Blended Wing Body
A Green Future Air Transportation Concept

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Greener Skies Ahead
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Outline

- Boundaries for Future Developments

- Trade Off between Mobility and Green Transportation

- BWB @ DLR: An Integrated Approach

- BWB concept assessment

- Conclusion
Despite any disturbances aviation industry is still expecting **4.8% global annual growth** in terms of growing passenger movements.
Boundaries for Future Developments
Perspectives in Aviation (2/3)

Remarkable growth on long range
Growth on short range is depending on regions

Source: Boeing Market Outlook 2011
Boundaries for Future Developments
Perspectives in Aviation (3/3)

Trips per capita 2010

Growing Countries

Mobility steep increasing function of the economic growth

Mobility nearly independent from economic growth and static

 Short range transport will increase in growing countries with own manufacturing industry

 Long range transport will grow between „Western World, Middle East and Growing Countries“
Boundaries for Future Developments
Changing Global Air Traffic Flow

- **Middle East reaches 2/3 of global population** within 8 hours flight

- **Mega airport turntables** provide significant long range transport capacities

- **Air transport flows will change** resulting in a changing relevance of the actual airport hubs and spokes in Europe

- **European Airlines will benefit but also change** their business models due to the Middle East and Asian developments

Dubai World Central Airport
Oil price is constantly growing with increasing gradient, which leads to a highly sensitive and destabilizing development.
Trade Off between Mobility and Green Transportation

- Mobility is a major pillar of high life style and prosperity
- Increasing energy/oil cost and ecological responsibility argue against quantitative traffic growth
- Ensure mobility with less energy effort, materials, emissions and noise requests for less traffic ➔ less aircraft, less airport, airspace capacity
- Passenger mobility can be achieved with less aircraft movements
- Cost and emissions per flight are to be shared by more people per trip

➔ Paradigm shift from quantitative air transport growth to qualitative air transport growth

Source: U. Becker, TU Dresden, V. Gollnick, DLR
The Paradigm Shift of Flying
Qualitative Growth of Aviation

- Balance of time, cost, emissions, effort
  - **Less traffic, less aircraft, consolidated capacities**
  - **Less** noise and **emissions**
  - **More** potential for robustness, and reliability in the transportation processes

- **Increased level of service**
  - **More comfort** and relaxed **travel experience**
  - Air transport is **more attractive**
  - **More** potential for **punctuality** (door to door)

- **Common Vision**
  - Joint targets and common goals

- **Integrated ATS**
  - Understanding of systems dependencies

Source: U. Becker, TU Dresden, V. Gollnick, DLR
The Blended Wing Body
A potential solution

- It offers potential benefits
- Expand the design space and possibilities
- It gives answers to global developments
- „Known unconventional“!
- It is emotional!
- Still technically challenging
The Blended Wing Body
A potential solution

### Concepts

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<th>Payload - Cabin</th>
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<td>DLR BWB</td>
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### Diagram

- **BWB-750F (B747-8)**
- **BWB-750F**
- **BWB-1000**
- **BWB-750F (A380)**
- **BWB-450 (A380-700)**
- **BWB-450F**
- **BWB-750F (B747-8)**
- **Green Freighter**
- **A380-800**
- **A380-700**
- **Boeing 747-8**
- **Boeing 747-8F**
- **BWB-450F (B747-8)**
- **BWB-450 (A380-700)**
- **MOB Baseline**
- **Green Freighter**
DLR Integrated Design Approach
Design for ATS
DLR BWB
A Coupled Disciplinary Design

Source: DLR, Institute for Air Transportation Systems
DLR BWB
An Overall ATS Design

Cabin Design

Boarding

Turnaround Operations

Source: DLR, Institute for Air Transportation Systems
DLR BWB
Potentials assessment

- Block fuel improvements respect to conventional configurations
DLR BWB
Answers to global developments

- Provides mass transport capacity on growing long range distances (EU-Asia, EU South America, US-Asia, US-South America)
- Provides reduced airspace and airport capacity demand per transport performance
- Provides less emissions and less noise per transport performance (g Nox/Pkm)
- High comfort cabin
Thank you for your interest!

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