



PENN STATE AEROSPACE ENGINEERING

FALL 2014 NEWSLETTER

Message from the Department Head



Our department continues to have a major impact on the global aerospace enterprise. We provide talent to organizations around the world, and we continue to advance aerospace technology and systems that address critical societal issues related to defense, commercial flight, earth observation, exploration, and energy. Our major continues to be in high demand, as our enrollment "cap" of 100 juniors was exceeded considerably this year, and 30 students earned

graduate degrees. Almost 300 people (graduates and their families and friends) attended our spring graduation luncheon. Our wind-energy courses are now available online via Penn State's World Campus, and we are creating a one-year residence M.Eng. degree.

Our undergraduate curriculum is distinguished by many opportunities for students to get involved with and lead team-based, hands-on projects and design competitions. One group, advised by **Susan Stewart**, took 1st place in the inaugural DOE Collegiate Wind Competition, and another, advised by **Mark Maughmer**, took 6th place (of 73) at the American Institute of Aeronautics and Astronautics (AIAA) Design-Build-Fly competition. Many additional activities are highlighted within.

Our faculty members continue to garner well-deserved recognition and to provide high-profile service to our nation and industry. We congratulate **Joseph Horn** on his promotion to full professor. **Mark Maughmer** received the AIAA Piper General Aviation Award for his contributions to winglet design, and **Sven Schmitz** received the Penn State Engineering Alumni Society Outstanding Teaching Award. **Philip Morris** serves as co-chair of a NATO working group that is charged with fostering innovation in noise reduction for fighter aircraft, while **Ed Smith** serves on the Technical Advisory Board for the Army Research Lab's Vehicle Technology Division. And I am serving as the general chair of the AIAA Science and Technology Forum and Exposition (SciTech 2015)—the world's largest event focused on aerospace RD&T.

We had two outstanding McCormick lectures this year from **Rob Kunz** (Ph.D. '91), senior scientist and head of the computational mechanics division at Penn State's Applied Research Laboratory, and **Stefan Bieniawski** (B.S. '92, M.S. '94), Boeing Technical Fellow and Senior Flight Sciences Research Engineer. To close the spring semester, **Brian Chappel** (B.S. '83), vice president for F-35 JSF Programs, Northrop Grumman, was honored with an Outstanding Engineering Alumnus Award.

We are delighted to welcome **Namiko Yamamoto** to our faculty as an assistant professor. She comes to us from MIT, following a post-doc at Caltech/JPL. Her research interests include nano-/micro-engineered materials and structures and their applications to space systems. One of her recent papers was selected as an Editor's Choice in *Science*.

Other alumni and students received additional awards. Two of our graduates were elected to the National Academy of Engineering: **Ian Waitz** (B.S. '86), dean of engineering at MIT, for analysis of environmental effects of aviation, enabling practical regulations; and **Robert ("Bobby") Braun** (B.S. '87), Lewis professor of space technology at Georgia Tech, for contributions to space exploration and technologies for planetary atmospheric entry. **Samuel Johnson** (M.S. '13) won the Pauling-Eisenhuth Award, and **Pierre Thurier** (M.S. '14) took 1st place (Engineering) at the Penn State Graduate Research Exhibition. **Edward Rocco** won a Twenty-20 Award from *Aviation Week & Space Technology*. **Davide Conte** and **Charlotte Gill** received this year's **Anthony E. Wolk** (B.S. '56) senior thesis awards, and **Reed Kopp** and **Alexander Troup** received Wolk Citizenship Awards. Reed Kopp also received the Sigma Gamma Tau Undergraduate Award, and was named aerospace student marshal for the spring 2014 commencement ceremony. Many graduate students won prestigious external fellowships.

Through your collective generosity, we awarded more than \$150,000 in college and departmental scholarships to 39 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. We depend on your gifts to purchase materials for projects and to send students to competitions, as well as to support new initiatives that provide the foundation for our future curriculum.

We are pleased to feature **Sven Schmitz's** research in rotary-wing aerodynamics in this year's research article. I know you will enjoy reading about the many activities and accomplishments of our students, staff, faculty and alumni. 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 53rd AIAA Aerospace
Sciences Meeting-SciTech 2015**
January 5, 2015 – Kissimmee, FL

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

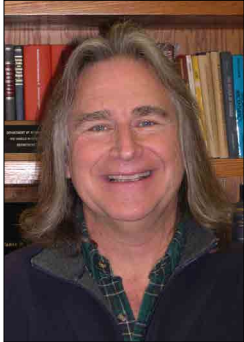
<http://www.aero.psu.edu>

Awards & Recognition

PROMOTIONS

Joseph Horn was promoted to full professor, effective July 1. Horn graduated from the University of Virginia with his B.S. in 1990 and M.S. in 1992, then worked for four years at Piasecki Aircraft. He received his Ph.D. from the Georgia Institute of Technology in 1999 and worked at Sikorsky Aircraft before joining the aerospace faculty in 2000. His research is in the areas of flight mechanics, flight control design, flight simulation, and handling qualities, with emphasis on rotorcraft.

FACULTY AWARDS/RECOGNITION



Mark Maughmer, professor of aerospace engineering, received the 2014 American Institute of Aeronautics and Astronautics (AIAA) Piper General Aviation Award. Maughmer was recognized for his contributions to winglet designs on high performance sailplanes. His research promoted the broader acceptance and diffusion of winglet technology in the general aviation community. He received his award at the AIAA Aviation and Aeronautics Forum and Exposition in June in Atlanta.

Sven Schmitz, assistant professor of aerospace engineering, received the 2014 Penn State Engineering Alumni Society (PSEAS) Outstanding Teaching Award in April. This award honors individuals whose inspiration and contributions to learning are truly memorable.



Sven Schmitz receives his PSEAS award from College of Engineering Dean Amr Elnashai.

George Lesieutre, professor and head of aerospace engineering, delivered the 2014 Lecture at the 55th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials (SDM) Conference in National Harbor, MD in January. The title of the lecture was "Damping: The Turbulence of Structural Mechanics?"

Philip Morris, Boeing/A. D. Welliver Professor of Aerospace Engineering, is the United States co-chair of the NATO Applied Vehicle Technology Technical Working Group 198. This working group is charged with fostering future innovations in noise reduction for tactical fighter aircraft. The innovations include improvements in hearing protection for military personnel as well as reductions in source noise. In 2014 the working group met in Copenhagen, Denmark and Brussels, Belgium.

Edward Smith, professor of aerospace engineering and director of the Vertical Lift Research Center of Excellence ("Rotorcraft Center"), serves on the external Technical Advisory Board for the Army Research Lab's Vehicle Technology Division. He also led the Airworthiness Process Study Group of the U.S. Army Aviation and Missile Research, Development, and Engineering Center IMPACT (Innovations and Modernization Projects Affecting Capabilities and Technologies) study on the Airworthiness of Complex Systems.

The College of Engineering recently created a new Innovation Grant Program to support integrative research. **Sven Schmitz**, assistant professor of aerospace engineering, and James Brasseur, professor of mechanical engineering, received one of six grants awarded from forty-six proposals. Their proposal was titled "Application of the Penn State High Performance Computing "Cyber Wind Facility" to design atmosphere-informed controls of wind turbines within wind plants to lower levelized cost of energy."

Jianhua Zhang, research associate in aerospace engineering and **Edward Smith**, professor of aerospace engineering, received a best paper award for their technical paper titled "Influence of Aeroelastically Tailored Wing Extensions and Winglets on Whirl Flutter Stability." The paper was presented at the second annual Asian/Australian Rotorcraft Forum in September in Tianjin, China.

SABBATICALS

Cengiz Camci, professor of aerospace engineering, is strengthening research collaborations with faculty at Istanbul Technical University, the Middle East Technical University, and Turkish Aerospace Industries in Ankara. He will also be involved in a lecture series at the von Karman Institute for Fluid Dynamics in Brussels.

