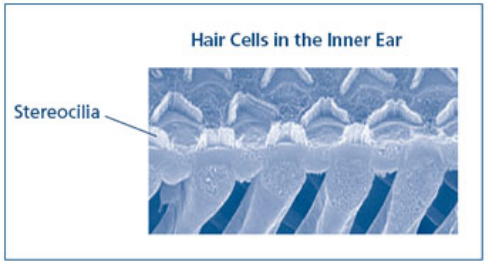
UNIVERSITY OF GEORGIA
Facilities Management Division

# *HEARING CONSERVATION*

***FACILITIES MANAGEMENT DIVISION***
*1180 East Broad Street*
*Athens, Georgia 30602*




# How We Hear

*Hearing depends on a series of events that change sound waves in the air into electrical signals that the auditory nerve carries to the brain.*

*•Sound waves enter the outer ear and travel through a narrow passageway called the ear canal, which leads to the eardrum.*

*•The eardrum vibrates from the incoming sound waves and sends these vibrations to three tiny bones in the middle ear. These bones are called the malleus, incus, and stapes.*

*•The bones in the middle ear amplify, or increase, the sound and send the vibrations to the snail-shaped cochlea, or inner ear. The cochlea is a fluid-filled organ with an elastic membrane that runs down its length and divides the cochlea into an upper and lower part. This membrane is called the "basilar" membrane because it serves as the base, or ground floor, on which key hearing structures sit.*

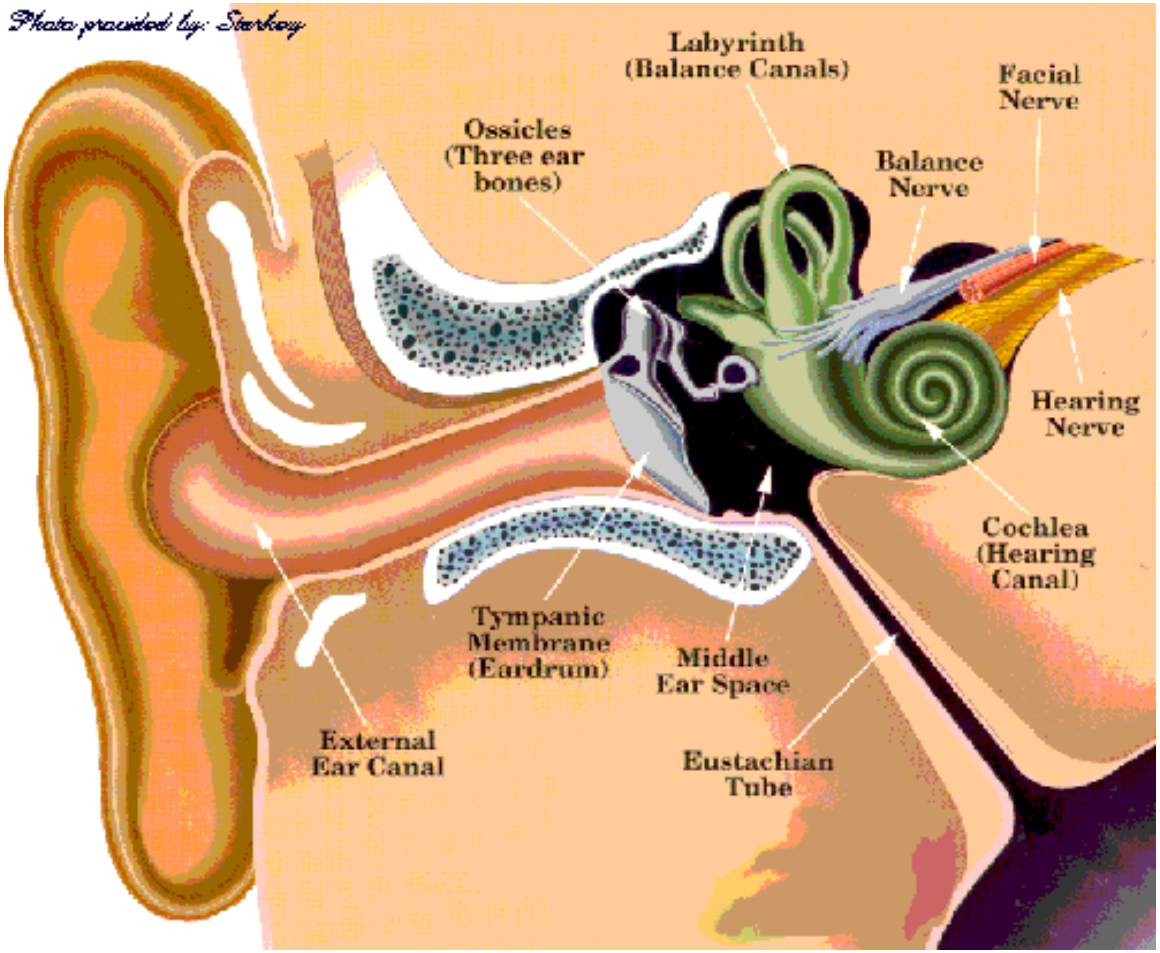
*•The vibrations cause the fluid inside the cochlea to ripple, and a traveling wave forms along the basilar membrane. Hair cells—sensory cells sitting on top of the membrane—"ride the wave." This motion causes bristly structures on top of the hair cells to bump up against an overlying membrane and deflect to one side.*

