

Rowan University
College of Engineering

Annual Report **2008-2009**

*Henry M. Rowan Hall, the home of
the College of Engineering*

Table of Contents



Message from the Dean	2
Tech Park Expands Research Space and Opportunities	3
Partnerships Enhance Both Industry and Education	5
Engineering Reaches New Generation of Students and Educators	7
College Gives Back at Home and Abroad	9
Students and Faculty Earn More National Accolades	11
Innovative Clinic Projects Challenge Future Engineers	13
Graduates Take Engineering Degrees In Rewarding Directions	15
Message from the Chairperson	18

Message From The Dean

It is hard to escape the news that bombards us with security threats, escalating energy prices and costly health care virtually every day. For engineers, that news generates more than concern; it is indeed a call to action. In the world of technology, there are ongoing efforts to define needed engineering innovations for today's problems and create future paths for research.

By significantly increasing our space with the opening of the South Jersey Technology Park, we have enabled an expansion of engineering clinics and research facilities. Our recent accomplishments help address the looming challenges we all face, and I extend our thanks to the many who helped make the Tech Park a reality.

Our hallmark continues to be the engineering clinics, and we recognize the important industrial partnerships that have supported our productivity in our clinics during the past decade. This is particularly true for Johnson & Matthey, which has sponsored engineering clinics for more than a decade. It is also notable that the majority of Rowan Engineering's 120 yearly

engineering clinics are externally funded by industry and government agencies. Champions in this process are the faculty, who serve as project managers on all clinics and continue to earn national accolades for their work.

Rowan does more than provide an excellent education for our students in preparation for careers. Our summer programs that promote engineering to K-12 students and teachers and our numerous service projects exemplify a well-balanced College. Students respond to our education models with award-winning performances that are creative and innovative. Students also are engaged ambassadors, offering their engineering expertise in service roles that impact broader populations and strengthen our linkages to K-12 students.

I invite you to enjoy highlights of our activities in this annual report. Please contact us if you would like more information about our outreach and clinic projects or want to explore opportunities to work together. We welcome your energy and interest as we address the challenges of tomorrow.



A handwritten signature in black ink that reads "Dianne Dorland".

Dianne Dorland, Ph.D., P.E.
Dean of Engineering

*The Samuel H.
Jones Innovation
Center at The
South Jersey
Technology Park*



Tech Park Expands Research Space and Opportunities

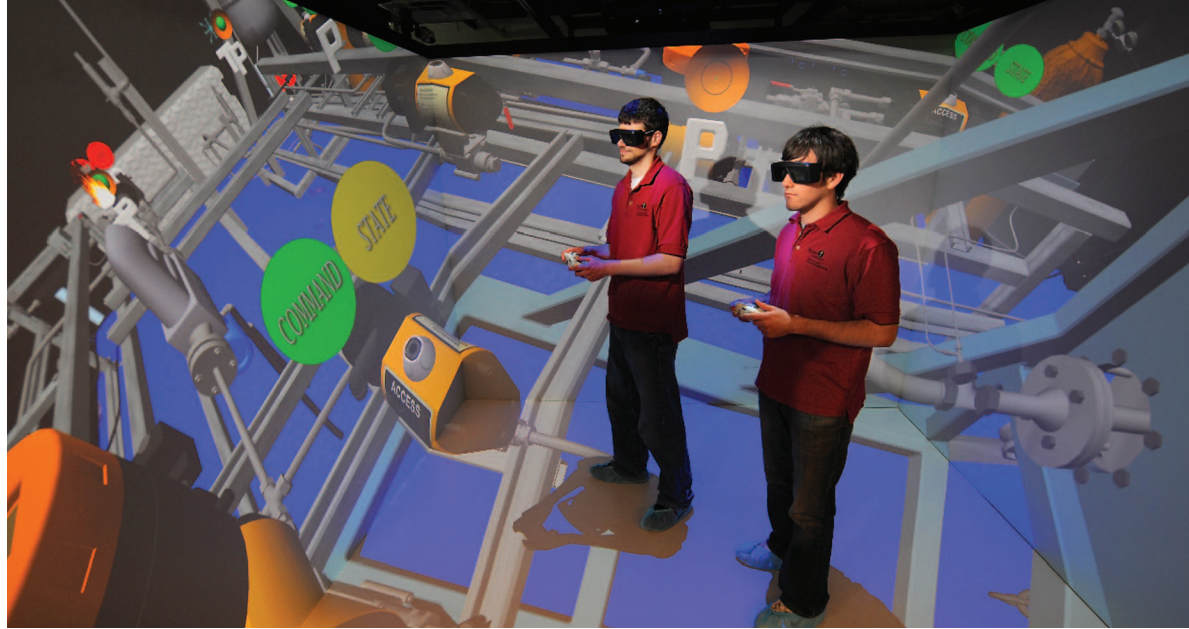
The 2008 opening of the South Jersey Technology Park at Rowan University launched a new era of engineering, science and business development in the Greater Philadelphia region. The College of Engineering moved into nearly a dozen new laboratories in the Tech Park's first building, the Samuel H. Jones Innovation Center, now a hub for research of regional and national significance.