Lyle Long, professor of aerospace engineering, is performing research on software and algorithms for neural networks and cognitive robots in collaboration with the Army Research Laboratory in Aberdeen, Maryland. In addition to his research, Long plans to develop an outline for a new textbook in Computational Science.

Edward Smith, professor of aerospace engineering and director of the Vertical Lift Research Center of Excellence ("Rotorcraft Center"), is assisting the faculty at the U.S. Military Academy with their Aeronautical Systems curriculum and the education of future Army aviators.

Editors: Philip Morris, George Lesieutre, Deborah Mayes, Michelle Barnyak and Cole Hons with contributions from the College of Engineering Office of Communications.

This publication is available in alternative media on request.

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Scholarships/Fellowships 2013-14

Department of Aerospace Engineering

Aero Pioneers Class of 1944 Scholarship
Alexander Borowski, Matthew Shaw, Benjamin Wortman

Lou Borges Scholarship
Zachary Fisher, Daniel Parks, Belen Veras-Alba

Brian Chappel and Marion Stone Chappel Scholarship
Garrett Blake, Philip Chow, Kara Morgan

Mary Ilgen Memorial Scholarship
Samuel Dubin

Richard W. Leonhard Scholarship
Garrett Blake, Kevin Dugan, Matthew Honeychuck, Jacob Johnson,
Brian Killeen, Reed Kopp, Edward Rocco, Brandon Starr,
Kurtis Thrush, Gregory Walsh, Gerek Whitman, Patrick Wittick

James Reynolds Norris Memorial Scholarship
Nisherag Gandhi

David J. Peery Memorial Scholarship
Timothy Weathers

Carl A. Shollenberger Memorial Scholarship
Mitchell Gennocro

Donald G. and Jayne L. Steva Scholarship
David Blyton, Davide Conte

Anthony E. Wolk Citizenship Award
Reed Kopp, Alexander Troup

Anthony E. Wolk Senior Thesis Award
Davide Conte, Charlotte Gill

College of Engineering

Frances S. and E. Keith Anderson Scholarship
Nicholas Grasser

David L. and Rena Miller Arm Int'l Travel Program for UG
Philip Chow

AT&T Trustee Scholarship
Joseph Plummer

Boeing Company Scholarship
Joseph Plummer, Gregory Walsh, Angelina Conti, Darren Slotnick

John J. and Jean M. Brennan Trustee Scholarship
Matthew Glass

James Bricker Memorial Scholarship
David Irizarry

Barry and Patricia Chapman Trustee Scholarship
Param Desai

College of Engineering Excellence
Daniel Rueda

College of Engr. - Engineering Minority Scholarship Fund
Gretchen Buttorff, Jessica Meyers

College of Engr. General Scholarship
Harley Austin, Sandilya Kambampati

College of Engr. - Internal Scholarship
Lovedeep Bhela, Brian Killeen

College of Engr. - Underrepresented Program Fund
Alfredo Iturralde, Ramon Morales

Patrick J. Dixon Scholarship in Engineering
Alexander Troup

Ronald W. & Nancy J. Ewing Scholarship
Samuel Harvatine

Donald G. Ferguson Memorial Honors Scholarship in the COE
Philip Chow

H. Thomas and Dorothy Willits Hallowell Scholars Endowment
Kevin Dugan

John Pierre Hemler Memorial Scholarship
Gretchen Buttorff

Elias A. Kazmierski Memorial Scholarship
Gerek Whitman

King Family Trustee Scholarship
John Sendek

Albertha and Milton Langdon Memorial Experiential Learning Endowment in COE
Christopher Cavanaugh

William & Wyllis Leonhard Scholars
Collin Russo, Angelina Conti

William J. Minor Trustee Scholarship
Mitchell Gennocro

Paul Morrow Endowed Scholarship
Gerek Whitman, Walter Maier, Patrick Wittick

John and Brenda Myers Study Abroad Scholarship
John Targonski, Corbin Weaver

T. Alan Payne Trustee Scholarship
Jessica Bashioum

John A. Pursley Trustee Scholarship
Nisherag Gandhi, Ryan Mattern

Rozmus Family Trustee Scholarship
Belen Veras-Alba

John E. and Lynn A. Shavinsky Scholarship
Samuel Dubin

Loren and Bernardine Stolp Family Trustee Scholarship
Lovedeep Bhela, Alexandro Retamozo

Trustee Scholarship Fund for Engineering
Brandon Dillinger

Paul E. White '30 and Rachel W. White Trustee Scholarship
Jian Tian

Woodle Family Scholarship in Engineering
Alexander Troup

Graduate Scholarships/Fellowships

AHS Vertical Flight Foundation Scholarship
Ethan Corle, Frank Kody, Justin Long, Adam Thorsen

Bell Graduate Fellowship
Michael Spires, Abishek Jain

DoD SMART Scholarship
Todd Henry, Leighton Myers, Russell Powers

Richard W. Leonhard Graduate Scholarship
Ethan Corle, Adam Thorsen

Pauling-Eisenhuth Award
Samuel Johnson

LORD Corporation Graduate Fellowship
Alexandre Bondoux, Raheel Mahmood

National Defense Science and Engineering Graduate Fellowship
James Coder, Ethan Corle, Nathan Depenbusch

PA Space Grant Consortium Graduate Fellowship
Neal Parsons

Joe and Sue Paterno Memorial Post-Graduate Scholarship
Emery Etter

Science, Technology, Engineering and Math (STEM) Award
Guillermo Costa

University Graduate Fellowship
ZuQun Li, Neal Parsons

Eric Walker Fellowship (Penn State/Appplied Research Laboratory)
Mark DeAngelo, Lawrence DiGirolamo, Margalit Goldschmidt,
Jason Halwick, David Hanson, Erika Lieberknecht, Michael Policelli,
David Reich, Grant Skidmore, Jared Soltis

Awards & Recognition

STAFF NEWS



Two members of the aerospace department were recognized for 25 years of service to Penn State. **Tammy Besecker**, administrative assistant in aerospace engineering, started at Penn State in 1980 and has remained with the department in various positions for more than 30 years. **James Miller**, research assistant in aerospace engineering, joined the department in 2012. Miller previously worked in the Penn State Gas Dynamics Lab for 23 years. Both Besecker and Miller were recognized at the annual ceremony held in Kunkle Lounge in April.

ADDITIONS TO THE DEPARTMENT



Namiko Yamamoto joined the aerospace engineering faculty as an assistant professor in July. She received her B.S., M.S., and Ph.D. in aeronautics and astronautics from the Massachusetts Institute of Technology. Yamamoto majored in materials and structures and received a minor in space systems. She was a postdoctoral fellow at the California Institute of Technology, on a prestigious Keck Institute for Space Studies fellowship. Her research focus is on the experimental study of nano-/micro-engineered materials and structures. We are glad to welcome her to the Penn State aerospace and materials communities!

PARTINGS

Deborah Levin, professor of aerospace engineering, accepted a new position at the University of Illinois in fall 2014. We appreciate her 14 years of dedicated service to Penn State and wish her all the best.

Nancy Nagle, graduate program staff assistant, accepted a position with the Vice President and Dean for Undergraduate Education at the Undergraduate Admissions Office in October, 2013.

Robin Bang, graduate program staff assistant, accepted a position with the Office of Graduate Enrollment Services in October, 2014.

INDUSTRIAL AND PROFESSIONAL ADVISORY COUNCIL



IPAC Committee, standing from left: **D. Hallman**, **D. Weir**, **D. Pauling**, D. Heverly, D. Senft, **P. Holcombe**; sitting from left: **K. Leath**, **R. Sedwick**, T. Balint, **S. Corbets**.

