

Train to Maintain

Industrial Maintenance Another Lost Art?

By Jack McGuinn, Senior Editor

“Job skills gap.” We’ve all heard about it. But what exactly is it? The respected NFP American Society for Training & Development (ASTD) defines a skills gap as “A significant gap between an organization’s current capabilities and the skills it needs to achieve its goals. It is the point at which an organization can no longer grow or remain competitive, because it cannot fill critical jobs with employees who have the right knowledge, skills, and abilities.”

Fair enough. But we might wish to consider a corollary to that condition and its definition when the topic is industrial maintenance, and that would be a *will* gap. A gap in the will to *train*, and a gap in the will to *be* trained. At least that remains the general and arguably correct perception of the state of U.S. industrial maintenance today—whether it’s a growing, yet unmet need for technicians inspecting the local hydro-electric power plant down the road or checking the fail-safe mechanisms for the nuclear control rods at the nuclear facility out in the bay.

Now, un-closed gaps like that can get a little scary.

But, hope lives. And, more importantly, people are out there working to make hope happen. That would be those who fill the administrative and training roles in the schools that exist around the country for the kind of maintenance training that is dearly needed—almost to the point of it being considered a matter of public safety and national security in some extreme but real cases (see above).

This is an issue with a dual demographic. On one hand is the group of, say, eager, 40+ “displaced” i.e.—canned workers. On the other, we have kids just out of high school with no college plans—for them “the halls of ivy” might as well be the name of an 80s hair band. The dilemma is getting trained those who desperately want to be trained (40+), and luring in

those who should be at least *considering* it as a career path (kids).

How challenges like that are being met and much more were asked of: Micah Statler, technical training program manager for Advanced Technology Services (ATS); Lisa Goetsch, director of workforce development & continuing studies, Kent State University at Trumbull; and Steve Straub, dean of Fox Valley Technical College’s (FVTC) manufacturing and agricultural divisions.

One of the first issues addressed was the aging workforce—not the aging workforce looking to retire; the older but still capable workers looking to hold on to a decent quality of life. So we asked: In this economy, are you seeing older applicants?

“We do see several older applicants in the field of maintenance in general, says Micah Statler of ATS. “With regard to jobs, recovering from the recession has kept more workers in the market longer. Particularly, we see many applicants from the Michigan region who were affected both by the recession hitting their retirement funds as well as early displacement from jobs around the auto industry.

“With respect to training, the older workforce is having to adapt from the requirements of single trade expertise to that of multi-skilled, which is now more prominent—both due to staffing efficiencies and heavy integration in more modern automation.”

At Kent State, located in the bedrock manufacturing state of Ohio, Lisa Goetsch sees it a bit differently.

“Not necessarily an increase,” she says. “We have always served a large number and percentage of older students. These adults are either (a) seeking skills to advance their careers within the maintenance field, or (b) seeking skills to *enter* the maintenance field (whether they are currently working or are unemployed).”

At FVTC they are taking the get-‘em-while-they’re-young long view—an approach that many who have closely followed the subject are in full agreement—including Steve Straub.

“Innovative partnerships with K-12 systems are front-and-center when it comes to changing the way our society looks at the value of higher education. The new economy calls for skill; it is no



FVTC trainers closely assess students’ development in order to gage their ideal skillset based upon knowledge, preference and life experiences (photo courtesy FVTC).

longer as dependent on four-year degrees, for the most part.”

Youth must be served, however. But are they stepping up to the table? (This reminds of the saying, paraphrased):

“Those who refuse to step up to the table, run the risk of ending up *on* the table.”

“Not only do we expect (an increase), but it is happening regularly,” says Straub. “As the older workforce has retired, there is a vacuum in those available to back-fill; this is the ‘skilled labor shortage.’” Unfortunately, it’s not just the lack of apprenticeship programs that is a leading contributor, but the relative lack of primary education in the fields of electrical, mechanical, and fluid power theory and practice. We are seeing an influx of younger (workers) in the maintenance arena.

“This younger generation may have the aptitude, but (also) lack the formal training, at fundamental levels, to begin to grasp the concepts and integration of today’s modern factory equipment.”

