established Worldwide Aeros Corp. (Aeros) in Montebello, CA with the goal of becoming a major manufacturer of lighter-than-air (LTA) craft in the U.S. The Aeros website is here: <http://aeroscraft.com/aeroscraft/4575666071>

In 2005, Aeros was one of two contractors selected by the Defense Advanced Research Projects Agency (DARPA) to conduct Phase I of Project WALRUS and develop a prototype of their variable buoyancy airship that implemented a process called "Control of Static Heaviness" (COSH). The end product was the *Dragon Dream* prototype Aeroscraft airship, which was completed under Project Pelican and successfully flew in 2013.

During the same period, Aeros developed an impressive patent portfolio addressing rigid airship aerostructures, an air bearing landing system, and most importantly, the COSH flight system for a constant volume, variable buoyancy air vehicle. For details on these Aeros patents, please refer to my separate article on the Aeros Aeroscraft *Dragon Dream*.

From their experience with *Dragon Dream*, Aeros developed a family of advanced COSH airship designs, known as Aeroscraft, that are scaleable and configurable for a range of commercial, civil, military and private applications. These Aeroscraft airships are addressed in this article.

Aeros LTA products include the non-rigid Aeros 40 *Sky Dragon* airship and advanced tethered aerostatic systems. Other notable Aeros LTA designs include the Global Rapid Redeployable (G2R) Stratospheric Airship and the Neona lenticular airship yacht.

2. The DARPA Project WALRUS and other military heavy lift airship design concepts

Project WALRUS was terminated in mid-2006, after completion of Phase I. The cancelled Phase II was to focus on design refinement, technology development, risk reduction demonstrations of components and systems, and flight testing an Advanced Technology Demonstration (ATD) scaled airship with a payload comparable to a C-130 Hercules fixed-wing cargo airplane (about 30 tons).

Aeros developed design concepts for larger COSH airships to meet the WALRUS Phase II goals. Aeros also developed COSH airship concepts to support the Navy's HULA goals for heavy lift airships to support operations at sea. These larger military designs implemented a consistent design philosophy that evolved along with the closely-related family of large commercial Aeroscraft airships offered today by Aeros.



Artist's rendering of an early Aeros WALRUS heavy lift airship, the ML-60T. Source: Aeros



Three artist's rendering of military versions of a heavy-lift Aeroscraft airship. Source: Aeros

3. Commercial Aeroscraft airships

Commercial Aeroscraft rigid airships bear a family resemblance to the *Dragon Dream*, but are much larger, more sophisticated and powerful, and configurable for a wide range of applications. Basic design characteristics of the Aeroscraft family of airships are summarized in the following table. “Pelican” is the *Dragon Dream* prototype that flew in 2013. ML866, ML868 and ML86X are three size ranges in the scalable family of Aeroscraft rigid COSH airships.

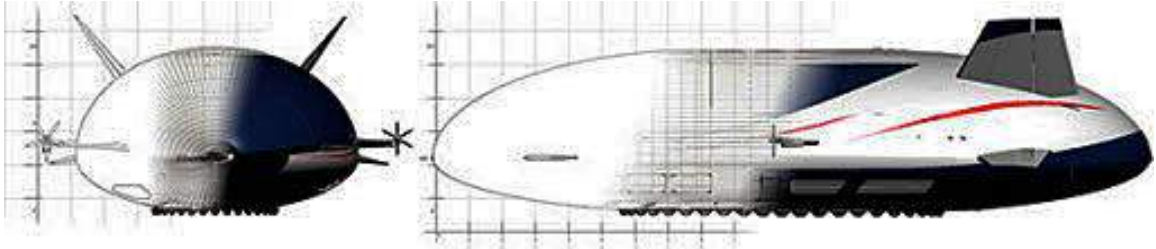
	PELICAN	ML 866	ML 868	ML 86X
PAYLOAD	0 Tons	66 Tons	250 Tons	500 Tons
LENGTH	266 ft	555 ft	770 ft	920 ft
WINGSPAN	96 ft	177 ft	296 ft	355 ft
HEIGHT	51 ft	120 ft	183 ft	215 ft
MAX SPEED	60 knots	120 knots	120 knots	120 knots
CRUISE SPEED	40 knots	100 knots	100 knots	100 knots
RANGE	N/A	3,100 nm	5,100 nm	5,100 nm
ALTITUDE CEILING	9,800 ft	12,000 ft	12,000 ft	12,000 ft
CARGO DIMENSIONS	N/A	220 ft X 40 X 30	380 ft X 61 X 45	455 ft X 74 X 54

Source: Aeros

The ML866

Aeros began development of its first commercial-scale Aeroscraft, the 66-ton ML866, in 2009. It appears that this airship was renamed in 2018 as the Aeroscraft Gen 2 Cargo Airship.