Each year a group of prominent individuals from industry, government, and academia are invited to serve on the department's advisory committee. The annual Industrial and Professional Advisory Council (IPAC) meeting was held March 26-28, 2014. IPAC is tasked with reviewing the department's activities and presents a report of their findings, ultimately to the Dean of Engineering. Observations include: Students continue to excel in competitions, students and industry desire more hands-on activities, and our graduate and undergraduate program rankings remain high. Aerospace faculty are leaders in their fields of expertise, and research funding is consistently above average compared to other departments. Enrollment demand continues to increase beyond capacity. Recommendations include: expand the graduate program without jeopardizing the distinguished undergraduate program and increase faculty and expand facilities to meet enrollment demands.

IPAC members participating in 2014 include:

Tibor Balint, senior technical advisor, Space Technology Mission Directorate, NASA Headquarters, Washington, DC

Shelly Corbets (B.S. '01), manager Aerodynamics and Acoustics, Lockheed Martin Aeronautics Corporation, Palmdale, CA

Douglas Hallman (B.S. '85), program manager for the F-35 Program in Turkey, Lockheed Martin Aeronautics Company, Fort Worth, TX

David Heverly II (B.S. '90, M.S. '91, Ph.D. '02 – M.E.), principal engineer, Structural Dynamics, Bell Helicopter Textron, Inc., Fort Worth, TX

Pierson Holcombe (B.S. '56), retired president of Grumman Data Systems Corporation, currently Holcombe Enterprises, Advance, NC

Kevin Leath (B.S. '85), director of affordability and the Boeing Product Development System, Boeing Commercial Airplanes, Seattle, WA

David Pauling (chair) (M.S. '75), retired, Department of Defense Senior Executive

Service and former executive director for the Department of Homeland Security's Customs and Border Protection, and currently a consultant at DANANS Institute, Herndon, VA

Raymond Sedwick (B.S. '92), associate professor of aerospace engineering and director of the Space Power and Propulsion Laboratory, University of Maryland, College Park, MD

Donna Cowell Senft, (B.S. '83 – E.Sci.), mission lead, Space Communications, Air Force Research Laboratory /RV, Kirtland AFB, NM

Donald Weir (B.S. '73, M.S. '75), engineering fellow and technical manager, Acoustics, Honeywell Aerospace, Phoenix, AZ
Unable to attend this year was **Michael Rudy** (B.S. '70, M.S. '73), vice president/general manager, Teledyne Turbine Engines, Toledo, OH

The department would like to extend a special thank you to IPAC members **David Pauling** and **Pierson Holcombe** who rotated off this year's council.

Awards & Recognition

BARNES W. MCCORMICK HONORARY ALUMNI LECTURES



Robert Kunz, the fall 2013 Barnes W. McCormick Honorary Alumni Lecturer, pictured with **George Lesieutre**.

Robert F. Kunz (Ph.D. '91), the fall 2013 Barnes W. McCormick Honorary Lecturer, presented "Computational Fluid Dynamics (CFD) in Aerospace Engineering and Beyond." Kunz is a senior scientist and head of the computational mechanics division at the Applied Research Laboratory and professor of aerospace engineering. He is a member of both the AIAA and ASME. His lecture summarized the interesting history of CFD, from the perspective of an aerospace engineer with 30 years of experience in the field. During this period, CFD has grown from being a "toy" to an indispensable design tool for aerospace systems. Today, the breadth of its applicability has extended well outside of aerospace sciences to impact all engineering and science disciplines where there is flow of any kind.

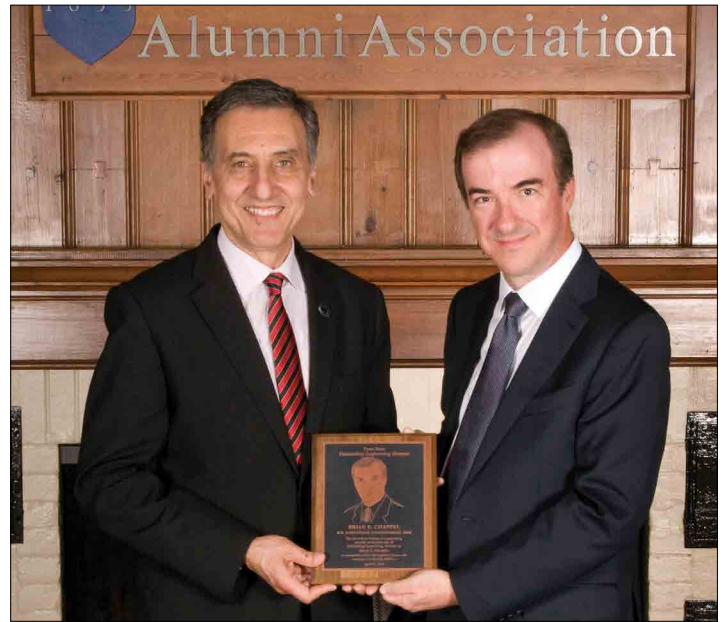


Stefan Bieniawski, the spring 2014 Barnes W. McCormick Honorary Alumni Lecturer, pictured with **George Lesieutre**.

Stefan R. Bieniawski (B.S. '92 M.S. '94) presented the spring 2014 Barnes W. McCormick Honorary Lecture, "Flight Testing Results for the Formation Flight for Aerodynamic Benefit Program." Bieniawski is a Boeing Technical Fellow and Senior Flight Sciences Research Engineer at Boeing Phantom Works in Seattle, WA. Bieniawski specializes in development and test flight of advanced flight controls systems and flight vehicles and is an expert in optimization in collective/collaborative networks. In 2013, Bieniawski was recognized as a Boeing "Engineer of the Year" (one of three), in part for his work on the USAF Air Mobility Command's C-17 fleet (SAVE: Surfing Aircraft Vortices for Energy), which reduced fuel burn by 10% and showed that fleet-wide fuel savings of about 2.5% can be achieved.

OUTSTANDING ENGINEERING ALUMNUS

Brian E. Chappel (B.S. '83) received an Outstanding Engineering Alumni Award, the highest honor bestowed by the College of Engineering. Chappel is the vice president, F-35 Joint Strike Fighter Program, for Northrop Grumman's Military Aircraft Systems Division. Northrop Grumman is principal partner to Lockheed Martin on the F-35. Since joining the company in 1993, Chappel has served in several leadership positions. Most recently, Chappel was the vice president and business manager for the company's Advanced Development Programs business unit. He also served as the key business partner to the division general manager and supported a diverse set of air and space development programs, including the Unmanned Combat Air System demonstration program. He was a member of the Scaled Composites advisory board, where he provided executive guidance and coordination on major Scaled Composites programs for customers that included Virgin Galactic and Stratolaunch. He also held several leadership positions on the National Polar-Orbiting Operational Environmental Satellite System program. Chappel spent nearly 10 years in the U.S. Air Force, where he held a number of leadership positions in program acquisition and management at the Air Force Space Division and the Ballistic Missile Office. Chappel also earned an MBA from UCLA.



Brian Chappel receives his OEA award from the College of Engineering Dean Amr Elnashai.

Attention Aerospace Grads! What are you doing now?

You can send your news by email to aerospace@engr.psu.edu. We look forward to hearing from you! Visit us on our website at www.aero.psu.edu. If you've moved and would like to continue to receive our newsletter, please remember to update your address with the Alumni Association at www.aero.psu.edu/Alumni/addresschange.html and complete the secure online change form.

Alumni News

Two aerospace graduates were elected to the National Academy of Engineering. **Robert D. Braun** (B.S. '87), David and Andrew Lewis Professor of Space Technology, and co-director, Space Systems Design Laboratory, Georgia Institute of Technology, Atlanta, GA for contributions to space exploration and technologies for entering planetary atmospheres from space and **Ian A. Waitz** (B.S. '86), dean of engineering and Jerome C. Hunsaker Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology, for analysis of environmental effects of aviation enabling practical environmental regulations. Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer.

