



Greetings Again from the Plains,

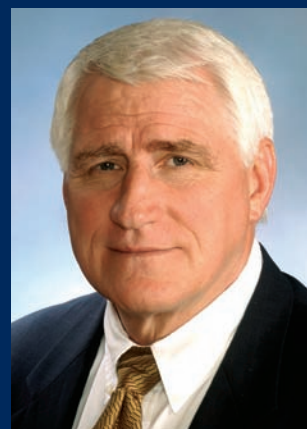
Many changes have occurred since our last newsletter. Some of these you may have read about in the Samuel Ginn College of Engineering newsletter and Auburn University, College, and Department websites. Some of the changes have resulted in a 30 percent change in our faculty membership. John Burkhalter and Rhonald Jenkins retired in 2004, and Ronald Barrett returned to his alma mater, the University of Kansas, last summer. Auburn University and many of you as students have been extremely fortunate that these three individuals were a part of the university. Of course, Drs. Burkhalter and Jenkins still are as emeritus faculty members. In fact, they are both still quite active in research and Rhon taught a course in "Starship Propulsion" last spring. Also, Dr. Barrett is still collaborating with some of our faculty on research projects.

Although we have lost some valuable faculty members to retirement and relocation, we have gained an equal number of highly qualified new ones. Brian Thurow joined us last December after receiving his doctorate from Ohio State University, specializing in high-speed aerodynamics, experimental and theoretical. Andrew Sinclair, who specialty is dynamics and control, came from Texas A&M in August. Brian and Andy filled the positions vacated by John and Rhon.

Gilbert Crouse has joined our faculty to continue the teaching of airplane design that Ron Barrett did and to conduct research related to unmanned aerial vehicles (UAVs). Along with Christopher Roy, our computational fluid dynamics expert, these three new faculty members have reduced the average age of our faculty substantially. They will give us some added energy to vigorously pursue our goals.

Another big change in our teaching personnel came, not because a retirement, but because of long distance commuting. Col. Jim Voss '72, who along with Adm. T.K. Mattingly '58 was a NASA astronaut, has returned to Houston, Texas after serving as Associate Dean of External Affairs for two years and teaching our space mission design course on the side. The students that were in his classes can testify to the benefits of having a person with actual manned space experience teach manned spacecraft design. We wish Jim well in his new job as Vice President of Transformational Space, LLC.

In this newsletter you can read more about Dr. Roy receiving the highest honor a young research engineer can receive from the U. S. government, a Presidential Early Career Award in Science and Engineering (PECASE) and Dr. Thurow receiving a Young Investigator Award from the Army Research Office.



John Cochran

Three big achievements by our students are detailed in this newsletter. The first two were winning a first place overall in the Society of Automotive Engineers (SAE) Aero Design East Heavy Lift competition and then picking up a second in the West competition in 2004. The third was two of our students winning first place in the 2006 National American Institute of Aeronautics and Astronautics (AIAA) student paper contest at the Aerospace Sciences Meeting in Reno.

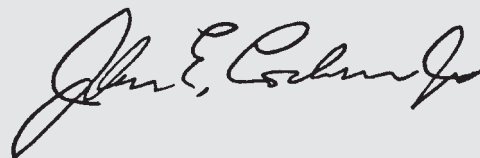
In the fall of 2004, the representatives of the Accrediting Board for Engineering and Technology (ABET) visited Auburn. At that time, the exit report of representative visiting our department indicated that our undergraduate aerospace engineering program would be re-accredited. Last summer, we received formal notification that our program has been re-accredited for the maximum six years. Many people are responsible for this, including many of our alumni who responded to our questionnaire that as a means of assessing whether we are effectively pursuing our educational objectives. Rhon Jenkins was the principal author of the questionnaire. We will be sending out another before 2010. Our Aerospace Engineering Advisory Council (AEAC) helped establish our objectives and Morris Penny '69, along with Louis Connor '67, gave their time to interview graduating seniors to obtain feedback on their educational experience in our program. Norm Speakman, B.A.E. '72, M.S. '74, who has served as the chairman of the AEAC for several years, and former chairman, Gene Fuller, B.A.E. '65, M.S. '66, were also instrumental in the external component of our accreditation. Steve Gross, our program coordinator, and Rhon Jenkins were the main reasons our internal component was found acceptable. The AEAC is continuing to help us assess and improve our program.

Gifts from alumni, friends and industry are an indispensable part of our plans for continuing on the path to excellence. Walt Woltosz, BAE '68 and M.S. '74, and his wife, Ginger, provided a significant gift that allowed us to purchase a demonstration gas turbine for our propulsion lab. Their more recent gift is helping us give more emphasis to the area of optimization, an area in which Roy Hartfield is carrying on the research using genetic algorithms to design missiles begun by John Burkhalter.

