Behind the Building Boom

Milwaukee is experiencing a development explosion with young alumni igniting the way.
Ignatian Engineers

As I reflect on another year as Opus Dean, I am thankful for many things, but perhaps most of all, the people who have inspired the way I look to serve the very college that made me a Marquette Engineer. Take local philanthropist Michael Cudahy (p. 4), for example. From working as an intern for his then company, Marquette Electronics, to now considering him a close friend, he has shown me the true spirit of a servant leader who puts the greater good before making a profit. Of equal importance are the values with which our students graduate today. It is my goal that they ask themselves each day — how is my work impacting the greater good?

That is why we are changing the way we teach, research and engage with our industry and community partners. The world no longer needs the obedient engineer of the past, but rather entrepreneurially minded engineers — men and women who are creative, innovative and comfortable with being uncomfortable. Across all of our majors and classes, we are taking students beyond the books and equations, and challenging them to find new and interdisciplinary ways to solve the world’s problems.

But beyond this new entrepreneurial mindset, we are challenging all Marquette Engineers — students, alumni, faculty and staff — to develop an Ignatian mindset. As a Jesuit institution, we are called to be servant leaders who use our work to positively impact humanity and make the world a more just place for all of God’s creation. This is what differentiates the Marquette Engineer.

Consider our students who are modifying toy cars to provide mobility to toddlers with disabilities (p. 4). Or, note our six young alumni who are behind the building boom in Milwaukee, creating a vibrant, more connected community (p. 10). Our faculty are innovating better electrical engines, safer roads and disaster-proof buildings (p. 14) while embedding industry practice into the classroom (p. 16).

This past spring, Tim Cook, CEO of Apple, urged college graduates to, “Measure your impact on humanity not in likes but in the lives you touch, not in popularity but the people you serve.” I am proud that Marquette has a long history of preparing graduates to be men and women for and with others.

Dr. Kristina Ropella
Opus Dean
Opus College of Engineering

Follow the dean on Twitter @DeanRopellaMU.
THESE STUDENTS ARE EAGER FOR AUDIENCES — It’s Design Day 2017 in Engineering Hall, and more than 600 of them stand at attention, anxiously ready to promote their engineering design projects to the faculty, industry reps, parents and fellow students who have gathered around. The 100-plus displays and presentations today represent hours of collaborative work done for senior capstone, freshman and other courses, plus projects independently led by students.

The hustle and bustle of DESIGN DAY

MORE THAN 600 STUDENTS PARTICIPATE

DESIGN DAY SAMPLING:
- LOW-COST MANUAL WATER PUMP FOR DEVELOPING COUNTRIES
- ONE-PERSON SOLAR CAR FOUNDATION
- BONE GRAFT SUBSTITUTE DESIGN
- CONCRETE CANOE

18 INDUSTRY SPONSORS
4 KEYNOTE SPONSOR PRESENTATIONS

SAVE THE DATE FOR DESIGN DAY 2018: MAY 4
Assistive technology to go, go

More Opus College of Engineering students are choosing to live out the university’s mission and be the difference when it comes to their senior design projects. Thanks to a National Institutes of Health five-year $108,000 grant received by Dr. Jay Goldberg, clinical professor of biomedical engineering, Marquette is able to fund several assistive technology projects each year. “We have students who want to work on a project that will benefit a specific client, and they can see how their work improves somebody’s life,” Goldberg says. “This is a rewarding type of project that can reinforce their choice of a career path.”

One such project is GoBabyGo, a national initiative aimed at modifying small play cars to provide mobility to toddlers with disabilities such as cerebral palsy or Down syndrome. A team of five Marquette engineering students developed several enhancements to the cars, including smoother acceleration and a remote control device for parents to use to steer or stop the cars. This year’s GoBabyGo project was funded with $2,000 from Goldberg’s NIH grant. Jessica Dreyer, Eng ‘17, a member of the GoBabyGo design team, says it was a great experience. “I feel that childhood is meant for learning, experiencing your surroundings, and socializing and interacting with other kids, so by developing these cars the children now have an opportunity to do that independently,” she says.

Assistant technology projects support Marquette’s mission, Goldberg says. “It’s all about using our engineering skills to help someone in our community.”

A 2016 Strategic Innovation Fund award from the university also will help Goldberg do that through a pilot program to support the development of a Center for Assistive Technologies. This multifaceted center would involve students from the problem-identification stage through commercialization of their products; create an online database for people with disabilities to learn what assistive technologies students have developed and how they can obtain them; and eventually offer resources to manufacturers of devices whose market size is too small to attract investment from established companies.

“My goal is to get technologies that students develop into the hands of people who can benefit from them,” says Goldberg. —CAROLYN DUFFY MARGAN

In demand

Not every engineering school offers students the chance to work at an industry-leading business right on campus. Students in the Opus College of Engineering have had this opportunity for nearly 25 years — and those who take it end up running a small enterprise that deploys the natural gas industry’s most accurate demand forecasts, saving utilities and their customers millions of dollars and reducing carbon emissions.

The venture is called GasDay, and it’s the brainchild of Dr. Ronald Brown, director and associate professor of electrical and computer engineering. Brown says Wisconsin Gas, now part of We Energies, came to Marquette for forecasting help in 1993. Brown learned about the utility’s approach, then took the problem back to his students. Together, they designed a mathematical model to forecast gas consumption. It wasn’t easy. The biggest challenge, Brown says, was a scarcity of high-quality historical data — needed for building the forecasting model — from the meters that measure quantities of natural gas entering a utility’s service area.

But the model worked, routinely beating the utility’s own methods in a utility’s service area.

Dr. Ronald Brown, director and associate professor of electrical and computer engineering...

Today, GasDay serves approximately 35 utilities in 26 states, and Brown estimates his students are forecasting about 20 percent of the nation’s residential, commercial and industrial natural gas demand. Current initiatives include expanding GasDay internationally and revising the application software to create a cloud-based solution, which will be more convenient for clients.

GasDay is self-funded, bringing in more than $5 million over the past five years. That’s enough revenue, for example, to support a payroll of 27 undergraduates and six graduate students this past spring.

“I have a diverse group of freshmen through doctoral students, and they have to apply — this is a real job,” Brown says. “We usually hire electrical engineering, computer engineering and biocomputing engineering majors. We also bring in computer science students from the math department, and we have some business students to help us with that side of the business.”

The educational aspect of GasDay is Brown’s priority. “We do not hide the fact that we are running this with students,” he says. “They’re the ones who talk to customers and support the application. I think as vendors go, we’re pretty reliable, and we’re very helpful.”

Colleen Dunlap, a computer engineering major, started working at GasDay in April of her freshman year and puts in about 10 to 15 hours a week.

“It’s very much a real-world experience, and it’s a huge resume booster,” she says, adding that her accomplishments at GasDay helped her clinch a spot in a summer systems engineering co-op.

Brown agrees that the authentic experience helps prepare students for the working world: “There’s an awful lot we can teach through this project that I haven’t figured out how to do in the classroom yet.” —PAULA WHEELER

Learn more at gasday.com.

