



# AHS International 69<sup>th</sup> Annual Forum & Technology Display

May 21-23, 2013  
Phoenix, AZ

## Call for Papers

The **AHS 69th Annual Forum & Technology Display** will take place May 21-23, 2013 at the Phoenix Convention Center, Phoenix, Arizona. The theme of next year's conference is **"Advancing Vertical Flight Technology in Demanding Environments."**

The Forum is a superb chance to present and discuss advances in every area of vertical flight technology, design and its applications. Technical sessions will be sponsored by each of the Society's Technical Committees.

The Forum Technical Chair for this event is **Michael R. Smith**, Bell Helicopter Textron, (817) 280-5005; Fax (817) 278-5005; email [MRSmith@bh.com](mailto:MRSmith@bh.com). The Deputy Forum Technical Chair is **Dr. Marilyn J. Smith**, Georgia Institute of Technology, (404) 894-3065; FAX (404) 894-2760; email [marilyn.smith@ae.gatech.edu](mailto:marilyn.smith@ae.gatech.edu).

Abstracts must be received no later than **Friday, October 26, 2012**. Late submittals will be difficult or impossible to include in the evaluation process. Abstracts are to be submitted to the web site <https://submissions.miraed.com/AHS2013>. Abstracts may not be larger than 2MB and should be submitted in PDF form (the web site can convert most files to PDF). They should be approximately 1,000 words, present the status of the background data to be used, summarize figures and illustrations to be used (with samples), and include a summary of important conclusions. Abstracts that exceed the stated limits may, at the discretion of the committee, be rejected. **Please note that several technical committees have additional specifications for abstract submission, so authors should read and follow the guidelines noted under their technical area of interest.**

Abstracts will be accepted in a variety of technical disciplines including: **Acoustics; Advanced Vertical Flight; Aerodynamics; Aircraft Design; Avionics & Systems; Crash Safety; Crew Stations & Human Factors; Dynamics;**

**Handling Qualities; History; HUMS/CBM; Manufacturing Technology and Processing; Modeling and Simulation; Operations; Product Support Systems Technology; Propulsion; Structures & Materials; Systems Engineering Tools/Processes; Test & Evaluation; Unmanned VTOL Aircraft & Rotorcraft and Wind Energy.**

Submittal of an abstract is a professional commitment: if the abstract is accepted, the author commits to prepare a final paper, attend the Forum and make a presentation based on that final paper. If an author finds that he or she will be unable to make the presentation, then it is incumbent upon him or her to find a substitute presenter. Abstract acceptance will be based in part on the submitter's prior history in following through with their previous commitments. Papers presented previously are not eligible for consideration. This ineligibility includes papers or presentations (or facsimiles thereof) that are submitted for presentation at a national meeting of any professional organization at any time prior to the Forum. One author may present no more than two papers.

### Other Important Dates:

Authors will be notified of paper selection by **Monday, November 30, 2012**.

Papers must be submitted electronically to the Mira web site by **Friday, April 12, 2013**.

The AHS Forum is open to an international audience. As such, it is the policy of the AHS that all papers submitted for inclusion in the Proceedings and all presentations made at the Forum are completely unrestricted. That is, they are not allowed to contain any proprietary, sensitive, classified, or otherwise controlled information. Authors should make note of this policy when submitting abstracts. It is the author's responsibility to obtain appropriate clearances, which sometimes takes several weeks, of their abstract, paper, and presentation in order to meet all deadlines.

**American Helicopter Society (AHS) International • The Vertical Flight Technical Society**

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## No Paper – No Podium Rule

A general “No Paper –No Podium” policy will be in effect for all contributed papers. This policy means that an author will not be scheduled to speak if the paper has not been properly submitted at the time of the Forum. Any paper received after the final submittal date will not be included in the printed or CD-ROM version of the **AHS 69th Annual Forum Proceedings**. **Please note that there will be no supplemental CD for Forum 69.** In the event of extenuating circumstances, exemption to the “no paper, no podium” rule may be requested from the session chair. However, in no case will late papers be included in the *Proceedings*. Exemptions should be requested well in advance of the paper submission deadline so that the presenter can be included in the printed program. Papers not included in the Proceedings are NOT eligible for consideration for the Alfred Gessow Forum Best Paper Award.

