

# EHS Today<sup>®</sup>



## EXOSKELETONS IN THE WORKPLACE: A WEIGHTY PROPOSITION

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exoskeletons for your workers.*

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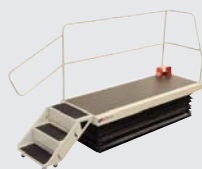
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## It's Not Time to Relax Yet

*Even with new COVID-19 vaccines and new leadership in Washington, workers still aren't quite ready to go back to the workplace.*

**A** new year starts a new chapter in the mission of keeping the workplace safe. We have a new president, and both houses of Congress are now under the same party; there is new leadership at the Department of Labor (including OSHA) and the Department of Transportation (including the Federal Motor Carriers Safety Administration); new heads of the Environmental Protection Agency and the Food and Drug Administration; and in fact an entirely new regulatory mission on the part of the government when it comes to EHS matters.

However, we still have some of last year's problems, chief among them catching COVID-19 and the fear of returning to the workplace. Convincing the entire U.S. population that it's safe to go back into the workplace is not going to be easy, no matter how much in sync the Executive and Legislative branches of the government are aligned, and no matter how quickly vaccines are produced and administered. And it's going to continue to be a daunting hurdle for every safety leader to confront the reality that some of their workers are not merely a little bit uneasy about going back into the workplace—they're just plain scared.

There have been all sorts of polls and surveys conducted lately, asking people about their readiness and willingness to return to the workplace. Here are some recent findings:

- 54% of respondents who've been working from home during the pandemic say they'd prefer to continue doing so after the pandemic ends. Meanwhile, of those people who have had to report to their traditional workplace, 54% say they're worried about being exposed to COVID-19 from their fellow workers (Pew Research Center).
- 38% say that would accept a 10% pay cut if it meant they could continue working at home (TalentLMS).
- 49% think that the pandemic in the United States is behind us, but 47% think that the worst is yet to come (CNN).
- 35% say they're not willing to be vaccinated against the virus (Gallup).

An optimistic reading of those survey results would suggest that most people are hopeful that someday soon they'll be looking at COVID-19 through their rearview mirror and their personal and work lives will have resumed some sense of pre-pandemic normalcy. A less-optimistic interpretation, however, is that a large number of people feel the entire world is still on "pause," with no definable end in sight and rumors of a more contagious form of the virus prompting calls for people to start double-masking. No matter how you look at the survey results, one thing is beyond dispute: The role of EHS managers is only

going to get even more intense, as workplace safety protocols continue to evolve, reflecting the new administration's guidelines, the impact (or lack thereof) of vaccinations, and the insidious reluctance of the coronavirus to just go away already.

For those of you longing for "the good ol' pre-COVID days" when we had other EHS-related things to talk about, I ventured into the *EHS Today* archives to see what I wrote in my column a year ago, the last one before the pandemic. Unfortunately, the topic I wrote about then was an equally disturbing subject: a 2% rise in workplace deaths from 2017 to 2018. I wish I could report that the latest annual tally from the U.S. Bureau of Labor Statistics (BLS) shows an improvement, but that's not the case. In 2019 (the BLS has always been a year behind in its reports, despite having access to the fastest computers and data analytics processors in the world), there was again a 2% increase in fatal work injuries compared to the previous year. In fact, there were 5,333 workplace fatalities in 2019, the largest annual number since 2007.

"With many safety advancements being readily available to employers nationwide, it's troubling that we're continuing to see higher numbers of worker fatalities," said Deborah Roy, president of the American Society of Safety Professionals (ASSP). "Strong workplace cultures that bring together management and employees while including safety and health climates must become a priority for all companies and organizations."

Echoing the ASSP, the National Safety Council (NSC) expressed its concern over the increase in fatalities, and added an "even more alarming" observation that these are pre-pandemic figures. "2020 data could be far bleaker given COVID-19's impact on workplace safety," the NSC cautioned.

Let's hope the NSC is wrong, and that the heightened calls to the entire population to take safety very seriously will result in fewer workplace fatalities (although it's unclear exactly how the BLS will determine if a COVID-related death should be considered a workplace fatality). But one thing is clear: Workers are very skittish right now about coming into the workplace, so the vigilance of EHS leaders will be vital to ensuring that we all are able to resume our work lives in safe and healthy environments.

A handwritten signature in black ink that reads "Dave Blanchard". The signature is fluid and cursive, with a large initial "D" and "B".

Send an e-mail with your thoughts to [dblankard@endeavorb2b.com](mailto:dblankard@endeavorb2b.com).



THE WAY TO INVITE PEOPLE INTO A CONVERSATION IS NOT BY MAKING STATEMENTS, BUT BY ASKING QUESTIONS.

## STARTING A SAFETY CONVERSATION

*Good communication starts with a strategy of what needs to be communicated and tactics for how that will be accomplished.*

**O**ver the decades, I have only worked with a handful of organizations that had excellent safety communication. Even when leaders have good intentions to communicate safety, they tend to fall short of their own expectations. Often, this is because intentions are all they have. Good communication starts with a clear strategy of what needs to be communicated and exact tactics for how that will be accomplished.



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The root cause of most communication failures I encounter lies in setting the strategic goals. Leaders tell me their workers are uninformed and that their goal is to keep them more informed. Usually in another conversation, leaders ask me to help get their workers more engaged in safety. I find that these goals can be combined.

The overall strategic goal should be worker engagement, and the primary tactic for accomplishing that goal should be communication. But communication needs to be more than simply disseminating information. That means everyone needs to be invited into a conversation about safety.

The way to invite people into a conversation is not by making statements but by asking questions. Communication experts often cite three qualities of effective communication: clear, non-threatening and two-way. Conversations facilitate all three of these qualities better than sent messages. If the original message is not clear, a conversation can provide clarification. A sent message can be perceived as a command or dictate even if it is not intended as such.

Conversations allow perceived threats to be defused. When messages are sent, there is no

easy way to determine if it was received. In conversations, the receipt of information can be determined by body language or by follow-up questioning if necessary.

W. Edwards Deming told us that people support what they help create. Being involved in the conversation gives everyone a chance to help create the basic ideas upon which actions may be based. Leaders who ask questions are perceived to be more open to ideas and collaborative than leaders who speak without listening in return. Getting input from others is not just good communication—it is a sign of respect. Additionally, others often have knowledge about specifics that leaders do not, and that knowledge can help them make better and more practical decisions.

I recently talked to organizational leaders who were boastful and proud of the improvements they had made to one department at their site. When I spoke with workers from that department, they told me that leaders had not asked them about the improvements and many of them had created more problems than they solved. The net result was millions of dollars spent that complicated work and demotivated the workforce. All of this is easily avoided by a simple conversation.

A common barrier to an effective flow of information is the subordinate who does not want to be the bearer of bad news to the boss. To address this, many organizations require leaders have what is commonly called skip-level meetings. These are meetings in which the boss skips the direct reports and has a meeting with the next lower level in the organization.

Skip-level meetings are only effective if they foster a conversation. If the boss simply lectures the attendees with the same directives given to direct reports, no new insights are gained. Savvy bosses ask the right questions to uncover the information that may be withheld. That helps remove the threat that may make attendees feel uncomfortable sharing information and ideas openly and creates an atmosphere of trust.

Some organizational leaders tell me they are already good at asking questions and getting input from others. However, I often find that

their questions are all about tactics, not strategy. The leader decides on a goal or direction and simply asks others to fill in the blanks on how that might be accomplished in their departments or regions. Contributing to tactics creates a level of ownership and engagement but contributing to the rationale behind the decisions takes engagement and ownership to a whole new level. Deciding what to do gets hands and feet moving. Deciding why to do it gets hearts and minds involved and connected to the organization.

The most effective safety strategies are the ones to which all key leaders have contributed, and the best way to get such contributions is through asking questions. Some questions I often recommend include: “Why do we want to be more excellent in safety?” “How would the organization benefit from better safety?” and “How can we keep safety and production from competing with each other for priority?” Those who contribute to such conversations feel a deeper ownership and pride in the performance that results from the strategy.

Most organizations are attempting some form of audits or behavioral observations as a part of their safety activities. One of the goals of such processes is to increase employee engagement. However, the most difficult part of such audits or observations is giving feedback on what was observed and getting information from the workers being observed that can help improve safety.

Observer training should include strategies for fostering a conversation between observers and the person/people being observed. Observers need a list of potential questions to ask at the end of an observation. Truly good questions will spawn conversations among employees even after or between observations, and those discussions will flow over to safety meetings and pre-job planning sessions.

Plato and Aristotle were two of the most famous philosophers of the Golden Age in Greece. Aristotle proposed all the answers, and his thinking has been superseded many times over by advancements in thinking and technology. Plato asked the deep questions underlying our life decisions, and his questions remain pertinent today. He told us the unexamined life is not worth living. The unquestioned safety strategies might equally not be worth pursuing. Start a conversation and talk about it! **EHS**

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**Terry L. Mathis, founder and CEO of ProAct Safety ([www.proactsafety.com](http://www.proactsafety.com)), has served as a consultant and advisor for top organizations the world over. A respected strategist and thought leader in the industry, Mathis has authored five books, numerous articles and blogs. EHS Today has named him one of the “50 People Who Most Influenced EHS” four times. He can be reached at [info@proactsafety.com](mailto:info@proactsafety.com) or (800) 395-1347.**



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# Ethylene Oxide: The Next Regulatory Battleground

*Proposed emission controls for a carcinogen widely used in manufacturing are said to be too weak.*

It's expected that President Joe Biden's administration will accelerate adoption of new regulations regarding per- and polyfluoroalkyl substances (PFAS) after environmental advocates charged the federal government wasn't doing enough under former President Donald Trump, but there is another environmental battle over chemicals looming as well.

