

Technology at Your Fingertips & Preventing Heat Stress Injuries



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Wearables: Utilizing Data for Improved Worker Productivity/Efficiency

Wearable technology has become a real trend in the workplace, and we are not talking about an iWatch or the average Fitbit bracelet. There are many products being designed to help companies better manage their time, predict situational work hazards, and, in general, boost productivity in different workplace environments. Here are just a few ways utilizing wearables can provide data on workplace productivity and safety.

1. Beat the Heat with Wearables

As we move into the end of the summer, it is important to remember that wearable technology has helped a great deal in preventing high core body temperature (CBT) and heat-related illness, (HRI). Products like wearable physiological monitoring systems have helped notify workers of un-safe temperatures and warnings of HRI before symptoms have set in. Most monitoring systems are available in styles worn around the torso, chest, on belts or in the ear. Several companies offer more compact, light-weight options that can be worn more conveniently around the arm as well.

2. Mobile Devices = Wearables

There is something most people nowadays always have on their person: a Smartphone. This is a resource that brings unlimited learning and data-tracking possibilities in the palm of the hand. “Smartphones make it possible for organizations to deploy microlearning modules—which consist of compact bursts of information—that can be accessed by workers whenever and wherever they want.” (*IHW, May/June*)

In addition, micro-learning type training sessions can be modified to individual employee’s specific job and is a quick way to deliver easily understood tutorials when

time is short and urgent tasks need to be completed. It also gives managers valuable user-engagement metrics and feedback. Workers can learn in real time—on the job, and even at home, if companies employ a bring your own devices (BYOD) policy.

All companies might want to consider making this policy in their workplace, because BYOD strategy means workers will always have a data-tracking device on-hand. Use this free resource and make it work to your advantage. A BYOD policy means employers do not have to acquire new devices for each individual employee. “This reduces the bottom line, while enabling employees to choose exactly which device to use—instead of having managers who make that choice for them. And, when employees use the device they want, they are more likely to be engaged and ready to embrace their safety training.” (*IHW*)

3. Into the Looking Glass: They are not just for seeing

Finally, we look at the first piece of wearable technology ever created: eyeglasses. Created by Salvino D’Armati in the 13th Century, this wearable tech is now being modified to have even more exciting, futuristic capabilities. Current options offer a wide range of features and pricing options.

- **Low-price point options:** Starting at the lower end of selections for smart eyewear, these glasses can have all the characteristics and capabilities of a standard smart watch. Other products act as a platform for viewing information; can take calls; deliver notifications; and allow the wearer to control music through a touch interface. Some eye technology can even take pictures and apply filters to the pictures.

- **Mid-price point options:** According to *IHW*’s article set to be published in the July-August 2022 issue, “Higher-tech eyewear solutions were designed to supplement the brain’s ability to memorize complex diagrams and processes. These glasses allow the user to view displays from their phone or computer while working. Some even integrate with virtual meeting platforms, allowing workers to consult supervisors or share live work experiences.”
- **High-end-price point options:** Finally, multifaceted and expensive smart glasses experiment with augmented reality (AR) solutions that allow the user to overlay images on a real-world, real-time view. “Glass technologies that include VR or AR options are being used to reduce time and costs for training. Smart glasses can even be used to assess an individual’s job skills.” (*IHW*)

Companies and industries should keep a close eye on smart-wear technology, as it is projected to double in value in as little as three years, with increased capabilities at decreased costs. All wearable technology has an important role and provides vital information in today’s workforce. ■

By: Tom West, SPHR, SHRM-SCP, COSS, Contributor

Four Ways Wearable Tech Goes Beyond Safety

“More than 70% of companies are still stuck in ‘pilot purgatory’” when adopting digital technologies, according to the [World Economic Forum](#). From our perspective, automation efforts frequently stall because they fail to interact with a plant’s most important asset—its people. Connected workers are a massive opportunity to increase the breadth of intelligent sensors throughout a manufacturing facility.

Using only a small device worn in an armband, an entire workforce can automatically and continuously capture environmental, motion and other observations from the front line and location/proximity data.

“We need to recognize that there is an interplay between equipment and people. This relationship has a direct impact on product quality, safety and health,” explained Gabe Glynn, MakuSafe’s CEO and Co-founder. “By integrating workers on the IoT network, we can uncover insights that have powerful implications on long-term safety, productivity and efficiency.”

Connected workers can close the gap on your goals for industrial Internet of Things (IIOT). Employees with industrial wearables generate a rich stream of data that can be mined to uncover new paths to operational efficiency. Employees can go beyond workplace safety and make tactical improvements to environmental quality, assembly line speed, equipment permissions and productivity.

1) Environmental Quality

What if every worker in your building was collecting environmental data, no matter their location?

The drawback of most environmental sensors is that they are stationary. Mounted to a wall or ceiling, their measurement radius is limited. But place these instruments on workers, and now environmental readings are entirely mobile and provide real-time visibility into the conditions each individual is experiencing. Metrics are generated throughout your facility wherever employees are positioned. Those findings can then be integrated into a HVAC sequence to automatically regulate temperature, humidity and ventilation.

