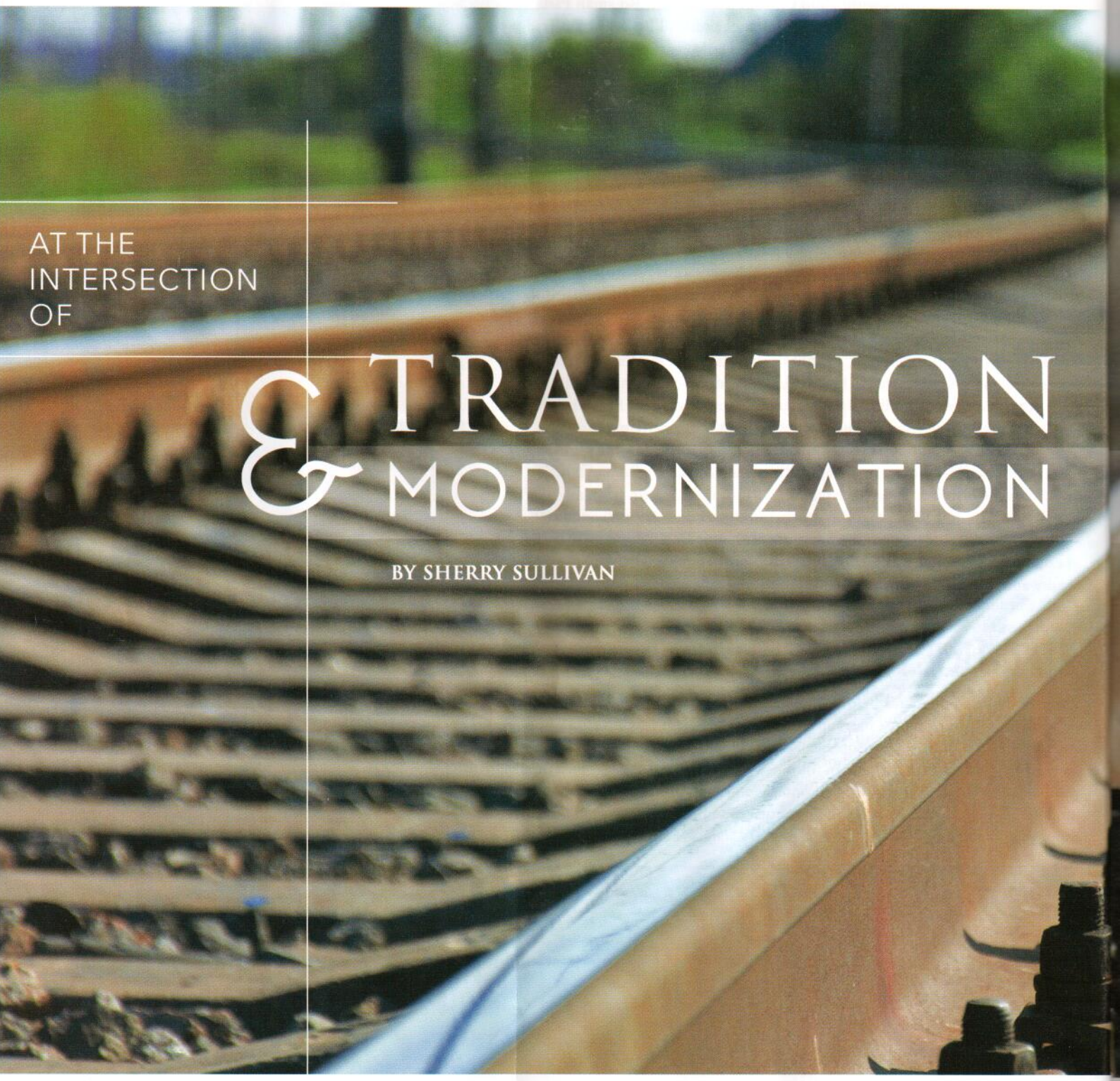
