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5 WAYS ROBOTICS IS ADVANCING CONSTRUCTION ON THE JOBSITE

Learn how emerging technology is shaping the way construction work is done on the jobsite.

5 ways robotics is advancing construction on the jobsite.

Digital disruption within the construction industry is a topic of broad interest right now, with players from around the world trying to solve the industry's most complex problems. The industry has also seen a rapid advancement in hardware available to project teams, with the cost of 360 cameras and 3D laser scanners dropping significantly. Alongside this advancement in the construction technology space, one development stands out as being particularly game-changing: *Construction Robotics and its applications in the field.*

Digital disruption on the jobsite.

Digital disruption.

Robotics in the construction industry is not an entirely new concept, with advancements in manufacturing, prefabrication, and logistics in the last few decades. However, perhaps the most disruptive advancement we see in the industry is deploying robots on jobsites and tasking them with highly repetitive, dangerous, or tedious tasks.

In the following, we highlight five ways robotics is advancing construction on the jobsite. As with any sector, the construction industry is highly fragmented and the cost of implementation is a factor in wide-scale adoption. Robotics requires an initial capital investment and training for operators.

Perhaps even more significant is overcoming the cultural aversion to embracing robots. The construction industry will need to change the perception of robots as a threat to jobs and position them as another tool in the toolbox.

1

Capital Investment

As the cost for robotics drops, the more robot technologies will be adopted for specific use cases. For example, in the mid-1960s a state-of-the-art, calculator cost in excess of $2,000.

2

Operator Training

Effective collaboration between humans and robots is essential for successful adoption. Use of robots in construction requires unique skills that employers will need to actively invest in.

3

Cultural Acceptance

Robots are not meant to replace the experience or skill of a tradesperson -- they are meant to automate repetitive tasks and enhance quality. Widespread adoption will require a change in perception.

Translating digital designs into jobsite layout.

The use of robotics on the jobsite has the potential to greatly increase the quality of construction and aid trade workers in handling dangerous, repetitive, or complex tasks. From translating an architect's design into physical reality to tracking construction progress and improving jobsite safety - leveraging emerging technology is smart business.

Automating building layout using robotics to improve accuracy and increase efficiency.

The Dusty Robotics team is developing tools to automate the construction layout process. Their product aims to increase efficiency and accuracy in laying out architectural plans and mechanical elements before installation.

Increased accuracy in this realm can reduce rework from inaccurately installed building elements and save time and resources as the traditional process is highly manual and labor-intensive.

Another example comes from Leica Geosystems whose iCON iCT30 Construction Layout Tool offers high-performance construction layout construction layout applications.

One of the primary benefits is that a single operator can do the work of two people to layout lines for foundation, structure and exterior building applications along with interior drywall and insulation.

Building walls & structural elements.

3D concrete printing has been developed by UK-based ChangeMarker 3D and materials specialist Versarien.

The technology, called 'Printfrastructure,' is set to be used by builders working on the London tunnels. Computer-operated robots will print the concrete structures on site instead of precast units manufactured offsite and delivered for installation.

Another example comes from Branch Technology who offers a patented 3D printing process called Cellular Fabrication, C-Fab®.

This unique printing method allows material to solidify in open space, creating a matrix of polymer in virtually any shape. Moreover, this new technology gives architectural designers unprecedented freedom to create next-generation wall systems.

Preventing structural deterioration.

Recent research demonstrates how hyperspectral cameras and full-waveform laser scanners could soon be used to inspect the water content of concrete during construction. This is one example of how technology can improve the quality of completed construction.

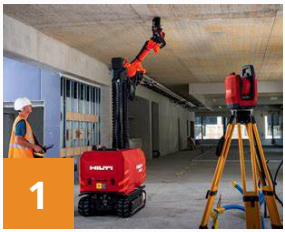
Automating repetitive tasks on the jobsite.

Repetitive tasks.

Construction involves an untold number of repetitive tasks. Robots are automating these tasks in much the same way that nail guns eliminated hammer swinging in decades past.

The Canvas team has revealed a construction robot capable of elevating speed and quality with skilled site workers in the drywall finishing process. As a result, Canvas delivers a higher level of consistency in wall finish in automating this highly repetitive task across large-scale projects.

