Marketplace of Ideas
Success lies in envisioning the future

Up Close: faculty
The energy challenge

Up Close: students
Student innovation addresses real-world challenges

In My View
Intrapreneurship: finding support from within
From Dan’s Desk

Among President France A. Córdova’s priorities is fostering an environment in which Purdue discoveries are routinely translated into products and processes that meet the world’s challenges—in other words “discovery with delivery.” This is a great fit with the School of Mechanical Engineering and especially so this year, the 50th anniversary of the Ray W. Herrick Laboratories.

The Herrick Laboratories was created to foster interdisciplinary research involving the School of Mechanical Engineering and the Department of Animal Sciences that would extend “climate control” to the animal agriculture business. The idea of interdisciplinary research was well received by the Purdue administration of the 1950s, and today it is expected of all major research universities. Five decades of interdisciplinary research have positioned Purdue and the School to have a major impact on global grand challenges. Environment and energy are among the grand challenges being addressed by mechanical engineering. The soon-to-be constructed Roger B. Gatewood Wing of the Mechanical Engineering Building will be the first structure on campus built to Leadership in Energy and Environmental Design (LEED) green building specifications and will expand research and student learning facilities.

The new Herrick Laboratories Building will also be a LEED building and incorporate a “Living Laboratory” with a Sustainable Building Technologies Laboratory (SBTL). The SBTL will be both a test bed and an incubator for a new class of high-performance commercial, residential, and institutional building technologies that provide personalized, healthy, secure, comfortable, and productive indoor environments with low energy and environmental impacts. (More information on Herrick can be found in College Impact on page 27.)

A primary purpose of a research institution like Purdue is to discover new knowledge and the School of Mechanical Engineering has been a leader in that since its establishment in 1882. But discovery without delivery is merely an academic exercise. The delivery of new knowledge and ideas to the marketplace frequently involves entrepreneurship and that is the focus of this issue of Impact. There is an article by Dr. Milton Hollander about ME education and entrepreneurship. Dr. Robert V. Adams writes about intrapreneurship from his experiences with Xerox Corporation. We hope you are as proud of our students as the faculty and I are when you read about a social entrepreneurship project taken on by a team of seniors in their capstone design course to build a cooler to transport vaccines to remote areas of Africa.

The school also took another step this year to support innovation among students and faculty. The Thomas J. and Sandra H. Malott Endowment Fund for Innovation was established to encourage innovation among students, faculty, and staff. The inaugural awards were for the most innovative designs created in our senior capstone design class, ME 463. Entries included motorized roller skates (the winning team), a ping-pong playing robot, an endoscopic device, a CPR assist device, and a portable solar generating system.

The good news I’ve shared and the successes of our students and faculty could not have happened without your generosity. I extend my sincerest thank you and trust our work is worthy of your continued support. The value of a Purdue Mechanical Engineering degree has never been greater!

Dan

E. Dan Hirleman
William E. and Florence E. Perry Head
School of Mechanical Engineering
UP FRONT

From Dan's Desk

AROUND ME

Big Research, Little Footprint • Energizing an Audience

COVER

Success Lies in Envisioning the Future

UP CLOSE: STUDENTS

Creativity for a Cause

IN MY VIEW

Intrapreneurship • Keeping an Open Mind

UP CLOSE: FACULTY

The Energy Challenge

ALUMNI NEWS

Class Notes • Distinguished Engineering Alumni

IMPACT INTERACT

Torque Troubles

ME Impact is published for alumni and friends of the School of Mechanical Engineering at Purdue University. To comment on the magazine or to ask to be removed from the mailing list, please contact:

Mechanical Engineering Impact
Attn: Cynthia Dalton
Purdue University
585 Purdue Mall
West Lafayette, IN 47907-2088
(765) 494-7320

We welcome your comments. Please send them to the following E-mail address: peimpact@purdue.edu

In submitting a letter, you grant us permission to publish it in part or in whole in an upcoming issue. We reserve the right to edit letters for length or clarity.

