

THIRTY
UNDER
30

manufacturing ENGINEERING®





UNDER THIRTY

RECOGNIZING THE FUTURE LEADERS OF MANUFACTURING

For the fourth consecutive year, *Manufacturing Engineering* recognizes 30 individuals under the age of 30 who are making a difference in manufacturing and STEM fields. These young people deserve recognition for their accomplishments in a field that gets unfairly branded as dark, dirty and dangerous—or even worse, as a career of the past.

This year's group of honorees prove that nothing could be further from the truth. We received over 100 nominations, our highest amount yet, with submissions from multiple industries—automotive, aerospace, additive, medical, automation, robotics and more, proving that manufacturing is not only alive and well, but is adapting and advancing.

Several nominees made sure to point out that while manufacturing is a challenging and rewarding career, it's also fun, often in ways the general public might not expect. One honoree, Andrew Siwicki of ABB, helped to program the robotic piano Lady Gaga played at this year's Grammy Awards.

Another honoree, Ashley Buchner of FCA US, leads the Virtual Assembly Group for the automaker and uses motion capture suit technology. "A lot of people think we play with video games," she said, "but it's in a manufacturing setting. It's a cool and powerful tool, that's for sure."

Many of this year's honorees mentioned a toy or competition that sparked their sense of wonder about manufacturing, such as Legos, K'Nex and FIRST Robotics. The show "How It's Made" on the Discovery Channel, which documents how everyday items are manufactured, got a few nods as well.

The takeaway from all of this? Manufacturing can be fascinating and fun, especially when kids are allowed to be curious, take risks and experiment outside of the classroom.

Hannah Kalinowski of Boeing said it best. "As a kid, even if you don't know the word engineering, you're kind of always just doing engineering," she explained. Let kids get creative and get their hands dirty, and above all, teach them not to be afraid of failure. Maybe then, the skills gap will shrink. ➤

—Digital Editor Katelyn DaMour



Daniel Tunis

Age: 25
FCA US LLC
Auburn Hills, MI

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There's nothing quite like an automotive stamping plant. Massive presses every few seconds thump sheets of metal into body panels and other parts. You can feel the vibration constantly while you're on the factory floor.

This is Daniel Tunis' world. His title is professional maintenance pillar lead. He works at FCA US LLC's Warren, MI stamping plant.

"My main focus is having proper maintenance in place for all of our equipment," he said. That involves ensuring preventative maintenance schedules are kept. If a problem arises, he wants to make sure it doesn't reoccur. "My role is to try to orchestrate all that, to make sure we keep running our machines as long as possible and minimize downtime."

Tunis is from southeastern Michigan, which meant he was exposed to the auto industry at a young age. "As a kid growing up in the Detroit area, it's the biggest thing here, obviously," he said.

He received a bachelor's of science in industrial and systems engineering from Oakland University (Rochester Hills, MI). While attending school, he joined FCA US in May 2012 as a manufacturing intern. The internship was a partnership between the company and Oakland, which consists of engineering students who focus their careers on auto metal stamping. Tunis worked out of the Warren stamping plant during his internship.

Early in the internship, Tunis worked with a Warren plant employee who was skeptical of what the newcomer was trying to do. "I pulled the gentleman over. 'Hey give me a chance. It hasn't been working but let's try to make it work.'"

Later, "The guy said thank you for getting things accomplished." Tunis said it "was one of the most impactful moments I had."

After graduation in 2013, Tunis was promoted to maintenance supervisor within the automaker's press-room operations. He supervised several tradesmen within the maintenance organization as well as being part of a troubleshooting team for equipment malfunctions. In June 2014, Tunis was promoted to the Professional Maintenance department.

Tunis has been involved in efforts to cut the time needed to change dies, improve maintenance procedures and the company's World Class Manufacturing audit efforts.

World Class Manufacturing (WCM) is an association of companies who work to eliminate waste in production operations. FCA is the only automaker involved. Chrysler adopted WCM after Fiat acquired a controlling interest in Chrysler in 2009 as part of a US government-backed bankruptcy and reorganization.

Representatives of association members audit each other's factories. Tunis helped the Warren plant receive a bronze certification from the group and wants the factory to get a silver certification by the end of this year.

"We're getting ready for one of our World Class Manufacturing audits," Tunis said when interviewed in April. "We have three professional maintenance projects we're showcasing. We have a World Class Manufacturing audit scheduled about every six months."

Tunis was asked to describe what it's like to work at a stamping plant.

"It's very organized chaos," he said. "It's very chaotic but the amount of organization and control and mechanics is just tremendous. We have dies the same size as the pickup trucks we make." When a stamping press has to be worked on, "We're talking about gears the size of a table at a wedding."

The stamping presses are "very similar to a Swiss watch but 200 times bigger," he said. ➔



Anselmo Gallegos

Age: 27
General Motors Co.
Detroit, MI

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Anselmo Gallegos had the chance to play a key role in the development of a new Chevrolet Camaro before he turned 30. Gallegos helped determine how the Camaro's convertible version would be built at a General Motors Co. plant in Lansing, MI. He was part of the convertible's launch team.

"As a member of the Camaro launch team, Anselmo is responsible for the management and development of manufacturing processes, assembly tooling and dimensional performance and total integration for the convertible system in body shop and general assembly areas," according to a 30 Under 30 nominating letter by Kurt Wiese, GM vice president of global manufacturing engineering, and Keith Martin, engineering group manager. "I'm a huge Camaro fan," Gallegos said. "When I got put on this program, it was a dream job."

The new version of the sports car would be more complex than its predecessors. There would be more mixed materials. Gallegos said he couldn't comment about specifics. But with mixed materials more care is necessary to join certain parts. With dissimilar materials, adhesives or coatings come into play.

The convertible would also be built off a new platform. "The new platform is much improved over the previous platform," he said. "It provides just an awesome driving potential." Still, anytime there's a change in a vehicle platform, it calls for production adjustments. "That's the beauty of manufacturing," he said. "There isn't a typical day."

Gallegos joined GM (Detroit) in 2011. He received a bachelor's in mechanical engineering in May 2011 and joined GM in July of that year. He'd obtain a master's of engineering in global automotive and manufacturing engineering in December 2015.

Gallegos' first assignment at the automaker was at Warren, MI, where he was an associate manufacturing engineer. It was a one-year rotation through the Global Body Manufacturing Engineering Center. From there, it was a product interface engineer, also at Warren, where his duties included integration between body manufacturing engineering and product development for the Camaro. In August 2014, he received his current assignment as senior manufacturing engineer for the Camaro convertible launch. "I have a big passion for improving manufacturability of our vehicles," Gallegos said. "You find things that were huge opportunities to avoid problems."

For the Camaro launch, which began earlier this year, Gallego has been on the plant floor in Lansing, working and talking to machine operators. He said one of his main jobs was "coming up with a more efficient system" for assembling the new convertible model.

At the Lansing plant, his duties include "getting the plant up and ready to meet their targets," he said. Gallegos is focusing on quality issues in the early stages of production. Besides his engineering duties, Gallegos is a talent scout for the automaker's Society of Hispanic Professional Engineers and Great Minds in STEM recruiting team.

"Anselmo provides a strong, enthusiastic linkage for General Motors," according to the 30 Under 30 nominating letter. "He understands the needs and demands of this technical organization and proudly represents the company in a highly competitive environment. He is also a mentor in our current summer intern program."

In the future, Gallegos wants to deal with issues such as the interaction between automakers and suppliers. "A big push in manufacturing in general is the use of our supply base to provide more complete assemblies to the assembly plant," he said. "I've seen that area grow in the time I've been in manufacturing." ➔



Ashley Buchner

Age: 30
FCA US LLC
Auburn Hills, MI

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Ashley Buchner uses some of the tools of the virtual world to help automaker FCA US LLC get production of new models off to a smooth start in the real world.

Buchner leads the Virtual Assembly Group within the automaker's manufacturing organization. Her team comes up with digital simulations for assembly processes as the company prepares to bring out new and redesigned vehicles.

For example, her team uses motion capture suit technology. A user dons the suit, which has sensors that generate data for computers to produce a "virtual" person as part of the digital simulations. Buchner once demonstrated a motion capture suit in front of a group of 500 manufacturing employees.

Motion capture suits are a tool used in movies and video games that utilize computer-generated effects. Buchner's team uses such a suit with a more down-to-earth intent.

"We are able to create these simulations of the operator," she said. "You are able to more accurately depict what the operator will be doing...It's a more complete and more accurate simulation. You are now that operator who's in the computer."

"Application of the motion capture suit included developing custom scripts with software suppliers," wrote Marc Banning, manager of ergonomics and virtual assembly for FCA who nominated Buchner for 30 Under 30. Buchner "developed a quick simulation process to visualize manufacturing operations at a station level. During this time the number of simulations progressed from 25 to over 600 for a new vehicle program."

Buchner joined FCA US in 2011 as a contract employee and became a direct hire in 2013. The auto

industry runs in her family. Her parents, Raymond and Sharon Ellerbe worked at General Motors Co. (Her mother still does).

"I had the car bug in me," Ashley Buchner said. "I've always been intrigued by putting things together and taking things apart to figure out how things work."

Buchner graduated from Oakland University (Rochester, MI) with bachelor's and master's degrees in mechanical engineering.

Joining FCA US gave Buchner more appreciation for the production process of vehicles.

"I've always liked cars from the outside," she said. "It wasn't until I got into this field of manufacturing" that she realized "there is this big picture a lot of people don't see...There are thousands of people who work to put one thing together."

Buchner's job calls for travel to factories where FCA is preparing to start production of new models. She may work at a factory in the Detroit area or she could journey to Mexico, depending on the project.

"For me, a typical day starts at 7 in the morning, sometimes 6:30 in the morning," Buchner said. "I like to know my job is complete. My day could be an eight-hour day, it could be a 10-hour, 12-hour day."

Buchner's responsibilities have expanded over time.

"Ashley and her team are in the midst of building a virtual assembly lab, which will allow innovative interaction with product engineering, process engineering and hourly employees," Marc Banning, her boss, wrote in his nomination letter. The lab, he wrote, will boost quality and productivity "as well as significantly shorter ramp-up curves."

"A lot of people think we play with video games," Buchner said. "But it's in a manufacturing setting. It's a cool and powerful tool, that's for sure." ➤



Justin Wenning

Age: 23
Fabrisonic LLC
Columbus, OH

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Justin Wenning's first interest in technical matters came at a young age. His father ran a family heating and air conditioning business.

"I did service calls with him when I was five years old," Wenning said. "That got me wanting to know better ways to do things." Years later, "I was his apprentice for several years growing up. That got me to being hands on, seeing what a design flaw really looks like in the field."

Wenning decided to pursue engineering as a career, obtaining a bachelor's degree in welding engineering from Ohio State University. He supplemented his education with work experience.

At Wayne Trail Technology (Fort Loramie, OH), part of Lincoln Electric Co., he was a welding engineering intern from May through August of 2013. Wenning dealt with "automation systems for MIG, laser, and resistance spot welding systems. That really broadened my scope. I was dealing with every problem they could throw my way during a very busy summer... They knew how to teach me how to logically work through problems and come up with creative solutions."

He then became a welding engineering intern at Deere & Co., from May through August 2014. His duties included performing robot welding for FANUC MIG welding systems and tooling design for manual and robotic MIG welding systems.

Wenning then landed at his present job, 3D printing startup Fabrisonic LLC (Columbus, OH).

During his senior year, Wenning met Mark Norfolk, Fabrisonic's founder and president, at a welding class. "He said he was looking for an intern."