Meredith A. Almoney (B.S. '07) received a 2013 National Defense Industrial Association Tester of the Year Award. She also was one of fourteen Naval Air Warfare Center Aircraft Division employees who earned M.S. degrees and one of three to receive the Wayne E. Meyer award for excellence in systems engineering for outstanding academic achievement.

Richard "Pat" Anderson (B.S. '91, M.S. '93), associate professor of aerospace engineering and director of the Eagle Flight Research Center at Embry-Riddle Aeronautical University, was named 2012 Florida Professor of the Year. The award, presented by the Carnegie Foundation for the Advancement of Teaching, is one of the most prestigious awards honoring undergraduate teaching.

Guion S. Bluford Jr. (B.S. '64) was featured during the Dec. 19, 2013 episode of WPSU-TV's "Conversations from Penn State: Reaching for the Stars." Bluford discussed his experiences as an astronaut in space.



Samuel "Eric" Cregger (B.S. '86) was named a Boeing new Senior Technical Fellow. This is one of Boeing's highest honors for an engineer. The fellowship program includes an internal network of talent whose member experience is used to solve technical and scientific challenges across the Boeing enterprise. Entrance to the Technical Fellowship program is a manager-nomination process. With the inclusion of this year's new members, Cregger becomes one of only 61 current Senior Technical Fellows at Boeing.

Robert D. Braun (B.S. '87), David and Andrew Lewis Professor of Space Technology, and co-director, Space Systems Design Laboratory, Georgia Institute of Technology, Atlanta, GA, was selected as editor-in-chief of the *American Institute of Aeronautics and Astronautics Journal of Spacecraft and Rockets*.

F. Matt Ekinci (B.S. '10) was recognized at the 2014 Goddard Space Flight Center Agency Honor Awards ceremony with a NASA Exceptional Public Achievement Medal. He also received a 2014 Outstanding Engineer Award from his employer (Honeywell Technology Solutions) for his work in identifying and mitigating guidance, navigation, and control anomalies for the Solar Dynamics Observatory.

Kylie N. Flickinger (B.S. '11, M.S. '13) and Daniel Claypool were married on May 24, 2014 at Stoney Creek Farm in Boonsboro, MD.

Eric T. Gilligan (B.S. '12) is part of a team of young engineers at NASA's Marshall Space Flight Center in Huntsville, AL, who are developing flight control systems for the Space Launch System (SLS) – NASA's new heavy-lift launch vehicle. The first flight test of the SLS is scheduled for 2017.

Scott T. Glaser (B.S. '99, M.S. '02), who is employed by The Spaceship Company, was the flight test engineer for the world's first commercial spacecraft built by Virgin Galactic. This was the second successful powered flight of the SpaceShip Two over the Mojave Desert.

Brett M. Hoffstadt (M.S. '97) is an enterprise entrepreneurship architect in the Ventures Organization, Boeing Defense, Space & Security in San Antonio, TX.

Harika S. Kahveci (M.S. '04) co-authored, "Comparison of Temperature Profile and Heat Transfer Predictions with Statistically-Modeled Data from a Cooled 1-1/2 Stage High-Pressure Transonic Turbine." The paper won an ASME International Gas Turbine Institute Committee Best Paper at the ASME Turbo Expo Awards Program in Dusseldorf, Germany in June.

Eric Loth (M.S. '85) associate chair of aerospace engineering at the University of Virginia, was the first faculty member to be named the Rolls-Royce Commonwealth Endowed Professor of Engineering. A total of three Rolls-Royce Commonwealth endowed professorships are planned with funding from the Commonwealth of Virginia as part of an innovative partnership with Rolls-Royce.

Alvord Marques (B.S. '06, M.S. '08) is an aircraft structures engineer II, in-service repair, at Airbus Americas Engineering, Inc., in Wichita, KS.

Bernard P. Miller, (B.S. '49), retired as Senior Vice President, Lockheed Martin International Council, located in Princeton, NJ.

Eric E. Schultz (B.S. '95) was recently promoted to the rank of Lieutenant Colonel. He is an F-35 test pilot at Edwards Air Force Base.



Michael S. Selig (Ph.D. '92), associate professor of aerospace engineering at the University of Illinois at Urbana-Champaign, was selected to receive the AIAA 2014 Aerodynamics Award. Selig was chosen "in recognition of outstanding contributions to applied aerodynamics research, design, and education, including leadership in the development and public dissemination of airfoil and propeller data."

Graham K. Webster (B.S. '10) received the NASA Early Career Achievement Medal for his role in the on-site fuel loading of the Global Precipitation Measurement spacecraft prior to its launch in February. He was recognized at the 2014 Goddard Space Flight Center Agency Honor Awards ceremony.

The Graduates

SUMMER 2013

Bachelor of Science

Marcia I. Castillo
David R. Cycon
Rochak R. Dahal
Emery C. Etter IV
Ryan R. Hilliard
Travis J. Palm
Trevor D. Steiner

Master of Science

Heather M. Barron
Dwight D. Brillembourg
Kwok K. Cheng
Kylie N. Flickinger
Nicholas A. Grande
Nicholas L. Herwig
Jayanth Krishnamurthi
Anuradha Mangalgi
Neil A. Mehta
Ilker Oruc

Varun N. Patil
Grant M. Skidmore
Jared T. Soltis
Bradley J. Sottile
Ilker Topcuoglu
Michael V. Wozniak

Doctor of Philosophy

Peter J. Hammond

FALL 2013

Bachelor of Science

John P. Baum
Troy T. Bushmire
Cavon R. Cormack
Christina M. Darcie
Charles J. Garlisi
Taylor J. Hoover
Evan N. McGinley
Douglas M. Rood
Avery V. Williams

Master of Science

John J. Bird
Christine M. Brown
Shawn C. Daugherty
Christopher L. Hassa
Zeljko Raic
David B. Reich
Rebecca L. Stavely

Doctor of Philosophy

Christopher C. Hennes
Gurbuz T. Ozdemir

Master of Engineering

Marvin Washington

SPRING 2014

Bachelor of Science

Zachary G. Armagost
Jessica L. Bashium
James H. Bement
Lovedeep Bhela
David C. Boal
Adam D. Boyer
Tyler C. Brantner
Thomas J. Casselberry
Christopher A. Cernicky
Davide Conte*
Param M. Desai
Brandon M. Dillinger
Derek T. Dinardo
Timothy J. Double
Nolan A. Dow
Tyler S. Druce
Samuel H. Dubin
Kevin P. Dugan§
Dylan J. Epler
Bryce F. Esbenshade
Steven H. Flinchbaugh
Nisherag D. Gandhi
Thomas M. Gemp
Mitchell J. Gennocro
Charlotte S. Gill§
Matthew D. Glass
Michael T. Gooden
Nicholas J. Grasser§

Ahmad M. Haidar
Ryan N. Hammerschmitt
Brian S. Harrell
Charles F. Herlihy
Adam J. Johnson
Joshua A. Kennedy
Jordan D. King
Reed A. Kopp#
Jacob J. Lampenfield
Nathan T. Laudenslager
Gregory J. Liptak
Yande Liu
Jessa M. Manga
Nicholas S. Martin
Michael G. Matas
Ryan T. Mattern
Zachary R. Mihalov
Joe J. Miller
Ramon L. Morales
Michael R. Negro
Kelvin Nguyen
Karah A. Oliver
Daniel C. Osterhout
Parth P. Patel
Joseph W. Pitts
Michael W. Popp
Sean N. Readdy
Jacob A. Resh
Brandon J. Rhone
Daniel J. Rueda
Collin J. Russo

