

# Industrial Hygiene

March/April 2021

*in the* **Workplace**

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...and more

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**"Men are not prisoners of fate, but prisoners of their own minds."**

—Franklin Delano Roosevelt

That sentiment has always been my favorite quote from a former U.S. President. That's really saying something, since FDR is also the one who so famously gave us "We have nothing to fear but fear itself."

However, both quotes are two sides of the same coin. They are about educating the mind; changing the paradigm; being open to facts.

It's worth noting that FDR was a victim of childhood polio; he survived it, but it crippled him for life. If not for the Salk vaccine, millions worldwide would have been crippled or died of that dreaded disease. A friend in the UK, a man in his 70s, has been in a wheelchair for six decades due to polio. I vividly recall photos of patients in iron lungs and stories from my parents about polio; they gave me many a childhood nightmare. Children in iron lungs is the stuff of horror movies—and yet—when I saw images of COVID-19 patients intubated, hooked up to machines, I was eerily reminded of those terrors. That it could still happen, in 2020, made it more frightening.

Fast forward to March 2021: The vaccine rollout is going full steam, and millions of people throughout the world are beginning to have hope for normalcy again. That we will never return to pre-COVID "normal" is pretty much a given, but it will nevertheless feel so good to go to restaurants, movies, family gatherings, etc., while being mindful of CDC/medical guidance.

Science and technology and chemistry are what brought us the vaccine so quickly. This past year, as I've Zoomed with experts from around the industrial hygiene/safety universe, I saw incredible commitment to the latest technology and science, as companies strove to make workplaces safe to open up and keep workers healthy during the pandemic. Those solutions will have multiple applications in the future, to make factories, warehouses, medical facilities, schools—all workplaces—safer.

From this issue's cover story, "Wireless Tech in Confined Spaces," to articles on heat safety, gas detection, air sampling, the latest in PPE and more—we delve deeply into the latest science, research and practices that are helping industrial hygienists and safety specialists do their jobs more effectively.

Part 2 of "The Future of Industrial Hygiene" features various companies talking about their efforts to embrace change and utilize the latest science and technologies to make their companies meet 21st Century challenges.

Clearly, people across the industry refuse to be "prisoners of their own minds" and embrace solutions that help people live and work safely. And for that, we can all be thankful and grateful.

IHW's goal, as always, is to provide facts-based articles from around the industry that help serve readers in their everyday jobs and lives. To that end, I hope this issue brings you educational, thought-provoking information. Stay safe.

Regards,

**Barbara Nessinger, Editor-in-Chief**

P.S. If you are interested in contributing an article or "Perspectives" piece, contact me at [bnessinger@workplacemhs.com](mailto:bnessinger@workplacemhs.com).

# Industrial Hygiene

in the Workplace

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By: Jamie Greene, Contributor

# Wireless Tech in Confined Spaces



When you think about wireless connectivity, the first thing that comes to mind is the phone in your pocket or your laptop hooked up to an internet hotspot. This technology has been around since the turn of the century, but why aren't we seeing it used on the job site? Having the ability to integrate new technology and new practices into your everyday workflow is what is going to catapult your company into the digital age. Wireless communication is coming to a lifesaving device near you—and it's sure to make your site safer.

Taking this a step further, think about using this technology in confined spaces. The use of wireless communication technology for confined space entries could save lives. On average, 130 people die in confined spaces each year. There are many reasons confined spaces are the most dangerous part of a job site. One reason is the variations between the spaces. Confined spaces can be large, small and everything in between. They can contain physical entrapments and liquids; have limited entry points; and they can contain gases that can neither be seen nor smelled.

All of these factors combined create an unwelcoming work environment. Despite these variations, one thing remains constant: Wireless connectivity can keep you safe in these hazardous areas.

## Wireless Connectivity Increases Safety in a Confined Space

Confined spaces differ from one site to the next. It's important to remember that some connectivity may be better than others, depending on the depth or location of the confined space.

If you are using a connected gas detector in a confined space, you are being monitored by more than just your hole watch. When you use cellular or wi-fi connectivity on top of peer-to-peer connectivity, your hole watch has the ability to see real-time gas readings on their own monitor, and your data

is transmitted to the cloud. Once the data is transmitted to the cloud, supervisors can receive real-time safety alerts via text or laptop. Both options can be the difference between getting rescue personnel to the confined space with the required information or someone blindly going in and falling victim themselves.

## Types of Technology

Wireless connectivity in gas detectors allows you to relay critical information from within the confined space to workers outside. The connectivity method determines who receives the gas readings and alerts, so it's important to understand the differences between the methods. At the same time, you need to consider the characteristics of your confined space to find the most reliable connectivity method.

### Peer-to-Peer Connectivity:

Gas detectors using peer-to-peer connectivity can talk to each other in a local area and transmit alarms. Users can view gas readings, as well as see panic and man-down alarms for their peers working nearby. Having this peer-to-peer connectivity is beneficial for people working in teams to verify other alarms and make sure peers are not in distress. If a peer's monitor goes into alarm, you can see whether the alarms are being



Wireless connectivity in gas detectors allows you to relay critical information from within the confined space to workers outside. (photos courtesy Industrial Scientific)



caused by a gas hazard or another emergency—so you know the dangers before starting a rescue. This technology is critical for confined spaces, because it significantly reduces the risk of “would-be rescuer” fatalities.

### Cellular Connectivity:

Cellular connectivity is a significant advancement for confined space monitoring, especially for mobile workers. When workers need to enter a confined space that's off-site or in a remote corner of a facility, a cellular connection makes it easy to share gas readings and location data to the cloud and live monitoring software. This gives supervisors the ability to track worker safety in real time and dispatch help when needed. Knowing when workers need help, thanks to live monitoring alerts, is a major advantage. Being able to safely dispatch rescue personnel and communicate gas levels is crucial to a safe rescue—without putting more workers in danger.

While cellular connectivity makes it easy to use live monitoring software without adding site infrastructure, you first need to check that your confined space has cellular coverage. Extremely remote settings or confined spaces deep underground may not have an adequate signal.

### Wi-fi Connectivity:

When working in a confined space, it's key to stay in touch with the outside world. Similar to cellular connectivity, a gas

detector with a wi-fi connection can drastically improve safety by connecting you with others in case of danger. The advantage of using wi-fi on your site is that you have greater control over connectivity coverage. In hard-to-cover areas, you can add wi-fi access points to ensure consistent connectivity across the site. This allows gas detectors to stay connected to cloud-based, live monitoring software and reliably transmit gas readings and alarms, so safety personnel have visibility into what hazards exist and so they can intervene in an emergency.

No matter the wireless connectivity method you choose for your gas detector, any kind of connection is a good one. Confined spaces on the job can have many unseen hazards, so you need to expect the unexpected. By maintaining wireless connectivity, you have gas detectors on which you can rely to alert about dangers and provide additional visibility to safety managers and peers.

This added layer of connectivity gives visibility into what gas workers encounter, which can lead to faster response times in an emergency. It also gives you the opportunity to be proactive when implementing safety improvements and eliminating potential hazards in the future. With a gas monitor that is transmitting data, you are a step ahead in keeping yourself and your co-workers safe in confined spaces. **IHW**

*Jamie Greene is a Training Specialist at Industrial Scientific.*

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# Powering Portable Gas Monitors

Atmospheric monitors use sensors to measure gas. Some types of sensors need more power, while other types need less power. Very low-power sensors may use so little power that a set of disposable or rechargeable batteries can last for months or years of operation. But, no matter what kind of sensors are installed, portable atmospheric monitors need power—and that means the instrument depends on batteries.

There is no perfect type of battery. Each type of battery has benefits and liabilities. How well the instrument performs is a combination of the type and capacity of the batteries; the type of sensors installed; the environmental conditions in which the instrument is used; and the power requirements of the instrument electronics.

### Types of Batteries

There are three major types of batteries that are commonly used in portable instruments: disposable alkaline, rechargeable lithium ion (Li-ion) and rechargeable nickel metal hydride (NiMH) batteries.

Portable instruments can be powered by disposable alkaline batteries, rechargeable batteries—or they might be able to use both types of batteries. A primary advantage of rechargeable batteries is overall cost-effectiveness. Frequent (or daily) replacement of disposable batteries can be expensive and is increasingly viewed as environmentally objectionable. Some instrument designs offer interchangeable rechargeable and alkaline battery packs. Other designs allow the optional use of either alkaline or “off-the-shelf” rechargeable batteries.



The internal rechargeable battery pack of the G888 is fully encapsulated and molded into the rear cover. To replace the battery pack, simply replace the rear cover.



Use of an internal NiMH rechargeable battery pack delivers compact size plus excellent operation time. The G888 multi-sensor instrument can measure up to seven different hazards simultaneously and can operate for up to 24 hours on a single charge. (photo courtesy GfG Instrumentation, Inc.)

Contractors who only use their instruments occasionally often find disposable batteries are an easier solution than charging and maintaining rechargeable batteries. For other instrument users, simply having the ability to use disposable batteries “in a pinch” is a strong design advantage.

Make sure any disposable or rechargeable, off-the-shelf batteries you use are approved by the manufacturer. The owner’s manual will list the batteries which are approved for use. Using a non-approved battery, even if it fits the instrument and seems to work, can void intrinsic safety and other certifications carried by the instrument.

Alkaline batteries have the benefit of convenience, but they suffer from poor performance in low temperatures. Generally, when the temperature is below freezing, instrument users should avoid alkaline batteries. The batteries may work for a while, but once the internal temperature in the battery drops below freezing, the amount of available power drops as well.

The most common types of rechargeable batteries are lithium ion (Li-ion) and nickel metal hydride (NiMH) batteries. Each type of rechargeable battery has specific advantages and limitations. The weight of the instrument, run time, time to recharge the battery and the number of charging cycles that the battery can survive without loss of capacity are all affected by the type of battery included in the design. Less obviously, the temperature code and operating ambient temperature range over which the instrument’s certification for intrinsic safety applies are also affected (or limited) by the type of batteries used in the design.

### Design Improvements, “Smart” Battery Chargers

Battery and battery charger manufacturers have made major improvements in their designs over the last few years. Today’s





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Interchangeable battery packs can increase the size of the instrument but provide the convenience of using disposable alkaline, as well as rechargeable battery packs. (photo courtesy GfG Instrumentation, Inc.)

“smart” battery chargers contain electronics for assessing the condition of the battery pack during charging and are able to drop from a “fast” charge rate to a “trickle” the moment charging is complete. The trickle charging rate is too low to produce damage or loss of capacity due to heating. As a result, instruments containing rechargeable batteries can be recharged in a very short period, while still being left on the charger for long periods of time without damage.