Wenning began this internship in January 2015 and concluded it when he graduated from Ohio State in May. He began full time at Fabrisonic in June 2015.

Fabrisonic was founded in 2011. The company uses Ultrasonic Additive Manufacturing (UAM) technology, in which ultrasonic vibration waves weld layers of metal foil. With UAM, metals aren't heated above 93 degrees C. There is no melting and metals aren't altered. Fabrisonic also sells custom 3D printing machines, performs custom additive-subtractive production as well as other 3D printing services.

"It is so different from every other additive technique out there," Wenning said. "Everything we do is solid state, no melting, which allows us to do material combinations that other people didn't find possible."

Wenning said Fabrisonic has challenges but also a potentially bright future.

"All other 3D printing technologies have a 10-year head start on us. They have a lot more backers." At the same time, "It's extremely exciting to be here. It's cool from that aspect of seeing it physically growing."

What's more, working at a small startup with fewer than 10 employees, provides experiences at multiple tasks.

"We wear every hat," Wenning said. Mark Norfolk, the company president, "is on the road a lot" and Wenning said he at times has taken on such jobs as customer relations.

"I'm in at 7," Wenning said, when asked to describe a typical work day. Employees review the previous day's work and plan out the new day.

"I was in 7 to 9:30 [PM] two days. There are so many jobs I have going on." Some days he mostly runs machines. "There's always something to do here."

At times, he has performed design engineering to improve Fabrisonic technology. He also has done research and development to improve the capability of UAM. "I actually redesigned part of our machine to improve upon the concepts." ↻



Perry Parks

Age: 28
Siemens PLM
Cypress, CA

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Perry Parks made a big impression on the folks interviewing him at Siemens PLM about four years ago, his colleague Altaf Arsiwala recalled. As Parks described his master's thesis—"Translational Damping on High-Frequency Flapping Wings"—he at one point leapt to his feet and flapped his arms to illustrate a concept. He was hired on the spot.

Parks earned an integrated master's in mechanical engineering in five years at Purdue. That was another reason Arsiwala felt sure Parks could handle the tons of code and variety of concepts he would be exposed to in the first couple of years in the Assembly Modeling area in NX.

"Right from the start Perry demonstrated an instinctive talent for developing Mechanical CAD software," he said. "He was unfazed by the complexity, and we were able to trust him with design and project leadership responsibilities towards the end of his first year."

The research Parks took on at Purdue involved "bio-inspired robotics," he said: "Taking cues from nature on how it had solved some of the biomechanical problems of locomotion." Others at the school had developed a micro-air vehicle (MAV) flapper mechanism that resembled a cicada—for which they needed to design a control system.

To get there, they first needed Parks' help studying the system dynamics: "We needed to understand the physical dynamics of the system before we could move on to using that information in a control loop in the electronics. So I worked on investigating what type of damping, or resistance, the cicada-size vehicle would encounter when moving through the air (and not rotating) while flapping its wings."

He found that an MAV flapping in a vertical hovering orientation while moving through the air produced more drag than if it were just gliding in the same orientation. "You could imagine that, but you wouldn't necessarily expect it—because the wings are pushing forward in one direction and backward in the other direction as it's translating forward," he said. "But it doesn't completely cancel out."

The data is helpful because it helps engineers create more inherently stable systems. "If you're flapping in a hovering orientation and a wind gust hits you, it turns out that even without actively working to compensate for the gust you will already have a bit of natural resistance to this type of disturbance." And such systems are what's needed for autonomous flight.

Using CAD software, Parks built a test apparatus—a mounting point with a bracket and some ball bearings—and suspended a pendulum from it. He mounted the flapper mechanism on the end of the pendulum and set up the system so it could oscillate back and forth while flapping in order to measure drag.

He reached his goal of recording a drag coefficient that matched an existing theoretical model. And that, he said, means engineers can now more easily calculate the drag for such MAVs by measuring the geometry of the flapper and using existing equations—saving time in the lab.

Today, he is involved in the design of CAD software tools that let people design similar objects.

He loves variety. Projects he's been able to work on include functionality to mirror an assembly of parts and clearance analysis—"when you have parts that are intersecting, we can use mesh geometry to make measurements that determine how far one object penetrates into another," he said. ➔



Matt McKee

Age: 29

Lockheed Martin Aeronautics

Fort Worth, TX

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Structured light is among the virtual manufacturing technologies Matt McKee sees as a critical tool for the future of production measurement and quality assurance.

“It’s made huge leaps, especially in the last five years” and is gaining in adoption, he said. “The leaps it is taking are finer accuracy, faster refresh rates and a larger field of view. Everyone wants it better, faster and cheaper.”

McKee knows about structured light from his work as the technical lead for non-sprayed, or bonded, finishes in the manufacturing technology group at Lockheed Martin Aeronautics—where he also works on automated process integration.

A structured light system, which is pre-programmed and electronic (read: hands-off) projects a fringe pattern of light across the surface of the F-35 and uses two cameras to collect data

that is then used to map the fighter jet’s surfaces for subsequent applications in the manufacturing process and for quality assurance/acceptance as a form of automated inspection.

Human immersion/augmented reality is another technology McKee is sold on. “And seeing how much additive manufacturing has advanced, even in the last year, I can see that buying its way on—maybe not for flight parts but for applications other than production parts, such as quick, low-cost cast or injection molds, non-critical structure mounts, and continued rapid innovation test articles.”

Additive manufacturing has also proven the ability to expand the realm of engineering capabilities, producing parts that otherwise could not be machined and

combining multiple components into a single component build.

McKee, who has always been interested in tinkering and problem solving and knew in his junior year of high school that he’d follow in his mechanical engineer father’s footsteps, earned a BS in mechanical engineering from Oklahoma State and joined Lockheed in 2009.

He always wanted to work on planes, “but I didn’t think I’d get to work on a fighter jet, so that was a pretty big bonus,” he said.

On top of that, he gets to investigate and develop “cutting-edge technologies to be solutions to problems in the manufacturing environment,” he said. “And we go from a concept on a piece of paper all the way to equipment in production. If you stay in your position long enough, you can see a project from sketch to solution.”

“I didn’t think I’d get to work on a fighter jet, so that was a pretty big bonus.”

A portion of his work is taking things that used to be sprayed on applications and making

them bond-on for improved accuracy to meet the stringent manufacturing requirements of military aircraft. Usually, this involves hard-to-reach areas of the F-35 and/or highly contoured surfaces. Often, the solution involves direct-injection molding or various adhesives in the form of epoxies and tapes.

McKee advises taking on “stretch assignments”—urgent projects that pop up in any organization that are outside your general scope of work.

“I was given the opportunity to work on a couple of those at Lockheed,” he recalled. “One was related to improving wiring harness fabrication, and another was related to developing a method for applying a new adhesive tape to complex surfaces for production use.” ➔



Nick Raymond

Age: 28

Monterey Bay Aquarium Research Institute
Moss Landing, CA

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With the ink barely dry on his master's in mechanical engineering from UC Davis, Nick Raymond is interning this summer at the Monterey Bay Aquarium Research Institute. He is working to retrofit a buoy used to sample water temperature profiles at different depths in the ocean—by adding an inertial sensor that could measure the float's speed while it is drifting in the currents.

The buoys sometimes beach themselves. So the scientists with whom he is working need to track how fast each buoy is moving and its relative location so when it gets too close to shore they can change its buoyancy in an effort to send it back to deeper waters.

To get on the front lines of the climate change battle, Raymond took what some would see as a circuitous path: He attended Santa Rosa Junior College and worked full time for six years in Bodega Bay, for the Sonoma County Regional Parks system, before entering the UC system.

He loaded up on a variety of classes to sort out what interested him (engineering physics) and what did not (psychology). He took on an independent project, in ocean wave energy capture and built a small model from PVC pipe and magnets. To test the power output, he converted a fish aquarium into a wave tank for generating four-inch-tall waves. And he bought a three-axis desktop manual milling machine that he later retrofitted into a small CNC machine to fabricate and engrave more sophisticated parts for the prototype.

When he transferred to UC Davis, Raymond landed a research gig in the Intelligent Manufacturing Systems & Mechatronics lab, in part because he had a CNC milling machine in his apartment and experience programming and learning G code.

Overnight, he went from using his mini mill at home to operating and programming traditional and nontraditional machine tools using CAM software.

During his senior year, he led a team of fellow mechanical engineering students as they designed, built and tested a full-scale prototype of a 100-watt wave energy converter that could harness energy from ocean waves. The team posted construction plans for the wave energy converter online (<https://oceanpowerproject.wordpress.com/>) so others could improve the technology, he said.

"As a result, I've had about 30 inquiries from people in six different countries but haven't yet seen someone building the exact same thing," he said

Raymond has a clear ethos: lower the barrier to entry.

While he is interested in prototyping and developing new tools and hardware with the latest machine tool technology, he is even more interested in integrating simple sensors and microcontrollers with existing components to make inventions that hobbyists and tinkers can replicate:

"I love the concept of taking something off the shelf and making something new out of it," he said. "That was the idea with the wave energy project: You don't need to spend all this time making custom parts and components. You can just take hydraulic components that go into tractors and springs from a car, and you can combine them to make a new device that can harvest energy from the ocean.

"It's really hard to manufacture things precisely and accurately, and to make them smooth and have perfect 90-degree angles," he said. "So I'm really interested in finding ways to share information with people who don't have CNC machines and finding ways to get them excited and making it so things are accessible and open sourced." ➔



Jacob S. Larson

Age: 22
John Deere
Waterloo, IA

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When Jacob Larson was able to find someone online to pay about a hundred bucks for a 1/64th-scale semi-truck he put together with some parts in his parents' basement in Breckenridge, MN, and painted "a little bit wrong," he was hooked on engineering. He was 16.

Fast forward a few years and Larson graduated from farm toys to ginormous ag equipment and medical lab devices. He just earned a degree in Manufacturing Engineering from North Dakota State University and relocated to Waterloo, Iowa, to work as a machining engineer at John Deere.

At NDSU, he worked on graduate level research, some of which involved dental implants. He built a self-contained apparatus to test biological systems like those found in mice, rats and humans. That dynamic bioreactor, whose trade name is Cellulation, would facilitate faster and less costly development of pharmaceuticals, cardiovascular devices, or implants by replicating in vivo conditions in the laboratory so that at least some of the small animal testing taking place today could be eliminated.

His research team at NDSU has applied for patent protection, as well as grants to continue the research "at a much higher level" and to get the device ready for commercialization, he said.

In addition to classwork, Larson built his engineering knowledge interacting with two lab instructors, his mentor and academic advisor, David Wells, NDSU students in biochemistry and microbiology, a Mayo Clinic researcher and about a dozen other professors on campus and off campus.

The first credit for his finding engineering intriguing goes to his dad, he said.

Larson would tag along with his father on weekends

and during school breaks as the elder Larson worked with farmers to "come up with creative solutions in the field" to fix farm equipment on the fritz.

"What got me interested in engineering in general was coming up with solutions to problems off the cuff of your shirt," he said.

His shop teacher, as well as his physics and chemistry teacher, in high school also encouraged him to be a maker.

Today, Larson knows it's important to "find something you are really passionate about—something you are proud of," he said. "Engineering, creating and designing is not just about the math; it is also about beauty and the creation of something that can better society."

Larson is enthralled by turning ideas into reality.

"It's a skill I have that a lot of people don't have or think is voodoo science," he said. "But it just takes training and practice and time and education."

He recently designed and 3D printed a 1/64th-scale Geringhoff corn header for a combine for farm models, for a customer who had the idea for a new product but lacked the design and 3D printing skills needed.

