

Spring 2016

Spring 2016

Echoes Staff

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SPRING 2016

Echoes

HONORING A LEGACY

Samuel F. Hulbert

ROSE-HULMAN INSTITUTE OF TECHNOLOGY

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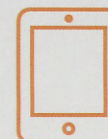


PRIME
17 YEARS

Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Engineering
Electrical Engineering
Mechanical Engineering

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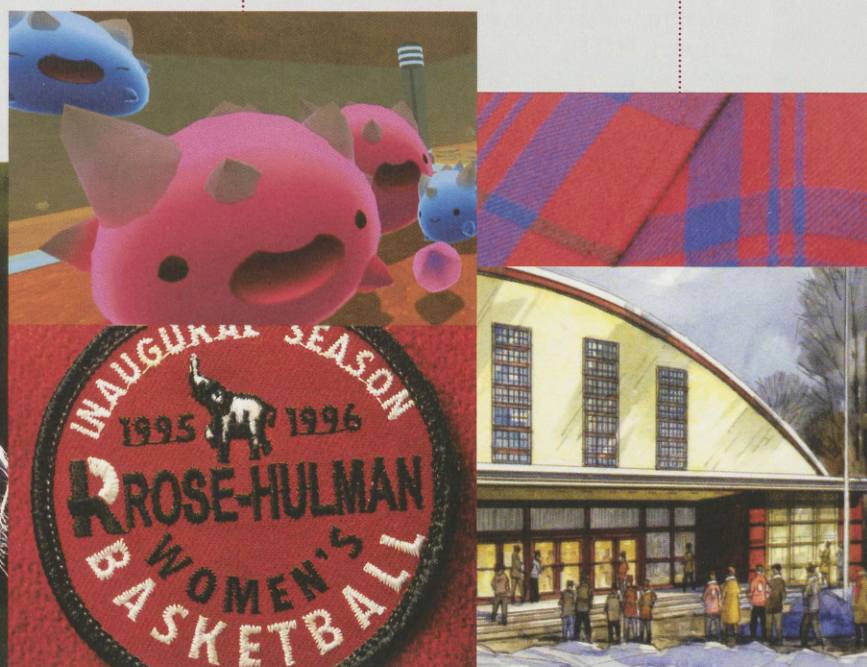
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ROSE-HULMAN
INSTITUTE OF TECHNOLOGY

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This spring concludes Jim Conwell's third year as Rose-Hulman's president. Marking this occasion, *Echoes* Executive Editor Dale Long sat down with the president recently for an interview touching on a variety of topics. His answers provide insight about where the institute is headed, the challenges that still need to be addressed, and how alumni can lend support.



JIM CONWELL, PRESIDENT
conwell@rose-hulman.edu

Q: You have suggested that America is in the midst of the 'Golden Days of STEM.' What gives you such optimism, and how can Rose-Hulman capitalize on these good times?

Conwell: I'm optimistic because there are a lot more students entering college today that recognize the value of a STEM education and, at the same time, we're seeing programs being put in place that will increase that talent pipeline for the future. We need more STEM-educated students. Fortunately, Rose-Hulman is in a great position to provide them. I would also like us to be the leader in educational methods, processes, evaluations, and methodologies

that represent the best way to educate students in today's ever-changing STEM landscape. My question is: Does Rose-Hulman have a moral responsibility to grow beyond Terre Haute, Indiana—through continuing education, taking programs on the road, and distance learning? Those are the things we're considering very closely.

Q: Rose-Hulman has been recognized for being "Best in Class" among the Kern Entrepreneurial Engineering Network (KEEN), a collection of 24 American institutions. How is KEEN enhancing our institution, and what will our students gain as a result of our participation?

Conwell: I believe places like Rose-Hulman, along with our KEEN partner institutions, have a moral imperative to generate the world's best engineers, and make sure America remains competitive. KEEN has allowed us to engage every faculty member on our campus in the development of educational initiatives that are helping our students become more collaborative, more able to recognize opportunities to demonstrate value, and more aware of the value of lifelong learning.

Q: May 1 will mark your third year leading Rose-Hulman Institute of Technology. What are areas that you have learned to appreciate the most about this institution?

Conwell: I came to Rose-Hulman with a deep understanding that our faculty and staff members were committed to the institute, but I have a much deeper appreciation for how our people OWN our mission statement and want what's best for the students.

I have enjoyed seeing the magic in the classroom by our outstanding teachers, and seeing the magic as our students learn the valuable lessons that will make them succeed in their careers.

ROSE-HULMAN
INSTITUTE OF TECHNOLOGY

The mission of Rose-Hulman Institute of Technology is to provide our students with the world's best undergraduate science, engineering, and mathematics education in an environment of individual attention and support.

Q: In your view, what are the greatest challenges facing Rose-Hulman today?

Conwell: There are two areas that I believe are crucial for the institute's future success: Better name recognition for the great things happening on our campus, and gaining the financial resources needed to meet our future strategic goals. It is time for Rose-Hulman to be recognized for the great things happening on campus. I flew 78,000 miles throughout the country last year carrying those messages to alumni groups, foundations and corporations, and our educational peers. At the same time, we need to have a successful fundraising activity so that we can grow our diversity from a socioeconomic standpoint and have the high-quality facilities that match our reputation as a leader in science, engineering, and math education.

Avalanche of Alumni Share Ski Terre Haute Photos

The Down Memory Lane feature in the *Winter Echoes* examined the iconic Ski Terre Haute poster that was a recruiting piece for the institute from the late 1970s to the early 1990s. We suspected that some of our alumni had their original copies hanging around—so, we asked them to submit photographic evidence. The responses poured in, which may have something to do with the fact that we were giving away Rose-Hulman sweatshirts to the first five alumni to submit a Ski Terre Haute selfie.

Below, you'll find a couple of our favorite responses. View more by visiting our Ski Terre Haute photo gallery at www.rose-hulman.edu/skiTH.

"I received the new-format *Echoes* (Winter 2016) today, and had a big smile after turning to page 32. Yes, I knew I had a Ski Terre Haute poster—but where was that tube of posters from college? Within 10 minutes I found it. Much to my surprise, I have THREE Ski Terre Haute posters.

—Scott L. Lindner (ME, 1981)

The next day, Scott emailed again to tell us that he'd forgotten he's actually ON the back of the original poster. (See photo of him pointing out his younger self.)



"I want to thank your team for the recent *Echoes* article. It's now posted beside the posters (front and back) in my office space at InterVarsity's National Service Center. Appreciating what you do for the campus."

—John T. Egleston (ME, 1983)



More alumni showcase their Ski Terre Haute posters at www.rose-hulman.edu/skiTH

We love getting your feedback on each issue. Send Elephant Ears items to dale.long@rose-hulman.edu or Dale Long, executive editor-*Echoes*, CM 14, Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803.

Technology Behind the Badge

I enjoyed the High-Tech Sleuthing article in the *Winter Echoes*. It was particularly of interest as one of my sons, John, is a detective with the St. Louis Police Department's Real-Time Crime Center, working with aspects of Motorola Solutions' equipment and systems featured in the article. It's great to know that members of the Rose-Hulman family are the brains behind the

systems and equipment that are being used to keep St. Louis and other communities safe.

—Mike S. Baumann (CHE, 1976)

Smarter than a Fifth Grader?

I have submitted two solvers to *Echoes'* Winter Bailey Challenge. The first is mine. The second

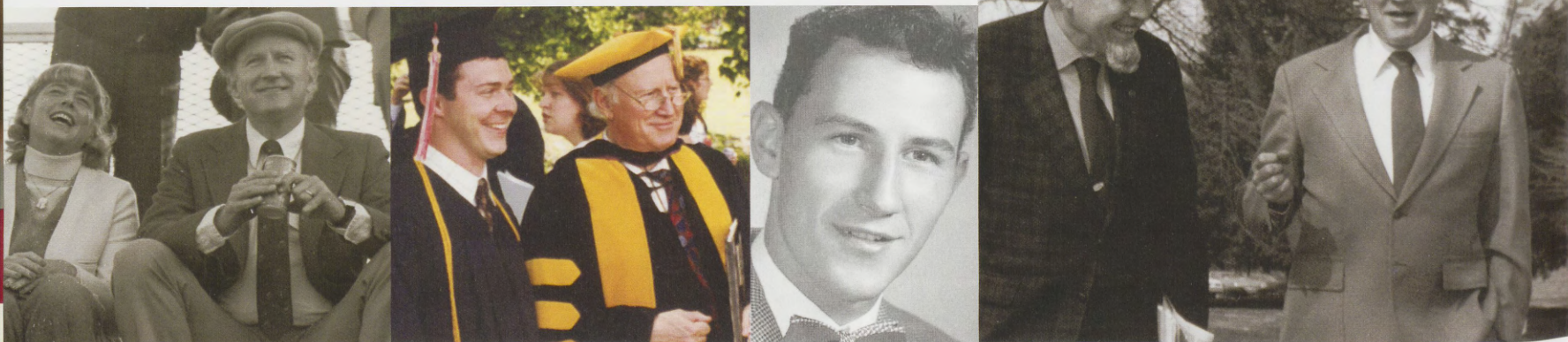
belongs to my fourth-grade daughter, Dorrie, age 10. She was inspired by the young solver (Ashlyn Roehm featured in the issue) and said she wanted to try it—so she could "be smarter than the fifth grader." It was some trial-and-error on Problem 1, but she did get to the answer. Problem 2 caused her some major brain power, but once she discovered the going-back-across-empty trick, she had it figured out. We even gave Problem 2 to her teacher, who used it as a morning-challenge problem for her students.

—Brian M. June (ME, 1996)

STORY
BY DALE
LONG

Honoring A Legacy

Sam Hulbert left an indelible imprint on an institute and its people



Servant leader. Trailblazer. Dreamer. Those were some of the many glowing phrases used to describe Samuel F. Hulbert, Rose-Hulman's late inspirational president who was a mentor and educator to thousands and a groundbreaking orthopedic scholar.

Hulbert, 79, died on January 29, 2016. He led the institute for 28 years (September 1, 1976 to June 30, 2004), the longest presidential tenure in institute history, and set a course for Rose-Hulman to become a national leader in undergraduate science, engineering, and mathematics education.

"Sam Hulbert was a man of extraordinary vision and passion, whose impact extends well beyond the border of this campus. It can be felt in the lives of every member of the Rose-Hulman family," says current

President Jim Conwell, who adds, "Today, thanks to the leadership of Sam Hulbert, Rose-Hulman is a beacon of engineering education in the U.S."

The institute found a rising star in higher education when Hulbert arrived on campus in 1976 after serving three years as dean of the School of Engineering and professor of bioengineering at Tulane University. His reputation was further enhanced as an educator and researcher at Clemson University and Alfred University.

Like those other stops, it wasn't long before Hulbert began transforming Rose-Hulman. Professor Emeritus of Film and Literature Peter Parshall refers to it as a revolution. Enrollment slowly expanded, support was found for the construction of new buildings, the student body

HULBERT'S ROSE-HULMAN ACCOMPLISHMENTS

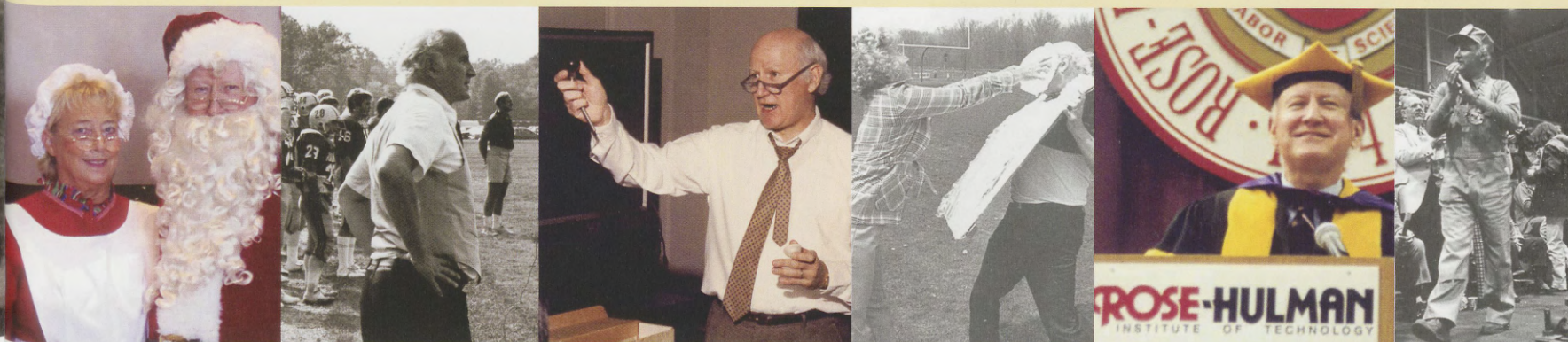
The college went coeducational in 1995.

Rose-Hulman began gaining a national reputation in science, engineering, and mathematics by consistently ranking as the nation's best college that offers the bachelor's or master's degree as its top degree in engineering; its faculty began receiving recognition for their teaching and scholarly excellence; and several academic programs earned national honors from their peers.

The largest fundraising program in the college's history, the Vision to be the Best campaign, raised \$250 million. This included the largest gift in Rose-Hulman history, a \$29.7-million Lilly Endowment Inc. grant that created Rose-Hulman Ventures, located on the institute's South Campus.

Enrollment doubled while the college continued to attract academically talented students. The number of faculty also doubled, making it possible for the institute to maintain a 13-to-1 student-faculty ratio.

Rose-Hulman's student retention and graduation rates became among the best of any private engineering college or university in the nation.



became coeducational, and talented teachers and committed staff members were attracted to teach new academic areas.

"Sam taught us what we could become. In effect he said, 'Rose is good now, but you ain't seen nothing yet!'" remarks Tom Roper, retired vice president and professor of mechanical engineering. "We were trapped by our history and our perception of what we could do with the resources that we had. Sam had a vision and, with energy and effort, he provided the resources that made it possible."

That vision has now come into focus everywhere on campus, says Bill Pickett, emeritus history professor who featured Hulbert prominently in a two-volume book of Rose-Hulman history. "The ingredients of Sam's success—from his unique combination of

genetic make-up, childhood upbringing, and adult experience—included an uncanny sense of balance in moving forward...Quite simply, he surrounded himself with the best people he could find, encouraged them to use their imaginations, and supported them in their efforts. In the process he created what can be best described as a vibrant, dynamic, and inclusive learning community."

Parshall remarks, "Sam Hulbert envisioned a Rose-Hulman committed to the never-ending pursuit of excellence. His enduring legacy is an institute that has made that vision its own."

Notes Conwell, Hulbert changed engineering education from a model where the faculty-student relationship was adversarial in nature to one that is still rigorous, but in a supportive environment.



Watch video from the Celebration of Life event at www.rose-hulman.edu/samhulbert

Letters to Sam

Alumni & Friends Remember Inspirational Campus Leader

Samuel F. Hulbert took time as president and throughout retirement to write numerous hand-written letters, congratulatory messages, and greeting cards for members of the campus community, alumni, family, and friends. So, it wasn't surprising that many of those recipients would take time to recall the special role that Hulbert had in their lives and Rose-Hulman. Here is a selection of these heartfelt notes and stories:

HULBERT'S PRESENCE EVERYWHERE

As one drives onto campus, Sam Hulbert's accomplishments are everywhere. Virtually everything, from the flowers and shrubs and routing of the roadways to the water tower beside Moench Hall, was either built or renovated during his 28 years. Perhaps most important, the banners hanging on the campus light posts remind visitors that Rose-Hulman is recognized nationally as the best undergraduate college of science and engineering for the excellence of its educational programs, with its graduates occupying positions of important and satisfying responsibility in all sectors of society.