Opening doors

First-generation students hoping to earn an engineering degree from the Opus College have new scholarship opportunities thanks to Donald, Eng ’66, Grad ’68, and Frances Herdrich, who have donated $1 million to executive and philanthropist Michael Cudahy, who donated $1 million to fund a full-tuition, room-and-board scholarship for Opus College students who are the first in their families to attend college.

Also seeking to educate tomorrow’s engineers is entrepreneur, business executive and philanthropist Michael Cudahy, who donated $1 million to support the development of a Center for Assistive Technologies. This multifaceted center would involve students from the problem-identification stage through commercialization of their products; create an online database for people with disabilities to learn what assistive technologies students have developed and how they can obtain them; and eventually offer resources to manufacturers of devices whose market size is too small to attract investment from established companies.

“My goal is to get technologies that students develop into the hands of people who can benefit from them,” says Goldberg. —CAROLYN DUFFY MARGAN

In demand

Not every engineering school offers students the chance to work at an industry-leading business right on campus. Students in the Opus College of Engineering have had this opportunity for nearly 25 years — and those who take it end up running a small enterprise that deploys the natural gas industry’s most accurate demand forecasts, saving utilities and their customers millions of dollars and reducing carbon emissions.

The venture is called GasDay, and it’s the brainchild of Dr. Ronald Brown, director and associate professor of electrical and computer engineering. Brown says Wisconsin Gas, now part of We Energies, came to Marquette for forecasting help in 1993. Brown learned about the utility’s approach, then took the problem back to his students. Together, they designed a mathematical model to forecast gas consumption. It wasn’t easy. The biggest challenge, Brown says, was a scarcity of high-quality historical data — needed for building the forecasting model — from the meters that measure quantities of natural gas entering a utility’s service area.

But the model worked, routinely beating the utility’s own methods in a utility’s service area.

Dr. Ronald Brown, director and associate professor of electrical and computer engineering...

Today, GasDay serves approximately 35 utilities in 26 states, and Brown estimates his students are forecasting about 20 percent of the nation’s residential, commercial and industrial natural gas demand. Current initiatives include expanding GasDay internationally and revising the application software to create a cloud-based solution, which will be more convenient for clients.

GasDay is self-funded, bringing in more than $5 million over the past five years. That’s enough revenue, for example, to support a payroll of 27 undergraduates and six graduate students this past spring.

“I have a diverse group of freshmen through doctoral students, and they have to apply — this is a real job,” Brown says. “We usually hire electrical engineering, computer engineering and biocomputing engineering majors. We also bring in computer science students from the math department, and we have some business students to help us with that side of the business.”

The educational aspect of GasDay is Brown’s priority. “We do not hide the fact that we are running this with students,” he says. “They’re the ones who talk to customers and support the application. I think as vendors go, we’re pretty reliable, and we’re very helpful.”

Colleen Dunlap, a computer engineering major, started working at GasDay in April of her freshman year and puts in about 10 to 15 hours a week.

“It’s very much a real-world experience, and it’s a huge resume booster,” she says, adding that her accomplishments at GasDay helped her clinch a spot in a summer systems engineering co-op.

Brown agrees that the authentic experience helps prepare students for the working world: “There’s an awful lot we can teach through this project that I haven’t figured out how to do in the classroom yet.” —PAULA WHEELER

Learn more at gasday.com.

Reaching out

Opus Dean Kristina Ropella and Dr. Lars Olson, associate professor and interim chair of biomedical engineering, have sparked an initiative to team up with fellow Jesuit engineering schools from around the globe. The goal of the International Network of Jesuit Engineering Schools and Universities — or INJESU — is to increase cooperation and collaboration among Jesuit engineering schools in the areas of research, faculty and student education experiences, cultural exchanges and product development.

“We have made contact with Jesuit schools in GUATEMALA, EL SALVADOR, NICARAGUA and COLOMBIA with more coming soon. There is lot of enthusiasm from our colleagues in the Americas for increased collaboration with us,” says Olson.

Not every engineering school offers students the chance to work at an industry-leading business right on campus. Students in the Opus College of Engineering have had this opportunity for nearly 25 years — and those who take it end up running a small enterprise that deploys the natural gas industry’s most accurate demand forecasts, saving utilities and their customers millions of dollars and reducing carbon emissions.

The venture is called GasDay, and it’s the brainchild of Dr. Ronald Brown, director and associate professor of electrical and computer engineering. Brown says Wisconsin Gas, now part of We Energies, came to Marquette for forecasting help in 1993. Brown learned about the utility’s approach, then took the problem back to his students. Together, they designed a mathematical model to forecast gas consumption. It wasn’t easy. The biggest challenge, Brown says, was a scarcity of high-quality historical data — needed for building the forecasting model — from the meters that measure quantities of natural gas entering a utility’s service area.

But the model worked, routinely beating the utility’s own methods in a utility’s service area.

Dr. Ronald Brown, director and associate professor of electrical and computer engineering...

Today, GasDay serves approximately 35 utilities in 26 states, and Brown estimates his students are forecasting about 20 percent of the nation’s residential, commercial and industrial natural gas demand. Current initiatives include expanding GasDay internationally and revising the application software to create a cloud-based solution, which will be more convenient for clients.

GasDay is self-funded, bringing in more than $5 million over the past five years. That’s enough revenue, for example, to support a payroll of 27 undergraduates and six graduate students this past spring.

“I have a diverse group of freshmen through doctoral students, and they have to apply — this is a real job,” Brown says. “We usually hire electrical engineering, computer engineering and biocomputing engineering majors. We also bring in computer science students from the math department, and we have some business students to help us with that side of the business.”

The educational aspect of GasDay is Brown’s priority. “We do not hide the fact that we are running this with students,” he says. “They’re the ones who talk to customers and support the application. I think as vendors go, we’re pretty reliable, and we’re very helpful.”

Colleen Dunlap, a computer engineering major, started working at GasDay in April of her freshman year and puts in about 10 to 15 hours a week.

“It’s very much a real-world experience, and it’s a huge resume booster,” she says, adding that her accomplishments at GasDay helped her clinch a spot in a summer systems engineering co-op.

Brown agrees that the authentic experience helps prepare students for the working world: “There’s an awful lot we can teach through this project that I haven’t figured out how to do in the classroom yet.” —PAULA WHEELER

Learn more at gasday.com.
Leadership shaping

With its glass-walled collaborative spaces, exposed structural elements and 3-D printer, Marquette’s 707 Hub has been the most-buzzed-about space on campus since its grand opening in March. But it might not have happened if Sam Wesley and Creighton Joyce, both Bus Ad ’12, hadn’t met at the Institute — a leadership retreat provided by LeaderShape, a national nonprofit, in partnership with the Opus College’s E-Lead program. The Institute, introduced to Marquette in 2015, has grown to involve communication and business students too.