We are improving our laboratories which are used in for instruction and research. In addition to the demonstration gas turbine for our propulsion lab, we have continued to improve our wind tunnel and water tunnel facilities in which Anwar Ahmed conducts tests for government sponsors. Dr. Thurow is developing a unique high-speed flow visualization lab. We are working with the army to build a Missile and Aircraft Hardware-in-the-Loop System Simulation Lab in which graduate students can work in facilities comparable, on a smaller scale, to those at the Aviation and Missile Research, Development and Engineering Center.

I hope that you enjoy reading this newsletter and will let us know what you think about it. Also, please remember that we are in the middle of a major campaign to improve Auburn University, including the College of Engineering and the Department of Aerospace Engineering. Remember, IT BEGINS AT AUBURN!

John E. Cochran, Jr., B.A.E. '66, M.S. '67

A handwritten signature in black ink, reading "John E. Cochran, Jr." The signature is written in a cursive, flowing style with a large initial "J".

Department Welcomes New Faculty Members

Our department has had many new additions to our faculty in the past two years. Andrew Sinclair, Brian S. Thurow, and Gil Crouse were all welcomed to Auburn University in 2005.

Andrew Sinclair holds bachelor's and master's degrees in aerospace engineering from the University of Florida. During his time there he worked with the U.S. Navy's Naval Surface Warfare Center in Panama City, Fla. After graduating, he attended Texas A&M University, receiving a doctorate in aerospace engineering. He joined the faculty at Auburn University in the fall of 2005 and has since taught Fundamentals of Engineering Mechanics, Dynamics, and Aerospace Systems. Sinclair's research interests are in the areas of nonlinear dynamics and control, as well as guidance and navigation. He is currently working on the development of hardware-in-the-loop simulations. In addition, his interests also include cooperative control of autonomous agents. In this area, he has currently been studying interplay of navigation and path planning.

Brian S. Thurow earned his doctorate in mechanical engineering from Ohio State University in 2005. Thurow joined the Department of Aerospace Engineering in 2005 and has since taught Fundamentals of Aerospace Engineering and Aerodynamics I & II. He is also currently preparing a graduate course on optical diagnostics for aerodynamic measurements. In recognition of Thurow's concern for his students and his efforts towards being extremely accessible to them, he recently received the 2006 Aerospace Engineering Outstanding Faculty Member award at the Faculty/Student Awards and Alumni Recognition Spring Reception in March. Thurow's research interests include advanced laser diagnostics, experimental aerodynamics, turbulence, high Reynolds number flows, and aero-optics. Since his arrival, Thurow has been hard at work developing the Advanced Laser Diagnostics Laboratory (ALDL). Thurow and his wife, Jennifer, have a two-year old son, Hunter, and recently they welcomed a new baby girl, Elizabeth, into their family.

Gil Crouse earned his bachelor's degree in physics from Wheaton College. He then received his master's degree and his doctorate in aerospace engineering from the University of Maryland, College Park. Prior to his move to Auburn, Crouse founded DaVinci Technologies, a small business focused on development and marketing of software products for engineering design. The company also offered design and analysis service and Crouse was involved in a number of diverse projects such as design and analysis of a novel VTOL aircraft configuration, conceptual design of a high speed and endurance UAV for maritime surveillance applications, and conceptual design of a large VTOL cargo aircraft. Before starting DaVinci Technologies, Crouse was a division scientist and deputy technical director for maritime systems at BBN Technologies in Arlington, Va. There he was involved in a number of government sponsored research initiatives and directed BBN's IR&D efforts in the maritime systems department. Crouse joined the Auburn Aerospace Engineering Department in fall 2005, and teaches the senior level aircraft design capstone course. In addition, he advises Auburn's entries in the American Institute of Aeronautics and Astronautics (AIAA) Design/Build/Fly competition, which requires students to design a radio-controlled airplane to meet the competition objectives then construct the airplane from scratch and fly the airplane at the competition site. Crouse's primary areas of research interest include manned and unmanned aircraft design, unmanned aircraft guidance and control, and S/VTOL aircraft. He is a senior member of the AIAA. He serves on the unmanned systems program committee and as vice chair of the aircraft design technical committee. Crouse is also active in the Auburn community—he has served on the science/math textbook committee for Auburn City Schools, coached recreational soccer and baseball teams, and served as advisor to a Science Olympiad team from Cary Woods Elementary School.



