

Imaginative – Alert, Invitation & Kugaaruk airships

Peter Lobner, updated 10 March 2022

1. Introduction

Charles Bombardier, grandson of Joseph-Armand Bombardier, the founder of Bombardier Inc., developed a concept for a modern rigid, hybrid airship. This design concept was first introduced in 2014 as the ALERT military airship by the Canadian non-profit organization Imaginative, whose mission is to inspire the next generations to imagine, design and build the vehicles of tomorrow. Using this design as a common platform, Imaginative developed two derivative designs; the Invitation cruising airship (2016) and the Kugaaruk heavy-lift airship (2018). Following is an overview of these Canadian hybrid airship concepts.

2. ALERT military airship

The ALERT military airship concept was developed by Charles Bombardier and designer Abhishek Roy in 2014 to conduct all-weather patrols and other missions over the Canadian Arctic, including the transport of equipment, troops, and supplies. The ALERT is named after a military and scientific outpost in the Qikiqtaaluk Region, Nunavut, Canada, which is the northernmost permanently inhabited place in the world. The 2009 study, “Projecting Power: Canada’s Air Force 2035,” noted:

“In the future, large cargo airships that can airlift more than 20 tons, operate on short runways and travel distances of 2,000 kilometers or more would eliminate Canada’s reliance on foreign airbases to support our Northern outposts.”

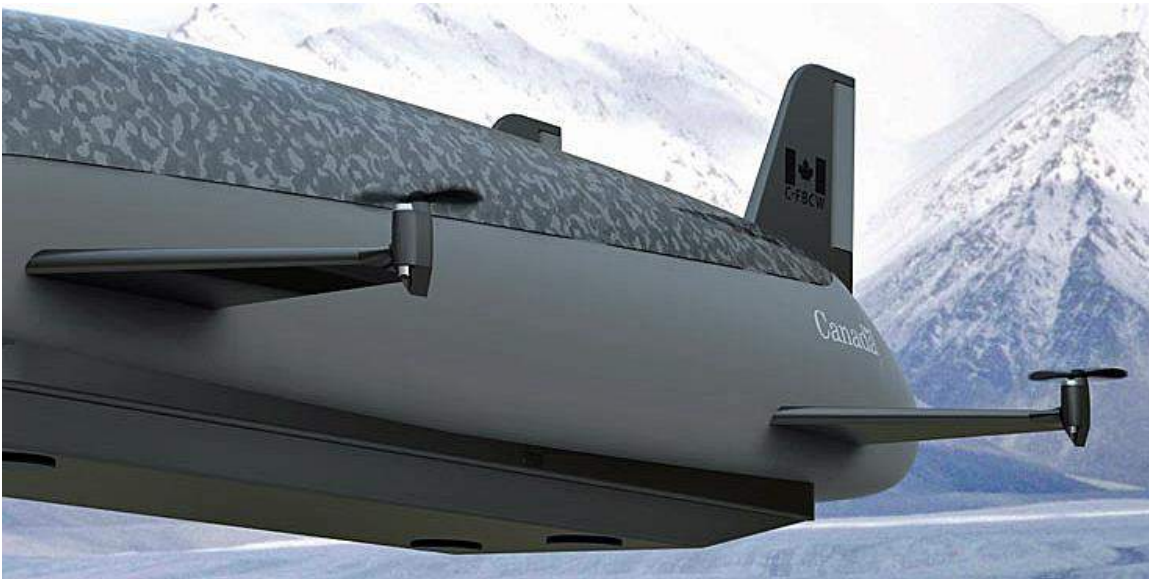
The ALERT airship also gives Canada the capability to provide assistance along the Northwest Passage trade route, which is almost completely devoid of infrastructure. ALERT airships could conduct critical missions such as search and rescue along this route, which is becoming increasingly important as climate change opens more of the Arctic region to commercial sea transportation

The ALERT airship is designed to be able to hover while carrying a heavy load and to take off and land without the need for significant infrastructure, except for a hangar at its home base. It appears that ALERT has a variable buoyancy system using compressed gas (air) as the variable ballast (this feature is mentioned for the ALERT-derivative Invitation-class cruising airship) to enable vertical takeoff and landing performance. An air cushion landing system (ACLS) with four ACLS pads gives the airship the ability to land on and move over a variety of surfaces, including unprepared ground and ice.