For example, temperature and humidity can fluctuate significantly throughout a manufacturing space. IoT-equipped workers can reveal variations that need to be addressed, such as turning on an air handler or closing overhead ventilation. All of this could be done without any active intervention—no manual reports of thermal discomfort or overriding building automation controls.

2) Assembly Line Speed

What if your feet per minute could intuit when the rate needs to slow down?

There are scenarios when production can’t and shouldn’t maintain a static speed. But an automatic conveyor runs at a predetermined pace, regardless of staffing levels. When

The potential to maximize manufacturing operations with connected workers is vast. Companies have an amazing opportunity to implement IoT findings as continuous improvement efforts. (photo courtesy Adobe Stock)

there’s a mismatch between the rate and crew, it creates an additional work burden on those present. This can lead to stress, decreased efficiency and increased safety risks. If workers don’t feel empowered to speak up, their situation may go unnoticed and unresolved.

With IoT-connected workers, however, manufacturing processes can automatically align with the number of people detected. If someone steps away for a break or is temporarily pulled to another line, the system will know and adjust accordingly.

The conveyor can similarly modulate its rate if a team is short-staffed for a shift. Conversely, data may prove which specific teams work more productively together. Proximity data could show where workers are, and who they are close to. That could be compared to production/output quantities and reveal that this team of three people has higher output than most teams of five.

3) Equipment Permissions

What if your manufacturing equipment could verify or decline users?

This is essential for machines that need mandatory training and certifications, such as CNC machines or forklifts. Most

already have IoT capabilities for maintenance issues—it’s not a stretch to add an authorization step.

For example, a worker approaches a forklift for use. A sensor registers the employee and verifies if their certification is current. If it’s not, the machine will remain locked. It’s the same concept as an access control badge—but applied to equipment clearance.

This application can also be used as a form of intelligent spatial awareness. An approved user is operating a robotic arm, but what happens if an unauthorized person enters this zone? The proximity sensor could detect this new worker and instruct the machine to stop, automatically eliminating a potential injury risk.

4) Productivity Analysis

What if you could pinpoint the performance of an assembly team?

Quality, efficiency and output—they are the foundation to any manufacturer’s success. However, productivity can vary among different teams. Whether a crew has a stellar or subpar defect rate, the question is always “why.” Data from IoT-connected workers can reveal if the physical environment is a contributing factor. Incorrect temperature,

excessive noise or improper humidity might be overlooked culprits.

Exertion might also be a factor. Some sensor-packed wearables can not only detect slips and falls but also repetitive motions and worker physicality. Supervisors can correlate this information against productivity metrics. It could lead to a discovery that a focused ergonomics assessment or targeted training is needed. It might even prompt an evaluation of workstation design or process reengineering to avoid the risk of injuries, such as cumulative stress, strain and exertion, or musculoskeletal disorders (MSDs). Without worker-generated data providing a clue to investigate, these low-cost and simple measures might have been missed.

The potential to maximize manufacturing operations with connected workers is vast. Companies have an amazing opportunity to implement IoT findings as continuous improvement efforts.



MakuSafe’s sensor-packed wearable not only detects slips and falls but repetitive motions and worker physicality. (photo courtesy MakuSafe)

“There are undiscovered elements that impact a worker’s safety and health, simply because we haven’t measured them yet. Remember that there was once a time when asbestos and lead paint weren’t a concern,” Glynn stressed. “Our knowledge is always changing. For example, how can we act on the growing evidence that suggests sound exposure can negatively impact heart health? Or might it be possible to gain leading indicators of worker behavior and movement that are precursors to fatigue? We need the data from IoT-connected workers to keep probing our understanding of safety, health and productivity.” ■



Tap into Expert Guidance on the Use of Direct Reading Instruments

The proper use of Direct Reading Instruments (DRI) is key to identifying dangerous environments in order to make real-time decisions that protect worker health and safety. Improve your proficiency by learning the foundations of DRI use and how to avoid common misuses.

AIHA University's certificate program, [Use of Direct Reading Instruments](#), covers concepts that can be applied to any DRI, including hazard evaluation, chemistry for monitoring, types of hazardous gas and vapor monitors, DRI functions and limitations, sensor specificity, calibration and functional tests, "reality checking" results, and recordkeeping and datalogging. You'll also learn to identify whether the equipment you're using is appropriate for the task at hand.

