

# The Replacements

## TAKING STEPS TO STRENGTHEN THE FUTURE SKILLED WORKFORCE

Matthew Jaster, Associate Editor



Sarah Williamson (left), Nathan Young (center) and Christopher Melton (right) work on an engineering project at Morton High School in Morton, IL. Photo courtesy of A3 Creative Group.

For years, politicians, educators and business leaders have generated various ideas to revitalize U.S. manufacturing and engineering. These include manufacturing initiatives, internal training programs and an emphasis on science, technology, engineering and mathematics (STEM) in the classroom. The declining expertise in these fields, however, continues to be a growing problem in every facet of manufacturing and engineering.

Each year, many respondents to *Gear Technology's* "State of the Gear Industry" survey voice their concerns about the lack of skilled workers available in the United States. In 2009, retirements, resignations and various cutbacks will force many companies to look toward the next generation of workers to pick up the slack. If you're worried this incoming workforce might not live up to expectations, you're not alone.

Whether it is inadequate math and science skills, misguided education programs or simply the 1950s perception of manufacturing by parents, students and teachers, things will need to change in order to better prepare future manufacturers and engineers for careers in these fields.

The government and the academic community are tackling the issue, but it's the manufacturers themselves that must take a more proactive role.

### A New Direction in Manufacturing

Joe Arvin, president of Arrow Gear, attended vocation night at a local high school in Downers Grove, Illinois. He noticed students packing into rooms for information on careers in computer programming, marketing and sales. The room for manufacturing jobs was empty most of the night.

"Two students came in," Arvin says. "One said he had come because his father told him he had to and the other said he came in just to accompany his friend."

Training and recruitment are vital to the success of Arrow Gear. The company has attended job fairs, visited trade schools and universities and produced a video to communicate to students that a job in manufacturing is not a dirty, oily job.

"We have a clean, modern and well lit factory with CNC machine tools. The operators do not get hit with hot chips and there is no oil being sprayed on them."

continued

Unfortunately, the perception of manufacturing is stuck in the past.

“We need an immediate change in perception in regards to engineering and manufacturing, not only the impression of the students, but the parents,” says Niel Tebbano, vice president of operations for Project Lead the Way (PLTW), a foundation developing engineering curriculum at the pre-college level. “Many parents still carry the antiquated impression of manufacturing as it was 50 years ago.”

Tebbano sees a growing need to market contemporary engineering and manufacturing to students interested in relationships and life sciences, particularly young women.

“How does manufacturing and engineering contribute to saving lives? Emphasizing what’s possible in these fields in terms of improving human life is so important,” Tebbano says. “These are the kinds of things that resonate with young people and the approach that needs to be taken.”

Sylvia Wetzel, chief learning officer at Bison Gear, knows how important it is to deliver a consistent message to students on the value of manufacturing careers.

“There is certainly a need for STEM education awareness,” Wetzel says. “We need programs that are sponsored towards the positive side of manufacturing, programs young people see as a challenging, productive path for their careers.”

Bison works closely with educators, counselors, students and teachers to deliver this message. The organization hosts tours for students that provide an in-depth overview of manufacturing careers, a history of the industry and a firsthand look at production.

“I’m hoping the new administration supports and creates initiatives that help manufacturing companies excel and provides the career paths that are so desperately needed for young people to succeed in life,” Wetzel says.

Initiatives are being developed by the Obama administration to boost the renewable energy sector, create five million new green jobs and put major investments into the next generation of scientists and innovators. The administration also plans to double the funding of the Manufacturing Extension Partnership (MEP), a program to improve efficiency, implement new technology and strengthen company growth in the manufacturing sector.

“While the new administration is well intended with what it would like to do, there are certainly one or two other items on their agenda,” Tebbano says.

That leaves the task up to the manufacturers themselves. In order to bolster the next generation of skilled workers, companies must be more involved in education programs and manufacturing initiatives.

### Fine-Tuning Early Education

While manufacturing initiatives continue to educate, many feel these programs are missing one important ingredient—the manufacturers.