The carcinogen ethylene oxide (EO), used extensively in manufacturing, is facing state government actions, and it is believed that the new administration will initiate new federal enforcement action. Dozens of private lawsuits have been filed against EO emitters, and it's only a matter of time before more tort lawyers join the fray.

Ethylene oxide, also known as oxirane and epoxide, is an organic compound usually found in the form of a colorless and highly flammable gas. EO is used as a fumigant in food and textiles, but it is mainly found in the manufacture of consumer products and non-consumer chemical intermediates. Products made with EO include fabric, detergents, medicines and adhesives.

The chemical also is used as the raw material for polyethylene terephthalate (PET) resins incorporated into the manufacture of bottles and containers, along with polyester fiber.

Ethylene glycol is also derived from EO and is widely used in hospitals and other medical settings as an alternative to using steam for the sterilization of medical equipment.

EO has been linked to non-Hodgkin lymphoma, leukemia, multiple myeloma and breast cancer, among many other cancers and physical ailments. The United States is among the world's largest producers of ethylene oxide and chemicals made from it. More than 90 facilities across the country work with the chemical, according to the American Chemistry Council.

Previous Environmental Protection Agency (EPA) studies raised concerns about the chemical's emissions, especially in communities where it is manufactured. EPA held off on developing new rules while it conducted more research, including additional gathering of emissions samples. Environmental activists wanted stronger action.

During the campaign, Biden's environmental platform made community focus and environmental justice (EJ) prominent themes, and ethylene oxide may provide an early EJ opportunity for the new administration, note attorneys for the environmental law firm of Beveridge & Diamond.

Last March, the EPA's Office of Inspector General (OIG) recommended that the agency should inform residents living near EO facilities about their exposure to the chemical. (Notably, the OIG left that duty to state personnel in Texas and Louisiana, which both have significant EO emissions footprints).

The OIG asserted that an EPA revised corrective action plan dealing with EO failed to address the "seriousness associated



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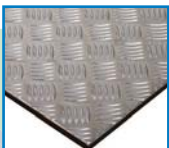
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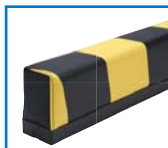
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## NEWS BEAT

with the 25 high-priority ethylene oxide-emitting facilities that the EPA had previously identified” and added that its commitment should encompass interactive outreach with residents using a variety of risk communication tools, such as virtual webinars and workshops.

### PRIMED FOR ACTION

“The Biden administration has an unusually ripe opportunity to review—and potentially implement—the recommendations of the Inspector General in what could be an easy and early EJ example for the new administration,” the Beveridge & Diamond attorneys observe.

They point out that the new administration also could ask the EPA to notify communities near identified sources of emissions. This communications campaign might not end happily for the companies accused of excessive emissions, the attorneys added. “An official EPA warning to a community could well set the stage for collective community concerns and further embolden plaintiffs’ lawyers to reach out for potential class members.”

EPA’s perceived failure to act also prompted 11 environmental groups to ask the Washington, DC, Circuit Court to review the EPA’s rule regulating toxic emissions for about 200 chemical plants, saying the agency’s failure to act leaves those living in areas surrounding the plants exposed to unacceptable cancer risks.

It was ethylene oxide’s widespread use in a medical device sterilizing agent that most recently drew legal action from Hector Balderas, the attorney general of New Mexico. In late December, Balderas sued Sterigenics U.S., charging that its facility in the state has been releasing excessive amounts of the chemical into the atmosphere since 1989. The company denies that its releases have been excessive and argues that they have been well within safe levels.

Balderas cited environmental justice as motivation for the action. The facility in question is in Santa Teresa, New Mexico, an unincorporated community where 56% of the estimated 4,300 total population is Hispanic.

“Industrial companies must follow the law and maintain the highest safety

standards for all communities, and it is not fair to exploit poor communities of color when they deserve protection with their health and safety,” Balderas said. “My office will always fight to hold companies accountable for jeopardizing the health and safety of all New Mexicans, especially those most vulnerable communities.”

The New Mexico suit is just the latest in a steadily rising flood of legal actions targeting EO. In early 2019, Sterigenics closed a facility in Willowbrook, Ill., in response to an order from the Illinois Environmental Protection Agency. Later that year, the company also closed a facility in Atlanta following an investigation by the Georgia Environmental Protection Division.

Ethylene oxide also has captured the attention of members of the Illinois state legislature, which is considering two separate bills aimed at restricting EO emissions. Lawmakers in other states are reported to be focusing on EO, including Georgia and South Carolina.

The early actions that resulted in facility shutdowns raised concerns about their potential negative impact on the supply of medical devices before the COVID-19 pandemic erupted. A Food and Drug Administration (FDA) advisory panel in late 2019 warned that these plant shutdowns constituted a real threat to capacity and might lead to shortages of medical devices lacking the available sterilization capacity.

Many hospital procedures, including those that use hip replacement equipment and pacemakers, require the chemical for sterilization. However, many of these were considered elective procedures and were largely halted in the early days of the pandemic, a move that some officials and hospitals are reinstating amid the latest surge of COVID-19 cases.

“Industry is in a unique position to get ahead of the issue now to manage the risks posed by these dynamic and integrated drivers giving momentum to EO litigation and enforcement cases,” the Beveridge & Diamond attorneys say. “Now is the time to assess and mitigate company risk in a holistic, proactive and community-inclusive manner.”—*David Sparkman*

ADRIENNE  
SELKO  
Senior Editor



## THE DIGITAL AGE IS HERE. IS YOUR WORKFORCE PREPARED?

*Microlearning techniques offer employees a way to more quickly get comfortable with digital tools in the workplace.*

**W**hat was to come is, in fact, already here. Analyzing data based on a myriad of software platforms is how most companies operate today. And that data has moved out of the IT department and is now available across the company.

My favorite example of this new world is the commercial where a football player uses analytics after his touchdown to review the percentage possibilities of what he accomplished. If football players can become so comfortable with this, then your employees can as well.

This isn't a situation where it would be nice if everyone had these skills—it's more dire than that, according to the G20 network, an international forum of governments and banks. In a recent report, the group warned that people over age 35 must develop the agility to diversify their knowledge base and embrace data analysis if "we are to ensure no one is left behind."

Luckily, we have the technology—artificial intelligence (AI)—to create that knowledge base. And this technology can be used by workers at all levels, from those on the factory floor to those in more corporate functions.

"All people are skilled but are simply not presented with the right information and technology to apply those skills," says Gabe Batstone, CEO of Contextere, an industrial software company.

Batstone founded his company to bring data culled from AI directly to the workers on the line. As he explains it, "Warm hands still touch cold steel, [but] the information on how to be safe and productive is just not reaching these workers. These workers have been left behind when it comes to using the data we are collecting, and these are the people who are making our trains run and our planes fly."

Batstone points out that big data and AI can contextualize the information, making it consumable for everyone. By using wearables, data provided through AI as well as other technologies such as the Internet of Things, machine learning and augmented reality can be used to increase safety in a facility. In fact, the G20's Think20 task force has recommended AI-based learning to better prepare workers throughout the world.

So how can we ensure that current and future workers learn how to use these technologies? While the most com-

mon answer used to be through a four- or two-year degree program, it turns out that is not the only option. A new system has emerged called microlearning, which involves the issuing of micro-credentials. These credentials demonstrate that someone has mastered a very specific skill, for which they receive a badge. The earliest badges were awarded for computer programming, so it's a next logical step to use this system for AI.



PHOTO: PRODUCTION/DIGITALSTAGE

Using new educational techniques is something companies have been exploring for quite a few years. In 2016, for instance, IBM's then-CEO Ginni Rometty let it be known that many of the jobs at IBM don't require a college-degree but specific training. She pointed out that as many as one-third of IBM employees did not have four-year degrees, in such areas as cybersecurity, data science and cognitive business.

Rometty rightly recognized that it's the skill set, not a preset education level, that is necessary for companies to fill the jobs IBM had open and will need in the future.

While many businesses are both looking for talent with a variety of education acumen and providing in-house training, it will also be interesting to see the role that government might take. G20 has offered recommendations that it suggests governments take to utilize AI-based learning, including:

- Embracing and regulating industry micro-credentials;
- Accessing government funding for workplace learning in traditional sectors and those working within the platform and gig economies; and
- Promoting innovative technical and vocational education training institutions with the backing of quality control and licensing bodies.

As Heidi Alaskary, co-chair of Think20, says, "It is now the responsibility of governments, industries and citizens to collaborate to humanize the technological process and bring balance to the future way of working," and by extension, creating safer workplaces for all of us.

*Adrienne Selko*

Send an e-mail with your thoughts to [aselko@endeavorb2b.com](mailto:aselko@endeavorb2b.com).



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## A Weighty Proposition: **EXOSKELETONS IN THE WORKPLACE**

*Eight questions to ask if you're considering exoskeletons for your workers.*

**By Karl Zelik and Matthew Marino**

**M**ajor corporations, such as Toyota, Ford and Boeing, have begun adding exoskeletons to their operational toolbox over the last few years. They have gone deep; generously shared their learnings; and reported some encouraging results, including positive worker feedback, less exertion, less discomfort, and even reduced injuries and workers' compensation costs when using exoskeletons.

