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Construction industry tinkers with wearable technology to improve safety, cut costs



A construction worker wears Triax Technologies' Spot-r Clip, a wearable sensor device that detects worker falls and other potential hazards on a job site. PHOTO CONTRIBUTED

BY NATALIE MISSAKIAN
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When it comes to danger in the workplace, few jobs are more treacherous than those on a construction site.

Of the 4,674 private-sector workers who died on the job in 2017, one in five were in construction, according to Occupational Safety and Health Administration statistics.

The way Dennis Mullen, New England safety director for Gilbane Building Co., describes it: "Everything we work with is either hard, hot, sharp or heavy."

Add in the fact that much of the workday can be spent high above the ground or around high-wattage power tools and heavy machinery, and the chance of an accident is even more likely.

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To mitigate those risks, a growing number of construction firms are experimenting with wearable technology and the internet of things to enhance their workplace safety efforts.

Construction's "Fatal Four"

Out of 4,674 worker fatalities in private industry in 2017, 971 or 20.7 percent were in construction, according to the Occupational Safety and Health Administration. The leading causes of private-sector worker deaths in the construction industry are known as the "Fatal Four" and they include:

Falls — 381 out of 971 total deaths in construction in 2017 (39.2%)
Struck by object — 80 (8.2%)
Electrocutions — 71 (7.3%)
Caught-in/between* — 50 (5.1%)

*This category includes construction workers killed when caught-in or compressed by equipment or objects, and struck, caught or crushed in collapsing structure, equipment or material.

Source: Occupational Safety and Health Administration

From trackable clips that can detect falls and help first responders locate injured workers, to hazard-and-fatigue-sensing smart helmets, to bionic exoskeletons that absorb the burden of heavy lifting, wearables are catching on in the construction field. And it's only a matter of time before some of the best technology goes mainstream, experts say.

"I don't think it'll be very much time at all, because safety is so important to everyone," said Nancy Greenwald, executive director of the Construction Institute, an industry association and think tank based at the University of Hartford.

Right now, larger construction firms like Gilbane — with bigger budgets and more resources — are taking the lead in piloting some of the newest technology, and the industry's eyes are on them, Greenwald said.

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“Once its proven to work for them, others are going to start using it,” she predicted.

John Butts, safety liaison for the 300-member Connecticut Construction Industries Association, said many of his organization’s members have shown interest in wearable technology but are taking a wait-and-see approach.

“It’s in the infancy stages and I don’t think they’ve got enough data to go on,” Butts said. “Companies are going to have to be convinced that it’s going to save them money [in workers compensation and insurance costs] and that it’s going to make their workplace safer.”

Connecticut has been on the frontlines of studying the trend thanks to a partnership between Gilbane, property-and-casualty insurer Travelers Cos. and Norwalk-based startup Triax Technologies, which specializes in cloud-connected wearables for the construction industry.

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Triax has developed a wearable device, called the Spot-r Clip, which attaches to a worker’s waist belt and monitors their location as they move around a job site.

Gilbane began piloting the technology on a dormitory project at Fairfield University two years ago, and now is using it on about a dozen job sites nationwide, including a school construction project in South Windsor, Mullen said.

Last year, Travelers began working with Gilbane to evaluate the technology and its potential safety benefits. The company hopes to use what it learns to help construction firms reduce their risk, which can ultimately lead to lower insurance costs.

“There are a lot of different [wearable] companies out there touting their technology, and we want to be able to help our customers determine what’s right for them,” said Casey Banks, Travelers’ senior regional risk control consultant. “Even though we can’t give them a specific cost-benefit analysis, we can help guide them in the right direction.”



Ian Oullette, Vice President of Product, Triax Technologies

The Spot-r Clip has a sensor that can detect a fall — the No. 1 cause of construction-site deaths — and send a notification to supervisors. Meanwhile, a push-button alert or "panic button" lets employees flag potential hazards, like a broken guardrail or loose scaffolding, or report injuries in real time, explained Ian Oullette, Triax's vice president of product.

Another feature is a high-decibel emergency evacuation alarm, which can be sent to the devices via computer or smartphone. Oullette touts the technology as more efficient than traditional protocol, which he said usually involves "someone walking around with an airhorn on-site and blasting it."

Through the system's web dashboard, he said, managers can instantly determine which workers have made it out safely as well as the location of anyone still left inside.

"So, when the first responders show up, they're not guessing where the people are and searching — they're seeking," Oullette said. He said the system was recently used successfully to rapidly clear a steel-beam-exposed vertical high-rise site after a thunderstorm rolled in unexpectedly.

Although the full benefits of the technology are still being evaluated, Mullen said it is already helping Gilbane identify and eliminate risky behaviors. He pointed to one worker, flagged for having an unusually high number of two-foot falls, who had actually been jumping down from an elevated foundation wall while traversing a job site.

"Even though it's only a couple of feet, those are the kinds of things that can result in an injured knee or a twisted ankle," Mullen said. "It's an opportunity to go and coach that person and help them figure out a safer way of getting from point A to point B."

Other wearables, such as strength-enhancing exoskeletons or lumbar monitors, aim to prevent fatigue, pain and soft-tissue injuries that can occur with repetitive physical labor, said Mike Ferry, chief safety officer for Torrington-based O&G Construction. His company recently piloted an exoskeleton technology, the Ekso Zero G, to chip concrete on a bridge-replacement project in Newington.

The mechanical arm, which attaches to scaffolding, can bear the weight of a 30-pound power tool and absorbs the impact of the chipping. Using the arm, a single worker finished the job in four hours when it normally would have taken two people two days, according to Ferry.



"It's really grueling labor," he said.

Buy-in challenges

Despite some early successes, cost is still an obstacle for many companies, industry officials say. (The Spot-r system costs $100 per clip, but the network fee varies based on the project scale and complexity of the job site, according to Oullette.)

Another challenge is getting buy-in from senior management and workers. CCIA's Butts said many smaller firms lack the personnel to effectively analyze the information captured by the wearables.

"It's one thing to adopt it, it's another thing to manage it. So you can collect all this data, but what are you going to do with it?" he said.

While some workers are initially wary about putting on a tracking device, education and training usually eases any "big brother" fears, Oullette said.

Triax's wearables leverage RFID (radio frequency identification) technology, not GPS, so it only monitors a worker's general wearabouts within a job site's footprint. "We're not tracking you down to the foot," Oullette said.

Gilbane's Mullen said most workers accept the technology once they "have an understanding of why you're doing it."

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