## Li-ion Battery Pros & Cons

Li-ion batteries do not suffer from charging “memory” issues, and they do not lose capacity as a function of over-charging. Li-ion batteries have low internal self-discharge rates and lose power only very slowly in storage. They also do not require periodic cycling to prolong life. The materials used in Li-ion batteries are environmentally friendly, and Li-ion batteries are better in cold temperatures than alkaline batteries.

Lithium ion batteries share a major concern, however, which is the possibility that mechanical damage can lead to an internal short leading to a “thermal runaway” condition. This can, in turn, lead to a fire.

If you slice a Li-ion battery in half, it looks like a jelly roll with many extremely thin layers. A non-conductive separator layer is used to keep the cathode and anode layers apart. The electrolyte consists of salts and other additives in a solution that contains flammable solvents. It serves as the conduit of lithium ions between the cathode and anode layers. Mechanical damage that allows the anode and cathode material to directly come into contact can cause a short, causing an increase in temperature of the electrolyte and battery components. As the temperature becomes hotter, other components in the battery begin to break down, worsening the short-circuiting. If the heat is not dissipated quickly enough, the reaction becomes self-sustaining. The higher the temperature, the greater the current flow, increasing the temperature still further—until the electrolyte and other components in the battery reach the auto-ignition temperature and burst into flame.

Li-ion battery fires are *extremely* difficult to put out. This is the reason airlines prohibit electronic devices equipped with

rechargeable, Li-ion batteries being checked in baggage. While you are allowed to take Li-ion battery-equipped devices with you into the cabin, the safety briefing warns you to be careful you do not do anything that could mechanically damage the device (i.e., getting it caught in a reclining seat mechanism). If you have ever seen video footage of a burning Li-ion battery pack, you will know why the airlines are so concerned.

## Intrinsic Safety

Fortunately, certification laboratories like UL® and CSA® take this issue very seriously. Unlike the Li-ion batteries in many consumer products, the rechargeable battery packs in portable gas detectors are evaluated as part of the Intrinsic Safety certification process for the complete instrument. Testing includes deliberately creating a short and measuring the temperature rise within the battery.

Gas detector battery packs have fuses to interrupt uncontrolled flow of power and are encapsulated with fire-resistant potting that helps to spread and dissipate heat. They might include other components, such as metallic “heat pipes” or vanes to further spread heat quickly and evenly through the battery pack and reduce the chances of “hot spots” in the battery, which reach the auto-ignition temperature of the other components in the instrument.

Nickel metal hydride (NiMH) batteries have several safety advantages over Li-ion batteries. The electrolyte is not flammable, and they are not prone to run-away short circuiting. NiMH batteries are also a particularly good choice for low-temperature operation. While all types of rechargeable batteries are affected by cold temperatures, NiMH batteries are typically usable down to -20°F (-29°C) with only a modest loss of operation time. They can be used for shorter periods of time, even in colder temperatures.

NiMH batteries are durable and able to survive up to 500 complete charging cycles without a significant loss of capacity. To avoid harming the battery, compared to Li-ion battery chargers, NiMH chargers can take a little longer to fully recharge depleted batteries. While rechargeable NiMH batteries can be left on the charger for prolonged periods of time without damage, they still benefit from periodically being deep-discharged. Most instruments that include this type of battery also include an automatic deep discharge cycle.

For maximum flexibility, being able to use disposable batteries is a strong design advantage. But, when battery safety, cold temperature operation and/or the certifications carried by the instrument are the major concerns, NiMH batteries should be strongly considered. **IHW**

*[Bob Henderson is President, GfG Instrumentation, Inc., Ann Arbor, Mich.]*





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# Listen Up! A note from NHCA

## Apache Helicopter Wins Safe-in-Sound Award

The National Institute for Occupational Safety and Health (NIOSH), in partnership with the National Hearing Conservation Association (NHCA) and the Council for Accreditation in Occupational Hearing Conservation (CAOHC), recently announced the winner of the 2021 Safe-in-Sound Excellence in Hearing Loss Prevention Award™ at the 45th annual NHCA conference: Vertical Lift, AH-64 Apache Helicopter of the Boeing Company in Mesa, Ariz.

The Apache's environmental control system is an air-conditioning system used to keep electronics and the cabin cool. Four ducted fans or exhaust outlets on the sides of Apache run quickly to move air across the condenser. The fans are extremely loud, with high-pitched noise levels ranging from 84-104 dBA.

Production employees and in-house engineers worked together to develop a noise suppression kit, or "hush kit," to reduce noise levels when testing the helicopters. The kit consists of a baffled box with sound-absorbing foam which is rolled and situated against the exhaust outlet. This cost-effective solution reduced

noise levels by 50-72% to ≤85 dB when workers are 5ft from the source.

"Although the AH-64 hush kit does not relieve individuals from using hearing protection, it is simple in design and makes life a lot more enjoyable working around an energized AH-64, greatly reducing the noise and comfort levels on and around the aircraft. It's helped with my tinnitus, which the AH-64 ECS had previously aggravated," said Stuart A. Lange, Apache Production Flight Tester.

The Safe-in-Sound Award recognizes organizations that document measurable achievements in hearing loss prevention and disseminates information on their real-world successes. Interested in applying or nominating others for this award? Visit <https://www.safeinsound.us/>. **IHW**



Apache Helicopter with hush kits attached (in white).

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Hear, hear! Industrial hygienists serve key roles in providing education and training, one of the essential elements of a Hearing Conservation Program (HCP). Consistent delivery of effective education can have a positive impact on influencing workers to voluntarily adopt behaviors that preserve their sense of hearing.

The Occupational Noise Exposure mandate (OSHA's 29 CFR 1910.95) requires employees exposed to 85dBA TWA be enrolled in the HCP. Employers are required to ensure employees participate in hearing conservation training for the duration of their employment. This should begin with initial orientation training, followed by annual reinforcement.

We will cover the mandates of 29 CFR 1910.95 and specifically highlight the who, when, what and how.

**Who:** All employees exposed to 85 dBA TWA, for even one day, need to be enrolled in the HCP. 85 dBA TWA is referred to as the action level (AL) under OSHA. The program must have, at a minimum, annual testing, annual training and available hearing protection to enrolled employees. When employees reach the Permissible Exposure Limit (PEL) of 90 dBA TWA, hearing protection is mandated. Annual education and training remain a constant throughout, once the AL is reached.

**When:** HCP training must be completed annually, and employers must ensure employee participation. The education and training element allows flexibility for the employer to provide the training at different times throughout the year, by any HCP team member. There is not a requirement to discuss all mandated education and training topics in a single event; however, the mandatory topics need to be covered and employee attendance rosters maintained.

**What:** 29 CFR 1910.95 includes specific guidance as to what topic areas must be covered annually. The required topics can

be broken into three “buckets” of information to include the following:

1. The effects of noise on hearing
2. The purpose of hearing protectors; the advantages, disadvantages and attenuation of various types; and instructions on selection, fitting, use and care
3. The purpose of audiometric testing and an explanation of the test procedures

Some industries are covered by regulations outside of the general industry standard covered by 29 CFR 1910.95. If your industry is covered by another federal regulation, please consult those regulations for specifics related to this HCP elements. Several resources are listed below:

- MSHA's 30 CFR Part 62, 62.180 (VOLUME III - 30 CFR PARTS 40 THROUGH 50 AND PARTS 62 and 100 | Mine Safety and Health Administration (MSHA)
- FRA's 49 CFR 227.119 (49 CFR 227.119 - Training program. (govregs.com))

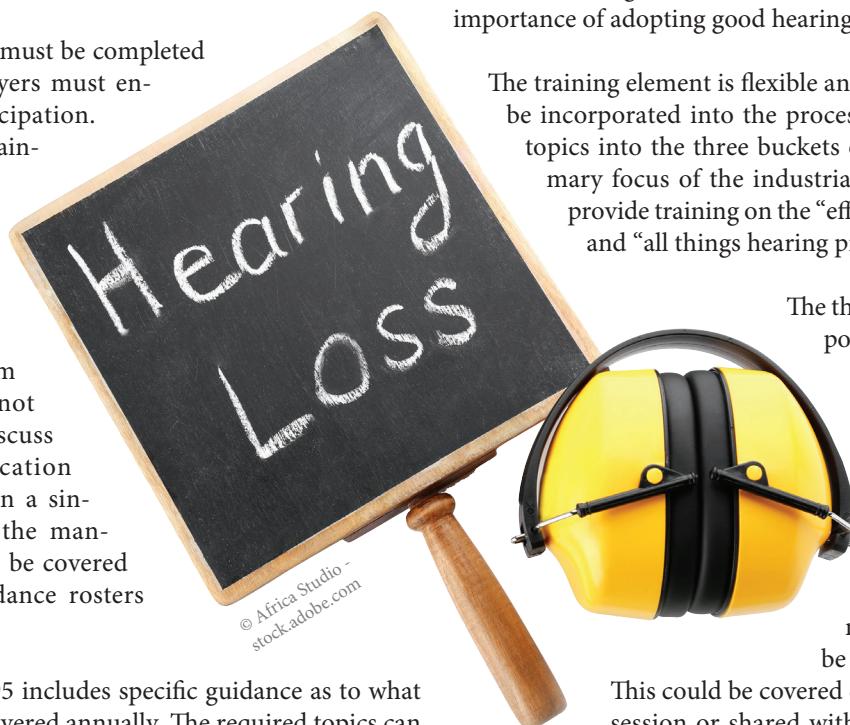
**How:** As an industrial hygienist, you are well-positioned to provide both formal training, as well as informal or impromptu education, when conducting area monitoring or dosimetry. Formal training should always be documented and records maintained in event of an audit. Informal or impromptu education serves as great reinforcement to remind workers of the importance of adopting good hearing conservation practices.

The training element is flexible and allows for creativity to be incorporated into the process. When you break the topics into the three buckets of information, the primary focus of the industrial hygienist would be to provide training on the “effects of noise on hearing” and “all things hearing protection.”

The third required topic, “purpose of audiometric testing and explanation of test procedures,” should be provided by the hearing technician at the time of the hearing test.

The topic “effects of noise on hearing” can be delivered at any time.

