



# DAY 4

THURSDAY | SEPT 16, 2021

## FABTECH

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# SHOW DAILY

THE OFFICIAL FABTECH PUBLICATION

## TODAY'S EVENTS

**Keynote: Adam Genei, Owner of Mobsteel and Detroit Steel Wheel Co.**

8:30 – 9:30 AM  
Lakeside Center Ballroom

**Leadership Exchange: Attracting & Preparing the Next Generation of Manufacturing Talent**

11:00 AM - 12:00 PM  
Lakeside Center Ballroom

**Careers in Welding Exhibit**

During Show Hours  
Booth B20084

## Building Signature, One-of-a-Kind Vehicles: Some Highlights from ToyMakerz' David Ankin Keynote

The keynote address by David Ankin on Wednesday proved to be one of the highlights of this year's FABTECH event. The former stunt man and motorcycle racer is a hands-on entrepreneur and CEO of ToyMakerz, a custom motor vehicle fabricator specializing in one-off custom builds and OEM enhancements for anything with wheels.

Ankin said he is living his dream by creating everything from monster trucks to race cars as are featured on the ToyMakerz TV show. The series follows his team as they bring unrivaled ingenuity and a unique skill set to motorized builds for a wide array of customers. These include such creations as The Beast, the SB2, the V8 Vanquish, and Ranchero.

As well as describing his many creations, Ankin shared his secrets to success as a leader in the fabrication business. But it all started with his father. He described his father as his biggest inspiration.



Growing up, he lived inside his dad's shop, he said. The way he inspired the youngster was in his approach to life: He didn't buy anything, said Ankin, he made everything.

"He could take a pile of steel and turn it into anything – from a spiral staircase to an old school hot rod," said Ankin. "He let me know that if I could dream it, I could build it."

### It's All About the Team

ToyMakerz builds unique toys for big boys. From his custom vehicle fabrication shop in North Carolina, Ankin brings to life a great many colorful, one-of-a-kind-cars.

During the keynote, he made it very clear that success in the modern age only comes about through

continued on p. 29

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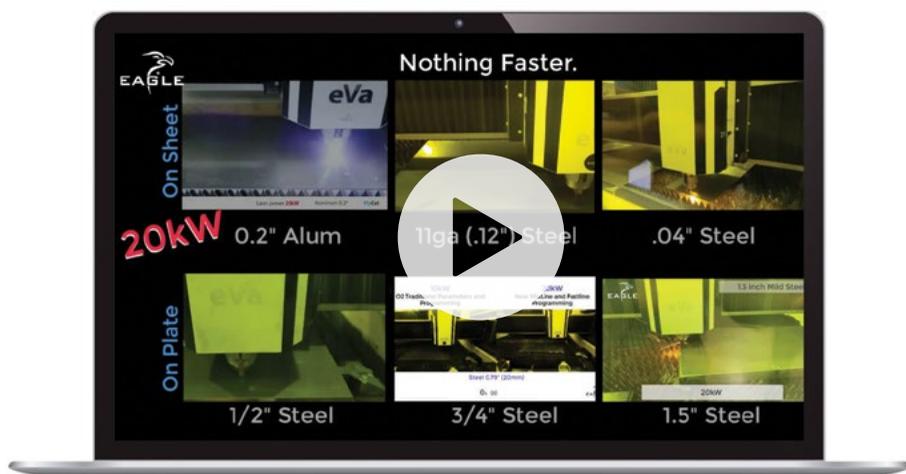
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## CCAI Finishing Education Foundation Hits the Ground Running – Celebrates Founding Members

While still in its infancy, the CCAI Finishing Education Foundation (CCAIFEF) is well on its way to achieving its goal to support education and training programs that improve skills at all levels within the industrial finishing industry. With an ongoing and expansive need for skilled employees in the finishing industry, CCAIFEF strives to provide support for programs that not only attract new talent, but also retain those who have already chosen a career in industrial finishing.

### Recruiting the Next Generation

With a focus on attraction, the Matt Heurtz Scholarship Program strives to recruit bright young talent to the industrial finishing industry by providing scholarship awards to high school seniors, technical school and college students whose studies could lead to a career in finishing. The program, honoring the first executive director of the Chemical Coaters Association International, has

been in existence since 1992. Now administered by CCAIFEF, more than \$100,000 in scholarships has been awarded to deserving students over the past several years. This year, the CCAIFEF Board of Directors awarded scholarships totaling \$17,500 to ten outstanding high school and university students. The application process opens in January and award winners are typically notified in June. For more information on the Matt Heurtz Scholarship Program, visit [www.ccaiweb.com/scholarship](http://www.ccaiweb.com/scholarship).

### Filling the Skills Gap with Diverse Programs

As most in the manufacturing sector are aware, there is an ongoing gap between the number of open



manufacturing jobs and available skilled workers to fill them. Expectations are that this trend will continue for the foreseeable future. "If we have any chance of closing the gap between open positions and available skilled workers, we must reach all of those with potential to work in our industry," notes Sheila LaMothe, executive director CCAIFEF. "Therefore, it is crucial we include under-represented groups such as women, inner-city schools, and the Spanish speaking community, in our efforts and offer programs that spark their interest in finishing," she adds.

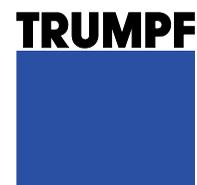
An example of CCAIFEF's initiatives in this area is the creation of the Elizabeth Teska Women in

Finishing FORUM Scholarship Program which debuted this year. Women are certainly a minority in the industrial finishing industry, but more and more are choosing careers in the field every day – and it is crucial that they stay in the industry. CCAI's Women in Finishing programs provide professional development and networking opportunities that women in our industry crave. Since the program's inception in 2017, involvement has grown exponentially. Webinars and networking events like the Women in Finishing reception held at FABTECH continue to attract more attendees, but it's the group's two-day Women in Finishing FORUM that has really caught the attention of women in the industry. The annual conference provides exceptional professional development and networking opportunities that cannot be found elsewhere in the industry. "Attendees leave

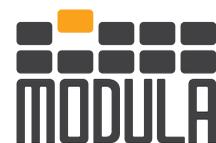
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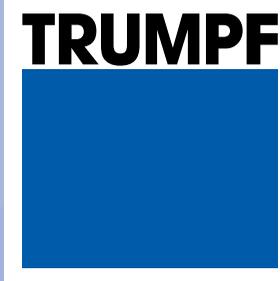
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# PRIME Pathways to Developing Talent

By Robert Puhr, Contributing Editor, SME Media

*This is a story of success-in-the-making.*

While it takes place in Michigan, it is being duplicated in various forms in 22 states across the United States. The reason that it is success-in-the-making is because it is not a “one-and-done” project. At least not the way Jenny Geno and her colleagues in Saginaw are approaching it. Geno is executive director of career and technical education for Saginaw’s Intermediate School District (ISD).

Saginaw has one of the more extensive programs following the roadmap laid out by the SME



Education Foundation’s PRIME (Partnership Response In Manufacturing Education) initiative. It involves six high schools and a

career center (the Saginaw Career Complex) and is highly visible to the county’s 27,000 students. It is also very much in the hearts and minds of the Saginaw Valley’s base of manufacturing companies. “Without the input, guidance, and support of these manufacturers,” said Geno, “we would be nowhere with this program.”

PRIME is designed to build tailored manufacturing and engineering programs in high schools across the country. It provides equipment, curricula, and professional development for instructors; scholarships for students; and extra-curricular activities for students and the local community alike. At present, there are 62 PRIME schools in the U.S. Local manufacturers play critical roles guiding, funding, and supporting these schools. In return, they have access to skilled candidates, many of them certified, to fill specific job openings in their plants.

## Bringing Back ‘Shop Class’

In the 1970s and 1980s, virtually every high school in the country had a shop class. Students who were so inclined would take classes in machining, welding, or other “hands-on” disciplines. These shop classes were a good “feeder source” for new hires in local plants and factories.

Then something happened.

Students were nudged toward college prep courses. Parents who had never attended college steered their kids toward a university education and the dream of a “better life” for them. It didn’t help that factories at that time bore little resemblance to the modern and safe manufacturing plants of today. Shop classes fell by the wayside.