“Creighton and I met at the retreat. It’s where we realized how important it was to interact with different majors on campus,” says Wesley. “That is one of the core reasons for the 707 Hub.” At the time, the two were undergraduates from different colleges — Wesley in business and Joyce in engineering (though he later transferred into business). Fired up by their Institute experience, they entered their hub concept in Marquette’s Strategic Innovation Fund process and received support to pursue their vision. This was the kind of student leadership college administrators had in mind when they partnered with LeaderShape three years ago. The immediate aim was extending opportunities for E-Lead students to develop from technical problem solvers into real-world leaders. Soon, however, Opus Dean Kristina Ropella spotted an additional opportunity to help students prepare for the multidisciplinary work teams they’ll encounter in industry — by including communication and business students. The Institute now brings 60 students — 20 from each college — to a camp facility in Lake Geneva, Wis., each January for a six-day program led by Marquette faculty and staff and LeaderShape instructors.

While there, students break into cross-disciplinary groups of 10, guided by leaders who just might be Ropella, Diedenhof College of Communication Dean Kimo Ah Yun, or other professors. Through core values of vision, action and community positivity, the Institute encourages students to inspire change with integrity and a “healthy disregard for the impossible.” The lasting ties and campus leadership demonstrated by Joyce and Wesley aren’t an exception; they’re the expectation with the Institute, says Andrea Gorman, assistant director for engineering leadership programs and an Institute graduate herself as a University of Minnesota program participant. She cites another group of engineering and business students who met at Marquette’s Institute that formed a 2016 Hackathon team and credited their cross-college makeup for boosting their winning effort proposing senior health care uses for robots. Hackathon sponsor Direct Supply liked their idea so much, it hired a few of the students part time to continue developing it.

—BRIAN BOYLE, Student Intern

Degree of dosage

Dr. Taly Gilat-Schmidt, associate professor of biomedical engineering, has received a four-year National Institutes of Health award totaling nearly $2.5 million to develop and validate a software tool that can estimate the radiation dose delivered to a patient’s organs during a CT exam.

The proposed tool will estimate radiation dose to the patient’s specific anatomy, whereas existing clinical software tools estimate radiation dose to a plastic cylinder or a model patient. Once developed, the tool can be used for radiation dose tracking, developing protocols to reduce radiation doses, and large-scale epidemiological studies for estimating cancer risk due to CT exams. The project is a collaboration between Marquette University, Varian Medical Systems, Inc., the Medical College of Wisconsin and Children’s Hospital of Wisconsin.

“...we realized how important it was to interact with different majors on campus.”

—BRIAN BOYLE, Student Intern

Marquette University
Growing STEM learners

For more than a decade the Opus College’s outreach program has invested in the critical need to grow interest in STEM fields. Programming has included nearly 80 academies for K–12 students, residential programs for high school students, a partnership with a local STEM school, and training sessions for teachers delivering engineering in their curricula.

“We need to reach these students early enough so they stay on a path to pursue engineering.”

The success of the outreach program has led to a three-year $210,000 grant from the Johnson Controls Foundation to start a robotics program within local, urban middle schools and to fund scholarships for the college’s Engineering Leadership Academy, a weeklong on-campus immersion experience for high school juniors and seniors interested in engineering.

“We need to reach these students early enough so they stay on a path to pursue engineering,” says Dr. Mark Federle, P.E., associate dean for academic affairs.

“As president and CEO of CG Schmidt, Rick Schmitt finds

it extremely gratifying to create exceptional facilities that improve the lives of others, such as the newest silhouette of Milwaukee’s skyline, Northwestern Mutual Tower and Commons, and the rebuild of Walnut Way Innovation and Wellness Commons in the Lindsay Heights neighborhood — two of the construction management and general contracting firm’s current projects.

PROFESSIONAL ACHIEVEMENT AWARD

Ronald J. Schmitt

Managing partner of Robins Kaplan LLP’s New York office, Ron Schmitt chairs the firm’s Intellectual Property and Technology Litigation Group, which allows him to work with many distinguished inventor clients. He is a former chair and current board member of the Center of the American Experiment. Additionally, he is a member of the board of directors of the Guthrie Theater, the YMCA of the Greater Twin Cities and of the advisory boards of the William Mitchell Law School Intellectual Property Institute and the University of St. Thomas Journal of Law and Public Policy.

ENTREPRENEURIAL AWARD

Michael S. Butler

Mike Butler is president and CEO of Life Spine, a multi-technology spinal surgical tool and implant product company. He is an eighth-generation startup, and one of four companies he currently operates. Life Spine has brought to market more than 60 products families, focusing on minimally invasive technology. Holding more than 120 issued patents and 180 pending applications, the company is in the top-five innovative Chicago companies on the Eureka list.

YOUNG ALUMNA OF THE YEAR

Dr. Kathryn A. Weiss

Now a principal role costing software engineer at Walt Disney Imagineering, Kaitan Weiss spent 18 years as a senior flight software engineer at NASA’s Jet Propulsion Laboratory. She led the Core Flight software effort — JPL’s next-generation software platform — served on NASA’s Software Architecture Review Board, and was a member of the Mars Science Laboratory (Curiosity) Systems and software engineering team, helping the rover land on Mars in 2012.

Honors roll

Opus Dean Kristina Ropella is both “honored and humbled” to have received a pair of awards this past year — the 2016 Outstanding Dean Award from The Kern Family Foundation, and the 2016 Engineer of the Year award from STEM Forward.

The foundation’s award was presented at the Kern Entrepreneurial Engineering Network (KEEN) National Conference. Marquette is one of 30 partner institutions in KEEN collaborating to develop best practices in engineer- ing education and champion the entrepreneurial mindset in undergraduate engineering students. (See related story on page 19.)

STEM Forward, a Milwaukee-based nonprofit organization, presented its award to Ropella for focusing her research and teaching career on biobased processing, bioinstrumentation and medical imaging. The Engineer of the Year award has been a tradition since the 1950s, given to a remarkable person who has made an extraor- dinary contribution to the engineering profession.

Big year

It’s not shocking that Dr. John Borg, P.E., has much to celebrate this year. This spring, Borg was named chair of the Mechanical Engineering Department, succeeding Dr. Kyle Kim, P.E., who served the department for 17 years in this capacity. Borg also received the Lawrence G. Haggerty Award for Excellence in Research and was named a fellow in the American Society of Mechanical Engineers.

Borg, professor of mechanical engineering, joined Marquette in 2003. His research in shock physics, fluid dynamics and aerodynamics has resulted in more than 25 refereed journal publications, significant funding from the Defense Threat Re- duction Agency, an impressive number of mentored graduate student theses/dissertations and undergraduate research experiences and — not to be missed — plenty of press for his research on the knuckleball pitch.

Learn more at marquette.edu/outreach.

CELEBRATING OUR DISTINGUISHED ALUMNI

DISTINGUISHED ALUMNI OF THE YEAR

Richard L. Schmidt, Jr., P.E., Eng’78

As president and CEO of CG Schmidt, Rick Schmitt finds

it extremely gratifying to create exceptional facilities that improve the lives of others, such as the newest silhouette of Milwaukee’s skyline, Northwestern Mutual Tower and Commons, and the rebuild of Walnut Way Innovation and Wellness Commons in the Lindsay Heights neighborhood — two of the construction management and general contracting firm’s current projects.

