

# EREA NEWSLETTER

Association of  
European  
Research  
Establishments in  
Aeronautics

April 2010

## ■ EREA internals

### INCAS is the new full EREA member

The EREA Board during its 21st General Assembly / Board Meeting, hosted by DLR, Brussels on December 2nd 2009, accepted the National Institute for Aerospace Research "ELIE CARAFOLI" – I.N.C.A.S Bucharest as full member of EREA, starting January 1st 2010. Since 2006 until December 2009 INCAS was part of EREA Association as an associate member.

#### EREA full members:

CIRA Italy - DLR Germany - FOI Sweden  
ILOT Poland - INCAS Romania - INTA Spain  
NLR Netherlands - ONERA France  
VZLU Czech Republic

#### EREA associate members:

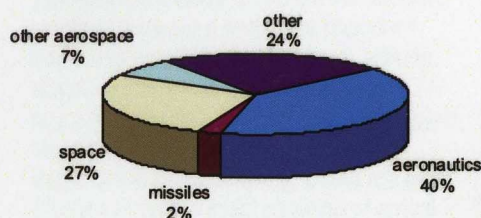
ARCS Austria - VKI Belgium - VTT Finland

#### EREA affiliate members: AFIT Poland

#### EREA in numbers (2008)

Number of employees	4360
Internal aeronautics research	375 M€
Annual revenues from	
EU projects	44,8 M€
Number of PhD thesis per year	170
Number of publications	
including technical reports	6260
Publications in refereed journals	1080

Breakdown of EREA 2008 expenditures for intramural R&T, D - Total: 888M€



## ■ The interview of the new chairman, Mr. Michel Peters



On 2nd December 2009 Michel Peters, General Director of NLR was appointed as new chairman of EREA. He succeeds Denis Maugar, President and CEO of ONERA. The EREA Chairman mandate is for two years. What goals does Michel Peters pursue and what issues does he want to put on EREA's agenda?

**Last year, EREA celebrated its 15th anniversary. In your opinion, what is so far the most important thing EREA has achieved?**

"Several bilateral (and even trilateral) steps to integrate our activities have been taken (for example the ATM-activities between DLR and NLR) and EREA has obtained a solid image as representative of the European national research establishments within the European Aeronautics and Air

Transport scene. Furthermore we have strongly improved the internal EREA-coordination of the European framework programmes. But of course, much remains to be done.

Finally, I would like to welcome the National Institute for Aerospace Research "ELIE CARAFOLI" – I.N.C.A.S Bucharest as full member of EREA."

**What issues are you going to put on EREA's agenda the next two years?**

"Promote the mobility of experts within EREA. This is important because for me it is clear that expert mobility (exchange of personnel) does contribute considerably to a better understanding of the "habits" and the ways of life and work in the various EREA research establishments. We will explore the possibilities to increase this expert mobility and exchange of knowledge within EREA as I am sure that such an exchange programme will be an attractive way to foster new talent and prepare EREA for the future."

**About the long term, can you tell us what EREA should do to become successful in 2015?**

"The main objectives of EREA to be successful, and therefore my objectives of as new Chairman, are to represent the joint interests of the EREA members, and to ensure the best offer for innovative research to industry, governments and European institutions. Furthermore, to be successful I will also activate EREA members to perform more fundamental and innovative research and to initiate internal cooperative projects to increase competitiveness"

**In what way is EREA participating in Framework Programme 7 (FP7)? And more specific, in SESAR and Clean Sky?**

"Let me limit myself here to Aeronautics and Air Transport (AAT). This is an important theme of FP7. Research is performed through the traditional Collaborative Research instruments, the Clean Sky JU and the SESAR JU. As a result of the 1st Call of FP7 Collaborative Research, EREA members participate in all four funded level-2 projects and one or more members are involved in eighteen funded level-1 projects. The results of the 2nd Call of FP7 Collaborative Research are even better: again EREA members participate in all four funded level-2 projects and one or more members are involved in nineteen funded level-1 projects. The results of the 3rd



Call (with level-1 topics only) will be announced soon, but I am optimistic of the results. Thus, in spite of the very strong competition in FP7, EREA members got rather good results and the involvement in level-2 proposals confirms the importance of our activity in the integration and validation of new technologies in cooperation with European industry.

EREA members are actively involved in the Clean Sky JU, as Associate Member in all Integrated Technology Demonstrators except the one for Green Engines. EREA members also play a leading role in the Technology Evaluator.

EREA members have not been involved in the SESAR "Definition Phase" but some members responded to the open call for new members launched by SESAR. I consider it very important that EREA members are involved in the SESAR research activities and the long-term research for ATM, to prevent a future technology gap."