This could be covered during a formal training session or shared with workers while visiting



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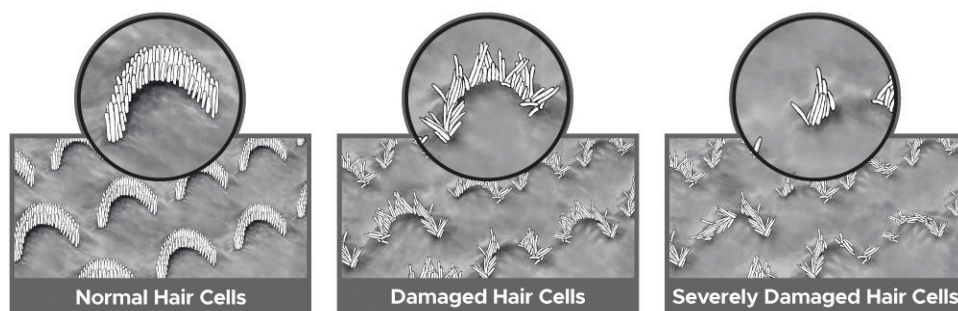
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# Hearing Conservation & Training



Visual aids can be particularly helpful in helping convey the damaging effects of unprotected noise exposure. (photo courtesy NHSA)

individual worksites. The informal education session is an excellent opportunity to discuss the noise hazards being heard in participants' workplaces; how unprotected exposures to this noise hazard may result in a permanent injury/illness; and how properly worn hearing protection can mitigate the risk of a permanent hearing loss.

Effective messaging will positively influence behavioral change. Showing an image of a healthy cochlea and one damaged from noise will make the injury something the employee can visualize. Education and training on the effects of hazardous noise exposure should include both auditory effects (e.g., noise-induced hearing loss, tinnitus, hyperacusis) and non-auditory effects (e.g., hypertension, stress, depression, etc.). Visual aids can be particularly helpful in helping convey the damaging effects of unprotected noise exposure.

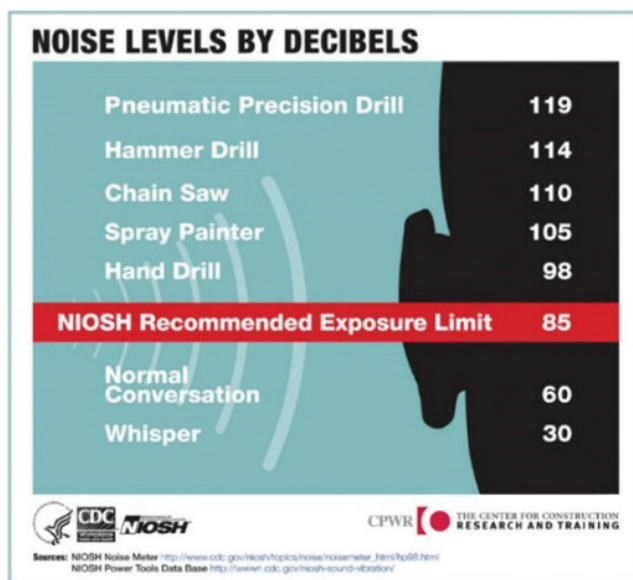
Covering "all things hearing protection" is a critical part of the orientation and annual education provided to employees. Industrial hygienists are well-suited to take on a major role in educating employees about hearing protection. This might start with their role in noise measurements and noise control; determining which employees may be enrolled; what their exposures are; and how much attenuation is required to adequately protect the employee.

An emerging best practice is Hearing Protection Device (HPD) Fit Testing and a role well-suited to the industrial hygienist. HPD Fit Testing, regardless of method utilized, results in a Personal Attenuation Rating (PAR) for the employee, obtained while wearing the hearing protection device with which they have been fit. The HPD Fit Test can reinforce training by providing immediate feedback to the employee on how well they inserted their hearing protection. This PAR eliminates any guesswork on attenuation achieved with the hearing protection worn by that employee. The report can then be maintained in the employee's records.

Repeated non-compliance with the mandatory wear of hearing protection should be documented, and reasonable disciplinary action taken as a last resort, in keeping with employer's policies. There is real value, however, in gaining voluntary compliance. Effective messaging can convince the employee that

the benefits outweigh the inconvenience of hearing protection. That voluntary compliance is more likely to ensure the use of hearing protection continues with off-duty noise exposures, as well.

An employee needs to understand that unprotected exposures to hazardous noise, regardless of where that exposure occurs, can result in a life-altering, permanent hearing loss with many associated negative auditory and non-auditory effects. They also need to understand that when they cannot move away from the hazardous noise source, or turn down the volume, the only course of action that can change the outcome is the proper use of PPE.



This infographic is a great way to explain hazardous noise levels. (Source: NIOSH Noise Meter)

There are several hearing conservation resources available to help inform and educate workers about hazardous noise and the importance of wearing hearing protection. Infographics are another great way to explain hazardous noise levels.

*Continued on page 46*



# DATA DOESN'T WAIT FOR SYMPTOMS

When it comes to worker exposure to heat, don't wait for symptoms to drive your decisions. TSI QUESTemp® Heat Stress Monitors put information in your hands to keep heat stress events from occurring.

Our instruments provide intuitive monitoring using WBGT sensing technology, giving you the knowledge to help you properly rest, hydrate and acclimate your workers.

That means understanding dangerous environments and protecting your workers before symptoms arise.

Visit [tsi.com/heat-stress](https://tsi.com/heat-stress) to learn more about the risks of workplace heat exposure.



## Heat Stress Guide for Employers



UNDERSTANDING,  
ACCELERATED

“Heat-Related Illnesses are preventable with the tools and controls. At TSI, our mission is to provide trusted measurement, application guidance and data analysis analytics that enable our customers to make informed decisions. QUESTemp® Heat Stress Monitors deliver high-performance monitoring of heat stress factors using Wet Bulb Globe Temperature sensing technology.” *Steve Graf, Quest Global Product Manager, [steve.graf@tsi.com](mailto:steve.graf@tsi.com), 651-703-5848*

### Important to Know:

Outdoor workers exposed to hot and humid conditions can be at risk of heat-related illness. The risk of heat-related illness becomes greater as the weather gets hotter and more humid. The combination of both air temperature and humidity affect how hot outdoor workers feel in hot-weather conditions.

Employers need to take into consideration the “heat index,” which is a single value that takes both temperature and humidity into account. The higher the heat index, the hotter the weather feels. The heat index is considered a better measure than air temperature alone for estimating the risk to workers from environmental heat sources.

- NOAA issues extreme-heat advisories to indicate when excessive, extended heat will occur. The advisories are based mainly on predicted heat index values:
- Excessive Heat Outlook: issued when the potential exists for extended excessive heat (heat index of 105-110°F) over the next 3-7 days. This is a good time to check on supplies, such as extra water coolers, and refresh worker training.
- Excessive Heat Watch: issued when excessive heat could occur within the next 24-72 hours, but the timing is uncertain.
- Excessive Heat Warning: issued when the heat index will be high enough to be life-threatening in the next 24 hours. This warning indicates that the excessive heat is imminent or has a very high probability of occurring.
- Excessive Heat Advisory: similar to an Excessive Heat Warning, but less serious. This is issued when the heat index could be uncomfortable or inconvenient but is not life-threatening if precautions are taken.

### Know the Guidelines:

Extra measures, including implementing precautions at the appropriate risk level, are necessary for reducing the risk of

heat stress for employees working outdoors in extreme heat. The employer’s response at the four risk levels is the subject of the remainder of OSHA’s guidelines. The steps employers should take in response to an elevated heat index are the same type of steps that they would follow to address other hazards in the workplace:

- Develop an illness-prevention plan for outdoor work based on the heat index.
- Train your workers how to recognize and prevent heat-related illness. Train workers about safe work practices before heat index levels go up. Workers should be prepared, so they recognize the signs and symptoms of heat-related illness; how to prevent it; and what to do if someone is demonstrating symptoms.
- Track the worksite heat index daily; communicate it and the required precautions to workers. Knowing how hot it will be during scheduled work activities can help to determine which preventive measures should be taken in preparation.
- Implement your plan; review and revise it throughout the summer.

It is suggested that workers are trained before hot outdoor work begins, and training can be more effective if it is matched to job tasks and conditions and is reviewed and reinforced throughout hot weather conditions. The following OSHA-suggested training topics might be addressed in one session or in a series of shorter sessions:

- Risk factors for heat-related illness
- Different types of heat-related illness, including how to recognize common signs and symptoms
- Heat-related illness prevention procedures
- Importance of drinking small quantities of water often
- Importance of acclimatization; how it is developed; and how your worksite procedures address it



OSHA does not have a specific standard that covers working in hot environments. Nonetheless, under the OSH Act, employers have a duty to protect workers from recognized serious hazards in the workplace, including

heat-related hazards. Using the Heat Index: A guide for Employers was created to help employers and worksite supervisors prepare and implement hot weather plans. This guide explains how to use the heat index

to determine when extra precautions are needed at a worksite, with the goal to protect workers from environmental contributions to heat-related illness.



- Importance of immediately reporting signs or symptoms of heat-related illness to the supervisor
- Procedures for responding to possible heat-related illness
- Procedures to follow when contacting emergency medical services
- Procedures to ensure that clear and precise directions to the worksite will be provided to emergency medical services

### Increase Your Knowledge:

You can find more about information about heat stress at *Using the Heat Index: A Guide for Employers* <https://bit.ly/34v0nYJ> or, for training documents, you can visit <https://bit.ly/2M6Eto9>. **IHW**



## OSHA' Critical Actions for Heat Risk

According to OSHA\*, the most critical actions employers should take to help prevent heat-related illness at each risk level:

**Heat Index:** <91°F

**Risk Level:** Lower-Caution

### Suggested Measures:

- Provide drinking water
- Ensure that adequate medical services are available
- Plan ahead for times when heat index is higher, including worker heat-safety training
- Encourage workers to wear sunscreen
- Acclimatize workers

**If workers must wear heavy protective clothing, perform strenuous activity or work in the direct sun, additional precautions are recommended to protect workers from heat-related illness.**

**Heat Index:** 91°-103°F

**Risk Level:** Moderate

### Suggested Measures:

In addition to the steps listed above:

- Remind workers to drink water often (about four cups/hour)
- Review heat-related illness topics with workers: how to recognize heat-related illness; how to prevent it; and what to do if someone gets sick
- Schedule frequent breaks in a cool, shaded area
- Acclimatize workers
- Set up buddy system/instruct supervisors to watch workers for signs of heat-related illness

**If workers must wear heavy protective clothing, perform strenuous activity or work in the direct sun, additional precautions are recommended to protect workers from heat-related illness.**

- Schedule activities at a time when the heat index is lower
- Develop work/rest schedules

**Monitor workers closely**

**Heat Index:** 103°-115°F

**Risk Level:** High

### Suggested Measures:

In addition to the steps listed above:

- Alert workers of high-risk conditions
- Actively encourage workers to drink plenty of water (about four cups/hour)
- Limit physical exertion (e.g., use mechanical lifts)
- Have a knowledgeable person at the worksite who is well-informed about heat-related illness and able to determine appropriate work/rest schedules
- Establish and enforce work/rest schedules
- Adjust work activities (e.g., reschedule work, pace/rotate jobs)
- Use cooling techniques
- Watch/communicate with workers at all times

**When possible, reschedule activities to a time when heat index is lower**

**Heat Index:** >115°F

**Risk Level:** Very High-Extreme

### Suggested Measures:

**Reschedule non-essential activity for days with a reduced heat index or to a time when the heat index is lower**

**Move essential work tasks to the coolest part of the work shift; consider earlier start times, split shifts, or evening and night shifts.**

**Strenuous work tasks and those requiring the use of heavy or non-breathable clothing or impermeable chemical protective clothing should not be conducted when the heat index is at or above 115°F.**

If essential work must be done, in addition to the steps listed above:

- Alert workers of extreme heat hazards
- Establish water drinking schedule (about four cups/hour)
- Develop and enforce protective work/rest schedules
- Conduct physiological monitoring (e.g., pulse, temperature, etc.)

