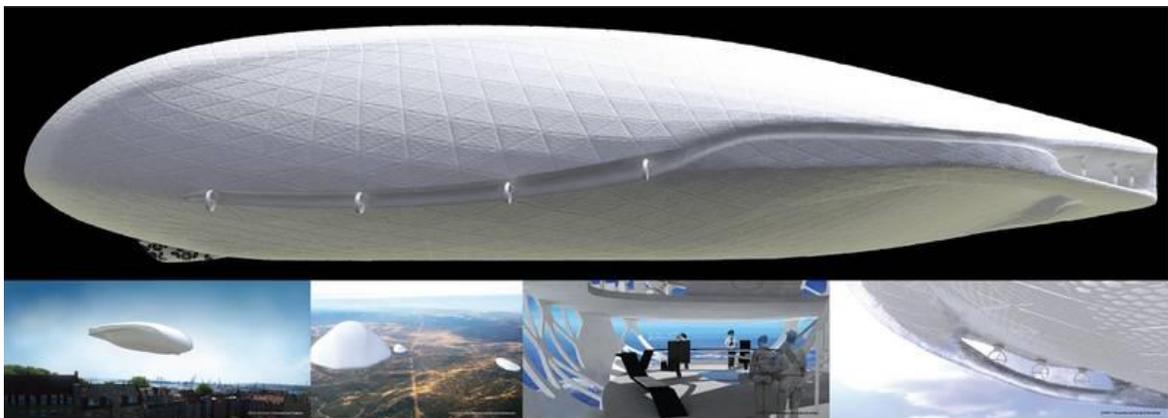


KNARR airships

Peter Lobner, 14 August 2019

The KNARR initiative is a project created by two Danish design architects, Rune Kirt and Mads Thomsen to design a freight solution using modern airships to reduce the cost and energy consumption of today's wind turbine freight business and make the logistics for wind turbine freight simpler and more efficient. Their main point is that transportation and installation costs can be up to 60% of the total cost of a new wind turbine, and these activities have a large carbon footprint. Their solution is a modern airship that is designed specifically for transporting very large and heavy wind turbine components directly from the manufacturer's factory to the installation site.



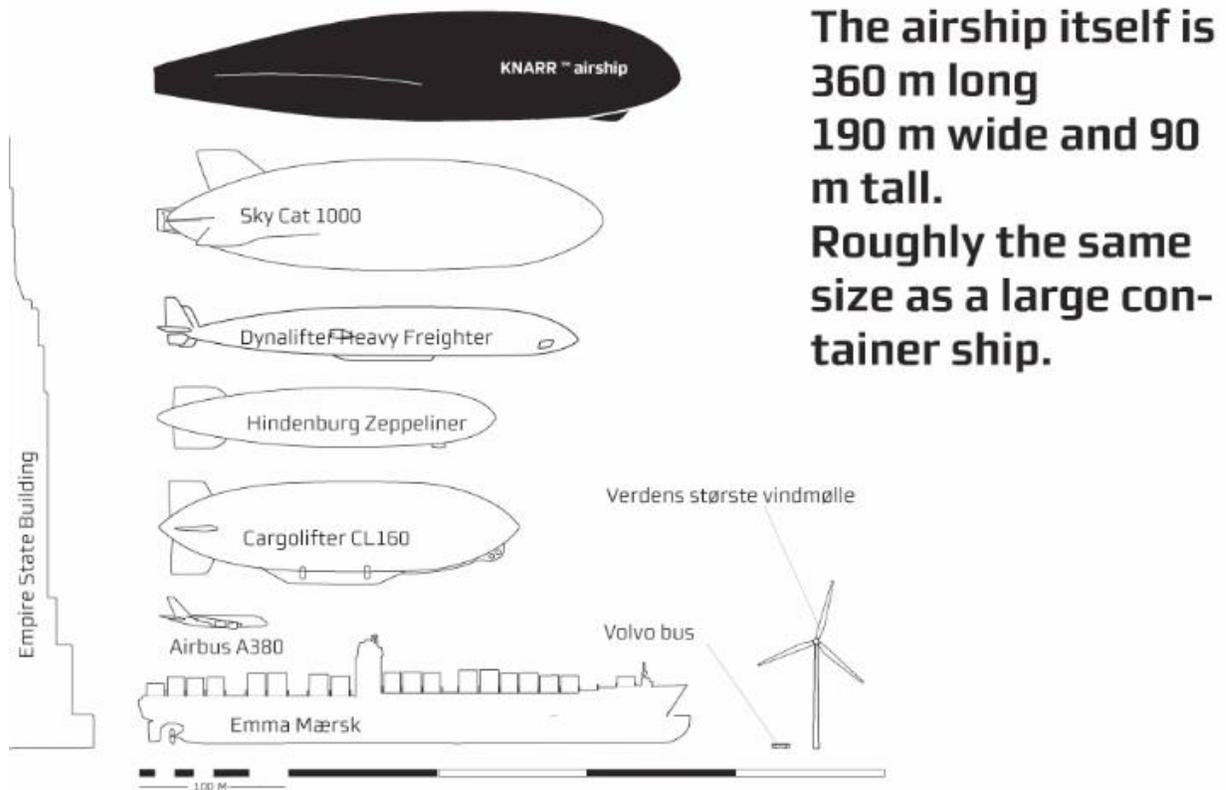
*A KNARR airship profile view & details.
Source: <https://www.kirt-thomsen.com/>*