Many smaller companies in industries

ranging from logistics to construction to agriculture to manufacturing have also begun using exoskeletons since this technology has become more practical, approachable and affordable.

At the core of exoskeleton technology is a simple concept: address potentially painful problems before they actually become a problem.

Overexertion continues to be a leading cause of pain, physical disability, missed work, lost productivity, turnover and medical expenses. According to the Centers for Disease Control and Prevention, back pain is the most prevalent work-related health problem. The Occupational Safety and Health Administration estimates that employers pay nearly \$1 billion per week for direct workers' compensation. That's why exos (rigid exoskeletons and flexible, textile-based exosuits) are becoming a popular investment to ensure worker safety, well-being and productivity.

Companies that are successfully integrating exo technology into their workflow have been purposeful in matching

the right type of device to the right job. Some organizations consider exos to be tools while others consider them to be personal protective equipment or even a form of engineering control.

Regardless, these companies have discovered that effective exo technology is built on three pillars: comfort, assistance and freedom of movement. You need all three working in unison to get the most out of an exo.

After years of experience in designing, testing and implementing occupational exos, we've identified a list of key questions for occupational health and safety professionals to ask when exploring the use of exos to sustain and support the hardworking women and men in their organizations.

### 1. Have you explored traditional ergonomic controls?

Ergonomics and safety efforts have been very effective in reducing injury rates over the last few decades. The Hierarchy of Controls is an effective approach

for reducing risk that has helped tremendously. Proactively preventing injuries is always better than reacting to them for both employees and employers.

Despite excellent progress, there are still work-related injuries. In a perfect world, there would be none. The National Safety Council's Work to Zero Initiative aims to eliminate workplace fatalities through the use of technology.

A similar initiative to reduce work-related injuries could be very helpful, especially one aimed at reducing preventable work-related musculoskeletal disorders (WMSDs) such as sprains and strains, which can be debilitating and costly for people and companies alike.

Previous injuries are the top predictor of future injuries. That's why it's critical to prevent as many injuries as possible in the first place. It's also important to reduce the cumulative wear and tear many workers experience as they age.

Exos can help reduce strain, fatigue and injury risk in the workplace. They are a complementary new tool in the ergo-



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nomics and safety toolbox that can be utilized with traditional engineering, administrative and behavioral controls.

Exos are becoming part of a comprehensive health, ergonomics and safety program. They are not a replacement for good ergonomics. If everything has been done to improve the ergonomics of a job but risk factors for overexertion, fatigue, injuries or turnover persist, then exos might be worth exploring.

## 2. Where do your workers need help?

There are many types of exoskeletons, including ones that specialize in supporting certain body parts or functions. For example, there are shoulder-assist exoskeletons. Toyota uses such an exoskeleton for its workers who are frequently working overhead on the assembly line. There are also back-assist exosuits that provide low-back support and assistance for workers who lift, bend and reach throughout their shift.

Consider the primary movements of your workers, what injuries are prevalent or where your workers are sore day in and day out. Then look into the exos that provide that kind of support.

## 3. Are your workers interested in relief? Are managers open to new ideas?

Culture is an important factor in the successful adoption of exos. It will be much easier to implement exos if workers and managers are interested and have bought in. First ask workers and managers if they are familiar with occupational exos. This is an emerging tech, and they may not realize practical workplace exos exist. They may also have erroneous preconceptions based on Hollywood movies or an exo they tried five years ago and did not like.

Much like early cell phones, there's no comparing modern exos to those previous models. There have been major advances in the last five to 10 years, including models that are much lighter weight, lower profile and more like clothing (exosuits). Exos

# Exos are becoming part of a comprehensive health, ergonomics and safety program.



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are not as clunky and obstructive as they used to be. Most now use springs, rather than motors and batteries to assist, which has made exos much more affordable.

It's not impossible to implement exos if your workers are not initially interested in exos (particularly if they are not aware of the newest tech), but it can be more difficult. Communicating with and educating workers and other stakeholders will be critical. Question 7 discusses how exo implementation experts can help your organization build awareness of exos and increase worker buy in.

## 4. What tasks would benefit most, and how long do workers perform these each day?

Identifying the pain point tasks in your workplace will help make sure you are looking at the right types of exos (e.g., shoulder vs. back). Even within back exos, there are models that excel for more static jobs that involve lots of bending (e.g., a worker bent over a conveyor belt) and others designed for highly dynamic jobs that

involve lots of lifting, stooping, walking or other tasks (e.g., case picker, aerial porter and construction worker).

You also need to understand how often exo assistance would be needed. Will your workers only need to use an exo for the most strenuous tasks or all day for 40-plus hours per week?

Knowing the answers to these questions helps narrow potential exo solutions. Some are great for short stints but can be uncomfortable or obstructive for long durations. Others have been optimized for longer use and can accommodate all sorts of tasks and postures without getting in the way. If workers are going to be using it all day, it better be light and comfortable. If they are going to take it on and off, then it better don/doff in seconds.

## 5. Is there evidence the exo you're considering actually works?

There is a large body of evidence that exos (as a general class of device, including rigid, soft, active, passive and quasi-passive devices) assist workers and relieve strain on the body—and not just by transferring loads elsewhere (see sidebar, “Common Misconceptions about Exo Technology”). But you still have to do your homework.

When considering models, review lab-based validation studies and field tests.

Look at the quality of evidence as well. Is it a random plot on a webpage without any source for the data or is it peer-reviewed science with supporting evidence from multiple studies?

And watch out for posture aids masquerading as exos. There are devices that provide tactile feedback to remind workers to use good posture (similar to back belts), but true exos are a very different class of device.

Exos can both promote good posture and substantially offload the muscles and bones. This offloading benefit is what distinguishes exos from back belts and posture aids and why exos reduce overexertion injury risks.

## 6. Will a given exosuit fit your en-

**tire workforce comfortably, safely and without interfering with other job tasks?**

Most companies that explore exos start with a pilot test on a small number of workers, often about 2-50, to assess effectiveness, worker acceptance and the likelihood an exo can fit into their workflow.

But before you bring in a new exo, or any new tech, be sure to think it through. If the first workers love this exo, then would this solution be feasible to roll out and scale to the rest of your workforce?

It's best to know this upfront. For instance, consider the cost and whether the exo will fit people of different sizes, shapes and genders. Don't assume that all exos fit women's bodies; this has long been a problem for exoskeletons and other types of PPE. But this is changing, and there are now companies offering specific versions of exos for women.

You also need to consider if there are any other environmental constraints with respect to safety, such as extreme heat or cold, electrical hazards, dirty/dusty environment, sensitive equipment and confined spaces? Would the exo you are considering be able to hold up in this environment, or would it get in the way? Can workers quickly don/doff if they need to use the bathroom, or turn off the exo and still be comfortable if they have a short break or need to hop in a forklift?

As important as it is to identify the tasks that need assistance, it is equally important to identify the tasks that do not. Do your workers need to sit down occasionally, climb ladders, get on their knees, walk, run or enter confined spaces? Movement interference has been one of the largest barriers to exoskeleton adoption. This has historically been a challenge for wearable assist devices, but some modern exos are using soft textiles, lightweight designs, and get-out-of-the way (on/off) modes to ensure worker freedom of movement. It's truly the beginning of a new era for exos.

**7. Does the exo vendor provide training and implementation support beyond the product sale?**

There are a number of considerations for successful implementation depending on the size of your organization, the industry and other internal dynamics. If your organization is new to exos, you likely

would benefit from advice and guidance on implementation from a vendor that has been implementing exos for years.

A few key questions to ask: How do you prepare for implementation before exos arrive on-site? Who is needed to support new exoskeleton users? How do you make sure a given exo fits well and continues to fit well over time? How will exos be

maintained, stored and cleaned to ensure safe and sanitary use?

**8. What does success look like for your organization?**

As safety professionals, you have to be in the driver's seat for this. Exos are not about technology. They are about people and organizations—keeping people

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## Common Misconceptions about Exoskeleton Technology

*Because exoskeletons (exos) are still relatively new to the market, there are some prevailing misconceptions about them.*

### Do Exos Cause Atrophy?

To date, there is no evidence that exos have caused, or will cause, muscles to atrophy. For instance, employees in warehouses have to lift and move 25-pound boxes. For workers wearing exosuits, they feel more like 15-pound boxes. These jobs still require plenty of effort, but even slight reductions in strain and fatigue can make a significant difference to workers' health and well-being, especially over time.

**And a little-known fact:** Muscle atrophy can actually occur when there is too little or too much muscle activation. That means overexertion can lead to muscle atrophy, as can the lack of muscle use after an injury. The purpose of exos is to keep workers in that healthier "sweet spot."

### Do Exos Just Shift Forces to Other Parts of the Body?

No, this is a misconception of how exos function. Exos use leverage to do the mechanical work more efficiently. They allow your body to do the same amount of physical work—for instance, to lift a box—but with lower forces applied to bones, muscles and joints.

Most exos also are not meant to encourage employees to do even more work. They are designed to reduce the risk for injury, help combat overexertion and fatigue over the course of a work shift and, quite simply, improve people's lives.

—Karl Zelik and Matthew Marino

healthy and energized, and organizations intact and productive.

You should understand upfront: What does success look like? What metrics or factors will your organization use to assess success? Do you have the support needed to roll out exos more broadly if your workers respond enthusiastically?