**Stop work if essential control methods are inadequate or unavailable.**

\*This chart is available online at [http://www.osha.gov/SLTC/heatillness/heat\\_index/](http://www.osha.gov/SLTC/heatillness/heat_index/).



## Heat Stress Monitoring Program Solutions

**[Editor's Note:** We sat down with the folks at TSI to discuss heat stress monitoring programs—and the company's unique solutions and capabilities for managing heat stress.]

### Why is it important to establish a heat stress monitoring program?

Millions of workers in the U.S. are exposed to heat in the workplace each year. In 2017 and 2018, there were a total of 30 fatalities recorded specific to heat-related illness by OSHA, most often from heat stroke<sup>1</sup>. The main goal of safety and health programs is to prevent workplace injuries, illnesses and deaths<sup>2</sup>. A well-implemented heat stress monitoring program modifies the safety culture from reacting to and treating heat-related illness to preventing disability or death—to instead being proactive and preventing it from occurring.

### What specifically needs to be included in a heat stress-management program?

A well laid-out program should include:

- Educating workers on heat stress and heat-related illness and their causes
- Knowing what symptoms to watch for and how to respond
- Creating an acclimatization schedule for experienced and inexperienced workers
- Policies for controlling heat hazards
- Establishing a work-to-rest and hydration program
- Accounting for the impact clothing can have in contributing to heat stress
- Having instrumentation to monitor the risk level and a response plan for different risk levels
- Implementing engineering controls when possible

### How is environmental heat stress measured? How can such data be used to help safeguard workers?

Environmental heat stress is typically measured through heat index or wet bulb globe temperature (WBGT). The significant drawback to heat index is that radiant heat, the effect the sun has on a worker outdoors, is not considered.

A WBGT meter is the most accurate tool for adjusting the temperature for heat stress factors, including humidity, air movement (i.e., wind), radiant heat and temperature.<sup>3</sup>

To help safeguard workers against heat stress, the WBGT data can be referenced against work to rest and hydration guidelines from ACGIH, OSHA, ISO, or NIOSH. These guidelines consider the worker's workload and the WBGT reading (plus clothing factors) to make recommendations.

### How can heat stress monitoring be used to stay in compliance?

Although there is increasing pressure for compliance standards to be enacted specific to protecting workers from heat-related illness, this remains under OSHA's general duty clause. Exposure to excessive heat is considered a recognized hazard from which the employers must protect employees. Because there is not a specific standard and guidance from OSHA, the WBGT monitor is an incredibly helpful instrument to demonstrate to compliance officers the employer is taking steps to protect workers from heat stress. WBGT monitors provide data that can be quickly referenced against best practice guidelines, such as ACGIH, to implement preventive measures and protect workers.

### Please explain TSI's heat stress solutions; their capabilities; and what you want our audience to know about them.

TSI's solution for supporting the prevention of heat-related illnesses is the QUESTemp® Heat Stress Monitor. This product series measures WBGT with a high degree of accuracy. It is straightforward for anyone to operate and integrate into their heat stress-safety program. The instrument provides work-to-rest guidance per ACGIH and U.S. military guidelines, making it easier to know when safety precautions are recommended. QUESTemp products come both in a traditional wet bulb and waterless wet bulb options. **IHW**

<sup>1</sup> <https://www.osha.gov/fatalities>

<sup>2</sup> OSHA Reference: <https://www.osha.gov/safety-management#:~:text=The%20main%20goal%20of%20safety,%2C%20their%20families%2C%20and%20employers.&text=Employers%20will%20find%20that%20implementing%20these%20recommended%20practices%20also%20brings%20other%20benefits>

<sup>3</sup> OSHA Technical Manual, Section III: Chapter 4



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# Heat Stress

By: Kyle Hubregtse, Contributor

Despite the diversity of locations and workforce, larger companies must focus on deriving value for new safety technology across the operation. (Photo courtesy Kenzen)

## Heat, Hydration & Worker Acceptance

### **CASE STUDY:** How Garney Construction found a heat stress safety solution to fit its diverse workforce and worksites

Garney Construction has put itself on a trajectory as an innovation leader in the construction industry. It completes both large and small projects for vital infrastructure for communities throughout the U.S. Whether it's building a wastewater treatment plant or installing miles of water line, Garney prioritizes the successful completion of multiple projects every year, safely and on time.

Exposure to heat; the difficulties of working in increasingly extreme and varying weather conditions across projects; and injuries or deaths from overexertion continue to be major risks for workers and their employers. Like many other companies, Garney has taken a proactive approach to addressing these issues by implementing guidelines designed to warn employees of dangerous situations caused by heat and inform supervisors of interventions to prevent disasters, such as proper hydration and work-rest schedules.

The company also realized that a one-sized approach to properly planning for hot and humid work situations wouldn't fit its business, given each of its individual workers handles heat-related stresses differently—and its projects take place in varying regions where heat conditions are unique.

Ryan Smith, Regional Safety Manager and CSP, and others from the internal safety council at Garney recognized the need to find solution to more effectively manage work among a diverse workforce and worksites. Just as with any safety decision, the team had to weigh the investment commitment against outcomes.

Especially when it applies to incorporating new technology into the safety program, any company must assess the short-term costs of not only the product/system, but the impact on productivity and adoptability. The short-term investment must always pay dividends in the long term. If the new technology and/or procedures prevent injuries or save a life, that's the ultimate measure of return on the investment. Increasingly, with industrial workforce safety technology, there are additional returns that come into play, given data is being collected while the products/systems monitor workers for stress.

#### **Optimal Performance, Maximum Safety**

The challenge for new safety mechanisms is and always has been how to implement strategies that allow optimal performance; provide the maximum level of safety; but not inhibit work progress. For heat stress prevention specifically, the interest was in finding a solution that is individual enough to respond to each worker and their unique physiology and risk profile, while choosing technology that would be widely adoptable and easy to interact with for workers and teams. Garney decided to test heat-prevention technology that might eventually fit the entire company and its complexities, by sampling it first.

The company tested the Kenzen device, which is small and light enough (at 30g) to be comfortably worn by any worker around the bicep and not interfere with daily tasks. The worker interface enables the employee to plan for their own day, based on a heat risk and work/rest calculator; monitor their own physiology; and access a tool that provides personally customized



intervention solutions to heat and overexertion from simple inputs into a symptom checker.

This standalone system gave the power to individual workers at various worksites. Once workers understood their personal data was private and only viewable by them, and they learned about their bodies' reactions to working in heat and humidity, enthusiasm for the solution increased.

### Diverse Array of Challenges

When companies operate in multiple geographic regions, there's a diverse array of challenges with different climates, teams, and individual "personalities" and preferences. Testing new technology should address this, to provide value at both the individual and corporate level. Despite the diversity of locations and workforce, larger companies must focus on deriving value for new safety technology across the operation.

For this case study, many heat-related challenges (such as exertion) were similar across worksites, while locations varied in temperatures and humidity. Technology needed to detect the nuances and report on how the unique characteristics of the environments affected workers as an aggregate. Clothing is unique at each site and attitudes are different—but the common denominator is that every worker should return safely to their family at the end of the day.

The ability to scale a new product or procedure requires local testing to be proven before a larger rollout. Workers, sites and supervisors were chosen to be part of the test, based on their location, background, unique regional challenges and the ability to champion a new technology (or not). The workers using the devices were diverse in their roles; their familiarity with technology; and even their enthusiasm for new safety measures.

### On Site Scenes

Stepping onto one of the project sites before the sun rises, the first thing to notice is the entire team warming up together and stretching before they begin the day—a clear indication of the company's focus on worker preparedness. Next, the team huddles before work begins to debrief from the previous workday and strategize for today. Although safety shouldn't be rushed, technology such as worker wearables that monitor for signs of heat stress must be designed to be quick to don—so progress can stay on schedule at the worksite.

Throughout the workday, while monitoring the safety of the workers' bodies under varying heat conditions, prevention and preparedness continue to be priorities. Wearable technology provides individualized alerts to both workers and their managers to effectively maintain optimal performance of uniquely individual bodies—by indicating when it's time to rest and rehydrate and when it's time to safely resume work. Variable, customized work-rest schedules increase productivity over the course of the day, as do the project vs. all-team breaks that treat everybody the same.

Tests conducted during the summer of 2020, across multiple locations and with diverse teams of individuals with unique physiological make-ups, have informed the company on deployment ease and adoption, and produced its first set of physiological data matched to the national footprint of the organization. Garney is using this information to make longer term, enterprise-wide decisions on a potential rollout of the technology that will provide it with universal heat detection and prevention and productivity data to use for future safety enhancements. This benefits both individual workers and the company overall. **IHW**

*Kyle Hubregtse oversees global commercial operations, worksite setup and user adoption for companies using Kenzen's physiological monitoring technology. Kyle is a veteran of the U.S. Air Force and has spent 15 years working with military, global supply chain and industrial projects focusing on strategy and project management in heavy industries where health and safety has always been motivating factor in his career.*



For this case study on wearable heat-detection devices, workers understood their personal data was private, and they learned about their bodies' reactions to working in heat and humidity. (Photo courtesy Kenzen)

## Respiratory Hazards in Construction Work

Construction can be a pretty dirty business. Over 2 million workers in the U.S. have regular exposure to dusty conditions at work. Approximately 90% of those 2 million are employed in the construction industry.

