

HEARING CONSERVATION **AND SAFETY**

COURSE OUTLINE

- **We live in a noisy world... sometimes too noisy.**
- **The Bureau of Labor Statistics estimates that tens of thousands of employees suffer permanent hearing loss from being exposed to excessive noise on the job.**
 - To help combat the problem, the Occupational Safety and Health Administration (OSHA) created the Occupational Noise Exposure Standard to protect workers from noise hazards.
- **To understand how you can protect your hearing from hazardous noise, it helps to know a few things about how sound works.**
 - "Sound" is transmitted from its source to your ear by pressure waves moving through the air.
- **How fast a sound's waves vibrate is called its "frequency".**
 - Low-frequency waves vibrate slowly, making "low-pitched" sounds.
 - High-frequency waves vibrate quickly, making "high-pitched" sounds.
- **Frequency is measured in "cycles per second," or "hertz".**
 - High-pitched, high-frequency sounds can be especially damaging to our hearing.
- **The "loudness" of a sound is called its "volume".**
 - The volume of a sound is measured in units known as "decibels" or "dB".
- **A sound's loudness can vary significantly, depending on the environment you're in.**
 - The background noise in a typical home measures about 55 decibels.
 - Music at a rock concert can reach 105 to 115 decibels.
 - The jets on an airliner register about 140 decibels.

- **How long a noise lasts is called its "duration". This is used to define three types of sound:**
 - Continuous.
 - Intermittent.
 - Impulsive.
- **Noise that goes on steadily with little or no change over time is called "continuous" noise.**
- **When loud sounds occur for significant lengths of time, but are separated by relatively quiet pauses, the condition is called "intermittent" noise.**
- **Noise that lasts for less than a second, but is very loud, such as when a punch press or stamping machine cycles, is called "impulsive" noise.**
- **All these types of sound can be hazardous, but noise that is loud and continuous is especially hazardous to your hearing.**
- **Our ears are designed to gather in the sounds around us and transmit them to our brains.**
- **The process of picking up and transmitting sound waves occurs in the outer, middle and inner ear.**
 - The outer ear collects sound waves and funnels them down the ear canal toward a tight membrane called the "ear drum".
- **Sound waves that strike the ear drum cause it to vibrate so that it transmits them to three small bones that are in the middle ear.**
 - These bones amplify the sound and carry it to a structure in the inner ear called the "cochlea".
- **The cochlea is filled with fluid, and contains thousands of hairs that are attached to nerve cells.**
 - When vibrations stir the hairs, the nerve cells send electrical signals to the brain, which interprets them as "sound".
 - This system can be fragile.
 - An overdose of noise can easily damage the hairs and nerve cells within the cochlea.

- **To visualize how this happens, imagine a field of wheat.**
 - Light breezes blow through the stalks without doing any harm, but high winds can bend the stalks so far that they break.
 - When this happens, the shafts don't bounce back, they're permanently broken.
- **Hazardous noise can do the same thing to the hairs of the cochlea, and the result is permanent hearing loss.**
 - So it's very important to recognize noise hazards and understand how to protect yourself from them, before they cause you any harm.
- **You'd expect to find potentially harmful noise levels in workplaces such as factories, airports and construction sites.**
 - But they also exist in restaurants, department stores, call centers and offices.
- **To safeguard all workers from these hazards, OSHA has established two important benchmarks.**
 - First, if the noise in a workplace reaches an average of 85 decibels over an 8-hour period, an employer must implement a "hearing conservation program".
 - Second, the program must ensure that employees are not exposed to average noise levels greater than 90 decibels over the course of a shift.
- **The employer is also required to provide employees with:**
 - Appropriate hearing protection.
 - Hearing safety training.
 - Free medical tests to monitor their hearing.
- **To keep noise levels at or below the 90 dB limit, companies use a "system of controls".**
- **Some of these are physical safety measures such as:**
 - Installing quieter equipment.
 - Isolating sources of noise from surrounding work areas.
 - Putting up sound-absorbing barriers.
- **Administratively, work shifts can be adjusted to limit the amount of time employees spend in high-noise areas.**

- **When measures like these cannot reduce workplace noise to a safe level, workers will need to wear hearing protection.**
- **Several types of hearing protection are available.**
 - Each has its own advantages, disadvantages and requirements for proper use and care.
 - They are all marked with a "Noise Reduction Rating" (NRR) that indicates how much noise reduction they can provide.
- **To determine how much noise reduction is required in a workspace, subtract OSHA's 90-decibel safety limit figure from the area's measured noise level.**
 - For example, for a workplace that averages 105 decibels of noise over an 8 hour period, subtracting 90 dB leaves 15 decibels.
- **But to really be safe, OSHA recommends that you double the difference for an extra margin of safety.**
 - So the hearing protection in our example would have to provide not just 15 dB but at least 30 decibels of noise reduction.
- **If you work in a high-noise area, make sure you know how much noise reduction you need and how much your protective equipment can provide.**
- **As we've said, employers must supply employees with hearing protection that will reduce their noise exposure to safe levels.**
 - But you need to remember that this equipment will only protect you when you're wearing it.
- **If hearing protection is uncomfortable or gets in your way, you might be tempted to take it off.**
 - You should never remove your protection in a noise-hazard area.
 - Hearing protection has to fit right and it can't interfere with the work that you do.
- **Several types of ear protection are available, including:**
 - Ear muffs.
 - Ear plugs.
 - Canal caps.
- **"Ear muffs" generally consist of two cushioned "cups" filled with sound-dampening material, mounted on a "headband".**

