AEROVIEW

THE AEROAFRICA-EU NEWSLETTER

Promoting European and South African research cooperation in aeronautics and air transport

AEROAFRICA-EU

July 2011 Issue 2

AEROAFRICA-EU – AEROVIEW NEWSLETTER 2011

COOPERATION

The FP7 programme was launched in 2007 and span 7-years (2007-2013). Activity areas include green aircrafts, ecological production and maintenance, green air transport operations, time efficient air transport operations, passenger friendly cabin, aircraft safety, operational safety, aircraft operational cost, air transport system operational cost, breakthrough and emerging technologies, step changes in air transportation and promising pioneering ideas in air transport.

Within these activities, the work programme calls for proposals for research projects and coordination actions which answer one or several topics mainly in the following non-exhaustive list of technical domains where research "topics" are proposed: Flight physics; Aerostructures; Propulsion; Sustainable biofuels; Systems and equipment; Avionics; Design systems and tools; Production; Maintenance; Flight management; Airports; Human factors.

A new approach will be adopted for Work Programme 2012 (WP 2012), reflecting the new political context and the priority given to the Innovation Union. This new approach is based on focusing on major socio-economic challenges and responding to societal concerns. Based on the policy context, to achieve critical mass, leverage effect and EU added-value, the strategic research and innovation priorities for WP 2012 will focus on three major socio-economic challenges, namely: Eco-innovation; Safe and seamless mobility; Competitiveness through innovation.

For the period 2012-13, a multi-annual strategy is proposed focusing on the above new approach. Work Programmes 2012-13 will be the last ones of FP7 and a smooth transition towards FP8 should also be ensured, in particular via Work Programme 2013.

The next FP7 call for proposal will be issued in July 2011; all activities under the Aeronautics and Air Transport Call are open to researchers and research institutions from third countries.

Dr. Al Savvaris, Cranfield University, United Kingdom

Early beginnings

The first flight in South Africa was apparently performed in a glider by John Goodman Household in ~1871-75. John's mom was so concerned with his passion for flying and the risks to his life that she promptly burned all his glider plans and thereby effectively grounded him.

John Weston was the first aeronautical engineer in South Africa and he formed the Aeronautical Society of South Africa in 1911. He is quoted as saying "Never allow human conventionality to interfere with the dictates of your conscience"; in other words, ´do right and fear not´. Frenchman, Albert Kimmerling, made the first powered flight in South Africa in East London on 28 December 1909 over the Nahoon Racecourse. John Weston, was the first South African, to perform a powered flight in South Africa in a modified Farman flyer in Kimberley on 18 June 1911.

Genl Jan Smuts (one of the influential leaders during and after World War I) realised the value of aircraft and established the South African Air Force (SAAF) in 1921, making the SAAF one of the oldest Air Forces in the world. The imperial gift from the United Kingdom was Avro 504K's and De Havilland DH4's. They were assembled at the Artillery and Armaments depot in Pretoria, and stationed at Swartkop AFB. During the 1930's other aircraft such as the Westland Wapiti and the Hawker Hart (or Hartebees as it is locally known) were built.

Aircraft such as the De Havilland Vampire, Canadair Sabre, Allouette II, Canberra, Mirage III, Buccaneer and Hercules C130 were straightforward purchases in the 1950s and 1960s. In 1960 the emphasis moved towards building capability and aircraft such as the Aermachhi MB326 (Impala) and Mirage F1 were manufactured and assembled locally in South Africa. Both these aircraft were used as platforms to create the local industry in the late 60's and 70's from which Atlas Aircraft Corporation was established. The MB326 Mk1 was eventually fully industrialised and wholly manufactured in South Africa, including airframes, engines and gearboxes. This led on to establishing a design capability that produced the MB326K Mk2 armed single seat version. The re-assembly of the Mirage F1 also established the capability to carry out depot level servicing of engines and components.

The driver behind the process of backwards technology integration was the erstwhile government's goal of 'strategic independence' – in order to ensure access to advanced equipment, which was not readily accessible due to the international arms embargo. Simultaneously, large investments were made into R&D infrastructure, flight test ranges, and other test and evaluation capabilities.

The culmination of above approaches (R&D capability development and backwards technology integration) resulted in a number of advanced prototypes. Most prominent is the OVID (an all composite trainer aircraft), the Hummingbird (all composite surveillance aircraft), a NOTAR concept on the Allouette II helicopter, the Oryx Medium Transport Helicopter, the Alpha XH-1 prototype attack helicopter, the Rooivalk attack helicopter and the re-engineering of the Mirage F1 and Cheetah fighters with the Russian Klimov RD33 engines. These ambitious programmes, helped to cultivate an innovative, and solutions based approach. It also helped to develop a strong systems level capability – for integration, upgrade or life extension programmes.

In the early 1990's the military aerospace sector in South Africa underwent a radical change. The requirement for local weapon systems and capabilities disappeared with the end of the `Border War´. Besides the fact that the local market disappeared virtually overnight, South African companies had to compete with large multinationals on home soil – sanctions were removed and South Africa embarked on a massive recapitalisation programme – known as the Strategic Defence Packages (SDP) of 1999. The

~R30 billion package (in 1999 value) contained strict requirements for local defence industry participation (DIP) and National Industry Participation (NIP) with multipliers for increased technology based activities and contracts to historically disadvantaged persons. However, despite the strict counter trade requirements, there was no national technology strategy from which any guidelines could be derived for the specific counter trade technologies, resulting in an uncoordinated transfer of technology. Despite this, a number of South African firms were able to capitalise on the countertrade opportunities and became part in the global manufacturing and product development network.

Aerosud is one of the leading entities in this regard, its strategy was not to tie in with specific Defence Package work, but rather become involved in long term sustainable manufacturing products. It is approaching 1 million components per annum – which are not all small components. Aerosud manufactures the interior linings, panels and wingtips for the A400M and Denel-Saab Aerostructures manufactures the wing-to-fuselage fairing and topshells of the A400M.

Besides the successful integration of the South African industry into the global supply chain, South African engineers and researchers are also active participants in a number of EU projects – as defined in the following table.

South African participation in EU Aeronautics Research Projects

EU project	Aim	SA participation and lead researchers	SA contribution
ALFA-BIRD FP7	*To investigate and develop the use of alternative fuels in aeronautics*	*SASOL*	*Providing fuel (coal-to-liquid) for qualification and certification test on civil aircraft*
FANTASIA FP6	*To develop Flexible and Near-net-shape Generative Manufacturing Chains and Repair Techniques for Complex-shaped Aero-engine Parts*	*CSIR, NLC (Francois Prinsloo)*	
FFAST FP7	*Future Fast Aeroelastic Simulation Technologies – development of numerical techniques to accelerate future aircraft design, through advanced loads processes and calculations*	*CSIR Aeronautics (Dr. Arnaud Malan, Louw van Zyl) University of Cape Town (Dr. Arnaud Malan)*	*To extend the capability of reduced-order-methods (ROM) in aeroelasticity – through the use of a non-linear, fluid structure interaction aeroelastic modeling numerical code*
FUTURE FP7	*To develop, validate and improve the current state of the art tools for prediction of turbine blade flutter*	*CSIR Aeronautics (Glen Snedden) Stellenbosch University (Johan van der Spuy)*	*Design, manufacture and integrate a flutter excitation system for the transonic compressor rig at TU Darmstadt*
NOVEMOR FP7	*Design and validation of tools for the greening of aircraft via morphing devices*	*CSIR, Aeronautics (Dr. Bennie Broughton)*	*Wind tunnel model design and testing of a morphing wing*
VITAL FP6	*Environmentally Friendly Aero-Engine technologies for low-pressure system improvements to reduce CO_2 and noises*	*CSIR, Aeronautics (Glen Snedden)*	*Experimental and CFD analysis of non-axisymmetric endwall contouring in the presence of unsteady effects*

Beeuwen Gerryts, Assistant National Contact Point for Aeronautics and Air Transport, South Africa, with inputs from Rob Jonkers, D

The (South) African Aeronautics and Air Transport Landscape

South African participation in EU Aeronautics Research Projects

At government level, the aerospace sector is recognised as a strategic sector that holds potential for long term benefits and as a driver for the investment in advanced manufacturing technologies. A number of aerospace related programmes are supported and funded from this level. Some examples include the dti's Aerospace Industry Support Initiative (AISI), the establishment of the Centurion Aerospace Village, the advanced manufacturing technology strategy, Titanium Centre of Competence and a national Unmanned Aircraft Systems programme that will help to position South Africa in this rapidly growing market segment.

