

ZEPPELIN[®]

Neue Technologie



Company Presentation

May 2010

History



Ferdinand Graf von Zeppelin (1838 - 1917),

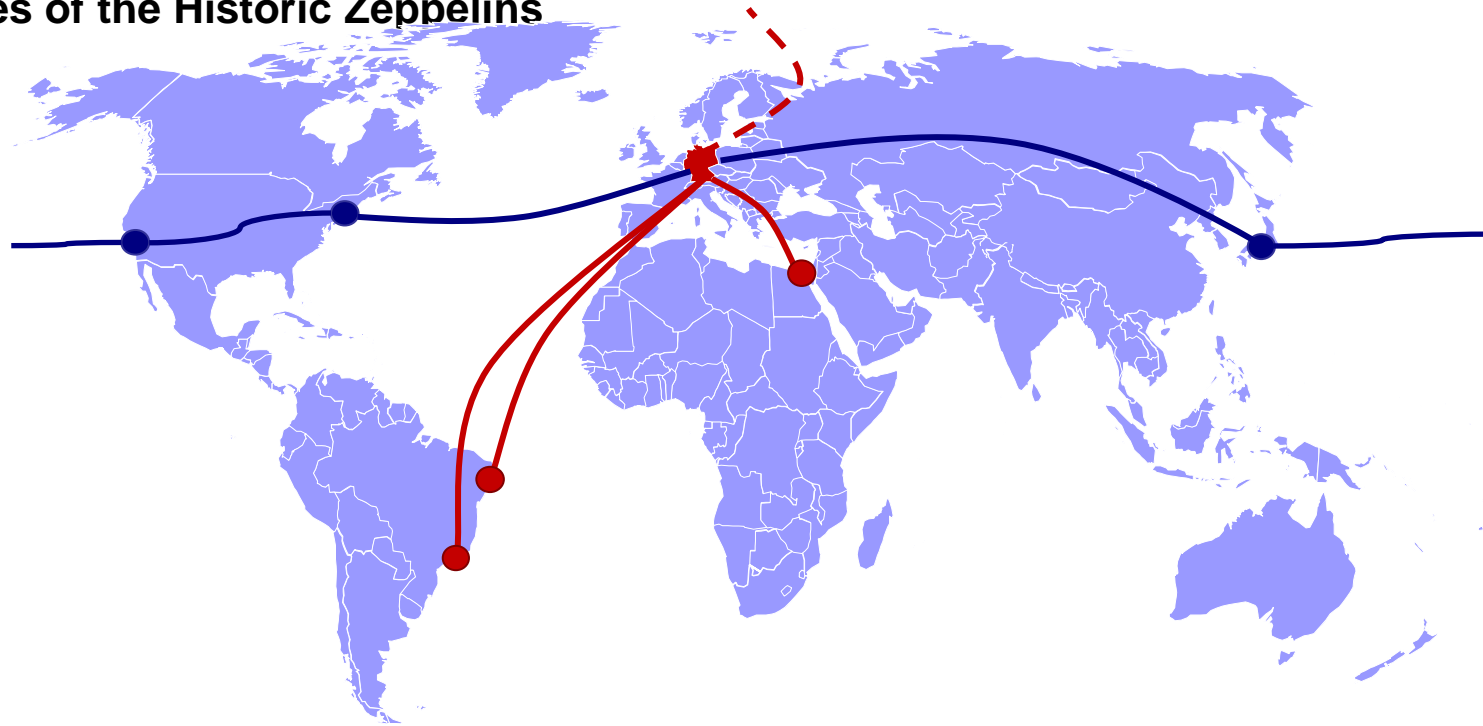
a cavalry general, diplomat and airship pioneer
began the development of rigid airships in 1890...



The LZ 127 „GRAF ZEPPELIN“

after it's around-the-world flight in October 1929.
The "Graf Zeppelin" was the most successful of the
Zeppelin airships, with a total of 590 flights
covering a distance of about 1.7 million kilometers.

Voyages of the Historic Zeppelins



— World circum-navigation 1929

— Scheduled Services

- - - Research Trip Polar Region 1931



Zeppelin Luftschifftechnik GmbH & CO KG

The heritage of the Count of Zeppelin is still represented in today's Zeppelin Group, a globally present group of companies including amongst others Zeppelin GmbH and ZF Friedrichshafen AG.

