THE MAGAZINE FOR ENVIRONMENT, HEALTH AND SAFETY LEADERS

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SAFETY FIRST:
MITIGATING SAFETY RISKS IN CONTROL AND ELECTRICAL SYSTEMS

Put in place a visible and well-planned safety system early in the manufacturing lifecycle. *p. 10*

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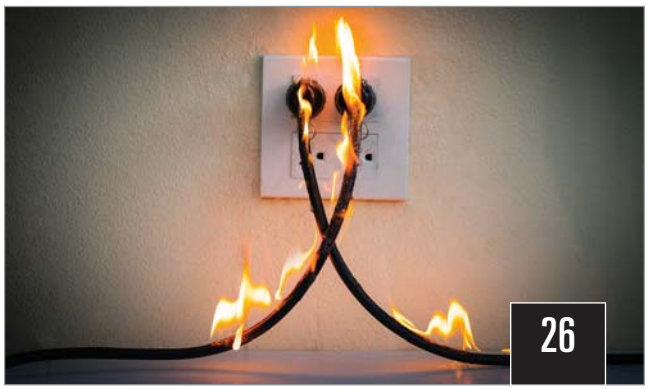

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ON-DEMAND WEBINAR

Don't Experiment with Your Safety - Choosing the Right Lab Coat

Sponsored by Bulwark CP

Tuesday, March 10, 2020 | 2:00 p.m. ET

Lab coats have been used for decades, but they have typically been made from polyester or polyester/cotton blends with the primary purpose being to keep foreign materials off of the clothing worn under the coat. However, with increased awareness around of the number of burn injuries related to thermal and chemical lab accidents, the use of flame resistant and chemical splash protective (FRCP) lab coats in research and commercial labs is becoming a more widely adopted component to of lab safety.

In this webinar, we'll take you through the basics of the chemical protection market, discuss common laboratory hazards and highlight the difference between FR, CP, FRCP and non-FR lab coats.

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DAVE
BLANCHARD
Senior Director of **Content**

Now Is Not the Time to Be Complacent

Preventing COVID-19 from spreading isn't somebody else's job; it's everybody's job

To celebrate our upcoming wedding anniversary, my wife and I are finally going to take a sea cruise this winter, a welcome respite from the Cleveland cold. We made sure we got our flu shots last fall and got prescriptions for seasickness meds in case we get the queasies. We're also packing plenty of sunscreen and other casual touristy PPE (sunglasses, hats, loose-fitting outerwear, etc.) to stay safe and healthy. We've been eating healthy, exercising, washing our hands multiple times throughout the day—anything we could do to make sure we're feeling fine when we board the ship.

The one thing that we didn't plan for when we booked the cruise last fall, though, is something we hadn't even heard of then: the coronavirus, or as they're calling it now, COVID-19. Luckily, our cruise is on the opposite side of the world from China (where the virus is said to have originated), and I've actually been doing all the things safety groups have suggested we do to protect ourselves while at work (**see sidebar**). But if nothing else, it brought home to me how easy it is to get lulled into complacency—that belief that because everything is going fine right now, nothing can come along and change that.

COVID-19: How to Protect Yourself at Work

- Avoid close contact with sick people.
- Stay home if you're sick. Limit contact with others as much as possible.
- Cover your nose and mouth when you cough or sneeze. Don't touch your eyes, nose and mouth with unwashed hands to avoid spreading germs.
- Clean and disinfect surfaces and objects that may be contaminated with germs.
- Wash your hands frequently with soap and water for at least 20 seconds

—National COSH

Motivational speaker Paul Mahoney knows a little something about complacency; in fact, he's written a book about it ("Man V Machine: Journey of Complacency"), and you can hear his latest thoughts on the subject in his article, "Avoiding the Complacency Culture" on p. 22. Mahoney, who is based in the UK, is the first person in that country to have lost an arm in an industrial accident at a paper mill and had it reattached above the elbow. As he says, that accident was caused by complacency: his own, his organization's and the industry's.

Paradoxically, it tends to be the best companies that are at the greatest risk of succumbing to complacency. "The more successful you and your team become, the more you slip into the cycle of thinking you're the best and all is fine," Mahoney points out. The best way to break that "culture of complacency," he says, is to be courageous enough, as individuals, to make the right decisions at the right time. That's what leadership is all about.

And right now, a lot of courageous people are working around the clock to try to stop the spread of the coronavirus. At this writing, nobody has a really clear idea as to the impact of COVID-19 on the United States. Certainly there's a lot of fear and uncertainty about whether the virus will actually spread throughout North America, and if so, will it lead to quarantines and travel restrictions and mandated plant shutdowns and furloughs. Many U.S. businesses (though so far, mainly those with Chinese operations or suppliers) have already been affected in some way, but the biggest question people have right now is: "How can I protect myself?"

"This virus is new, but well-tested safety precautions against infectious disease can reduce the risk of workplace exposure," explains Jessica Martinez, co-executive director of the National Council for Occupational Safety and Health (National COSH). EHS professionals should ensure that their workplaces are utilizing training, PPE, record-keeping and other measures to prevent the spread of infectious diseases, she adds.

My thanks to all of the courageous EHS and healthcare professionals who, whether they signed up for this or not, are doing all they can to protect us from this virus. Any and every effort, large and small, that can keep COVID-19 at bay needs to be gratefully acknowledged and applauded. And don't allow yourself to be lulled into a sense of false security merely because nobody you know has been affected. That's the worst kind of complacency.

***Send an e-mail with your thoughts* to dblanchard@endeavorb2b.com.**

SIF ALL-OR-NOTHING THINKING

Not all risks will cause an equal numbers of serious injuries and fatalities.

WHILE SIFS ARE REDUCING SLOWLY IN THE WORKPLACE, THEY ARE ACTUALLY INCREASING IN THE GENERAL POPULATION.

Heinrich's pyramid has been a model for safety thinking since 1931. It has two primary premises: the frequency of accidents is inversely proportional to the severity, and eliminating the at-risk behaviors at the bottom of the pyramid will proportionately eliminate the near-misses and accidents at the higher levels of the pyramid.

No one has seriously challenged the first premise, but many have challenged the second. Recent research has also failed to find the exact data Heinrich used to make his assumptions, so his exact numbers have also come under scrutiny. Even Heinrich's supporters suggest that the data he used was questionable since it was gathered from investigations done by untrained and often unqualified supervisors. Maybe Heinrich accurately reported inaccurate data, but even if you accept the validity of the study done in the early part of the last century, you must question if the conclusions from then are still valid today.

Fred Manuele and the National Safety Council (NSC), along with James Howe, former director of safety for the United Auto Workers, and others have taken issue with Heinrich's ratios and fault-finding with workers, but the basic premise on accident prevention has been challenged by recent developers of approaches to addressing SIFs (serious injuries and fatalities) and HOP (human and organizational performance).

The HOP folks mainly object to the idea Heinrich proposed that 88% of accidents were caused by human risk-taking. They do not challenge the numbers or percentages as much as the inferred idea that workers simply choose to take risks, which ignores all the other factors that influence decisions in the workplace. They prompt organizations to examine these influences and align them to promote safe decisions and practices rather than simply blaming the worker and trying to change behaviors with nothing but feedback.

The SIF folks challenge the idea that eliminating risks at the bottom of the pyramid actually reduces accidents at all levels of severity. This premise has led safety professionals to think that if they work on minor accidents, major accidents will go away. NSC data indicates that accident-reduction efforts have been more effective in accidents of lesser severity, and less effective in severe accidents and fatalities. However, the fact

that such efforts are less effective on SIFs does not necessarily mean they are totally ineffective.

While SIFs are reducing slowly in the workplace, they are actually increasing in the general population. Preventable injury-related deaths overall increased 5.3% yearly and have risen by 96% over the past 25 years. While work-related deaths have not decreased as much as lesser-severity injuries, they have decreased. This should indicate that our workplace safety efforts are not totally ineffective at addressing SIFs.

The current research in SIFs is taking two directions:

One group seems to be stuck in both parts of the Heinrich thinking, and in the premise that all accidents are preventable. Zero accidents slogans abound in many workplaces and leaders are pushing the idea that more and better prevention methods and efforts can address SIFs. There are several models of Heinrich's pyramid with smaller pyramids inside suggesting that it is possible to better assess which risks have SIF potential.

The problem with this model is that all risks have some level of SIF potential. Some risks may have more or less, but all have some. One organization had two fatalities in a single year. An office worker fell down two stairs in an office building and died. That same month a maintenance worker fell down a 50-foot contained

ladder and only sustained a broken wrist. Such cases may be exceptions to the general rule, but occur regularly. Assuming that all SIFs come from a smaller group of risks, and that by eliminating that pool of risks you can eliminate SIFs, is only a small improvement over Heinrich thinking in general.

The second group researching and addressing SIFs begins with the assumption that SIFs are anomalies or outliers. How else can a system that usually produces basically good safety results occasionally produce a SIF? If you accept SIFs to be anomalies or outliers, you must admit that your ability to predict them is somewhere between limited and futile.

Those trying to modify Heinrich's pyramid tend to focus on the most dangerous tasks. The anomalies group points out that many dangerous tasks can be performed safely with the right precautions. They tend to focus on the tasks that are most difficult to control.

Interestingly, the second group does not completely disagree with the first group. Rather, they propose to add on to prevention activities with measures that allow for failure while controlling severity. In other words, assume that workers will occasionally fail to prevent an accident, but put measures in place that ensure the worker can still survive. These countermeasures are very similar to those used in highway safety and PPE (personal protective equipment) in that they don't address preventing the event but rather address controlling the severity. Just as we use airbags, seatbelts and fall protection not just if, but when they are needed, countermeasures in other instances can allow workers to fail and survive.

