

Aeros 40 Sky Dragon Airship

Peter Lobner, 3 April 2021

1. Introduction

In 1994, Igor Pasternak founded 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. In 1995 Aeros produced their first airship, the non-rigid, single seat, ultralight Aeros 50 with active pressure control. This was followed by the larger, more capable Aeros 40A *Sky Dragon* and a series of improved versions, the 40B, 40D, and the current production model, the 40E.



*Evolution from the Aeros 50 to the Aeros 40 Sky Dragons.
Source: Aeros*

The current Aeros LTA product line also includes the rigid, heavy lift, variable buoyancy Aeroscraft airships and advanced tethered aerostatic systems. An Aeros 40D served as a flying test bed for Aeros' variable buoyancy airship technology known as COSH (Control Of Static Heaviness).

This article focuses on the non-rigid Aeros 40D and 40E. See my separate articles for more information on the Aeros rigid, variable buoyancy airships: the *Dragon Dream* prototype and the heavy-lift Aeroscraft airships.

The Aeros website is here: <http://aeroscraft.com>

2. The Aeros 40D

The Aeros 40D Type Certificate S00007LA was approved in June 2000 and it entered service in 2007. With fly-by-wire controls (first introduced in the 40B), the 40D is certified for single pilot operation, visual and instrument flight rules (VFR & IFR) and is approved for operating over populated areas. It is designed to operate as a stable platform from hover to its maximum speed of 51 mph (82 kph). The basic specifications are summarized in the following Aeros table.

Configuration	1 Pilot / 4 Passenger
Type Certificate	FAA TC No. S00007LA Europe & China Validated
Volume	100,032 ft ³ / 2,833 m ³
Length	152 feet / 42.6 m.
Operation	Single Pilot; VFR; IFR
Propulsion	2x 125 HP; Continental IO240B
Fuel	100LL Av Fuel - 70.5 gal / 266.8 l
Flight Management	Digital, Full Flight and Pressure Control Authority
Payload	Up to 1000 lb

The two piston engines are rigidly mounted to the gondola. They are not thrust vectoring engines.

The 40D *Sky Dragon* can be configured for a variety of missions, including intelligence, surveillance, and reconnaissance (ISR), border surveillance and interdiction, maritime patrol, search and rescue, infrastructure monitoring (oil & gas pipelines, electrical transmission lines), first responder coordination, advertising and tourism.

The Aeros 40D product brochure is at the following link:

<https://lynceans.org/wp-content/uploads/2021/03/Aeros-40D-Brochure.pdf>



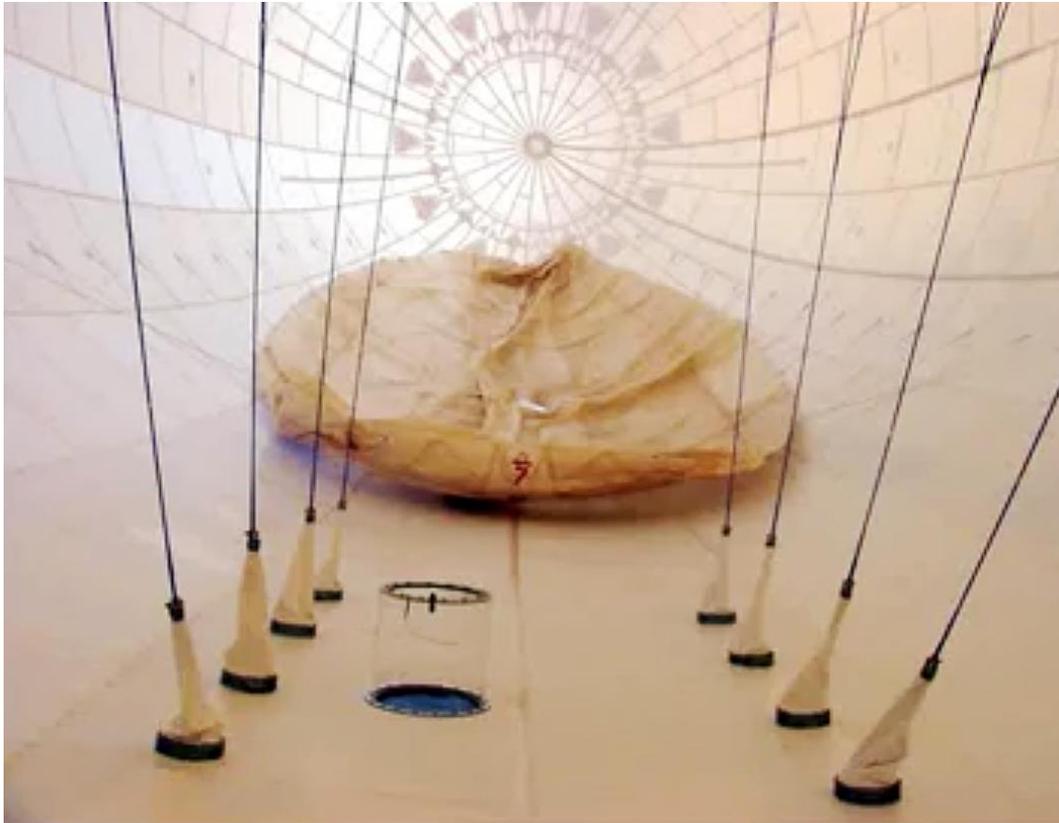
Aeros 40D. Source: Aeros





Aeros 40D at a mobile mooring mast. Source: Aeros





Inside the Sky Dragon envelope, looking forward from above the gondola. Note the catenary cables carrying the weight of the gondola into the upper surface of the envelope. Above: deflated forward ballonet. Below: partially inflated forward ballonet. Source: Aeros



3. The Aeros 40D COSH - Variable buoyancy proof-of-concept

In 2005, Aeros and Lockheed Martin were the two contractors selected by the Defense Advanced Research Projects Agency (DARPA) to conduct Phase I of Project WALRUS, which sought to develop new technologies and design concepts for a strategic, heavy-lift cargo airship. Under its \$3,267,000 Phase 1 contract, Aeros successfully demonstrated the operation of their COSH (Control Of Static Heaviness) variable buoyancy system in a ground-based test rig in 2006. Project WALRUS was terminated in mid-2006, after completion of Phase I.

Under a follow-on DARPA contract issued in October 2007, Aeros modified an Aeros 40D *Sky Dragon* by installing two inflatable collars that were controlled by an on-board, flight-weight, prototype COSH system. Aeros announced 17 July 2008 that a successful flight test of the modified Aeros 40D validated the operation of COSH. Aeros CEO Igor Pasternak explained, "We want to demonstrate we can change the static heaviness enough in a short time to be operationally acceptable."



The variable buoyancy Aeros 40D-COSH with two inflatable collars that were controlled by the on-board, flight-weight, prototype COSH system. Source: Aeros

4. The Aeros 40E

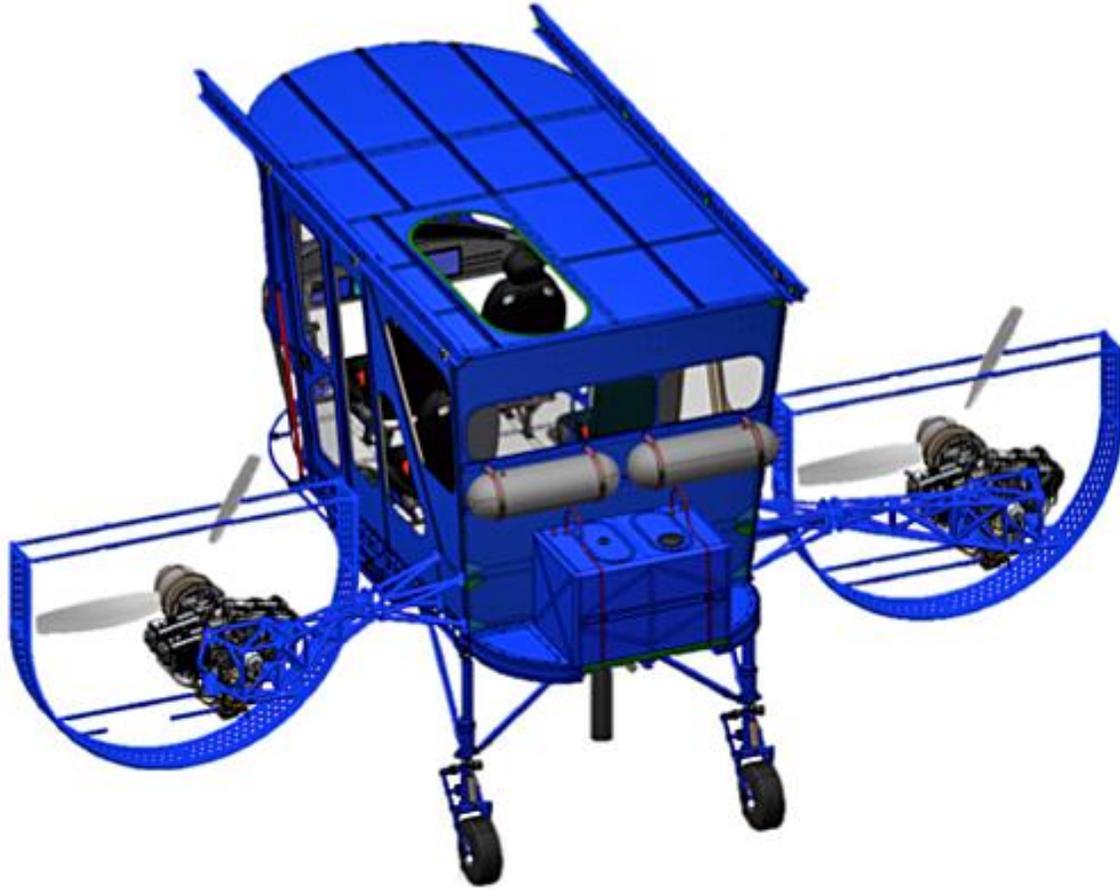
Worldwide Aeros Corp.'s 40E is the newest generation of *Sky Dragon* blimps. Production was initiated in 2014. Basic specifications are summarized in the following Aeros table.