Today, it’s clear that a better life is not necessarily guaranteed with a college degree. Graduates with skills and technical competency are very much in demand and can choose among many financially rewarding, intellectually challenging, and sustainable careers in manufacturing.

At least they can if they know about them.

“I’m a college graduate, so I’m not anti-college,” said Jim Terry, owner of PF Markey, a preeminent distributor of tooling solutions based in the Saginaw Valley. A board member of the Great Lakes Bay Manufacturing Association (GLBMA), Terry has been involved in manufacturing for over 35 years. “There is a huge talent gap in this region and the nation,” he said. “With nearly 500,000 open manufacturing positions in the U.S. at the moment, there is a tremendous opportunity for students who want to work with their hands and be around new technologies.”

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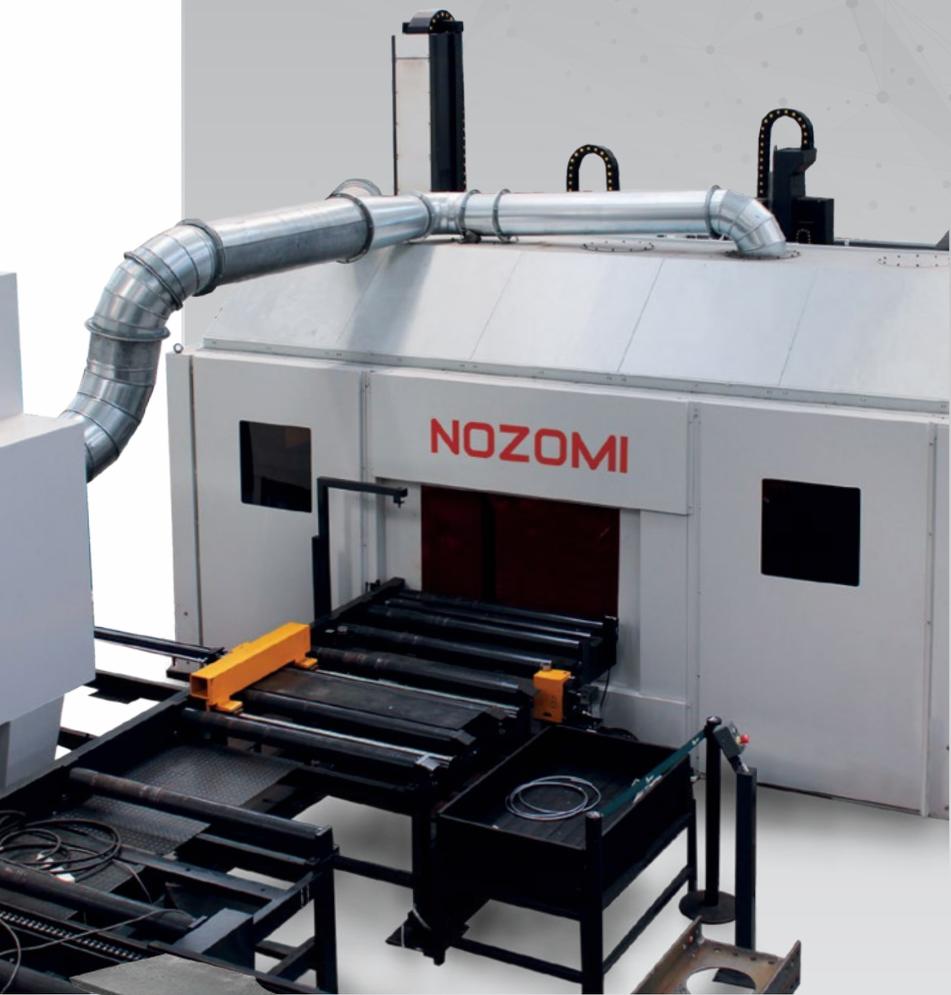
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# FORWARD

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## Why Can't Mobile and Standard Robots Just Work Together?

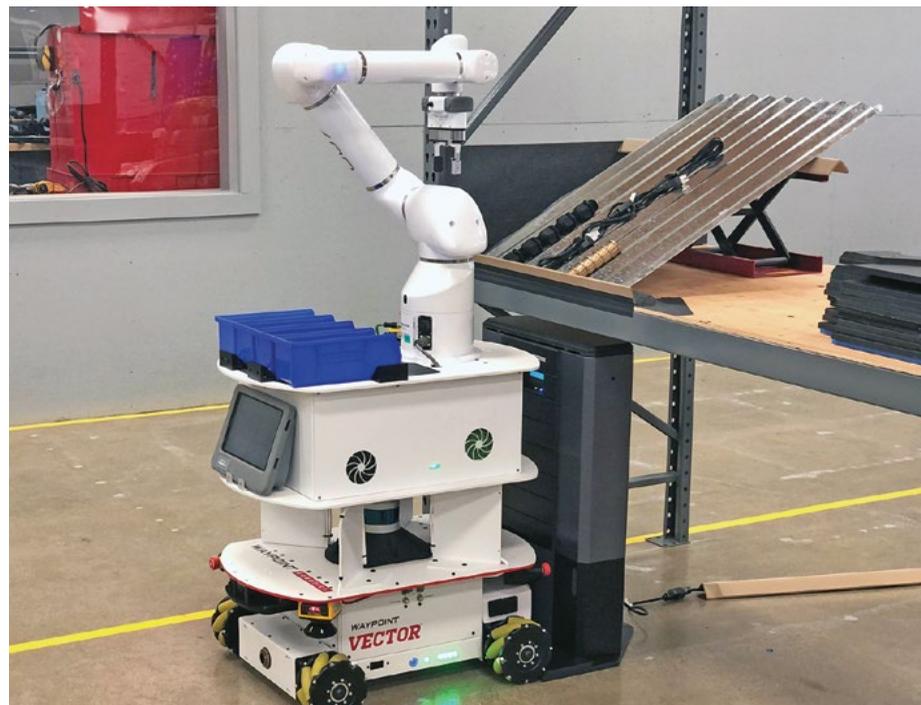
FABTECH's Leadership Exchange: Why Can't They Just Work Together? The Importance of Mobile Robot and Standard Robot Interoperability to Increase Adoption, on Wednesday was all about working with robots and dealing with the challenges of interoperability.

As anyone who has ever designed, built, or deployed robots can tell you – no one robot can do it all. As demand grows for automation, companies are increasingly requiring robots for specialized tasks within logistics and manufacturing applications. It is therefore imperative that robots and mobile robots, seamlessly work well together. Thankfully, there

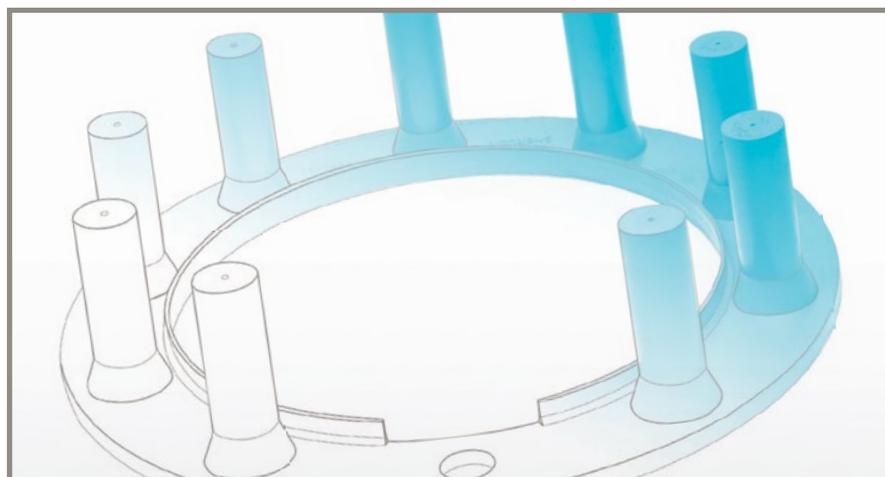
are several organizations within the robotics and automation communities working hard to create technology, standards, and best practices to address this.