Produced by the Engineering Communications Office.
Purdue is an equal access/equal opportunity university.
Big impact can sometimes come from making the least impact. This is especially true in the case of mechanical engineering professor Eckhard Groll and his thermal systems research. Groll, who is personally and professionally focused on environmental issues, aims to create energy-efficient heat pumps and refrigeration systems that will have minimal impact on the environment.

“The key for me is how we can supply energy and use it while not compromising our living standard,” he says. “We’re taking certain conveniences for granted, including food, air conditioning, and transportation. This has to change because our resources are going to be diminished.”

Groll works on design optimization and reliability studies for air conditioning, heating, cooling, and ventilation systems. His goal is to make individual components or entire systems more energy efficient. He does this, for example, by designing heat pumps and refrigeration systems that consume less energy because their on/off cycles are more sensitively tuned to operating conditions. His research has broad applications, from residential heating and cooling systems to commercial uses such as supermarket display case cooling loops and industrial uses in the chemical and food arenas.

For Groll, there is one common denominator: “I am very environmentally driven,” he says. “What is our human footprint on the environment and how can we have the least impact?”

As a child in Germany, Groll followed his civil engineer father into the field as he worked on country roads and bridges. He was fascinated with machines, satisfying this interest first with a model railroad and later, as a teenager, by taking motorcycles and mopeds apart and rebuilding them. Then he studied the topic formally, intending to make a career out of building power plants. During his doctoral studies, however, he shifted gears from power production to power consumption and heat pump cycles. He wanted to learn how energy is used, instead of how it is produced.

When Groll emerged from graduate school at the University of Hannover in 1994, energy issues weren’t in the spotlight. Now, nearly 15 years later, they are in the forefront of the public mind, especially issues related to energy production and consumption. The topic was explored this summer at Purdue during the 12th International Refrigeration and Air Conditioning Conference and the 19th International Compressor Engineering Conference. (See story on facing page.)

Among Groll’s recent research projects with the Thermal Systems Research Group in Herrick Laboratories is a study of the Flooded Ericsson Cycle Cooler with ME professors James Braun and Galen King, and doctoral student Ian Bell. This is an alternative to the traditionally dominant air conditioning and refrigeration technology of vapor compression, and uses an alternative cycle technology that can provide cooling capacity. The system is flexible with respect to the gas and liquid used, and can be charged with many different gases for environmentally friendly operation.

Groll believes that improved technology is, however, only part of the energy solution. “We need a cultural change in addition to the technology change. It cannot just come from engineering,” he says. —Linda Thomas Terhune
Energizing an Audience

Rising energy costs and environmental concerns drew record numbers to air conditioning and refrigeration conferences at Purdue this summer.

About 500 researchers from 30 countries attended the 12th International Refrigeration and Air Conditioning Conference and the 19th International Compressor Engineering Conference. Researchers and industry executives from around the globe, including North America, Europe, Asia and South America, presented talks.

The conferences, held every two years, drew about 10 percent more technical abstracts this year, largely because of special sessions focusing on energy-conserving technologies. Engineers presented findings on technologies such as solar-assisted designs, more efficient heat pumps for space heating in buildings and domestic water heating, compressors that integrate devices to recover energy ordinarily lost, systems that use naturally occurring “green working fluids” like air as a refrigerant, and designs that modify the conventional “vapor compression cycle” behind refrigeration.

“Compressors, air conditioners and refrigerators are responsible for a huge portion of the world’s total energy consumption. As energy prices increase, so too does interest in more efficient systems,” says general conference chair Eckhard Groll, professor of mechanical engineering.

The conferences covered many areas critical to industry, commerce, and domestic air conditioning and refrigeration. Topics ranged from industrial refrigeration to Ericsson cycle air conditioning systems, including miniature refrigeration systems to cool laptop and personal computers, led by Groll and Suresh Garimella, the R. Eugene and Susie E. Goodson Professor of Mechanical Engineering. ■ Emil Venere
Karthik Ramani is excited. He speaks rapidly, his voice animated as he locks in on a favorite subject—innovation and enterprise. As the mind behind several startups and patents, the professor of mechanical engineering knows about the subject and has definite opinions about the place of entrepreneurship in academia. It is a subject of equal interest to his colleague, Jayathi Murthy, Robert V. Adams Professor of Mechanical Engineering, who came to Purdue with a background that includes 10 years in the trenches with a startup. Now back in academia, she views engineering as a natural fit with entrepreneurship. What follows is a closer look at the two researchers and how enterprise has shaped their work.

