



## Stinson-Remick Hall

The College of Engineering's new Stinson-Remick Hall is a 142,000-square-foot building on Notre Dame Avenue near the campus entrance on the DeBartolo Quad.

The \$70 million structure houses a nanotechnology research center, the University's new Energy Center, an 11,800-square-foot semiconductor processing and device fabrication clean room, and an undergraduate interdisciplinary learning center. Thanks to features being built in, students will use the building not only to study energy as an abstract subject, but also to explore the nature of energy and to experience its relationship to everyday life, careers connected to it, and notions of sustainability arising from it.

## 75 Years of Aerospace Engineering at Notre Dame

Notre Dame decided to establish an aeronautical engineering program in 1935. University President Rev. John F. O'Hara, C.S.C., went to the University of Michigan to look for someone to lead and develop the program. There, he found Frank Newton Mithery Brown. Brown had bachelor and master's degrees from Michigan, teaching experience and work experience with the Ford Motor Company and the U.S. Naval Air Station at Mountain View, California. The Notre Dame Aeronautical Engineering curriculum in the 1935-1936 academic year included a total of 159 credit hours and a very strong orientation toward practical engineering. This began 75 continuous years of research in aeronautics at the University of Notre Dame.



*Above: 2010 Aerospace Seniors work with Faculty on capstone projects in the newly opened Stinson-Remick*



## Letter from the Chairman

Dear AME Alum:

Welcome to 7th edition of AME Highlights. This is my first issue as chair having assumed the helm from our dedicated former chair, **Dr. Steve Batill** in August of 2008. We use this publication to provide a review of activities and accomplishments in the Aerospace and Mechanical Engineering Department from the 2008-09 academic year. This issue also includes news about some of our AME alumni. As always, we appreciate your comments and observations and encourage you to share your news and accomplishments with us.

The new Stinson-Remick Engineering Building recently opened in the DeBartolo quad. It is an impressive looking structure and with the completion of the Law School addition to the North and the DeBartolo performing Arts Center to the south, the DeBartolo Quad is truly a sight to see. The building features 90,000 square feet of net assignable space, with about one third of the new building dedicated as undergraduate learning facilities for studio based classes and project offerings. Another third of the building supports electronic materials and devices (EMD) research carried out in Electrical Engineering. The remaining space is utilized by the ND Energy Center, Chemical and Biomolecular Engineering and the new Energy Frontier Research Center (EFRCs) led by Civil Engineering and Geological Sciences focused on the Materials Science of Actinides.

Aerospace and Mechanical Engineering will continue to be housed across five buildings, Fitzpatrick Hall, Cushing Hall, Hessert Laboratory, the Multidisciplinary Research Building and the new White Field Facility. As the College expands into the new Stinson-Remick Engineering Building, AME will be able to expand its facilities within the Fitzpatrick – Cushing complex. Our new dean **Peter Kilpatrick** has received a commitment from the administration to refurbish the Fitzpatrick-Cushing complex to be a 21st Century Engineering facility. Its hard to believe that Fitzpatrick Hall, which opened in 1978, is already 32 years old.

AME has enjoyed the fact that the two most recent shuttle missions have included AME graduates. **Kevin A. Ford** (BSE '82) served as the pilot of Space Shuttle Discovery on the STS-128 mission that launched August 2008 from NASA's Kennedy Space Center in Florida. In May of 2009 fellow AME and Notre Dame alumnus **Michael T. Good** (BSAE '84, MSAE '86) flew as a mission specialist on Space Shuttle Atlantis Mission STS-125.

In October of 2008, we had the good fortune of adding **Associate Professor Dr. Jim Schmiedler** (BSME '96) to the AME faculty. **Dr. Schmiedler** is a recipient of the prestigious NSF Presidential Early Career Awards for Scientists and Engineers (PECASE). The PECASE program recognizes outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership at the frontiers of knowledge. This Presidential Award is the highest honor bestowed by the U.S. government on scientists and engineers beginning their independent careers. **Dr. Schmiedler's** research interests fall broadly into the areas of kinematics, dynamics, and machine design, particularly as applied to the development of robotic systems and an understanding of human motor coordination.