Vincent J. San Miguel
Christopher M. Santo
Eric F. Schoellkopf
John T. Sendek
Kalki Sharma
Gregory A. Snyder
Jonathan M. Stacey
Stephen J. Stanek
Alexandria N. Stewart
Victor T. Thomas
Kurtis R. Thrush
Daniel B. Trew
Alexander J. Troup
Gregory D. Walsh
Gerek A. Whitman
Daniel J. Witherow
Chen Zhang
Xiaomo Zhang§

Master of Science

Michael A. Averbach
Davide Conte*
Samuel C. Johnson
Brian P. Lani
Dmitriy Makovkin

§ Schreyer Scholar

Aerospace Student Marshal

* Integrated Undergraduate/
Graduate Program

SEMINARS AND SHORT COURSES

CHRISTOPHER WOHL, research surface scientist, NASA Langley Research Center, "Mitigating Adhesion on Aerospace Surfaces" – April 2014

DAVID HEVERLY, principal engineer in the Structural Dynamics Group, Bell Helicopter Textron, Inc. "Bell Helicopter" – March 2014

KEVIN KINZIE, manager of the General Electric Power Wind Energy Blade Aerodynamics and Acoustics Team, Greenville, SC, "Moving the Wind Industry with Technology" – February 2014

CARLO BOTTASSO, Technische Universität München, Germany, and Politecnico di Milano, Italy, "Validation and Calibration of Computational Tools for Wind Energy Systems" – January 2014

HAIBIN TANG, deputy director of the Department of Aerospace Propulsion at Beijing University, Beijing, "Low-thrust Plasma Space Propulsion" – October 2013

NAMIKO YAMAMOTO, assistant professor of Aerospace Engineering, "Engineering Novel Materials for Next-Generation Aerospace Systems" – September 2013

M.E. RHETT FLATER, M. E. Rhett Flater & Associates, "The Department of Defense Rotorcraft Industrial Base Criticality and Fragility Assessment - 2013" – November 2013

ZHONGYANG FEI, 2013 graduate of Washington University in St. Louis, "A Rigorous Solution for Finite-State Inflow throughout the Flowfield" – October 2013

LARRY TRICK (B.S. '82, M.Eng. '94), chief engineer at the Naval Aviation Center for Rotorcraft Advancement, gave a seminar on his current research – October 2013

LANE MILLER, vice president, Global Engineering, LORD Corporation, "Control of Vibration and Motion – The State of the Art" – October 2013

JOHN VASSBERG, Boeing Research and Development, "The Aerodynamics of the Boomerang" – October 2013

EDWARD SMITH, professor of aerospace engineering, University Park, "47th Rotary Wing Technology Short Course" – August 2014



Jose Palacios, assistant professor of aerospace engineering, with John Tracy, Boeing chief technical officer, during a visit to the Centre for Acoustics and Vibration (left)

(Photo credit: Curtis Chan)

Glider flights at Harris Hill on return from AIAA Student Conference (below)



Pictured above (between the two astronauts) is aerospace grad student, and former Nittany Lion football player (#57) Emery Etter (B.S. '13). Etter was added to Michael Pilato's "Inspiration" mural on Heister Street. As the long snapper for the Nittany Lion's, Etter was the recipient of the Football Letterman's Club Joe and Sue Paterno Post-Graduate Scholarship, which awards \$5,000 to a senior to provide financial assistance for graduate school. Etter received his B.S. in aerospace engineering and is continuing his graduate studies in the department.



Members of AIAA, Sigma Gamma Tau, and AeroGSA on their trip to the National Air and Space Museum's Udvar Hazy Center in the spring.



The “sailplane” class (AERSP 204H and 404H). Sailplane continues to address human-powered aircraft with an eye towards competing for the Kremer Sporting Prize.



College of Engineering Dean Amr Elnashai with **George Lesieutre** at the College of Engineering ice cream social.



Aviation 2014 meeting in Atlanta. Pictured L to R: **Anupam Sharma** (M.S. '01, Ph.D. '04), assistant professor, Iowa State University; **Dennis McLaughlin**, professor of aerospace engineering; **Philip Morris**, Boeing/A.D. Welliver Professor of Aerospace Engineering; **Anurag Agarwal** (M.S. '00, Ph.D. '04) lecturer in aeroacoustics, Cambridge University, UK.

It is not unusual for Penn State to receive corporate donations, but last fall the Department of Aerospace Engineering received an unusual one.

In a small ceremony, an Airbus delegation including **Jason Reed** (B.S. '01), vice president of material, logistics, and suppliers for Airbus Americas, formally presented a left-hand side inboard flap for an Airbus A300 wide-body airplane to the department. A flap like this is valued at more than \$926,000 new; to ensure that the flap could not enter the spare parts market, the part was rendered unserviceable at delivery. The flap will provide students with hands-on experiences in our structures and dynamics laboratory.



Airbus Americas officials present the College of Engineering with a flap from an A300 wide-body aircraft. (Photo credit: Curtis Chan)

Student Highlights



Heather Nelson works at the Swift satellite's Mission Operations Center on Campus. (Photo credit: Curtis Chan)

Penn State and the U.S. Air Force are offering select students the opportunity to earn graduate degrees while gaining hands-on experience working in the Swift satellite Mission Operations Center. **Heather Nelson** (M.S. '14) is the second student to participate in the Air Force Tactical Exploitation of National Capabilities Program (TENCAP). Another aerospace alum, **Chris Hassa** (M.S. '12), was the first student to attend Penn State through the program. Students are selected based on their experiences and performance at the academy, leadership potential, and academic achievement. The student, upon earning a graduate degree, then goes to work for three years on a special assignment in the TENCAP. Nelson is advised by **Sven Bilén**, head, School of Engineering Design, Technology, and Professional Programs and professor of aerospace engineering.



Peter Blasco (L) and **Matthew Kapusta** (R) in Germany.

In early June 2014, **Matthew Kapusta** (B.S. '13) and **Peter Blasco** (B.S. '13), both graduate students in aerospace engineering, took part in the Transatlantic Program for Young Technology Leaders (TAP-YTL): Aerospace Engineering & Aviation Technologies in Germany. This specialized professional development program is an eight-day experience that provides nearly thirty-five hours of intensive German language exposure within the context of engineering education. Throughout the program, Kapusta and Blasco toured aerospace companies in Berlin, Hamburg, Braunschweig, Hildesheim and Munich. TAP-YTL strives to bring together future decision-makers from the U.S. and Germany to build networks and promote the transfer of knowledge through content-driven encounters and experiences.

Pierre Thurier, (M.S. '14) was awarded 1st place in the engineering category of the 29th Penn State Graduate (Research) Exhibition for his poster titled "Design of a Thermal Control Device using Topology Optimization." The Graduate Exhibition emphasizes the communication of research to a general audience and challenges the entrants to give their presentations in clear, comprehensible terms to people outside their fields. Thurier was co-advised by **George Lesieutre**, professor of aerospace engineering, Mary Frecker, professor of mechanical engineering, and James Adair, professor of materials science and engineering and bioengineering.



Reed A. Kopp was named student marshal for aerospace engineering's Spring 2014 commencement ceremony. **Edward C. Smith**, professor of aerospace engineering and director of the Penn State Rotorcraft Center was his faculty escort. Kopp's Penn State honors include the President's Freshman Award, the Evan Pugh Scholar Award, and the Sigma Gamma Tau (SGT) Undergraduate Award (Penn State and the Mid-Atlantic Region). Kopp was named to the dean's list every semester. He is a member of the Tau Beta Pi Engineering Honor Society and the SGT Aerospace Engineering Honor Society, serving as president of SGT during the 2013-14 academic year. As an undergraduate student, Kopp completed a two-part internship with The Boeing Company in Everett, Wash. As an undergraduate research assistant in the Vertical Lift Research Center of Excellence, he completed a research project concerning the aeroelastic behavior of soft in-plane, hingeless tiltrotors. Kopp's research involved analysis and simulation of rotorcraft aeromechanical stability, as well as model testing. Following graduation, Kopp plans to complete a one-year internship as a research assistant in the Mechanics Division of the U.S. Army Research Laboratory's Vehicle Technology Directorate. He then plans to return to Penn State to pursue a graduate degree in aerospace engineering.