ALERT
CHARLESBOMBARDIER.COM



Two views of an ALERT airship in flight. Source: Imaginative



*Two views of an ALERT airship in takeoff / landing configuration with turbo-prop engines rotated vertically for lift. Also note ACLS pads on the bottom of the hull.
Source: Imaginative*



*An ALERT airship loading cargo.
Source: Imaginative*

Here's a summary of the ALERT airship technical characteristics:

- Rigid airframe
- Payload: 200 tons
- Range: 5,000 nautical miles (9,260 km)
- Mission duration: Weeks
- Propulsion: Four vectorable Pratt & Whitney PT6 turbo-prop engines, delivering up to 2,000 hp each
- Ballast system: Likely compressed gas (air) ballast

To facilitate operation in Arctic conditions, the outer surface of the ALERT would be treated with a super hydrophobic coating to reduce ice build-up in sub-zero temperatures. Local infra-red heating systems would provide additional protection against ice buildup.

3. Invitation cruising airship

The Invitation is a concept for a cruising airship focused on entertainment and luxury, and designed to fly up to 48 passengers on voyages over scenic destinations. Voyages could be daily tourist flights or longer duration exclusive cruises. The Invitation concept is based on the ALERT airframe, but with the following substantially different features:

- Electric power for airship systems and propulsion is provided by solar energy and a combination of fuel cells and batteries for energy storage. Solar panels could be integrated within the fabric of the gas envelope.
- Thrust vector control is accomplished with four fixed, electrically-driven propellers on rotating wing segments
- Landing system uses extendable skids instead of an ACLS.

This airship concept design was developed in November 2016 by Charles Bombardier and designer Abhishek Roy.

The large cargo bay doors at the back of the airship can provide a venue for aerial recreational activities for passengers interested in sky diving, wing suits and gliders.

The main passenger accommodations are located in the main cabin beneath the gas envelope.

A special landing pad designed for supply drones and aerial vehicles would be located at the top of the Invitation. This pad would be used daily and would be put to the test if an emergency ever occurred on board; two helicopters could anchor themselves on the roof for people to rapidly leave the airship.



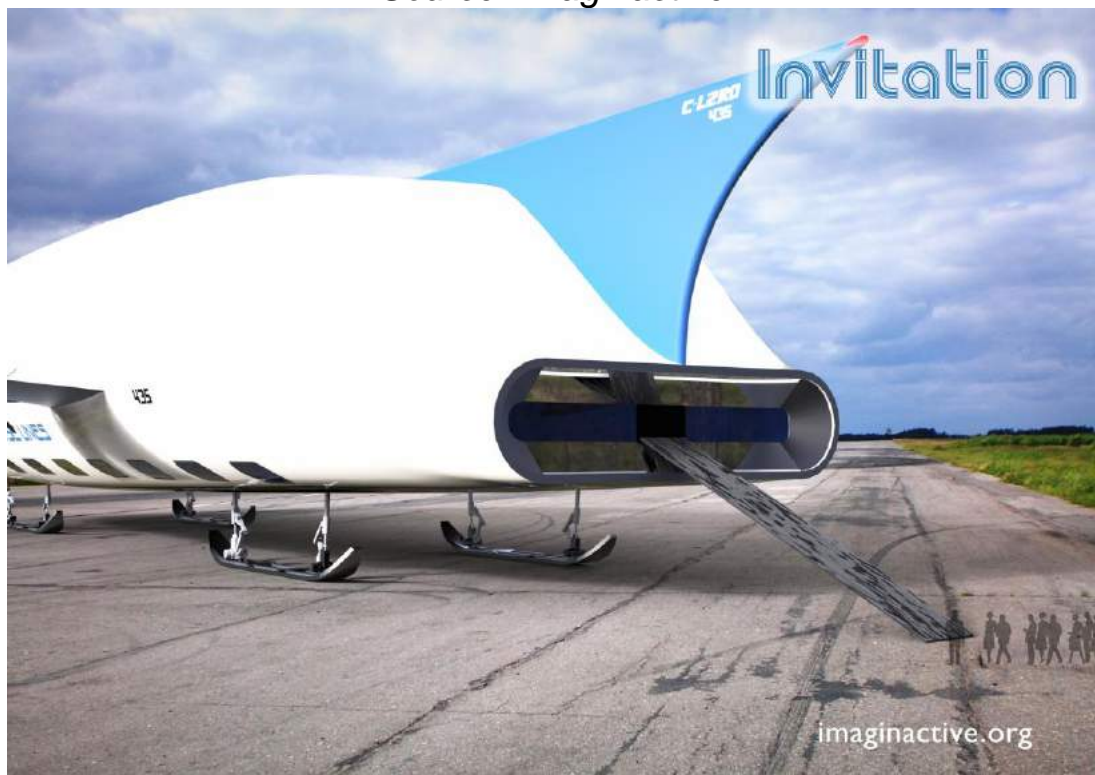
*Two views of the Invitation cruising airship.
Source: Imaginative*