It is not a matter of all-or-nothing. Just as every risk at the bottom does not cause equal numbers of minor injuries, not all risks will cause equal numbers of SIFs. The fact that we are reducing SIFs in the workplace while they are growing outside work is an indicator that our efforts are partially successful. Better prediction and prevention may be possible with more research, and preventing SIF potential events is an elegant potential solution.

However, if all or some of the SIFs are anomalies and, therefore, not accurately predictable, it will not be possible or practical to prevent all of them. Thus, countermeasures may be a critical part of the solution. If we cannot prevent the event, can we better control the outcome? But rather than debate either one solution or the other, why not pursue both? **EHS**

Terry Mathis, founder and CEO of ProAct Safety (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 or 800-395-1347.

HOW THE U.S. COAST GUARD UTILIZES POWERED-AIR PURIFYING RESPIRATORS

The U.S. Coast Guard is America's maritime first responder. Just like their counterparts on dry land, these first responders are called to action when citizens are in distress, when a crime has been committed and when natural disasters strike.

They are rescuers, law enforcement, border patrol and, in some cases, the Coast Guard also is involved in special operations.

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is committed to ensuring that all American responders have the tools they need to do their jobs safely and securely—including reliable personal protective equipment that won't let them down when it matters the most.

CHOOSING A PAPR

The Coast Guard's Maritime Security Response Team (MSRT) is a tactical unit that specializes in maritime counterterrorism and high-risk law enforcement operations, boarding and securing vessels held by terrorists or criminal groups at home and abroad. Some of these operations involve chemical, biological, radiological and nuclear (CBRN) threats and require protective equipment, including air-purifying respirator (APR) masks.

The Coast Guard asked the DHS S&T to assist in meeting a need to reduce the discomfort of wearing APRs by MSRT teams because discomfort adds to physical stress, which may impede endurance. To resolve this issue, S&T enlisted the U.S. Army Combat Capabilities Development Command's Chemical Biological Center (CBC) to assess existing Powered-air Purifying Respirators (PAPRs) and recommend models that would be a better fit with MSRT's current masks, literally and figuratively.

The physical stress of rapidly moving through ships, clearing spaces and potentially dealing with armed suspects can significantly raise respiration and heart rate," says Daniel Moose, technical director for MSRT East. "We wanted a system that would minimize some of the negative physi-

ological impacts during heavy exertion and extended missions—lower the respiration rate and make it easier to breathe through the filters in a regular protective mask."

S&T began assessing PAPRs in 2017 and concluded its work in September 2019. During this time, S&T invested subject matter expertise and conducted user tests for MSRT's CBRN missions. In June 2019, S&T and CBC assessed the performance of PAPR equipment at MSRT East in Chesapeake, Virginia, where MSRT operators tested products in simulated operational settings to select the most suitable one for their missions.

"MSRT members are responsible for keeping the maritime environment safe and are required to be capable of operating in a CBRN environment," said Dr. Don Bansleben, S&T Program Manager for the PAPR Assessment. "To perform their job most effectively, they need to be outfitted with high quality personal protective equipment, such as a respiratory protective system that minimizes stress and exertion, while also protecting against a range of contaminants."

PAPRS AND PROTECTION

Filters in PAPR systems protect against hazardous CBRN substances in the air via an activated carbon filter and a High-Efficiency Particulate Air, or HEPA, filter. PAPR takes in atmospheric air via a motor, filters it and blows it across the inside of the mask worn by MSRT operators.

Even at peak performance, when MSRT operators have to climb or run onto ships while carrying 70-pounds of equipment including weapons, armor, and detection equipment, physical discomfort can affect their intense focus on the mission at hand and make their work more difficult. Physical exertion leads to sweating, which can fog up the visor on the protective mask.

"Not being able to see clearly is more dangerous for them, especially if an adversary is shooting at them," Bansleben says. "You want to be really focused on what you're trying to do and not worrying that you are starting to feel weak, hot or tired. Effective PAPR systems provide a continuous stream of cool, filtered air across your face, so it keeps you cool. This helps MSRT operators maintain their physical stamina to safely finish their mission."

TESTING PAPR SYSTEMS

Many vendors make PAPRs for both military and industrial applications. S&T together with CBC evaluated currently existing respirator technology for its suitability for use in the maritime environment and ability to work in conjunction with MSRT's current protective masks.

The Coast Guard selected two Avon Industries products, the EZAir+ and MP-PAPR systems (wearable- like backpacks with a flexible hose) and worked with S&T and CBC to test them and provide the best one to

MSRT operators. The main purpose of the tests, which took place in January-June 2019, was to see whether these respirators meet manufacturer specifications as well as Coast Guard requirements.

"S&T and the Coast Guard, with the help of the U.S. Army's CBC in Edgewood, performed controlled lab testing to ensure that these systems are durable, reliable, simple to operate, and that they'll stand up in the environments that we would wear them in," says Moose.

For example, they tested the airflow to make sure it matches what the manufacturer states. They also tested the PAPR systems in a simulated maritime environment by spraying them multiple times with salt fog spray and letting them dry, and then taking the equipment apart to check for corrosion. Another test involved dropping the systems from 10-13 feet in the air onto hard surfaces and checking if the systems were still functioning.

"They need to withstand exposure

to salt water for long periods of time, to high temperatures, low temperatures, and they must be durable enough for the bangs and drops that they would be exposed to when our operators are using them," Moose said.

In June 2019, S&T and CBC tested the two systems at MSRT East in a simulated mission to make sure the respirators are compatible with the protective masks and work well with the equipment the MSRT operators wear.

The MSRT operators, while carrying guns and other equipment, descended and climbed ropes, climbed stairs, threw rope ladders on a structure that imitates a ship and ascended them. Finally, they provided feedback.

FUTURE OUTLOOK

The results, both qualitative and quantitative, were incorporated in a report for the Coast Guard and supported acquisition of the Avon MP-PAPR system for use by all MSRT teams for their missions. After the vendor made enhancements, the chosen system underwent successful final assessment in October at the MSRT Headquarters. Based on findings of the technology assessments, the DHS Countering Weapons of Mass Destruction Office is procuring these devices for the Coast Guard.

—EHS Today Staff

BENDIX COMMERCIAL VEHICLE SYSTEMS CONTINUES TO DRIVE SAFETY EXCELLENCE

Bendix Commercial Vehicle Systems LLC has once again recorded one of its safest years ever.

The Elyria, Ohio-based manufacturer develops and supplies leading-edge active safety technologies for medium- and heavy-duty trucks, tractors, trailers, buses, and other commercial vehicles throughout North America.

Carlos Hungria, Bendix chief operating officer, echoes the achievement, "Safe operations are the foundation of Bendix's company culture and a tenet of our success. We don't compromise on safety or safe operations, whether in making our products, putting them into the market, or at any point along the way."

While similiar manufacturing facilities document a total case incident rate (TCIR) of 3.2, the company falls well below the industry standard, landing at a TCIR of 0.64. Bendix recorded its lowest TCIR in 2018 at 0.48.

The company touts its lasting leadership commitment and mature safety processes have to its sustained safety performance.

"Ensuring a deep commitment and an active safety culture is a journey," explains Maria Gutierrez, Bendix director of corporate responsibility and sustainability, in a public statement. "Our mature safety-oriented processes are integrated into the organization's Knorr Production System (KPS) lean manufacturing system to help drive safety, quality, productivity and a continuous improvement mindset. KPS tools and practices have helped quantify improvement activities, increase visibility to safety losses, escalate safety concerns, and drive team-level ownership of safety."

Annual leadership back-to-work sessions incorporating messages from Bendix's executive board; safety reminders at the beginning of all meetings including emergency response measures and a "multifaceted" Walk & Talk programs are just some of the ways the company continues to drive a culture of safety.

Looking to 2020, the company will focus on the principles of safety excellence in order to "drive even greater accountability and ownership of safety performance among all levels of the organization to achieve the zero-injuries goal."

Hungria confirms, "We're very proud of what we've achieved over the last three years. Being named one of America's Safest Companies, continuing to sustain our safety metrics, and repeatedly surpassing industry safety performance averages are truly remarkable achievements. But we realize that safety metrics, like TCIR, are not just numbers – they translate into real people and real lives being impacted."

—Stefanie A. Valentic

CAN WEARABLES MAKE WORK SAFER?

It's an age-old problem. How can workers be encouraged to report near-misses?

"Not all workers can participate in a near-miss reporting program," explains Mark Frederick, Co-Founder of MākuSafe. "Many employees have specific goals they need to meet and even 10-15 minutes out of their day would throw them off. So, something they do notice often goes unreported."

But what if they could literally talk into a device that they are wearing on their arm?

It's possible and it's happening at companies across the country.. MākuSafe provides a device that is worn on the arm that is equipped with a voice memo feature that allows workers to make note of either a dangerous situation or a potential hazard.

"At one of our pilot programs, we learned that on the first day that workers were equipped with the device, they were using it for this purpose," says Frederick. "The memo goes to an EHS professional that can react immediately instead of waiting for the weekly safety meeting where many of these issues are discussed. It's a real-time solution."

The device has a variety of tools that takes a look at a number of physical conditions that are affecting employees. The device isn't looking inward, such as taking biometric information about the employee but instead is measuring the environmental conditions.

The device monitors motion, location and environmental conditions such as sound exposure, air quality, heat and light.

"We explain the device is like having eyes and ears that are protecting them," says Tom West, Strategic Relations Manager at MākuSafe.

West says that the availability of this information can lead to ways to decrease worker fatigue as well as increase productivity. He gave the example of a food processing facility where an employee was using a heavy piece of machinery to perform their job. The motion detector provided feedback to the EHS manager who realized that the level of effort needed to do this job might not fit all employees' abilities and they are now examining the process.

The information from these devices goes into a cloud platform that classifies and categorizes the information. The company platform called MākuSmart displays safety data in an interactive format. It uses machine learning and artificial intelligence to search for trends, based on OSHA standards. For example, the system can identify a slip versus a trip versus a fall.