Kent State’s Goetsch — aware of the serious ramifications of continuing to ignore this — is all about making high-skill training opportunities available to these kids — but they have to want it.

“Yes — we would love to see more young people considering skilled trades such as industrial maintenance and taking classes,” she says. “This is a national problem! In our region (NE Ohio) we have been working to increase awareness of manufacturing careers and opportunities to increase the number of youth enrolling in training programs. This includes bringing high school educators and guidance counselors to manufacturing facilities, having manufacturing workers speak to high school students about opportunities, and much more.

“We have been working with companies throughout the U.S. who are facing this issue. Employers are beginning to recognize that they need to be an active partner in solving the problem. They can no longer sit back and wait for the education system to produce the quantity and quality of workers that they need. What employers are doing (or should be doing) to make an impact is: working collaboratively with education partners (high schools, techni-

cal schools, community colleges, and universities); sharing information with educators such as hiring requirements, job descriptions and skill requirements; hiring forecasts and levels of demand for occupations, etc.; and partnering with educators (providing internships and other hands-on learning opportunities for students, referring students to training/education programs, interviewing/hiring program graduates, do-

nating equipment/resources, speaking to classes/students, etc).

And while Fox Valley’s Straub reports that the average age of his applicants has dropped, he’s puzzled that the actual class numbers aren’t higher.

“We should be attracting more young people because of the great employment outlook for people with these skills, and the rewards involved in this type of work.”



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Then of course there's the old "be careful what you wish for warning." With basic manual skill sets—hammer a nail; change a tire; saw a piece of wood—of the young at perhaps its nadir—being in the industrial maintenance training business must have its challenges. Add to that finding and keeping quality instructors—and trying to get through to the minds of probably the most distracted generation since the invention of television. According to a study by the Pew Research Center, 87% of teachers in the study—performed in conjunction with the College Board and the National Writing Project—said digital technology is creating an "easily distracted generation with short attention spans." And 64% of teachers (from middle and high schools) say today's digital technologies "do more to distract students than to help them academically."

"It has been quite difficult to address this challenge, which is more than providing technical knowledge and know-how," Statler of ATS allows. "We have been plagued culturally with educational institutions that have painted the factory portrait as a destination for delinquents, behavioral or learning impaired individuals; as evident by the general population in any remaining high-school shop classes. To this respect, we find that many who enter the factory work force, while potentially

competent, may also lack the fundamental skills of mathematics, general physical sciences, communications, and basic reading and interpretation skills. This makes it difficult to train individuals where these fundamental understandings are an implied given of primary education. Those others that do have the fundamentals, and even some secondary education, carry a stigma of being above the core skills (electrical, mechanical, and fluid power), and are often placed in work environments and training situations that are beyond their current skill-levels. To this we answer with assessments that focus on providing a "30,000-foot-view" of fundamental and core skills. This provides us with the opportunity to address the areas of needed improvement so that the student and the company get the greatest return of investment: immediate and sustained skills application."

Finding and retaining skilled, dedicated instructors is another longstanding problem. It is really no different than job shops looking for good machine operators.

"From a core training perspective, we look to those who are known subject matter experts," says Statler. "Most often, these are seasoned maintenance professionals that have climbed the ladder to or above the maintenance specialist level or reliability engineer.

We have a great relationship with retiring professionals, who out of respect to the trade want to help us overcome the skilled labor shortage. These individuals have the knowledge and skill to pass along, but also the freedom to remain semi-retired.

"Internally, through train-the-trainer programs, we identify strengths in the same manner that we identify opportunity for assessment-based improvement. For the highly skilled, the ability to train is an additional part of their career path."

