



Introduction to Airships

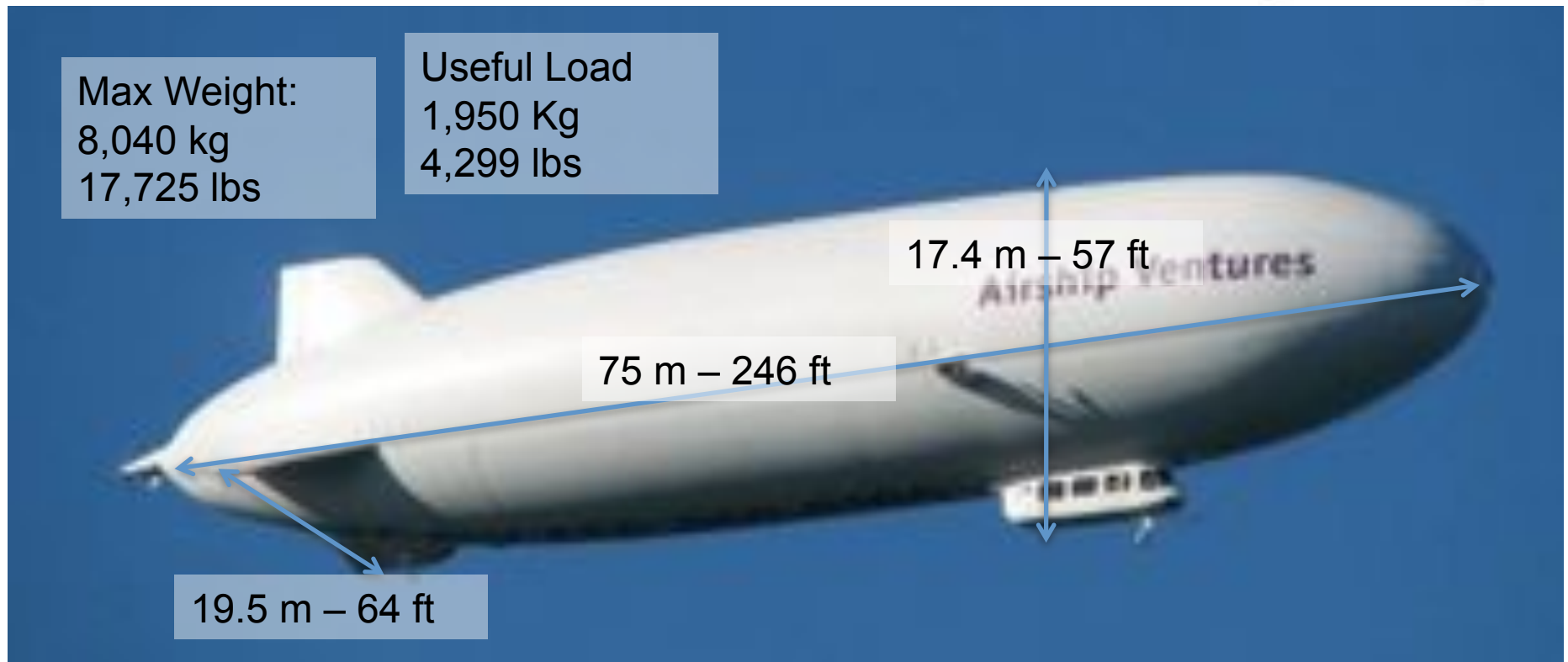
Special Missions

Airship Ventures

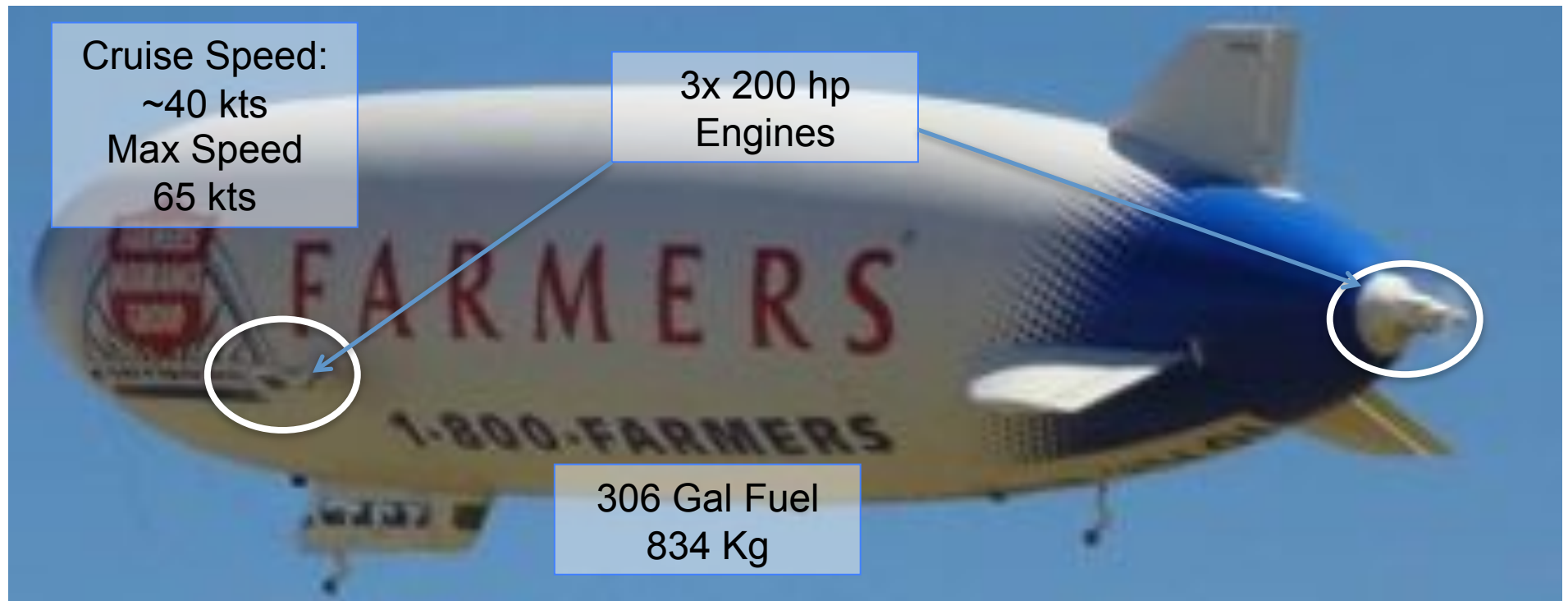
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Introduction to the Zeppelin NT 07



Zeppelin in Flight Configuration



The Zeppelin NT-07 “Eureka” is a fly-by-wire, thrust vectored semi-rigid airship with VTOL (Vertical Take off and Landing) capability

Zeppelin NT-07 Thrust Vector Control



Lateral Power Plants



Aft Power Plant



The Zeppelin NT: Thrust Vector Control – Propulsion System

Two lateral power plants, with a 0° to 120° propeller swivel range and adjustable pitch propeller blades for precise thrust and direction adjustability