A commercial construction project subjects personnel to a wide variety of conditions, including noise, vibration, weather, uneven working surfaces and numerous respiratory hazards. Injury and illness data indicate a direct correlation between elongated work in the construction industry and future health-related issues for those that work in the trades.

Let's break up a typical interior building renovation project into two basic phases—demolition and new installation—and examine the general activities and variety of respiratory hazards that can be present in each phase.

### Demolition

During the demolition phase, trade workers can expect to be exposed to an abundance of airborne particulates that can occur during the breaking, crushing or chipping of existing materials to make way for new materials. Common activities in a demolition project include:

- ▶ **Concrete removal:** concrete mixes contain large amount of quartz (silica) and limestone
- ▶ **Drywall removal:** gypsum exposure possible
- ▶ **Carpet removal:** carpet fibers and general dust accumulated in the carpet
- ▶ **Ceiling tile removal:** possible exposure to cellulose (The tops of ceiling tiles always contain dust, especially if the metal deck above has sprayed on fireproofing, which commonly contain slag wool and Portland cement.)
- ▶ **Steel removal using a torch:** lead fumes and other metal fumes
- ▶ **Insulation removal:** fiberglass and rockwool

### New Installation

The installation phase contains plenty of opportunities for exposure to airborne hazards. Typical activities in this phase include:

- ▶ **Cutting wood:** sawdust generation
- ▶ **Installing drywall:** gypsum dust
- ▶ **Sanding joint compound:** quartz, limestone, perlite dust
- ▶ **Daily housekeeping (sweeping):** general nuisance dust and whatever debris falls to the floor during installation activities
- ▶ **PVC Pipe installation (primer and solvent cement):** methyl ethyl ketone, acetone, cyclohexanone
- ▶ **Tile mastic:** limestone, quartz, volatile organic compounds (VOCs)
- ▶ **Metal pipe installation:** soldering fumes
- ▶ **Duct sealant:** VOCs
- ▶ **Latex (water-based) paint application using an airless sprayer:** polyvinyl acetate, titanium dioxide.

### How Much is Too Much?

As you can see, there are plenty of opportunities for personnel on the site to inhale a wide variety of contaminants throughout the entire project. How many industries have the potential for these constant respiratory exposures (and in different settings and constantly changing environments) to exist day after day, year after year?

OSHA lists an 8-hour, time-weighted average exposure limit of 15mg/m<sup>3</sup> for total dust exposure to Particulates Not Otherwise Regulated (PNOR) and a respirable dust exposure limit of 5mg/m<sup>3</sup>. Many of the particulate exposures a trade worker would commonly be exposed to fall under this standard. Even so, samples for total dust and respirable dust are not commonly collected during construction work.

Of the data that is collected, it indicates that tradespersons in general have total dust exposure well below OSHA levels. We should keep in mind that the total dust and respirable dust exposure limits set by OSHA are decades old. Silica exposure, which causes silicosis, a serious health condition which causes premature death, has gained some traction in the last 20+ years—for good reason. However, daily exposure to dusty conditions, as found every day in the construction industry, is not healthy—especially considering the synergistic effect of



particulate inhalation and cigarette smoking, which is still fairly prevalent in the construction industry.

### How to Reduce Risks

So, what can be done? The use of wet methods during the demolition phase will absolutely reduce airborne particulate exposure for not just the demolition crew, but the entire work site. Using water or water mist to reduce airborne concentration of dusts is possible but not always feasible. Issues include lack of availability, constant cleanup, freezing or icy conditions in cold weather, etc.

The next best option, utilizing negative air pressure, also significantly reduces airborne particulates. Containing a demolition project to be able to produce an adequate negative pressure environment is also possible—but again, not always feasible, because of logistical issues around creating the necessary airflows for contaminate reduction.

Using vacuums instead of brooms only has limited applicability. That leaves most projects in the position of combining an engineering control (such as water mist) with personal protective equipment (respiratory protection) to keep personnel safe.

The construction industry has struggled for many years with proper respiratory protection for the workforce. Complying with regulations is important, but gaining employee acceptance is everything. After being properly trained and fit-tested, if a tradesperson finds their respiratory protection to be uncomfortable; doesn't have the right look; or is extremely inconvenient,



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the likelihood that they will continue to wear that respirator falls dramatically.

The respirator of choice for the construction industry has been the N95 due to its light weight and availability. More important is the N95's high level of convenience due to its disposable nature. Case studies at workplaces that require moderate respirator use show the annual total cost of ownership (per wearer) for a disposable N95 mask is extremely high compared to the cost of re-usable, half-face air-purifying respirators fitted with HEPA cartridges. However, the culture of the construction industry leans towards the disposability of an N95, and that remains the standard.

The lack of availability of the N95 due to the COVID-19 pandemic has caused many tradespersons to wear inadequate or no respiratory protection. While half-face, air-purifying respirators with HEPA cartridges have been available during the pandemic, the overall culture of the construction industry does not support an instant change to re-usable respiratory protection.

Clouds of dust have been widely accepted as an effect of construction work. It's way past time to change the narrative. **IHW**

*Neil Webster, CSP, OHST, is the EHS Manager for DPS Group, a full-service engineering and construction management firm that specializes in the Life Sciences industry.*



Case studies show the annual total cost of ownership (per wearer) for a disposable N95 mask is high compared to the cost of re-usable, half-face air-purifying respirators fitted with HEPA cartridges. (photo courtesy DPS Group)

# Chemical-Resistant Nitrile Gloves

By: Matthew Piortowski and Brian Moseley, Contributors

## Growth of Nitrile Glove Market Means Buyers Need To Beware

With both industry trends and the coronavirus pandemic prompting the increased use of protective gloves—particularly disposable gloves—a number of new, third-party industrial distributors have entered the market. Buyers should look beyond mere cost as the major factor in purchasing decisions, however, and ensure they are getting high-quality nitrile gloves from reputable sources.

### What Are Nitrile Gloves; Why So Popular?

Disposable nitrile gloves were invented by Neil Tillitson and Luc DeBecker in the 1980s. They first came into widespread use in the medical profession, mainly because, unlike latex gloves, they did not cause allergic reactions among either the health care providers who wore them or the patients who came into contact with them.

However, the industrial sector quickly grew to recognize and appreciate the chemical resistance of nitrile gloves, eventually leading to nitrile glove-related revenues in that segment that

now rival those of the medical industry. Disposable nitrile gloves are commonly used in the chemical, food service, processing, automotive, healthcare, municipal services, janitorial/maintenance services and pharmaceutical industries, among others. Suitable applications include biotechnology; cytostatics; hospital and medical care laboratory, pharma and analysis; as well as life sciences, medical pharmaceuticals and API (Active Pharmaceutical Ingredient).

Single-use nitrile gloves are made from a synthetic rubber that is both durable and resistant to oils, acids, fuel, and potentially hazardous and corrosive chemicals—although exposure to certain chemicals can cause the glove to degrade and become prone to punctures. Nitrile gloves are free of BPA and phthalate (an acid) and—as mentioned above—tend to cause fewer allergic reactions among wearers than latex gloves. Nitrile gloves are stronger and more puncture-resistant than latex gloves. Although nitrile gloves don't offer as much comfort and dexterity as latex gloves do, manufacturers have made significant improvements in those areas.

The risks of sub-par single-use nitrile range from an elevated danger of incurring punctures, accelerated breakdown and even an increased exposure to COVID-19, due to their inability to provide effective protection against infectious disease transmission.

Vetting distributors can be accomplished by determining the following:

- Does the brokerage from whom you're considering buying nitrile gloves have the data and certifications to back their quality claims? These would take the form of test reports in respect to ASTM or ISO procedures.
- Can the brokerage supply certifications from third-party labs declaring the product's claims?
- Does the seller have a technical department you can contact for specific end-use recommendations? Can it offer end user-specific declarations signed by the manufacturer?
- Is every single pair of gloves individually hand inspected at the end of the production process?

Common sense goes a long way in making sound purchasing decisions. Looking into a company's background and



Common sense goes a long way in making purchasing decisions. Looking into a company's background and credentials is important when it comes to acquiring high-quality nitrile gloves. (photo courtesy Showa Group)





credentials is important when it comes to acquiring high-quality nitrile gloves.

There are red flags that should convince you to avoid doing business with a prospective vendor or partner, such as their inability to:

- Provide you with glove specifications
- Answer questions about a glove's Acceptable Quality Level (AQL) or its thickness (mils)
- Tell you whether the glove has been manufactured using accelerants, or whether or not the glove is chlorinated

Consumers need to ensure that they are securing hand protection from trusted brands that have quality control in place throughout the process of glove manufacturing to distribution.

Additionally, check to make sure the gloves have the features needed for the industry, tasks or environment in which they'll be used. These may include their being powder-free and/or being certified and suitable for use in a class 100 cleanroom environment. Certain operations may require gloves that have a textured finish on fingertips to enhance grip or rolled cuffs to prevent dirt from entering the glove. Are the gloves designed and formulated in a way that improves fit and reduces fatigue?

Doing your research and asking for certifications regarding claims, credentials and test results will help buyers avoid being taken advantage of during these unique times. The old adage

still offers sound advice: If it sounds too good to be true, most likely, it is. Do your homework! **IHW**

**[Editor's Note:** This article first appeared in Workplace Material Handling & Safety's February 2021 "Glove Issue." For more hand safety-related articles, visit [www.workplacepub.com](http://www.workplacepub.com).]



Industry trends and the COVID-19 pandemic have prompted an increased use of protective, disposable gloves, with a number of new, third-party industrial distributors. (photo courtesy Adobe Stock)

### About the Authors

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# Ergonomics for Industrial & Manufacturing Needs

Poor ergonomics on the job can lead to serious musculoskeletal disorders (MSDs). These injuries have widespread consequences for workers and employers. Serious short- and long-term disabilities can occur when the right ergonomic equipment is not in place. For Health & Safety and Human Resources Managers within manufacturing and industrial organizations, ergonomics should be a top priority. When an employee is injured on the job, it opens employers up to a wide range of liabilities—including disability compensation, increased insurance premiums and settlement costs, among others.

Ergonomic equipment and systems are specifically designed to allow workers to do their jobs without putting their bodies in harm's way. Stresses on the body can lead to injury; it doesn't have to be just heavy lifting. MSDs can occur as a result of repetitive motion, improper lifting, or forceful exertion or motion, among other factors. The right ergonomic equipment alleviates these potentially dangerous situations. Let's take a look at a few of the most critical ergonomic systems for the workplace.