"He does the assembly and sales, but I am the engineering lead," Larson said. "It was really cool to help him bring an idea into a product he's really passionate about, too."

Additive manufacturing is "definitely going to be big business," Larson said.

"Even other processes I think are going to be more social," he added. "You are seeing a lot of these household 3D printers, but I even think household CNC machines will start to become more prevalent now that 3D printing has allowed the software to be so user-friendly." ↻



Matthew R. Kelly

Age: 24

University of Notre Dame

South Bend, IN (River Forest, IL)

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Matthew R. “Matt” Kelly is a PhD candidate in mechanical engineering, but he could ace a major in leadership if such a degree were offered.

Kelly, 24, of River Forest, IL, led his senior robotics team at the University of Notre Dame (South Bend, IN) where he earned a bachelor’s of science degree in mechanical engineering, the same school where

he’s pursuing his doctorate; was elected president

of his local chapter of the Indianapolis-based College Mentors for Kids and also captain of his dormitory’s basketball team; and is guiding a group of undergraduates who are carrying on the research he started as an undergrad.

“I definitely have taken to different leadership roles,” said Kelly. “I do naturally fall into those roles due to my ability to analyze and sit back and then make the best decision for a team.”

A die-hard fan of the Discovery Channel’s documentary series “How It’s Made,” which inspired him to become an engineer, Kelly’s was the lone hand raised when one of his undergraduate professors asked the class why aluminum foil is shiny on one side and dull on the other.

“By the time I graduated high school, I watched almost every episode of ‘How It’s Made,’” Kelly wrote in a personal statement to support a grant application. “In the process, I realized I wanted to be a mechanical engineer with a future career in manufacturing.”

If a Discovery Channel documentary were to be made of Kelly’s life it might be called How It Should be Made, because he’s not content with the status quo.

“He is exactly the kind of person that can lead the manufacturing industry into the future.”

For example, when there were more mentees than students in his College Mentors for Kids chapter, Kelly collaborated on an email and direct marketing campaign to increase the number of mentors from 90 to 126. Later, he helped establish the first graduate student branch of the nonprofit program.

In addition, Kelly’s research as an undergraduate, and now his dissertation work, focuses on how to

improve linear friction welding so that it can be applied on an economically competitive scale to help lightweight automobiles.

As it happens, this type of welding is ideal for use in the automotive industry, where traditional welding can’t be used for joining steel and aluminum because of the metals’ different melting points. They can be joined with a mechanical weld, but that adds weight.

The downside to linear friction welding is that the machinery made to carry out the process is prohibitively expensive for widespread use.

During his undergraduate research, Kelly created a library of various welding materials at Manufacturing Technology (South Bend, IN), a friction welding company. He continues to work at the company on his research, the only student ever allowed to operate its manufacturing equipment.

After graduation, Kelly wants to pursue a career in advanced manufacturing to help restore the United States’ position as a nation of makers.

“He is exactly the kind of person that can lead the manufacturing industry into the future,” wrote his nominator, Steven R. Schmid, professor of aerospace and mechanical engineering at Notre Dame. ➔



Caroline Richardson

Age: 27
Abbott Point of Care
Princeton, NJ

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Whatever Caroline Richardson's doing at her job at Abbott Point of Care, she must be doing something right. When Richardson was appointed instrument operations engineering manager in February 2015, it was her third promotion since starting with the company five years earlier.

She had been promoted from product engineer to product engineer II after nearly two years with the company; it was Richardson herself who initiated the upgrade to a management position in mid-2013 to fill her former supervisor's slot.

"If you think you can do something, you need to ask for it," Richardson, 27, Princeton, NJ, said. "The burden is on you as a person who's trying to develop yourself; you need to be your own advocate."

Of course, it helps if you've actually done something to earn a promotion, which she has, David Jamieson, director of instrument operations, Richardson's 30 Under 30 nominator, points out.

"Caroline has a great ability to compartmentalize her intellect toward the key issue of the moment and is willing to run to the fire while others may back away," Jamieson wrote. "This is a key attribute of leadership that is innate to Caroline."

One of Richardson's first projects was to review and update, if necessary, the company's protocols for validating the decontamination procedures for its devices in a clinical setting. This was in response to an industry-wide mandate from the US Food & Drug Administration. Her protocol has become the standard for her division's validation of decontamination practices.

Then, when the ebola epidemic struck in 2014, and Abbott needed to instruct users how to decon-

taminate a device infected with the deadly virus, Richardson developed a best practices document to use in the field. Given her background in biochemistry, she said she felt it a duty to raise her hand and volunteer for the task.

"That was another fire drill moment for the company," said Richardson.

Also, she saved her company \$1 million per year by working with a third-party engineering firm to produce a proprietary printer for the i-STAT, Abbott's handheld bedside patient blood analyzer. Abbott had been supplying its customers with an off-the-shelf printer. Richardson received the company's President's Award in 2011 for her work, and thinks it helped lead to an even better assignment.

"It set me up pretty well to work on the bigger project I'm working on now," she said.

Currently, she's leading 10 direct reports and 25 dotted-line reports in a project to help develop Abbott's next-generation i-STAT.

"That's one of my favorite experiences in my role, revamping an entire instrument," Richardson said. "It's the largest-scale development (in Abbott Point of Care) in 15 years."

Part of the project included producing 100 prototypes within a two-week period in 2015, a timeframe that happened to include Labor Day weekend. Richardson and her co-workers volunteered to work over the holiday.

"We were all sort of anxious to see if it would work," she said.

Jamieson puts it another way: "Her indefatigable nature and can-do attitude inspired her team to rally around her and deliver." ➔



David Zwick

Age: 22
University of Florida
Gainesville, FL

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It looks like taking a risk and becoming a teaching assistant in undergraduate school led David Zwick to his life's work.

"That was a major turning point when I started as a teaching assistant," said Zwick, 22, of Gainesville, FL. "It convinced me to pursue a PhD and also helped me figure out my teaching philosophy; I want to see every student succeed."

If it's possible to be a natural teacher, Zwick may be one. During his first semester as a TA, he taught numerical methods for engineers to a group of 20 students. An older student dropped the class, but showed up the next semester sitting in the front row. The student had taken time off because he lacked the math literacy needed to be an engineer.

"Despite this, he decided to try again and chose me as his recitation leader because I was the only teaching assistant he had found that made accommodations for every student to succeed despite their background," Zwick wrote in a personal essay to support his application for a National Science Foundation Graduate Research Fellowship.

The older student ended up succeeding in the class, and so did Zwick; not only was he named outstanding ASU teaching assistant as an undergrad, he was awarded the NSF fellowship earlier this year.

"I was so excited [about the NSF award] I called my family in Arizona" without noting the western state is two hours behind Florida, said Zwick. "It

seems like doors are opening for me even now in graduate school."

Fortunately, Zwick's father, Robin, was up getting ready for work at the time the phone rang.

Robin Zwick, a manufacturing engineer for The Boeing Company (Kennedy Space Center, FL), was David Zwick's inspiration to pursue a degree in mechanical engineering. The older Zwick worked in a machine shop to support his family while earning his undergraduate and master's degrees.

"Even now, I still remember watching him study at night after a long day of work," said David Zwick.

Unlike his dad, David Zwick is headed for a career in academia and plans to study and research fluid

"I was captivated by the complex geometrical patterns that formed in the desert dust and swirled around in the air as I watched helicopters land."

mechanics, specifically particle interactions in the presence of shock waves. The work has practical applications in

volcanic eruptions, geysers, powder snow avalanches, explosives, dust storms, and other phenomena.

Speaking of dust storms, one of Zwick's earliest inspirations came when he was a child and his father took him on a tour of Boeing's Mesa, AZ, facility, production site of the AH-64 Apache helicopter.

"I was captivated by the complex geometrical patterns that formed in the desert dust and swirled around in the air as I watched helicopters land," Zwick wrote to the NSF. "At the time, I did not realize my observations related to the field of fluid flow, but the experiences provided lasting impressions that continue to motivate me to advance my education so that I can educate others." ➔



Amber Williamson

Age: 28
Baxter Healthcare
Mountain Home, AR

30

UNDER THIRTY

If FIRST Robotics' goal is to get students to pursue careers in science and technology, then its mission was accomplished with Amber Williamson.

Williamson, 28, Mountain Home, AR, wasn't really interested in technology until her senior year of high school when she was the sole student to enroll in a class to learn computer networking. That's when the class' teacher said, "You know, if you like this, you might be interested in Bomb Squad."

Bomb Squad is the name of the school's FIRST, or For Inspiration and Recognition of Science and Technology, Robotics team. In the FIRST program, students work with volunteer engineers to build a robot that has to accomplish a specific task. The experience enabled Williamson to work side by side with engineers from Baxter Healthcare.

"I thought, man, if this is what they do every day, I'd like to do that for the rest of my life," said Williamson, who had previously aspired to be a doctor. "Being on the team brought me into the STEM world."

During the project, Williamson learned how to use power tools and was introduced to electrical wiring concepts. She also had a chance to practice organizational and time management skills that come naturally to her, and to start to develop her "engineering intuition." Williamson defines this type of intuition as being able to focus on a problem and know quickly whether a possible solution will work.

These are skills she uses in her job as an engineer II at Baxter, where she was hired in 2012 after earning a degree in mechanical engineering. Williamson works in the plastics division, where products are made for home dialysis.

As for FIRST, she's not done yet.

Williamson has been mentoring a local team since 2011, along with her husband, whom she met while volunteering. She's also volunteered for a FIRST Lego League since 2012. In addition, Williamson is president (also since 2012) of the Science and Technology Group, a nonprofit that raises money for FIRST and other STEM initiatives.

"In one year alone, she volunteered more than 550 hours mentoring students between the ages of 16 and 18 in the FIRST program," wrote her 30 Under 30 nominator.

Williamson is part of a tradition at Baxter, which was a founding sponsor of FIRST. Since 1998, its aggregate support for the robotics program exceeds \$2.5 million, and about 30 employees throughout the country participate as mentors, many from the Mountain Home facility.

Williamson focuses on helping out with the business side of the local FIRST team, including news media relations, social media, travel logistics and scouting for competitors. Seeing the excitement in the team is rejuvenating for her, Williamson said.

"It's definitely a different world for me," she said. "I want the students to have the best experience."

After having been involved with FIRST for so long, Williamson said she definitely sees stronger participation among females, at least anecdotally. Her high school team included three girls out of more than 20 team members; the team of 24 students she mentors today includes almost one-third females.

Her future plans include staying with Baxter's plastics division and continuing to support FIRST with her time and efforts.

"It's addicting," she said. "Honestly, after one build competition, you don't want to stop." ➔



Troy Wallace Pierson

Age: 18

University of Alabama - Incoming Freshman

Mission Viejo, CA

30

UNDER THIRTY

When high-schooler Troy Pierson completes his engineering degree in four years or so, he may be one of few in his class who's not sending out resumes and scheduling interviews.

Pierson, 18, of Mission Viejo, CA, has had a job in his field since June 2015. He's also already been promoted—from summer intern to trainee in the Pilot Metals department at Applied Medical (Rancho Santa Margarita, CA), a firm that designs and manufactures devices for minimally invasive surgery and other clinical specialties.

"I always had an interest in building and making things, and I was always at the top of my class in math and science," Pierson said. "With so many kids nowadays earning degrees with no guarantee of a career I wanted to give myself the best chance at starting a career out of college."

Pierson already has a bullet on his resume for saving Applied Medical money. He did it by suggesting a bunk bed-style arrangement for some CNC milling machines, which freed up space on the shop floor worth \$100,000.