Driven to Exceed
Karthik Ramani is a mechanical engineer. He's also a serial entrepreneur, a term he uses to describe a friend who has opened coffee shop after coffee shop. If you track Ramani’s activities, he has had a hand in enterprise for years, ranging from technical patents in graduate school to co-founding an online international grocery store with his wife and others—that did not grow or materialize as he had expected. He was a bit ahead of his time—online grocery is being reinvented today again in the Bay area and even Amazon.com has entered the market.

Ramani’s most well-known effort to date is, however, not in food service. It is Imaginestics, a company based in the Purdue Research Park for which he has been a key partner since April 2003. It is based on the first online visual search engine for manufacturing, Vizseek, which Ramani developed that allows users to search for parts using a rough sketch, photograph, or professional design.

Ramani, also a courtesy professor in electrical and computer engineering, is never content to stop exploring. “A lot of my current and future work is about imagining new worlds and
creating new paths, rather than walking on existing ones,” he says. He particularly likes research that can lead to disruptive technologies.

Ramani is currently working on a project, funded by the Computer Science (IIS) Division at the National Science Foundation (NSF), inspired in part by his children. It will enable amateurs and professionals alike to take sketches into 3D shapes without knowing how to use a computer program or the technicalities of computer-aided design. He is also working on proteomics research funded by the National Institutes of Health (NIH) and would like to explore its use in computational drug discovery.

During the past academic year, Ramani has returned to his educational roots to incubate his ideas during a sabbatical at Stanford and the Institute of Pure and Applied Mathematics at UCLA. Ramani’s roommates and good friends at Stanford included one who developed epinions.com (consumer opinions); one who co-founded Neoteris acquired by Juniper; another who developed Snapfish, which was acquired by Hewlett-Packard; one who developed the search engine Junglee, purchased by Amazon; and another who created the recently acquired Stratify. “I’m a product of Silicon Valley,” he says of what may be entrepreneurial contagion. “You see others, you learn how to think about the ‘so-what’ of research, and it’s very much part of the culture here in the Bay area.”

**Invention and Intellectual Property is Key Concept**

Ramani is a convert to entrepreneurism and its related areas. He cites a remark by former Federal Reserve Chairman Allen Greenspan during a 2004 lecture at Stanford to illustrate the importance of its place in modern society. “As America’s economy shifts from emphasizing the production of material goods to the creation of ideas, the issue of intellectual property rights has assumed increasing importance,” Greenspan said.

Intellectual property (IP) concepts occupy enough of Ramani’s thoughts that he initiated the development of a course in the mid-1990s, when it wasn’t part of the academic lexicon. This well-attended class, taught by Indianapolis attorney John McNett, introduces students to concepts such as claim writing, how to protect ideas, licensing, and litigating intellectual property.

Ramani says he created the course out of a personal need and its importance to education in general. “I wanted to write my own patents and understand other IP, and I knew it was going to become important. I didn’t know enough about it, so the only way was to educate myself. Knowledge about what an invention is and how to think about it helps one become a better engineer.”

While the place of the entrepreneur in an academic setting is evolving, Ramani is adamant that there is room for significant transformation and growth. “To have impact, we have to change

“A lot of my current and future work is about imagining new worlds and creating new paths, rather than walking on existing ones.” — ME Professor Karthik Ramani
Imaginestics was co-founded by Purdue Mechanical Engineering Professor Karthik Ramani in April 2003. The company, located in the Purdue Research Park, will soon be renamed VizSeek. It is dedicated to organizing and marketing, industrial manufacturer’s product and service organization and making it visually searchable on a global basis. With a staff of 30, the company’s products include a search-shape search engine; an engineering advisory system; an enterprise-wide product configurator; an interactive, configurable online parts catalog; and a tool for intelligent design content extraction, matching, and locating.