The Tech Park's Virtual Reality Lab houses the Cave Automated Virtual Environment, or CAVE®, the only such unit at any college or university in New Jersey. The College acquired the CAVE® through a \$392,000 grant from the National Science Foundation.

The CAVE is a 10' x 10' x 10' cube that provides an immersive, interactive and navigable environment. Within the structure, researchers can conduct 3-D visualization and prototyping, simulating virtually any condition. Rowan engineers have replicated rocket engine testing and modeled ship-board systems for NASA and the U.S. Navy, both of which have sponsored research projects with the College.

Electrical and Computer Engineering Chair Dr. Shreekanth Mandayam manages CAVE research with graduate student George Lecakes. Mandayam views the CAVE as instrumental to technology growth in the area. "It allows local industry to gain

Dr. Yusuf Mehta, associate professor of civil and environmental engineering



access to cutting-edge research and technology, and it allows us to train our students in these advanced technologies and add to the workforce in the region," Mandayam said.

Rowan engineers also are exploring solutions for making New Jersey's roads greener in the Tech Park's Binder and Recycled Materials Lab.

Dr. Yusuf Mehta, associate professor of civil and environmental engineering, is leading a study to determine the feasibility of using more reclaimed asphalt pavement in new road construction. The New Jersey Department of Transportation awarded Mehta a \$272,453 grant to support this research. According to Mehta, the state currently allows only 15 percent of pavement to be recycled. The vast majority of

Michael Bloom and Michael Russell, graduate students in electrical and computer engineering, conduct research in the CAVE, which has brought near-limitless virtual reality capabilities to the College of Engineering.

remaining pavement resides in asphalt plants throughout New Jersey.

"These stockpiles are from multiple sources," Mehta said. "We need to know what is in there and to analyze whether reused pavement and new asphalt and aggregate will work together."

At the Tech Park, Mehta's research team is testing samples collected from state asphalt plants to find the properties that will eventually support up to a 35-percent increase in pavement recycling. If so, New Jersey could reduce its new pavement costs while reusing its large supply of asphalt concrete.

Graduate student Terry Hopely (center) and Associate Professor and Mechanical Engineering Chair Dr. Eric Constans have partnered with researchers at the Children's Hospital of Philadelphia to improve child safety in vehicular collisions.



Partnerships Enhance Both Industry and Education

If one organization could best attest to the benefits of collaborating with the College of Engineering, it would be Johnson Matthey, Inc. The chemical company's West Deptford-based division has worked closely with Rowan for more than a decade, the longest of any of the school's industry partners.

For Dr. Richard Gutowski, manufacturing manager for chemicals and catalysts at Johnson Matthey, the College of Engineering is a value-added extension of the organization. “At our company, we have active imaginations. But our scientists don’t have a lot of time to look into ideas,” Gutowski explained. “Rowan does a great job of investigating the ideas to see if they are workable.”

A current sponsored project has Rowan students analyzing whether a spent material generated in Johnson Matthey’s processing unit can be converted to its starting material and be reused for manufacturing. Other projects have moved from conception to pilot phases.

“With the students and faculty, it’s an interactive approach to problem solving,” Gutowski added. “We get the opportunity to examine ideas that we normally don’t have the ability or time to look at.”



The College signed an education partnership agreement in 2009 with the Naval Air Systems Command’s Lakehurst, N.J. division to offer future clinic experiences for students.



Dr. Richard Gutowski (center), of Johnson Matthey, detailed his company’s long-standing partnership with the College of Engineering to attendees at the College’s Industry Day event in early 2009.

Gutowski spoke about his company’s long-standing association with Rowan to area businesses and organizations as part of a panel discussion at the College of Engineering’s inaugural Industry Day in early 2009. The day provided an open house for area businesses and organizations to learn more about partnering with Rowan Engineering.

