

Lockheed Martin SkyTug and LMH-1

Peter Lobner, 17 August 2019

Background

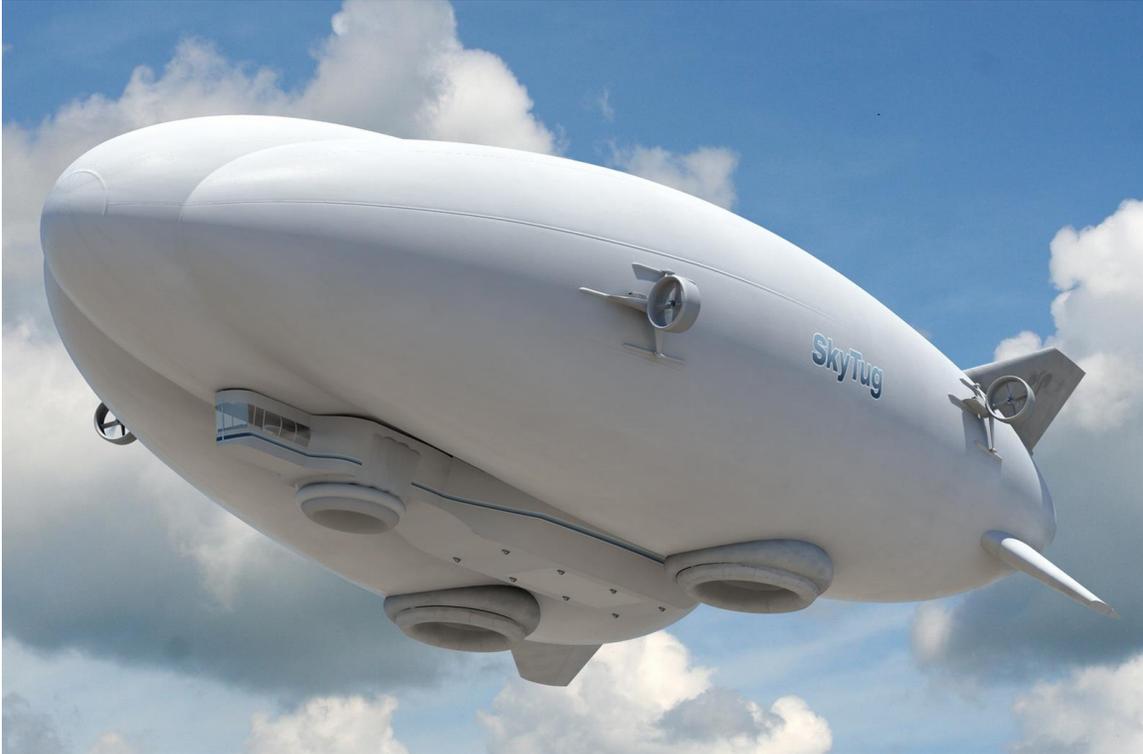
Lockheed Martin's current hybrid airship program is based in Palmdale, CA. Their hybrid airship builds on the design of their P-971 prototype airship, which was about one-third the scale of the follow-on designs: the SkyTug and the LMH-1.

First there was the SkyTug airship

In March 2011, Lockheed Martin announced that it planned to develop a larger commercial version of the P-971, to be called SkyTug, which would be scaled up to carry at least 20 tons of cargo for the Canadian firm Aviation Capital Enterprises of Calgary. The first commercial airship was expected to be delivered in 2012, and future versions were expected to have larger cargo carrying capacity.

According to Aviation Capital, "the fully vertical-takeoff-and-landing (VTOL) capable SkyTug will provide 'greater payload and range at a fraction of the cost of a helicopter'. The larger ships that will follow apparently won't be fully VTOL - they'll require something of a run-up on the ground to generate dynamic lift and get airborne, rather as an airplane does."

Evidently, the VTOL version was to have powerful vectored thrust engines to provide the needed lift for VTOL operations, while the larger versions would have had STOL performance typically associated with hybrid airships.