The panel was moderated by Arnie Kravitz, Chief Technology Officer of the ARM (Advanced Robotics for Manufacturing) Institute. He introduced an elite panel consisting of

- Aaron Prather, Senior Advisor – Technology Research & Planning, FedEx.
- Jason Walker, CEO & Co-Founder, Waypoint Robotics.
- Ben Waters, CEO & Co-Founder, WiBotic.
- Samir Patel, Senior Director of Robotics Engineering – Kawasaki Robotics (USA).



A Waypoint Vector AMR operating on the factory floor.



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They briefed attendees on efforts to develop technology that allows organizations to deploy robots and autonomous mobile robots (AMRs) from multiple vendors within the same environment. They provided insight into the challenges around heterogeneous robotic environments such as information sharing, battery management, safety, and other performance characteristics, and what the automation community is doing to solve these challenges within a warehouse or factory floor.

#### What FedEx Needs from Robotics Manufacturers

FedEx has long been a leader in using automation to deliver packages faster, cheaper, and more efficiently. The company works closely with robot manufacturers and stresses the need for seamless integration of robotics into its network.

"We are always open to showing robot and automation companies how our operations work and why we take the position we do when it comes to the concept of interoperability," said Prather.

His company is active in industry efforts to open dialog between those that building the technology

and those that are using it in their operations.

"Organizations like MassRobotics, Association for Advanced Automation (A3), and the ARM Institute address different aspects of the interoperability issue, be this in developing code or standards," said Prather. "The larger community of manufacturers and end users can solve this challenge as the key will be collaboration and understanding that everyone can win if we work together on it."

Prather explained that each robot "sees" the world differently due to the sensor package and mapping algorithms they use. In many cases, this is what makes many of these robots special as they are designed to address certain use cases. To bring everything together, baselines need to be established concerning where information sharing can be done that is useful for all parties.

"At the end of the day, us end users will want our pallet-moving robot to be able to talk to our mopping robot or security robot in a way that allows them to operate safely and efficiently together," said Prather.

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## Four New Products for the Automotive Industry

Recently released products designed to increase quality and productivity for a variety of automotive applications.

### Ultrasonic Spot Welding Machine Joins Nonferrous Metals

Made by Emerson (emerson.com), the Branson™ GMX-20MA ultrasonic spot welding machine (Fig. 1) bonds nonferrous metals, including bus bars, foils, switches, and wire terminations for automotive electrical systems, electric vehicles, batteries, battery packs, and power storage systems. It showcases a rigid pneumatic actuator with dual-linear bearings



Fig. 1 – The Branson GMX-20MA ultrasonic spot welding machine by Emerson.

and a digital load cell to provide a smooth vertical motion and precise downforce control for enhanced weld quality and repeatability. It also tracks and measures actuator travel and tool positioning relative to the welded parts using a linear encoder. Once tooling/part contact is made, a digital load cell measures and maintains a precise level of actuator downforce on the parts to ensure the weld energy is accurately delivered and the weld quality is consistent from one weld to the next.



Fig. 2 – The Multishift automatic laser system by ACSYS Lasertechnik.

### Laser System Works for Advanced Applications

Created by ACSYS Lasertechnik (acsylaser.com), the Multishift automatic laser system (Fig. 2) with Industry 4.0 integration achieves advanced marking, structuring, cutting, and engraving. It supports nanosecond, picosecond, femtosecond, and CO2 laser-processing capabilities to offer operators progressively finer laser-structuring options. Additionally, it enables optical character recognition and optical parts recognition for complete, accurate, and hands-free laser processing. It also provides online depth control and dynamic focus control to track the laser's focal point. Additional features include robotic precision for reliable and consistent results; sensitive gripping, which leaves no indelible marks; automatic pallet processing to eliminate some batch tasks; and a minimized footprint that allows it to fit into small spaces. The laser system is also easy to configure into a company's specifications. It is suitable for medical, automotive, tooling, minting, and jewelry applications.

### Playlist Includes 19 Videos on Automotive Laser Technologies

Produced by Coherent Inc. (coherent.com), the Laser Solutions for Automotive YouTube playlist (Fig. 3) presents 19 videos that highlight advanced laser technology. The short videos show how these technologies enable materials-processing tasks in automotive production, energy storage (batteries), and e-mobility manufacturing that were difficult or impossible to perform with lasers in the past. Some of the diverse and challenging applications featured in the playlist include welding copper, foil, and dissimilar materials.



Fig. 3 – The Laser Solutions for Automotive YouTube playlist by Coherent.

### GTAW Power Source Enhances Mobility on Work Sites

Made by Castolin Eutectic (castolin.com), the CastoTIG 1611 Advance (Fig. 4) boasts a gas tungsten arc welding (GTAW) power source of about 15 lb (6.6 kg) even though it is controlled by a microprocessor. Its compact size allows it to be used on mobile sites for maintenance, joining, and construction-related applications. It comes with S and CE approval ratings for safe usage and class IP23S protection, making it suited



Fig. 4 – The CastoTIG 1611 Advance by Castolin Eutectic.

for the outdoors. It also consumes minimal power and can be used with power generators. Other features of the welding machine include the following: It is remote controllable with integrated up/down functions; it offers a spot function for seamless stapling; its touch panel has a clear, readable digital display that welders can program; it comes with a pulse function for enhanced soldering pool control, especially when working with thin sheets; and it provides lift-arc ignition for repairing sections that are highly sensitive to electronics, such as steering and control systems. The welding power source comes with a ground cable and a robust carrying case. ■

*This article was written by Katie Pacheco (associate editor of the Welding Journal) for the American Welding Society.*



## PRIME Pathways to Developing Talent continued from p. 6

Exposing young people to modern manufacturing is key to motivating them. “Give them a tour of a clean, climate-controlled plant that is stuffed full of high-tech machines – particularly a plant that employs AI, 3D printing, and Industry 4.0 systems – and their eyes pop out of their heads,” said Terry. “It’s like a video game on steroids.”

There is another gap, too, according to Terry Morse, associate professor of advanced CNC and manufacturing for nearby Delta College in University Center, Mich. “Yes, we have a skills gap,” Morse said, “but another gap, perhaps more challenging, is finding enough people interested in learning the skills. I started out as a tool-and-die maker 30 years ago, so this industry is in my blood. Young people are not as exposed to it, don’t know about it, and if they have thought at all about it, their perception is usually negative. But once they become aware of the options and the opportunities – it’s like a light bulb goes on.”

### Changing the Trajectory of a Student’s Life

Turning on the light bulb in a student’s mind – and then keeping that light bright – is what the community of Saginaw is rallying around. The commitment runs deep, involving a tight partnership that includes educators, manufacturers, and government officials, all facilitated by the SME Education Foundation.

Creating awareness and developing a pipeline of skilled talent for a local community of manufacturers is what PRIME is about, according to Rob Luce, vice president of the SME Education Foundation, Southfield, Mich. PRIME is the glue in partnerships between manufacturers and educational institutions to “build out” manufacturing and engineering programs inside high schools.

“We’ve seen our program change the trajectory of a student’s life in very positive ways,” said Luce. “Equipped with both hard and soft skills, a student can transition from a life of minimum-wage jobs to a very livable wage career with opportunities to grow.”

Key to PRIME’s success is that it is both informed and supported by local industry. “PRIME has never been off-the-shelf, out-of-the-box,” said Luce. “It is tailored to the needs of local manufacturers.” Given that the PRIME initiative is about 10 years old and has seen more than 50,000 students, there is a proven process whereby PRIME managers can assess the needs both from the donors’ and the local manufacturers’ standpoint.

Shelley Wooley is an educational program manager in the PRIME organization. She has a doctorate in education and global experience. “Students who go through the PRIME program are transformed,” she said. “They graduate with a skill set, and often industry-recognized certification, that the manufacturers in their community are in desperate need of.”

Wooley said that the SME Education Foundation is eager to expand PRIME to more locations. “We hope to work with more Title I schools (which include students from low-income families) and support diversity, equity, and in-

clusion through the participation of under-represented populations. In this way, we can help transform more lives.”

The PRIME program is flexible to meet local needs, relying on “pathways” to focus the curricula and the instruction. Core pathways are Metrology & Quality, Additive Manufacturing, and CAD/CAM. Wooley explained that elective pathways like Industrial Maintenance, Machining & Fabrication, Mechatronics & Robotics, and Welding are site-specific and tailored to local needs.