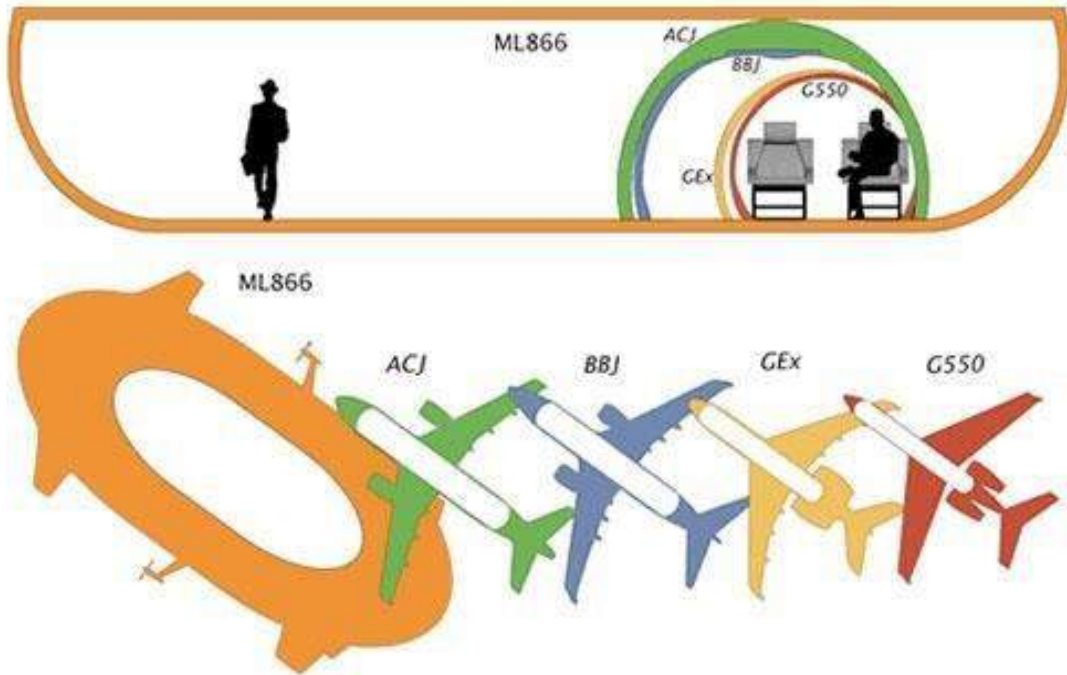
At the October 2007 National Business Aviation Association (NBAA) show in Atlanta, Georgia, Aeros presented a “super yacht” version of the ML866 with more than 5,382 square feet (500 square meters) of floor space in the main cabin, which can be configured to meet customer requirements.



ML866 bow and profile views. Source: Aeros



ML866 "Super yacht" concept drawings, 2007. Source: Aeros



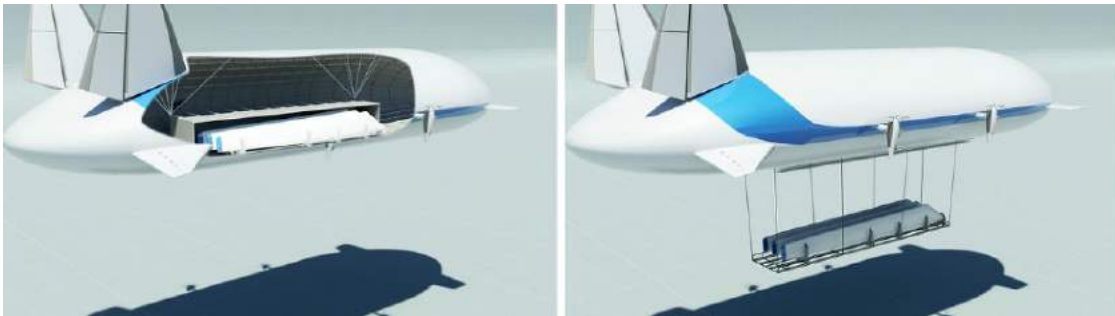
Scale of the ML866 main cabin in comparison to high-end business jets. Source: Aeros