The search engine, vizseek.com, uses a unique shape-matching technology to match the input shape with hundreds of thousands of parts that have been made available by participating suppliers to provide search users with an accurate match within seconds. The shape search engine is well suited to a global marketplace in which different terms and languages complicate text-based searches.

The Purdue Research Park-based company has received innovation research awards totaling $1.73M from the National Science Foundation and the U.S. Department of Defense, and $800,000K from the state of Indiana’s 21st Century Research and Technology Fund as matching Small Business Innovation Research funding awards. The initial funding allowed Imaginestics to gain market support and receive additional funding from the NSF for the Small Business Innovation Research Phase II B project and industry partners, including Lockheed Martin and Dana Corp. It was recognized with an Indiana technology trade group, the 2007 Indiana Entrepreneurial Awards of Distinction for Innovation, and the 2007 Tibbetts Award from the Small Business Technology Council.

Engineering as a Conduit

When Jayathi Murthy was in graduate school, she balanced thoughts of a future life in the business world with one in the academic community—the scales were even. She wanted ultimately to do something that mattered; the setting didn’t make a difference.

Murthy, a professor of mechanical engineering and founding director of Purdue’s new PRISM: Center for Prediction of Reliability, Integrity and Survivability of Microsystems, managed to embrace both worlds when she left the University of Minnesota with her doctorate. She joined the faculty at Arizona State University and, a few years later, was drawn to the cosmos of startups. Friends from graduate school were launching a computational fluid dynamics (CFD) product that she says, “sounded very exciting, and was a chance to make a real impact in a new field.” The company that launched the product is now known as Fluent Inc., a world leader in the CFD business.

Murthy took charge of the startup’s Research and Development group and successfully navigated the challenges of funding with the development of robust unstructured pressure-based methodologies. The decade-long experience vastly broadened her research focus.

“It taught me a huge amount,” she says. “The most important was
What does it take to be a successful entrepreneur?

**Vision**, first and foremost—an ability to spot missing links, so as to formulate products that can fill the gaps. **Risk-taking**—an ability to move forward even when all the data are not in. **Persistence**—the ability to survive adversity and to believe in your vision. — Jayathi Murthy, Robert V. Adams

Professor of Mechanical Engineering
Creativity for a Cause

Student design could save lives in developing countries

When vaccines are transported to remote villages in developing countries, as much as 60 percent of the medicine is spoiled before it gets to its destination. That means lives that could have been saved are being lost. There is a solution.

During spring semester 2008, a team of three Purdue mechanical engineering seniors and four students from GEARE partner Karlsruhe University in Germany put their minds to this medical matter and designed what they have dubbed the vaccine cooler. The concept was developed within the team’s senior global design course, which requires student teams to come up with engineering designs based on their four years of study.

The team started from scratch knowing only that their project would relate to their interest in heating and cooling systems. They tossed a variety of ideas around and initially settled on a portable refrigerator box designed to cool beverages. Later, they chose a more humanitarian application. They designed a mobile cooling box for use in the final stage of the vaccine transport process—the trip from the plane to a village—which can take up to five days. The initiative was funded by a humanitarian project grant from Shell Oil Company.

“What we found was a project that used cooling technology and could benefit a great deal of people,” says team leader Laura Palac. The device—about the size of a picnic cooler—has an internal cooling system that runs on a low-power battery. Vaccines must be kept at a stable temperature between 2 and 8 degrees Celsius. Most are currently transported on ice, which can both freeze and destroy the medicine or melt and render it useless.

When the destination is reached the vaccines require storage in refrigerators that need a power source to operate. The ME team’s design allows for steady temperatures and has its own power supply.

The team’s cooling system uses adsorption technology based on ammonia and activated carbon. Air is circulated in the cooler via a fan driven by a battery that can be recharged using solar power. The cooler, which can store 30 vaccine packages, could be produced at a relatively low cost using commonly available materials.
An estimated 2.1 million people around the world died in 2002 of diseases preventable by widely used vaccines.

In 2004, nearly 50 percent of Gambia’s Yellow Fever vaccines were spoiled due to weaknesses of the cold chain.

A one-week supplemental immunization activity against measles carried out in Kenya in 2002 — in which 12.8 million children were vaccinated — could prevent 3,850,000 cases of measles and 125,000 deaths over a ten year period.