"Once you get beyond ensuring compliance you look for potential hazards and risks which allow safety leaders to gain insight, through data, into the issues that need to be solved," said Frederick.

—Adrienne Selko

SAFETY FIRST:

Mitigating Safety Risks in Control and Electrical Systems

Put in place a visible and well-planned safety system early in the manufacturing lifecycle.

By Michael Jammal and Chris McConnell

Safety First is not just a corporate slogan. It is an important guide to many occupational safety managers in manufacturing. Companies have many leaders who manage different aspects of their operations. The safety manager/leader is an individual that is tasked with keeping all operational aspects of the company business safe and secure for the entire population inside and outside the walls of the manufacturing spaces. Hence the job of the safety management professional arguably is more important than that of the CEO of a company because their concerns include the lives of everyone, not just the fiduciary responsibilities of keeping the manufacturing system profitable.

Manufacturing spaces are full of unknown hazards. Think of a manufacturing space as the real world magnified by a factor of 10 or 15 times when it comes to safe operating conditions. By comparison, for residential spaces the highest voltage levels that a person is exposed to in a normal daily routine are between 115 V and 230 V. This is not the case for many manufacturing employees, as they routinely operate and maintain machines or work in a related process within an industrial space where the electrical power distribution level is between 480 V to thousands of volts.

Similarly, chemical hazards are uniquely challenging around manufacturing systems. Worker safety becomes a risk concern as chemicals become more pronounced in a process or when they are stored in higher concentrations

or larger volumes. Even in light industrial spaces many hazards remain such as electro-static discharge (ESD), low-level toxic powder, air quality and unknown liquids. Even household cleaning chemicals that normally are harmless in low quantities and dosage pose significant risks when present in larger quantities and concentrations.

A COMPREHENSIVE SAFETY PROGRAM

Corporations and industry innovators recognize these risks and develop products to identify, protect and ensure safe work conditions in all stages of the manufacturing lifecycle. The examples above cover two common areas of safety risk in manufacturing: electrical and chemical hazards. However, workplace safety includes many other types of risk as well. These many risks are essential to a comprehensive workplace safety program. A comprehensive safety approach begins with a visible and well-planned intentional safety system that must be put in place early in the manufacturing system lifecycle.

Workplace safety and risk mitigation are areas of important focus for all of us in manufacturing, and we should always strive to safeguard the systems from intentional or unintentional hazards that are always present but seldom clearly identified and contained.

SAFETY PROGRAM COMPONENTS

Hazard communication often is the most visible aspect of a comprehensive safety program. Manufacturing facilities and most other types of workplaces are full of signs and labels to indicate hazards or convey safety-related messages to employees. Facility identification through signs, labels and other markers is extremely important.

Despite the obvious need for safety hazard and risk communication, this is a subject that often is overlooked or improperly addressed, leading to frequent safety violations.

MULTIPLE LAYERS OF SAFETY

Electrical equipment must be properly grounded. Improper grounding of cable trays, enclosures, communication and control cable, or metallic surfaces can cause inadvertent energizing by a power cable short or lightning. This risk potentially can lead to an electrical shock, causing injury or equipment damage. A proper grounding and bonding system always is a sure bet to protect against these types of electrical hazards.

Safety First truly means that safety must be the focus of employees and managers each and every day.

An appropriately designed grounding and bonding system is intentional (designed and specified), visually verifiable (e.g., green and yellow cable jacket), and consists of adequately sized conductors to safely handle expected electrical currents and dissipate electrical noise.

Electrical systems have varying levels of power systems, including incoming power, capacitive power and re-generative power systems. Regardless, all of these power sources pose many hazards to the health of the manufacturing systems and the employees that operate them. Qualified, authorized electrical workers should follow the NFPA 70E Standard for Electrical Safety in the Workplace when accessing any electrical enclosures and control systems.

Before opening an enclosure to begin electrical maintenance work, a best practice and requirement is to verify that the equipment is not energized. Within NFPA 70E 120.5 (7), the process of verifying the absence of voltage is defined as a qualified worker with a portable test instrument (voltmeter), using the required personal protective equipment (PPE), and testing for voltage on each phase conductor or circuit part to mitigate shock or arc-flash hazards.

This traditional method of voltage verification actually has the potential for human error and other limitations, which increases the safety risk to employees. Consequently, in the 2018 edition, NFPA 70E added 120.5 (7) Exception 1 to provide an alternate method of verifying the absence of voltage though a new product category: Absence of Voltage Testers (AVTs).

AVT devices are permanently installed in control panel and power distribution enclosures to test for the absence of voltage. These AVT devices test for both AC and DC voltage and therefore will detect when capacitive voltage is present. These UL1436/SIL3-rated AVT testers mitigate electrical risks associated with the task of verifying the absence of voltage by reliably automating the testing process without exposing workers to the electrical hazards.

LOCKOUT/TAGOUT

Lockout/Tagout (LOTO) is another method to ensure best safety practices in a manufacturing workplace. LOTO is another layer of safety for workers and equipment, which works hand-in-hand with the AVTs mentioned above. Any LOTO activity should first verify the absence of volt-

age, preferably through an AVT (or a voltmeter if an AVT is not available), before opening an electrical enclosure to install a lockout device, tag and safety lock.

Lockout/Tagout is defined by the hierarchy of controls as an administrative control. While LOTO is an essential part of any comprehensive workplace safety program, using LOTO together with AVTs and other measures is a more effective and safer approach.

Furthermore, LOTO can also cover additional manufacturing safety hazards beyond electrical risks, including chemical, thermal, mechanical, hydraulic, and pneumatic sources of stored energy.

NETWORK AND DATA SECURITY

An additional element of a comprehensive safety program is the inclusion of network and data security. The data network should be considered as an integral part of the overall security and safety strategy.

Integrating safety into the communication network is essential as it allows design and controls engineers to create an additional layer of security/safety that extends outside the immediate scope of automating and controlling machines and assets to protect employees, equipment and the data network.

ASSESSMENTS

As a final element, assessments or audits must be periodically planned into the process to re-visit the integrity of safety programs and systems. Assessments should include well-planned remediation policies when non-compliance is observed as well.

With a comprehensive safety program, manufacturing and safety managers should look for and build expertise through qualified electrical and data communications professionals. And finally, remember that Safety First truly means that safety must be the focus of employees and managers each and every day.

The best approach to "Safety First" concepts is to address safety compliance requirements by providing all of the tools and components of a comprehensive safety program. By combining the industry-proven solutions of hazard communication, AVTs and Lockout/Tagout (LOTO), network security, data communications, and assessment tools, companies can provide multiple layers of safety assurance to help constantly protect their manufacturing employees and equipment. **EHS**

Michael Jammal is senior business development manager, and Chris McConnell is product strategy manager with Panduit (www.panduit.com).

What's On the Horizon for OSHA'S LOCKOUT STANDARD?

Important developments may be underway for the law of lockout.

By Arthur G. Sapper

The OSHA Lockout Standard, 29 C.F.R. § 1910.147, is OSHA's fourth-most cited standard. The standard, which was adopted in 1989, has not kept up with technological developments, however. It was based largely on a consensus standard adopted in 1982, which in turn reflected the technology of the mid-1970s. The standard also has provisions, such as the minor servicing exception and the ban on control circuitry, that make no sense today, and likely never made sense.

In May 2019, OSHA published in the Federal Register a "request for information" on how the standard might be improved. That development and others described below show that changes lie on the horizon. To understand them fully, however, one must know the case law that has developed involving the standard.

WHEN DOES THE LOCKOUT STANDARD APPLY? THE GM-DELCO DECISION

The Lockout Standard in paragraph (a)(1)(i) states that the standard applies only to "unexpected" startups of machinery. In the General Motors-Delco case, the Occupational Safety and Health Review Commission in 1995 and the United States Court of Appeals for the Sixth Circuit in 1996 held that the word "unexpected" must be literally applied. They held that the Lockout Standard would not apply if, for example, startup were preceded by an audible alarm or a long start-up sequence, thus making any start-up expected rather than unexpected.

An important consequence of the decision is that if the control circuitry used to trigger the alarm or govern the start-up sequence is reliable enough to prevent unexpected startup, the Standard does not apply in the first place—even though the Lockout Standard, when it does apply, generally forbids reliance on "control circuit type devices."

OSHA greatly dislikes the GM-Delco decision. After OSHA lost before the Sixth Circuit, it wrote a compliance directive that construes the decision so narrowly as to almost never apply. It has not trained its inspectors to apply the decision and, as a practical matter, they ignore it. OSHA also believes that some later Commission decisions have subtly undermined GM-Delco.

Nevertheless, Commission judges continue to take the word "unexpected" seriously and to apply it. For example, in the 2015 Alro Steel case, Judge Baumerich vacated a citation because reliable control circuitry would have prevented startup. Similarly, in the 2018 Swisslog Logistics decision, Judge Calhoun vacated a citation because startups would be expected rather than unexpected. The lesson is: If you're cited, don't be afraid to rely on the word "unexpected."

THE BAN ON CONTROL CIRCUITRY

Suppose the GM-Delco decision does not apply because an unexpected startup could occur. That means that the Lockout Standard's general ban on control circuitry would generally apply. The ban is in the definition of "energy isolating device," which states in part that, "Push buttons, selector switches and other control circuit type devices are not energy isolating devices." (emphasis added) (Note that the ban does not apply if the minor servicing exception applies; that exception is discussed below.)

The reason for the ban, OSHA stated when it proposed the standard in 1988, was that devices using control circuitry "are not adequate in themselves to be considered energy isolating devices." OSHA never explained in the preamble to either the proposed or final standard why control circuity is never "adequate."

In 2008, OSHA in an interpretation letter implied (but did not outright state) that a kind of control circuitry called a programmable logic controller (PLC) "is presumed to be ineffective" as a lockout device because of "component failure, program errors, magnetic field interference, electrical surges, and improper use or maintenance." But again OSHA failed to explain why it thought that these problems pertain to all control circuitry.