The deliverables that PRIME provides include new equipment (typically up to 75 percent of the budget), a curriculum plan and learning tools (in concert with Tooling U-SME), and professional development for instructors to become proficient in teaching students how to operate specific equipment or explaining specific manufacturing processes. Said Luce, “We can support virtually any teacher to become proficient. They don’t have to be a machinist or welder or programmer by background.”

In addition, PRIME provides scholarships for students who want to continue with post-secondary education; support for STEM activities outside the classroom such as summer camps, tours and robotic clubs; and funding for schools to sustain their programs after the initial period.

### The Voice of Manufacturing

*The process starts with a need.*

“When you have a need, you can either complain about it or take action,” said Patrick Curry, president of Fullerton Tool Company Inc., a Saginaw-based manufacturer of carbide cutting tools. “My experience is that it does no good to complain, so the alternative is to do something.”

Curry, along with a few colleagues in Saginaw’s manufacturing sector,

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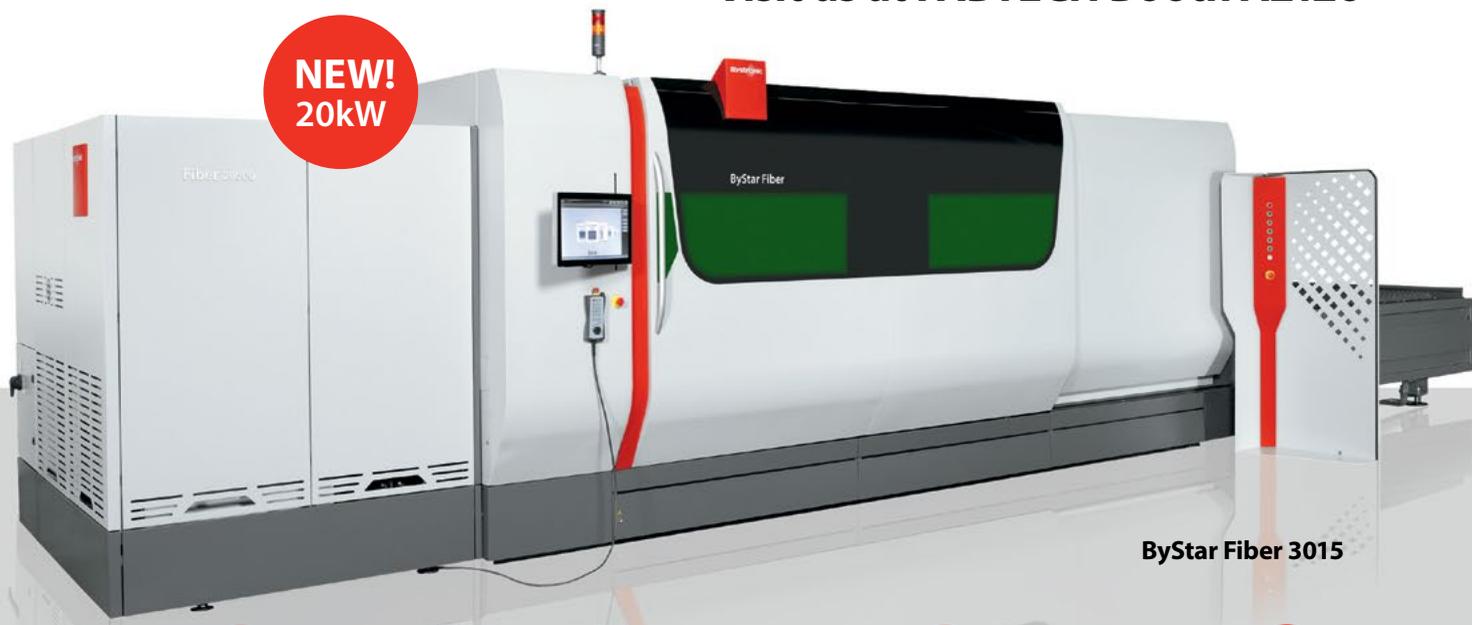
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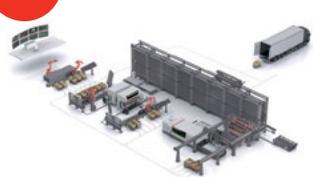
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# AM Meets Supply-Chain Challenges, Positions Itself as Long-Term Answer

By Lou Kren, Senior Editor  
3D Metal Printing magazine

"If the disruptions caused by the pandemic have taught us anything,

it's how fragile supply chains can be — especially those that have been optimized for cost at the expense of responsiveness."

This observation, from Daniel Lazier, strategic application engineer at Markforged who authored an article on how the additive manufacturing

(AM) industry might move forward, hits the nail on the head.



The decades-long trend toward just-in-time manufacturing, relying on timely shipments of supplies in the door, and deliveries out, while reducing inhouse inventories, ran smack into COVID-19 this past year-plus. Stretched supply lines, lengthened by many supply-chain participants seeking greater cost savings as transportation remained relatively cheap and dependable, finally snapped under the pandemic pull.

As demand soared for certain goods, such as appliances, manufacturers couldn't keep up. For example, during the second half of 2020, GE Appliances increased production by 25 percent in response to demand, thanks to capital investment as well as to a concerted plant-floor reorganization effort to meet pandemic-related spacing in its plants.

Still, "We literally cannot keep up with the demand," Melanie Cook, GE Appliances CEO, told the Wall Street Journal in December 2020. "We've invested, added capacity, and we're still flat out."

For its part, AM stepped up big,

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# PRIME Pathways to Developing Talent

continued from p. 10

were key drivers in getting the local program off the ground. Though the group was not aware of SME PRIME when it first began its quest to fill the skills gap, the manufacturing leaders were painfully aware of the problem. “We had 11 very experienced people retire from Fullerton last year and we need to keep the pipeline full of good talent.”

The impetus for action came during a meeting of the GLBMA in 2018, Curry recalls. “One of the speakers was from SME’s Education Foundation and talked about the PRIME program,” he said. “We all agreed about the shortage of skilled labor and the lack of programs to develop those skills, and this PRIME initiative seemed like it would fit the bill.”

Andy Stewart, Saginaw REPS general manager for Nexteer Automotive, headquartered in Auburn Hills, Mich., was also on the GLBMA board and recalled the discussion and the actions following. Nexteer is a major manufacturer with a complex of six facilities and a technical center in the Saginaw area. “PRIME was new to me, but the concepts behind it were not,”

Stewart said. “I’ve been involved in automotive manufacturing for over 30 years and have seen the benefits of hiring people who have the basic knowledge and skills. It was clear to me that we should represent the voice of manufacturing by identifying the skill sets required and then building a program in Saginaw.”

To get the true flavor of a PRIME program in action, Stewart, Curry, and a few others hopped in a van and drove to Wadsworth High School in north central Ohio. “It was really inspiring,” Stewart recalls. “Modern facilities, CNC machines, a robotics station, 3D printer, ultra clean. A perfect spokesperson for the voice of manufacturing to young people.”

Jeremy Bockelman, director of the Michigan Manufacturing Technology Center (MMTC), which provides consulting and training for manufacturers in the state, was also on the Ohio trip. His liaison with GLBMA and other manufacturing organizations, combined with witnessing what Wadsworth was able to accomplish, inspired him to want to be involved in rolling out a PRIME program in Saginaw.

## ‘Why Wouldn’t We Do This?’

“My first exposure to PRIME was an invitation from Patrick Curry to come to a meeting so he could introduce me to a few people,” Geno of Saginaw ISD said. “That meeting was attended by several manufacturers and a representative from the SME Education Foundation who spoke about the PRIME program. Immediately, the manufacturers were excited about the

potential. They made it clear there was a need, so my thought was, ‘why wouldn’t we do this?’”

“We were really pumped up,” Curry said. “We liked what we saw at Wadsworth and we liked the PRIME approach because we wouldn’t have to reinvent the wheel here in Saginaw. The PRIME process was proven to work. We knew what we wanted to do—now all we had to do was find a way to pay for it!”