If Applied Medical doesn't work out, or even if it does, Pierson has his eyes set on Mercedes Benz, which operates a plant just 15 minutes away from his classes at the University of Alabama (Tuscaloosa, AL), where he plans to start in the fall.

"This opportunity excites me as the automotive industry has always fascinated me," said Pierson, who has a Plan C if plans A and B should fail. "At the end of the day, I see myself being a lead engineer for a Fortune 500 company."

In the meantime, Pierson is focused on graduating from Trabuco Hills High School (also Mission Viejo) and

a project he and a fellow student will enter in the California State Fair's (Sacramento) Industrial and Technology Education portion of its Student Showcase.

For their State Fair project this year, the pair designed, engineered and 3D printed a drill speeder, along with a stand for the device and a box, to showcase their skills in AutoCAD, SolidWorks, additive manufacturing and CNC milling. Pierson estimates they'll have spent up to 2000 hours on the project before submitting it to fair judges. Pierson and his partner will find out in July if they've won their hoped-for best of show.

"The time that he puts into his projects is remarkable due to his 20–25-hour-a-week job and all of his advanced placement classes, which have earned him the Presidential Scholar award [scholarship] to The University of Alabama," wrote his nominator and engineering drafting teacher Frederick Kendell.

Pierson has participated in local and state fair competitions for various AutoCAD, Solidworks and 3D-printed model projects throughout high school; he was once State Champion and twice a runner up.

He also earned accolades from professors he worked with at the California State Summer School for Mathematics and Science, a month-long engineering camp that accepts 200 students each year. He spent a month living at and using the facilities of the University of California, San Diego, where he studied civil engineering. Pierson's final research work focused on base isolation and was voted best project by his professors.

"His work habits and determination have overcome obstacles in his individual projects as not all projects turn out correct the first time," wrote Kendell. "He embraces the fact that failure is just a stepping stone to success." ➔



Long Phan

Age: 27
United Grinding
Miamisburg, OH

30

UNDER THIRTY

Long N. Phan's career path to his current position as an applications engineer for United Grinding in Miamisburg, OH, is in some ways unexpected. Long earned his mechanical engineering degree from the University of Missouri St. Louis/Washington University in 2011. At the time, the job market was a little tight so Long decided to increase his skills by learning about solid modeling.

When parents of a friend of his learned that he was pursuing certification in solid modeling, they offered him a job in their small St.

Louis machine shop working with Mastercam. By his own admis-

sion, Long didn't know a lot about machining feeds and speeds at the time, but in no time Tom Roderick and Mike Stockglusner, the shop's owners, had him out on the shop floor learning to operate mills and lathes.

"That opportunity really opened my career path to me. Working at the small shop helped build my great appreciation for machining. I enjoyed it and now I love it. It's my career."

The first big opportunity in Long's career came when he joined Honda of America, as a Level 2 Engineering staff in Anna, OH, working on its major Continuously Variable Transmission (CVT) components line. Interestingly, in spite of the fact that Honda was offering positions in turning, Long was assigned to grinding processes. He quickly learned that grinding is one of the most challenging processes, especially because of new difficult-to-machine materials and tighter production requirements.

At Honda, Long was responsible for equipment procurement, developing efficient layout and parts flow for CVT components as well as manufacturing equip-

ment specifications to meet mass production schedules. Randy Seger, one of the CVT project engineers who worked with Long at Honda, describes him as "self-motivated and persistent. Long quickly earned the respect of the entire team through his effort and willingness to tackle difficult challenges," said Seger.

"Long joined United Grinding last summer and immediately exhibited the acumen that gave us the confidence to assign him to some of our highest profile development and installation projects," said 30 Un-

der 30 nominator Ted Neckel. "In fact, Long has worked with some of our largest custom-

ers, including aerospace manufacturers in Mexico and Canada, to successfully implement Studer cylindrical grinders into their processes."

Tom Vieira, who is an application manager in United Grinding's cylindrical division and Long's supervisor, said that Long is a character-driven employee who always has a positive attitude. He really appreciates Long's willingness to jump into any project and propose solutions, which is extremely valuable to United Grinding and its customers.

Long's contributions to United Grinding have been almost immediate, for example, developing an ID grinding process for HVOF-coated parts. His solid machining experience that was developed while working as an apprentice machinist has enabled him to excel at training United Grinding's customers and troubleshooting application challenges. "Since joining United Grinding almost a year ago, Long has earned high marks as an essential member of our team. He is both an outstanding leader and a talented engineer," said Neckel. ➔

Long has worked with some of our largest customers, including aerospace manufacturers in Mexico and Canada.



Aaron Birt

Age: 26

Worcester Polytechnic Institute
Worcester, MA

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UNDER THIRTY

Aaron Birt has been nominated “as much for what he will do in the future as for what he has already done in the past,” according to Diran Apelian, director of the Metal Processing Institute. “In many cases, the future is perfectly tied to past actions. In few other young individuals that I know is this truer than in my PhD student, Aaron Birt. He is one of those individuals who when asked about plans for the future simply tells me he plans to ‘change the world.’”

Aaron graduated with honors in mechanical engineering from Lafayette College and then began his education at Worcester Polytechnic Institute, obtaining first a master's of materials science and engineering degree before beginning his PhD in 2014. During his MS studies, he published two peer reviewed papers, two conference proceedings, and presented at more than 10 conferences. He discovered unique connections between the thermomechanical processing of laser-assisted cold spray (LACS), a high velocity solid-state spray process, and the microstructure of Ti-6Al-4V consolidated with the technique.

Aaron has excelled at identifying innovative technologies and integrating them into existing processes to increase efficiency or effectiveness. Though he is a materials scientist by training, his insights are not limited to that field. In addition to his PhD thesis, he has started research into a technology that could completely alter the way lithium ion battery cathodes are manufactured. Aaron has already filed a provisional patent, won a \$40,000 Massachusetts Technology Transfer Award, built a team to do the research, and started the research process in earnest.

Working with IPG Photonics, he developed a program that guided IPG toward a study of experimental

machine learning algorithms and how they might enhance and reduce the time required for the overall optimization process of a new material application. IPG Photonics was sufficiently impressed to sponsor his PhD thesis on the topic. Aaron quickly discovered that there were far too many experiments and samples in the program for one person to undertake. Rather than despairing, Aaron made a few modifications to the experimental plan, and then went out and recruited 15 undergraduate students to work with them. He then went on to hire three to five paid interns for every summer on the project, guiding them in various aspects of the work-scope and technology.

Beyond academia, Aaron has given back to the organizations around him that have helped bring him success. He has participated as a student board member of both the Heat Treating Society and ASM International where he offers advice about how these societies can direct student interest within their organizations. He has chaired programs in The Venture Forum, a local Worcester-based entrepreneurship group for several years where he has grown their 5 Minute Pitch contest to more than 40 local applicants and 200 attendees.

He has also worked with his doctoral advisor to co-advise one of WPI's Major Qualifying Projects, where a team of undergraduates was tasked to design and develop a new high-pressure, mass flow controlled, multi-material powder feeder for LACS—something that doesn't exist in the industry at this time.

Aaron has identified several career choices lying ahead of him, but whether in academia, industry, or government research he relishes the opportunity to endeavor down the path of maximum impact. ➡



Austin Hall

Age: 27

HDH Manufacturing
Indianapolis, IN

30

UNDER THIRTY

There is no one roadmap to becoming an entrepreneur, or in the case of Austin Hall, a co-owner of a manufacturing start-up. Austin is president and CEO of HDH Manufacturing, a job shop in Indianapolis in partnership with his brother, Gabe, and their friend, Roger Dettmering—the namesake of HDH.

Austin got his start in manufacturing working during summers in a small job shop. Austin started out assembling parts, sawing material, and doing anything else that needed to be done around the shop. With his strong work ethic and desire to learn, he quickly picked up more skilled tasks, including running the machines. Having taken a real interest in machining, Austin put himself through a two-year associates program at Ivy Tech. After some formal training at

Ivy Tech, Austin became one of the shop's CNC programmers and manager of the night shift.

In addition to starting his own business, Austin has been an adjunct professor at Ivy Tech since the fall of 2013, teaching a class called interactive CNC for which he created his own curriculum. His curriculum is designed to introduce students to advanced manufacturing techniques and applications in a shop environment to give students a real world perspective of manufacturing. For the final exam, students have to design their own part, draw it up in CAD, formulate a work flow process, document the setup process, and program, produce, and quality control the part.

In high school, Austin had an aptitude for science and geometry, and took two years of calculus and physics. What really motivated him were two competitions that he took part in. During his senior year, Austin participated in the rocketry team in the

national Team America Rocketry Challenge (TARC). His team didn't win a place in the nationals, but in another national competition, The NASA Student Launch Initiative, his team was invited to launch their rocket at the US Space and Rocket Center in Huntsville, AL. Austin was the payload supervisor on a project that took eight months to design, build, and launch.

"In Huntsville, there was so much to see relating to manufacturing components for the space station. It was truly amazing," he said. "It really inspired me to pursue something in the field of manufacturing."

In February of 2015, after seven years of running the night shift at the job shop, the owner of the job

shop decided to close down the business due to a downturn in the economy and the oil

industry. Austin was night shift supervisor, Gabe was the day shift supervisor and shop floor manager, and Roger was the weekend supervisor. When the owner decided to shut down permanently, the three decided to partner together and form their own company.

Fortunately, the shop's owner said they could use the shop's equipment till he was able to auction off the assets, paying only rent and utilities. That period stretched out to several months, during which time the three partners were able to accumulate savings that would be used to finance their operations. At the auction they were able to purchase much of the equipment and tooling they needed for their own shop. In their first year of operations they were subsequently able to finance a new mill (Hurco VM20i) and a new lathe (Hurco TMM8).

After a successful first year, Austin says he is excited for the future of his company. ➔

In addition to starting his own business, Austin has been an adjunct professor at Ivy Tech since the fall of 2013.



Joe Lampinen, M.S., CMfgE, LEED AP, PMP

Senior Director, Engineering,
Global BPO Center of Excellence at KellyOCG

WORKFORCE PIPELINE

A MONTHLY FEATURE ABOUT TRAINING, EDUCATION & WORKFORCE DEVELOPMENT

Engineering a Successful Career Path

With the worldwide shortage of qualified engineers expected to hit a critical point in the next 15 years, now might just be the best time in history to come out of school with an engineering degree. This demand for technical talent is certainly great news for anyone entering the engineering profession. But to paraphrase the old business school saying, “with success comes increased competition.” And you can be sure the best jobs go to the best prepared.

If you’re part of the new generation of engineers who graduated in the past decade, you’ve no doubt been exposed to a wide range of new technologies that you’re expected to be proficient in. But some of the most important things to know likely weren’t found on the syllabus—namely, how to successfully manage your career and keep making progress as you move forward. If you’re just getting started or have a few years under your belt, now is a great time to consider how to build and augment the professional skills that will get you ahead and keep you there for the long term. The best part is, you don’t have to do it alone.



familiar with these processes and disciplines, they may not know that hiring managers most frequently cite analytical/critical thinking, verbal/written communication skills, and complex problem solving as hard skills lacking among underqualified candidates.¹

Certainly, these hard skills are imperative for today’s engineers to own. But just as these technological advances and the ability to work effectively with them has become de rigueur, so has the need to be able to successfully collaborate with other engineers, project supervisors, and managers across the table and on virtual projects across the globe

(both with internal colleagues, as well as with clients, suppliers, and other collaborators).

This is why a proficiency in soft skills is so critical to career success. Because quite frankly, engineers who understand that side of the work equation are almost certain to build their careers faster than those who don’t. And with the variety of

employment options available to engineers in today’s marketplace, those skills can, and will, open doors to opportunity like never before.