In fact, OSHA could never have explained it. Its general ban on control circuitry was always too broad. That the ban came to be unusually problem-ridden should, therefore, not have come as a surprise to OSHA.

We know that the ban was always too broad because the private standard that OSHA used as a drafting model for §1910.147 was to the contrary. The 1982 version of the ANSI lockout standard expressly permitted during "normal production operations, [the use] … of specially designed control circuits, control equipment, and operating procedures, that provide proven effective protection for the affected personnel." OSHA's version of the standard lacked that provision—without explanation.

The standard's failure to distinguish reliable from unreliable control circuitry made for great waste and either did nothing for safety or detracted from it. For example:

- The ban reversed the usual hierarchy of controls. With the ban, the Lockout Standard prefers lockout (an administrative control, dependent on correct employee behavior) over control circuitry (an engineering control).
- The ban forced employers and employees to use lockout even when their real-world experience taught them it was unnecessary. This caused widespread resentment of the resulting regulatory overkill. The ban put employers to the choice of either being in violation or threatening their employees with discipline if they were to follow their common-sense experience and prefer control circuitry over lockout.
- The ban meant that machinery was unnecessarily being completely shut down and restarted, often repeatedly, resulting in greater wear. Worn-out machinery makes for more, not fewer, accidents.

Ironically, the GM-Delco decision, which OSHA so dislikes, pointed to a way out of the problem, as it sometimes permitted employers to use reliable control circuitry to entirely avoid the Lockout Standard—if employers could stomach the thought of being cited and paying lawyers to fight OSHA over whether the standard applies in the first place.

It is disappointing that the Trump Administration allowed OSHA to publicly mention this sleight-of-hand favorably.

THE 2016 RULEMAKING PROPOSAL TO DELETE "UNEXPECTED"

In 2016, OSHA proposed to eliminate the word "unexpected" from the Lockout Standard. The proposal attracted an avalanche of adverse comments. In 2019, OSHA announced that it was neither withdrawing nor implementing the proposal. It stated:

[T]he GM-Delco decisions misconstrued … "unexpected"…. OSHA… acknowledges the overwhelming opposition to this change and agrees with the many comments that cited complications … due to technological advancements. Further, the AFL-CIO [proposed] … a path OSHA could follow to uphold the rigor of the proposed rule. … OSHA is not in a position at this time to make a final decision …. As a result, the agency will not finalize its proposal to remove the word "unexpected" … but will further consider this issue in light of the overall standard.

What is this "path" that the AFL-CIO proposed and why did it so impress OSHA? The "path" impressed OSHA because it was OSHA's own idea. The AFL-CIO had taken its "path" verbatim from OSHA's own compliance directive.

The "path" blazed by OSHA's compliance directive was to use a verbal gimmick—to redefine "unexpected" into meaninglessness. It would redefine "unexpected" as, "Any energization or start-up that is not sanctioned (through the removal of personal LOTO devices) by each authorized employee engaged in the servicing and maintenance activity."

How would this re-define "unexpected" so as to be meaningless? It would presume (contrary to fact) that lockout devices had been applied in the first place and that there had been a need for them—regardless of whether there had in fact been a need for them. To illustrate:

Suppose that a machine had been shut down using reliable control circuitry, or would give employees enough advance warning to avoid injury by, before any restart, reliably sounding alarms or requiring a multi-step startup sequence (as in the GM-Delco case). Under those circumstances, lockout would not be required and locks would not have been applied in the first place. The suggested re-definition would ignore these facts and require locks anyway. It is disappointing that the Trump Administration allowed OSHA to publicly mention this sleight-of-hand favorably.

Employers should insist that the word "unexpected" be retained. It provides an easily-understood dividing line, grounded in the real world, between when lockout is and is not needed. It also provides employers an easily-understood and practical dividing line between the Lockout Standard and the machine-guarding standards. It is unfortunate that OSHA places more importance on making it easier to issue cita-

tions than providing rules that employers can respect and practically follow.

If a Democrat is elected to the White House in 2020, one can expect OSHA to revive its push to revoke or neuter the word "unexpected." One can also expect that, no matter what happens in the election, any proposal on the word "unexpected" will be considered together with the next rulemaking development.

THE 2019 REQUEST FOR INFORMATION ABOUT CONTROL CIRCUITRY

On May 20, 2019, OSHA issued a request for information (RFI) on how the Lockout Standard could be "modernized" with respect to control circuit-type devices and robotics. OSHA stated: "[T]echnological advances since … 1989 suggest that, at least in some circumstances, control circuit type devices may be at least as safe as [energy isolating devices]. … Accordingly, OSHA is revisiting the … standard to consider whether to allow the use of control circuit type devices … for some tasks or under certain conditions."

The irony of any future proposal permitting broader use of control circuitry would be great. It would mean that OSHA would, in effect, have at least partially acceded to GM-Delco without saying so.

OSHA's RFI suggests, however, that any such proposal might well pose a severe problem for employers, i.e., excessive paperwork requirements to justify the use of control circuitry. The RFI noted that the ANSI standard's 2016 edition requires lockout unless the employer "complete[s] a practicability/justification analysis, a risk assessment, and other applicable evaluations." The 2016 ANSI standard uses ten pages to describe these analyses, assessments and evaluations. The RFI at Question 21 asks whether employers should be required to follow them before control circuitry may be used.

Although such paperwork requirements will provide full employment for safety managers and consultants, they will create a compliance nightmare for medium and small employers, and will provide a convenient citation mill for OSHA inspectors.

There is a more important problem with any such requirement, however: It would shift the burden of thought away from OSHA rulemakers and onto employers. Why should OSHA's rulemaking staff do the hard work of figuring out criteria for the reliability of control circuitry if employers can be forced to do so instead?

The business community should demand that OSHA abandon its always-overbroad ban on control circuitry, and adopt a new rule, supported by evidence, stating criteria by which employers could determine whether control circuitry is too unreliable for use under the Lockout Standard. If OSHA fails to do so, and tries to foist upon employers the burden of determining criteria for the reliability of control circuitry, a complaint to the Office of Information and Regulatory Affairs, which is responsible to the White House, would be in order.

One of the most badly written and misunderstood provisions of the Lockout Standard is the so-called minor servicing exception.

A FORTHCOMING RULEMAKING DEVELOPMENT: REVISION OF THE MINOR SERVICING EXCEPTION? OR ITS ELIMINATION?

One of the most badly written and misunderstood provisions of the Lockout Standard is the so-called minor servicing exception. It states:

Minor tool changes and adjustments, and other minor servicing activities, … during normal production operations, are not covered by this standard if they are routine, repetitive and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection (See Subpart O of this Part).

One problem is that many employers overlook that the last part of the exception requires that employees be somehow protected from machine hazards during minor servicing. But that is not our present focus.

As I discussed in my previous EHS Today article, "The Need for a Critical Eye: The OSH Review Commission and the Lockout Standard's Minor Servicing Exception" (May 2017), some OSHA inspectors and the Commission have misunderstood the phrase "normal production operations" in the first part of the exception.

Some inspectors think that, if a machine is turned off for a tool change, it is no longer engaged in "operation" or "production," let alone "normal production." And the Commission in the 1993 Westvaco decision seemed to agree. It found that adjusting shaft heads on a machine between customer orders is considered "setting up" and thus does not meet the exception.

That is absurd. That means that the only way to meet the exception would be, for example, to replace a tool bit while a chuck is still turning. Moreover, there is in the real world no clear distinction between tool changes and minor machine setup. So the exception could never practically apply to either.

Unfortunately, Commission judges had relied on Westvaco to find the minor servicing exception inapplicable. By June 2016, even OSHA realized this made no sense, so in a settlement, it agreed that "merely shutting off a machine (for example, to change a tool bit or blade) does not make the minor servicing exception inapplicable."

What does this portend for the future of the minor servicing exception? Importantly, the latest version of ANZI Z244.1 eliminated the minor servicing exception entirely. Look for OSHA to propose something similar in a forthcoming rulemaking proposal, perhaps coupled with a proposal to expand the use of control circuitry. **EHS**

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OSHA's Combustible Dust Program: WHERE ARE WE TODAY?

While there's no standard to fine a company for a combustible dust problem, many other standards can be used to enforce combustible dust safety.

By Jeremiah Wann

OSHA put its Combustible Dust National Emphasis Program into place over 10 years ago. Since then, new NFPA standards on combustible dust have been issued, OSHA's plan for a comprehensive Combustible Dust Standard has been quietly tabled, and combustible dust incidents continue to occur.

Safety professionals recognize the potential hazards of combustible dust. However, OSHA has left its National Emphasis Program (NEP) vague in many ways, and this presents a challenge. OSHA has kept the NEP in place. They continue to issue citations based on already existing standards.

Where does this leave companies with possible combustible dust issues? It's important to understand best practices for combustible dust safety, as well as the pre-existing OSHA standards that form the basis of the NEP.

WHAT IS A NATIONAL EMPHASIS PROGRAM?

OSHA can implement a National Emphasis Program any time there seems to be a developing or ongoing problem with worker health and safety. These programs are put into place when a situation requires special attention to protect people.

OSHA can issue National, Regional and Local Emphasis Programs. A Local or Regional Program may be targeted toward a particular issue that tends to be located in certain areas (e.g., oil and gas industries or marine operations). A National Program addresses nationwide hazards. Combustible dust accidents occur in many different industries all over the country.

With an NEP in place, industries that fall under the program's issue of concern can expect to see more inspections. The combustible dust NEP allows OSHA to inspect facilities in any industry where combustible dust could be a hazard. However, an emphasis program is not a standard or a law. OSHA cannot specifically cite a company for violations of the combustible dust NEP.

However, the NEP allows OSHA inspectors to focus on potential combustible dust hazards, and while there's no standard to fine a company for a combustible dust problem, many other standards can be used to enforce combustible dust safety.

