Overview
Describe the reasons for developing “another” ergonomic assessment tool

- Describe the tool and how it is used to assess work-related musculoskeletal disorder (WMSD) risk

Introduction
Reasons for Developing the Tool
- Many Army jobs expose workers to intense (adverse) mechanical stress
- High WMSD Incidence Rate
- Lack of Ergonomic Personnel
- Deficiencies In Existing Tools

Adverse Mechanical Stress
Exposure to mechanical energy that has sufficient intensity/frequency/duration to be associated with a significant probability of producing injury or functional impairment

Adverse Mechanical Stress
Exceeds physical tolerance limits
Too weak to trigger adaptive changes
Injury
Dysfunction
Hardiness
Wellness
Adverse Mechanical Stress
Types of Medical Conditions

Acute Conditions
- Muscle Tear
- Tendon Rupture
- Ligament Tear
- Cartilage Tear
- Bone Fracture

Chronic Conditions
- Myositis
- Tendonitis
- Bursitis
- Fasciitis
- Stress Fx

Types of Medical Conditions

Introduction

Muscle Tear
Tendon Rupture
Ligament Tear
Cartilage Tear
Bone Fracture

Acute Conditions
- Myositis
- Tendonitis
- Bursitis
- Fasciitis
- Stress Fx

Chronic Conditions
- Nerve
- Compression
- Neuropathy
- Entrapment
- Degenerative
- DDD
- DJD

Civilian Mechanical Exposures

Introduction

Work-Related
Risk Factors

Civilian Mechanical Exposures

Repetition
Contact Stress
Hand-Arm Vibration
Whole Body Vibration

Military Mechanical Exposures

Introduction

WB Vibration

Military Mechanical Exposures

Repetition
Contact Stress
Hand-Arm Vibration

The Tool

Ergonomic Features

The IH Ergonomic Assessment Tool

Features of Assessment Tool
- Basic Assessment Tool
  - Screening tool to identify potential risks
- Ergonomic Assessment Matrices
  - Provide more detailed evaluation
  - Scoring (0 – 8 point scales) to characterize the exposure/prioritize targets for mitigation
- “Expert” consultation available

Ergo Risk Factors Considered

Risk Factors
- Frequent Repetition
- Awkward/ Fixed Posture
- Forceful Exertion
- Vibration
- Lifting
- Lifting
The IH Ergonomic Assessment Tool

**IH Ergo Assessment Process**

IH personnel will perform ergonomic assessments in addition to customary assessments.

- Basic Ergonomic Assessment
- Exposure Assessment Matrices
- Document Results
- End Assessment

**Basic Ergonomic Assessments**

- **Overview**
  - Obligates evaluator to examine work activities & identify ergonomic risk factors
  - Excludes tasks performed for less than two hours per day

- **Sample -- Frequent Repetitions**

**Advanced Ergonomic Assessments**

- **Overview**
  - The Basic Survey contains one question in each of these areas:
    - Frequent Repetitions
    - Awkward Postures/Fixed Postures
    - Forceful Hand Exertions
    - Frequent Forceful Manual Material Handling
    - Vibration
**Assessment Components**

- **Repetition**
- **Posture**
- **Forceful Exertion**
  - Vertical & Horizontal Push/Pull
  - Forceful Hand Exertion
- **Lifting**
- **Vibration**
  - Hand-Arm Vibration
  - Whole Body Vibration

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**Repetition Exposure Matrix**

**Posture Exposure Matrix**

**Forceful Hand Exertion Exposure Matrix**

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**Frequent Repetition Risk Factor**

- Performing the same motion over and over again with little variation
- Repetitious movement may be a "pattern" of several motions which are repeated

**Posture Risk Factor**

- Placing joints in non-neutral positions
- Assuming fixed joint positions that do not include movement variation

*Score dependent upon body part used and type of motion performed*

*Select position from ranges in graphic*
Hand Exertion Risk Factor

- Performing hand activities that require powerful muscular contractions

Lifting Exposure Matrix

- Score dependent upon body part used and type of motion performed

Lifting Risk Factor

- Using powerful muscular contractions to move objects from one location to another

Horizontal Push/Pull Exposure Matrix

- Score using lifting index based upon MIL-STD-1472F

Horizontal Push/Pull Risk Factor

- Applying horizontal force against an object, excluding lifting/lowering actions