South Africa's long history of aeronautical activities, its emphasis on innovation, flexibility and ability for complex problem solving contributes towards its ability to deliver niche products, and to be in 4th position (of the ICPC countries) in terms of EU FP participation. Going into the future, the South African aerospace sector would like increase its partnering activities – on the R&T and production domains, and thereby continue to help advance the global state of aerospace.

Introduction/Overview

Results from Mapping Exercise

Successful partnerships and collaborations result from a "knowledge" of the expertise, skills, capabilities and resources of the partners, on identifying areas of mutual interest and benefit, and the identification and leveraging of enablers to facilitate and promote relationships. Numerous aeronautics initiatives exist between EU and SA organisations. Discussions between EU and SA representatives have yielded a number of topic areas of mutual interest that could potentially lead to increased cooperation between the EU and SA. Collation and analysis of the various interactions between EU and SA (African) partners in the governmental, research and private sectors is essential to supporting and maximising efforts to develop and enhance collaborative relationships between EU and SA/African researchers and institutions, so as to facilitate the exchange of ideas and knowledge, lead to the creation of programmes directed at solving challenges with global significance or that mutually impact on the participants, and nurture the development of scientific excellence.

Various interactions between the EU and SA (and African) partners in all sectors were collated and analysed in the following categories:

- R&D competences in the SA governmental, research and private sectors, and similarly in other African countries
- Collaborations such as Framework Programme projects, bilateral initiatives etc.
- The „enabling environment", which includes co-operation and legislative frameworks, as well as an overview of respective research, aeronautics and air transport policies
- Specific South African R&D strengths or comparative advan-tages
- Political, economic or development co-operation imperatives
- Funding mechanisms.

Air Traffic Management

Increasing time efficiency

A step-change in aviation Air Traffic management (ATM) systems and procedures is vital to accommodate the projected growth of three times more aircraft movements over the next 3-5 years and thereby improving punctuality in all weather conditions and reducing significantly the time spent in travel-related procedures at airports while maintaining safety. Research into new innovative Air Traffic Management (ATM) systems within the context of the Single European Sky Air traffic research System (SESAR) initiative is therefore of paramount importance. Integrating air, ground and space components, together with traffic flow management and systems aimed at more aircraft autonomy are of significance and need to be addressed. Likewise design aspects of aircraft to improve handling of passengers and cargo, novel solutions for efficient airport use and connecting air transport to the overall transport system will also be addressed.

This research theme corresponds to the Highly Time-Efficient High Level Target Concept in ACARE's research agenda. It aims to produce a significant reduction in journey time through maintaining flight times within schedule and minimising the time that passengers have to spend in airports whilst travelling.

South African R&D entities:

Air Traffic and Navigation Service (ATNS), Council for Scientific and Industrial Research (CSIR), SAAB Avitronics (SAAB Avi), Tellumat.

Aircraft Design

Improving cost efficiency

Fostering a competitive supply chain able to halve the time-to-market, and reduce product development and operational costs, will result in more affordable transport for all citizens. Research will focus on improvements to the whole business process from conceptual design to product development, manufacturing and in-service operations, including the integration of the supply chain. This theme embraces all the costs arising in the design and operation of the whole air system and mirrors the Highly Cost Efficient High Level Target in ACARE's Strategic Research Agenda. It will address the tools and technologies required to enhance the whole enterprise process. It will include both the developments needed to deliver zero-maintenance aircraft, as well as ‚lean' airport, aircraft and air traffic management operations to give a substantial reduction in operating costs.

South Africa has the following topics of interest:

- Aerodynamics and aircraft design, optimisation
- Design and manufacturing
- Flight testing

South African R&D entities:

Aerotechnic, Aerosud, Council for Scientific and Industrial Research (CSIR), Denel Aerostructures, Diomedes Innovations (Pty) Ltd, Finite Element Analysis Services (FEAS), Jonker Sailplanes CC, Overberg Test Range/Baan (OTB), Robin Coss Aviation, University of Cape Town (UCT), University of Pretoria (UP), University of the Witwatersrand (WITS), University of Johannesburg.

Environment

Greening of air transport

The greening of air transport means developing technologies to reduce the environmental impact of aviation with the aim of halving the amount of carbon dioxide (CO_2) emitted by air transport, cutting specific emissions of nitrogen oxides (NO_x) by 80 % and halving perceived noise. The targets reflect the Ultra Green High Level Target Concepts developed by the Advisory Council for Aeronautical Research in Europe (ACARE) in its strategic research agenda. Reducing soot, water vapour and particulates emissions will also be tackled.

The research will address green engine technologies, alternative fuels, novel aircraft/engine configurations, intelligent low-weight structures, improved aerodynamic efficiency, airport operations and air traffic management as well as manufacturing and recycling processes.

The ‚Clean Sky' Joint Technology Initiative will bring together European R&D stakeholders to develop ‚green' air vehicle design, engines and systems aimed at minimising the environmental impact of future air transport systems.

South Africa has the following topics of interest:

- Low emissions combustions
- Noise control
- Service and network design
- Sustainable and green engines

South African R&D entities:

CSIR National Metrology Institute of South Africa (NMISA), University of Cape Town (UCT), University of the Witwatersrand (WITS), SASOL.

Innovative Design and Manufacturing

Pioneering the air transport of the future

Europe's ambitions in future aeronautics were described in the ‚Vision 2020' report and the EU's Transport White Paper which form the basis of ACARE's Strategic Research Agenda. This research theme stretches the Vision 2020 horizon to explore and pioneer the more radical, revolutionary, environmentally efficient and innovative technologies that might configure the step changes required in the air transport of the second half of this century.

Research will address aspects such as new propulsion and lifting concepts, new forms of guidance and control, new ideas for the interior space of airborne vehicles, new airport concepts – including the concept of off-shore air stations, alternative concepts of air transport system operation – including personal transport systems and the use of urban-space, and its integration with other transport modes. This area will pioneer the air transport of the future addressing the longer term challenges of aviation with accessible and innovative combinations of technologies which will lead to significant steps forward in air transport.

South Africa has the following topics of interest:

- Composite materials
- Light metals and metals processing
- Nano technologies
- Rapid prototyping and direct manufacturing
- Smart composites and smart materials

South African R&D entities:

AAT Composites (Pty) Ltd, Aerosud, African NDT Centre (Pty) Ltd, Advanced Technologies and Engineering (ATE), Cape Peninsula University of Technology (Adaptronics AMTL), Central University of Technology, Centre of Excellence in Strong Materials, Council for Scientific and Industrial Research, Element Six (Pty) Ltd, Jonker Sailplanes CC, National Metrology Institute of South Africa, Nelson Mandela Metropolitan University, South African Airways Technical, Stellenbosch University , University of Cape Town, University of Johannesburg, University of Limpopo, University of the Witwatersrand.

Safety

Ensuring customer satisfaction and safety

Improving air transport safety and security means ensuring that irrespective of the growth of air traffic, there will be fewer accidents and aircraft will be more secure against hostile actions.

Under the Seventh Framework Programme (FP7), research under this theme will seek to attain quantum leaps in passenger choice and schedule flexibility, while achieving a five-fold reduction in accident rate. New technologies will enable a wider choice of aircraft/engine configurations ranging from very large, wide-body airliners, medium size craft, business jets, tilt-rotor aircraft to personal small-size vehicles with the highest levels of safety as well as comfort, health conditions and services. Research will include the adaptation of airport and air traffic operations to 24-hour utilisation ay acceptable community noise levels.

This theme relates to the ‚Highly Customer-Orientated High Level Target Concept' of ACARE's Strategic Research Agenda, in particular focusing on the safety objective.

South Africa has the following topics of interest:

- Accident research
- Automatic onboard conflict recognition
- Autonomous flight
- Communications, navigation and surveillance (CNS)
- Controller pilot data link communication (CPDLC)
- Integrated surveillance systems

South African R&D entities:

African Astronautics (Afrinautics), Advanced Technologies and Engineering (ATE), Cape Peninsula University of Technology (CPUT), Citijet Air Charter (Pty) Ltd Hyperspectral Aviation (Citijet), Council for Scientific and Industrial Research (CSIR), Denel Dynamics, Elmer Group, SRS Aviation, Stellenbosch University (SUN), University of the Witwatersrand (WITS), Tellumat.

