

Advancing Heavy Construction Safety with Technology

Safety is everyone's goal. Here's how to take it to the next level.



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Worker safety is a central pillar of any heavy construction contractor.

For good reason: Heavy construction consistently ranks in the top three industries worldwide for injuries and fatalities. The confluence of heavy traffic, large equipment, poor visibility, blind spots, pedestrians, uncertain communication, changing terrain and the ever-present push to meet project deadlines creates a working environment with a high risk for injury and even death.

In 2019, for example, construction accounted for about one in five worker fatalities in private industry. What makes the number even more startling is the fact that construction represents just eight percent of U.S. workers.

The push to reduce worker injuries will be coming into an even sharper focus as dollars from the \$1.2 Trillion Infrastructure Investment and Jobs Act begin funding hundreds of local, state and federal projects. It's no secret a contractor's safety record will often be a significant factor in determining who's in and who's out at contract award time.

This playbook examines the state of heavy construction safety and the opportunities—including the business impact—that a no-harm culture presents to heavy construction contractors. We'll also examine the growing role technology plays in deciding winners and also-rans in a competitive heavy construction marketplace.

For every company, the ultimate safety goal is the same: **Everyone goes home safe tonight.**



“Dynamic” heavy construction jobsites bring a range of risks

It's difficult to imagine a financial decision with more near- and long-term business benefits than a robust construction worker safety program investment.

Each \$1 invested into high-quality safety programs can save \$4 to \$6 thanks to the fewer illnesses, injuries and fatalities that will occur, OSHA findings reveal. The generous rate of return is explained by many factors, including:

- Construction-related transportation incidents continue to increase.
- The average cost of a construction injury is nearly double that of all industries (\$27,000 per injury versus \$15,000 for injuries across all industries).
- The Centers for Disease Control and Prevention (CDC) puts the average cost of an occupational fatality at around \$990,000, which includes medical expenses, worker's compensation and civil litigation. Add costs associated with the disruption to work, increased insurance premiums, worker replacement/training and attorney fees, and the actual expense soars well beyond the CDC estimate.

While the construction industry has made strides toward safer jobsites, more work is needed. Fatalities across all U.S. occupations have plummeted from about 38 per day in 1970 to 15 per day in 2019 (of which construction represents 20 percent of that number, or about three daily fatalities). The trend line for construction isn't as encouraging, however. In 2019 construction recorded just over 1,100 fatal injuries, according to the Center for Construction Research and Training.

“The heavy construction jobsite is a dynamic place. No two sites are alike. No two sections of a site are alike,” explains Brad Mullis, product manager at Leica Geosystems, a leading manufacturer of heavy construction machine control and safety technology. Mullis speaks from personal experience. His background includes stints as an occupational health and safety officer at heavy construction contractors in South Africa. “I’ve been at a construction site where there was a fatality,” he says. “It’s not something you ever want to see repeated.”



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BRAD MULLIS

Product Manager, Leica Geosystems





Can contractors close construction's safety gap?

No one disputes the need for continuous field safety education. Personal protective gear such as safety helmets, protective footwear, high-visibility vests, safety goggles, gloves and face masks are now even more prominent safety-first badges as a result of the pandemic's focus on personal health.

Early and often toolbox talks also remain a regular company feature, reminding everyone of all of the risks present on the job that day and sharing prevention strategies.

Not enough? According to a study, nearly six in 10 [construction workers believe project safety takes a back seat to productivity](#). Mullis understands the concern. "The production department has goals to meet to avoid penalties or earn performance rewards, so there's always a temptation to take safety shortcuts to achieve near-term goals."