The ingredients of Sam's success—from his unique combination of genetic make-up, childhood upbringing, and adult experience—included an uncanny sense of balance in moving forward. A visionary, he was also a pragmatist. He was persistent but patient; open but prudent; sensitive to others but willing to make hard, even risky, decisions; an internationally recognized scholar-researcher, but also an inspirational teacher.

Quite simply, he surrounded himself with the best people he could find, encouraged them to use their imaginations, and supported them in their efforts. In the process he created what can be best described as a vibrant, dynamic, and inclusive learning community.

Sam is no longer with us in person. But he remains in the many individuals who felt his inspiration, received his unfailing support, and helped him to make Rose-Hulman their professional home.

William Pickett, Emeritus Professor of History



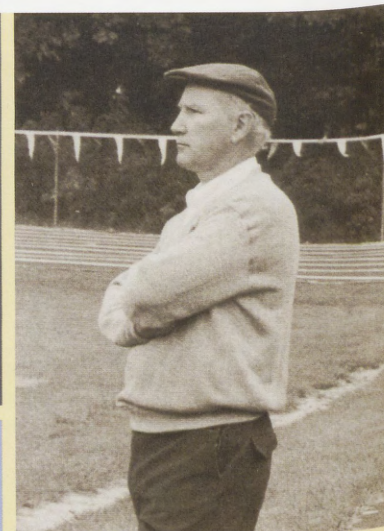
A DIFFERENCE-MAKER FOR STUDENTS

For me, Dr. Hulbert epitomized what it meant to be a leader. He was able to create a long-lasting culture of collegiality and excellence, which, for those two together, isn't easy. It all stemmed from his eternal optimism and that each member of the Rose-Hulman community played a vital role in the overall experience of students and alumni. He definitely set the stage early on during freshman orientation, where on the first day, he announced to the parents, "We'll treat your son as if he was one of our own." He kept his word. My parents still recall those words, and it only validated their support of me going to Rose-Hulman.

During graduate school, Dr. Hulbert served as my thesis adviser. He helped find me a summer internship, which led to my thesis project. He guided and mentored me throughout the entire two-year process. He allowed me to do my thing and only advised me when I went to him. He truly was a mentor, and with so much else he had going on in his role as president, he showed so much patience.

Later, after word spread back to campus that I was diagnosed with cancer, Dr. Hulbert called me to lend his support. At some point in the conversation he started crying. He informed me that I was not in the battle alone and that I had the full support of my Rose-Hulman family. He eventually helped connect me with the world's leading oncologist for the type of cancer I had. This all stemmed from the caring campus culture created and sustained by Dr. Hulbert.

Ashvin Lad (BSCHE, 1996; MSBE, 1998)



ONE-OF-A-KIND LEADER

Dr. Hulbert took over at Rose-Hulman when I was a freshman, so I guess we learned the ropes together. During my four years there, I remember his infectious exuberance about our school, and how approachable he was. Of course, I didn't know how special he was at the time. I thought all college presidents were probably that way.

After graduation I learned differently, of course. Not all company or collegiate leaders were as "follow-able" as him. I figured Dr. Hulbert was either an anomaly or he really knew how to lay on the B.S. About 25 years later, shortly before Dr. Hulbert retired, I went back to Rose-Hulman for a recruiting trip. I had a break and went walking around Moench Hall, looking at all the changes that had taken place. I remember vividly walking down the catwalk upstairs and who was walking towards me but Dr. Hulbert. Before I could say anything, he looked at me and said, "Hey Jerry! How've you been?"

Like most folks, 25 years had changed me quite a bit. Less hair (mostly gray), and several more pounds changed my appearance quite a bit. Yet he still recognized me, and could instantly recall my name from 25 years before.

No, Sam Hulbert wasn't a master of B.S. He was a one-of-a-kind, the real deal.

Jerry L. Fish (ME, 1980)

WELL-GROUNDED & RESPECTED

Samuel F. Hulbert was a truly special person who loved our school and students, and we loved him very much.

Following my graduation in 1974, I was fortunate to have success in the medical technology field and now help lead Edwards Lifesciences Corporation, a company focused on helping patients through the development of innovative technologies. I had the honor of getting to know Sam personally during my career journey, and he was kind enough to invite me to lecture at Rose-Hulman on several occasions. He had a passion for applying engineering to health sciences, and he truly helped build the school's focus on bioengineering.

Sam's accomplishments in Rose-Hulman's growth and recognition as a national leader are remarkable. More impressive was his ability to remain a very good and caring person, who raised a wonderful family.

I am deeply saddened at the loss of a well-admired man. It is my hope that this sympathy, and the knowledge that his immense spirit will continue to be carried forward by those who had the privilege to learn from him, provides some comfort for the entire Hulbert family.

Michael A. Mussallem (CHE, 1974)



LETTER FROM THE HULBERT FAMILY

On behalf of my brother Greg, my sister Samantha, and myself, we wanted to thank the entire Rose-Hulman family and community, past and present, for all the support they have extended to us with the passing of our father and mother (Sam and Joy). The memorial celebration Rose-Hulman hosted for our parents was a wonderful and touching event. We have received many wonderful cards and letters from current and former faculty and staff as well as many alumni. We appreciate all the kind words and personal stories shared with us about people's connection with our parents. My parents thought of all the students they met during their 28 years at Rose-Hulman as their children as well. They also had so many dear friends at Rose-Hulman and the Terre Haute community, and the countless fond memories and fun stories will live on forever.

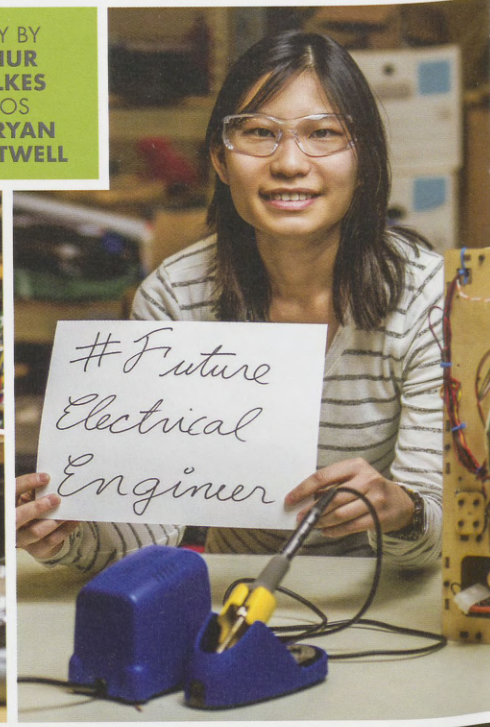
Jeff D. Hulbert (ME, 1991)



Read more letters from alumni & friends at www.rose-hulman.edu/extraletters



STORY BY
ARTHUR
FOULKES
PHOTOS
BY BRYAN
CANTWELL



support sySTEM

Grassroots efforts helping advance women in STEM fields

When Rose-Hulman's student body became co-educational in 1995, women accounted for 17 percent of the freshman class. Twenty years later, one in every four freshmen is a woman.

While that shows improved gender equity, nudging females to greater participation in science, technology, engineering, and math (STEM) fields continues to be a national challenge.

"We've got half the population that is way underrepresented in [STEM] fields and that means that we've got a whole bunch of talent...that is not being

encouraged," stated President Barack Obama in a 2013 White House report on women in STEM fields.

Moving the numbers upward is not easy, especially because there is no single, clearly identified cause of the gender gap. A 2011 U.S. Department of Commerce report suggested male-female stereotypes, a dearth of female role models, and workplaces less accommodating to taking time off to have and raise children might be some of the reasons.

Eliza Brock Marcum, a 2008 computer science alumna, is

Rose-Hulman's "Future Faces of STEM" campaign features seniors (top, from left) Abigail Etters, Cassidy Cain, and Elena Chong. Alumna Eliza Brock Marcum (CS, 2008) (below) believes increasing women in STEM fields is critical for ending old male-female stereotypes. She owns her own software business in Nashville, Tennessee.



outspoken about the need to encourage diversity in STEM fields. She owns her own software business in her home city of Nashville, Tennessee, and is a co-organizer of Nashville Women Programmers, a "meet up" group designed to support diversity in computer programming.

"The [computer] industry as a whole has serious issues with sexism and bias," she says. "Because of high levels of attrition, the average woman you meet in the field has been in it less than two years. The focus needs to be on keeping them in."

At Rose-Hulman, seniors Melissa Thai and Samantha Staszak this school year created a new organization, Women of Like Fields Passionate About Computing (WOLF PAC), to provide encouragement to future computer scientists, programmers, and software engineers. The organization already has dozens of members.

Promoting gender equity in STEM "starts with us," says Staszak, the organization's president. "It is our problem and we need to fix it."

In an opinion article for USA Today College, Staszak and Thai discussed how WOLF PAC and other efforts are vital to increasing the number of women in computing. In addition to providing a space for women to interact with a community of their peers, these groups provide professional development opportunities and reach out to youths, as early as elementary school, to encourage girls' interest in studying computing fields in college.

Junior software engineering student Morgan Cook, a WOLF PAC member, is among other students joining in the grassroots effort to change the face of STEM. She remarks, "It is important that women not be afraid to break into such a male-dominated world."

(CONTINUED ON NEXT PAGE)

Seniors Melissa Thai (left) and Samantha Staszak created a new organization on campus, Women of Like Fields Passionate About Computing, to provide support for female students majoring in computer science, software engineering, and computer engineering.

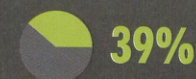


NUMBERS TELL THE STORY

Women remain underrepresented in the science and engineering workforce, although to a lesser degree than in the past, with the greatest disparities occurring in engineering, computer science, and the physical sciences, according to the National Science Foundation's 2014 Science & Engineering Indicators report.

Women make up 47% of the total U.S. workforce, but are much less represented in certain science and engineering occupations:

CHEMISTS AND MATERIAL SCIENTISTS



ENVIRONMENTAL SCIENTISTS AND GEOSCIENTISTS



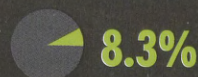
CHEMICAL ENGINEERS



CIVIL ENGINEERS



ELECTRICAL AND ELECTRONICS ENGINEERS



INDUSTRIAL ENGINEERS



MECHANICAL ENGINEERS



Source: U.S. Department of Labor, Bureau of Labor Statistics, Women in the Labor Force: A Databook, 2014

WHAT'S UP

(CONTINUED FROM PREVIOUS PAGE)

This just means that the few women in STEM fields have to bond together and help each other out. That female comradeship is exactly what WOLF PAC is designed to encourage.”

Women make up about 24 percent of the U.S. STEM workforce while filling about 47 percent of all of the nation’s jobs. At Google, just 17 percent of tech roles are staffed by women, and at Twitter, it’s 10 percent, according to multiple

degrees awarded to women declined in computer sciences by 10 percent.

While very few professions show gender balance, the focus on the large imbalance in STEM may be due to a perceived national shortage of science and engineering professionals. It may also be linked to the understanding that STEM-related jobs typically are better-paying jobs. Women in STEM professions, for example,



Preparing for their STEM careers are Kelly Farner (top), a junior optical engineering and engineering physics major, and Kali Nordquist (left), a senior chemical engineering student. Both students have been active in campus organizations and academic endeavors.



published reports. Another figure from the National Center for Education Statistics reveals that women earned only 17.8 percent of bachelor’s degrees awarded in computer science at U.S. colleges and universities in the 2012-13 school year. Meanwhile, the National Science Foundation’s 2014 Science and Engineering Indicators Report revealed that since 2000, the share of bachelor’s

earn about 33 percent more than women with non-STEM employment.

Rose-Hulman, for its part, is taking steps to recruit more female students. A “Future Faces of STEM” web page and social media campaign showcase female students majoring in science, engineering, and mathematics. The efforts have been successful,

with the freshman class of 2015 bringing the highest percentage of women to the institute. And, earlier this year, MarketWatch identified Rose-Hulman among colleges “where female STEM students flourish.”

During her years at Rose-Hulman, Brock Marcum recalls what she considered a clear gender bias from her male classmates. For example, they would try to assign her to the “soft” aspects of a team project, such as “making it look pretty,” she recalls.

But, after wavering between her freshman and sophomore years, the computer science major decided to stick with her education at Rose-Hulman and then never looked back. “My professors were very supportive,” she says, adding the handful of other women studying computer science were also a source of support.

“Women are great role models,” Brock Marcum says. “We have to let each other know, ‘You’re not alone.’”

Campus' Entrepreneurial Culture Stands Out Within National Network

The Kern Family Foundation of Waukesha, Wisconsin, recognized Rose-Hulman with the 2015 Best in Class Award among educational institutions in the Kern Entrepreneurial Engineering Network (KEEN).

Rose-Hulman is a select member of KEEN, a national effort by the foundation to align 24 U.S. private engineering colleges to produce graduates with an "entrepreneurial mindset," characterized by exercising curiosity, seeking connections, and creating value.

Thor S. Misko, the Kern Family Foundation's entrepreneurial engineering program director and team leader, wrote in a letter announcing the award: "We hope that others will be inspired by the entrepreneurial culture created



at Rose-Hulman that prepares engineering graduates for fulfilling lives and productive careers. Rose-Hulman continues to lead KEEN in many ways, contributing to the shared mission of transforming the U.S. workforce by instilling the entrepreneurial mindset in engineering students."

One of foundation's key goals, shared by Rose-Hulman, is to offer students a vision of the breadth of their possible futures and prepare them to identify unexpected opportunities to create value,

whether technical, societal, or economic. The program emphasizes the development of curiosity and connecting technical skills to societal needs and opportunities.

"If you believe, as we do, that being an engineer will change in the future, to have a much broader context, then KEEN is a wonderful organization to be affiliated with," says Rick Stamper (ME, 1985), interim vice president for academic affairs.

Rose-Hulman has a \$2.25-million grant from the Kern foundation to encourage development of the entrepreneurial mindset through educational practice, faculty engagement, and student experiences through 2018.

Physics Professor Gets \$500,000 NASA Grant to Develop High-Tech Laser Systems for Space

NASA has selected physics and optical engineering professor Paul Leisher for a \$500,000 grant to develop an early-stage solution to a high-priority need within America's space program.

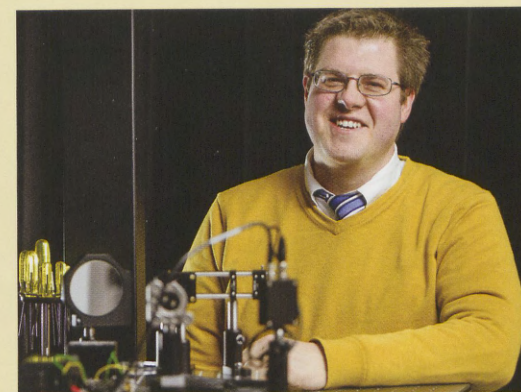
For the next two years, Leisher will work with several undergraduate- and graduate-level students to design and test semiconductor lasers that communicate optically at very high speeds (greater than 100 Gbps) in a free-space environment. The project will be based on the InGaAsP material system.

"Modern satellites must have efficient systems with the ability to transfer large amounts of data at very high speeds," says Leisher, who has spent eight years developing high-efficiency, high-power semiconductor lasers. "Future laser transmitters must also be compact, lightweight, power efficient, reliable, and hardened against the harsh environment of space."