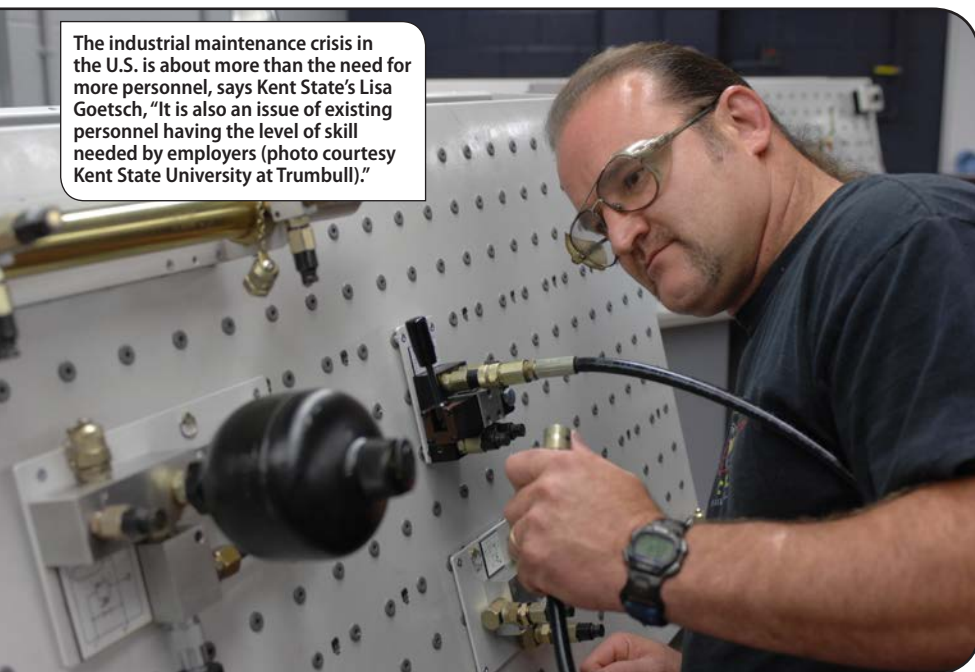
"Yes, (recruiting trainers) can be a challenge," says Goetsch. "Retirees and/or individuals seeking a second career away from the plant floor provide a great pool of candidates. We also utilize working employees for evening or Saturday training. And we partner with a variety of professional associations and other training providers to best utilize available resources."

"We recruit instructors from industry," says FVTC's Straub. "We need instructors who have recent experience in the field in which they teach. Indeed it is sometimes difficult to find people with the technical expertise required along with an aptitude and desire to be a good teacher."

"Industrial maintenance" certainly covers a lot of territory—requiring differing levels of training and education. With virtually no previous exposure to these skillsets, how do young students decide on which area to pursue?

"We focus internally on providing multi-skilled technicians on the factory floor, but the breadth of expertise required to specialize in all fields is insurmountable," Straub concedes. "Through our assessments we are able to identify areas of strength as well as areas for improvement. We view a technician's development much like a college would a major and minor. Assessment will tell a manager or trainer clearly where an individual technician's skillset is, based on knowledge, preference and life experiences. What we strive to do is provide these technicians with development that enhances their strengths and minimizes their weakness to at least a point of competence in the core theories and application of skill. This strategy has proven to

The industrial maintenance crisis in the U.S. is about more than the need for more personnel, says Kent State's Lisa Goetsch, "It is also an issue of existing personnel having the level of skill needed by employers (photo courtesy Kent State University at Trumbull)."



be beneficial in the troubleshooting of complexly integrated and automated equipment and fosters the teamwork that is often required in troubleshooting, ensuring that everyone is able to speak the same fundamental language.”

“Employers use a variety of titles for maintenance mechanics, but predominantly they are considered maintenance technicians as they are required to have strong technical skills,” says Goetsch. “There are typically three classifications of maintenance technicians: 1) Maintenance Technician Mechanical (MTM); 2) Maintenance Technician Electrical (MTE); and 3) Maintenance Technician Multi-Crafted (MTMC) (both electrical and mechanical). That being said, there are also “specialty” areas that students might pursue—for example, welding or ironworker. But these occupations are more dependent on regional employment trends and over the last 10+ years, most manufacturers have moved away from “specialties”—maintenance technicians must have a broad range of skills. For industrial maintenance there are really only two primary choices: mechanical and electrical. When advising students (young or old), we focus on the region and types of positions available, the level of demand for the jobs, the hiring requirements, what background/strengths they may have, and their goals/interests.”

For those incoming students having already done their “homework,” Straub simplifies it to, “The primary areas are electrical and mechanical maintenance. The choice is usually based on interest of the student. Aptitude and interest often are directly correlated.”

