

# Highlight

## Department of Aeronautics & Astronautics Named for William E. Boeing

On November 8, 2012, the UW Board of Regents approved a name change of the UW's Aeronautics & Astronautics Department to become the William E. Boeing Department of Aeronautics & Astronautics, recognizing the shared history of our department and the Boeing Company, and honoring the man who launched them both.

"The University of Washington and the Boeing Company are long-established Pacific Northwest institutions whose histories are closely tied," said UW President Michael Young.

"For many decades, UW talent and skill have contributed to Boeing's premier place in global air transportation, while Boeing has built an environment of technical, business and philanthropic leadership that has strengthened the university and our state. We are proud to recognize this amazing partnership in naming our outstanding Department of Aeronautics & Astronautics for Bill Boeing."

The almost 100-year history began when William Edward Boeing founded the Boeing Airplane Co. in 1916 along the shores of Lake Union and hired two UW engineering graduates to work on his flying machines. Though Clairmont Egtvedt and Philip Johnson were mechanical engineering graduates, they went on to become presidents and general managers of the growing company.

Boeing realized he needed trained aeronautical engineers, as well as a facility to test new airplane designs. The department had its early beginnings in 1917 when Boeing donated a

wind tunnel to the UW, paid for with a personal gift of almost \$6,000, on condition that the university would establish an aeronautics curriculum. The building that housed that original wind tunnel still stands east of Guggenheim Hall.

In the 1920s, Boeing wrote on behalf of the university to the Guggenheim Fund for the Advancement of Aeronautics, and in 1928 the fund approved a grant of \$290,000 for the building, renovated in 2007, that still houses UW Aeronautics & Astronautics.

The company and the department have grown together. In 1926, all but one member of Boeing's engineering department were UW graduates. In the 1940s most of Boeing's engineers still came from the UW, and even today the UW remains a primary supplier of engineering talent for the company. Thousands of UW alumni have gone on to work for the company, and company employees, students and

faculty have carried out many joint research projects.

"We are thrilled with the University of Washington's decision to name its Department of Aeronautics & Astronautics for our founder, William E. Boeing. His name is on every product we design, every service we provide and every task we undertake," said Ray Conner, president and CEO for Boeing Commercial Airplanes. "His vision and mandate for technical excellence and innovation lives on in the hearts and minds of Boeing employees, and we hope that the students who pass through the College of Engineering will be similarly inspired as they take their places as our future aerospace leaders."



William E. Boeing in 1931

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## Message from the CHAIR



Jim Hermanson

As another eventful and exciting year for A&A comes to a close, we have a chance to reflect on the many events of 2012. One very big news item is that the department has recently been named for William E. Boeing, founder of the Boeing Company and early supporter of our department. This is a great distinction for A&A and honors both Bill Boeing and the vital partnership between the Boeing Company and our department. We are going to

formally celebrate this major milestone in A&A on February 4, 2013 (4 PM - 6 PM, in the HUB North Ballroom on the UW Campus). We hope you will join us for this great event.

As you will see in the following pages, our students, faculty and staff have been busy and productive, and their outstanding efforts have been recognized. One example was our senior Space Design team, which under the expert guidance of their instructor, Dr. Dana Andrews, made us all proud when they received first prize at the NASA sponsored 2012 Revolutionary Aerospace Systems Concepts-Academic Linkage (RASC-AL) competition. Another team of A&A students designed, built and flew a sounding rocket at this year's 7<sup>th</sup> Intercollegiate Rocket Engineering Competition (IREC), reaching an altitude of more than 26,000 feet with their rocket, the DAQ Destroyer, to win first place at the event, as well as the Furfaro Award for technical excellence. More details on the Space Design project and our outstanding Aircraft Design project are on pp. 6-7; the Sounding Rocket effort is presented on p. 8. One of our own graduate students was selected from among an elite group of nominees from around the world to attend

the Nobel Laureate Meeting in Physics. Our department also hosted the very successful American Institute of Aeronautics and Astronautics (AIAA) Region VI Student Conference in Seattle this year.

Members of the A&A faculty continue to be active in research in controls, fluids and propulsion, plasmas, structures, and other areas broadly related to aerospace. Recent research activities in plasmas and fluids are respectively highlighted on pp. 4-5 and 8. The scope of A&A faculty research continues to extend beyond the department with increasing involvement with other academic units, government, and industry.

Members of our staff, too, have been working hard this year. The rate of growth of our undergraduate program in 2012 was higher than any other department in the College of Engineering; we have also seen significant growth in our graduate program. We are currently redesigning our Master of Aerospace Engineering degree to better meet the educational needs of students pursuing careers in industry. Our department successfully passed its 10-Year Academic Program Review, which is a major review required by the State of Washington of all academic programs at the UW. Finally, we are happy to report that A&A has jumped up to #13 in the US News Ranking of Best Aerospace Schools for graduate programs (we are also #13 with our undergraduate program). We are very pleased with these recognitions as we move the department forward, and higher ... although to all of us, our students, faculty and staff are always #1!

As always, we very much appreciate the continuing involvement of our alumni and friends. Thank you to all of you who have supported us this year, and throughout the years. We look forward to working further with you next year!

Best wishes to all for an outstanding 2013 from the William E. Boeing Department of Aeronautics & Astronautics.

## Faculty NEWS

**Professor Robert Breidenthal** presented his paper, titled, "Turbine Blade Cooling Using Coulomb Repulsion," at the American Physical Society's 65th Annual Fall Division of Fluid Dynamics meeting November 18 - 20, 2012 in San Diego, California.