Security

Protection of aircraft and passengers

Research in this theme will be aimed at enhancing protection measures including preventing hostile action and aircraft misuse. Topics will include security measures in the cabin and cockpit designs and automatic control, as well as security aspects of airspace management and airport operations.

The aim is to make a successful attack of any kind on an aircraft causing injury, loss, damage or disruption to travellers or other citizens impossible. This research theme will address aircraft security systems including cockpit and cabin monitoring and protection, as well as controlled aircraft operation and landing from the ground, secured airspace management and communication networks, as well as airport security systems. Protection of aircraft and passengers is paramount and the systems will include improved data and identification methods, auto recovery and improved security design of aircraft. The theme corresponds to ACARE's Ultra Secure Air Transport System High Level Target Concept.

South Africa has the following topics of interest:

- Communication
- Contraband detection
- Data links

South African R&D entities:

Advanced Technologies and Engineering (ATE), African Astronautics (Afrinautics), African Defence Systems (ADS), ANSYS, Cobham Satcom, Incomar, Mechem, Radiant Antennas, Reutech Radar Systems (RRS), SAAB Avitronics (SAAB Avi), Stellenbosch University (SUN), Tellumat.

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Aeronautics and Air Transport Landscape in Africa

Egypt, a new sun rising

Egypt has had its Aerospace Engineering Department established in 1938 in Cairo University. During its first thirty years, the department graduated Engineers who were capable of developing the Egyptian Aerospace Industry. That development was manifested in the production of two jet aircraft: Kahera 200, a trainer aircraft, Kahera 300, a supersonic fighter, and „Kaher" and „Zafer" medium range ballistic missiles.

During that Period, the department has also graduated scientists who were recognized internationally, such as Maher Bessmar-Nasr and Raouf Ibrahim.

For the past 4 decades, the geopolitical conditions have prevented Egypt from using its full potential in the Aerospace industry.

However, after the 25th of January revolution and the international support for the Egyptian people to reach their full potential, the Aerospace Engineering Department is developing plans to restore its scientific and industrial role according to the new worldwide conditions.

The Aerospace Engineering Department is currently preparing 4 programs for bachelor of engineering: General, Aircraft Design, Space Design, and Aircraft Maintenance. Meanwhile, the department was granted more than 10 M Egyptian pounds ($1.6 M) from the Egyptian government to develop its laboratories over the next two years.

We are currently seeking cooperation with the African Countries in the fields of small Aircraft design and manufacturing with the cooperation of the EU. Also, we are currently developing a nano-satellite project with Japanese partners.

I wish that the new Egyptian Sun rising will be with a full cooperation with the African and European neighbours as that sun will deliver light and power to the south and the north equally.

Mohammad Tawfik AboElSooud

Mohammad Tawfik AboElSooud is an Assistant Professor at the Aerospace Engineering Department, Faculty of Engineering, Cairo University, Giza, Cairo, Egypt. He obtained his PhD and MSc from the Department of Mechanical Engineering at the University of Maryland, USA, his MSc from the Department of Aerospace Engineering, Old Dominion University in Norfolk, USA and a Graduate Diploma in Computer Science as well as his BSc in Aerospace Engineering from Cairo University, Egypt.

Kenya

Kenya has an active air transport industry, with the flag carrier Kenya Airways being the most recognisable brand. There are over seventy licensed aircraft operators in the country. Statistics on the total number of licensed aircraft were not readily available.

The industry has a vibrant aircraft maintenance branch, though this mainly specialises in light aircraft. Kenya Airways however performs light and heavy maintenance on the 737 type of aircraft.

There are two institutions of higher learning in Kenya which offer Aeronautics and air transport related programs, namely Kenya Polytechnic University College and Moi University. Both institutions have the capacity to do research in Aeronautical and air transport related subjects. Jomo Kenyatta University of Agriculture and Technology (JKUAT) and the University of Nairobi (UoN), through their Departments of Mechanical and Mechatronic Engineering also have the capacity to do research in areas related to aerodynamics and aircraft instrumentation. The Department of Mechanical Engineering at UoN has well equipped Fluid Dynamics laboratories with low velocity and high velocity wind tunnels.

At national level, there are no institutions that are involved in Aeronautical and Air Transport research. The Kenya Civil Aviation Authority and Kenya Airports Authorities are regulatory bodies only. There is also the Aircraft Accident Investigation branch of the Ministry of Transport that deals solely with investigating aircraft incidents and accidents.

Being a developing country, Kenya requires a lot of capacity building in this area. It is through research initiatives from learning institutions that relevant bodies can be given a wake-up call on the importance of the sector. Through the Ministry of Higher Education, Science and Technology (MOHEST), education and research in Aeronautics has now been prioritized and is receiving enough attention. Currently, the key research priority areas are in Maintenance execution and management, Flight Management and Human factors in air transport, with the aim of improving the safety track record and opening up new frontiers of operations and research in Aeronautics and air transport.

Anthony Kariuki Muchiri

Anthony Kariuki Muchiri is a Masters degree holder from the Delft University of Education, where he studied Aerospace Engineering where he graduated in 2002. He is currently working as a lecturer at the Jomo Kenyatta University of Agriculture and Technology. He is also undertaking a PhD in Maintenance Engineering and Management the same university. He has published papers in the area of aircraft maintenance optimization. His interests lie mainly in new trends in Aeronautical Engineering and maintenance activities in developing nations.

Dr. Tarek Lazghab is Assistant Professor at the Preparatory Institute for Engineering Studies El-Manar, Tunis in Tunisia. He obtained his PhD in Mechanical Engineering from Florida International University, Miami. His research interests include fatigue of metals, fatigue mitigation of aerostructures, Finite element modelling, composite materials, structural and design optimization and constitutive modelling.

Tunisia

Tunisia is among the „emerging" countries around the Mediterranean and has been for several years one of the fastest growing countries in terms of industrial activity. This growth has been fueled by Tunisia's strategic location, incentives and support for industrial investment, high quality of its college graduates and trainees and the competitiveness of its human resources.

It is the will of the Tunisian authorities in concert with aeronautics manufacturers and GITAS to work towards further development of the aerospace industry in Tunisia.

The aeronautics and space industry in Tunisia is represented by GITAS (Tunisian Aeronautics and Space Industrial Group) whose objectives include developing a Tunisian aeronautics supply chain, acting as an industry representative in the Tunisian government and promoting an environment favorable for creation of new companies in the domain.

Dr. Tarek Lazghab

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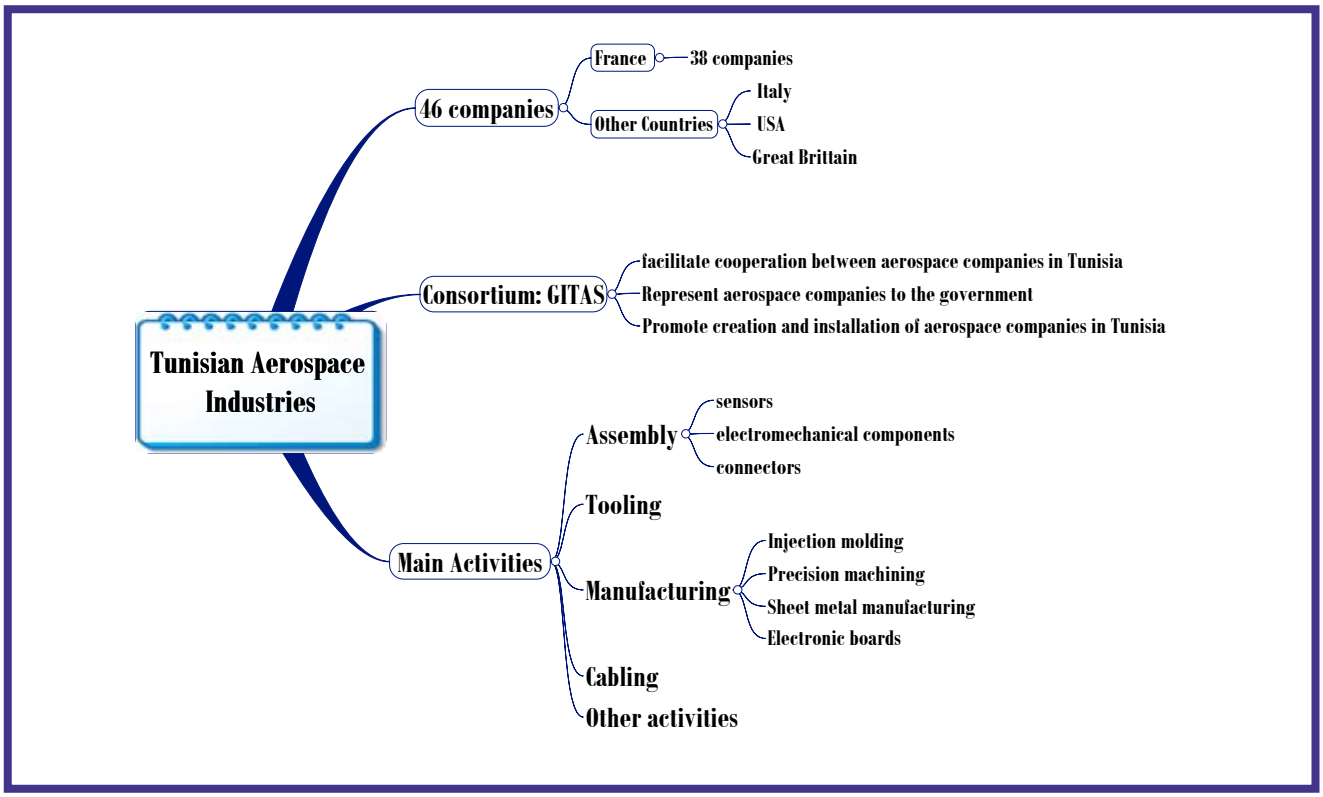
Overview of the Tunisian Aeronautics and Air Transport Landscape



