



Safer Working Through Technology

Safety is a matter of culture - and technology can help

Introduction Committing to a safer jobsite



Let's just get this up front: **Construction work can be dangerous and unhealthy.** In 2019, the U.S. construction industry reported more than 200,100 cases of injuries and illnesses – 79,700 of which resulted in missed work days. ¹ At some estimates, **this costs the industry around \$11 billion a year.** ²

Work-related injuries and illnesses hurt not just people but team morale, productivity and bottom lines. **Unsafe working conditions increase downtime** and make jobsites unappealing to young workers, which doesn't help alleviate the industry's high turnover rate (20%) and worker shortfall (430,000 in 2021). ³

But let's emphasize the "can be" part

of our opening sentence, because construction doesn't have to be dangerous or unhealthy. There are **effective strategies for preventing injuries and illnesses while reducing costs** (from workers' comp premiums and the like), increasing productivity and keeping workers happier, more engaged and better employed.

Examples include **adopting technological innovations in tools and processes, changing working methods and implementing effective management strategies**, such as the Construction Industry Institute's (CII) Zero Injury principle. Based on the idea that all injuries are preventable, the Zero Injury principle doesn't set safety goals but instead demands a **"demonstrated management commitment"** to changing safety culture. ⁴

In other words, it starts at the top, with leaders, managers and especially CEOs demonstrating, not just expressing, their commitment to achieving zero injuries. **Actions, not words.**

Pain Points That Literally Hurt

Because of the dynamic nature of construction work, contractors face challenges in reducing or even identifying jobsite safety issues and work-related health problems.

Most injuries stem from risky working conditions and can be categorized by a root cause (see table, right).

In addition to jobsite risks, **contractors face compliance challenges.** Regulatory bodies constantly update safety standards to meet the demands of bigger, more complicated projects; new working methods; new technologies and materials; fewer skilled workers; and **ever-shrinking deadlines that demand higher productivity and faster results.**

And as infrastructure spending increases in the U.S., businesses can expect a flurry of new regulations: **OSHA plans to double the number of inspectors**, reflecting former construction worker and current labor secretary Marty Walsh's declared commitment to worker safety. ⁹

But compliance doesn't always mean safety. Regulations are often written to satisfy the baseline. **A genuine commitment to health and safety demands exceeding the minimum criteria.**



People

Includes human error and risky or reckless behavior; misuse of tools or PPE; lack of knowledge or experience; inattention; working under the influence; and misjudgment of risk

Example:

Lifting heavy loads is one of the most common causes of musculoskeletal disorders such as sprains and strains and joint, bone and nerve injuries. (5)



Tools

includes damaged or poorly maintained equipment leading to defects; missing or improper use of PPE; missing safety accessories; and using improper, worn or damaged inserts

Example:

A damaged or overused grinder disc can break unexpectedly, sending pieces flying. This is even more dangerous if the guard is missing.



Organization

Includes missing or improper PPE; inadequate training or certification; inattention to hazards and ergonomic risks such as discomfort and fatigue; and inadequate planning leading to rushing

Example:

Overexposing employees to vibrating tools that drill, chisel, break or grind can lead to operator discomfort and fatigue. (6)



Environment

Includes poor lighting; excessive noise; distractions; poor weather conditions or extreme temperatures; hazardous substances such as dust or chemicals; and working at heights or overhead

Example:

Drilling concrete can create dust particles that can damage the respiratory system. (7) Risk increases when working on ladders: Falls are the leading cause of death on jobsites. (8)

It starts with leaders demonstrating their commitment to achieving zero injuries.

When CEOs Lead, Safety Follows

How Can Technology Help?

Applications such as drilling and anchoring in concrete can be substituted with innovative fastening systems. And if hammer drilling is unavoidable, an **OSHA-compliant integrated extraction system** on an SDS rotary hammer can help **remove almost all the dust directly from the bit.**

Some high-end hammer drills and combihammers feature technology to reduce vibration and torque-control systems to help prevent unexpected over-rotation if the bit gets stuck. This technology also extends to other tools. For example, Hilti has developed a more advanced form of torque-control technology, called 3D ATC, that uses multiple gyroscopic sensors to detect when an angle grinder suddenly leaves a work area, triggering a disc brake.

Some high-end hammer drills feature technology to reduce vibration and unexpected over-rotation.

Contractors can reduce the risk of fatigue and musculoskeletal injuries by integrating wellness programs, such as team stretching, into the workday. Of course, the jobsite's traditionally macho "brute-force" approach to work can make buy-in difficult. "It used to be that a sign of a good day at work was a sore back," Joe Garza, the regional safety manager for California-based DPR Construction, told the Engineering News-Record. "We'd rather it be our workers' ability to do other things without pain when they get home."¹⁰

One solution is using cordless tools with **higher performance-to-weight ratios, meaning they're lighter and more comfortable to use,** especially when working overhead. However, comfort shouldn't come at the expense of power – the effort required to use them should remain manageable.