No Shortage of Tools to Use or Problems to Solve

Given the amazing tools and technologies new engineers have to work with today, and the endless variety of problems to solve and products to deliver, it’s easy to get tunnel vision when it comes to your career. With rapid advances in automation and additive manufacturing, and the demand for industrial sustainability and product energy efficiency improvements, today’s engineers have more than enough tasks on their plates to fill their days and then some. And while it’s likely that most engineers under 30 are

Full Time for Free Agent? It’s Your Call

Understanding and taking advantage of soft skills comes into sharper focus when you consider how the workplace paradigm has shifted in recent years. Workers, including engineers, now have a choice as to whether they stay with a company or leave whenever a better opportunity presents itself. Known as free agents, these workers represent a growing segment of the workforce. Until relatively recently, many in the engineering workforce sought long-term employment with one firm (e.g., an automaker) where they could tuck in

[1] 2015 Hiring Manager Research, conducted by RDA Group on behalf of Kelly Services.
[2] HFS Consulting CEO Phil Fersht

WORKFORCE PIPELINE

and work on a relatively small number of assignments—expecting to work there until retirement.

Today, good engineers can have their pick of engagements. And in fact, a growing number of professional/technical workers are now free agents. Many choose to work on a contract basis because it affords them the opportunity to take jobs that best fit their lives. A project-based focus helps them round out their skill sets, encounter new technologies and engineering challenges, upgrade their resumes, and ultimately make themselves much more attractive and valuable to future employers. But navigating this new world successfully means building and then demonstrating these hard-to-hire essential skills.

What the Hiring Experts Say

At Kelly Services, we've studied this situation extensively as part of our Kelly Global Workforce Index. We discovered that six out of 10 hiring managers across technical professions say they have difficulties finding candidates with the right combination of hard and soft skills.



These hiring managers cite social intelligence—the ability to get along well with others and get them to cooperate with you—as the heart of soft skill development. Of five key soft skills, PT hiring managers most frequently cite the ability to listen/comprehend (81%) as highly important, and 72% claim that teamwork/ability to collaborate is critical (significantly higher for engineering talent, at 85%). For underqualified candidates, 27% of PT hiring managers report a lack of teamwork/ability to collaborate—again, especially for engineering talent, at 40%.

Clearly, underestimating your need for soft skills is a bad move if you want to get ahead. So here are five good rules to follow that will help you augment and hone those skills as you go forward:

- Treat your career like a business by developing a personal brand. What are your career goals and objectives? Develop a portfolio of work, keep your social media space clean, and network in the circles that can leverage your skill specialty while expanding your circle of influence. Engage with organizations with employer brands that best match yours. You cannot underestimate the significance of your credibility and how that speaks for you.
- Take responsibility for yourself and your growth by being brutally honest with yourself. What gaps are there in your skill set and experience? Once identified, use and extend your network to fill those gaps with industry certifications and/or direct experience. Gradually and systematically develop complementary and supplementary skills and experiences that align with your career objectives.
- Be collaborative with your colleagues. How well do you collaborate with others? Collaborating is about sharing work, sharing experiences, and learning from each other—not about being the smartest person in the room and inviting them to that room. Sometimes it's about creating the room for everyone to be smart in together.² You want these individuals to be your next referral.
- Leverage social intelligence. What soft skills do you need to develop? What feedback from colleagues or mentors have you not put in place yet? Social intelligence is being able to analyze your own behavior and create definitive actions to improve it, from LinkedIn to each interaction.
- Go beyond your comfort zone. This economy requires some risk-taking in order to have resilience—are you ready for that? Only reinforcing expertise in a specific industry or technology at the expense of gaining knowledge, skills, and experiences outside your core area could put you at greater risk for becoming irrelevant in the long term.

Ultimately, as an engineer and as a professional, you need to be prepared to manage your own career—now and down the road. But trust me, that path can be easier to navigate when you avail yourself of available resources and services, such as working with professionals at workforce solutions agencies who can help you to network, find engagements, and effectively market your services. ➤



David Kriesberg

Age: 22

University of Maryland

College Park, MD

30

UNDER THIRTY

It's not that big a stretch of the imagination to see someone who was interested in building with a "humongous" Lego collection when he was young become fascinated with today's hottest advanced technology—3D printing/additive manufacturing. David Kriesberg is that person—an undergraduate mechanical engineering student with a December graduation date.

David wrote an award-winning paper on 3D printing and won the Italian Machine, Tools, and Technology Award (IMTTA) and a trip to Italy sponsored by the Italian Trade Agency. The paper focused on the different kinds of additive manufacturing (AM) processes and how 3D printing could be introduced into the undergraduate curriculum.

David learned how to use conventional subtractive machining mills and lathes working as the manager assistant in the college's machine shop, which is equipped with a variety of 3D printing machines. "I'm more of a hands-on person. I learned open and closed software 3D printing programming, just as I learned CNC machining," David said. His responsibilities in the machine shop range from ensuring that proper safety procedures are followed to training students in the use of various machines such as lathes, mills, laser engraving and 3D printers.

David, who came to the US from Colombia when he was 18, studied mechanical and aerospace engineering at Montgomery College in Takoma Park, MD, before attending the University of Maryland's A. James Clark School of Engineering. David is fluent in Spanish and has been active in prominent Hispanic organizations on campus and in the Washington, DC area. As treasurer of the Maryland Chapter of the

Society of Hispanic Professional Engineers, David has been able to help students receive financial assistance to attend a national conference and managed a budget of about \$6000. As house manager of the Gala Hispanic Theater in Washington, DC, David has supervised management of the 360-person performance arts facility.

The goal of the Society of Hispanic Professional Engineers is to encourage high school students to pursue a higher education. Members visit local high schools and sponsor science nights where professionals can work with parents, teaching them about financial aid and how to apply for it.

"We try to treat our meetings and activities like a community or family where they can feel comfortable and speak Spanish with their friends. We encourage attending national conferences, bring in companies to talk about opportunities that are available, and even provide resume writing clinics."

David intends to pursue a master's degree focusing on additive manufacturing. He believes that there is a great deal that has to be learned about how different materials behave in 3D printing and that applications are just now scratching the surface of what AM will be capable of in the future. The skills that he has gained include programming in Creo, Inventor, SolidWorks, AutoCAD, MeshCAM, among others, and proficiency in laser engraving and cutting, CNC milling and lathe work.

Beyond the master's work, David has considered how working for a company can help him gain knowledge and experience that would help him create his own start-up company or consulting firm to help people's ideas and dreams become a reality. ➔

David intends to pursue a master's degree focusing on additive manufacturing.



Whitney Hill

Age: 30
The Boeing Company
Everett, WA

30

UNDER THIRTY

There likely are not many engineers at Boeing who began college as a film major. The odds against a Boeing engineer having been a film major as far away from Hollywood as Montana State University are even greater.

But, as she has proven in many areas of her life, it doesn't pay to bet against Whitney Hill.

A native of the Pacific Northwest, Hill doesn't have much in the way of a family background that would point her toward engineering. Her mother is a cytotechnologist with a degree in biology. Her father, she said, "is a talented landscaper who now works for the US Department of Agriculture."

Hill, however, has a knack for math and physics, and her parents always encouraged her in those areas. Still, how did she wind up in engineering?

"By the end of my freshman year in Montana," Hill said, "I finally admitted that I needed to treat higher education as an investment in myself, not just a chance to study the subject that looked the most enjoyable. So I took a year off to think about my next move.

"During film school, I had been taking the physics and calculus series of classes 'for fun,' so I knew I should choose something that would use those skills. When choosing between mechanical engineering and physics, I pictured a life as an engineer, designing things or problem solving in a factory, versus a life as a physicist, writing grants for research. The factory sounded more interesting, and engineering appeared to offer a wider range of possible jobs."

I pictured a life as an engineer, designing things or problem solving in a factory, versus a life as a physicist, writing grants for research. The factory sounded more interesting.

"Once I decided to pursue a degree in engineering, it was an easy choice to go to Oregon State, as they have an excellent engineering department."

At OSU Hill earned a BME. She also was a Formula SAE composites manufacturing and testing team member and a Boeing student engineer for 767 manufacturing engineering. In this latter role she investigated and documented processes of the 767 Final Body Join and Final Assembly.

After graduating she joined Boeing as a process manufacturing engineer for the 767/KC-46 Tanker

airframe and structures. This does not necessarily seem remarkable—until you learn Hill has a reading disability.

"I have [an eye muscle defect] that causes my eyes

to skip around the page," Hill said. "I cope with it by reading slower because I have to make sure I didn't skip some key words that change the intent of a sentence and create a misunderstanding.

"However, my reading disability has actually helped me in some ways, too. For one thing, it forces me to pay close attention to details. It has also helped my public speaking skills, because I am so scared to death of having to read aloud that I have learned to memorize things very quickly."

And a quick study she is.

"Whitney joined Boeing just 4.5 years ago," said Alan Frisby, Hill's boss and the manager of 767 Airframe Manufacturing Engineering. "She has been performing more like a more senior ME. Recently she was appointed the lead of the Airframe Fuselage Process Engineering ME team with nine employees."

Is this as far as her career will go? Don't bet against her. ➔



Teresa Munger

Age: 30
Pratt & Whitney
East Hartford, CT

30

UNDER THIRTY

“**M**aybe.”
That one word likely changed Teresa Munger’s life.
“As a junior in high school,”

she said, “my honors physics teacher asked the class if anyone was interested in going to school for engineering. I raised my hand and said maybe. I didn’t really know what I wanted to major in, but engineering seemed like it might be a good fit as I did well in math and science. After class, she asked me if I was serious about it and if I was interested in RPI [Rensselaer Polytechnic Institute; Troy, NY]. She ended up nominating me for the Rensselaer Medal Scholarship. That one question in physics class ended up being a significant catalyst into my future.”

Of course, Munger may also have had a predisposition toward engineering—and toward RPI.

“My father has a mechanical engineering degree,” Munger said, “and works as a plant engineer. Additionally, my aunt and uncle both graduated from RPI with engineering degrees.”

Munger got her own degree, a BS in mechanical engineering with a manufacturing concentration, in 2008, posting a GPA of 3.92 out of 4.0. It was during her undergraduate years that she realized she wanted a role in manufacturing.

“I took a two-semester course called Advanced Manufacturing Lab. We spent the first semester designing a product and the manufacturing processes for it,” she said. “The second semester was spent manufacturing 600 of one of the designs from the first semester. I enjoyed the hands-on elements of being able to work with machines and actually see a product come to life. From this class, I knew that I wanted to pursue a position in manufacturing.

“Meanwhile, a friend, who had graduated from RPI two years ahead of me, had taken a job in the Manufacturing Engineering Development [MED] Program at Pratt and Whitney [East Hartford, CT]. Everything that she told me about the program sounded like something that I would be interested in. I liked that it was manufacturing related, would be based in the northeast, and would allow me to see multiple areas of the company as I still didn’t know exactly what I wanted to do. During the interview process, I was able to tour the facility and it seemed like an interesting place to become a part of.”

Another advantage is that RPI has a satellite campus in Hartford that offers an Advanced Professional Studies program for working professionals. Munger took courses toward a master’s of science in management while herself taking part in the P&W MED program, which she completed in June 2010. Her next P&W assignment was in the Hot Section Module Center’s Advance Coatings group. Before this assignment was over Munger had received her master’s (while bumping her GPA up to 3.93).

Munger has also been promoted to senior manufacturing engineer.