*•As the bristles, or stereocilia, move, pore-like channels on their surface open up. This allows certain chemicals to rush in that generate an electrical signal.*

*•The auditory nerve carries the signal to the brain, which translates it into a "sound" that we recognize and understand.*

*•Hair cells near the base of the cochlea detect higher-pitched sounds, such as a cell phone ringing. Those nearer the apex, or centermost point, detect lower-pitched sounds, such as a large dog barking.*

# Ear Anatomy




When we are exposed to harmful noise—sounds that are too loud or loud sounds that last a long time—sensitive structures in our inner ear can be damaged, causing noise-induced hearing loss (NIHL). These sensitive structures, called hair cells, are small sensory cells in the inner ear that convert sound energy into electrical signals that travel to the brain. Once damaged, our hair cells cannot grow back. Exposure to harmful noise triggers the formation of molecules inside the ear that can damage or kill hair cells.


# *Noise Hazards*

- Can be acute, or short burst of noise (nail gun, hand tools) over several hours of work

- Constant (chronic) exposure during typical work (heavy equipment operation, hand tools, high ambient levels)

# ***Symptoms of Hearing Loss***

- You often have to ask people to repeat themselves
- You have trouble hearing normal conversation
- You feel like people are mumbling
- Constant ringing or buzzing in the ears
- Others complain your TV or music is too loud

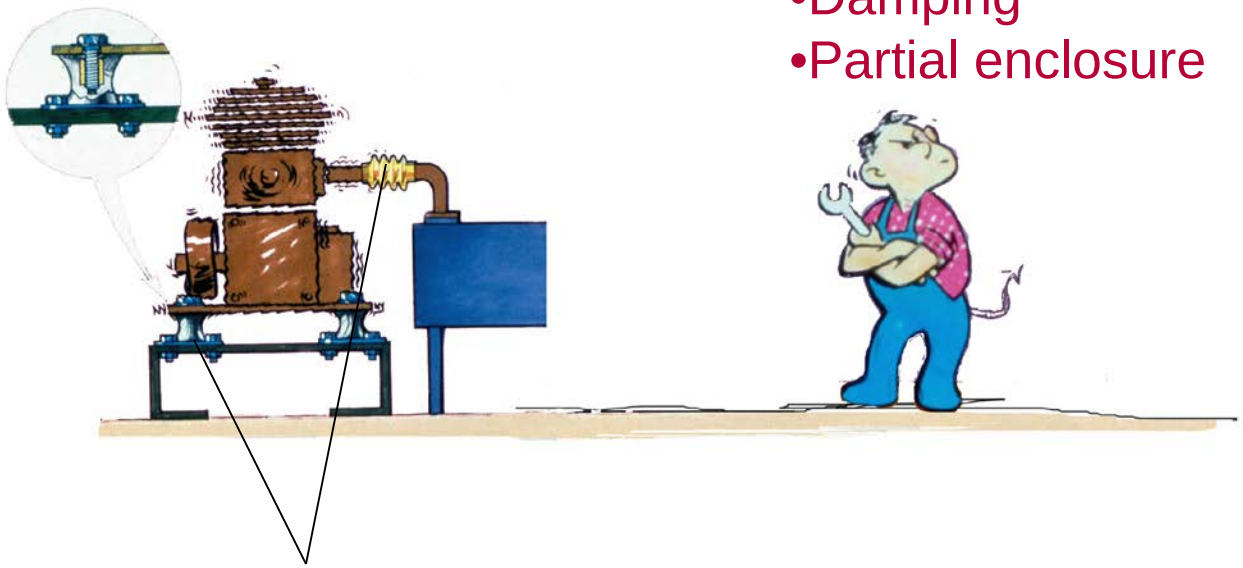
# FMD's Hearing Conservation Program

1. Evaluation of Exposures - at Shop level
2. Noise Control with Engineering Upgrades
3. Education and Training of Personnel
4. **Posting of Hazard**
5. Hearing Protection for Employees
6. Hearing Tests if Hearing Protection Should Be Worn for Work
7. Annual Program Review