Ineffective organizational processes, such as insufficient training or poor PPE management, can be tightened up with **proactive, cloud-based construction management apps.** Some software can manage safety and training certifications and provide alerts that help enable compliance. Others track PPE stock, helping supervisors keep dust masks, gloves and glasses onsite at all times.

See "Innovations for a Safer Jobsite" on page 6 for a summary of effective technological solutions.



That "demonstration of commitment" starts with **management convincing their employees that nothing is more important than health and safety.** The philosophy should then trickle down to employees looking out for one another every day and taking co-ownership of jobsite safety. Dr. E. Scott Geller of Virginia Tech calls this an "actively caring for people (AC4P) safety culture."⁴

Leaders can enable an AC4P safety culture by implementing **regular injury-prevention activities** such as near-miss analyses, safety inspections, worker-led committees and worker-established KPIs for measuring safety. **This requires not a huge financial investment** but group alignment, process execution and personal accountability. For a manager, that's all in a day's work.

Managers can also lead by **adopting a Health, Safety and Environment (HSE) strategy that takes advantage of technological innovations.** Investing in products and services that help reduce jobsite risk is a proactive approach that can also **keep companies a few steps ahead of regulators.**

Unsafe jobsites are typically due to poor management. Conversely, **some of the safest businesses in the U.S. are CII members whose leadership, most notably at the C level, have demonstrated a commitment to Zero Injury principles.** In 2018, CII's best-performing members logged a Total Recordable Incident Rate (TRIR) of 0.24 per 2.6 billion hours worked. That's one OSHA-reported incident every 909,000 hours, good for almost 13 times safer than national figures published by the U.S. Bureau of Labor Statistics.⁴

20%
of all workplace fatalities in the U.S. in 2019 occurred in construction¹¹

Number of injuries and illnesses reported by U.S. construction companies in 2019:¹

200,100

53%
of large general contractors use software to manage safety inspections¹²

100%
of all jobsite injuries are avoidable

Innovations for a Safer, Healthier Jobsite

Managers can demonstrate their commitment to safer jobsites by adopting technology that proactively reduces risk. Here are a few effective solutions.



Reduce worker strains and fatigue

- ▶ Lighter, more ergonomically friendly and comfortable tools
- ▶ More productive tools that reduce trigger time
- ▶ Power tools with vibration reduction technology
- ▶ Exoskeletons for assisting with lifting and overhead work
- ▶ Automated machines for dangerous or repetitive tasks
- ▶ Rig-mounted wet diamond drills with automatic feed
- ▶ Tool-connected mobile apps that provide trigger-time recommendations as well as dust and noise ratings



Address organizational deficiencies

- ▶ Tool-connected mobile apps that provide on-demand safety training modules
- ▶ Asset management software for tracking worker qualifications and certifications; providing tool maintenance alerts; enabling transparency into PPE stock availability; and activating smoother repair or replacement of damaged/dangerous tools

Reduce dust

- ▶ Tool-integrated dust removal systems that extract virtually all dust from the source
- ▶ Hollow drill bits that integrate better with dust extraction systems
- ▶ Powerful cordless vacuum cleaners for more convenient extraction and cleanup
- ▶ BIM processes that identify ways to avoid drilling (e.g., by specifying cast-in anchors)



Prevent hazards

- ▶ Laser measuring tools to reduce ladder use
- ▶ Tool tethering to help prevent dropped tools
- ▶ State-of-health alerts for dangerous batteries
- ▶ Battery-powered cordless tools that don't require combustible fuel



Address high-risk tasks and behavior

- ▶ Torque-control technology that helps prevent stuck tools from uncontrolled spinning
- ▶ Dead-man and touch-activated switches for stopping tools when the user lets go



Safer Jobsites, Better Business

Employees respond positively to genuine commitments to improving health and safety culture. **Business leaders who take an active role** in executing effective safety strategies, engage employees throughout the entire process and adopt effective safety innovations **can measurably reduce injuries and downtime.**

Running a safer and healthier jobsite is not only better for everyone onsite; **it's better for business.** Construction companies continue to operate on razor-thin profit margins. Though increasing productivity might be the primary goal, avoiding hefty fines, reducing workers comp premiums and sufficiently staffing projects should also be a priority.

But more importantly, and in the words of Jeff Owens, the CEO for Illinois-based industrial maintenance service provider Advanced Technology Services: **“Without knowing that [we] care about their safety, employees would not feel valued. Without valued employees, customers would not be engaged. Without engaged customers, [we] would not get results.”**¹³

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