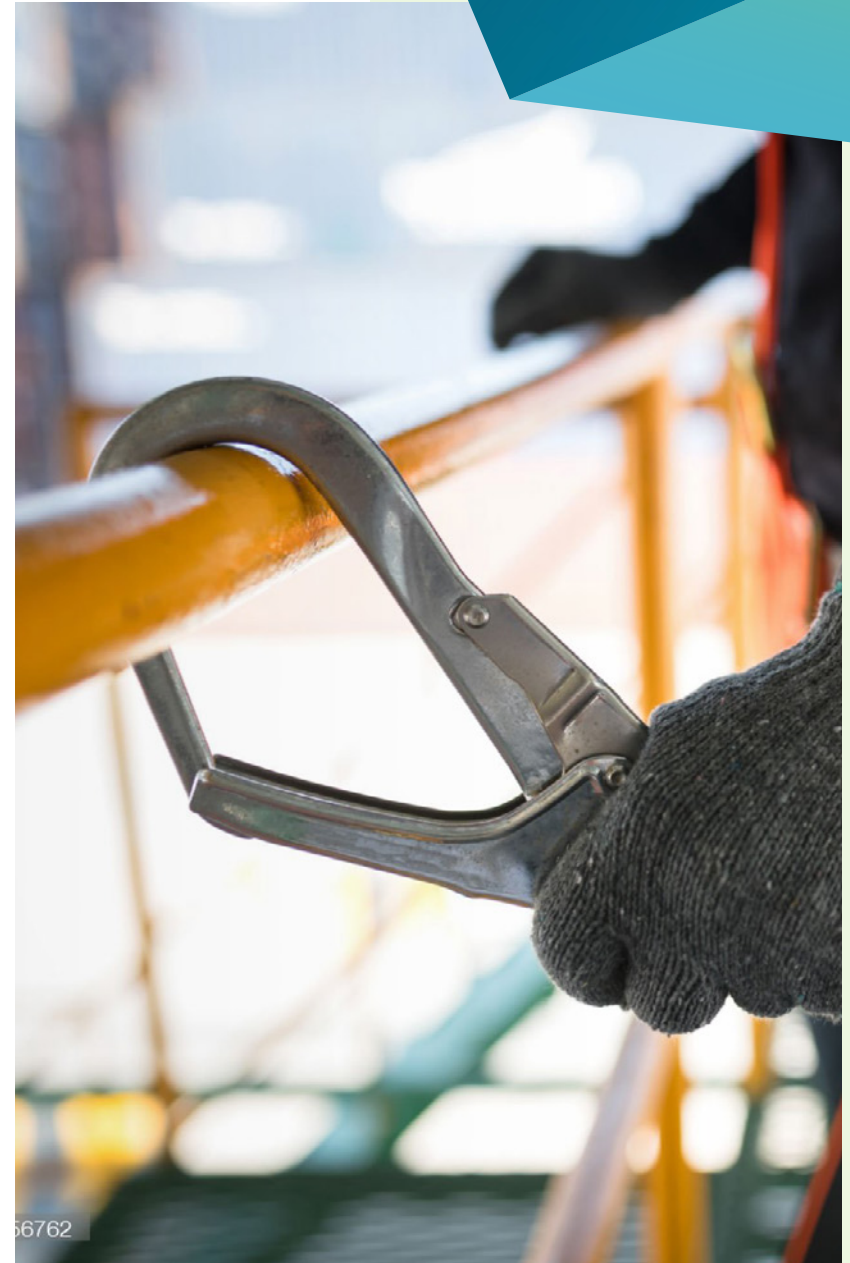
What makes the situation even more confounding is safety's impact on a contractor's expenses. One study found that, on average, 3.6 percent of construction companies' budgets go toward workers' compensation. The dollar allocation for safety training? [Just 2.6 percent on average](#). The implication is companies prefer to spend more on medical care than on the training that prevents it.

When a safety program is viewed as a wise business investment, the perspective radically changes in favor of safety. Beyond the primary goal of protecting workers, safety also delivers striking business benefits, including:

- **Better insurance terms.** Nearly 80 percent of construction companies expect improved insurance premiums and/or terms from an effective safety program, one survey found. That percentage soars to 90 percent when examining top-tier contractors.