One example of the large ML866 main cabin configured for luxury tourist use. Source: Aeros

Aeros claims that the technologies demonstrated by the *Dragon Dream* will “enable the Aeroscraft to fly up to 6,000 nautical miles, while achieving true vertical takeoff and landing at maximum payload, to hover over unprepared surfaces, and to offload over-sized cargo directly at the point of need.”

Operational Aeroscraft airships will be designed with an internal cargo bay and a cargo suspension deployment system that permits terrestrial or marine (shipboard) delivery or pickup of cargo from a hovering Aeroscraft, without the need for local infrastructure or an exchange of external ballast. The COSH variable buoyancy system and the low speed control (LSC) system are designed to precisely manage airship buoyancy and position throughout the in-flight load exchange operation.



Discharging cargo from a hovering Aeroscraft airship. Source: Aeros



ML866 / Aeroscraft Gen 2 hovering and making an in-flight load exchange. Source, both graphics: Aeros



*ML866 / Aeroscraft Gen 2 ground cargo handling.
Note the side access to the cargo bay.
Source, both graphics: Aeros*

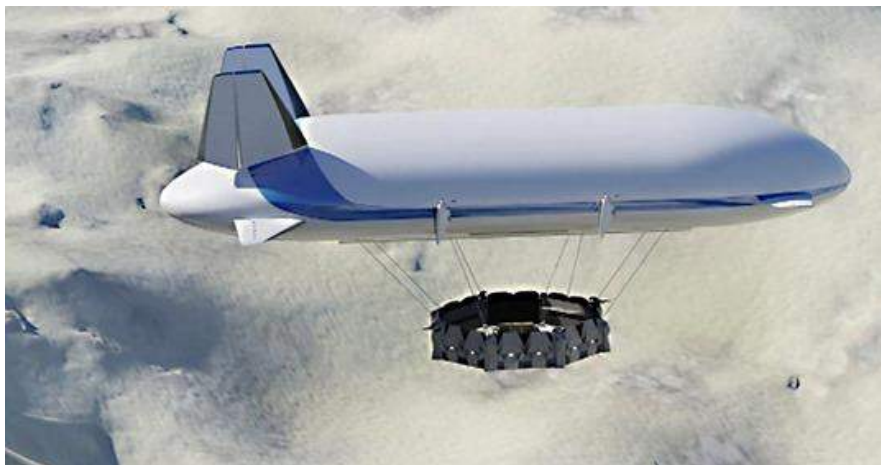


In 2014, Aeros reported it had completed the design and implemented a 'design freeze' for the ML866. In September 2015, Aeroscraft CEO Igor Pasternak announced, “We are excited to reveal production is underway on the 555 ft (169 m) long ML866, and (we are) committed to achieving FAA operational certification for the first deployable Aeroscraft in approximately five years.”

Three years later, it became clear that Aeros had changed its plans and was focusing on system and subsystem design and validation rather than on building a complete airship.

On 8 August 2018, Aeroscraft announced that “they have completed the preliminary design phase for their Aeroscraft Gen 2 Cargo Airship”.....”Aeroscraft Gen 2 will have enhanced buoyancy control, flight surfaces and modular cargo systems. The aircraft will feature zero emission operations, representing the only truly green technology capable of moving cargo over long distances. Aeros is now proceeding with the build and test phase on all major systems and subsystems for Aeroscraft Gen 2.” The Aeroscraft Gen 2 is being designed with great range (3,100 nautical miles; 5,741 km), a cruise speed of 100 – 120 knots, and an altitude ceiling of 12,000 feet (3,658 m).