Edward Rocco (C) receives his award from Michelle Lohmeier (L), Raytheon Missile Systems Vice President, and Gregory Hamilton (R), president and group publisher of Aviation Week.

Aerospace engineering undergraduate student **Edward Rocco** was named a winner of *Aviation Week's* Twenty20 Award. The Twenty20s Award is a partnership between Aviation Week & Space Technology and Raytheon that recognizes 20 top engineering, math, science and technology students. Rocco was honored for his outstanding academic performance and his involvement in the Adverse Environment Rotor Test Stand (AERTS) facility. The AERTS laboratory, developed by **Jose Palacios**, assistant professor of aerospace engineering, examines new anti-icing and de-icing concepts for helicopter rotors and wind turbines. Rocco was recognized during Aviation Week's annual Aerospace & Defense Programs Conference in Phoenix, AZ.

Student Highlights

STUDENT SOCIETIES



AHS members at "RotorFest" in West Chester, PA.

American Helicopter Society (AHS)

The Penn State chapter of AHS International had a busy year. In October 2013, **Larry Trick** (B.S. '82, M.Eng. '94), chief engineer at the Naval Aviation Center for Rotorcraft Advancement, gave a seminar on NACRA activities. Two trips followed, one the annual trip to RotorFest in West Chester, PA, and the other to the 75th Anniversary of the First Rotating Wing Aircraft Meeting at the Franklin Institute in Philadelphia. In November, the chapter welcomed six helicopter pilots (LTC **William Clark** (B.S. '62), LTC James Fitzgerald, Steve Schellberg, Major **Chris Knarr** (B.S. '98), Dave Corle, and Liza Errki). The pilots provided insight into helicopter usage ranging from test flight programs, civilian flight and military operations. The semester wound down with a presentation from two more pilots (LTC Baril and LTC Culbertson) from the Army War College in Carlisle, PA. They spoke about their experiences in dealing with challenges of operating in combat environments in Afghanistan.

The spring semester spun up with a tour of the VLRCOE Rotorcraft Simulation Facility. Students had a chance to fly the simulator and prizes were awarded for the fastest shipboard landing times. The chapter hosted a number of excellent guest speakers throughout the spring. First, Sandy Jaffe displayed some scale-model RC helicopters and discussed the associated technology. Afterward, the students took the controls and flew them. Next, David Heverly, principal engineer at Bell Helicopter, gave a seminar on the new Bell product line: the 505, the 525, and the V-280. Finally, Steve Glusman, director of advanced vertical lift at Boeing Phantom Works, described key technology advances that led to breakthrough successes in helicopter configurations that had previously failed.

Outreach highlights for the year included a LORD Corporation-sponsored "Haunted Helicopter Lab" that drew approximately 300 visitors and integrated science, technology, engineering, and mathematics activities for the children. Additionally, throughout the spring semester a group of students volunteered at Young Scholars of Central Pennsylvania, a local middle school, to help build an auto-rotating egg drop apparatus for a science competition.

American Institute of Aeronautics and Astronautics (AIAA)

Members of the Penn State AIAA student chapter participated in the regional AIAA student conference at Cornell University in April. Four graduate students and six undergraduate students presented papers. Master's students who participated in the conference were **Ben Pipenberg**, **Grant Dowell**, **Peter Blasco**, and **Pierre Thurier** (M.S. '14). Undergraduate students who participated were **Xiaomo (Terry) Zhang**, **Jessica Bashioum**, **Nick Grasser**, **Charlotte Gill**, **Ahmad Haidar**, and **Kevin Dugan**. Ben Pipenberg's paper titled, Design, Fabrication and Flight Testing of Fixed-, Flapping-, and Rotary-Wing Micro Air Vehicles won 3rd place in the Master's division. His presentation included flight demonstrations of incredibly light (sub-gram) micro air vehicles. The group also took a detour to Elmira, NY to enjoy glider flights.



Penn State group at the AIAA Student Conference closing banquet.

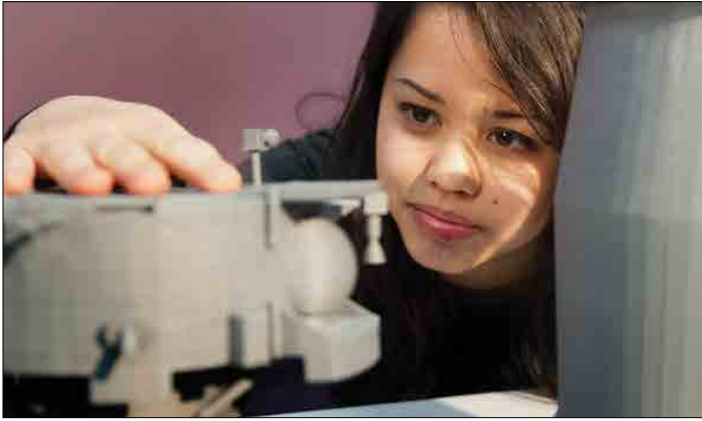
Sigma Gamma Tau (SGT)

The Penn State Chapter of SGT had a very active year. Corporate attendance at SGT's 3rd annual Aerospace Networking Reception included representatives from NASA, Boeing, Lockheed Martin, United Technologies Corp., Ball Aerospace, and GKN Aerospace. SGT participated for the first time in the Reverse Career Fair, seeking to strengthen relationships between industry and student members through corporate sponsorship. Also for the first time, members of SGT joined members of AIAA and AeroGSA on a trip to the Steven F. Udvar-Hazy Center in Chantilly, VA, where they saw historic aerospace artifacts, flew simulators, and watched an IMAX film. Jeremy Frank, president and CEO of KCF Technologies, headlined the SGT Induction Banquet in the spring. Other SGT events included hosting a Boeing information session and Resumania by Pratt & Whitney. Members of SGT routinely provide tours of aerospace engineering laboratories to prospective students, industry representatives, and alumni.



2014 Inductees at the SGT induction banquet.

Student Highlights



Kara Morgan, an undergraduate student in aerospace engineering, examined a 3-D printed model of the Lunar Lion spacecraft. (Photo credit: Patrick Mansell)

Lunar Lions

The Penn State Lunar Lion Team is competing as the only student-led team in Google's Lunar XPRIZE competition, with a grand prize of \$20 million. Their mission? Construct a lunar lander that can travel 500 meters on the surface of the moon and record eight minutes of video. To qualify, this goal must be achieved by the end of December, 2015. The winner will be the first privately-funded mission to the Moon, and the competition is re-igniting a passion for space exploration. The students are working under the guidance of team director Michael Paul, research and development engineer at Penn State's Applied Research Lab. The effort has brought together more than 240 students from across the university. The following aerospace engineering students are part of the team: **Chris Bachman, Amelia Batcha, Rachel Bires, David Blyton, Jacob Bresler, Ryan Burns, Philip Gorski, Chris Greer, Jacob Harper, Ajeeth Ibrahim, Peter Jackson, Alex Kershetsky, Brian Killeen, Billy Koffler, Logan Krawchyk, Brian Lani, Nathan Laudenslager, Casey Leavens, Morton Lin, Eric Ly, Ryan Mattern, Jessica Meyers, Kara Morgan, JP Muncks, Chloe Nagle, Troy Newhart, Kelvin Nguyen, Dan Parks, Alwin Paul, Joe Pitts, Joe Plummer, Michael Policelli, Mike Popp, Creed Reilly, Brandon Rhone, Vince San Miguel, Tyler Simches, Zach Skank, Nick Sofocleous, Jason Stanko, Sam Stoley, Mohammad Syed, Austin Taylor, Adam Thames, Patrick Wittick, Richard Zang, and Kody Zezenski.**