What's included:

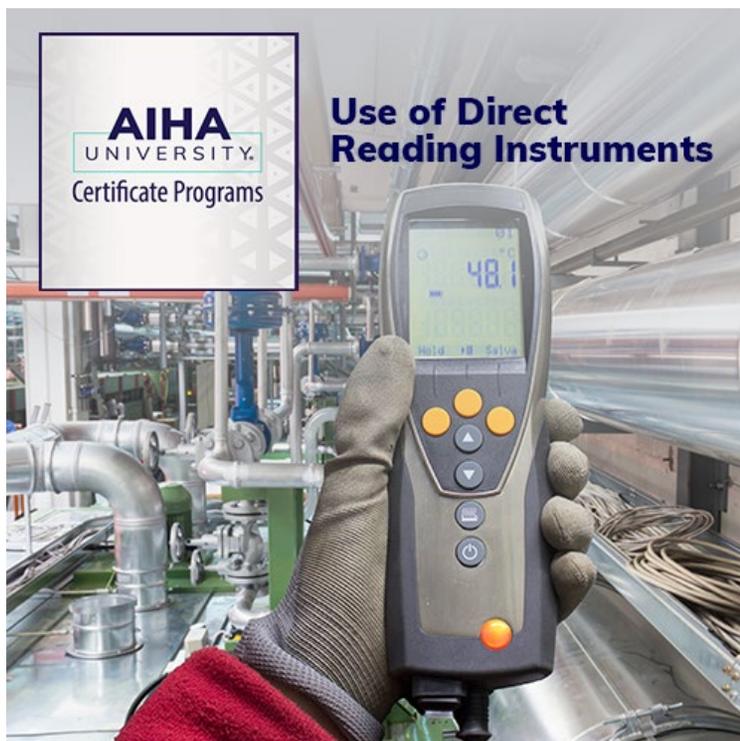
- Interactive knowledge checks throughout
- Practical case studies on DRI use and misuse
- Practice module utilizing a real-world scenario
- Customizable sample maintenance log, glossary of DRI terminology, and several other take-away documents
- Personalized certificate upon successful completion of the online assessment

[AIHA University Certificate Programs](#) are the first step in your journey to a successful career in the occupational and environmental health and safety (OEHS) field, awarding tangible proof of your technical knowledge and skills.

Certificate programs like this allow you to learn the principles you need to advance your career anytime, anywhere, without disrupting your busy schedule or draining your savings. An added benefit for those responsible for training

is the [bulk purchasing program](#), which can save you between 25-40% depending on your group size.

This certificate program displays just one of the ways AIHA University supports IH/OEHS professionals in their pursuit of healthier workplaces and a healthier world. The AIHA members who contribute their expertise to develop our education products and services put AIHA on the map as a trusted resource for scientific-based education and training. Consider taking your seat at the table by [joining AIHA](#). ■



By: Cheryl Palmer, Contributor



Wearables in the Modern Workplace

Did you know helmets were once blamed for causing head injuries? Yet today, the thought of setting foot on a work site without a hard hat is unheard of. Low-tech PPE, such as hard hats, steel-toed boots and high-visibility clothing may sound like obvious safety requirements in 2022, but they were once novel technologies. They were questioned and scrutinized the same way businesses question high-tech options today. There will be a time when people look back and question the sanity of those of us who worked in high-risk environments *without* worker-centric technology.

As consumers, we are already using high-tech solutions for our most challenging problems and to make our lives easier. One example is technology that monitors our health and wellbeing—from sleep technology to smart watches and apps on mobile phones. Now, consumer technology used by large groups of people is becoming specialized for use in industrial applications.

Since 2015, survey results indicate a consistent 73% of workers are willing to use wearable technology at work if it improves safety. 81% of CIOs believe high-tech wearable technology will become common in the workplace. Despite these numbers, only about 12% of workers report using wearable technology on the job.

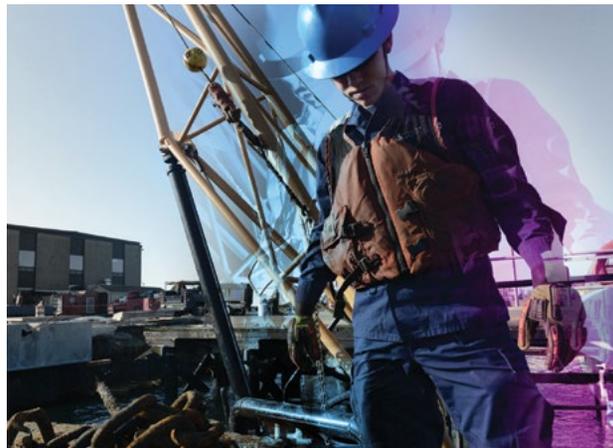
Emerging Wearable Technology to Consider

Artificial Intelligence (AI), machine learning and automation are buzzwords that guide our decisions on ways to

benefit from technology. Numerous companies are focused on increasing worker safety or productivity through developing connected worker technologies. These technologies fall into several wearable categories.

Accessory Devices

High-tech watches and fitness trackers have been part of our day-to-day lives for several years. Currently, their most common use in the workplace is related to healthcare incentives that track employee behaviors and gather data used to lower insurance premiums. They're also often credited with assisting in time-management and boosting productivity.



Using wearable technology to connect workers for the purpose of understanding the "what, how and why" of worker injuries is imperative to advancing safety, productivity and workers' health and wellbeing. (photo courtesy Kenzen)

Major wearable watch companies have also been researching how to develop illness-detection capabilities. Many viruses are communicable before a person knows they are sick, so illness-detection could increase workplace health and safety by informing employees they are ill and encouraging them to stay home—so they do not spread the illness within their workplace.