### Desks and Workstation Lifts

Jobs in the manufacturing, healthcare laboratory and industrial fields oftentimes require workers to position their bodies in ways that can lead to injury. Jobs types in these fields include mechanical engineers, assembly professionals, laboratory workers, mechanical engineers and manufacturers of furniture. Many desk and workstation lifts use hydraulic legs that move the workstation surface up or down to achieve a safe position for each worker.

Because workers' heights vary, there is no single static workstation that fits everyone. The height of a workstation is critical to ergonomics because, when the body is positioned improperly, it can lead to strain. Ideally, when sitting, the elbows should be at a 90-degree angle when resting on the station or desk. When sitting in a chair, knees should be level with the hips or just below. Feet should be flat on the ground or on a flat, sturdy footrest.

### Vacuum & Magnetic Lifts

Lifting and material handling are among the leading causes of ergonomic-related workplace injury. The Bureau of Labor Statistics reports more than 36% of injuries that lead to missed work involve the back and shoulder. Even light loads can cause problems. Activities that require overexertion, bending, twisting, turning and improper lifting techniques put strain on the back and can lead to muscle sprains and strains.

Vacuum and magnetic lifts are designed to lift objects, removing the human element. Ergonomic lifting equipment comes



Vacuum and magnetic lifts are designed to lift objects, removing the human element. Ergonomic lifting equipment comes in a range of forms and functions. (photo courtesy American Sales Development, LLC)

in a range of forms and functions. The Ergo Equipment portable jib crane, for example, uses an articulating arm to lift up to 180lbs and can easily be moved from place to place by one worker. Vacuum lifts can be used to handle boxes, bags and other objects. Many lifts have a lifting capacity of up to 500lbs; some can be designed to customers' specifications.

### Electric Walkie Tuggers

The force required to push or pull heavy loads puts serious strain on the musculoskeletal system. This strain can cause injury to muscles, tendons, circulation and nerves. Damaging the back while pushing and pulling is the biggest risk factor and can lead to the most serious injuries. The risk for pulling a muscle or damaging the back increases when these motions are repeated, day in and day out, on a jobsite.

Tuggers can be designed specifically to push and pull heavy loads. Some are offered as battery powered and self-contained, and are operated by walking behind the unit. A range of tugs are available, depending on the specific requirements of the job. The smallest units are capable of moving loads of up to 1,000lbs when the load is on a wheeled cart, whereas heavy-duty tugs can pull up to 50,000lbs. Some tugs are specifically designed for dumpsters and carts; still others can move a range of equipment.



*Continued on page 46*

Some tugs, such as Ergo Equipment Walkie Tuggers, are designed specifically to push and pull heavy loads. They are battery powered, self-contained and operated by walking behind the unit. (photo courtesy American Sales Development, LLC)



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## Air Sampling Verses Dispersion Modeling During the COVID-19 Pandemic

As the American economy recovers and workers return to work, there is concern the air may contain the SARS CoV-2 virus. This is especially of concern if it is found there is no long-term immunity from recovered individuals. People in various industries may work and/or live in close quarters, such as meat processing, canaries, fisheries, onboard military ships and submarines, schools, agricultural settings, etc., or use public transportation.

In certain limited workplaces and work practices, air monitoring may be appropriate to evaluate worker exposure and determine the level of risk. The spread of the SARS CoV-2 virus through the air has become a controversial topic among scientists. Airborne transmission calculators have modeled the dynamics of risk, based on building management system parameters, but there are limitations in the available information and assumptions.



As the U.S. economy recovers and workers return, there is concern the air may contain the SARS CoV-2 virus. This is especially worrisome for those in various industries who work in close quarters. (photo courtesy Adobe Stock)

The SARS CoV-2 virus has a reproductive rate higher than other similar contagions, especially during speaking, suggesting it is a super spreader in the environment. The infectivity rate appears low, as represented by the  $R_0$  and  $K$  factors, suggesting the viral load for causing infection may be 1,000 log copies or as low as 100 log copies in air.

Preliminary air sample results are mixed, based on study limitations to healthcare and the number of total number of samples collected during the investigation. Compounding this is the fact that there are no established air sampling protocols for viral loads in air. Moreover, the level of risk of respiratory infection has not been determined.

Air sampling methods vary by sample size and cost, while analytical test method for the SARS CoV-2 virus is limited presently to reverse transcriptase polymerase chain reaction (RT-PCR) for precision and accuracy. Reliability and cost remain issues remain elusive on whether or not to perform air monitoring in work areas of concern or use a risk assessment dispersion model. This article attempts to investigate the business value for collecting air samples, in collaboration with modeling, to protect the health of the workforce in specific or nontraditional workplaces.

### Monitoring Air in the Indoor Environment

In the working environment, people may be exposed a variety of noxious gases, vapors, dusts, mists and fumes. Besides these potential airborne contaminants, infectious agents like bacteria, viruses, mold spores and fungi can be found in the indoor environment. Some air contaminants may be liberated from a work process or operation, while other indirect

exposure may arise as a result of dry sweeping, vacuuming or cleaning contaminated surfaces. Of most concern today is the presence of the SARS CoV-2 novel coronavirus, which is attributed to the generation of aerosols by infected individuals during the COVID-19 pandemic.

Airborne contaminants are inhalable particles suspended in the air that may enter the body when breathed. Most large particles are stopped in the upper respiratory tract (e.g. nose and back of the throat), but smaller respirable particles can reach deep inside the lungs. The mass and particle size will determine how far the aerosolized particle can reach the bronchioles or the terminal alveolar sacs. Inhaled contaminants may cause



of respiratory issues including tissue damage, tissue reaction, disease, or physical obstruction. New scientific evidence is available on the transmission of SARS CoV-2 virus which suggests that not only larger droplets can become airborne, but respiratory aerosols can function as potential transmission pathways for COVID-19.

The novel coronavirus may be aerosolized by coughing, singing, shouting, sneezing, playing sports or musical instruments. The airborne concentration is based on the rate of generation and suspension of the respiratory droplets or aerosols in air over a period of time. Large respiratory droplets in the near field are typically greater than 50  $\mu\text{m}$  in size with water and mucus; medium size respiratory droplets are greater than 10  $\mu\text{m}$ ; and small micro droplet nuclei are less than 5  $\mu\text{m}$ , which can spread to the far field. Respiratory droplets can cause infection when they are inhaled or deposited on mucous membranes in sufficient quantities over time, such as those that line the inside of the nose and mouth, bronchiole passages and alveolar spaces in the deep lung.

As the respiratory droplets travel further from an infected person, the airborne concentration of these droplets decreases. Larger droplets fall out of the air due to gravity. Smaller droplets and particles spread in the air, depending on the airflow pattern and amount of building ventilation. With passing time, the amount of infectious virus in respiratory droplets can decrease with fewer people in the room. In most instances, the building ventilation should continue to operate even with nobody in the room and for a period after normal work hours.

Other potential modes of transmission may include medical procedures, such as bronchoscopy, tracheotomy, tracheal tube intubation, noninvasive ventilation and dental procedures. Viral aerosols may become aerosolized by flushing toilets in COVID-19 patient hospital rooms and vacuuming carpets and cleaning other porous surfaces, such as bed linen and surgical gowns in healthcare facilities. For example, otolaryngologists and supporting health care workers (HCWs) are particularly at high risk of becoming infected while treating patients, as many in-office procedures and surgeries are Aerosol Generating Medical Procedures (AGMP). Based on a review of the literature and various guidelines, engineering and administrative controls help mitigate the risk to health care workers of becoming infected with SARS CoV-2 while providing clinical care. Without air monitoring in workspaces with high density occupancy or workspaces with a lack of building or room ventilation, workers are at risk of exposure to the virus.

### Risk of Airborne Infectious Disease

One approach to quantifying the risk associated with airborne transmission aerosols and respiratory disease has been the Wells-Riley model (Riley et al., 1978). The model is based on



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the concept of “quantum of infection”, whereby the generation rate of infectious airborne particles (or quanta) can be used to model steady state conditions in a well-mixed and ventilated indoor environment. The model was constructed to evaluate exposure to infectious particles in air and potentially succumbing to infection. In 1997, the original Wells-Riley model was enhanced to consider dynamic or time-varying exposure.

The premise of the Wells-Riley model examined the probability of infection based on assumptions like the number of infected cases, number of susceptible individuals, pulmonary ventilation rate, quanta generation rate, room air ventilation with clean air and exposure time. The model did not look at the person-to-person variability of those who may be infected but not expressing clinical symptoms or changes in room occupancy density, because people move about in different work spaces throughout the day. Finally, the model did not evaluate the size or mass for aerosol dispersion based on source of exposure—coughing, sneezing, speaking etc., and evaporation of moisture, which may affect transmission.

### Infectivity of the Working Population

Reproductive rate ( $R_0$ ) is the average number of infections caused by each person.  $R_0$  refers to the “effective reproduction number” and, basically put, it’s a way of measuring an infectious disease’s capacity to spread. The  $R$  number signifies the average number of people that one infected person will pass the virus to other people. Importantly, a disease’s  $R_0$  value only applies when everyone in a population is completely vulnerable to the disease. This means:

- No one has been vaccinated
- No one has had the disease before, and
- There’s no way to control the spread of the disease

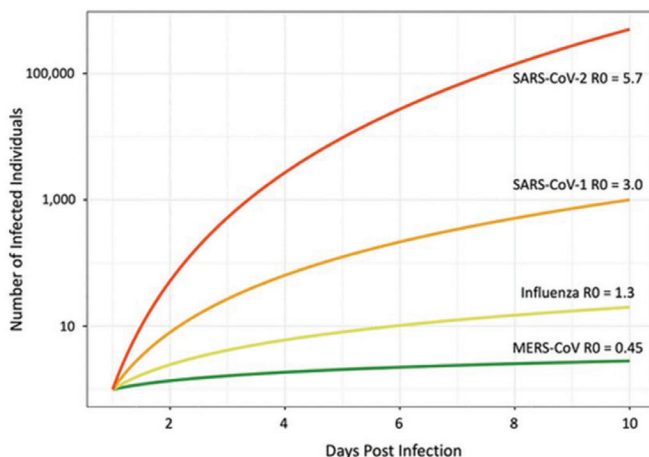


- If  $R_0$  equals 1, each existing infection causes one new infection. The disease will stay alive and stable, but there won't be an outbreak or an epidemic.
- If  $R_0$  is more than 1, each existing infection causes more than one new infection. The disease will be transmitted between people, and there may be an outbreak or epidemic.