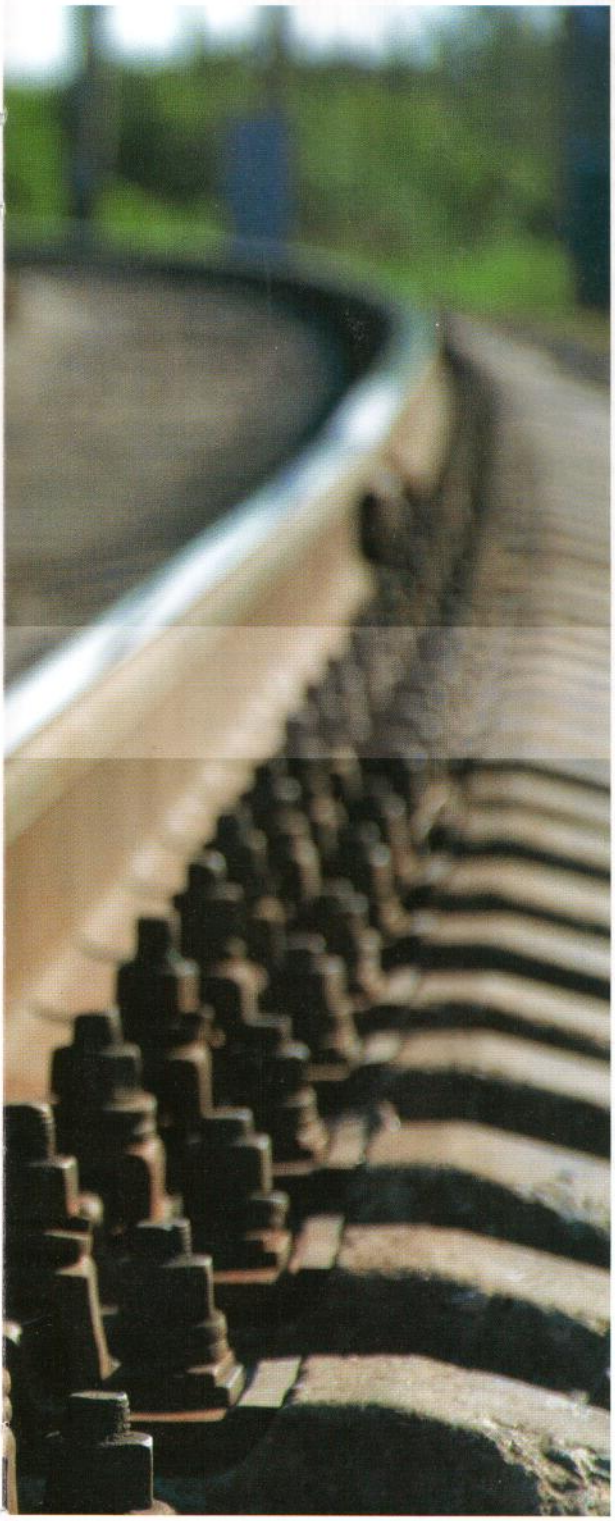


