

THE AEROSPACE ENGINEERING NEWSLETTER

A PUBLICATION OF AEROSPACE ENGINEERING · FALL 2012

Message from the Department Head



Our faculty, students, and staff continue to advance aerospace technology and systems, contributing to national defense, commercial flight, earth observation, exploration, and new sources of energy. And as the aerospace enterprise gears up to address significant workforce challenges in the coming decade, our major continues to be in high demand. Our undergraduate and graduate programs are ranked 10th and 13th by U.S. News & World Report and Penn State Engineering was ranked 11th in the annual Academic Ranking of World Universities!

Our faculty members continue to garner well-deserved recognition. Mark Maughmer received the 2012 Alumni Fellow Teaching Award, Penn State's highest teaching award. Maughmer is the founder of our Flight Vehicle Design and Fabrication ("Sailplane") course, and advises students in numerous hands-on design activities including the AIAA Design-Build-Fly competition (DBF) and the Kremer sport prize for human-powered flight. Instructor Jose Palacios (B.S. '03, M.S. '04, Ph.D. '08) received the Bagnoud Award from the AHS for an outstanding contribution to vertical flight technology by a member under the age of 35.

A team of our undergraduates took 2nd place in the annual student design competition of the American Helicopter Society—the 7th year in a row that we have placed in the top two! Student teams also participated in DBF, the University Student Launch Initiative, and the SISO Smackdown.

Other students and alumni garnered additional awards. Justin Long (B.S. '12) received this year's Anthony E. Wolk (B.S. '56) best senior thesis award, advised by Steve Conlon. Brandi Wingate (B.S. '12) received the Sigma Gamma Tau Mid-Atlantic Region Undergraduate Student Award. Graduate student Russell Powers (B.S. '10), advised by Dennis McLaughlin, received the best student paper award from the AIAA Aeroacoustics Technical Committee. And John Bird, a graduate student advised by Jack Langelaan, received the Mertens Award for the best student contribution at the OSTIV Congress.

Former NASA Chief Technologist Bobby Braun (B.S. '87) was Penn State Engineering's spring 2012 commencement speaker. Ray Baker (B.S. '98), senior propulsion systems engineer at JPL, played a key role in the development of the braking engines used in the Curiosity Mars rover landing. Thanks for the thrill, Ray! Mark Dreier (B.S. '74, M.S. '77) of Bell Helicopter Textron won the AIAA 2012 de Florez Award for Flight Simulation. And Razvan Rusovici (M.S. '95) received one of three 2012 Faculty Excellence Awards from the Florida Institute of Technology.

We also had two outstanding McCormick Lecturers this year, Jim Woodburn (B.S. '86) chief orbital scientist at Analytical Graphics, Inc., and Bob Nelson (Ph.D. '74) of Notre Dame University. Barnes McCormick (B.S. '48) himself recently offered his "Rotary Wing Technology" short course for the 45th year! To close the spring semester, Duncan Koerbel (B.S. '83), president of Global Services, Suzlon Wind Energy, received our Outstanding Engineering Alumnus award.

Susan Stewart, Sven Schmitz, and Dennis McLaughlin continue to lead our efforts to develop new courses related to wind energy. At present, three courses are being developed for online offering, with initial rollout imminent. Elaine Gustus joined our department as instructional designer to assist our faculty content experts in making these courses a reality. The courses will comprise a graduate certificate program, and will provide a degree option for a proposed online master's degree program in Renewable Energy and Sustainability Systems.

We are pleased to acknowledge Peter and Barbara Papadakos for their gifts of a restored AGM-78 missile and a MK-44 torpedo. These have already found places in our undergraduate structures laboratory, where students are gaining invaluable experience by performing structural vibrations tests on real defense hardware.

I am also delighted to announce that David and Nancy Pauling have endowed the "Pauling-Eisenhuth Award" to honor a master's degree student whose studies focus on national security. And through your collective generosity, we awarded more than \$150,000 of college and departmental scholarships to more than 40 students this year. We appreciate your assistance and loyalty to Penn State in making these a reality, and your continued support is more important than ever.

One in twenty-five people in the U.S. who holds a degree in aerospace engineering earned it from Penn State—evidence of our responsibility and impact. The department strives to prepare students for a competitive future, and we are committed to improving the quality of the education they receive.

We are pleased to feature Joe Horn's research in rotorcraft handling qualities in this year's research article. I know you will enjoy reading about the other recent activities and accomplishments of our students, staff, faculty, and alums. We always like to hear from you, and we welcome your feedback. Please send us news at: aerospace@engr.psu.edu.

Best regards,

George A. Lesieutre

George A. Lesieutre

UPCOMING ALUMNI EVENTS

**Reception at 51st AIAA Aerospace Sciences Meeting
Jan. 7, 2013 – Grapevine (Dallas/Ft. Worth Region), TX**

*Please visit our website for current information
regarding upcoming events.*

www.aero.psu.edu

Awards & Recognition

Faculty



Mark Maughmer (R) receiving his Penn State Alumni Teaching Award from President Rodney Erickson.

Mark D. Maughmer, professor of aerospace engineering, was named a 2012 Penn State Alumni Teaching Fellow, one of the University's highest teaching awards. Maughmer developed the Flight Vehicle Design and Fabrication course upon joining the aerospace engineering faculty in 1984. The course, which has received national attention, immerses undergraduate students in many aspects of aerospace engineering, including fabrication and testing of full-scale components. Maughmer has previously received several other teaching awards including the Penn State Engineering Alumni Society Outstanding Teaching Award and Premier Teaching Award, and the American Society of Engineering Education's Fred Merzfeld Engineering Educator Design Award.

George A. Lesieutre, head of aerospace engineering, presented the keynote address at the 20th AIAA Adaptive Structures Forum. The forum was held April 23-26 in Honolulu, in conjunction with the 53rd Structures, Structural Dynamics, and Materials Conference of the American Institute of Aeronautics and Astronautics (AIAA). The title of his address was "Adaptive Structures: The Journey to Flight."

Robert G. Melton, professor of aerospace engineering, will serve as the interim assistant dean for student services for the 2012 fall semester. Melton will take over for Jean Landa Pytel, who will be on leave to enhance the college's global engineering education programs. His duties involve directing the Engineering Advising Center and reviewing and making decisions related to enrollment matters.

Victor W. Sparrow, professor of acoustics and interim chair of the Graduate Program in Acoustics, received the 2012 Outstanding Faculty of the Year Award from the FAA Center of Excellence for Aircraft Noise and Aviation Emissions Mitigation. The award, presented in March, recognized his outstanding achievement in aviation research and education. Sparrow specializes in teaching computational acoustics and nonlinear acoustics.

Promotions:

David B. Spencer was promoted to full professor, effective July 1, 2012. He joined the Penn State faculty in 1999 as an assistant professor. He received his B.S. degree in mechanical engineering in 1983 from the University of Kentucky, his M.S. in aeronautics and astronautics in 1985 from Purdue University, and his Ph.D. in 1994 in aerospace engineering sciences from the University of Colorado.

Jacob (Jack) W. Langelaan was promoted to associate professor with tenure, effective July 1, 2012. He joined the department in 2006 as an assistant professor. Before joining the Penn State faculty, he served as a research assistant for six years in the Aerospace Robotics Laboratory at Stanford and prior to that, he was an engineer at Bombardier Aerospace (formerly de Havilland Inc.) in the Acoustics and Vibration Group. He received a B.A.Sc. in 1992 from Queens University, an M.S.A.A. in 1994 from the University of Washington, and his Ph.D. in 2006 from Stanford University.

Partings:

Farhan S. Gandhi, professor of aerospace engineering, has taken the position of the Redfern Chaired Professorship in Aerospace Engineering at Rensselaer Polytechnic Institute. We appreciate his 17 years of service to Penn State and wish him success at RPI.

Staff News



Debby Mayes, head staff assistant, received a 2012 Penn State Engineering Alumni Society (PSEAS) Outstanding Staff award. The PSEAS award recognizes and rewards outstanding service by staff employees in the College of Engineering. As a recipient of the award, she received a plaque and monetary prize that is funded through annual gifts from Engineering alumni and friends.