Without using physical or social distancing, the  $R_0$  rate can range from 2-5 for super spreaders. A study by Shröder (2020) suggests that SARS CoV-2 virus may have a  $R_0$  of 5.7, which slightly higher than the SARS CoV-1 virus at 3.0. To assess the risks posed by “super-contamination” events, we have to look at the K factor, as well as the R factor. The dispersion factor, K denotes how even the rate of the spread is between all the different people infecting others. In other words, whether each carrier infects roughly the same quantity of people or if it varies. The lower K is, the newer infections come from a small number of carriers.

Alternatively, the K factor is close to 1 for the seasonal flu, meaning that all carriers infect about the same number of people. Scientists have also established that during the 2002 SARS epidemic, K was 0.16, which is very low—suggesting that “super-spreaders” played a big role in the transmission of the virus. By contrast, scientific estimates for Covid-19's K factor are very divergent. In a paper awaiting publication, a team of Swiss researchers said that the K factor is much higher for Covid-19 than it was for SARS, so “super-spreaders” are much less of an issue than they were in 2002.

The R number isn't a fixed value, but it can be affected by a range of factors, including not just how infectious a disease is but how it develops over time, how a population behaves, and if any immunity already possessed from previous infection or vaccination. Location is also important: a densely populated city is likely to have a higher R than a sparsely peopled rural area. Three possibilities exist for the potential transmission or decline of the COVID-19 illness, depending on its  $R_0$  value:



- If  $R_0$  is less than 1, each existing infection causes less than one new infection. In this case, the disease will decline and eventually die out.

However, a team of researchers from the London School of Hygiene and Tropical Medicine estimated that 80% of infections are caused by only 10% of carriers. In this model, K is very low, at around 0.1%, which would mean that “super-contamination” events can play a critical role as lockdown measures ease. The dispersion factor (k) represents how much a disease cluster. The lower the K number, the higher the risk, as shown below:

- 1918 Influenza pandemic had a K factor or 1
- MERS had a K factor of 0.25
- SARS CoV-1 had a K factor or 0.16
- SARS CoV-2 has a K factor of 0.1

In short, some scientists believe the infectivity rate may be around 1,000 log copies of the RNA virus to as low as 100 log copies in more susceptible or vulnerable populations or workers. **IHW**

*[Editor's note: This article is taken from a paper written by Bernard L. Fontaine, Jr., CIH, CSP, FAIHA, for The Windsor Consulting Group, Inc. It is used here with permission. This investigative paper can be read in its entirety at <http://industrialhygienepub.com/air0321.>]*



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# Reduce the Spread of Germs in Manufacturing Facilities

Manufacturing workers are some of the employees that have the highest risk of exposure to the novel coronavirus (COVID-19) in your facility. It's important to identify and minimize the exposure risks as much as possible to help them safely return to work during the pandemic.

COVID-19 has had, and will continue to have, a huge impact on our personal lives and economic responsibilities. Promoting coronavirus safety and implementing changes that help reduce the spread of germs in your manufacturing facility helps protect your employees and is simply good business.

In this article, you will find four practical ways to reduce the spread of germs in your facility, based on CDC and OSHA recommendations.



Administrative controls to help keep workers safe include implementing germ-prevention protocols for social distancing, hand washing and using PPE, such as disposable face masks. (photo courtesy Avery Industrial)

### 1) Know the Exposure Risk for Manufacturing Workers

**Minimal distance between individuals.** During the manufacturing process, it is common for employees to work closely together on production and/or assembly lines. Crowding may also be caused by the natural structure of the workday. For



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example, many employees will be clocking in and out; taking breaks; and using locker/changing rooms at the same time.

**Prolonged contact with coworkers.** Manufacturing shifts are generally between eight-12 hours long, with extended contact between coworkers. If there is an infectious person on a long shift, the risk of transmitting COVID-19 increases—the longer they are near others.

**Droplets in the air and contaminated surfaces.** A cough or a sneeze from an infected person can cause workers to be exposed to the coronavirus through airborne particles. The same droplets can also contaminate tools, break room tables, door handles, workstations and other surfaces.

### 2) Create a COVID-19 Assessment and Control Plan

Designate a qualified person in your facility to act as coronavirus safety coordinator, responsible for assessing COVID-19 hazards; planning controls; and staying up-to-date with state and county officials. This person can also lead regular work site assessments to identify COVID-19 risks and prevention strategies.

#### What should your coronavirus safety control plan look like?

The CDC and OSHA recommend using the hierarchy-of-controls approach for preventing the spread of germs. The recommended three-point approach includes eliminate hazards; install engineering controls; and implement appropriate sanitation, cleaning and disinfection methods.

**Eliminate hazards.** Make sure employees know to stay home if they are sick. Make sure anyone (including contractors and visitors) that exhibits COVID-19 symptoms is separated and sent home immediately.

**Install engineering controls.** Engineering controls are physical changes you can make to the work environment to help employees safely return to work. This can include configuring workstations and break areas to be at least 6ft apart (in all directions) and providing physical barriers, such as strip curtains or clear acrylic dividers.



It can also include managing facility temperature so that personal cooling fans (which can distribute droplets from a cough or sneeze) are not needed. Additionally, increase ventilation and place hand-sanitizing stations that meet OSHA's Sanitation standard (29 CFR 1910.141) in multiple areas.

**Implement appropriate sanitation, cleaning and disinfection.** Make sure employees can safely clean and disinfect frequently touched surfaces—first cleaning with soap and water, then disinfecting to kill germs. Provide disposable gloves; ensure adequate ventilation; and make sure cleaning chemicals are properly labeled, even when secondary containers are used.

### 3) Use Administrative Controls to Reduce Germ Spread

While engineering controls are changes to the environment where people work, administrative controls are changes to how people work.

Administrative controls that promote coronavirus safety include limiting access to essential workers only; getting rid of non-essential meeting; and re-arranging schedules for shifts and break times to reduce crowding. It can also include implementing germ-prevention protocols for social distancing,

hand washing and using PPE, as well as distributing disposable face masks.

### How to successfully implement administrative controls for coronavirus safety

Facility-wide protocols for germ-prevention are imperative for helping employees safely return to work and require effective communication to be successful. Visual cues, such as floor signs, help employees maintain 6ft spacing in aisles, lines, work spaces and break areas.

Floor stop signs show employees and visitors alike where to stop and wait for assistance and can also be used to inform personnel of face mask requirements before entering a building. Signage can also be used to direct personnel through COVID-19 screening and communicate effective handwashing techniques.

### 4) Screen and Monitor Workers for COVID-19

Under normal circumstances, the American Disabilities Act (ADA) prevents employers from conducting health screening for workers. However, the Equal Employment Opportunity Commission (EEOC) has stated that the ADA and Rehabilitation Act do not interfere with CDC recommendations during the pandemic.



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**Screen before entry to the facility.** All personnel, including employees, contractors, vendors and other visitors should be screened before entering the facility. Make sure you have a station set up outside the entrance with signage clearly communicating coronavirus screening protocol.

**Provide verbal screening.** Ask about specific COVID-19 symptoms, as outlined by the CDC, which include (but are not limited to) cough, shortness of breath, and new loss of taste or smell in the past 24 hours. Ask whether the person has been in close quarters with someone who has COVID-19 or recently traveled to a high-risk area, as defined by the CDC.



Options for coronavirus screening solutions range from color-coded visual identification to barcode-capable wristbands for digitally tracking access in and throughout your facility. (photo courtesy Avery Industrial)

Make sure questions during COVID-19 screening are limited to symptoms outlined by the CDC and CDC travel information regarding the coronavirus.

**Check temperatures.** Be alert for temperatures of 100.4°F or higher or reports of feverish feelings, such as chills. Screeners performing temperature checks should always wear appropriate PPE; be trained to use temperature monitors; and know how to accurately adjust to conditions, such as cold weather, which could affect temperature accuracy.

**Identify screened employees.** Having a system in place to quickly identify employees who have been screened and do not show any signs of COVID-19 symptoms is a vital component of administrative controls that help reduce the spread of germs. Options for coronavirus screening solutions range

from color-coded visual identification to barcode-capable wristbands for digitally tracking access in and throughout your facility.

## What do you do if screening results indicate a worker may have COVID-19?

If coronavirus screening results indicate someone may have COVID-19, they should be separated from others and denied entrance to the facility. Employees should be sent home and encouraged to contact their doctor or other health-care provider.

You should also supply your COVID-19 screening station with copies of your return-to-work policy, so workers who are sent home can be provided with that information. Human resources and the employee's supervisors should be alerted, so arrangements for re-assigning duties can be made, if needed.

## IN SUMMARY

Manufacturing employees face a high risk of exposure to the novel coronavirus when returning to work during the pandemic. Virus protection at work must center on CDC and OSHA recommendations, as well as state and county guidelines.

A robust, germ-prevention program should include a plan for assessing COVID-19 hazards and implementing controls. This includes eliminating hazards and installing engineering controls, as well as implementing appropriate sanitation, cleaning and disinfection.

Administrative controls that change the way people work and coronavirus screening are also crucial for helping employees safely return to work. This includes meeting OSHA's PPE standards; effectively communicating protocols; and having a method in place to identify screened employees. **IHW**

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# Future of Industrial Hygiene, Pt 2

By: Barbara Nessinger, Editor-in-Chief

## The Way Ahead: The Future of Industrial Hygiene, Part 2

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*Industrial Hygiene in the Workplace* reached out to numerous companies for expert opinions on a range of subjects that affect how industrial hygiene and safety will change going forward and, most importantly, the issues and challenges ahead. The evolution of industrial hygiene includes improving the ability to anticipate, recognize, evaluate, control and confirm worker protection—across all of the industries that serve this growing field.

Despite setbacks this year by the global pandemic, there is great enthusiasm in the industry, as a whole. This is part 2 of the series; in it, we focus on the diversity of the modern workforce and how 21st Century technology has changed (and improved) the safety game.

### From the Silent Generation to Gen-Z

There is no doubt: The workforce of the future will be its most diverse—not just culturally and ethnically—but in the span of ages and experience levels. For the first time ever, safety professionals must protect a workforce that includes five generations: the Silent Generation (born between 1928-1945); Baby Boomers; Generation X; Millennials; and Generation Z or the Post-Millennial Generation.