AT THE INTERSECTION OF

TRADITION & MODERNIZATION

BY SHERRY SULLIVAN

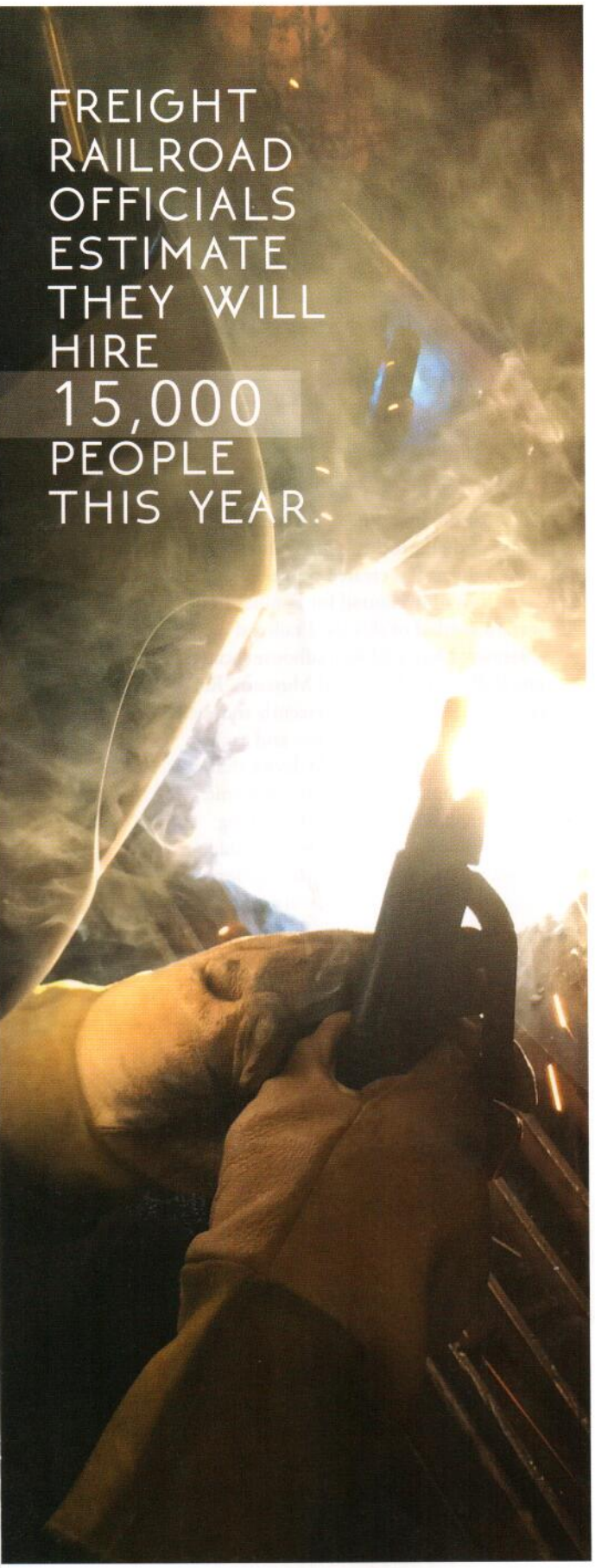


Penn State Altoona Graduates a New Generation of Railroad Specialists

AS YOU DRIVE THROUGH the streets of Altoona for the first time, it doesn't take long before you get a sense of the historical significance of the railroad to the community. It has created tradition, a local economy, and generations of livelihood for families in the region. One important symbol of this local railroad heritage is the Harry Bennett Memorial Roundhouse located behind the Altoona Railroaders Memorial Museum. Rail yard roundhouses were created in the nineteenth and early twentieth centuries to perform maintenance, and each roundhouse was equipped with a turntable device that was essential in addressing one important railroad dynamic: trains coming from many directions but only moving forward. The turntable allowed engines to be serviced and rotated to move forward toward their next destination.

Fast forward to 2015. Times have changed. Companies and technologies have modernized. In the midst of the change, the Association of American Railroads has indicated that "the nation's major freight railroads plan to spend an estimated $29 billion—which would set an annual record—to build, maintain and grow the rail network. This private spending will go to expenditures like new equipment and locomotives, installation of new track and bridges, the raising of tunnels, and new technology used to keep America's rail network the best in the world. In addition, freight railroads estimate they will hire 15,000 people this year, building on hiring trends over the past five years. These are high-paying jobs being made available due to projected retirements, normal attrition, as well as growth."

Just in time to meet that demand, Penn State Altoona's new Rail Transportation Engineering (RTE) program has graduated its first class—a pool of nine railroad engineering specialists who have come from many directions but are only moving forward.



ALL ABOARD!

In the winter 2010 edition of *Ivy Leaf*, we introduced readers to the new RTE program (altoona.psu.edu/ivyleaf/t.php?v=051001001):

> *"The inspiration of [now former] State Representative Rick Geist, the proposed RTE program has been in the incubation stage for several years. A champion of technology within Blair County, Geist serves as chairman of the House Transportation Committee and has been awarded for his efforts in creating the Ben Franklin Partnership, one of the nation's longest-running technology-based economic development programs.*
>
> *The proposed program already is creating a buzz on campus and beyond. With significant input by the college's faculty toward the proposed curriculum, the Penn State Altoona RTE development team has designed a major that gives students the foundation of a traditional civil engineering program, including courses in surveying, design, structures, materials, construction, management, fluids, and soils. Eight new RTE courses are added in the third and fourth years in areas including industry and regulatory overviews, operations and safety communications, and signals, track, and mechanical. To graduate, students complete a capstone design course during which they use the range of their training in a team-based design project."*

The RTE program has continued to develop over the past four years. Currently, Penn State Altoona is in negotiations with the Altoona Railroaders Memorial Museum to acquire a portion of the roundhouse for lab, research, and classroom space to support the program.

Bryan Schlake is an RTE instructor at Penn State Altoona. He is also an engineering graduate of the University of Illinois at Urbana-Champaign which offers one of the leading rail engineering programs in the nation. After graduating, Schlake became a management trainee for Norfolk Southern and worked his way through various positions to became a process engineer. As a Norfolk Southern industry advisor to Penn State Altoona, he was instrumental in helping RTE students establish the first chapter of the American Railway Engineering and Maintenance-of-Way Association (AREMA) on campus. AREMA is dedicated to the "development and advancement of both technical and practical knowledge and recommended practices pertaining to the design, construction, and maintenance of railway infrastructure."