Welcome New Staff



Elaine Gustus was hired to fill the department's newly created position of instructional designer. She joined the department in March 2012 and will be working closely with **Susan Stewart**, research associate in aerospace engineering, and **Sven Schmitz**, assistant professor of aerospace engineering, to develop online courses in wind energy for a university-wide Master's of Professional Studies in Renewable Energy and Sustainability Systems. Gustus enjoys hiking in the central Pennsylvania forests with her dog and photography.

Brenda Kasubick joined the department in April 2012 as our bookkeeper. Kasubick had previously worked for more than 24 years at US Foods in Altoona. She enjoys visiting her son at West Point and traveling with her family.



Partings:

Arabella (Bell) Confer left her position as bookkeeper in March 2012 after 3½ years with the department. She works now as a financial assistant in the College of Liberal Arts.

Barbara Kepinska left her position as administrative support assistant with the Vertical Lift Research Center of Excellence in June 2012 to pursue other interests.

Colonel (ret.) Sam Evans, research associate with the Vertical Lift Research Center of Excellence, recently moved to Penn State's Applied Research Laboratory (ARL) in the Systems and Operations Automation Division, Applied Enterprise Systems Department, where he works in various research projects in Condition Based Maintenance, logistics and health, and usage monitoring.

Editors: Farhan Gandhi, Deborah Mayes, and Michelle Barnyak with contributions from the College of Engineering's Public Relations Office

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, genetic information, national origin, race, religious creed, sex, sexual orientation, gender identity or veteran status and retaliation due to the reporting of discrimination or harassment. Discrimination, harassment, or retaliation against faculty, staff or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding this nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802 Tel. (814) 863-0471/TTY: U.Ed. ENG 13-06 MPC 121194

Awards & Recognition

Scholarships/Fellowships 2011-12

Department of Aerospace Engineering

Aero Pioneers Class of 1944 Scholarship

Tyler Druce, Kevin Dugan, Collin Russo

Lou Borges Scholarship

Anthony Montalbano, Emily Wolf

Mary Ilgen Memorial Scholarship

Jared Meyer

Richard W. Leonhard Scholarship

Robert Arrowood, Tyler Bello, John Chisholm, Brett Davis, Eric Gilligan, Brian Killeen, Megan Kwolek, Nicholas Ravago, Nicholas Svrbely, Adam Thorsen, Shiang-Teng Yeh

James Reynolds Norris Memorial Scholarship

ZuQun Li

David J. Peery Memorial Scholarship

Yaowei Li

Carl A. Shollenberger Memorial Scholarship

Jeffrey Jesiolowski

Donald G. and Jayne L. Steva Scholarship

Justin Long

Anthony E. Wolk Senior Thesis Award

Justin Long

College of Engineering

Bigony Trustee Scholarship

Nathan Johnson

Boeing Scholarship

John Chisholm, Kaomi Hashimoto, Anthony Montalbano, Thuan Nguyen, Emily Wolf

Marion S. and Edward C. Breinig Scholarship

Alexander Troup

James Bricker Memorial Scholarship

Alexander Troup

Coldren Family Trustee Scholarship

Ryan Royce

Diefenderfer Scholarship

Jason Harmon

H. Thomas and Dorothy Willits Hallowell Scholars Endowment

Kevin Dugan

Roy E. Happel Scholarship

Emery Etter

John Pierre Hemler Memorial Scholarship

Christine Marabella

Huck International

Duy Nguyen

William & Wyllis Leonhard Honors Program

Collin Russo, Emily Wolf

Loren & Bernardine Stolp Family Trustee Scholarship

Alex Karns, Thuan Nguyen

Irv and Barbara Susson Trustee Scholarship

Katherine Trageser

Howard J. Waltemeyer, Sr. Scholarship

Stephen Prichard

Graduate Fellowships/Awards

AHS Vertical Flight Foundation Scholarship

Austin Overmeyer, Jason Slaby

Bunton-Waller Graduate Award

Marvin Washington

College of Engineering Recruitment Fund (CERF)

Jayanth Krishnamurthi, Michael Lurie, Varun Patil

DoD SMART Fellowship

Eric Hayden, Todd Henry, Gabriel Murray, Leighton Myers, Russell Powers

Richard W. Leonhard Graduate Scholarship

Eric Hayden, Russell Powers, Zeljko Raic

National Defense Science and Engr. Graduate Fellowship

James Coder, Nathan Depenbusch, Mihir Mistry, John (Jack) Quindlen, Anna Winslow

PA Space Grant Consortium Graduate Fellowship

Brian Wallace

Eric Walker Assistantships (ARL)

Michael Policelli, David Reich, Grant Skidmore, Michael Wozniak

Paulings Endow Graduate Award for Academic Achievement

The department is delighted to announce that David and Nancy Pauling have endowed the "Pauling-Eisenhuth Award" in the Department of Aerospace Engineering "to honor and recognize outstanding academic achievement by a master's degree student whose studies focus on national defense or homeland security."

The award is named for the Paulings and **Joseph Eisenhuth**, a former faculty member and Nancy Pauling's step-father. Eisenhuth served with distinction in the Pacific Theatre during World War II as a carrier-based dive-bomber pilot, earning numerous awards including the Navy Cross. He returned to Penn State to earn B.S. ('48) and M.S. ('49) degrees in Aeronautical Engineering, and earned his Ph.D. ('63) degree while working at ARL. He worked in industry before returning to Penn State ARL to do research and teach in aerospace engineering. Eisenhuth passed away in 2009.

Nancy Pauling is a Penn State graduate in Home Economics Education (B.S. '74). **David Pauling** (M.S. '75) is presently executive director for operational integration strategic planning for the Department of Homeland Security Customs and Border Protection, having retired from the DoD Senior Executive Service after 35 years of service. During that time he served as U.S. Army Air Defense Artillery officer and combat helicopter pilot in Vietnam, flight test engineer at the Naval Air Test Center, and rose through positions of increasing responsibility to Assistant Deputy Under Secretary of Defense for Materiel Readiness and Maintenance. He earned combat air medals in Vietnam and, among other awards, the Presidential Rank Award for Meritorious Executive in the Senior Executive Service. He received the Penn State Outstanding Engineering Alumni Award in 2009, and serves on our IPAC.

We are grateful to the Paulings for their continuing confidence in, and support of, our department and its students.

Department Activities

IPAC 2012

The 2012 Industrial and Professional Advisory Council (IPAC) meetings were held on March 21-23. IPAC meetings are held once a year to evaluate and guide the department. The eight members in attendance spent their days and evenings interacting with our faculty and students. This year's IPAC suggested that the department continue to expand its faculty, ensure that our Master's degree program stays top notch, and develop new resources to provide educational and research experience for our students and faculty. IPAC praised the efforts of our faculty and staff. They appreciated the large number of hands-on design activities offered that enhance student learning and provide students with experience desired by industry. The high-quality faculty and diverse offerings enable the department to attract and retain very well-qualified students (the department graduated three B.S. students in spring 2012 with a GPA of 4.0). IPAC members participating in the 2012 review include:



IPAC Committee, standing from left: M. Rudy, P. Holcombe, M. Dreier, R. Braun, D. Pauling; sitting from left: D. Senft, J. Mantini, H. Rarick.