## The timing was excellent.

PRIME programs are typically funded by local manufacturers, but in Saginaw’s case, major funding comes from Michigan taxpayers. In 2018 Michigan initiated what it called the Marshall Plan for Talent to offer grants in support of partnerships between educators, employers, and other stakeholders to “transform Michigan’s talent pipeline.” Its investment fund was about \$63 million. Geno wrote a grant application and applied for funding.

In December 2018, Geno and her collaborators received over \$1 million in grant money to establish PRIME programs at Saginaw’s high schools. The first priority, though, was to perform a “full build” of the capabilities at the Saginaw Career Complex to which all the county’s students had access.

Bockelman’s team at MMTC brought its consulting expertise to help Saginaw build out the program at the Complex. “We assessed industry needs and put forth our recommendation to build from the ground up—what equipment to acquire, what precision measurement and auxiliary items to include, and how to incorporate Industry 4.0 technology into the mix,” Bockelman said.

The other important thing that happened in 2018 was that Saginaw County passed a 10-year Career and Technical Education tax millage. The manufacturing commu-

nity worked tirelessly to inform voters and support the millage. “The millage allowed us to replace old, antiquated equipment and to re-design our curriculum to be directly responsive to local needs,” Geno said.

## Pivoting with COVID-19

Everything was progressing right on plan until the pandemic hit. Like all schools, Saginaw had to pivot and adapt quickly.

“We have been doing some instruction remotely, but the pieces of the program that we really want to develop need to be in-person,” Geno said. “Tooling U-SME has been a godsend because it [has] an online tool that students can access remotely.”

Bockelman concurred. “Tooling U-SME is a real effective tool for blended learning,” he said. “It is interactive and gives students the foundational knowledge to support hands-on instruction.”

The Career Complex has been open since the beginning of the year on a hybrid schedule, combining remote and in-person learning, in order to meet guidelines for social distancing. There have been rollbacks and pauses at the local high schools when outbreaks occurred.

“In terms of training and equipment installation, we are mostly on track,” Geno said. “I’ve been very impressed with the way we have been able to move forward and work through challenges.”

Geno said that by the end of the three-year grant period, all the curricula will be fully implemented, all the equipment installed, all teachers fully trained, and the PRIME process will be up and running at six high schools and the Career Complex. “There was certainly a learning curve, but everyone has been extremely cooperative,” she said. “We’ve got a really great team right now.”

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### 3D/ADDITIVE MANUFACTURING SHOWCASE

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# Making Welding Accessible to All

By Ed Sinkora, Contributing Editor, SME Media

*Automating repetitive welding jobs allows welders to focus on higher-value tasks*

With the ongoing shortage of skilled workers and the pickup in the economy, suppliers of welding equipment are finding ways to making welding easier for those working in manufacturing. Automation is the leading technique among many.

A common rule of thumb states that a robot welder is three times more productive than a person, depending on the application. But, added Ross Fleischmann, marketing manager for Miller Electric Mfg. LLC's Welding Automation Group, Carol Stream, Illinois, "we find improved quality can be more important than productivity in justifying the move towards robotic automation." Fleischmann went so far as to say that if the application is suitable for automation, you might achieve yet another multiple on your payback in lowering the cost of quality. Additionally, Fleischmann referred to U.S. Bureau of Labor Statistics information on workplace accidents and injuries, which shows incidents to be lower in automated versus manual welding.



"Manual welding is an area with a very high degree of repetitive motion injury, resulting in turnover and associated costs," he said. "OSHA puts out a statistic that says any investment in safety yields a six-

to-one payback. So, robotic welding is an investment in safety, as well as productivity and quality. Take all these factors into account and you get a pretty big payback number."

If automation looks like the right fit, the question becomes how best to implement it. Fleischmann observed that many of the older robotic systems throughout in-

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# Why Can't Mobile and Standard Robots Just Work Together?

continued from p. 8

He explained the problems inherent in uncoordinated robotic innovation. One example concerned chargers. With FedEx using robots from many different manufacturers, charger incompatibility becomes a challenge. He called for more standardization when it comes to chargers.

"The more chargers I need, the fewer robots I might end up with in a facility because the charging infrastructure becomes a limiting factor," said Prather. "It makes sense if they all use the same chargers, perhaps having the chargers that adjust their charging protocol as needed."

He believes the groups working on such issues can solve these problems and avoid situations like what happened during the eighties with video. The VHS versus Beta-Max battle created a large group of winners and a large group of losers, he said.

"The industry needs to work together to have everyone winning when it comes to interoperability," said Prather.

## Robotics Manufacturer Perspective

Jason Walker, CEO and Co-Founder, Waypoint Robotics, explained the interoperability challenge

from the perspective of the robotics manufacturer. His company makes autonomous mobile robots such as Vector and MAV3K with an open architecture. As such, there are many ways to connect to Waypoint mobile robots including GPIO, MODBUS, and Websockets. This makes their data easily accessible for other mobile robots and fleet managers. The company also provides cloud-based software to enable partners, teammates, and customers to integrate its robots with 3rd party software systems.

"Waypoint's AMRs are ROS-native, which makes them accessible to robotics experts, researchers, developers, companies, and startups," said Walker.

The company is an active participant in the ARM Institute project for interoperability, and the A3 interoperability working group. It also supports organizations like MassRobotics that are developing standards to allow organizations to deploy AMRs and other automation equipment from multiple vendors. The goal is to have them work together in the same facility, better realizing the promise of warehouse and factory automation. These standards will allow robots of different types to share status information and eventually establish operational conventions

to help them coexist on a warehouse or factory floor.

"The scope of the MassRobotics Standard provides a framework for robot location, speed, direction, availability, capability, and status with the goal of improving interoperability in mixed environments," said Walker.

The good news is the industry has pulled together to solve interoperability. From the industry bodies working on interoperability standards to the many AMR manufacturers incorporating them in their offerings, and others building fleet managers and setup tools that work with all types of automation equipment, the future looks bright.

"Companies like WiBotic and Waypoint are working on establishing an interoperable wireless charging standard that can be adopted and utilized by everyone in the robotics community, which is a key pain point for robotics companies and end users alike," said Walker. "And end users like FedEx are allocating resources to support these efforts, and through their involvement, ensure that the outcomes are useful to end users."

Ben Waters, CEO & Co-Founder, WiBotic, explained that robots with different batteries or charging requirements can take advantage of the WiBotic autonomous charging system to share the same charging docks and have a common API for communicating across a fleet of heterogeneous robots and charging stations.

WiBotic has achieved worldwide certifications for many of its products. It is also working with



ASSURE UAS is also a member of MassRobotics to help define standards around charging and electrification of autonomous vehicles.

"These standards and guidelines will help eliminate regulatory bottlenecks for robots and drones to be more readily deployed in commercial and consumer environments," said Waters.

## Buildings Being Robot-Ready

He is happy that forums like FABTECH are talking about these challenges. Five years ago, he said there was little discussion of interoperability. Everyone was focused on trying to make the robots work.

"Companies have moved beyond proving how useful robots can be in a warehouse setting, and they're thinking about how they can scale up quickly to deploy larger fleets," said Waters.

He believes building managers and system integrators can do more to pre-configure buildings with infrastructure to support robots. Currently the technology is being driven by the robot end-user and the robot manufacturers.

"If the building was 'ready for robots,' meaning the factory floor already had charging stations and sufficient energy to have thousands of robot charging stations added to the factory, this would help companies lease or occupy the factories and deploy robots much faster," said Waters. ■



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<b>FORMING &amp; FABRICATING</b>	<b>NEW! ■ F403:</b> Form Tapping <b>Room S403B</b>	<b>NEW! ■ F404:</b> Combination Hybrids - An Arranged Marriage by Manufacturers <b>Room S403B</b>		
<b>SMART MANUFACTURING</b>	<b>NEW! ■ F903:</b> The Promise of Industry 4.0 & Lean Management <b>Room S404D</b>	<b>NEW! ■ F904:</b> Big Data to Analyze Manufacturing and Industrial Companies <b>Room S404D</b>		

<b>WELDING SESSIONS</b>	<b>W9:</b> Weld Cracking <b>Room N230AB</b>	<b>8:00 AM - 11:00 AM</b>
	<b>W10:</b> ASME Codes and Standards Update <b>Room N231</b>	<b>8:00 AM - 11:00 AM</b>



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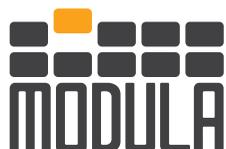
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# Potential Career Paths are Manufacturing's Greatest Lure

Employers have positions to fill, but talented job seekers want rewarding careers

By Tim Heston, Senior Editor, FMA Communications Inc.

