

Dieter Scholz (Ed.)

Book of Abstracts

**13th European Workshop on Aircraft Design Education
(EWADE 2017)**

in co-operation with the
2nd Asian Workshop on Aircraft Design Education
(AWADE 2017)

co-located with the
6th CEAS Air & Space Conference
(CEAS 2017)

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<http://CEAS.org>

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Abstracts

Dieter Scholz

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Aircraft Design and Systems Group (AERO)

Welcome to EWADE 2017

The "Welcome to EWADE 2017" gives an introduction to the program including the video conferencing with AWADE in Nanjing, China. The history of EWADE is briefly explained for those new to the workshop. The first workshop was held in 1994 on invitation only. EWADE has links to several other workshops and organizations: READ, CEAS, SCAD and AWADE (in order of the length of the established contact). EWADE is an important activity in the CEAS Technical Committee Aircraft Design (TCAD) together with SCAD. Both share the URL www.AircraftDesign.org. Available presentations from EWADE reach back to the year 2000. In some cases full papers were written after the presentation. Also these are published on the web page. EWADE has always discussed possibilities for journal publications in aircraft design. Several cooperations exist.

Keywords:

EWADE 2017 programme, history, cooperations, web pages, publications

Octavian Pleter, Sterian Dănăilă

University Politehnica of Bucharest (UPB), RO
Faculty of Aerospace Engineering

Education in Aerospace Engineering at the University "Politehnica" of Bucharest

Romanian has contributed to pioneering aviation. The University "Politehnica" of Bucharest (UPB) stands in this tradition. Higher education in aviation started in 1928, when Prof. Elie Carafoli opened the first conference on Aeronautics at the Polytechnic school in Bucharest. He also built the first wind tunnel in South-Eastern Europe (1931), still in operation. Today, graduates from the Faculty of Aerospace Engineering can be found in all sectors of aviation and space in many countries of the world. Alumni of the faculty have contributed to major aerospace programs. UPB is active in aerospace research and teaching and offers Bachelor and Master

degrees as well as doctoral studies. Fields of study are: Aerospace Constructions, Propulsion Systems, Equipment and Aviation Instruments, Engineering and Management in Aeronautics, Air Navigation, and Aeronautical Design. 180 to 200 students commence their studies in the faculty each year. The faculty has more than 1000 students, more than 40 professors and lecturers, several laboratories. An international network with partner universities results in many opportunities for incoming and outgoing students.

Keywords:

aerospace, education, research, industry, alumni, history

Petter Krus

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Aircraft Systems Engineering and Concept Evaluation

Methods and tools are presented that facilitate the evaluation of aircraft system concepts in various ways. One such tool is HOPSAN-NG. It allows a wide range of simulations from the aircraft hydraulic system, via aircraft dynamics up to the simulation of a whole aircraft mission based on pre-defined way points. This allows an evaluation of the aircraft including its fuel consumption due to aircraft systems and the evaluation of many more details of the aircraft's behavior.

Keywords:

aircraft systems, systems engineering, simulation, evaluation

Fabrizio Nicolosi

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Design of Aircraft and Flight Technologies Research Group (DAF)

Innovative Tools for Aircraft Preliminary Design – Development, Applications and Education

The Design of Aircraft and Flight Technologies Research Group (DAF) at University of Naples is involved in research activities addressing the development and application of new and innovative tools and frameworks for aircraft preliminary design. To build such new tools for aircraft design we believe that the following activities should be carried out: (a) derive new semi-empirical formulations (even through the construction of surrogate methods) which can be more accurate in the prediction of aircraft characteristics (especially for non-conventional configurations); (b) integrate medium to high fidelity tools into the analyses; (c) design with a multi-disciplinary approach (i.e. including systems and direct operating costs); (d) include innovative propulsive systems; (e) deal with innovative configurations; (f) include new and efficient optimization algorithms; (g) use advanced software engineering to enhance tool capabilities, speed and usability (for example user-friendly graphic interface or inter-operability with other software). Recent research activities of the DAF group have been focused on the development and application of a new framework. Examples and applications in relevant European research projects can be presented. The development of these tools play also a relevant role in educational activities at the University of Naples as far aircraft design is concerned.