Robert D. Braun (B.S. '87), the David and Andrew Lewis Professor of Space Technology, Georgia Institute of Technology, Atlanta, GA

Mark D. Dreier (B.S. '74, M.S. '77), a staff engineer with the Preliminary Design group at Bell Helicopter Textron, Inc. in Fort Worth, TX

Pierson J. Holcombe (B.S. '56), retired president of Grumman Data Systems Corporation, a subsidiary of Northrop Grumman Corporation

Janis L. Mantini (B.S. '79), retired program manager from The Boeing Company, Huntington Beach, CA

David V. Pauling (M.S. '75), retired from the Department of Defense Senior Executive Service and currently executive director for Department of Homeland Security Customs and Border Protection

Heather L. Rarick (B.S. '87), flight director, Mission Control at NASA's Johnson Space Center, Houston, TX

Michael D. Rudy (B.S. '70, M.S. '73), vice president/general manager at Teledyne Turbine Engines in Toledo, OH

Donna C. Senft (B.S. E Sci '83), mission lead for the Air Force Research Laboratory (AFRL), Space Vehicles Directorate, located at Kirtland AFB, NM

Unable to attend were, **Shelly K. Brimmeier** (B.S. '01), aerodynamics engineer, advanced development programs at Lockheed Martin Aeronautics Company, Palmdale, CA, and **Brian Chappel** (B.S. '83), vice president, Business Management, Advanced Programs and Technology Division at Northrop Grumman Aerospace Systems, El Segundo, CA, and Michael Eder, director, Airframe and Installation Design at Lockheed Martin Aeronautics, Fort Worth, TX.

The department would like to extend a special thank you to those IPAC members who rotated off the council this year - **Robert Braun, Mark Dreier, and Janis Mantini.**

In Memoriam

Maurice M. Sevik, 88, died Oct. 20, 2011, in Oakland, CA. Sevik graduated in 1943 with top honors in engineering from Robert College in Istanbul and received a master's degree in engineering from the Imperial College of Science, Technology, and Medicine in London. He was named professor of aerospace engineering in 1968 and then director of the Garfield Thomas Water Tunnel in 1969. He was the keynote speaker at the 1968 meeting of the Acoustical Society of America in Rome. His work led to a 27-year career with the United States Navy as head of ship acoustics at the Carderock Division of the Naval Surface Warfare Center in Bethesda, MD, where he served from 1972 until his retirement in 1999; a building was named after him at the Naval Surface Warfare Center. His honors included the Navy Superior Civilian Service Award, the Presidential Rank Award and the Gold Medal Award from the American Society of Naval Engineers. He also was elected a member of the National Academy of Engineering.

Frederick R. Mazzitelli, 88, of Lake Ariel, PA, formerly of Huntington Station, NY, died, July 1, 2012. Mazzitelli graduated from Penn State in 1947 with a degree in aeronautical engineering. At Penn State, he was the

first violinist in the Symphony Orchestra. During World War II, he served as an aviation electrician's mate in the Navy. After his service with the Navy, he spent his career working in the aviation field, primarily with Piasecki Helicopters and Grumman Aerospace Corporation. He retired from Grumman in 1990. The development of principles describing the aerodynamics of helicopter rotor blades and the development of early V/STOL aircraft were among his many professional accomplishments. He was recognized in "Who's Who in American Men of Science."

In September 2011, a small group of Tyrone Area High School (TAHS) alumni and administrators gathered in the TAHS Library to honor the legacy of **Roger O. Woodring** (B.S. '70). Woodring graduated from TAHS in 1965 and received his aerospace engineering degree from Penn State in 1970. He enlisted in the Navy and served as a helicopter pilot from 1969-1974, dying in an accident during a training exercise. In 1976, the TAHS Library established the "Lt. Roger O. Woodring Aerospace Collection." The memorial collection continues to be supported by Woodring's classmates from the Class of 1965, making additional books and a new plaque possible.

Horn Seeks to Improve Rotorcraft Handling Qualities

Civil and military helicopter pilots face numerous challenges. Helicopters must often operate close to terrain, in proximity to structures, in adverse weather and poor visibility, and near the performance limitations of the aircraft. Rotorcraft typically have less inherent stability than their fixed wing counterparts, especially when operating in hover at low speeds. All of these factors can lead to high pilot workload or poor handling qualities, which can limit the operational effectiveness of the aircraft.

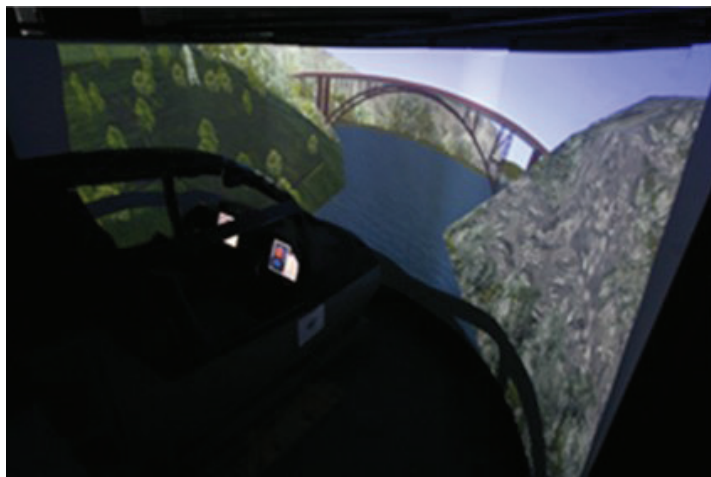
One example of a high workload mission is the launch and recovery of a helicopter from a ship. Ship speed and ambient winds produce a turbulent airwake behind the ship's superstructure, sometimes resulting in very gusty conditions over the flight deck. Furthermore, the deck can experience significant motion in high sea states, and pilots must time their landings to set down during quiescent periods. The U.S. Navy commits substantial resources towards ensuring safety of rotorcraft operations from ships by conducting extensive dynamic interface (DI) flight testing of virtually every combination of rotorcraft, ship, and wind condition. Even after extensive testing, operations can be more restricted than desired, and the Navy must prohibit rotorcraft operations in some sea states and relative wind conditions.

Advanced control systems can enhance rotorcraft stability, reduce pilot workload, and ultimately expand the flight envelope. Fly-by-wire technology, where traditional mechanical control linkages are replaced with electronic connections and flight control computers, greatly expands the control engineer's ability to tailor the response characteristics of the aircraft and reduce workload. **Joe Horn**, associate professor of aerospace engineering, is conducting research on novel control design methods to enhance rotorcraft handling qualities and expand the operational envelope of current rotorcraft.

At the heart of a fly-by-wire control system are the *control laws*, the algorithms that process sensor data and pilot stick inputs and then drive aircraft actuators to achieve a desired response. Over the last several years, one focus of Horn's work has been the development of control laws to improve gust rejection and response characteristics for rotorcraft operating from ships. His research team developed a control law algorithm, the *airwake compensator*, to help reject disturbances typically encountered in ship airwakes. The airwake compensator can be integrated with an existing control law to improve gust rejection without complete re-design and re-qualification of the system. Horn has collaborated with industry and government partners to develop several variants of such a compensator. This includes a version that uses on-blade control devices (trailing edge flaps) to augment gust rejection. His research group also developed an *adaptive airwake compensator* that learns the frequency characteristics of airwake disturbances in flight and tunes the compensator to optimize gust rejection. Several of the control laws have been tested in piloted simulations (both at the Penn State simulator described below and at industry flight simulators) and have demonstrated significant improvement in handling qualities.

An essential tool in Horn's research is the Rotorcraft Flight Simulation Laboratory at the Penn State Vertical Lift Research Center of Excellence (VLRCOE). The simulator was built around the XV-15 simulation cab donated to Penn State by Bell Helicopter Textron. It includes the cockpit of one of the original XV-15 tiltrotor aircraft and a programmable control loading system. The simulator has a three-channel image generation system which projects onto a 15-foot diameter cylin-

dricl screen providing a 180-degree field of view. This simulator allows Horn's research group to design control laws, test their performance in simulation, and collect pilot opinion data to assess handling qualities. For example, the simulator was recently used to test control system modifications for the X-49A compound helicopter developed by Piasecki Aircraft Corporation.



The PSU VLRCOE rotorcraft simulator includes the Bell XV-15 cab and a 3-channel IG system.



U.S. Navy pilots evaluate the adaptive airwake compensator on the PSU VLRCOE rotorcraft simulator.