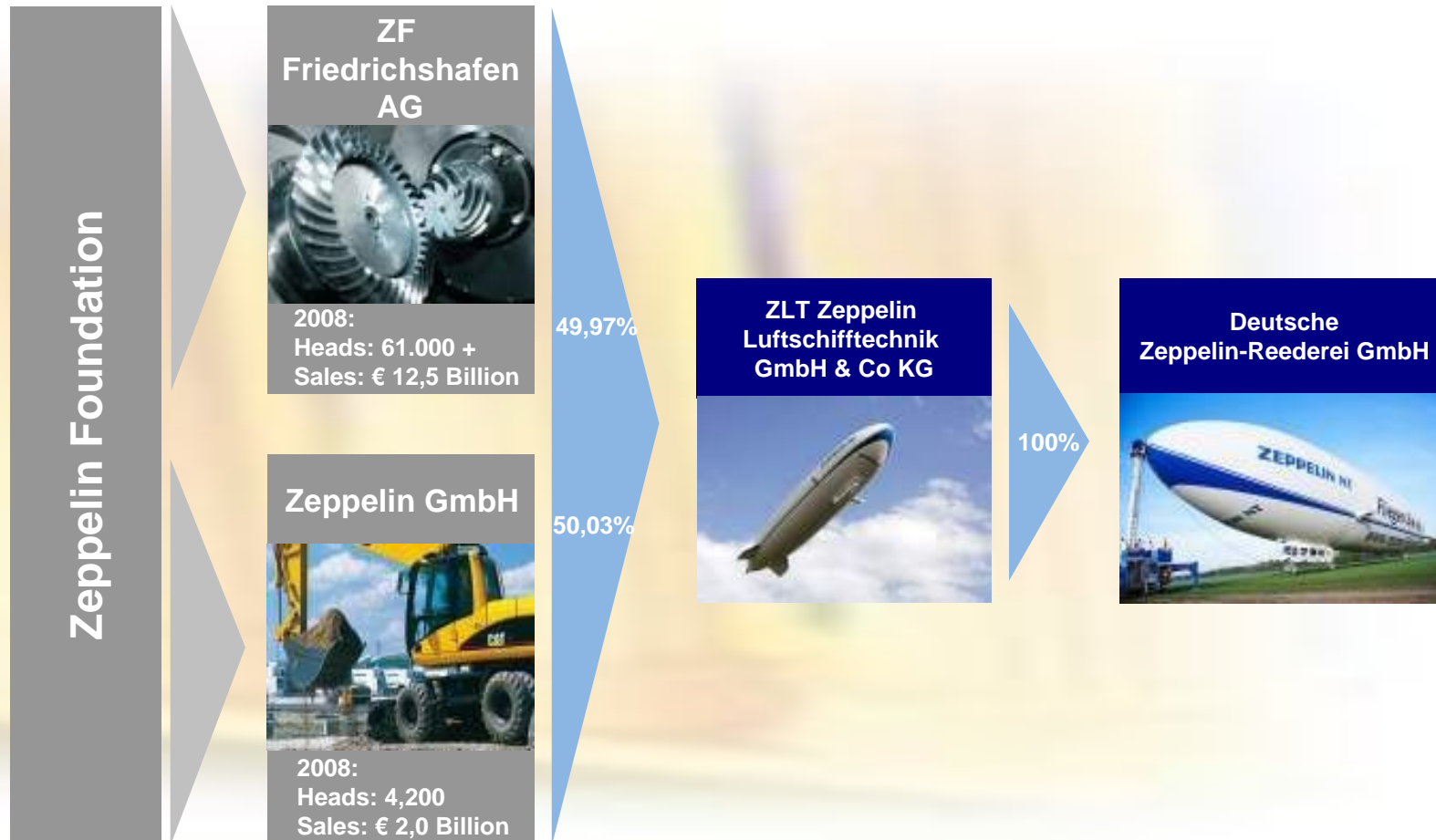


The airship idea continues...

ZLT Zeppelin Luftschifftechnik GmbH & Co KG:

Founded in 1993 for the development of a Zeppelin New Technology and Deutsche Zeppelin-Reederei GmbH, a 100% subsidiary of ZLT, founded in 2001 for commercial operation of the Zeppelin New Technology Airships

Shareholder Organigramm



ZLT Zeppelin Luftschifftechnik GmbH & Co KG

gegründet im Jahr 1993 mit Hauptsitz in Friedrichshafen

Deutsche Zeppelin-Reederei GmbH

gegründet im Jahr 2001 mit Hauptsitz in Friedrichshafen

- Development of Zeppelin NT (EASA certified Design Organisation)
- Manufacture and Maintenance the Zeppelin NT
(EASA certified manufacturing and maintenance Organisation)
- Marketing of Zeppelin NT airships including training of operating personnel
- Training for Maintenance and Certifying Staff
(EASA certified training Organisation)
- Modification of existing airship to customer requirements
- Performance of special missions
- Operation of Zeppelin NT through Deutsche Zeppelin-Reederei GmbH



The Product

New Technology

- High system redundancy due to thrust vector control and aerodynamic flight controls
- Vertical take-off and landing
- Minimum ground crew (Zeppelin NT requires NO rope pullers!)
- Manoeuvrability, hovering
- Prepared for auto-pilot and remote control
- Safe ground handling



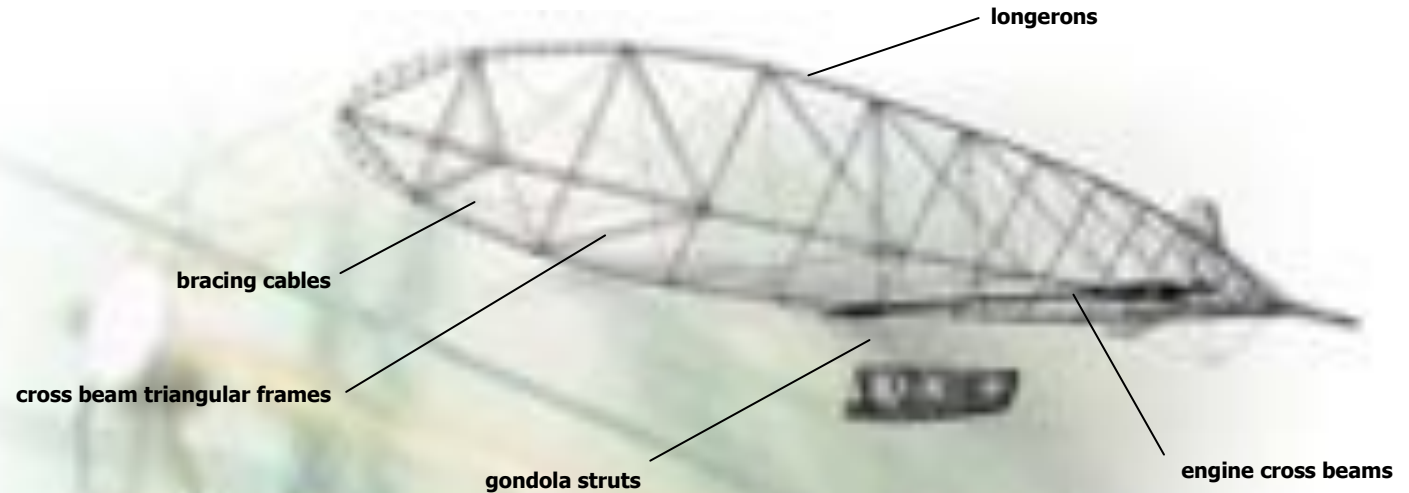
The Product

New Technology

- Re-defined rigid structure – outstanding safety
aluminum / carbon fiber hybrid structure
- Multi-layer composite envelope
- Automatic envelope pressure system
- Thrust vector flight control
- Full fly-by-wire flight controls
- Composite empennage and cabin
state-of-the-art light weight construction



Rigid Structure

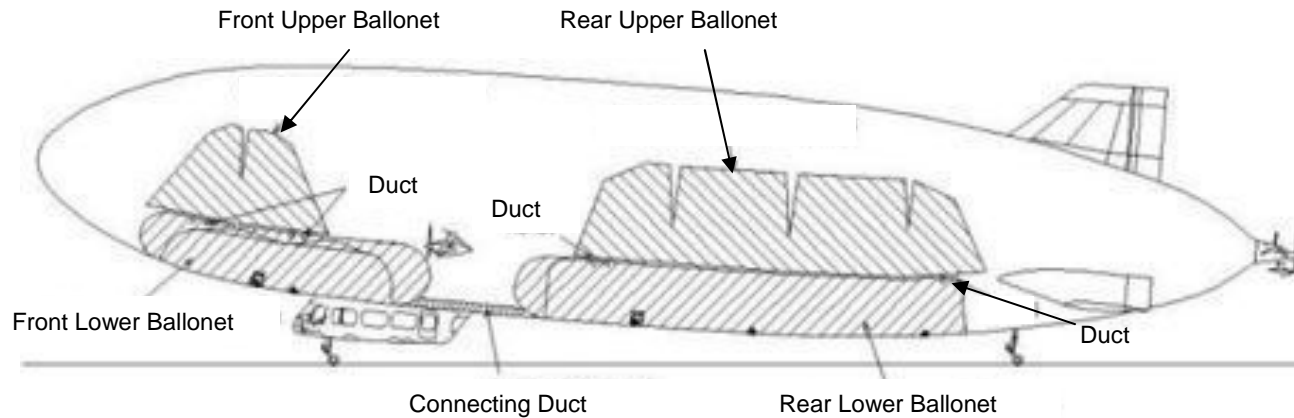


The Zeppelin NT: Re-Definition of the Semi-Rigid Airship Concept

Zeppelin NT internal rigid structure:

- Comprises 3 longerons
- Connected via 12 triangular frames
- Engines, passenger gondola and empennage attached to rigid structure.
- Envelope attached to the structure
- Increased total stability through helium inflated envelope
- In case of loss of helium pressure structure ensures flight controllability – **no envelope collapse**

Envelope / Pressure System



The Zeppelin NT: Envelope System

- Aerodynamic shape and stability through helium 500 PA helium pressure
- Material – multi-layered, durable, gas-tight and weather-resistant heavy-duty laminate
- Natural, temperature and air pressure (altitude) causes helium extension/contraction
→ compensated by sophisticated ballonet system
- Air interchange to ballonets controlled through unique, automatic pressure control system

Flight and 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 sustained 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 (15 passengers) in three minutes

Cockpit

The Zeppelin NT: Cockpit

- State-of-the-art avionics – glass cockpit
- Side stick operated fly-by-wire flight controls for precise maneuvering and reduced pilot workload
- Spacious cockpit for optimum pilot vision
- Single pilot operation certified

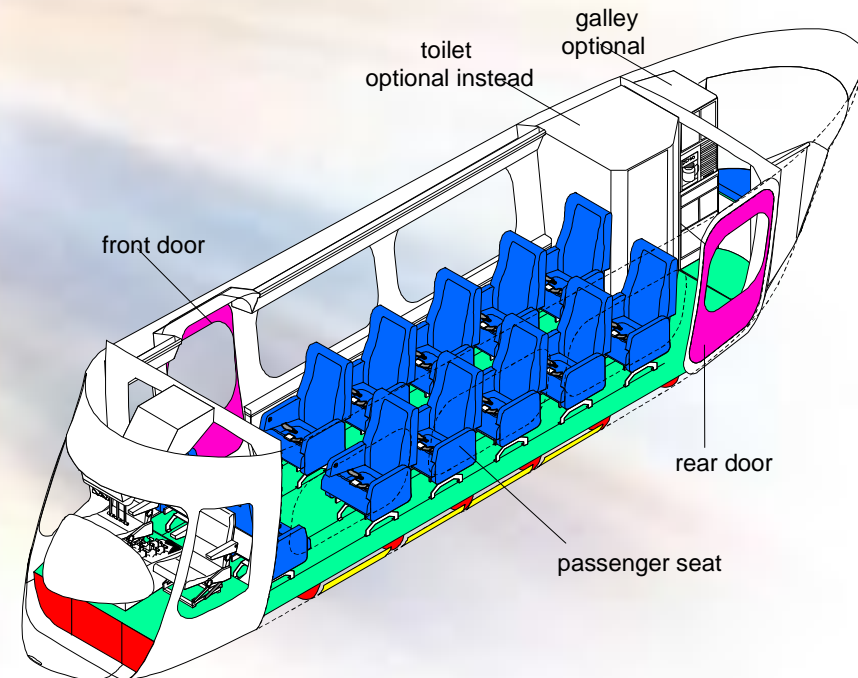


Cabin - Impression



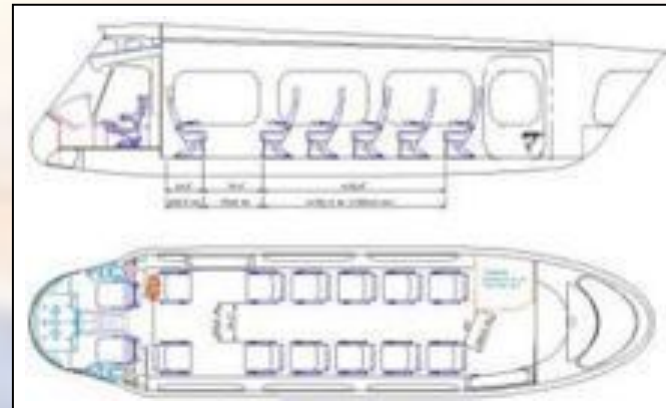
The Zeppelin NT: Cabin Impression

- Spacious, multiple-use cabin
- Flexible cabin layouts
- Toilet or galley optional
- Special mission equipment possible

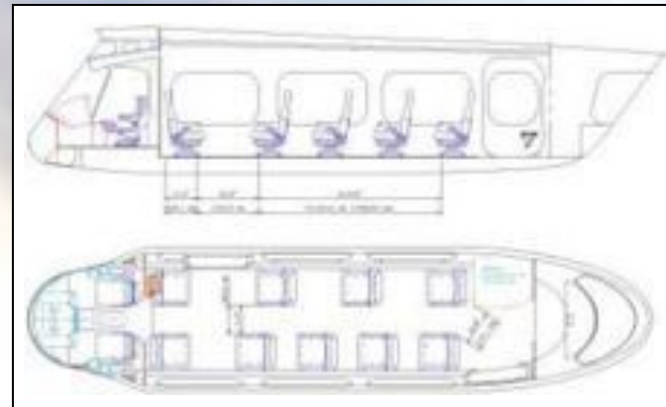


Flexible Passenger Cabin

12 seat cabin layout



9 seat corporate cabin layout



Improvements LZ N07-101 (new) versus LZ N07-100



New cabin design incl :

- 2 additional windows
- 2 additional seats
- standard toilet
- enhanced cabin volume
- reinforced structure
- 260mm more floor room

and optional :