Rose-Hulman has formed a strong partnership on this project with Freedom Photonics, a Santa Barbara,

California-based startup company specializing in high-speed photonic integrated circuit technology. The firm will be responsible for fabricating the devices designed at Rose-Hulman. Milan Mashanovitch, general manager of Freedom Photonics, has worked with Leisher on many similar projects for NASA and other major clients.

The project is one of 15 university-led proposals selected by NASA under the Early Stage Innovations 2015 program.



The NASA laser project is among several research opportunities that Paul Leisher has brought to campus in hopes of enhancing students' undergraduate experiences.

GETTING YOUR MESSAGE ACROSS

STORY BY
STACEY
MUNCIE
PHOTOS
BY BRYAN
CANTWELL

EFFECTIVE WRITTEN, VERBAL
COMMUNICATIONS SKILLS
ARE ESSENTIAL PARTS
OF ENGINEERS' TOOL BOX

To those in industry, it's no secret that engineers must be adept at communicating and collaborating with a variety of project stakeholders in order to be effective. But it's a fact that isn't always obvious to students as they battle their way through rigorous engineering, mathematics, and science courses within their disciplines.

Students at Rose-Hulman have long been required to take a course in technical communications, but many see it as a necessary evil, not ascribing the same weight to knowledge they gain as they would to calculus or mechatronics.

"They're used to compartmentalizing," observes Associate Professor of Mechanical Engineering Sean Moseley. Many times, he adds, his students want to dismiss the importance of verbal and written communication skills because those items are outside of their comfort zones.

"For students who are drawn to the analytical world, writing can be kind of scary. It's a defense mechanism—you're not good at it, so it's not important," he says.

But mastery of effective communication skills is not only essential in the workplace, it can make or break a candidate's chances of landing his or her dream job in the first place.

According to the National Association of Colleges and Employers (NACE) Job Outlook 2016 survey, employers rank collaboration and communication skills (both written and verbal) among the attributes they most seek in candidates, alongside traits like leadership and problem-solving ability.

Students who are successful communicators have more success with recruiters, confirms Kevin Hewerdine, Rose-Hulman's director of career services and employer relations.



Engineering and humanities faculty members (from left) Richard House, Sean Moseley, Jessica Livingston, and Richard Layton published a new manual (page 13) to help engineers become better communicators.



"The top skill set that they're searching for, besides technical skill, is the ability to communicate to both internal and external constituencies, and being able to work in a team environment," he says, adding, "Frequently the students that have difficulty bringing thoughts together and communicating them have a difficult time getting opportunities."

Hewerdine recalls an example that reinforces the NACE findings. "One interview question that threw [a recent candidate] for a loop was 'Tell us how you described a technical situation to a non-technical person.'"

The Office of Career Services works with students to help them interview successfully, but relying on that alone would be akin to waiting until midnight before a final exam to crack open your physics book for the first time. That's why communication skills are being increasingly emphasized and woven into the fabric of the institute's technical courses.

More and more, students are having opportunities to see how the ability to communicate effectively is not truly a separate skill set from being able to engineer effectively. A group of faculty from engineering and humanities has collaborated on a new resource

specifically designed to be a tool that is relevant and applicable to engineers.

Moseley, along with fellow mechanical engineering professor Richard Layton, and English professors Richard House and Jessica Livingston, recently published *The Engineering Communication Manual* through Oxford University Press.

The manual contains modules organized into categories, from general communication skills to tailoring communication to different constituencies, types

of audiences and genres, the writing process, and visual presentation elements.

Unlike other communications tomes, this one is specifically designed to help students, faculty, and young professionals integrate communication skills into their engineering projects.

To do this, the group sought real-world examples from practicing engineers across a variety of industries. These authentic examples help reinforce the message that the ability to communicate effectively is fundamental to every engineer's knowledge arsenal.

"There were a lot of Rose-Hulman colleagues, alumni, and students who helped us by providing documents," explains Livingston.

The collaboration between the faculty members also was its own exercise in communication, forcing the faculty to practice what they were about to preach.



Strong communication skills are key attributes sought by employers that interview students at campus career fairs.

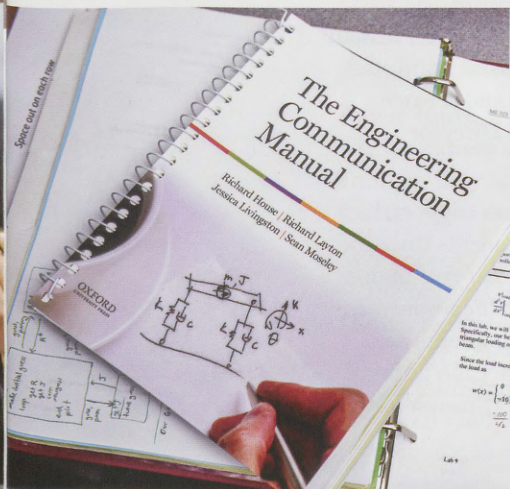
"It helped both sides keep from being 'jargony,'" Livingston adds.

"There are not a lot of books covering technical communications that specifically focus on engineering in a compelling way," says Moseley. "We also wanted a reference resource for someone teaching a mechanical engineering course. When I have some communication task, I can use the knowledge in the book to help inform what I expect from the student, and what I expect them to perform."

Being able to communicate succinctly and clearly to a target audience is essential to succeed in the collaborative process that young engineers will find in the workplace, according to Livingston.

"If they're going to make a difference in the world, they're going to have to communicate effectively across all lines of a project," she says.

Moseley adds that while students may not understand the importance of the lessons now, "ultimately, I think it'll make our students much more successful. It's something they'll really benefit from a few years after they graduate."



Inclusion, Respect Key Elements for First Full-Time Diversity Director

As the institute's first full-time director for the Center for Diversity, Janice Fenn is promoting cultural change in the area of diversity within Rose-Hulman by establishing education goals and programs that develop and sustain an environment of inclusion, respect, and

support on campus for people from diverse backgrounds.

She is also supporting student groups and services that have focus and impact on diversity, and working with the Office of Human Resources to develop a "best in class" recruitment program of talented individuals from diverse backgrounds.

Fenn is well prepared for the challenge. She has more than 25 years of

experience in implementing diversity programs for employee development with such companies as Kraft Foods, Sara Lee Corporation, and Quaker Oats Company. She designed and launched diversity and inclusion tools, including "The Development Ladder Game," "Reel-Time Scenarios," and "Diversity Fairy Tales for Business Professionals."

She has been recognized by the NAACP, YMCA, United Negro College Fund, and Walmart for her contributions to diversity and inclusion.

George Berzsenyi Gets MAA Award

Former Department of Mathematics Chair George Berzsenyi has received the Mathematical Association of America's (MAA) lifetime award for distinguished service to the international mathematics community. He was nominated by his former students.

During his career, Berzsenyi served on several MAA math competition committees, led the American Invitational Mathematics Examination for its first six years, and founded the USA Mathematical Talent Search, which identifies math talent and develops

Homework Hotline Turns 25

Partners with Penn State Campuses

Homework Hotline tutors are blowing out candles this spring as the groundbreaking tutoring service celebrates its 25th anniversary and third educational partnership, further strengthening its role as a national model in helping youths understand math and science.

Penn State University's branch campus in Berks, Pennsylvania, has announced plans to replicate aspects of Rose-Hulman's free tutoring service this fall, with campuses in New Kensington and Schuylkill following in the future. Representatives from the three campuses visited Rose-Hulman to learn the basics about the hotline's operations and observe firsthand tutors answering calls in the communications center.

Rose-Hulman's Homework Hotline has also been adapted for use by Harvey Mudd College in Claremont, California, and the University of Southern Illinois-Edwardsville.

"This is another shining example of how Rose-Hulman, our enterprising students, and our faculty and staff members are helping improve math and science education," says Homework Hotline Director Susan Smith Roads.

The hotline, with Lilly Endowment Inc. support, has helped more than 500,000 Indiana students since the spring of 1991, through tutoring via toll-free phone calls (1-877-275-7673), emails, and online resources (www.AskRose.org). More than 30 students are available between 7 p.m. and 10 p.m. each Sunday through Thursday, from September through May.

students' problem-solving skills. He also was a popular columnist for the *Consortium* and *Quantum* math journals.

At Rose-Hulman, Berzsenyi initiated the Al Schmidt Freshman Math Competition, the Technical Report Series, and a study abroad program to showcase student scholars during his decade on the math faculty. He is the father of alumni Eric Berzsenyi (ME, 1992) and Daniel Berzsenyi (ME, 1994), and father-in-law to alumna and trustee Agnes Berzsenyi (MSME, 1995).



Keep up on latest campus news at www.rose-hulman.edu

Hipster Students, Alumni Help Discover Better Orthopedic Replacements



Students used the Orthopedic Biomedical Engineering Laboratory on campus to determine the optimal shape for hip replacements provided to people whose original hip replacements have failed.

STORIES BY
ARTHUR FOULKES
PHOTOS BY
BRYAN CANTWELL

Rose-Hulman students' biomedical engineering skills are improving people's lives by helping medical device makers develop products for those struggling with debilitating hip problems.

In one study, students evaluated hip designs for use when a patient's original replacement has failed. In another, they helped determine the optimal length for hip replacement stems.

"We conducted a study across a wide range of stem shape options to determine what combination of factors led to the most stable implant," says Scott Small (ME, 2005/MSBE, 2007), engineering director for the Joint Replacement Surgeons of Indiana (JRSI) Research Foundation of Mooresville, Indiana. The Orthopedic Biomedical Engineering Laboratory, located in John T. Myers Hall, is a collaboration between JRSI and Rose-Hulman.

A new hip stem, introduced by Exactech of Gainesville, Florida, based on the students' work, has been approved by the Food and Drug Administration, and is in the pilot-launch phase with doctors in Indiana and New York.

"Our work with Rose-Hulman was critical in the development of this product, which is now helping patients throughout the world. The Rose-Hulman team was thorough, insightful, timely, and very professional," says Jeff Pierson, an orthopedic

surgeon with the Franciscan Medical Group in Indianapolis and JRSI Research Foundation.

"I learned the fundamentals of how the total hip replacement works," says Ryan Seale (BE, 2015), who worked on the project and is now a clinical research specialist for Zimmer Biomet, a medical device manufacturer in Warsaw, Indiana. "It also showed me that what I was learning matters and can make a difference in people's lives."

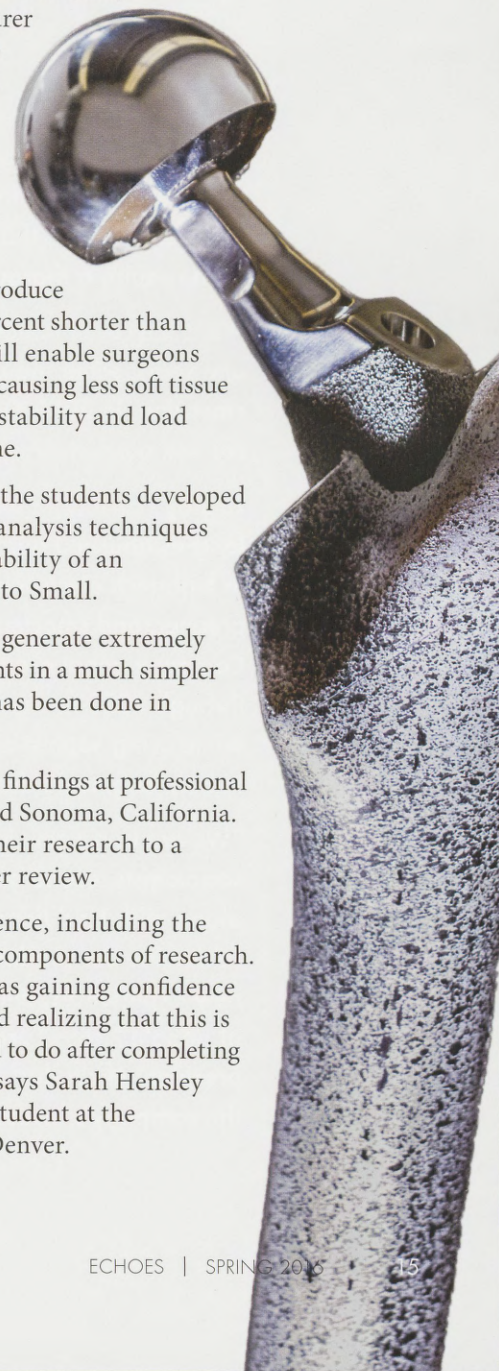
Zimmer Biomet used recommendations from another student team to introduce a new hip stem that is 36 percent shorter than the original design. This will enable surgeons to make smaller incisions, causing less soft tissue damage, while maintaining stability and load distribution within the bone.

Key to this project was that the students developed a novel approach to image analysis techniques to study the motion and stability of an implanted stem, according to Small.

"This method enabled us to generate extremely precise stability measurements in a much simpler and efficient manner than has been done in previous studies," he says.

The students presented their findings at professional conferences in Las Vegas and Sonoma, California. They have also submitted their research to a professional journal for peer review.

"I gained hands-on experience, including the design, test, and validation components of research. Most important, though, was gaining confidence in my engineering skills, and realizing that this is the type of research I wanted to do after completing my Rose-Hulman degree," says Sarah Hensley (BE, 2015), now a graduate student at the University of Colorado in Denver.



STORY BY
ARTHUR
FOULKES
PHOTOS
COURTESY
FORD
MOTOR CO.

ELECTRONIC INNOVATIONS: **TONY COOPRIDER** LEADS FORD MOTOR COMPANY THROUGH HIGH-TECH REVOLUTION

Cars are such an integral part of America's culture that it's hard to imagine what life was like before they were parked in nearly every driveway across the country. And, that century-old relationship may soon require a thorough rethinking.

While the car of tomorrow may still have doors, tires, and seats, some radical design changes are already emerging. In 2014, Google introduced a driverless car without a steering wheel, gas pedals, or brakes.

To stay relevant in this rapidly changing market, long-established automakers are investing heavily in high-tech electronics, making their cars safer, greener, and smarter. In December, Ford Motor Company announced it would invest \$4.5 billion through 2020 in electric vehicle development, while using sophisticated social science research to help engineers design the car of the future.

"We are using new insights from anthropologists, sociologists, economists, journalists, and designers, along with traditional business techniques, to reimagine our product development process, create new experiences, and make life better for millions of people," says Ford's Raj Nair, executive vice president of product development, in announcing the company's investment in technology.

Tony Coopriders first job was as electrician/plumber's assistant in Clay City, Indiana. He recalls the "dirty look" he got when he asked for \$3 per hour, as opposed to the then-going wage of \$2 per hour. The 1986 electrical engineering alumnus is now a senior electrical engineer at Ford Motor Company.





Voice command, stay-in-lane technology, collision warning, and parallel parking assistance are just some of the smart features becoming standard equipment in modern cars. "People want these things. They demand them," says alumnus Tony Coopridner (EE, 1986), a senior engineer with Ford Motor Company.

This movement excites Tony Coopridner (EE, 1986) and other Ford engineers. As senior technical leader of vehicle electronic engineering systems, architecture, and hardware design, Coopridner is a key player in the automaker's quest to design tomorrow's trucks and cars. He holds the most senior technical specialist leadership position within Ford's global electrical organization, which focuses on technology strategy, technical implementation, and technical workforce development.

