Skills Shortage

Manufacturing's poor image has resulted in a severe shortage of skilled employees.

ANYONE WHO KEEPS UP with the news can tell you that manufacturing, once the bedrock of the U.S. economy, has been shaken, rattled, and rolled in recent years by globalization, "merger-mania," and plant downsizing. According to the 1993 *CIA World Factbook*, the United States alone accounted for 29 percent of global production. Last year, that figure had fallen to 21 percent.

But while we see the obvious fallout—such as massive layoffs in the automotive industry—there are other effects right below the surface that aren't as visible to the general public, yet threaten the future of U.S. manufacturing. A general lack of interest in manufacturing careers spawned, in part, by misconceptions about the field and a lack of training, both in schools and on the job, have resulted in a severe shortage of skilled manufacturing employees.

There's been publicity about the need for renewed emphasis on math and science in the nation's schools, but manufacturers also will need to make their companies more attractive to workers by increasing training investments. In addition, manufacturers and workers can take advantage of training resources that are being provided by community colleges, industrywide manufacturing technology consortia, and the vendors of manufacturing automation systems and software.

Manpower deficit

The National Association of Manufacturers (NAM) laid out the scope of the manpower deficit in its most recent *Skills Gap Report*, published last year. Of those manufacturers who responded to an NAM survey, 80 percent reported a shortage of trained personnel and 90 percent characterized the shortage as moderate to severe. In addition, nearly half of the respondents said their current employees lack basic employability skills, such as attendance, timeliness, and work ethic. About 46 percent reported that employees have inadequate problem-solving skills, and 36 percent said their employees lack sufficient reading, writing, and communications skills.

Stacey Jarrett Wagner, managing director of the NAM Center for Workforce Success, recalls that, in past generations, young people with or without high school diplomas could obtain good jobs in manufacturing and, in many cases, enjoy the benefits of lifetime employment.

"But manufacturing isn't about brawn anymore," she says. "It's about brains. You have to be able to communicate, to problem solve, and to work in teams, and you should know something about statistical analysis. These are things that, in the past, were considered higher order skills, but which now are baseline for any job."

By Dan Sussman

While large global manufacturers have been able to maintain their commitment to training through sophisticated learning strategies and corporate universities, the small- and medium-sized manufacturers that make up the biggest portion of the industry in the United States have had a more difficult time keeping their employees up to speed, according to Wagner.

"If you're a small manufacturer, you're barely scraping by in many cases," she says. "You're probably taking any profits and putting them back into the business. For example, between 2000 and 2003, there were large investments in technology, but there weren't necessarily investments in training workers in that new technology."

She also says many manufacturers have made the mistake of firing skilled, experienced employees, assuming that they simply could hire younger replacements when they were needed. But skilled, experienced employees are harder to come by than many companies had imagined, and only 13 percent of the respondents to the NAM survey said they provide employee training as a way to attract new workers.

Poor industry image

One reason capable young people are not being attracted to the field is manufacturing's unattractive image, say some observers. The Maricopa Skills Center in Phoenix—part of Maricopa County, Arizona's community college system—has offered a 600-hour manufacturing automation program for the past two years. However, interest has been limited.

Currently six students are enrolled in the course, which represents less than a third of the number that course instructor Larry Geczy would like to teach. Part of the problem is perception. Manufacturing's unattractive image persists, says Chris Liberti, who directs marketing for the skills center.

"When we started the automated manufacturing program, we asked students what they thought of when they heard the word 'manufacturing.' Sure enough, the answers that came back were things like, 'sooty' and 'dirty,'" he says.

The Maricopa program more accurately represents the current state of manufacturing, however. The spacious classrooms in which courses are taught are filled with computer terminals that reflect manufacturing as an industry increasingly driven by technology. Students are trained in supply chain management techniques and production scheduling using sophisticated manufacturing execution systems. Much of their work is carried out on a manufacturing simulation system—essentially a miniature factory with workstations to manage production scheduling, packaging, warehousing, and other typical plant functions. There isn't a speck of soot in sight.

Geczy, who created the manufacturing automation program following a long career with IBM, Motorola, and other technology companies, says he is frustrated with the bad rap manufacturing has acquired, but he is decidedly upbeat when it comes to threats to manufacturing's future in the United States. For one thing, he thinks that the perceived threat of outsourcing is misunderstood and somewhat exaggerated.

"The only manufacturing that is going offshore is in mature processes," he says. "Many of the things going abroad that people portray as innovative actually are replications of what we've done in this country."

Industry training

By focusing on innovation, the United States can strengthen its position in manufacturing, but doing so requires educating a new generation of manufacturing professionals, Geczy adds.

Training offered by businesses and schools are not the only educational options that manufacturing professionals have. Industry organizations dedicated to the spread of technological innovation are providing workers with some of the knowledge that they cannot get elsewhere. For example, representatives of some of the world's leading automation vendors and users banded together a dozen years ago to form the World Batch Forum, now simply known as WBF. The group was founded to promote the technologies behind batch manufacturing processes, which are commonly used in industries such as food processing and chemical and pharmaceutical manufacturing. WBF holds annual conferences that feature numerous presentations as well as formal classes in a number of manufacturing technologies. In addition, WBF offers web-based seminars and presentations that members can attend.

Lynn Craig, a manufacturing consultant as well as a founding member and officer of WBF, says that industry technology organizations play a vital role in training manufacturing engineers because colleges no longer do an adequate job at the undergraduate level.

"If you go to the universities, they teach a lot of the technical, process-oriented stuff to students, but that's only a small part of what they have to know to work in manufacturing today," Craig says, explaining that manufacturing engineers and operators have to know how manufacturing fits into the entire supply chain, which extends from suppliers to customers. They also must understand how production relates to other manufacturing functions such as quality control, lab analysis, and shipping.

"When you couple that lack of education with the

fact that young engineers don't want to go into manufacturing much anymore, you have a problem. We're trying to let the younger engineers who are interested know what they're dealing with."

Craig acknowledges, however, that his organization and other technology groups need to improve the ways in which they deliver training to members.

"Let's face it: WBF is a bunch of engineers, some of whom can teach, but others can't do it well. We've got to formalize the way we deliver training so we can spread it. But so far, we haven't had the resources to award continuing education credits, and that's something that industry is looking for," he says.

While groups like WBF provide general training in manufacturing concepts, many major automation system vendors have sophisticated training units to ensure that users are well-versed in vendor technologies and products. One example is Honeywell's Automation College, which provides training on the company's control systems and software.

In the past, most training took place at a small group of Honeywell facilities around the country. The trend today is toward delivering onsite training to customers, says Kathy Meredith, who directs the college. She explains that customers used to send a handful of employees to automation college for training and that those employees would train others once they returned to their workplaces.

"But many of those companies don't have the same resources they used to have, so they look to us to train everyone who needs it at their sites," Meredith says.

Despite fears about the state of manufacturing and the readiness of the workforce, there is cause for optimism. According to NAM, manufacturers' investments in training are on the upswing, with 50 percent of its respondents reporting a stronger investment in employee training compared with three years earlier. About 44 percent reported that spending was about the same, and only 6 percent said it had decreased. In addition, says Wagner, organizational culture has shown up near the top of respondents' list of most important factors in attracting new employees. One aspect of that culture is the provision of ongoing training and development, which employees can use in their current positions or in future ones.

"Manufacturers are starting to realize that a welcoming workplace is part of the equation," says Wagner. TD

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