

Robots Already Make Windows; Can They Install Them, Too?

by Trey Barrineau

Robots have been automating door and window manufacturing for several years, but now similar technology is being applied to the installation of fenestration products in modular homes. Future improvements in this area could ease the labor strain in the construction industry, which is struggling to attract skilled workers.

A labor shortage isn't the only problem in construction, however. The industry has long struggled to embrace technological innovation, causing productivity to suffer.

According to a February report from the McKinsey Global Institute, productivity in manufacturing, retail and agriculture has grown by as much as 1,500 percent in the U.S. since 1945, but it's only risen by about 1 percent a year in construction during much of that same time period. Globally, if construction productivity could catch

up with other sectors, the industry's value could rise by \$1.6 trillion a year, the report says.

Cue the Robots

Blueprint Robotics in Baltimore runs an assembly-line operation that builds modular (also known as manufactured) housing, a segment that's matured far beyond the old stereotype of mobile homes and shoddy construction.

The market is growing, too. U.S. demand for manufactured housing is forecast to reach 85,000 units in 2020, according to a study from the Freedonia Group, an industry market research firm in Cleveland, Ohio.

Today's modular homes are nothing like trailers; in fact, they're often indistinguishable from stick-built homes. And the term "modular" covers a huge range of construction nowadays. Blueprint cranks out everything from

multifamily units and hotel rooms to mansions that sell for millions. And they're fast, too — the company says it can reduce total time on a multifamily project by 30 percent.

The Fenestration Connection

Inside Blueprint's facility, walls for modular homes are put together along a robotic assembly line. The company says it can produce 40 linear feet of framed wall in about 11 minutes. Robots then precisely cut the rough openings for doors and windows. After adding drywall, insulation and siding, a pneumatic gantry picks up the doors or windows, places them in the pre-framed and cut openings, and secures them in place. Carpenters in the factory then complete the fastening and flashing.

Could Blueprint's robot-assisted window installations be used in the field? It's possible. Several robotic devices are already there, including Hadrian, a masonry robot that can lay 1,000 bricks an hour.

However, it might be well into the future before robots do detailed work such as installing flashing around windows.

"It's going to be a long, long time before we see humanoid robots strutting around construction sites, but we are seeing slow progress in the automation of some isolated construction and maintenance processes," said Mic Patterson, director of strategic development for Schuco-USA.

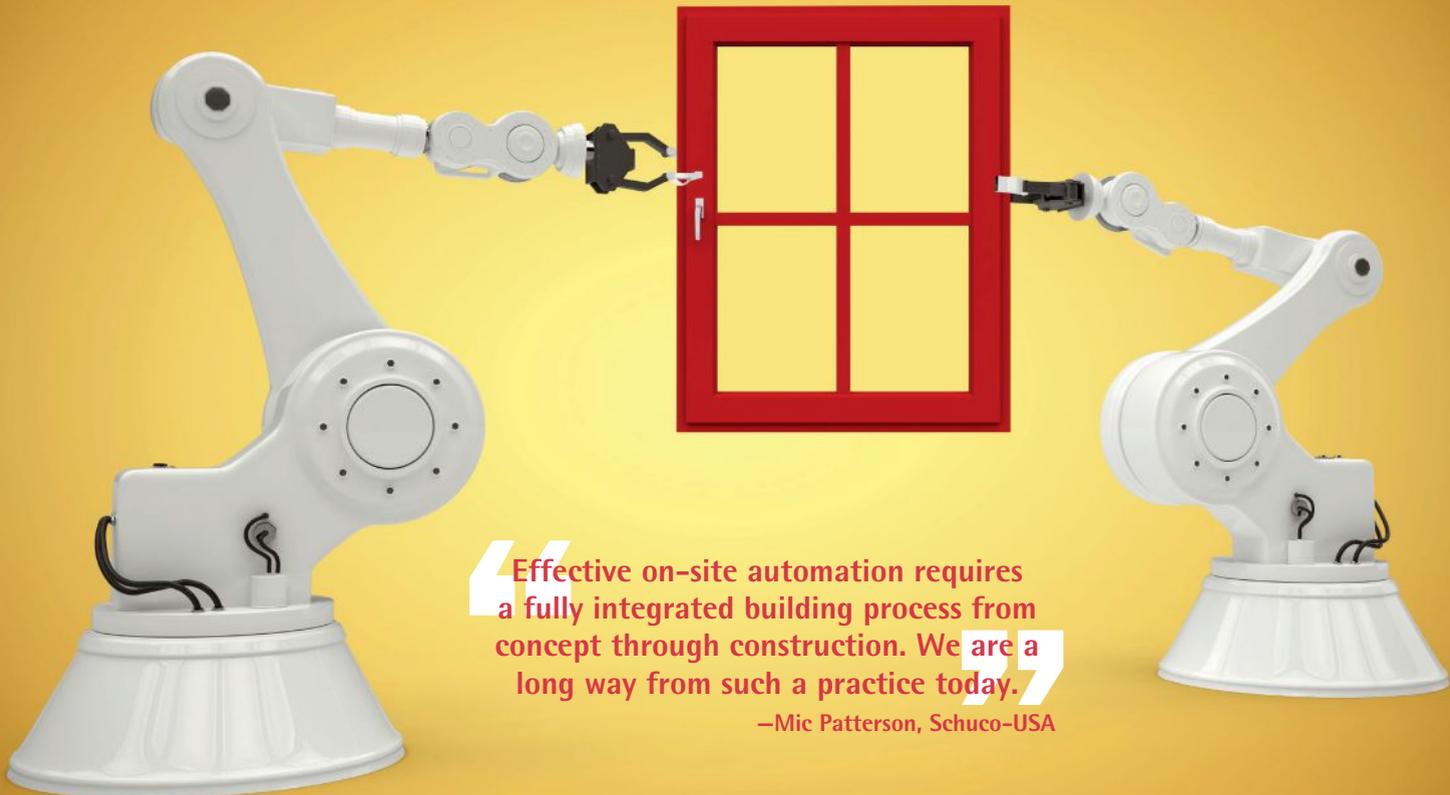
Patterson said one problem is that building construction is a process, "and in its current (rather fragmented) form it doesn't lend itself particularly well to automation."