WHICH STANDARDS ARE ENFORCED UNDER THE NATIONAL EMPHASIS PROGRAM?

The combustible dust NEP is still in place. Currently, OSHA fines from these inspections have fallen under several general categories:

- 1910.22 General Housekeeping
- 1910.94 Ventilation and Environmental Control
- 1910.305 Electrical Safety
- 1910.1200 Hazard Communication
- 1910.134 Respiratory Protection
- Section 5(a)(1) General Duty Clause.

The General Duty Clause states that companies are required to provide a safe, healthy workplace for employees. While almost any health or safety hazard could be cited under this clause, most of the citations resulting from the NEP come from other standards. Grain handling facilities are covered by their own standard, since historically grain and agricultural products have been recognized as an explosion hazard.

The Chemical Safety Board (CSB), an independent government body investigating industrial incidents, has called on OSHA to institute a universal combustible dust standard for over a decade. They report that from 2006 to 2017, food product industries generated the highest level of in-

cidents. However, metal and woodworking industries came in tied for a close second place. The first call for action on combustible dust came from the CSB in the wake of a notorious sugar refinery explosion that killed 13 people in 2008. The most recent one came after a 2017 accident at a milling facility that killed five.

NFPA AND THE NATIONAL EMPHASIS PROGRAM

The National Fire Protection Association (NFPA) is a nonprofit organization that develops codes and standards for fire and explosion safety. The NFPA is not a regulatory group and does not conduct inspections or issue fines. However, their standards often guide other organizations. Many building codes and insurance companies use NFPA standards as legal requirements.

Although OSHA's NEP on combustible dust is not an actual OSHA standard, inspectors have been encouraged to use NFPA standards to determine whether there are dust safety issues in a facility. The focus is on two of the newer NFPA standards: NFPA 625 Standard on the Fundamentals of Combustible Dust, and NFPA 654 Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids. Along with several industry-specific standards, other relevant ones include NFPA 68 Standard on Explosion Protection by Deflagration Venting and NFPA 69 Standard on Explosion Prevention Systems.

One of the new requirements for the NFPA's combustible dust standards is a dust hazard analysis, which must be kept on record and presented to "the authority having jurisdiction." Often, this applies to a local, county or state official who enforces building codes and fire safety inspections. Since OSHA does not have an official standard requiring a dust hazard analysis, they cannot demand a dust hazard analysis. However, there are OSHA standards for Process Hazard Analysis, and any dust-producing process should include combustible dust issues in this analysis.

WILL THERE BE AN OSHA COMBUSTIBLE DUST STANDARD?

When OSHA initiated the NEP on combustible dust in 2007, one stated goal was to move toward an enforceable combustible dust OSHA standard. In 2009, OSHA added this potential standard to a long list of standards awaiting review and discussion.

The intent to establish an enforceable combustible dust standard hit many roadblocks. First, a combustible dust standard would apply to many industries and processes, with huge differences between them. This standard would need to be applicable to all industries with combustible dust (the exceptions would include grain handling and mining, which have their own standards already). **EHS**

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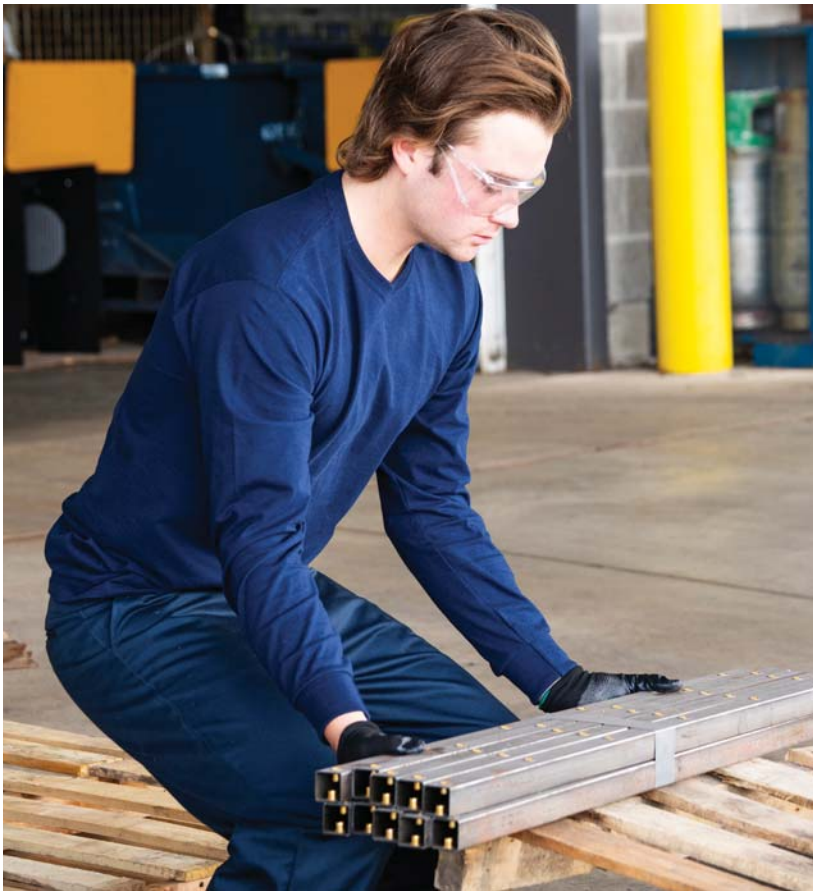
ERGONOMIC LIMITATIONS
and what you need to overcome them

Why proper movement matters when it comes to protecting your workers.

By Ben Kanner



We all know that overexertion injuries, mostly showing up as musculoskeletal injuries (MSIs), are a big problem, that is old news.

According to the 2019 Liberty Mutual Safety Index, injuries resulting from "overexertion and bodily reaction" are the most costly type of injury in the US, totaling $13.1 billion across all industries.

The direct costs of this injury category alone disproportionately affect industries like transportation and warehousing, where physical tasks such as pushing, pulling, lifting, and reaching, are just part of the job.

Humans have been trying to eliminate MSIs like these for years. To date, ergonomics has been the most common cure.

IN A NUTSHELL

Ergonomics is strictly defined as, "an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely" (emphasis mine). That's a bit academic, so let's just call it engineering the environment to the person. By virtue of engineering the environment to the human being, we can engineer some of the risk out of it, thus reducing the opportunity for injury.

Let's think about a typical office environment. This is very applicable to individuals, like me, who sit at a desk in front of a screen for most of the day. Luckily, we're familiar with common injury risks in the controlled environment of the office, so we've been able to use ergonomics to help mitigate them - to a degree.

I can buy a fancy ergonomic chair to potentially reduce the stress on my lower back, or I can get a hand-shaped mouse to alleviate wear and tear on my hands and wrist to prevent carpal tunnel and other ailments. Other solutions range from raising my monitor to eye-level, using a footrest, or even installing a standing desk. The list of engineering options goes on and on. However, other than making me look like I'm in a flight simulator, does this engineering guarantee you won't get injured?

ERGONOMIC EFFECTIVENESS

A study by OSHA published in 2002 showed that, all else being equal, ergonomically engineering the environment eliminates 26% of "ergonomic related" injuries (their term) resulting in days away from work, over a ten-year period.

While roughly a quarter reduction or said differently, 1 out of every 4, is a good start, that still leaves a large portion, 74%, of "ergonomic related" injuries that won't be affected by ergonomics. What can we do about those?

If we look at our simple definition of ergonomics, engineering the environment to the person, it doesn't tell us anything about how the human body will actually interact with that engineering.

Let's revisit the example of me sitting at my desk. I can buy the $800 ergonomic chair, but if I slouch over my keyboard

all day long, then it's not going to do me any good. My neck will still be sore, my back will still ache, and I may potentially end up with a lasting MSI.

It's critical that I use my body to correctly interact with the engineering, or else I am not going to get the benefit from the engineering, rendering it useless.

Now let's look at a delivery driver using a box truck with no lift gate as an example. We can add engineering, such as handles and steps, ramps, a hand cart, etc. to help make the job easier and reduce the risk of the driver being injured (**Figure 1**). However, even engineering can create added opportunity for injury if not used correctly, in this case while setting it up. This is a shoulder injury waiting to happen (**Figure 2**).

Figure 1

Figure 2

Figure 3

PROPER MOVEMENT MATTERS

Oftentimes, there's no engineering available or appropriate for the job at hand. It just comes down to the team member and the task (or in this case the team member and the keg). No engineering, short of getting a robot to do the job, can completely eliminate the risk.

Millions of front line workers who do more than sit at a desk all day, such as delivery drivers, warehouse workers, linemen, nurses, or firefighters (just to name a few), are confronted with these kinds of scenarios on a daily basis. These individuals come across an infinite number of situations while they're on the job. Ergonomics simply can't be applied to this multitude of tasks and environments. Its effectiveness is largely limited to known environments, which leaves big opportunities for injury everywhere else.

If engineering the risk out of the environment is only effective for 1 out of every 4 injuries, we need to focus on the only thing we can always control: the human being (**Figure 3**). By focusing on the human, specifically how they use their bodies to move through space and interact with their environments and the engineering we are able to put in place, we're able to put them in stronger, more stable positions - reducing their risk in any situation.

At the end of the day, we aren't creating superheroes, but we are working to reduce the risk of injury in the 1) known environments where we have been able to implement ergonomics by interacting with that engineering correctly, 2) in the known environments where we have not yet been able to implement ergonomics, and 3) in the circumstances and environments we have not yet encountered.

Movement matters! **EHS**

Ben Kanner is the co-founder and CEO of Worklete.

That Robot Next to You is Helping Create a SAFER WORKPLACE

PHOTO: UNIVERSAL ROBOTICS

The delicate dance between machines and humans continues in the workplace.

By Adrienne Selko

I fear that I have been asking the wrong question.

In talking with companies who manufacture robots and those that use them, I keep asking if it's safe for workers to interact with robots.