Other companies are exploring and developing uses for wearable devices that may increase worker safety, such as fall detection, posture monitoring, GPS positioning and core body-temperature monitoring. These applications are not part of existing consumer-brand smartwatches and are generally used for a very specific purpose and dataset. These capabilities will likely be developed and merged into one device in the future.

Smart Clothing

Wearable technology won't be confined to accessory devices for much longer. Smart textiles have become a focus for several major companies and universities. PPE-type clothing, such as cut-proof sleeves, arc-proof clothing and slip-resistant surfaces, are existing wearable tech solutions. PPE clothing will become smarter—capable of monitoring employees' heart rate, breathing and posture. Clothing will also be able to monitor environmental hazards, such as UV exposure, temperature and air quality. Many companies will collect this data from the clothing and connect it to an app



Smart clothing will be able to monitor environmental hazards, such as UV exposure, temperature and air quality. (photo courtesy Kenzen)

that offers safety insights and suggestions for improving performance.

Exoskeletons

Ironman-type suits that reduce risk to the human body are still a vision of the future. Exoskeleton development dates back to the 1960s, but products didn't come to market as viable solutions until the 21st century. The first exoskeleton prototypes were for gait training for people with stroke and spinal cord injuries.

Since 2014, several companies have designed exoskeletons to protect workers. They are designed to reduce muscle fatigue and prevent injury when lifting, bending, reaching, squatting and performing other repetitive or heavy-lifting activities. This wearable technology generally works

by improving posture and redistributing weight. The capabilities of this technology and its workplace applications are still being discovered and researched.

Glasses

The first piece of wearable technology ever created was the eye glass. Eyeglasses with futuristic capabilities are still in prototype and secondary development stages. Tech innovators are only skimming the surface of how glass technologies may be used for worksite enhancements. Current smart glasses offer a wide range of features and price tags. Simple, cheaper versions have the characteristics of a smart watch. Some act simply as a platform for viewing things. Eyeglasses can take calls, deliver notifications and allow the wearer to control music through a touch interface. Some eye technology can even take pictures and apply filters to the pictures.

Other higher-tech eyewear solutions were designed to supplement the brain's ability to memorize complex diagrams and processes. These glasses allow the user to view displays from their phone or computer while working. Some even integrate with virtual meeting platforms, allowing workers to consult supervisors or share live work experiences.

At the more complex and expensive end of smart glasses, big brand names and start-ups alike are experimenting with augmented reality (AR) solutions. They can overlay images on a real-world, real-time view. Not surprisingly, versions

that currently exist are only available for specific work applications. Glass technologies that include VR or AR options are being used to reduce time and costs for training. They can also be used to experiment with various approaches and techniques to view the most favorable approach and outcome, i.e., for use in complex medical surgeries.

Smart glasses can even be used to assess an individual's job skills. AR smart glass solutions are now available for healthcare, manufacturing, education and national defense applications. While smart eyewear is currently cost-prohibitive for many employers, this category of smartwear is projected to double in value in as little as three years, with increased capabilities at decreased costs.

Considerations Before Implementing High-Tech Wearables

With the exception of smart eyewear, most industrial wearable options are affordable. Ready to give the majority of workers what they want when it comes to wearables? Here are considerations and next steps:

Do it for the Right Reason: Focus on Safety

Bring high-tech wearables into your workplace for the primary purpose of increasing worker safety. Increase user adoption and success rates by choosing solutions that empower and enable employees to make good choices about their health and wellness.

Understand Data Privacy

You can avoid being seen as a "Big Brother" by giving employees access to their data and educating them on how to use it to make informed decisions. Always use informed consent by being transparent about the data that is collected (or not collected); who can see the data; and how the data will be used.

Educate yourself about the type of data the technology collects. Know whether the device collects biometric (identifiable) or physiological (not identifiable) data and learn the difference between the two. Understanding the data that is collected and the purpose for that data can help you identify privacy risks vs. data benefits. Data knowledge allows you to provide employees with transparent information and accurate training regarding the technology.

Correct data handling and storage is vital, no matter what type of data a wearable collects. Let your IT team do its due diligence on the technology you are considering. Have them research the technology vendor's security and privacy policies

Ensure the security and privacy policies adhere to local or regional regulations. Require vendors to meet security standards (SOC2, ISO27001, GDPR, etc.) before bringing their technology into your company. Be open and transparent with your employees regarding the findings of your privacy and security investigations. Create FAQ documents that explain what data is collected, who owns it, how it is stored and how it is used. Explain how an employee can request access to their data or have it deidentified.