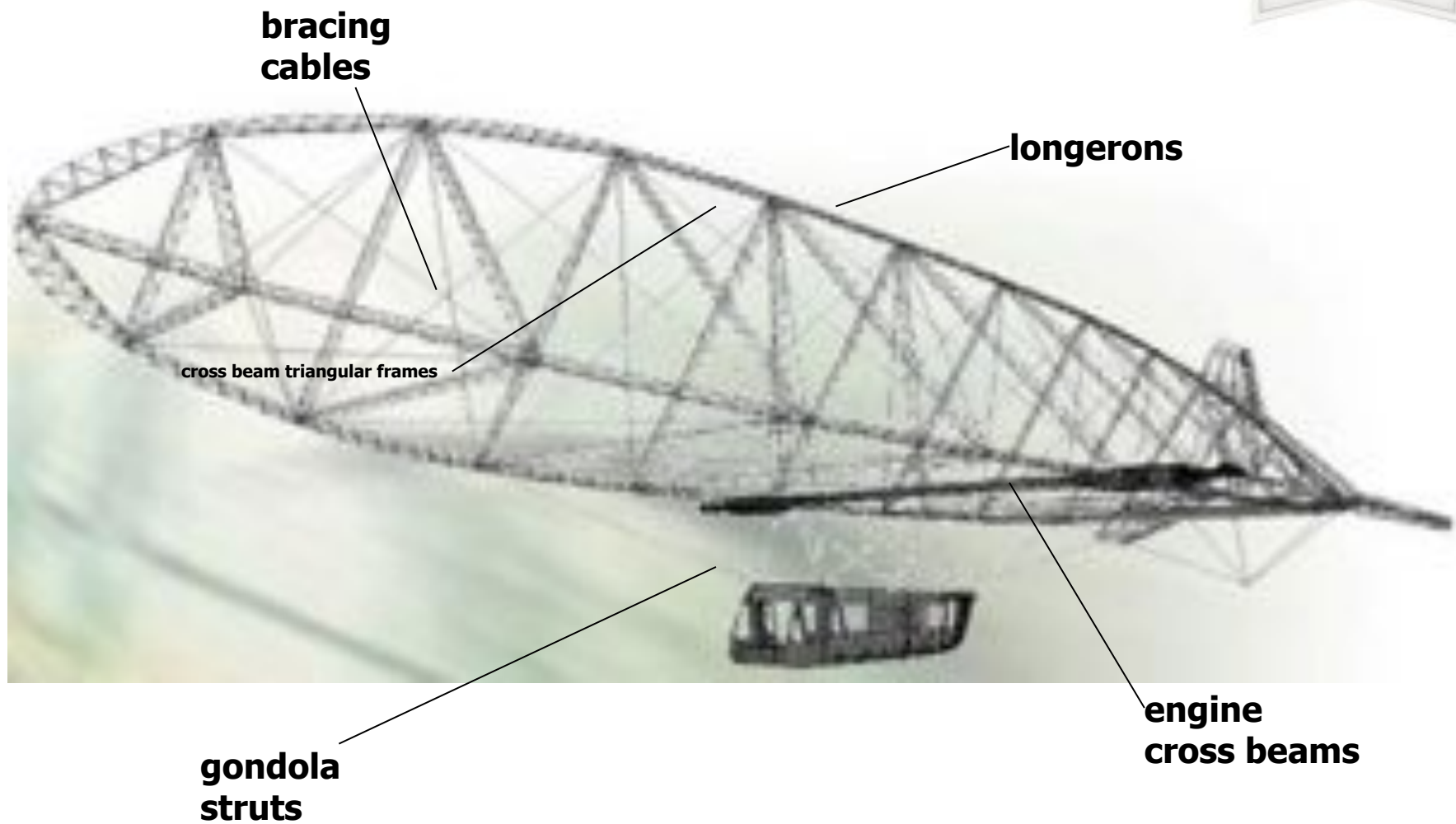
One additional dual propeller (one swivel) aft power plant for simultaneous lateral and vertical thrust

Maximum maneuverability during take off and landing when aerodynamic control is ineffective