Vertical Push/Pull Exposure Matrix

- Score using MAF based upon MIL-STD-1472F7
**Vertical Push/Pull Risk Factor**

- Applying vertical force against an object, excluding lifting/lowering actions

**Hand-Arm Vibration**

**Exposure Matrix**

- Identify exposure based upon value from ISO 8041

**Hand-Arm Vibration Risk Factor**

- Transfer of mechanical oscillations to the UE usually as a result of contact with powered tools, equipment or structures

**Whole Body Vibration**

**Exposure Matrix**

- Identify exposure based upon value from ISO 2631-1

**WB Vibration Risk Factor**

- Transfer of mechanical oscillations to the body usually as a result of contact with powered tools, equipment or structures

**Case Study**
Overview of Target Task
Objective: Assess Potential Musculoskeletal Injury Risks From Mechanical Exposures Related To:
Releasing Track Tension (subtask) when Removing M-88 Track Shoe

Task Analysis
Job: Repair M-88 Track Shoe
- Task 1: Remove Track Shoe(s)
  - Release Track Tension
  - Remove Bolts From End Connectors
  - Separate Track
  - Position Track Shoe (by moving M-88)
- Task 2: Install Track Shoe(s)
Assume 3 Hours Exposure for Case Study

Parse Subtask Into Elements
Release Tension
- Unscrew locknut to end of threads
  - Place wrench on locknut
  - Pull wrench up
  - Remove wrench from locknut

Identify Risk Factors
Which RFs?
- Repetition
- Awkward Posture
- Lifting
- Forceful Exertion
- Vibration

Next: Rate Task Using Appropriate EAMs

Score Frequent Repetitions
Characterize “Overall” Task Motion?
- Rapid, Steady (Can’t Keep Up)
- Rapid, Steady (Can Keep Up)
- Steady, Infrequent Pauses
- Slow, Steady, Brief Pauses
- Very Slow, Long Pauses
- Idle, Little Exertion

Score Frequent Repetitions
Involved Joints?
- Shoulder
- Elbow
- Forearm
- Wrist/Hand
- Neck
- Back
**Find Freq Rep Scores**

**Advanced Ergonomic Assessment**

**Score Frequent Repetitions**

**Score Frequent Repetitions Results**

<table>
<thead>
<tr>
<th>Part</th>
<th>Score</th>
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<tbody>
<tr>
<td>Shoulder</td>
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<td>Elbow</td>
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<td>Forearm</td>
<td></td>
</tr>
<tr>
<td>Wrist/Hand</td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td>2</td>
</tr>
</tbody>
</table>

**Advanced Ergonomic Assessment**

**Score Awkward Posture**

**Score Awkward Posture**

**Score Awkward Posture**: Scoring the Back

**Score Exertion**

**Score Exertion**: How Much Exertion Measured?

Trial 1: 221 lbs
Trial 1: 203 lbs = 208 lbs (Average)
Trial 1: 200 lbs
Score Exertion
How Much Force Allowed? 166 lbs

Calculate Exertion Percentage
\[ \text{Exertion Percentage} = \frac{\text{F}_{\text{Measured}}}{\text{MAF}} \times 100 \]
\[ = \frac{208 \text{ lbs}}{166 \text{ lbs}} \times 100 = 125\% \]

Find Risk Score For Male Population

Summary
Repetition:
Shoulder = 1, Wrist/Hand = 1, Back = 2

Awkward Posture:
Back = 7

Forceful Exertion:
Vertical Push/Pull = 4

Progress Report
IH Ergo Assessment Tool Status
- The assessment tool being field tested
- A mechanism has been established to monitor injury reports and identify the level of ergonomic assessment activity being performed at installation
- We are hopeful that this program will improve efforts to identify ergonomic risks and drive down injury costs

USACHPPM Contact Information
Don Goddard, Ergonomist
Email: don.goddard@us.army.mil
Phone: (410) 436-2736

Katharine Neufeld, Industrial Hygienist
Email: katharine.neufeld1@us.army.mil
Phone: (410) 436-5476

Steven Chervak,
Email: steven.chervak@us.army.mil
Phone: (410) 436-7324
Questions?