Two hot areas in industrial maintenance these days are predictive maintenance and condition monitoring. They are both relatively new, and some schools are probably scrambling for funds and instructors to teach them.

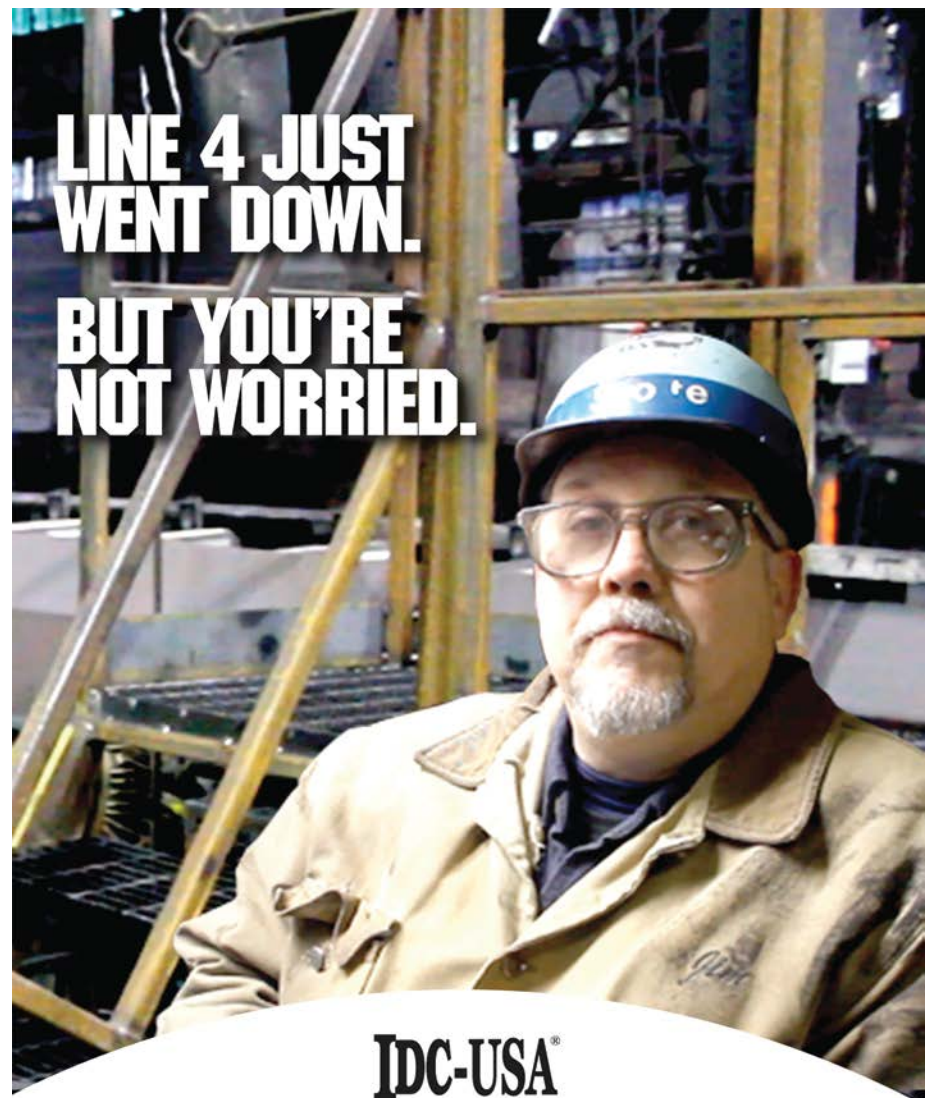
“Predictive maintenance is included in our training,” says Goetsch. “As noted previously, most students—including those currently working in maintenance—do not have the level of “basic” skills needed. We need to start with a strong foundation and work up to predictive skills. For example, you

need to understand hydraulic components; how they work; how they are impacted by other components and drive systems; how to troubleshoot problems; fix the problems; determine what is causing the problem; preventing the problem from recurring; THEN apply predictive maintenance techniques and measures to control the process and eliminate problems from recurring. Most employers would like their maintenance technicians to be involved with predictive maintenance,

but typically it is being done by plant engineers and/or highly skilled maintenance supervisors.”