## Alfred Gessow Forum Best Paper Award

Each of the authors of the best paper presented at the Annual Forum for each session, as determined by the Committee Chairs, Session Chairs and the Technical Council, will receive a certificate. The overall best paper will receive the Alfred Gessow Forum Best Paper Award. One of the winning authors is invited to present his or her paper at the European Rotorcraft Forum (ERF). The ERF organizers provide complimentary registration and accommodations as well as a copy of the ERF proceedings.

## Registration

Presenters of all papers to be delivered at technical sessions, both regular and special sessions, must register and are eligible to pay reduced Forum speaker registration fees, whether members or non-members of AHS.

## Annual Forum Technical Sessions

### Acoustics

Papers are invited addressing recent advancements in the study of internal and external rotorcraft noise generation, propagation and control (active and passive). Appropriate external noise topics include rotorcraft component and full system noise prediction methodology development and validation, wind tunnel and full scale flight test acoustics measurements, new procedures for acoustic data acquisition, reduction or analysis, active and passive rotor noise reduction techniques and noise abatement flight operations, acoustic propagation models and community impacts of rotorcraft noise. Topics of interest include, but are not limited to: current research contributing to a basic understanding of fundamental aerodynamic noise sources such as rotor harmonic noise, impulsive noise and broadband noise as well as interaction between various rotorcraft noise sources for both manned and unmanned rotorcraft. Papers dealing with the development or implementation of national or international civil noise regulations are also encouraged. Appropriate interior noise topics include the application of numerical techniques to predict noise in rotorcraft cabins, active and passive noise control technologies to reduce cabin noise, studies of human response to cabin noise, and source noise reduction concepts, such as concepts for the engine and transmission.

**Session Chair: Tim Samuels**, Bell Helicopter Textron, Inc., (817) 280-1472, email: tosamuels@bh.com; **Deputy Session Chair: Chris Hobbs**, Wyle Laboratories, (703) 415-4550 ext. 39, email: chris.hobbs@wyle.com.

## Advanced Vertical Flight

For this session the AVF Committee seeks papers that focus on topics relevant to advanced and unconventional vertical flight concepts. Included among these topics are innovations in rotorcraft configurations, such as tilt wing, tilt rotor, and slowed or stopped rotor configurations, and non-rotorcraft systems, such as lift fans, lift engines, lift or lift/cruise vectoring nozzles, thrust augmentation devices, and attitude/reaction control systems. Special interest subjects include next generation rotorcraft configurations, such as micro scale vehicles, unmanned systems, and new configurations proposed for the JHL and JMR missions. Among other relevant paper topics are conceptual air vehicle design, flight systems, systems integration, vehicle control systems, piloted flight simulation, full and scaled vehicle ground, wind tunnel and flight testing for advanced vertical flight systems.

**Session Chair: Kit Borden**, U.S. Army AED, (256) 313-9007., email: kit.borden@us.army.mil; **Deputy Session Chair: Dr. Janet Sater**, Institute for Defense Analyses, (703) 578-2978, email: jsater@ida.org.

## Aerodynamics

Papers are invited that address recent accomplishments in all areas of rotorcraft and vertical and/or short take-off and landing (V/STOL) aerodynamics. Topics of interest include, but are not limited to, computational fluid dynamics techniques, analytical methodology, experimental aerodynamic and/or flight test results, flow visualization methods and results, correlation, aerodynamic design methods for components or complete aircraft, unique aerodynamic modeling, interactional aerodynamics, low Reynolds number aerodynamics, aerodynamic flow control for components or complete aircraft, and computations or measurements of high angle of attack, unsteady, or vortex flows. **Abstracts exceeding 5 pages (10 pt., single-spaced, 1 inch margins, all-inclusive) will not be evaluated.** Please note that the aerodynamics review process is highly competitive and is characterized by a high rejection rate.

**Session Chair: Dr. Chunhua Sheng**, University of Toledo, (419) 530-8248, email: chunhua.sheng@utoledo.edu; **Deputy Session Chair: Mark Potsdam**, US Army AFDD, (650) 604-4455, email: mark.potsdam@us.army.mil.

