EUROPEAN ROTORCRAFT FORUM 2014

2-5 SEPTEMBER 2014 / SOUTHAMPTON, UK

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The European Rotorcraft Forum (ERF) is one of the premier events in the rotorcraft community’s calendar, bringing together manufacturers, research centres, academia, operators and regulatory agencies to discuss advances in research, development, design, manufacturing, testing and operation of rotorcraft.

This Forum will be the 40th in a series of meetings, which take place annually across Europe, rotating around the United Kingdom, Germany, France, Italy, the Netherlands and Russia. The first ERF was held in Southampton, England, in 1975, and the most recent in Moscow, Russia, in 2013.

The 40th European Rotorcraft Forum is being organised by the Royal Aeronautical Society. In celebration and commemoration of 40 successful years, the Forum will return to its birthplace in Southampton from the 2nd to the 5th of September, 2014.

VENUE
Grand Harbour Hotel
West Quay Road
Southampton
Hampshire
SO15 1AG
United Kingdom

CONTACT US
Conference & Events
Royal Aeronautical Society
No.4 Hamilton Place
London, W1J 7BQ, UK
+44 (0)20 7670 4308
erf2014@aerosociety.com
www.erf2014.com

THE KEYNOTE SPEAKERS ARE
Dr James Wang - Head of Research and Technology, AgustaWestland
Colin James - Airbus Helicopters UK
Peter Flinn - Interim Director, Aerospace Technology Institute (ATI)

TECHNICAL VISITS - 5 SEPTEMBER 2014
Middle Wallop - The Museum of Army Flying is home to a unique collection of military aviation history, one of both international and national importance. They have a selection of fixed wing and rotary wing aircraft, artefacts, models and trophies which serve as a profound and inspiring tribute to the Army and their machines. Delegates will also be able to view the working Army Air Corps’ airfield, Middle Wallop, home to the Apache and Lynx helicopters. Lunch will be provided.

Vector Aerospace - Vector Aerospace is a global provider of aviation maintenance, repair and overhaul (MRO) services. Through facilities in Canada, the United States, the United Kingdom, France, Australia, South Africa, and Kenya Vector Aerospace provides services to commercial and military customers for gas turbine engines, components and helicopter airframes. Vector’s customer-focused team includes over 2,700 motivated employees.

SOCIAL PROGRAMME
Beaulieu Motor Museum - The welcome reception on the evening of Tuesday 2 September will be held at the museum. Housing a collection of over 250 automobiles and motorcycles telling the story of motoring on the roads of Britain from the dawn of motoring to the present day, the award winning National Motor Museum appeals to all age groups. There are two new exhibits for 2014 – the Motorcycle Story and the Landspeed Record Display

Grand Café - The conference dinner on Wednesday 3 September, sponsored by AgustaWestland, will be held at the nearby Grand Cafe, a venue steeped in history located within a Grade II listed building. Once Southampton’s grandest hotel, it was used by first class passengers of the Titanic the night before boarding the ill-fated ship.

Solent Sky Museum - On Thursday 4 September delegates are invited to tour round the Solent Sky Museum; a museum that highlights and showcases the history of aviation in the Southampton and Solent area. Delegates will have the opportunity to view a famous Spitfire up close as well as board the Sandringham flying boat and take a tour onto the flight deck. Tickets will be available at the ERF2014 registration desk.
PROGRAMME / DAY 1 – TUESDAY 2 SEPTEMBER 2014

Main Room – Mayflower 2  Parallel 1 – Mayflower 1  Parallel 2 – Mayflower 3  Parallel 3 – Bradford & Winslow Parallel 4 – Standish

08:00  OPENING REMARKS
Air Cdre Bill Tyack, President of the Royal Aeronautical Society & Richard Markiewicz, ERF2014 Chairman

09:00  KEYNOTE ADDRESS 1
Dr James Wang, Head of Research & Technology, AgustaWestland

09:30  KEYNOTE ADDRESS 2
Collin James, Managing Director, Airbus Helicopters UK

10:00  NETWORKING AND REFRESHMENTS

11:00  KEYNOTE ADDRESS 3
Peter Finnn, Interim Director, Aerospace Technology Institute (ATI)

11:30  AHS BEST PAPER
Cameron Robertson, VP Structures, Aerovolo

14:00  AERODYNAMICS 1:
1A) Experimental Tests and CFD Simulations on a Tiltwing Aircraft in Hover
Gianni Droandi, Post Doctoral Fellow, Politecnico di Milano

1B) Vortical Flow Behind an Isolated Helicopter Fuselage
Alexander Kusyumov, Professor, Kazan National Research Technical University