Other panelists, including Susan Gresavage from the New Jersey Department of Transportation, Dr. Sriram Balasubramanian of Children’s Hospital of Philadelphia and Timothy Klingensmith

from the Naval Sea Systems Command in Philadelphia relayed their experiences as engineering clinic partners with Rowan. Klingensmith conveyed the benefit from a business perspective of working with students and tapping into the knowledge base of faculty. “You can’t get a bigger bang for the buck anywhere,” he said.

Kyle Denny, Salvatore Randazzo and Cameron Corini won the Best Undergraduate Student Paper award from the 2009 Delaware Valley Engineers Week Council for their paper titled: "Evaluation of the Compaction Characteristics of Unbound Material using the Superpave Gyrotory Compactor."

Working in teams, teachers discovered the math and science concepts required in kite making by constructing their own kites as part of the Engineering Clinics for Teachers program.



Engineering Reaches New Generation of Students and Educators

Project-based learning happens year-round at the College of Engineering. With the summer comes a new set of pupils — students in grades K-12 and their educators — who, through Rowan's College of Engineering outreach programs, get a hands-on introduction to engineering.

Edison Venture Fund contributed \$420,000 to fund the College's Engineers on Wheels program. From this contribution, Rowan will purchase two vans and retrofit them with engineering activities to use for K-12 school outreach visits.

Two pre-college workshops show students how engineering is both fun and relevant to their world. Rowan's Introduction for Students to Engineering program enabled high school students to discover the chemical properties of chocolate, learn about alternative energy and perform hydropower experiments. A record 160 girls produced lip gloss and crafted bottle rockets during the 2009 Attracting Women into Engineering Workshop for middle school girls. Through these experiences, students gained a better understanding of the many career options in engineering today.

The College also works with K-12 teachers to help strengthen engineering education in primary and secondary schools. Project Lead the Way conducted a two-week training session designed to support middle and high school teachers and guidance counselors in implementing pre-engineering curricula in their schools. The Engineering Clinics for Teachers program paired educators with Rowan faculty members, who developed experiments that the teachers could then replicate in their classrooms, such as kite and bridge construction. The program expanded this year to include high school seniors who are considering careers as engineers or technology teachers.