Source: World Health Organization

While the vaccine cooler project called on mechanical engineering skills, it also introduced the team to real world challenges, such as constraints on the design imposed by World Health Organization specifications on how vaccines are transported. The seniors explored that topic as well as more familiar areas such as basic structure, heat exchange, temperature control, and cost issues.

Ben Borgmann says the experience was not only instructive but good for the heart. “Engineering is not all about working on fast cars. You can reach out to a lot of people. It’s pretty cool to see,” he says.

The vaccine cooler project was awarded second place in the first annual Innovation in Mechanical Engineering Award sponsored by Thomas J. and Sandra H. Malott. The team received a $750 cash award. With the semester over, the vaccine cooler project came to an end. Eckhard Groll, the ME professor advising the group, says he would like to see another senior design team continue to work on it, with the hope of some day getting the technology out in the field. ■ L.T.T.
Intrapreneurship

Robert V. Adams

When thinking about entrepreneurs, the image that may first come to mind is that of an individual or group of individuals who invent something or turn a dream into a profitable business. I think of that as “American Dream” entrepreneurship. The ability for individuals to turn their dreams into successful businesses is one of the building blocks of our economic system and makes the U.S. unique. However, for successful businesses, entrepreneurship does not and indeed cannot end with the initial invention or dream.

For companies to remain viable and keep pace with change, the same process must continue internally, often radically and always rapidly because of the scarcity of capital and with little historical information to go on. The term “intrapreneurship” was coined about 25 years ago, but the practice of setting up internal organizations to foster innovation within a larger company goes back decades. Skunk Works (currently trademarked by Lockheed Martin) is a term Lockheed used in 1943 to describe a group given a high degree of autonomy to work on secret projects. Many companies have set up similar groups to either help generate new innovations or to move “back burner” research and development projects to the marketplace.

I have been fortunate to be involved in both types of startup businesses at Xerox. In the 1970s Xerox research had come up with a new way to print information coming from a computer at high speed. Because of the unproven technology and the fact that the business might not easily fit into the Xerox system, attempting to bring this successful research project into the marketplace was a high risk. This tiny new business had to be protected from the operating costs of the large company design and manufacturing process. The result, the Xerox high speed laser printer and a second product, the high speed laser copier, became extremely successful. By the time they reached over $6B in annual revenue, each was successfully woven back into the main Xerox system. Without the latitude to operate independently it is unlikely that they would have been successful. In these cases, Xerox was the only financial investor. At Xerox Technology Ventures (XTV), we did some of each.

XTV was formed in 1989 to take advantage of technologies Xerox had developed over the years to identify and promote ideas, technologies, and businesses that had potential but fell outside of the strategy or mainstream business of Xerox. These included electronic publishing and document processing; software; computer peripherals; electronic imaging and scanning; and distribution, services, and supplies. In addition to identifying spinouts and joint ventures from Xerox R&D, we did a series of entrepreneurial startups with other outside investors providing some of the financial investment. During its 10-year planned life, XTV returned Xerox’s investment tenfold and at the peak of its activity, there were 11 companies with two as IPOs forming public companies.

To be actively involved with the intrapreneurial activities of an existing large business and helping to take a product or service from an idea to a deliverable product or service is every bit as exciting and fulfilling as entrepreneurship. The same technical and intellectual skill sets are required, and personal risks are similar.

The biggest difference between intrapreneurship and entrepreneurship, in my view, is that the intrapreneur would have some upfront funding from the parent company and may be able to draw on marketing and sales expertise from within the parent (when it is requested). But in both types of processes to bring new businesses into creation, success was dependent on small, highly motivated, highly competent, highly flexible, highly compatible, independent teams, and that is what made these startups successful.

Robert V. Adams (BSME ’54, DEA ’83, OME ’91, HDR 2005) served in several director and vice president positions with Xerox Corporation before becoming executive vice president. He was also the president, CEO, and senior principal of Xerox Technology Ventures.
Keeping an Open Mind

Lifelong learning essential ingredient for success

To be a successful ME student or a successful entrepreneur, you must have a strong motivation and the stamina to work 80-plus hours a week when it is necessary, as it often is. Not everything comes easy; not everything is a breeze. Some tasks will take twice as long or cost twice as much as expected, and you need to plan and budget for those contingencies. You need to recognize your own limitations and surround yourself with talented colleagues who share your vision.