- Galley
- Air Condition

Type certification up to 15 passengers

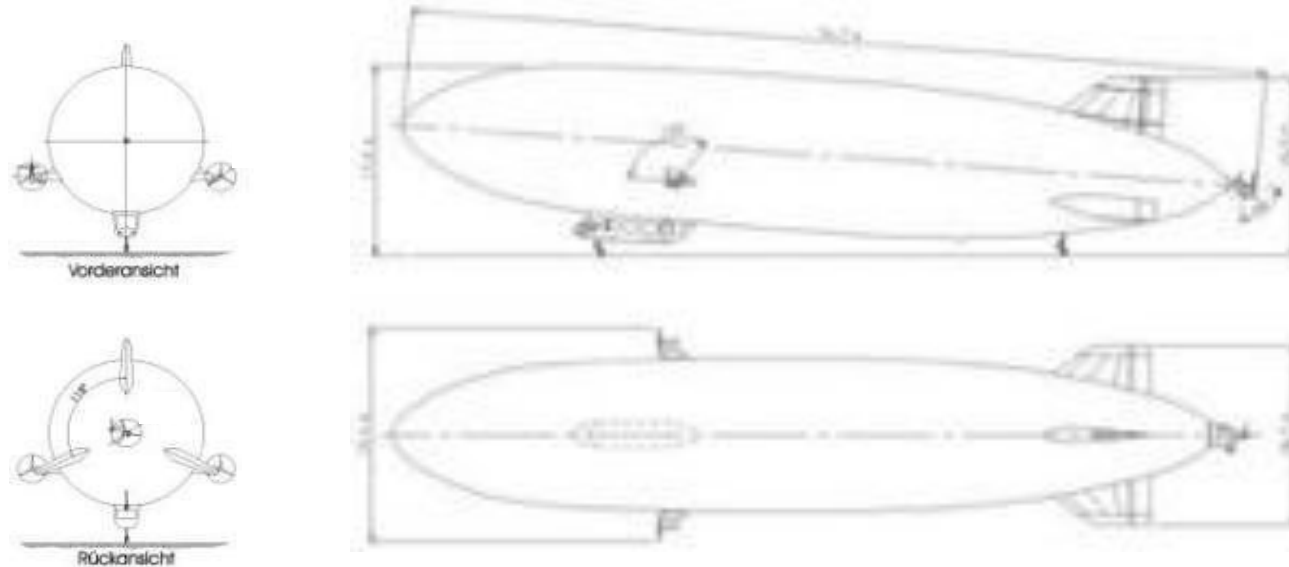
Improved primary flight structure

Modular cabin design

Additional mission power (for optional Air Condition and LED night sign)

Higher profitability due to enhanced cabin payload

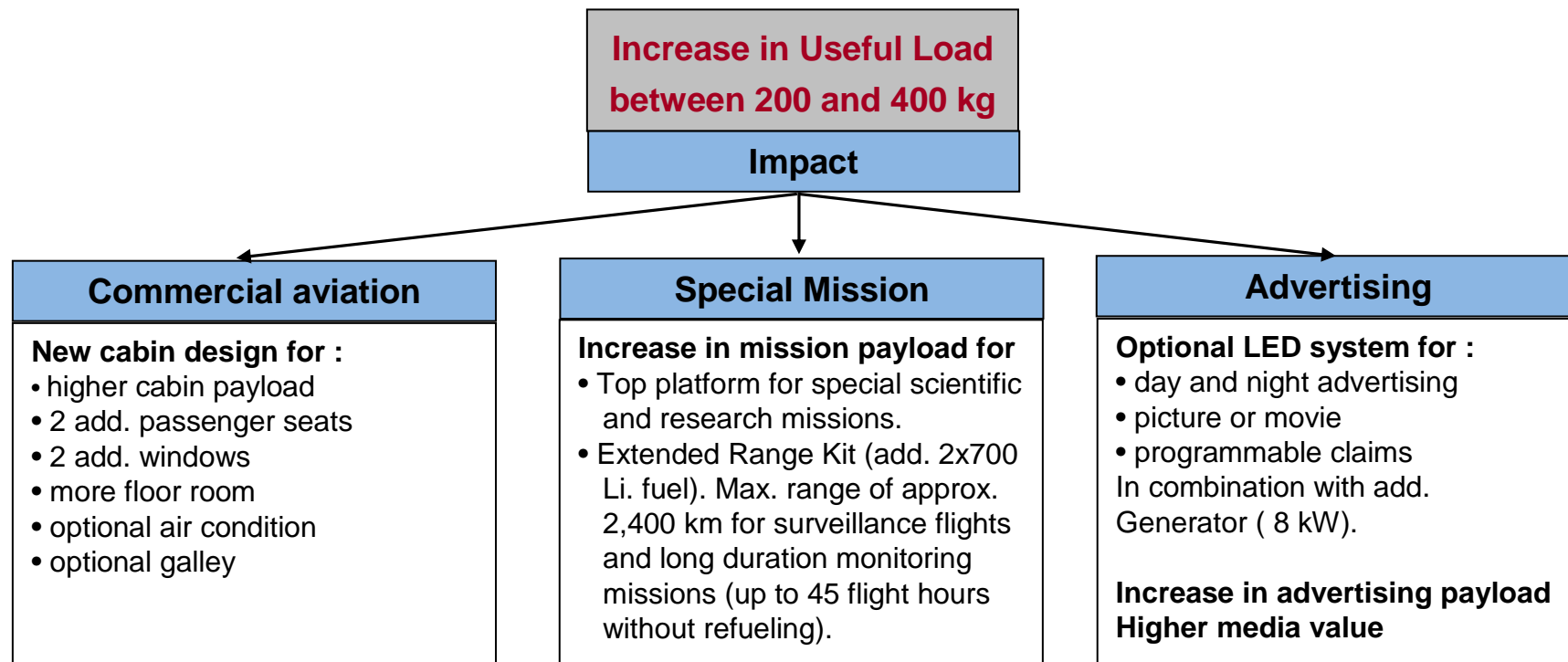
Dimensions Zeppelin NT LZ N07-101



DIMENSIONS	
Length	75.0 m
Max. width	19.5 m
Height	17.4 m
Envelope volume	8,425 m ³
Ballonet volume	1,500 m ³
Surface area	2,630 m ²
MASS	
Max. take-off weight	8,040 kg
Useful load	2,350 kg

PERFORMANCE	
3 x Lycoming IO-360	200 hp
Max. level flight speed	125 km/h
Range	900 km
Ceiling	2,850 m
Max. Endurance	app. 24 hrs
CABIN	
No. of seats	2 + 15
Cabin volume	29 m ³
Cabin length	10.7 m

Multi-Role-Modular-Mission-Platform LZ N07-101



Flexible platform for higher efficiency, better customer value and increased profitability

Manufacturing and Certification Experience

Manufacture and certification of four NT 07 airships

- 2001 Type Certificate NT 07 and Operating License
- 2002 Full operational start of Deutsche Zeppelin-Reederei GmbH
- 2003 First Flight NT 07 SN 003
- 2004 Delivery NT 07 SN 002 to NAC
- 2005 EIS NT 07 SN 002 in Japan
- 2006 Start of assembly NT 07 SN 004
- 2008 EIS NT 07 SN 004 in San Francisco
- 2008 Start planning NT 07 SN 005 for EIS late 2010



Logistics

The operation of the Zeppelin NT 07 requires the following ground support:

- Supply of helium
- Helium purification unit
- Hangar space for certain maintenance and inspection as well as
- Shelter in case of adverse weather conditions
- Maintenance platforms
- Mast truck
- Ground Convoy Vehicles including a fuel trailer