Uganda

Towards introducing aeronautic and space transport in Mbarara University of Science and Technology

Aeronautics and space transport are not adequately covered in the national curriculum structure in the Ugandan education system. As a result of this, research in aeronautics and air transport is not well established in Uganda, although this is vital for the aviation industry. The national budget for many years has no vote particularly for aeronautical studies and space science research in general, yet such research endeavours are capital resource intensive in terms facilities and equipment. In addition, Government grants to higher institution of learning may not be adequate for research in aeronautics and space transport. This poses an impasse to the design and management of ambitious projects in these areas.

The Government of Uganda now has new education policy plans geared towards popularizing and developing science and technology for national economic and human resource management. This has resulted in the creation new science-oriented schools and universities as well as implementation of structural changes in the existing institutions in an effort to popularize and further develop the culture of science and technology in the country. Mbarara University of Science and Technology was therefore established by act of parliament in 1989 to address the shortage of the professional and technical expertise the country needs for technological development.

Mbarara university of science and technology is therefore best situated to spearhead the introduction of aeronautic and air transport studies in Uganda. Following the successful introduction of space physics and Astrophysics studies at both undergraduate and postgraduate level, Aeronautic and Air transport studies is at the embryonic stage in Mbarara university of Science and Technology. Our immediate plan is the development of human resource that is needed for the establishment research in Aeronautics and Space transport. This will be done through training of postgraduate student who have expressed interest in aeronautic studies, participation in regional and international conferences in aeronautics, as well as collaboration with some of the government development partners, like South Africa, who have well developed research and facilities for research in aeronautic and air transport. It is our expectation that this will have a spin-off effect on other higher institutions of learning, and consequently result in the establishment of research facilities in aeronautics for the country.

Dr. Edward Jurua

Dr. Edward Jurua, Head of the Physics Department of the Mbarara University of Science and Technology, holds degrees in physics from the University of the Free State (PhD, MSc), University of Cape Town (Bsc Honours (Postgraduate)), Makerere University (Bsc (Hons)) and National Teachers College, Muni (Dip. Education). His research interests are Space Physics (Global Satellite Navigation Systems Applications in Communication Navigation and Positioning) and Astrophysics (Stallar Evolution; Magneto-hydrodynamic Instabilities in Accretion Discs is Close Binary systems Aeronautic and Space Transport).

People

Aerospace Engineering is a global industry and community reflecting the global nature of its market. And there is rich exchange of people and culture within that community. An example of this exchange is given by the profiles of four native Africans who have charted international careers in Aerospace spanning southern African and Europe.

Dr. Trevor M. Young, born 1959 in South Africa.

Growing up on the outskirts of Johannesburg, Trevor had a passionate interest in aviation, exploring the delights (and dangers) of skydiving and gliding at a young age. He matriculated from King Edwards VII School (KES), Johannesburg, in 1976. Following a two-year conscription, he studied aeronautical engineering at the University of the Witwatersrand, Johannesburg. His final year project was conducted at the CSIR, Pretoria. His early engineering training involved the servicing of Alouette and Puma helicopters at Denel Aviation (then Atlas Aircraft Corporation); this was followed by short stints in Switzerland and Israel. In November 1985, he returned to Johannesburg to work as a Project Engineer at Denel, responsible for the design of replacement ventral fins for the Dassault Mirage F1. He then led several projects, including a feasibility study to upgrade the Mirage F1.

In 1987/1988, he studied Aerospace Vehicle Design (MSc) at Cranfield University, UK. Returning to Denel, he worked as a Design Leader in the Future Aircraft Projects group. This included a period as Project Engineer for Denel on the innovative CSIR/Denel Ovid technology demonstrator. One of the more interesting tasks was the qualification of the crew egress system on the Denel Rooivalk helicopter.

In May 1991, he was appointed Technical Manager at Advanced Aeronautics Ltd (now defunct), a manufacturing and consulting enterprise with facilities in Pretoria and later Shannon, Ireland. On the demise of the company in 1993 – resulting from an ill-advised venture into general aviation – Trevor joined the University of Limerick, to assist in the establishment of the first BEng degree in Aeronautical Engineering in the Republic of Ireland.

Over the past 18 years, he has held several positions at the university, including Course Director and Head of Department. He currently teaches Aircraft Design (BEng), Flight Mechanics (BEng) and Fleet Planning (MBA). He is actively involved in applied aerospace research and has been the recipient of five EU Framework research grants and numerous State and industry research awards. He has published over 50 technical papers, two books on technical writing and five book chapters. He holds a Private Pilots Licence (PPL), flies regularly, and has recently completed the construction of a two-seat kit aeroplane (SportCruiser).

The 11th day of August in the year 1960, in Lourenço Marques, Mozambique, must have been a beautiful sunny day; most days are in a tropical paradise. The early years would best be described as uneventful, spent in a cocoon of blissful ignorance. However, this status quo was to end with the political and social upheaval during the post-colonial era.
In my pursuit of excellence in education, the highway of life has since meandered through Portugal, where I have re-planted my roots; England, where I spent eight wonderful formative years; and Canada, where in British Columbia I have finally found a beautiful home away from home. Each station has most certainly provided me with a platform for further growth in knowledge, understanding and wisdom.

I obtained my BSc (Honours, 1984) and MSc (1986) in Aeronautical Engineering from Imperial College, University of London in the UK, followed by a PhD in Space Dynamics in 1992 from the University of British Columbia, Canada. Following the completion of the PhD, I attended the International Space University and completed the Advanced Space Studies Program in Japan in the summer of 1992.

Next, I was awarded the National Academy of Sciences/National Research Council Fellowship in the USA for a period of two years (1992-1994) to further my research in Advanced Aerospace Structures at Wright-Patterson AFB, U.S. Air Force. In 1995, I joined the Faculty of Engineering at Instituto Superior Tecnico in the Aerospace Program in Portugal, and currently I am an adjunct professor and a principal investigator at the Instituto de Engenharia Mecanica.

In Canada, I am a Professor in the Department of Mechanical Engineering at the University of Victoria where I have also served as Associate Dean Research (2005-2009) and Associate Vice-President Research (2009-2010). For the past ten years, I have been a national delegate at both the United Nations Committee on Peaceful Uses of Outer Space (UN-COPUOS) and NATO Research and Technology Organization Applied Vehicle Technology (AVT-RTO), a member of Aeronautics and Space Advisory Council in Portugal, Associate Fellow of the American Institute of Aeronautics and Astronautics, a member of the Canadian Aeronautics and Space Institute, and a member of the AIAA Multidisciplinary Design Optimization Technical Committee, and chaired numerous engineering conferences and committees. More recently, I have been appointed as a national delegate at the EU CleanSky Programme.

Professor Afzal Suleman, born 1960 in Mozambique.

Professor Mark Lowenberg, born in South Africa.

At the time that I entered high school in Durban, where I grew up, I knew that I wanted to be an aeronautical engineer. I had always had a passion for aviation, enjoyed as many local air shows as I could get to, and had been awestruck by the newspaper and radio reports on the Apollo missions to the moon – there was no TV in South Africa in that era.