Know the Science Behind the Tech

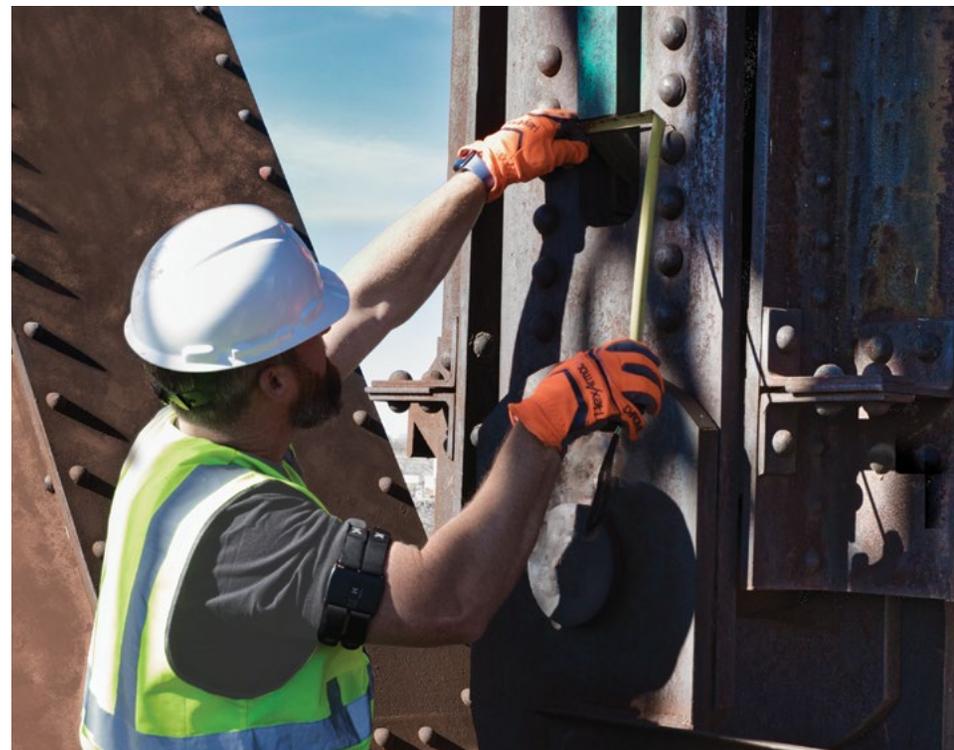
Consider whether the technology vendor provides evidence-based research, proving their device is capable of doing what they claim it does. Conducting partnered research with reputable universities and publishing peer-reviewed articles are good signs the vendor is able to deliver exactly what it promises. Don't be afraid to ask for reasoning and research to guide your decisions, especially when it relates to worker physiology. Even if you don't fully understand physiological science, you should be capable of judging whether the company has solid, scientifically

backed methods or formulas for their solutions.

Organize a pilot project at one of your worksites to gather your own use-case information to ensure the device will meet your needs and perform as expected. Determine whether the company is willing and able to adjust their product and services to meet the specific needs of your industry and company.

Understand the Return Before You Invest

Prepare and analyze some return on investment (ROI) scenarios. Start with simple, straightforward equations that balance the cost of the technology vs. the number of injuries you can expect to prevent. Consider the increase in productivity because of improved health and wellness, and add this number into your ROI calculation. Finally, calculate other metrics impacted by the technology and build them into your ROI. For example, you may find a technology that monitors core body temperature increases the productivity of certain safety professionals, such as your nursing or safety staff. You may also see a reduction in slips, trips, falls and machinery accidents when workers receive alerts to rest and cool down before the impacts of heat illness affect them. Thinking beyond the initial benefits of the technology and using data gathered from your pilot project can help you build out strong, more accurate ROI scenarios.



Increase user adoption and success rates of high-tech wearables by choosing solutions that empower and enable employees to make good choices about their health and wellness. (photo courtesy Kenzen)

Connected technology is defining what many call the Fourth Industrial Revolution. Using wearable technology to connect workers for the purpose of understanding the “what, how and why” of worker injuries is imperative to advancing safety, productivity and the health and wellbeing of everyone on the job. ■

[Cheryl Lynn Palmer is Customer Success Manager with Kenzen. She works with companies globally that use wearable technology to predict and prevent worker injuries and fatalities caused by heat.]

Personal Heat Stress Monitoring

As temperatures rise, companies are searching for innovative ways to keep their workers safe. Environmental monitoring has been the tool of choice for years to protect against heat stress, now advances in the emerging field of physiological monitoring are enabling organizations to keep larger workforces safe with real-time, secure and transparent data. Using an instrument that looks at the individual and not the environment, companies can shed one-size-fits-all approaches for more worker-centric safety.

How does the SlateSafety BAND V2 estimate core body temperature?

The SlateSafety BAND V2 uses a Photoplethysmography (PPG) sensor that shines light onto the skin and measures its reflectance. The detection of minute changes in blood volume can be used to

measure heart rate. This information along with other sensor data form the basis for SlateSafety's personal metrics. Once the data is collected, advanced algorithms compute and digest the complex data for easy interpretation.