Maybe the real question should be: "Isn't it safer for workers in environments that employ robots?"

One answer to that question comes from Seegrid Corp., a manufacturer of self-driving industrial vehicles for material handling. Their vision guided vehicles (VGV) have traveled 2.6 million production miles without a single personnel safety incident.

Those robots, which travel guided by several methods including marked lines or wires on the floor, radio waves, vision cameras, magnets or lasers for navigation, have been hard at work at Amazon, GM, Whirlpool, United Technologies and other companies.

Can manual forklifts live up to that safety record? No. From 2011 to 2017, 614 workers lost their lives in forklift-related incidents, according to a June 2019 report from the Bureau of Labor Services. More than 7,000 nonfatal injuries with days away from work occurred every year during that time period.

From a safety standpoint, the argument is on pretty solid ground that this type of automation is a safer alternative.

ROBOTS GET GOOD SAFETY MARKS

This bring ups an interesting philosophy many people ascribe to automation.

"A robot vehicle must always be safer than a manually operated one," explains Jeff Christensen, vice president of product, Seegrid Corp. "Everyone has that expecta-

tion, and this is why our company exists. Material handling is a dangerous profession. High employee turnover further complicates safety since a high percentage of the workforce is less experienced. These VGVs can offer a safer alternative."

A safer and also more efficient environment is exactly how Ford Motor Co. would characterize its experience with robots.

"We choose to automate functions on the factory floor based on safety and quality," explains Harry Kekedjian, manufacturing engineer manager for Advance Control and Digital Factory at Ford Motor Co.

Let's take a closer look at these robots, which like humans, have evolved over the years in both form and purpose.

Robots have been used since 1962 when GM placed its first robot in a factory in New Jersey. The current iteration of industrial robots most commonly seen across manufacturing floors today are large and housed in cages.

"Traditionally, we have kept the robots and humans separate for safety purposes," explains Kekedjian.

Very heavy machines carrying high payloads are under lock and key.

THE RISE OF THE COBOTS

The new guy on the block is a collaborative robot (referred to as a cobot) that has shrunk in size but increased in terms of function and ability. Unlike their larger cousins whose scope of job duties are limited, these cobots can be easily programmed to perform a variety of duties.

And they are moving closer, literally, to the human beings in the factory. The cages have been torn down and these friendly-looking robots sit right next to their human co-workers.

I can't help myself, so again I ask, "Are they safe for humans to work with?"

"These cobots are functionally different in that they are power, and force limited, " says Kekedjian.

To put my mind further at ease, he explains that Ford does a rigorous safety and risk assessment of all cobots that operate on the floor including a safety scanner around the manufacturing cells. That is in addition to all of the safety standards that have been programmed into the cobots. Ford uses ISO/TS 15066 which addresses end-of-arm tooling as well as ISO 13849-1 machine safety.

Robot safety standard is Roberta Nelson Shea's particular expertise. While she is currently the global technical compliance officer at Universal Robotics, she has long been involved in safety standards. She chaired the U.S. National Robot Safety Committee for 23 years. In addition to her day job, she is a convenor of the ISO committee publishing technical specifications on risk assessments of collaborative robots.

When Shea is asked about the safety of her company's cobots, 42,000 of which are currently installed around the globe, she says that no cobot is inherently safe, as is it an incomplete machine, and there is no way to know how it will be used. However, the products her company produces have an "extensive range of safety functions." She cites the e-Series cobot which has 17 safety functions. All of these functions are certified by TÜV Nord and are in compliance with the EN ISO 13849-1 and EN ISO 10281-1 safety standards.

Shea suggests it's best to provide an extensive risk assessment that consists of identifying all tasks (operation, programming, setup, maintenance etc.) and all hazards that are associated with the task. Shea says that her mission is to "demystify robots and make sure that the deployment barriers are broken down. I am an advocate of global harmonization of safety requirements to reduce costs of design, manufacturing, and compliance."

One way cobots are demystifying automation is their ease of use.

"We have found that people are adapting well to working alongside the cobots," says Shea.

One reason might be that the training necessary to work with cobots is short and easy, especially compared to the weeks of training necessary for the larger robots of the past.

And what is currently on the market is only going to improve. Just this past March, Universal Robots announced it will be joining with Mobile Industrial Robots to share a 334,000 square foot facility to become the "cobot hub" in the city of Odense, Denmark.

MAN VERSUS MACHINE?

As cobots continue to increase their capabilities, will this put the workforce at another type of risk? Will people lose their jobs to robots?

"This is a non-issue," says Shea. "It has no meaning in the current economic situation. The biggest challenge is finding workers."

Christensen agrees. "Many of our customers have having trouble finding people who are interested in working in warehouses and distribution centers, so robots are becoming a necessity."

Finally satisfied that cobots are not a threat to the workforce, I ask Kekedjian how workers view their new colleagues, around 150 of which are working at plant across the company's footprint.

"Robots enhances our workforce's ability," he says. "People can focus more on things that they are best at." For example, cobots that are used for standard inspection purposes allows workers to focus on the issues that need closer attention.

In the company's Livonia Transmission Plant, a cobot performs a job that is so ergonomically difficult for employees that they could only do that job for one hour at time.

Finding additional areas in which cobots can assist their human counterparts continues at Ford. In December 2018, the company built a new $45 million Advanced Manufacturing Center in Redford, Mich.

"We are excited to move the needle on the technology in our 4.0 strategy," says Kekedjian. "It all comes down to the most efficient way to build the products that our customers love, with the number one priority being able to do that in a way that keeps our workforce safe."

Ironically, the use of robots both for efficiency and safety is having the benefit of attracting more workers to the auto industry.

"We are always bringing students into our plants," says Kekedjian. "All education levels come through here – elementary, high school, college – and everyone has the same question after the tour, "How do I get a job here when I graduate?"

With the next generation asking how to be part of a workplace that depends on robots as co-workers, I guess I can finally stop asking if it's safe. **EHS**

AVOIDING THE *COMPLACENCY*

Don't take for granted that everything is going well just because nobody got hurt.

By Paul Mahoney

What have you walked past twice or more today without even a second thought because it has always been there? Another way of putting it is, what have you walked past today and didn't even know it was missing?

Take a couple of minutes and really look at what you missed. It might even be a sound, like a noisy bearing. We get so used to our environment that we automatically start to categorize what is important or not.

We all do it and the more successful you and your team become, the more you slip into the cycle of "we are the best—all is fine." Take an office environment. How many would walk past fellow workers standing on chairs to grab folders or say nothing about trailing cables? And yet, if a lion was let loose in that same office, everyone would be running around screaming. Complacency is nothing more than being comfortable in one's own skin.

Consider this quote from Captain Edward Smith: "When anyone asks me how I can best describe my experiences of nearly 40 years at sea, I merely say 'uneventful.' I have never been in an accident of any sort worth speaking about. I never saw a wreck and have never been wrecked, nor was I ever in any predicament that threatened to end in disaster of any sort." Smith said those words back in 1907, a few years before he became captain of the Titanic.

Complacency is an interesting thing that cannot be seen, but it can certainly be felt! Take your first day at work. You arrive at the gate, you sign in, go through induction, and then finally you're shown to your job, and in your head a little voice is screaming, "I want to go home!" Your chest has been pounding from the moment you got up, a condition known as "butterflies." Over the following days, weeks, months and years the butterflies slowly disappear as you get used to the job and the environment you're working in. As they fade, they light a fuse—luckily most people live to a grand old age without a scratch, but there are those who have the fuse blow up in their faces and are scarred for life.

> Most complacency is made up of little steps and elements that people have missed.

As I stated earlier, complacency can be the nemesis of your success. There has been lots of hard work amongst your team and you finally get to the top and ride the crest of the wave and then bang! An incident happens and everyone is asking what happened there. Coca-Cola has said that it was easy to become the top soft-drink brand in the world but staying there is the hardest thing.

Most complacency is made up of little steps and elements that people have missed. You could call it operational creep.

When I look back at my accident in 2000, there were several elements that people overlooked that, in hindsight, were obvious to anyone outside the organization or the industry:

- How we were trained and the lack of written procedures.
- Taking for granted that everyone operates the same way, when right-handed employees operate differently from left-handed ones as they stand in different ways to do the job.
- Miscommunication with walkie-talkies and hand signals.
- Leadership from bottom to top of the organization and how they deal with issues and successes.
- Overconfidence in trust amongst team members as they build a sixth sense in what they are doing that they understood what was going on.
- Overformalization with machinery, especially when it is going wrong consistently and how to deal with the issue.
- Narratives—the stories that people tell about incidents to make them a normal thing.

When I joined the paper industry as an 18-year-old, the narrative was that to be a papermaker, you had to lose a finger. It was almost a badge of honor or a cover for one's embarrassment that they had mutilated themselves at work.

How do we stop having a complacent culture? Site walkarounds with people from the department and people from the outside walking together. Remember that those from the outside are not asking questions to catch people out—they are asking questions about situations that have potential to have been missed.

Technology will help as well as more security cameras are installed and used, and body cams will play their part too. Body cams are great as they get a prospectus from the actual boots on the ground and not from above. These are very reflective tools, as they are normally used after an event.

Debriefs can help as well, where teams review the day's operations before they go home. Don't leave it until the next day, as things can be forgotten when people go home and think about other things. Debriefs make it easier to talk about action plans that can be drawn up to combat any issues.

THE FOUR BEDROCKS OF SAFETY

A continuous focus on the bedrocks of modern safety policies will help avoid the complacent culture as well. When I say bedrocks (or the foundations), I'm talking about the leadership, culture, communication and behaviors of the organization that encourage safer workplaces. These four elements have proven to reduce workplace accidents and incidents since they were recognized in the early 2000s.

So far I have focused on what organizations have done to reduce fatalities, injuries and ill health in the workplace, but we now need to turn our attention to the individual.

CULTURE

We get so used to our environment that we start to automatically categorize what is important or not.