The University of Natal in Durban did not offer an aero course, so I went to Wits (University of the Witwatersrand, in Johannesburg) in 1978 to study for a BSc Eng (Mech, Aero Option). The standards were extremely high and, once I'd realized how much effort was needed to succeed in such a degree, I completed it and went on to work at the Council for Scientific and Industrial Research (CSIR) in Pretoria. Just as Wits provided me with a solid education, so the CSIR opened my eyes to the exciting range of opportunities in aeronautical research. It was there that I was introduced to nonlinear flight dynamics and was given enormous scope and encouragement to develop my own activities in this area … a topic of research in which I remain active to this day. I was able to work with many first-rate researchers and even to dabble in project management.

In 1987 I moved to an academic role back at Wits. I was privileged to be part of the educational enterprise, teaching several cohorts of excellent students – many of whom are now in senior positions in aerospace in South Africa and abroad. I was given plenty opportunity to both broaden and deepen my research experience, and completed an MSc that I had started at the CSIR.

At the end of 1992 I was offered a lecturer position in the University of Bristol in the UK. Once again I had been fortunate – this time to be a part of the much larger aerospace enterprise in the UK, and in a region with one of the biggest concentrations of aerospace activity in Europe. I did a part-time PhD at Bristol and have been here for over 18 years now. During this time, I have been lucky enough to engage in a vast number of exciting research and educational initiatives. Many of these have involved collaboration with industry and other universities, including European projects: EU Framework projects and GARTEUR (Group for Aerospace Research and Technology in Europe) activities. Networking with others in Europe and beyond provides new dimensions to one's research and, often, further opportunities for follow-on projects. The fact that South African organizations can participate in Framework 7 initiatives is of enormous potential benefit to the aerospace research community in that country; colleagues in my department at Bristol are in fact coordinating such a project in which the CSIR is a partner.

I was privileged to be a keynote speaker at the International Aerospace Symposium of South Africa (IASSA) in October 2010. There, and at a seminar on Aerospace Partnership Opportunities in South Africa run by the SA High Commission in Bristol in 2008, I was very encouraged to learn of the South African government's vision for aerospace as a priority sector in its economy and its strategies to support its growth. This should lead to further partnering with overseas entities and enable future generations of young South Africans to be enticed into the fascinating world of aerospace.

Dr. James F. Whidborne, born in Zimbabwe.

I was born and raised in Rhodesia (later Zimbabwe), in the small city of Gweru where my father worked as a civil engineer. The city is home to one of the main airforce bases, however my experience with aeronautics as a youth was restricted to flying with the local gliding club. After doing well at school, I was fortunate enough to win a scholarship to Cambridge University to read engineering. At Cambridge, I became very interested in computing and in the mathematics and abstract ideas of feedback control. Subsequently I spent a few years working in the software industry in the United Kingdom to save enough money to finance an MSc and then a PhD in control systems at UMIST (which is now incorporated into the University of Manchester).

My doctoral work was on some aspects of control theory and computation. However, I did test the theory on some simplified flight control problems. I then spent three years as a post doctoral researcher at Leicester University where I had some exposure to the ground-breaking work done by Ian Postlethwaite and his team on the application of H-infinity optimal control to rotorcraft flight control. The deteriorating economic situation in Zimbabwe meant that there was little prospects for me to return there, and I decided to attempt an academic career in the UK. This lead me to a lectureship at King's College London, where I was placed in the mechatronics research group, with not a lot of chance to work on flight control. However, King's College London had some extremely talented people working in the fluid dynamics area. So one of the problems I tackled was that of delaying the transition to turbulence in flows by means of feedback, and it was with this work that I discovered the joys and tribulations of inter-disciplinary research. Our success in this area evidently reached Cranfield University, as I was invited to apply for a position in the Flight Dynamics and Control Group.

I joined Cranfield in 2004 and was immediately working with some of the very best flight dynamicists, Mike Cook and Alastair Cooke, on various challenging flight control problems. With a background in control theory, my naivety about real flight was sometimes exposed. However, as a team, we have tackled some extremely interesting and sometimes very hard problems. These include autonomous soaring, close flight formation, automated air-to-air refuelling and collision avoidance amongst others. My collaborative work in fluid flow control has also continued, and recently we have also been looking at control problems in oilwell drilling – some of the results we recently presented at a conference in Cape Town.

The opportunities in Europe are tremendous, and the challenges often very different to those in Southern Africa. However, the burgeoning UAV industry, with its much lower capital requirements means that there may be more opportunities in Africa for applying advanced control to aerospace problems. One of the very positive applications for UAVs is for wildlife monitoring and conservation. That combined with an airspace that is not overcrowded gives me hope for a future in UAV applications in Southern Africa.

Project Success Stories – Research featuring South African partners in the field of Aeronautics and Air Transport

VITAL – EnVIronmenTALly Friendly Aero Engine

VITAL will provide a breakthrough in low noise and low emission engine architectures. This breakthrough will be achieved by developing and validating novel light weight and low noise technologies for commercial aircraft engines and thus provides a key step towards achieving the ACARE environmental goals in terms of CO_2 and noise.

VITAL will design, manufacture and rig test the critical technologies required to achieve this goal: low noise and low weight fan technologies and architectures (direct drive turbo fan and contra-rotating turbo fan), low weight structures for very high bypass ratio engines, more efficient low pressure turbo machinery, advanced low pressure torque shaft and overall engine installation. To complement these technological advances VITAL will provide a techno-economic and environmental risk assessment and accompanying optimiser tool for measuring the impact of engines on the environment as well as their economic impact and make this tool available to all stakeholders via a dissemination activity.

VITAL will also take-up the results of on-going research programmes in the field of noise and emissions and will deliver a fully validated, novel technology base together with the roadmap to enable a 20 % reduction in CO_2 emissions and a 6dB reduction in aircraft engine noise (per certification point) and hence contribute to the full realisation of the ACARE goals by 2020.

VITAL will achieve this technology breakthrough by bringing together 53 actors from the European and South African aero-engine industry, including the Council for Scientific and Industrial Research CSIR in South Africa, made up of the leading engine manufacturers, the engine-industry supply chain, key European research institutes and SMEs with specific expertise. The advance and benefits that

VITAL will bring to Europe at large in terms of more efficient and environmental-friendly air transport will be disseminated throughout the project to all stakeholders.

http://cordis.europa.eu

FANTASIA – Flexible and near-net-shape generative manufacturing chains and repair techniques for complex shaped aero engine parts

The aim of the FANTASIA project is to develop new flexible and near-net-shape additive manufacturing chains and repair techniques using laser metal deposition (LMD) and direct laser forming (DLF) processes. The starting point for both processes is a 3-dimensional CAD model, which is subdivided into layers of a defined thickness. The part is generated by a repeating process of applying new material layers and transferring the geometrical information of each layer into the material using a laser beam. The most important difference between LMD and DLF is the provision of the powder material. For LMD the powder material is locally supplied by a powder feeding nozzle (coaxial or off-axial), while for DLF the part is fabricated in a "powder bed". These techniques, in combination with conventional manufacturing processes, offer the possibility to realise a breakthrough in the manufacturing of aero-engine parts. The FANTASIA consortium, comprising 18 partners (11 industry, 7 R&D) from 8 countries, including the Council for Scientific and Industrial Research CSIR in South Africa, will make a crucial contribution to this overall aim. In particular the following potential can be achieved:

1. New design possibilities using the nearly unlimited geometrical freedom of DLF
2. Decrease in time and efforts in the whole life cycle of a part: starting with the design and/or redesign phase, subsequent manufacturing and the repair phase
3. Savings in production and raw material costs due to reduced time effort and raw material quantity to be used in additive manufacturing

The following topics will be addressed in this presentation:

1. Modelling of the LMD process
2. Equipment for LMD and DLF processes, such as processing heads including powder feeding devices and preheating equipment for LMD and DLF.
3. LMD and DLF process development for titanium alloys, nickel base alloys and TiAl intermetallics
4. Metallurgical evaluation of the processed samples and parts and investigation of the mechanical properties

These basic results are used for the development of repair and manufacturing strategies for various aero engine parts. Some examples of these parts will be also addressed in this presentation.

Dr. Konrad Wissenbach, Fraunhofer ILT
www.fantasia.aero

FFAST – Future Fast Aeroelastic Simulation Technologies

The FFAST project aims to develop, implement and assess simulation technologies to accelerate future aircraft design. These technologies will demonstrate a step change in the efficiency and accuracy of the dynamic aeroelastic "loads process" using unique critical load identification methods and reduced order modelling. The outcome from the project will contribute to the industrial need to reduce the number of dynamic loads cases analysed, whilst increasing the accuracy and reducing the cost/time for each unsteady aeroelastic analysis performed compared to the current approach.