"The industry is really transforming," Coopridner says from his office at Ford's Dearborn, Michigan, headquarters. In addition to making vehicles energy efficient, technologically advanced, and safe, "we need to make cars that are also fun to drive. The experience we create for our customers has to exceed their expectations."

DRIVING THE TECHNOLOGY

While cars have gotten much smarter in recent years, they've also become advanced technological machines. Many come equipped with sensors to warn drivers of a possible collision, detect low tire pressures, provide onboard navigation, and connect to the Internet. Some of these features are now standard equipment on nearly all models.

"Vehicle electronics and software technologies have just exploded," Coopridner says. "People, our customers, want these things. As consumer electronics have fueled the technology revolution, our customers demand the same from automobiles."

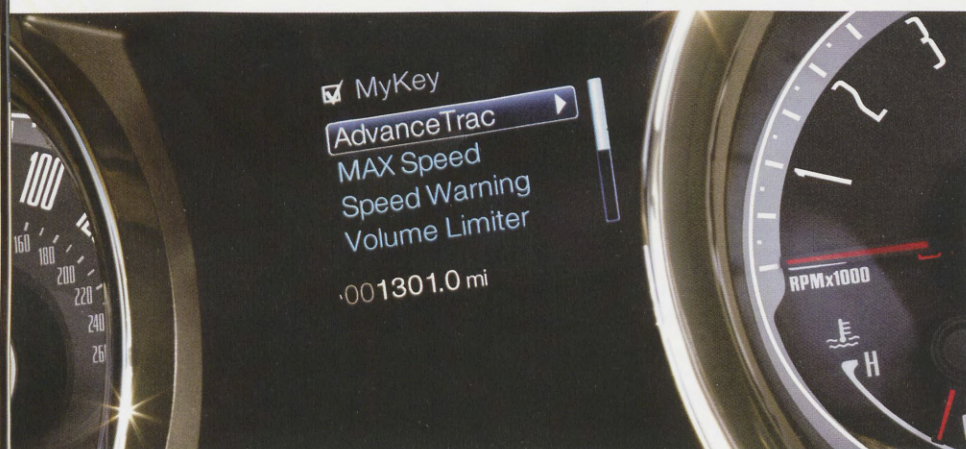
(CONTINUED ON NEXT PAGE)

TECHNOLOGY TUNE-UP

(CONTINUED FROM PREVIOUS PAGE)

Technological features inside new cars include voice-recognition technology that allows drivers to tell their cars to activate the navigation system, lock the doors, or adjust the interior climate. Ford's SYNC® technology helps drivers keep their eyes on the road and their hands on the steering wheel as they access smartphone apps, make telephone calls, select music on the radio or MP3 player, and get directions to their next destination, such as a restaurant or sports venue. Other new forms of technology provide automatic parallel-parking assistance, recognize traffic signs, and prepare the vehicle in case of an impending or potential crash. "The car is preparing for a collision, even if you [as the driver] don't react," Coopriders says.

As people have grown more dependent on their smartphones and tablets, they don't want to abandon those connections just because they are driving.



Electronic Systems in automobiles have grown dramatically since Tony Coopriders (EE, 1986) joined Ford Motor Company in the 1980s. He was one of 40 electrical engineers on the new electrical systems engineering staff when it was created in 1991. He's now the most senior technical specialist of the automaker's 2,300 electrical and software engineers.

Coopriders notes. New technology allows motorists to use smartphones to locate a parked car, remotely start a car's engine, and check an electric vehicle's battery charge level. "People want to plug their cars into the Internet of Things," he says.

Over the next 10 years, Coopriders believes that automotive innovation will center on cars becoming even more autonomous. In some urban settings, autonomous vehicles might be used to provide transportation as a service. That includes serving people who don't own a vehicle. "The changes have been dramatic up to this point," Coopriders says. "But, the future will have all sorts of things we haven't even thought of yet."

FROM HUMBLE BEGINNINGS

Growing up on a Clay County, Indiana farm, Coopriders was the first in his extended family to attend college. He developed a childhood interest in electronics thanks in part to his parents' ham radio hobby.

"I was just fascinated by that stuff," he recalls, adding electrical engineering especially appealed to him because of its heavy use of mathematics. While in high school and in college, he learned more about electricity as a part-time assistant to a professional plumber/electrician in Clay City, Indiana.

Despite his fondness for math, Coopriders was not too keen on standardized mathematics exams, a fact reflected on his college entrance exam scores. However, a high school counselor convinced former Rose-Hulman mathematics professors Alfred Schmidt (ME, 1949) and Dale Oexmann (MA, 1962) to devise

a math test just for Coopriders. "It was a real math test," the Ford executive recalls. "I crushed it."

Next, during a personal interview, Oexmann and Schmidt quizzed Coopriders with a series of math questions, challenging his problem-solving skills, and queries about how he spent his spare time. "They were testing me," Coopriders recalls. "They knew, if you didn't have a work ethic, you wouldn't survive [at Rose-Hulman]."

As a Rose-Hulman student, he had his first experience with Ford as a summer intern in 1985, before returning after graduation the following year instead of attending graduate school to study electromagnetics. "I was flat broke," he says. Later, at the urging of a Ford senior

executive, he returned to school while continuing his career, and obtained a master's, Ph.D., and MBA over the next several years.

Today, Coopriders is clearly proud of Ford's legacy as he works to help the company adapt to a rapidly changing automotive market. He is also proud that Ford has a heritage of making sophisticated technology affordable for the average motorist.

"We want to make sure this new technology is not limited to high-end cars," Coopriders says. "That's something that goes back to the company's founding, to Henry Ford and his Model T. It's in our culture. It's part of our DNA."

X-Man: Lifelong Interest in Rockets Lands Steven Schmitz at SpaceX

STORY BY
ARTHUR
FOULKES
PHOTOS
BY BRYAN
CANTWELL



Few things compare to the anticipation and excitement of a rocket launch. There's the countdown, the thundering roar of the engines, and the steady lift-off of the towering space vehicle.

Steven Schmitz (ME, 2007) has witnessed all of these experiences up close, with the added satisfaction of knowing he helped make them happen for SpaceX, a private rocket and spaceflight company headquartered in California.

"It's just as cool as it sounds," he says.

As a senior manager of avionics mechanical engineering at SpaceX, Schmitz manages the design, analysis, and integration of secondary structure supporting avionics across the company's family of vehicles. He also played a key role in the initial development of SpaceX's Falcon 9 rocket.

"I originally wanted to be an astronaut, like pretty much every kid my age," Schmitz recalls. "As I grew up, I realized that it would be way more fun to build rockets than to fly them, and my dream shifted to becoming an aerospace engineer."

Steven Schmitz (ME, 2007) visited his alma mater last fall to recruit promising new engineers for SpaceX. "I get to sift through this fantastic pool of talent [at Rose-Hulman] and pull in rock stars to join us," he says.

Growing up in Mequon, Wisconsin, Schmitz's family played an important role in his future career. His family's trips would purposefully involve stops at museums and other sites of interest to him, such as the Smithsonian Air and Space Museum in Washington, D.C., and NASA's Cape Canaveral spaceflight launch center in Florida.

"My father would set aside an hour almost every night with me and we'd go downstairs and build model airplanes and model rockets," Schmitz remembers. His grandfather made another important contribution by giving him a drafting kit. "I think I was only 6 years old at the time, but I spent a ton of time drawing pictures and cutaways of spaceships and airplanes."

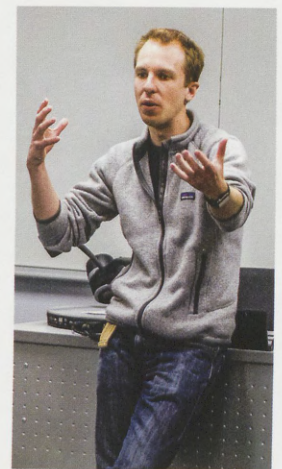
Schmitz learned to juggle complex engineering problems as part of Rose-Hulman's Design/Build/Fly model aircraft competition team. That was a valuable lesson paving the way for much of his career success.

"Taking the [Design/Build/Fly] project through the design process, from concept to design, to fabrication, and, finally, to test and competition, was a dry run for the work I do at SpaceX," he says.

Schmitz is one of several alumni who have landed careers at SpaceX. Others include Leslie Cottingham (ME, 2008) and Jeffrey Van Treuren (ME, 2010).

For Schmitz, working for SpaceX has been a perfect fit.

"SpaceX excited me because they weren't messing around," he says of his original interest in the company. "They have these massively ambitious goals—such as someday going to Mars—and they are building the hardware necessary to make these goals a reality."



Experience with Rose-Hulman's Design/Build/Fly team helped Steven Schmitz (ME, 2007) prepare for his current role at SpaceX

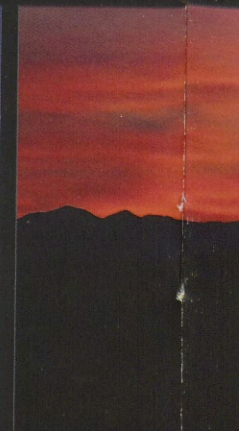
PLANES TRAINS & HORSES



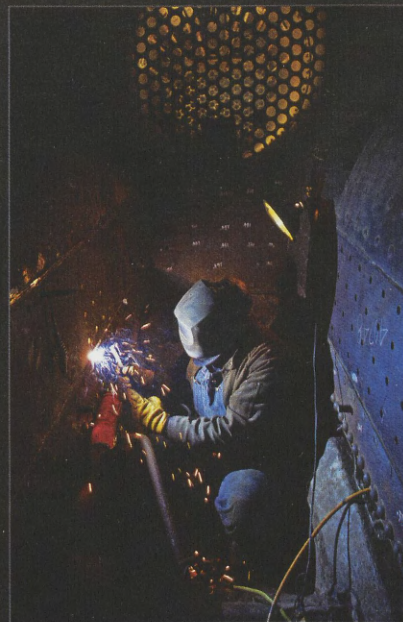
BY **DAVID HONAN**
CIVIL ENGINEERING, 2005

Seeing things from a different perspective was the focus of a photography course taught by Rose-Hulman Art Curator Steve Letsinger. David Honan gravitated to those lessons during his sophomore year, and has been expanding his views through the camera's lens ever since. His longtime passion for trains and bridges inspired his career as

a transit project engineer with HDR Engineering in Seattle. David's transportation photography has been featured in *Trains* magazine and the American Society of Civil Engineers' annual calendar. He has spent time during the past two years documenting the restoration of an 1899 Northern Pacific steam locomotive for the Northwest Railway Museum, where he serves on the board of trustees. Now, David has been expanding into other subjects, especially horses (a passion of his wife, Cortney) and airplanes. "I quickly learned that working with horses is much more difficult than trains, because their motions are to a large degree unpredictable. Also, unlike with a mechanical subject, animals have individual personalities, and capturing that aspect is critical to allowing viewers to connect with the subject," he says. With regard to airplane photography, he observes that "it's fun to find ways of composing aviation photos that aren't simply 'plane in the sky,' but incorporate ground elements to provide context." David's photograph at left has been selected as a finalist in the Smithsonian Institution's 2015 Air & Space Photo Contest.







Building Bridges to Span a Lifetime

STORY
BY DALE
LONG



Arik Quam



Arik Quam has joined fellow civil engineers in bringing technical expertise to manage several large-scale projects that are strengthening America's aging transportation infrastructure system.

As senior project manager for bridge industry leader Walsh Construction Company, the 1996 alumnus is leading the development of a \$892-million bridge-building and interstate improvement project in Louisville, Kentucky; is actively involved in a \$899-million project to replace hundreds of bridges throughout Pennsylvania; and has completed three new bridges utilizing steel-tied arch, cable stay, and cast-in-place segmental building techniques.

"The infrastructure industry continues to have a tremendous need from all levels of civil engineers in the design and construction sectors of the industry," Quam says.

And, each project presents its share of design and technical challenges.

For instance, the mighty Ohio River showed who was in control as Quam's team (nearly 100

management staff) worked on components of a new three-tower cable-stay bridge, and the significant rehabilitating of the truss-based John F. Kennedy (JFK) Bridge—both vital links between southeastern Indiana and Louisville. Seasonal flooding and swift currents caused numerous safety concerns, with employees sometimes working within 50 feet upstream of the existing JFK Bridge, providing little room for error.

Aspects of that same project, including reconstructing a large complex urban interstate interchange system (three highways carrying 200,000 cars daily), have put an enormous strain on the region's construction resources, requiring an intricate network of skilled trade workers, subcontractors, and suppliers. The four-year-long project is on schedule to be completed this December.

Another Quam-led project, the Blennerhassett Bridge at Parkersburg, West Virginia, was an 898-foot-long steel-tied arch bridge with inclined hangers that spans the Ohio River and Blennerhassett Island.

"Different challenges certainly lead to things never getting stale, and new projects certainly keep the scenery changing," he says. "It is the innovative technical solutions to support the bridge that provide opportunity for some creative solutions."

The evolution of public-private partnership projects is a major change in the infrastructure marketplace. Walsh Construction is working with the Pennsylvania Department of Transportation, other contractors, and private investors for the design and complete reconstruction of 558 structurally deficient bridges throughout Pennsylvania during the next two years.

"Bridge-building materials also continue to evolve and get stronger," says Quam from Walsh Construction's offices in Pittsburgh. "Fiber, galvanized, and even stainless reinforcing are being used to eliminate corrosion, allowing the infrastructure of today's bridges to have a 100-year useful life and beyond."



RANCH HAND

**COMPUTER GAME DEVELOPER
MIKE THOMAS LASSOS SUCCESS
WITH 'SLIME RANCHER'**

Since a moving square of light on a TV screen first captivated people playing Pong in 1972, the fantasy world of video games has grown dramatically. From humble beginnings, "gaming" has evolved into a \$20-billion industry offering increasingly sophisticated and realistic-looking alternative universes where people, especially youths, spend countless hours of their days and nights.

Slime Rancher is making a notable splash in this hyper-competitive business since its release in January by gaming veterans Mike Thomas (CS, 2000) and Nick Popovich. Their game takes players into a make-believe world many light years away to eke out a living rustling "slimes," cute little creatures that look like bouncing water balloons.

Rustling up "slimes" is the object of Slime Rancher, a new computer game released by Mike Thomas (CS, 2000) and a business partner. The game has received a thumbs-up from the often-finicky gaming community.

"It's very different from anything else that's out there," Thomas says about reasons for Slime Rancher's success. "We wanted to make something that was very different."

Slime Rancher has earned an "overwhelmingly positive" rating from thousands of reviewers who critiqued the game on Steam, an online game store. That's rare. Many games achieve only "positive" or "very positive" reviews.

So what makes Slime Rancher, or any video game, a hit?

"There's no global secret that I know of," Thomas says. Slime Rancher benefits, he believes, from being nonviolent and appealing to gamers of all ages. But, at the end of the day, "the market is fickle. You never know what people are going to latch onto."