"The most exciting thing about the RTE program—something that many people may not know—is that Penn State Altoona is currently the first and only college in the country to offer a bachelor of science degree in rail transportation engineering. No student can get this anywhere else. There is a handful of schools that offer railroad-related courses, but ours is the only pure railroad science degree. That is something special."

In the spring of 2015, Penn State Altoona presented its first class of graduates from the RTE program. All nine of them had internships, and all nine had jobs in place within the rail transportation industry upon graduation—a 100 percent placement rate.

NOT YOUR FATHER'S TRAIN HOBBY

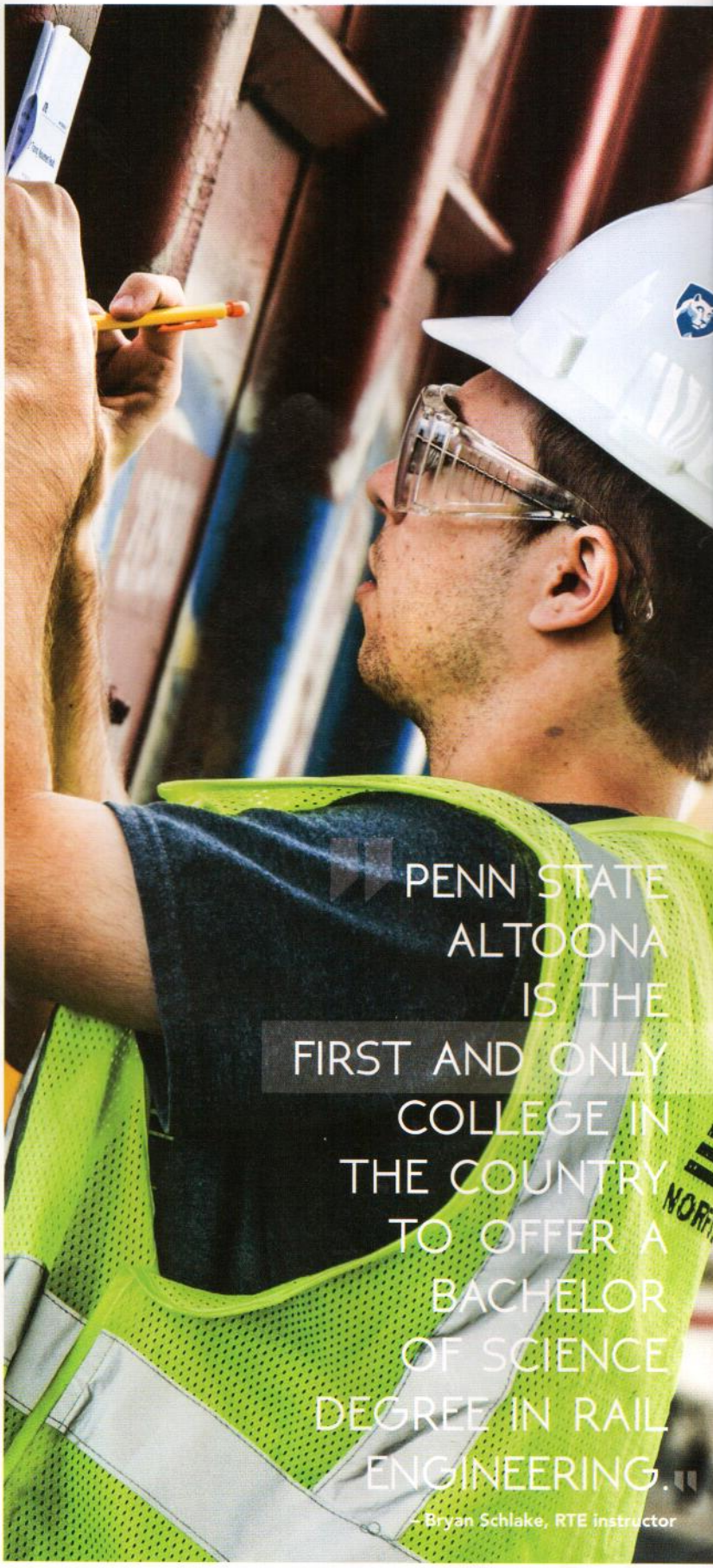
When the phrase "train enthusiast" comes to mind, many of us can think of someone we know with hundreds of feet of track in the basement and a significant investment in Lionel toy trains. Maybe you think of someone with an impressive collection of railroad memorabilia. Certainly, modern-day stories like *Thomas the Tank Engine* and *The Polar Express* have created a new generation of train lovers ready to hop on the next vintage passenger train for a memorable ride. This quote from a turn-of-the-century freight conductor expresses his allure of the railroad:

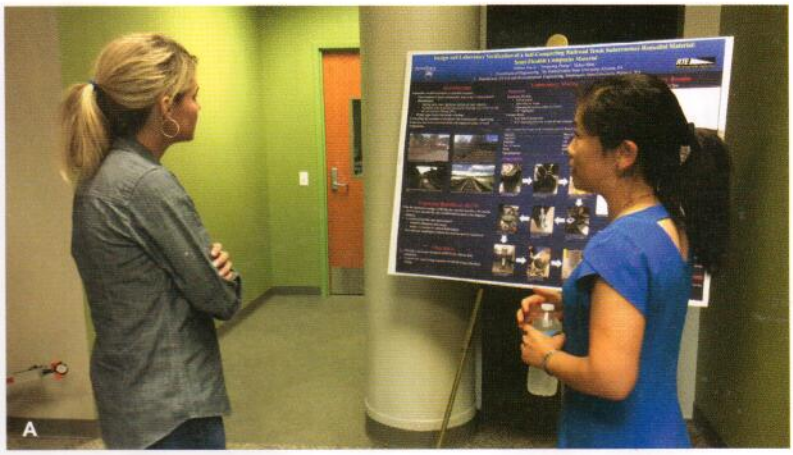
> *"I was born on a farm near Pocomo City, N.C. Only a swamp separated our farm from the town, and the rail road tracks that skirted the town were just across the swamp. I would lay awake nights and listen to the whistle of the locomotives, and the clanging of their bells—sweetest music I thought I had ever heard. Whether it was the passing trains with their bells and whistles and clatter on the rails that put the wander-lust into me, or whether it was just born in me, I can't say. All I know is that from the time I knew anything I wanted to go places and see things. I wanted to get on one of those trains and go as far as it would take me. I thought I'd like to be an engineer at the throttle of a locomotive, sending it thundering through the darkness and careening around curves. Or I would be a brakeman walking the tops of rolling freight cars with the wind flopping the legs of my trousers." (Library of Congress, Folklore Project, Life Histories, 1936-39)*

Now, put those notions aside.

Nathan Harris is one of the spring 2015 RTE graduates. As a newly admitted student from Glastonbury, Connecticut, Harris knew that he wanted either a mechanical engineering or civil engineering degree from Penn State's University Park campus. Just as he was making his decision, he heard about the RTE program and transferred to Altoona.

"Now that I am through the program," he explains, "I realize that this degree has given me and everyone else in the program an opportunity we would not have had elsewhere. What some might not understand is that this is a real engineering degree. A lot of people come in who like trains and think it is just a vocational degree. As with many engineering degrees, up to 60 percent of those who sign up don't make it. You have to

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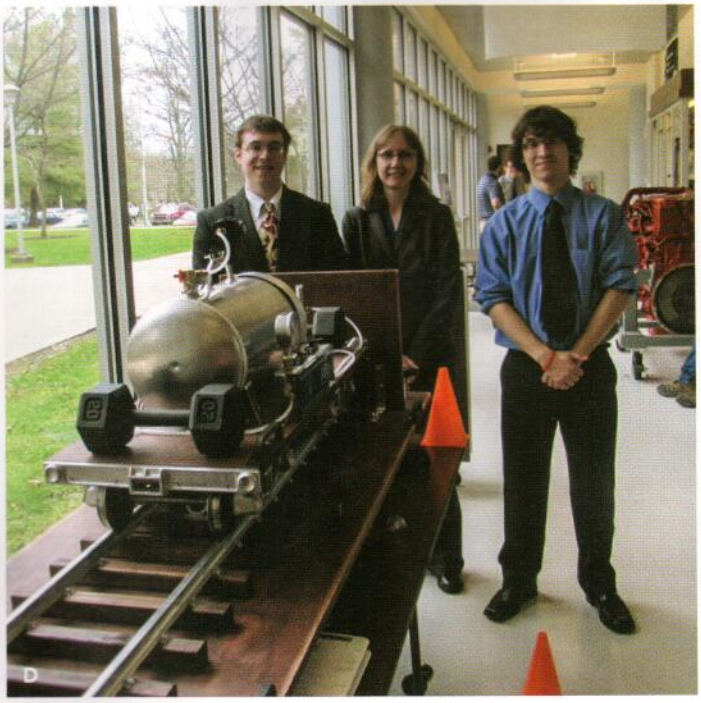
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E

pass the same courses you would have to for any engineering degree. For that reason, I am privileged to be among those who have completed this degree for the very first time."