Horn's research in rotorcraft flight controls has been supported by a combination of U.S. Army, Navy, NASA, and industry sponsors, much of it under the VLRCOE grant and by the Vertical Lift Consortium (VLC). He has worked in collaboration with the major rotorcraft manufacturers (Sikorsky Aircraft, Boeing Helicopters, and Bell Helicopter Textron), and he has collaborated on projects with several smaller companies such as Continuum Dynamics, Barron Associates, and Piasecki Aircraft.

2012 Outstanding Engineering Alumnus



Duncan Koerbel (B.S. '83), president of Global Services for Suzlon Wind Energy Corporation, was named a 2012 Outstanding Engineering Alumnus. Koerbel returned to his alma mater in late April for the College's recognition ceremony. While on campus he presented a lecture titled, "Airplane Product Development and Aerospace Engineering in the Renewable Wind Energy Industry." The lecture discussed lessons learned over 25 years in airplane product development and the relevance of an aerospace engineering background in the renewable wind energy industry. At Suzlon, Koerbel oversees the Operations, Maintenance, and Services (OMS) of a worldwide fleet of 8,400 wind turbines and 11,000 gigawatts of power generation in 14 countries. Koerbel has held senior executive positions with Lockheed Martin, HawkerBeechcraft, Adam Aircraft, Bombardier Aerospace in Montreal, Canada, and Fairchild Dornier in Munich, Germany. In addition to his B.S. degree from Penn State, Koerbel earned an MBA in 1990 from Wichita State. He also holds a pilot's license with commercial and instrument ratings.

Barnes W. McCormick Honorary Alumni Lectures

Fall 2011



James Woodburn (C) with Barnes McCormick (L) and George Lesieutre (R) as the fall 2011 Barnes W. McCormick Honorary Alumni Lecturer.

James Woodburn (B.S. '86) was on campus in November to present the fall 2011 Barnes W. McCormick Honorary Alumni Lecture. The seminar titled, "Dealing with Uncertainty in Astrodynamics via Systems Engineering" was delivered to an audience of faculty and students who were given an overview on how maintaining accurate knowledge of the trajectory of a spacecraft is critical to most satellite missions. Woodburn joined Analytical Graphics Inc. (AGI) in 1994 as chief orbital scientist. Working in algorithm and software development, he is currently responsible for the development, verification, and enhancement of algorithms related to orbit determination, orbit dynamics, and visibility computations within AGI's family of products. Prior to joining AGI, he was employed by GE and Martin Marietta.

Spring 2012



Robert Nelson, the spring 2012 Barnes W. McCormick Honorary Alumni Lecturer, with George Lesieutre.

Robert Nelson (Ph.D. '74) was the spring 2012 Barnes W. McCormick Honorary Alumni Lecture. Nelson teaches and researches at the Hessert Center of Aerospace Research in the Department of Aerospace and Mechanical Engineering at the University of Notre Dame. His lecture titled, "Wind Energy Research," addressed the issues and challenges facing the Wind Power Industry and key technologies used to increase energy capture, improve wind turbine control, and lower the cost to produce electric power using wind turbines. Prior to joining Notre Dame, Nelson was an instructor in aerospace engineering at Penn State and later worked as a civilian engineer at the United States Air Force Flight Dynamics Laboratory (AFFDL) at Wright-Patterson Air Force Base in Ohio.

Alumni News



Robert D. Braun (B.S. '87) delivered the spring 2012 commencement address for Penn State Engineering. Braun is the David and Andrew Lewis Professor of Space Technology and director of the Space Systems Design Laboratory at the Georgia Institute of Technology. In his address, delivered to more than a thousand engineering seniors, he exhorted the class of 2012 to change the world through innovation. Braun, who served as the first NASA chief technologist in a decade, left the agency in October 2011 and returned to the faculty of the Georgia Institute of Technology in Atlanta. During his tenure at

NASA, Braun served as the agency's principal adviser and advocate on matters concerning agency-wide technology policy and programs. Braun also was responsible for the formulation and initial implementation of NASA's Space Technology Program, which develops crosscutting technologies and advanced capabilities to enable NASA's future space missions.

Braun also received the 2012 Al Seiff Award at the 9th International Planetary Workshop (IPPW) in Toulouse, France. The award is bestowed annually at the IPPW in recognition of outstanding contributions to the technology, science, and mission planning of atmospheric entry probe missions that advance the knowledge of planets or moons in the solar system, and the mentoring of young engineers and scientists in these fields.

Jose L. Palacios (B.S. '03, M.S. '04, Ph.D. '08) received the American Helicopter Society's Francois Xavier Bagnoud Award. This award recognizes an outstanding contribution to vertical flight technology by a member under the age of 35. Palacios traveled to Fort Worth, TX, in early May where he was presented the award at the AHS Awards Banquet. The banquet is one of the main events held during the society's Annual Forum and Technology Display.



Razvan Rusovici (M.S. '95), associate professor of aerospace engineering at the Florida Institute of Technology, was one of three faculty members to be honored with the University's 2012 Faculty Excellence Award for outstanding performance. Rusovici has taught eight different courses in his years at Florida Tech, and has consistently received excellent evaluations from his students. During his supervision of the senior design course sequence, several student design teams received national, regional, and local awards, including the American Institute of Aeronautics and Astronautics Foundation's 2011 Best Paper Award of the International Student Conference. Rusovici currently serves as faculty adviser to the Sigma Gamma Tau National Aerospace Honor Society, where he is dedicated to involving aerospace students in industry and social outreach activities. He is also active in multidisciplinary curriculum and course development in the College of Engineering.

Anupam Sharma (M.S. '01, Ph.D. '04) moved from his position as a senior engineer at the General Electric Global Research Center located in Niskayuna, NY, to academia when he joined the Iowa State faculty in January 2012 as assistant professor of aerospace engineering and the Walter W. Wilson Faculty Fellow. Sharma is focusing his research on aeroacoustics and aerodynamics with applications to turbomachinery and wind turbines.

Emily T. Wallis (B.S. '10) attended flight school in Pensacola, FL, after receiving her commission from the U.S. Navy. She received her 'wings of gold' at the Naval Helicopter Association Symposium in Norfolk, VA, in May 2012.

David B. Shelton (B.S. '95), president of MotoPOD LLC, announced the company's latest aviation invention, the MotoLOAD. The MotoLOAD is a motorcycle loading system for personal airplanes, helping to alleviate the problem of ground transportation at small airports.

Christopher E. Giersch (B.S. '93) is the Education and Public Outreach manager for the Exploration and Space Orientations Directorate at NASA Langley Research Center in Hampton, VA. Giersch hosts the NASA EDGE, a video podcast that takes an inside and outside look at all things NASA. Coincidentally, Giersch sent his team to California to cover the CAFÉ Green Flight Challenge when our own **Jack Langelaan** led team Pipistrel/USA to victory.



Guion "Guy" S. Bluford (B.S. '64) was honored with the Pennsylvania Society's Gold Medal for Distinguished Achievement at the Society's 113th Annual Dinner. The society honors achievement and excellence and celebrates service to the Commonwealth and humanity. The Gold Medal is presented each year to a prominent person "in recognition of leadership, citizenship, and contributions to the arts, science, education, and industry."

Lance B. Bush (B.S. '85, Ph.D. '96) was named president and CEO of the Challenger Center for Space Science and Education. He assumed his new position in January 2012, having accumulated more than 25 years of leadership and entrepreneurial experience, most recently as the chief strategic officer and head of the Washington office of Paragon Space Development Corporation.

Anthony P. Masslofsky (B.S. '93) earned the rank of Navy commander and executive officer of Air Test and Evaluation Squadron Nine (VX-9).

Eric E. Schultz (B.S. '95) is a test pilot on the F-35 Joint Strike Fighter at Edwards Air Force Base. He had previously been an exchange pilot in Canada at Cold Lake, Alberta.

Congratulations to **Lawrence L. Trick** (B.S. '82, M.Eng. '94), who has had an award created in his name. This award will be given annually to the Civil Air Patrol squadron with the best cadet program in the state. The first Col. Lawrence L. Trick Award was announced in November 2011. Trick was the Maryland wing commander from 2000-2004 and was the first former cadet to be the Maryland wing commander.