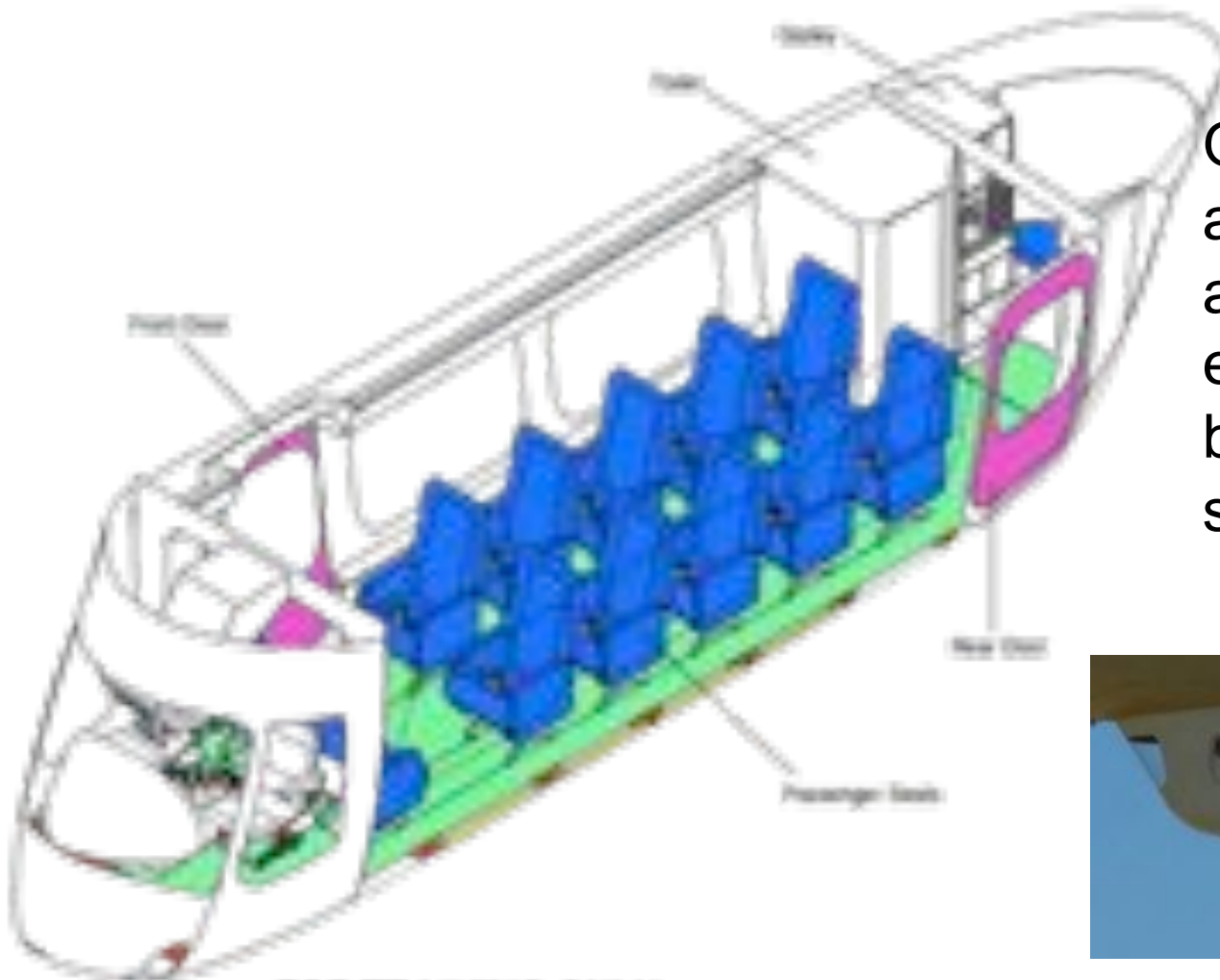
Continuous complete pilot control at all flight conditions

Only 3 ground crew necessary for passenger turn-around (12 passengers) in four minutes

Zeppelin NT-07 Internal Frame



GONDOLA



Other configurations are possible – seats are removable and equipment racks can be installed on the seat rails



WHY AIRSHIPS?



Persistent (long duration)

Stable

Payload Capacity

Environmentally Friendly

Low acoustic signature

Low Speed

Robust

Sensors



OUTSTANDING SAFETY RECORD



Airships have the best safety record of any flying vehicle

– better than balloons, helicopters, airlines, or small airplanes.