I would also like to welcome **Associate Professor Karel Matous** to the AME faculty. **Dr. Matous** received his BS, MS and PhD degrees from Czech Technical University in Prague. He went on to Rennselaer Polytechnic Institute as a post doctoral associate for three years, followed by a prolific career at the University of Illinois as a research scientist for six years. **Dr. Matous** works in the areas of multi-time, multi-scale, multi-physics modeling of complex systems, constitutive material modeling, micromechanics based models of inelastic and failure processes, numerical methods and nonlinear mechanics, and high performance parallel computing. He arrived with several funded research projects in place.

Please keep us posted on your activities and do not hesitate to stop by the Department during your next visit to campus. I hope that you will feel free to get in touch with me at [Renaud.2@nd.edu](mailto:Renaud.2@nd.edu) or at (574) 631-8616 if you have any suggestions for the newsletter or anything else you would like to share.

Sincerely,  
**John E. Renaud, Professor and Chair**

### Industry supporters

AME receives financial support annually from both individual and corporate donors. These funds are used to assist in the mission of the Department in many important ways. The University is well-known for the generous support of its alumni. This is particularly helpful when organizations, with the encouragement of our alums, contribute either by participation in events such as Industry Day, by supporting intern programs or through grants or gifts. This year we wish to recognize those organizations that have provided direct support to AME: Chrysler, Honeywell Inc., Innovative Scientific Solutions, Inc., Spectral Energies LLC, Boeing, Orbital Research Inc., Pratt and Whitney, Zimmer, Rohm & Hass Co., Bell Helicopter, Honda R&D Americas, AM General, and Shell International.

## Alumni Recognition and News

**Kevin A. Ford** (BSAE '82) served as the pilot of Space Shuttle Discovery on the STS-128 mission that launched from NASA's Kennedy Space Center in Florida. He carried the jacket of a book titled "Aeronautics to Aerospace at the University of Notre Dame," which was written by Thomas J. Mueller and Robert C. Nelson, professors of aerospace and mechanical engineering, into space.

During a 13-day flight, the crew of seven Discovery astronauts delivered science and storage racks, a freezer to store research samples, a new sleeping compartment and a treadmill named after comedian Stephen Colbert to the International Space Station. The treadmill is a consolation prize for Colbert, who hoped to have a room in the space station named after him.

Ford, who was born in Portland, Ind., and considers Montpelier, Ind., his hometown, was graduated through Notre Dame's ROTC program in 1982 with a degree in aerospace engineering. In 1989, he earned a master of science degree in international relations from Troy State University and, in 1994, a master of science in aerospace engineering from the University of Florida. He earned his doctorate in astronautical engineering in 1997 at the Air Force Institute of Technology at Wright Patterson Air Force Base in Ohio.

This was Ford's first flight aboard the space shuttle. He joined NASA as a pilot in 2000 and has had a variety of assignments, including technical duties, advanced exploration issues, and avionics and testing.

In 2004, Ford was director of operations at the Gagarin Cosmonaut Training Center in Star City, Russia. Between 2005 and 2008, he was capsule communicator in the mission control center for six shuttle missions.

A retired U.S. Air Force colonel, Ford has 4,300 flying hours and Federal Aviation Administration commercial certificates for planes, helicopters and gliders.



**Michael T. Good** (BSAE '84, MSAE '86) flew as a mission specialist on Space Shuttle Atlantis Mission STS-125 in May of this year.

**James D. Wetherbee** (BSAE '74), who retired from NASA in 2005, flew six times aboard the space shuttle and is the only U.S. astronaut to command five space flights.

**W. Michael Hawes**, (BSAE '78) graduate, is associate administrator for program analysis and evaluation in NASA's office of the Administrator.

**Annette P. Hasbrook**, (BSAE '85) graduate, is a lead space station flight director at NASA's Johnson Space Center.

**Rachel M. Paietta** (BSME '08) was awarded an NSF graduate fellowship. She is currently a PhD student in Mechanical Engineering at the University of Colorado, Boulder.

**Timothy Stuhldreher** (MME '09) is currently working for the Department of Defense in the Naval Sea Systems Command (NAVSEA) with Naval Reactors. He and his wife welcomed their first child in October.