The key physiological metrics in the SlateSafety platform include real-time heart rate, core temperature and exertion. Each with their own unique perspective on how a worker is doing. SlateSafety's proprietary core temperature algorithm leads the way for protection against heat illnesses and injuries in hot environments. This algorithm was recently the highlight of a peer-reviewed, journal-published [validation paper from the University of Alabama School of Nursing](#). The study demonstrated that the SlateSafety algorithms offer a reliable and accurate means of

monitoring the core temperature and heart rate as compared to ingestible pills and chest-strap heart rate monitors.

Where does the information go?

The SlateSafety BAND V2 and software use best-in-class industry standards to make sure data is protected. By allowing teams to control multiple settings (including biometric alert thresholds) organizations can tailor information access and make sure the right data is provided to the right people at the right time. Connectivity paths from the device to the application set the BAND V2 apart from other bluetooth (BLE) only solutions. Built-in cellular connectivity offers unlimited range for devices in cell-enabled areas while locations with poor or no cell service can use the SlateSafety GATEWAY V2 to seamlessly integrate into existing networks. In areas without cell connectivity or power the mobile application, SlateSafety GO, allows data to be viewed locally on a tablet or phone. In the rare occasion where connectivity is not available (or not desired) devices store data, algorithms and thresholds to keep workers safe. Once connectivity is reestablished recorded data will be uploaded for historical analysis.

The Next Generation in Connected Safety

The SlateSafety BAND V2 is the next generation in ruggedized wearable technology for connected safety. Purpose-built for the toughest workers in the most



rugged conditions, it provides a bevy of functionality including worker physiological monitoring, real-time location status, automated work/rest cycles and more.

Is real-time physiological monitoring right for your team? SlateSafety offers free 30-day pilots. Reach out to the team today to learn more. ■



By: Elizabeth Foster, Contributor



Photo courtesy Kenzen

Climate Change: How Technology Can Help Predict and Prevent Heat-Related Injury & Illness

The World Health Organization estimates that heat exposure will directly lead to 38,000 unnecessary deaths during the 2030s and more than 100,000 additional deaths per year in the 2050s.ⁱ Each year, we are experiencing an escalation of extreme weather.

This past summer brought record-breaking heatwaves across the globe. July is notably the hottest month of the year, and July 2021 carries the distinction of being history's hottest recorded month.ⁱⁱ The record-breaking heat in the Western U.S. and Canada sparked catastrophic wildfires and had humans battling the growing flames which then left land desolate. Due to the ongoing climate crisis, we can expect continuing extreme heatwaves of increasing magnitude that will impact essential workers due to high heat exposure.

Core Body Temperature

The human brain will maintain a core body temperature (CBT) within 1 or 2 degrees of 98.6F (37C). Body temperature control is vital, because many of the body's essential processes require a temperature within a particular range.ⁱⁱⁱ When faced with rising temperatures, the body utilizes two critical functions to cool down. The person will begin to sweat, and the evaporation of that sweat will cause the body to start the cool down process. Also, the body will send blood to the extremities to allow heat to escape.

If the body fails to cool itself, CBT will continue to rise. An increasing CBT puts you at risk for heat cramps, heat exhaustion and heatstroke. While all three conditions can be detrimental and lead to heat illness, they can also lead to heatstroke, which can be life-threatening. Another symptom

of rising CBT is diminished work capacity, as the worker begins to feel discomfort and fatigue. Errors will start to occur, due to reduced power in judgment and perception, and the body can exhaust and collapse.^{iv}

Fortunately, tech companies are developing tools using technology to prevent such heat-related occurrences, improving worker health and productivity.



Tools using technology to prevent heat-related occurrences can help to improve worker health and productivity. (photo courtesy Kenzen)

Smart PPE: Wearable Technology

Some companies, such as Kenzen, provide smart PPE by using proprietary algorithms and wearable technology to bring actionable insights to the worker, supervisor and corporate EHS decision-makers. A wearable device worn on a worker's upper arm contains sensors that monitor the individual's physiological responses to heat in real-time. Kenzen incorporates additional information, such as the individual's height, weight, age, pre-existing conditions, history of heat injury or illness, and environmental factors (humidity and temperature) to track heat risks for the worker. This information is used to calculate an individual's heat susceptibility.

Heat susceptibility is how sensitive an individual is to heat and therefore more at risk for a heat-related injury or illness. Workers can be classified into low, moderate or high heat-risk. Heat susceptibility allows managers and safety personnel to identify who to watch closely on scorching hot days and better adjust workloads for those at varying risk levels.

Hydrate, Hydrate, Hydrate

Drinking enough fluids helps to combat potential heat-related illness on hot, humid days by replenishing the body's fluids lost through sweating and lowering CBT. Some modern monitors have a sweat rate monitoring feature that calculates and predicts the amount of sweat loss an individual will have on a given day. Through an analytics dashboard, management can see how much water their teams will need each day and how much water each person needs to drink per hour based on their sweat rate. This sweat rate feature provides critical data. It enables management to bring an adequate amount of water to worksites and empowers them to structure worker breaks and encourage proper hydration—with data to back their decisions.