1C) Validation of an Unstructured CFD Solver for Complete Helicopter Configurations with Loose CSD-Trim Coupling
Jan-Henrik Wendisch, Research Engineer, German Aerospace Centre (DLR)

14:30  DYNAMICS 1:
2A) Analytical Modelling of Rotor-Structure Coupling Using Modal Decomposition for the Structure and the Blades
Thibault Rouchon, PhD Student, Airbus Helicopters

2B) A Parametric Pilot/Control Device Model for Rotorcraft Biodynamic Feed Through Analysis
Pierangelo Masarati, Associate Professor, Politecnico di Milano

15:00  AIRCRAFT DESIGN 1:
3A) Highspeed Rotorcraft of the Mi-450 – A New Generation of Cross Arrangement Rotary Wing Aircraft
Stasislav Mzdyanyovskiy, Chief of Engineering Innovation Centre, JSC Moscow Mi Helicopter Plant

3B) A Solution to the Age Stiffening Problem in Natural Rubber and Polybutadiene Elastomers
James R. Halladay, Senior Fellow, LORD Corporation

15:30  NETWORKING AND REFRESHMENTS

16:00  AERODYNAMICS 2 / ACTIVE SYSTEMS 1:
6A) CFD Simulation of Flapped Rotors
Florent DeHaese, R&D Aerodynamics Engineer, AgustaWestland

6B) AgustaWestland’s Application of HMB to Simulate the Active Gurney Flap
Karl Baverstock, Principal Engineer, AgustaWestland

16:30  DYNAMICS 2:
7A) Helicopter Rotor Elasticity Stability Evaluation Using Lyapunov Exponents
Pierangelo Masarati, Associate Professor, Politecnico di Milano

7B) Evaluation of Fluidic Pitch Links for Rotor Hub Vibration Controls
Edward Smith, Professor, The Pennsylvania State University

17:00  AIRCRAFT DESIGN 2:
8A) Experimental Study of Tail Rotor-Fin Interference Ratio in Hover
Elmar Recker, Associate Professor, Royal Military Academy, Belgium

8B) The Overview of KARI Bearingless Main Rotor Hub System
Deog-Kwan Kim, Principal Research Engineer, Korea Aerospace Research Institute (KARI)

17:30  OPERATIONAL ASPECTS & SAFETY 1:
4A) Solutions to Helicopter Blade Erosion: Improving Aircraft Availability and Reducing Costs
Pat Collins, Science Gateway, Helicopters Operating Centre, DE&S & Chris Moore, Materials Engineer, AgustaWestland

4B) Lessons Learned from NH90 NFH Helicopter – Ship Qualification: Testing across the Complete Dutch Fleet
Airk Hoencamp, Experimental Flight Test Engineer, Royal Netherlands Navy

17:45  OPERATIONAL ASPECTS & SAFETY 2:
3A) Highspeed Rotorcraft of the Mi-450 – A New Generation of Cross Arrangement Rotary Wing Aircraft
Stasislav Mzdyanyovskiy, Chief of Engineering Innovation Centre, JSC Moscow Mi Helicopter Plant

3B) A Solution to the Age Stiffening Problem in Natural Rubber and Polybutadiene Elastomers
James R. Halladay, Senior Fellow, LORD Corporation

18:00  TEST & EVALUATION 1:
5A) Advanced Vibration Technique for Monitoring of Helicopter Bearings
Aleksy Misronoy, Scientific Director, D un D Centres

5B) Level Flight Performance Determination using Collective Pitch
Alex Duarte Mironov, Flight Test Engineer – Rotary Wings, Instituto de Pesquisas e Ensaios em Voo Air Force Academy, Belgium

18:30  TEST & EVALUATION 2:
10A) Initial Flight Tests of a Automatic Slung Load Control System for the ACT/FHS
Hyun-Min Kim, Researcher, German Aerospace Centre (DLR)

19:00  WELCOME RECEPTION AT BEAULIEU MOTOR MUSEUM
All coaches will depart at 17:45 from outside the Mayflower Suite Foyer
All coaches will return to Grand Harbour Hotel
**PROGRAMME / DAY 2 - WEDNESDAY 3 SEPTEMBER 2014**