Finally, given that there indeed exists an industrial maintenance crisis in the country, we asked each of our participants which area of the industry they felt to be most in need.

“There is a need for people who are well versed in industrial control technology, such as Programmable Logic Controllers,” says Straub. “People with this skill are needed to design, build, trou-



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bleshoot, and repair automated manufacturing systems. Most manufacturing in the U.S. is highly automated, and the trend will continue in that direction.”

Says Statler, “Often this question is answered with a ‘can’t see the forest for the trees’ explanation of whatever technology is being employed at a given facility – Robotics, CNC, Laser Technology, PLC Programming, etc. However, I am greatly of the opinion that the leading areas for improvement are in the mathematics and physical sciences. Math and Science provide all of the tools for troubleshooting technological problems. There is a deficiency in these fundamental skills, yielding a deficiency in troubleshooting and problem solving, which cannot be overcome from a systems oriented training. The common rebuttal to this predisposition is that the military does a great job of providing technical experts with regard to each piece of equipment and process that is available. This is true, yet the military can control the configuration, programs and processes of each type of equipment and develop SOPs and troubleshooting flow charts dedicated to the units. In a factory environment, there is no standardization, a century’s worth of equipment iterations, and each piece of equipment is performing its own specific process.”

“It is not just an issue of ‘more’ maintenance personnel, it is also an issue of existing personnel having the level of skill needed by employers,” says Kent State’s Goetsch. “Even when manufacturers are fully staffed with maintenance technicians, they face a number of problems. This includes longer equipment downtimes due to limited troubleshooting skills, decreased production and profitability due to downtime, limited or lack of preventive or predictive maintenance – resulting in ongoing breakdowns/problems, hiring of outside contractors to handle specialty fixes/problems, inefficient use of engineers and/or supervisors time handling maintenance tasks, etc. The critical skill gaps that are hindering manufacturers appear to be related to (a) root cause analysis and effective troubleshooting, and (b) advanced technology skills in electronics/PLCs.” **PTE**

Furthermore...

As the less-than-full-employment condition continues to fester right along with the ongoing skills gap dilemma, bad news continues.

According to a still relevant 2012 McKinsey Global Institute report, “The World at Work: Jobs, Pay, and Skills for 3.5 Billion People,” predicts a potential global shortage of 38 to 40 million high-skills workers in 2020 (13 percent of the demand for such workers) and 45 million middle-skills workers (15 percent of the demand).

But the report also includes mention of an idea long on promise but, to date, short on execution. It speaks of a coast-to-coast information “pipeline” to keep all involved and interested parties apprised of the latest employment news, needs, and developments:

“While both targeted training and education are necessary for closing the nation’s skills gaps, these efforts have minimal long-term impact when treated as isolated events. It is incumbent upon the entire pipeline to identify job openings and skills needs and work together to meet these deficiencies.

“The mid-skills gap in Middle America identifies four essential stakeholders critical to informing, funding, advocating for, and building successful public-private partnerships to enhance the skills pipeline: 1) Government (via policy decisions,

agencies and flexible mandates); 2) private sector businesses and industry associations, educational and training institutions; 3) (K-12 and two- and four-year colleges); and 4), non-profit intermediaries (Source: 2012 McKinsey Global Institute; ASTD).

What matters most is that everyone pulls from the same end of the rope.

Critical Workforce Development for U.S. Manufacturers

The Manufacturing Extension Partnership (MEP), within the National Institute of Standards and

Technology (NIST) and housed within the United States Department of Commerce, is tasked with helping small and medium-sized manufacturers — those with fewer than 500 employees — understand how investments in workforce development pay off and how to implement corporate training that helps them become successful high-tech innovators.

With support and encouragement from the highest levels of the U.S. Administration, MEP supports and encourages innovation and growth for small manufacturers, and collaborates with many partners, such as other U.S. federal agencies, community and technical colleges, manufacturing collaborations, and professional associations (2012 McKinsey Global Institute; ASTD).

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