USEFUL PAYLOAD:	1,000 KG / 2,200 LBS
ENVELOPE VOLUME:	3,200 M ³ / ~113,000 FT ³
RANGE:	510 KM/ ~275 NM
PROPULSION:	TWIN ENGINE / VECTORED (160HP X20)
ENGINE:	LYCOMING AEIO-320-D
CRUISE SPEED:	92 KPH / 50 KNOTS
CEILING:	3,050 M / 10,000 FT
SEATING:	1 + 6
CREW:	SINGLE PILOT OPERATION
OPERATION:	VFR / IFR (DAY/NIGHT)

The 40E incorporates many improvements over the 40D, including:

- More than double the payload (2,200 lb vs. 1,000 lb)
- More cabin seating (1+6 vs. 1+4/5)
- Vectoring (directionally-controlled) engines
- Near vertical takeoff and landing (VTOL)
- Higher max. speed (50 knots / 92 kph vs. 54 knots / 100 kph)
- Longer range (500+ km)
- “Weight-off-wheel” landing gear provides static lift data for pilots and optimizes dampening force and ground clearance
- Reduced pilot workload

The 40E's vectoring engines improve handling during takeoff and landing handling and reduce ground crew requirements.



Aeros 40E gondola (viewed from rear quarter) and vectored propeller arrangement. Source: Aeros

The Aeros 40E can accommodate advanced payload technologies:

- Long-range AESA multi-mode radar
- HD (high definition) daylight and thermal imaging (electro-optical / infrared, EO/IR) systems
- Communications and data equipment
- Threat response systems
- Downlinks for secure data dissemination or remote operations

The Aeros 40E product brochure is at the following link:

<http://aerosairship.com/wp-content/uploads/2016/08/8.16.16-SKY-DRAGON-AIRSHIP.pdf>

5. For more information

- “Production Underway on Aeros' Next Generation Airship, '40E Sky Dragon,' Following Program Initiation with the FAA,” CISION PRWeb, 30 December 2014:
<https://www.prweb.com/releases/2015/01/prweb12419496.htm>
- “Aeros Completes Critical Design Review for New '40E Sky Dragon' Airship,” The Lighter-Than-Air-Society, 21 February 2015: <https://www.blimpinfo.com/airships/aeros-completes-critical-design-review-for-new-40e-sky-dragon-airship/>
- “FAA and Aeros Reach Agreement on Plan for Certification of Aeros' Latest Airship, the '40E Sky Dragon’” sUAS News, 11 September 2015: <https://www.suasnews.com/2015/09/faa-and-aeros-reach-agreement-on-plan-for-certification-of-aeros-latest-airship-the-40e-sky-dragon/>
- FAA Accepts Certification Data and Subsystem Test Plans for Aeros 40E 'Sky Dragon' Airship in Production,” Airtrantech, 29 November 2015: <http://airtrantech.com/tag/40e-sky-dragon/>
- A. Amirian & S. Abdou, “Air Power,” (describes improvements in the 40E), Ansys Advantage Magazine, Volume IX, Issue 3, 2015: <https://www.ansys.com/about-ansys/advantage-magazine/volume-ix-issue-3-2015/air-power>

6. Video

- “Aeros' 40D 'Sky Dragon' Airship Takes Flight” (1:33 minutes), Aeros, 28 October 2014:
<https://www.youtube.com/watch?v=6KMlmpsbZgg>