Measuring 101 – How to Make the Most of Your Ergonomics Assessments Using Low-Tech Measurement Tools

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Workshop Description

1. There is often confusion about what ergonomists and safety professionals should have in their “ergonomics toolbox” and also how to best use these tools.

2. This workshop will:
   - Guide attendees through the decision-making process of choosing the types of measurement devices needed to provide accurate results.
   - Combine this discussion with a review of the level of measurement accuracy needed by several common ergonomics assessment tools.

3. These concepts will be applied to a series of hands-on activities.

4. Attendees also will be briefed on some of the more quantitative ergonomics measurement tools available and the appropriate situations for their use.
Workshop Presenters

• Gary Allread
  – Program Director for SRI•Ergonomics at The Ohio State University

• Rick Barker
  – Corporate Ergonomist for Inteva Products
1. Physical Work Exposures Linked to Injury Risk
### Known Physical Workplace Exposures Linked to Injury Risk

- **Force**
  - The level of muscular effort required to perform a task

- **Posture**
  - The body position assumed during a task

- **Repetition**
  - The number of (similar) exertions required during a task

- **Static work postures**

- **Lack of micro-rest breaks**

- **Vibration (tools, surfaces)**

- **Mechanical contact**
  - Soft tissue compression
  - High impact force

- **Environmental conditions**
Basic Measurement Principles

- Force and moment arm/lever
- Posture
- Repetition
- Whole-Body exertion
2.

Useful Measurement Equipment for Conducting Ergonomics Evaluations
Suggested Equipment for Your Ergonomics Toolkit

• Primary
  – Heavy-duty scale
  – Heavy-duty tape measure
  – Digital video camera
Suggested Equipment for Your Ergonomics Toolkit

• Secondary (industry/work-specific)
  – Push-pull gauge
  – Stopwatch
  – Heartrate monitor
  – Hand grip dynamometer
  – Goniometer
3.

Equipment Needed for Commonly Used Ergonomics Assessment Tools
Common Ergonomics Assessment Tools

• Ergonomics workplace checklists
• NIOSH *Lifting Guide*
• Rapid Upper Limb Assessment (RULA)
• Strain Index
• Liberty Mutual / psychophysical tables
• Hand Activity Level
• ACGIH for Lifting
Common Ergonomics Assessment Tools

• Example:
  – NIOSH Lifting Guide
Common Ergonomics Assessment Tools

- Example: Rapid Upper Limb Assessment (RULA)
Common Ergonomics Assessment Tools

- Example:
  - Liberty Mutual / psychophysical tables
4.

Measurement Accuracy Needed for Common Ergonomics Assessment Tools
What Level of Measurement Accuracy is Needed?

• How more- or less-quantification impacts the various, common ergo assessment methods
• How this impacts assessment results
• Various workshops will be conducted to demonstrate these concepts
5. Trade-Offs Between Low-Tech and High-Tech Measurement Tools
Situations Where a More Advanced Tool is Needed

• Workplace examples:
  – In product or task development
  – Where a solution may be less obvious
  – Where the work task is more complicated
  – For work conditions that are more problematic, possibly high-injury, or not easy to solve
Examples of Higher-Tech Ergonomics Assessment Tools

- Electromyography (EMG)
- Optical tracking systems
- Vibration measurements
- Force transducers
- 3D Static Strength Prediction Program
- Industrial Lumbar Motion Motion Monitor
6.

Resources to Find Measurement Tools
Ergonomics Measurement Resources

• Tools that are in the public domain
• Fee-based, commercially available tools