A semi-automated drilling technology, the Hilti Jaibot is a robot that takes over installation execution, while allowing contractors to track project progress through data. Using digital plans, the Jaibot marks and drills holes, relieving construction workers from the strenuous task of overhead drilling.



1

Drilling

A semi-automated drilling technology, the Hilti Jaibot is a robot that uses digital plans to mark and drills holes, relieving construction workers from the strenuous task of overhead drilling.

2

Drywall Finishing

The Canvas team has revealed a construction robot used for drywall finishing. In the hands of a skilled operator, the quality, speed, and predictability of finished work is enhanced.

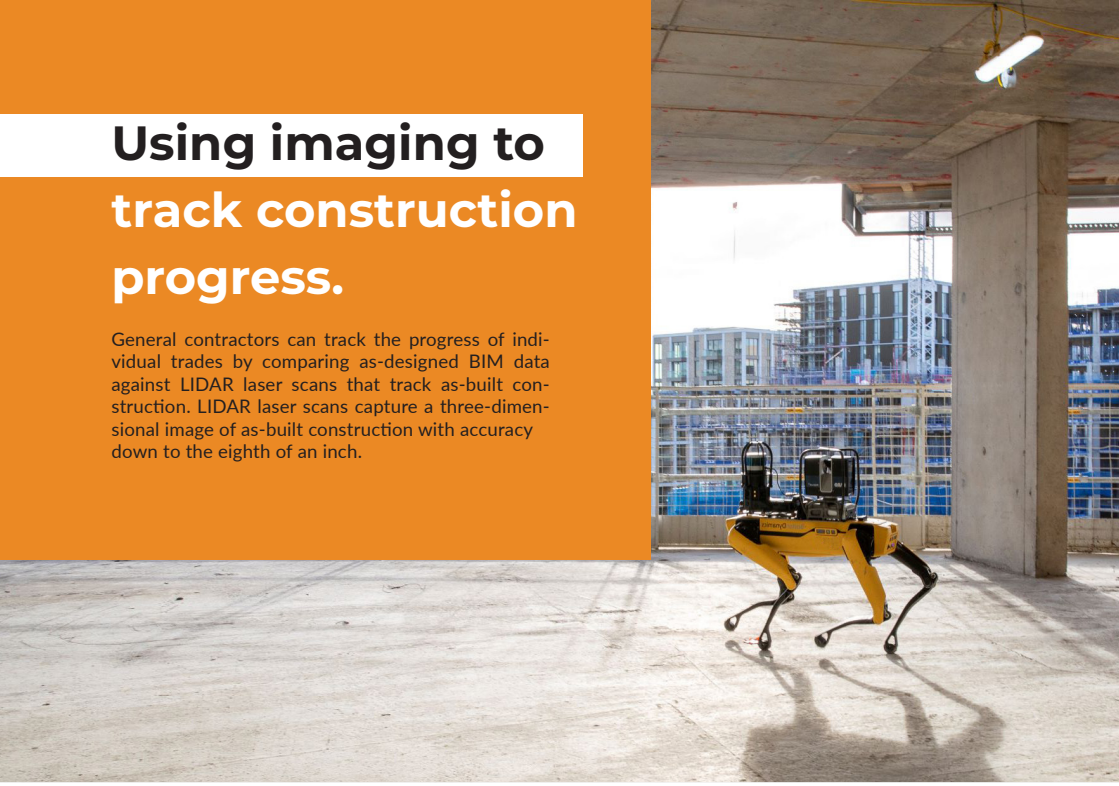
3

Woodworking

A FANUC robot sands a cabinet door with more precision than a human operator. Using robots to complete repetitive tasks frees up skilled tradesmen to focus on work with a higher ROI.

Using imaging to track construction progress.

General contractors can track the progress of individual trades by comparing as-designed BIM data against LIDAR laser scans that track as-built construction. LIDAR laser scans capture a three-dimensional image of as-built construction with accuracy down to the eighth of an inch.



Tracking construction progress to measure deviation and prevent costly rework.

The Boston Dynamics team has built Spot, their autonomous jobsite robot that can host various payloads to service jobsite tasks, including laser scanners and 360 cameras for automated site documentation.