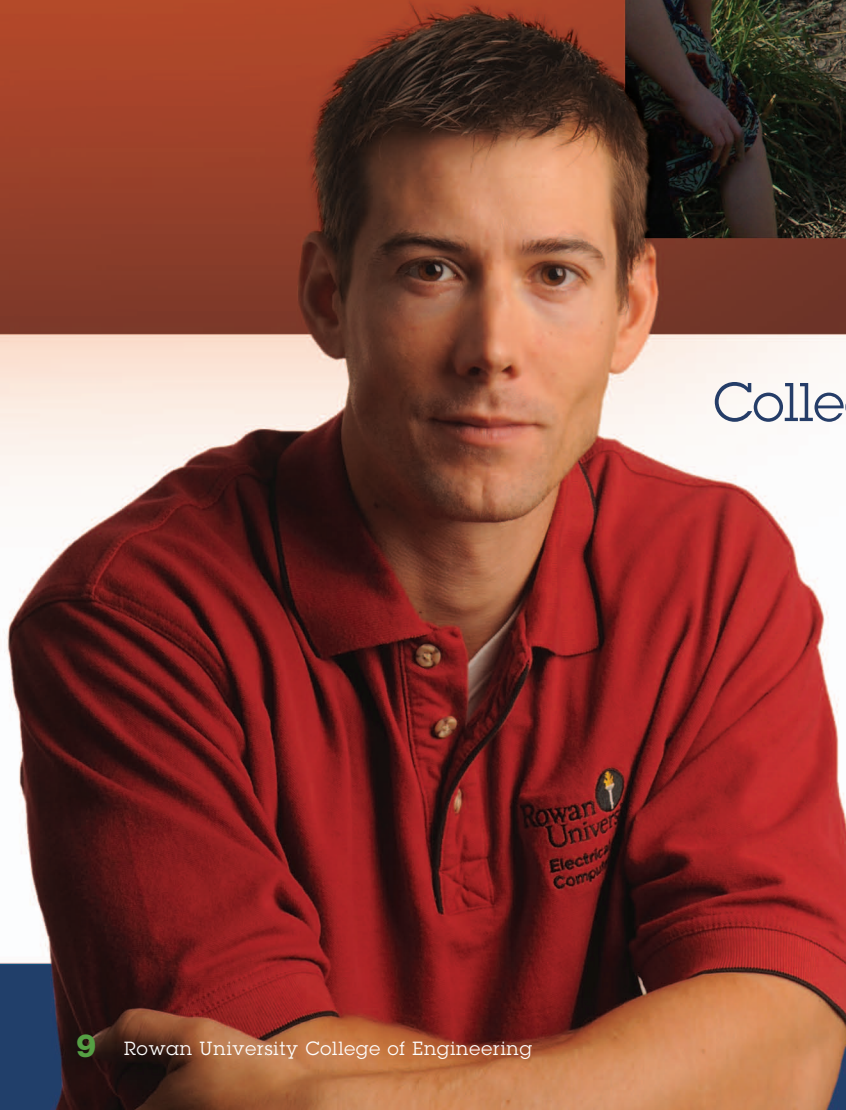


Educators in the Engineering Clinics for Teachers program learned how to activate a LEGO® brick, a computer-controlled device used to program robots.

“ My daughter loved the workshop. She has decided she would like to be an engineer and wants to attend Rowan when she grows up. It has given her a new appreciation of being a ‘smart’ girl. ”

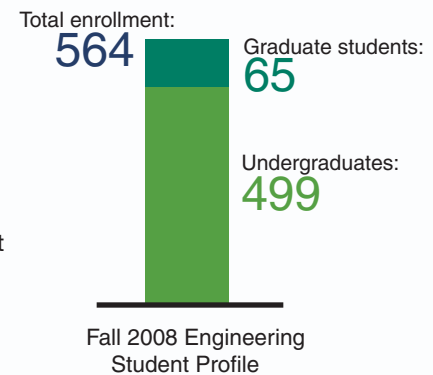
—parent of a 2008 Attracting Women into Engineering student

Residents of Africa's The Gambia helped Rowan students from the Engineers Without Borders-USA™ student chapter navigate through a flooded road.



College Gives Back at Home and Abroad

On campus and across the globe, Rowan engineers are engaged ambassadors, lending time and skills in service roles. The College's Engineers Without Borders-USA™(EWB) student chapter continued to help other countries in need, travelling to The Gambia in 2009. Students collected data to investigate a road that has become flooded for most of the year, leaving locals with restricted access to doctors, food and other critical needs.