“The overall attitude on science and engineering education is that it’s the responsibility of the state and local districts and not the manufacturers and engineers. I believe there is too much at stake for these organizations not to be directly involved,” Tebbano says.

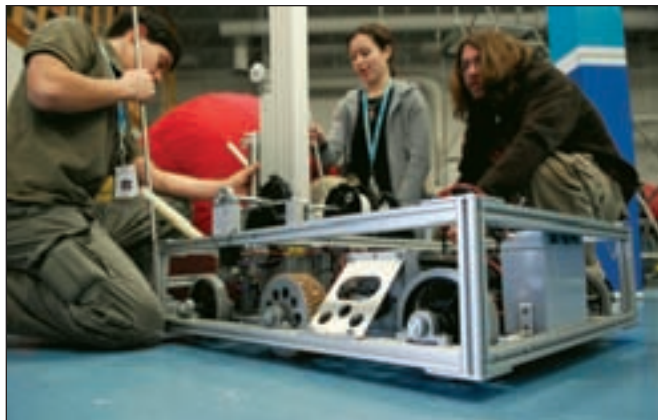
PLTW reinforces relationships between corporations and schools through its partnership teams. These teams consist of local business leaders, educators and parents and serves as a resource for local teachers involved in a PLTW program.

“We’ve had enormous success with these partnership teams,” Tebbano says. “I applaud companies like Lockheed Martin, the Society of Manufacturing Engineers (SME), and Rockwell Automation for making a full commitment to our program.”

Rockwell Automation, headquartered in Wisconsin, has strong relationships with the Milwaukee Public School District. The company supports STEM education programs such as PLTW and For Inspiration and Recognition of Science and Technology (FIRST), an afterschool programming initiative.



Student Christopher Moss gets hands-on with an engineering assignment at Riverside University High School in Milwaukee, WI. Photo courtesy of A3 Creative Group.



Students Daniella Shada (center) David Schmidt (right) and Lucas Zahn (right) participate in a PLTW program at the Lakeview Technology Academy in Kenosha, WI. Photo courtesy of A3 Creative Group.

“Rockwell provides opportunities for public school students in K-12, as well as students participating in summer technology programs,” says Mary Lou Young, director of global community relations at Rockwell. “Our employees support many of our STEM partnerships as volunteers and mentors. We’re excited about the growing number of participants in STEM programming and encourage other companies to do what they can to help the next generation.”

Another area where companies can contribute to these initiatives is by sponsoring various community projects.

“Rockwell has developed a hands-on learning vehicle called the Rockwell Automation Dream Machine at Discovery World in Milwaukee,” Young says. “We also helped fund the Toymaker 3000 exhibit at the Museum of Science and Industry in Chicago. Both of these exhibits help to excite and engage students and promote an interest in technology.”

The goal, according to Tebbano, is to break the mindset that corporations shouldn’t be involved in STEM education.

“Corporations are the best resource to gauge what the future workforce requires. They are in the perfect position to make sure these education programs are heading in the right direction,” Tebbano says. “There’s a significant difference between what academia sees as essential skills and knowledge compared to what corporations believe is necessary.”

A study conducted by the National Academy of Engineering (NAE) entitled “Changing the Conversation: Messages

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PLTW Instructor Armando Dominguez and students Evelyn Correa (front) and Damaris Santoyo (center) at Escuela Vieau School in Milwaukee, WI. Photo courtesy of A3 Creative Group.



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# Wind Education Opportunities



Iowa Lakes Community College offers a wind technician training program for college students that features a Vestas wind turbine on-campus for hands-on training. Photo courtesy of Iowa Lakes Community College.

The National Science and Technology Council reports that the number of college graduates receiving degrees in science and engineering declines each year in the United States. Bad news considering industries like wind power will require a substantial number of skilled workers for all the major expansion projects planned.

“The expansion of wind power in the United States requires training and hiring skilled personnel to design, build, operate, maintain and advance wind power equipment and technology, according to a report by the U.S. Department of Energy,” says Christine Real de Azua, assistant director of communications at the American Wind

Energy Association (AWEA). “The wind energy industry is reaching out to academic programs and to companies along the supply chain and across the country, to make them aware of the tremendous employment and business opportunities available thanks to wind power.”