PROFESSIONAL ACHIEVEMENT AWARD

Ronald J. Schmitt

Managing partner of Robins Kaplan LLP’s New York office, Ron Schmitt chairs the firm’s Intellectual Property and Technology Litigation Group, which allows him to work with many distinguished inventor clients. He is a former chair and current board member of the Center of the American Experiment. Additionally, he is a member of the board of directors of the Guthrie Theater, the YMCA of the Greater Twin Cities and of the advisory boards of the William Mitchell Law School Intellectual Property Institute and the University of St. Thomas Journal of Law and Public Policy.

ENTREPRENEURIAL AWARD

Michael S. Butler

Mike Butler is president and CEO of Life Spine, a multi-technology spinal surgical tool and implant product company. He is an eighth-generation startup and one of four companies he currently operates. Life Spine has brought to market more than 60 products families, focusing on minimally invasive technology. Holding more than 120 issued patents and 180 pending applications, the company is in the top-five innovative Chicago companies on the Eureka list.

YOUNG ALUMNA OF THE YEAR

Dr. Kathryn A. Weiss, Eng’01

Now a principal role costing software engineer at Walt Disney Imagineering, Kaitan Weiss spent 18 years as a senior flight software engineer at NASA’s Jet Propulsion Laboratory. She led the Core Flight software effort — JPL’s next-generation software platform — served on NASA’s Software Architecture Review Board, and was a member of the Mars Science Laboratory (Curiosity) Systems and software engineering team, helping the rover land on Mars in 2012.

Nominate a deserving alumnus for the 2016 Marquette University Alumni National Awards at marquette.edu/alumni/awards/nominate.php

At Marquette University, students learn how to become fearless leaders, agile thinkers and effective doers. Your gift to scholarship aid will help provide a Marquette education for students who desire to Be The Difference for others, ready in the spirit of St. Ignatius to “go forth and set the world on fire.”

Make a gift in support of scholarship aid at marquette.edu/give or contact Karlyn Agnew at 414.288.6958.
The Milwaukee Journal Sentinel says an “extraordinary building boom is reshaping Milwaukee’s skyline.” The Milwaukee Business Journal describes a “Downtown Milwaukee Renaissance.” And Milwaukee Mayor Tom Barrett crowns that his favorite bird is the crane—referring not to the avian variety but the flock of towering steel machines roaming our skyline. Milwaukee’s metamorphosis is undeniable. So is the excitement and sense of pride these projects are bringing. With billions of dollars being invested, Milwaukeeans are being put to work, and the groundwork for the city’s evolution and growth is being laid before our eyes.

Leading this unprecedented wave of construction are six young, highly talented Opus College of Engineering graduates. These engineers are managing many of Milwaukee’s latest signature projects worth more than $1 billion combined. And they’re thrilled to be literally building Milwaukee’s future.

Angie Helfert, Eng’07, is leading one of Milwaukee’s most talked-about projects—the new $524 million Milwaukee Bucks arena under construction downtown. Helfert, with Mortenson Construction, Brookfield, Wis., is the project manager for structure.

“It’s a once-in-a-lifetime opportunity to build this type of project in your backyard, and I’m extremely proud to be a part of it,” Helfert says. “This is the most exciting time for development I’ve seen during my time in Milwaukee, and I absolutely think the new Bucks arena influences that opinion.”

Helfert says she’s amazed by the pace and quality of work. “Seeing measurable progress is one of my favorite parts of being in construction, and every day the project changes significantly,” she says.

John Peronto, Eng’03, Grad’03, with Thornton Tomasetti, is working on the $122 million, 44-story Couture high-rise apartment on Milwaukee’s lakefront. Peronto, lead senior structural engineer and engineer of record on the project, is excited about how the striking Couture tower will change Milwaukee’s skyline.

“It is very slender and tall, and its location will transform the urban landscape of the southeast part of downtown, further connecting it to the lake and the Third Ward,” Peronto says.

Mary Collins, Eng’06, is also helping build a new Milwaukee, but rather than bringing a signature new building out of the ground, Collins is focused on what lies beneath the ground. Collins, with Gilbane Building Co., is a project manager for the current $13 million phase of the foundation restoration of Milwaukee’s City Hall—a historic 122-year-old icon.

Collins is fascinated by restoring a historic building’s foundation and learning about its original designs. The project involves a nontraditional design where the original limestone bases of each steel-support column are encased, shifting the loads from the old wood pilings underneath to the new concrete bases, tied in to new steel pilings driven 35 feet underground; it’s a novel approach being used only for the second time in the United States.

By Jeff Bentoff
“On a daily basis, City Hall is a reminder to all where the city has been and how far it has come,” Collins says. “While the skyline is changing with the recent construction boom, I’m fortunate to be a part of the team that is allowing this building to continue to be a part of the skyline for another, hopefully, 100 years.”

Not all cranes around town are dedicated to buildings.

**“Marquette promotes the person beyond just the technical, with an emphasis on service, teamwork and engagement.”**

—Carolynn Gellings

One of three senior project managers for the nearly completed $200 million Zoo Interchange’s Phase 1 project, Dr. Nicholas Hornyak, Eng ’03, Grad ’05, ’10, sees how important highway improvements can be.

Now that the project is almost completed, Hornyak, with Edgerton Contractors Inc., Oak Creek, Wis., fully recognizes the overall impact it will have.

“During construction, everything is so busy, we barely have time to breathe. Now that we are done with construction for the Zoo (Phase 1) project, driving through and seeing how we contributed to a freeway that is safer, added capacity, the Zoo (Phase 1) project, driving through and seeing how we contributed to a freeway that is safer, added capacity, the Zoo (Phase 1) project, driving through and seeing how we contributed to a freeway that is safer, added capacity, the Zoo (Phase 1) project, driving through and seeing how we contributed to a freeway that is safer, added capacity,” Hornyak says. “There is no such thing as a perfect set of plans, and one of my specialties is tackling problems between what the plans indicate and what the actual conditions are.”

Carolynn Gellings, P.E., Eng ’06, Grad ’17, now with DAAR Engineering, went from serving as design and construction project manager of the $193 million I-794/Hoan Bridge reconstruction to design project manager of the Lakefront Gateway redesign to, today, construction manager for the $128.1 million Milwaukee streetcar project.

“Back when I was an undergrad in engineering at Marquette, if anyone would have told me I would have been afforded opportunities to lead projects like these, I would never have believed it,” Gellings says. “Being involved in projects in Milwaukee during this time of so much transformation feels like I’m part of something historic. It’s one of those moments in time you know you’ll be reliving to anyone that will listen, long into the later years of life.”

Gellings says her Marquette education taught her more than engineering. “Marquette promotes the person beyond just the technical, with an emphasis on service, teamwork and engagement,” Gellings says. “Marquette’s engineering college has the same family-like feel I’ve grown to try to implement or be part of on the projects I work on.”