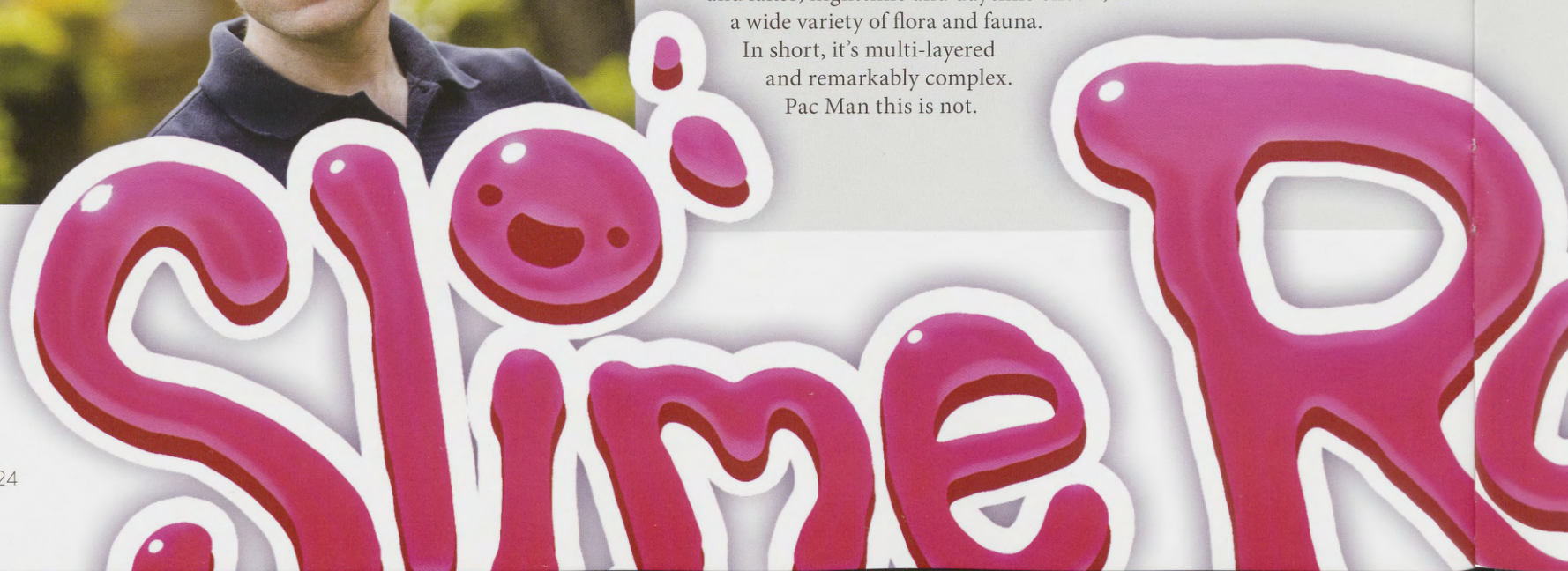
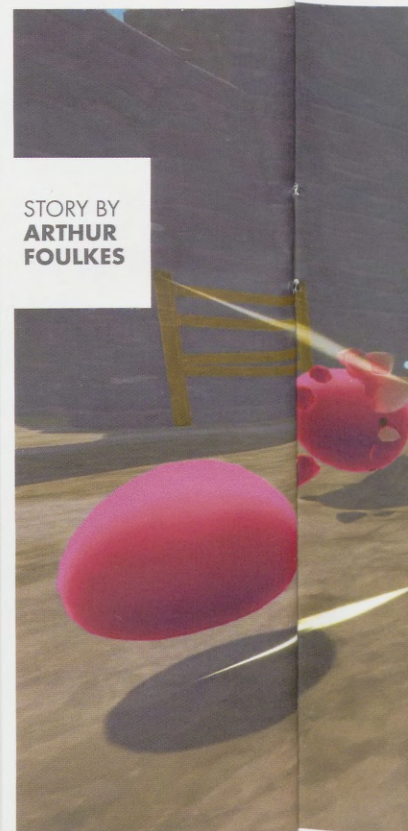
Slime Ranchers' players have become so enthused with the game that they have uploaded videos, available on YouTube, about their game-playing experiences.

"This is the happiest game ever made," declares one neon-haired enthusiast whose Slime Rancher YouTube video has received an eye-popping 2.5-million views. Like other reviewers, this gamer is charmed by the "adorable" slimes he is rustling.

Slime Rancher is a single-player game where the object is to suck up slimes using a "vacpack" and then deposit the slimes into corrals, where they produce valuable gems called "plorts." These nuggets can be sold for cash, enabling the rancher to purchase all sorts of useful accessories, including new pens for slimes, or property for growing food or raising chickens. The game includes an alluring landscape of cliffs, canyons, and lakes, nighttime and daytime effects, and a wide variety of flora and fauna.

In short, it's multi-layered and remarkably complex. Pac Man this is not.

STORY BY
ARTHUR
FOULKES





"Playing the game seems to give you a positive feeling," says Thomas, further trying to pin down Slime Rancher's popularity. "The art direction turned out really well." At first, he and Popovich worried the slimes might be too cute, "but we have yet to run into that."

Thomas, who worked for five years after graduation for Lockheed Martin in New Jersey, moved to California in 2005 to enter the gaming industry as a game engineer at Three Rings Design. He used his background in computer science and artificial intelligence (from a master's degree) to contribute to such popular games as Puzzle Pirates, Doctor Who: Worlds in Time, and Super Monkeyball: Bounce. He is now the software engineer for Monomi Park, the San Mateo-based company he and Popovich founded in 2014. Popovich is the company's artist and game designer.



Although Slime Rancher is ready for purchase (\$19.99), the game is in the early release stage, with Monomi Park continuing to make improvements and additions to the game. Then, Thomas and Popovich will start working toward development of their next game.

The gaming industry is changing rapidly, according to Thomas. Some games are now offered "free to play," but require purchasing upgrades and enhancements once you've been hooked into playing. Others are designed for very superficial engagement on the part of the player, requiring only occasional interaction. Neither of those trends appeal to Thomas, who sought the independence of his own company.

Growing up, Thomas enjoyed video games, and one of his favorites was the Legend of Zelda (1986), a game that involved exploring a magical kingdom. Slime Rancher is also about exploring a strange and magical world, with the added intrigue of making a living as a farmer and rancher.

"You wish you could walk around in it," Thomas says of the Slime Rancher experience. "We're very happy with how it has turned out."

Slime Rancher

Mixing Engineering and Business to Deliver Solutions

STORY BY
ARTHUR
FOULKES

Add Mike Jacobs to the list of Rose-Hulman alumni who have never worked as an engineer.

However, skills gained in earning a chemical engineering degree have helped Jacobs sort out complex business problems for 25 years as a management consultant for companies around the world. He is currently vice president and chief procurement officer for Staples Inc., helping the office-supply giant find its way in a rapidly changing and competitive marketplace.

When facing a new business challenge, Jacobs often visualizes a process flow diagram he first encountered in a Rose-Hulman classroom. "That mental image comes back to help me better understand the problem," says the 1979 alumnus. "I think my engineering education has really served me well."

Staples, a multi-billion-dollar company with close to 2,000 locations in more than two dozen countries, is just the latest stop for Jacobs, an Ohio native who was the first in his family to attend college. As a procurement specialist, he often finds himself at companies going through serious challenges, such as Eastman Kodak, which he helped steer through Chapter 11 bankruptcy restructuring earlier this decade.

During the past two years, Jacobs has helped Staples cut its external costs through procurement savings, putting the company



in a stronger position to adapt to an evolving marketplace and expand an online ordering process linked to store pickup locations.

After graduating from Rose-Hulman, Jacobs joined Procter & Gamble as a production team manager. He then took a position at Kimberly-Clark before leaving to earn an MBA in economics and finance from the University of Chicago's Booth School of Business. That business degree, combined with his engineering education, turned out to be a magic combination that has opened doors to interesting and challenging professional opportunities in 50 companies around the world during the past 25 years. He spent an eight-year stint living in London as a

Mike Jacobs (CHE, 1979) is vice president and chief procurement officer for Staples, Inc., a multi-billion-dollar office supply company with close to 2,000 locations in more than two dozen countries.

vice president and partner with A.T. Kearney, a leading global management consultancy.

Engineers who obtain a strong business education "find the world is their oyster," says Jacobs, who advises people to take risks throughout their careers. He left a good-paying job to earn his MBA, and he disregarded a lot of well-meaning advice by moving to Europe. Both decisions greatly enriched his life and his career, he says.

"Serendipity plays a role in where you'll end up. Don't worry about planning out everything," he says.

Bailey

Challenge

BY PROFESSOR EMERITUS
HERB BAILEY



My wife and I are slowing down a bit (first derivative negative, second derivative zero) and have moved to a retirement village in Avon, Indiana. (Note the change of address below for those who mail in their solutions). There were more than 90 solvers of the Winter Challenge! Let's shoot for 100 or more in this challenge.

SPRING PROBLEM 1

A truck has a 15-gallon fuel tank, gets 30 miles per gallon, and takes a trip at 45 miles per hour. The fuel tank leaks gas at a constant rate. It starts a trip with a full tank and runs out of gas after 270 miles. Find the leak rate.

SPRING PROBLEM 2

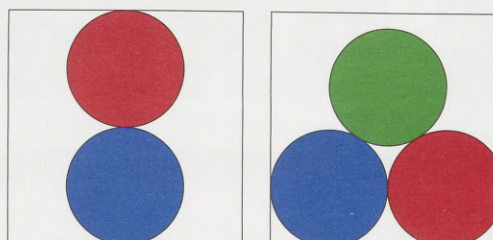
The sum of the digits of a two-digit number is 10. If the digits are reversed, then the new number exceeds the original number by 36. Find the original number.

SPRING BONUS PROBLEM

A square is to enclose non-overlapping unit circles (radii equal one) and you are to find the smallest such square. Examples are shown for squares enclosing two and three circles, but smaller squares are possible.

First, find the smallest square for two circles. Then, find the smallest square for three circles.

There will be full credit for basing your answers on the correct guesses, and extra credit for providing proof of your solutions.



SOLUTION TO THE WINTER BONUS

The only solution in the case $N = 4$ is $\{2, 1, 2, 0, 0\}$ and we gave full credit for this answer and extra credit for the assortment of ingenious proofs of uniqueness from some solvers. First, note that $S = a_0 + a_1 + a_2 + a_3 + a_4 = 5$ and also $T = a_1 + 2a_2 + 3a_3 + 4a_4 = 5$, since these are two ways to find the sum of the a 's.

We now show that $a_3 = 0$. If $a_3 > 0$, then at least one of the other a 's must be 3. This "other a " cannot be a_1 , a_2 or a_3 , since T would then be greater than 5. If $a_3 = 0$, then the sequence would be $\{3, 0, 0, 1, 0\}$ and $S \neq 5$. Similar calculations show that $a_4 = 0$. Thus the sequence is $\{a_0, a_1, a_2, 0, 0\}$ and a_0 cannot be 3 or 4, but must be at least 2, so $a_0 = 2$. The sequence is then $\{2, a_1, a_2, 0, 0\}$, where a_1 and a_2 cannot be 0, 3 or 4. Also, $a_1 \neq 2$, since there would be no place for two 1's. Hence, the only possible sequence is $\{2, 1, 2, 0, 0\}$.

Send your solutions to Herb.Bailey@rose-hulman.edu or to Herb Bailey, 6990 E. County Road 100 N., Apt. 207, Avon, IN, 46123. Alumni should include their class year.

Congratulations to the following solvers of the winter problems:

ALUMNI: J. Moser, 1956; H. Brown, 1957; P. Cella, 1958; D. Bailey, 1959; J. Dhooge, 1960; J. Kirk, 1960; R. Archer, 1961; R. Ireland, 1961; J. Ray, 1961; J. Tindall, 1961; R. Turecky, 1961; C. McCoy, 1962; S. James, 1965; B. Kevorkian, 1966; M. Bailey, 1967; J. Elzufon, 1968; R. Dutton, 1969; R. Rouse, 1969; S. Jordan, 1970; D. Jordan, 1971; G. Mells, 1971; W. Pelz, 1971; T. Nelson, 1972; R. Kominiarek, 1973; M. Marinko, 1973; B. Hunt, 1976; J. Schroeder, 1976; P. VandeMatter, 1977; T. Greer, 1978; M. Clouser, 1979; J. Slupesky, 1979; R. Joyner, 1980; S. Nolan, 1981; R. Roll, 1981; M. Taylor, 1982; J. Marum, 1983; K. Shafer, 1983; G. Kujawa, 1984; M. Saltsgaver, 1984; T. Eubank, 1985; M. Talley, 1985; D. Johnson, 1987; M. Lancaster, 1987; E. Cegielski, 1990; B. Burger, 1991; J. Harris, 1991; P. Kimmerle, 1991; C. Schlamm, 1991; R. Wilkinson, 1991; J. Zamora, 1991; K. Koziol, 1992; R. Antonini, 1993; G. Wise, 1994; K. Henley, 1995; J. Markwardt, 1995; R. Hochstetler, 1996; B. June, 1996; M. Pilcher, 1998; R. Hoerst, 2001; S. Corbin, 2002; B. Hirsch, 2004; G. Lane, 2004; B. Ross, 2004; J. Lange, 2005; S. Tourville, 2005; T. Homan, 2007; J. Krall, 2007; M. Lapsley, 2007; G. Shields, 2008; B. Shover, 2008; M. Trowbridge, 2008; K. Kragh-Buetow, 2010; D. Schoumacher, 2010; M. Schoumacher, 2010; D. Straub, 2010; B. Hopf, 2011; M. Yuhas, 2013; A. Taylor, 2015; and E. Yuhas, 2015.

FRIENDS: T. Cutaia, J. Denny, S. Hagness, D. June, L. Kulbago, T. Kulbago, J. Ley, J. Marks, L. Metcalfe, L. Morical, M. Rosene, and D. Voltmer.

PROBLEM-SOLVING FOR YOUNG & OLD

While *Echoes* is filled with articles about alumni newsmakers, this is the very first page that Harold (Hal) Brown (CHE, 1957) reads religiously in each issue. He's not alone.

Brown (above) is among a legion of fans of the interesting and amusing problems provided in each issue by emeritus mathematics professor Herb Bailey (EE, 1945).

"I remember one about the ages of people and (Bailey) personalized it by naming the people in the challenge after his daughters. In another he named one of the characters Doc Sousley (one of the institute's legendary math professors)," says Brown, who lives in DeSoto, Texas, after retiring as president of the Woodacre Corporation. He keeps his mind sharp by solving a logic-based Sudoku number-placement puzzle each morning and playing lots of bridge card games weekly with friends.

"I began solving the Challenges when Bailey started them," he remarks. "I always looked at who solved them, and a lot of them were familiar names. So, I gave it a try. Sometimes the solutions have come quickly, but most of the time I had to think about it." (He estimates solving 75 percent or more of the problems.)

On those occasions when Brown has been too busy to offer a solution, Bailey has been known to call one of his most faithful solvers. "He was just checking on me when I did not turn in my assignment," remarks Brown.

Each member of the 1995-96 women's basketball team was given a patch marking her participation in the program's inaugural season.

STORY BY
DALE LONG
PHOTOS
BY **BRYAN
CANTWELL**

HOOPS DREAMS



FROM WINLESS START, WOMEN'S BASKETBALL GROWS INTO A CHAMPION

The student-athletes scoring the first points for Rose-Hulman's women's basketball program look back at their hardcourt experiences with many special memories, but very few victories.

Losing by an average of 48.9 points per game, the inaugural team finished the 1995-96 season with a 0-20 record. There were games with more turnovers than points. Some games were completed with four players on the court, after two players had fouled out. One team member had never played basketball before stepping onto the court—not knowing how to check into the game—as the team's only reserve player.

"It was pretty rough," admits Amanda (Speich) Witter (CHE, 1999), the team's leading scorer (14.9 points per game) from the point guard position. "Getting through each game was an accomplishment. We worked hard in practice. We had fun."

