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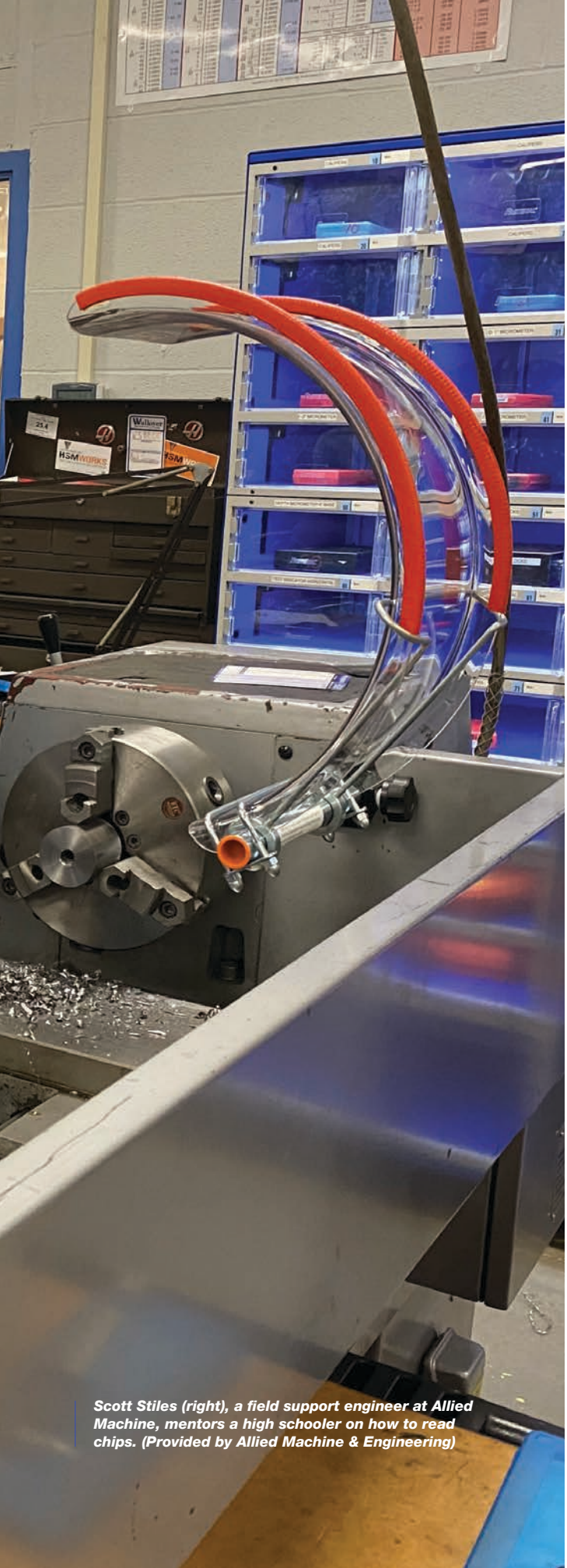
EXCELLENCE AWARD



Scott Stiles (right), a field support engineer at Allied Machine, mentors a high schooler on how to read chips. (Provided by Allied Machine & Engineering)

Building the Next-Gen Manufacturing Workforce

Help for your workforce problem is here—and in the mirror

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There is no greater challenge in manufacturing than maintaining a qualified workforce. Manufacturers have to recruit, train, and retain people—and people are far more complex than the fanciest machine. What's more, even if a shop is lucky enough to have a solid staff now, demographics argue against getting comfortable about it. Experienced machinists and other skilled trades will soon be retiring in greater numbers than the supply of young people interested in manufacturing jobs.

Happily, there are lots of smart, dedicated professionals in both national and local organizations working on this problem, and far more help is available than most people realize. But you need to play an active part in the solution. You must reach out and grab this lifeline of outside expertise and assistance before the demographic tsunami swamps your shop.

Broadening the Recruiting Pool

It seems everyone who thinks seriously about the problem of recruiting manufacturing professionals comes to two key conclusions: We must each work to change the public perception of manufacturing in our own communities. And we must broaden our notion of viable candidates to include

women and other underrepresented groups. “We need to get high school guidance counselors to realize what’s going on in the world, rather than pushing everyone in one direction,” said Robert Tessier, national director of advanced fabrication technologies at Airgas, an Air Liquide company, Radnor, Pa. This isn’t a black and white situation where you either go to college or ‘good luck.’ Manufacturing offers lots of opportunities [with and without college]. You have to get involved with the education of the children in your city or town. If we want people to build things, let’s teach people how to build things.”