I graduated high school in 1946, a year after the end of World War II. The next week, I enlisted in the Army, as did many of my friends. I joined the Army Corps of Engineers, and filled out my Purdue application in a Quonset hut in Korea. I arrived home from Korea on Thanksgiving Day and enrolled at Purdue for the next semester in February 1948. The G.I. Bill made it all possible.

Purdue did a lot to help the vets get reacquainted with their studies. Purdue offered refresher classes for the vets and some of the basic classes were offered two ways. Normal classes were three days a week. Those who needed extra help could take two extra catch-up classes in the same course each week.

Today’s Purdue ME students are learning about technology that hadn’t been invented when I went to school. In the years ahead, students will work with technology that doesn’t exist today, and many current students will have helped to invent it. A Purdue ME education teaches an engineer how to study, think clearly and learn new subjects. All engineers need to continue learning throughout their careers. It’s especially important for an entrepreneur who will have to study entirely new subjects such as marketing, finance, and/or patent law. An engineer’s education doesn’t end with graduation, and a Purdue mechanical engineering education provides this solid foundation.

Milton Hollander (BSME ‘51, DEA ’72, OME ’91) is the CEO and chairman of the board of Newport Electronics, Inc. He was previously corporate vice president of science and technology for Gulf & Western, Inc., and holds more than 200 patents worldwide. Hollander also received the Purdue President’s Council Pinnacle Award in 2006.
The Energy Challenge

Gore considers solutions from discovery to delivery

As former associate dean for research and entrepreneurship in the College of Engineering and now director of the Energy Center at Purdue’s Discovery Park, Jay Gore has long understood the relationship between research and commerce. “Any problem that requires engineering solutions automatically leads to entrepreneurship,” says the Vincent P. Reilly Professor of Mechanical Engineering. “From discovery to delivery, Purdue plays a role. Many faculty are entrepreneurs, with so many inventions, so many discoveries,” he says. “The community and the state of Indiana can benefit if companies start here. I feel very passionately about the Energy Center integrating entrepreneurship.”

Energy Center Explores Alternatives

Launched in 2005 with seed money from the Lilly Endowment, the Energy Center today brings together more than 150 faculty from six Purdue colleges who are working on high-impact, multidisciplinary projects in energy alternatives and consumption.

One project that’s reached commercialization is the work of Nancy Ho, a Purdue molecular biologist who developed genetically engineered yeast that ferments xylose, a sugar in corn stalks, wood and grasses, known as cellulosic biomass. It is a renewable resource for producing ethanol. The yeast has been licensed to producers throughout the world, and Ho has formed a company, Green Tech America, to further develop and market the yeast. Another is the work of Michael Ladish, now on leave from Purdue at Mascoma Corp. in Massachusetts, which is producing ethanol using cellulosic biomass.

The Energy Center also focuses on the dynamics of social, policy, economic and education. “There is an opportunity for us to find new energy by saving energy we already have,” Gore suggests. “Most of us feel gas prices are too high, but as far as our behavior is concerned, we don’t necessarily send that signal.” That’s an area being explored. “Looking at the energy grand challenge as a big-systems problem is one of the emerging, hot areas,” he says. “Energy is a worldwide system.”

Bioenergy, wind turbines, coal, and nuclear energy must remain as options, Gore says. “The challenge with nuclear energy is how to make it safe and address the waste issue, so the Energy Center is helping build a partnership with mechanical and nuclear engineering.”

Coming of Age in Earlier Energy Crisis

Gore earned his bachelor’s at the University of Poona in 1978, and was drawn to his field by the energy concerns of the day. He earned master’s and doctorate degrees at Pennsylvania State University, and came to Purdue in 1991, where his research in combustion and flame radiation phenomena probes efficiency, productivity enhancement and pollutant reduction in gas turbine combustors and industrial burners and furnaces. He was named interim director of the Energy Center at its founding and permanent director in March 2008.