A high-performing, no-harm workplace culture often helps lower a company's experience modification rating or MOD Rating. This is insurance shorthand for the company's safety history. A low MOD Rating means a lower insurance premium. A high one means you pay a penalty through higher insurance premiums. That's more than a drag on profits. A high MOD Rating puts you out of the game on key projects. Today a growing share of project owners require a favorable MOD Rating as a condition for bidding on a job. Even if you pass that hurdle, the MOD Rating can become the tiebreaker in deciding a winning bid.

- **Improved industry standing.** What's one way to get on everyone's short-list at bid time? Enact a rigorous safety program. For top-ranked companies, the safety investment is mandatory to maintain their position as a player for the most lucrative contracts. A corollary benefit is the helpful glow of a grade-A safety program in attracting top talent, a powerful differentiator in a super-tight labor market.



What construction can learn from the mining sector

One way heavy construction contractors gain the upper hand on worker safety is through technology. To understand how safety technology can serve a heavy construction contractor, it's instructive to consider the safety challenges of a sister industry, mining.



Why mining? OSHA shares a few reasons:

- 1 The work processes of mining and heavy construction are similar in some ways. Ground clearing, drilling, blasting, excavating, trenching, tunneling, earth transportation, vehicles and pedestrian traffic are a few of the common work activities. The presence of heavy earthmoving equipment with limited sight lines is another shared feature.
- 2 The element of risk is higher in mining than in construction. Construction is a vastly larger industry, today numbering about 10 million workers. The mining workforce is a fraction of that. While total fatalities are higher for construction, the fatality rate for mining is higher, helping drive aggressive mitigation.
- 3 Mining is further along in its digital transformation than construction. Wearable technology like personal air monitoring devices is common in mining. “Digital technology has been a part of mining culture for a long time,” reports Mullis. “The willingness to automate work processes through machine control is well advanced in mining.”



The results from the use of mine safety technology have been transformational. For example, reports of near-miss incidents “... between people and equipment and machine to machine are down by 60 percent within the first year of deployment at some open-air mines,” Mullis says.

The adoption rate of mine safety technology has been widespread over the last decade, clocking in nearly one billion operational hours, Mullis says. Today more than 50,000 active units mitigate earthmoving equipment blind spots and collisions. Wearable sensors are also commonplace. The technology is considered highly evolved and essential.

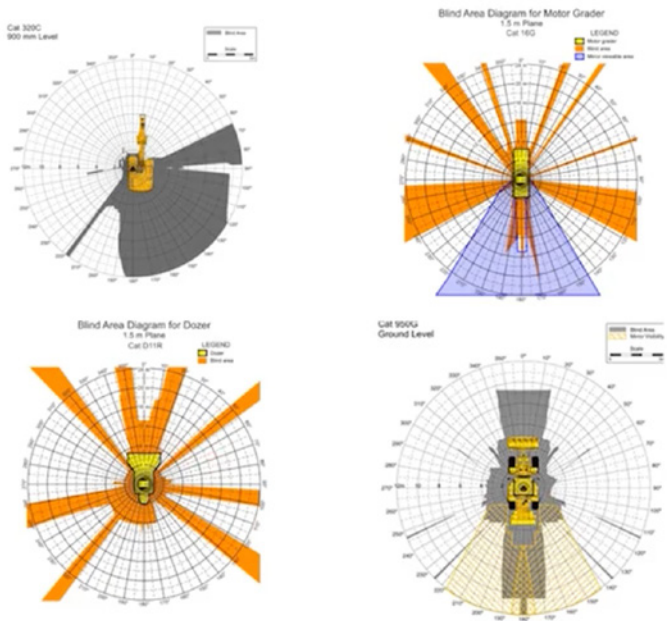
Struck-by incidents, once a severe hazard in mining, have been sharply reduced. In effect, mining has emerged as a vast test lab for its larger sister industry, construction.