Unsteady loads calculations play an important part across much of the design and development of an aircraft, and have an impact upon the concept and detailed structural design, aerodynamic characteristics, weight, flight control system design, control surface design, performance, etc. They determine the most extreme stress levels and estimate fatigue damage and damage tolerance for a particular design. For this purpose, loads cases due to dynamic gusts and manoeuvres are applied to detailed structural models during the design phase.

The flight conditions and manoeuvres, which provide the largest aircraft loads, are not known a priori. Therefore the aerodynamic and inertial forces are calculated at a large number of conditions to give an estimate of the maximum loads, and hence stresses, that the structure of the detailed aircraft design will experience in service. Furthermore these analyses have to be repeated every time that there is an update in the aircraft structure. Within the modern civil airframe industry, each of these loads calculation cycles requires more than 6 weeks. This long lead time, together with the multiple times this calculation procedure needs to take place, has a detrimental effect on cost and time to market.

This discussion of the number of critical loads cases raises two main points. First, the replacement of the current low fidelity models with more accurate aeroelastic simulations is attractive because of the reduced tunnel testing costs and the decreased risk of design modification in the later design phases, however the overall computational costs of the loads process must not increase. Secondly, the new aircraft configurations that will be vital to meet 2020 performance targets are likely to possess design envelope boundaries and therefore critical loads cases that are very different from those previously found on conventional aircraft. Engineering experience, that is currently used to reduce the number of critical loads cases without compromising air safety, cannot be extended to novel configurations. FFAST is coordinated by the University of Bristol, United Kingdom and involves 13 organisations from eight countries, including six different member states. The consortium is divided into four universities, four research organisations, including the Council for Scientific and Industrial Research CSIR and the University of Cape Town UCT in South Africa, two small and medium enterprises (SMEs) and two larger aerospace companies. All have relevant experience in the field of reduce order modelling techniques, numerical modelling of fluid flows and aeroelastics, and are recognised experts in these fields.

www.bris.ac.uk/aerodynamics-research/ffast

FUTURE – Flutter-Free Turbomachinery Blades

In modern aircraft engine design, where the driving forces are increasing aircraft safety, lowering weight, raising performance and cost-effective manufacturing, the challenge is to optimize for conflicting aerodynamic and structural demands. Increasingly thinner, lighter, but more loaded blades substantially raise the vulnerability towards flow induced vibrations such as flutter, leading to a high damage potential. By advancing the state-of-the art in flutter prediction capabilities and design rules, the FUTURE project will lead to short term benefits in terms of decreased development cost in current engine programs, reduced weight and thus fuel consumption, and increased ability to efficiently manage flutter problems occurring on engines at service.

In order to meet the ambitious goals of the FUTURE project all major European aero engine manufacturers as well as relevant academic partners in the field of turbomachinery aeroelasticity are gathered. The project involves a total of 25 partners, including the Stellenbosch University SUN and Council for Scientific and Industrial Research CSIR in South Africa, and is led by KTH. Spanning a project time of 4 years the overall budget is 10,7M€.

Mid-term and long-term benefits are that improved analysis and design aeromechanical methods for aggressive lightweight blade design are an enabling factor for high efficiency future environmental friendly aero engines and gas turbines with maintained safety. In combination with a reduced time-to-market the project outcomes will have a strong impact on the competitiveness for the European aero engine module and stationary gas turbines manufacturers participating in the project. The project will give the partners access to experimental data that are not available in any other company in the world.
Different work packages are interconnected to give a coherent and clear progress of the state of the art of aeroelasticity in turbomachines. The different activities in the FUTURE-project can be summarized as:

- Eight interconnected turbine and compressor experiments (using rotating and static rigs) will be performed, and
- combined with numerical modelling of vibrating blades together with the surrounding flow interfering with the vibrating structure.
- Results from all the activities in the project will lead to a more coherent view and a better physical understanding of the flutter phenomena in turbomachines. The high-quality vibration- and unsteady pressure measurements in cascade and rotating rig settings foreseen in the FUTURE project will constitute worldwide leading edge technology and provide the European aerospace universities, research institutes and industry with a distinctive competitive advantage in the aeroelasticity field.

www.future-project.eu


Figure 1


Figure 2

Figure 1: Artist sketch of a possible joined-wing airliner.
Figure 2: Joined-wing engineering model of concept being developed in NOVEMOR.

NOVEMOR Project Novel Aircraft Configurations

Innovative Aircraft Concepts

Air transport is increasingly becoming more accessible to a greater number of people who can afford travelling by air, both inside and outside Europe, for leisure and business purposes. This is evidenced by the fact that last year the European air transport system moved more than 1 billion passengers and 14 million metric tonnes of freight through its airports, whilst handling more than 12 million movements over the same period.

Despite the effects of 9/11, SARS and the IRAQ war, the sector forecasts that over the next decade, both passenger and freight traffic is expected to increase at an average of 4 to 5 % p.a., with freight being expected to increase slightly more - both significantly above global GDP growth. In air transport terms, this implies a doubling of traffic about every 16 years.

It is evident that environmental requirements, such as noise impact and emissions, will play a dominant role in future transport aircraft development, becoming a driving force for aircraft design. This is the main reason for which ACARE, in the Strategic Research Agenda, established the so-called greening aircraft as the first objective of future research activities related to Aeronautics. The adoption of this kind of global requirement has two main consequences: firstly, the greening level becomes one of the criteria for which a new aircraft has to be judged or selected; and secondly, the aircraft configuration itself must be defined to fulfil the greening requirements. Since other design targets, such as economic and technical factors, must be satisfied, new design criteria arising from the greening requirements must be taken into account right from the beginning of the design cycle.

Need for Novel Aircraft Configurations

The traditional aircraft configuration of a circular tube containing the passengers with wings employing under-slung engines attached using pylons has been optimised almost as far as is possible. For example, the latest versions of the 737 now look very similar to the A320. Although further advances in efficiency will be achieved through the use of advanced materials, improved engines, better aerodynamics (e.g. winglets) and indeed morphing devices, these advances will be incremental. A non-conventional configuration that is a strong candidate to provide a step change in aircraft performance will be considered by the NOVEMOR project, namely the JOINED-WING concept, shown in Fig 1.

The aim of the NOVEMOR (**NO**vel Air **VE**hicle Configurations: From Fluttering Wings to **MOR**phing Flight) research project is to investigate novel air vehicle configurations with new lifting concepts and morphing wing solutions to enable cost-effective air transportation, such as the engineering model depicted in Fig. 2.

A multidisciplinary analysis and design optimisation environment developed in an earlier EU Project (SIMSAC) will be used and improved to include analysis of novel configurations, such as the joined-wing concept for improved lift, and morphing wing solutions to tailor the wing for optimum lift and maneuvering capabilities. The design and development of the proposed solutions will be performed as an integral part of the aircraft conceptual design, rather than just as an add-on later in the design cycle, thus enabling innovative aircraft designs to be made through the use of morphing structures technologies. Such concepts will enable improved aircraft efficiencies, aerodynamic performance, reduced structural loads and lighter weight structures. Figure 3 presents the workflow of the design and development efforts to bring forth a new configuration.

Figure 4

The NOVEMOR project focuses on the following primary objectives:

1. Design and evaluation of a new aircraft concept, the joined-wing configuration, including structural, aerodynamic and aeroelastic scaling simulations and analysis, and multidisciplinary design optimisation techniques. This configuration will be evaluated against a reference aircraft. See Fig 2
2. Morphing wing solutions (span and camber strategies and wing-tip devices) will be proposed to enhance lift capabilities and manoeuvring. These will be considered early in the design process, right from the beginning of the aircraft design cycle, included in the conceptual design.
3. Design, test and evaluate the joined wing configuration and some of the more promising adaptive/morphing concepts and mechanisms as part of a conceptual design environment, capable of augmenting performance characteristics in terms of drag reduction, loads reduction, weight and noise impact reduction;
4. To evaluate the overall benefits of these new proposed concepts in terms of reducing operational cost.