Andrew Sinclair



Brian S. Thurow



Gil Crouse

Roy Earns Presidential Award

On July 26, Chris Roy was honored with a Presidential Early Career Award for Scientists and Engineers (PECASE) for his work on verification and validation in computational science and engineering. Roy is one of seven researchers recognized by the Department of Energy, and one of 56 researchers who received this year's presidential award. He was nominated for the award by the National Nuclear Security Administration's Sandia National Laboratories in recognition of his work in support of the administration's national security mission.

"It's an amazing honor to receive a PECASE," says Roy. "It's a privilege to have my work acknowledged in this manner, and I look forward to continuing my research and furthering engineering education."

Roy earned the award for his work on the development of verification (mathematical accuracy) and validation (physical accuracy) methods for increasing confidence in computational science and engineering simulations, work on unsteady hybrid turbulence models for fluid dynamics simulations, and for providing high quality educational opportunities for the next generation of American scientists and engineers.

"The usual process for designing an engineering system is to build it, test it, fix it and repeat," Roy says. "My goal is to help designers move from a test-based approach to a more simulation-oriented process."

The PECASE, established in 1996, honors the most promising researchers in the nation within their fields. Nine federal departments and agencies annually nominate scientists and engineers whose work shows exceptional promise for leadership at the frontiers of scientific knowledge. The presidential award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers in the beginning of their independent careers. Each presidential award winner received a citation, a plaque, and a five-year commitment for continued funding of their work.



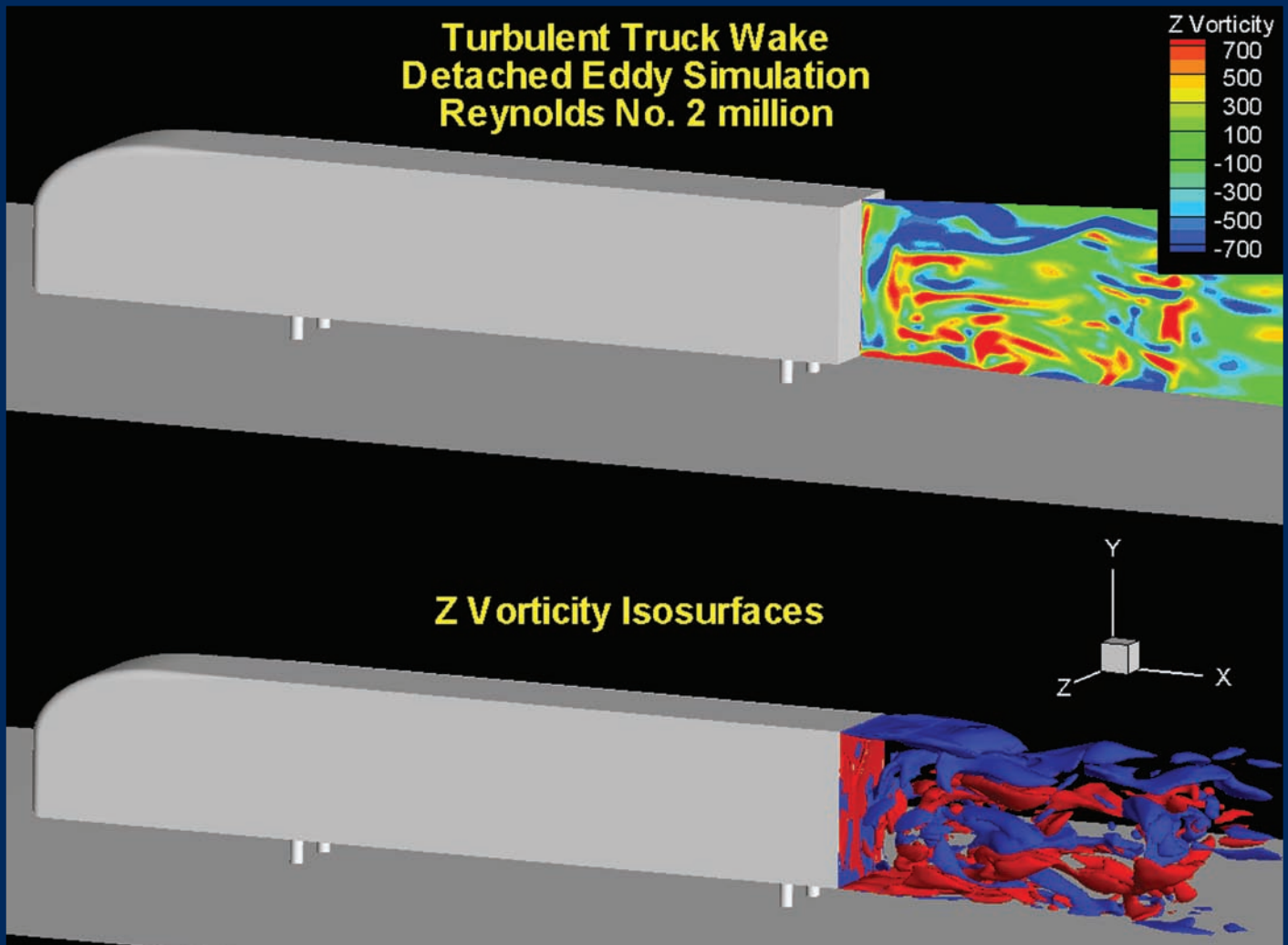
Dr. Roy (right) with U. S. Department of Energy Secretary Samuel Bodman