Airship Ventures is a fully FAA certified with regularly scheduled passenger service – we carry over 3,700 passengers per year

There have been 2 airship fatalities in the last 50 years (since 1962). All airships today use non-flammable Helium as a lifting gas

Environmental Surveys via Airship



Cultural Items

Fish Resources

Geochemical Resources

Surface Water

Hydrology

Lakes

Lake Birds

Mammals

Meteorology

Noise

Raptors

Water usage

Snow Cover/Pack/ Glaciers

Visual Landscape

Wetlands

Wildlife Habitat



Tested to Date:

FLIR 230-HD STAR SAFIRE

- Color HD Camera
- Infrared (mid-range) Thermal camera
- Low Light (Image Intensifier) Camera
- Laser Rangefinder

•Raymarine 424 HD Radar

- 48 mile range
- Multiple Modes – Navigation, Ship Detection, Weather

•Optec 3D LIDAR (Laser Radar)

•Hyper spectral Imaging System



*Optec LIDAR unit
mounted on airship's aft
camera platform*

OTHER SENSORS



The airship can be configured to carry sensor types:

IR – Fires, Hot Spots, Search and Rescue, mammal surveys, birds

Magnetometer - geology

Gravitometer – geology, ground composition

Hyper spectral Imaging – vegetation, habitat, soil types, ground cover, ice/snow cover, cultural

3D LADAR (laser radar) – hydrology, ground slope, vegetation, ground water

Gas/ Atmospheric (greenhouse gases) sensors – methane, state of permafrost

Radiation Sensors – prospecting, background studies, photochemistry

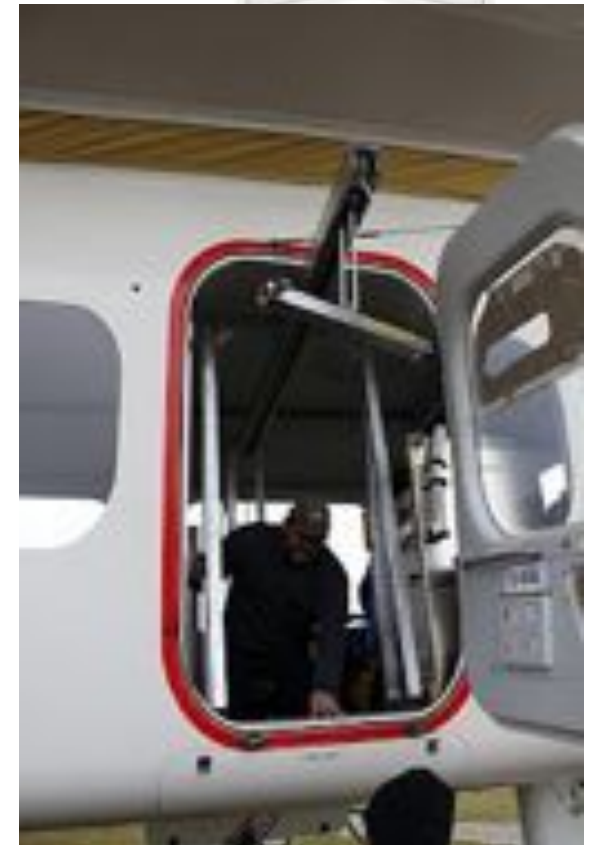
Microwave and satellite communications / telemetry – real time data collection and processing, safety, communications,

Rack Equipment and Gondola Door Winch



To facilitate the installation of equipment racks in the airship gondola, a special crane was developed in Germany for the Airship. A 19" rack fits through the gondola door

The airship can be fitted with a winch system for insertion/extraction or rescue operations