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BRAD MULLIS

Product Manager, Leica Geosystems



The Power of Near-Miss Incident Data

The pressure is now on for many heavy construction contractors to heighten their safety response for the sake of their most prized asset—their employees—as well as to reap a host of business benefits.

Hardware and software developers have responded with a variety of safety-focused technologies, including advances in machine control, wearables utilizing IoT and RFID connectivity, and geospatial solutions based on GPS, RS and GIS navigation technologies.

Leica Geosystems recently introduced modular safety awareness solutions that transfer powerful safety technology proven in mining to heavy construction. The new tools help prevent machine-to-people, machine-to-machine and machine-to-objects near-misses and collisions, Mullis explains.

“The idea of safeguarding workers on foot in a highly dynamic jobsite is nothing new,” Mullis says. “Our personal alert system includes collision avoidance protection and the capability to geofence 3D obstacles and avoidance zones like curing concrete or an environmentally sensitive area. If you come within a user-configured distance, warning alarms are triggered.”



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BRAD MULLIS
Product Manager, Leica Geosystems

Because a jobsite can be loud and dusty, the Leica wearable sensor, called the PA10, alerts the user with a trio of alarms with light, sound and vibration. The nearby equipment operator is also alerted, creating a 360-degree safety zone. What's more, near-miss events are automatically documented, giving safety officers valuable analytics about the what, where and when of near-miss events.

“The capture of near-miss data is huge,” Mullis says. “Companies that rely on workers to report near-misses typically gather only a fraction of the actual incidents. Workers may not bother because it takes time away from other duties, they may view it as a negative event or not view it as a near-miss. This technology captures those daily, surprisingly frequent episodes with documented precision. The data helps inform safety planning decision-making.”

The insights that emerge from that data can be revealing. The correlation between near-misses, injuries and fatalities in mining is widely understood, based on hundreds of thousands of incidents over a 10-year period:

For every 3,000 near-misses = One serious injury

For every 100,000 near-misses = One fatality

“It's the difference between understanding and not understanding,” Mullis says. “The Leica modular safety awareness solution not only helps prevent the unthinkable but also equips safety leaders with the data they need to make informed, fact-based decisions.”



Make safety investments that prioritize your people

Project complexity. Digital transformation. Rising owner and general contractor sophistication. Contractual safety requirements. MOD Rating performance. Together these ideas help describe a fast-evolving operating environment for heavy construction contractors.

In various direct and indirect ways, safety and the technology that supports it have emerged as a differentiating element in a business-winning strategy. The correlation between an effective safety program and company success shouldn't surprise anyone. Safety goes far beyond protecting valued employees. It marks a progressive, confident company.

Seasoned, skilled construction talent has never been more highly valued. Lessons learned from the tough world of mining are now helping construction safety reach new effectiveness standards. For heavy construction contractors, now is an opportune time to consider proven, trusted safety technology like [Leica Geosystems' Safety Awareness Solutions](#).

As you weigh your options, keep your No. 1 imperative in mind:
Everyone goes home safe tonight.





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Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications. Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon Heavy Construction solutions provide actionable information that helps you to win, do and close more work, on spec, on time and on budget. At every stage of the life cycle of a construction project, from bid to sign-off; at every location, from field to office; at every level of coordination, from single-job to multi-job workflows, Hexagon's solutions make your work Dirt Simple.

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Leica Geosystems has been revolutionizing the world of measurement and survey for nearly 200 years. We provide powerful software, efficient workflows and experienced support for a complete construction technology solution. Our products give you the tools needed to increase safety, facilitate quick scene documentation, save money, and substantially reduce the probability of errors. Together we provide maximum productivity and exceptional results, no matter how complex the task at hand.

With precise and accurate instruments, sophisticated software, and trusted services, Leica Geosystems delivers value every day to those shaping the future of our world.

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