Research Initiatives

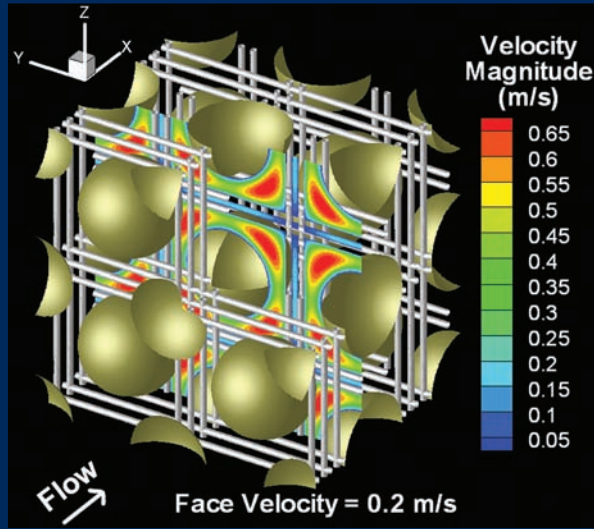
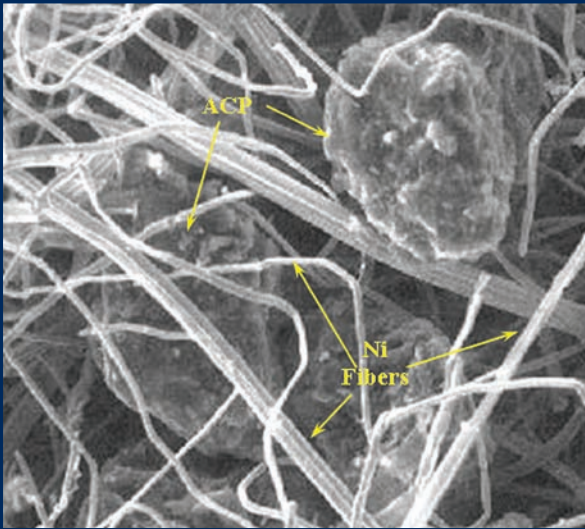
David Cicci spent the summer of 2006 in Huntsville, Ala., working at the NASA Marshall Space Flight Center. He is working on navigation system component modeling for the Crew Launch Vehicle development program.

Chris Roy, Roy Hartfield, and Anwar Ahmed are currently collaborating with Digital Fusion out of Huntsville, Ala. to develop a framework to reduce the aerodynamic drag and increase the highway safety of tractor trailers. The project is being funded under a research grant from the U.S. Department of Transportation. Their efforts include CFD simulations, experimental wind tunnel testing and aerodynamic optimization.

In a related effort, Roy and a group of his students are being supported by the Department of Energy in the investigation of the structure of the turbulent wake developed behind tractor-trailers. An unsteady turbulence simulation is shown below where the larger, more energetic turbulent structures in the wake are simulated, while the smaller, more homogeneous structures are modeled. This figure gives the z-component of vorticity which provides a measure of the rotation of the flow about the z-axis (blue denotes clockwise rotation while red counter-clockwise rotation).



Unsteady Turbulence simulation of a Truck Wake



An electron micrograph of the microfibrous material is shown on the left, while a simplified computational geometry, which provides detailed information on interstitial velocities, is given on the right.

Roy is also working closely with Bruce Tatarчук of Auburn's Department of Chemical Engineering to study gas flow through microfibrous materials. By embedding small, catalytic particles in a matrix of microfibers with diameters on the order of a few microns, enhanced chemical reactivity by up to a factor of five has been achieved. CFD is being used to provide insight into the fundamental mechanisms behind the increased chemical reactivity, and will ultimately be used to design new, more efficient materials.

Roy Hartfield is currently working on a program with MSIC to develop the tools necessary for reverse engineering of foreign missiles using liquid engine propulsion systems. This program uses a genetic algorithm to find the best match between observed performance for a given missile and the possible design choices which could be used to produce the missile.