## Aircraft Design

Papers are invited from industry, government, academia, and operators on all aspects of manned and unmanned rotary wing or vertical flight aircraft design including, but not limited to: design and fabrication of dynamic systems or components, airframe components, or entire vehicles; conceptual, preliminary or product design development tools and processes; and analytical modeling leading to advanced rotary wing or vertical flight technologies. Optimization or trade studies focused on new or alternative configurations are likewise of interest. Papers discussing the interaction of technology, configuration and requirements in the design of next generation civil and military rotorcraft are also sought. **Session Chair: Charley Kilmain**, Bell Helicopter Textron, Inc., (817) 280-5889, email: ckilmain@bh.com; **Deputy Session Chair: Dennis McGuire**, LORD Corporation, (814) 868-5424 ext. 6630, email: dennis.mcguire@lord.com.

## Avionics & Systems

The AHS Avionics & Systems Technical Committee invites papers that address the following for both manned and unmanned vertical flight aircraft:

- Techniques which improve the efficiency of developing complex software intensive avionics systems;
- Partitioned architecture of fielded mission and cockpit management systems, and the success or challenge associated with integrating such systems after aircraft deployment;
- Evolving definitions and options for defining network structures that will provide high bandwidth, worldwide connectivity to serve as the information backbone for net-centric, tactical information sharing;
- Descriptions of applications where commercial off-the-shelf hardware and software have been successfully employed in tactical helicopters with minimal modification;
- Sensors and systems that provide true 'see-through' capability in sand, dust, rain, and other obscurants found in Degraded Visual Environments – airborne examples of field trials and operational solutions are of particular interest;
- The current status and future expectations for manned and unmanned surveillance and weapons platforms, especially as interfaced at higher modes to and from helicopters;
- Methods to achieve harmonization of certification requirements which results in systems solutions acceptable to FAA, EASA and military regulators;
- Fly-by-wire and fly-by-light flight control system architectures and the critical requirements imposed upon the supporting avionics systems and sensors;
- Mission Equipment, including communications, weapons systems, fire control architectures, software, survivability equipment, and other systems critical to successful accomplishment of helicopter missions:
- Methods for addressing obsolescence and other life cycle issues related to aging avionics and systems components.
- Avionics Sensors or Systems Integration or performance testing either in the integrated lab environment or through aircraft ground and flight test,
- Advanced electrical controls, actuator and servo technology.

**Session Chair: Dr. Mel Johnson**, US Army Aviation Engineering Directorate, (256) 313-8461, email: mel.johnson1@us.army.mil; **Deputy Session Chair: Dr. Walter Rawle**, Ultra Electronics Flightline Systems, (585) 851-1777, email: walter.rawle@ultra-fei.com

## Crash Safety

Papers are invited for ALL aspects of crashworthiness and aviation safety relating to rotorcraft, UAVs, and other V/STOL aircraft. Potential application areas include military, civil, off-shore transport, mountainous terrain, emergency medical services, and law enforcement. Emphasis will be given to the recent development of new crash safety concepts toward minimizing human impact injury; maximizing post-crash survival; development of new crash-resistant design criteria; development and application of improved and more comprehensive human tolerance and injury criteria; and development of systems that reduce airframe damage while also reducing injury potential. Also of key interest are system

integration analyses that demonstrate enhanced occupant safety while minimizing system penalties for aircraft cost and weight. Additional crashworthiness topics of interest include, advancements relating to energy absorbing systems such as landing gears, composite airframe structures, seats, cargo and mass item retention systems, and internal/external inflatable devices; crew, troop, and passenger restraint systems; post-impact flotation; crashworthy fuel systems to include range extension tanks; testing and validation; and methods of mishap data retrieval, collection and analysis. Other safety topics of interest include, but are not limited to, use of mishap data to define crash safety technology deficiencies and to support system safety analyses. Analytical simulation of aircraft crash with rigid, massively sloped (mountainous), soil and water impact surfaces, simulation of aircraft crash protective systems such as landing gear, energy-absorbing seats, landing gears, and inflatable devices are of keen interest. Finally, papers regarding new validated analytical methods that will improve the reliability, accuracy, and expand the scope of computer simulations for crash safety are also sought.

**Session Chair: Dr. Cheng-Ho Tho**, Bell Helicopter Textron, Inc., (817) 280-8462, email: ctho@bh.com; **Deputy Session Chair: Dr. Akif Bolukbasi**, The Boeing Company, (480) 891-5111, email: akif.o.bolukbasi@boeing.com.

