



DEPARTMENT OF AUTOMOTIVE AND AERONAUTICAL ENGINEERING

Systematic Evaluation of Alternative Box Wing Aircraft Configurations

Task for a *Project*

Background

As part of the research project Airport 2030 (**Airport 2030**) a Box Wing Aircraft for short-/medium range based on the Airbus A320, has been investigated to improve performance and to make ground handling more efficient. A first configuration was designed in **Schiktanz 2011**. This project was based on the usual aircraft design methods (see **Scholz 1999**) considering the special characteristics of a Box Wing Aircraft. The aircraft designed as such complies with all mission requirements. However, it can not be guaranteed that the box wing configuration chosen is the best among all possible box wing configurations. Therefore, there is the need to identify also alternative box wing configurations and to evaluate their potential.

Task

Alternative configurations of box wing aircraft have to be designed and evaluated. This task requires a systematic approach. Chapter 3 of **Pahl/Beitz 2007** shows different possibilities for a systematic approach covering the design space. The task includes following sub-tasks:

- Describe the current box wing configuration and determine potential disadvantages.
- Determine requirements for the box wing aircraft on aircraft level and on the level of major aircraft components (fuselage, wing, ...).
- Come up with major aircraft component design principles that meet requirements for these major components.
- Combine such major aircraft components in a systematic way to synthesize box wing aircraft that meet requirements (e.g. use a morphological strategy).
- Visualize the box wing aircraft configurations found in 3D using OVSP (**NASA 2013**).
- Evaluate all synthesized the box wing aircraft and compare the alternative options with the current configuration of the box wing aircraft. Use e.g. the cost-benefit analysis.

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

Literature

- Airport 2030** URL: <http://Airport2030.ProfScholz.de> (2013-03-17)
- NASA 2013** URL: [http:// http://www.openvsp.org](http://http://www.openvsp.org) (2013-03-17)
- Pahl/Beitz 2007** PAHL, Gerhard; BEITZ, Wolfgang; FELDHUSEN, Jörg; GROTE, Karl-Heinz: *Konstruktionslehre : Grundlagen erfolgreicher Produktentwicklung: Methoden und Anwendung*. 7. Auflage. Berlin, Heidelberg, New York : Springer, 2007. – ISBN 978-3-540-34060-7
- Schiktanz 2011** SCHIKTANZ, Daniel: *Conceptual Design of a Medium Range Box Wing Aircraft*. Hamburg, Hochschule für Angewandte Wissenschaften Hamburg, Department Fahrzeugtechnik und Flugzeugbau, Master Thesis, 2011.
- Scholz 1999** SCHOLZ, Dieter: *Skript zur Vorlesung Flugzeugentwurf*, Hamburg, Fachhochschule Hamburg, FB Fahrzeugtechnik, Abt. Flugzeugbau, 1999