Hartfield is currently performing a trade study based on optimized designs for solid rocket boosted ramjets and scramjets. This effort is being funded by the army. The genetic algorithm based missile design tool is being modified to accommodate the task and analysis tools for ramjets and scramjets developed for previous efforts are being adapted for modeling the cruise condition performance.

Hartfield is also working with a colleague at the University of Glasgow in Scotland to offer a rocket propulsion course as a study abroad option for Auburn students during the summer of 2007.

Christoph Burger, a doctoral student in aerospace engineering, is currently pursuing a project to optimize the propulsion system and air frame for an organic aerial vehicle (OAV). This effort has included an excursion into the field of wind turbines and a spin-off of this effort will include a tool for optimizing full scale aircraft propellers. The technical approach used in this effort has been to model the performance of propeller and wind turbine blades using vortex lattice theory and then allow a genetic algorithm to select an optimum design by selecting blade geometry parameters and driving the vortex lattice code to produce performance data for candidate designs. Some sample results from a paper presented at the Fourth AIAA Energy Conversion Conference in San Diego, Calif. in June 2006 on the topic of wind turbine optimization are shown schematically in the figure on the next page.



Three-Stage Solid Propellant Rocket Schematic

Maj. Douglas Bayley, a doctoral student at Auburn, is being funded for graduate study by the Air Force as a part of his career development. The subject of Bayley's dissertation research is optimization of earth to orbit launch vehicles primarily for minimum cost. In his design optimization study, Bayley is considering combinations of solid rocket boosters, liquid rocket engine systems and air breathing options for possible propulsion systems. A schematic illustrating a three stage solid motor powered design developed using the genetic algorithm-based optimization tool is shown in the figure on the next page.

Andrew Sinclair is currently working with John Cochran on the development of a Hardware-in-the-Loop (HWIL) Simulations Lab and doing research in on the development of HWIL simulations. This field combines numerical simulation codes, flight motion simulators, and computer visualizations to provide realistic tests for aerospace systems. Such simulations are a high-fidelity alternative to actual flight that cost much less. The army's Aviation and Missile Research, Development and Engineering Center (AMRDEC) at Redstone Arsenal is providing government-furnished HWIL equipment and computers for the lab, including a motion table and computers. This lab will provide hands-on opportunities for students to learn how hardware, such as missile seeker head sensors and software, such as, guidance algorithms are evaluated in the HWIL environment.

In the area of cooperative control of autonomous agents, Sinclair has been collaborating with researchers at Eglin Air Force Base and the University of Florida to study the interplay of navigation and path planning, two necessary tasks that must be performed by autonomous vehicles. Progress has been made in the development of vehicle trajectories that enhance the navigation performance of the vehicles relative to a target. Potential applications for this research include the cooperative attack of air munitions.

Brian Thurow has been working on developing the Advanced Laser Diagnostics Laboratory (ALDL) since his arrival at Auburn University. The ALDL specializes in the development and application of advanced laser diagnostics for aerodynamic measurements. The highlight of the laboratory is a one-of-a-kind, home-built pulse burst laser system that can produce high energy laser pulses at repetition rates between 10 Hz and 10 MHz. Used with an ultra-high-speed camera, flow field imaging at up to 10 million frames per second can be achieved.

Thurow recently received a Defense University Research Instrumentation Program (DURIP) award through the Army Research Office (ARO) that will enable the purchase a camera capable of recording images at up to one million frames per second. In addition, he has received funding through the Department of Defense and will be receiving a three-year grant through the ARO's Young Investigator's Program to develop a three-dimensional (3-D) imaging technique based on high-speed imaging technology. For 3-D imaging, a laser sheet formed by the pulse burst laser is rapidly scanned through the flow field. A high-speed camera is used to capture images of the flow as the laser sheet sweeps through the flow field, from which a 3-D image can be reconstructed. The laboratory is also developing a variety of other techniques including a micro planar laser induced fluorescence (μ -PLIF) technique with resolution on the order of 1 micron, a high-speed 3-D particle image velocimetry (3-D PIV) system and a 3-D density measurement technique based on acetone fluorescence. Applications for these techniques include high Reynolds number turbulence, aero-optics, micro-fluidics, missile/rocket aerodynamics, SCRAMJet engines, internal combustion engines and dusty plasmas.

Winifred Foster has been working on two projects during the last two years. The first project is for the army at Fort Rucker. Foster has been working on evaluating the crashworthiness of a medical evacuation system that is to be used on black hawk helicopters to evacuate injured military personnel. In particular, the work was directed at determining the structural integrity of a system which was attached to an evacuation litter and which consisted of a platform for carrying various medical life support equipment and monitoring devices. The second of Foster's projects was for NASA under a subcontract from the University of Alabama at Huntsville. This project involved a study of a combustion chamber cooling jacket similar to those used in liquid rocket engines. The study was directed toward developing a more computationally efficient model for determining the number of firing cycles the chamber could undergo before failure.