#### **In 2014 FP8 starts. How should EREA prepare for this?**

"As you may know, the Lund Declaration (2009) calls to focus research (in FP8) on a limited number of 'grand challenges'. We should ensure that Aeronautics and Air Transport research will reappear in these challenges (e.g. in sustainable mobility), because a competitive and environmentally responsible Aeronautics and Air Transport sector is a strategic asset of Europe. In addition existing instruments such as Collaborative Research in which EREA members participate so actively, should again be part of FP8. Certainly EREA should position itself with respect to this process by defining its own view on the future Air Transport System beyond 2020, and the research roadmap that is needed to achieve the future goals."

#### **ACARE's (Advisory Council for Aeronautic Research in Europe) vision 2020 slowly gets outdated. What should EREA's long term vision on ATS (Air Transport Systems) entail?**

EREA should be proactive and provide an independent and authoritative view on the long term research issues for the future Air Transport System. EREA members should analyse the technology options and propose research roadmaps, analyse the basic scenarios in which these technologies are needed and will be deployed. Finally, EREA members should define the framework and mechanisms to implement the needed research. In this context, the current internal EREA ATS 2050 study is important.

## ■ **ONERA - eurocopter partnership of 30 years' standing bears fruit again**



**Eurocopter has announced the launch of the Blue EdgeTM Blade, its new quiet main rotor blade.**

At the Heli-Expo 2010 (February 20 to 23, 2010 in Houston, Texas (USA)), Eurocopter has announced a major technological breakthrough for the helicopter market: a significant noise reduction up to 3 to 4 dB thanks to a new blade shape, the Blue EdgeTM Blade.

The Blue EdgeTM Blade is the result of more than 15 years of cooperative research. At first, Onera aerodynamic computational codes allowed to design new blade shapes. Then, the qualities of ERATO revolutionary blade were validated by Onera-DLR teams. ERATO shape patented jointly by Onera and DLR demonstrated during wind tunnel tests a noise reduction of the rotor up to 4 to 7 dB.

In a second step, the ERATO concept was extended to a full scale blade shape by Onera and Eurocopter. The Blue EdgeTM Blade technology is now accepted by Eurocopter for its future helicopters, thanks to the 3 to 4 dB noise reduction demonstrated in real flight conditions.

This tremendous noise reduction is a major advantage for helicopter dedicated to urban transport. Heliport vicinity is very often a critical issue for operators. And noise is a driver for the extension of the use of helicopter for civil and missions.

For 30 years now, Onera, DLR and Eurocopter are working together for innovative rotor blades. The next challenge is now the active rotor blades. These smart blades will adapt themselves to their immediate environment, that is to every azimuth to reduce resistance to air.

## ■ **EREA association initiatives and plans for 2010**

- >22nd Board Meeting and Strategic Workshop on Mobility in Toledo, Spain.
- >Preparation of EREA work plan 2010-2011.
- >EU Project Preparation seminar 2010.
- >Finalising summary of policy seminar and distributing it to Board members.
- >Meeting of EREA Board with new European Commissioners.
- >EREA inputs on FP7 midterm review and formulating postulates for FP8 by specialized groups: ARG, SRG and HR.
- >Simplification of Project Preparation Procedures.
- >Combination of the EREA Annual Event with ASD Aero-week.
- >Preparation of "Young Researchers Seminar".
- >Preparation of „EU Project Preparation seminar 2010".
- >Preparation of "EREA award 2010".
- >The website: maintenance and improvement; [erea@cira.it](mailto:erea@cira.it) is the mail address for asking the "publication" of anything on EREA.org webpage (Under the ES-Members Responsibility).
- >Preparation of „short lists" of Research Establishments young scientists to undertake supported stages in other EREA REs. For the sake of European mobility EREA organs should encourage and help young engineers in matching their professional interests and abilities with REs receiving policies.
- >2010 Year Event in Brussels is planned for the 2nd-3rd of December.
- >2011 spring Board Meeting is planned to take place in Bucharest.
- >Edition and printing of this EREA Spring 2010 Newsletter is realisation of the commitment of ILOT – Polish Institute of Aviation.



# ■ High lift, low noise airframe INCAS investigation for green regional aircraft

HiLoN project is dedicated to experimental investigation in INCAS Subsonic wind tunnel for efficient high lift systems with low noise characterization. The project is based on a Romanian national R&D program, with a direct link with INCAS participation in JTI - Clean Sky, Green Regional Aircraft ITD.