Forward Becky Smith (CHE, 1999) adds, "Our goal was to not lose by a worse margin when we played an opponent the second time in that season...We knew it wasn't going to be easy, but the program had to start somewhere. It might as well have started with us."

STARTING FROM SCRATCH

Rose-Hulman wasted little time entering intercollegiate athletics in the year that also brought coeducation to the institute. Officials reviewed the applications from all of the initial freshmen, looking for prospects to field a team. Anyone with a background in athletics went to the top of the list.

Witter had put her basketball playing days behind as a high-school senior in Stillwater, Minnesota. Smith hadn't played the sport since her sophomore year in Plainfield, Indiana. Jodie (Barcus) McClure (ME, 1998) and Holli (Krumbein) Shenfield (CHE, 1999) also had limited high school hoops careers.

Jamie (Funk) Miller (CPE, 2000) had never played basketball before being invited to attend the basketball team's practices. She needed to be taught the game's fundamentals—how to dribble, shoot, and pass the basketball—and became a familiar figure on the team's lonely bench, sitting alongside President Samuel Hulbert. She managed to get on the court for 18 of the team's 20 games, playing an average of nine minutes per game.

She scored two career points, making one of her six field goal shots.

"I made a basket and the crowd went wild," Miller recalls. "The game kind of stopped for a second. The opposing coach couldn't understand all of the commotion being made toward me. She said, 'Is this the first basket you've made this season?' I replied, 'No, this is the first basket that I have EVER made.'"

And, 1995-96 was her only season on the team.

"I had my moment," Miller remarks. "Whenever I got into the game, I wanted to do well by my teammates...In the end, I played college basketball. I earned a varsity letter. I scored a basket."

Four members of the 1995-96 women's basketball team showcase the ceremonial basketballs given to the squad during the 20-year reunion. The group included (from left) Jodi (Barcus) McClure (ME, 1998), Jamie (Funk) Miller (CPE, 2000), Becky Smith (CHE, 1999), and Amanda (Speich) Witter (CHE, 1999). Team members missing were Holli (Krumbein) Shenfield (CHE, 1999) and Michelle (Eash) Query (CHE, 2000).

My name is in the Rose-Hulman basketball record book, and that's simply amazing."

Vice President for Enrollment Management and Strategic Communications Jim Goecker, the team's official scorekeeper for most home games, remarks that "we're indebted to the players on those groundbreaking teams. They laid a solid foundation for the future of athletics and coeducation."

A total of 2,200 fans attended the program's first home game, a 77-38 loss against crosstown rival St. Mary-of-the-Woods College. This annual game has become a favorite with the colleges' players and alumni, along with local sports fans.

THE TIES THAT BIND A TEAM

There were 12 players on the roster when the program claimed its first victory, 55-43 at Agnes Scott College (Ga.), in the third game of

the 1996-97 season. There would be five more wins before members of the inaugural group graduated with a 6-89 record.

"If you learn as much about yourself from losing than winning, then we learned a lot during those first few seasons," says McClure.

Picking up that point, Witter remarks, "Getting through everything put in front of us, while not experiencing the fun from winning, created lifelong friendships that we still appreciate. It would have been so easy for us to quit, but we didn't."

Those valued relationships brought 18 Fightin' Engineers women's basketball alumnae back to campus for a celebration of their shared experiences. They also enjoyed the record-setting success of this season's team.

"We all appreciate the blood, sweat, and tears that go into a winning sports team," says Amanda (Rice) Plance (EE, 2001), a three-year starting player. "Our teams had a family-oriented attitude, just like the rest of the college. We respected each other and the efforts we all put forth on and off the basketball court."

Twenty years after the inaugural season, the present-day Fightin' Engineers spent this winter winning a school-record 23 games and tying for the Heartland Collegiate Athletic Conference regular-season championship (another program first). The team also won 18 straight games and earned respect in the NCAA Division III national and regional rankings.

"What we started has now turned into something special," says McClure.



Watch players discuss memories from the inaugural basketball season at www.rose-hulman.edu/hoopsdreams

CLASS NOTES

60s

Charles E. Webb (EE, 1967), president of The Webb International Group, is author of *Downfall and Freedom: A Novel about the Arms Trade, South Africa, and the KwaZulu*. Webb worked 40 years in the global electrical, mining, petroleum, and safety industries. He lives in Allen, Texas.

70s

John W. Phipps (CHE, 1970) has retired after hosting the U.S. Farm Report television show since 2005. He has returned to his farming roots in east-central Illinois and writes humor and commentary articles as contributing editor for *Farm Journal* and *Top Producer* magazines.

Stephen L. Koss (MA, 1973) has authored *Beautiful Su: A Social and Cultural History of Suzhou China* (China Books), a general-interest book about the Chinese city located 50 miles west of Shanghai. He resides with his native Suzhounese wife of 12 years in New York City, while maintaining an apartment in Suzhou's New District.

Dennis W. Colvin (CS, 1974) was featured in the November issue of *QST*, the ham radio magazine, for his work with Internet remote control systems, like the Apple Watch, to operate his ham radio station through a concept known as "WristRig."

Richard C. Haut (ME, 1974) has been named a distinguished member of the Society of Petroleum Engineers. He is a senior research scientist at the Houston Advanced Research Center, where he serves as the program manager for energy and environment projects.

Gary A. Eck (EE, 1978) co-founded Eck-Mundy Associates, a company in Jasper, Indiana, specializing in computer and telephone technologies for small- and mid-size business, government, and non-profit organizations. He formerly was chairman of the IEEE's Evansville/Owensboro (Kentucky) section.

Michael W. Huff (CHE, 1978) has become industry and operations partner in Arsenal Capital Partners, a leading New York-based private equity firm investing in middle-market specialty industrials and health care companies. He has extensive experience working in senior operating positions with Citadel Plastic Holdings, Inc. (since 2008), Johns Manville Corporation (2003 to 2007), and GE Plastics (1982 to 2003). He began his career with Diamond Shamrock.

Thomas R. Burtzlaff (CHE, 1979) is using his engineering background, combined with more than 25 years of large corporate experience, in a new start-up,



CMIT Solutions of Columbia (South Carolina). He spent 10 years as vice president and general manager with Arcade Beauty.

80s

Dan E. Wolodkiewicz (ME, 1982) has been named a member of Equity Services' Circle of Excellence, given to the nation's top-25 investment advisory representatives. He is a certified financial planner with Pinnacle Financial Associates, working out of an office in Beavercreek, Ohio.



Eugene J. LeBoeuf (CE, 1985) has been named vice provost for academic affairs for Army University, a new office providing oversight to all U.S. Army training and education institutions. He has been recalled to active duty at Fort Leavenworth, Kansas, after serving as professor of civil and environmental engineering at Vanderbilt.

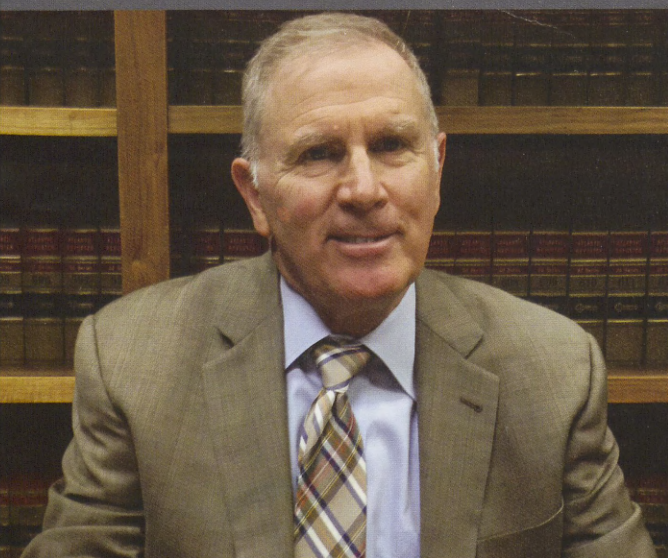


Elzufon Soars with Delaware's Top Legal Eagles

Knowledge of science and mathematics principles have helped **John A. Elzufon (CHE, 1968)** provide the keen legal defense skills needed to win complicated medical, legal, and accounting malpractice cases. This has earned him respect among his peers, and the honor of being named one of Delaware's top lawyers for 2015 by *Delaware Today*. It is the third time he has been recognized by the organization.

Elzufon is the senior litigator and managing director of the Wilmington, Delaware-based law firm of Elzufon Austin Tarlov and Mondell, P.A. He specializes in complex defense cases involving professional liability, product liability, bad faith, commercial and construction defect litigation. He is best known for representing health-care providers, and has handled more than 500 cases, taking nearly 100 of these cases to jury verdict or bench decision.

"Attention to detail is the key in any legal matter," he says. The Newark, New York, native used his engineering skills as a lieutenant in the U.S. Army Corps of Engineers (1969-1970), and earned a law degree from Georgetown University Law Center (Washington, D.C.) in 1974. He started his law firm in 1982 and it now has three offices throughout Delaware.



King Gives Back to Those Who Helped Him Succeed



Christopher M. King (CE, 2002) is proving author Thomas Wolfe wrong: You CAN go home again.

Early in his engineering career, King returned to his central Indiana roots to help make Shelby County and Shelbyville a model for community development, workforce training, and educational programs, creating the next generation of leaders in science, technology, engineering, and mathematics (STEM).

Those efforts have led to the 35-year-old being named one of the *Indianapolis Business Journal's* 2016 Forty Under 40 and recipient of Shelby County's Citizen of the Year Award.

King is a part owner and executive vice president of Runnebohm Construction Company, an industrial and general contractor in Shelbyville. Since 2012, he has led many of the company's community economic development projects in Franklin, New Castle, and Shelbyville. Each project has helped attract jobs and millions of dollars in community investment.

He was president of the Shelby County Chamber of Commerce in 2015; has led the Mainstreet Shelbyville organization; and forged a partnership between Rose-Hulman and the community that's providing technical expertise to local businesses, nurturing community entrepreneurial startup activities, and encouraging students to explore STEM careers.

Richard A. Correll (CHE, 1986) has been promoted to Rear Admiral Lower Half in the U.S. Navy, and has been assigned as the joint and fleet operations officer for the Atlantic fleet command operations center, based in Norfolk, Virginia.

Richard J. Payonk (CHE, 1986) has been appointed executive director of the United Way of the Wabash Valley (Terre Haute, Indiana), an organization he supported as a volunteer in his hometown. He retired in 2015 as manager of SG Solutions' production facility in West Terre Haute, Indiana.

Robert M. Conroy (EE, 1987) is the new vice president of state regulations and rates for Louisville Gas and Electric Company (LG&E) and Kentucky Utilities Company. A LG&E employee since 1987, Conroy is responsible for development and implementation of the state regulatory strategy of the company. This includes maintaining compliance with applicable statutes and regulations at the state and local levels and managing the LG&E's rates and regulatory function.



Kris Zadlo (EE, 1989) helped the energy storage company Invenergy earn the 2015 Innovation Award from the Energy Storage North America organization. He led the project to develop the Grand Ridge Battery Storage Facility in LaSalle County, Illinois. Zadlo is senior vice president of regulatory affairs, storage, and transmission at Invenergy.



90s

Barry T. Schneider (ME, 1990/MSEM, 2011) has been promoted to senior vice president of Steel Dynamics' flat roll steel group, being responsible for two steel mills and eight coating lines with annual capacity of approximately 7.2-million tons. He had been vice president overseeing the company's engineered bar products and Roanoke Bar steel divisions.



Jerry E. Harris (CE, 1991) has been named head football coach at Pusch Ridge Christian Academy in Tucson, Arizona, after serving as a long-time assistant. The 2015 team won the Arizona Division IV state championship. He has been executive vice president of Tucson-based Southwest Energy.

Robert J. Broadhead (CS, 1993) has co-founded IT 4 Recruiters, a company bringing more talent to the information technology industry, while also owning RB Consulting. He has more than 20 years in developing enterprise systems on a variety of system architectures and platforms.

Kurt A. Johnson (ME, 1994) received Rose-Hulman's Jess Lucas Alumni Leadership Award as a former residence life staff member making a positive impact on career and life. He is a marketing manager in Boston Scientific's cardiac rhythm division in Minnesota.



WE WANT YOUR NEWS!

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alumniaffairs@rose-hulman.edu

Kenneth Reid (MSEE, 1994) received the American Society of Engineering Education's 2015 William Elgin Wickenden Award for co-authoring the judged best paper in the *Journal of Engineering Education*. Reid is assistant department head for undergraduate engineering programs at Virginia Tech.

Kenneth J. Hanley (CHE, 1995) is the global technical director of 3M Corporation's advanced materials division, based in Maplewood, Minnesota.

Wesley O. Hamilton (ME, 1996) has been promoted to senior project engineer with General Motors' Allison Transmission operations. He is leading the development of a hybrid propulsion system for urban transit buses.

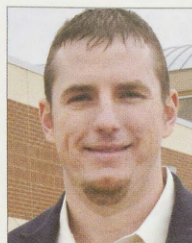
Nathaniel J. Jenniges (EE, 1998) is the senior director product manager within Intel Security Group, leading global teams across multiple product lines.

Rahul L. Iyer (ME, 1999) is a new senior project engineer for Honeywell's operations in the Phoenix area. He formerly was a contract engineer with Nammo Talley.

Doris Woo (CS, 1999) is a trainee solicitor with Browne Jacobson LLP, a top-50 United Kingdom-based law firm. She completed her first six-month seat with the commercial/intellectual property team, working on patent and trademark infringement trials.

00s

Patrick C. Grace (EE, 2000) is the new chief executive officer and general manager of the Oklahoma Electric Cooperative, a member-owned utility based in his hometown of Norman, Oklahoma. He has spent his entire professional career with the company, previously serving as vice president of engineering and assistant manager.



Shaun D. Lindley (CHE, 2000) is in charge of all USA business activities as vice president of sales for Spirax Sarco, a leader in products and services for steam system solutions. He previously had sales positions with Newman Hattersley and IML.

Jeffrey R. Scott (CE, 2000) is program manager of Peloton Land Solution's office in Austin, Texas, leading the growth of business site projects. He has more than 15 years of experience in commercial, retail, and multi-family housing land development, and has been active in community and professional organizations in Austin.

Erica (Snyder) Buxton (CHE, 2002)

is the chief executive officer of the educational media company EQtainment, which offers emotional intelligence games and content. She spent the past decade as a leader in finance and strategy for Mattel's Barbie, Hot Wheels, and Monster High brands.



Alex (Bowers) Schoen (CSSE, 2003) was promoted to lead engineer for her department at CareerBuilder, and also received the company's Diamond Club Award as one of the top-100 performers from the previous year.

Kevin L. Waldrup (CE, 2003) has earned a master's degree in project management from Saint Mary's University (Minnesota).

Andrew Twarek (CE, 2005) is now a project manager for Ruby+Associates in Bingham Farms, Michigan. He is leading engineering teams in structural design, analysis, and steel detailing. He has worked for the company since 2005.

Todd C. Wallace (CE, 2005) is the new town engineer for Brownsburg, Indiana. Previously, he was a senior project manager for Schneider Corporation and was site group leader for the firm's Indianapolis office.

