

# 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.) \***

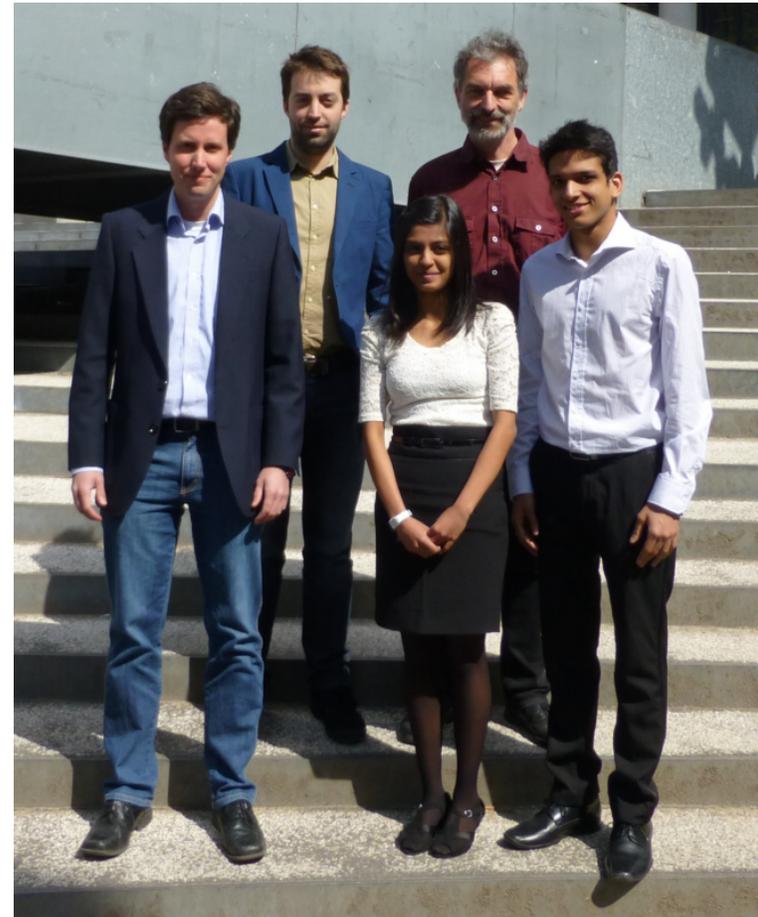
**Priyanka Barua, B.Tech (Hons.) \***

**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)**



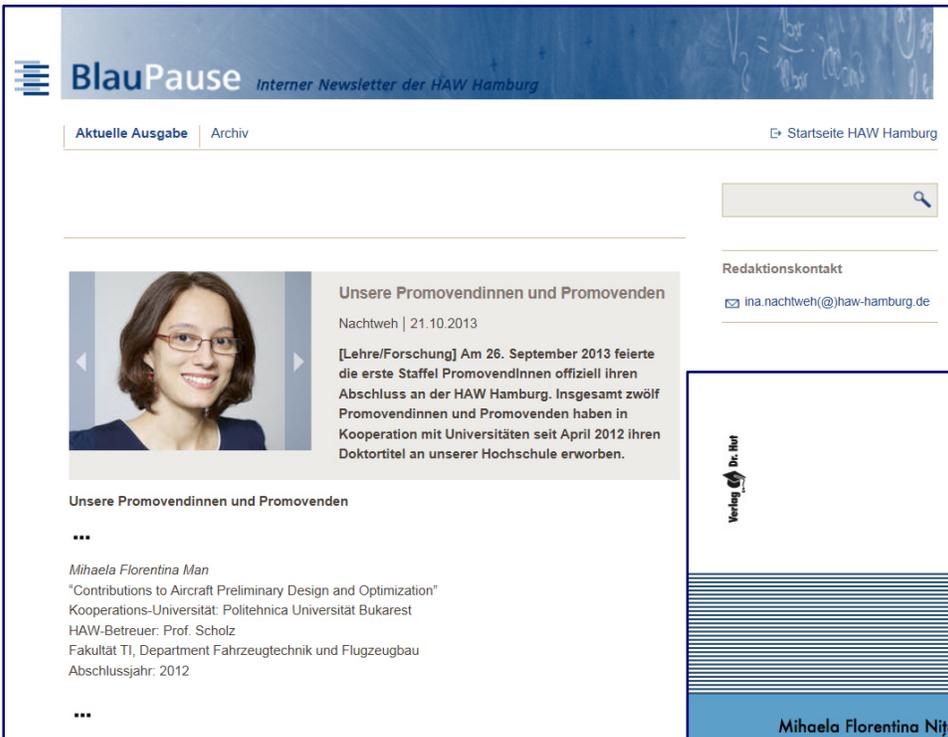
**Dipl.-Ing. Mike Gerdes \***  
**(PAHMIR)**