**Nathan Sniadecki** (BSME '00) is working as an assistant professor in Mechanical Engineering with the University of Washington in Seattle, WA. Nathan received a NSF CAREER award recognizing his outstanding research.

**Richard Sellar** (BSAE '89) works full-time for SpaceX in Hawthorne, CA as the ERP Systems Director. His job is to assess, implement, and support the systems necessary to run the design, production, and business decision-making of orbital launch vehicles.

**Rajeesh Nair** (BSAE '98) lives in Madrid, Spain and works in entrepreneurial ventures, finding investors for seed level projects related to the aviation and defense fields.

**Thomas J. O'Connor** (BSME '83) is the Director of the Office of Gas Reactor Deployment (GRD) with responsibility for the Department of Energy's Next Generation Nuclear Plant (NGNP) and the Nuclear Hydrogen Initiative. NGNP will provide the basis for commercialization of a new generation of advanced nuclear plants that utilize high-temperature gas-cooled reactor (HTGR) technology to supply competitive, emission-free, high temperature process heat, co-generated electricity, and/or hydrogen for a number of petrochemical industrial applications. Mr. O'Connor also serves as the US Representative to Generation IV International Forum Policy Group, a nuclear R&D partnership of 12 countries and the European Union, dedicated to collaborating on the next generation of nuclear reactors. Mr. O'Connor received his MS in Mechanical Engineering from the Georgia Institute of Technology.

### College of Engineering Honor Award:

Each year, departments within the College of Engineering nominate distinguished alumni or other "friends of the University" for this unique distinction. The 2009 College of Engineering Honor Award was presented to **Audrey M. Beckman** (B.S. '87). In recognition of her distinguished achievements in mechanical engineering, as well as her contributions to her profession and the University of Notre Dame:

Her demonstrated contributions as senior vice president of Knee Development at Zimmer, Inc., as well as her leadership in the orthopedics industry for more than two decades.

Her accomplishments as a professional engineer, development leader for products such as Zimmer's NexGen - the world's best-selling knee system, and holder of multiple patents of orthopedic devices.

Her services to her profession as a supporter of the interchange that exists between industry and academia, consistently working to build alliances in research and education.

Her contributions to engineering education as a catalyst for collaborations between Notre Dame and Zimmer, including a formal internship program, and as guest lecturer in mechanical engineering and machine elements courses.

Her service to society as a developer of orthopedic solutions, which contribute to the health and welfare of millions of people worldwide, as well as her volunteer efforts with Junior Achievement and on the Board of Directors of CASA of Kosciusko County.



*Department Chair, John E. Renuad and 2009  
College of Engineering Honor Award recipient,  
Audrey M. Beckman*

### Graduate Student participates in Naughton Exchange Fellowship

**Andrew Steward**, an AME graduate student, is one of the inaugural fellows of the Naughton Graduate Student Exchange Program. The exchange program enables graduate students to experience an international graduate education at Notre Dame and Trinity College in Dublin, Ireland. Naughton Exchange Fellows are expected to serve as ambassadors for both universities and countries, preparing for a life of leadership and service grounded in their scientific and technical accomplishments.

Andrew received his Bachelor's Degree in Biomedical Engineering from Rose-Hulman Institute of Technology in the spring of 2009. At Notre Dame, he has begun research into the role of cell-matrix interactions in the response of adult mesenchymal stem cells to mechanical stimulation under the direction of **Dr. Diane Wagner**. He is expecting to travel to Ireland next year to continue his research at Trinity College Dublin in **Dr. Daniel Kelly's** lab for two years before returning to Notre Dame to complete his PhD in Bioengineering.



*Pictured Above: 2009 Senior Design Participants, Team Blue and Team Gold*

## FACULTY NEWS

### *New Faculty - Karel Matous*

Joining our department this year is **Associate Professor Karel Matous** (Czech Technical University, Prague, 2000). His research interests include multi-time, multi-scale, multi-physics modeling of complex heterogeneous systems, constitutive material modeling, micromechanics based models of inelastic and failure processes, numerical methods and nonlinear mechanics, high-performance parallel computing, and optimization techniques. Current projects in the Computational Physics Laboratory, which he directs, focus on the development of multi-scale models of polycrystalline alloys and a parallel solver for multi-layered laminated plates. Matous and his team have recently received grants from Alliant Techsystems for the project entitled "Heterogeneous Solid Propellant Characterization using Micro-computer Tomography" and the Department of Defense Small Business Innovation Research Program, in conjunction with the U.S. Army Aviation and Missile Research Development and Engineering Center, for the project titled "Experimental Computational Program for Slow and Fast Cookoff for Insensitive Munitions Testing."



