CONNECTED

A shrinking world
needs partnerships

PURDUE **CHEMICAL**

ENGINEERING IMPACT

SUMMER 2007

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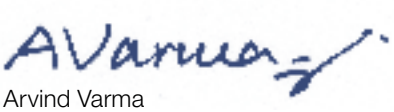
On My Mind

Globalization is now a buzzword, but our school's faculty and alumni have long played a major role in industry, research, and education efforts that span the globe. In this issue of *ChE Impact*, we discuss how globalization affects our school—in a positive way. We also report on the exciting news about all the wonderful things happening in the school. From celebrating Rex Reklaitis' election to the National Academy of Engineering to two staff members receiving a prestigious university award, there's much to celebrate—and, on the following pages, you'll read about these and many more recent accomplishments.

All this good news is capped by the excitement surrounding our centennial celebration of the chemical engineering undergraduate curriculum at Purdue, which was celebrated on April 13 with a banquet and a day of activities that included departmental and laboratory tours, and presentations and a panel discussion with the dean of engineering and academic and industry leaders. Visit us at www.Purdue.edu/ChE for highlights of the event.

Remember to stay in touch, and keep us informed of your news. Drop in occasionally to say hello and walk around Forney Hall to see all the exciting work that is going on.

As always, our vision remains to be the premier source of well-educated chemical engineers in the world. This vision can only be achieved with your help and involvement! We are excited about our future and our plans to excel as we grow. We will continue to share our progress with you.



Arvind Varma
R. Games Slayter Distinguished Professor and Head

Tell Us What You Think

Share your Purdue memories, react to a story, or let us know your thoughts about a particular issue. Write to us at peimpact@purdue.edu. In doing so, you grant us permission to publish your letter in part or in whole in an upcoming issue. We reserve the right to edit letters for length and/or clarity.

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COLLEGE OF ENGINEERING

School of Chemical Engineering

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Awards and Honors


Chelsey Baertsch


Steve Beaudoin


Nick Delgass


Michael Harris

Chelsey Baertsch, assistant professor of chemical engineering, received a National Science Foundation Career Award for her project "Designing Partial Oxidation Catalysts for Selective Gas Microsensors." The award recognizes outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership at the frontiers of knowledge.

Steve Beaudoin, professor of chemical engineering, was named the school's associate head, replacing Doraiswami Ramkrishna, who is returning to full-time teaching and research.

Purdue's Board of Trustees ratified the appointment of **Nick Delgass** as the Maxine Spencer Nichols Professor of Chemical Engineering.

Michael T. Harris, professor of chemical engineering, has joined Purdue's Engineering Leadership Team as the associate dean for undergraduate education. The Undergraduate Education Office is responsible for all undergraduate engineering programs, including the Office of Professional Practice (cooperative education), Engineering Projects in Community Service, the Minority Engineering Program, the Women in Engineering Program, and undergraduate recruitment and scholarships.

Reklaitis Elected to the NAE

Rex Reklaitis, the Edward W. Comings Professor of Chemical Engineering, has been elected to the National Academy of Engineering (NAE) for developing the theory and application of batch design, scheduling, and optimization tools, and for outstanding contributions to education. Election to the NAE is among the highest professional distinctions accorded to an engineer.

ChE's Discovery Informatics Team Wins Purdue Engineering's Team Award

The Discovery Informatics Team began in the late 1980s, when chemical engineering professors **James Caruthers** and **Venkat Venkatasubramanian** developed a new paradigm for materials design and discovery. The team has worked with companies such as Lubrizol, Caterpillar, Equistar, and Cummins to revolutionize the chemical industry. This is a multidisciplinary team of scholars, including chemical engineering faculty members **Chelsey D. Baertsch**, **W. Nicholas Delgass**, **Hugh W. Hillhouse**, **Fabio H. Ribeiro**, and **Kendall T. Thomson**. The team was honored at the college's 2007 Faculty Awards of Excellence on April 28, 2007.

Newly Named University Faculty Scholars

Steve Beaudoin and **Fabio Ribeiro** were designated as University Faculty Scholars in recognition of their scholarship. Faculty scholars receive additional funding to support their research.

2007 *U.S. News and World Report* Graduate Rankings

We're pleased to report that Chemical Engineering is now ranked 14, up from 16, in the latest *U.S. News* rankings.