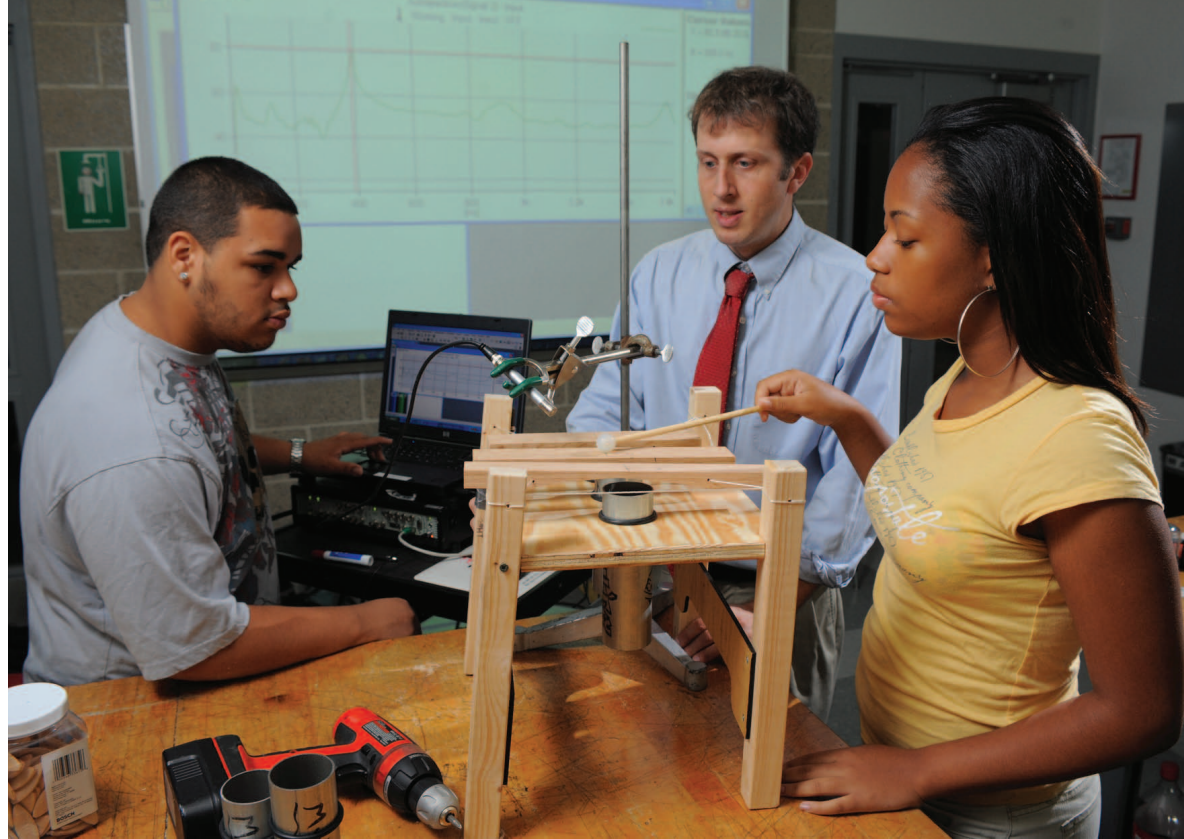


“**W**e determined that raising the road was the only option they had,” said Dr. Jess Everett, professor of civil and environmental engineering, who led the trip. Everett and students are planning to return in early 2010 to help rebuild the road with the full participation of residents from the small, impoverished African country.

College of Engineering faculty, students and alumni also support teaching service projects. On the Glassboro campus each summer, the College gives underserved students what may be their first exposure to engineering through the C.H.A.M.P. (Creating Higher Aspirations and Motivations Project) program. C.H.A.M.P. students, entering their junior or senior years of high school, live on campus while taking courses in English, math, public speaking and more.

According to Dr. Eric Constans, associate

Students on the Africa trip collected data about the water systems used in the area.



Dr. Eric Constans, associate professor and chair of Mechanical Engineering, leads an experiment with students in the C.H.A.M.P program.

professor and chair of Mechanical Engineering and C.H.A.M.P. instructor, many of the students never have heard of engineering. “The main goal is to give them an idea of what engineers do,” he said. Students from the 2009 C.H.A.M.P. class designed motorized LEGO® robots and fabricated musical drums, applying math to tune them to hit specific notes. The classes also have brought out a competitive streak among some students. “The kids want their projects to succeed, and we try to

encourage that,” said Neil McCall, a 2005 College of Engineering graduate and current C.H.A.M.P. instructor. “By the end of the program, they’re more confident. If no one suggested an engineering career to them before C.H.A.M.P., it’s now an option.”

“After C.H.A.M.P., they can appreciate how engineering affects them in everyday life.”

–Neil McCall '05

"Disney's Spaceport," the design created by David Lester, an electrical and computer engineering senior, and a team of New Jersey students, won the 2009 Walt Disney Imagineering ImagiNations Design Competition.



Students and Faculty Earn More National Accolades

Walt Disney once said, "If you can dream it, you can do it." A Rowan-sponsored team did just that — and took top honors at the 2009 Walt Disney Imagineering ImagiNations Design Competition. The 18th annual contest encouraged university students to pursue careers in digital arts, engineering and architecture.

David Lester, a Rowan electrical and computer engineering senior, led the winning team of students from Rowan, Rutgers University and The College of New Jersey. After receiving more than 130 international entries, Disney invited Lester's group to the headquarters of Imagineering in Glendale, Ca. to present its design against two other finalists.

The team engineered a futuristic theme park called “Disney’s Spaceport,” taking guests on interactive journeys set in the mid-28th century. The team’s concept won first place or “best in show.” Lester and his teammates also earned coveted internships at Disney’s Imagineering headquarters.

Two chemical engineering faculty members also received national recognition. Their honor was for implementing environmentally sound strategies in education and industry. The United States Environmental Protection Agency (EPA) honored Drs. C. Stewart Slater, professor, and Mariano Savelski, associate professor, with the 2009 Environmental Quality Award

Rowan's David Lester and Disney's most famous mascot, Mickey Mouse.



The Environmental Protection Agency cited Dr. C. Stewart Slater, professor of chemical engineering, and Dr. Mariano Savelski, associate professor of chemical engineering (not pictured), for their teaching efforts.

for Environmental Education. The EPA credited Slater and Savelski for implementing Rowan’s signature clinic program with pharmaceutical companies to support source reduction, pollution prevention and green design. According to the EPA, the professors have advocated green manufacturing practices to the larger pharmaceutical industry, students and international community through sponsoring and participating in seminars, conferences and workshops.