**Professor Antonino Ferrante** has had a busy year with the publication of three papers, receiving a travel award from the US National Committee on Theoretical and Applied Mathematics to participate in their 23rd international conference, and presenting a seminar at the UW Mechanical Engineering Department.

**Professor and Chair Jim Hermanson** was featured on KING 5TV for a piece about alternative fuels and the future of aerospace. Filming took place in the UW Kirsten Wind Tunnel.

**Professor Kristi Morgansen** was named UW deputy director of the Center for Sensorimotor Neural Engineering, an NSF Engineering Research Center. Professor Morgansen spent six weeks this summer as an instructor for a study abroad program in Australia, with most participants being STEM students from underrepresented groups.

### Innovations in Professional Education for Aerospace Engineers

The relationship between industry and academia can take many forms, and one key element in this relationship is the responsibility of universities to produce a highly skilled workforce. We take that part of our mission – developing tomorrow's industrial and economic innovators – very seriously.

That is why, starting with the incoming class of 2013, the William E. Boeing Department of Aeronautics & Astronautics will offer a newly reorganized and updated Master of Aerospace Engineering (MAE), aimed at meeting the needs of the local, regional, and national aerospace industry, as well as the working professionals who keep that industry running. The goals of our MAE degree – cutting-edge education for industry-bound aerospace engineers – will remain the same but the structure will be noticeably different.

This “new” MAE will be available on a part-time schedule and can be completed in three years. Students in the program will focus on one of our department's primary specialties – controls, fluids, propulsion/plasma/power, structures, or structures/composites – and will enjoy a series of unique, application-oriented courses designed to meet their needs. Courses will meet in the evening, and students will have the option to participate on campus or via distance learning (online). The new structure will allow us to tailor courses and materials in response to the practical, application-oriented issues that demand our attention today.

The department is implementing these changes in order to address the needs of our constituents – our students, our industry partners, and our larger economic community. One aspect that will never change, though, will be the rigorous, high-quality instruction and top-notch students you will find in the Master of Aerospace Engineering program at the University of Washington!

For more information on the pending changes to the MAE, please contact our newest team member, Ed Connery: [gradadvising@aa.washington.edu](mailto:gradadvising@aa.washington.edu)

### New Academic Advisor Joins A&A Graduate Program

Ed Connery joined the department in summer 2012 as the academic advisor for professional and distance learning programs. Ed is a West Coast native who earned a BA at UC Berkeley in 2004 and an MA in Educational Policy Studies from the University of Wisconsin in 2010. Over the past few years, Ed has worked in the field of higher education policy and curriculum in several capacities – including special projects on assessing graduate student experiences and improving professional development opportunities for STEM graduate students. He is thrilled to join the team and looks forward to working with students, faculty, alumni, and industry partners alike.



Ed Connery

### Joe Sutter Scholarship

With the help of leadership volunteers and a generous gift from Boeing, we are working to establish an endowed fund to honor Joe Sutter (BSAA 43), one of our most famous alumni and “Father of the 747.” The fund will support undergraduate education, including scholarships, senior design projects, and K-12 outreach. Please go to [www.uw.edu/giving/sutter](http://www.uw.edu/giving/sutter) to make an online gift or contact Megan Ingram at (206) 685-1378 or [mkingram@uw.edu](mailto:mkingram@uw.edu).

### First Graduate Student Poster Session



Graduate students Eric Lovejoy (left) and Keon Vereen discuss their research

The A&A Department hosted a graduate student research poster session on November 30, 2012. Forty-five students showcased their research in the areas of controls, fluids, plasma science and structures. The poster session and reception was attended by 110 students, faculty, alumni and industry partners (including some members of the Governor's newly formed Joint Center for Aerospace Technology Innovation). It was a wonderful opportunity for attendees to

see the exciting work being done by our students and faculty, as well as for students to meet our supporters, and to discuss one another's work. We plan to make this an annual event. For a listing of the posters and presenters, go to: <http://www.aa.washington.edu/research/undergrad.html>

## Plasma Startup Creates High-Energy Light to Make Smaller Microchips

The A&A Plasma Science group has been working for more than a decade on fusion energy, trying to harness the energy-generating mechanism of the sun. But in one of the twists of scientific discovery, in the process the researchers found a potential solution to a looming problem in the electronics industry.

To bring their solution to market two UW engineers have launched a startup, Zplasma, that aims to produce the high-energy light needed to etch the next generation of microchips.

“In order to get smaller feature sizes on silicon, the industry has to go to shorter wavelength light,” said Professor Uri Shumlak, “We are able to produce that light with enough power that it can be used to manufacture microchips.” The UW beam lasts up to 1,000 times longer than competing technologies and provides more control over the million-degree plasma that produces the light.

For more than four decades, the technology industry has kept up with Moore’s Law, a prediction that the number of transistors on a computer chip will double every two years. This trend has allowed ever-smaller, faster, lighter and less energy-intensive electronics. But it has hit a roadblock: the 193-nanometer ultraviolet light now being used cannot image smaller features.

The industry has determined that the future standard for making microchips will be 13.5-nanometer light, a wavelength less than 1/14 of the current size, that has the potential to carry the industry for years to come. Such extreme ultraviolet light can be created only from plasmas, which are high-temperature, electrically charged gases in which electrons are stripped from their nuclei.