**NT 07 moored
on Mast Truck**



**4x4 Vehicle
with Fuel
Trailer**

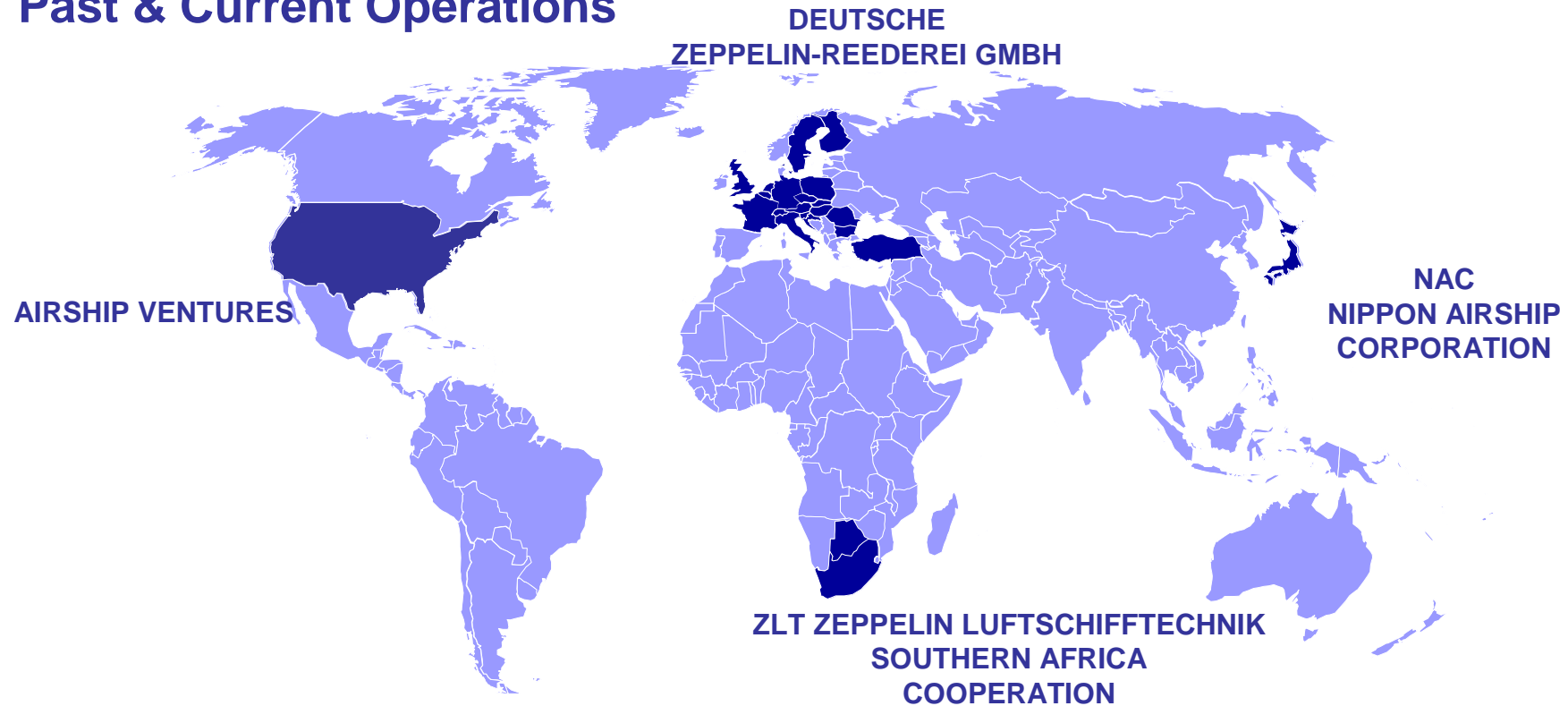


**Maintenance
Platform**



Mast Truck

Past & Current Operations



Operation - Europe

Operator: Deutsche Zeppelin-Reederei GmbH

Operational Profile:

- Passenger flight-seeing home base Friedrichshafen
- Special events / tours
- Special missions
- Advertising



Flight Seeing

Since August 2001:

- 12.000 paying passengers / year totaling more than 98.000 commercial passengers
- Single and dual-ship operational experience
- DZR flight seeing tours in Germany
- Flight seeing during air shows in Europe
- Customized cruise tours for companies



Advertising References

- BMW
- BMW Financial Services
- Caterpillar CAT
- Credit Suisse
- DLR
- DHL
- Hit Radio FFH
- Konica Minolta
- MasterCard
- Raiffeisenbank Allgäuer Land
- Stuttgarter Hofbräu
- Sofema
- T-Online, T-City
- VauDe
- XXXLutz
- ZF-Friedrichshafen
- Mainau / Szczesny
- Lange & Söhne and more ...



Ambient Media

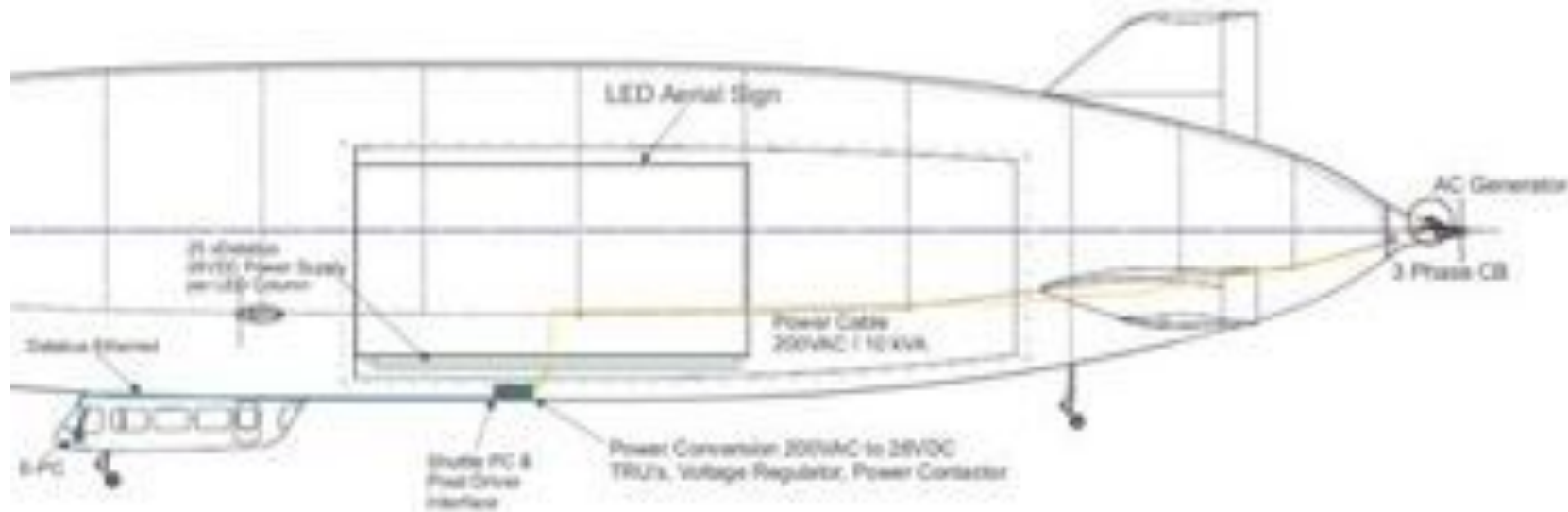
- Ambient media are *advertisement media*, in the form of *exterior advertisement* used in the direct living environment of the *target group*
- Ambient media are media formats, plan ably consumed in the out-of home area of the target group
- The sympathy value and the degree of publicity of airship advertisement are above 80% (IT Works Study-2005)
- Very high recognition value
- Very good visual reception, max. branding size 12 x 60m (each side of the airship)
- Excellent surprise effect
- High emotional value