- **"Cap mounted" ear muffs attach to safety helmets.**
 - They're used in places where conditions are such that both the head and the ears need to be protected.
- **For best protection, the cups must make a secure seal against your head**
 - Glasses, facial hair or other PPE such as a respirator can sometimes interfere with a good fit.
- **Muffs are popular because:**
 - They're easy to use and can be worn with ear plugs if additional protection is needed.
 - They aren't easy to lose or misplace.
 - They don't tend to irritate the ear or cause infections.
- **But ear muffs are heavier than other types of hearing protection.**
 - They can also be bulky, especially in confined spaces.
 - They may become uncomfortable in hot working conditions.
- **As with all PPE, you should inspect ear muffs for wear and tear every time you get ready to use them.**
 - If you find problems, don't put them on.
- **Remember, ear muffs can't take care of you if you don't take care of them.**
 - Dirt and skin oil can cause cup cushions to harden and crack.
 - Keep them clean by washing with a mild detergent and scrubbing with a soft brush.
 - Be sure to follow the maintenance directions of the equipment's manufacturer.
- **While ear muffs cover the outside of the ear to prevent hazardous noise from getting inside, "ear plugs" and "canal caps" block sound from inside the ear canal itself.**
- **Ear plugs are an especially convenient type of ear protection.**
 - They're small and lightweight.
 - They are more comfortable to wear in hot working conditions than ear muffs.
 - They don't interfere with other protective equipment such as respirators.
 - They are inexpensive (especially the disposable type).

- **But ear plugs also have disadvantages:**
 - They can easily be lost.
 - They provide less protection against high noise levels than ear muffs.
 - Putting them in and getting them out can sometimes be difficult.
 - Some people find that they irritate their ear canals.
- **To prevent ear infections, wash your hands before handling ear plugs.**
- **Inspect ear plugs before you put them in.**
 - If you find torn flanges or other signs of wear, don't use them.
 - Damaged plugs can't give you the protection you need.
- **Reusable plugs should be cleaned regularly, to prevent infection and ensure a proper fit.**
 - Wash them in a mild detergent, scrubbing gently with a toothbrush.
 - After rinsing, let the plugs "air dry" and put them back in their container.
- **"Canal caps" are essentially ear plugs attached to a headband.**
 - Like individual ear plugs, their "plugs" (known as "pods") keep hazardous noise out by "capping" the entrance to the ear canal.
- **The rigid band that they are mounted on makes them easier than individual plugs to put on and take off.**
 - This makes them more convenient to use when the noise you are exposed to is intermittent.
 - But keep in mind that canal caps provide less noise reduction than either ear muffs or individual ear plugs.
- **Another important element in an employer's hearing conservation program is conducting regular hearing tests for employees who work in high noise areas.**
 - These tests are conducted by healthcare professionals and provided to employees at no cost.
- **The tests determine how loud sounds have to be for a person to hear them at various frequencies.**
 - The results are plotted on an "audiogram", providing a visual representation of the employee's hearing.

- **The first test establishes a baseline of how well an employee can hear, before they start work in a high noise environment.**
 - As further tests are conducted, usually on a yearly basis, those results will be compared to the baseline, to determine if any changes have occurred in the employee's hearing.
- **If the testing shows a 10 dB reduction in an employee's ability to hear sounds at frequencies of 2000, 3000 or 4000 hertz, the employer is required to notify the employee.**
 - This type of change is called a "Standard Threshold Shift", or STS.
 - If one is detected, further testing may be necessary.
- **If the hearing loss is determined to be permanent and related to exposure to workplace noise, the employer will take whatever steps are necessary to prevent the employee's condition from getting worse.**
- **Having these hearing tests regularly can help to catch hearing problems early... so they can be dealt with more effectively.**
 - So make sure you don't "skip" yours if you're scheduled for one.

*** * * SUMMARY * * ***

- **When noise in a work area reaches an average of 85 decibels over an 8-hour period, employers are required to implement a hearing conservation program.**
- **The program's goal is to prevent employee hearing loss by reducing noise exposure to safe levels.**
- **Employees who work in high noise areas will be provided with appropriate hearing protection, safety training and free hearing tests.**
- **Hearing protection must:**
 - Provide sufficient noise reduction for the conditions.
 - Fit correctly.
 - Not interfere with the work that employees are doing.
- **Now that you understand the procedures and equipment that can protect your hearing from hazardous noise on the job, you can help ensure that you and your coworkers go home with your hearing intact at the end of every workday!**