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



\* in progress

# AERO: Cooperative Dissertations



**BlauPause** Interner Newsletter der HAW Hamburg

Aktuelle Ausgabe | Archiv Startseite HAW Hamburg

Redaktionskontakt  
ina.nachtweh@haw-hamburg.de

**Unsere Promovendinnen und Promovenden**  
Nachtweh | 21.10.2013

[Lehre/Forschung] Am 26. September 2013 feierte die erste Staffel Promovendinnen offiziell ihren Abschluss an der HAW Hamburg. Insgesamt zwölf Promovendinnen und Promovenden haben in Kooperation mit Universitäten seit April 2012 ihren Dokortitel an unserer Hochschule erworben.

**Unsere Promovendinnen und Promovenden**

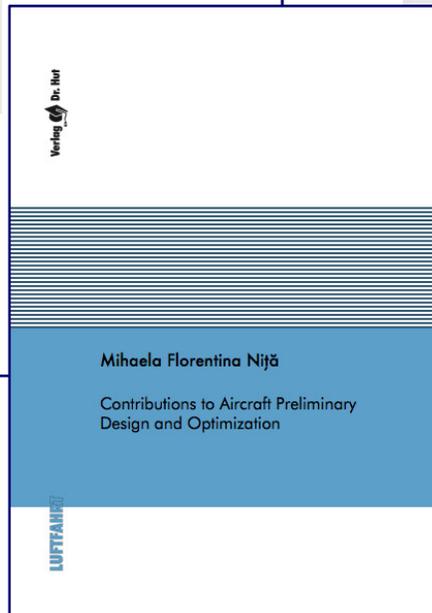
...

*Mihaela Florentina Niță*  
"Contributions to Aircraft Preliminary Design and Optimization"  
Kooperations-Universität: Politehnica Universität Bukarest  
HAW-Betreuer: Prof. Scholz  
Fakultät TI, Department Fahrzeugtechnik und Flugzeugbau  
Abschlussjahr: 2012

...



