UNIVERSITY OF HOUSTON – DOWNTOWN

ENGR 4310 - INDUSTRIAL HYGIENE INSTRUMENTATION

LECTURE NOTE OUTLINE – THERMAL STRESS – CHAPTER 12

WEEK 4

I. Degrees of Thermal Stress
   - A. Comfort Zones
   - B. Discomfort Zones
   - C. Outer Zones

II. Thermal Balance
   - A. Model
   - B. Affecting Factors

III. Heat Stress
   - A. Recognition
   - B. Heat-Related Disorders (Table 12-A)
   - C. Physiological Markers
   - D. Worker Behaviors
   - E. Summary of Recognition

IV. Evaluation of Heat Stress
   - A. Core Temperature
   - B. Physiological Strain
   - C. Overview of ACGIH TLVs
   - D. Assessment of Metabolic Rate
   - E. Assessment of Environmental Conditions
   - F. Prolonged Exposures
   - G. Evaluation of Time-Limited Exposures
     1. WBGT
     2. Heat Balance
     3. Physiological Strain

V. Control of Heat Stress
   A. Training
   B. Hygiene Practices
      1. Fluid Replacement
      2. Self-determination
      3. Diet
      4. Lifestyle
      5. Health Status
      6. Acclimation
      7. Medical Surveillance
      8. Evaluation of Risk
   C. Specific Controls
      1. Engineering Controls
      2. Reduce physical work demand
      3. Reduce air temperature and/or air humidity
      4. Change clothing
      5. Reduce radiant heat
      6. Increase air movement
      7. Acclimation
      8. Work pacing, sharing, and scheduling work
      9. Work times, self-determination, and personal monitoring
      10. Personal protection
      11. Circulating air and water systems; ice garments
      12. Reflective clothing
      13. Respirator considerations

VI. Cold Stress
   A. Considerations
   B. Measurement
   C. Recognition
   D. Evaluation
      1. Systemic
      2. Local
   E. General Controls
   F. Specific Controls
   G. Thermal Comfort

UNIVERSITY OF HOUSTON – DOWNTOWN

ENGR 4310 - INDUSTRIAL HYGIENE INSTRUMENTATION

LECTURE NOTE OUTLINE – ERGONOMICS – CHAPTER 13

WEEK 4

I. Ergonomics Definition

II. Human as Information Processor
- A. Nervous System
  - 1. Central
  - 2. Peripheral
  - 3. Autonomic
- B. Sensors
  - 1. Internal
  - 2. External
- C. "Signal Loop"
- D. Responding to Stimuli

III. Human Capacity for Work
- A. Properties of Workload Measures
- B. Human Capacity for Mental Work
- C. Measuring Mental Workload
- D. Human Capacity for Physical Work
- E. Energy Cost of Work
- F. Classification of Work
- G. Work/Rest Cycles
- H. Fatigue

IV. Engineering Anthropometry
- A. Civilian Body Dimensions
- B. Anthropometric Statistics
- C. Determining Percentiles
- D. Phantom of Average Person
- E. Designing to Fit the Human Body
- F. Population Changes

V. Biomechanics
   A. Body Strength/Measurements
   B. Model of Strength Generation
   C. Measuring Techniques

VI. Handling Loads
   A. Keys of Load Handling
   B. Training
      1. Techniques
      2. What/Who
      3. Content of Training
      4. Review of Training

VII. Design of Work Task and Workplace
   A. Human vs. Machine Load Handling
   B. Rules for Lifting
   C. Permissible Load Handling
   D. Limits for Lifting and Lowering, etc.
   E. Use of Back Belts

VIII. Hand Tools

IX. Workstation Design
   A. General Principles
   B. Standing or Sitting

X. Workplace Design

XI. Office (Computer) Workstations
   A. Work Task
   B. Body Position
   C. Healthy Work Postures
   D. Designing for Vision, Manipulation, and Body Support
   E. Designing Sit Down Workstations
   F. Designing Stand Up Workstations
   G. Designing the Home Office
   H. Fitting all Together

XII. Controls and Displays
   A. Light Signals
   B. Labels

XIII. Avoiding Cumulative Trauma Disorders
- A. CTDs in Industry and Keyboard Users
- B. CTD Causes
- C. Work Factors for CTDs
- D. Cumulative Injuries to the Body
- E. Body Components at Risk for CTDs
  - 1. Carpal Tunnel Syndrome
  - 2. Occupational Activities and Related CTDs
- F. Countermeasures