Also, does everyone in your organization understand that the goal is not for workers to wear exoskeletons so they can handle heavier things? The goal is to protect workers from injury risks, not push them harder.

If you are new to exos, you ideally want support from EHS personnel, management, the workers themselves and also external guidance (e.g., exo vendor) on implementation support.

## PARTING THOUGHTS

There's a lot to consider when exploring exos to supplement and expand your occupational health and safety toolbox. However, exos have never been more practical and approachable.

Sites like ExoskeletonReport.com offer balanced, valuable and accessible information for those interested in learning more about exoskeletons and exosuits.

Exos are now available that can help companies promote a healthier and safer workplace in ways that make financial sense, too.

Active workers are now able to work better—and safer—at their jobs and live better away from them, too. **EHS**

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**Karl Zelik, PhD, is the co-founder and chief scientific officer of HeroWear ([www.herowearexo.com](http://www.herowearexo.com)), a provider of exoskeleton technology for working men and women. He is also a mechanical engineering professor at Vanderbilt University with secondary appointments in the departments of Biomedical Engineering and Physical Medicine & Rehabilitation. He co-directs Vanderbilt's Center for Rehabilitation Engineering & Assistive Technology (CREATE).**

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**Matthew Marino, PT, MSPT, CPE, is director of ergonomics and human factors at HeroWear. He has been an active member of the ASTM F48 Committee on Exoskeletons and Exosuits since its inception and is a founding partner of the ASTM Exo Technology Center of Excellence.**

# Vaccinations in the Workplace

*EHS professionals need to have policies in place to address their workers' expectations and concerns about COVID-19 vaccines.*

By Adrienne Selko



It had never been done before, and many wondered if it was possible. How could the lengthy process of creating a vaccine be accomplished in under a year? It's a testament to the ingenuity and drive of many capable people that only nine months after COVID-19 was declared a pandemic we not only have a vaccine, but we can sign up to receive it in our hometowns.

Not to dampen the jubilation, but the practical aspect of how to manage the process requires thoughtful responses. One of the most challenging is for employers, which are now faced with many ques-

tions: What level of involvement should employers be taking? What are the regulations? How are employees feeling?

Let's start with the sentiment of the general population.

In a survey of 2,000 U.S. adults conducted in November, Sykes, a provider of customer engagement solutions, asked if employers should require employees who work in an office/facility to take the vaccine—54% of the respondents said yes. The requirement reflects the fact that 63% said they will get a vaccine as soon as they are able.

Other studies support those findings.

A study of 1,000 people conducted in December by Eagle Hill Consulting found that 49% of working Americans believe employers should require COVID-19 vaccines. CNBC's survey in December of 9,000 U.S. workers found that 57% want their employer to require the vaccination before they return to the workplace.

And 9% of those who support mandatory vaccines look to employers to cover the cost, according to the Sykes study. While deciding who should pay for the vaccine doesn't seem to be a major issue, a few big-name companies are stepping up and offering incentives to encourage



THRASAK PHUCHOM | DREAMSTIME.

employees to get vaccinated.

In January, for instance, Instacart announced it will pay workers \$25 if they get the COVID-19 vaccine. Trader Joe's said it will give employees two hours of pay per dose. Not to be outdone, Dollar General will give its employees four hours of pay to get the vaccine.

## NO, THANK YOU

However, not everyone is on the vaccine bandwagon. In the Sykes study, 37% of respondents did not want to get the vaccine. When asked for their reasons the answers are as follows:

- I worry about the safety of the COVID-19 vaccine—38%
- I worry about the effectiveness of the COVID-19 vaccine—26%
- I worry about the cost—14%
- I have underlying health issues—12%

These numbers have been changing as vaccines have been administered.

## HOW TO PROCEED

Regardless of public sentiment, EHS professionals must devise policies to tackle this issue. While this particular vaccine is new, how employers handle this isn't, says Gary Pearce, chief risk architect at Aclaimant, a provider of workflow solutions for safety and risk management.

"When you look at any organization, there is an existing relationship between the company and the employees with regard to trust," Pearce explains. "And that's the accumulation of a lot of experiences and impressions and attitudes which creates this culture."

It's this solid relationship that will de-

termine the success of creating policies to deal with the pandemic and any other issues that will arise. "Having a favorable relationship with one's own workforce is arguably of greater importance than ever before," Pearce says. "As we evaluate this issue of mandatory vaccinations and the return-to-work process or how the workforce will change next year, it's not a new situation we're walking into but [rather] adapting a new challenge to an existing situation."

One area that will require a lot of attention is how companies will bring employees back to the office and the associated risks this involves. "While right now we are very dependent on remote work, soon we will return to a more traditional working environment," he predicts.

Given all of these issues, Pearce advises companies address employees' concerns through constant communication.

"You don't communicate with just one message," he says. "It needs to be ongoing. As we look at all these developments on the vaccination front, for example, there's a lot of science involved and not all employees are really up to the task. It's going to be common for employees to look to trusted sources for information and, like it or not, employers need to be a trusted source. If they aren't, they're going to have employment relationship issues."

## COMPLIANCE CONCERNS

Figuring out the right course as it relates to regulation is another challenge employers are facing. "Even in industries where remote work was impossible, there's still going to be an attitudinal, cultural and even a legal shift as we move

forward," Pearce says.

He believes the legal aspect will ramp up once we are past dealing with the day-to-day concerns of the pandemic. He sees an increased willingness on the part of employees to pursue legal remedies. This will arise from higher expectations of safety standards. People will look to their employers to protect them.

"Ensuring the safety of a workplace will not be something that is nice to have," Pearce says. "It will be a must-have."

He warns that if employees feel a safe environment is missing, they might be willing to pursue remedies, which could include filing regulatory complaints, taking to social media to air grievances or changing jobs.

And then there is the overarching question as to whether employers can actually require employees to get vaccinated. While there isn't yet a consensus about this, the direction experts see this going is that employers do have a lot of leeway in what they can require.

With regard to the legal aspect, EHS Today's contributing editor and Washington correspondent David Sparkman cites the opinion of Sherelle Wu, an attorney for the law firm of Bowditch & Dewey. Wu points out that the Occupational Safety and Health Administration permits employers to establish what are considered legitimate health and safety policies, so long as they are job related and consistent with business necessity.

Another government entity, the U.S. Equal Employment Opportunity Commission, which issued new guidance in December, has in the past allowed companies to mandate the flu and other vaccines. The general opinion is that they will do the same for COVID-19 vaccines.

Of course, there are a variety of circumstances that need to be considered, and policies must comply with the Americans with Disabilities Act and Title VII of the Civil Rights Act of 1964.

Navigating the regulatory issues while simultaneously addressing the workforce needs will be quite a challenge for most companies. However, at the end of the day, Pearce observes, the workforce needs to believe that the employer is doing the right thing by balancing the needs of the organization with the safety of the employees. **EHS**



# What's Next for Smart PPE

*How a confluence of factors, including the COVID-19 pandemic, are helping to reimagine safety technology at the workplace.*

By Nicole Stempak

As the saying goes, necessity is the mother of all invention, then the EHS market will proliferate in the aftermath of COVID-19.

Following years, decades even, of fighting for attention, budget and—if we're being honest—respect, safety is being finally viewed in a new light. As a result of the global pandemic, people are hearing the call for safety. And, OK, they might not always be heeding all the advice.

But for the most part, there's a greater sense of awareness and recognition that the same EHS professionals who pester them about filling out paperwork are also the ones trying to keep workers from catching a highly contagious disease.

COVID-19 is changing the conversation about safety at the workplace, accelerating slowly building trends and quickly demonstrating a return on investment, a critical component to management support that has sometimes been intangible. All of that will help build the case for, and hopefully buy in, for more prominence in the decision-making process and bigger safety budgets to purchase new tools

and technology. One area that's ripe for change: smart personal protective equipment (PPE).

Technavio, the global technology research and advisory company, released a report in July 2020 that predicts the global smart PPE market will grow by \$2.25 billion from 2020-2024 and the market will accelerate at a compound annual growth rate of more than 16%.

## THE RISE OF SMART PPE

Smart PPE is part of the larger movement for the connected workforce and the Industrial Internet of Things to improve workplaces safety and achieve operational excellence.

Smart PPE refers to smart wearable equipment that connects to the Internet or other devices, such as Bluetooth, to deliver real-time safety information to workers in the field as well as managers remotely. These wearables can track movements, send voice messages, monitor body temperature, issue alerts and record audio and/or video. They're often paired with a cloud-based analytics

platform, and sometimes they pair with a smartphone app, too.

There are thousands of different data points smart PPE can capture and track, which can be used to address any number of safety concerns, everything from fever to heat exhaustion to fatigue to improper lifting motions.

"It's a huge space, and so being honest about what problem we're trying to solve is really critical," says Rodolphe d'Arjuzon, Ph.D., co-founder and global head of research and finance director of Verdantix, an independent research and consulting firm focused on EHS, operational excellence, smart buildings and sustainability technologies.

There's a proliferation of devices, fabrics and platforms that can both solve all and none of your problems at once. Part of the reason is that the smart PPE market has changed dramatically over the past decade. Established companies, such as 3M and Honeywell, have introduced product offerings as have plenty of startups, such as Guardhat, Corvex Connected Worker, Eleksen, Kenzen, MākuSafe, Bodytrak and Seebo. Sometimes, those startups attract attention from investors, as was the case when global insurance firm AIG partnered with now-defunct startup Human Condition Safety in 2016.