In the summer following his sophomore year, Harris was a data analysis intern with Amtrak. The following summer, he applied with Northern Southern and was successful in securing a track maintenance internship in Greensboro, North Carolina. Here, he participated in a lot of hands-on track maintenance. Harris received a job offer from Northern Southern and is currently back in North Carolina in its management trainee program.

For Danielle Cyran, a nontraditional student from Portage, Pennsylvania, the railroad was "in her blood." Her stepfather and father-in-law were both local railroaders, and in her memory, they always had jobs. After working in the local manufacturing industry from her teenage years until age 30, and being laid off multiple times, Cyran was ready for a change.

"My husband reminded me that Norfolk Southern hasn't laid off a manager since 1977. There is a saying that when you work for the railroad, you work for either three years or thirty. You work three years if it isn't for you. You work for thirty if it is. I was ready to work for an industry that could provide some stability to our family."

A displaced worker who had assisted engineers, Cyran had never really thought about engineering as a degree for herself. However, as she began an associates degree program, she found her passion for engineering. In the fall of 2013, she began the RTE program at Penn State Altoona with the full support of her family.

"I was the mom of the RTE group. My daughter is 18, and I wanted to show her that you don't have to be pigeonholed just because you are a girl. When I first joined the program, I thought, 'Oh, those are the train nuts.' Today, I have the utmost respect for all of them—for all of us. There are major differences among us, but there are also a lot of similarities. This is a difficult program. We have overcome the stigma that this is just a program for 'people who drive trains.' I am proud to be part of a group that will positively change the face of the railroad industry in the coming years."

In July of 2015, Cyran began her new job as a management trainee for maintenance-of-way for Norfolk Southern. "It is a lot of work and long hours," she explains. "but I knew exactly what to expect. So far, so good!"

MINDING THEIR OWN BUSINESS

If you research the board of directors of any Fortune 500 company, you will find one common link: a vested interest in supporting the success of the industry or, in colloquial terms, the focus of executives to purposefully and strategically "mind their own business." Board members are often former senior executives who have led the way in growing and advancing their respective industries. The board of the RTE program is no exception.

"We have been caught by surprise at the interest within the industry," explains Stephen Dillen, the program's coordinator and an electrical engineering instructor who was hired by Penn State Altoona directly from the community's pool of railroad project engineers. "We have been fortunate to have such great representation from the industry. As a result, we can bring in speakers, hold workshops, and give our students direct access to executives who really help make internships and jobs happen."

Recently, Dillen worked with Sarah Feinberg, the acting administrator for the Federal Railroad Administration. Feinberg visited Altoona to observe the workings of the RTE program. "She was really astonished at our projects," Dillen explains. "We were able to show her our lab environment and studies on track defects, vibration analysis of substructures, and wheel-rail interface."

Currently chairing the RTE Industry Advisory Board at Penn State Altoona is Gerhard Thelen, a Penn State graduate and the former vice president of operations, planning, and support for Norfolk Southern.

"We haven't had an undergraduate degree in rail engineering in this country since the '40s or '50s," Thelen says. "At one time, many of the top railroad prospects came from Yale, Princeton, the University of Illinois, and other highly esteemed engineering programs. Each railroad had their favorites. China and Russia have degrees like this, but this is the first of its kind in the United States. Our program at Penn State Altoona is of huge advantage to our railroad industry. I was privileged to take a train trip with our RTE students from Washington, D.C., to New York City and back. Several other members of the board were there as well, and

A Shihui Shen presents her research to FRA Administrator, Sarah Feinberg, during Feinberg's recent visit to Penn State Altoona.

B RTE senior, Danny Belles, prepares to take a freight car measurement using the SafeLoad© laser-based measurement system.

C The 2015 Penn State Altoona RTE graduating class poses after commencement with RTE faculty and the Interim Associate Dean for Academic Affairs.

D (L-R) Students Ross Bernard, Danielle Cyran, and Brice Barrett demonstrate their senior capstone project.

E The RTE Civil Materials Laboratory, at EMS in Altoona, used for soil and concrete testing and analysis.