The AIAA Student Design-Build-Fly Competition

A team of Penn State students took 6th place at the 18th annual AIAA Design-Build-Fly competition (DBF). It was the best finish since Penn State first entered the contest in 2007. Seventy-three teams from twenty-nine states and fifteen countries competed in the event, held in April in Wichita. The DBF challenges student teams to design, fabricate and demonstrate the flight capabilities of an unmanned, electric powered, radio controlled aircraft which can best meet a specified mission profile. The theme for this year's competition was to produce a "Back-Country Rough-Field Bush Plane" that was capable of accommodating a variety of payloads, maneuvering over rough terrain on the ground, and performing well in flight tests. Over the course of the year, the team produced a detailed technical report for the competition, along with five prototypes. Penn State's entry "The Kodiak" included team members **George Farah, Nick Grasser, Nate Keegan, Evan Savage, Alex Troup** and Eric Tschantz. **Chris Saunders** (B.S. '08) piloted the aircraft, **Mark Maughmer**, professor of aerospace engineering, served as the faculty adviser, and **Ben Pipenberg** (B.S. '11) was the graduate student adviser.



Design Build Fly Kodiak Team, from left: **Nick Grasser, Ben Pipenberg, Evan Savage, Eric Tschantz, George Farah**; kneeling from left: **Mark Maughmer** and **Chris Saunders**.



It Flies USA 2014

In April, three Penn State aerospace engineering students entered their Zephyrus Human Powered Aircraft in the Merlin Flight Simulation group's aircraft design and handling competition, "It Flies USA." Undergraduates **Justin Valenti, Angelina Conti** and **Chris Axten**, students in Flight Vehicle Design Fabrication, taught by **Mark Maughmer**, professor of aerospace engineering, travelled to Dayton for the competition. Groups took turns "flying" their designs in the MP521 Engineering Flight Simulator at the University of Dayton.

Participants at the It Flies USA competition, from left: **Justin Valenti, Angelina Conti** and **Chris Axten**.

Student Highlights

The “Simulation Exploration Experience” (SEE)

The SEE is an annual event created to promote an understanding of the importance of modeling and simulation in space systems logistics. Penn State students have participated for several years, and this year the team focused on modeling an Asteroid Redirect Vehicle (ARV) based on the design of a team from the Spacecraft Design course. The team also modeled other supporting spacecraft, including a shuttle that would ferry supplies between the lunar surface and the orbiting ARV. This year’s team members were **Zachary Armagost** (B.S. ’14), **James Bement** (B.S. ’14), **Jake Lampenfield** (B.S. ’14), **Joe Miller** (B.S. ’14), **Kelvin Nguyen** (B.S. ’14), and **Vincent San Miguel** (B.S. ’14), with **ZuQun Li** (B.S. ’12) acting as the team’s graduate adviser. David Spencer, professor of aerospace engineering, was the team’s faculty adviser. The Penn State team received the SEE 2014 Team Achievement Award for outstanding effort in distributed teamwork, overall project development and management including criteria and selection of options, interoperability challenges, obstacles overcome and quality of results in a complex interactive simulation experience.



(Kneeling from left) **B. Wallace**, **M. Popp**, **K. Knechtel**, K. Palamara, (Standing from left) **S. Stewart**, **G. Liptak**, N. Ward, **S. Flinchbaugh**, **P. Patel**, **J. Lampenfield**, **Y. Liu**, K. Veit, P. Tarantowicz, J. Lehrer, and B. Dougherty

The DOE Collegiate Wind Competition

Penn State’s undergraduate team overcame a near disaster in preliminary testing and came back to win first place overall at the inaugural Department of Energy (DOE) Collegiate Wind Competition, held in May in Las Vegas. The contest challenged university teams in three areas: 1) to design and build a prototype wind turbine to compete in areas of performance, power control, and safety; 2) to present a business plan to market their wind turbine; and 3) convey understanding of contemporary wind energy market issues. The aerospace engineering members of the team included undergraduate students **Chris Cernicky**, **Sahil Desai**, **Tyler Druce**, **Steve Flinchbaugh**, **Adam Johnson**, **Kevin Knechtel**, **Jacob Lampenfield**, **Gregory Liptak**, **Yande Liu**, **Evan Masters**, **Ramon Morales**, **Parth Patel**, **Mike Popp**, **Gabriel Rosenwald**, and **Grant Schneeberger**. Other members of the team included students from energy business and finance, communications, energy and mineral engineering, electrical engineering, and mechanical engineering. The team was advised by **Susan Stewart**, research associate in aerospace engineering and director of the PA Wind for Schools Program, **Brian Wallace** (B.S. ’08, M.S. ’11), Ph.D. candidate in aerospace engineering, as well as **Dennis McLaughlin**, professor in aerospace engineering and **Rick Auhl**, research associate in aerospace engineering. The team also won the Market Issues Contest Award as well as the People’s Choice award. As the team with the highest cumulative score, Penn State’s winning turbine was on display at the Energy Department headquarters in Washington, D.C. throughout summer 2014.

Student Space Programs Laboratory (SSPL)

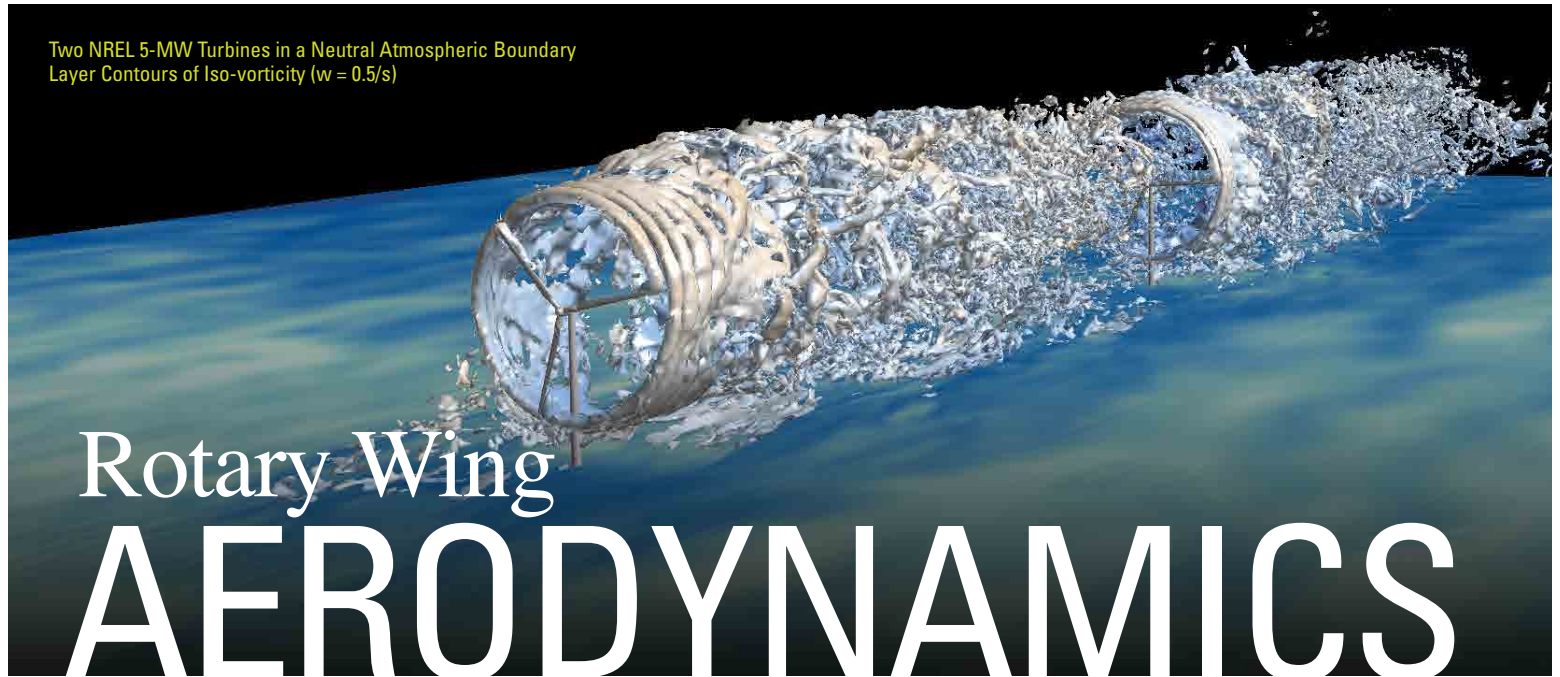
Students and faculty at the SSPL continued development of the OSIRIS-3U cube satellite. The satellite, poised for launch in early 2016, will investigate space weather interaction with the Earth’s atmosphere. Students developed their systems engineering and presentation skills by preparing a System Requirements Review for the satellite. The review was hosted by engineers and scientists at The Aerospace Corporation in April.