Mike Stern, Eng ’10, is a proud Marquette grad who feels a special connection to his current project — the university’s new $112 million coed residence hall, the Rev. Robert A. Wild, S.J., Commons, which will house 890 freshmen and sophomores when it opens in fall 2018.

“Marquette has helped me end up where I am right now, and I think the best way I can give back is by helping this project be successful,” says Stern, who is with J.H. Findorff & Son and a project manager on the residence hall.

“Knowing that I am working for a client that is collaborative and supportive makes it easy to come to work. And then, being able to be a part of something so substantial at my alma mater adds to the excitement.”

Beyond learning construction fundamentals, Dr. Yong Bai, McShane Chair in Construction Engineering and Management and professor of civil, construction and environmental engineering, says students are taught to think critically, develop problem-solving skills and perform effectively in real-world assignments.

“Besides technical knowhow, our program provides students with essential non-technical skills needed to effectively work with and lead a diversified workforce in the construction companies that operate in both domestic and global markets,” Bai says.

Dr. Mark Federle, P.E., associate dean for academic affairs, acknowledges that the successes of these six grads are representative of the impressive work being done by Opus College grads around the country — and the world.

“We’re fortunate that our alumni are proud to keep us updated on their latest accomplishments and ventures,” Federle says. “It’s inspiring to see how many of our grads are rising in the ranks of their firms, spearheading major projects in their cities, or continuing their education with licensing. They’re always going above and beyond.”

Peronto, the alum managing The Couture, is also working on Saudi Arabia’s Jeddah Tower, soon to be the tallest building in the world. But he says Marquette engineering alumni play a role in Milwaukee’s future that eclipses the size of their projects.

“It is not always about working on the flashiest jobs — it is about how you lead in the community and help build a better Milwaukee together,” Peronto says. “Marquette grads have a strong sense of community and service, which sets them apart.”
According to Opus Dean Kristina Ropella, “in the Jesuit tradition” means advancements must come with a responsibility to the consequences created by such change. Does the innovation benefit humankind and sustain the world in which we live? At Marquette, there is no shortage of faculty research projects that are focused on doing just that.

By Guy Fiorita

Breathing easier

DR. SOMESH ROY
Assistant Professor of Mechanical Engineering

How are pollutants such as soot or nitrogen oxides formed during combustion of fuel, how do they change as they age in the atmosphere, and how do they affect the global climate? Those are some of the things that occupy Dr. Somesh Roy’s day. By using high-fidelity modeling tools and high-performance computing, or HPC, he and his team are able to predict emission and efficiency of various combustion devices such as engines, furnaces and power plants. “This will lead to better design choices for future combustion devices.” Roy assembled his research group in the fall of 2016, and they have already built an in-house, state-of-the-art HPC cluster for detailed combustion modeling. “This will lead to better design choices for future combustion devices,” Roy says.

Better electric engines

DR. AYMAN EL-REFAIE
Professor of Electrical and Computer Engineering and Thomas H. and Suzanne M. Werner Endowed Chair in Secure and Renewable Energy Systems

As a principal engineer and project leader at GE Global Research Center in New York, Dr. Ayman El-Refaie worked on awarded projects focusing on developing advanced electrical machines and drives for hybrid vehicles, mining vehicles and hybrid propulsion applications for aerospace. Named the Werner Chair in January 2017, El-Refaie plans to focus his work on improving next-generation electrical machines; drives for renewables and transportation electrification, as the demand for sustainable transportation grows. “In addition I will tackle broader areas of hybrids like energy storage, energy management and charging issues. This is applicable to land as well as aerospace applications.” At present El-Refaie is in the writing phase for proposals to various government and industrial partners. In the meantime his plans include expanding his scope from working at the component level to the system level, covering topics like smart buildings, microgrids and the integration of renewables into the grid.

Safer roads ahead

DR. RONALD A. COUTU, JR.
Professor of Electrical and Computer Engineering and V. Clayton Lafferty Endowed Chair in Electrical Engineering

Before coming to Marquette in 2016, Dr. Ronald Coutu was an associate professor at the Air Force Institute of Technology. Among his areas of expertise are microelectronics, mechatronics and systems (WIREDS), advanced microsystems and device fabrication. Currently Coutu is putting these skills to work conducting electrical and mechanical testing for Solar Roadways, Inc. “The company has developed solar pavers for horizontal surfaces like sidewalks, roadways and parking lots.” These panels are designed to support heavy vehicle weight and offer the same traction as standard road pavement, and they include LED lighting for signage and heaters to minimize snow and ice buildups. “At present Coutu is involved in the mechanical testing of freesea, moisture conditioning and shear testing. Working with him is a team from Marquette that includes Dr. Jim Covetet, Dr. Nathan Weise and Dave Newman. Soon he will begin heavy vehicle simulator testing in a pilot project with a heavy wheel load traversing the area for approximately six months. Solar Roadways will first use the tested pavers in parking lots and driveways, but expects to see the nation’s highways safer to travel thanks to the paver’s intelligent design.

Disaster-proof buildings

DR. TING LIN
Assistant Professor of Civil, Construction and Environmental Engineering

Understanding climate change and its effects on our coasts is vital for any future building in these areas. Dr. Ting Lin’s work in earthquake and sustainability aims to improve the performance of buildings under multiple hazards in the face of climate change, which would ultimately save lives and rebuilding costs. Today part of her research focuses on Probabilistic Sea-Level Rise Hazard Analysis, a novel framework used to develop informed engineering and policy decisions that affect coastal infrastructure, populations and ecosystems. “My research is in the general area of sustainable and resilient infrastructure, with parallel tracks in earthquake engineering and climate change. Interfacing engineering with earth science, I currently focus on earthquake and sea-level rise hazards, risk and uncertainty.” As the inaugural vice-chair of the American Society of Civil Engineers (ASCE) Structural Engineering Institute (SEI) Committee on Advances in Information Technology (AAT), Lin is also helping to shape the vision for the future in advanced technologies for building more resilient and sustainable communities.

No more basement backups

PAIGE E. PETERS
Graduate Research Assistant

While developing her master’s thesis, “Advanced, High-rate Wet Weather Treatment”, Paige Peters, Eng ’11, has blossomed her research into the startup company Rapid Radicals Technology. “For the last two years, I’ve been working to create a two-step process for the rapid treatment of wet weather flows for high-intensity rain events, so we can prevent combined and sanitary sewer overflows and basement backups.” Along with civil, construction and environmental faculty Drs. Daniel Zitomer, Brooke Mayer and Patrick McNamara as co-investigators, Peters is working with the NSF’s Water Equipment and Policy Industry-University Cooperative Research Center to develop the technology. Eventually it will be developed to handle overburdened or blended flows at wastewater treatment plants; in the watershed for overflow treatment; and as a mobile unit for high-rate, high-quality treatment during disaster relief efforts. “I am currently forming a board of directors and searching for a chief operations officer to help with our growth. My hope is that the technology will be able to handle wet weather flows to meet the needs of municipalities, and that our success will encourage similar efforts focused on water treatment, public health and environmental stewardship.”
Students already have the chance to work with $300,000 worth of machinery that came straight from a real-world industrial training program. Soon, they’ll also have access to a flexible assembly systems lab and a Class 1,000 clean room.