FLIR SYSTEM



FLIR Sensor mounted on Airship

IR Image - Sailboat



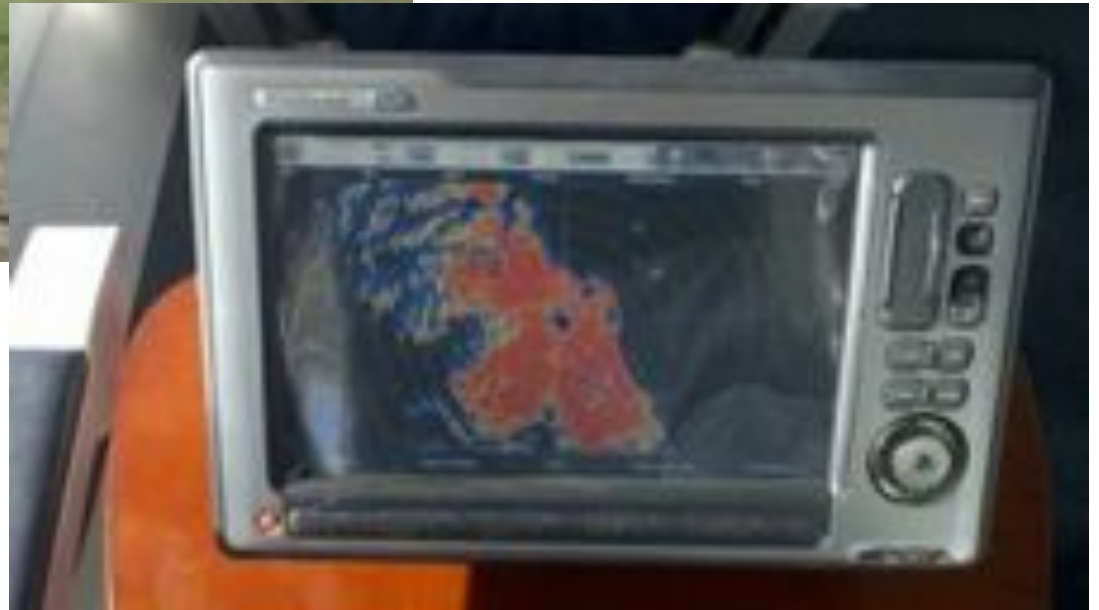
Wildlife Detection – IR - Bison



RADAR TESTING



Airship Ventures



Mineral Exploration in Southern Africa



A feasibility study showed:

Gravity and magnetic data used in combination improves kimberlite discovery rate

Implementation of the Bell Geospace gravity gradiometer on an airship would provide data with significantly higher resolution and lower noise levels
Substantial improvement in cost-benefit over ground gravity and existing airborne systems

A geophysical program could productively be flown by an airship in Southern Africa



