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Workers Not Included



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In Lights-Out Factories Machines Still Make Things Even When No One Is There

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IT'S THE STUFF of fairy tales: Every morning workers at a plastics plant here owned by ABA-PGT arrive to find boxes filled with gears that were made overnight as they slept.

Of course, elves have nothing to do with it. Fourteen giant injection-molding machines worked in the dark, forming gears used in such things as lawn sprinklers and computer printers, and dropping them into boxes waiting on conveyor belts. Workers at the closely held company come in, collect the finished parts and prepare them for delivery.

Something similar happens at closely held Evans Findings Co. in East Providence, R.I., where metal-stamping machines that make parts, such as the tiny cutting devices mounted on dental-floss containers, run without people for one shift each day. There, the company's goal is to do as much as possible with no labor.

Faced with the need to raise productivity to survive, especially against low-cost competitors, in such nations as China, more companies are pushing toward so-called lights-out manufacturing. Once a science-fiction dream, the phenomenon is emerging in plants and factories throughout the U.S. as machines become more reliable in making flawless parts on their own. New computer technologies also have broadened possibilities by linking plant equipment to the Internet where supervisors can check operations at any time and from any place; even do repairs from a distance.

Injection molding machines crank out plastic parts without human workers there to supervise at ABA-PGT's plant.

Air Products & Chemicals Inc., an industrial-gas maker in Allentown, Pa., calls its lights-out system, "unattended operation with remote access." The company no longer needs full-time operators at its many small plants that produce gases fed directly into larger, neighboring factories, such as steel mills. Instead, the company's machines send a signal to alert operators miles away when a motor overheats or a valve sticks. Safety systems automatically shut the plant down if a problem poses imminent danger.

An operator working from home and assigned to monitor several plants scattered in his region first will try to fix the problem from a computer at home by sending signals through a telephone line

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to restart processes, just as the operator would from inside the plant's control room. If that fails, the operator then drives to the site to fix the problem.

"We can leverage one individual over a large geography this way," says David Fritz, general manager of North American product supply. Air Products' gas plants never had large payrolls — at most, a few people on each shift. But in this industry, Mr. Fritz says, savings from operating with fewer people are crucial to be competitive.

Many early efforts in the 1970s and 1980s to develop completely automated factories were a bust. Samuel Pierson, ABA-PGT's president, first tried building a lights-out operation in 1974 by partitioning off part of his factory with two machines running unattended. But he soon decided the technology wasn't ready. Machines couldn't continue for hours making parts precise enough to sell.

Then in 1993, while attending a plastic-equipment show in Chicago, he saw a new generation of injection molding machines capable of producing consistently good parts. However, rather than create a lights-out section in his existing operation, he built a separate factory entirely dedicated to it. Mr. Pierson says he didn't want people fiddling with the machines. "People develop a lot of ways to keep things going, rather than fixing the underlying problem that broke down the process to begin with," he says. It is better to come in the next morning, find a broken down machine and figure out the root cause.

Increasingly companies are adopting lights out with a gradual approach. For instance, a portion of a plant may run unattended, with the rest of the facility staffed. Or a factory may staff one shift, then run the next shift with just machines. At Evans Findings, only machines have worked the second shift from 3 p.m. to 10:30 p.m. since the beginning of this year.

"The future of manufacturing for me is doing it whenever possible with no labor at all," says Pete Evans, the fourth generation in his family to head its 73-year-old business. By expanding lights-out manufacturing, he expects to double output in the coming two years without adding to his 49

workers. His ultimate goal is to make between 30% and 50% of his products using lights-out manufacturing — compared with about 5% of his products today.

Mr. Evans says lights out has become more difficult in recent years, because customers are more demanding, which means machines must be even finer tuned. Previously, customers may have accepted parts with slight flaws or that don't exactly meet specifications. Today they don't. So to expand his lights-out operations, he is investing \$1 million to upgrade equipment and improve training.

Manbir Sodhi, a professor of industrial and manufacturing engineering at the University of Rhode Island, Kingston, who has studied lights-out operations, says economics and improving technology are certain to drive its growth. Yet it still has kinks to work out. Mr. Sodhi recalls recently visiting one small machine shop where lights out worked fine for a while. But then the company received an order to make parts out of a costly alloy. One night, one of the dies used to bend the metal broke when nobody was in the plant but the machine wasn't equipped to alert managers about the breakdown.

"They came in and found things all over the floor in the morning," Mr. Sodhi says. "Their quarterly profit went down the tube in that one night."

In a lean economy, many companies are nervous about trying lights-out manufacturing because of the financial risk and fear that it will rile already-fretful workers who feel it threatens their jobs. Yet, most companies now don't see lights out as eliminating people entirely. Steve Ward, general manager of International Business Machines Corp.'s global industrial sector, concedes that in the 1980s he and other managers at IBM envisioned a point where no people would be needed to assemble things such as computer printers.

"But as we've worked on it, we began to realize that to get the last person out cost a ton of money." By instead spending that money on other efforts — such as designing products so they are easier to assemble — the company is getting much more benefit, Mr. Ward says.