Jeff Valley


Joe Pekny

One Brick Higher Awards

Jeff Valley, maintenance mechanic and building deputy in Forney Hall, and **Joe Pekny**, professor of chemical engineering, were awarded Purdue's One Brick Higher Award in recognition of their extraordinary contributions to the betterment of the university.

CONNECTED

By Linda Thomas Terhune

As industries around the world are drawn closer by globalization, universities are finding that the distance between classrooms on opposite sides of the globe is also shrinking. Once the activity of a privileged few, participation in international exchanges is barely optional—it is viewed as critical to the future of the field and its scholars. This has led to a surge in the number of studies abroad, research exchanges, and international internship opportunities for students and faculty in Purdue's School of Chemical Engineering.

"We must realize that a U.S.-centric engineering education is an inadequate engineering education," says Stephen Beaudoin, associate head of the school. "We must create engineering talent that can excel in a worldwide business marketplace, which means that we must create engineers who can function well in different cultures and settings, and who can help engineers from different cultures be successful in domestic settings."

Beaudoin, whose research focuses on particle and thin-film adhesion, is among the school faculty forging new frontiers in international exchange. He teaches international short courses offered through FSI Knowledge Services that bring industry leaders into the classroom. This spring, Beaudoin taught "Fundamentals of Particle Adhesion and Removal" at locations in Shanghai and Hsinchu, China. The short courses benefit FSI, a wafer processing technology business, by offering its clients an opportunity for interactive information exchange and, ultimately, better customer service.

A New Take on an Old Tradition

While international teaching exchanges have been around for decades, they are now being redefined to keep pace with the changing world of industry.

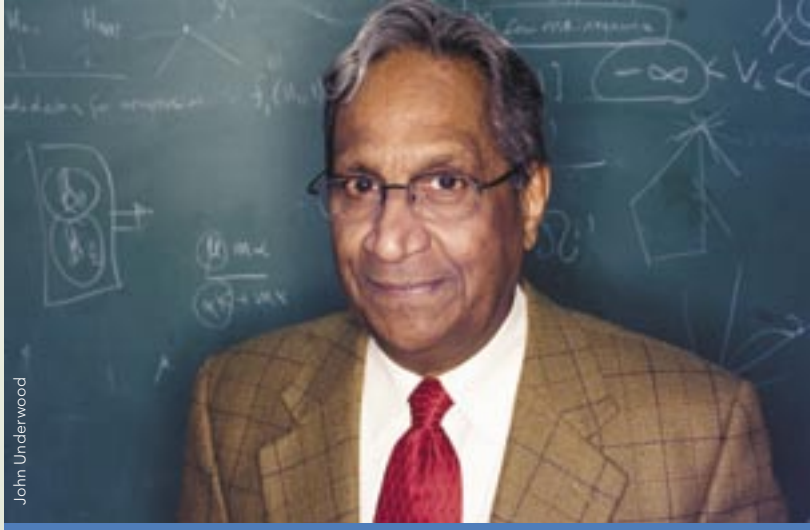
"Globalization has become a big part of today's commercial operation. Along with that comes a need to become sensitive about what it takes to establish yourself in that environment," says Doraiswami Ramkrishna, the Harry Creighton Peffer Distinguished Professor of Chemical Engineering.

Ramkrishna's research focuses on the applications of mathematics to problems in chemical engineering, for which he is widely recognized. He also has an academic interest in the increasing importance of global education. Since joining the Purdue faculty in 1976, he has spent time abroad—as a distinguished fellow and a visiting professor at Mumbai University and as a visiting professor at the Indian Institute of Science (IISc) in Bangalore. In 2001, he was awarded the prestigious Senior Humboldt Award to visit the Max Planck Institute in Magdeburg, Germany.

Ramkrishna observes that international interaction in the past was basically undertaken on an individual basis, while the current effort is to spread this kind of interaction more widely among faculty.

Between 1986 and 2001, Ramkrishna established a research partnership with IISc, for which travel had been funded at times by the National Science Foundation and the United Nations. Through the partnership with IISc, Ramkrishna has published papers with students and faculty in Bangalore. A similar collaborative research program has been in effect for the last six years with the Mumbai University Institute of Chemical Technology (UICT). These programs have also brought Indian post-doc students to Purdue, who then completed the cycle of mutual enrichment and returned to faculty positions in India. Currently, Ramkrishna has a continuing collaborative research program with the University of Magdeburg and the Max Planck Institute for Complex Systems in Magdeburg, involving exchange of students.