After an earthquake in 362 BC, a huge deep pit suddenly opened in the Roman Forum, and the Romans attempted to fill the bubbling hole, to no avail. Despondent, they consulted an augur who responded that the gods demanded the most precious possession of the country. The Romans doubted the warning and continued to throw in anything at hand, including jewelry, while they struggled to think of what was Rome's precious possession.

A young soldier named Marcus Curtius reprimanded them and responded that arms and the courage of Romans were the nation's most precious possessions. Astride his horse, fully and methodically armed and decorated, Marcus Curtius rode and leapt into the bubbling evil chasm. Immediately, the deep evil pit closed over him, saving Rome.

What has this story got to do with the individual avoiding the complacency culture? It illustrates the two rudiments that get anyone home each day: making the right decisions and having the courage to speak up and/or stop the job!

We make decisions every day, normally under no pressure or free will, as they are the right thing to do or they just need doing, like breathing. They are subconscious choices due to the environment around us. Start adding pressure slowly, and in the end the simplistic decisions to be made feel like life or death choices.

This is where courage kicks in, as it takes a courageous person to stop, speak up or walk away from a task.

Unfortunately, all too often because of the fog of complacency in the workplace, people get sucked into this spiraling mess that the job has got to be done because we cannot be seen as failures—whether it's the self, the team or the organization.

It is like the famous definition of insanity: doing the same thing over and over again and expecting different results. It worked last time and the time before and we know what we're doing because we're the best.

Going back to Marcus Curtius and the Romans. The Romans knew that if you threw enough material in a hole it would finally fill up. But when it didn't fill up, they just kept going by throwing even more precious objects into the hole. It needed someone outside the crowd to ask the right question and answer it with a decision that was a courageous act.

To break the spiral of complacency and avoid its culture, I finish with this quote from President Kennedy: "Ask not what your country can do for you—ask what you can do for your country." We rely on others to sort out issues, but actually it is us (the individual) that can stop the complacency culture from developing by being courageous to make the right decisions at the correct time. **EHS**

Motivational speaker Paul Mahoney is principal of Paul J Mahoney Inspiring Safety Ltd. (www.pauljmahoney.co.uk), and is the author of Man V Machine: Journey of Complacency.

The 6 Axioms of Safety Management

A robust safety infrastructure is crucially important to achieve high levels of safety.

By G.C. Shah

For this article, the term "axioms" is intended to imply broad observations regarding safety management. These observations are primarily experience-based and are an accumulation of the wisdom of many safety practitioners and my own experience in the EHSS (environmental, health, safety and security) area.

1. Each company has an optimum rate of change at which it can achieve its highest level of safety.

As is true in any profession, change is ever-present. Changes are necessitated by a variety of issues, including for example, local, state or federal regulations, technological changes, recent incidents at the company, neighboring community relations, and natural disasters. Obviously, if a company's safety practices are not fast enough to respond to events, the company's safety issues will worsen and, in the long run, may even lead to its demise.

Thus, at a very slow rate of change, a company's level of safety is below its optimum. There are a number of items that tend to contribute to a slow rate of change at a company—bureaucracy, lack of team spirit, poor financial health of the company, and lack of safety focus are some examples.

On the other hand, to stay competitive, technology, processes and safety practices must change. For instance, with the widespread move toward digitization in many industries, it is natural to expect that some companies would want to catch up. However, if the company attempts a rate of change that is excessively fast (for the company), it will also lead to a level of safety which is below optimum.

The reasoning is as follows: At a fast rate of change, the focus will be away from safety and on how fast to complete a project. Focus away from safety will tend to increase the number of unsafe events at the company. Tacit disregard for safety at the top management levels, poor safety culture at the worker level, budget and schedule pressures are some of the examples of the factors that contribute to a fast rate of change.

2. Safety infrastructure at a company strongly influences the level of safety achievable by the company.

Simply put, safety infrastructure is the systems, people and procedures in place at a company to support safety. Safety infrastructure includes, for example, systems for ensuring contractor safety, training, emergency response (including response to natural disasters), safe operating and maintenance procedures, updated drawings, equipment records, and change management procedures.

An inherent feature of safety infrastructure is that it is a dynamic or a "living" system—it must be reviewed and updated periodically and should be available electronically. There also should be backup systems in the event electronic systems fail.

A review of most of unsafe incidents, including such major events as Bhopal and Macondo, shows that lack of proper safety infrastructure and its implementation partly contributed to the incident. Obviously, a poorly managed or incomplete safety infrastructure will lead to unsafe events. As we all know, the outcomes could be enormously severe and could destabilize a company. In extreme cases, major unsafe events could spell the demise of the company. The importance of safety infrastructure is difficult to overemphasize.

3. A company's economic health impacts safety.

This axiom applies to both poor as well as excellent economic performers. Obviously, management and workers at the companies with lackluster economic performance are under heavy stress to cut costs—and to do that quickly. In this tension-filled environment, safety gets shortchanged.

Companies with a strong balance sheet would tend to expand or acquire new businesses. Although at the corporate level, things may look under control, the acquisitions entail a meeting of diverse cultures and philosophies. These differences could contribute to impaired safety. If the management at the acquiring company is focused on making quick profits and then sells the company they acquired, it creates added strain on workers. It is possible that these companies will provide minimal resources for safety.

Unfortunately, market volatility has and will continue to have a major impact on safety. Of course, organizations have to be able to respond to changing market conditions quickly to stay economically viable.

However, monolithic emphasis on profitability has an adverse impact on safety. Paradoxically, this sole emphasis on profitability hurts profitability.

4. Inherent characteristics of a process and processing steps impact safety.

Different processing systems and chemical slate yield different levels of inherent risk to a company. On the other hand, highly reactive chemicals, highly toxic chemicals and quantities of these chemicals in process and/or storage, pressures and temperatures are examples of inherent characteristics of process that determine the risk of an incident. Ideally, hazardous chemicals and/or processing conditions should be eliminated or minimized. However, this is easier said than done.

Emphasis is on designing "fault-tolerant" systems. In essence, these systems are designed to minimize impact or consequence of an unsafe incident. Multiple safeguards or Independent Protection Layers (IPLs) are provided to minimize the likelihood of occurrence of an unsafe event and minimize its impact. Many companies employ the ISA-84 or IEC 61511 system of risk assessment. Others enhance HAZOPs (Hazard and Operability study) to minimize risk. In either case, safety systems, no matter how well designed and installed, could fail to function if not inspected and maintained periodically and properly.

5. Regulations (too much or too little) can impact the level of safety.

Safety regulations provide criteria for the minimum level of safety that should be provided. A number of regulations, including lockout/tagout, confined space entry, PPE, electrical safety, fall protection and HAZCOM, have collectively contributed to improved safety. If such regulations were not there, one could argue that the level of safety would probably have been lower.

However, as may be expected, too many agencies and confusing jurisdictions and regulations tend to lead to diminished safety, i.e., the Law of Diminishing Returns.

6. Public rapport is an important component for sustained safety.

On the one hand, in today's litigious environment, it is prudent to minimize liability. On the other hand, if we extend the concept of "safety culture" to the neighboring community, it makes sense to have an amicable relationship with the neighboring community.

The question is: What has public rapport to do with safety? The reasoning is as follows: When public concerns are taken into consideration during the design stage, the safety systems will not only protect the plant site, but also the neighboring community. Additionally, ongoing rapport with neighbors will help a company respond quickly to their concerns. **EHS**

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Fire Safety Isn't ONE-SIZE-FITS-ALL

There's a gap between at-home and workplace fire safety knowledge.

By Tonya Dybdahl

While "stop, drop and roll!" is an elementary school mantra and every homeowner has had to fan the fumes of a burnt pizza from the smoke detector, there's a serious gap in employees' fire safety knowledge between the home and the workplace. The more demanding the environment, the more comprehensive your fire safety strategy should be, and manufacturing facilities have a unique set of concerns.

From the corporate office to the plant floor, every part of the building must be considered before, during and after the build-out process to ensure that your plans exceed compliance. Beyond the physical layout, promoting a culture that respects fire safety standards is key to a functional disaster plan.

The U.S. Fire Administration (USFA) maintains statistics for fire losses, injuries and deaths for nonresidential buildings, including manufacturing and office environments. Between 2003 and 2017, an average of 5,180 fires broke out annually, attributed to everything from natural causes or, at both the #1 and #2 most common occurrences, equipment failure. These staggering statistics are a reminder that there is no such thing as a workplace that's too prepared, and that process starts from the ground up.

START WITH CONSISTENT STANDARDS

To close the gap between common sense and specifics, ensure that employees start out with a uniform rundown of safety standards. While some may have existing knowledge, not everybody will be on the same page and incorporating a fire safety plan into orientation puts your workforce on even footing.

Beyond posting evacuation plans in legally-required locations, take a moment to go over the best paths of egress and physically show employees the locations of exits, fire alarms, detection systems, sprinkler systems and fire extinguishers. Don't forget to explain the differences between extinguishers—the chemicals that work on one fire won't work on every one and the dynamic nature of a manufacturing plant can cause a number of fire types.

Maintain this knowledge and keep your employees on the right path by conducting routine fire drills, ideally at times when the building is fully-staffed and across different shifts, if applicable. Smoke detectors and other indicators, whether small units or building-wide systems, should be checked both by personnel as well as local fire authorities. This includes sprinkler systems, which should be optimized with either a high-pressure water-driven system or a chemical foam that is well suited to your industry.

REMEMBER ELECTRIC UPGRADES

Electrical fires are a leading cause of fire losses—and even death—in nonresidential environments. In offices, this is the second most common fire starter, while in manufacturing facilities it is the sixth. The USFA's data from 2003 to 2017 reveals that nearly every type of fire has become scarcer as safety regulations and knowledge increase, especially electrical fires.