*Lockheed Martin SkyTug hybrid airship concept drawing.
Source: Lockheed Martin*

The LMH-1 airship

By 2015, reference to SkyTug seems to have disappeared and Lockheed Martin was promoting the LMH-1 as their next large commercial hybrid airship based on the P-791 design. The LMH-1 will generate about 80% of its lift from helium and the balance from vectored thrust engines and, in forward flight, from aerodynamic lift generated by the lifting-body fuselage.

As currently described by Lockheed Martin, the LMH-1 is designed to carry a crew of 2, up to 19 passengers or 21 metric tons (21,000 kg / 46,300 lb) of cargo at a maximum speed of 60 kts (111 kph) over a range of 2,593 km (1,400 nautical miles). The 18 x 3.2 x 3 meter (59 x 10.5 x 9.8 feet) cargo compartment is a little bigger than the cargo box of the widely used Lockheed Martin C-130 Hercules fixed-wing cargo aircraft.

As a hybrid airship, the LMH-1 typically will make a STOL takeoff and landing, with the aid of the air cushion landing system (ACLS)

demonstrated on the P-971 prototype airship. For an STOL takeoff at full load, the LMH-1 will require about 2,400 feet (732 meters) of clear space, which needs to be clear obstacles but does not need to be paved. When lightly loaded, an LMH-1 may be able to takeoff and land vertically.

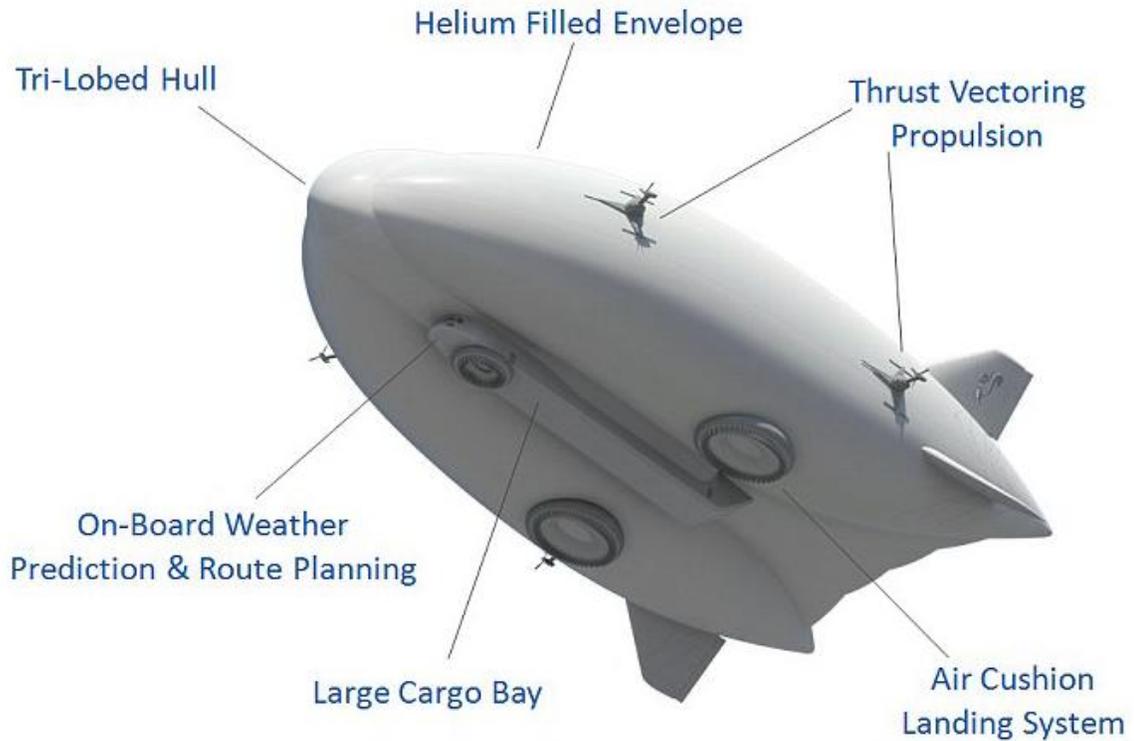
You can view a short video on the LMH-1 hybrid airship here:
<https://www.lockheedmartin.com/en-us/products/hybrid-airship.html>