Momentum for smart PPE has been slowly building, aided by advancements in technology and a decrease in hardware costs. There are still plenty of barriers to entry, but the conversations surrounding



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## Technology advances will refine existing smart PPE and give way to new developments.

smart PPE are different this time.

“Before COVID hit, I’d say there was a growing awareness [of smart PPE], but the adoption was low,” says Bill Pennington, research director for EHS at Verdantix. “It was nice to have. Now, it’s not as much a nice to have as it is a need to have.”

Pennington says prior to COVID-19, smart PPE was more likely to be deployed by a certain division or for a certain condition at a large corporation like Shell or Chrysler. The pandemic is demonstrating that smart PPE manufacturers can spur large-scale adoption by leveraging their capabilities and reducing costs so small- to medium-sized enterprises can see improvements.

As smart PPE has gained traction, so too have consumer wearables. Widespread reception to, and adoption of, smart consumer electronics such as fitness trackers and smartwatches have whet wearers’ appetite for more data. They’ve also made the general public more comfortable with wearing these devices.

In January 2021, analyst firm Gartner Inc., forecast the worldwide end-user spending on wearable devices will total \$81.5 billion in 2021, an 18.1% increase from \$69 billion in 2020. Gartner, in a news release, acknowledged “the rise in remote work and an increased interest in health monitoring during the COVID-19 pandemic was a significant factor driving market growth.”

### THE IMPACT OF COVID-19

The startup Kenzen focuses on physiological monitoring—heart rate, hydration and core body temperature—to prevent industrial workforce injuries caused

by heat, overexertion, fatigue and fever. Workers wear an armband that records their data, which can be accessed by workers themselves via an app and their managers via a dashboard.

Kenzen co-founder and COO Heidi Lehmann says the risks and costs associated with heat stress are easily understood, allowing companies to see the return on investment that Kenzen offers. She has been fielding inquiries from Fortune 500 companies, and Kenzen is conducting multiple pilots with large multinational conglomerates in oil and gas, mining and the construction industries.

Early on in the pandemic, Lehmann and her team recognized their expertise could also be used to detect fevers, a common coronavirus symptom. That helped reposition the wearable as a way to reduce COVID-19 transmission at the workplace. That’s one way that Kenzen and other manufacturers can help companies find a smart PPE solution now while opening the door for future conversations down the line.

To better understand what companies are planning, Verdantix interviewed 301 EHS decision makers across 31 countries and 25 industries for a 2020 survey on EHS budgets, priorities and technology preferences. Of these respondents, 74% were from firms with revenues greater than \$1 billion and 71% held titles of director or above. When asked how their firm’s spending on PPE will change in 2021 compared to 2020, 51% say it will increase and 47% say it will not change. Of 15 categories, PPE reported the most planned increase in budget.

It’s worth noting that the survey category includes all kinds of PPE, both

smart and traditional. PPE supplies have been front and center during the pandemic, both for employers trying to protect their workers and for workers trying to protect themselves and their families. That has led to unprecedented consumer and business demand for respirators, gloves, safety shields and other gear to prevent the spread of SARS-CoV-2, the virus that causes COVID-19.

Part of what’s driving the all-time high demand is a need to maintain adequate inventory, a challenge since manufacturers are still trying to stabilize the supply chain. There’s also a growing recognition that it will take longer than initially hoped before a majority of the population is vaccinated, so these COVID-19 safety precautions will need to continue for the coming months.

In the meantime, employers can face penalties for not protecting workers, and they will likely be held to higher standards in the new administration. In President Joseph R. Biden’s first week in office, he signed an executive order directing the Occupational Safety and Health Administration (OSHA) with issuing new COVID-19 guidance to keep workers safe.

“The EHS function has been digitizing slowly over the past several years,” Pennington says. “It’s a laggard compared to operations and other business units, but COVID-19 has actually accelerated it because people have realized they can’t do their job the same way without leveraging digital technologies.”

### WHAT’S NEXT

d’Arjuzon adds that for months, many companies haven’t been in a position to pilot or purchase new technologies or smart PPE. They’ve leveraged what tools, data and information they already had to help mitigate risk of COVID-19 exposure. As the pandemic wears on, employers of all sizes must be more forward-looking while acknowledging an unpredictable future.

“In an emergency, you don’t necessarily look at cool cutting-edge innovations,” he says. “You look at what works, what’s proven, what you already have, what you can make do with, what can be ordered in quantity and what you can deploy really quickly.”

We're by no means out of the COVID-19 woods yet but what's around the corner is starting to come into focus.

"Safety leadership can see the light at the end of the tunnel and a return to normal operations in 2021, including the unthawing of the budgeting freezes that affected many organizations in 2020," says Robert Thomma, vice president of EHS sales Americas for Bodytrak. "They have a thirst for new technologies that can help them keep their workers safe, and they are ready to start exploring what's out there."

Bodytrak is a wearable for physiological monitoring of key vital signs such as core body temperature, heart rate, VO<sub>2</sub> and motion (including fall detection). The in-ear device also provides two-way audio communications and features both hearing protection and ambient sound transparency.

Thomma says many companies they've spoken with deferred buying decisions in 2020 because of uncertainty surrounding COVID-19. Now, those that have continued operating throughout the pandemic feel comfortable adding Body-

trak to their worker safety toolkit.

There's optimism to be sure, but there are still barriers to adopting smart PPE. As more companies resume or start investing in smart PPE, they are faced with the same thorny questions and concerns that have plagued smart PPE for years. How do companies protect worker privacy? What happens if the devices malfunction and an accident occurs? How do companies encourage employees to wear and engage with the technology? There are no easy answers to these and other questions. But maybe COVID-19 has reminded companies and workers alike what really matters: Going home and having a family dinner at the end of the day.

"The companies that we work with are forward-thinking, and what they told us is, 'If something bad happens, we're going to get sued. We would much rather have the opportunity to try to find something and fix it before it happens. It's the right thing to do, and we think it will make us look better for our employees that we care. We're try-

ing to be proactive. We're investing in technology to try and make them safer,'" says Gabe Glynn, CEO and co-founder of MakuSafe, an armband wearable that gathers real-time data on environmental conditions, potentially hazardous human motion, proximity and other risks. The device also allows workers to record voice memos and other observations.

Billion-dollar companies still use Microsoft Excel or pen and paper to record safety information. Workers probably won't be all decked out in wearables in the next five years. During that time, the smart PPE market will see plenty of entries, bankruptcies, mergers and acquisitions. Hardware advances will refine existing smart PPE and give way to new developments.

These changes are part and parcel of adopting new technology. And while seeing the future can feel like walking through heavy fog right now—we're still in the throes of a pandemic, after all—one thing is clear: COVID-19 will have a lasting impact on the adoption of smart PPE for years to come. **EHS**

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## Remote Workplace SAFETY CHECKLIST

*Help your employees assess workspace risks and implement proper safety measures to control and reduce injuries outside the office.*

By John McFarland

**T**he COVID-19 pandemic has changed the way we work, how businesses operate and our work-life balance—especially when working from home. Remote work, working from home or telecommuting has become one of the most widespread, immediate results of the pandemic.

With a new or reinvigorated remote workforce comes specific challenges such as increasing collaboration, maintaining social interactions and managing distractions. For employers, though, it's important to keep the challenge of reducing risk and providing a safe working environment top of mind, even when employees are not physically on-site.

Remote work has made it more difficult for employers to assess employee workstation needs to mitigate risk and

injuries. Employers should provide their remote employees with a safety checklist to help them assess the workspace risks and implement the necessary safety measures to control and reduce injuries outside the office.

There is value in creating a safety plan focused on remote employees as many risk factors in an office space can carry over to an employee's home space. That includes ergonomic issues; slips, trips and falls; and work-related stress, including mental health. However, identifying each remote work situation is not feasible.

Therefore, the responsibility also falls on employees to make sure they are assessing their current workspaces and following proper safety procedures to reduce the risk of injury or illness while working remotely.

Working remotely can lead to bodily

injuries with long-term effects. Eyestrain and musculoskeletal injuries such as neck or back pain are common with remote workers. Sometimes referred to as over-use injuries, these develop from repetitive trauma due to a lack of movement or proper workspace setup. Mental strain and the lack of social interaction, combined with extended working hours, can result in fatigue and a decline in productivity. To avoid these common injuries while working remotely, provide your employees with the below checklist to mitigate risk and prevent potential long-term injuries.

### ERGONOMICS

Ensure your workplace follows these guidelines from the Mayo Clinic to prevent fatigue and body injury.

- *Choose the right space.* An ideal workspace should have adequate lighting to avoid eye strain; an appropriate work surface, such as a desk or table; and is set apart from busy areas in the home to allow for optimal focus during work hours.
- *Get up and move.* To reduce muscle soreness and pain, try to change your posture frequently. Don't sit or stand for ex-

tended periods of time.

- *Check your posture.* Your shoulders shouldn't curve inward or forward, and your head shouldn't bend so that your ears are at shoulder-level. To keep yourself from slouching, pretend there is a string attached to the top of your head, pulling you upright. This will help to avoid back and neck pain.

- *Keep an eye on your monitor:* When setting up your computer screen, make sure the top of the monitor is at eye level. This will avoid neck and eye strain. If working on a laptop, try plugging in a wireless keyboard and mouse and prop the laptop up on some books to make the top of the screen level with your eyes.

- *Choose the right chair.* When seated, your knees should not be higher than your hips. This will help avoid lower back pain and reduce the pressure on your spine while seated.