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



Verlag Dr. Hut

Mihaela Florentina Niță

Contributions to Aircraft Preliminary Design and Optimization

LUFTFAHRT



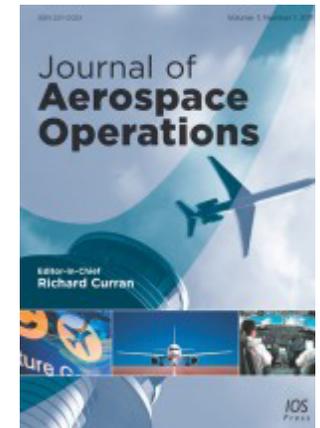
# AERO: Publications



EWADE



Springer



## 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



**Scientific  
Research**



## **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](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**

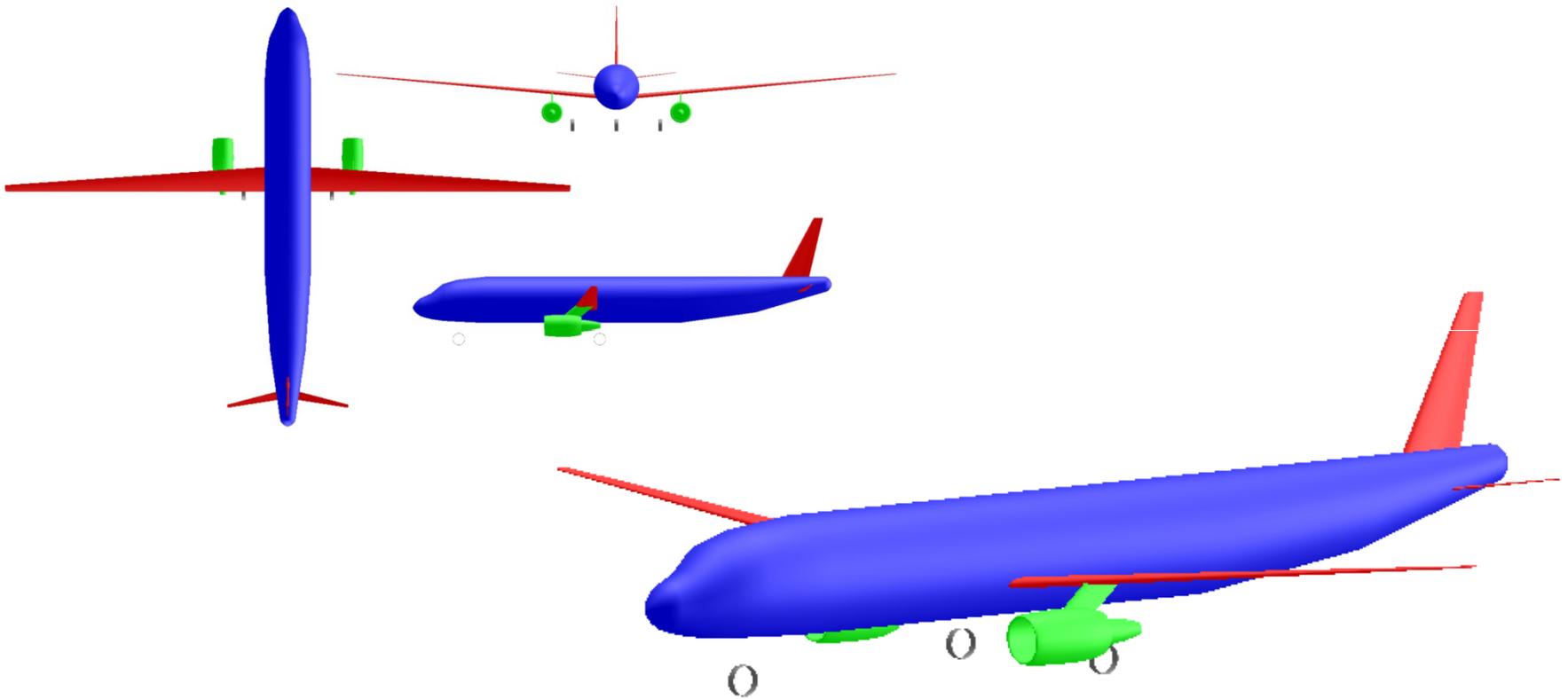


Airport2030



## 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)

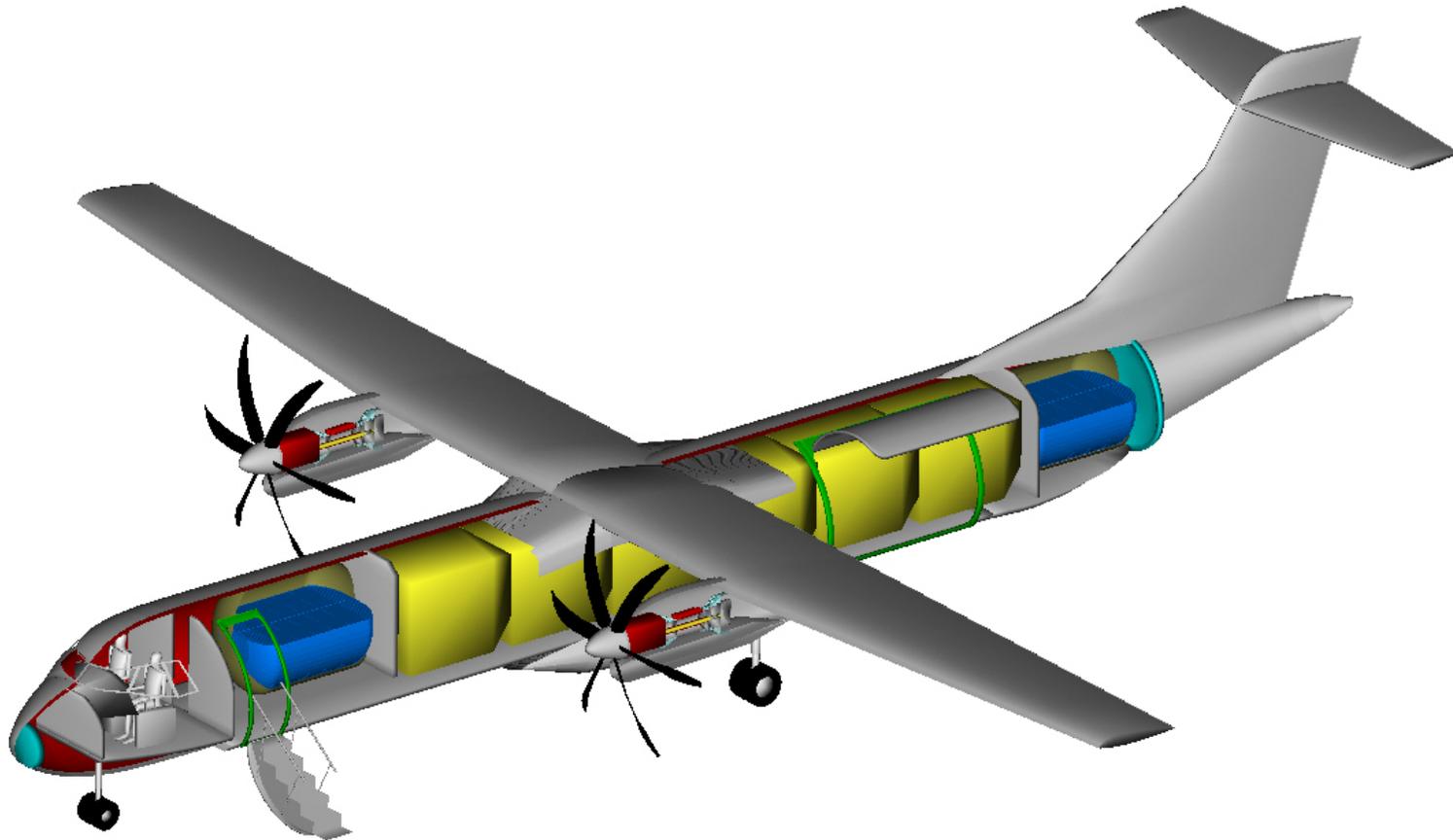




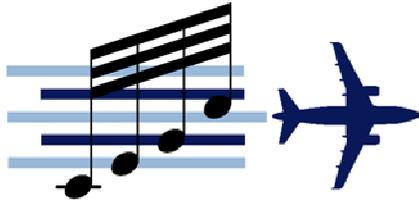
„Smart Turboprop“ with Wing Brace (4 Engines)



„Smart Turboprop“ with Wing Brace (2 Engines)



LH2 feeder freighter from „Green Freighter“ Project



**PreSTo**

Aircraft Preliminary Sizing Tool