## Crew Stations & Human Factors

Papers are invited for all aspects of crew stations and/or human factors engineering relating to rotorcraft, unmanned aerial vehicles, and other V/STOL aircraft including crew systems design, pilot vehicle interface, maintainer interfaces and accessibility, ground support, UAS operator control station designs, and air traffic control. Areas of interest range from concept formulation through design, development, evaluation, and fielding. Other human-machine interfaces including mission crew member roles, maintainer roles, ground support, equipment design, air traffic control, life-cycle cost of ownership, and logistics considerations are also crucial factors in delivering safe and effective products to the customer and provide fertile ground for human factors engineering applications. Suggested topics include:

- integrated crew station design
  - degraded visual environment solutions
  - virtual reality displays
  - synthetic vision
  - aural, visual and kinesthetic display concepts and performance requirements
  - innovative control and display concepts
  - the interface of crew systems with other vehicle subsystems
  - prototyping of conceptual designs
  - the role of crew systems integration and human factors engineering within the concurrent engineering environment, in rapid fielding initiatives, and on an agile lean plus project
  - use of front-end analysis defining user roles, functional allocations and measures of effectiveness
  - effective mission management techniques
  - tactical decision aids and associated systems
  - information management
  - emergency egress aids
  - maintainer interface design and analysis
- Computer aided/assisted tools and processes which support the crew systems design or analysis in any of the above

functions are also of considerable interest. Papers may emphasize analytical, laboratory, simulation, operational or flight test results. Experimental results along with attendant conclusions or recommendations for crew station design are particularly encouraged.

**Session Chair: Kristin Little**, The Boeing Company, (480) 891-1246, email: kristin.little@boeing.com; **Deputy Session Chair: Jeff Erwin**, Bell Helicopter Textron, Incorporated, (817) 280-1928, email: jerwin@bellhelicopter.textron.com.

## Dynamics

Papers are invited in all areas related to rotorcraft dynamics and aeroelasticity, including rotor response and stability, dynamics of coupled rotor/airframe systems, load prediction, vibration reduction, analytic modeling techniques, and experimental measurements. Papers reporting on the development of rotorcraft dynamic or aeroelastic analyses and experimental validation are especially encouraged. New experimental results are of particular interest, as are advances in dynamics technology and design methodologies. Papers reporting on dynamic aspects of technologies such as on-blade controls, UAV/MAVs, heavy lift, and unconventional V/STOL aircraft are also welcome. Priority will be given to completed programs where significant conclusions are substantiated and the results contribute to advancing the state-of-the-art. Please indicate in your abstract the current status (completed versus ongoing work). Abstract length must not exceed 1000 words.

**Session Chair: Dr. Mark Wasikowski**, Bell Helicopter Textron, Inc., (817) 280-7774, email: markwasikowski@bellhelicopter.textron.com; **Deputy Session Chair: Dr. Matthew Floros**, US Army Research Lab, (410) 278-7752, email: matthew.w.floros.civ@mail.mil.

## Handling Qualities

Papers are invited that address all factors of rotorcraft and V/STOL handling qualities from research through engineering design and development to civil certification and military qualification. Handling Qualities encompasses aircraft characteristics which govern the ease and precision with which a pilot is able to perform tasks in support of an aircraft mission. This includes basic vehicle stability and control/response characteristics and the pilot-cockpit-vehicle interface. Papers are encouraged on topics that address significant results from flying qualities, applications of mathematical modeling to rotorcraft design, development and use of handling qualities flight test data, rotorcraft component integration, operational needs and experience, safety considerations, night and adverse weather requirements, terminal area operations, the impact of handling qualities on safety considerations, and development of advanced flight control systems.

**Session Chair: Marc Hoefinger**, German Aerospace Center (DLR), +49 531 295 3249, email: marc.hoefinger@dlr.de; **Deputy Session Chair: Dr. Mike Jump**, University of Liverpool, +44-151-794-6845, email: mjump1@liverpool.ac.uk.

## Health & Usage Management Systems (HUMS) – Condition Based Maintenance (CBM)

Papers are invited on the following topics within the area of rotorcraft health and usage monitoring, management, and condition based maintenance: (1) advanced monitoring

technologies, including sensors, algorithms, processing methods, wireless, energy harvesting, data fusion, data mining, and decision support methods/tools; (2) life and usage assessment techniques including modeling, analysis, data fusion; (3) aircraft implementation to include verification and validation, certification/ qualification; and (4) benefits and success stories to include operational availability, safety, costs, and maintenance benefits. The application areas are Propulsion, Drive Systems, Structures, Rotor Systems, Vehicle Management System/Flight Control, Electrical and Electronic Systems.