Gore has stepped into entrepreneurial waters by advising others, including the Purdue Research Park spectrometer company, En’Urga. “I remember Burton Morgan saying he started many companies and only a few were successful. I’m waiting for my few,” he says of his preference for encouraging others. “There are players and there are coaches.”

Kathy Mayer

Purdue Mechanical Engineering Impact
Class Notes

1930-39

Ernest E. Bradley (BSME ’39): Retired as technical director to the vice president of Youngstown Steel Door Company. As a student at Purdue he was a member of Tau Kappa Epsilon. He enjoys reading the Purdue Alumnus and Engineering Impact magazines.

1940-49

Thomas H. Seaney (BSME ’48): Retired in 1998 from Lockheed Martin. He has fond memories of the early black-and-white TV’s, first transistor radios, BMESWS (early radar warning systems in Alaska and England), and Navy shipboard radar systems. He and his wife Martha (BA ’50) live in Cherry Hill, New Jersey.

Karl Ziegler (BSME ’48): Retired in 2002 as a marketing planning manager for IDAB Inc. in Hialeah, Florida. He received an MBA in 1950 from the University of Denver. Karl and his wife Elizabeth live in The Villages, Florida.

1950-59

Jack Sowle (BSME ’54): Received an MBA from Ohio State in 1957 and worked for four years in the U.S. Air Force in technical research. He is now retired after 35 years in technical and management positions at Shell Oil. Jack and his wife Melissa (BA ’54) live in Senecaville, Ohio.

William Hedderich (BSME ’58): Currently working as the general manager in the Power Systems Group at Interset in Manhattan Beach, California. He was a supplier of mission-critical transportable (land/sea/air) uninterruptible supply systems used in the pre-launch calibration phase (navigation, IR & optical sensors) of the anti-ballistic mission kill vehicle used in President Ronald Reagan’s Star Wars Program. His father, William E., was a 1928 BSME graduate.

Roger A. Willby (BSME ’58): Retired from the wire and cable division of Western Electric Cable Engineering (Lucent) in Norcross, Georgia. Roger and his wife Kathleen live in Marietta, Georgia, and spend summers in Maine. They work with the American Chestnut Foundation to restore the tree to the Appalachian Mountains.

1950-59 (cont.)


Thomas G. Owen Jr. (P.E., BSME ’59): Retired as owner of Owen & Sons. He holds a 1970 patent on a cotton picker machine and is developing and constructing a new and improved model. He and his wife Phyllis reside in Seven Mile, Ohio.

L.M. Christopher Clark (BSME ’73, MSME ’74): Currently working as manager of Continuous Improvement, Shell EP Americas in Houston, Texas. Previous work included a long history as an HR manager.

1970-79

K. Terry Jackson Jr. (BSME ’81): Currently working as the engineering group manager, Advanced Vehicle Development for Global Manufacturing Engineering for General Motors Corp., in Warren, Michigan. He recently returned from a four-year overseas assignment for General Motors in Thailand as director of Planning and Program Management.

1980-89

Mark E. Rickman (BSME ’93): Currently working as a quality systems manager for the HON Company in Muscatine, Iowa. He is a church deacon, judge for the Iowa Recognition for Performance Excellence, and member of the executive council for the Iowa Quality Center.

1990-99
Daniel Cuhat (MSME '93, PhD '99): Currently working as a senior engineer for John Deere Power Systems. He and his wife Gabriela Torres-Cuhat (MA '94, PhD '98) welcomed a third child, Isabelle Rose, on April 13, 2007. They live in Cedar Falls, Iowa.

M. Daniel Spillman (BSME '99): Currently working as an intellectual property attorney with Brinks, Hofer, Gilson & Lione in Indianapolis. His area of focus is in the mechanical arts, including medical devices.

Brian S. Longardner (BSME 2002): Currently working in the United Kingdom for Dana Corporation on vehicle designs and components to increase the efficiency of vehicles utilizing Dana Corporation products.

2008 Honorary Doctor of Engineering Degree

William K. Cordier
BSME '49, OME '95, DEA 2003
A mechanical engineer and entrepreneur who went on to hold leadership positions at a number of New York Stock Exchange corporations. He was the President’s Council Chairman in 1998.