The electronics industry is trying to produce this extreme ultraviolet light in various ways. One method takes a droplet of tin and shoots it with a laser to make plasma that releases a spark of light. But so far this spark is too brief. Chip manufacturers use a \$100 million machine to bounce light off a series of mirrors and eventually project the light onto a silicon wafer, but with each step absorbing some of the light’s energy.

“Over the past decade, the primary issue with extreme ultraviolet

light sources is that they just can’t produce enough power,” Shumlak said. “It is a stumbling block for the whole semiconductor industry.” Fusion scientists, it turns out, are plasma experts. The hydrogen plasma in the sun is so hot that hydrogen nuclei fuse together and release energy. Scientists around the world, including at the UW, are working to replicate this on Earth. A fusion reactor would use hydrogen as its fuel and emit helium as a waste product, a technically challenging but clean source of energy.

The UW group’s specialty is a lower-cost version of a fusion reactor that uses currents flowing through the material, rather than giant magnets, to contain the million-degree plasma. Their method also produces plasma that is stable and long-lived.

“It is a completely different way to make the plasma that gives you much more control,” said Brian Nelson, a UW research associate professor of electrical engineering.

The first time they triggered the experiment in 1999, an engineer looking through the glass said, “That was really bright!” That was when the proverbial light bulb went off, Nelson said, and the team began to explore applications for bright high-energy light.

They may have found that application in the microchip industry. Light produced through techniques now being considered by the chip industry generate a spark that lasts just 20 to 50 nanoseconds. Zplasma’s light beam lasts 20 to 50 millionths of a second, about 1,000 times longer. “That translates directly into more light output, more power depositing on the wafer, such that you can move it through in some reasonable amount of time,” Shumlak said.

An initial grant from the UW’s Center for Commercialization allowed the team to verify that it could produce 13.5-nanometer light. A gift last fall from the Washington Research Foundation helped the team shrink the equipment from the size of a broomstick to a new version the size of a pin, capable of producing a very sharp beam.

The company was established last year with help from the UW’s Center for Commercialization and Henry Berg, a technology entrepreneur who met the researchers through the center’s Entrepreneurs in Residence program. Berg is now CEO of Zplasma.

The company is seeking “smart money” from corporate investors who can integrate the new technology with existing industrial processes. “I hope this gets implemented into the industry and has an impact,” Shumlak said.

The group will continue its fusion research project funded by the US Department of Energy. Raymond Golingo (BS 90, MS 98, PhD 03) a research scientist in A&A, is co-author of the patent for the technology issued in 2008.

Article courtesy of Hannah Hickey, UW News & Information

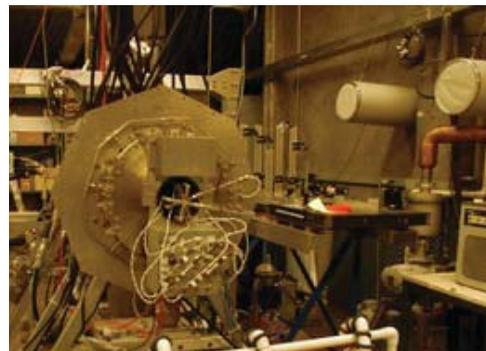
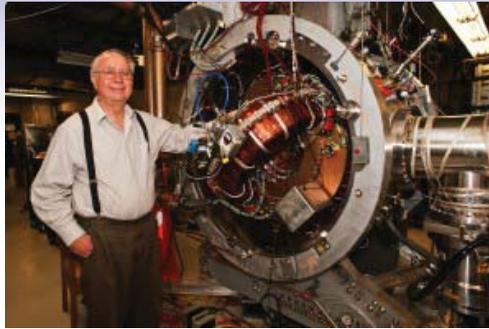


Photo by Photonics Media

Zplasma’s new inexpensive fusion reactor model

## Lower-Cost, Controllable Fusion Energy Developed in A&A Plasma Laboratory



Professor Thomas Jarboe

Photo by Mary Levin, UW Photography

Researchers around the world are working on an efficient, reliable way to contain the plasma used in fusion reactors, potentially bringing down the cost of this promising but technically elusive energy source. A new finding by A&A Professor Thomas Jarboe and his team could help contain and stabilize the plasma using as little as one percent of the energy required by current methods. He presented the findings in October at the International Atomic Energy Association's 24<sup>th</sup> annual Fusion Energy Conference in San Diego.

Most people know about nuclear *fission*, the commercial type of nuclear power generated from splitting large atoms in two. Still under research is nuclear *fusion*, which smashes two small atoms together, releasing energy without requiring rare elements or generating radioactive waste.

Of course, there is a catch – smashing the atoms together takes a lot of energy, and scientists are still working on a way to produce more energy than is put in. The sun is a powerful fusion reactor but we cannot recreate a full-scale sun on Earth.

Tom Jarboe has worked on fusion energy for more than three decades. For two of those decades, his team has worked on helicity injection as a more efficient alternative. Spirals in the plasma produce asymmetric currents that generate the right electric and magnetic fields to heat and confine the contents. Plasma is so hot that the electrons become separated from the nuclei. The plasma cannot touch any walls and so instead is contained by a magnetic bottle. Keeping the plasma hot enough and sustaining those magnetic fields requires a tremendous amount of energy.

Results showed the UW strategy required less energy than other methods, but the system was unstable, meaning that if conditions change it could wobble out of control. By contrast, in a stable equilibrium, any shift will tend to come back toward the original state, like a ball resting at the bottom of a bowl that will settle back where it started.