Similarly, Arvind Varma, the school's R. Games Slayter Distinguished Professor and Head, has been involved in international programs for many years, with a new activity starting later this year. Varma was a Fulbright Scholar in 1989, staying at the Indian Institute of Technology (IIT), Kanpur, followed by several one- to two-month-long research and book-writing visits to the University of Cagliari and Politecnico di Milano, Italy. These connections led to Varma having a long list of outstanding former PhD students and postdoctoral scholars who are on chemical



John Underwood

Doraiswami Ramkrishna

engineering faculties in Italy and ETH-Zurich.

This January, he spent one week at UICT as the G. P. Kane Visiting Professor. And he was recently selected in the first batch of researchers for India's prestigious Collaborative Projects with Scientists & Technologists of Indian Origin Abroad program (CP-STIO). This will permit Varma to collaborate in research with UICT colleagues for three years, and will include annual visits as well as joint PhD and postdoctoral scholars.

"It is very satisfying to have long-term collaborative relationships of the type I have enjoyed with colleagues in Italy and India," Varma says. "They have led to lasting friendships and many research publications and books. I am very optimistic that our school faculty will have many such relationships in the future, with colleagues around the world, which is now increasingly flat."

Ramkrishna adds, "Globalization has come to stay as an important aspect of living in the U.S. It is really quite important to consider global connections. It used to be that we were quite independent; others were dependent on us. Now, if the Chinese markets go down, it hits us here. That shows the economic coupling on a global scale. If we're not sensitive to this and don't continue our collaborations overseas, we're going to be in trouble."

Have Passport. Will Travel to India, Italy, and Beyond

In the past, ChE students had only one Purdue-based option for overseas study and research—England. Now, in addition to a junior-year abroad program at University College London, the choices are rapidly growing.

ChE sent its first undergraduate to IIT, Mumbai, in

continued on next page

Vincent Walter

Stephen Beaudoin (left) and David Corti

January through the College of Engineering's Global Engineering Alliance for Research and Education (GEARE) program. Participants undertake a domestic internship, then go overseas for study and a paid internship with the same company. They also team with students from the host university for a design project.

In the summer of 2007, ChE students will, for the first time, be able to take part in a summer laboratory program in a non-English-speaking country. The program will be at CPE in Lyon, France; the lab will be taught in English, and a beginner's language course will be taught in French. Students will also be able to carry out research projects over the summer at Politecnico di Milano in Milan, Italy. And talks are underway for exchanges with universities in Denmark and Germany.

Purdue ChE students have also benefited from the school's sharper focus on international enrollment. Five years ago, international students made up 13 percent of the student body; in 2007, they comprise 18 percent. "This gives our domestic students exposure to students from other countries and, with the group activities we attach to ChE courses, the opportunity to work closely with individuals from widely differing backgrounds," says David Corti, chair of the ChE study abroad programs and coordinator of ChE's portion of the GEARE program. "Feedback we have received from our alumni working in industry suggests that they have valued this diverse and international exposure."

With a growing array of overseas experiences available to students and faculty, the days of armchair travel, it would seem—at least for aspiring engineers—are over.

"These experiences provide the total immersion setting that allows domestic students to understand what it is to not be in a majority setting," says Beaudoin. "This understanding is essential to future success." ■

campaign impact

Success!

Everyone comes together for a better future.

The Campaign for Purdue comes to an end on June 30, 2007. It has been an incredible seven years, and every person in the School of Chemical Engineering has been involved and has made an impact on the campaign: faculty, staff, students, and alumni.

The biggest impact has been made by our alumni and friends who believed in our cause and invested in it to reach and surpass the school's $41,500,000 goal. As of March 30, 2007, the school has raised $64,786,248 during the campaign. This includes deferred gifts.

For many years now, Purdue ChE alumni and friends have provided the important funding needed for the school to function. Approximately 15 percent of ChE alumni make a gift each year. As the years have gone by, state funding has been reduced, and gift funds now cover 100 percent of the school's operating expenses (excluding salaries). We could not do it without you!