Taking the field capture work off the plate of field staff will allow project teams to allocate their resources to more critical project management tasks.

Robotics implemented in Reality Capture workflows, whether drones capturing 360 site photographs or the Boston Dynamics Spot robot traversing the site with a laser scanner have been some of the most exciting advancements in this space.

When partnered with the right applications, these autonomous site capture technologies offer many benefits, from increased productivity, safety outcomes, and even overall project outcomes.

For example, see the Swinerton case study, where autonomous site capture has been paired with the Avvir platform to automate the analysis of work in place against the BIM model to track costs, schedule, and quality.

In addition, such applications reduce the overhead hours typically allocated to tasks like scanning and site documentation, allowing project teams to focus on more critical tasks to keep their project on track.

Improving jobsite safety.

Improving Jobsite Safety through automated survey, surveillance, and inspection.

Safety is a contractor's number one priority. It is estimated that every year 4.6 million preventable injuries occur on the job site.

By deploying a robot to conduct dangerous survey work instead of a human, we can greatly reduce exposure to harm and prevent injuries.

Inspecting projects while they are under construction presents a host of hazards from operating at heights or inspecting the clean-up effort after a chemical spill.

Boston Dynamics' Spot robot is used on construction sites for, among other things, surveying and inspecting projects. It's the construction crew's version of the bomb-squad but built for the jobsite to use robotics in dangerous and unsafe conditions.

Another example comes from Skydio who sells custom drones designed specifically for inspecting construction projects. Skydio drones can navigate under structures that block GPS signals and see 90 degrees up and down, making them the ideal solution for dangerous bridge inspections.

Safety First

Eliminating the "Fatal Four" causes of construction accidents would save 582 workers' lives in the United States each year. This includes falls, electrocution, getting caught in-between objects and being hit by falling objects. - osha.gov

Reducing Risk

Statistically, every construction worker will face at least one work-related injury in their lifetime. Robots represent a fantastic opportunity to supplant the risky work done by humans with robotics technology.

Automating the future of construction.

The use of robotics on the jobsite has the potential to greatly increase the quality of construction and aid trade workers in handling dangerous, repetitive, or complex tasks. Contractors who can overcome cultural aversion to adopting new technology stand to significantly improve their tool set.

Automating building layout using robotics to improve accuracy and increase efficiency.

The global market for construction robotics represents a huge opportunity for developers and suppliers. The construction robot market is expected to reach USD 166.4 million by 2023 from USD 76.6 million in 2018, at a CAGR of 16.8% between 2018 and 2023.

This growth can be attributed to enhanced productivity, quality, and safety due to the implementation of construction robots and growing urbanization worldwide.

As the construction technology market evolves and grows alongside new technological innovations, robots could soon become commonplace on our job sites. As a result, general contractors and developers alike are starting to lean into the technology and startup space more aggressively, running partnerships and pilot programs across their portfolios to test new solutions and evaluate their outcomes.

Construction Robotics in the field offers considerable advancement in efficiency and safety protocols as robots can perform tedious, repetitive, and dangerous tasks, allowing site personnel to focus on the bigger picture and keep their projects on track.

Additionally, utilizing robotics to continuously monitor and record your jobsite conditions offers insights into project status, progress, and quality on an entirely new level. When paired with a platform like Avvir, this information can be contextualized, shared across your project team, and, most importantly, acted on.

Leveraging Construction Robotics in the field stands out as a significant leap in the automation of construction jobsites.

Automation and digitization are driving a revolution in the construction industry, which has historically been slow to adopt new technologies. From design through final inspection and maintenance, the benefits of construction robotics are opening a new frontier of exciting opportunities.

About Avvir

Avvir is reshaping the way project owners and their general contractor partners manage construction progress. Contractors can track the progress of individual trades by comparing as-designed BIM data against LIDAR laser scans that track as-built construction. LIDAR laser scans capture a three-dimensional image of as-built construction with accuracy down to the eighth of an inch.

The Avvir platform includes *Avvir Progress*, *Progress 5D*, and *Avvir Inspect*.

- Focus on solving issues, *not finding them*.

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