

Airships

For many of us, airships occupy a sort of odd speculative space left open where materials science, aviation, engineering, computerization, and air traffic control have all improved massively while airships themselves have seen comparatively little use. That leaves a lot of room for argument and a handful of startups that promise that everything is fixed now and they can slot neatly into this low carbon, slower than planes, faster than ships, with fewer transfers, cargo or passenger niche.

The interesting thing is that airships didn't actually vanish with the Hindenburg, though there are certainly fewer examples in operation, and many of those that remained were military. Still, these airships give us some solid evidence backing up the kind of improvements we expect from massively more powerful motors, better materials, etc.

Misconceptions

The remaining hurdles are in terms of the lack of available experts and sufficient funding to undergo a years-long research and development program for a large airship, but it has long been established in World War II and the Cold War that airships can be engineered to serve as safe, practical, low-cost alternatives to conventional aircraft where speed isn't a priority.

Much in the same way we know that it is possible to build reliable, profitable high-speed rail, even if the concept of such a thing seems wildly out of reach to people in places where it doesn't exist.

Types of Modern Airship Design

This section gathers broad categories of design and intended use

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The Airship Niche

With ships, they can compete sometimes (fresh food, high-value manufactured goods, etc), with freight trains, definitely not, but trucks? The largest airships can compete with trucks in terms of cargo cost per ton/mile, and are considerably faster, in addition to their capability to carry things too bulky and/or too heavy for a truck. That won't detract from trucks' ability to transport things last-mile, of course, but there's certainly some useful applications.

Relevant Technological Advancements

What can you expect from a modern airship?

Airships actually benefit far more from electrification than other aircraft, for a number of reasons—which are many and varied, but basically boil down to the advantages of electric propulsion not being particularly helpful to airplanes and helicopters, while the disadvantages exacerbate their

greatest weaknesses.

For airships, it's the reverse—they're greatly aided by the benefits of electrification, and the disadvantages of electrification aren't particularly harmful to airships, or are even beneficial instead.

For example, airplanes and helicopters are greatly disadvantaged by the fact that batteries and fuel cells either don't lighten at all or lighten far less than a kerosene fuel tank, which can be reduced by tens of tons over the course of a flight, making it much more efficient. By contrast, airships greatly appreciate a constant, unchanging weight since that allows them to operate more efficiently without having to compensate for changes in buoyancy.

Movement Speed

Lift Gas Types, Sources, and Storage Requirements

The astronomical improvements in aviation safety would more than make up for the difference in safety between hydrogen and helium, such that a properly designed modern hydrogen airship would be incomparably safer than a historical helium one, but that doesn't change the fact that hydrogen is always going to be more dangerous.

Docking Facilities

Traditionally Airships had to dock at a mooring mast (of which there were several types) or shelter inside a hangar. This is because an airship is basically a huge sail, and is as likely to drift while not under power as a ship on the ocean. When they docked at mooring mast, the crew would anchor them nose-first to the tower so they could weathervane in the wind. Landing them on the ground was a huge and dangerous undertaking which involved landing parties of hundreds of men physically pulling the airship down to the ground by ropes.

With improvements to maneuverability and control over buoyancy modern airships are far more controllable and can dock or land on their own. Not all airships are designed to land, but those that do have such a light footprint they often land on completely unimproved grassy fields. They have also landed on lakes, beaches, swamps, ice floes, and aircraft carriers. Some of the new designs, such as those of Lockheed-Martin, have no ground infrastructure or crew requirements whatsoever.

For the airships that don't land, such as the LCA60T, a simple mast truck is usually sufficient.

A modern airship like the Lockheed-Martin P-791 can use its landing gear to stay fixed in place on the ground without any external support equipment with up to 40 knots of wind down the nose or 25 knots of wind from any other direction. A Cessna needs to be tied down at 25 knots to keep from being flipped over. When hooked up to a mast truck, airships can stay put in 70-90 knots of wind—and anything past that, they'd have to evacuate the area, because higher wind speeds than that would be a hurricane or tornado.

Mooring Masts

Realistically a lot of locations might use platforms on the ground which rotate so the airship can land

and still weathervane in the wind instead of mooring masts. I've seen these called Boyant Aircraft Rotating Terminals or Depots (BARTs or BARDs).

Hangars

Hangars are to airships as drydocks are to ships—they can be located on cheap land, since they don't need to be visited very often except during initial construction or intensive tear-down maintenance overhauls/refits, which don't happen very often. Modern Airships are designed to spend almost their entire lives outside.

Further Reading:

The best layman-accessible compendium on the various airship projects over the years, past and current, is Peter Lobner's excellent "Modern Airships" series of articles, which are given a handy index and general airship industry overview/airship science summary [here](#).

The best source for understanding airship science, economics, and design from a far more technical perspective is the [Feasibility Study of Modern Airships](#), a vast, multi-phase, multi-part study for NASA and the Department of Commerce conducted in many separate parts by Boeing and Goodyear Aerospace. These can be found on NASA's archives for free.

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