PHYSICAL WORK ENVIRONMENT

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LECTURE OUTLINE

- Noise factors and effects
- Noise control

NOISE FACTORS AND EFFECTS

NOISE FACTORS OF PRIMARY CONCERN

- Two noise factors of primary concern in terms of their effects on human workers:
  1. Intensity of the noise
     - Perceived by listener as loudness
  2. Duration of exposure

OTHER NOISE FACTORS OF INTEREST

- Frequency
  - Perceived by listener as pitch
  - Industrial noise is usually broadband - composed of a wide range of frequencies so its importance is diminished
- Noncontinuous noise
  - Intermittent noise - machines with on-off cycle
  - Impact noise - drop forge hammer
  - Impulse noise - gunfire

PHYSIOLOGICAL EFFECTS OF NOISE

- Startle response - due to sudden loud noise
  - Causes spontaneous muscle contractions, blinking eyes, head-jerk movement
- Hearing loss (three categories):
  1. Temporary threshold shift - hearing impairment of short duration
  2. Noise-induced permanent threshold shift - results from long term exposure to noise levels above 90 dB
  3. Acoustic trauma - single exposure to high intensity noise can cause temporary or permanent hearing loss

PERMISSIBLE NOISE LEVELS

- Established by OSHA to avoid hearing loss
- Standards specify permissible duration of exposures for various dB levels

Sound Level	Duration	Sound Level	Duration
80 dBA	32 hr	95 dBA	4 hr
85 dBA	16 hr	100 dBA	2 hr
90 dBA	8 hr	105 dBA	1 hr
92 dBA	6 hr	110 dBA	30 min

NOISE CONTROL

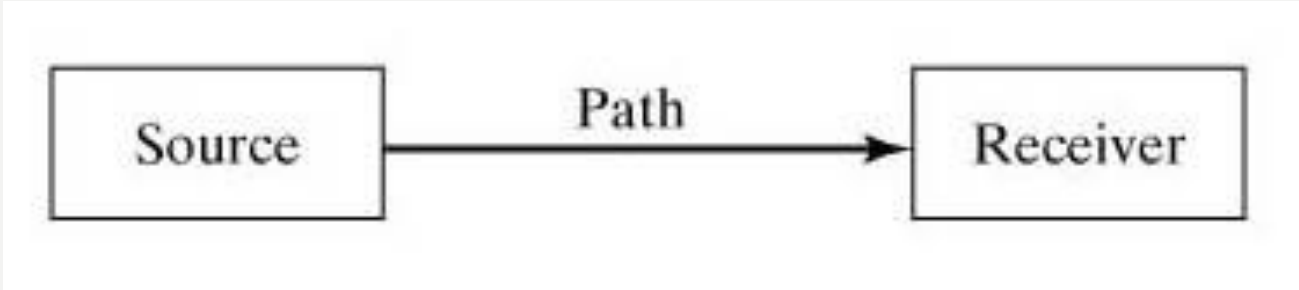
NOISE CONTROL

- Administrative controls
  - Managing the exposure durations for employees working in noisy environments
    - Setting time limits on exposure to noise level
- Engineering controls
  - Noise abatement at three locations:
    - Source - design quieter machinery
    - Receiver - use of ear plugs, helmets
    - Path between source and receiver - enclosures for noisy machines

SOURCE-PATH-RECEIVER MODEL

The source-path-receiver viewpoint in the design of engineering controls for noise abatement

Three regions where noise can be reduced: (1) at the source, (2) at the receiver, and (3) along the path between source and receiver



LECTURE CLOSING

IF YOU WERE……????

- If you were an automobile engineer, which type of exhaustion system would you like to have in your design in order to reduce the noise while having an engine with a very high power……???

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PLEASE READ CLIMATE CONTROL FROM RECOMMENDED REFERENCE BOOKS FOR A BETTER UNDERSTANDING OF NEXT LECTURE