Support from industry, trade organizations and government offices will ensure that university programs will be made available to students interested in careers within the wind power sector. Real de Azua states that many wind programs are at different stages of development and interested students and corporations should contact colleges directly to get involved in these programs.

## Wind Power Programs in the United States

**University of Arkansas—Supply Chain Management Research Center**  
Phone: (479) 575-2000 <http://scmr.uark.edu>

**Cuyamaca College**  
Phone: (619) 660-4020

**University of California, Davis**  
Phone: (530) 752-7741 <http://cwec.ucdavis.edu>

**Iowa Lakes Community College**  
Phone: (712) 632-8374 [www.iowalakes.edu](http://www.iowalakes.edu)

**The University of Iowa**  
Phone: (319) 335-5934 [www.icaen.uiowa.edu/~ankusiak](http://www.icaen.uiowa.edu/~ankusiak)

**Boise State University**  
Phone: (208) 426-4078 [www.boisestate.edu](http://www.boisestate.edu)

**Sauk Valley Community College**  
Phone: (815) 835-6218 [www.svcc.edu](http://www.svcc.edu)

**Cloud County Community College**  
Phone: (800) 729-5101 [www.cloud.edu](http://www.cloud.edu)

**Cape Cod Community College**  
Phone: (508) 362-2131 [www.capecod.edu](http://www.capecod.edu)

**University of Maine—AESC Composites Center**  
Phone: (207) 581-2121 [www.aesc.umaine.edu](http://www.aesc.umaine.edu)

**Lansing Community College**  
Phone: (517) 483-1339 [www.lcc.edu](http://www.lcc.edu)

**Minnesota West Community and Technical College**  
Phone: (507) 223-7252 [www.mnwest.edu/human-resources](http://www.mnwest.edu/human-resources)

**Mesalands Community College**  
Phone: (505) 461-4413 [www.mesalands.edu/wind](http://www.mesalands.edu/wind)

**Alfred University**  
Phone: (607) 871-2623 [www.alfred.edu](http://www.alfred.edu)

**Clarkston University**  
Phone: (315) 268-6509

**Wayne Technical and Career Center**  
Phone: (315) 589-2600 [www.wflboces.org/wtcc](http://www.wflboces.org/wtcc)

**Oklahoma State University—Oklahoma City**  
Phone: (405) 945-3376 [www.osuokc.edu](http://www.osuokc.edu)

**Columbia Gorge Community College**  
Phone: (541) 506-6031 [www.cgcc.cc.or.us](http://www.cgcc.cc.or.us)

**Penn State University**  
(814) 865-2569 [www.psiee.psu.edu/windenergy](http://www.psiee.psu.edu/windenergy)

**Holland College**  
Phone: (902) 888-6730 [www.hollandcollege.com](http://www.hollandcollege.com)

**Mitchell Technical Institute**  
Phone: (800) 952-0042 [www.mitchelltech.edu](http://www.mitchelltech.edu)

**Texas Tech University Wind Science and Engineering Research Center**  
Phone: (806) 742-3476 [www.wind.ttu.edu](http://www.wind.ttu.edu)

**University of Houston Wind Energy Center**  
Phone: (713) 743-5053 [www.egr.uh.edu/wind/](http://www.egr.uh.edu/wind/)

**University of Texas Continuing Legal Education**  
Phone: (512) 232-1110 [www.utcle.org](http://www.utcle.org)

**Utah State University**  
Phone: (435) 797-7051 [www.usu.edu](http://www.usu.edu)

**University of Wisconsin—Madison**  
Phone: (608) 263-3064 [www.epd.engr.wisc.edu](http://www.epd.engr.wisc.edu)

**West Virginia University**  
Phone: (304) 293-7872 [www.wvu.edu](http://www.wvu.edu)

for Improving the Public Understanding of Engineering,” asked Americans to identify careers they felt carried great prestige in today’s workforce.

In the study, firefighters, doctors, nurses, scientists, teachers and military officers were at the top of the list. Engineers came in below farmers, priests and police officers but higher than architects, lawyers, accountants and journalists. Manufacturers didn’t make the list.