Advertising Examples



Spezifikation LED system



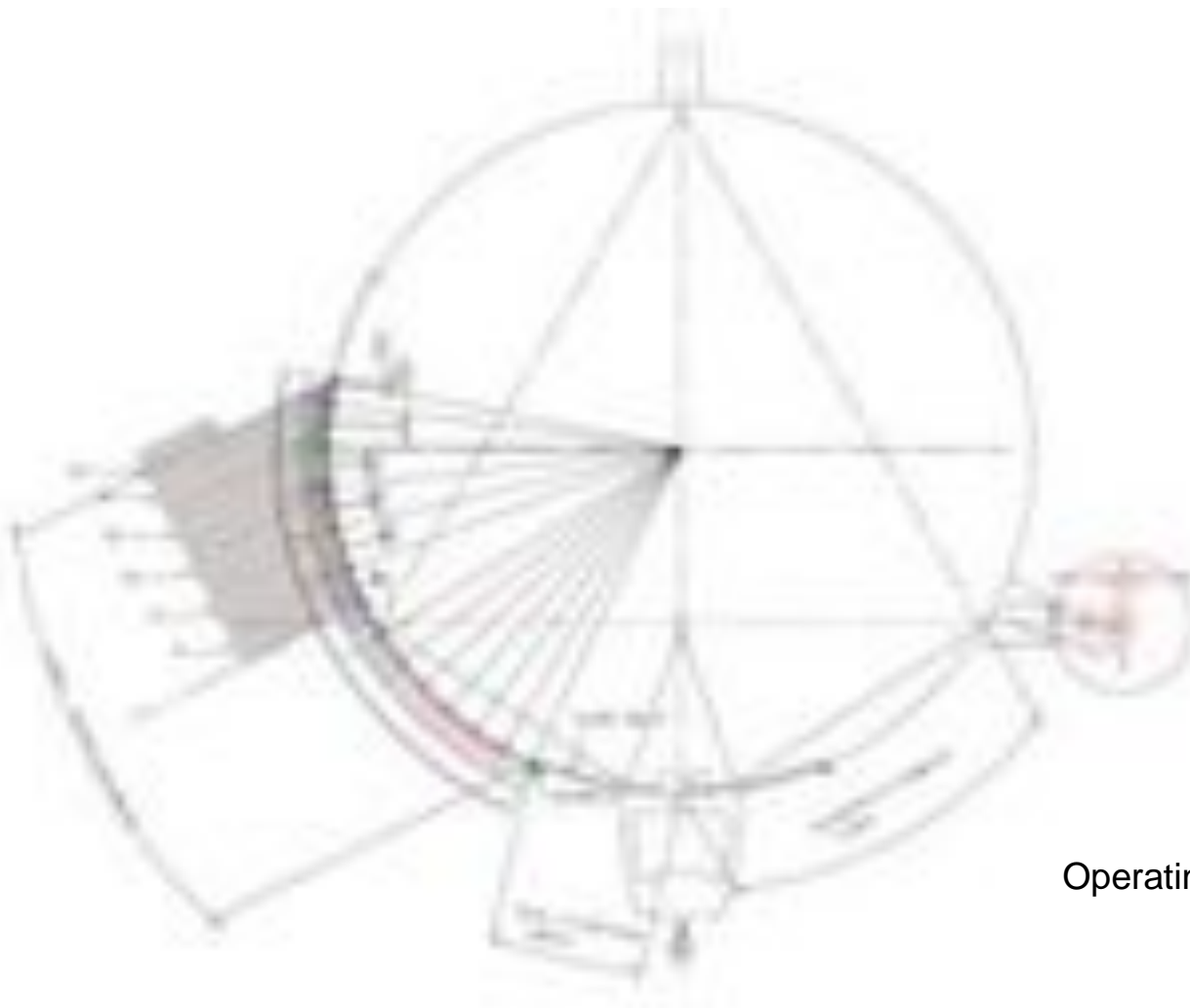
Size : approx. 152 m² per side
(length : 16.5 m ; height : 9.2 m)
Mass : approx. 400 kg per side

Electric power supply : 8kW
provided by additional generator

Specification LED system

Pixel composed of color-LED (RGB)

Per side 22,400 pixel



Operating: programmable, picture
or movie possible

Operation – Southern Africa



Operation – Southern Africa

Operator: ZLT Zeppelin Luftschifftechnik GmbH & Co KG

Flight portfolio:

- Special Mission (Geological Survey)
- Flight level: 80m above ground
- Night flying
- Precision flying with a 15m 3-D tolerance

Operational Experience :

- Productive survey flight hours: 1.255 hours
- Excellent data quality
- Numerous Targets found
- First Kimberlite confirmed/verified June 13th 2007

Current Status

Airship was lost in a weather incident, while properly moored



Global Airship Mobilization

Mobilization to remote Areas

Ferry Flying:

- July 2004 Finland
- April 2004 Easter Europe incl. Balkan and Turkey
- June 2004 London
- November/December 2005 Paris
- Transatlantic Flight studied, respective equipment in development

Sea Transport:

- Ferry Flight to commercially feasible port
- Airship preparation for shipping
- ZLT accompanied/supported shipment
- ZLT supported mobilization at final destination
- 2004 Gioia Tauro (Italien) – Kobe (Japan)
- 2005 Rotterdam - Kapstadt
- 2008 Hamburg – Beaumont (Texas)