CEASIOM Software for Virtual Aircraft Design

Recently, new software systems specifically tailored for aircraft conceptual design have been proposed but while they include specific tools for many aspects and requirements, such as environmental impact, an established framework for conceptual design of morphing aircraft does not exist at the moment on the market, and will be developed in NOVEMOR. An integrated digital design and decision making environment, called CEASIOM (Computerized Environment for Aircraft Synthesis and Integrated Optimization Methods), where for any given aircraft configuration the specific information for weight prediction, aeroelastic analysis, aerodynamic performance as well as stability and control assessment can be computed at some user-defined fidelity level. Figure 4 is a pictorial rendition of the utility of this simulation system. Further information can be found on: **www.ceasiom.com**.

The GeoSUMO module of CEASIOM provides a description of the geometry, and this represents one of the critical aspects of conceptual design. Therefore a fundamental activity is the enhancement of this module to treat the analysis and design of aircraft equipped with morphing devices. This module adopts a set of geometrical parameters which are general enough to ensure that a wide array of aircraft morphologies can be represented and analyzed by the aerodynamic, structures and controls modules.

Figure 3: Workflow and division of labour among the partners to reach the objectives of NOVEMOR.

Figure 4 CEASIOM is a computerized analysis and synthesis tool for virtual aircraft design (see also www.ceasiom.com).

Figure 5: Dynamically scaled model of a Mirage F1, used for flutter code verification.

Figure 6: Dynamically scaled flutter model of a T-tail, used for flutter code verification.

Figure 4

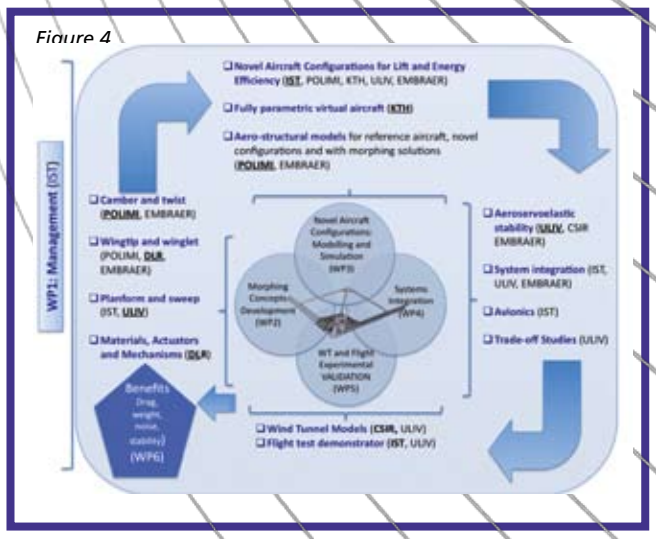


Figure 5

Figure 6

List of Participants

Organization	Scientific Leader	Country
Instituto Superior Técnico	Prof. Afzal Suleman	PT
Politecnico di Milano	Prof. Sergio Ricci	IT
University of Liverpool	Prof. Jonathan Cooper	UK
Kungliga Tekniska Högskolan	Prof. Arthur Rizzi	SWE
Deutsches Zentrum für Luft- und Raumfahrt	Dr-Ing Hans Peter Monner	DE
Centre for Scientific and Industrial Research	Dr Benjamin Broughton	SA
Empresa Brasileira de Aernautica S.A.	Dr. José Ricardo Negrão	BRA

Getting involved in NOVEMOR

AeroAfrica-EU was established in 2008. At the initiative of Prof Arthur Rizzi from the Royal Institute of Technology (KTH) in Sweden, who evaluated the local capabilities in South Africa and invited the CSIR to take part in preparing a submission for FP7.

After a dedicated teleconference with Prof Rizzi and Suleman, a plan of action was agreed upon. The topic of novel configurations based on the concepts of wing morphing and increased wing elasticity was very well aligned with the capabilities at the CSIR. The eventual workload stated that the CSIR will be involved in the Wind tunnel testing (transonic tests that enabled Reynolds number scaling) on a model that could be dynamically scaled (pending on the final configuration requirements). CSIR is the only partner with this cabability.

At the Aeromart meeting in November 2010, in Toulouse – the CSIR team and Profs Rizzi and Suleman met and very quickly a good repore was established. The level of complementarity in capabilities and track record was much better than imagined.

Prof Suleman completed the final touches to the proposal and submitted it on time for the 2 December 2010 deadline.
Despite the uncertainty of the success of the proposal, the newly established network continued to develop. Talks are underway to have a South African PhD student enrolled under Prof Suleman. Prof Rizzi enabled access to the South African team to the code 'CEASIOM' – developed under an FP6 program. The design code is currently being utilised as a design environment for an optimised unmanned aircraft platform. Constant communications and proposed modifications are being discussed with the CEASIOM partners for the expansion of the code in a multidisciplinary design optimisation scheme. Talks are underway to involve KTH students in the further development phase of CEASIOM.

The good network and joint work was furthermore supported by the news that NOVEMOR was successful! CSIR is also now better positioned to be involved in more technical aspects (such as the multidisciplinary Design optimisation work) that is planned under NOVEMOR.

As often experienced in the past – great technical skills and abilities often only needs the smallest of opportunities to expand into a greater, more synergistic effort. The CSIR is excited to be part of a novel air vehicle design project, due to the capable partners but also the opportunity to be involved in real novel airframe designs.

A word of thanks to Profs Rizzi and Suleman for their effort to date in making project NOVEMOR a success.

Event Highlights

AeroAfrica-EU Roundtable Meeting hosted at Cranfield University

An AeroAfrica-EU Roundtable Meeting was hosted at the Cranfield Management Development Centre (CMDC), Cranfield University in the United Kingdom in July 2010. The purpose of the meeting to bring together key EU and South African stakeholders involved in aerospace R&D and to identify areas of mutual priority and technological interest and discuss mechanisms to best facilitate African-EU collaboration in the future.

One of the topics discussed at the workshop was the collaboration and participation of South African entities in the upcoming European Union's 7th Framework 'Cooperation' Work Programme (FP7) 2010 Calls for proposals in Transport (including Aeronautics) focusing on research topics in aeronautics and air transport.

Various presentations were made relevant to the two themes of Advanced Technologies and Advanced Manufacturing. The event overall went well and there was interest in collaborating with South African researchers, with some potential projects being identified. The South African participants also took the opportunity to visit the Farnborough Air Show and explore other collaboration opportunities.

Africa Aerospace and Defence 2010

The African Aerospace and Defence (AAD) event is hosted bi-annually to support and promote the South African aerospace and defence industries.

AAD 2010 was held at the Air Force Base Ysterplaat in Cape Town, South Africa from the 20 – 25 September 2010.

The exhibition is attended by a wide range of local and international defence and aerospace industries and paved the way for local manufacturers to participate in the international aerospace arena. Over 300 exhibitors from 31 countries exhibited their products and organisations at the 2010 event. The exhibition was attended by 13 000 trade visitors and 80.000 public day visitors with 91 aircrafts on static display.

The AeroAfrica-EU exhibit was undertaken in partnership with the Department of Science and Technology and the NAC, and included exhibiting content through posters and brochures. A comprehensive contact list was compiled of interested parties and exhibition attendees. Keen interest was shown in the AeroAfrica-EU project which allowed for good publicity thereof. Various members of the consortium held one on one interactions and larger meetings with a wide range local and international aerospace industry players through which AeroAfrica-EU as a support mechanism was effectively promoted.

AeroAfrica-EU Seminar: Perspectives for Strengthening Aeronautics and Air Transport Research Cooperation between South Africa and the European Union, CSIR International Convention Centre, 27 October 2010, Pretoria, South Africa

Dr. Andras Siegler, Director of Transport (including aeronautics research), Directorate-General Research, EC, and Dr Arnoldas Milukas, Head of Unit: Horizontal Aspects and Coordination Transport visited South Africa on 27 to 29 October 2010.
Dr. Siegler's visit was co-hosted by the DST and the AeroAfrica-EU project, which is an FP7-funded project aimed at, (i) enhancing aeronautics and air transport research and development (R&D) cooperation between the EU and SA, and (ii) exploring the potential for – and, where appropriate, promoting the participation of – other African countries in such cooperation.

As part of the programme Dr. Siegler visited the Council for Scientific and Industrial Research (CSIR) and the Aerosud, a private sector company doing commendable work in aeronautical engineering solutions for the civil and aviation industry.

Dr. Seigler also participated in an ESASTAP event that was hosted by Stellenbosch University which provided him with the knowledge to understand SA's capacity in transport and aeronautics research.