As faculty members work to bring engineering industry practices to campus, one professor decided to bring himself to industry instead, taking a yearlong sabbatical to find out what life is like as an entry-level engineer today.

The Opus College of Engineering is emphasizing an entrepreneurial mindset and innovative teaching methods, tailoring Marquette engineering students’ education to the demands of today’s working world. “We no longer have to train ‘obedient’ engineers,” says Opus Dean Kristina Ropella. “When I was in school, a lot of time was spent number crunching and working through equations. You still need to understand the theory, but those computations are all being done by computers today. So what do we need to do as engineers? I think we have to have a much higher-level systems approach, seeing how all the pieces fit together.”

NEXT-GENERATION MANUFACTURING

As a senior project engineer at Rockwell Automation, Dr. Aderiano da Silva brings 22 years of invaluable industry experience into the classroom as an adjunct instructor of mechanical engineering. In a stroke of good fortune, he also found a way to bring in significant industrial hardware.

Da Silva already was developing a graduate-level industrial automation course for the college when he found out that Rockwell was looking for something to do with $300,000 worth of surplus equipment from a training program. “It was a good coincidence!” Da Silva says. He used the equipment to build six stations that students use to develop and test projects they design for his Industrial Automation and Controls course; in a recent class, students had to design a machine that makes cookies, and another one that can fill, form and seal a bag of potato chips.

Da Silva, Grad ’06, ’15, also coaches students on how to build their resumes and teaches them the differences between writing a technical report for industry and writing one for class, which they practice while writing their reports for each project. “It opens their eyes to things that they were not aware of,” Da Silva says.

This class has students apply academic knowledge to practice by bringing the latest technology, methods and design techniques used in the industry today into the classroom. “It helps them build a better relationship between what they learn in their other classes and what’s used in industry,” he says.

Students’ real-world manufacturing experience is about to become even more robust. On the first floor of Haggerty Hall, Dr. Joseph Schimmels, Eng ’81, Robert C. Greenheck Chair in Design and Manufacturing and professor of mechanical engineering, is overseeing the construction of a Flexible Assembly Systems Network (FASN) Advanced Manufacturing Center. Once complete, it will give students the chance to work with a set of machines that can adapt to assemble different kinds of products — a significant area of growth in industry.
WHO’S THE NEW GUY?
When Dr. Philip Voglewede decided to trade his Engineering Hall office for a cubicle at Eaton Corp. to work as an entry-level engineer for a year, he wanted his experience to be as authentic as possible — even if the person in the cube next to him was one of his former graduate students. When they needed someone to run basic device testing, he was there at 5:30 a.m. to do it.

Why make a temporary return to the real world? Voglewede had previous industry experience at Whirlpool, but that was in the 1990s.

“All my examples had this statistical theme to them,” Voglewede says. “I’m like, ‘Yeah, when I was working back in the mid-1990s,’ and you look at your students and they were born in the ‘90s. I’ve got to come up with better stories. And now I can do that.”

Back on the job, the associate professor of mechanical engineering was struck by the availability of technology; computer-aided drafting and dynamic simulation programs, once rare, are now on everyone’s desktop.

“I’ve got to have my undergrads ready to be able to do computational analysis straight out of school,” Voglewede says. “They have to analyze systems at a much higher level.”

WHERE INNOVATION MEETS ST. IGNATIUS
So if engineering students don’t need to spend quite as much time crunching numbers as they used to, what should they do instead? Ropella believes the college’s focus on teaching theory in the context of industry application will help students in the job market. She also wants to increase collaboration with industry partners, academic institutions and other academic units at Marquette.

“Our best work will be done when we’re teaming with others,” Ropella says.

Beyond that, Ropella wants to train engineers to work not only with an entrepreneurial mindset, but also with a Jesuit and Ignatian mindset — something she calls “Ignatian innovation.”

“Our engineers are continually reflecting on the impact of their work on humanity as a whole,” Ropella says. “Our engineers should be doing that, given who we are as Marquette University.”

CULTIVATING CURiosity
A s one of its strategic efforts to incorporate entrepreneurial learning throughout the engineering curriculum, the Opus College has partnered for the last several years with the Kern Entrepreneurial Engineering Network (KEEN). A national partnership of 30 universities engaging in undergraduate engineering students on how to think and work with an entrepreneurial mindset, KEEN fosters interdisciplinary collaboration to develop lessons on cultivating curiosity, developing connections and creating value.

Dr. Lisa Bosman, research assistant professor in the Opus College, has worked with KEEN to develop faculty training that gives educators the tools and resources necessary to incorporate the entrepreneurial mindset into their own undergraduate engineering courses. So far, 80 percent of the college’s faculty has participated in the KEEN training, with 60 percent going on to incorporate the lessons into their own curriculum.

One such example is Dr. Taly Glat-Schmidt, who creatively incorporated KEEN teachings into her biomedical engineering courses. Glat-Schmidt, associate professor of biomedical engineering, required her undergraduate students to research articles on new medical technologies before venturing out to the Medical College of Wisconsin to learn how some of these high-tech methods are being used. Students also engaged in a formal debate over the pros and cons of computer-aided mammography and ended the course by presenting their own ideas for viable new technologies.

“I think that going about this project in this way led to much more active learning and helped the materials become more engaging and relevant for the students,” says Glat-Schmidt. “It made them think about the big picture and how the theories they learned are put into practice.”

A side benefit to the KEEN courses has been the added faculty engagement. “It’s created a forum where we can get together and share ideas,” adds Glat-Schmidt. “It’s been great to have an opportunity to get together to talk about teaching.”

This May Marquette was awarded a $742,000 grant from the Kern Foundation to incorporate the entrepreneurial mindset into industry co-ops and internship experiences, in addition to the engineering classroom; further broadening the scope of students’ exposure to this progressive school of thought.

— JENNER ANDERSON

IN-HOUSE ENTREPRENEUR
A bonica Randall was eight months pregnant with her first child, Mônique, in 1979 when the call came from the White House.

A certified radiosotope handler, Randall was summoned to help officials determine the scope of the Three Mile Island accident in Pennsylvania. Despite being on a no-fly restriction from her obstetrician, Randall made the trip to help with the incident that transfixed Americans’ attention.

“I didn’t have a choice,” she says.

“The president called all of the nation’s isotope handlers to Washington.”

At the time, Randall was near the beginning of a long career that led to many different technical and business occupations. Her latest is a new role as the Opus College’s first entrepreneur-in-residence, a position she will hold for a year.

What is an entrepreneur-in-residence? Typically, he or she is a successful businessperson who dedicates a specific amount of time pursuing academics on campus — becoming a guest lecturer, mentoring student startups, coaching entrepreneurs, assisting with business plans or serving on advisory boards.