Purdue is a dynamic place for chemical engineering. We believe our campaign fund results are a testament to the school's stature and to your commitment to strengthening it. Your support is vital to keeping us among the best programs nationally. We hope that, with your caring and generous support, you will continue to demonstrate loyalty and commitment to Purdue ChE.

Thank you!

Dick and Mary Lou Hazleton being presented the Pinnacle Award in Naples, Florida, by Purdue president Martin C. Jischke.

Go Big or Go Home

What it takes to compete on the world stage.

From the viewpoint of Jay Ihlenfeld (BSChE '74), senior vice president for 3M's Asia-Pacific region.

I'm on my third global assignment with 3M, living and working outside of the United States. My first time working abroad was in Germany and Belgium in 1985, when the European community was finding its way as an economic entity. Now, China and India are more influential, and multinational corporations are redefining their borderless business practices. I've witnessed this shift firsthand with recent assignments in Japan and throughout Asia. Today, over 60 percent of 3M sales come from outside of the U.S., with the majority of those sales in Asia.

Globalizing as a company used to mean "make it here, sell it there." Today, that model is obsolete. Global competition has intensified. In Asia, we find ourselves competing with other multinationals on the world stage and at the same time facing strong and capable local competitors. Markets and customers are both global and local, with the latter becoming increasingly sophisticated. They demand the best cost, service, and speed.

What does this mean for today's practicing engineer? The reality is that highly skilled and ingenious technical people now exist all over the world, and the creation of new technology happens everywhere. The challenge is how to embrace, be effective, and take full advantage of globalization. Those who don't—or won't—will be left behind.

Successful engineers will be those who quickly learn how to navigate through language and cultural barriers and will have well-developed leadership skills. And they will be able to promote cultural awareness, teamwork, and mutual access to information networks to make sound and lasting decisions.

From 3M's perspective, there are four essential elements to competing successfully in the world economy:

Be Customer-Centric

Borderless customer support is the norm, prompting a need to be responsive to local needs and opportunities.

Localize

Responsiveness demands localization. To be more vital to customers, companies must respond quickly and with the right solutions at competitive costs. This means new products and services must be developed locally, products must be manufactured locally, supply chains must be simplified, and raw materials sourced locally. Marketing approaches, corporate awareness, brands, and customer service all must be driven locally.

Jay Ihlenfeld speaks in China.

Lead

Localization demands effective and imaginative local leadership. Strong local leaders protect the corporation by setting standards for ethical behavior, preserving the corporate culture, and ensuring respect for the local social and physical environment.

Innovate Everywhere

Globalization demands innovation everywhere: in new business models, new pathways to growth, new products and services, new ways to serve customers, supply chains, and in the transfer of knowledge and know-how. Sometimes this means having the courage to give up what is routine—what was once considered great or at the core of the company. The best time to invent a new future is when things are going well. ■ **Jay Ihlenfeld**

Destination: India

Allison Yates studies abroad and finds a country in transition.

"I've been living in a contradiction for the past few months," Allison Yates writes in an e-mail from the Indian Institute of Technology (IIT), Mumbai, where she's studying abroad for the spring semester. She continues to explain that she finds India as a thriving paradox of life and culture. "Inside IIT, you'll find India's most intelligent people studying hard, while outside the main gates exists everything that would classify the country as developing.

"It's a country with many political parties, hundreds of languages, and hundreds of traditions all trying to work together as one India."

Since the establishment of India's first IIT in 1951, the country has grown into what Tom Friedman in *The World Is Flat* calls a knowledge factory that "churns out and export[s] some of the most gifted engineering talent on the globe."

Yates is seeing this explosion of talent firsthand. "It is no longer prestigious in India to be anything but an engineer or doctor," she observes. "Families here send their children to special coaching classes, much like our SAT prep classes, for the Joint Entry Exam—which grants admission into an IIT."

These prep courses are actually taken every year for one to two years. Some students in India even take a year off after high school to strictly prepare for the JEE, thus increasing their likelihood of being accepted in one of seven IITs. If you're a member of the elite 1 percent who are admitted, you're set for life. "The rest of their life plan in a broad general stroke is something like this: graduate from IIT; be hired by an international company that will relocate them abroad; move abroad; stay abroad," says Yates. "Abroad usually means the United States."