Recently “Teresa has been working on a variety of initiatives that positively impact the financial performance of the coating business unit,” said David Bonsall, general manager of P&W’s Hot Section Module Center and the person who nominated Munger for 30 Under 30.

“Outside of P&W,” Bonsall said, “she is an active member of the Hartford section of the Society of Women Engineers, and serves on the Executive Board as a section representative.” ➤



Edward Brabandt

Age: 30
Systematic Manufacturing Inc.
Sterling Heights, MI

30

UNDER THIRTY

Edward Brabandt is president and founder of Systematic Manufacturing Inc. (SMI; Sterling Heights, MI) and was nominated by Betsy Aller, associate professor of engineering at Western Michigan University where Brabandt received his engineering degree. She recommended Brabandt for supporting "the education and professional development of his employees, paying for the college courses and training of his employees."

Why is Brabandt a patron for his employees?

"I read an article recently that stated the average age of a machinist is 50 years old. This is and will continue to be a big problem for domestic manufacturers in the near future," he said. "I plan to do my part in making American manufacturing strong once more—and showing the next generation of manufacturers that the trade can be very gratifying."

Brabandt fondly recalls those who mentored him. Among them was Fred Sitkins. "Early in my college career," he said, "I took an elective in manufacturing processes with the late Dr. Fred Sitkins, and I knew [then] my calling was in an applied engineering curriculum. Though I think many people influenced my decision, Dr. Sitkins convinced me...to begin my journey as a Manufacturing Engineering Technology undergrad."

One of those other people was a high school teacher.

According to Brabandt, his "passion for manufacturing began when I was 14 years old in Mr. Hart's precision machining program at Romeo High School. His program laid the foundation for my success." (It cer-

tainly laid a foundation for his machining skills. "While in college," said WMU's Aller, "Ed was acknowledged as the finest machinist the faculty recalled teaching.")

Brabandt's great grandfather, a machinist, his grandfather, a machine designer for General Motors, and his father, a GM product engineer, also played more than passing roles in his development.

"In college," said Aller, "he acknowledged what he felt was his debt to those [mentors] and a desire to give back. He has done just that. His company has donated manufacturing tools and lathes, as well as money, to his high school. He has been a

guest speaker there, involving students in discussions on the

future of manufacturing...and encouraging their participation in hands-on activities. Students hold co-op positions at SMI and several have gone on to full-time positions there."

Upon graduating with honors from WMU in May 2010, Brabandt worked as a quality engineer for a time. Then in January 2011 he launched SMI with one employee—himself. His first-year revenue was \$30,000. This year, said Aller, he is on track to earn \$1.6 million and the machine shop's client list includes the likes of Stryker (where Brabandt interned while in college), FANUC America, Clausing, Stanley Black & Decker, Kuka and others.

Why did he make the leap from employee to entrepreneur?

"My father always told me 'if someone can do it, so can you.' I took it a step further by telling myself 'if someone can do it, I can do it better.'" ➔

"I plan to do my part in making American manufacturing strong once more."



Kaylie Crosby

Age: 23

University of Alabama

Tuscaloosa, AL

30

UNDER THIRTY

The most challenging aspect of mechanical engineering student Kaylie Crosby's daily routine might seem surprising. It's not a particularly hard engineering course or spending many solitary hours studying for a test. It's maintaining clear and constant communication with over 130 students at the University of Alabama, across multiple disciplines.

Driving a new, fresh off the production line Chevrolet Camaro around the Tuscaloosa Regional Airport might have been one of the best parts of her job though, so it seems like a fair trade.

Kaylie is the project manager for the University of Alabama's team in the EcoCAR 3 Advanced Vehicle Technology Competition. The four-year competition, which is sponsored by the US Department of Energy and General Motors, challenges students at 16 universities to redesign and rebuild a 2016 Chevrolet Camaro. The teams must make the car more fuel-efficient and reduce environmental impact without compromising performance or consumer standards.

Kaylie was recruited for the position by one of her professors in the STEM Path to the MBA program, which allows students to earn a BS in mechanical engineering and an MBA in five years. Her professor noticed her stellar academic record, organizational skills, and above all, her ability to work well with her peers—treating them with respect while also encouraging them to produce their best work—and knew she was the right person for the job.

That professor made a wise choice: Under Kaylie's leadership, the UA EcoCAR 3 team racked up several organization awards in the competition's first year, including Best Media Relations Report, Most Creative

Outreach Event, Best Outreach Presentation and Team to Watch. Kaylie herself received the Excellence in Leadership Award.

Kaylie has also earned recognition from the group that manages the program, Argonne National Laboratory. Kristen De La Rosa of Argonne nominated Kaylie for 30 Under 30, describing her as a confident and charismatic leader.

"Have a short conversation with Crosby," says De La Rosa, "and you'll quickly realize she is wise beyond her years with a rare mix of ambition, engineering know-how, leadership qualities and work ethic that all but guarantee she'll be successful in her career."

The EcoCAR competition is in its second year, but Kaylie graduates this year with her MBA and will pursue project management with a job in Washington, DC. Those who nominated her say she's done an excellent job of preparing the next generation to assume leadership roles within the team.

That's because for Kaylie, being an ambassador for engineering for the next generation is essential. As part of the community outreach portion of the competition, the team goes to a local middle school once a month, on a Saturday, to do STEM activities with the kids and talk to them a little about what they do as engineers working on the EcoCAR.

Kaylie is also a member of the MentorUPP program at UA, acting as a guide to younger students in the engineering program, and she has previously volunteered with Engineers Without Borders and as a fourth grade math tutor.

She offered advice for any aspiring engineers. "I would encourage them not to stop," she said, "Anything worth doing is going to be difficult." ➤



Hannah Kalinowski

Age: 28
The Boeing Company
Everett, WA

30

UNDER THIRTY

As a young girl growing up in northeastern Illinois, Hannah Kalinowski developed a fascination with airplanes. Her family lived close to a small regional airport, and Hannah would watch the planes come and go.

She said she didn't really realize she wanted to be an engineer until high school, when a couple of people, including a guidance counselor, suggested that it might be a good fit because of her aptitude in math and science, and that was when it all clicked. She attended Marquette University and majored in mechanical engineering, but a career in aerospace or aeronautical engineering was always the goal.

Right after graduating college in early 2011, that goal was achieved. She was hired in at her dream company—Boeing. As a manufacturing engineer there, Hannah's job includes creating build plans for planes and improving the manufacturing processes in place to make them more efficient.

Michael Beazer of Boeing, who nominated Hannah for 30 Under 30, said she has surpassed expectations in the five years she's been at the company. "Hannah has undertaken projects above her level of experience, has excelled at driving them to completion, and has become a recognized expert in her area of focus," he said. "She has very few peers who have shown her level of maturity and skill, at her age and experience level."

One of Hannah's initial projects at Boeing was the ground floor implementation of new noncontact metrology technology. Not only did Hannah become an expert on the equipment, she was instrumental in developing a process to translate the raw data into useable information and convincing employees at all levels of the data's value.

"Collecting data is just one thing," Hannah said, "but if you can't do anything with that data, or you can't drive any results or changes from it, then it's really not all that useful. I think we were able to really show the value of how that data could help us drive changes."

The new metrology technology evolved beyond the 747—the plane Hannah was working on at the time—and was adopted by other departments at Boeing. Hannah became the go-to person for training those teams in how to effectively use the equipment, analyze the data, and apply the results.

In 2014, Hannah took on another challenge. She was selected to be part of Boeing's Airline Engineering Rotation Program and represented Boeing at Singapore Airlines. For three months, she lived in Singapore and assisted with plane maintenance and fleet reliability.

"It's a different kind of sense of urgency" when people are waiting to board a plane, she said—every minute counts.

Now, Hannah is working in the Airplane Development division on a new version of the 777, the 777X. In this role, she is tasked to ensure the smooth implementation of a complex new production system. She's performed tolerance analyses for a complex system of parts and assemblies for the entire airplane fuselage and developed an optimized data and index plan that will be applied through the entire supply chain.

In her new role, Beazer said, "Hannah has shown a strong aptitude for communicating her process knowledge and results to her peers across different functions, as well as to multiple levels of management." ➤



Joseph Prosnitz

Age: 27

Prosnitz Solutions/Up-Ride

Skokie, IL

30

UNDER THIRTY

There are three things you should know about Joseph Prosnitz that explain how his project Up-Ride, the bicycle-to-elliptical conversion kit, came into existence. The first is that he volunteers at The Recyclery, a Chicago nonprofit that operates as an educational bike shop. Second, he does long-distance triathlons and is an avid cyclist and runner. And lastly, he has ankylosing spondylitis, which is a kind of juvenile arthritis, related to Crohn's disease.

Joseph was looking for a way to train for long-distance running without the hard impact that often exacerbated his pain. He knew there were elliptical bikes on the market, but they were out of his price range. He ended up purchasing a knock-off online.

"It was just complete garbage," he said, "I looked at it, and I looked at my bicycle, and I looked at this piece of junk I had in my garage and I thought 'This could be a bicycle accessory.'"

Now in its third prototype, the Up-Ride conversion kit consists of three components—a stationary trainer that holds the bike in place, a conversion device that allows the rotation of the pedals to stretch to the motion of an elliptical, and handlebar extensions that allows the user to hold on while standing. With these parts, the user can take a traditional outdoor bike and use it as a stationary bike, stationary elliptical, or mobile elliptical—four different pieces of exercise equipment all rolled into one.

However, as Joseph himself will say, the road to produce the Up-Ride hasn't been an easy one. He created the first prototype by tinkering with existing bike parts he had in his garage, trying to figure out if the idea was even feasible. Then, he sought out assistance from SCORE. SCORE is a national nonprofit organiza-

tion that helps small businesses get off the ground and operate efficiently, and one service it provides is business mentoring.

SCORE introduced Joseph to Mark O'Brien, a manufacturing executive and chairman of the Chicago chapter of SME. O'Brien guided Joseph through the arduous tasks of writing business plans, navigating the patent process, and pitching his concept in entrepreneurial competitions in order to obtain funding.

Joseph also sought out other resources wherever he could—he hired engineers to help with parts of the process, worked with local fabricators, and researched organizations that provided attorneys for entrepreneurs with limited funds. His second prototype was funded with his winnings from design competitions.

Joseph is still working on improving the design's user experience. He doesn't know if he'll be successful or not. But the experience has sparked his passion for manufacturing. He has plans for several other designs and wants to make his career in commercializing hardware products.

"Manufacturing to me is just awe-inspiring, that the things you touch in your everyday life all went through this very elaborate process of being thought about and then produced and sold," he said. "I have a big passion for this."

He's set up a metal shop and wood shop in his garage, has taken welding classes, and plans to get NIMS certified in the future. He's also collaborating with Design for America and Northwestern University on other projects.

Joseph is seeking additional mentorship, learning opportunities, corporate sponsorship, and collaborators. ➔



Andrew Siwicki

Age: 23
ABB Inc.
Auburn Hills, MI

30

UNDER THIRTY

For Andrew Siwicki of ABB Inc., robotics wasn't always the goal. Growing up in rural Illinois, he was more interested in the wind farms that dotted the landscape. When he was applying to college, his focus was on the future of alternative energy.

"I was expecting renewable technologies to be bigger than they are now," he explains.

It wasn't until he came across the Caterpillar Integrated Manufacturing Laboratory lab at Illinois State University that he started to see a future in automation. In the lab, which features several ABB robots, Andrew learned about PLC and HMI systems and various robotic applications.

"Just being in those classes within my degree was a big eye opener," he says. "The classes we did were exactly how it is in the field today."