Keywords:

aircraft design tool, aircraft design framework, aircraft MDO, innovative configuration

Dieter Scholz

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Specific Fuel Consumption of Jet Engines – Implications in Aircraft Design and Performance Calculations

Basic considerations about an overall efficiency of an aircraft lead to the conclusion that a power-specific fuel consumption (PSFC) has to be constant, whereas a thrust-specific fuel consumption (TSFC) has to be proportional to speed. This however, leads to a contradiction, because the fuel consumption at zero speed cannot be zero. Furthermore, specific fuel consumption is a function of thrust (or drag) which varies

with speed. This links SFC not only to engine characteristics, but to the whole aircraft and its flight condition. We understand that (in contrast to tradition) the Breguet range equation for jets could be written with a (constant) power-specific fuel consumption (PSFC). Optimizing for maximum range now leads to a different optimum speed compared to a derivation based on a constant thrust-specific fuel consumption (TSFC). We also understand why flying low and slow (for reduced fuel consumption) does not work as well as expected – even for a newly designed aircraft for which the wing area is not yet fixed.

Keywords:

specific fuel consumption, SFC, Breguet, range, fuel, saving, flight, low, slow

Jizhou Lai

Nanjing University of Aeronautics and Astronautics (NUAA), CN
International Affairs Office

Welcome to Asian AWADE and European EWADE

The presentation looks at the international dimension of aerospace at Nanjing University of Aeronautics and Astronautics. Many international contacts exist. The Asian Workshop on Aircraft Design Education (AWADE) started with its first workshop in 2016. It was inspired by Prof. Anatoly Kretov who joint NUAA from Kazan State Technical University, Russia. Prof. Kretov had participated in EWADEs already since 2007 and was able to bring the special spirit of this workshop to Asia. CEAS 2017 is now the first opportunity for EWADE and AWADE to hold a joint meeting.

Keywords:

NUAA, international relations, EWADE, AWADE, AWADE 2016

Pinqi Xia

Nanjing University of Aeronautics and Astronautics (NUAA), CN
College of Aerospace Engineering (CAE)

Aerospace Engineering Education at Nanjing University of Aeronautics and Astronautics

The presentation considers the system of education and preparation of students at Nanjing University of Aeronautics and Astronautics at the Aerospace Engineering College.

Keywords:

aerospace industry, education, directions, preparing of specialists

Zhijin Wang, Anatoly Kreto

Nanjing University of Aeronautics and Astronautics (NUAA), CN
College of Aerospace Engineering (CAE)

The 60th Anniversary of the Launch of the First Satellites – Historical and Technical Analysis

Students' interest can be increased by studying the history of technology developments. The presentation describes the launch of the first satellites Sputnik1 and Sputnik2 in 1957. The historical background is given followed by a brief analysis and conclusions.

Keywords:

teaching, aerospace, history, technology development, satellite, Sputnik

Anthony Hays

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Generation of the Drag Map and Derivative Plots for Commercial Aircraft

The drag map provides important information about the transonic aerodynamic characteristics of an aircraft design. In an aircraft design course, students should be aware of the significance of the drag map and its derivative plots. The presentation describes how a drag map and its derivatives can be constructed that are representative of a given aircraft configuration.

Keywords:

aircraft design, transonic aerodynamics, transonic drag rise, drag map

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Aircraft Noise Sources and Analysis of Possibilities for Noise Reduction

This presentation analyzes the existing methods of aircraft noise measurements and proposes methods to decrease noise levels by taking into account drag reduction criteria. The implementation of this method in the learning process is discussed.