### *Corke Named AIAA Fellow*

The founding director of Notre Dame's Institute for Flow Physics and Control and director of the Hessert Laboratory for Aerospace Research, Clark Equipment Professor of Aerospace and Mechanical Engineering **Thomas C. Corke** has been named a fellow of the American Institute of Aeronautics and Astronautics.

In addition to this most recent honor, he is a fellow of the American Physical Society and the American Society of Mechanical Engineers. His research on plasmas has been emulated worldwide for flow control applications and includes a new type of plasma sensor designed for use in hypersonic Mach number, high enthalpy flows. He is also the author of "Design of Aircraft", which has been adopted as the capstone design text in more than a dozen aerospace departments across the U.S. and in numerous programs around the world.

Corke earned his bachelor's, master's and doctoral degrees, all in mechanical and aerospace engineering, from the Illinois Institute of Technology (IIT). He joined the IIT faculty in 1981 after completing his doctorate and reached the rank of full professor before joining the Notre Dame faculty in 1999.



### *An industry immersion – A Deep Dive at IDEO*

During the Fall 2008 semester, Prof. **Steve Batill** had the opportunity to serve as a Scholar-in-Residence at IDEO in Palo Alto, California. IDEO is one of the most recognized design consultancies in the world with offices in the US, Asia and Europe. While at IDEO he worked with Mr. Dennis Boyle, (BSME '75), who heads the Health and Wellness Practice. This was a unique opportunity to be engaged in design practice and management and to see how IDEO applies its human-centered design approach across a wide range of projects and clients. At the conclusion of his visit he was given the chance to present to the IDEO Palo Alto staff his observations during this "deep dive." The IDEO experience was a continuous exposure to inspiration from a very dynamic and stimulating environment, ideation from creative and excited people, and implementation, by talented and inventive designers. During the second half of his yearlong sabbatical, Prof. **Batill** was a Fulbright Scholar at the Technical University in Delft, Netherlands where he was in residence with the Design Methodology Group in the Product Innovation Management Department of the School of Industrial Design Engineering. Both of these experiences have influenced his teaching and research activities as he returned to campus for this academic year excited to share his learning with students and colleagues.

Prof. **Joseph M. Powers** spent four weeks in residence in Beijing, China, at the Chinese Academy of Sciences' Laboratory of Scientific and Engineering Computing. He gave a series of lectures aimed at graduate students studying computational modeling of combustion phenomena. He also gave a research seminar at the nearby Institute of Mechanics, also housed within the Chinese Academy of Sciences. The lecture series focused on 1) development of the coupled non-linear partial differential equations that describe reactive flows, 2) classical analytic solution strategies to obtain solutions in special limiting cases, and 3) modern methods to obtain accurate and reliable solutions using discrete numerical methods for more general cases. Prof. **Powers** enjoyed visiting many of the many sites of the Beijing area including the Forbidden City, the Great Wall, the Summer Palace, the Temple of Heaven, and the Olympic venues. He took a special interest in learning about ways in which Chinese education has evolved over the centuries and how the education influenced its national development. He also explored some of the sites where the Jesuit missions to China had unusual influence, including the ancient astronomical observatory and extant local cathedrals.

Prof. **Powers** was also recently re-appointed for a third term as Associate Editor of the Journal of Propulsion and Power. He has held this position since 2003. This journal is the key journal of the American Institute of Aeronautics and Astronautics (AIAA) which has a focus on all aspects of propulsion science and technology. Prof. **Powers** focuses his editorial efforts on papers addressing modeling of high speed reactive flows. The position involves all aspects of shepherding journal articles from submission to publication, including preliminary evaluation, selection of external peer reviewers, coordination of communication between authors and reviewers, and adjudication of a variety of conflicts.



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