## SLIPS, TRIPS AND FALLS

Common injuries like slips, trips and falls are just as relevant to the remote environment as they are to the office environment. Ask employees to take a look around their remote workspace and make sure the floors are clear of any hazards. Risk management consulting firm Willis Towers Watson offers these suggestions:

- *Clear the floor of any obstacles.* This may include toys, boxes, books, or loose or dangling cords.

- *Repair any loose carpeting and secure lifted corners on rugs.* Frayed or torn carpeting and unsecured rugs can easily cause trips if the loose areas are caught underfoot while walking. Be sure to repair any worn patches to avoid tripping.

- *Watch your step.* Stairs are another place where slips, trips and falls can occur. If your workspace requires you to go up or down flights of stairs, be careful not to carry too many items in your hands while on the stairs. One hand should be free at all times to hold onto the railing.

## FIRE SAFETY

Just like in an office space, proper fire safety is a must for your remote workspace. SafetyCulture recommends the following:

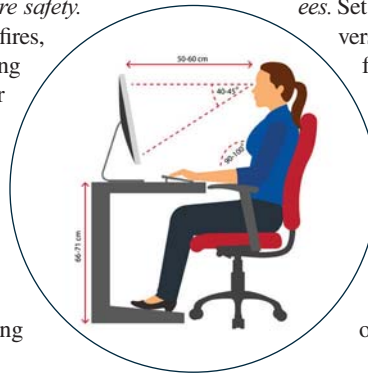
- *Inspect cords.* Electrical cords and

extension cords should be in good condition. Make sure they are not frayed, prongs are not bent or damaged and your outlets are not overloaded with too much power. Any cord that feels hot or is giving off excessive amounts of heat should be unplugged.

- *Practice general fire safety.*

To avoid potential fires, make sure the following are present in or near your workspace:

- A working smoke detector: Check the batteries at least twice per year to see if they need replacing.
- A functioning



## Check Your Posture.

Your shoulders shouldn't curve inward or forward, and your head shouldn't bend so that your ears are at shoulder-level.

fire extinguisher: Make sure you are inspecting your fire extinguisher regularly and follow proper fire extinguisher usage. Fire extinguishers should be stored in a place that is easily accessible; inspect the physical state of the extinguisher for any dents, slits in the hose, and be sure the locking pin is intact; and check the pressure gauge to make sure the needle is in the green zone.

- Have an evacuation plan in the event of a fire: You and everyone in your household should be aware of the evacuation plan to ensure everyone's safety. This plan should include identifying an outside location away from the property where you would meet.

## STRESS & MENTAL HEALTH

Managing employees' stress levels and overall mental health is even more important for remote workers. As the employer, you should take an active interest in the mental health and well-being of

your employees while working remotely.

- *Ensure employees are not inadvertently overworking.* Employees should still be encouraged to take regular breaks, eat lunch and maintain standard business hours when possible.

- *Keep in regular contact with employees.* Set aside time for casual conversations as a replacement for what on-site employees would be engaging in at the office over a cup of coffee or walking around.

- *Ask employees to dedicate a workspace.* This allows them to focus on their tasks free of most distractions. This

will help recreate the physical separation from work and home life.

While the pandemic has necessitated that many companies adopt remote work, on-the-job work injuries can still occur. Employers should assist employees with creating as safe a working environment as possible.

By implementing proper ergonomics and following general safety guidelines to reduce common injuries, employees can reduce their risk of common injuries, maintain good mental health and prevent work fires while working in their remote environment. Providing employees with a remote safety plan gives them have the tools and information they need to make their home workspace safe and make them productive. **EHS**

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**John McFarland is senior vice president of client development with Vensure HR ([www.vensure.com](http://www.vensure.com)), a provider of human resource services for small and mid-market companies.**

# Reduce **ARC FLASH RISKS** W

*The right technologies and proper installation can reduce exposure to arc-flash events and other electrical hazards.* **By John Kay**

Industrial companies have put a greater focus in recent years on addressing a top electrical safety risk: arc flash events. Arc flashes can be created by a wide range of actions, from a dropped tool, to the build-up of conductive dust, to improper work procedures. And the resulting massive heat and energy waves created by them can reach temperatures of up to 35,000 degrees Fahrenheit.

Arc flash events create serious risks in nearly all industrial operations. The proper use of appropriately sized and applied low- and medium-voltage motor control centers (MCCs) can reduce the likelihood of arc flash events, but the risk still exists. Fortunately, MCCs can be enhanced to further reduce risks to both people and equipment.

There are three primary safety-enhancing technologies worth knowing about for an MCC, and it's important to understand not only the technologies but also the importance of proper installation. This can help ensure critical safety capabilities are retained during and after equipment implementation.

## REMOTE ACCESS AND MONITORING

The safest way to interact with any MCC is from a distance through the use of remote connectivity. By not requiring workers to approach the MCC in the first place, companies can reduce the risk of people being exposed to voltage and power.

Low- and medium-voltage MCCs are available with built-in Ethernet networking and software that make remote monitoring and access possible. The MCCs al-

low operators to monitor energy usage and operating conditions, receive notifications and diagnose issues or faults—and even make programming changes—all from the comfort and safety of any remote location.

These capabilities are built into the MCCs and can be preconfigured to reduce integration and setup time.

## ARC-RESISTANT EQUIPMENT

When workers do



need to physically approach an MCC, an enhanced, arc-resistant version of the MCC can further mitigate risk and provide increased protection from arc-flash events.

Arc-resistant MCCs incorporate multiple design features to contain and control the pressurized arc event byproducts and then safely direct them away from personnel.

Some equipment offers different arc-resistant design options to better meet the needs of specific applications. For example, a device-limited design option can contain an arcing fault for the time it takes a pre-tested main protective device to clear a fault. This can be ideal for applications that need a wider variety of structural or unit options. A duration-limited

design option can contain an arcing fault for a predetermined current level and tested amount of time. This option is recommended for applications that require high bus short circuit currents levels or specific types of mains.

When choosing arc-resistant equipment, it's important to make sure a vendor's proposed solution has been tested for compliance with the rigorous arc-resistance requirements in standards such as

IEC/TR 61641 or IEEE C37.20.7. Equipment is only arc resistant if the following criteria are met during testing:

- Doors and covers do not open
- Parts are not ejected from the equipment
- The arc does not burn holes in the tested structure's exterior
- Untreated cotton test indicators are not ignited or perforated
- Grounding connections remain effective.

Of course, choosing properly designed and compliant

arc-resistant equipment is just one consideration. Making sure it's installed in accordance with the manufacturer's requirements is just as critical.

## The Importance of Proper Installation

A lack of familiarity with arc-resistant equipment creates the risk that installers may not follow the equipment manufacturer's specific installation requirements. For example, they may leave screws out of panels, replace or not use supplied cover plates where wires are to enter, use oversized or misaligned conduits, or not properly install or seal the arc-gas ducting system.

These practices—often used to save

# With Motor Control Centers

time or money during an installation—can result in openings in what effectively disable the sealed system of the enclosures and arc-gas control devices. That can create a very dangerous situation for personnel.

If an arc event does occur, pressurized arc gases will seek the point of least resistance. And if extremely hot gases and vaporized metals escape through unintended openings, they could harm people, damage nearby equipment, or ignite dust or other flammable components in the area.

To help make sure arc-resistant equipment functions as designed—and to reduce risk to workers—it's essential that the equipment be installed according to the manufacturer's requirements. Fortunately, there are some measurable steps that users can take to help make sure electrical contractors install equipment correctly.

## Reinforcing Correct Equipment Installation

To date, electrical standards don't provide specific guidance for installing arc-resistant equipment. However, they do require that the equipment be installed according to the supplier's requirements.

In particular, the latest version of NFPA 70E requires that users verify the equipment is properly installed and maintained. The phrase "properly installed" means the equipment is installed in accordance with applicable industry codes and standards as well as the manufacturer's requirements.

How can users make sure that arc-resistant equipment is installed correctly?

First, they should include the equipment vendor's installation documentation in their request for quotes (RFQ). Doing so will give electrical contractors an understanding of the scope of work before they bid on it. The contractors can then incorporate into their budget and project plan any additional time required to install the specialized equipment.

Users of arc-resistant equipment should also reach out to the equipment manufacturer. Especially for first-time buyers, the manufacturer can serve as a helpful resource, such as by answering questions about the installation or use of equipment.

The manufacturer can also supply useful equipment documentation and images that can be used as part of the RFQ process.

Another way users can reinforce proper installation practices is by incorporating



**To help make sure arc-resistant equipment functions as designed—and to reduce risk to workers—it's essential that the equipment be installed according to the manufacturer's requirements.**

it into their electrical safety program. For example, they should have a process for verifying that equipment has been properly installed and that ongoing maintenance and inspection requirements are performed according to the vendor's requirements.

## CLOSED-DOOR POWER DISCONNECT

A low voltage MCC that allows operators to disconnect and reconnect power

from an individual MCC plug-in unit without opening the unit door can reduce exposure to electrical shock and hazards.

Here's how it works: When an operator turns the unit to the "disconnect" position, the power stabs that connect the unit to the MCC vertical bus to establish power are disconnected and retract inside the stab housing. Once the power stabs are securely inside, the stab housing shutters close and the disconnected state can be verified. When operators turn the unit back to the "connect" position, the power stabs reconnect with the vertical bus.

Lock-out mechanisms can also be used to help prevent the power stabs from being connected and the unit from being placed back into service.