Optimization in Preliminary Aircraft Design



Simple Aircraft Sizing (and Optimization)

## Aircraft Preliminary Sizing Tools @ AERO

Many Possibilities to Connect Tools

**SAS** → ...

**OPerA** → ...

**SAS** → **PreSTo** → ...

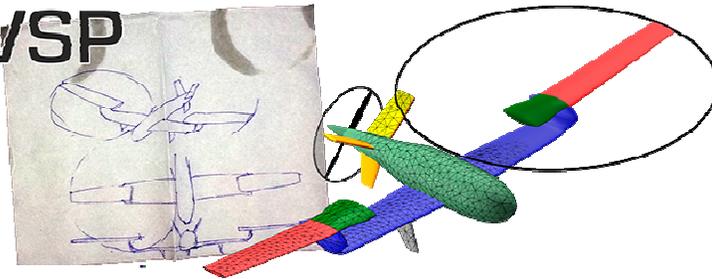
**OPerA** → **PreSTo** → ...

... → **OpenVSP-Connect** → **OpenVSP**

... → **external Tools** (e.g. flight simulation)

## External Tools

OpenVSP

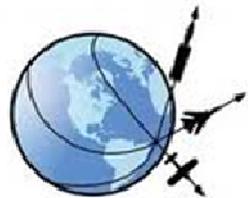


Computerised Environment for Aircraft Synthesis and Integrated Optimisation Methods

Tornado



USAF Digital DATCOM



JSBSim



# Training on Airbus A320 System Simulators

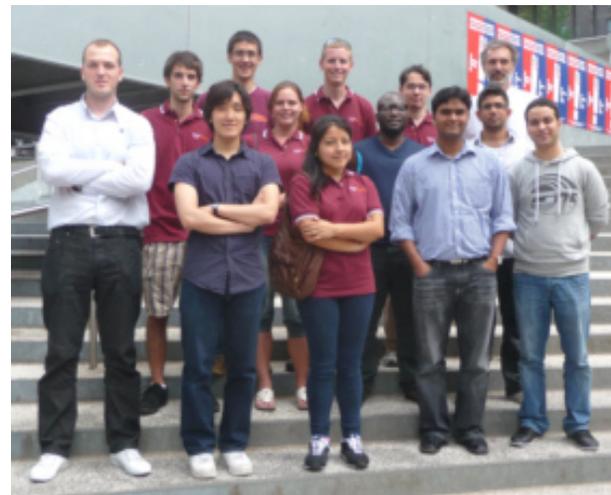


## Short Course: Aircraft Design

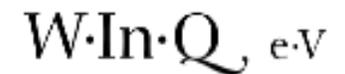
Offered at Hamburg University of Applied Sciences ...



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