# Engineering Control

Methods

- Reduce impact and vibration
- Transmission and belt noise
- Silencing
- Damping
- Partial enclosure



Anti-vibration mounts

# Best Machine for the Job?

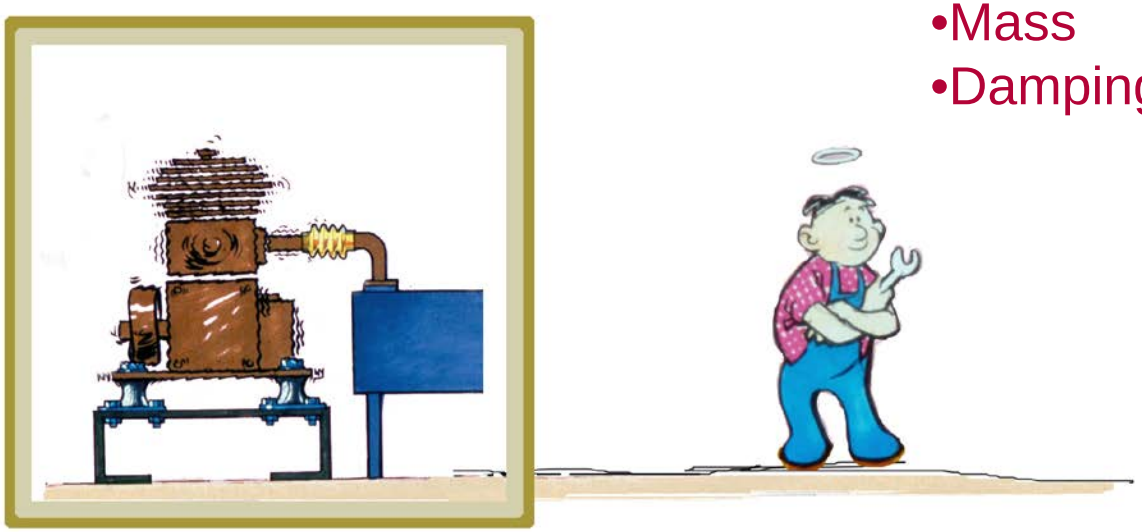
Purchasing policy

- Quieter process
- Buy low noise machines

Maintenance

- Worn
- Loose
- Lubricate

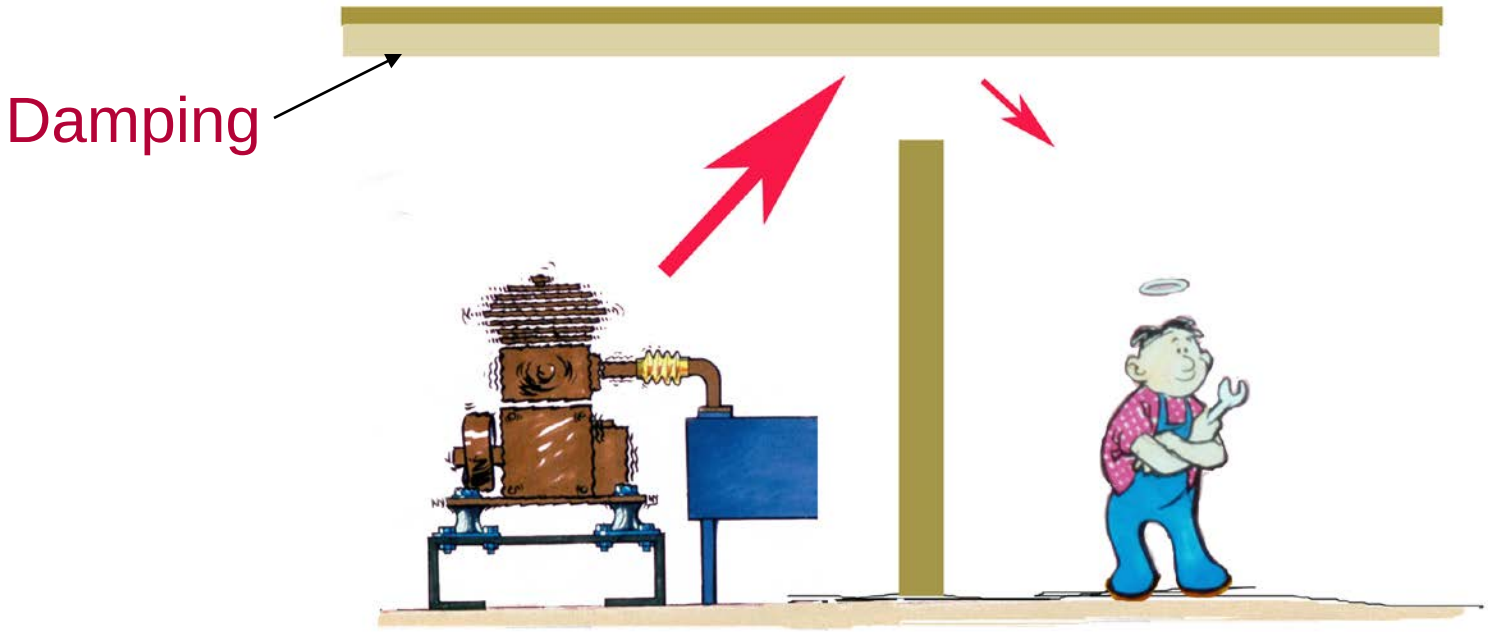
# Noise Enclosure



Enclosure

- Mass
- Damping/absorption

# Noise Barrier



# *Personal Protective Equipment*

***PPE is designed to minimize injury, not prevent all injuries.***

***Minimizing your job hazards will reduce your injury risk. Wearing appropriate PPE can reduce the severity of injury.***

# Hearing Protectors

## Must be *worn* if:

| Duration (hours per day) | Sound Level (dBA) |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1.5 | 102 |
| 1 | 105 |
| 0.5 | 110 |
| 0.25 or less | 115 |

# *Types of Hearing Protection Products*


Disposable Ear Plugs

Reusable Ear Plugs

Corded & Uncorded Ear Plugs

- **Ear Plugs** are made from a variety of materials, and are positioned in the ear canal. Can be reusable or disposable and are available corded or uncorded.
- **Ear Muffs** cover and seal the entire ear. Sometimes worn in conjunction with plugs in high noise areas.
- **Banded Hearing Protectors** have flexible headbands for a comfortable seal. Offers several degrees of insertion for different levels of protection.

# Hearing Safety

- In general, if you have to shout to talk to someone within 2 or 3 feet - Wear hearing protection
- Off-the-job activities (woodworking, shooting, etc.) can hurt your hearing - Hearing protection is recommended
- Never remove hearing protection in high noise areas

# *Daily Job Hazard Analysis*

- *Know the potential job hazards prior to work being conducted -* Mowers, blowers, mechanical rooms, saws, power tools and heavy equipment are all known to exceed minimum noise requirements, so use protection!!