The apparatus developed in the UW A&A plasma lab uses two handle-shaped coils to alternately generate currents on either side of the central core, a method the authors call 'imposed dynamo current drive.' Results show the plasma is stable and the method is energy-efficient, but the UW research reactor is too small to fully contain the plasma without some escaping as a gas. Next, the team hopes to attach the device to a larger reactor to see if it can maintain a sufficiently tight magnetic bottle.

The research is funded by the US Department of Energy. Co-workers are Brian Nelson, research associate professor of electrical engineering, research associate Brian Victor, research scientist David Ennis, Nathaniel Hicks, George Marklin and Roger Smith, and graduate students Chris Hansen, Aaron Hossack, Cihan Ackay and Kyle Morgan.



A computer drawing of the prototype, which attaches current-carrying handles to either end of the central plasma

Article courtesy of Hannah Hickey, UW News & Information

## Senior Space Design Project

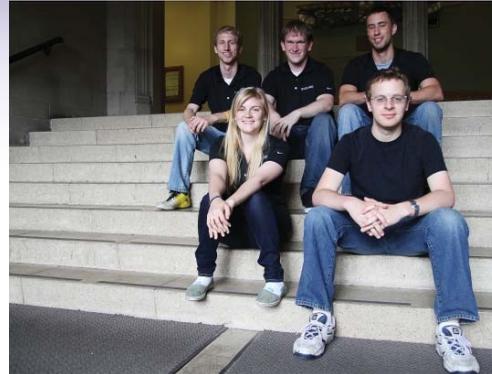


Photo by Joshua Bessex

Members of the 2012 Senior Space Design Class (L-R), Top row: James Lesko, class TA Michal Hughes, and Robert Gruenfelder. Bottom row: Lindsay Gibbons, Andrew Girardeau-Dale

Last winter, recent UW alumna Lindsey Gibbons sat below a clean whiteboard with a marker in hand and etched out a simple diagram before her teammates.

“I drew the Earth on one side and the Moon on another side and was like, ‘Okay, how are we going to get from Point A to Point B?’” Gibbons said.

This was the simple task for a team of 23 aerospace engineering seniors at the UW whose solution to the problem won them first place in a NASA space design competition titled “2012 Revolutionary Aerospace Systems Concepts-Academic Linkage,” or “RASC-AL.” The competition asked teams to contrive a way to support a 30-person habitat on the Moon.

This year was the UW’s first time taking first place.

In the photo on the right, senior Andrew Girardeau-Dale holds a plastic model of a lunar-surface habitat. The actual habitat would be inflatable and buried in the ground on the Moon to protect inhabitants from radiation.

Thirteen members of the team flew to Florida on June 11 to present their proposal, dubbed “Mission for the Acquisition of Valuable Extraterrestrial Resources for Industry Commercialization,” or “Maveric,” before a panel of NASA and aerospace-industry experts.

Most of the competing teams focused specifically on designing a habitat, but the UW’s 2012 Space Systems Design Team went

a step further. In addition to creating a sustainable settlement, the students created a detailed lunar mining concept to mine platinum group metals and rare Earth elements from the Moon, two types of substances in high demand on Earth.

“When people think of lunar mining, it sounds a little wacky,” Gibbons said. “So I think everybody was just a little shocked by our project.”

Pushing its idea even further, the team’s proposal included a David versus Goliath type slingshot that would catapult elements from the moon to land in the Pacific Ocean. Team lead Bryan Hopkins said the slingshot, used in place of a rocket, would be able to use alternative energy methods, such as solar power.

“It allows for giant savings in fuel,” he said.

Other parts of the proposal were also outlined with cost savings in mind.

The UW team’s paper included a description of a fully reusable single-stage-to-orbit vehicle, plans to rent out research space at its lunar outpost, and a reusable lunar lander. In addition, under the team’s proposal, profits from the platinum and rare Earth elements would serve to fund future space missions.

“Other groups were focused on doing a science mission for NASA, and we were going to the moon to make a profit,” team member Adam Hadaller said. “That was our entire goal.”

The members of the team were enrolled in Aeronautics & Astronautics 420/421, a course called “Spacecraft and Space Systems Design.”

“Students in the past would optimize to come up with the best technical solution, whereas students this year were taught, ‘What does a customer want, and how do we best get there?’” faculty advisor Dana Andrews said. “In this case, we had to do it very low cost — in real life as an engineer, the lowest cost solution is often the right answer.”

As winners, the team presented its concept in September at the AIAA Space 2012 Conference in California.



Model of the lunar-surface module

Article courtesy of Kirsten Johnson, UW Daily

### Senior Aircraft Design Project

Each year, the Senior Capstone Aircraft Design class is presented with a challenging set of requirements for designing an airplane. The 2012 challenge was to design a high aspect ratio, swept-wing concept airliner which matches the payload, range, and speed of the Boeing 777-200ER but with increased fuel efficiency and noise reduction characteristics. While a wide spectrum of concepts was considered, from blended wing body to joined wing aircraft, a conventional “Large Business Jet” configuration was chosen as the best compromise among fuel efficiency, noise reduction, passenger comfort, and marketability.

After the configuration had been selected, full scale conceptual design began. To increase the efficiency of the plane, the wing span was made as large as possible to increase aspect ratio without reaching “diminishing returns” in fuel burn due to weight and wetted area increases. This long and slender wing thus required significant structural and aeroelastic analyses to ensure that it would be strong enough to meet safety requirements without a major weight penalty and have enough internal volume to carry fuel for long range flights.