Other Technologies to Watch

Robert Bono and Stephen Pillsbury, who wrote the *2016 Industrial Manufacturing Trends Report* for business consulting firm PWC, urged manufacturers of windows to keep an eye on these trends, too:

Augmented reality. Advances in computer vision, computer science, information technology and engineering have allowed manufacturers to deliver real-time information and direction at the point of use, according to Bono and Pillsbury. In this "augmented reality," users "simply follow the text, graphics, audio, and other virtual enhancements superimposed onto goggles or real assemblies as they perform complex tasks on the factory floor." These tools can assess the accuracy and timing of these tasks while simultaneously notifying the operator of quality risks.

3-D printing. The technology "is still in its infancy," the report reads. "But companies must begin planning for the incorporation of this technology now. As an initial step, industrial manufacturing companies should apply 3-D printing technology to the product development and prototyping process, where its speed and flexibility can spur innovation and reduce time-to-market."



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—Mic Patterson, Schuco-USA

“Products must be designed for efficient automated assembly, and buildings are no different,” he said. “To really optimize the potential for on-site automated construction, we need to rethink the entire building process starting with the design of the buildings themselves, the materials used, the design of components and products—taking maximum advantage of smart, offsite pre-assembly and prefabrication strategies—and finely tune all to facilitating very specific and detailed strategies for automated onsite assembly. In other words, effective on-site automation requires a fully integrated building process from concept through construction. We are a long way from such a practice today.”

Automation in the Factory

While robots are still relatively rare in door and window factories, automation isn't. But when it comes to manufacturing, growth is accelerating in this area, mainly because the industry is grappling with the same labor issues as construction.

That's why more fenestration companies are adopting enterprise resource planning (ERP) solutions, said Matt Batcha of FeneTech's business development team during a recent presentation to an industry

gathering. This involves automating the entire production process and eliminating what he calls “islands of automation,” or the automation of only certain processes in a facility. Many of these solutions can integrate with robots.

“A well-run, well-executed plan on the front end can make all the difference in the world when it comes to overall satisfaction and productivity after an ERP system is in place,” said Brant Olson, sales technician and fenestration ERP expert at WTS Paradigm. Olson was a presenter at a recent industry panel in Canada.

Batcha says Industry 4.0, also known as the fourth industrial revolution, is here. It's transforming manufacturing by combining the miniaturization of sensors with advances in wireless Internet technology and applications. This is popularly known as the “Internet of Things” (IoT).

“Industry 4.0 brings two-way communications between machines and systems,” Batcha says.

The benefits? Efficiency, shorter lead times and lower costs thanks to automation and fewer workers.

As with any big decision, care and planning is needed when launching a fully integrated automation program.

“Investing in an ERP solution is very

similar to other capital expenditures in that it requires an understanding of the long-term value it will provide to the business,” said Olson. “The right ERP solution may come with a big price tag, but over the life of that system, it can make your operations more efficient.”

It seems inevitable that robots will play a bigger role with ERP systems at door and window manufacturers, too. However, today there are challenges.

“We're starting to see some of the larger companies using robots, but the hard thing is it's all about the programming,” said Jonathan Chauvette, the vice president of sales and marketing with Groupe Eugenie in Quebec. “The robots are very flexible, but there are a lot of challenges, because a lot of people programming them don't have the knowledge.”

Despite that, the industry seems anxious to put more robots to work.

“Many customers are asking us ‘What's next?’” said Joe Shaheen, director of sales and marketing with GED Integrated Solutions. “They'll ask ‘What other machines or processes can utilize a robot, or robotic technology to automate?’ ”

Trey Barrineau is the editor of DWM magazine. USGlass editor Ellen Rogers contributed to this story.