Heat-monitoring technology comes at a valuable time, as the Biden administration is calling on OSHA to protect workers against heat-related injury and illness. On September 20, OSHA announced the implementation of an enforcement initiative addressing heat-related hazards, the development of a heat inspections program and an impending workplace heat standard.^v

Climate change makes it difficult to predict what the future holds for our environment. One thing that we can expect is extreme weather to continue, which brings extreme heat. Now that enforceable safety regulations are on the way for heat-related work hazards, technology will play a greater role in managing to the standards and, ultimately, keeping employees safe and productive as conditions change around them. ■

About the Author

Elizabeth Foster is a Product Manager for *Kenzen*, the smart PPE innovator focused on physiological monitoring and the prevention of heat injury and death among workers. Foster has experience in wearable technology, delivering software, SaaS, IoT and IaaS, including Kenzen's real-time heat monitoring system, used by companies to keep workers safe from heat-related injuries on the job—while maintaining productivity.



One thing that we can expect from climate change is that extreme weather will continue, bringing more extreme heat. (photo courtesy Kenzen)

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OSHA's National Emphasis Program— Outdoor & Indoor Heat-Related Hazards

History/Background

On a warm, summer day in July, a 42-year-old man was on his way to work for his new job as a roofer. When he arrived, there was plenty of water, ice and drinks available at the site for him to hydrate throughout the day. It was only his third day on the job, and he got straight to work. The high temperature was about 86°F and a relative humidity of 57%, for a heat index of 90°F. Later that afternoon, the man told his colleagues he wasn't feeling well. He climbed down from the roof and sat out of the sun. When his co-workers checked on him a few minutes later, he had developed symptoms of heat stroke. He was taken to nearby hospital where he died shortly after. (See OSHA's case studies link, below.)

Cases like the one above demonstrate why the new Outdoor and Indoor Heat-Related Hazards standard and the National Emphasis Program (NEP) are so important to keeping workers safe. The NEP protects employees from heat-related hazards and the resulting injuries and illnesses in outdoor and indoor workplaces. The standard expands on the agency's ongoing heat-related illness prevention initiative and campaign by setting forth targeted enforcement components and reiterating its compliance assistance and outreach efforts. This tactic is intended to urge early interventions by employers to prevent illnesses and deaths among workers during high heat conditions, such as working outdoors in a local area experiencing a heat wave. Early prevention measures include implementing water, rest, shade, training and acclimatization procedures for new/returning employees.

Why the Standard Matters

Millions of American workers are subjected to heat in their work environment and, even though illness from heat exposure is preventable, every year thousands become sick from occupational heat exposure. And, as noted in the above case study, some exposures can be fatal. According to OSHA, "Most outdoor fatalities, 50-70%, occur in the first few days of working in warm or hot environments, because the body

needs to build a tolerance to the heat gradually over time." This process is called [heat acclimatization](#), and the lack of acclimatization represents a major risk factor for fatal outcomes.

Occupational risk factors for heat illness include heavy physical activity; warm or hot environmental conditions; lack of acclimatization; and wearing clothing that holds in body heat.

Hazardous heat exposure can occur indoors or outdoors—and during any season, if the conditions are right—not only during heat waves.

Some outdoor industries where workers have suffered heat-related illnesses include:

- Agriculture
- Construction—road, roofing and other outdoor work
- Landscaping
- Mail and package delivery
- Oil and gas well operation

And, some indoor industries where workers have suffered heat-related illnesses include:

- Bakeries, kitchens and laundries (businesses with heat-generating appliances)
- Electrical utilities (boiler rooms)
- Fire service
- Iron/steel mills and foundries
- Manufacturing with hot local heat sources, like furnaces (i.e., paper products and concrete)
- Warehousing

Key Compliance Requirements:

All industries that could potentially deal with heat-related illnesses and conditions should note the following:

- Compliance safety and health officers (CSHOs), who are investigating for other purposes, shall open or refer a heat-related inspection for any hazardous heat



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conditions observed, or where an employee brings a heat-related hazard(s) to the attention of the CSHO (such as, employees or temporary workers being exposed to high-temperature conditions without adequate training, acclimatization, or access to water, rest and shade).

- When the weather is hot or a heat alert is issued for an area where the WHD, (Wage and Hour Division) is investigating, the WHD is encouraged to coordinate with OSHA by providing information on heat-related hazards.
- CSHOs should inquire during inspections regarding the existence of any heat-related hazard prevention programs on heat priority days. A heat priority day follows when the heat index for the day is anticipated to be 80°F or more.
- Programmed inspections could occur on any day that the NWS (National Weather Service) has announced a heat warning or advisory for the local area. ■

Resources:

- ➔ For more information about how to properly access high temperatures in correlation with safe working practices, visit: <https://www.osha.gov/heat-exposure/hazards>
- ➔ For Employers Adminstrating Heat Illness Prevention Training, read: https://www.osha.gov/sites/default/files/osha_heattraining_guide_0411.pdf
- ➔ For Specifics on planning and supervision, visit: <https://www.osha.gov/heat-exposure/planning>
- ➔ To read up on more case studies, visit: <https://www.osha.gov/heat-exposure/case-studies>
- ➔ For general heat exposure guidelines, visit: <https://www.osha.gov/heat-exposure>

By: Doug Niemtschk, CIH, CSP, Contributor

Keeping Lone Workers Safe

People working in field operations who work alone face different risks than those who work with a team. Safety professionals and industrial hygienists in any industry would not debate this fact. The question comes when someone asks, “What’s the risk of me working alone, and what do I do about it?” The first thing to do is help these workers recognize what those risks are and to implement control measures that will mitigate those risks.

