Hochschule für Angewandte Wissenschaften Hamburg
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DEPARTMENT OF AUTOMOTIVE AND AERONAUTICAL ENGINEERING

Ground Handling Cost Optimized Aircraft

Project work towards a thesis at Politechnika Warszawska (PW)

Background

According to Boeing and Airbus forecasts, passenger traffic will grow with an average of 5% each year. The low cost airliners (LCA) share is dramatically increasing and it is expected a 50% share of the market by 2020 in some regions. In addition, the single aisle fleet will grow to more than 20000 aircrafts by 2025.

An internal unpublished study carried out by Airbus about the cost structure of the LCA shows that LCA save costs among other things by means of new procedures in ground handling operations. If newly designed aircraft would take account of the LCA's handling requirements even greater savings would be possible.

The most frequently used aircraft in the low cost market are the single aisle medium range Airbus 320 and Boeing 737, which were designed respectively 20 and 40 years ago based on conventional airline requirements. As a replacement of these aircraft, new aircraft designs are discussed that are optimized for LCA and at the same time for conventional airline requirements.
This project is part of the aircraft design research project "ALOHA" (http://ALOHA.ProfScholz.de).

Task

The task consists of the development of a new aircraft design, optimized for LCA and conventional airline requirements alike. The task consists of these subtasks:

- Preparation of a summary of methods for ground handling cost calculations and evaluation tools.
- Preparation of 3-view sketches showing different ideas for new aircraft designs towards ground handling costs reduction.

- Selection and justification of several proposals; preliminary aircraft design studies of selected proposals by means of the PrESTO (Preliminary Sizing Tool); evaluation of ground handling costs characteristics and aircraft performance of the proposals for LCA and conventional airline operation.
- Selection and justification of at least one proposal, development of the selected proposal in PrADO (Preliminary Aircraft Design and Optimization), parameter variation and optimization with PrADO, evaluation of ground handling costs characteristics and aircraft performance of the proposals for LCA and conventional airline operation.
- Discussion of the pros and cons of the PrADO design against today's aircrafts (A320, B737).

The design should be based on the following requirements:

- Entry into service: 2025.
- Number of passengers: 180.
- Maximum payload: m_{MPL} = 19200 kg
- Range at maximum payload: R = 1025 km.
- Possibility of aircraft family design.
- Low Direct Operating Costs (DOC) with a focus on low ground handling costs.
- Environmentally friendly operation (low noise, low emissions).
- Minimum impact on current airport operations.

The report has to be written in English based on German or international standards on report writing.