“Both teenagers and adults don’t have a strong perception of what engineering and manufacturing is or how it contributes to the quality of our lives,” says Greg Pearson, senior program officer at the NAE. “This lack of awareness contributes to kids not considering careers in these various fields.”

The NAE has seen strong signs that kids who are exposed early on to engineering—late elementary school—have a greater chance of pursuing careers in technical fields.

“It seems to be around this age that turnoff really seems to kick in,” Pearson says.

While educational programs like PLTW, Engineering is Elementary and Infinity Project are developing engineering curriculum at the pre-college level, there is currently not a nationwide system in place.

“We know through preliminary studies that half a dozen countries offer pre-college engineering courses, but we don’t know the effect these courses are having on the students,” Pearson says. “England, Australia, Israel, France, the Netherlands and South Africa all have some sort of engineering activity before students go to college.”

Pearson says one potential problem in the United States is that many teachers don’t have the right background for engineering and manufacturing instruction.

“These classes are being taught by industrial arts or technology educators. Some engineers are teaching K-12 graders, but not enough to make a significant impact.”

### **Reinforcing the Talent Pool**

As the academic community stresses the importance of early education in these fields, another essential tool is recruiting at the high school and college level. Michael Sloan, associate dean of agricultural and industrial technologies at Illinois Central College (ICC), believes companies should take a more active role in the recruitment process.

“I think local manufacturers could spend some time with their high school administrators and faculty. Invite teachers to make your company a field trip destination. Focus on capturing the imagination of your young visitors. They need to think about creating internship experiences and growing their talent locally,” Sloan says. “Manufacturers can teach educators about process improvements.”

ICC, located in East Peoria, is receiving a \$200,000 federal grant to develop interdisciplinary coursework that can be taught to high school students and adults in order to build reading, math and communication skills through manufacturing programs.

“Unlike professions in the healthcare industry, many

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occupations within manufacturing are not well defined,” Sloan says. “It would help those interested in manufacturing to better understand how they can develop the necessary skills to perform the unique duties associated with a CNC machinist, production welder or maintenance person, etc.”

Sloan says students and job seekers typically don’t know what manufacturing positions are available to them and what skills are necessary to succeed.

“Those entering the labor force would feel more comfortable knowing how their skills are valued,” Sloan says. “If more students understand the concept of value-added business and support local and regional companies, they may be more inclined to work for these organizations. Education, healthcare and other community needs are enhanced when manufacturing is strong within a region.”

At Arrow Gear, the company is involved in the Manufacturing Skills Standards Council (MSSC), an industry-led training, assessment and certification system focused on the core skills and knowledge needed by the nation’s production workers.

“While a move in the right direction, the MSSC does not go the full nine yards. It stops short of what we need to fill a skilled craftsman’s job at our gear manufacturing plant,” Arvin says. “The National Association of Manufacturers is working on a new program that will take the MSSC to the technical college level and produce people for the manufacturing industry that will have the basic skill levels required.”

Wetzel at Bison believes that setting consistent, repeatable and sustainable standards is helpful in defining what is needed and deploying it in a process that is easy and attainable.

“Ron Bullock, our chairman, worked passionately towards defining the specific requirements needed by manufacturers in order to have those seeking employment prepared with the required core skill sets. These skills were encompassed in the MSSC that benefit all in safety, quality practices and measurement, process/production and maintenance awareness.”

Before learning manufacturing skills, however, the next generation of skilled workers needs to concentrate on basic math and science.

“Young students are so technology savvy today,” Wetzel says. They create YouTube messages and Facebook pages with graphics as if they were marketing experts. As for math and science skills, well, we’re all aware that many students need to take remedial courses after graduation. This must be addressed in order to improve our socioeconomic crisis.”

PLTW’s Tebbano states that the resurgence of U.S. manufacturing and engineering will ultimately occur when all parties—the manufacturers, the educators and the government officials—come together for the common good.

“This nation has a real opportunity to reestablish its place in the competitive global market,” Tebbano says. “The key will be our ability to innovate and create. This is the edge that American manufacturing, engineering and science have always had over the rest of the world.”

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