Ralph S. Johnson
BSME '30
Responsible for several designs and innovations that have improved air safety throughout the world. At age 101, he is retired after a successful career that included flying more than 7,000 test flights for United Airlines as the company’s chief test pilot. He also served two terms in the Wyoming House of Representatives.

2008 Distinguished Engineering Alumni

Anthony Harris
BSME '75
President and CEO, Campbell Security Equipment Company

Moira A. Gunn
PhD '74
Host, National Public Radio “BioTech Nation” and “Tech Nation”
Solution to Torque Troubles

Here is the puzzle presented in the Winter 2007 issue of Mechanical Engineering Impact:

An enthusiastic engineer working for a race team overheard a rival discussing how important it is to reduce “rotating mass” in order to get quicker vehicle response. To impress his chief engineer, he redesigned the half-shafts from 1-inch solid shafts to hollow shafts using the same material, while not changing the length or the amount of torque it will transmit. He carefully matched the max shear stress in the new shaft to determine its diameters and chose a wall thickness of 0.125 inches to prevent accidental damage. A week later the half-shafts had been machined and returned. What is the new mass and mass moment of inertia compared to the original? Express the two answers as ratios, new/old. Do you find anything interesting?

Consider what other information would be required to actually determine if his effort was worthwhile.

Assume:
loading is pure torsion, and shafts are perfect cylinders with no splines.

Solution:
The solution is found by matching the max shear stress using: \( \sigma = \frac{TD}{Ip} \)

Where:
- \( T \) = torque (same for both shafts)
- \( D \) = diameter of shaft (outer diameter, in case of hollow shaft)
- \( Ip \) = polar moment of inertia (different for solid and hollow shaft)

Using this and knowing the wall thickness of the hollow shaft, the outer and inner diameters of the hollow shaft can be found. Now masses per unit length can be calculated and compared in the form of a ratio by knowing the density of both shafts is the same. Finally, the mass moment of inertia can be compared in the form of a ratio.

What is the new mass and mass moment of inertia compared to the original? Express the two answers as ratios, new/old. Do you find anything interesting?

Consider what other information would be required to actually determine if his effort was worthwhile.

Solution:
The solution is found by matching the max shear stress using: \( \sigma = \frac{TD}{Ip} \)

Where:
- \( T \) = torque (same for both shafts)
- \( D \) = diameter of shaft (outer diameter, in case of hollow shaft)
- \( Ip \) = polar moment of inertia (different for solid and hollow shaft)

Using this and knowing the wall thickness of the hollow shaft, the outer and inner diameters of the hollow shaft can be found. Now masses per unit length can be calculated and compared in the form of a ratio by knowing the density of both shafts is the same. Finally, the mass moment of inertia can be compared in the form of a ratio.

What is the new mass and mass moment of inertia compared to the original? Express the two answers as ratios, new/old.

Mass:
- 0.5252 (Mass was reduced)

Mass Moment of Inertia:
- 1.1754 (Mass moment of inertia was increased)

Do you find anything interesting?
The mass goes down, but the mass moment of inertia goes up by this change. The result is the object is easier to linearly accelerate, but more difficult to angularly accelerate. Therefore this has not guaranteed that the vehicle will accelerate faster.

Consider what other information would be required to actually determine if his effort was worthwhile.

As a first-cut approach, we need to know the mass moment of inertia of the entire drivetrain to see how significant the increase in the mass moment of inertia was to the system. We also need to know the entire mass of the vehicle to see how significant the reduction in mass was. Using these we can begin to understand if the reduction in mass was worth the increase in mass moment of inertia.
This colorful collage consists of work by MSE Professor R. Edwin García. It is actually two superimposed simulations of the nucleation and growth process of an undercooled Nickel melt. The background shows periodic tapestry of Ni nuclei during the initial stages of the solidification process. The superimposed structure in the center corresponds to a single solidified Ni-dendrite. The coloring embodies the degree of crystallinity and the orientation of each nuclei. Simulations were performed by Michael Waters (BSMSE 2008). García’s work is featured in the current issue of *MSE Impact*. 