**Session Chair: Mark Davis**, Sikorsky Aircraft Corp., (203) 386-7639, email: MADavis@sikorsky.com; **Deputy Session Chair: Brian Tucker**, Bell Helicopter Textron, Inc., (817) 280-4795, email: btucker4@bellhelicopter.textron.com.

## History

The AHS History Committee invites scholarly papers and first-hand accounts that facilitate the preservation and understanding of vertical flight history. Of particular interest are papers documenting important but not well-known developments in vertical flight technologies or vehicles, rediscovery of forgotten pioneers, or events involved in understanding specific phenomena. Personal involvement in the subject matter or extensive research and documentation are highly desirable. Exceptions can be made from the no-paper/no-podium policy for first-hand accounts.

**Session Chair: Dr. Bruce H. Charnov**, Associate Professor Emeritus, Hofstra University, (858) 598-6284, cell (917) 414-3754, email: bruce.h.arnov@hofstra.edu.

## Manufacturing Technology & Processing

Papers are invited on novel manufacturing technology and processes including topics of special interest to the vertical lift community such as: Integration of manufacturing considerations earlier into the product development cycle; Global procurement strategies; Low volume lean production cells, rapid prototyping, tooling and learning; Cost effective fabrication of improved damage tolerance and fatigue designs; Regulatory impacts and environmental issues; Quality assurance approaches, and applications of innovative process measurements; Rotor and drive system manufacturing; Advanced bonding, joining and assembly techniques; Manufacturing modeling and simulation; and Accelerating readiness levels. Papers from industry, government and academia are solicited.

**Session Chair: William C. Harris**, Sikorsky Aircraft Corp., (203) 386-3568, email: wharris@sikorsky.com; **Deputy Session Chair: Jon Schuck**, US Army AATD, (757) 878-2101, email: jon.c.schuck.civ@mail.mil.

## Modeling & Simulation

The AHS Modeling and Simulation Technical Committee is looking for papers on applications applied to air crew training and mission rehearsal, rotorcraft operations, and rotorcraft/subsystem design and certification. Papers are invited from authors who would like to:

- Advance and demonstrate the use of simulation as an essential foundation for rotorcraft and Vertical Take-Off and Landing engineering disciplines;
- Determine the overall simulator/component fidelity ratings and metrics and system/subsystem fidelity and

- pilot cueing requirements for specific air vehicle configurations and /or mission tasks;
- Focus on safety and demonstrate commercial or military flight operations quality assurance;
- Explore advanced or novel simulation technologies, especially in-flight and real time simulation, and parallel computing in real time simulation;
- Explore the use of simulation to evaluate advanced or novel rotorcraft concepts and applications in stand alone or distributed environments;
- Address applications using ADS-33E-PRF, 14 CRF Part 60, or JAR-FSTD H guidelines and issues related to rotorcraft simulation certification;
- Apply simulation to UAVs, slung loads, urban operations, and shipboard operations, including airwake-downwash coupling;
- Apply simulation options to explain the differences between low speed land and ship based flight envelopes;
- Use M&S options to help integrate the rotorcraft design and flight test analytics;
- Apply novel modeling techniques for advanced and/or future vertical lift concepts, including compound helicopters;
- Address specialized topics relating to verification and validation and transfer of training methodologies;
- Demonstrate quantitative cost savings using simulation compared to traditional approaches toward design, flight-testing and training; or
- Demonstrate the use of simulation to support virtual engineering lifecycle concepts.

**Session Chair:** **Dr. Rajneesh Singh**, US Army Research Lab, (410) 278-4022, email: rajneesh.k.singh.civ@mail.mil; **Deputy Session Chair:** **Dr. Mark White**, University of Liverpool, Phone: +44-151-794-6848, email: mdw@liv.ac.uk.

### Operations

Papers are invited that address military and civil rotorcraft operations (manned or unmanned) in the following areas: concepts of operations; tactics, techniques, procedures, tools, technologies, and methodologies; rotorcraft survivability, vulnerability and operational effectiveness analyses; electronic decision-aiding; command, control, and communications techniques; intelligence and electronic data gathering applications; aircraft supportability; extreme weather operations; public safety and emergency medical service operations; offshore operations; and continued operational safety/safety management.