Another option to increase safety is with remote operation. This allows operators to use a wired or wireless controller to disconnect and connect unit stabs from up to 300 feet away, which can remove the operator from the arc flash boundary and further minimize exposure to hazards.

## BENEFITS BEYOND SAFETY

Selecting a complete MCC solution that combines these three technologies can help reduce personnel exposure to electrical hazards. What's more, the technologies can also deliver valuable business benefits beyond safety.

For example, the built-in technology that enables remote monitoring and reduces the need for operators to approach the MCC can also give plant teams access to valuable information, such as real-time diagnostics and advanced warnings. These insights can help speed up troubleshooting, reduce downtime and ultimately benefit the bottom line. **EHS**

**John Kay is a principal application engineer with Rockwell Automation ([www.rockwellautomation.com](http://www.rockwellautomation.com)), a provider of industrial automation and information products. He is a Fellow Member of the IEEE and is actively involved with several technical committees, including various standards development and review subcommittees for the IEEE and UL.**

# Create Safe and Healthy Warehouse Environments through **Data-Driven Technology**

*Companies are implementing new technologies to prevent injuries, reinforce safety protocols and reduce COVID-19 spread.*

**By Kristi Montgomery, Allen Polk and Miguel Trivino**

**M**aintaining a safe and reliable warehouse environment for employees is the top priority for facility managers across the supply chain. As a result, companies go to great lengths to foster a culture of safety. With so much unpredictability, safety training must be at the core of successful operations to eliminate workplace accidents.

However, the biggest barrier to delivering this heightened degree of safety is often the high workforce turnover driven by an increasingly competitive industry. It can be difficult to effectively maintain protocols and communicate a consistent level of urgency with a constant rotation of employees.

As a result, companies involved in transportation and warehousing are increasingly turning to the power of technology to reinforce safety protocols to fill any gaps in training created by employee turnover. From advanced Internet of Things (IoT) sensors to artificial intelligence (AI) and machine learning (ML), companies are optimizing their warehouse safety practices with the latest emerging technologies to create a safer work environment.

## WAREHOUSE SAFETY STARTS WITH DATA

Reliable data has proven to be foundational to warehouse safety. Previously, decisions around safety were made by safety managers who physically monitored employees on-site, manually identified hazards and rectified any potential danger. This method is no longer practical during the COVID-19 pandemic. Due to social distancing guidelines, security managers are tasked with maintaining a consistent quality of leadership and safety often without being physically available



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on the floor. Fortunately, safety can be remotely monitored through the collection and strategic utilization of data.

By augmenting existing and traditional tools, such as telematics, with advanced IoT sensors, warehouse managers can gather valuable data to make those technologies safer and more productive. For example, sensors added to material handling equipment (MHE) provide greater insight into operator activity and performance by instantly measuring and reporting on factors such as speed, proximity and impacts. The simple presence of safety monitoring sensors can have a positive impact because they act as a reminder to employees that their MHE performance is being reported. When integrated with additional capabilities, these tools can transform a company's safety strategies.

## TURNING REAL-TIME DIGITAL INFORMATION INTO ACTIONABLE INSIGHTS

By employing AI technology, companies can take their data to the next level by strategically turning their existing data into actionable insights. Leveraging AI and ML, advanced solutions can

automatically notify warehouse managers of any safety protocol infractions and provide actionable next steps, such as instructions on additional employee training. Management then has the information it needs to quickly intervene and prevent any additional breaches in safety.

These technologies can also send helpful reminders of safety best practices to MHE operators' mobile devices in real time, maximizing their effectiveness. For instance, back injuries are some of the most common workplace injuries in warehouse environments due to the constant bending, lifting and standing that are required of the job. Wearable IoT sensors are proving to be an innovative solution to reducing or avoiding these injuries. Clipped to the back of the shirt collar, these devices use ML capabilities to determine a baseline for normal movements. Should individuals make a movement deemed abnormal and potentially hazardous, the device vibrates, alerting them of hazardous body movement. Dashboards provided by the wearable IoT sensor can provide immediate, in-the-moment feedback and coaching to the individuals. That enables individuals to quickly learn and adapt their behaviors.

When leveraged in conjunction with each other, these technologies contribute to the creation of a smart warehouse. This optimized, highly efficient environment provides the data and ML necessary to predict safety infractions or accidents before they happen. Rather than simply waiting for an incident, leadership can be proactive, glean insight into where additional training is needed. And because these technologies rely on real time and readily available data, they are not impacted by sudden employee turnover. Thanks to technology, safety managers have the tools they need to protect their workforce.

## EVOLVING WAREHOUSE SAFETY IN THE AGE OF COVID-19

The COVID-19 pandemic has completely changed how businesses across industries operate, and this also rings true for logistics companies. One of the most important trends that has emerged during the pandemic is the convergence of safety and health. Due to COVID-19, no warehouse can truly be considered safe for employees if it is not also a clean, healthy environment. As a result, infection fighting technologies have quickly become best practices for safety-minded companies.

Contact tracing devices have been implemented in warehouses to provide safety managers with granular information about employee interactions while remaining respectful of individual privacy. Should an employee contract COVID-19, safety managers can quickly trace their contact points to determine who must quarantine, helping to mitigate the spread of infection throughout the warehouse. In addition, the implementa-

tion of electronic checklists enables touchless operations, reducing the back-and-forth of paperwork that can require close proximity and could therefore potentially spread disease. Installing thermal camera solutions at warehouse entry points enables automated temperature checks, allowing safety managers to prevent possibly contagious individuals from entering the facility.

Finally, robotic cleaning devices assume the risks of sanitizing the entire warehouse from its human counterparts, ensuring all assets are clean and ready for operation. These technology implementations contribute to a healthier, and therefore safer, workplace for all.

## PREDICTING THE FUTURE OF INTELLIGENT WAREHOUSE SAFETY


The last few years have seen incredibly rapid innovation in warehouse safety technologies, and this momentum is only expected to accelerate in the future. With

emerging solutions ranging from mechanical exoskeletons that augment lifting movements to intelligent dock locking devices, it is clear that companies will continue to turn to technology when crafting their safety strategies.

Whether you are concerned about workplace injuries or viral infection, there is a technology implementation to meet your needs. By combining a culture of safety with powerful, data-driven technologies, companies can ensure they are providing their workforce with the most comprehensive and resilient safety protocols possible, regardless of workforce turnover.

Ultimately, a company's greatest asset is its people, and when a company lets data lead the way, it can protect its people with a forward-thinking warehouse safety strategy. **EHS**

***Kristi Montgomery is vice president of innovation, Allen Polk is vice president of sales, and Miguel Trivino is director of EHS at Kenco (www.kencogroup.com), a provider of integrated logistics solutions.***



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# Done Right, Inclusivity Is GOOD BUSINESS

*When a diverse workforce feels safe psychologically, they perform better.*

By David Sparkman

**T**here is a lot of controversy surrounding workforce diversity training in the United States right now, and that is not likely to go away anytime soon. One fact management needs to remember is that when inclusive policies are implemented correctly, they add to workplace harmony and improve productivity.

Studies conducted by several top universities and consultancies support the idea that diversity makes teams work harder and delivers a higher quality of work. In 2018, McKinsey & Company reported that public companies in the top quartile for gender diversity and ethnic and racial diversity in management were 21% and 33%, respectively, more likely to have returns above the industry mean.

A Boston Consulting Group study also found that companies with higher

levels of gender, geographical or industry diversity also enjoyed greater revenue derived from the development of new products and services. (The same study also found that innovation jumps once the proportion of female managers within an organization rises above 20%.)

But you can't have innovation if employees are afraid to speak their minds.

"A workplace where employees believe they can speak up candidly with ideas, questions and concerns, and even make mistakes without fear of reprisal or adverse repercussions, contributes to inclusivity and can improve performance. This construct is called psychological safety," says Michael D. Thomas, principal attorney in the Los Angeles office of the Jackson Lewis law firm.

"When employees feel free from worrying about repercussions—how they will be perceived or what people



will think of them—they are able to be more engaged and connected in the workplace. They spend less time and energy being stressed or anxious, can create more mental space to think creatively, share their unique perspectives and are more actively engaged in problem solving.”

Thomas offers the following advice for how management can create a safe, inclusive environment for their employees.

**Understand stereotypes and preconceptions, and conduct a diversity, equity and inclusion (DEI) assessment.**

“We all have conscious and unconscious biases,” Thomas says. “Unconscious biases are more concerning because, by definition, we are not fully aware of them.

“Unconscious biases are beliefs about certain groups of people that individuals form outside their own conscious aware-

Put yourself in the shoes of a new employee and try imagining what they are going through, especially when this person is a different race, age, gender identity, sexual orientation, ability or status from the majority of employees.

ness. A critical step in creating psychological safety is to understand one’s personal biases, along with those of the organization.”

Thomas explains that an initial step in creating psychological safety is discussing bias as well as conducting anti-bias training. However, implementing diversity initiatives in a vacuum can actually turn out to be harmful for an organization.

A better approach is to conduct a DEI assessment in accordance with key metrics and cultural indicators, and then prepare a DEI strategic plan to inform development of effective initiatives.

(DEI assessment tools and plans are widely available and can be easily found through a quick search of the Internet. One simple, easy-to-understand plan for creating one comes from the Society for Human Resource Management.)

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**Empathize and be curious.**

Thomas recommends putting yourself in the shoes of a new employee and try imagining what they are going through, especially when this person is of a different race, age, gender identity, sexual orientation, ability or status from the majority of employees.