Benjamin J. Day, Jr. (B.S. '08, M.S. '10) and **Dana (Brutsche) Day** (B.S. '08) were married in August 2011. Day is working as an acoustic technologies engineer and Dana as a Product Support Engineer; both work for the Boeing Company in Seattle, WA.

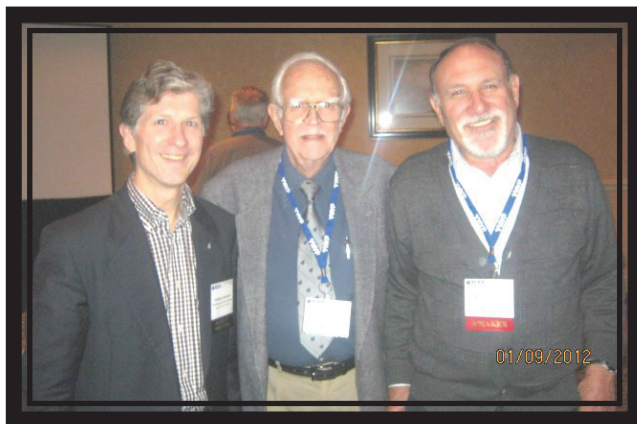
Matthew Ferringier (B.S. '02, M.S. '05, Ph.D. '09), of The Aerospace Corporation, was part of the team that developed the Genetic Resources for Innovation and Problem Solving (GRIPS) program. This is a decision-support process that uses evolutionary algorithms, efficient parallel processing on thousands of compute cores, and advanced high-dimensional visualization to solve complex problems. By using solutions generated by GRIPS, a small airline could save as much as \$1 million a day by streamlining its flight schedule. After nearly a decade of research, the team was honored with The Aerospace Corporation's Howard Katzman Innovation Award for their work with GRIPS.

Mark Dreier (B.S. '74, M.S. '77), staff engineer at Bell Helicopter Textron, Inc., was awarded the AIAA 2012 de Florez Award for Flight Simulation. This award is named in honor of the late Admiral Luis de Florez, and is presented for an outstanding individual achievement in the application of flight simulation to aerospace training, research, and development.

Five of the six remaining members of the 25-person **Aero Pioneers Class of 1944** either have already turned 90, or will be 90 by the end of Oct. 2012.



LEFT: Spring 2012 Graduation Ceremony.



RIGHT: **George Lesieutre, Barnes McCormick, and Dennis McLaughlin** (current and former department heads) at the ALAA Aerospace Sciences Meeting in Nashville.



Future Aerospace Engineering Student, Peter Corby.



Aerospace graduate students, **Sean Marlow, Grant Skidmore, and Rebecca Stavelly**, team up to complete a Tough Mudder—a 12-mile run through mud, water, and challenging obstacles.





David Spencer and Bill Nye "The Science Guy" at the International Astronautical Congress in Cape Town, South Africa.



*Spring 2012 graduation with **George Lesientre**, **Conor Marr** (B.S./M.S. '07, Ph.D. '12), and **Ed Smith**.*



Sailplane Class at their "for-fun" hand-launch glider competition.

*RIGHT: **Shelly Brimmeier** (B.S. '01) and **Jeffrey Corbets** (B.S. '05, M.S. '08) at the AIAA Aerospace Sciences Meeting Reception in Nashville.*



*LEFT: Aerospace Blue Band members from left to right: **Jacob Ndjali** (B.S. '12), **John (Jack) Chisholm** (B.S. '12), **Nicholas Rudenko** (aerospace undergraduate student), and **Erika Lieberknecht** (B.S. '12).*

THE GRADUATES

Student Marshal—Spring 2012



ZuQun Li was selected as the spring 2012 student marshal for the aerospace engineering program. Li, the son of NaiJian Li, is a 2007 graduate of the Northeast High School in Philadelphia, PA. Li represented the department at the undergraduate commencement ceremony held at the Bryce Jordan Center and chose **Jacob (Jack) Lange-**

laan, associate professor of aerospace engineering, to be his faculty escort. Li was a member of AIAA, Tau Beta Pi, and Sigma Gamma Tau. He received the Ayoub Mathematics Achievement Award, the Sanford F. Nicol Award for Engineering, and the Isaac H. and Jeanette Novack Award. While at Penn State, Li completed two internships at NASA and participated in several competitions. He also volunteered as a tutor at the Northeast High School in Philadelphia, PA. Li plans to continue his education as an aerospace engineering graduate student at Penn State.



Wolk Award



Justin Long was chosen by the department's thesis committee to receive the 2011-12 Anthony E. Wolk Senior Thesis Award. The award consists of a plaque, a cash award, and a booklet which was presented at this year's spring graduation reception. Long was selected for his thesis titled, "Investigation of Static Load Effects on Active Vibration Based Structural Health Monitoring." His thesis supervisor was **Steve Conlon**, assistant professor of aerospace engineering and his honors adviser was **Dennis McLaughlin**, professor of aerospace engineering. The Wolk Award was first presented in 2009 and is named in honor and memory of **Anthony E. "Tony" Wolk**, who graduated from Penn State with a B.S. in Aeronautical Engineering in 1956.

SUMMER 2011

Bachelor of Science

Mark J. Cavanaugh
Stephen P. Cheney
Daniel G. Melly
Ryan J. Moore
Michael S. Siegmund[§]
Bradley J. Sottile
Schuyler N. Sturdevant
Michael Zahradnik

Master of Science

Erica E. Capalungan
Nathan T. Depenbusch
Brenton R. Forshey
Yiqiang Han
Ryan F. Hook
Jeffrey R. Hopkins
Taylor R. Marotta
Sean M. McIntyre
Jesse K. McTernan
Santhosh V. Padala
Amandeep Premi
Peter Q. Romano

Doctor of Philosophy

Yongle Du
Dae Yong Kim
Jung Soo Kim

FALL 2011

Bachelor of Science

Christopher L. Berry
Patrick W. Doyle
Corey W. Friedenberger[§]
Edward Lee-Eng
Alessa J. Makuch
Brandon K. Miller
Kenneth W. Moore
Benjamin T. Pipenberg
Ryan M. Pischke
Sian A. Terry

Master of Science

Eric P. O'Neill
Christopher Peña
Michael Pontecorvo

Master of Engineering

Arkaprateem Hangloo
Stanley J. Kocon
Matthew D. Sirignano

Doctor of Philosophy

Julien M. Austruy
Scott D. Hanford
Ozhan H. Turgut

SPRING 2012

Bachelor of Science

Akinwale Y. Akinbiyi
Stephen M. Barr
David H. Baver Jr.
Matthew S. Becker
Tyler J. Bello
Michael E. Berger
Michael P. Boeckel
Jason P. Botta
Jorge F. Bunker
Collin J. Burden
Artem A. Busorguin
Andrew D. Chaves[§]
John R. Chisholm[§]
Adam G. Covino
Adam P. Crampton
Robert J. D'Alonzo
Ryan M. Daley
Brett M. Davis

Lawrence J. DiGirolamo

Michael A. Disori
Grant R. Dowell[§]
Bryan M. Finneyfrock
Eric T. Gilligan

Margalit Z. Goldschmidt

Andrew M. Goodyear

Titos M. Gosalvez

Christopher D. Gumke

Matthew L. Hanna

Brian D. Hantz

Jason S. Harmon[§]

Kaomi C. Hashimoto[§]

Drew H. Hirko

Ajeeth M. Ibrahim

Brian F. Imperiale

Jeffrey M. Jesiolowski

Michael J. Joppy

Stephen J. Kalasky

Harshad Kapoor

Alex M. Karns

Kaitlyn L. Kissane

Stefanie M. Kuhn

Megan J. Kwolek[§]

Matthew D. Labriola

Andrew R. Larkin

Dennis J. Larkin

ZuQun Li[#]

Erika N. Lieberknecht

Christine M. Lihn

Brian A. Linden

Debra A. Long

Justin A. Long[§]

Alan S. Love

Christine E. Marabella

Nicholas S. McCurdy

Jared A. Meyer

Jacob O. Ndjali

Stephen W. O'Neill Jr.