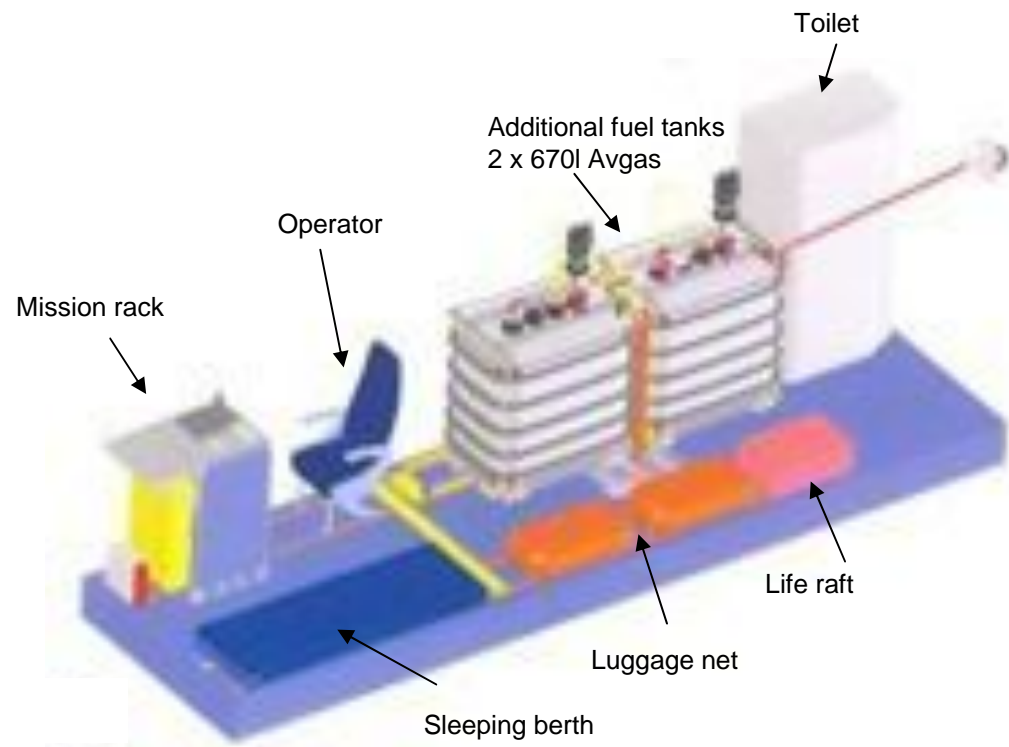
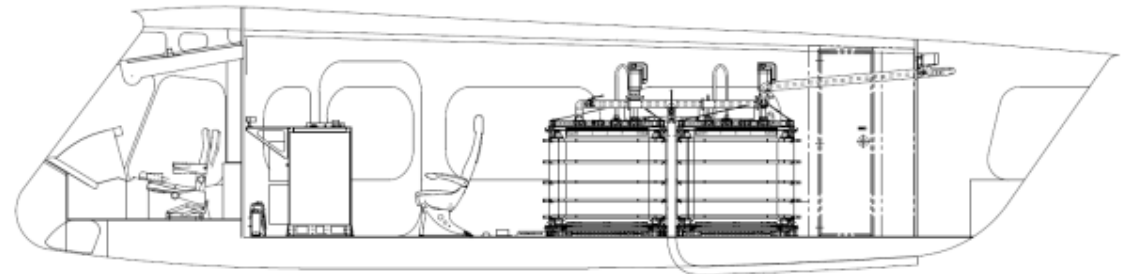
LZ N07 Option : *Extended Range Kit*

Option : *Extended Range Kit*

- Additional fuel tanks
- Additional engine oil-supply system
- HF-radio/SATCOM
- Cabin-Layout
- Operation mode

Performances :

- Increase of fuel capacity from 825 kg to 1790 kg max.
- Range extension without reoiling from 20h to 76h max.
- Communication and Data-Link-Capability for long distance flights
- Shift operation of the flight crew,



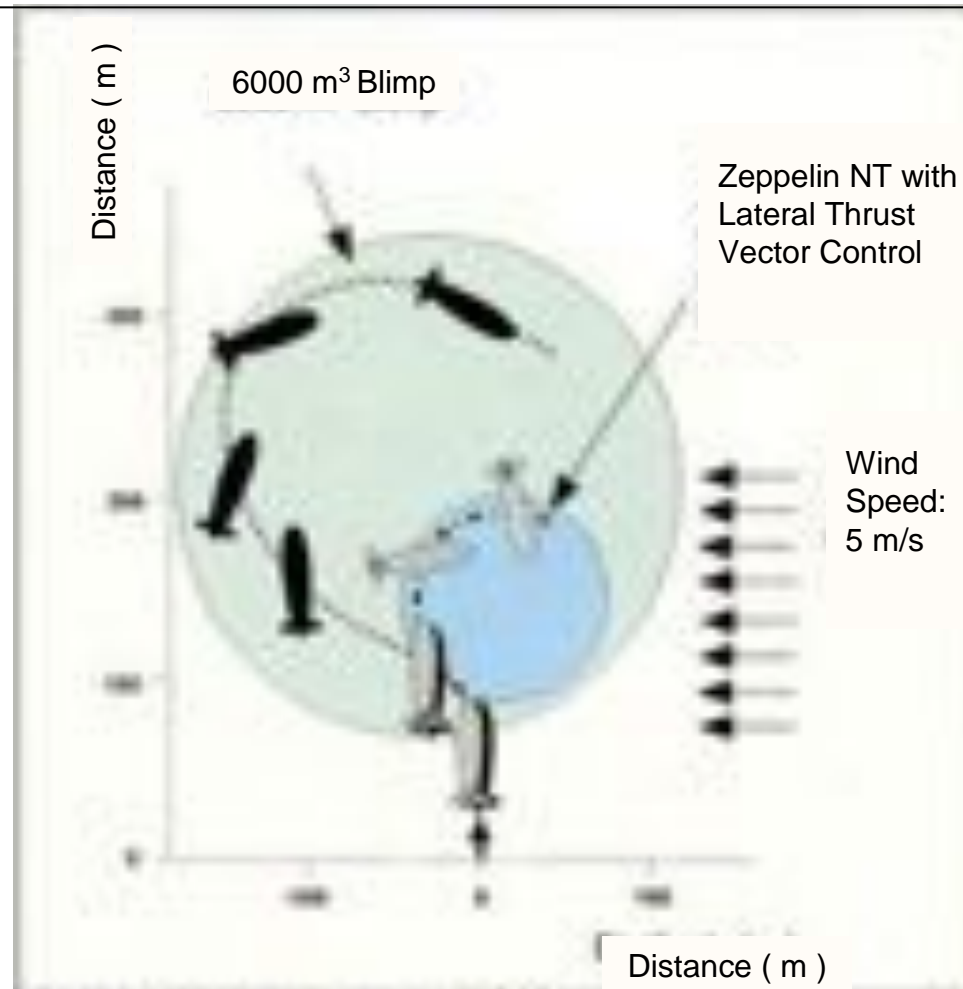
Competitor Comparison

Parameter	WDL 1B	ABC A150	SkyShip 600	NT 07
Length	60 m	50,30 m	61 m	75 m
Diameter	16,40 m	13,10 m	15,30 m	14,5 m
Gross volume	7.200 m ³	4.247 m ³	7.188 m ³	8.425 m ³
Useful load	1.435 kg	1.634 kg	n/a	2.350 kg
No. engines	2	2	2	3
Max. power	309 kw	264 kw	375 kw	441 kw
Max. speed	105 km/h	96 km/h	104 km/h	125 km/h
VERTOL capacity	No	No	No	Yes
Range	n/a	914 km	640 km	900 km
Max. endurance	18 hours	12 hours	24 hours	24 hours*
Ceiling	3.000 m	2.400 m	2.600 m	2.850 m
Passengers	6	9	12	15
Ground crew	15 - 18	15 - 18	15 - 18	3