BELL GEOSPACE
www.bellgeo.com



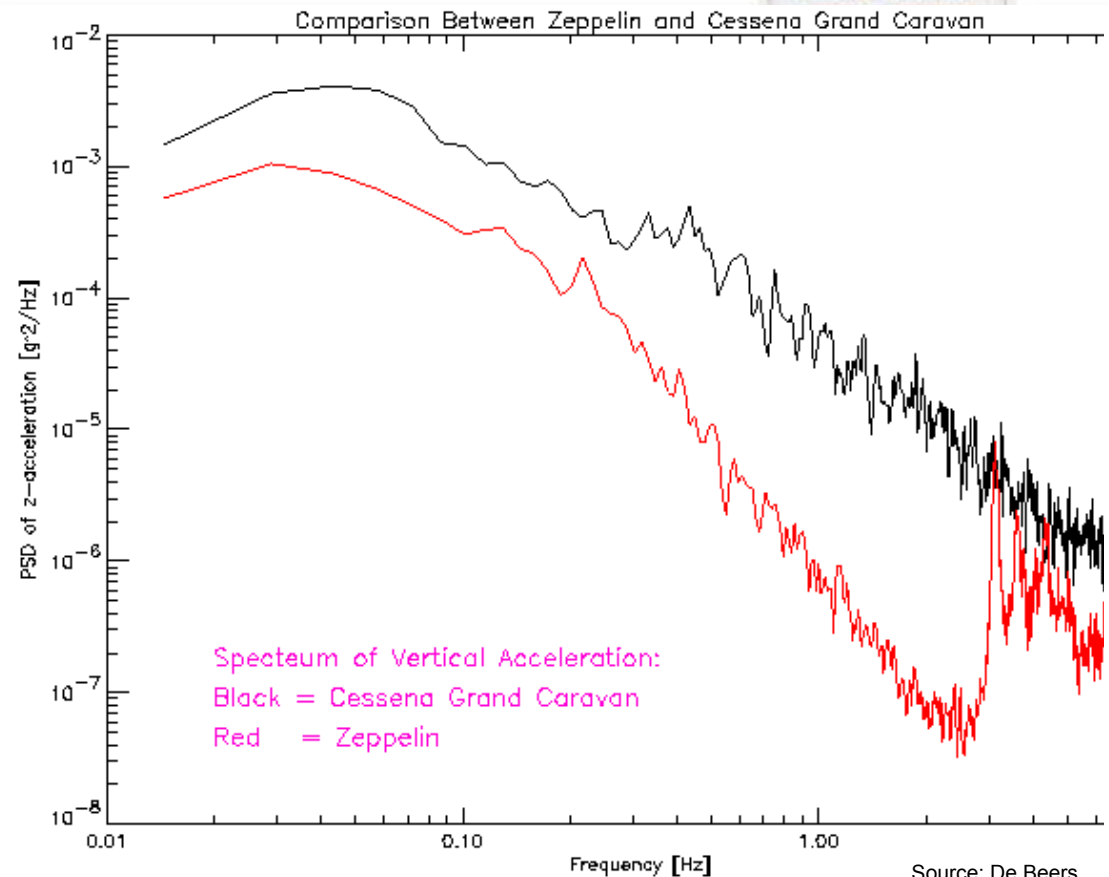
Cabin Vibration Levels



Gondola Vibrations and Accelerations Zeppelin NT vs. Airplane

Due to high mass and minimal aerodynamic lift, the Zeppelin NT is:

- Less sensitive to changes in angle of attack than compared aircraft
- Obtains reduced lateral accelerations on maneuvers
- Experiences little acceleration effect on small-scale gust or turbulence
- Power spectrum shows airship 10 to 100 times quieter vibration environment



Airship Endurance – Full Payload and Crew of 6



Calibrated Airspeed	Fuel in Kg = 600		220 Fuel in Gals
	H/kg Fuel Burn	Endurance Hrs	Gal/Hr
25	0.031	18.6	11.82
30	0.0285	17.1	12.85
35	0.0235	14.1	15.59
40	0.019	11.4	19.28
45	0.0155	9.3	23.63
50	0.013	7.8	28.18
55	0.0115	6.9	31.85
60	0.0085	5.1	43.09

Reference: AFM Fig. 5.-30 Specific Endurance Pg. 5-63
Does not include fuel reserves, typically 2 hours

Airship Endurance – Ultimate (restricted payload)



Fuel in Kg = 800		293 Fuel in Gals	
Calibrated Airspeed	H/kg Fuel Burn	Endurance Hrs	Gal/Hr
25	0.031	24.8	11.82
30	0.0285	22.8	12.85
35	0.0235	18.8	15.59
40	0.019	15.2	19.28
45	0.0155	12.4	23.63
50	0.013	10.4	28.18
55	0.0115	9.2	31.85
60	0.0085	6.8	43.09

Reference: AFM Fig. 5.-30 Specific Endurance Pg. 5-63
Does not included fuel reserves, normally 2 hours

Carbon Footprint



36,864 gal/year for Zeppelin

707K lbs of CO₂ = 9.6% of the CO₂ of a Blackhawk

9.6% of the fuel

384,000 gal/year for Blackhawk

7.3M lbs of CO₂



Airships are a superior platform for aerial reconnaissance and surveys because:

- Affordability
 - Safety
 - Sustained Flight / Persistence
 - Space / Volume / Payload
 - Electronic and Human Friendly Environment
 - Survivability and Robustness
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- Source – “Airships: Why Now?” Chuck Meyers



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