Stability and control also represented a significant design challenge. As this aircraft was designed for commercial use, favorable flying characteristics were desired. *MATLAB/Simulink* and *X-Plane* computer simulations of the new airplane were created to verify the handling qualities, with the addition of subsequent scaled model unmanned aerial vehicle (UAV) flights that would validate the accuracy of these mathematical models. In addition, numerous tail designs were studied to enable the selection of the optimal tail configuration.

After the full-scale conceptual design was completed, the design was scaled down to a 10 ft wingspan in order to fit a wind tunnel

model in the Kirsten Wind Tunnel for aerodynamic testing. The scaling of a full-size configuration to small UAV size presented significant difficulties across all disciplines involved. For example, high-lift design issues influenced both full-scale and UAV designs. Wind tunnel tests in conjunction with computational fluid dynamic simulations showed that, due to the low Reynolds number of UAV flight, the leading edge Kruger Flap angles required significant revision. In addition, due to dissimilarities between full-scale and model landing gear systems and available landing gear placement, gear struts required significant modification as well as aerodynamic revision.

Over more than 20 academic weeks, students of the capstone aircraft design class who began the course with limited airplane design knowledge managed to carry out the conceptual design of a modern long-range passenger jet, scale it down to UAV size, design the UAV, carry out simulations in all key disciplines plus wind tunnel, structural, and systems tests, and conclude the academic year with a thorough report. The result was a well received final design presentation, and an almost ready to fly student-built research UAV.



2012 Senior Airplane Design Class

### A&A Student Rocket Blasts Off



At this year's 7th Intercollegiate Experimental Rocket Association's Rocket Engineering Competition, a team of A&A students launched a rocket of their own design to more than five miles above ground level. Their efforts were rewarded when they learned that they had won both first place in the advanced category and

the Furfaro Award for Technical Excellence! Student teams from 11 universities participated in the event, six of which had entries in the advanced category. The A&A student launch team (**Viggo Hansen, Travis Edwards, Clayton Chu, Tom Slais, Andrew Hatt, Guo Shi Li, and Ben Dagang**) and supporting team members (**Michal Hughes, Tim Ip, Raymond Li**, and external advisor **David Stechmann**) developed a high-performance nitrous oxide-paraffin hybrid rocket motor and integrated it into a 13.6-foot-long rocket. The rocket, named DAQ Destroyer, was designed to deliver a payload of 10 pounds to 25,000 ft. The rocket was the end result of last year's Sounding Rockets course for integrated system design, which was focused on the art and science of sounding rockets. The novel hybrid motor created by the students had been under development for nearly 18 months. Seven full-scale static tests were carried out that ultimately resulted in the design of a hybrid motor that was able to attain approximately 93% of the theoretical specific impulse possible for the propellant combination being used. This is a remarkable engineering feat for a student-based project!

The team expressed their gratitude for the support they received from project sponsor Aerojet/Gencorp, as well as **Dr. Carl Knowlen** and **Professors Adam Bruckner, James Hermanson, and Tom Mattick**. They also acknowledged the assistance they received from the A&A, Mechanical Engineering, Physics and Chemistry Departments' machine shops, and the UW Automobili Lamborghini Advanced Composite Structures Laboratory.

Read more about the project and see videos of the launch on the UW Society for Advanced Rocket Propulsion website: <http://www.sarpuw.org/>

Congratulations to the A&A Sounding Rocket team for their achievement!

### Accolades

The American Institute of Aeronautics & Astronautics (AIAA) Region VI Student Conference took place in Seattle March 29-31 and was a great success, thanks in large part to our AIAA students who coordinated the event. Students from schools throughout the West Coast competed for cash prizes in the Technical Paper Competition. Congratulations to the UW AIAA for putting on this successful event, and to those of our students who won awards: Undergraduate Division: **Kenneth Low** (2nd), **Bryan Hopkins** (3rd), Masters Division: **Wei-Hsin Tien** (1st), **Clayton Chu** (2nd), **Tim Elder** (3rd), Team Division: **Viggo Hansen** and **Travis Edwards** (2nd).

Doctoral student **Noah Reddell**, who works with **Professor Uri Shumlak**, attended the 62nd Lindau Nobel Laureate Physics meeting in July in Germany. Noah was among an elite group of students selected from universities world-wide to attend this meeting, which featured recipients of the Nobel Prize in Physics. The honor was well designated for Noah, who is a Department of Energy Office of Science Graduate Fellow.

**Nathan Powel**, a doctoral student working with **Professor Kristi Morgansen** in the Nonlinear Dynamics and Control Laboratory, was selected as the 2012-13 recipient of the Osberg Endowed Presidential Fellowship. Nathan was a student panelist at the College of Engineering Scholar-Donor Lunch in November.

**Marzieh Nabi-Abdolyousefi** was a finalist for the UW Graduate School Medal. This award is given to recognize PhD candidates whose academic expertise and social awareness are integrated in a way that demonstrates an exemplary commitment to the University and its larger community. Marzieh is completing her PhD under the supervision of **Professor Mehran Mesbahi** in the Distributed Space Systems Lab.