Andrew M. Palski

Joshua H. Panning

Parth Patel

Carl M. Phillips

Stephen M. Polonchak

Naveen S. Rehal

Joseph M. Risalek

Zachary P. Rohman

Charles A. Rose

Anthony C. Sabatino

Christopher J. Saucier

Wesley L. Shaw

Gregory L. Soneson

Jason B. Stocker

Derrick A. Stough

Adam T. Thorsen

Katherine H. Trageser[§]

Brian A. Vasquez

XingYun Wang

James J. Wark

Zachary M. Watson

Brandi N. Wingate

Joshua L. Wysocki

Ehtsham Yasin

Master of Science

Todd C. Henry

Austin D. Overmeyer

Pierre-Yves Taunay

Brian D. Taylor

Jason E. Town

Doctor of Philosophy

Conor M. Marr

[§] Schreyer Scholar

[#] Aerospace Student Marshal

Student Highlights

Student Awards

Brandi Wingate (B.S. '12) received the Sigma Gamma Tau (SGT) Mid-Atlantic Region Undergraduate Student Award. SGT is the national honor society for aerospace engineering. The objectives of SGT are to recognize and honor those individuals in the field of aeronautics and astronautics who have, through scholarship, integrity, and outstanding achievement, been a credit to their profession. Annually, each chapter submits a candidate to be considered for the regional award. A national winner is then chosen from the regional award recipients. Wingate served as the 2011-12 president of the Penn State SGT chapter. Wingate was also honored at the Engineering Diversity Awards banquet held at the Nittany Lion Inn in late March. She was one of the first runner-ups for the 2012 Joelle Award. This award recognizes outstanding leadership contributions by a woman student to the College of Engineering. After graduation, Wingate started her aerospace engineering career working for Ball Aerospace and Technologies in Boulder, CO.

Graduate student **Russell Powers**, who is advised by **Dennis McLaughlin**, professor of aerospace engineering, received the Best Student Paper Award from the AIAA Aeroacoustics Education Subcommittee. The winning paper was titled, "Acoustics Measurements of Scale Models of Military Style Supersonic Beveled Nozzle Jets with Interior Corrugations," and was presented at the 18th AIAA Aeroacoustics Conference in Colorado Springs, CO, in June 2012.

Sang-Ik "Terry" Cho, a graduate student in acoustics, was selected as a recipient of the Alumni Association Dissertation Award. This award provides funding and recognition to outstanding full-time doctoral students who have passed their comprehensive exams and have received approval of the dissertation topic. This award is considered to be among the most prestigious available to Penn State graduate students and recognizes outstanding achievement in scholarship and professional accomplishment. **Victor Sparrow**, professor of acoustics, serves as Cho's adviser.

John Bird, a master's student in aerospace engineering (advised by **Jack Langelaan**, associate professor of aerospace engineering) was awarded the "Mertens Award" for the best student contribution at the OSTIV Congress. OSTIV is the acronym for the Organisation Scientifique et Technique Internationale du Vol à Voile (International Organization for the Science and Technology of Soaring). It is a branch of the FAI (International Aeronautics Federation), which oversees all aeronautical records and competitions. The OSTIV Congress is a technical meeting held every two years concurrently with the World Gliding Championships. This year, the Congress and the Championships were held in Uvalde, TX, in August 2012. Bird's prize-winning presentation was titled, "Spline Mapping to Maximize Energy Exploitation of Non-Uniform Thermals." The prize is made available by the Mertens family in memory of Josef Mertens.

Of Note

Megan Kwolek (B.S. '12) graduated this spring not only with a B.S. in aerospace engineering, but also a B.S. in German language and a B.S. in global and international studies. She is one of only four aerospace students to graduate with three simultaneous degrees. The others are: **William R. Snow**, B.S. '73; **Angelo B. Intorre**, B.S. '08, M.S. '08; and **Shing K. Wong**, B.S. '09. After graduation, Kwolek accepted a position as an associate engineer in turbine aerodynamics and thermodynamics at Pratt & Whitney, East Hartford, CT.

Aerospace undergraduate student, **Emery Etter**, will likely be the starting longsnapper for the Penn State Nittany Lions. Etter is a walk-on from Chambersburg, PA and hopes to make an impact on the field this fall. "I feel like this is a position where you're part of the team," he said. "You don't get your name out there unless you screw up. For me, it's the definition of being part of the team. Nobody knows who you are, they just know you as a Penn State football player."

Student Societies



2012 inductees with the 2011-12 officers that were in attendance at the SGT induction banquet.

Sigma Gamma Tau (SGT). SGT is the national Aerospace Engineering Honor Society. The Penn State Chapter of SGT was very busy this year hosting a number of brand new events within the department. Corporate events with aerospace industry companies, such as Pratt & Whitney and GE Aviation, took place in the fall and spring to allow aerospace students to network and learn more about industry internships and full-time positions. SGT also hosted an Aerospace Engineering Networking Reception. This reception was held in the Hintz Alumni Center during the Spring Career Week at Penn State. Four companies participated in the event: Ball Aerospace, Lockheed Martin, MIT Lincoln Labs, and Pratt & Whitney. The event was very successful and it is anticipated that it will be held again during the 2012 Fall Career Days.

In April SGT hosted the annual induction banquet for its new members. This year's inductees are: **Robert Arrowood**, **Peter Blasco**, **Davide Conte**, **Ethan Corle**, **Matthew Honeychuck**, **Matthew Kapusta**, **Brian Killeen**, **John Knisely**, **Thomas LeTarte**, **Yaowei Li**, **Richard Mardis**, **Jared Meyer**, **Anthony Montalbano**, **John Morelli**, **Devin O'Connor**, **Parth Patel**, **Stephen Prichard**, **Nicholas Ravago**, **Swarna Sinha**, **Nicholas Svirebely**, **Ethan Thompson**, **Katherine Trageser**, **Joseph Tylutki**, **Emily Wolf**, and **Shiang-Ting Yeh**. **Pierson J. Holcombe** (B.S.'56), a distinguished professional of engineering, business development, and general management roles in the aerospace and defense industries, spoke at the induction ceremony. He discussed his overall career and provided students with words of wisdom as they move forward in the field of aerospace engineering. The newly elected officers for 2012-13 include: **Anthony Montalbano** (president), **Richard Mardis** (vice president), **Robert Arrowood** (treasurer), and **Ethan Corle** (secretary).

American Institute of Aeronautics and Astronautics (AIAA). The 2011-12 academic year offered many special opportunities to the students of the Penn State chapter of the AIAA. In addition to monthly meetings, the organization planned new and different activities to get the students more involved. In September new members set up booths at involvement fairs and increased the society's presence in the engineering community. The officers also participated in several events such as Major Night, which informs freshman and sophomore students about the aerospace major. In the beginning of October, a group of students

Student Highlights

toured the University Park Airport. A tour of Geisinger's Life Flight office and their air-ambulance helicopter were also on the schedule. November saw several more career events, including one by Pratt & Whitney. During this event, students were able to learn about the work environment, projects, and how to adjust to life outside of academia.

The spring semester saw several larger events and unique opportunities for students and faculty alike. With the start of January came more career and professional activities including the planning stages for the annual AIAA Congressional Visits Day in Washington, D.C., and the Region 1 AIAA Student Conference. February saw several groups of students reaching out to educate high school students about the aerospace major and the role engineers play in society. In March, a group of eleven students traveled to Washington, D.C., for Congressional Visits Day. The students learned about the state of the industry and how the government can further the aerospace enterprise. By meeting with members of Congress from both the U.S. House and Senate, this year's AIAA students were able to voice their opinion about the future needs of the industry. The second weekend in April, Penn State hosted the Student Conference which gave both undergraduate and graduate students a forum in which to present their thesis, an exhibition topic, or an outreach project to the aerospace community. More than 50 students from several universities over the Mid-Atlantic region presented their work; Penn State served as an excellent venue for our students to learn about activities at peer institutions and to make new friends.