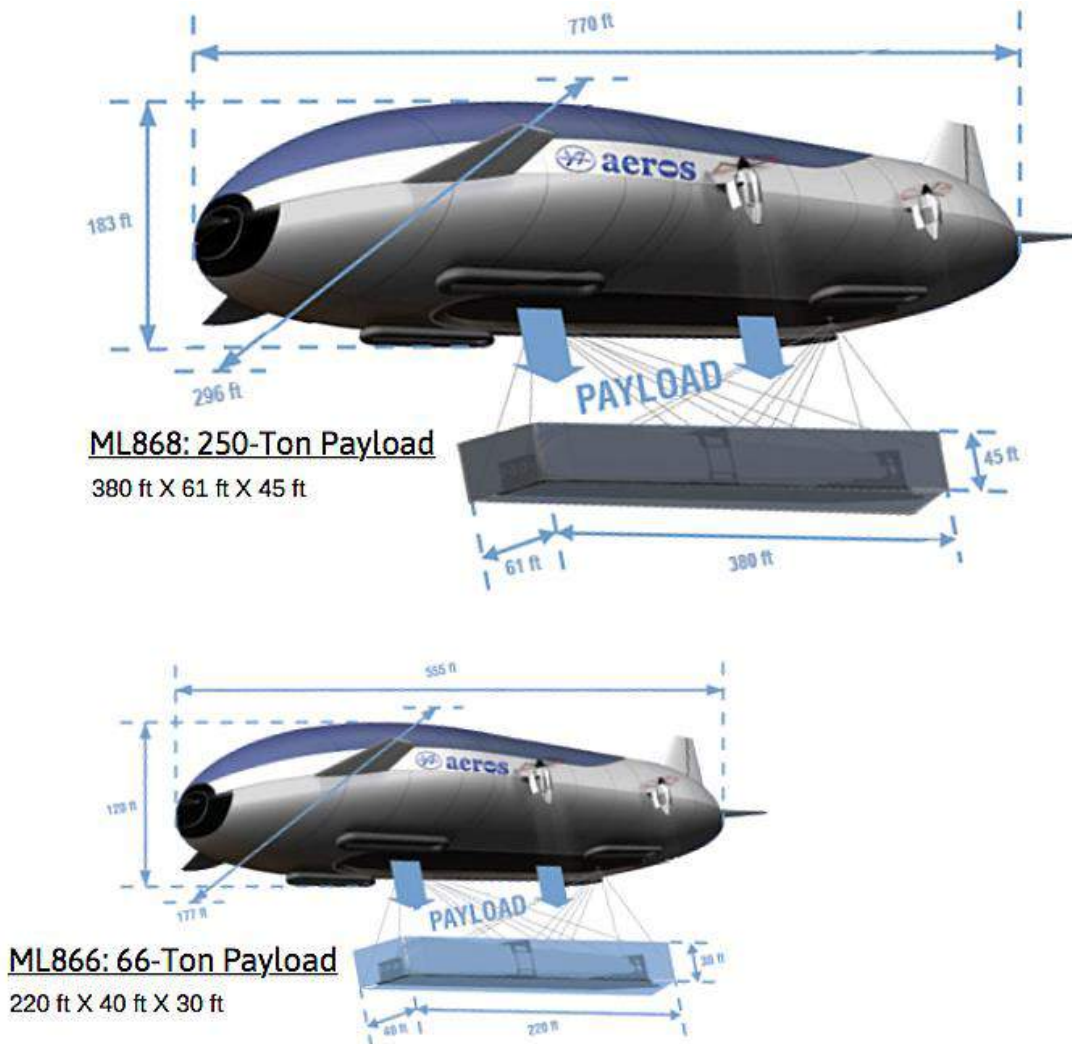
Like several other manufacturers of large airships with mature (almost ready-to-go) designs, Aeros’ next step most likely depends on the availability of a commercial or military sponsor that will take the financial risk and provide major funding for the construction, testing and certification of the first large Aeroscraft airship.



Aeroscraft carrying oversized cargo as a sling load. Source: Aeros

Beyond the ML866

The basic Aeroscraft 66-ton ML866 airship design can be scaled up to be a much larger airship with greater load carrying capacity. For example, the relative scale of a 66-ton ML866 and a 250-ton ML868 is shown in the following Aeros graphic.



At 380 ft (115.8 m) long, the internal cargo bay on the ML868 is long enough to carry even the longest wind turbine blades being manufactured today. The longest blade currently in production is the 351 ft (107 meter) blade manufactured by LM Wind Energy for the General Electric Haliade-X 12 MW wind turbine. A set of three Haliade-X blades for a single wind turbine weighs 165 metric tons (181.5 tons), well within the ML868's 250 ton cargo capacity.