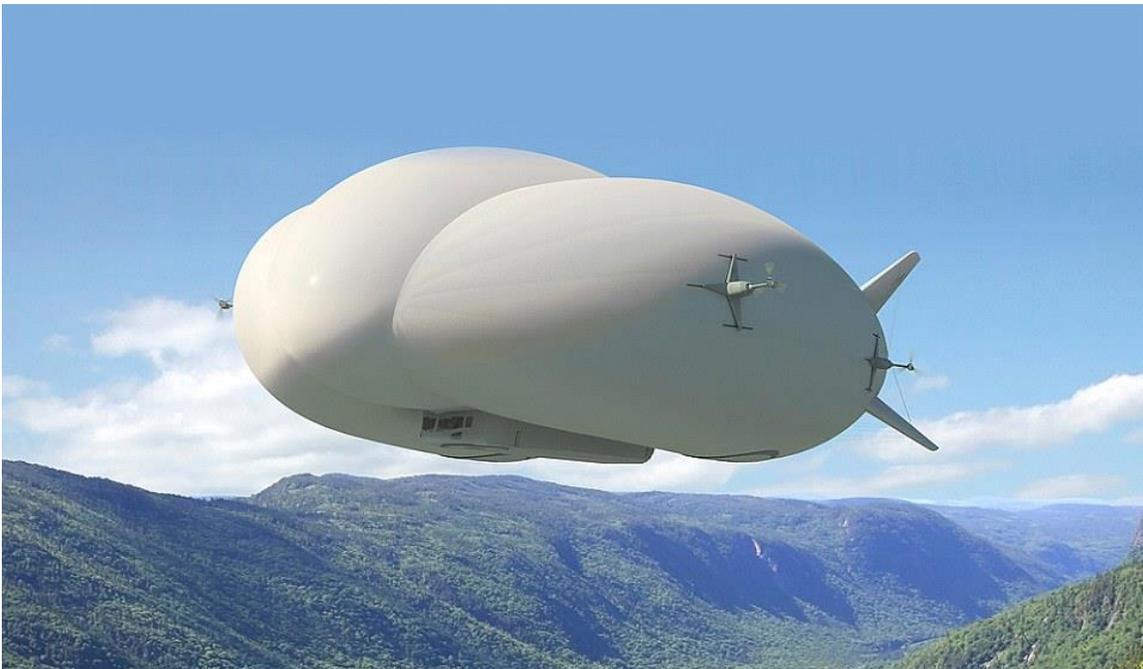
Profile view of an LMH-1. Source: Lockheed Martin



Overhead view of an LMH-1. Source: Lockheed Martin



*LMH-1 general arrangement.
Source: Lockheed Martin*



LMH-1 concept drawing. Source: Lockheed Martin

In November 2015, the U.S. Federal Aviation Administration (FAA) approved Lockheed's certification plan for the LMH-1. Lockheed

Martin also is working with Transport Canada on plans to get the airship certified for use in Canada.

Since 2014, Hybrid Enterprises has been marketing LMH-1 and is accepting orders at a price of about \$40 million USD plus an additional \$350,000 for a full charge of helium. This price is more than for a fixed-wing Hercules transport (\$12 – \$30 million). However, the airship is expected to have lower operating and maintenance costs, can take-off and land on unimproved surfaces, requires minimal ground support equipment and can stay aloft for days. In September 2017, Lockheed Martin claimed it had Letters of Intent for 24 LMH-1 airships.

First flight of a production LMH-1 is expected in 2019.



An LMH-1 hybrid airship flying in the Arctic - concept drawing.

Source: Lockheed Martin

Beyond the LMH-1

Lockheed expects that the basic LMH-1 design can be scaled up to carry much heavier cargo. After LMH-1, Lockheed Martin is reported to have plans to build a larger (50 to 90 ton cargo) hybrid airship that would be more competitive with trucking and rail transport in remote areas. Eventually, an 800 foot (244 meters) airship carrying a 500 ton cargo may be possible.