The honor is given to those who have made significant contributions to improving the environment and public health in EPA Region 2, which spans New Jersey, New York, Puerto Rico, the U.S. Virgin Islands and seven federally recognized Indian Nations.

**The College of Engineering received
\$1.81 million in sponsored
research funding for the fiscal year
(July 2008-June 2009).**

Dr. Smitesh Bakrania, assistant professor of mechanical engineering, and Susan Bowman, associate professor and chair of the Art Department, review the prototype both engineering and art students designed in their joint clinic.



Innovative Clinic Projects Challenge Future Engineers

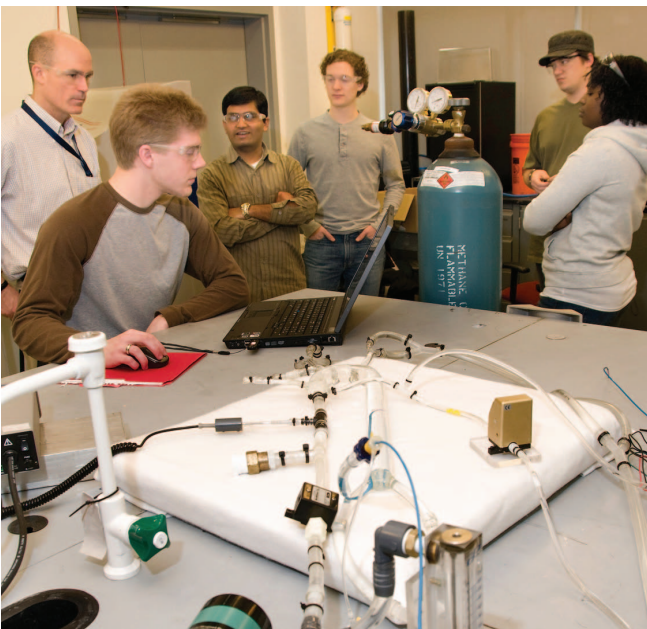
The hallmark of engineering education at Rowan continues to be the clinic program, which engages students in solving real-world problems. One challenge had engineers partner with visual artists in a joint venture between the College of Engineering and Rowan's College of Fine and Performing Arts. The result was a feat of technical and aesthetic proportions.

Two engineering students and three art students conceived an interactive sculpture design that, once implemented, would engage visitors passing through Rowan Hall's expansive atrium.

Dr. Smitesh Bakrania, assistant professor of mechanical engineering, and Susan Bowman, associate professor and chair of the Art Department, planned the clinic experience, which ultimately thrived on cross-disciplinary collaboration.

“At first, there were two camps: art versus engineering. Then we saw this huge transition when they began working together,” said Bakrania, who also consulted with Dr. Linda Head, associate professor of electrical and computer engineering, and Tom Bendtsen, assistant professor of the Art

Mechanical engineering students tested heart-cooling catheter technologies with Dr. Thomas Merrill, assistant professor of mechanical engineering (left).



Department, on the clinic. “The engineering students became more creative, and the art students became more technical.”

The team produced a sculpture prototype using 100 illuminated Lucite® cubes, each reflecting the image of a person standing below the unit using an array of colored LED lights. The students envisioned that the sculpture would span nearly three stories. “It would be a great asset to this space,” Bakrania said of the atrium.

Another clinic enabled students to research ways to prevent feeding tube clogging in young children. Dr. Stephanie Farrell, associate professor of chemical engineering, led the bioengineering project. Farrell understands this problem all too well; her daughter received nourishment through tube feeding as a toddler. The professor turned to a program at the Medical

For the **2008-2009** academic year, engineering students took part in **139** clinic projects, of which **84** were externally funded.



Dr. Stephanie Farrell, associate professor of chemical engineering, led a clinic to research ways to mitigate feeding tube clogging for young children.

University of Graz in Austria to wean her daughter off the feeding tube. Little research has been conducted on infant tube clogging. Now, Farrell and the Rowan team are working with physicians at Graz to reduce clogging incidences in young children’s feeding tubes.

Jacki Stewart '05 launched her career at the Philadelphia refinery of Sunoco, Inc., where she also recruits for the corporation (photo courtesy of Sunoco, Inc.).