**REGISTRATION**

**NETWORKING AND REFRESHMENTS**

**08:00**

**09:00**

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**15:30**

**NETWORKING AND REFRESHMENTS**

**NETWORKING LUNCH**

**TEST & EVALUATION 3:**

**15A) Design of a Rotor Blade Tip for the Investigation of Dynamic Stall in the Transonic Wind Tunnel**

**15B) Experimental Investigation of an Active Twist Model Rotor Blade with Low Voltage Actuation System**

**15C) Achieving Clean Sky - The Measurement of Success**

**TEST & EVALUATION 4:**

**16A) Tilt-Rotor Aerodynamics Activities During the NICETRIP Project**

**16B) An Investigation of Fundamental Flow Structures in Ground Effect with Application to the Development of Brownout Conditions in Hover**

**16C) Aeromechanical Evaluation of Smart Twisting Active Rotor**

**17A) Simulation and System Identification of Helicopter Dynamics Using Support Vector Regression**

**17B) Identification of the Attitude Dynamics for a Variable-Pitch Quadrotor UAV**

**17C) Towards the Development of a Methodology for Designing Helicopter Flight Control Laws by Integrating Handling Qualities Requirements from the First Stage of Tuning**

**18A) Apple iPad use as a Portable Instructor Operating Station for Training Devices**

**18B) Development of a 6 DOF Nonlinear Helicopter Model for the MPI CyberMotion Simulator**

**18C) Development of Occupant-Preferred Landing Profiles for Personal Aerial Vehicle Applications**

**19A) Simulation of Helicopter Noise in Maneuvering Flight**

**19B) Towards Accurate Unsteady Real-Time Helicopter Aeroacoustic Analysis Using GPU-CUDA Accelerated Tools**

**19C) Code-to-Code Comparison Study of Rotor Aeromechanics in Descending Flight**

**20A) String Potentiometer Blade Motion Measurement System Applied to Fully Articulated Inter-Blade Rotor**

**20B) Wind Tunnel Testing of a Full Scale Helicopter Blade Section with an Upstream Active Gurney Flap**

**20C) Slowed Rotor Wind Tunnel Testing of an Instrumented Rotor at High Advance Ratio**
## PROGRAMME / DAY 2 – WEDNESDAY 3 SEPTEMBER 2014 (cont)

<table>
<thead>
<tr>
<th>Time</th>
<th>Main Room – Mayflower 2</th>
<th>Parallel 1 – Mayflower 1</th>
<th>Parallel 2 – Mayflower 3</th>
<th>Parallel 3 – Bradford &amp; Winslow</th>
<th>Parallel 4 – Standish</th>
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<tbody>
<tr>
<td>16:00</td>
<td><strong>AERODYNAMICS 5:</strong></td>
<td><strong>FLIGHT MECHANICS 3:</strong></td>
<td><strong>ACTIVE SYSTEMS 2:</strong></td>
<td><strong>OPERATIONAL ASPECTS &amp; SAFETY 3:</strong></td>
<td><strong>ENGINES &amp; PROPULSION 1:</strong></td>
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<td></td>
<td>21A) Shaft Angle Corrections for Rotor Tests in a Closed Section Wind Tunnel Mirco Valentini, PhD Candidate, Politecnico di Milano</td>
<td>22A) CFD Simulation of Helicopter Ship Landing Crozon Clement, PhD Candidate, University of Liverpool</td>
<td>23A) Experimental and Numerical Investigation of Helicopter Fuselage Model with Active Flow Control Fabrizio De Gregorio, Senior Researcher, CIRA</td>
<td>24A) Assessment of Classical and Extended Messenger Models for Rotorcraft Icing Phenomena Jeewoong Kim, MSc Student, Georgia Institute of Technology</td>
<td>25A) A Preliminary Parametric Study for an Advanced Propulsion Technology Helicopter Fakre Ali, Engineering Doctorate Student, Cranfield University</td>
</tr>
<tr>
<td>16:30</td>
<td>21B) Numerical Investigations of Aeroelastic and Three Dimensional Effects for an Airfoil in Transonic Flow Stefan Surrey, Scientist, German Aerospace Center (DLR)</td>
<td>22B) Performance and Stability Assessment of Compound Helicopter Configurations Kevin Ferguson, PhD Student, University of Glasgow</td>
<td>23B) Time Resolved Stereo PIV Measurements of an Active Gurney Flap System Stefan van t’Hoff, R&amp;D Engineer, National Aerospace Laboratory (NLR)</td>
<td>24B) Wind Turbine Wake Encounter by Aircraft Yaxing Wang, Research Fellow, University of Liverpool</td>
<td>25B) The Turbine Driven Rotor Concept, a New Vision for Helicopter Propulsion Frank Buysschaert, Research Engineer and Teaching Assistant, University of Southampton</td>
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<td>17:00</td>
<td>21C) A Parametric Study of Planform Effects on Rotor Hover Performance Using a Hybrid Navier Stokes – Free Wake Methodology Jeewoong Kim, MSc Student, Georgia Institute of Technology</td>
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<td>24C) Initial Progress to Establish Flying Qualities Requirements for Maritime Unmanned Aircraft Systems Thomas Fell, PhD Student, University of Liverpool</td>
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<td>17:30</td>
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<td>25C) Holistic Approach for Development and Optimisation of Helicopters Gearboxes Joerg Litzba, Director Drive Train Components, ZF Luftfahrtechnik GmbH</td>
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### Depart for Conference Dinner at The Grand Café on foot