"OUR PROGRAM AT PENN STATE ALTOONA IS OF HUGE ADVANTAGE TO OUR RAILROAD INDUSTRY."

– Gerhard Thelen, RTE Advisory Board chair and former vice president of operations, planning, and support for Norfolk Southern

RTE students and faculty member pose in front of an EMD SD70ACe-T4 Locomotive at the outdoor yard exhibits during the Railway Interchange 2015 in Minneapolis, MN. (L-R back) Andrew Green, David Fillman, Roel Gregorio, and Alex Ricci; (L-R front) Lucas Aland, Ryan Smith, Andrew Fayerweather, David Clapper, Bryan Schlake, and Alex Reinsmith.

we all had a chance to talk with the students. I also speak to the students when I am able to be on campus. I am truly amazed at how much industry insight they have."

The board currently represents executive-level expertise from Canadian National, Union Pacific Railroad, HDR Engineering, Altoona Pipe & Steel, Electric Motor & Supply, Inc., BNSF Railway, Amtrak, Norfolk Southern, CSX Transportation, Gannett Fleming Transit & Rail System, the Thomas D. Larson PA Transportation Institute, Transportation Technology Center, Inc., American Short Line and Regional Railroad Association, and Consolidated Rail. [For more on the Advisory Board, visit: altoona.psu.edu/rte/advisoryboard.php]

In November of 2014, Norfolk Southern Juniata Locomotive Shop and Norfolk Southern Foundation hosted the Penn State Altoona Engineering & Business Case Competition and provided scholarships to the winning teams. The competition "challenged ten teams of engineering and business students to develop sustainability initiatives that can be implemented and measured at the Juniata Locomotive Shop in Altoona." RTE graduates Shelby Stigers and George Mukai were on the winning team, each receiving a scholarship of $2,500.

Stigers, a graduate from Sidman, Pennsylvania, came to Penn State Altoona from a rigorous math and science background. Thus, she was pleased with the engineering opportunities provided in the RTE program. For example, she was able to work with Hai Huang, an assistant professor of engineering, in a research project that utilized a computer modeling system to link a dynamic track model with a dynamic vehicle model. Stigers accepted a position with Siemens Rail Automation in Pittsburgh as a systems engineer.

George Mukai hails from Amherst, New Hampshire. As a high school student, Mukai had a neighbor with railroad connections who helped him get an internship with Pan Am Railways. His growing interest in the railroad industry positioned him for a college degree in civil engineering, but a quick Google search introduced him to the RTE program at Penn State Altoona. "I certainly didn't expect to have as much industry attention in this program as we have seen," Mukai admits. "We really were the guinea pigs. The faculty has been incredibly engaged and has constantly asked for our feedback. The result has been the development of specialized engineers who can support the industry."

In the fall of 2014, Mukai applied for an internship with BNFS Railway Co. After passing their automated exam, he flew to Ft. Worth, Texas, for an interview and was offered an internship in Minot, North Dakota, to support significant growth around the oil and gas industry. More recently, Mukai has celebrated his wedding and relocation to Flagstaff, Arizona, where he is working as an engineering management trainee for BNSF.