Presentations were made by the DST and the Transport Directorate of DG RTD in order to identify areas of cooperation between SA and the EU. Based on the presentations it was agreed that experts from DST and the EU should convene a workshop to develop an action plan drawing from priority areas that were identified from the DST presentation, AeroAfrica-EU seminar, and the Transport Surface Researcher workshop. Priority areas included:

- Exchange of information about best practices/experience,
- Long-term investment in transport research and development,
- Inclusion of non-motorised transport in FP projects,
- Participation of South Africa at the Transport information day in July 2011, and
- Alternative fuels and new areas on transport research systems focusing on other environmental aspects.

With regard to aeronautics and air traffic research the areas that will be discussed for possible SA involvement are as follows:

- Flight mechanics, health monitoring and composites,
- EU airspace and certification for unmanned aircraft systems,
- Aerodynamics modelling and simulation, new aircraft configurations, engine emissions and test evaluations, and
- Facilitation of industry to industry cooperation

On conclusion of the visit, Dr. Siegler and Prof. Thomas auf der Heyde, Deputy Director-General, International Cooperation and Resources signed a joint statement on behalf of the South African Department of Science and Technology (DST) and the Transport Directorate of DG RTD of the European Commission, whereby the parties agreed to promote transport research between South Africa and the European Union.

IASSA
INTERNATIONAL AEROSPACE SYMPOSIUM OF SOUTH AFRICA

AEROMART TOULOUSE 2010

AeroAfrica-EU at IASSA 2010

IASSA 2010, held in the Western Cape from the 23rd to 25th November, was attended by over 100 delegates representing a broad spectrum of South Africa's Aerospace industry and R&D. Keynote speakers included Dr David Vos and Prof Mark Lowenburg, both South African's who have found international success in industry and academia.

AeroAfrica-EU hosted a stand at the Conference as part of its awareness building initiatives. Information was provided on the various AeroAfrica-EU project activities and initiatives, and opportunities for Africa-EU collaboration was highlighted, with specific emphasis being placed on participation in the EU's Framework Programme. Various AeroAfrica-EU dissemination materials were made available to the Conference delegates.

Aeromart Toulouse, 30 November – 02 December 2010/ AeroAfrica-EU Technical Workshop, 3 December 2010, France

The Technical Workshop was well organised by Aerospace Valley and held at the premises of ONERA research lab, Toulouse, France. The purpose of the event was matchmaking between SA and EU partners in preparation of possible collaborative R&D projects in view of the 5th FP7 aeronautics call. In general the workshop aimed at identifying areas/proposals in Transport (including Aeronautics) focusing on research topics in aeronautics and air transport for mutual collaboration – not only necessarily the current call but future FP7 calls, and even looking forward to FP8, as well as potential bilateral cooperation initiatives that could springboard into FP in-volvement. Two technical sessions were proposed: Aircraft Design & Tools (led by KTH) and Aero-Structures & Production (led by CSIR). These sessions were held sequentially thus allowing all participants to attend the entire event. A demonstration of Design Software tool CEASIOM software was given in the afternoon session. The workshop was held in conjunction with the 2-days b2b matchmaking event "Aero-mart" where SA-partners had a booth in order to promote their activities. A technical visit of the Airbus A380 final assembly line was organised for AeroAfrica project partners.

AeroAfrica-EU at Aeromart 2010

Aeronautics Days 2011, 30 March – 01 April 2011, Spain

The sixth European Aeronautics Days took place from 30th March to 1st April 2011 in Madrid, following its successful predecessors that took place in Brussels (1991), Naples (1993), Toulouse (1997), Hamburg (2001) and Vienna (2006). The event will brought together aeronautics stakeholders, ministries, agencies and R&D centres from all over Europe and overseas to network, present their latest research results and discuss common future R&D projects. Organized by CDTI (Centre for the Development of Industrial Technology in Spain) and the European Commission (Directorate General for Research), Aerodays 2011 provided a perfect opportunity to present and disseminate information about EU-funded RTD results, and was in line with the EU goals of creating a Single European Sky and a European Research Area, and of finding innovative approaches to sustainable aviation in a global environment.

On behalf of the AeroAfrica-EU consortium, Mmboneni Muofhe (Department of Science and Technology, South Africa) gave an overview of the aeronautics research landscape in South Africa, highlighting relevant research expertise, for example new materials (titanium and natural composites) research, and outlining the experience in cooperation with the EU and opportunities for further cooperation.

AeroAfrica-EU Workshop, 14-15 April 2011, South Africa

The AeroAfrica-EU Workshop – Promoting African and European research cooperation in Aeronautics and Air Transport held at the Professional Development Hub, University of the Witwatersrand, Johannesburg, South Africa from 14 to 15 April 2011 attracted over 40 individuals from Europe and Africa was a great success. Researchers from Egypt, Kenya, Tunisia, Uganda, and South Africa participated and presented at this event. Presentations were also being made by European colleagues encompassing Europe´s Vision for Aviation "Flightpath 2050", the Common Strategic Framework (FP8) and the forthcoming FP7 Aeronautics and Air Transport call. The Department of Science and Technology was also be presenting on the Joint Africa-EU Strategy, as well as the INCO-Nets and ERA-Net for Africa. As part of this workshop, the concept note on a Policy Framework for South African Aeronautics and Air Transport Research, compiled by and on behalf of AeroAfrica-EU, was presented for comments and deliberations.

Upcoming Events for your Calendar

AUVSI's Unmanned Systems North America, Washington, DC, USA, 16-19 August 2011

MAKS, Zhukovskiy-Moscow, Russia, 16-21 August 2011

BIAF 2011 (Bulgarian International Aviation Festival), Plovdiv Military Airport, Bulgaria, 3-4 September 2011

China Helicopter Exposition, Tianjin, China, 15-18 September 2011

AFA National Convention & Aerospace Technology 2011, Washington, DC, USA, 19-21 September 2011

Aerospace Meetings Casablanca, Casablanca, Morocco, 19-22 September 2011

Aviation Expo China, Beijing, China, 21-24 September 2011

International Aerospace Symposium of South Africa, Centurion, South Africa, 26-28 September 2011

Helitech 2011, Duxford, Cambridgeshire, United Kingdom, 27-29 September 2011

MRO Expo China, Xiamen, China, 12-14 October 2011

Seoul Airshow, Seoul Airport, Republic of Korea, 18-23 October 2011

Heli-Power 2011, Farnborough, United Kingdom, 19-20 October 2011

Aerospace & Defense Meetings Torino, Torino, Italy, 26-27 October 2011

Aerospace Industry Exhibition Tokyo, Tokyo, Japan, 26-28 October 2011

Dubai Airshow 2011, Dubai, United Arab Emirates, 13-17 November 2011

LIMA Airshow, Mahsuri International Exhibition Centre, Malaysia, 4-8 December 2011

Aerospace & Defense Supplier Summie Seattle, Seattle, USA, 12-15 March 2012

Aerospace & Defense Meetings Sevilla, Sevilla, Spain, 14-17 May 2012

Aeromart Tianjin, Tianjin, China, 25-29 June 2012

ILA Berlin 2012, Berlin, Gemany, 11-16 September 2012

Aerospace Meetings Tunisia, Tunis, Tunisia, 24-27 September 2012

Aerospace Meetings Guadalajara, Guadalajara, Mexico, 1-3 October 2012

Aerospace Meetings Japan, Nagoya, Japan, 9-14 October 2012

Aeromart Toulouse, Toulouse, France, 4-6 December 2012

More information

www.aeroafrica-eu.org

Register your organisation

One of the AeroAfrica-EU's main objectives is to raise the general awareness around FP7, but more specifically in the thematic area of aeronautics and air transport, within the African R&D community. Furthermore, AeroAfrica-EU wants to promote African, and in particular South African, aeronautics R&D expertise in Europe. A key task towards meeting this objective is to provide a searchable expertise database on the capacities of African R&D players. In registering your organisation through our website, we will be able to identify your capabilities and provide this information to the European community so as to encourage greater participation in FP7 projects.

For registering your organisation please visit:
www.aeroafrica-eu.org/form/index.php.

Register for Aeroview newsletter

This newsletter aims to impart useful information on the AeroAfrica-EU initiative; provide an insight into various projects and people in the aeronautics industry; and feature an up-to-date calendar of current events.

To subscribe to receive future issues of this newsletter please visit:

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AeroAfrica-EU is a Coordination and Support Action project supported by the EU 7th Framework Programme (FP7), funded under the Work Programme AAT.2008.7.6.

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XL jet airplane landing at sunset.
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