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Advances in Hearing Protection & Mitigating Noise-Induced Hearing Loss

Occupational hearing loss is preventable with the right controls and proper hearing protection. Despite this, hearing loss is often overlooked in industrial environments, where more obvious hazards like preventing slips, trips and falls are typically the priority. Yet, exposure to noise levels high enough to cause irreversible hearing loss costs employers significantly, with U.S. Workers' Compensation for occupational hearing loss exceeding $242 million annually. Beyond the financial losses, hearing loss can lead to social isolation, dementia, mental health issues and even premature death.

HISTORY OF HEARING PROTECTION

Throughout history, the dangers of noise-induced hearing loss (NIHL) have been well-documented. In the Greek tale of *The Odyssey*, Odysseus's crew is warned about the Sirens' bewitching songs, which lure sailors to steer their boats ashore and perish. To avoid this fate, the crew fashions earplugs from beeswax. Originally, earplugs were made from pliable materials like clay, cotton, beeswax and wool, which could be easily inserted and removed. By 1884, canal caps with adjustable headbands were developed to cover the ears of sailors and soldiers, protecting their hearing from gunfire noise.

Occupational hearing loss is preventable with the right controls and proper hearing protection. *(photo courtesy Sensear)*

By the early 1960s, moldable silicone earplugs replaced moldable clay ones. In 1972, the National Research Corporation refined earplugs into today's memory foam versions, made from polyvinyl chloride or polyurethane.

Considering this slow evolution of hearing protection and a deeper understanding of noise-induced hearing loss (NIHL) from the 16th century to the end of the 20th century, it is obvious hearing protection and enhanced communication in high-noise environments has not necessarily kept pace with other health and safety protocols.

More recently, smart digital headset technology has started to emerge in the industrial markets, with technological enhancements that offer robust hearing protection while enhancing the users' awareness of environmental sounds in various settings. Leading smart industrial headset manufacturers are continually refining innovations associated to speech enhancement, noise attenuation, signal processing, hearing protection, directional microphone arrays and proprietary face-to-face communication. Be sure to look for these solution features when sourcing high-end industrial noise-suppression and enhanced-communication headsets and in-ear technology.

NOISE SUPPRESSION VS. CANCELLATION

It is critical to understand the difference between noise suppression and noise cancellation.

If you are considering an investment in traditional passive hearing protection, such as foam ear plugs (frequently referred to as foamies) or passive noise-cancelling headsets, think again about the goals you are trying to accomplish. A recent study at Johns Hopkins School of Medicine found that hearing loss exponentially increases the odds of falling, with a 140% increase for every 10dB of hearing loss. It follows, if a typical set of foam ear plug has a Noise Reduction Rating (NRR) of between 20–30 NRR, you are increasing your risk of trips and falls by 280% or more. While traditional noise-canceling headphones block background noise, they also tend to isolate workers from important

auditory cues, like alarms or the awareness of other equipment or personnel approaching.

Additionally, there are hygienic risks associated with foam ear plugs to consider, as they require manual rolling and inserting the foam earplugs into the ear for a proper fit—which frequently introduces dirt, dust and chemical contaminants into the ear canal, compromising one's hygiene and safety.

With smart digital industrial headsets and in-ear technology, the emphasis is on noise suppression and speech enhancement. In short, it means suppressing the background noise introduced to the headset cup or earbud to 82dB(A), below the OSHA safety standard of 85dB(A), and at the same time enhancing the broadcast speech to make it audible over the background noise. This selective amplification allows individuals to comprehensively maintain situational awareness of their surroundings; improve safety; and more effectively communicate. In noisy environments, this capability ensures clearer understanding, better engagement, higher productivity—and enhances safety protocols.

EXTREME NOISE DUAL-PROTECTION HEADSETS

Prioritizing hearing protection in extremely high-noise environments is paramount, given the heightened risk of NIHL with prolonged exposure to noise levels above 110dB(A) in the workplace. Industries such as heavy construction, mining, manufacturing, steel, paper and pulp, metal fabrication, bottling, crushing, sawing, milling, grain processing and even data centers are all challenging environments for promoting better communication and hearing protection when noise levels approach or frequently exceed 110+dB(A).

Despite not being mandated by OSHA, specific industry operations, like the Mine Safety Health Administration (MSHA), require DHP when noise exposure surpasses 105 dB(A)—emphasizing its importance for worker safety.

Frequently, in extremely high-noise environments, users will resort to using foam ear plugs in conjunction with headsets for double hearing protection (DHP). Although this will help suppress the noise, as outlined previously, the foam inserts are also going to compromise both the workers' balance, safety and situational awareness.

Fortunately, today there is a new headset solution available for these extreme noise environments. Extreme noise or dual-protection headsets provide an innovative alternative by integrating connected earplugs into the earmuffs. This dual-protection solution provides users with unparalleled hearing protection and technology for situational awareness, offering the user comprehensive protection with a noise reduction rating (NNR) of 36dB(A).

INTRINSICALLY SAFE HEADSETS

In simple terms, "intrinsically safe" means your headsets are safe from igniting when working in an explosive environment. It is important to validate and certify that your intrinsically safe or "hazardous location" headsets will limit the amount of electrical energy released and not emit a spark that could ignite the hazardous environment.

Intrinsically safe headsets are required for hazardous locations such as mining, oil and gas, and food processing. These combustible or explosive environments require RF, two-way radio and headset technology that complies with rigorous standards instituted by global agencies, such as ATEX (European standards), UL (North American standards), CSA (Canadian standards) and IECEx (Global standards). Search for headset manufacturers who maintain certifications with all these governing agencies.

Considering the innovations smart, high-end noise industrial headsets have made since the turn of the century, the industry is making great strides to mitigate noise-induced hearing loss. *© Tomasz Zajda - stock.adobe.com*

HEARING PROTECTION INNOVATION

When you consider the innovations that smart, high-end noise industrial headsets have made since the turn of the century, the industry is making great strides to mitigate noise-induced hearing loss.

Smart industrial headsets are experiencing significant innovations including:

- Enhanced noise suppression
- Clearer audio
- 360° situational awareness
- Face-to-face communication
- Bluetooth capable
- Optional communication modes
- Noise reduction ratings

Occupational hearing loss is preventable with the right controls and proper hearing protection. *© Elizaveta - stock.adobe.com*

- Intrinsically safety certifications
- Dual hearing protection
- Rugged & durable products
- Compatibility with PTT & PoC devices
- Various form factors
- Volume limiters
- Enhanced battery life

HEARING LOSS IS PREVENTABLE

The journey to mitigate NIHL continues to be a concern for many organizations across the world. Concerns still abound for occupational health and safety professionals and employees to recognize the risks of high-noise environments and be proactive in wearing and complying with the technology provided to them or, when necessary, requesting better technologies.

When exploring your options for smart digital hearing protection headsets, look for companies who are partnering with renowned organizations worldwide to combat industrial NIHL and optimize critical operational communications.

Carefully consider your options when it comes to protecting the health and safety of your workers. Look for providers with an extensive portfolio of innovative, over-the-ear hearing protection solutions.

While hearing loss is irreversible, it is preventable with proper protection. By consulting with a reputable hearing protection manufacturer, companies can reduce the risks of noise-induced hearing loss and maintain communication and situational awareness for their workers. **IHW**

About the Author:

Amanda Miller, Chief Executive Officer of Sensear, is an enthusiastic leader who brings a wealth of experience from outside the industry to Sensear. She has proven success as a strategic business development professional, with a track record of success in global sales. Her ability to drive high-growth impact makes her an ideal leader for Sensear.