Randall, Grad ‘79, appears to be a great fit for the job. She has held positions at General Electric, IBM, General Motors and A.O. Smith, and has owned and operated her own consulting business in the Milwaukee area for the past 15 years. She brings real-world expertise and entrepreneurial practice to students and academia by giving practical tips and guidance while sharing her real-world stories.

“You don’t have to own your own company to be an entrepreneur,” she says. “This entrepreneurial and innovative mindset is critical to the growth of students.”

It’s clear that Randall has that mindset.

At GM, she worked at its Milford Proving Ground in Michigan, the automobile industry’s first dedicated automobile testing facility, and also worked on a joint project with Ford to design catalytic converters, widely used in new cars beginning in 1975. At A.O. Smith, she worked on the first ATMs, called Tymke (Take Your Money Everywhere) machines. Her team also conducted 3-D mathematical modeling for magnetic properties, working on systems for tandem machines, as part of a windshield wiper project for farm equipment.

Now, she’s at Marquette to help students have the same success she’s experienced.

“The world wants these people who have no boundaries,” she says. “They just need to rise to the occasion.”

— JOE BIDWYNN, Jan ’77
With this short amount of training, humans can learn to use a completely new form of sensory feedback to improve the speed and accuracy of reaching motions. Dr. Robert Scheidt, Eng ‘89, professor of biomedical engineering, and his NeuroMotor Control Lab colleagues are finding ways to streamline the use of such vibratory sensory substitution in rehabilitating stroke patients. In recent studies, the team has used small vibrating motors — like those found in cell phones — on a subject’s arm to apply vibrations in four locations. They control and change the intensity of vibrations to provide the user with information about how their arm is moving. For example, if the arm is moving forward, the vibration intensity of the motor that is correlated with forward movement will increase, thereby increasing the user’s awareness of the direction and speed of their movement.

The Opus College of Engineering is transforming engineering education by preparing today’s engineers to be creative problem solvers. We invite you to read how our professors and programs are seeking the next solutions to our world’s greatest concerns, all the while leading the way for the next generation of Marquette engineers.
A massive dust storm in 2015 killed at least a dozen people and sent scores more to hospitals, while covering parts of the Middle East in a historic haze. Media reports blamed land-use changes linked to regional military conflict — deserted farmland, reduced irrigation and military vehicle traffic — for causing the storm.

Specializing in ecosystem-water cycle interactions, Dr. Anthony Parolari, assistant professor of civil, construction and environmental engineering, knew how to test that theory. He and his team studied surface-air temperatures, humidity levels and wind speeds, and used weather simulation models to study the storms’ atmospheric circulation patterns. The more likely causes, they found, were extremely hot and dry conditions coupled with cyclonic winds, followed by an unusual reversal in wind direction. Above-average vegetation levels in 2015 further refuted theories that agriculture abandonment was a factor in creating more dust.

Compared to potentially reversible conflict-related conditions, the storm’s actual causes raise more long-term concerns. “If such dust storms result from aridity and atmospheric conditions that could be significantly affected by climate change, then prolonged impacts in the Middle East may be unavoidable,” says Parolari.

Nineteen

Number of antimicrobial chemicals, including triclosan, banned from use in soap by the Food and Drug Administration because of their frequency to spread antibiotic resistance throughout the environment. Dr. Patrick McNamara, Eng ’06, assistant professor of civil, construction and environmental engineering, who studies how triclosan disrupts the microbial communities used in wastewater treatment facilities, applauded the action but went further in a commentary published in Antimicrobial Agents and Chemotherapy by saying, “Moving forward, caution should be exercised when considering what chemicals, if any, are placed into everyday consumer products. . . Behavior that promotes antibiotic resistance needs to be stopped immediately when the benefits are null.”

Six hundred sixty-nine

The number of vehicle-crash fatalities in work zones in 2014. Dr. Yong Bai, McShane Chair in Construction Engineering and Management, has studied the most effective placement of portable changeable message signs (PCMS) used in work zones to reduce truck-related crashes. The difference of speed changes between trucks and cars was considered one of the major reasons for such accidents and reducing it could improve safety in work zones, Bai says.
The amount of U.S. Department of Energy grants received by Dr. Ayman EL-Refaie for his research on advanced traction motors for hybrid applications, while he worked as a principal engineer and project leader for the Electrical Machines Lab at General Electric’s Global Research Center. Dr. EL-Refaie, now the Opus College’s first Thomas H. and Suzanna M. Werner Endowed Chair in Secure and Renewable Energy Systems, has received $20 million in research funding from EPRI — an independent, nonprofit organization for public interest energy and environmental research — to investigate more than 10 research projects aimed at improving the safety and occupational health of electric power field-workers. From this research funded by EPRI’s Environment Sector, eight ergonomics handbooks have been distributed by the institute to its utility members, and these have helped utilities implement physical ergonomics interventions for common tasks performed by field-workers. The most notable and effective ergonomic interventions are battery-powered tools for cutting cables and making crimp connections.

Marklin’s current project is to design a new pistol-grip control for aerial-bucket trucks that requires less manual force than current models require. Dr. Mark Nagurka, associate professor of mechanical engineering, is a co-investigator of the project. At the Applied Ergonomics Conference this spring, Marklin presented a paper summarizing how the results of EPRI-sponsored field testing substantiated reports that line workers who operate pistol-grip controls experience forearm muscle fatigue. The results of this work have led Marklin, Nagurka, and Jonathon Slightam, a mechanical engineering graduate student, to design an advanced, reduced-force pistol-grip control to decrease muscle fatigue. The trio submitted a provisional patent application with Marquette in February 2017 for the new design.

The total weight of wastewater biosolids produced annually within the nation’s water resource recovery facilities, which are then challenged to generate energy, recover nutrients and remove pollutants from such biosolids, pyrolysis — a process of heating organic solids at high temperatures in an oxygen-deprived environment — has proven to be an effective method of generating energy and fertilizer (biochar) while removing pollutants. Dr. Simcha Singer, assistant professor of mechanical engineering, along with environmental engineering colleagues Drs. Patrick McNamara and Zhongjie Liu, is working on optimizing the pyrolysis process for industrial use. With a $156,936 grant from the Milwaukee Metropolitan Sewerage District, Singer is investigating the ideal temperature and time spent in the reactor to produce biochar as energy-efficiently as possible.

According to the U.S. Department of Agriculture, more than 870 million people around the world lack access to nutritious and safe food, a staggering statistic that has compelled the government agency to make global food security a top priority. “Significant advances in agricultural automation are essential to improving food security for an increasing population,” says Dr. Henry Medeiros, assistant professor of electrical and computer engineering.

Medeiros and his Computer Vision and Sensing Systems Lab colleagues have partnered with the USDA to solve some of the most relevant and challenging problems in agricultural automation — crop-load estimation and pest management. Crop-load estimation is the process of determining the expected productivity of a fruit orchard based on the number of flowers and fruitlets present soon after bloom. Proper crop-load estimation allows for more efficient management of crops, labor and harvest equipment. Manually counting flowers is labor-intensive and prone to human errors. Roboticians and agricultural engineers have been trying to automate this process for decades, according to Medeiros, but existing approaches using machines have had limited success because retrieving field data in variable light conditions with visual obstacles challenges the machines’ accuracy.