Today, Andrew works as a field service engineer, working on robotic installs and system development for ABB's customers across the country.

Many of his clients use

ABB's robots for automotive painting applications, but Andrew enjoys working with any and all applications.

"Working with a robotics system is incredibly rewarding," he says. "It's challenging—systems change frequently and you have to adapt. But it's amazing to see what robots can do."

The biggest challenge, he says, is adapting a system to a customer's need.

"Every robotics system is so unique, and trying to make the system do what the customer wants as fast as they want it and as efficiently as they want it is the most challenging part of my job," he says.

But Bobby Pillot, director of customer service at ABB, says Andrew is rising to the challenge.

"Andrew continues to develop his skills and knowledge while providing the most professional, dedicated work ethic possible to deliver the highest quality product and system to ABB customers," he says.

Andrew's job also has a glamorous side—not something most people would expect. At this year's Grammy Awards, he played a special part in Lady Gaga's tribute to the late David Bowie. Working with AndyRobot, robotics integrator to the stars, Andrew programmed the robotic piano that Lady Gaga played during her performance. Originally, the performance included eight robots that performed a light show. A few days before the ceremony, Lady Gaga decided she wanted something else, and designed the robotic piano.

"The idea was kind of out there, but we trusted her and she was right—it was awesome," Andrew says.

He's collaborated with AndyRobot before, on a 2015 episode of

America's Got Talent. He programmed an IRB2400 to move in sync with dancers from the dance company Freelusion. Working with a choreographer, Andrew programmed the robot's dance moves and safety features and "literally made a robot dance."

For young people considering a career in engineering, Andrew advises that it's an incredibly rewarding field.

"Engineering's always going to be here," he says. "There are always new things to build, debug, fix, and design."

And sometimes, he adds, "engineering can be glamorous." ➔

"Working with a robotics system is incredibly rewarding."



Fabian Bartos

Age: 16

East Leyden High School

Franklin Park, IL

30

UNDER THIRTY

Fabian has a passion and drive for 3D printing like no other student I have encountered,” says Frank Holthouse, Fabian’s teacher at East Leyden, who nominated Fabian for 30 Under 30. It’s easy to see why.

As a student in East Leyden’s Project Lead the Way (PLTW) Introduction to Engineering course, Fabian wasn’t satisfied with just completing his schoolwork. On top of the PLTW course curriculum, he designed and printed a model of his previous school. The process took two weeks of scaling, drawing, and finally printing. The success of that project encouraged him to do the same with East and West Leyden High Schools. Using Google maps and observations from each campus, Fabian was able to build a highly accurate model.

“The level of detail is truly amazing,” Frank says. “It included all of the windows, stairs, and air conditioning units on the roof and took five months to complete.”

Building on PLTW curriculum, which focuses on solving real-world problems with 3D printing, Frank’s students teamed up with e-NABLE, an organization that connects people in need of a prosthetic hand or arm with volunteers who want to make a difference through 3D printing. Working with his classmates, Fabian printed several parts and assembled them to create a functioning prosthetic hand for an adopted boy from China who was born without his right hand. The hand helped him use both hands to accomplish tasks he wasn’t able to do before, Frank says.

Fabian’s interest in 3D printing is simple. “It fascinates me how you can design something on a com-

puter and then you can hold it in your hand,” he says. His interest in building models started with a book on the Titanic, which sparked his interest in how it was built. For him, 3D printing was a natural fit. Others in the Leyden community are taking notice, too.

“Fabian has made a name for himself at Leyden,” Frank says. In 2015, the school principal contacted Fabian about building a model of the White House that would be presented to President Obama at a Maker

Education event. Despite being on summer vacation, Fabian quickly got to work scaling,

drawing, and building the White House and finished the project in two weeks.

The venture was not without its challenges. For example, after the first print, the columns on the front of the White House kept breaking. Fabian quickly realized that he would have to print another model without the columns, and instead glued sanded toothpicks to the model in post-processing.

“Fabian thinks on his feet and learns from his failures,” Frank says.

Fabian’s current project is a 3D model for a major addition to East Leyden High School and he is always looking to hone his Autodesk Inventor skills. He plans to continue taking PLTW courses and while he’s not sure exactly what the future will bring, he likely plans to study engineering in college and continue to use his talents to benefit his community.

“Fabian has found great success at the intersection of community and technical skills,” Frank says. “I strongly believe that he represents the future of manufacturing.” ➔

“It fascinates me how you can design something on a computer and then you can hold it in your hand.”



Madeline McCloughan

Age: 24

3M - Industrial Adhesives & Tapes Division

St. Paul, MN

30

UNDER THIRTY

Madeline McCloughan always knew she wanted to pursue a career involving math, but it wasn't until college that she discovered a love for engineering.

"I think math is awesome because there's always a right answer," she says. "Once I was able to get into some electives, I thought it was cool how engineering is a very process-oriented mindset, much like math."

The opportunities presented by a degree in engineering were attractive to Madeline as well. She decided to major in chemical engineering and soon secured an internship with 3M's Industrial Adhesives and Tapes Division. As an intern, Madeline dove into

the world of spittable flying and other splicing tapes relied on to keep presses running

in the commercial print industry. Her work was so impressive that she was asked to join 3M as a full-time employee after graduating in 2014.

In her current role as a technical service engineer, Madeline develops testing procedures, helping her understand the impact of tape performance on different film media. Her work with customers has extended into film handling procedures, splicing practices and identification of opportunities both on and off the press to identify improved solutions offering benefits to our customers' processes.

"I like where we fit into the development process; how we can bring feedback from our customers and really find a solution that they need," she says. "It's cool because you get to spend a lot of time with the end user. It really helps me better understand our products."

In 2015, Madeline took on the two new 3M priority tape projects in her tech service role. Using Six Sigma skill sets, she set about creating standard questions, guidelines and a data reporting methodology to reflect the "voice of the customer" in her field work. These sources of customer data later became highly valued input used in the development, sales and marketing of the products.

Kathleen Vanderwall, a senior technical manager at 3M who nominated Madeline, praised her eagerness to take on leadership roles.

"Madeline's leadership at 3M has gone beyond her traditional role," Kathleen said. In her first year at 3M,

Madeline joined the Tech Service Committee, part of a corporate-wide technical forum. Within her first year,

Madeline was asked to co-chair the entire Tech Service Committee—a corporate-wide committee focusing on providing technical assistance to customers. She has also provided leadership and representation for 3M at the regional Society of Women Engineers conference.

"In her short time at 3M, Madeline has made a large impact through her thought leadership, focus on the customer, and accomplishments outside of her traditional job role," said Kathleen Vanderwall, who nominated Madeline. "She represents our future of manufacturing."

For other young people who may be considering a career in engineering, Madeline encourages them to go for it.

"I say that if you have the abilities—I think you have to have some natural science and math abilities—it's so worthwhile. It's opened so many doors for me." ➔

"I thought it was cool how engineering is a very process-oriented mindset, much like math."



Andres Valdez

Age: 25

Global Shop Solutions
The Woodlands, TX

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UNDER THIRTY

Before graduating from Sam Houston State University, Andres Valdez hadn't thought of a career in manufacturing. A business major in management information systems, Valdez started out in manufacturing working for Global Shop Solutions (The Woodlands, TX), a developer of enterprise resource planning (ERP) software, where he currently is a service consultant helping customers understand how to automate and improve their manufacturing processes.

"Creative problem solvers don't come along every day. Fortunately for Global Shop Solutions, Andres Valdez is one of them. When he started work for us in January of 2013, it didn't take long to realize we had a 'keeper,'" said Adam Grabowski, Global Shop Solutions director of marketing, in Valdez' nomination. "Over the last three years as one of our top service consultants, he has touched the production line of most of the 2000 manufacturing facilities our ERP software supports, helping resolve problems and streamline their manufacturing processes."

Working with up to 20 customers a day, Valdez helps users expand their understanding of and fluency with the ERP software, Grabowski added. "Using our Global Application Builder [GAB], which is our software development toolkit and a proprietary programming language, he also assists customers in creating custom programs to further automate and improve their production processes."

Using his programming skills and manufacturing experience, Valdez is able to help companies in any manufacturing mode, including mixed mode, make to stock, make to order, engineer to order, and more, Grabowski noted. "More important, when the standard solution is not enough to resolve a customer issue, he has the ability to recommend and develop new solu-

tions that achieve the customer's desired outcome," he added. "Andres' personal motto is, 'There's always a way to do what the customer needs; my job is to figure out how to do it.'"

Taking on the challenge of entering a completely new field was a good experience, Valdez recalled. "Coming out of college, I was a MIS major and my knowledge was in servers, programming and system analysis. We did a few projects using SAP and learning how a company would use SAP to build a product and work it from quote to cash," Valdez said. "This was a very new and interesting thing to me, to learn the process of how something is being built and seeing all the moving parts. That caught my interest. When I was hired by Global Shop they explained there was a lot to learn, and since I knew the technical side they started me in manufacturing, and this is how I got into it."

When he graduated, Valdez thought he'd be working with databases, servers and troubleshooting PCs. "Turns out I still do some of that, along with the experience of learning manufacturing. I still work on the things I went to school for and I also learn the manufacturing side as well," Valdez said. "One piece of advice is to never give up the opportunity to learn something new, because it could never hurt. I took a step out of the box to learn something new and now customers listen to me for advice, and I'm glad I took that step. There are so many opportunities in the manufacturing markets and knowing what I know now is great.

"My biggest challenge was actually learning the terms and what certain things were," Valdez recalled. "Like I said before, manufacturing was not my background coming out of school. I came to Global Shop and I learned a lot about manufacturing. I hope to continue to learn more as well since things are changing all the time." ➔



Sean Sullivan

Age: 30
Siemens Industry Inc.
Tacoma, WA

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UNDER THIRTY

As a CNC application engineer for Motion Control Business of Siemens Industry Inc. (Elk Grove Village, IL), Sean Sullivan works with Siemens' West Coast customers out of the Tacoma, WA, office, supporting primarily aerospace manufacturers using the Sinumerik line of CNCs.

An honors graduate of the University of Florida with a bachelor's of science degree in mechanical engineering, Sullivan started with Siemens right after graduating in 2009, and he quickly distinguished himself with the company. On a given day, Sullivan works with OEMs designing and implementing Siemens motion control and automation technology, develops and tests software, develops training courses and assists with end-user technology project planning by applying Siemens' technology to an entire manufacturing facility, noted Stephen Czajkowski, applications engineering manager for Siemens' Machine Tool Business Unit.

"Sean has made a huge impact at Siemens as well as the larger machine tool industry. He pairs this technical knowledge with an outstanding customer focus. Sean is able to deliver his communication at a level the customer understands—which is why customers ask for him time-and-time again," said Czajkowski in nominating Sullivan. "The colleagues in Sean's department, many of which are 30-plus-year industry veterans, often look to him for assistance, too."

When he joined the company, Sullivan started out in Siemens' two-year Emerging Leader Development Program (ELDP) for Engineers.

In his current role, Sean has been applying his previous work experience on the job while continuing to gain knowledge of a cross-section of industries. This has allowed him to work with many manufacturing applications and projects. "These applications range from milling and turning centers for the job shop,

grinders, filament winding, metal-spinning and a variety of complex machines and systems for the aerospace industry," Czajkowski said.

Manufacturing was always fascinating to Sullivan. "I imagine it started with my interest in Lego and K'nex, and I've always loved shows like How It's Made," Sullivan said. "I'm also something of a computer nerd. I knew I wanted to study mechanical engineering early on, and my favorite classes were in systems and controls. When I realized I could combine my interests in building things, computers, and controls with automation and motion control in manufacturing, I jumped at the opportunity.