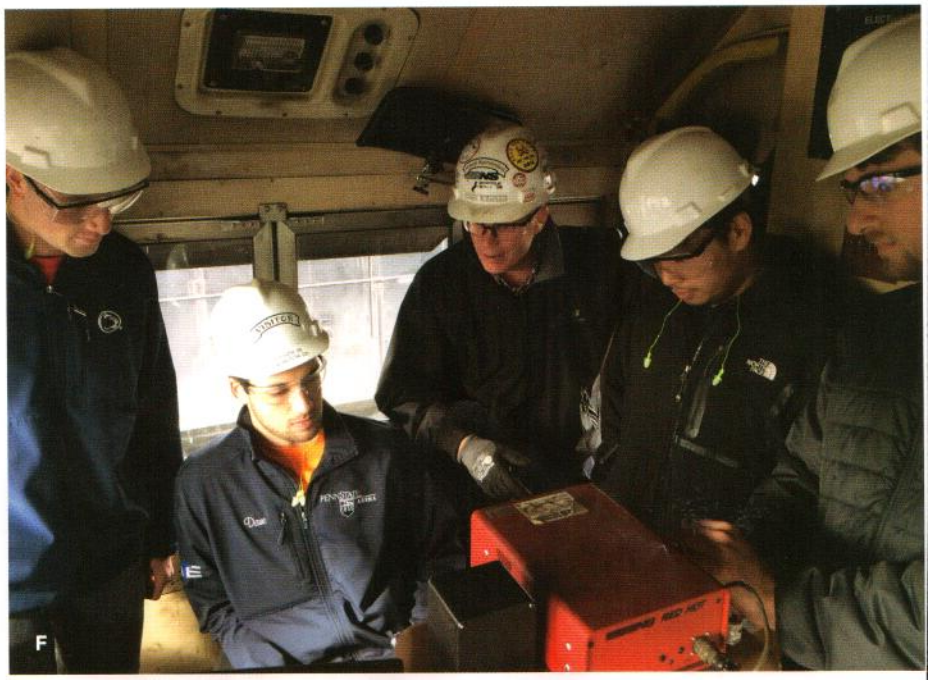
ON A ROLL

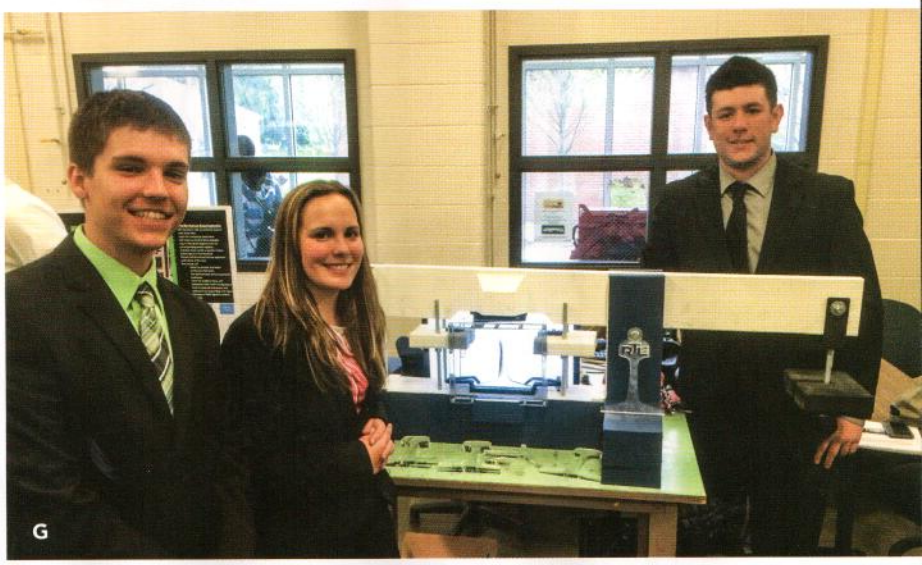
A January 2014 Forbes article addressed the topic of what some are calling America's second rail boom.

"Rail is on a roll, and not just in North Platte [Nebraska]. Thanks to leaps in technology, the rising price of diesel and improved delivery speeds, more and more freight traffic has moved from roads to rails, where trains can move one ton of goods about 500 miles on a single gallon of fuel. Since 2009, Union Pacific's weekly carloadings have increased from 133,000 to 180,000, helping the company achieve record earnings every quarter since the beginning of 2010. Since 2009, its stock price has surged 350% while competitors like Kansas City Southern and Canadian Pacific have seen shares more than double."

Charlie Marshall is the former president and chief operating officer of Genesee & Wyoming, the operator of short line and regional freight lines in the United States, Canada, Australia, and the Netherlands. Marshall, a rail consultant and member of the RTE Industry Advisory Board, has provided a valuable service by exploring the demand and assessing the needs of the industry in order to adequately prepare program graduates for this new rail boom.

"This program is off to an impressive start—there is palpable success as observed by those both at Penn State Altoona and those in industry. We are getting national attention. This transformation created by the University—the development of a pool of candidates recognized and valued nationally—is vital to the health and expansion of the industry, and we are planning to be part of that growth." ■





F RTE seniors load test a locomotive during a lab exercise with Norfolk Southern Shop Superintendent, Don Faulkner, at the Juniata Locomotive Shop in Altoona.

G RTE seniors Nate Harris, Shelby Stigers, and George Mukai demonstrate their senior design project, "Use of Polarized Light to Identify Causes of Failure in Rail."

H Members of the AREMA student chapter recruit new members at the Penn State Altoona Involvement Fair. (L-R) Alex Ricci, Andrew Fayerweather, David Fillman, Ryan Smith, David Clapper, Alex Reinsmith, Andrew Green, and Roel Gregorio.