American Helicopter Society (AHS). The Penn State chapter of the American Helicopter Society had an exciting year. Students participated in a range of events including technical talks by rotorcraft experts, a trip to an all-helicopter airshow, a radio-controlled helicopter air show, a treat day, and more.

The semester kicked off in September with a drop-in treat day in the aerospace engineering office. Students were invited to take a break during the school day to enjoy a variety of treats provided by AHS. An informal information session was hosted in the evening during which



AHS students enjoying RotorFest 2012. From left: **Brandon Dillinger, Anna Winslow, Conor Marr, and Christine Brown.**

the club and its objectives were introduced and upcoming events were presented.

In late September, students attended RotorFest 2012, an all-helicopter airshow at Brandywine Airport in West Chester, PA. In addition to the airshow, which consisted of military and civilian rotorcraft, students were able to explore a variety of helicopters on static display and to interact with both military and civilian pilots. Also in late September, William Bousman of NASA Ames Research Center presented his 2011 Nikolsky Lecture on lessons learned from UH-60 airloads testing. In October, Steve Glusman of Boeing Phantom Works discussed engineering ethics with the organization.

The spring semester began with a visit from **Robert Roedts** (M.S. '08) of Columbia Helicopters. Roedts discussed his work at Columbia and students were invited to apply for jobs and internships with the company. In April, local pilots put on a radio-controlled helicopter airshow for AHS students.

Student Organizations/Events

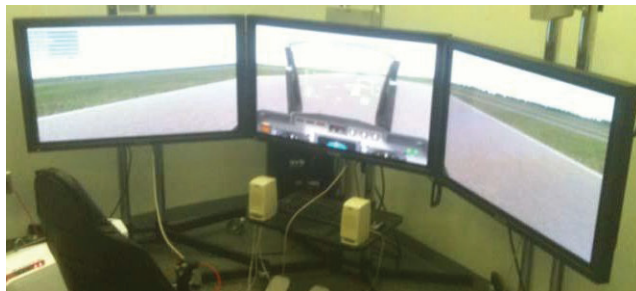


AHS Student Design Team, from left: **G. Soneson, S. O'Neill, A. Love, X. Wang, A. Thorsen, S. Kalasky, J. Horn, R. Bill, and E. Smith.**

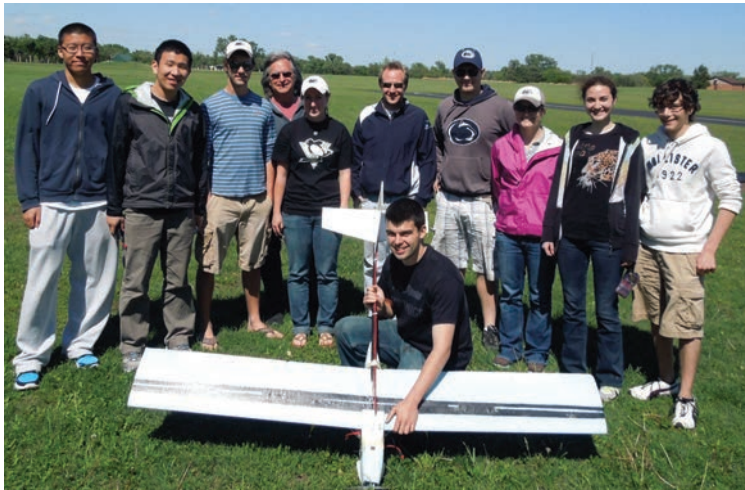
29th Annual American Helicopter Society (AHS)/Industry Student Design Competition. A group of aerospace students won 2nd place in the undergraduate division of the 29th annual AHS/Industry Student Design Competition last year. The design addressed a rotorcraft optimized to perform on a prescribed pylon course similar to those used in the fixed-wing Reno and Red Bull air races. The rotorcraft had to be capable of high speed and high load-factor maneuvers, and a predicted time to finish the course had to be calculated. This required students to analyze performance in complex transient maneuvers, which was a unique and particularly challenging aspect of this year's competition. A Penn State team from the AERSP 402 Senior Design class entered the Altair, a high speed coaxial helicopter and successfully demonstrated a simulated flight of the pylon course in X-plane. The team comprised **Stephen Kalasky, Alan Love, Stephen O'Neill, Greg Soneson, Adam Thorsen, and XingYun Wang.** Faculty advisers included **Joseph Horn**, associate professor; **Robert Bill**, research associate; and **Edward Smith**, professor.



The Altair as flown in X-plane.



Student Highlights



Design Build Fly—Hurricane team, L to R: X. Zhang, Y. Liu, B. Pipenberg, M. Maughmer, C. Lihn, C. Saunders, J. Valenti, J. Cole, C. Gill, and J. Satira; kneeling: K. Dugan.

The AIAA Student Design-Build-Fly Competition. The 2012 AIAA Design-Build-Fly Competition took place this year in April in Wichita, KS. The contest required each team to design an aircraft capable of flying three separate missions with the lightest possible aircraft. The missions this year included flying timed laps, ferrying simulated passengers, and a time-to-climb with two liters of water dropped at a set altitude. The Penn State team was advised by **Mark Maughmer**, professor of aerospace engineering, and consisted of **Christopher Saunders** (B.S. '08), graduate students **Julia Cole**, **Christine Lihn**, and **Benjamin Pipenberg**, sophomores **Charlotte Gill**, **Yande Liu**, **Xiaomo Zhang**, and **Kevin Dugan**, and freshmen **Jason Satira** and **Justin Valenti**. The competition was scheduled to run for three days, but was cut short during the second day due to inclement weather and ultimately cancelled after a tornado hit the contest site that night. Despite the bad weather, the Penn State entry the *Hurricane* had the opportunity to complete the first two missions, enough to place 19th out of 68 teams.



2012 SISO Smackdown team, front: Z. Li, B. Wingate, J. Harmon; back: A. Larkin, J. Chisholm, M. Kwolek.

Simulation Interoperability Standards Organization (SISO). The 2012 NASA SISO Smackdown was held in Orlando, FL, in the Florida Hotel and Conference Center. The Lion(s)³ team, consisting of **John**

“Jack” Chisholm (B.S. '12), **Jason Harmon** (B.S. '12), **Megan Kwolek** (B.S. '12), **Andrew Larkin** (B.S. '12), **ZuQun Li** (B.S. '12), and **Brandi Wingate** (B.S. '12), participated as the Lunar Shuttle and Lunar Rover federates. The team was advised by **David Spencer**, professor of aerospace engineering. The Lunar Shuttle is part of the Aerospace 401 Spacecraft Design class in which all members contributed to the design, configuration, and specification. The Lion(s)³ team won 3 out of 7 awards: the Pitch Award, the XCOM Award, and the WOW Award (voted best group by all in attendance).



Soaring Club members, L to R: J. Bird, A. Crampton (B.S. '12), J. Parotte, G. Dowell (B.S. '12), B. Capozzi, and D. Walls at the Soaring 100 in Kitty Hawk, NC.

The Penn State Soaring Club. The Penn State Soaring Club continued to grow this year and is now over twenty members. New members came from across the University, including both graduate and undergraduate students. Combined, the club made well over 500 flights with many students advancing in the licensing process. Of note, three club members took their first solo flights early in the fall of 2011, and one member earned both a commercial and flight instructor rating. In addition to flying, the club took several field trips this year, including a trip to Elmira, NY to fly with the Harris Hill Soaring Club. In addition, the University Park Allocation Committee (UPAC) sponsored a trip to the Soaring 100 in Kitty Hawk, NC. Finally, thanks to support from both the aerospace department and UPAC, the club purchased a dedicated soaring simulator to help with training and to allow the club to fly in virtual competitions with pilots from around the world.