Doctoral candidate, Ran Dai, is currently working with John Cochran to find minimum-time-to-climb (MTTC) trajectories for aircraft in constrained airspaces. The objective find MTTC trajectories that is remain within a specified volume of space that contains the initial and final positions of the aircraft. Similar methods will be used to determine minimum time rendezvous and intercept trajectories. Cochran is also the principal investigator for the HWIL Simulation Lab project with AMRDEC.

In connection with the many ongoing departmental research projects, faculty members and graduate students have presented numerous papers at technical conferences during 2006. Hartfield, Roy and Ahmed attended the 25th Applied Aerodynamics conference in June in San Francisco. Hartfield was the technical chair of this conference.



Picture of the San Francisco skyline taken at the Applied Aerodynamics Conference

Other conferences attended include:

Hartfield, Crouse, Foster, Roy, Thurow, Ahmed, 44th Aerospace Sciences meeting, Reno

Sinclair attended and presented a paper at a conference in Colorado, August 2006

Ahmed attended and presented a paper at a conference in Colorado, August 2006

Hartfield presented a paper at the 4th AIAA Energy Conversion Conference in San Diego, June 2006

Hartfield presented a paper at the AIAA/ASME/ASEE Joint Propulsion Conference in Sacramento, CA, July 2006.



From left to right: Richard Bramlette, Barrett, and Ryan Leruk happily accept their first place prize in the AIAA Global Technical Paper Competition

Student Achievements

AIAA Student Chapter: Bramlette and Leurck Win National Paper Contest in Reno in 2006

The AIAA student chapter continues to maintain a strong presence in the overall experience for students within the Department of Aerospace Engineering. AIAA activities include guest speakers, facility tours, social functions and attendance of the annual AIAA Region II student conference. Under faculty advisor Ron Barrett, Auburn aerospace engineering students Richard Bramlette and Ryan Leurck took first place in the 2005 regional student competition which was held in Gainesville, Fla. Their paper, "A Method for Control of Surface Deflection Utilizing Piezoceramic Bimorph Actuators," qualified them to participate in the international competition held in Reno, Nev. Richard and Ryan competed against national and international teams in the AIAA Global Technical Paper Competition and came out on top. They were awarded a \$1,000 honorarium and, according to faculty member Roy Hartfield, "the most prestigious professional award that can be given to an undergraduate aerospace engineering student". Both Richard and Ryan have since graduated from Auburn.

Brian Thurow recently took over as faculty advisor from Ron Barrett, who is now at the University of Kansas. This year's conference was held in Starkville, Miss. where four papers from Auburn University were entered into the competition with over 40 Auburn students attending the conference. In addition to the conference, AIAA hosted a number of guest speakers this year including:

- Ms. Margaret Ringenberg, a former pilot with the Women Airforce Service Pilots (WASP), gave a talk entitled "Yes! We Can" as part of the AIAA Distinguished Lecturer program
- Gene Austin, an AE Department Alum ('63) and former manager of NASA's X-33 program spoke about the future of space travel in a talk entitled "Space Tourism... Moon, Mars... and Beyond!!"



A ride on the "Vomit Comet"

- Klaus Dannenberg, recipient of this year's Aerospace Engineering Outstanding Alumnus Award and chief communications officer for AIAA, and his father, Konrad Dannenberg, spoke about a number of topics, including Konrad's experiences working on the V-2 program with Dr. Wernher von Braun

NASA's Reduced Gravity Student Flight Opportunities Program:

In March, Auburn University sent a team of six undergraduate students to Houston, Texas, to participate in NASA's Reduced Gravity Student Flight Opportunities Program. The students who made the trip were Mike Brennison, Megan Brown, Ryan Leurck, Venessa Smith, Jonathan Wright, and Chris Worley. As part of this program, they performed experiments to assess the performance of a shape memory alloy actuated truss in a micro-gravity environment. The experiments were performed on board a modified C-9 airplane, affectionately nicknamed the "Vomit Comet", which performed a series of ~40 parabolas to achieve ~30 seconds of 0-g flight at the top of each parabola.

Design/Build/Fly

In April 2006, a group of Auburn's aerospace engineering students entered the AIAA Design/Build/Fly competition, held in Wichita, Kan. The student team consisted of Gareth Andrews, Richard Bramlette, Michael Brenison, Christoph Burger, Daniel Gossman, Daniel Hiatt, Samuel Kobliska, Ryan Leruk, Christopher Newbolt, Robert Peluso, Bryan Reckenwald, Zachary Slatton, and Joshua Wallace. The faculty advisor for the team was Gil Crouse, Auburn's aircraft design professor.