LIFT brings students from nearby Detroit high schools into its Learning Lab to meet engineers and learn about new manufacturing innovations and processes. (Provided by LIFT)

Allied Machine and Engineering, Dover, Ohio, offers an excellent example. Allied is located in sparsely populated Tuscarawas County in northeast Ohio, on the edge of Appalachia, which Executive Vice President Steve Stokey described as “beautiful, but not a destination location for a career, or the typical go-to place for a young college graduate looking for a big city, the South, or a beach.”

Despite this, Allied has managed to boost interest in engineering at local high schools, and open students’ eyes to the opportunity to pursue fulfilling work back home after getting a four year technical degree. They did this in part by teaming up with Project Lead the Way (PLTW), a nationwide non-profit dedicated to improving STEM (science, technology, engineering, and mathematics) education in high schools. With the cooperation of the local school system, PLTW provided curricula and teacher training, and Stokey led a fund-raising effort among local businesses to buy the necessary equipment—things like 3D printers and robotics.

Tessier of Airgas reported that it’s often necessary to supplement local school funding to equip classes with manufacturing equipment. For example, he pointed out that while a computer lab can use the same computers for a number of years, it’s more expensive to buy welding equipment and then have to constantly resupply the lab with steel and other consumables, including protective gear. But the payoff is encouraging, Tessier added.

Stokey said little Tuscarawas County now has over 150 students presenting impressive STEM projects at an annual showcase, and local manufacturing businesses have had major success in recruiting from the participants.

Diversity Does Wonders

Manufacturing success will also require workforce diversity going forward. For one thing, we won’t solve our problem by continuing to focus on men. As Tessier put it, “it’s not just a matter of recruiting that other 51 percent of the population to help resolve an issue. It’s the intellect that we’re missing out on. Diversity is an answer to a lot of issues, because you get different perspectives and it is absolutely amazing how much better things can become when you get these different viewpoints.” The same is true for racial and ethnic minorities, and the good news is there are lots of organizations available to help you do this.

For example, Gretchen Schultz, director of workforce development at Tooling U-SME, Cleveland, pointed to the Jane Addams Resource Corp. in Chicago and West Virginia Women Work (both of which focus on women), and Job Corps and YouthBuild, two publicly funded organizations that focus on the inner city. Schultz added that these organizations often go beyond help with recruiting and training to include “wrap around” services, like transportation and childcare, that might otherwise hinder hiring. Lest you think we’re exaggerating the scope of help out there, she said

"there are currently about 210 active YouthBuild programs in more than 40 states serving over 6,000 youths per year. And it's all geared at the populations that have been underrepresented in manufacturing."

Joe Steele, senior director of communications and legislative affairs at Detroit-based LIFT said his organization is reaching out to women and minorities with initiatives like "a manufacturing patch with the Girl Scouts of Southeastern Michigan, to introduce girls to advanced manufacturing." It also brings students from nearby Detroit high schools to the LIFT Learning Lab to participate in a curriculum called IGNITE: Mastering Manufacturing. The program gives students "the opportunity to meet LIFT engineers and see our ecosystem at work on new manufacturing innovations and processes. By immersing them in that environment, not only are they being introduced to materials science and advanced manufacturing, they are also able to see the future for themselves," he said.

Making a Good Training Program

If recruiting is problem number 1, training is problem 1B. Naturally, you'll try to hire "qualified" people. Even then, you'll almost certainly have to train them in the particulars of your operation. And, like recruiting, the best approach to training generally involves partnerships with outside organizations, like local community colleges. A great place to start is with SME, Southfield, Mich., and in particular its learning and development division, Cleveland-based Tooling U-SME.