We asked folks how industries that help support industrial hygiene and worker safety can address the needs of this diversely aged group of workers. Since each of these generations will have had different work experience interacting with health and safety professionals, “it will be difficult for a ‘one size fits all’ approach with these workers,” said the staff at ACGIH. “The industries that support industrial hygiene and safety will need to provide risk communication to the different generations in a manner to which they can respond.” For example, Baby Boomers will likely respond better to a face-to-face meeting on the hazards and controls. The Post-Millennial (Gen Z) generation may prefer short, to-the-point, online training that utilizes animation and music. “Each generation will require risk communication that resonates with their own experience and the preferred method of communication.”

The ACGIH Board talked about effective communication—how it is a challenge when seeking to deliver standardized messaging across generations. One way to overcome this challenge

is through collaboration with professionals that specialize in communication and, specifically, who understand the unique generational needs and know the most effective ways to communicate. Such inter- and intraorganizational partnerships are not typical; however, they possibly could help OHS/EHS professionals to “improve the communication of relevant information and, ultimately, the prevention of occupational illness, disease and injury,” they concluded.

The implementation of “visibly felt leadership” is of utmost importance. “Visible, felt leaders care about people across all generations; they champion the commitment to prevention of occupational illness, disease and injury; and they provide appropriate support and genuine messaging supporting related requirements,” said the Board members.

The folks at both Cority and Blackline safety echoed many of the above sentiments, but also took a very tech-focused approach to the question. At Cority, for example, the focus was not just on the differences these age groups have, but also on their commonalities. “Vendors need to recognize these differences and offer solutions that are adaptable to meet the needs of these groups, and ideally, fostering opportunities for individuals across generations to engage and work together to resolve some of the most pressing H&S challenges.”

Blackline Safety noted that an increasing number of worksites are undergoing digital transformation and are therefore utilizing devices and leveraging the data they produce to improve safety and productivity. “Naturally,” said Blackline, “these instruments draw various concerns from craftspeople of several generations. Some may share skepticism over their privacy and how the data is being used. Others may have minimal experience with technology and would benefit from being educated on the advantages that digital tools bring to both the organization and each individual worker.” Such education might include how technology enables worksites to approach and address problems from a different, more effective lens.

Safety professionals must understand the needs and concerns of all of its employees by embracing a communicative and collaborative environment, “[b]ecause the only way you can address their needs or concerns, while simultaneously ensuring



a safe workplace, is by knowing what they are and embracing an open-door policy,” Blackline concluded.

### 21st Century Tools

The evolution of industrial hygiene has to include improving professionals’ ability to anticipate, recognize, evaluate, control and confirm worker protection. Use of technology by industrial hygiene/OHS professionals is, therefore, growing exponentially. We asked how our respondents think 21st Century technology can serve as tools to drive innovative preventive measures. Again, the answers were thoughtful and insightful.

“Many of today’s industrial technologies produce millions of data points across a worksite,” opined Blackline Safety. As more organizations adopt technology to drive their safety programs forward, it will be critical for them to track, combine and analyze those data points in an efficient and digestible way. “This will enable safety professionals to better manage risk on their worksites—by understanding threats from multiple angles, such as environmental and operational conditions, allowing them to identify patterns of risk and prevent them from happening again.”



The workforce of the future will be its most diverse—not just culturally and ethnically—but in the span of ages and experience levels. For the first time, safety professionals must protect a workforce that includes five generations. (photo courtesy Adobe Stock)

The folks at Cority concurred, also adding that there has been “a rapid acceleration in EH&S technology adoption in recent years, with much of that adoption focused on solutions to enable enhanced real-time risk management at both the worker and asset level.” By enabling organizations to better harness EH&S data to uncover trends or emerging threats in their operations—whether dealing with an unsafe behavior or potential equipment failure—it is thought that businesses will be better equipped to target the precursors of these issues, before they can result in harm to people or business interruption.

Yet, Cority warned, that approach isn’t without challenges. “Data is growing at a rate we’ve never seen before, and that means better risk management isn’t simply a question of collecting more (and better quality) data. It’s also a question of how businesses can more efficiently tease through their collected metadata to uncover those meaningful, actionable insights needed to better inform decisions on where to prioritize efforts, and what specific actions should be taken to reduce risk exposure.”

### Opportunities Abound: The Way of the Future

The growing interest in IoT-enabled devices also provides businesses with opportunities to create a more comprehensive view of organizational risk, through both real-time assets and worker health management.

For assets, businesses can expand the use of remote monitoring devices and sensors to improve asset lifecycle management and failure prediction, thus helping to reduce downtime events and repairs that could place workers at risk. Smart monitors and wearable devices are being adopted at higher frequency, improving real-time monitoring of worker risk exposure and

health—even alerting workers of concerning exposures and offering recommendations on steps to take to limit that exposure. And this is all delivered to workers right in the field through mobile devices.

“Those solutions,” said Cority, “when integrated within a larger EHS software platform, can also help businesses trigger additional workflows instantaneously, improving response times to investigate the event and work on mitigation measures.” For example, while a worker is being alerted of their exposure to high noise levels, an investigation can be triggered to help understand the circumstances giving rise to the hazardous work conditions.

By coupling enhanced, real-time data collection practices with more powerful analytics technology, organizations are shifting away from a “diagnose and treat” method to a more predictive approach to risk management. By feeding collected data through analytics tools driven by machine-learning algorithms, firms can use their data to create predictive models that tell them what risks will mostly likely emerge in their operations, and where, thereby enabling business leaders to focus resources on efforts most likely to reduce the potential for harm.

“Advanced solutions may even provide prescriptive insights—recommendations not only about what may happen, but what specifically should be done now to prevent that occurrence—helping reduce decision time and leading to more effective and consistent interventions that lower the risk of loss,” Cority noted. And, since AI-enabled analytics solutions are constantly learning, models are constantly being refined and their accuracy improved—leading to greater confidence in the actions taken to address risk.

Such a melding of technological advancements is reshaping the way health and safety is performed on a daily basis. This improves professionals’ capacity to support business growth, while limiting risk to individuals in the workplace. In other words, a win-win. **IHW**

*[Editor’s note: Part 3 of this series will focus on how the COVID-19 pandemic has changed the industry—and helped to shape its future. Stay tuned!]*



Safety professionals must understand the needs and concerns of all employees by embracing a communicative and collaborative environment.

### ABOUT THE CONTRIBUTORS

We’d like to thank the following people for their assistance and participation in this article’s content. The time these individuals took to give complete, thoughtful answers is greatly appreciated.

- ACGIH: members of both the ACGIH staff and the ACGIH Board participated
- Mark Ames, Director of Government Relations, AIHA
- Dave Angelico, President, Air Systems International, Inc.
- Sean Baldry, CRSP, Product Marketing Manager at Cority
- Sean Stinson, Chief Revenue Officer, Blackline Safety

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## Lift Your PPE Game

Two new products are now available from LIFT Safety—the LIFT Safety Face Mask and the Neck Gaiter.

**Safety Face Mask:** Made to meet CDC Guidelines, the LIFT Safety Face Mask is 100% cotton and incorporates soft elastic ear loops that are adjustable for added modularity. The mask also features finished sewn seams and an antimicrobial finish throughout.

**Neck Gaiter:** Made from breathable, moisture-wicking and UV-protective material, the Lift Safety neck gaiter is comfortable to wear in both warm and cold climates. Place the neck gaiter over your mouth and nose; position it to be worn as a face covering; or around your neck as a protective shield against sunlight and weather. Available in hi-viz, orange and black.

LIFT Safety, [www.liftsafety.com](http://www.liftsafety.com)



## Combat Heat Stress

Ergodyne announced the launch of six new Chill-Its® products to help keep workers cool and protected amidst perennially rising summer temps and global pandemics. “This year more than ever, coverage is the name of the game,” said Jess Ellis, Product Specialist for Ergodyne. “From sweltering heat and scorching UV rays to asymptomatic aerosols, our latest heat stress solutions are designed to shield workers from summer’s worst.”

The 2021 launch includes:

### Face Coverage

- Chill-Its 6489 2-Layer Evaporative Cooling Multi-Band

### Head Coverage

- Chill-Its 8936 Lightweight Ranger Hat with Mesh Venting
- Chill-Its 6634 Evaporative Cooling Headband

Ergodyne, [www.ergodyne.com](http://www.ergodyne.com)



The advertisement features a large yellow circular manhole cover being installed by two workers in high-visibility vests. The cover has a black handle and a locking mechanism. Text overlays include:

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Your Safety... Our Solution

A QR code is located in the bottom left corner, linking to the U-TECK website. At the bottom, a black banner contains the website [www.UTECK.com](http://www.UTECK.com) and the phone number 1-800-542-7011.

## Hearing Conservation & Training

Continued from page 18

At the end of this article are some sources with useful information about hazardous noise and hearing protection. Check them out to help prepare and package your messages about hazardous noise and use of hearing protection. Your one-on-one discussions with workers while visiting worksites can have a positive impact on the prevention of noise-induced hearing loss. As an industrial hygienist, you definitely have a role in saving hearing, one ear at a time. **IHW**

### About the Authors

Dr. Vickie Tuten and Dr. Kathy Gates are both AuD audiologists. Dr. Gates works for the DOD HCE, as a contractor, zCore Business Solutions, Inc. Dr. Tuten is an independent contractor with Occupational Marketing, Inc., where she teaches CAOHC courses. Both were also military audiologists.

### Additional Resources:

- Noise and Hearing Loss Prevention | NIOSH | CDC
- Listen Up! Protect Your Hearing (infographic) | NIDCD (nih.gov)
- DoD Hearing Center of Excellence
- Hearing Loss (cdc.gov)

## Ergonomics & Safety

Continued from page 30

### Electric Lifts
























Manufacturing and industrial lifting requirements vary widely. Some are designed to lift a wide range of objects and feature a modular design. Lifts can handle drums and barrels, rolls, totes and boxes, among others. These ergonomic products not only lift, but they also tilt, turn and precisely orient the position of an object for safe, effective movement and unloading. Platforms and end effectors can often be custom-designed to customer specifications.

### Smart Strategy

When the job calls for employees to consistently put strain on their bodies, addressing ergonomics should be a top priority. Investing in proper ergonomic equipment and systems in the workplace is a smart idea for protecting the health and safety of workers. Doing so also reduces the chance of subjecting businesses to serious liability. **IHW**

*[Editor's Note: This article first appeared as an Ergo Equipment Blog post and is used with permission from American Sales Development, LLC. For the original article, go to <https://bit.ly/2MXW8l7>.]*

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