### A&A Grads Test Evaporating Films in Zero-G

A&A graduate students **Juan Carlos (JC) Gonzalez** and **Eric Lin** recently completed a series of experimental tests on film evaporation in reduced gravity on board a parabolic-trajectory aircraft at NASA's Johnson Space Center. **Professor Jim Hermanson**, their research advisor, accompanied JC and Eric on their flights. The research is focused on determining the effects of gravity in evaporating films, an important consideration for space-based applications such as humidity control of the cabin environment, water recovery, and thermal management.



(L-R) PhD student JC Gonzalez, Professor Hermanson, and grad student Eric Lin running their experiment in zero-G

## Alumni NEWS AND UPDATES

### Alumnus Leroy Keith Pays it Forward

Ever since Leroy Keith (BS 64) was a young boy growing up in Western Kansas, he dreamed of being an aviator. He used to watch the condensation trails from the airplanes in the sky and wonder how those gleaming machines worked. While in high school, he was able to take flying lessons and when he graduated, he joined the ROTC in hopes of becoming a pilot. Although poor eyesight kept him from flying for the Air Force, he discovered his love for aeronautical engineering.

As a student at the University of Washington, he worked in the Kirsten Wind Tunnel with classmates Jerry Lee, Rod Hanson, Bob Dooley, Bob Shagino, Dave Anderson, Dean Mills, Porter LaPlant, Dave Burrough and Tony Schaff, just to name a few. Professor Bill Rae was running the wind tunnel at the time. Leroy credits this work as the most valuable experience of his engineering education. Working in the wind tunnel allowed him to apply the theory he was learning in the classroom and connect with his peers. He also had contact with leaders in industry, which positioned him well for employment after graduation.

After leaving the university, Leroy worked as an engineer at Boeing and later enjoyed a storied career at the FAA. This work resulted in continued employment as a private consultant. As an industry professional, Leroy is concerned that there



Leroy Keith in Action in the Kirsten Wind Tunnel

are not enough qualified home-grown engineers to take the place of his retiring generation. This, coupled with competition from overseas, makes it more critical than ever to support students in the pursuit of their engineering degrees.

Earlier this year, Leroy informed the department that he made plans to leave a significant estate gift to the students in the Department of Aeronautics & Astronautics. His gift will help establish a scholarship for undergraduates and support student design programs like the Senior Aircraft or Spacecraft Design Capstone Projects. Leroy was inspired by the hands-on work undergraduate students are doing to apply classroom theory to physical design.

Leroy was motivated to make this gift because he recognizes how his education has been critical to his success and wants others to have the same opportunities. He said that this is his chance to “pay it forward.” The realities of rising tuition, the shrinking middle class, and the burden of student loans are concerns that Leroy took into consideration when making his decision to make a gift to the University of Washington.

When asked how he would like to see other alumni support the department, he answered “do whatever you can – give money or give time. Be engaged with the department and find out how you can help. Stay in touch and open your professional networks to faculty and students.” To learn more about how you can support A&A with a gift, please contact Megan Ingram, Associate Director for Advancement, at (206) 685-1378 or [mkingram@uw.edu](mailto:mkingram@uw.edu).

### UW A&A Distinguished Alumnus 2012 Ron Dittmore



At our annual spring banquet in May 2012, Ron Dittmore (BS 74, MS 75) received our distinguished alumnus award for his leadership in the aerospace industry. Ron Dittmore is the former senior vice president and former president of ATK Launch Systems, a premier aerospace and defense company with more than 17,000 employees. As president at ATK, Dittmore was responsible for the overall management of marketing, design, development, manufacturing and support operations of their space and strategic propulsion business unit. Prior to joining ATK, Dittmore had a distinguished 26-year career with the National Aeronautics and Space Administration (NASA), serving in several key senior executive positions, including director of the Space Shuttle Program, providing executive direction and setting policy, including launch, orbit and landing operations at NASA's space flight centers. Dittmore was also manager of the Space Shuttle Orbiter Project, where he directed the design, development, modification, certification and test of the orbiter vehicle and attendant software. Dittmore also served seven years as a Space Shuttle flight director at the Johnson Space Center with responsibility for overall leadership, flight preparation, and direction of Space Shuttle missions from NASA's Mission Control Center.

## Alumni UPDATES

**Leland Nicolai (BS 57)** was invited by the seniors to be the speaker at the 2012 department graduation celebration. Leland, Lockheed Martin Fellow for Aircraft Conceptual Design, had many insights for our graduates, and presented the graduating class with a model of the Lockheed Martin Joint Strike Fighter with an inscribed plaque.

**Ramses Antoun (MS 72)** stopped by Gugenheim to visit. Ramses is retired now, but his son, Daniel, is a Husky!

**Greg Johnson (BS 77)** flew a full-scale space shuttle trainer in the back of NASA's "Super Guppy" cargo plane (a modified Boeing 747) from Houston to Seattle. The shuttle trainer is now on exhibit at Seattle's Museum of Flight. Greg, a Seattle native, is a NASA astronaut.

**Tim Cacaindin (BS 84, MS 85)** stopped by with his family this summer to visit the UW. Tim is mission systems lead engineer with the JSF Integrated Test Force at Edwards Air Force Base.

**Alek Komarnitsky (BS 84)** sent holiday greetings and a link to his "Controllable Christmas Lights for Celiac Disease" [http://www.komar.org/cgi-bin/christmas\\_webcam](http://www.komar.org/cgi-bin/christmas_webcam)

**Jeff Slostad (BS 89, MS 93)**, vice president of engineering at Tethers Unlimited, Inc., came as an industry guest this spring to see the senior design class final presentations.