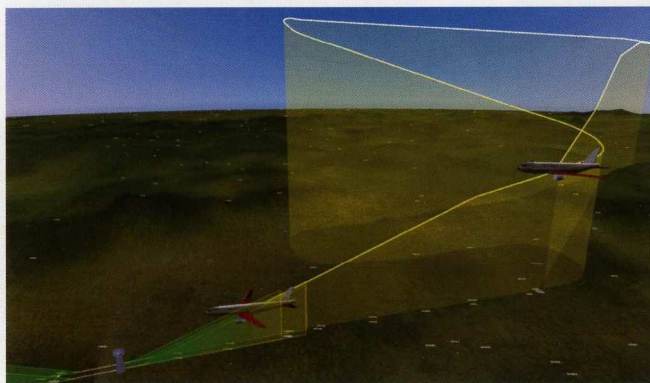
The airframe noise is an important noise source mainly for large aircraft in its landing/take-off configuration. Also, the level of noise produced just by the passage of an

airplane through the air, especially in its landing configuration, may only be a few decibels below the level of noise radiated from the engines. As a consequence, with respect to new designs for green aircraft, the main interest is for landing/take-off configurations and steep descent/climb manoeuvres with reduced noise emission.

The experimental investigation is based on existing capabilities in INCAS Subsonic Wind tunnel, where a new aero acoustic

virtual radar has been introduced. The system hardware is based on a microphone array with 72 highly sensitive elements and beam forming technology for signal analysis. Specific calibration with respect to the closed tunnel section, background noise and various reflections, has been performed. Model instrumentation is also used for equivalent theoretical evaluation of a new proposed metric for airframe noise, where CAA and URANS analysis are combined in a generic formulation.

## ■ Progress in aviation research - reduced noise and less environmental impact



One of the primary objectives of the aviation research team at the German Aerospace Center (Deutsches Zentrum für Luft und Raumfahrt; DLR) is to make flying quieter and to reduce its environmental impact. DLR came a step closer to this goal with the culmination of the FAGI (Future Air Ground Integration) project. In the future, a modified flight approach procedure with improved environmental credentials should help cut noise levels and save fuel. A noise reduction of between three and five decibels and fuel savings of up to 500 kilograms per landing can be achieved, provided that pilots have access to an environment-friendly approach path during landing. In approaches of this kind, known as CDAs (Continuous Descent Approaches), the aircraft descends continuously with engines idle - much like a glider - from its cruising altitude to final approach without interrupting its descent profile or applying more thrust. "This procedure demands a lot from the aircraft's systems because it must take important parameters such as flight pattern, altitude, airspeed and weather conditions into account," explains Alexander Kuenz, Project Manager at DLR's Institute of Flight Guidance in Braunschweig. CDAs are most efficient when the initial planning of arrival

times is undisturbed from additional air traffic controllers' directions during the descent. This is why these more environment-friendly landing procedures are only followed during off-peak times, for instance, late at night.

### **FAGI supports environment-friendly approaches even at peak times**

In the FAGI project, researchers at the DLR Institute of Flight Guidance in Braunschweig have been developing a concept which will simplify the work of air traffic controllers and will enable aircraft to take environment-friendly approach paths even at peak times. Aircraft with modern 4D equipment (three spatial dimensions plus time) are able to negotiate precise arrival times with the air traffic controller prior to commencement of the CDA and execute the agreed approach board-autonomously. The air traffic controllers may then focus on the aircraft that are not 4D capable and stack CDA approaches and final approaches accordingly. Highly developed assistance systems support them in this task. Planning is handled by a new kind of arrival manager developed as part of the FAGI project. This system continuously analyses the situation in 4D and makes proposals for the optimum

way to manage air traffic. During the entire approach, CDA aircraft do not receive any further instructions from air traffic control, leaving them free to fly in their optimum profile. Landing procedures of this kind depend firstly on precise and reliable navigation of the aircraft; this capability was verified during the project with a series of test flights. Interdisciplinary collaboration between the DLR Institutes of Flight Guidance and Communication and Navigation has examined the 4D management capability of the air traffic controller employed, in conjunction with ultra-precise modern satellite navigation systems.

### **Simulation test of the system**

The entire system was tested and evaluated during simulations with eight certified air traffic controllers from three countries in the course of a comprehensive simulation campaign. At DLR's facilities in Braunschweig, over the course of a one-hour trial, the entire volume of inbound aircraft to a passenger airport was simulated using a mix of conventional and CDA-capable aircraft. This trial employed the Future Aeronautical Communications Traffic Simulator (FACTS) data link simulator - a project of the DLR Institute of Communication and Navigation in Oberpfaffenhofen that implements a simulation system for radio communication in the aviation sector. This made it possible to investigate whether the performance of the radio system was adequate to facilitate the procedures developed in FAGI. "The assistance systems and the concept were well-received by the air traffic controllers, who found them helpful and easy-to-use. FAGI demonstrated that, assuming modern technology on board the aircraft and on the ground, landing can be accomplished quietly and with much less environmental impact, even at times of heavy air traffic," states Project Manager Kuenz. Now, at a time of rising air traffic volumes, the successful conclusion of FAGI is an important step towards the future of air travel.



