Rise of The Machines? For Construction, Not Yet.

Written by: Matthew Thibault, Associate Editor, Construction Dive

ROBOTS' PROMISES OF SAFETY AND PRODUCTIVITY ABOUND, BUT ISSUES LIKE IMPACT ON JOBS, ADDED COSTS, AND SPECIALIZED TRAINING HAVE KEPT MANY CONTRACTORS ON THE SIDELINES.

When it comes to construction technology, contractors adopt far slower than the rapid advances made.

Take a pre-marked jobsite. In the past, surveyors and expert tradespeople would have to go on a jobsite and note information, such as overall elevation, earth that needed to be brought in or moved, and the layout of the buildsite. Today, drones can capture that information, and robotics can deliver the layout, saving time, energy, and money.

However, only 55% of construction companies across the U.S., Europe, and China say they use robotics, compared to 84% of automotive companies and 79% of manufacturing companies, according to a survey commissioned by ABB Robotics, an arm of global tech company ABB.

Despite this slow rate of adoption, the construction industry stands on the brink of a robot revolution.

"I think things are really starting to pick up in the context of construction robotics," said Venkat Krovi, a professor of vehicle automation at Clemson University in South Carolina. "I think overall, it's really wonderful to see the industry interest in doing some of this."

Robot-powered jobsites are not an out-of-this-world fantasy,

far out of reach. Relying on tech-enabled machines to handle most of the demanding, dirty, and dangerous work on jobsites won't take decades of research and advancement to achieve, experts say. In fact, many predict that robots will proliferate U.S. jobsites within the next 20 years, with many saying as soon as five.

What Makes a Robot

Robots are tech that perform two functions: sense the environment and take in information, then use that information to make a decision, said Chen Feng, an assistant professor at New York University's Tandon School of Engineering.

Most of the robots working on jobsites today, include task-checking aids like drones, autonomous excavators, or exoskeletons that remove strain on humans lifting heavy objects or materials, Feng said.

But fully autonomous robots — what Feng jokingly calls "the Terminator stage" — are not close to becoming reality.

"There are a lot of things we think the robot can do. Robots are not at this stage," Feng said.

A Worthy Trade-Off?

For wholesale adoption across the industry, price can exclude smaller firms with smaller tech budgets, a fact even robotics makers acknowledge.

For instance, Brian Ringley, the construction technology manager at robotics company Boston Dynamics, said that any change to construction workflow creates "a little cost and disruption" and that smaller contractors would wait for the larger firms to move forward first.

Boston Dynamics created "Spot," a customizable quadruped robot that specializes in capturing data by walking around a jobsite. It doesn't bark or bite, but it can fetch photos of your jobsite and free up workers.

"For some of the newer mobile robots moving around on the site, they're going to wait until some of the bigger companies, that have bigger projects with bigger margins and bigger R&D groups, really improve and operationalize those technologies before there's mass adoption," Ringley said.

Boston-based contractor Suffolk uses Spot on its Massachusetts jobsites, where the 2-foot-tall robot is loaded with a 360-degree camera before walking a jobsite, taking photos, and eliminating the need for any human to do that task. Boston Dynamics told Construction Dive that the base Spot model starts at around $100,000.

"You can imagine Spot taking on that work and giving the project and commuters more time to spend with more senior level superintendents, project managers. And again, spending more time problem solving instead of doing that data collection," said Kelsey Gauger, Suffolk's director of operational excellence.

Adoption hesitancy also stems from the construction industry's infamous aversion to change. In December, a report from Dodge Construction Network detailed the hurdles that contractors often run into when attempting to implement a digital strategy, from hardware issues to a lack of a transformation roadmap.

An Asset To The Modern Jobsite

Robots can offer increased safety to workers, according to Feng. The robots could either help with, or entirely eliminate, the burdens of hard labor on the body by helping workers as they lift, such as through an exoskeleton, or through the robot doing the lifting on its own.