In a research project funded by the USDA, Medeiros and graduate student Philip Dias developed an algorithm that applies new learning methods to the problem of machine crop-load estimation. In their system, the images collected by a ground robot are processed by machine-learn- ing algorithms that determine how many flowers and fruitlets are present in the image. Their approach shows improved performances of up to 90 percent in certain conditions and significantly outperforms previous approaches.

In the future they plan to integrate their algorithms with the robotic platform and perform field tests in the USDA orchards.
BRAD BONCZKIEWICZ | DIRECTOR OF TECHNOLOGY

The Opus College’s head of technology doesn’t do his own. But Brad Bonczkiewicz fills the essential role of providing and maintaining technology for engineering faculty, students and the entire academic and support staff. It’s a position he stepped into in 2012 after serving as Marquette’s computer systems manager for four years. The needs have changed significantly over time, and Bonczkiewicz must stay on top of developing technology needs such as virtual computer labs, media-based classrooms with lecture capture and video conferencing, and cybersecurity threats. He also manages a student-staffed help desk. Last year, Bonczkiewicz started the Mobile Applications Development Lab with the purpose of instructing students from colleges across campus on how to program apps. His goal of “changing the face of technology” at Marquette does not go unnoticed by his fellow directors. As Laura Lindemann, director of industry relations, aptly puts it: “Everyone needs technology!”

Laura Lindemann, Eng’16 | Director of Industry Relations

“Our office is this amazing hub of chaotic connections that result in employment,” says Laura Lindemann of helping students determine and realize their career dreams. Lindemann’s department first meets the engineering undergrads in their sophomore year and starts helping them move in the direction of “what’s calling them.” Connecting students and employers is also a central goal of industry relations. Because of the industry relationships cultivated by her office, 75 percent of engineering undergraduates work in industry through the co-op and internship program. An example of the industry relations office bringing practical engineering applications to life is the Marquette Hackathon, an initiative that began in 2014 and gives students a real-life problem to solve with engineering. “We have the unique challenge of trying to get them to network and dream,” says Lindemann.

Chris Perez, Eng’92, Grad’96, ’03, Law’13 | Director of Student Studies and Records

Working closely with Brigid Lagerman in the Academic Advising Center, Chris Perez considers himself the “behind-the-scenes guy” who handles curriculum, academic procedures and records. The native of Guam is part of the backbone of this “unique” model of advising that both he and Lagerman say has created a much higher level of satisfaction for students and faculty. The latter are able to fulfill their role as faculty mentors in a more effective, meaningful way,” he says. Perez works with students on several fronts, starting with orientation, providing assistance with academic records and course registration, conducting final degree audits and distributing diplomas at Commencement. He also teaches a few courses and advises students interested in the study abroad program. His hardworking, academic-minded parents were integral to building his attitude of serving others — a quality he says he shares with Lagerman. And the two have ideas for making the process even more successful. The mission is “to serve the students. We have an important job to do, but I don’t think a lot of people outside our walls know about it.”
Searching for Alternative Cost-Saving Methods
So the Student Experience Remains Unaffected

KATE TREVEY, Bus Ad ’04 | DIRECTOR OF ENGINEERING LEADERSHIP PROGRAMS

It’s not an overstatement to say that Kate Trevey challenges students to “live and lead with integrity.” E-Lead (Engineers in the Lead), the three-year undergraduate leadership development program that Trevey spearheads, empowers students to consider their role as Jesuit-educated leaders and engineers who are called to guide change, solve problems and serve others. And Trevey’s preparation of students doesn’t stop at graduation. “We prepare them for their lifelong journey of leadership development,” she says. Another facet of her work is supporting students in three full-tuition scholarship programs in the Opus College of Engineering: Opus Scholars; Donald J. and Frances I. Herdrich Scholars; and Michael J. Dubsky Scholars. These scholarships are awarded to students who are chosen field of study can lead them to job, and one of the best parts of my job is helping them learn how their resources they require, and mentors them as they work with real-world customers at companies around the country. “For most of our students, this is their first job, and one of the best parts of my job is helping them learn how they can somehow be related to the student experience,” Rawson explains. “We do our best to provide an environment such that the student never knows the financial challenges facing the university as a whole. I am always searching for alternative cost-saving methods so the student experience remains unaffected.”

PHIL RAWSON | DIRECTOR OF ACADEMIC BUSINESS AFFAIRS

The economic climate universities are operating in is a challenging one at best. And it’s Phil Rawson’s job to constantly balance the needs of the college and its students with the funds available to meet them. Since 2004 Rawson’s most important responsibility as director of academic business affairs is budget maintenance and monitoring. “Since behind all of the student experiences are underlying costs, every action I take can somehow be related to the student experience,” Rawson explains. “We need to provide students and faculty with the opportunity to learn about and appreciate traditions in this way,” she says. “The alfombras event provided students and faculty with the opportunity to learn about and appreciate traditions in this way.”

—MEGAN KNOWLES, ARTS ’17

On a cold, gray November day, engineering students and faculty gathered to brighten up the sidewalks near Old Main Hall with vibrant colored salt designs called alfombras (carpets), a cultural expression of faith among Latin Americans.

This marked Marquette’s first time participating in this tradition, which allowed students and faculty from the Opus College to craft the designs in memory of those who died for their faith. Every November the campus community of the University of Central America, a Jesuit university in El Salvador with which Marquette has collaborated over the years, makes alfombras to remember six Jesuits and two women who were assassinated on its campus on Nov. 16, 1989.

Dr. Lars Olson, associate professor and interim chair of biomedical engineering, organized Marquette’s event along with Julia Griep, Eng’17, who conducted research with Olson on his human-powered nebulizer project in Guatemala. While there, Olson’s research team attended the Corpus Christi Festival, where alfombras were displayed in the surrounding neighborhood. They then decided to host a similar event on Marquette’s campus to spread cultural awareness.

I hope students learned about the world outside of Marquette and the global experience opportunity they may be a part of through campus initiatives,” Griep says.

Describing the process of creating the alfombras, Olson reflected on receiving a large amount of participation and resources, including the chance to get free salt from a local spice company, which they used to color and create the designs.

“Half of their waste products into art and religious expression,” Olson says. “We also got participation from the Theology Department and our Jesuit community. They, too, know the importance of alfombras in Latin American faith.”

Esther Baas, a civil engineering senior, highlighted the benefit of this cultural event. “Most engineering students do not fully learn from a book — we learn by doing,” she says. “The alfombras event provided students and faculty with the opportunity to learn about and appreciate traditions in this way.”
The majority of the world’s engineers serve but a minority of the world. In the Opus College of Engineering, we believe that engineering is bigger than that. We immerse our students in rich experiences and demand that they think critically. We prepare them to become adept problem solvers who are creative, innovative, technically proficient and ready to lead. Ready to be Marquette engineers who solve problems for the majority. Ready to Be The Difference.