After graduating college in 2009, Patrick O’Rahilly dove head-first into the world of factory automation. He launched Compass Automation, an Elgin, Ill.-based custom automation builder that focused on robotics integration, complex assembly, and inspection.

In 2016 O’Rahilly pivoted and launched FactoryFix, a jobs- and career-oriented website that matches vetted job candidates with manufacturers in need of specific talent; that is, not just a machine operator, but an operator who has experience with a certain machine brand performing a specific process. As anyone who has hired in metal fabrication (or any machine-based skilled trade, for that matter) knows, programming a machine, setting up a machine, and operating a machine can require three entirely different skill sets. FactoryFix.com aims to match workers with specific skills with fabricators and other manufacturing companies that need those skills.

The pivot was a big one in many respects, but in other respects it was less of a pivot and more of an evolution—one that points to a broader issue. Manufacturing technology has changed, as have manufacturing careers. Industry continually trumpets new technology, but it really doesn’t trumpet the manufacturing career path. Yes, the industry needs skilled press brake operators, but what will life as a press brake operator look like?

Simple awareness of manufacturing is a challenge, and details behind a career in manufacturing often remain shrouded in mystery. That opaqueness, O’Rahilly said, might be one root cause behind the industry’s perennial skilled labor shortage.

“The industry as a whole doesn’t do a great job showing people how they can progress over an entire career and how exactly manufacturing can be a lucrative career path,” O’Rahilly said.

Running Compass Automation, O’Rahilly witnessed a manufac-



FactoryFix is a jobs- and career-oriented website that matches vetted job candidates with manufacturers in need of specific talent. FactoryFix

turing landscape undergoing transformation. “Companies were having trouble finding people to hire,” he said, “so our pitch at Compass was, ‘Let us build a machine to automate the process, so you don’t have to worry about it.’”

This seemed like a straightforward, honest pitch at first, but O’Rahilly soon discovered it oversimplified a complex situation. Yes, manufacturers had to auto-

mate to compete, but automation wasn’t a cure-all for a company’s skilled labor problems.

“After we installed these systems, our customers had trouble supporting the equipment,” O’Rahilly said. “So they would constantly ask us for someone to do programming, to tweak the system, or to perform some kind of upgrade ...Problem was, we had only so many employees at Compass, and we were busy building machines.

“So we launched a separate website and called it FactoryFix. We wanted to keep it separate. Basically, we’d send [Compass] customers to the site to fill out a form to describe what help they needed and what skills they needed people to have. For instance, ‘We need someone with Allen Bradley PLC experience.’”

FactoryFix evolved gradually as a side business. “We were playing matchmaker, basically handling the billing, logistics, and all the back-end processes. As it began gaining traction, we found it to be more of an opportunity. So at that point we ended up selling Compass and working on FactoryFix full time.”



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The business began as a kind of “Uber for an automation guy,” O’Rahilly added. Businesses would use FactoryFix to find independent technicians for repair work or temporary projects. “As I talked to customers, though, they would say, ‘This project-based stuff is great, and we’ll definitely keep using [FactoryFix] as needs arise, but our real pain is filling full-time positions.’” This latest pivot led to what FactoryFix is today, a site free for job seekers and where employers pay a flat subscription fee, without the per-hire fees that typify staffing agencies.

One area of the site, the “Manufacturing Manual,” describes different jobs, expected pay, and gives visitors information to start building potential career paths. It’s a good thing to feature, considering potential career paths are one of manufacturing’s greatest lures. Someone might start as a second-shift machine operator, but the more that person learns, the more that person earns, and the more opportunities arise.

The career path focus moves the conversation away from what a company needs now toward what talented people want out of a career. Sure, a fab shop might be desperate for a second- or third-shift operators, positions that have always been tough to fill, and end up throwing more money at the problem — a noticeable trend now as starting wages, even for the untrained and unskilled, are rising. If it’s all about money, though, these folks will likely jump ship for a few more cents an hour.

But if they apply for a job and have an entire career in mind, the situation could change. For instance, modern press brake operators might start on second shift, running programs. Then they learn to program. Soon they’re programming and simulating programs via software. Then they’re managing and running robotic bending cells. Eventually they may move on to actually designing automation systems — something more fab shops (especially large ones) are doing

themselves. After all, in-house automation development helps not only differentiate a fabricator from the competition but also create new career paths for ambitious talent.

Such talent might start making just above minimum wage. But within a few years they could be making

a healthy, middle-class wage to support a family. Within a decade or two, they could be making six figures. Sure, they might or might not stay at one company for decades, but they’ll have a good life. And they won’t spend a lifetime jumping from job to job, all for just a few cents more an hour. ■

*Article originally appeared in The FABRICATOR, May 2021 issue.*



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## Making Welding Accessible to All continued from p. 15

dustry are relatively intimidating for even an experienced human welder to program. But now cobot welding is emerging as an exciting new way to automate. As Joe Campbell, senior manager of applications development for Universal Robots USA Inc., Ann Arbor, Mich., explained, companies like Hirebotics, Vectis, and THG are integrating cobots with welding technology from Miller and others to create flexible solutions.

For Fleischmann, it isn't so much the ability of cobots to function in proximity to people that's important. It's the fact that these companies have come to the market with "a clean sheet of paper" in terms of the user interface and programming. "The user interface has more modern tools and techniques. And the welder can manually move and position the robot to the physical locations on the parts when they're programming. That's an intuitive thing for a welder to do. They're not intimidated by positioning the torch on the part, pushing a button, and creating a program."

Campbell said programming approaches have differed a bit. For example, "Hirebotics believes a welder is going to be more comfortable doing a setup via a smartphone than they will through any teach pendant. Vectis' alternative approach is that the teach pendant offers a higher concentration of information in bigger graphics that's easier to see." Whatever the approach, the integrator builds on Universal Robots' open software architecture, which allows third parties to create specialized applications.

Beyond easy programming, he said their cobots are also easy to deploy and redeploy because they're light, 120 V, and can be oriented in any way. "You can mount the cobot upside down, on a wall, tilted. With most traditional robots, different orientations require different products because of how they structure the bearings and the lubrication systems."

### What's Your Need for Speed?

David Savage, product manager for Miller welding automation



systems, complimented another aspect of cobot programming. "Some of the software being implemented on these cobots prompts the user with default welding parameters based on the material type and thickness, and the type of weld. We've gotten a lot of feedback that this is a huge bonus for users that may be breaking ground on welding automation." Savage said Miller offers similar functions on traditional robot welders using the Panasonic power supply, but he hasn't seen it on a wider range of products. His

explanation is that "the type of user that is interested in a cobot is different from an automotive or high-volume user — like stamping shops where welding is perhaps 20 percent or less of their manufacturing processes."

Likewise, Savage said, it's hard to see the benefits of using cobots in a traditional welding robotics application. He explained that the lower positioning speed of cobots (their "air movement," if you will), makes them less productive. Campbell agreed. "We tell customers that if you're going to make a million of one part per year and you have to make them at high speed, it's not for us. We're never going to compete on speed with some of the highest speed traditional products." But here's why cobot welding is exploding, he continued. "The bulk of the market is not running at ultra-high speed. The bulk of the market has been running, and continues to run, at cobot speed."

### Adapting to Smaller Shops

"There are about 250,000 manufacturing establishments in the U.S.," Campbell continued. "About 90 percent of these establishments have fewer than 100 employees. These are small- and medium-enterprise businesses. They don't have a multimillion-dollar, high-speed line. They're prob-

continued on p. 24

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## Making Welding Accessible to All continued from p. 22

ably higher-mix, lower-volume businesses. Probably a little bit batch oriented. And so, there's still a tremendous market for automation in those spaces."