Effectively addressing the lone worker risk is important for any business—whether it’s petroleum, chemical, utility,

trucking, shipyard, agriculture or other industries. The challenge lies in how you address the risk, based on your organization’s unique needs.

More people work alone than you think. [Berg Insight](#) reports there are 53 million lone workers in the U.S., Canada and Europe combined, which is about 15% of the overall workforce. The International Data Corporation (IDC) estimates that approximately 1.3 billion people worldwide are mobile workers, many of whom work alone continuously or at various times during their workday.

Lone Worker Programs

The goal of any lone worker program is to prevent workers from going undetected if they become incapacitated or trapped in the field and are unable to summon help. Meeting this goal requires that businesses develop a systematic approach that accomplishes several objectives:

1. Identify when workers will be in the field alone.
2. Establish an alert system should a lone worker become incapacitated.
3. Develop the means to summon emergency first responders capable of providing rapid response to any medical emergency.

For most of my 25 plus-year career, I have worked in chemical industries, such as refining, fertilizer production, crude storage facilities, etc. Since 2017, I have worked for a midstream petroleum company with pipeline and terminal operations primarily in the western half of the U.S. I have seen the advent of the development and implementation of a systematic approach to addressing lone worker safety. My company uses technology for solving the problem and has an excellent system that addresses the risk. Workers are at risk from potential exposure to hazardous gases, such as hydrogen sulfide and hydrocarbons. Therefore, monitoring technology is critical.

At my company, all lone workers are required to carry a monitor that tracks their location using a real-time GPS, as well as the hazardous gases to which they could be potentially exposed. If a worker becomes incapacitated, an alert is sent to a control center staffed 24/7 by people who can help summon emergency responders, if needed. The system can also notify the worker’s supervisor, who can assist in the response.



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People working in field operations who work alone face different risks than those who work with a team. It's essential to recognize what those risks are and to implement control measures to mitigate those risks.

Other Methods: Keep Connected

There are also other methods an employer can use for addressing the lone worker risk, even if it is simply having a cell phone and a supervisor making sure the employee is OK by checking up on them periodically. However, any system that relies on electronic communication devices (e.g., cell phones) must recognize and address the challenge of connectivity.

Many industrial worksites are in remote locations where connectivity of the electronic device(s) the worker depends on can be an issue. It's essential to know that the safety devices workers are relying upon can work anywhere.

Key to ensuring devices have the connectivity necessary in extremely remote locations is to ensure the devices have not only cellular but satellite connectivity, as well. When using satellite connectivity, the "bridge" should be portable to extend coverage in isolated areas. Consult an expert when designing or implementing these types of systems.

Recognize that all systems, whether they take advantage of technology or not, require people who are diligent in managing the lone worker risk.



Do take advantage of today's technology, but recognize that there are many safety solutions for lone workers. This is key to developing a program that meets an organization's needs.

Simple solutions, such as requiring employees to carry a cell phone while working in a remote work site would be the first step. Second, a protocol that requires workers to check in with their supervisor before they travel to a site and after they finish their task would be prudent. The supervisors, of course, would need to be trained on how to respond to a medical emergency, with the first action being calling 911 and giving the worker's exact location.

In closing, recognize that there are many resources that companies can use to help develop their own lone worker program. For example, the U.S. OSHA Standard on Working Alone addresses this issue (29 CFR 1915.84); it lists the requirements of a good lone worker program. Although the standard only applies to shipyard employers, others can benefit from using it to establish their own programs.

The final question I'll leave with readers of this article is: "How do you determine the right lone worker safety device for your work force?" The answer, in my opinion, is to

consult a qualified industrial hygienist or safety professional first. They will help you develop a program or evaluate an existing one based upon your organization's unique needs.

Ideally, you should take advantage of today's technology that manages risk, but at the same time recognize that there are a multitude of safety solutions for lone workers. Choose the one you believe will be most effective in preventing poor outcomes in the case of emergencies.

As any good industrial hygienist or safety professional knows it's imperative for employers to anticipate your lone worker risks. Control the unique hazards your workers face. It could mean the difference between a rapid response to an emergency and one that is delayed—which puts the worker at an increased risk. ■

[Doug Niemtschk, CIH, CSP, is a Health and Safety Manager, EHS, with Holly Energy Partners.]

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