SSPL welcomed a new group of students into the Student Training Program this year. A team of multidisciplinary freshmen through junior students learned about building space systems by designing a soda can–sized rocket payload. 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 detach its parachute upon landing. It was successfully launched aboard a model rocket in May and students conducted a post-flight review.

SSPL participated in several education outreach activities this year. SSPL hosted a take-your-child-to-work-day station where K-12 students built “bugs” that reacted to light. Students also staffed a table at the State College and Bellefonte Exploration-U events to teach students about chemical propulsion using film-canister rockets fueled by antacid tablets and water. The group is advised by **Sven Bilén**, head, School of Engineering Design, Technology, and Professional Programs; professor of engineering design, electrical engineering, and aerospace engineering.



SSPL faculty and students visit The Aerospace Corporation for a System Requirements Review.



Rotary Wing AERODYNAMICS

Sven Schmitz, assistant professor of aerospace engineering, conducts research in the areas of wind turbine aerodynamics and rotorcraft aeromechanics. Current activities include wind farm wake modeling, icing on wind turbines, rotor hub flows, and rotor active control. A few of these are highlighted below.

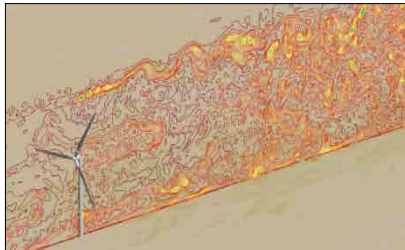
Wind Turbine Wake Modeling

Schmitz's group recently performed a high-fidelity Large Eddy Simulation of an array of two NREL 5-MW wind turbines immersed in neutral and moderately-convective atmospheric boundary-layer flow. The fluid domain contained more than 30 million grid points, and the simulation was run on 512 CPUs. The objective of these simulations is to quantify turbulence statistics in the atmospheric boundary-layer flow and in the wakes of the wind turbines. Of particular interest are unsteady blade responses to the various coherent turbulent structures in the atmosphere and their effect on blade fatigue.

Wind Turbine Icing

Performance losses due to atmospheric icing are a major concern for wind turbine operators. Schmitz and his

colleague Jose Palacios, assistant professor of aerospace engineering, have been working with the National Center of Atmospheric Research to perform ice-accretion experiments on wind turbine airfoils at various scaled icing conditions; ice shapes were subsequently molded and tested in the Hammond wind tunnel. Using the lifting-line wind turbine design



Tip Vortex Instabilities in the Turbine Wake



and analysis software, XTurb-PSU, they found that turbine power can decrease by as much as 30% due to icing events.

Helicopter Rotor Hub Flows

The rotor hub assembly is the largest single contributor to helicopter parasite drag, accounting for up to 30% of the total parasite drag of the vehicle. The ability to reduce this drag is critical

for reducing overall drag, which could improve forward-flight speed, fuel efficiency, and vehicle payload. Schmitz's group conducted experiments in the Garfield Thomas Water Tunnel (GTWT) at the Applied Research Laboratory (ARL) at Penn State. Water tunnel testing provides an advantage with respect to Reynolds scaling compared to a wind tunnel due to water having approximately 1/15-times the kinematic viscosity of ambient air. The main objectives of the tests were to understand the spatial- and temporal content of the unsteady wake downstream of a rotor hub up to a distance representative of the empennage and tail of a large helicopter. The team was able to measure total hub drag and to use flow diagnostics involving PIV, SPIV and LDV at several locations downstream of the hub.



Model Rotor Hub in 12" Diameter Water Tunnel

Outreach and Other News

We Are!



According to the U.S. News and World Reports “2015 Best Colleges Rankings,” **Penn State ranks No. 8** among all public national universities. The College of Engineering is ranked 18 among the “Best in Undergraduate Engineering” programs among institutions offering Ph.D. degrees; aerospace engineering is ranked No. 11 among aerospace programs (No. 7 public).



Thon 2014 Participation by Aerospace Students

Brian Bender – Phi Mu Alpha
David Blyton – Outing Club, Alternate Fundraising Chair
Ryan Burns – Rules and Regulations Committee
Saray Checo – Phi Sigma Rho
Kevin Dugan – Hospitality Committee

David Irizarry – Student United Way
Ana Jimenez – Delta Zeta
Wally Maier – Infinity
Vincent San Miguel – Boulevard
John Tragonski – Kappa Delta Rho
Greg Walsh – Moraler; Newman's Club

Lengels Establish Fund for Excellence in Aerospace Engineering

Aerospace engineering alumnus **Robert H. Lengel** (B.S. '68) and his wife, Sandy, have made an estate gift commitment that will enhance future initiatives in the Department of Aerospace Engineering. The fund is envisioned to support student project activity, including travel, and scholarships for student leaders. The gift will also be allocated toward new educational initiatives, awards for academic excellence, student research in faculty laboratories, international exchanges, laboratory equipment, and faculty development opportunities.

In addition to his degree from Penn State, Lengel also holds a master's degree in engineering science, a master of business administration, and a doctorate in business administration from Texas A&M. His professional experience spans the aerospace industry, financial services, environmental impact research and analysis, and academia.

Lengel is founder and executive director of the newly-established Academy of Leadership and Transformation in the College of Business at the University of Texas at San Antonio (UTSA). He is also the founding director of UTSA's Center for Professional Excellence, the Executive MBA program, the Leadership Challenge program, and the For-the-Kids Dance Marathon project, modeled after the Penn State Intrafraternity Council/Panhellenic Dance Marathon (THON).



Mark Maughmer, professor of aerospace engineering, was recognized by Nigel Lamb (a renowned British aerobatics pilot) for designing the winglets for his race plane – one of two MXS-Rs flown in the Red Bull Air Race World Championship.



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, 2013 to June 30, 2014. 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.

Robert J. Agece
Ronnie E. Allan
Dominic Amatore
Nathan & Kelly Bachman
David & Deborah Bailey
Robert & Nicholle Bair, Jr.
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Jeffrey & Valeria Walters
Duane & Virginia Webb⁴
Michael & Laurie Weigner
Ida Blackburn Wolk²
Timothy & Mary Jo Wolk²

Bold – Corporate Support

- ¹ Matching funds
- ² Wolk Senior Thesis Award
- ³ Chappel Scholarship
- ⁴ McCormick Excellence Fund
- ⁵ DigitalGlobe Foundation
- ⁶ Pauling-Eisenhuth Award
- ⁷ Carl Shollenberger Memorial Scholarship
- ⁸ Steva Award

Your support makes a difference to our department and our students.

Please consider a gift for the future:

- Go to www.givenow.psu.edu
- Select "Other" in the Designation of Gift section
- Write in "Aerospace Engineering" with any other special designation you may desire

Thank you for your generosity!