Don't apply a one-size-fits-all approach to creating teams or assigning supervisors without understanding the potential for those who are underrepresented to feel excluded. Empathizing with the experience of employees who may be doubted or judged because of personal characteristics could change how you create teams and assign supervisors.

Empathy and curiosity in the workplace include asking employees about their ideal supervision: the style of communication (email, call or face-to-face meeting), type of feedback (direct or example), and frequency of checking in (daily or weekly). This doesn't mean that you have to accommodate all these requests, but listening and trying goes a long way, Thomas says, because it builds trust and encourages employees to "buy-in" and feel engaged.

**Onboard with intentionality.**

An important step in mitigating cultural barriers occurs at the start of employment in the form of effective onboarding. Thomas cites research showing that this brings new employees up to speed 50% faster, which means they're more quickly and efficiently able to help the organization achieve its desired goals. Effective onboarding also is said to dramatically reduce failure rates and increase employee engagement and retention.

Often, employers believe the best approach is to hire talent and provide training over time. "But making efforts to help employees feel welcome and valued up front will build confidence and belief that they belong," Thomas says. "It will also reduce stress and anxiety and create an initial feeling that it is safe [for employees] to engage or add value. Moreover, if an organization lacks diversity, careless onboarding can heighten feelings among underrepresented employees of not belonging."

**Be consistent.**

Litigation can arise when communication and behavior do not align. Make sure actions match your messaging. In recent months, many employers have released statements committing to fight against racism and to promote diversity and inclusion. "Public statements and training, however, must result in changes in workplace behavior," Thomas warns. "Otherwise, you lose credibility with employees."

Similarly, some workplaces have unwritten rules on achieving success that can

"When management takes the time to build an understanding of other people, [employees] become more comfortable to speak up," Thomas says. "It is helpful for workplaces to think of ways to foster and support positive, healthy interactions among employees." This may include collaborations across teams, informal discussion at periodic team meetings, or setting boundaries and expectations for employee interpersonal engagements that are informed by inclusion.

When you create a work environment where employees see a representation of themselves in varying positions within the workplace, they are more likely to feel comfortable being themselves.

run counter to an inclusive environment because of inconsistency between written metrics for performance and promotion and workplace realities. If a functioning inclusive environment is in place, there would be no need for any unwritten rules. Until that is the case, Thomas says knowing the unwritten rules or what they may be up against at a minimum empowers individuals to make more informed decisions about navigating their way.

Psychological safety ultimately involves trust, which takes time to build and work to keep. If an employer's actions are inconsistent with its diversity and inclusion messaging, it will lose credibility. "Employees, particularly those who are underrepresented or who have been marginalized, will feel less safe in the workplace because of these inconsistencies," he says.

**Develop opportunities for more interpersonal interactions.**

Employees need to have more opportunities to interact organically to form social bonds and trust over time. If employees feel more comfortable in the workplace, they are more likely to discuss any disputes internally and try to resolve them cooperatively.

**Recognize the value of a diverse pool of employees.**

When employers create a work environment where employees see a representation of themselves in varying positions within the workplace, they are more likely to feel comfortable being their authentic selves. One way to achieve this is by increasing the diversity of the pool of candidates considered for positions. Thomas offers the Rooney Rule in the National Football League and the Mansfield Rule adopted by numerous law firms as two examples of ways to increase diversity within all levels of an organization.

"Diversity and inclusion is a journey," he says. "Like most journeys, a well-crafted vision is key to its success, but be wary of legal traps. Failing to think strategically about diversity can result in employees feeling unsafe in the workplace.

"A well-crafted diversity and inclusion strategy fueled by data from a diversity assessment creates more employee engagement; less employee turnover; and, importantly, helps reduce stress, anxiety and fear that may result in litigation." **EHS**

*David Sparkman is founding editor of ACWI Advance (www.acwi.org) and contributing editor to EHS Today.*

# NEW PRODUCTS

## Work Gloves



Keep your fingers safe while retaining the dexterity you need for the job at hand. The Brass Knuckle SmartCut BKCR2403 are light-duty, cut-resistant gloves that offers cut and abrasion resistance while retaining flexibility. These gloves are made from an 18-gauge high performance polyethylene and feature a black polyurethane palm coating for nimble handling and enhanced grip. The Brass Knuckle SmartCut provides ANSI Level 2 cut resistance, making it suitable for light-duty job functions in industries such as construction, manufacturing, metal fabrication, and electrical and general assembly.

### Brass Knuckle Safety Products

[www.brassknuckleprotection.com](http://www.brassknuckleprotection.com)

## Fabric Face Masks

Milwaukee Tool has designed fabric face masks for the job site. The 3-Layer Performance Face Mask and 2-Layer Face Mask are lightweight, breathable face coverings for all-day wear on the job site that also meet the CDC's recommendations to protect against COVID-19. The face masks feature adjustable ear loops and flexible nose bridge and are available in two sizes, S/M and L/XL. They are reusable and machine washable.



### Milwaukee Tool

[www.milwaukeetool.com](http://www.milwaukeetool.com)

## Safety Sneakers

KEEN Utility has launched the Vista Energy line of shoes for men and women who work in warehouses and factories. The Vista Energy styles combine the athletic style and comfort of street shoes with safety features to safely maneuver the plant floor. The shoes feature asymmetrical carbon fiber toes that are 15% lighter than steel. The oil- and slip-resistant outsole with water-diverting channels maximizes surface area and improves traction. Vista Energy shoes feature a lightweight, compression-resisting midsole and a non-marring, two-layer mesh upper for increased breathability.



### Keen

[www.keenfootwear.com](http://www.keenfootwear.com)



## Anti-Fog Film

SABIC has launched the LEXAN HP92AF Anti-Fog film to help frontline workers see clearly and stay protected against COVID-19. The anti-fog film is designed to stay fog free so workers can wear PPE without having to frequently remove them and wipe them down. The film allows workers who wear clear safety visors, lenses and goggles to see even in high humidity environments, including those with transition zones between controlled and uncontrolled work climates. The film product features a one-sided coating that extends the time-to-fog even at very high ambient humidity.

### SABIC

[www.sabic.com](http://www.sabic.com)

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## AN ACCIDENT WAITING TO HAPPEN

*When practicing what you preach, start by acknowledging your own unsafe behaviors. Then make plans to correct them.*

I enjoy cooking, and I'd say I'm a decent cook. I know how to follow a recipe, and I've learned a trick or two over the years. If you were a dinner guest, I think you'd enjoy your meal. But you might not like it if we were cooking alongside each other in the kitchen.

I'd never serve you a sneeze muffin or something that had fallen on the floor. I'm meticulous about disinfecting surfaces where meat has been prepped. I always wash my hands before and between tasks. But I'm also clumsy pretty much all of the time, and I'm unwieldy with my chef's knife.

Over the past two years, I have found myself at the center of some unwanted attention from my boyfriend and mom. They both agree, and have bonded over the fact, that I'm an accident waiting to happen in the kitchen.

They'll usually volunteer to do any chopping, dicing, mincing or julienned. I don't protest, especially with onions. My eyes burn and water so much that I usually struggle to keep them open. My mom bought me a pair of onion goggles a few Christmases ago that help, but because they form a kind of suction to your face, I must take off my glasses to use them. Even with my nearsightedness, I squint to see what's in front of me, creating a very unsafe situation.

My boyfriend pretty much summed it up the other night as I was attempting to cover baked penne that was already in the oven with aluminum foil. I was struggling with the wire rack and the oven mitts to cover the 9x13 pan. After I finally managed, my boyfriend simply remarked, "You always find the most dangerous way to do things." I countered that the oven mitt had a hole in it, but I'm not sure that helped my case.

I have never been bothered by my poor cooking techniques before because I've always thought that I had a good feel for the process (and pretty quick reflexes). But hearing some of your stories has made me think twice. I don't want to lose a fingertip or feeling in my arm be-

cause I suck at cutting onions. I've had dozens of near misses, and while I'm certainly thankful, I realize I need to change my ways to avoid an all but certain future.

I know the stakes are much higher on the job site, but perhaps my pedestrian example can serve you. Are there things that you know you do (or others have pointed out) that can be considered unsafe?

What have you witnessed of others' behaviors? Have you said anything?

We've all heard accounts of tragic accidents that could have, should have or ought to have been avoided. I think it's safe to say no one wants to get injured, maimed or worse. It's not as though we leave for work planning to come home injured.

If anything, we're probably thinking about all the things we have to do, or have the joy and privilege of doing, after the workday is done.

People always say accidents happen. Sometimes, they do by a seemingly random string of events. Most times, though, they are a result of unsafe behaviors and habits that we have acquired over time. Seen this way, they have been accidents waiting to happen all along.

That's why recognizing those poor behaviors and intervening earlier is so critical, both for ourselves and the safety of others. I can say, "Look, Mom, I haven't drawn blood yet," but that doesn't mean I'm a safe cook. After all, I have trimmed my fingernails with my knife blades.

I follow most rules in the kitchen, but I clearly have room for improvement. I resolve to focus on my cooking techniques, so I can learn safer behaviors and avoid future accidents. It's time for me to roll up my sleeves and get to chopping. Here's to the safest—and tastiest—French onion soup yet!

*Nicole Stempak*

Send an e-mail with your thoughts to [nstempak@endeavorb2b.com](mailto:nstempak@endeavorb2b.com).



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