Aircraft Design and Systems Group (AERO)

Current Status

Prof. Dr.-Ing. Dieter Scholz, MSME

2013-12-01
Aircraft Design and Systems Group (AERO)

• **AERO is part of:**
  Research Focal Point Aeronautical Engineering
  Department of Automotive and Aeronautical Engineering
  Faculty of Engineering and Computer Science
  CCNF – Competence Center Novel Flight

• **AERO's aim** is to guide research assistants to cooperative dissertations and to conduct funded projects in research, development and teaching (short courses).
Aircraft Design and Systems Group (AERO)

*Emphasis* of our work is on:

- Aircraft Design
- Aircraft Systems
- Flight Mechanics
AERO: Research Assistants

Dipl.-Ing. Andreas Johanning
Dipl.-Ing. Ricardo Caja Calleja, MSc
Tahir Sousa, B.Tech (Hons.) *
Priyanka Barua, B.Tech (Hons.) *
Dipl.-Ing. Liana Urseanu (BSc) **

Dipl.-Ing. Mike Gerdes (PAHMIR)

* up to 7/2013
** starting 9/2013

Summer Semester 2013
AERO: Finished Projects and Activities

- EPMA – Building an International Master Program in Aviation
- FLECS – Simulation of the Environmental Control System
- Green Freighter – Design of Freighter Aircraft
- ALOHA – Aircraft Design for Low Cost Ground Handling
- PAHMIR – Health Monitoring of Aircraft Systems
- CARISMA – Optimization of Aircraft Cabin Design Processes
- OPerA – Optimization in Preliminary Aircraft Design
- MOZART – Health Monitoring of Fuel Cell Systems in Aviation
- TOC – Take-Off Calculation
AERO: **Current Projects and Activities**

- Airport 2030 – Airport Compatible Innovative Aircraft Designs  
  (Aviation Cluster Hamburg)
- PreSTo – Preliminary Aircraft Design Environment
- SAS – Simple Aircraft Sizing
- OpenVSP-Connect
- Off-Take – Fuel Consumption due to Off-Takes from the Engine
- Training on Airbus A320 System Simulators
- Short Courses:  
  - Aircraft Design  
  - Introduction to Aeronautical Engineering
**AERO: Cooperative Dissertations**

- Dipl.-Ing. Kolja Seeckt  (Tekn. Lic; licentiate)  
  (Green Freighter)

- Dr.-Ing. Mihaela Niță  
  (CARISMA, OPerA)

- Dipl.-Ing. Mike Gerdes *  
  (PAHMIR)

- Dipl.-Ing. Andreas Johanning *  
  (Airport2030)

* in progress
AERO: Cooperative Dissertations

Dr.-Ing. Mihaela Niță
(CARISMA, OPerA)
AERO: Publications

Advances in Aerospace Science and Technology

Editor-in-Chief: Prof. Dr. Dieter Scholz

Website: http://www.scirp.org/journal/aast
http://aast.ProfScholz.de

- international
- scholarly, peer-reviewed
- online and print on demand
- open access
- application oriented
- review: single blind – open review choice
AERO: Information on the WWW

http://AERO.ProfScholz.de
- Link to all Projects and Publications
- Reports@AERO – Full Text

http://News_at_AERO.ProfScholz.de
- List of Activities

http://library.ProfScholz.de
- Digital Library: Student Projects, Thesis Work – Full Text
An example of a research project:

**Airport2030 - Evolutionary Aircraft Configurations**

- Leading-Edge Cluster Competition
- HAW: 217 k€
- 5 years
- Up to 4 employees
- Partner: Airbus, DLR, …
- Sponsor: Federal Ministry of Education and Research
Aim of the Project Airport2030

- Investigation of evolutionary passenger aircraft configurations
- Only configurations which could be certified today
- Balanced design for optimized ground handling and cruise flight
- DOC and/or fuel optimized configurations

- Optimization Tools: OPerA (jet) and PrOPerA (turboprop)

- Configurations investigated (reference A320):
  - Strut Braced Wing Aircraft, Folding Wing Aircraft (also with Natural Laminar Flow)
  - Box Wing Aircraft (diamond wing)
  - Box Wing Aircraft (double deck wing)
  - Smart Turboprop (slower and lower flying)
A320-like Aircraft with Modified Requirements, Optimized for Minimum Fuel Mass
Box Wing Aircraft (diamond wing)
„Smart Turboprop“ with Wing Brace (4 Engines)
„Smart Turboprop“ with Wing Brace (2 Engines)
LH2 feeder freighter from „Green Freighter“ Project
Aircraft Preliminary Sizing Tools @ AERO

Many Possibilities to Connect Tools

- SAS → ...
- OPerA → ...
- SAS → PreSTo → ...
- OPerA → PreSTo → ...

... → OpenVSP-Connect → OpenVSP
... → external Tools (e.g. flight simulation)
External Tools

OpenVSP

JSBSim

CEASION

Computerised Environment for Aircraft Synthesis and Integrated Optimisation Methods

Tornado

USAF Digital DATCOM

X-Plane

By Laminar Research
Training on Airbus A320 System Simulators
Short Course: Aircraft Design
Offered at Hamburg University of Applied Sciences …
continuously from 2007 … … up to 2011.
Short Course: Aircraft Design
Offered at Customer’s Premises ...

... at Embraer, São José dos Campos, Brazil, 2013.
Summary: Aircraft Design and Systems Group (AERO)

- Many research projects
- Almost 100% third party funds
- Several cooperative dissertations
- Many publications

- Training on Airbus A320 System Simulators

- Short Courses:
  - Aircraft Design
  - Introduction to Aeronautical Engineering