Even though this was Auburn's first year to compete in the DBF competition, the team placed first among schools from the southeast and thirteenth overall. The contest consisted of almost 60 teams from not only the United States, but also Turkey, Israel, and Canada.

The competition requires students to design and build scratch a remote-controlled airplane. The plane designed by Auburn's aerospace engineering students had an empty weight of 10.5 pounds and a wingspan of over 8 feet. The students must then fly the airplane and accomplish certain objectives such as carrying a payload of over nine pounds. The pilot for Auburn's team was Daniel Hiatt, who recently won a national championship in a separate competition for flying remote control helicopters. Daniel made four flights without mishap, and the plane completed all of its required missions.

Aerospace Engineering Awards/Scholarships

Faculty:

John Cochran was one of the Fellows of the American Institute of Aeronautics and Astronautics elected in 2005.

David Cicci was named 2005-2006 Outstanding Faculty Member of the Department of Aerospace Engineering by the AIAA student chapter. Cicci was also elected as the chair-elect of the Auburn University Senate for 2006-2007. He will serve as chair for 2007-2008.

Andrew Sinclair's paper, "Investigations on the Use of the Cayley Form for Feedback Controller Design", was chosen as one of the 10 best papers of the 258 papers presented at the 2004 AIAA Guidance, Navigation, and Control Conference.

Brian Thurow was named the 2006 Aerospace Engineering Outstanding Faculty Member at the Faculty/Student Awards and Alumni Recognition Spring Reception.

Chris Roy was awarded the Presidential Early Career Award for Scientists and Engineers (PECASE) in July 2006 to honor his verification and validation in computational science and engineering.

Winifred Foster was awarded for his efforts in sustaining the knowledge base of the solid rocket industry by the AIAA Solid Rocket Technical Committee.

Students (2005-2006)

Boeing Scholarship – Allison Koenig

Michael S. Cayley Endowment – Erik Ahlgren, John Worley

Christopher J.G. Couch Endowment – Zachary Alderwald

Kent Lutrell Endowment – Elizabeth Copelin

Fred W. Martin Scholarship – Zachary Alderwald

Michael Pindzola Fund – Chase Martin

Richard T. Scott Endowment for Presidential Scholarships – Zack Glaser, Bryan Gunter, Wesley Johnson, Joseph Moore, Samantha Roberts, Scott Thomas, Steven Williams

Students (2006-2007):

Admiral James L. Holloway Jr. Award (2006 Outstanding NROTC Graduate)
– Samantha Roberts

Aerospace Engineering General Departmental Scholarship – Neal Allgood, Eric Grimes

AIAA Scholarship – Daniel Burns

Boeing Scholarship – Bradley Diedrick, Allison Koenig
Michael S. Cayley Endowment – Neal Allgood, Jeffrey Bodyrka, James D’Amore,
Eric Grimes
Christopher J.G. Couch Endowment – Danny Bradford

Kent Lutrell Endowment – David Chapelle, Joshua Judy, Ajay Madhav

Fred W. Martin Scholarship – Lauren Mitchell

Outstanding Student Award – Samantha Roberts

Michael Pindzola Fund – Neal Allgood, Robert Love

Richard T. Scott Endowment for Presidential Scholarships – Zachary Alderwald,
David Chapelle, Chase Foster, Zack Glaser, Wesley Johnson, Ajay Madhav, Katy
Milam, Joseph Moore, Michael Patterson, Steven Williams

Society of Automotive Engineers (SAE) Scholarship – Sarah Gallops, Robert
Wilmont

SRTC Scholarship – Daniel Burns

Alumni:

Outstanding Alumni Award – Klaus D. Dannenberg

Aerospace Engineering Advisory Council

The Aerospace Engineering Advisory Council serves the department in many ways. The council provides different perspectives regarding our curriculum and keeps faculty and students aware of new movements in research and development. They also play an indispensable role in accreditation. In addition to periodically reviewing our curriculum, council members interview graduating seniors as part of our ABET assessment of program outcomes. Younger members of the council, representatives of the “5 to 10 years since graduation” group, are polled to measure how well we are progressing toward our educational objectives. Last, but certainly not least, council members have a wealth of experience that we tap regarding research collaboration and funding opportunities.

We will be adding more members this year. Mark Miller, a manager at Dynetics, Inc. in Huntsville, Ala., is the chairman of the council, which includes active and emeritus members. If you are interested in serving on the council, please contact Mark or John Cochran.

Active Members:

Laurence H. Burger – '80, Director, Space and Missile Defense Future Warfare Center, U.S. Army Space and Missile Defense Command.