**Benedicte Bonomi (MS 90)** visited A&A this summer from France with former classmate **Vinit Sethi (MS 90)**.

**Robert Lind (BS 90, MS 92)** and **Andrew McComas (BS 03, MS 07)** presented a seminar for the autumn quarter undergraduate Control in Aerospace Systems class taught by **Chris Lum (BS 03, MS 05, PhD 09)**. The seminar was titled, "Practical Applications of Aeroservoelastic Analysis for Aircraft Design and Certification." Robert is the engineering manager and Andrew is lead engineer at TLG Aerospace in Seattle.

**Eric Johnson (BS 91)** was a speaker at a forum on drones and robotic warfare at the Hammer Museum in Los Angeles in July. Eric is a leading expert in the development and operation of UAVs.

**Dayton Griffin (BS 92, MS 93)** visited the

department in early August with his family. Dayton recently accepted a position with DNV KEMA Energy and Sustainability, as the business director for renewable energy services, Asia Pacific. Dayton is currently in South Korea, but he may move to Beijing in 2013.

**Michael Balzer (BS 92, MS 94)** received Boeing's top innovation honor, the 2012 Special Invention Award. He was a member of a team that invented critical parts that made the 787 Dreamliner possible. Well done, Michael!

**Duane Ludwig (MS 98)** came to Seattle to attend a wedding in April and came by to say hello. Duane is a senior aerospace engineer at CSSI, Inc. in Washington, DC. Duane shared some photos of the Space Shuttle Discovery (being delivered to the Smithsonian Museum) flying overhead in the back of a modified NASA Boeing 747.

After six years at Lufthansa Technik, **Jose Valdez (BS 98, MS 03)** has rejoined PATTS College of Aeronautics as president. PATTS Tourism Management Department is building a small hotel in a popular destination in the Philippines. Jose welcomes A&A alums to visit the college and enjoy the hotel.

US Air Force Lieutenant Colonel **C.B. Cain (MS 01)** is commander of the 418th Flight Test Squadron and the director of the Global Reach Combined Test Force. C.B. leads a test force of over 350 military, civilians, and contractors responsible for developmental test and evaluation of Air Force mobility aircraft and parachute systems.

**Bobak Ferdowsi (BS 01)** gained notoriety as the "Mohawk Guy" in the NASA control room as the Mars Curiosity rover landed in August. Bobak, who works as flight director for Curiosity Mars rover at NASA, came to the UW in September to



Photo courtesy of NASA

appear with the Pacific Northwest Ballet's season kick-off, which they called a "futuristic space extravaganza!"

**David Meller (MS 01)** is back at the UW as a bioengineering technology manager at the Center for Commercialization. David received his PhD in bioengineering from Arizona State University in 2010. Welcome back, David!

**Jonathan Lee (BS 02, MS 04)** was married in December 2012. Jonathan is an engineer at Boeing Commercial Airplanes in the Aerodynamics Stability & Control group. Congratulations to Jonathan and his beautiful bride, Lilda.

**Marcus Holzinger (BS 03, MS 05)** stopped by at the end of last year to say hello. Marcus received his PhD from Colorado State University, and he is now an assistant professor in aerospace engineering at Georgia Tech.

**Stuart Jackson (MS 03, PhD 06)** and his wife welcomed a beautiful baby girl named Avery Victoria in August of this year.

**Christopher Lum (BS 03, MS 05, PhD 09)** and his wife, Alison, welcomed their first child in November—a lovely girl named Amara. Even their dog, Gus, was enchanted by her. Chris is a research scientist and instructor in our department.



After a seven+ year career with Lockheed Martin Space Systems, **Steven Nielson (BS 04)** joined Hexcel, an aerospace subcontractor, as a quality engineer for the C-17 and 777 product lines. Steven was married in October of this year and has two beautiful little girls, Sawyer and Isley.

**Mark Rothnie (BS 04, MS 07)**, an engineer at Andrews Space, came to A&A in February to teach the Senior Space Design class how to use trajectory optimization software.

**Rahul Mahajan (MS 04)** was married this spring to his long-time sweetheart, Sarah.

## Alumni UPDATES

Rahul received his PhD in Atmospheric Sciences at the UW in 2011, and accepted a position as a scientist at NASA Goddard Space Flight Center. Congratulations on all counts, Rahul!

**Sanjoy Som (MS 04)** was back at the UW as a colloquium speaker in the Astrobiology Program. Sanjoy, who received his PhD in ESS at the UW, is a post-doctoral research fellow at NASA. He also founded S.A.G.A.N., an astrobiology and space exploration social network, and Blue Marble Space Institute of Science, a non-profit, virtual research institute.

**Kakani Young (BS 04)** was at the UW this fall to present a seminar in the Biology Department and stopped by A&A to say hello. Kakani received her MS and PhD from Caltech, and she is now a postdoctoral fellow at Woods Hole Oceanographic Institute. Kakani was married in July, and among the attendees were A&A alumni from her class: **Clinton Travis**, **Rebekah Arnold**, and **Garrett Teahan**.

**Daniel Klein (MS 05, PhD 08)** made a presentation to the undergraduate Control in Aerospace Systems class this fall. Dan is a research scientist at Intellectual Ventures in Bellevue.

**Laurent Viard**, a visiting graduate in 2005, came by the department and introduced us to his wife Aya and daughter Yuna. Laurent is living in Kobe, Japan, working as a manufacturing engineer for Rolls Royce.