# ■ Cooperation in aeronautics between European Union and Latin American countries



The CoopAIR-LA, funded by the EC through the Aeronautics and Air Transport theme of the 7th Framework Programme (FP7) and coordinated by INTA (Instituto Nacional de Técnica Aeroespacial), is an ambitious and innovative action supporting and fostering cooperation in Aeronautics between EU and Latin American countries (LA). It aims at deepening strategic RTD cooperation starting from what already exists in the multinational and multi-stakeholders community by identifying common interests and opportunities for cooperative RTD. It will target relevant participants (researchers, companies, policy makers, users) on RTD in Europe and LA. The best potential partners in Brazil, Mexico, Argentina and Chile will be identified through CoopAIR, to promote common actions on RTD, to collaborate in FP7 by including them in proposals as partners. To reach this objective, the consortium CoopAIR-LA will provide a report where the main Latin American actors and the most mature technologies

will be listed to allow European coordinators to find a competitive Brazilian, Mexican, Argentinean or Chilean partner in a specific area of expertise.

CoopAIR-LA, via Technology Watch, is mapping the Aeronautics and Air Transport Latin American market by identifying industries, universities, research centres and SMEs, and the aeronautics projects funded by European, US and Latin American research programmes as well. The project is also interviewing the coordinators and leaders of these projects to ensure that the participation of the Latin American identified partners count with enough quality to participate in the AAT FP7 consortiums. From a more strategic point of view, the report with actors and technologies will help the European Commission and Latin American authorities, if applicable, to set up the technological base to launch bilateral AAT Research Programmes EU-BR, EU-AR, EU-MX and EU-CL.

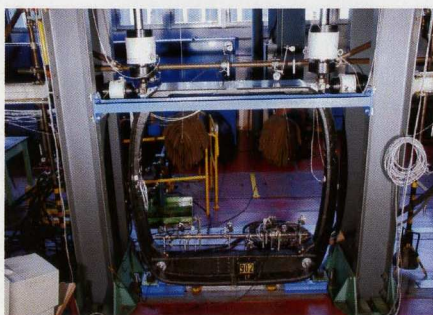
The consortium CoopAIR-LA comprises 9 partners from 7 different countries. It is coordinated by INTA and includes the main aircraft manufacturers from Europe and Latin America, such as Airbus or Embraer.



It also covers the institutional and research sides, along with GMV Portugal, the Polytechnic University of Madrid, ISDEFE (Spain), ILOT (Poland), the Ministry of Science and Productive Innovation of Argentina and the National Council for Science and Technology of Mexico.

**Partners:** INTA (Spain), ISDEFE (Spain), UPM (Spain), Airbus (France), Embraer (Brazil), GMV-SKYSOFT (Portugal), ILOT (Poland), MINCYT (Argentina), CONACYT (Mexico)

## ■ Testing of all-composite primary fuselage structure of small utility aircraft, performed at VZLÚ, a.s., Praha, Czech Republic



One of significant development programs at VZLÚ Praha, supported by Czech Ministry of Trade and Industry, is called „Application of advanced composite materials in primary fuselage structure of CS/FAR 23 class utility aircraft”. The main goal is to achieve good level of knowledge and experience in the development, testing, production and qualification of all-composite aircraft fuselage.

As a test article there was purposely selected middle part of the fuselage, which features as joining element of payload, wing and undercarriage loads. For the fuselage itself was used autoclave technology, for undercarriage beams was used RTM technology as „low cost alternative”. All composite applications used tested and qualified carbon fibre and epoxy resin. The fuselage structure was of sandwich type with foam core. Individual structural elements as cover panels, undercarriage beams or fuselage frames were separately tested for static and dynamic loads and environment effects. The technology of glued and combined joints was also developed and verified. Because of primary structure, NDT programme was developed and applied during the production and later in the testing and verification cycle. The fuselage section of the 3.8 metres length was fully tested for both static and dynamic

loads, based on selected operational cases. Second testing unit was used for fatigue tests, including of Damage Tolerance principles application.

**Final analysis demonstrated following features of full-composite fuselage, compared to its all-metal alternative:**

### **The all-composite structure:**

- is 20% lighter
- contains only 15 % of manufactured items
- has 16% less of labour content
- features 7% less cost

As a principle output of the program there is the readiness for the development of all-composite regional utility aircraft in national or international cooperation.