Vice President Jeannine Kunz explained that beyond the commonly referenced skills gap in manufacturing, she finds an "execution gap" in how companies address training. That might be as basic as not having a training plan, or not knowing that the local workforce investment board can help, as can national organizations like Manufacturing USA. "SME finds itself in an important role: understanding industry's needs and the many useful organizations out there, so that we can help educators and manufacturers find their way through that labyrinth." Plus Tooling U-SME itself offers over 500 interactive online courses covering a range of manufacturing disciplines, plus instructor led classes, customized training, industry certifications, and more. It also works hand-in-hand with staffing agencies (another recruiting source), to make sure they understand industry needs and can pre-train the talent pool.

Tooling U-SME's courses are aligned with industry recognized credentials established by SME and organizations like the National Institute for Metalworking Skills (NIMS), based in Fairfax, Va. Executive Director Montez King said NIMS' main role is to "teach you how to train and how to validate job performance with practical experiences that reflect what employees will face on the job." He went on to say that the main reason so much training falls short is that "we're holding on to traditional training principles, while manufacturing technology continues to advance at a rapid pace." A good example of backward thinking, he said, is the notion that we should train people to master an occupation. In the case of a traditionalist definition of "machinist," that would be a roughly five-year process. "And in five years the field would change and you'd never really master the occupation," King said.

More importantly, King argued, businesses don't really

Tooling U-SME offers more than 500 interactive online courses covering a range of manufacturing disciplines. (Provided by Tooling U-SME)

operate based on occupations. They operate based on roles. "An individual's trade or occupation might be 'machining,' but their role in the company might be as an operator. Or perhaps they work as a setup person, but they don't operate the machine. Or they do QC." That's why NIMS' new "smart standards," King explained, "are a compilation of duties—hundreds of one-page documents that describe the many possible responsibilities within an occupation." Employers no longer has to think of a machinist needing to learn everything associated with that occupation. They instead build their training standards based on roles. They define a given position as a collection of specific duties and train towards that.

While there may be hundreds of duties associated within a given occupation, King said, NIMS has also grouped them into industry recognized roles within each

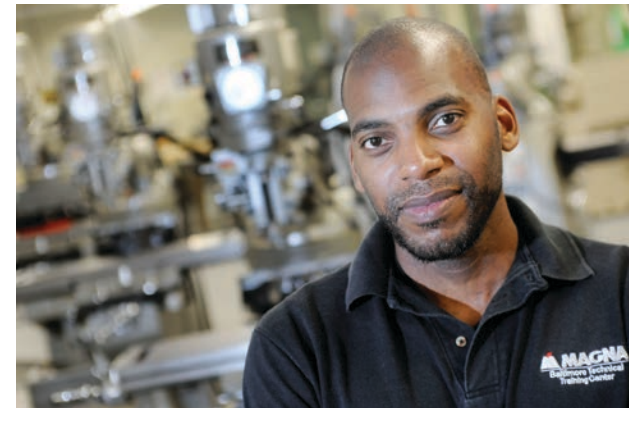
occupation. Some might find a more convenient way to build a training standard, "or you can say 'I don't care about any of these industry recognized roles. I need to pull one duty out of this quality technician role, another duty out of this Industry 4.0 role, another duty out of this, and I'm going to train towards that.'"

King said another big problem with many training programs is the reliance on what he calls "osmosis." Putting someone out on the shop floor and expecting them to gain knowledge simply by working there, observing things as best they can, and maybe (if the supervisor likes them) asking some questions. It's learning "by chance," as King sees it, and it's an especially risky approach for training women and minorities, since they are more likely to be different from the current workforce. The much better approach, King said, is "deliberate and targeted training in which you show someone how to do something, talk to them about what you've done, give them an opportunity to do it, and then check their work."

King's third big recommendation for creating an effective training program is to establish key performance indicators (KPIs). He added that it's critical to establish KPIs for both the trainee and the trainer. "We teach our organizations to accept that all individuals associated with training are performers," explained King. "Most organizations look at the trainee as the only performer. But looking at the trainer and the company as the performer, you can truly understand whether a program is working." The right KPIs can also help determine if a program is doing the heavy lifting, or if a community or school is feeding the pipeline with "a really good batch of people who have a desire to learn. That has very little to do with whether you have a good training program. You're getting good people despite your training."