**Joe Giordano (MS 06)** and his wife Jihyan had a second baby boy in September 2012. Little Nicholas Louis was also welcomed by his big brother Jonah, age three and a half.

**Christopher Lanning (BS 06)** came to A&A for a visit back in January. Christopher is a design engineer at Forest Concepts, and he is also an adjunct instructor at Seattle Pacific University. Since graduation, Christopher has been granted three patents around systems for a woody biomass baler, and he has eight publications!

**Manav Bhatia (PhD 07)** and his wife Andrea welcomed a handsome baby boy named Mavin Tej in September. Manav is a postdoctoral research engineer at the Air Force Research Laboratory at Wright Patterson AFB. Congratulations on the new addition!

**David Kane (BS 08)** joined Pratt and Whitney earlier this year. He is part of the Systems Engineering and Validation rotational program in the Test Systems Engineering group working on development programs for the PW1500 to be used on Bombardier Aerospace's C series aircraft and the Airbus A320 NEO.

**Skander Mzali (BS 09, MAE 10)** is the CEO and founder of Teamfind, a company that helps match gamers with the right team. Teamfind currently has more than 21,000 members.

After working as a postdoctoral fellow at the University of Stuttgart in Germany for two years, **Daniel Zelazo (PhD 09)** accepted a position as assistant professor of aerospace engineering at the Technion—Israel Institute of Technology. Dan came to the UW in December to present a seminar for Professor Mesbahi's Mathematical Foundations of Systems Theory class (and to get some time on the slopes!).

**Ashley Clark (BS 10)** came to A&A to say hello on a trip back home to see family. Ashley is pursuing her PhD at Stanford University, and she is working part-time at NASA Ames on the Cubesat attitude control system.

**Tripti Mathur (MAE 10)** and her husband, Alok, welcomed a happy and beautiful baby boy named Aditya in 2012. Congratulations, Tripti and Alok!



On September 23, 2012 the **class of 1977** gathered at the home of Phil and Geda Condit to commemorate the 35 years that have passed since their graduation. In an effort to support current A&A students, they will raise money for an undergraduate scholarship. We are currently accepting donations and ask that you join your classmates in supporting an undergraduate with a onetime award this spring. To make a gift, please contact Joseph Sherman at (206) 616-6925 or shermjp@uw.edu.

### In Memoriam

**Joseph L. Anderson (BS 41)** passed away in October 2012 at the age of 94. Joseph had a long, successful career at the National Advisory Committee for Aeronautics (which later became NASA). Joseph's son, Eric, came to visit A&A and learn more about his father's time here.

1998 A&A Distinguished Alumnus **Lloyd Frisbee (BS 42)** passed away in April 2012. Lloyd had an impressive career at Boeing, Northrop Aircraft Co., and finally as vice president at Lockheed Corporation, where he was responsible for the full-scale structural testing of the NASA Space Shuttle. Our thoughts are with Lloyd's family.

Former staff member and UW Research Professor in Mechanical Engineering, **George Vlases**, passed away suddenly in August, 2012. George joined the UW in 1969 and helped to found the department's plasma science program. In addition to his fusion research with the ME Department, George worked at the Redmond Plasma Physics Laboratory until 2011. He will be missed by all here who knew him.



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## Highlight

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# Highlight

## Department of Aeronautics & Astronautics Named for William E. Boeing (continued)

Through the years, Boeing has invested nearly \$80 million in the UW. In the 1980s, the company donated \$2 million to upgrade the computer systems of a second wind tunnel, the Kirsten Wind Tunnel, that it helped fund in the 1930s. That tunnel is still operated by students and performs tests for UW students, faculty and external clients. In the 1990s, the company created a major faculty endowment to support engineering teaching and research.

William E. Boeing and pilot Eddie Hubbard flew the first international mail flight to the US on March 3, 1919 from Vancouver, BC to Seattle. UW alumnus Clairmont Egtvedt later designed the Model 40 plane that in 1927 won Boeing the contract to deliver mail from San Francisco to Chicago.

"It's difficult to think of a company that has had a greater impact on the aerospace industry worldwide than the company created by Bill Boeing," said James Hermanson, professor and chair of UW Aeronautics & Astronautics. "Bill Boeing is considered a founding father of our department, which was one of the first aeronautical engineering programs in the nation."



William E. Boeing and pilot Eddie Hubbard on the first international mail flight to the US in 1919

"We are thrilled to be able to honor Bill Boeing and recognize the ongoing, vital partnership between the Boeing Company and the Department of Aeronautics & Astronautics, the College of Engineering, and all of the UW," Hermanson added. "The company Bill Boeing founded has played a vital role in our community of faculty, students and alumni."

Today the UW's aeronautics & astronautics department has an enrollment of 153 undergraduates, 167 graduate students and 17 faculty members. In recent years, UW faculty have collaborated with Boeing on unmanned aerial vehicles and on lightweight, composite materials incorporated in the Boeing 787. Recently the company and the UW launched joint post-graduate certificate programs for the analysis and design of composite materials and for integrated systems engineering.

The permanent naming honors nearly 100 years of partnership, and specifically recognizes William E. Boeing Sr. as the department's founding benefactor.

"Both my father and the University of Washington understood very early in the development of commercial aviation how big the industry would become, and how much it would impact people's everyday lives," said William E. (Bill) Boeing Jr. "My family and I are very pleased to have the aero department named in his honor to permanently link two aeronautics pioneers."