



Safety

How Virtual Reality Is Making Real-World Workplaces Safer

James Langford | Oct 19, 2023

There's nothing like experience to prepare workers for tackling hazardous tasks safely, whether they're in manufacturing facilities or offshore oil-drilling platforms.

The challenge for U.S. industry has been finding a way to provide opportunities for untrained employees to gain that kind of experience without exposing them to potentially *life-threatening hazards*.

Virtual and augmented reality technology—the kind behind consumer devices like Google Glass and Meta's Quest headsets—is offering an answer, bringing employers as close as they're likely to get to reality-based instruction without the risk.

"For many jobs and situations, training has long offered an unappealing choice between easy but ineffective, or effective but expensive" and hazardous, the consulting firm *Deloitte explains in a report*. "Virtual reality promises a third way: a method of training that can break this trade-off of learning and providing effective training in a safe, cost-effective environment."

Impact of Industry 4.0 Tech

Virtual reality, which uses video headsets and sensors to immerse users in an artificial three-dimensional environment, and its cousin augmented reality, which uses video screens to overlay digital data onto real-world surroundings, have both seen surging use with the expansion of *Industry 4.0* technology and *smart-factory* systems, and analysts say they're likely to grow even more.

Deloitte predicted in 2020 that sales of digital reality tools for public infrastructure maintenance, industrial maintenance, and logistics and package delivery management would double each year in the five years through 2024.

It's a trend driven by demand from corporate managers, their boards and regulators to leverage technological advances to make workplaces safer, reducing the risks of *job-related deaths and injuries* as well as the lost productivity and regulatory fines that can accompany them.

The payoff is evident in digital reality programs at companies from plane maker Boeing to utility giant Exelon and other firms. The benefits are particularly apparent in new-employee training, which costs an *average of \$4,129 per worker* across all industries.

Moving new employees into the field can pump up the price tag even more, given the risk that they'll make costly mistakes, potentially with expensive equipment, in unfamiliar situations.

The ability of virtual reality tools to lower that risk makes it "extremely valuable in jobs where exposure to dangerous situations is a daily occurrence," consulting firm PwC says.

Offshore oil-drilling platforms, for instance, can use virtual reality to replicate the workplace on land, preparing staff "to handle a variety of different scenarios before potentially experiencing them for real in the field," PwC explains.

When the Lights Go Out: Training Utility Crews

Exelon, the largest U.S. electric utility, realized the potential of the capability and decided to leverage it in safety training for crews handling power outages during high winds, snowstorms or other weather emergencies, according to a *Deloitte case study in late 2022*.

Previously, on-site training sessions could only be conducted in good weather, which made scheduling them a challenge.

Not only was virtual reality a perfect solution to that dilemma, it also allowed workers to go through the physical steps of powering down high-voltage equipment before working on it, helping to build muscle memory that's invaluable in settings such as electrical substations, where simply touching the wrong device can subject workers to a powerful shock.

"If workers do it in virtual reality, it becomes a habit so that when they get out in the field, the proper actions are automatic," Elizabeth O'Connor, Exelon's vice president of customer information technology, explained in the case study. "We view safety as paramount. We don't want people getting hurt, so we'd rather them make a mistake in virtual reality than out in the field."

Another example of digital reality's potential benefits to industry comes from Boeing, the manufacturer of commercial airliners and defense planes, which used an augmented reality headset to buoy efficiency as well as safety when *converting 767 jetliners* to refueling tankers for the U.S. military in 2017.

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Deloitte

The job required significant rewiring on the aircraft's lower deck, Boeing said, and the confined environment forced electricians to find enough floor space to lay out printed schematics, memorize the new configurations, then return to their work area and complete as much as they could before consulting the blueprints again.

At the same time, machinists were working in the 767s on projects that sometimes required removing sections of the floor, heightening the risk for everyone on the aircraft of falls, trips, cuts and head injuries.

Adopting Microsoft's HoloLens headset—a digital reality tool designed for businesses—simplified the job by allowing electricians to safely view 3D schematics and safety messages in their headsets while still seeing their surroundings clearly, Boeing said.

Regulatory Limbo

Despite its successes, however, digital reality remains a developing tool. While some of its potential benefits are still unknown, so are possible drawbacks.

Governmental regulations typically lag developments in corporate and consumer marketplaces alike, and the U.S. Occupational Safety and Health Administration hasn't yet clarified the extent to which businesses can rely on digital reality tools to comply with its training requirements.

When and where their use is sufficient to replace traditional training methods is determined on a case-by-case basis, the agency said in an *interpretive letter* in 2020.

"Employers need to examine the standards applicable to their workplaces and determine whether the training tools (such as online or virtual reality) they are using advance their employees' overall comprehension and understanding of workplace hazards," the agency said.

Businesses themselves are also grappling with how to deploy the technology most effectively.

Parsons, a technology-focused defense, security and infrastructure engineering firm with 15,000 employees, leveraged 360-degree camera technology to develop realistic office and field environments that employees use during orientation, according to a *National Safety Council presentation*.

Trials of the program showed Parsons the importance of relying on subject matter experts when developing virtual reality content; determining which job roles and tasks would benefit most from virtual reality training and demonstrating a return on investment to boost leadership support, the company said.

The technology's most appropriate use may be in augmenting classroom learning and in-the-field instruction rather than replacing either one entirely, experts suggested in an article in *Safety + Health magazine*, a publication of the National Safety Council.

Virtual reality makes "an effective stopgap between our e-learning and our live hands-on learning," Dick Hannah, vice president of innovation and learning at the Houston Area Safety Council and a former corporate training director, said in the article. "I believe in the long term, virtual reality will become the norm and virtual reality headsets will be sent to offices to support training and career goals for workers. They can take virtual reality training that helps increase their abilities, on demand, at the point of need and at their convenience across the nation."

How could your workplace use digital reality tools to improve safety? Tell us in the comments below.

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