**Session Chair:** **Mac Dinning**, US Army AMRDEC, (703) 617-0449, email: malcolm.w.dinning.civ@mail.mil; **Deputy Session Chair:** **John Barber**, Bell Helicopter Textron, Inc., (817) 280-5828, email: jbarber@bh.com.

### Product Support Systems Technology

Papers are invited that present the perspective of the air vehicle, powerplant, ground support equipment, training device or mission equipment manufacturer. Because of the nature of the subjects presented during the Product Support Systems Technology Technical Session of the AHS Forum, written papers are encouraged but are not mandatory to support your presentation. Some of the supportability considerations in product introduction may be entirely new to the user and/or manufacturer, requiring new and innovative support concepts. Key elements are Platform

Maintenance Applications (PMA); Performance Based Logistics (PBL); Condition Based Maintenance (CBM); Soldier Focused Logistics (SFL); Contractor Logistics Support (CLS); Fleet Information Management (FIM); Flight Operations Quality Assurance (FOQA); Centralized Automated Flight Records Systems; site activation; pre-operational support planning; service center support, training facilities, lessons learned from previous fieldings; environmental conditions; support within budgetary constraints; pre-production prototyping and field evaluation programs.

Presenters are reminded that they must submit written papers for publication in the AHS Forum Proceedings in order to be eligible for the Alfred Gessow Forum Best Paper Award.

**Session Chair:** **Ron Walterick**, US Army Research Development and Engineering Command, (361) 961-6477, email: ronald.walterick@us.army.mil; **Deputy Session Chair:** **Treven Baker**, US Army AATD, (757) 878-0155, email: treven.e.baker.civ@mail.mil.

### Propulsion

The AHS Propulsion Committee invites papers which present new and innovative information on propulsion for rotorcraft and other vertical flight aircraft, including unique propulsion challenges of Unmanned Aerial Vehicles (UAVs), Future Vertical Lift (FVL), and V/STOL aircraft configurations with variable speed/multi-speed propulsion concepts. Recommended topics for these configurations include rotorcraft engines, rotorcraft drive systems, platform energy requirements, propulsion system integration, and related airframe/engine technologies. Centered around these topics and of specific interest are papers addressing recent approaches or technologies that enhance safety and improve performance, provide methods and design analyses that improve engine and drive system reliability, enable a reduction in customer component-repair/replacement burden, provide a reduction in operations and sustainment costs, and/or presents weight/noise reduction technologies. Recommended topics also include system integration considerations, environmental impacts and requirements, integrated/advanced electronic control systems (to include sensors), advanced materials, gear and bearing technology, shafting advancements, alternative fuels and lubricants to include non-hydrocarbon energy storage, and the impact on performance/reliability due to superfinishing techniques. We also request papers which demonstrate the use of simulation to enhance propulsion systems and subsystems, detail the design tools that support the above technologies, and provide creative validation/testing methods aimed at reductions in development/qualification costs.

**Session Chair:** **Isaac Lopez**, NASA Glenn Research Center, (216) 433-5893, email: isaac.lopez@nasa.gov; **Deputy Session Chair:** **Eric Sinusas**, Bell Helicopter Textron, Inc., (817) 280-1309, email: esinusas@bellhelicopter.textron.com.

### Structures & Materials

Papers are invited which address the development, design, analysis, testing, service experiences, or novel application of structures and materials to manned and unmanned rotorcraft, powered lift and fixed-wing V/STOL aircraft. Topics of interest are durability and damage tolerance, fatigue and fracture mechanics, impact mechanics, advanced metallic and composite materials and structures, probabilistic and reliability methods, repair concepts and methodology,

structural health monitoring/prognosis of remaining useful service life, stress and finite element analysis, structural design criteria, structural loads development, and structural optimization. In general, related topics on affordability, weight reduction, material and structural qualification and stress prediction accuracy improvements are desirable. Papers on practical applications of high strain, high durability, or adaptive materials to advanced structural concepts for improved performance or affordability are also solicited.