This cycle—this brain drain—is placing an enormous burden on India. In her short time in the country, Yates has observed a culture in despair. Much of India still experiences poverty and goes without conveniences like safe drinking water. "I wonder why there aren't proper garbage disposal systems in place, well maintained roads, reliable communication systems, or any form of stable infrastructure," she says.

"Why are call centers for almost every major computer and software company in India, yet all my banking here is still done on paper sheets? Why are carbon-copy receipts the only form of bookkeeping?" she asks. "I marvel at this everyday contradiction, at this dance of life that is simultaneously following the beat of two very different drums.

"I can only describe it as if India grew up too fast." ■ **L.L.**

"Even on the opposite side of the globe, our basic human values are the same. The culture is different, the language is different, the religion is different, but we share that common goal: to be happy."
—*Allison Yates*

Read Allison's blog at https://engineering.purdue.edu/Blogs/AllisonYates

2007 Distinguished Engineering Alumni:

Michael Ott

BSChE '74
President, CEO, and Owner
Polysciences Inc.

"I am one of the very few people who got to do exactly what I always wanted to do," says Michael Ott, owner and president of Polysciences Inc. Ott grew up on a farm in southern Indiana and knew from a young age that he wanted to study chemistry.

When Ott graduated in 1974, he had 13 job offers but chose to stay with Rohm & Haas, because the time he had spent with the company in the Cooperative Education Program put him closer to his goal of running a business. "A lot of people, when they first graduate from engineering school, are asked to go into the plant so they can learn the processes before they go into the business side," Ott says. "Because I had done the co-op work already, I was able to go straight into the business side." With his goals constantly in mind, and after three years on the East Coast with Rohm & Haas, Ott returned to school for an MBA at the University of Chicago.

Ott took a big step toward his goal by joining Polysciences Inc., a chemical company in Philadelphia founded in 1961 to make sample preparation chemicals for use in electron microscopy. Founder and owner David Halpern was nearing retirement, and Ott saw an opportunity. He joined Polysciences as a general manager and slowly increased responsibilities until 1993, when Halpern retired and Ott bought the company.

Rick Roberts

BSChE '76
Senior Vice President, Manufacturing
Chevron Phillips Chemical Company LP

As a college student, Rick Roberts followed his father to work in the steel mills one summer and discovered a passion for being in the midst of the manufacturing process and understanding how it works. The experience was formative.

After receiving his BSChE in 1976, he began working as a process engineer at the El Segundo refinery for Chevron Phillips Chemical Company. He has remained with Chevron since, adding an MBA from Pepperdine University to his resume along the way.

As senior vice president of manufacturing, Roberts is in charge of both process and personal safety and oversees 10 U.S. plant managers.

Roberts has remained an enthusiastic spokesperson for the industry and an influential member of the Purdue community throughout his career. Through his work with the industrial advisory committee, Roberts helps keep the School of Chemical Engineering updated about industry trends so that it can best serve the students.

■ **Linda Thomas Terhune**

2006 Outstanding Chemical Engineers

Michael Ladisch, MS '74, PhD '77

Michael Ladisch is director of Purdue's Laboratory of Renewable Resources Engineering and a distinguished professor of agricultural and biological engineering. He holds a joint appointment in biomedical engineering and a courtesy appointment in food science. Ladisch was elected to the National Academy of Engineering in 1999.

James Rust, BSChE '58, PhD '65 Nuclear Engineering

James Rust began his career on the faculty of the School of Nuclear Engineering at the Georgia Institute of Technology in 1967, was promoted to full professor in 1977, and worked in the field of heat transfer and reactor engineering until retiring in 1981.

James Stake, BSChE '74

James Stake is the executive vice president of Enterprise Services—a 3M Corporation. Stake has been with 3M since graduating from Purdue in 1974. He obtained his MBA in finance in 1979 from the Wharton School at the University of Pennsylvania.

This image of Earth's city lights was created with data from the Defense Meteorological Satellite program Operational Linescan System, which NASA uses to map urbanization. The brightest spots are the most urbanized but not necessarily the most populated. (Compare Western Europe to China and India, for example.) See "Prime Numbers" on page 10 (college side) for a numerical quick look at our world.