*A large Aeroscraft can be configured to handle large numbers of passengers on scenic tours, or fewer passengers on luxury cruises.
Source: Aeros*



*A large Aeroscraft configured as a freighter.
Source: Aeros*



A large Aeroscraft can be configured as a high volume passenger carrier or airborne “cruise ship”. Source. Aeros circa 2006

4. HALO luxury airship

Halo is a giant, luxury, residential airship concept designed in 2015 by Andrew Winch Designs, London, UK, based on an Aeroscraft variable buoyancy airship, likely the very large ML868. For details, please see my separate article on this airship.

5. FAA Type certification

In Modern Airships – Part 1 (<https://lynceans.org/all-posts/modern-airships-part-1/>), I made the following comment on the current state of aviation regulations pertaining to advanced airships:

“Current US, Canadian and European airship regulations were developed for non-rigid blimps and they fail to address how to certify most of the advanced airships currently under development. This means that the first airship manufacturers seeking type certificates for advanced airships will face uphill battles as they have to deal with aviation regulatory authorities struggling to fill in the big gaps in their regulatory framework and set precedents for later applicants.”

On 11 March 2008, Aeros announced that the US Federal Aviation Administration (FAA) had accepted the type certification application for their Aeroscraft ML866. The intent was to certify the ML866 as a new type of aircraft.

A separate application will be needed for a Production Certificate, which would allow Aeros to issue Standard Airworthiness Certificates for the ML866.

In an August 2020 Robb Report article, Aeroscraft forecast that it will be another three to five years before it receives FAA certification for passenger travel. The initial target appears to be for passenger trips among the Hawaiian islands.

6. For more information

- Gemma Bowes, “Cruise ship for the skies,” The Guardian, 5 March 2006:
<https://www.theguardian.com/travel/2006/mar/05/travelnews.theairlineindustry.observerescapesection>
- Loz Blain, “DARPA provides funding for Aeros' ballast-free airship weight control system,” New Atlas, 3 November 2007:
<https://newatlas.com/go/8282/>
- “Lin Lao & Igor Pasternak, “A review of airship structural research and development,” Progress in Aerospace Science, Vol. 45, Issues 4 – 5, pp. 83 – 96, May – July 2009:
<https://www.sciencedirect.com/science/article/abs/pii/S0376042109000153>
- James Martin, “Inside Aeroscraft, the future of luxury airships,” CNet, 17 July 2012: <https://www.cnet.com/pictures/inside-aeroscraft-the-future-of-luxury-airships-pictures/>
- “Zeppelins poised to make comeback in Siberia,” The Siberian Times, 30 November 2013:
<https://siberiantimes.com/business/casestudy/news/zeppelins-poised-to-make-a-comeback-in-siberia/>
- Igor Pasternak, “Aeroscraft: Delivering Game-Changing Innovation for Global Cargo Logistics,” presented at IATA 8th World Global Symposium, 11 – 13 March 2014:
<https://www.slideserve.com/ashby/aeroscraft-delivering-game->

[changing-innovation-for-global-cargo-logistics](#)

- “Zeppelins to move equipment in Siberia,” Solid Ground, 25 September 2014: <https://solidground.sandvik/zeppelins-move-equipment-siberia/>
- “Self-ballasting Aeroscraft cargo airship now in development in California,” JEC Group, 10 September 2015: <http://www.jecomposites.com/knowledge/international-composites-news/self-ballasting-aeroscraft-cargo-airship-now-development>
- Brian Wang, “Hybrid airships nearing significant commercialization,” NextBigFuture, 25 March 2015: <https://www.nextbigfuture.com/2016/03/hybrid-airships-nearing-significant.html>
- Jemima Sissons, “These New Luxury Blimps Hope to Become the Superyachts of the Skies,” Robb Report, 19 August 2020: <https://robbreport.com/motors/aviation/rise-of-airships-2944817/>

Other Modern Airships articles

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
 - Aeros Aeroscraft prototype, *Dragon Dream*
 - DARPA Project WALRUS
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
 - Aeros 40 *Sky Dragon* blimp
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>
 - Aeros *Neona*
 - Halo luxury airship