Module OSH10010
Ergonomics and Ergonomic Hazards – Part 2

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What This Lecture Will Cover
Having covered aspects such as the role of ergonomics in occupational health and safety, regulatory requirements, common types of occupational musculoskeletal disorders, the following session will look at:
- Ergonomics risk factors
- The scope of ergonomics risk factors including physical, cognitive and environmental aspects
- How to design work to minimise the potential of sustaining musculoskeletal disorders

Learning Outcomes
Having completed all of the learning activities associated with this lecture, you should be able to:
- Explain the importance of knowing and identifying ergonomics risk factors.
- Discuss the use of risk assessments in Ergonomics.
- Explain the design factors in sedentary and active work practices.

Ergonomics Paradigm

Ergonomics Risk Factors - Physical
- Awkward posture - Any non neutral posture. This occurs when a body position places undue load on the muscles, tendons, nerves, blood vessels etc. e.g. sitting slouched at your pc.
- Static loading - this is a prolonged contraction of the muscles which usually means that some posture is held for some time e.g. working overhead or stooped over to a level below the waist.

Ergonomics Risk Factors - Physical
- Contact stress - localized pressure against the skin by an external force e.g. leaning wrists on desk while typing/mouse use.
- Force - the mechanical effort to accomplish a specific movement or effort e.g. pulling a load.
- Repetition/Exposure - how often a task is performed over time e.g. exposure to PC work over a given day or constant assembly work over a shift.
Ergonomics Risk Factors - Cognitive
- Most common is “stress”
- Increased muscle tension as a result of chronic stress.
  - Job content
  - Work demands
  - Job security
  - Nature of work contract
  - Bullying
  - Attitude
  - Motivation
  - Perception

Ergonomics Risk Factors - Environmental
- Temperature
- Lighting
- Noise
- Air Movement
- Vibration
- Chemical Exposure

Importance of Risk Assessments
Critical tool to manage and therefore prevent occupational injuries.

Physical Risk Assessments

Physical Risk Assessments
Manual Handling – NIOSH Equation

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Multiplier Name</th>
<th>Equation (U.S. Units)</th>
<th>Equation (Metric)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>Load Constant</td>
<td>51 lbs</td>
<td>23kg</td>
</tr>
<tr>
<td>HM</td>
<td>Horizontal Multiplier</td>
<td>(10/</td>
<td>H</td>
</tr>
<tr>
<td>VM</td>
<td>Vertical Multiplier</td>
<td>(1-</td>
<td>0.0075</td>
</tr>
<tr>
<td>DM</td>
<td>Distance Multiplier</td>
<td>(.82+(1.8/D))</td>
<td>(.82+(4.5/D))</td>
</tr>
<tr>
<td>AM</td>
<td>Asymmetric Multiplier</td>
<td>From Table 3</td>
<td>From Table 3</td>
</tr>
<tr>
<td>FM</td>
<td>Frequency Multiplier</td>
<td>From Table 4</td>
<td>From Table 4</td>
</tr>
<tr>
<td>CM</td>
<td>Couple Multiplier</td>
<td>From Table 4</td>
<td>From Table 4</td>
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Physical Risk Assessments

Manual Handling – Psychophysical Equation

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Multiplier Name</th>
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<tbody>
<tr>
<td>RWL</td>
<td>Recommended Weight Limit (to commence with)</td>
</tr>
<tr>
<td>WD</td>
<td>Working Duration</td>
</tr>
<tr>
<td>HR</td>
<td>Headroom</td>
</tr>
<tr>
<td>AP</td>
<td>Asymmetry Person</td>
</tr>
<tr>
<td>CM</td>
<td>Coupling</td>
</tr>
<tr>
<td>LP</td>
<td>Load Placement Clearance</td>
</tr>
<tr>
<td>AL</td>
<td>Asymmetry Load</td>
</tr>
</tbody>
</table>

Final RWL = RWL x WD x HR x AP x CM x LP x AL

Cognitive Risk Assessments

Physiological Stress Test

HSE’s Stress Risk Assessment – Questionnaire

Ergonomics Risk Assessments - Environmental

- Temperature [Digital Thermometer]
- Lighting [Lum Meter]
- Noise [Sound Level Meter]
- Air Movement [Hot Wire Anemometer]
- Vibration [Accelerometer]
- Chemical Exposure [Personal Gas Detector]

Design of Work

Corlett’s Principles
i. Upright forward posture
ii. Clear vision
iii. Allow change of working position
iv. Allow an element of choice
v. Weight equally on both feet
vi. Use joints and muscles in their mid position
vii. Use largest muscles where force is needed
viii. Do most work at waist level
ix. When force is necessary use either arm
x. Rest pause from all activity

Sedentary vs Dynamic Work

Which type of work do you believe would put the employees at a higher risk of an occupational MSD?

Henneman’s Size Principle would illustrate that the PC related work would be of a higher risk than the handling of the pallets!

Workstation Design
Summary

- Ergonomics Paradigm
- Risk factors
- Risk Assessments
  - Physical
  - Cognitive
- Corlett's Principles
- Sedentary vs Dynamic Work

Ergonomics and Ergonomic Hazards

Part 1
What is ergonomics?
Ergonomics role in occupational health and safety
Regulatory requirements
When ergonomics fails – Occupational Musculoskeletal Disorders

Part 2
Ergonomics risk factors
Examples of ergonomics risk assessments
Corlett's principles