Keeping Score with Craig Pohlman



Craig Pohlman (CS, 2000) has never made a basket, hit a home run, or scored a touchdown in professional sports. However, he plays a key role in enhancing the fan experience for those sports as lead operator and programmer for electronic scoreboards at several Phoenix, Arizona-area arenas and stadiums. Along the way, he has earned three WNBA championship rings, created videos for the World Series champion Kansas City Royals, and helped Will Ferrell make his minor-league baseball debut.

Pohlman, lead software engineer for Hyperion Works in Phoenix, spends many nights and weekends at the controls of hundreds of graphics that keep fans informed and excited at Talking Stick Resort Arena, home of the Phoenix Suns (NBA), Phoenix Mercury (WNBA), Arizona Rattlers (Arena Football League), and many special events. He worked at the NBA All-Star Game in 2009 and has spent the past two years at Hohokam Stadium (Mesa, Arizona), spring training home for the Oakland Athletics (MLB), with the largest scoreboard of all spring training facilities.

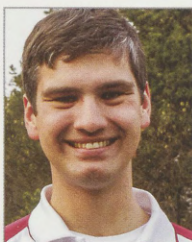
Pohlman's interest in scoreboard programming started at Rose-Hulman when he saw a small electronic message board across the top of the scoreboard in Hulbert Arena of the new Sports and Recreation Center.

Jeremy H. Hochstedler (EE, 2006) and **Kellen R. Hurst (CE, 2007)**, co-founders of the baseball statistics analytical start-up Diamond Charts, made their new-product pitch to a group of NFL executives, team owners, and venture capitalists at this year's Super Bowl as a finalist in a TechCrunch 1st and Future competition. The Noblesville, Indiana-based company also features **Paul Gagnon (SE, 2006)**. The trio's new venture is Telemetry Sports, with a product focusing on analyzing football in a whole new way.

Kellen J. Hills (BE, 2007) has been named a certified quality auditor by Orchid Design, a leader in innovative surgical device design, development, and regulatory submission services for the orthopedic and medical device industry. He is a senior quality and regulatory consultant for the company.

Christopher C. Watkins (ME, 2008) is a senior account executive with Bluewater Technologies Group's office in Indianapolis. He formerly was a sales engineer with Fuller Engineering and Johnson Controls.

Eván L. Breedlove (ME, 2009) contributed to featured research papers focused on the biomechanics of mild traumatic brain injury, specifically concussion in football and lacrosse, while earning his doctorate at Purdue University. He is now a senior research engineer for 3M's Corporate Research Analytical Laboratory, reinvigorating the Mechanical & Physical Properties Laboratory, and has several pending patents.



Abisha (Varatharaj) Gross (BE, 2009) and **Christian Hidden (CE, 2011)** are leaders of America's branch of 500K Churches, a non-profit organization formed in 2015 to support missionaries bringing Christian messages to 500,000 unreached villages throughout India. Abisha is a post-market surveillance engineer for an orthopedic company in Warsaw, Indiana. Christian is business development manager for Performance Structural Concrete Solutions, a startup based in the Charlotte, North Carolina area.

Caroline A. Andersen (BE, 2011) has been promoted to technical operations manager with PepsiCo's operations in Bakersfield, California.

She is responsible for the reliability and innovation at a plant servicing the largest consumer base in the country for snack foods.

Emma E. Barrasso (EP, 2011) is now leading the Smartec engineering team at Hydro-Gear. She has worked for the Indianapolis-based company since 2014, after working at Silicis Technologies and Raytheon.

Greg J. Laudick (ME/ECON, 2012) had the unique opportunity to interview Boeing Chairman/Chief Executive Officer Jim McNerney for a Q&A article published in *The Harbus*, the student news organization for the Harvard Business School. Laudick is studying for a master of business administration degree at Harvard.

Emily M. Yedinak (CHE/CHEM, 2013) is serving as a Fulbright U.S. Student Program Alumni Ambassador, representing the program at college campuses through the U.S. She was a U.S. Student Fulbright Scholar in 2014 at the University of Santiago in Chile, and is now a graduate student at Rice University.



Austin L. Nash (ME, 2013; MSME, 2015) was a contestant in the Atmospheric Flight Mechanics Student's best paper competition for his paper "Euler-Lagrange Optimal Control of Indirect Fire Symmetric Projectiles," presented at the 2016 American Institute of Aeronautics and Astronautics' Science and Technology Forum and Exposition.

Nick A. Birch (ME, 2014) has founded his second entrepreneurial enterprise, Propel. The Indianapolis-based firm is helping technology companies scale their software development teams through custom-designed immersive mentorship and training programs.



Matthew B. Etchison (MSEM, 2014) is the assistant vice president of computing/informatics/public service/business at Indiana's Ivy Tech Community College.

Weddings

David R. Schue (CPE, 2004) married Molly Park on October 10, 2015. He is a research engineer at MIT Lincoln Laboratory. The couple resides in Amherst, New Hampshire.



Andrew L. Houvener (SE, 2009) married Rebecca Thomas on July 18, 2015, in Winona Lake, Indiana. He is a software engineer. The couple resides on the East Coast.

Jennifer E. Hardyniec (CE, 2011) married **Spencer R. Bohlander (ME, 2013)** on October 17, 2015, in Galveston, Texas. Jennifer is a bridge structural engineer for HNTB Corporation, while Spencer is a drilling supervisor at Apache Corporation. The couple resides in Houston, Texas.



Ryan L. Parker (ME, 2011) married Samantha Bowman on June 4, 2015. He is a mechanical engineer for Flying S, an aerospace company. The couple resides in Robinson, Illinois.

Timothy "Billy" W. Buell (ME, 2013) and **Kira M. Boswell (ME, 2014)** were married on July 11, 2015, in Cincinnati, Ohio. Billy works at Fiat Chrysler Automobiles U.S., while Kira is in the Edison Engineering Development Program at General Electric. The couple resides in Cincinnati, Ohio.



Nicholas S. Pilipovich (BE, 2013) married Anne Parks on October 31, 2015, in St. Louis. He is a certified cardiac device specialist and works as a field clinical specialist with Biotronik. The couple resides in St. Louis, Missouri.



In Memoriam



Jim Shaw, 55, of Terre Haute, died on November 10, 2015. He retired as men's basketball coach in 2014 after ranking second in school history with 303 career coaching wins and a .578 winning percentage, including an 82-29 record in his final four seasons. Shaw's 20-year coaching legacy featured six NCAA Division III tournament appearances, five regular-season conference tournament titles, five conference Coach of the Year awards, and four seasons featuring 20 or more wins. He also served as the institute's men's golf coach earlier in his career and won a pair of league Coach of the Year honors in that sport as well.

Avery C. Kelsall (EE, 1940), 96, of Napoleon, Ohio, died on December 28, 2015. He retired as a consulting engineer.

Dennis T. McCarthy (CHE, 1941), 97, of Skokie, Illinois, died on September 17, 2015. He retired as a manager for BP America.

John W. Welsh (ME, 1943), 94, of Bloomington, Indiana, died on October 28, 2015. He was founder and chairman of J W Welsh Associates.

Millard A. Ferguson (EE, 1947), 94, of Sacramento, California, died on September 19, 2015. He retired as an assistant manager for the Imperial Irrigation District.

Allen E. Smith (ME, 1948), 93, of Carmel, Indiana, died on September 24, 2015. He was an Eli Lilly and Company retiree.

James E. Ingle (CE, 1953) of Ellettsville, Indiana, died on February 8, 2016. He was founder and principal engineer with the Engineering Group, after working with the Kerr-McGee Corporation and Maxon Construction Company.

Carl M. North (CE, 1954), 91, of Indianapolis, Indiana, died on December 11, 2015. He retired as the State Engineer for the State of Indiana.

Joseph T. Verdeyen (EE, 1954) died on February 16, 2016, in Champaign, Illinois. He retired as professor of computer and electrical engineering at the University of Illinois.

James A. Kleptz (ME, 1959), 83, of Shelburne, Vermont, died on October 28, 2015. He retired as a systems engineer with General Electric.

John F. Edgington (CHEM, 1960), 77, of Harrodsburg, Kentucky, died on November 14, 2015. He retired as a manufacturing engineer for General Electric.

Jerome E. Hahn (EE, 1962), 75, of Peoria, Illinois, died on December 22, 2015. He was a former mathematics professor at Bradley University.

Donald C. Todd (MA, 1962), 74, of Manchester, Tennessee, died on September 27, 2015. He retired as an analyst from Jacobs Technology.

Victor L. Risch (CE, 1963), 74, of Indianapolis, Indiana, died on November 3, 2015. He retired as a project engineer for Dixon Engineering.

Robert C. Blahut (MA, 1965), 71, of Indianapolis, Indiana, died on October 10, 2015. He retired after 30 years as a systems engineer with IBM.

James W. Engle (ME, 1967), 70, of Fairfield, California, died on September 1, 2015. He retired as a colonel in the U.S. Air Force.

Terry L. Agal (CHE, 1968), 69, of Norton Shores, Michigan, died on October 26, 2015. He retired as vice president of human resources for Clarion Technologies.

Ernest "Ernie" R. Jones (ME, 1973), 64, of Lynnville, Indiana, died on October 21, 2015. He was a broadcast tower specialist for Consolidated Engineering.

David H. Potter (PH, 1980), 57, of North Plainfield, New Jersey, died on October 21, 2015. He was a contractor with AT&T Mobility.

Timothy J. Drabik (EE, 1981), 56, of Petaluma, California, died on October 12, 2015. He was chief executive officer of Page Mill Technology.

George P. Shaffner (ME, 1981), 56, of Findlay, Ohio, died on January 18, 2016. He was senior vice president of health, environment, safety, and security with Marathon Petroleum.

Stephen D. Horchem (MSAO, 1987), 59, of Fort Wayne, Indiana, died on December 14, 2015. He had been the patent manager at Panduit.

Bryan W. Gardner (ME, 2009), 28, of Beavercreek, Ohio, died on November 2, 2015. He was a systems integration engineer with the U.S. Air Force.

SPECIAL FRIEND

Herman H. Russel, Jr., 84, of Terre Haute, died on November 25, 2015. He retired as owner of Herm Russel Mens' and Ladies' Fashions, and provided the tailor-made plaid jackets presented to the institute's Chauncey Rose Society members.

Rosebuds

Paul D. Rudolph (ME, 1991) and wife Lisa adopted a daughter, Lisa, on August 30, 2014. The family resides in Lafayette, Indiana.

Stephen M. Burnside (CHE, 2000) and his wife Lyssa welcomed a son, Everett, on February 15, 2014. The family resides in Clayton, North Carolina.

Rebecca (Hubbard) Crecelius (CPE, 2005) and husband Rush welcomed a daughter, Ava, on September 5, 2015. The family resides in Corydon, Indiana.

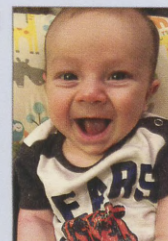
Alex Yovanovich (ME, 2002) and **Audra (Curry) Yovanovich (CHEM, 2004)**



welcomed their first child, Mara, on August 31, 2015. The family resides in Indianapolis.

Kathy (Wyrzykowski) Miller (ME, 2005) and husband Don welcomed a son, Thomas, on January 15, 2016. The family resides in Cleveland, Ohio.

Nick E. Corkill (CE, 2009) and **Amanda A. (Lundahl) Corkill (CHE/BCMB, 2010)**



welcomed their first son, Ethan, on September 10, 2015. The family resides in Chicago, Illinois.

Wesley C. McCullough (EE, 2014) and **Katrina R. (Yoder) McCullough (EE, 2014)** welcomed their first child, Matthias Cecil McCullough, on June 5, 2015. The family resides in Cedar Rapids, Iowa.

Alumni Calendar

Check latest events at
rosetem.rose-hulman.edu/events

APRIL 30

Career Achievement Awards

MAY 2-7

Attitude of Gratitude Week

MAY 7

Indianapolis Mini-Marathon Alumni Tent

MAY 14

National Society of Black Engineers'
Student-Alumni Dinner

MAY 22

Indianapolis 500 Pole Day Alumni Event

MAY 27-28

Class of 1966 50-Year
Commemorative Commencement

JULY 4

Indianapolis Indians Baseball Game
Victory Field, Downtown Indianapolis

AUGUST 26

Freshman Legacy Welcome Event

Pacific Northwest and California Alumni Trip

SEPTEMBER 4-13

Explore the majestic Pacific Northwest and California with your family and friends. This adventure will include the wilds of Mount St. Helens and the Columbia River Gorge, along with the sophistication of Portland and San Francisco. Travel along Oregon's beautiful Pacific coast. Enjoy an elegant dinner cruise on the Willamette River and experience Portland's dazzling city sights and city lights. Visit Redwood National Park and explore Eureka, a historic timber and fishing village. Cross the Golden Gate Bridge and discover the "City by the Bay," San Francisco. Go to <http://rosetem.rose-hulman.edu/AlumniTrip2016> for details.

Giving Bach

Christine (Winters) Bach (CHE, 2000) and **Michael Bach (CHE, 1999)**, longtime supporters of the institute, wanted to encourage students living in their Pacific Northwest region to experience a Rose-Hulman education. So, they established a new scholarship fund, making them among the latest inductees into the Chauncey Rose Society, signifying monetary gifts between \$50,000 and \$249,000.



The couple met when they were chemical engineering majors on campus. Christine is the first alumna to earn a Chauncey Rose jacket and the couple is among the youngest alumni to earn the honor.

Scholarships were key to Michael and Christine having the ability to attend Rose-Hulman, she explains.

The Bachs live in Vancouver, Washington, a suburb of Portland, Oregon, with their 3-year-old son, Evan. Michael is a performance manager with Frito Lay, and Christine, a native of Huntington, Indiana, is an engineering team leader with Pella Corporation. Their companies' matching gift programs have further enhanced the couple's new scholarship fund.

Class of 1996 Group Being Honored for Career Achievements

Four members of the Class of 1996 are being recognized this spring by the Alumni Association, based on their achievements within their communities and respective professions. The group includes:



Reinhard Koenig (BSCE/MSENVIRON) As chief of staff and executive officer for the Assistant Secretary of the U.S. Army, he has been based at the Pentagon since 2012. He planned and coordinated the water resource-related policy development activities for an office of 24 senior leaders and managers. He previously was district engineer and commander of the U.S. Army Corps of Engineers office in Anchorage, Alaska, and had military operational assignments in Baghdad, Iraq, and Fort Leonard Wood (Missouri).

David Orr (ME) This technology innovator has managed engineering and business development of product commercialization for Greenville, South Carolina-based Tsuracor (medical device consultancy) and Kiyatec (life science startup). He also is an adjunct professor at Clemson University, where he earned his doctorate in bioengineering (2006) after receiving a masters of business administration degree at Purdue University.



Tony Ragucci (PH/MA) A recognized expert in automated sensing and perception systems for aerospace, medical, and defense applications, he is chief executive officer of Periccept, a company he founded in Bryan, Texas, in 2015. Projects currently under development will help detect persons stranded in large bodies of open water, assess landing sites for small unmanned aerial systems, and produce a 3D multispectral vision system for robotic firefighting.

Jeff Ready (CS) Founder and chief executive officer of Scale Computing, whose turnkey infrastructure appliance, HC3, is helping information technology departments at a growing number of mid-sized companies. He is a board member and advisor for the National Federation of Independent Business, Smartfile, SteadyServe, and SpeedGaugem, and is an online columnist for *Fortune*.



DOWN MEMORY LANE

The elaborate fanfare and pyrotechnics at modern-day professional and collegiate sporting events have nothing on the well-choreographed atmosphere inside Rose-Hulman's Shook Fieldhouse that helped motivate the Fightin' Engineers to monumental basketball success for more than 25 years.