Thus, ease of programming and versatility are more important factors than speed. "The adoption of traditional automation in the small and medium enterprises is very, very low. That's because the combination of cost, complexity, time and effort required to program, set up and redeploy a traditional robot has made it prohibitive." Conversely, Campbell said, "you can buy a cobot arc welder today, fit it out with a power supply, a wire feed, a work table and a torch, and be ready to weld in a matter of hours for \$85,000. That's less than you're going to pay a skilled welder, if you can find one who will come to work for you."

Campbell observed that many small and medium shops use cobots for their "simpler, higher-volume, more repetitive parts. It's allowing them to put their higher-skilled workers on higher-value parts. And it's a triple win because it reduces costs, increases the margin for the shop owner, and it's also more gratifying for the welder. Welders are like artists. They don't get a big thrill out of making 1,000 little widgets a week. They want to work on a big, complex weldment."

Campbell also returned to the issue of quality. Asking a human to make lots of the same part all day is an invitation to boredom, poor quality, and repetitive motion injury. "I've had more than one shop owner tell me you can see the quality drop off at the end of a long shift."

### Sophisticated Off-Line Programming

While cobots are making it easier for a wider range of companies to automate their welding, there have also been significant improvements that ease the implementation of traditional robots. Savage

pointed to Miller DeskTop Programming and Simulation (DTPS), which—like cobots—is especially helpful for "high-mix, low-volume, job shop types of customers. They can mitigate risk upfront. Whether it's quoting a potential job to put on the robots, or estimating their potential gains for automating certain parts of their shop or potential customers, they can do that all upfront in DTPS. It's very accurate. They can make better business decisions with the tool, and they're limiting the time they take the robot out of production to introduce new products."

For very large, heavy items — whether you need laser-hybrid, TIG, MIG, or gas metal arc welding — look to a company like Pemamek LLC, Mason, Ohio. As North American Director Michael Bell explained, Pemamek has invested 21 years in developing software that "takes the welder and makes him an operator. And, in turn, he's given the vehicle to transmit his knowledge to the next generation. It truly enables the tribal knowledge to transfer between the older group to the newer group." If the shop has already created its welding procedure specification (WPS), Bell explained, it will save that in the Pemamek software database.

"That would instill confidence in the newer generation coming in. But let's say you're starting fresh and have never seen a Pemamek system or robotic welding. We import your existing 3D drawing and convert it into a file that's in robot program language. Then all you have to do is act like you're playing a video game and position the welds with your mouse. We use a vision system to go and double check what you have programmed to make sure that those elements exist. Then you press go and it's welding."

Pemamek's graphical user interface can combine the drawing with the photo overlay of what the system scanned, plus the

program's data points, plus the current operation on a single screen. "You can have everything going simultaneously, or make the screen just the camera if you like." In addition, Pemamek's system includes live laser scanning of the weld volume in order to monitor and control the process. The system is so good, said Bell, that a weld can be programmed from an office thousands of miles away with no input from the on-scene operator other than starting the job. The system is limited to larger components though, explained Bell, because it's difficult to put the vision equipment on the end of a robot while also keeping it out of the way when welding complex components in tight spaces.

### Adaptive Arc Techniques

One important advance making both manual and robotic welding easier, said Fleischmann of Miller Electric, is what you might call "adaptive arc techniques." One challenge for all forms of arc welding is "the task of maintaining the proper stick-out, travel speed, and work angle," he explained. Miller offers solutions called Regulated Metal Deposition (RMD),

Accu-Pulse, and Versa-Pulse that help a manual welder by "monitoring the stick out and the arc, and then doing some sophisticated work with the power supply and the power that's being delivered to make it easier for the welder to accomplish the weld. So if, for example, they miss and one of those angles changes a little bit, or the stick-out distance changes a little bit because they had a momentary lapse in their manual dexterity, it makes it easier for them to execute the weld. The welding process is more compliant, more forgiving." He added that these techniques are also applied to robotic welding—not because robots are inconsistent, but because there can be geometric variations in the workpiece.

### Training with 'Bacon Frying in the Pan'

Improvements in vision systems and computing capability have also enabled effective training with augmented reality. Miller's offering is called LiveArc and it covers manual MIG and stick welding. It uses a

continued on p. 26

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# CCAI Finishing Education Foundation Hits the Ground Running – Celebrates Founding Members

continued from p. 4

the event energized, confident, and armed with new tools to help them advance their careers,” shares LaMothe. “We want more women to benefit from the experience. So, when the concept of a scholarship was presented to the Board of Directors in late 2020, it received immediate and unanimous support,” she adds. Named in memory of one of the first Women in Finishing members, the Elizabeth Teska Scholarship Program covers registration fees and accommodations costs for two women each year. For more information on Women in Finishing, visit [www.womeninfinishing.org](http://www.womeninfinishing.org).

## New Training Resources for Employee Development

Ongoing education and training opportunities are important for continued employee development. Recognizing this need, CCAIFEF has identified the new online training programs conducted by the CCAI Finishing Academy as an initiative to support. The online courses provide a convenient learning platform and are led by an industry expert. Targeting both existing and new employees, four courses are planned. The first course focusing on powder coating was launched in early July and will be repeated beginning in October, along with a liquid course being added to the Academy’s offerings. Two more courses, pre-treatment, and system design will be added in 2022. These intensive courses provide in-depth education on key aspects of industrial finishing and are an effective and cost-efficient addition to an employer training program. The CCAIFEF Board of Directors voted unanimously to provide financial support for the delivery of the online training programs. For more information on the CCAI Finishing Academy online training courses, visit [www.ccaiweb.com/academy](http://www.ccaiweb.com/academy).

## Founding Members Provide Crucial Support

Acknowledging the progress of CCAIFEF, LaMothe shares, “I am proud of the contributions the Foundation has made towards education and training initiatives in our industry so early in its existence. However, I would be remiss if I did not mention that none of this would be possible without the support of CCAIFEF’s Founding Members.” CCAIFEF Founding Members are an exclusive group that share a commitment to supporting the advancement of the industrial finishing and coatings industry and are forever recognized for their support. Through their contributions CCAIFEF is able to establish and grow crucial education and training programs that benefit the finishing industry today and build a strong foundation for the future. “We are grateful for our Founding Members’ recognition of CCAIFEF’s potential, their commitment to educating and training the finishing industry, and for their generosity,” adds LaMothe. Donations of \$5,000 or more qualify for Founding Member status. The Founding Member campaign is scheduled to run through the end of 2021.

### Current CCAIFEF Founding Members include:

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**Bob Warren and Carole Curry-Warren**

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For more information on CCAIFEF and to become a Founding Member, contact Sheila LaMothe at [sheila@finishingfoundation.org](mailto:sheila@finishingfoundation.org) and visit Booth D45329. ■

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## Making Welding Accessible to All continued from p. 24

working torch with a constellation of LEDs that track with an overhead camera, so the system can calculate the trainee's work angle, travel angle, contact-tip-to-work distance, travel speed and aim – even in simulation mode. As Savage explained,

“when the student pulls the trigger and they draw the torch along the coupon, the system is able to look at the torch and crunch all those numbers. It can give them live feedback about how they're traveling, or their push angle. Then, when

the student feels ready to actually strike an arc, they can turn the arc on, pull the trigger, and now it's keeping track of what they're doing as they're actually laying a bead.”

Fleischmann added that for de-

grades welders have used sound as key feedback, with a good weld often compared to the “music” of bacon frying in the pan. “These virtual reality systems are also modeling the sound. So when you're practicing, you can look at where your torch is and not have to look at some other indicator. We're giving realistic audio feedback.”

### Resistance Spot Welding

John Slayton, national sales manager for welding at Bosch Rexroth Corp., Rochester Hills, Mich., said “the introduction of high-speed adaptive control of resistance welding has dramatically improved welding quality, helped increase throughput and significantly improved safety by reducing weld expulsion. The latest technology makes it even easier and more accessible to incorporate high-speed automated welding of the highest quality, with data on the quality of every single weld captured as part of the resistance welding process.”

Bosch Rexroth's latest advance in this area is its PRC700 weld controller, which Slayton said “dramatically expands the number of heat blocks available so that welding system programmers and technicians can fully customize the electric current waveform for each weld. Through user-friendly programming tools, each weld can be configured to have as much, or as little current and time as is needed to handle the specific conditions for each weld.”