For example, King said, trainer rating and trainee accuracy are important KPIs. "If the trainee had to go through an assessment three times to get it right, what is the average accuracy between the first time and the last time? And we associate the trainer with the trainee. So the success of the trainee is synonymous with the success of the trainer." The goal is to filter out the anecdotal and qualitative information in favor of quantitative data. "We rate a trainer from one to ten, ten being perfect. If 70 percent of whomever I trained gets it right, then my rating is a seven." This also enables the measurement of different cohorts flowing through the company, so you can see if a trainer is more or less successful with the pipeline from a college versus another source.

Finally, King said, focus on "training from the end: creating a practical experience, that when satisfied, gives the company the confidence that the trainee can satisfy the job, meaning they have the muscle memory to do the things they need to do, and they have the critical thinking skills to make the decisions associated with it." Such an assessment, he said, "becomes the nucleus for everyone. It helps the company define the kind of training courses they need. It helps schools define the kind of general information they need to teach for students to be prepared for this company. And it helps the Tooling U-SME's of the world to create the asynchronous platforms, so students can learn from any place in the country and at different times. Training from the end is not the job description, it is the performance measure."



From a tough Baltimore neighborhood to a high school apprenticeship at Teledyne to running NIMS: Montez King and his team can help you set up an effective training program. (Provided by NIMS)

Keeping Your Keepers

To keep personnel, start with a structured onboarding process, something Tooling U-SME has spent a lot of time on, said Kunz. "[With] a poor onboarding program, new hires will feel a bit lost in their job, and might not perform as well." That leads to turnover. Kunz added that studies show that "Millennial and Gen Z hires expect a lot more structure as they enter a new company than previous generations."

Telling a new hire they have to complete a five-year apprenticeship program to get anywhere, said King, is another way to lose them. Giving them the ability to add to their skills online and at odd hours with a service like Tooling U-SME is the opposite. Online training is a natural fit for the new generation, and a huge help in retaining people whose circumstances make it difficult to hold to a certain schedule (e.g., a single mother).

Be mindful of other discouraging factors as you diversify your workforce. For example, Tessier pointed to the dearth of protective equipment for women. "If I want steel toed boots, I can select from 100 to 140 different pairs that fit my attire, whether I'm an engineer or a welder in the shop. I have gloves that will fit my hand. I have welding jackets that fit my body. The arm length is correct. We have fall protection that's designed for me." But hiring a woman engineer means outfitting her in PPE that is designed for a male. "The sleeves are either way too long, or she has to roll them up, which creates a safety hazard," he said. "She may have a selection of two or three different pairs of steel toed shoes, that's it. That's what our industry has done and we need to do better."

Giving employees the opportunity to gain industry recognized certifications can be motivational. As Steele expressed it, certifications "provide the individual with a world of opportunity. They are also important because they provide alternative pathways for talent where the traditional degree system isn't accessible or isn't the right path for an individual."

Kunz said SME has been a certifying body since the early 1970s, so they're big believers. But she recognized that there are also times "it might not be the best path for a situation. Let's use our Certified Manufacturing Engineer (CMfgE) program as an example." The CMfgE certification program covers a large body of knowledge (BOK). A company may look at that BOK as a guide or roadmap for developing their manufacturing engineering workforce, but may conclude that a portion just doesn't apply to their operations. "The company might choose to train only to the areas of greatest importance to their business objectives," she said. "Certification BOKs are very valuable on their own! We encourage companies to use certification bodies of knowledge like a compass—it will point them in the right direction. They can tailor their training journey and celebrate their wins along the way." Maybe later the company ends up rounding out the training program with certification or an employee may pursue it on their own, noted Kunz.

Airgas offers an extensive welding training program. Training a welder, like a machinist, requires a commitment to providing equipment and consumables. (Provided by Airgas)

Schultz added that she sees a national trend toward "shorter-term certifications, and ones that might articulate into some type of community college or university credit." In general Kunz and Schultz said there is no one-size-fits-all arrangement, and businesses, schools, and communities are increasingly working together to attract people into industry and to offer different approaches that transition into employment with continuing education.

FYI

Airgas
855-625-5285 / www.airgas.com

Allied Machine & Engineering
330-343-4283 / alliedmachine.com

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313-309-9003 / lift.technology

The National Institute for Metalworking Skills (NIMS)
844-839-6467 / www.nims-skills.org

Tooling U-SME
866-706-8665 / www.toolingu.com