"I enjoy the value generation inherent in manufacturing. I knew it was the right path for me after seeing this process in action," Sullivan added. "I've had the opportunity to visit factories all over the country and see firsthand the valuable jobs and standards of living manufacturing provides to communities in addition to the products created."

Sullivan credits several mentors in helping him toward success in manufacturing. "I had a great coach and mentor for my senior design project, Professor Tim Dalrymple. It was a team project that was part of the Integrated Product and Process Design program at the University of Florida," he said. "Professor Dalrymple not only had a great technical knowledge, but also a working knowledge of project management and how to effectively achieve a given goal as part of a team. Also, my current manager, Stephen Czajkowski, has been instrumental in honing my current set of skills in the machine tool industry, and has also provided a great example of how to effectively manage a competent team. And I can't leave out how much I've learned from my father through his example of leadership and integrity, and his influence in my interest in technology from a young age." ➔



Graham Hargreaves

Age: 30
CNC Software, Inc.
Tolland, CT

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UNDER THIRTY

Graham Hargreaves grew up around people who are passionate about spreading the word for building up manufacturing. But Hargreaves, currently marketing manager for CAM software developer CNC Software Inc. (Tolland, CT), developer of the Mastercam manufacturing software, didn't really decide upon manufacturing as his field of choice until sometime in high school.

"I've been around the company for almost 24 years," Hargreaves said of CNC Software/Mastercam, where his dad, Gary Hargreaves, a CNC Software vice president who is a former machinist and programmer, has worked since 1992. "I've come to care a lot about the company itself.

"I think it has to strike a chord with people," Hargreaves said. "I'm not a machinist. I'm not from a mathematical background or an engineering background, but just to be exposed to the amount of things you can create in the manufacturing field, and in Mastercam, that was really what drew me in. If you can think it, you can do it, you can make it. That always amazed me."

As a youngster, Hargreaves would see some of those things firsthand, as his father tried to pique his interest in manufacturing, showing him wireframe models of parts and asking him to try to guess what it was.

At CNC Software where he's worked in marketing now for eight and a half years, Hargreaves has gained a wide exposure and appreciation for all things manufacturing, being heavily involved in high-profile manufacturing efforts with his company, including corporate sponsorships of the manufacturing show EdgeFactor, events like Manufacturing Day, and also the software developer's support of a vast array of K-12 and post-secondary manufacturing education programs.

"Graham has literally grown up in our offices, absorbing animated conversations about CNC programming software and the challenges that our customers [manufacturers of all sizes around the globe] face each day," said Meghan S. West, president of CNC Software.

"Graham is a fresh-idea generator and right now he is helping to address and solve a major issue that affects everyone in our industry: bridging the skills gap," said West, who was among the 2014 "30 Under 30" honorees. "Our company has a significant investment in the K-12 and post-secondary education sectors and also in many adult training programs throughout the country, such as Workshops For Warriors. Graham, as one of our team leaders, has become an ambassador representing our industry to those audiences and is an active advocate for recruitment. He and his team have developed marketing campaigns and stories that are attractive to young people and persuasive to parents, teachers, and guidance counselors."

While in college and initially undecided on his career path, Graham took graphic design and drafting courses before receiving his BA in business administration, marketing, at Central Connecticut State University. While not a programmer, he's taken online training with Mastercam University and developed a deep appreciation for manufacturing technology and how it impacts the economy.

"For us right now, the most important thing is filling the skills gap," Hargreaves said. "There's a stigma against the industry, that it's dirty and dingy."

The way to combat that image is to show administrators at the high school level that that simply isn't the case, Hargreaves added, and with more work to build up apprenticeships in manufacturing and with stronger support of machining programs in secondary and technical schools. ➔



Denise Karabowicz

Age: 25
Thales Visionix, Inc.
Aurora, IL

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UNDER THIRTY

After an internship with Thales Visionix Inc., a developer of helmet-mounted displays for the aviation market, Denise Karabowicz joined the company full-time as a design engineer upon her 2012 graduation from the University of Southern California with a bachelor's of science degree in mechanical engineering.

"I have had the privilege of working with Denise for more than a year now and can attest to her drive and charisma which positively impacts the manufacturing and engineering community at large," said Scott Metcalfe, Thales Visionix senior program manager, in nominating Karabowicz.

"Her passion for engineering extends outside of the work environment," Metcalfe added. "Her positive energy and attitude have been on active display with the FIRST Robotics program for more than a decade. Since participating on the Lego Building Club as a sixth grader, she went on to coach and mentor teams, dedicating her free time to developing the engineers of tomorrow. Since 2012, Karabowicz has been the head of, and expanded the scope, of Fox Valley Robotics and currently actively coordinates the three divisions consisting of more than 40 teams [first through 12th-graders] in the Chicagoland area."

At Thales Visionix, Karabowicz currently works on projects from the requirement stage, through design and prototype into production kick-off. "Our project duration is typically less than two years so the short time line allows me to be engaged in every step. I'm also involved with material selection, vendor evaluation, and vendor support," Karabowicz said.

Robotics initially drew Karabowicz into advanced manufacturing. "I've known I wanted to be an engineer since middle school when I first got involved with robotics but it wasn't until halfway through college that I settled on mechanical engineering," she said. "My job responsibili-

ties include following designs from initial work into production. Being able to see the big picture allows me work towards production during the concept and prototype phases. There are many different ways to design towards a set of requirements but they all not equal in assembly, manufacturability, sustainability, usability or maintainability. I enjoy [and thrive on] taking all these things into consideration when making new parts or redesigning old parts."

In her current work, Karabowicz is most excited about new and emerging technologies. "As materials and technologies get stronger and lighter, it's allowing us to make head worn equipment better by expanding what we can do within our requirements," she said. "I feel like I am at the beginning of the right path and am really excited to get to work on new projects that allow me to grow and increase my knowledge base."

Between robotics, high school and college, there have been many people who helped Karabowicz pursue her career path. The biggest standouts were two graduate students that were teacher assistants, she recalled, in the two-semester mechoptronics (an interdisciplinary study of mechanical, biological, chemical, optical and electrical systems and processes) course she took in college at USC. "Ben Bycroft and Prabu Sellapan helped me understand the big picture: engineering is part of a solution and what we do helps people. I didn't expect to go into the niche field of helmeted mounted displays but their guidance during my last two years of school have helped me care so much about what I do."

For aspiring engineers, Karabowicz advises them to take advantage of opportunities when they arise. "I had graduated from college and was path seeking when I was offered a summer internship at Thales Visionix," she said. "After it was over, I knew that I liked what I was doing and the engineers I was working with. I was very fortunate when that internship resulted in a job offer." ➔

Honorable Mention

Kristin Adams

Age: 22
Toyota/University of Cincinnati
Cincinnati, OH

Jonathan Ahn

Age: 29
University of Washington
Seattle, WA

Brigham Arce

Age: 30
Parrot Teleprompter
Provo, UT

Bailee Bailey

Age: 28
Precor
Woodinville, WA

Saurabh Basu

Age: 30
Georgia Institute of Technology
Atlanta, GA

Cam Benedict

Age: 29
Fabrisonic
Orient, OH

Zach Bibik

Age: 18
Nominated by SME-EF
Boulder, CO

Daniel Boutet

Age: 26
FCA Group
Windsor, ON, Canada

Russell Brent

Age: 27
General Dynamics NASSCO
San Diego, CA

Mark Briel

Age: 25
Sandvik Coromant
Fair Lawn, NJ

Victoria Calhoun

Age: 24
Barnes Aerospace
Windsor, CT

Chelsea Campelli

Age: 24
Manchester Community College
Manchester, CT

Kyle Christensen

Age: 25
University of Florida
Gainesville, FL

Emenike Chukwuma

Age: 30
Ford Motor Company
Dearborn, MI

Mark Dongon

Age: 25
ABB Robotics
Auburn Hills, MI

Dan Dykes

Age: 28
Beam Dental
Columbus, OH

Stacy Feeling

Age: 24
Alcoa Inc.
Alcoa, TN

Ryan Fisher

Age: 29
Global Shop Solutions
Auckland, New Zealand

Brady Flannery

Age: 18
Cazenovia High School
Cazenovia, NY

Leah E. Flynn

Age: 25
RL Hudson
Broken Arrow, OK

Max Friefeld

Age: 24
Voodoo Manufacturing
New York, NY

Mary Funderberger

Age: 20
Nominated by SME-EF
Whiteland, IN

Alan Gonzalez

Age: 31*
General Motors
Bedford, IN

Cory Grant

Age: 29
Genesis Systems
Davenport, IA

Clay Guillory

Age: 29
Titan Robotics
Colorado Springs, CO

Vic Hartings

Age: 27
Performance Motion
Xenia, OH

Ariana Hernandez

Age: 16
John Glenn High School
Norwalk, CA

Josh Herschbach

Age: 24
Carr Lane Manufacturing
Troy, IL

Dane Howell

Age: 29
Genesis Systems
Davenport, IA

Emma Hoying

Age: 18
Nominated by SME-EF
Centerville, OH

Josiah Johnson

Age: 25
Cirrus Aircraft
Duluth, MN

Carley Jones

Age: 24
Textron
Culpeper, VA

John Katona

Age: 28
General Motors
Rochester, MI

Sean Kelly

Age: 23
Worcester Polytechnic Institute
Worcester, MA

Adam Kiefer

Age: 30
3M
St. Paul, MN

David Koch

Age: 31*
Bechtel National, Inc.
Kennewick, WA

John Kovalchuck

Age: 29
Makino
Auburn Hills, MI

Wesley Mack

Age: 20
Helena Community College/
Nominated by Mastercam
Helena, MT

Charles McCaw

Age: 20
Hurco
Indianapolis, IN

James McOmber

Age: 19
Asnuntuck Community College
Enfield, CT

Zach Mercy

Age: 19
Nominated by SME-EF
Felton, PA

Katie Merrill

Age: 24
The Boeing Company
Renton, WA

Dayne Mosconi

Age: 26
Sandvik Coromant
Fair Lawn, NJ

David Mothersbaugh

Age: 26
Process Automation Solutions
Greer, SC

Ryan Neufeld

Age: 25
Triumph Aerostructures
Red Oak, TX

Niall Olling

Age: 26
FCA US LLC
Auburn Hills, MI

Jon Olsen

Age: 29
Big Ass Solutions
Lexington, KY

Rishi Pahuja

Age: 24
University of Washington
Seattle, WA

Tyler Rigby

Age: 21
Penn State University
South Park, PA

Kiana Sadri

Age: 16
Detroit Country Day
Upper School
Novi, MI

KC Sawyer

Age: 22
University of Michigan
Dearborn, MI

Nastassia Scott

Age: 26
Asnuntuck Community College
Enfield, CT

Kelsey Scheppers

Age: 21
Nominated by SME-EF
Holts Summit, MO

Alex Spowart

Age: 21
University of Pittsburgh
South Park, PA

Kelsey Taylor

Age: 22
Nominated by SME-EF
Beaverton, OR

Julia Vasileva

Age: 25
INKAS Armored Vehicle
Manufacturing
Toronto, ON, Canada

Joshua Vanderbyl

Age: 25
Shape Corp.
Spring Lake, MI

Abby Williams

Age: 30
Accu-Fab Inc.
Raleigh, NC

Deokkyun Yoon

Age: 29
University of Michigan
Ann Arbor, MI

Ryan Zimmerman

Age: 26
MITGI
Hutchinson, MN

*Nominees were required to be 30 years of age or younger by March 7, 2016, the deadline for nomination.