ALOHA

Aircraft Design for
Low Cost Ground Handling

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Objectives

• A detailed cost breakdown for ground operations has to be carried out with the main cost drivers for A/C operators clearly identified.

• The A/C design requirements for Low Cost Carriers regarding the minimization of ground handling cost needs to be understood.

• A number of design proposals for minimizing ground handling cost for A/C operators will be provided.
Project Partners

Sponsors
• Bundesministerium für Bildung und Forschung

Research Partners
• Airbus
• Airport Research Center
• Hamburg Airport
Market Analysis

• Passenger traffic will grow at 5% per year
• LCA sharing of the market up to 50% by 2020
• Single aisle fleet will grow to more than 20,000 aircrafts by 2025
• B737 design from 60s / A320 design from 80s based on requirements of conventional airlines

Airfrance A320 fleet renewal with A320

Clear Demand for a A320/B737 sucessor

Opportunity for a new design based on LCA requirements
Reference Aircraft

The Airbus A320 has been chosen, as it is the most commonly used Airbus aircraft at Low Cost Carriers.
Requirements for the New Design

- Entry into service by 2020
- 180 passengers. Possibility of aircraft family design
- Design point at R=1025 km. Maximum range 4400 km
- DOC target reduction 15%
- Turn-around time reduction of at least 20%
- Sustainable (fuel burn, noise, emissions)
- Minimum impact on current airport operations
- Feasibility
General DOC Reduction

- Turn-around time reduction
- Fuselage closer to ground leads to faster ground handling
- Use of composites involves less weight and low airframe maintenance
- Less MTOW leads to lower ATC and landing fees
- Similar A320/B737 cockpit, low cost pilot training
- Possibility to operate in secondary airports with lack of equipment. (No need for stairs or pushback tractor)
- New engine technology involve less TSFC, weight and noise
- Counter rotating fans, propfans, geared turbofan ...
DOC Estimation

- **A320 Datum**
- **B737-800**
- **A319-111**

**TARGET**
Turn-Around Time and Cost Reduction

- Integrated stairs
  - Foldable or door stairs solution
  - Weight penalty
- Auto push-back
  - Electrical engine solution
  - Weight penalty
  - Safety issues
- New cabin layout
  - Alternative seating arrangement
  - Foldable seats
  - Reduced galley
- New handling operations
  - Luggage handling. Special Cargo doors
  - Optimun boarding methods
Preliminary Sizing

Matching Chart

Wing loading in kg/m²

Thrust-to-weight ratio [-]

- 2nd Segment
- Missed appr.
- Take-off
- Cruise
- Landing
Previous Studies

ORCA
Aircraft design for minimum turn-around times

University of Stuttgart
Previous Studies

A2007
Low fare airline optimized aircraft

TU Delft
ALOHA Current Status

Definition of A/C requirements are completed.

Ground handling cost structure are still under study.
  Schedules of charges by airports.
  Ground handling agent fees.
  Self-handling procedures and costs.

A complete A/C model of the reference aircraft is being set up in order to analyze modifications in PrADO (Preliminary Aircraft Design and Optimization) software.