*subject to actual payload

Landing conditions NT07 vs. Blimp

The **excellent maneuverability** of the NT 07 resulting from the **Thrust Vector Control** system contributes greatly to the outstanding landing conditions and performance of the Zeppelin NT 07

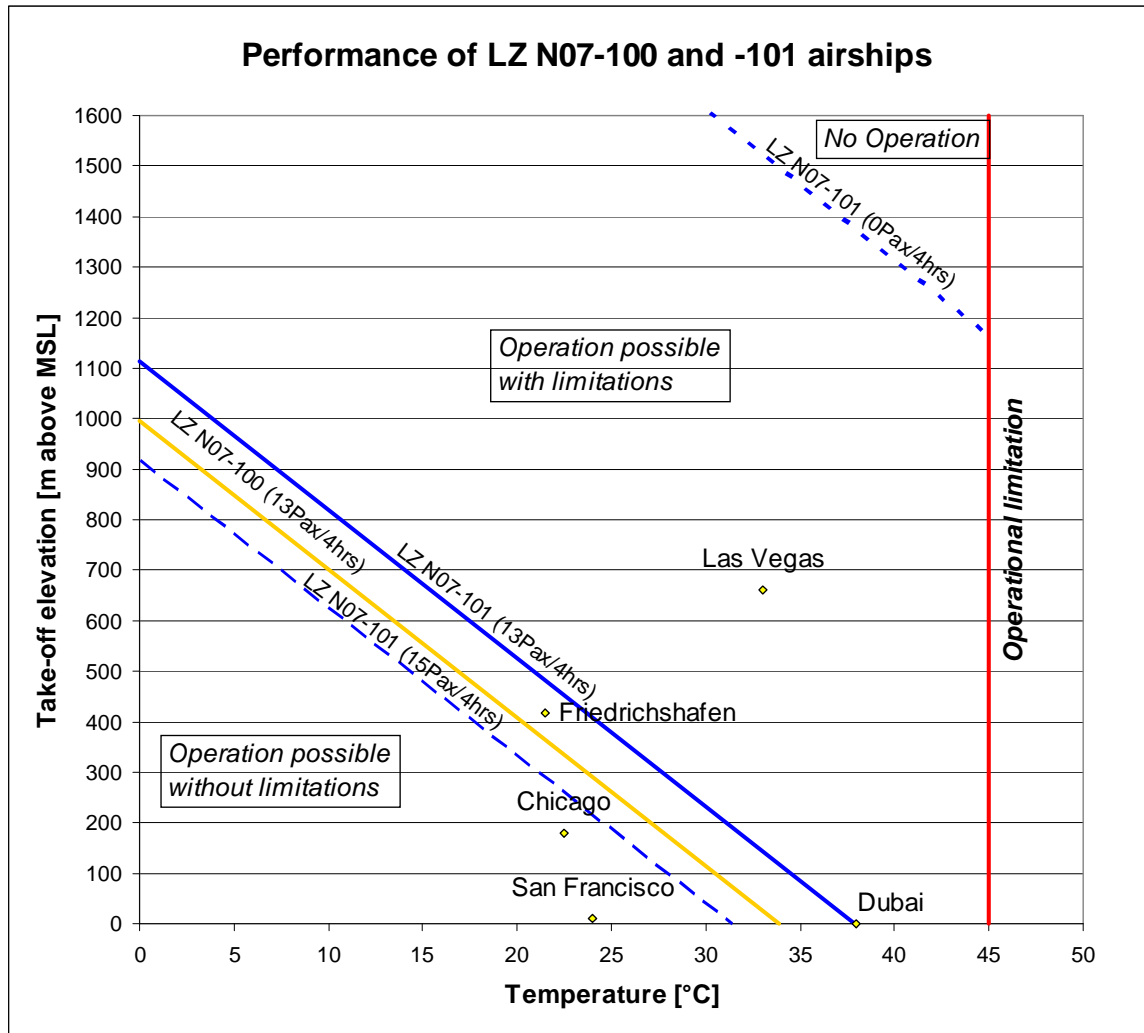


Mission Parameter Comparison

Parameter	Helicopter	Airplane	Zeppelin NT 07
Intensive presence	Low (max 2 hours)	Low (max 2 hours)	High (> 8 hours)
Vulnerability	High	High	Low (no crash)
Crew/passenger comfort	Low (noise & space)	Medium	High (noise <20dB)
Noise / other emissions	Medium	Medium	Low
Fuel consumption	High	High	Low (50kg/hour)
Min. speed	Hover ability	250 km/h	Hover ability
VERTOL capacity	Yes	No	Yes
Very low altitude mission	Yes	No	Yes
Media impact	Low	No	High

Platform Comparison NT 07 vs EC 155 B1

Feature	Helicopter	Zeppelin NT 07
Cabin capacity	2+12 Pax (high density)	2+15 Pax
Useful load	2.272 kg	2.350 kg
Ceiling	4.750 m	2.850 m
Max. speed	270 km/h	125 km/h
Cabin volume	6.7m ³	29 m ³
Fuel capacity	900 kg	860 kg
Fuel consumption	345 kg/h	50 kg/h
Max. range	700km	900 km
Endurance	4:05 h	14:00 h
Noise level / Fly over	88,9 EPNdB	69,4 dB(A)
Noise level cabin in flight	89 dB(A)	64,0 dB(A)
Vibration level	max. 0,1g	max. 0,02g
Utilization per year	357 h / 45.000 NM	1.200 h / 54.000 NM



Conditions:

- 1 Pilot + 1 Flight attendant
- Passengers (Pax) as shown
- Flight duration as shown
- Fuel reserve for landing 100kg
- Fuel-burn 50kg/h
- Purity 98%
- Max. Flight altitude =
Field elevation + 600m

Note: Installation of toilet reduces performance by 1 passenger

Thank you for your attention