For their work, Rune Kirt and Mads Thomsen were awarded both the Danish Design Center's Special Prize and the 2011 International Core77 Design "Speculative Concept." Read more here:

- KIRT x THOMSEN: https://www.kirt-thomsen.com/case10_airship-krarr
- KNARR initiative: <https://projectknarr.wordpress.com/what-is-krarr/>
- Core77 design award (in Dutch, but with many illustrations): <http://www.core77designawards.com/wp-content/uploads/2011/07/Speculative-Pro-e605-a.pdf>

The KNARR airship is a concept only. No prototype is being built at this time. You can view a short video defining the wind turbine transport application of KNARR airship here:

<https://vimeo.com/21023051>



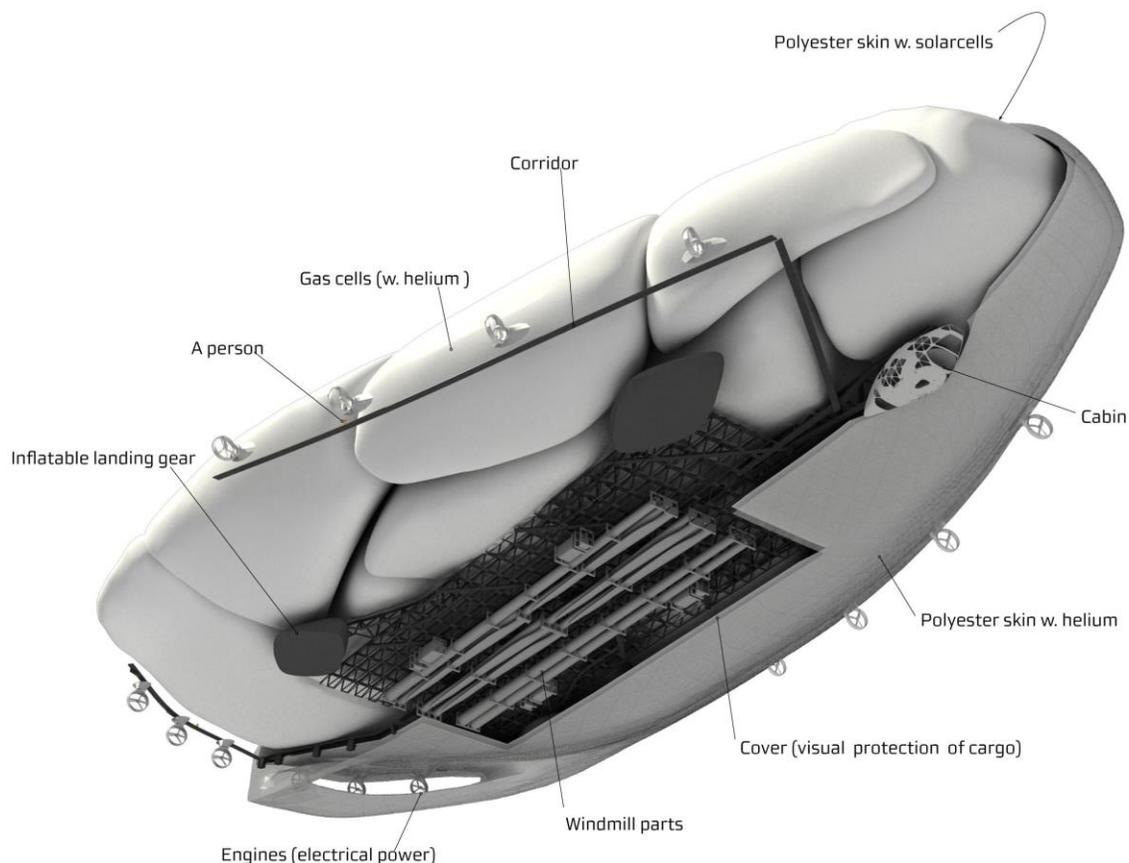
The airship itself is 360 m long 190 m wide and 90 m tall. Roughly the same size as a large container ship.

*Relative scale of a KNARR airship.
Source: <https://www.kirt-thomsen.com/>*

The KNARR semi-rigid airship is designed to carry wind turbine components in a large, enclosed internal cargo bay. The airship is designed to conduct vertical takeoff and landing (VTOL) operations with a full cargo load. Inflatable landing legs are extended prior to landing. When loading or off-loading heavy cargo, this airship must exchange ballast at the landing site.

Basic technical parameters of the airship are summarized below.

- Crew: 8
- Dimensions: L 360 m, W 200 m, H 90 m (1,081 x 656 x 295 ft)
- Freight capacity: 1,000 metric tons (1,102 short tons)
- Source of energy: Solar cells (63,062 m²; 678,794 ft²)
- Energy storage: Hydrogen fuel cells
- Propulsion: 14 x 400 horsepower (150 kW) electrically-powered vectorable thrusters; 4 thrusters along each side; 6 stern thrusters
- Flying range: Unlimited
- Flying altitude: maximum 3,000 meters (9,843 feet)
- Speed: 140 kph (87 mph) cruise; 180 kph (112 mph) maximum



Anatomy of a KNARR airship.
Source: <https://www.kirt-thomsen.com/>



*A KNARR airship lifts off after making a delivery at a wind farm site.
Source: <https://www.kirt-thomsen.com/>*



*A KNARR airship flying over a wind farm.
Source: <https://www.kirt-thomsen.com/>*

The major elements of KNARR airship design are depicted in the following four graphics from: <https://www.kirt-thomsen.com/>