Graduates Take Engineering Degrees In Rewarding Directions

College of Engineering alumni are charting new paths in corporate, entrepreneurial and academic careers.

Alumna Jacki Stewart has served two integral roles for Sunoco, Inc. in Philadelphia since earning her chemical engineering degree from Rowan in 2005. She works with a team of technical service engineers to optimize refinery production with an emphasis on safety and cost control. “I offer recommendations for streamlining processes to make our products in the safest, least-expensive and greenest way possible,” she explained.

Stewart also interviews soon-to-be engineering graduates for Sunoco's university recruiting program. And she noted there are common traits that set Rowan students apart.

"Compared to graduates from other schools, Rowan engineers work very well in groups, and their presentation skills are top-notch," Stewart said. "From my own Rowan experience, I feel comfortable communicating with and presenting to all levels of management."

Elsewhere, four engineering alumni, who met during their junior/senior clinic, have taken an idea they originally conceived in class to the masses. The budding entrepreneurs — Paul Dierksen '08, Daniel Brateris '09, Trevor Ferguson '09 and Michael Golias '09 — developed an idea for a portable and customizable LED display that municipalities or schools can use for flexible, on-the-go signage.

The group formed the company *Atlanticus Innovations* to market the patent-pending display and offer value-added consulting services. The recent graduates feel prepared to expand their business in the face of tough economic times.

"We always thought out of the box, even in college," Brateris said. "Since all of our classmates did so well in finding jobs, we felt confident taking this step. And that's a testament to Rowan."



Both passion and profession became clear for Dr. Doug Gabauer while earning his bachelor's degree in 2001 and master's degree in 2003 from Rowan.

"After graduate school, I got an opportunity to teach at Rowan as an adjunct," recalled Gabauer. "I just really enjoyed it and felt like this was something I could do for the rest of my life."

After earning his doctorate from Virginia Tech in 2008, Gabauer secured an academic appointment at Bucknell University, where he is an assistant professor of civil and environmental engineering.

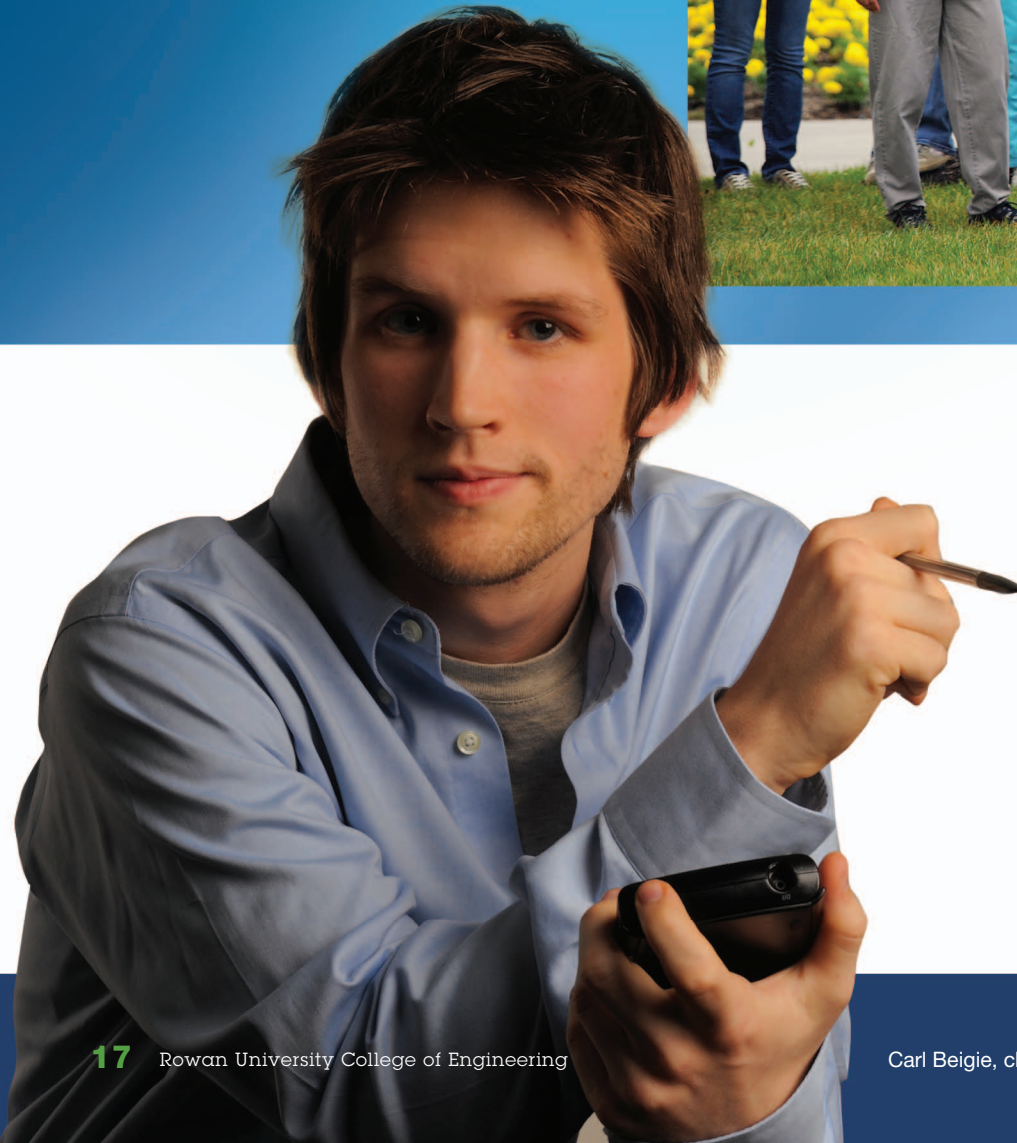
Gabauer has continued his studies of roadside barrier safety since analyzing crash