**CONFERENCE DINNER** - Sponsored by AgustaWestland

### Return to Grand Harbour Hotel on foot

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**ERF2014 VENUES**

**CONFERENCE:** GRAND HARBOUR HOTEL

**CONFERENCE DINNER:** THE GRAND CAFÉ

**WELCOME RECEPTION:** BEAULIEU MOTOR MUSEUM

**MUSEUM TOUR:** SOLENT SKY MUSEUM

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**FOR MORE INFORMATION AND TO REGISTER**  www.erf2014.com
PROGRAMME / DAY 3 - THURSDAY 4 SEPTEMBER 2014

08:00 REGISTRATION

09:00 AERODYNAMICS 6:

26A) Application of Passive Flow Control Device on Helicopter Rotor Blades
Fernando Tejero Embuena, Research Fellow, Institute of Fluid-Flow Machinery, Polish Academy of Sciences

26B) Advanced CFD-CSD Coupling - Generalised, High Performance, Radial Basis Volume Mesh Deformation Algorithm for Structured, Unstructured and Overlapping Meshes
Patrick P. Kranzinger, PhD Student, University of Stuttgart

09:30 NETWORKING AND REFRESHMENTS

10:00 AERODYNAMICS 7:

26C) An Experimental Set Up for the Study of Helicopter and Building Aerodynamic Interaction
Alex Zanotti, Post-Doctoral Research Fellow, Politecnico di Milano

10:30 NETWORKING LUNCH

11:00 AERODYNAMICS 8:

31A) Computational Investigation of Advanced Hub Fairing Configurations to Reduce Helicopter Drag
Wald Krier, Research Assistant, German Aerospace Centre (DLR)

31B) Three-Dimensional Bluff Body Aerodynamics and its Importance for Helicopter Sling Loads
Daniel Prosser, PhD Candidate, Georgia Institute of Technology

11:30 NETWORKING AND REFRESHMENTS

12:00 AERODYNAMICS 9:

31C) Consideration of Realistic Constraints in Passive Rotor Blade Design for Optimum Performance
Joon W Lim, US Army Aviation Development Directorate, NASA AMES

12:30 NETWORKING LUNCH
PROGRAMME / DAY 3 - THURSDAY 4 SEPTEMBER 2014

14:00 AERODYNAMICS 8: 36A) Observations of the Vortex Ring State Jordan Hislop, University of Glasgow

DYNAMICS 5: 37A) Robust Control Synthesis for Unmanned Helicopters Alexander Kusyumov, Professor, Kazan National Research Technology University (KAI)

AIRCRAFT DESIGN 5: 38A) Assessment of Power Sources and Electric Motors for Hybrid Electric Tiltrotors Vangelatorte T Nagaraj, Senior Research Scientist, University of Maryland

STRUCTURES & MATERIALS 1: 39A) Bird Strike Substantiation of a Rotor Component by Simulation - Test Correlation, Residual Strength Capability Emmanuel Laillet, Stress and Fatigue Expert for Dynamic Systems, & Severin Halbout, Engineer, Airbus Helicopters

AIRWORTHINESS 1: 40A) Cockpit Avionics Integration of Non-Required Safety Enhancing System Installations Adrian Illica, Airworthiness Office Specialist, Airbus Helicopters

14:30 36B) Experimental Validation of Tilt-Rotor Aerodynamic Predictions Julien Decours, Senior Researcher, ONERA

37B) Dynamic Properties of Some Gimbal and Teetering Two-Blade Helicopter Rotor Heads Radek Possamai, PhD Student, Politecnico di Milano

38B) Powering Wireless Sensors for Rotorcraft HUMS Stephen Burrow, Reader, University of Bristol

39B) Helicopter Dynamic Component Fatigue Life Prediction with a Probabilistic Load and Strength Model Sam Dekker, PhD Student, Airbus Helicopters

40B) Life Extension and Airworthiness – We Are All Being Asked to Work Longer Before Retirement – Even Military Aircraft! Mike Sleath & Ian Glazebrook, Senior Consultants, Airbus Helicopters