He added that “the PRC7000 has a more advanced adaptive welding function [than the previous generation], allowing even faster real-time processing to make sure the physical weld more closely represents the desired weld-curve. This greatly increases the quality of the weld, and, because aluminum is being used more widely in the industry, this is becoming a very important feature for our customers.” ■



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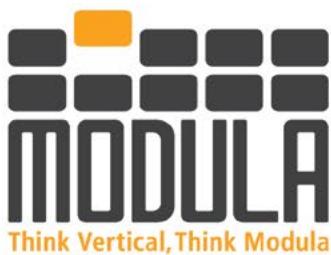
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## PRIME Pathways to Developing Talent continued from p. 14

### Taking the First Steps

What would the team's advice be to other communities and manufacturers considering a PRIME program?

"Go for it," Curry said. "The SME Education Foundation has a great process and is very helpful."

Said Terry, "If a manufacturer is not currently involved in donating to, or working with, a PRIME school, it

is missing out on one of the best opportunities to acquire talent and future workers."

It is important to understand that this is a multi-year commitment. "In previous times, I've seen high

school programs close down after a couple of years," Morse of Delta College cautioned. "It takes a longer-term plan and a longer-term commitment."

The program should also be grounded in realistic expectations. Since most PRIME programs are funded by the manufacturing base, manufacturers must be actively involved in initiating and providing mentoring for the program, sitting on boards and committees, and donating time.

The manufacturers agree that it is important to have a "project champion" in the educational system – the role that Geno fills in the Saginaw program. "The coordination and implementation have been outstanding," Stewart of Nexteer said.

Geno stressed the importance of having ways to reach the "decision influencers" of young students. "Summer camps, videos, extra-curricular events, plant tours, and clubs are very helpful," Geno said. "Also, since parents and teachers are the most critical adult groups that influence a student's career perceptions, helping them see the benefits of different manufacturing careers, and the steps needed to get there, is absolutely critical."

According to Wooley, it is also helpful to plan for attrition of students and what career choices graduates typically make. "About one-third of students in our PRIME programs graduate each year, enabling growth of the program as new freshman students are recruited," she said. SME Education Foundation data also show about 17 percent of graduates move on to a two-year community college and 39 percent pursue a manufacturing-related four-year degree. About 11 percent enter the workforce directly upon graduation. ■

**For more information about the PRIME program, visit [smeef.org/get-started-with-prime](http://smeef.org/get-started-with-prime).**

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# Building Signature, One-of-a-Kind Vehicles: Some Highlights from ToyMakerz' David Ankin Keynote

continued from p. 1

the teamwork and partnerships. From having the right team of specialists and administrative people within your own business, to partnering with the best, it takes the right collection of people to realize any vision.

"It's about hard work, perseverance, and not trying to replicate what others do," said Ankin. "When it comes to fabrication, it's not about what just looks good, it's about designing and building something that is not only beautiful, but usable and functional as well."

Take the case of ToyMakerz' signature, one-off, mid-engine, blown, formula car known as The Beast — hugely popular among motorheads and serious fabricators alike. Its feature list includes: a fully fabricated custom tubular chassis, a 408 inch Chevrolet small block with an 871 blower, aluminum heads, a carbon fiber nitrous bottle and system by Nitrous Outlet, a custom, computer-designed and hand-built fiberglass body by Starr Creations, a hand-tooled header system by I.C. Engine Works, a Magnaflow Exhaust, powder-coating by Aegis, dual caliper Wilwood disc brakes, a RacePak and Smartwire installed by Racewires, and 33 x 22 x 20-inch Mickey Thompson rear tires. Weighing just 1908 pounds, it takes off like a cannonball. And it looks awesome, too.

The Beast encapsulates everything that Ankin believes about success in the fabrication field. He couldn't have achieved what he has without the help of dedicated team members within his own shop, as well as a large ecosystem of external partners, suppliers, and professionals. Time spent building that team, he said, will pay big dividends in the quality of the final product.

"Everyone I know is a phenomenal talent," said Ankin. "This group of people that I call my 'toolbox' are not only my business associates,



they are my friends. We all have our area of expertise and help each other in business, in racing, and in life."

## Building Mashed Up Monsters

Another fabulous creation of the ToyMakerz team is the SB2. Built from the ground-up, the ToyMakerz SB2 features a Ford body, Chevy motor, and countless custom-fabricated components. Teamwork transformed it into a one-of-a-kind, mashed up monster of an automobile. It runs on 112 octane fuel and puts out 825 horsepower. An on-board nitrous tank adds an additional 250 horsepower. With a compact profile, it had to be built with wheelie bars to keep from flipping over.

And then there is the Vanquish, possibly the coolest bike on the planet. Even though Ankin has worked on hundreds of high-performance motorcycles over the years, the V8 Vanquish is one of his all-time favorites. Built together with his good friend Mike Kelly, the original inventor of the Vanquish, ToyMakerz' customized version features an all-aluminum 575 hp Big Inch Small Block 427 capable of 7000 RPM. It takes power to the extreme. Yet it is a super-smooth ride. Its proprietary carbon fiber belt is nearly indestructible. The

bike can accelerate from zero to 60 mph in just 3.7 seconds.

How does he keep up with the latest breakthroughs in automotive and fabrication to be able to continue to produce such interesting vehicles? Ankin said it goes back to his childhood.

"There was always a matchbox car I wanted to build," he said. "Now I can make those cars a reality and drive my dream cars. I am constantly building vehicles. I either take current technology and make it work with my concept or help develop technology to achieve my dream vehicle."

Everything done at ToyMakerz, he added, is a major challenge. There is no room for cookie cutter techniques or mass production. That makes every project exciting and challenging. There are no directions for any of the cars.

"We build everything for our custom vehicles — the chassis, body, steering, everything," said Ankin. "I never stop thinking, designing, and building...ToyMakerz is the ultimate challenge."

## New Concepts Need New Tools

Some of the concepts arrived at in the ToyMakerz shop are so out there that current materials, tech-

nologies, and tools struggle to realize the underlying vision. Sometimes it takes the development of entirely new components and tools. Once again, teamwork and partnerships play a crucial role.

"We work with multiple companies, such as SP Tools USA when we have to develop a tool that is not currently on the market," said Ankin. "One time, we worked with Starr Creations to develop a custom body that started out as a napkin drawing."

The bottom line: Dream big, work hard, and partner with people that share your vision and have the ability to help you execute it. ■

# AM Meets Supply-Chain Challenges, Positions Itself as Long-Term Answer

continued from p. 12

building on its potential to be a supply-chain saver. Not only that, AM became a literal life saver.

“For example,” writes Lazier in his article, “the maker community leveraged 3D printers to print personal protective equipment until

manufacturers were able to pivot their lines to produce at scale.”

Industrial AM joined the battle, as

system providers and print houses collaborated with health providers to meet supply needs for critical medical items such as ventilators, masks and testing kits.

“This trend toward collaborative, distributed production certainly will continue throughout 2021 and beyond,” Lazier writes.

The ability for AM technology and its user community to rapidly pivot and provide product quickly and without the need for costly tool design and build, sets up our industry for solid growth and as a key cog in the supply chain, in good times and bad. Digital networks can link printers throughout the world, providing the ability to create prototypes or volume parts locally or even at the point of use, without the need for shipment. And, the sustainability inherent in such a production model is most attractive to governments, companies and populations alike.

We can glimpse what’s coming by seeing what’s already arrived. To consolidate metal-AM technologies and enable collaboration, and quick design, production and delivery of products worldwide, Neighborhood 91 has opened its doors in a 195-acre development adjacent to the Pittsburgh International Airport. A public/private partnership provided the infrastructure, including a reliable micro power grid, argon-gas delivery and recycling, powder storage, and more. AM institutions and companies now are stepping in to build a concentrated base of expertise and capabilities to fuel economical scaling of AM development and production.

This most definitely is AM’s honeymoon period, and innovation continues to no longer just offer AM as the shiny, new thing, but cement it as an integral force in the worldwide making and delivery of things.

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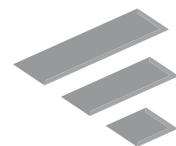
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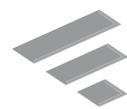
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