Dr. Doug Gabauer '01, M'03 teaches civil and environmental engineering at Bucknell University (photo courtesy of Bucknell University/Enche Tjin).

data as a Rowan graduate student. He is now part of a three-year research project sponsored through the National Cooperative Highway Research program to investigate injury mechanisms in motorcycle-to-guardrail crashes.

**Placement rate for
May 2008 College of
Engineering graduates: 97%**

Chet Dawson, chairperson of the Dean's Advisory Council, took part in a soda bottle rocket experiment at the 2009 Attracting Women into Engineering program.



Fall 2008 Engineering Freshmen Profile

Incoming Students: **120**

Average SATs in Math: **670**

Average SATs in Critical Reading: **598**

Average High School Percent (Rank): **87**

Message From The Chairperson

One of the most exciting advances for both the College of Engineering and the region was the 2008 opening of the South Jersey Technology Park at Rowan University. The Tech Park's first building, the Samuel H. Jones Innovation Center, is just one of 25 planned facilities. Emerging businesses, private companies and academic researchers will undoubtedly change the course of technology and education in South Jersey.

The College of Engineering will play a large role in these high-tech advances. In just a short time since the Tech Park opened, faculty members have expanded their research facilities and offered students more opportunities to be part of sponsored research projects. The Tech Park has also increased the College's entrepreneurial endeavors, making new engineering businesses a promising reality.

As part of the Dean's Advisory Council and the regional engineering community, I'm most pleased by the Tech Park's potential for job growth and economic development.

It's simply an outstanding venue to educate and retain engineering talent in the Greater Philadelphia region.

I had the opportunity to see perhaps the next generation of engineers at the Attracting Women into Engineering program this summer. The workshop shows girls entering seventh and eighth grades how engineering can be a rewarding career through team-based, hands-on experiments. This collaborative approach to learning is one of the ways Rowan has set itself apart in engineering education, and we're only beginning to see the impact of this vision. I take great pride in being part of the College of Engineering as it trains students to inspire, empower and contribute to business and community.



Chester A. Dawson
Chairperson, Dean's Advisory Council
Director, Site and Environmental Engineering
Sony DADC America's Region
Sony DADC



The National Science Foundation awarded \$600,000 to the College of Engineering. The S-STEM: Scholarships to Enhance the High-Tech Workforce of Southern New Jersey grant will fund four-year scholarships for aspiring engineers entering Rowan in Fall 2009 and 2010.

Engineering Earns High Ranking

Rowan's College of Engineering continued earning high marks from U.S. News & World Report, which most recently ranked the College 15th among the nation's undergraduate engineering programs offering a bachelor's or master's degree. Rowan's individual engineering programs ranked even higher:

Chemical Engineering	2nd
Electrical and Computer Engineering	9th
Mechanical Engineering	10th



College of Engineering

Henry M. Rowan Hall

201 Mullica Hill Road • Glassboro, NJ 08028

tel: 856-256-5300 • fax: 856-256-5350

E-mail: engineering@rowan.edu

www.rowan.edu/engineering