15:00 36C) The Effects of the Installation Location of Propulsive Rotor on the Aerodynamic Characteristics of Main Rotors for ABC Helicopters Lyu Wei-Liang, Assistant Professor, Dalian University of Technology

37C) Closed Loop Fidelity Assessment of Linear Time-Invariant Helicopter Models for Rotor and Flight Control Interaction Studies Ashwani Padthe, Post-Doctoral Research Fellow, University of Michigan

40C) A New Approach to Improved Rotorcraft Safety Gregory Bowles, Director, General Aviation Manufacturers Association

15:30 NETWORKING AND REFRESHMENTS

16:00 AERODYNAMICS 9: 41A) Helicopter Aft-Body Drag Reduction by Passive Flow Control Moritz Grawunder, Research Assistant, Technische Universität München

CREW STATION & HUMAN FACTORS 1: 42A) A Socio-Technical Approach to Safety Margriet Bredewold, Trainer and Consultant, Co-Guard GmbH

AIRCRAFT DESIGN 6: 43A) Computational Efficiency and High Fidelity Optimisation of Rotor Blade Geometry Yasutada Tanabe, Associate Senior Researcher, Japan Aerospace Exploration Agency (JAXA)

STRUCTURES & MATERIALS 2: 44A) Elastomeric Evolution: A New Look at Carbon Nanotube Reinforced Elastomers Joshua Joseph Cummins, Graduate Research Assistant, Vanderbilt University & Christopher Vengalattore T Nagaraj, Senior Research Scientist, University of Maryland

COST REDUCTION 1: 45A) Use of Tarawa Class Amphibious Assault Ships: an Option for Brazilian Offshore Operation Logistics Jones Mendes Vieira da Fonseca, Engineer, Embracer

16:30 41B) Improvement of Crossflow Aerodynamic Predictions for Forward Flight Marilyn Smith, Professor, Georgia Institute of Technology


43B) Feasibility Assessment: a Cycloidal Rotor to Replace Conventional Helicopter Technology Louis Gagnon, Postdoctoral Fellow, Politecnico di Milano

44B) Challenges and Perspectives for Nondestructive Inspection and Structural Diagnostics of Composites Andrew Makeev, Professor, University of Texas

45B) Pitch Horn in Infusion Technology Markus Zellhuber, Head of Engineering, Airbus Helicopters

17:00 42C) Task Specific Helicopter Flight Crew Training: Developing an ICAO Manual Gordon Woolley, Chairman, IPTC Helicopter Mission Training Working Group

END OF CONFERENCE

FRIDAY 5TH SEPTEMBER 2014

14:00 Return to Hotel via Southampton Airport and Southampton Central Train Station

FOR MORE INFORMATION AND TO REGISTER www.erf2014.com
REGISTRATION FORM:

Registration and secure payment can be made on-line at www.aerosociety.com/events.
Alternatively, complete one registration form per person (photocopies may be used) and return with payment to:
Conference & Events Department, Royal Aeronautical Society, No.4 Hamilton Place, London, W1J 7BQ, UK

TITLE:  
POSITION:  
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REGISTRATION FEES: (include refreshments, lunch and access to conference proceedings)
Extras (in bold below) are optional and will be allocated on a first come first served basis. Please tick the box next to the Extra you wish to attend.

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<th>Fee £</th>
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<td>RAEs Corporate Partner (inc. Armed Forces)*</td>
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Welcome Reception at Beaulieu Motor Museum
Technical Tour to Vector Aerospace (Tours will occur simultaneously; please tick ONE box only)
Technical Tour to Middle Wallop (Tours will occur simultaneously; please tick ONE box only)

*RAE's Corporate Partners are entitled to the special offer of five places for £3000.00 + VAT

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Bank Transfer: Payments can be made by bank transfer into Account No. 01564641, Sort Code 40 05 22, HSBC Bank plc, Mayfair Branch, 18a Curzon Street, London W1J 7LA, UK. Please indicate on the registration form if you have paid your fees direct.

Hotel Accommodation
To book a room at the Grand Harbour Hotel, please visit www.erf2014.com and view the Venue tab on the left hand side for more details. 150 rooms have been reserved on behalf of the delegates, please mention ‘ERF2014’ if calling directly to receive the discount. Other hotels are available nearby; please contact the conference team for more information on erf2014@aerosociety.com

Sponsorship and exhibition space
Please contact the Conference & Events Department for details on exhibiting, sponsorship and insertion of information into delegate booklets on 020 7670 4345.

Cancellations
In the event of cancellation, terms and conditions will apply. Please go to www.aerosociety.com/events for more details.

Reference: #725