- Use ear plug and/or ear muffs

# Hearing Protection

**As a general rule – if you have to raise your voice to speak to someone within 3 feet of you, hearing protection is required.**

*Work areas should be monitored for noise levels - Ear plugs and/or ear muffs should be used to lower your noise exposure to less than 85 dBA for an 8 hour work day. NRR (noise reduction ratings) are used to determine the level of protection needed.*

# *NRR*

*NRR – The Noise Reduction Rating is listed in the product description and on the package*

The measure, in decibels, of how well a hearing protector reduces noise, as specified by the Environmental Protection Agency. The higher the number, the greater the noise reduction. When dual protectors are used, the combined NRR provides approximately 5 decibels more than the higher rated of the two products.

For example, using ear plugs (NRR of 29 decibels) with ear muffs (NRR 27) would provide a Noise Reduction Rating of 34 decibels (29+5=34).

*So, if you have a work area with has a noise rating of 120 dBA and you wear the ear muff/plug combination, your work exposure would decrease with the following formula {dBA – (NRR – 7)} to 79 (120–34-7=79).*

*Ear plugs and/or ear muffs should be used to lower your noise exposure to less than 85 dBA. If your NRR is not sufficient, you would need to choose a product with a higher NRR OR use engineering controls to reduce the ambient noise levels!*

# Need Additional Information?

- UGA FMD's *Facilities Management SOP NO. 6 for Personal Protective Equipment (PPE)*
- UGA - Facilities Safety Office
- ESD Occupational And Industrial Hygiene Office
- www.osha.gov/SLTC/noisehearingconservation/index.html
- http://www.cdc.gov/niosh/topics/noise/

- Frequently Asked Questions –
  *http://www.cdc.gov/niosh/topics/noise/faq/faq.html*

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