Two views of the Invitation cruising airship in takeoff / landing configuration. Source: Imaginative



*Drone landing pad on the top of the hull.
Source: Imaginative*



*Large cargo bay doors at the back of the Invitation airship.
Source: Imaginative*

4. Kugaaruk heavy-lift airship

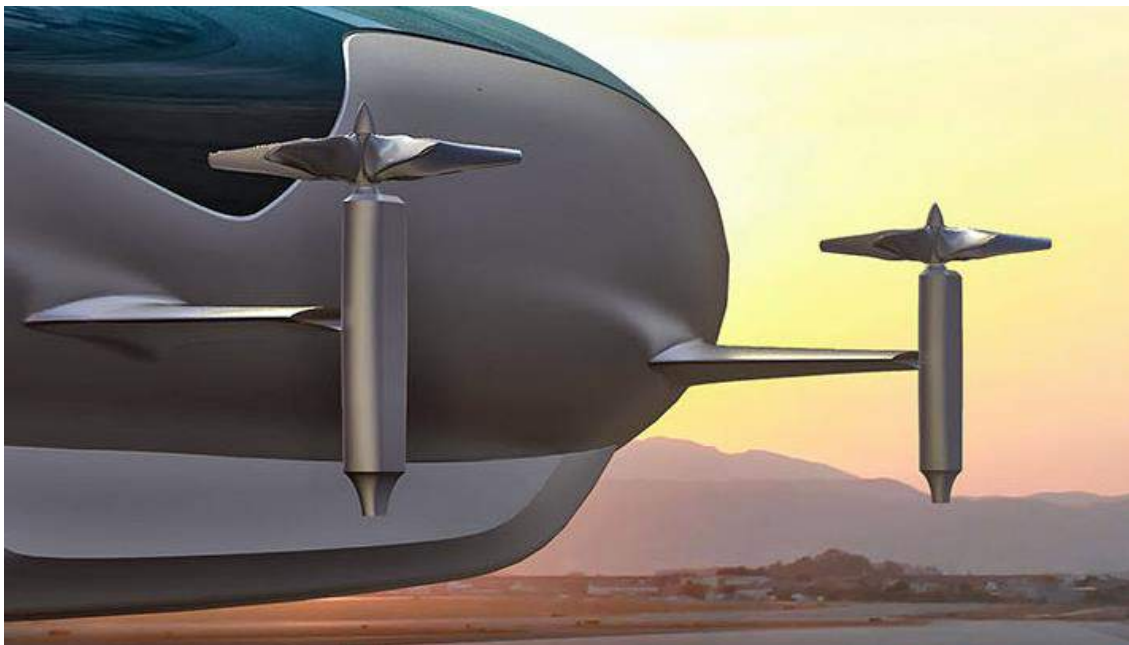
The Kugaaruk airship design concept evolved from the 2014 design of the ALERT airship, and was developed in November 2018 by Charles Bombardier and designer Martin Rico. The two airships share a generally similar airframe configuration and propulsion system.

The Kugaaruk airship can be configured for various missions. A key mission is to transport prefabricated homes, other large structures and supplies to remote Arctic areas that would otherwise be inaccessible by traditional land or sea transportation routes.

The Kugaaruk airship also could be outfitted to operate as a 'cruise ship of the skies,' similar to the Invitation-class cruising airship, offering luxury suites to its VIP passengers.



*Kugaaruk airship front quarter view.
Source: Imaginative*



*Two views of the Kugaaruk airship in takeoff / landing configuration.
Source: Imaginative*



Two views of the Kugaaruk airship in flight. Source: Imaginative

4. For additional information

- Charles Bombardier Portal, ICAO75:
<https://www4.icao.int/futureaviation/Future/Gallery>

Other *Modern Airships* articles

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>