San Francisco-based robotics firm Canvas has developed a robot to do an arduous task: the mudding and sanding processes of drywall finishing. Hanging drywall overall is an incredibly demanding task, with the potential for back, arm, and shoulder injuries. Canvas' robot eliminates the need for a human to finish this part of the construction process.

Salt Lake City-based Sarcos Robotics has developed its Guardian XT unit, a robotic arm that an operator can control remotely to do dangerous tasks. Contractors can lease the unit at $5,000 per month according to an investor report. For instance, the robot arm can trim large tree limbs while a human remotely operates it.

Large contractors say they have benefited from leading the field in adoption.

DPR's Henning Roedel, the robotics lead for the Redwood City, California-based contractor, said the company has also taken advantage of the boost in production robots bring. DPR uses Dusty Robotics' layout robot, and Roedel said that the productivity has been a huge boon, performing the layout work six times faster than without the robot.

If a product aids safety, it will attract DPR's attention, but productivity will drive the bottom line and scale usage for the company, Roedel said.

San Francisco-based Swinerton has been putting the tech to good use. Aaron Anderson, director of innovation for Swinerton, said the builder had used Dusty's layout robot and Canvas'

drywall bot. Anderson said both solved industry-wide problems.

"We're really motivated toward finding ways to improve productivity to address a lot of the labor shortage issues, improve quality, all of that. And robotics is emerging as a way to achieve that," Anderson said.

Out Of A Job?

As robots fill more roles in construction, industry watchers wait to see if they will replace human workers on jobsites, something that some labor activists say can lead to lower wages and fewer jobs.

A 2020 study from MIT and Boston University professors found that for every robot introduced per 1,000 workers in the U.S., wages decline by 0.42% and the employment-to-population ratio drops by 0.2%. The research claims that this has led to the loss of 400,000 jobs to date.

But, at least one union leader has prepared for robotic partners on jobsites.

"We embrace evolutions in the construction industry, we don't fight them. And it's a very simple reason — we want to be not just ready for it, we want to be hopefully part of it," said Jay Bradshaw, the executive officer of the NorCal Carpenters Union. Bradshaw represents 38,000 tradespeople across 22 unions in Northern California.

"Since time immemorial, there's historical examples you could find easily enough of folks that have tried to stop evolution of technology in any industry," Bradshaw said. "And it never works out well for those organizations."

Bradshaw said that robotics training occurs in the union's Northern California Carpenters training programs, at places such as the Carpenters International Training Center in Las Vegas. The training continues with their apprentice and journey-level tradespeople, but Bradshaw acknowledged that it hasn't taken off quite yet.

However, some academics are dubious about whether the future of employment and robotics can even be predicted.

"I think the [labor] situation is complex, no one can say for sure," said Juan De la Fuente, a visiting assistant professor at Chester, Pennsylvania-based Widener University.

He pointed to countries such as Germany and Japan, whose economies feature robots and people working alongside each other on the job. The countries rank No. 3 and No. 4, respectively, on the list of the world's most automated countries, according to the International Federation of Robotics. The U.S. is No. 9 on the list.

Where Are We Now?

The age of robotic advancement draws closer, experts agree, but timelines for when contractors can expect to see mass adoption vary. Most experts believe robots will become commonplace sooner rather than later. Others, however, make more conservative estimates.

"I think [5-10 years] is very optimistic," said De la Fuente. "It's just not about creating the technology. It's about making everyone else feel okay with the technology being in the workplace."

De la Fuente said he expected the industry's current, slow movement on robotics would pick up soon, and predicted widespread adoption within the next 20 years.

For Bradshaw and his workers, being there and being a part of the robot-assisted future is the ultimate goal. He brought up the invention of the automobile, and how even if buggy makers got angry and wrote to Congress, that wouldn't change anything.

"The automobile was coming, no matter what," Bradshaw said.

About the Author

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