Pete Cerny – '69, Deputy Director GMD Technology Office, Missile Defense Agency.

John E. Cochran – '66, Professor and Head, Department of Aerospace Engineering, Auburn University.

Louis Connor – '66, Director, Lockheed Martin Space and Missile Defense Technologies.

Gene Fuller – '65, President, REMTECH, Inc.

Ron Harris – '59, Senior Executive (retired), NASA and Rocketdyne.

Ralph M. Hoodless, Jr. – '59, Senior Executive (retired), NASA.

Robert M. Jones – '66, Business Development Manager, Missile Defense Programs for the Space and Missile Systems Division, Northrop Grumman.

George M. Landingham – '70, Senior Executive (retired), Systems Simulation and Development Directorate, Research, Development and Engineering Center, U.S. Army Aviation and Missile Command.

Mark S. Miller – '84, Manager, Missile Systems Department, Dynetics, Inc.
Colonel

Morris M. Penny – '59, Senior Systems Engineer (retired), Lockheed Martin.

Rex B. Powell – '49, Director, Sensors Directorate (retired), Aviation and Missile Research Development and Engineering Center, U. S. Army Aviation and Missile Command.

Axel Roth – '59, Associate Director (retired), George C. Marshall Space Flight Center, NASA.

Norman O. Speakman – '72, Former Chairman of Council, Currently Georgia Tech Research Institute.

James S. Voss – '72, Former Astronaut; Colonel, U. S. Army (retired); Vice President for Engineering, Transformational Space, LLC.

Emeritus Members:

John Junkins – '65, distinguished professor, Department of Aerospace Engineering, Texas A&M University, Director, Center for Mechanics and Control

Wendell Mead – '66, President (retired), AGRI, Inc.

Roy Norris = '67, President (retired), Gulfstream Aerospace

Samuel R. Pate – '60, President (retired), Sverdrup Technology, Inc.

Alumni Notes

Mark S. Miller was presented with the R. Duane Hays Award for Technical Excellence from Dynetics. The R. Duane Hays Award for Technical Excellence is presented each year to the Dynetics employee who exemplifies high standards of technical accomplishment established by Hays during his time with the company. Miller is highly involved in many areas of missile system research and development. He is also involved in the design, fabrication and testing of missile hardware and in the creation of computer models and simulations. Miller's success is evident in the implementation of grid fans on Army and Air Force ground-and-air launched missiles and bombs, and he has also made significant contributions in areas of aerodynamic modeling and analysis, including wind tunnel model testing. He has also successfully reverse-engineered foreign missile systems using extremely limited information. Miller continues to set the highest technical standards, and he is a leader and mentor to many at Dynetics. Miller received a \$1,000 honorarium along with his award. In 2005 Miller was promoted to department manager of the Missile Systems department at Dynetics

In 2005 Axel Roth retired from his career of over 40 years at the NASA Marshall Space Flight Center. Roth graduated from Auburn University in aerospace engineering in 1959, and he completed his graduate work at the University of Alabama in Huntsville. From 1960 to 1970 Roth worked as a structures engineer on the Apollo/Saturn program. He then worked for about three years on the Skylab program. From 1974 to 1981 he worked in MSFC's Spacelab Program Office, which led to him becoming payload operations director for the Spacelab-2 Mission. In 1987 he was named manager of the Habitability Module Office, and in 1989 he was named chief engineer of the Spacelab Payload Integration for the Payload Projects Office. Roth was named deputy manager of the Space Station Project Office in 1991, and in 1994 he became deputy director of Program Development. By 1995 he was the director of Program Development. He briefly assumed the position of acting manager in the Flight Projects Office in 1998, and in 1999 he was named director of the Flight Projects Directorate. In 2001 he assumed the position of associate director of NASA's George C. Marshall Space Flight Center. Roth also received numerous honors and awards during his 40 years of dedication to NASA. His special honors and awards include:

- ***Presidential Rank Award (2000)***
- ***NASA Medal for Exceptional Service (1996)***
- ***Group Achievement Award (1975, 1995, 1996)***
- ***Outstanding Performance Rating Award (1988, 1991, 1998)***
- ***Sustained Superior Performance Award (1980, 1986-1991)***
- ***Special Service Award (1984)***
- ***Director's Commendation Award (1973)***

Roth is the son of Ludwig Roth, a member of the German Rocketry team led by Wernher von Braun. Roth and his wife Gloria have six children, seven grandchildren, and two Rottweilers. He is a member of St. Thomas Episcopal Church, and he enjoys reading, playing golf and hiking. Roth now looks forward to relaxing at his retreat in Gatlinberg, Tenn.

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