Where else could you find the ear-piercing sounds of police sirens, submarine crash dive alarms, large brass bells, and a cannon blast that bewildered opposing players? Then, there was the large banner that seemed to mysteriously unfurl from the ceiling, urging the men's and women's hoops teams to "Give 'em Hell, Rose!"

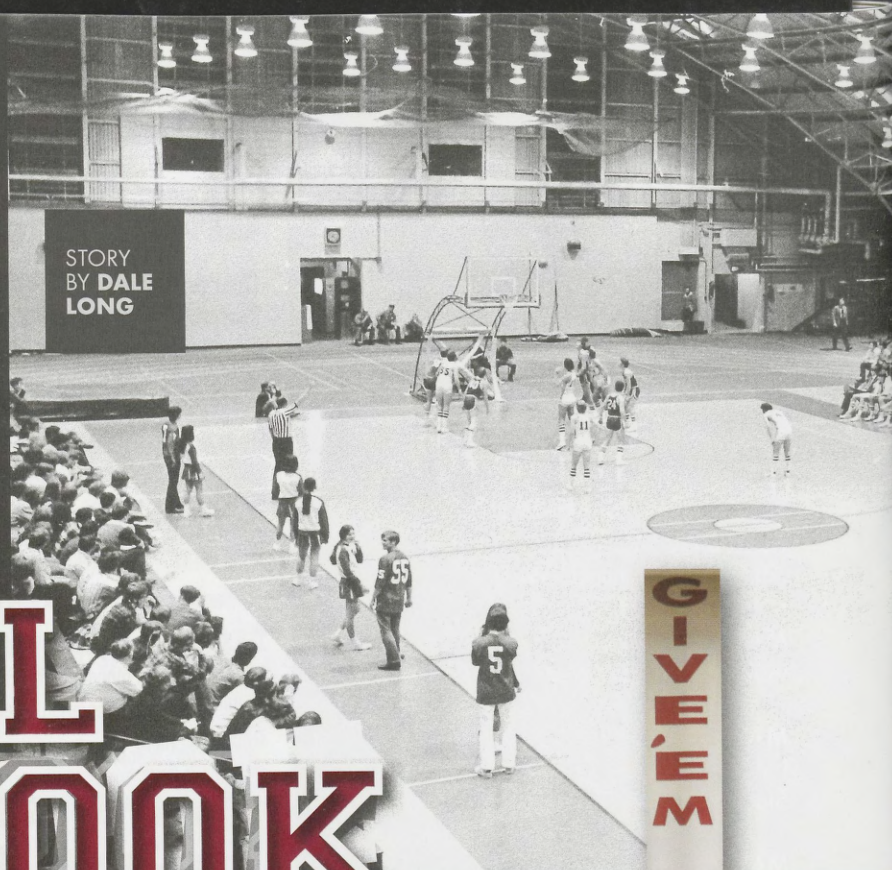
"It was electrifying," says legendary men's basketball coach and athletic director John Mutchner, who brought the antics to campus in hopes of bringing the public's attention to the small college program. "We needed to breathe some life into the program," he adds. "The sights and sounds brought crowds to see what was happening in the fieldhouse. Those crowds brought the players. Then, the players brought the wins."

Mutchner's 1976-77 team won a school record 24 games and advanced to the quarterfinal round of the 1977 NCAA Division III tournament. That started the first glory era of men's basketball, with postseason appearances in the 1977-78, 1980-81, and 1981-82 seasons.

"Shook Fieldhouse was a great place to play basketball," remarks the former coach.

Gary Dougan (ME, 1973), the most valuable player of the 1971-72 and 1972-73 teams, appreciated the special times in the quaint athletic facility, stating: "Shook was so far ahead of its time. The noise and the banner made every night a magical moment. Talk about starting the game with a home-team advantage. After the cannon blast, our opponent knew whose court they were playing on."

The fieldhouse was a converted unused World War II B-29 hangar, acquired from the War Assets Administration to shelter a basketball court and indoor track, starting in 1948. Wilbur B. Shook, a 1911 architecture alumnus, undertook the mission



ALL SHOOK UP

ICONIC FIELDHOUSE
LIVED UP TO ITS NAME
ON GAME NIGHTS

of reassembling the massive structure on the north side of the growing campus. He captained the baseball team and played football before going on to become a leading architect in Indianapolis.

The original basketball court featured a dirt-based floor that hugged the building's west end with a set of stationary concrete bleachers for the small crowds that attended games. The rest of the facility was used for track and indoor football practice, along with locker rooms and offices for athletic coaches. The basketball court was renovated in the mid-1950s to a wooden floor base, and elevated 2½ feet above its dirt foundation.

The next major transformation for the fieldhouse came in the early 1970s when a state-of-the-art tartan floor was installed (a first for college gyms). The basketball court was moved to take prominence in the center of the facility, with retractable wooden bleachers and surrounded by an indoor track. A recreation center, supported by Shook's 1911 classmate Everett E. Black, was later added, along with handball courts, a weight room, trainers' room,

The "Give 'em Hell, Rose!" banner, a centerpiece of pregame festivities in Shook Fieldhouse, is still part of Rose-Hulman as a fixture of Hulbert Arena in the Sports and Recreation Center.

GIVE 'EM
HELL
ROSE-HULMAN!

New Endowment Fund Raising the Bar for Athletic Excellence

A new athletic endowment fund has been established to allow alumni and friends to give Rose-Hulman student-athletes the extra boost needed to be successful on and off the playing field. Donor engagement and investment will help our teams and coaches achieve the highest level of excellence that has become an institute tradition.

The initial campaign goal is raise \$1 million by this year's Homecoming.

Rose-Hulman's athletics program has grown by 25 percent during the past decade, presenting budgetary challenges for the institute to keep pace with competing colleges and universities.

Endowment fund donations will help provide better training equipment and new uniforms, cover team travel costs, and support renovation of aging athletic facilities. In conjunction with this campaign, the Hulbert Arena court will be officially named in honor of our winningest basketball coach, John T. Mutchner, during this Homecoming. For two-and-a-half decades, Mutchner coached more than a quarter of our current alumni student-athletes in several sports. As athletic director, he helped elevate athletics to new heights.

CAMPAIGN CO-CHAIRS/CAPTAINS

The following alumni and friends have accepted leadership roles, by their respective sports, in this fund-raising campaign:

FOOTBALL:

CO-CHAIRS: Jack Fenoglio (CHE, 1959), Denny Smith (ME, 1971)

CAPTAINS: Kirk Augspurger (ME, 1977), Jeff Brugos (EE, 1966), Jack Farr (BIO, 1975), Jim Gidcumb (CHE, 1976), Norm Klein (ME, 1972), William Kuchar (EE, 1959), Rodney Schrader (CE, 1984), Larry Spilbeler (ME, 1976), and Roger Ward (BIO, 1971)

MEN'S BASKETBALL:

CO-CHAIR: Don Ings (ME, 1970)

CAPTAINS: Tim Cindric (ME, 1990), Rob Hochstetler (EE, 1991), Sam Reed (ME, 1981), and Robert Stone (EE, 1986)

BASEBALL:

CO-CHAIRS: Bill Fenoglio (ME, 1961), Ray Jirousek (ECON/MA, 1970), and Pat Noyes (ME, 1976)

CROSS COUNTRY/ TRACK & FIELD:

CAPTAINS: Greg Gibson (CE, 1984) and Steve Nerney (ME, 1985)

MEN'S SOCCER:

CAPTAINS: Scott Jaeger (EE, 1989) and Jeff Trang (EE, 1983)

GOLF:

CAPTAIN: Bill Olah (BIO, 1974)

TENNIS:

CAPTAINS: Bruce Cahill (EE, 1970/HD, 2012)

CHEER TEAM:

CAPTAINS: Kenny McCleary (CHE, 1983)

COACHES & STAFF:

CO-CHAIR: John Mutchner

CAPTAINS: Joe Touchton and Kent Harris

CAMPAIGN CONTACT

Alumni and friends wishing to make endowment donations or add themselves to the campaign team, should contact:

Jim Bertoli, Senior Major Gifts Officer
Office of Institutional Advancement
Rose-Hulman Institute of Technology
5500 Wabash Ave., Terre Haute, IN 47803
bertoli@rose-hulman.edu
812-877-8359



Shook Fieldhouse was a multipurpose facility that hosted a variety of entertainment events and special campus events, including the annual Homecoming pep rally.



A coal strike limiting energy usage in Indiana buildings wasn't going to stop Rose-Hulman from hosting a NCAA tournament game in 1977. Alumnus E. Crone Knoy (ME, 1958) brought in a diesel generator and Vern Fellows (EE, 1962) made the necessary electrical connections. Then, basketball captain Mike Griggs (ME, 1978) flipped the switch to provide the extra energy needed for the Fightin' Engineers' victory.

(Photo courtesy of Ronald G. Reeves)

and a Hall of Fame display area. The fieldhouse served well until being replaced by the present Sports and Recreation Center in 1997.

Besides hosting athletic events, Shook Fieldhouse also was the scene of a variety of entertainment shows, including concerts by Harry Chapin, Jim Croce, Earth Wind & Fire, REO Speedwagon, Styx, and The Association. There were also the popular post-Homecoming football game cocktail parties, preseason training camps for American Basketball Association champion Indiana Pacers, and camps by former Olympic gold medal gymnast Kurt Thomas.

Also, the facility hosted the proctoring of freshman calculus and physics final exams each academic quarter, a variety of intramural and club activities, events that kicked off the institute's major fundraising efforts, and engineering classroom project demonstrations. The fieldhouse was also home to such popular campus personalities as athletic trainer Til Panaranto, football coach Phil Brown, baseball/soccer coach Jim Rendel, track/cross country coach Bill Welch, and basketball coaches Jim Carr and Mutchner.

And, most significantly, the fieldhouse hosted commencement for nearly 50 years.

"Shook Fieldhouse was a special place that was used nearly 24 hours every day. It was a place for students to get away and unwind from the stresses of a Rose-Hulman education," says Ron Reeves (EE, 1958), retired vice president for development.



Watch John Mutchner talk about Shook Fieldhouse at www.rose-hulman.edu/shook



Contributing to the Journey

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INSTITUTE OF TECHNOLOGY

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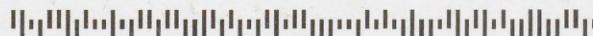


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- ☐ Rose-Hulman's Greatest Needs
- ☐ Other _____
- ☐ Student Scholarships

ANNUAL GIVING CIRCLES

Recognizing annual gifts from July 1 to June 30

Herman Moench Circle	\$25,000
Hulman Circle	\$10,000
Founders Circle	\$5,000
Trustees Circle	\$2,500
Presidents Circle	\$1,000
Deans Circle	\$500
Rose and White Circle	\$250
Century Circle	\$100

PRESIDENT'S G.O.I.D. CIRCLE

Recognizing cumulative young alumni giving

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Silver	\$2,500
Bronze	\$1,000

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Echoes Spring 2016

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- ☐ Give online at www.rose-hulman.edu/give

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See a listing of all 2014-15 donors at www.rose-hulman.edu/honorrollofdonors

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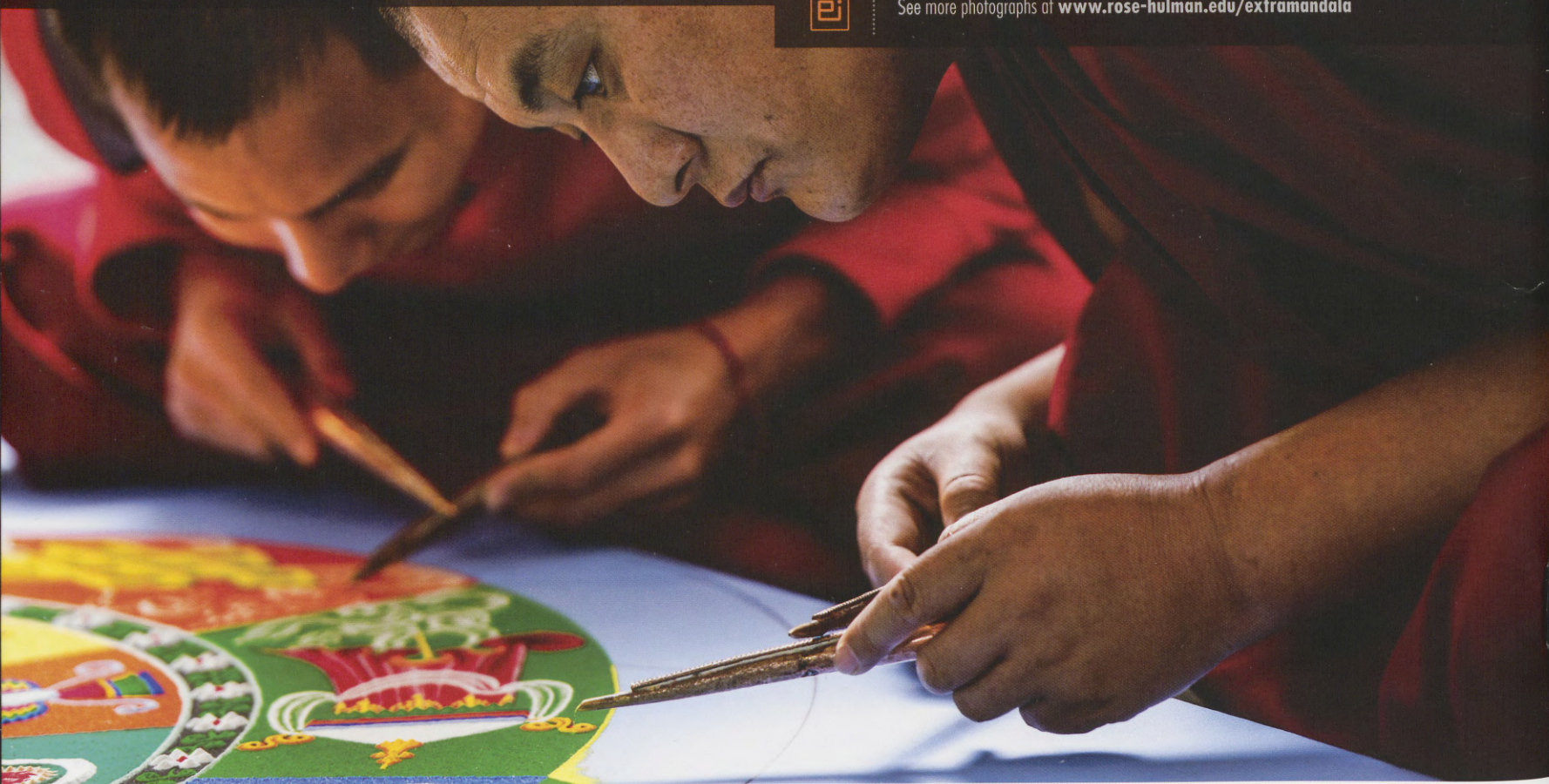
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PARTING SHOT

Peace, Man-dala: Tibetan Buddhist monks brought their peaceful perspective to campus this winter, creating a colorful world peace mandala and offering insights from their rich cultural traditions. According to custom, the monks destroyed the mandala at the end of their visit, symbolizing the finite nature of life. "Everything, no matter how beautiful, is impermanent," says monk Tenpa Phuntsok. *Photo by Bryan Cantwell*



See more photographs at www.rose-hulman.edu/extramandala



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