Preventing electrical fires requires work up front with great benefits later on:

- Start with a professional inspection and evaluation from a reputable electrician.
- Update, upgrade and overhaul electrical wiring as needed; don't be afraid to go

beyond basic requirements.

• Teach all employees the warning signs of electrical issues:

* Dim and flickering lights.
* Unusual sizzling and buzzing.
* Repeated tripping of breakers.

• Reduce use of electrical cords and overloaded outlets.

• Install outlet caps on any unused outlets that are being concealed by furniture.

• Make sure that every socket has the correct lightbulb type and wattage.

• Evaluate equipment in both office and plant environments; replace or repair items with outdated or weathered cords.

FOLLOW THE RULES

To get started, look to resources such as legally-mandated codes and fire authorities' websites. This will ensure that your environment is brought up to code while giving you the opportunity to go above and beyond the simple standards. Anticipate changes and enhancements in order to stay ahead of new regulations and ensure that you continue to have your workplace inspected to maintain compliance.

Online resources provide the best framework for getting started. The Fire Equipment Manufacturers' Association has put together an impressive list of safety resources that provide valuable statistics, important insights and official instructions for maintaining a fire-safe work environment. From a national perspective, The U.S. Fire Administration provides official government resources and documentation that can be viewed as an overarching authority.

AVOID ONE-SIZE-FITS-ALL SOLUTIONS

Prepare for the potential devastation that a fire can impart by determining the right protection solutions for your business. Irreplaceable documents, small and specialized equipment, and critical backups are never immune to fire damage, and even metal cabinets cannot protect from the heat of a blaze. Specialized gypsum-lined file cabinets and safes are available to protect these important elements that are essential to day-to-day operations.

Choose the suite of features that best suits the type of fires that can break out. The majority of these cabinets have been designed with standards set by Underwriter Laboratories (UL), which consider a number of factors, including:

• Length of time burning at a certain temperature, maintaining an interior temperature of 350°F.

• Ability to protect digital media, which has a significantly lower maximum temperature of 125°F.

• 2,000° explosion hazard rating, which is especially relevant in manufacturing plants that use highly explosive materials.

• Impact rating to protect items in case a floor burns out and the unit drops up to 30' and continues to burn.

Whether you're optimizing the manufacturing facility itself or an attached office space, these environments are always unique and there's no one-size-fits-all solution for protecting both employees and business necessities. Careful consideration saves lives and can be the difference between a total loss and a salvageable operation. There's no such thing as too much disaster preparation, so consult your regulatory authorities and begin this process before it's too late. **EHS**

> Between 2003 and 2017, an average of 5,180 fires broke out annually, attributed to everything from natural causes or, at both the #1 and #2 most common occurrences, **equipment failure**.

Tonya Dybdahl is a space planning and design assistant manager for National Business Furniture (www.nationalbusinessfurniture.com), a retailer of office furniture products.

How to Create an Effective SAFETY MENTORING PROGRAM

We learn to do our jobs from the people without an official title.

By David Lynn

New employees do not want to get hurt, and they have questions about their job. The goal of an employee new hire mentoring program is to teach new workers to do their jobs safely. You can't learn how to do all parts of your job in the classroom. You accumulate useful knowledge listening to an instructor, but you learn the practical hands-on functions of your job from those you work with every day.

On-the-job training is a natural part of everyone's learning process. An employee peer-to-peer mentoring process utilizes trusted employees to develop positive safety attitudes and disseminate critical information to new workers. This is similar to a safety champion program but the difference is the mentor's focus. The mentor focuses on training new employees in their first 30 days, while the safety champion program focuses on monitoring behaviors and conditions throughout the life of the job.

I understand the power of hands-on training. When I started work as a compliance officer at OSHA in 1992, I spent the majority of my first four months in a room the size of two cubicles with four other people. The objective was to study OSHA standards. We did this every day for four months. Can you imagine spending eight hours a day, five days a week trapped in a small room staring at the Code of Federal Regulations? How exciting is that? Better yet, how effective is that?

The training was not an orientation but rather an initiation. I don't know how much I learned the first four months in my OSHA role, but I—along with my coworkers—survived the imprisonment. The next stage of the program was MUCH more useful. We shadowed experienced compliance officers on their inspections, and I began to see how people did the job I would learn to do.

The experienced compliance officers were my mentors and they taught me the hands-on details of the job. That is where I really learned the most. Over the next nine months, I learned every facet of the inspection and report-writing process with a mentor. As I progressed, the compliance officers would let me do more of the job. It was an incremental process that taught me the details. After a year, I passed a final evaluation and began performing inspections solo.

The lesson I learned in my OSHA experience is that book learning is important, but it is not where you learn how to do your job. You learn your job from people. Companies with a history of exceptional safety performance have systems that take advantage of the power of peer-to-peer learning. Give safety-minded workers an opportunity to instill their safety values into new employees via mentoring. This helps perpetuate a culture that embraces safety.

An effective mentoring program should accomplish specific goals:

Step One: Identify safety-conscious leaders in your workforce. Every company has natural leaders in their work environment. They may not have a leadership title but you know that people go to them with questions. Employees trust them. Utilize this natural social norm to develop your mentoring program.

Step Two: Train the mentors. Empower your mentors to utilize their influence for the safety good. Explain how the process works and let your participants know how important their role is. Explain your expectations for how they will evaluate and coach employees. They have an opportunity to influence the next generation of workers in their company. The training should give the mentors a sense of pride in their contribution.

Step Three: Identify the new employees and let them know who their mentor is. Companies do this in multiple ways. You can provide new-employee stickers for hardhats. You can have new employees wear a new-employee vest. You can do whatever fits the culture of your company. The benefit is that mentors know who they need to help.

Step Four: Establish a way to evaluate and coach new workers. The purpose of this step is to confirm that new employees know and understand critical safety information. The evaluation is a coaching tool and not a performance measurement tool.

The goal for the mentoring program is to add structure to the way employees learn to do their jobs and the process empowers natural leaders to train new people. The classroom environment is an introduction to safety. The reality is that our coworkers teach us how to do our jobs safe. If you can harness this social dynamic in a positive way, you will have a powerful safety impact on the next generation of workers. **EHS**

David Lynn is president of Peak Safety Performance (www.peaksafetyperformance.com), a safety consulting firm.

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STEFANIE VALENTIC
Managing Editor

CITY OF NEW ORLEANS NEEDS TO RECOVER VICTIMS

Workers' bodies remain in the rubble at Hard Rock New Orleans construction site.

As Valentine's Day passed last month, significant others, friends and gathered to celebrate with one another.

New Orleans' Mardi Gras celebration took place shortly after on Tuesday, Feb. 25.

Thousands participated in Fat Tuesday activities seemingly unaware they were a short distance from 1031 Canal St., the site of the Oct. 12, 2019 Hard Rock Hotel construction site collapse.

The bodies of 63-year-old Jose Ponce Arreola and 36-year-old Quinnyon Wimberly remain in the rubble, two construction workers who will never again share love with their families. As of press time, the city of New Orleans has yet to take action to recover them.

Mayor LaToya Cantrell posted the following statement after one worker's body, which was hastily covered with a tarp following the collapse, became exposed in late January 2020,

"A tarp put in place to conceal the remains of one of the victims of the Hard Rock collapse has been shifted by the wind---exposing those remains. The condition of the building and the altitude above street level complicate efforts to replace the tarp, as they have prevented recovery thus far."

She continued, "To be clear: capturing or sharing images of the victims in such a condition is irresponsible, it is indefensible, and it is not who we are as New Orleanians. Out of respect to the victims and their families, and in the name of basic common decency: we urge news outlets, residents, and social media users to have nothing to do with making a tragic situation needlessly worse."

Cantrell declared a state of emergency on Oct. 12, 2019, which was extended on January 29, 2020.

She declared "the remaining threats to the health, safety, welfare, and property of the residents of the City of New Orleans are still in existence due to the partial demolition of the construction cranes, which have collapsed onto the remaining structure." Engineers' inspections reveal the current structure to be unsafe, as well as "a clear threat to human life and public safety, and must be demolished in full."

As of Feb. 4, 2020, the city exhausted $11.6 million to secure the structure, but why has it taken more than four months to take action and remove something that has now become a Segway stop for tourists?

Cantrell's word choices are indicative of how the city's administration has managed the situation since the tragedy. It is irresponsible and indefensible to not make it a priority to secure the worksite, remove the bodies and complete demolition of the structure. The city's lack of action continues to threaten the health, safety, welfare and property of its residents and visitors.

The administration has shown no respect to Arreola or Wimberly or their families. There shouldn't have to be outcry, but it is warranted. There shouldn't have to be demonstrations, but there also shouldn't be excuses as to why city officials state it is taking until March to execute plans.

Hard Rock International echoed the frustration of the city's residents and those affected by the collapse:

"It's important for New Orleans residents to understand Mayor Cantrell declared a state of emergency on Oct. 17, 2019 and no one except the City of New Orleans has had access to this site. Officials and experts have repeatedly said that safety concerns at the site prevent access to the victims. While we recognize the instability of the structure has prevented recovery efforts, we remain confused and frustrated at the length of time it has taken to resolve the issue—and have expressed this to the appropriate authorities via official communications."

The company added, "Hard Rock International had no involvement or role in the development, design or construction of the building, or in selecting the various contractors and subcontractors hired, we have extended our support and collaboration by providing meals for first responders, providing millions of dollars to remove the cranes, and helping fund advertising and online campaigns to support area businesses impacted by the tragic building collapse. We hope that recovery can happen soon to bring closure to this great city and its residents."

Halloween, Thanksgiving, Christmas and 2019 is now in the past, joined shortly after by Valentine's Day and Fat Tuesday. These are all holidays that Arreola's and Wimberly's families will never be able to share with them again. And there should have been some sense of closure by now.

Stefanie

Send an e-mail with your thoughts to svalentic@endeavorb2b.com.

Stefanie Valentic **SafetyEditor** **SafetyEditor**

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