Keywords:

aircraft, noise, aerodynamic drag

Oleksiy Chernykh

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Civil Aviation Engineering Department (CAED)

Airworthiness Knowledge Comes into Focus of Chinese Aviation Education

Air Transportation is the safest mode of transportation, because it has long been under comprehensive aircraft airworthiness management. The airworthiness chain consists of three main components (a machine, environment, and a man) which all ensure highest levels of safety through well coordinated work. The last (but not the least) component of the airworthiness chain is a human, professional specialist. Once China has started to develop its own aircraft, the need for well educated airworthiness professionals has strongly increased. The College of Civil Aviation of Nanjing University of Aeronautics and Astronautics offers airworthiness knowledge, which has been delivered by a number of professional teachers: local professors, who continuously advance their knowledge working abroad, and foreign professors invited from overseas universities to strengthen airworthiness education in China. Strong emphasis in teaching has been put on professional English, which opens better opportunities for graduates at Chinese and foreign aviation enterprises, because aircraft airworthiness is a worldwide issue.

Keywords:

airworthiness management, airworthiness education, Chinese aviation education, air transportation, aviation safety

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² Office National d'Etudes et de Recherches Aérospatiales (ONERA), FR

Review of Aircraft Design activities at ISAE-SUPAERO / ONERA

During last years, ISAE-SUPAERO and ONERA reinforced their collaboration in aircraft design. The objective of this presentation is to illustrate the various studies that have been performed. First, the common Sizing Tool FAST (Fixed-wing Aircraft Sizing Tool) that has been developed during last years through projects will be presented. In a second part, aircraft design activities related to distributed propulsion using FAST and other disciplinary codes are detailed. These studies concern regional aircraft as well a small-medium range missions. Always regarding innovative concepts, ISAE-SUPAERO launched many disciplinary studies related the the Blended Wing Body Concept: high fidelity structural analyses, aerodynamics, and control. Later on, it is planned to integrate these refined capabilities in the overall aircraft design tool. These recent activities are summarized to provide an clear overall status for this concept. To conclude the presentation, information about the Scaled Demonstrator used to support student projects will be given. ISAE-SUPAERO's activities in aircraft design are made under the Chair CEDAR sponsored by Airbus.

Keywords:

sizing tool, OAD, FAST, distributed propulsion, BWB, scaled demonstrator

Lorenzo Trainelli, Carlo Riboldi

Politecnico di Milano (POLIMI), IT

Department of Aerospace Science and Technology

Award-Winning Innovative Aircraft Design Projects at Politecnico di Milano

The presentation addresses the Aircraft Design graduate course at Politecnico di Milano and a series of projects developed in recent years that have been submitted to various international design competitions, achieving a remarkable success rate.

Keywords:

innovative aircraft design, aircraft design education, electric aircraft, hybrid-electric aviation, morphing tilt rotor, student competition

Diane Chelangat Uyoga

Moi University, KE

School of Aerospace Sciences

Aerospace Education in Kenya – The Case of Moi University

Learning is the heart of existence and education is the main driver of economic activities in the world. Education cuts across continents, generations and races where it is believed that having a formal education is a gateway to better living. Moi University (Kenya), has taken on a challenge to demystify a myth of “how a small stone when thrown up comes down and a plane that is big do not fall off from the skies”. Aircraft design has not been explored in the African context and aerospace education has captured limited attention, more so in a higher education context. Moi University, a state owned institution situated in the Eastern part of the continent attempts to address the technical and softer issues that are tailored to equip learners with knowledge on aerospace and its dynamics.

Keywords:

education, aircraft design, aerospace

Tomasz Goetzendorf-Grabowski

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Results of READ/SCAD 2016 – Proposal of a Joint READ/EWADE/SCAD Workshop 2018

The results from READ/SCAD 2016 are published online at READ and SCAD web pages and in the journal "Aircraft Engineering and Aerospace Technology".
<http://PapersSCAD2016.AircraftDesign.org>,
<http://www.emeraldgroupublishing.com/aeat.htm>,
http://read.meil.pw.edu.pl/wp-content/uploads/Program/READ_SCAD_2016.html.

Keywords:

education, research, aircraft design, workshop, publication, journal