**Session Chair: Dr. Stephen Conlon**, The Pennsylvania State University Applied Research Laboratory, (814) 863-9894; scc135@arl.psu.edu; **Deputy Session Chair: Jeffery Schaff**, Sikorsky Aircraft Corporation, (203) 386-7423; jschaff@sikorsky.com.

### System Engineering Tools/Processes

The AHS System Engineering Tools/Processes Technical Committee invites papers that will promote the advancement of the practice of system architecture, design, development, integration and management, across the multiple disciplines and specialty areas associated with the engineering of systems within the AHS technical community. Papers of interest can range from understanding and documenting of customer requirements and design, through the life cycle to include manufacturing, field support, upgrades and disposal. The System Engineering Tools/Processes Technical Committee is also interested in soliciting technical papers from other AHS Technical Committees to demonstrate the engineering of systems across multiple technical domains. Specific areas for consideration may include:

- Requirements Development and Management
- System Architecture, especially at the System-of-Systems level
- System Modeling and Simulation
- System Verification and Validation
- Systems Reliability
- System Qualification and Certification
- Program / Project Management for System-of-Systems
- Risk Management
- Systems Engineering tools, processes and best practice
- Systems Engineering quality management
- Systems Engineering education and training
- "Systems Thinking" benefits

**Session Chair: Oxana Fedak**, The Boeing Company, (610) 591-1182, email: oxana.s.fedak@boeing.com; **Deputy Session Chair: Joan Pham**, Sikorsky Aircraft Corp., (203) 386-5508, email: JPham@sikorsky.com

### Test & Evaluation

Papers are invited that address all aspects of rotorcraft, V/STOL and UAV testing, including evaluation of components and subsystems, as well as those specifically discussing ground, flight and wind tunnel testing. Papers showing new and insightful ways of innovative ground and flight test procedures, new test techniques, and novel control systems are highly desirable. The Test & Evaluation Committee strongly encourages papers covering the operational and environmental area of low-speed flight and inherent problems associated with rotary wing platforms. Abstracts should not exceed 5 pages (10 pt., single-spaced, 1 inch margins, all-inclusive) in length.

**Session Chair: Dr. Jose Palacios**, The Pennsylvania State University, (814) 867-2982, email: jlp324@psu.edu; **Deputy Session Chair: Jay Fletcher**, US Army AFDD, (650) 604-1846, email: jay.fletcher@us.army.mil.

### Unmanned VTOL Aircraft & Rotorcraft

Papers are invited on the concepts, design, development, operation, and robotics aspect of VTOL and rotary-wing UAVs in the following general areas:

- Autonomy, Collaboration, and Architectures
- Reliability and Robustness
- Payloads and Sensors
- Agility and Performance
- Survivability and Operability

Topics of interest include, but are not limited to:

- Design concepts, including small and micro air vehicles
- Mechatronics integration
- Reasoning, decision-making, autonomy, and multi-vehicle
- Collaboration architectures
- Embedded perception and data/information fusion
- Guidance, navigation and control
- Autonomous operation, tasking, and control (C4)
- Manned-unmanned teaming
- Flight testing, modeling, and simulation
- Data links and communications
- Airworthiness, safety and certification, operation in civil airspace.

**Session Chair: Dr. Harshad Sane**, Sikorsky Aircraft Corp., (203) 386-8695, email: harshad.sane@sikorsky.com, **Deputy Session Chair: Patrick Fabiani**, ONERA, 33-5-62-252-561, email: patrick.fabiani@onera.fr.

### Special Session: Wind Energy Technology

Wind energy and rotorcraft researchers encounter many of the same issues in the design, development of tools, manufacture and maintenance of their systems, due to the presence of the primary rotating system. Researchers in the wind energy and rotorcraft communities may not be aware of their counterpart's research and technology that is already existing and available that can address some of the technological challenges in design, analysis and operation. Some rotorcraft tools in structural dynamics, acoustics and aerodynamics are already in use by some wind energy companies, and vice versa. Technical papers are invited on wind turbine technologies, particularly those that are also applicable to lifting rotors. Similarly, rotorcraft technologies, modeling tools, approaches and concepts applicable to wind turbine blades are also sought.

**Session Chair: Michael R. Derby**, US Department of Energy, (202) 586-6830, email: michael.derby@ee.doe.gov; **Deputy Session Chair: Glen Whitehouse**, Continuum Dynamics, (609) 538-0444 ext. 126, email: glen@continuum-dynamics.com.