The Flight Vehicle Design and Fabrication (Sailplane) Class. The Flight Vehicle Design and Fabrication course (AERSP 2/404H), aka “Sailplane,” made considerable advances on their Human-Powered Airplane (HPA) this year. The Zephyrus took its first flight in May of 2011. The class members took a three-pronged approach to its development this year. First, they continued electric-powered flight testing. After a

Student Highlights

series of flights, the aircraft flew at full weight, which provided useful data for performance analysis. Second, they designed and built a new fuselage section. This improved both weight and take-off performance. Third, they continued work on the propulsion system. A new propeller fabrication method was developed and the drive-train system was prototyped. The class expects to assemble the final configuration of the Zephyrus in fall 2012. Once completed, the class will begin human-powered flights. In preparation for these flights, the class has selected a pair of Penn State grad students to pilot the aircraft. These students have already begun training for the job. The HPA efforts were further supported by a team, led by Peter Blasco (undergraduate student in aerospace), that traveled to the University of Dayton to compete in the ItFlies USA 2012 Aircraft Design and Handling Competition. This competition is unique in that all of the entries are tested and evaluated by USAF pilots using a flight simulator to determine how the aircraft would perform in actual and extreme flight conditions. Penn State did very well in its first year of competition, finishing third behind Swansea University (UK) and the University of Dayton.



Members of the STP winning team with their rocket prior to launch. From left: Annan Shang, Sean McFarlane, Amelia Batcha, James Zellhart.

Student Space Programs Laboratory (SSPL). SSPL welcomed a new group of students into the Student Training Program (STP) this year. STP put two multidisciplinary teams of Penn State freshmen and sophomore students head-to-head as they learned about building space systems while building a soda-can-sized payload to launch on a model rocket and deploy at 2,000 feet. The payload was required to report telemetry data including GPS data, atmospheric pressure, acceleration and roll and pitch throughout the flight. Additionally, the payload had to safely descend to the ground falling between 15 and 30 feet per second, land upright and, if a parachute was used, detach it upon landing. The teams launched as the closing attraction for Exploration Day 2012, an event to inspire children in science, technology, engineering and math (STEM).

In addition to this year's STP teams, students and faculty at SSPL submitted a proposal for their OSIRIS-3U program to the National Science Foundation's CubeSat-based Science Missions for Geospace and Atmospheric Research. This proposal is the next step in a multi-year program to develop a CubeSat capability at Penn State following environmental testing of a 1U CubeSat in the early fall 2011.



USLI team, from left: Megan Kwolek, Brian Taylor, Matt Hanna, Lawrence DiGirolamo, Russell Moore, Tom Letarte, Vince San Miguel, James Petran, Heather Dawe, Jared Meyer, Eric Gilligan, Nick Braskey, Tony Maurer, Rob Algazi (kneeling), Pierre-Yves Taunay, Luke Young, and Adam Covino.

University Student Launch Initiative (USLI). The LionTech Rocket Labs is a team of students that competed in the NASA USLI. The goal of the competition was to design, build, test, and fly a high-powered model rocket to an altitude of one mile with a science payload. The competition involved several design reviews presented to NASA, construction of subscale and full-scale rockets, and outreach activities to promote the STEM fields to younger students. The competition culminated with activities and a final launch at the Marshall Space Flight Center (MSFC) in Huntsville, AL, in the spring. This is the second year that the Penn State team has participated in the USLI competition. This year's team comprised undergraduate and graduate students mostly from the aerospace engineering major, but students from mechanical, electrical, and computer science majors were also a part of the team. The rocket, named Phoenix, was designed by the team to carry sensors to collect atmospheric data and video of the flight. After several test flights in Ohio and Maryland, the team traveled to Alabama in April for the final part of the competition. While at the competition, the team had the opportunity to tour several labs at MSFC. They presented their project at a rocket fair, where they also had the opportunity to meet the other university and high school teams competing in the USLI competition. The final launch took place on April 22, in Toney, AL. The Phoenix flew to an altitude of 4,542 feet, which was lower than the one-mile goal, but all other systems worked as planned, including the recovery system, which had proved to be a particular challenge earlier in the year. Overall, the team had a very successful year, meeting all of the design requirements and reaching approximately 3,000 children through outreach events.



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Student Highlights



On Oct. 13, twenty-five aerospace engineering students and faculty visited the Naval Air Systems (NAS) Command at Patuxent River, MD, and received hands-on experience relevant to the future of naval tactical aviation. At the F-35 integrated test facility, government chief test engineer Andrew Maack provided a tour of the facility and a close-up look at F-35C test aircraft CF-2. The students, seniors set to graduate in May 2012, were enrolled in Penn State's Principles of Flight Testing Course - AERSP 420. Penn State is one of only four academic institutions to offer such a course, according to **Barnes McCormick**, Boeing Professor Emeritus. Students in AERSP 420 worked with a Cessna 172 and test pilot to understand the basics of creating a flight test plan and reporting results of a test flight.

Outreach and Other News

Aerospace Engineering grad plays key role in the Curiosity rover landing on Mars



This artist concept features NASA's Mars Science Laboratory Curiosity rover, a mobile robot for investigating Mars' past or present ability to sustain microbial life. Image credit: NASA/JPL-Caltech

Ray Baker (B.S. '98) is a senior propulsion systems engineer at the Jet Propulsion Laboratory (JPL) in Pasadena, CA. Baker played a crucial role leading the successful touchdown of the Curiosity rover. He worked for 11 years on the team that developed the Curiosity landing system's eight braking engines. Curiosity completed its Mars mission on a "high note" as it touched down safely, with its communications link intact, early one Monday morning in the beginning of August. Gazing back, Baker credits Penn State's Student Space Programs Lab (SSPL) and its director, **Sven Bilen**, associate professor of aerospace engineering, for preparing him to help land Curiosity. Baker also said his Penn State education enabled him to make history.

In February of 2012, the Penn State's **Lunar Lion Team** was featured on one of the Big Ten Network's episodes of 'Impact the World.' The Lunar Lion team is competing for Google's \$20 million

prize that will be given to the first university team to land a spacecraft on the moon. The Nittany Lions are the lone Big Ten representative in the competition, which features 29 international universities. Penn State's team is drawing on the University's expertise in electrical, mechanical, and aerospace engineering to assemble a single machine, the Lunar Lion, to serve as a spacecraft, lander, and rover.

The aerospace department is proud that nineteen students participated, in some capacity, in the 2012 Penn State IFC/Panhellenic **Dance Marathon (THON)**. THON is the largest student-run philanthropy in the world and engages more than 15,000 student volunteers. The yearlong effort raises funds and awareness for the fight against pediatric cancer and culminates in a 46-hour, no sitting, no-sleeping marathon each February. This was yet another record-breaking year in fundraising with almost \$10.7 million raised by many dedicated students. Aerospace students who participated were **David Bayer**, **Andrew Chaves**, **Davide Conte**, **Matt Conway**, **Stacie Flamos**, **Thomas Gempp**, **Jason Harmon**, **Shannon Hegarty**, **Stephen Kalasky**, **Erika Lieberknecht**, **Chrissy Marabella**, **Amanda Mazzenga**, **Anthony Parente**, **Ishan Patel**, **Joseph Risalek**, **Jack Rowley**, **Joseph Tombasco**, **Brandi Wingate**, and **Shiang-Ting Yeh**.

Seminars and Short Courses

Barnes McCormick, Boeing Professor Emeritus, University of Bergamo Park, "44th Rotary Wing Technology Short Course" - August 2012

Carlo Antonini, research associate, University of Bergamo (Italy), "Are We Able to Reduce Ice Accretion Using Superhydrophobic Surfaces" - June 2012

Sung Nam Jung, professor and leader of the rotorcraft group at Konkuk University, Korea presented "Rotorcraft Research Activities at Konkuk University" - May 2012

Blain Rawdan, configurator, Boeing Company, Huntington Beach, CA "The Role of the Configurator in Aircraft Design" - April 2012



Contributions

Thank You to All Who Have Contributed to the Department!

The department is grateful to all who have provided financial support of its students and activities. Following is a list of individual donors to the department from July 1, 2011, to June 30, 2012. We apologize if there are any omissions. If you contributed and have not been acknowledged below, please contact us so that we can correct our records. If you are already giving to Penn State, you might consider directing your future gifts to the Department of Aerospace Engineering.

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