Noise Hazard and Control

- Workplace Noise Level
- Noise Exposure Levels
- Workplace Noise Limits
Presenter

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- Senior Support Engineer
- 7 Years in Test & Measurement (T&M) Industry, of which 5 Yrs in the Sound & Vibration (T&M)
- His main role is mainly supporting customers & distributors throughout the South Asia Pacific on product information and usage on analyzers and transducers.
Noise Hazards

- Anything or activity that has the potential to cause hearing loss and deafness is a Noise Hazard.

- Noise hazard exists if a person is exposed to an equivalent sound pressure level of more than 85dB(A) over an 8-hour period workday.
Noise Hazards

- Occupational & Non-Occupational noise hazards.

- What’s a non-occupational noise hazard?
  - Personal audio system
  - Exotic car with loud engines
  - Gymnasium (fitness fanatics)
  - Concert/Music performances
  - Night Spots (pubs & clubs)
  - Toys eg. Battery operated machine guns, squeeze toys.

- What are occupational noise hazards?
  - Metal forging / stamping [Metal Pipe Cutting (Shielded).MOV]
  - Tiling works [Tile Leveling.MOV]
  - Printing / publishing
  - Air Guns
  - Jack hammering
(Possible) Effects of Noise

- Excessive noise exposure impacts the quality of life, and is a major threat to human well-being.

- Greatest problem being difficulty with speech and communication.

- May suffer physical/emotional problems like
  - Depression
  - Poor attention span
  - Hypertension
  - Stress
  - Insomnia/Sleep deprivation
  - Daytime sleepiness
  - Work performance drop
  - Ability to learn declined
# Noise at Workplaces

<table>
<thead>
<tr>
<th>Activity / Process</th>
<th>Noise level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture of non-metal products</td>
<td>94</td>
</tr>
<tr>
<td>Manufacture of metal cans and containers</td>
<td>94</td>
</tr>
<tr>
<td>Manufacture of structural metal products</td>
<td>93</td>
</tr>
<tr>
<td>Manufacture of machinery</td>
<td>93</td>
</tr>
<tr>
<td>Metal forging and stamping</td>
<td>93</td>
</tr>
<tr>
<td>Manufacture of furniture</td>
<td>93</td>
</tr>
<tr>
<td>Manufacture of textiles</td>
<td>93</td>
</tr>
<tr>
<td>Food manufacture</td>
<td>92</td>
</tr>
<tr>
<td>Basic metal industry</td>
<td>92</td>
</tr>
<tr>
<td>Manufacture of fabricated metal products</td>
<td>92</td>
</tr>
<tr>
<td>Manufacture of chemicals and chemical products</td>
<td>92</td>
</tr>
<tr>
<td>Manufacture of aircraft</td>
<td>92</td>
</tr>
<tr>
<td>Manufacture of paper and paper products</td>
<td>92</td>
</tr>
<tr>
<td>Printing and publishing</td>
<td>89</td>
</tr>
</tbody>
</table>
Noise Induced Hearing Loss (NIHL)

- 72% Manufacturing
- 12% Shipbuilding / Repair
- 4% Construction
- 12% Others

Annual Report 2006, Occupational Safety and Health Division, Ministry of Manpower, Singapore
WHAT CAN WE DO?
There are three main ways to reduce noise in the workplace

1. reduce noise at the source
2. change to quieter methods of work
3. prevent or reduce propagation
Noise Control Measures

Reduce Noise At The Source

- putting damping sound radiating panels
- putting enclosures

Change to Quieter Methods of Work

- replace production equipment or part of it

Prevent Propagation

- by setting up sound absorbing ceiling and wall panels
- introduce vibration isolating joints in the building (structure borne sound)
Examples of Noise Control

Designing pipes and ducts
Examples of Noise Control

The fans can be exchanged with a type with more blades which shift the major sources of noise up in frequency. The higher tones are absorbed sufficiently by the atmosphere so that they are not a source of annoyance in the residential area.
Examples of Noise Control

Changing working methods
Examples of Noise Control

Prevent Propagation
Examples of Noise Control

Structure-borne vibration isolation
Noise Control of New Projects

- There are better possibilities for achieving good acoustical conditions when planning new projects.

- Exploit the best known techniques to reduce noise generation from machinery and processes.

- Acoustic problems should be considered right from the planning stage of the new building.

- Fixed installations (ventilation equipment, cooling systems etc) should be constructed with sound attenuation in mind.

- Work which produce little noise should be removed to a region with low noise.
## Noise Limits – Human Exposure by MOM

<table>
<thead>
<tr>
<th>Sound Pressure Level (dBA)</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>85</td>
<td>8 hours</td>
</tr>
<tr>
<td>88</td>
<td>4 hours</td>
</tr>
<tr>
<td>91</td>
<td>2 hours</td>
</tr>
<tr>
<td>94</td>
<td>1 hour</td>
</tr>
<tr>
<td>97</td>
<td>30 minutes</td>
</tr>
<tr>
<td>100</td>
<td>15 minutes</td>
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<tr>
<td>103</td>
<td>7.5 minutes</td>
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<tr>
<td>106</td>
<td>4 minutes</td>
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<tr>
<td>109</td>
<td>2 minutes</td>
</tr>
<tr>
<td>112</td>
<td>56 seconds</td>
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<tr>
<td>115 or more</td>
<td>30 seconds</td>
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Instruments & Measurements

- What instruments?
  - Class 1 Integrating Sound Level Meter – conforms to IEC 61672.
  - Noise Dose Meter for measuring human exposure to noise.

- Get a good and reliable meter for investigating the causes of the noise problem; because “rubbish in → rubbish out”

- Severe cases of NIHL with >50dB hearing loss across the speech frequencies are compensable under the Workmen’s Compensation Act.

- Active management of noise exposure, and early identification of possible NIHL cases is prudent.
In summary, overexposure to noise results in a wide array of effects on human health including NIHL, social, behavioral and educational problems.

It can be prevented.