ERGONOMICS

University at Albany
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WHAT IS ERGONOMICS?

From the Greek: *ergon* work and *nomoi* natural laws

Defined by Webster as: Biotechnology
WHAT IS ERGONOMICS?

• *The study of interaction between people and their work environment*

A main goal of ergonomics is adapting the work environment to the worker, whenever possible:
Adjustability, Adjustability, Adjustability!!!!!
ERGONOMICS

Interdisciplinary:
Anthropometrics (body sizes and types), Biomechanics, Psychology, Industrial Design and Engineering, and Safety

Includes:
Lighting & Temperature Process (heights, reaches, weights)
Layouts/ types of controls & displays
GOALS OF ERGONOMICS

• To reduce occupational injury and illness, such as carpal tunnel syndrome, tendonitis, and low back pain.
• To improve productivity and work quality
• To reduce employee absenteeism and improve morale
• To contain worker’s compensation costs
• Work Related Musculoskeletal Disorders
• What Are Work Related Musculoskeletal Disorders (WMSDs)?
• When a muscle, tendon, nerve or joint is stressed and traumatized on a repeated basis for days, months or years, those body tissues eventually become damaged. This leads to a work related musculoskeletal disorder. Work related musculoskeletal disorders (WMSDs) are sometimes called repetitive strain injuries (RSIs), cumulative trauma disorders and overuse injuries. When a WMSD develops a worker experiences:
  • swelling, as tissues become irritated
  • pain
  • stiffness and loss of range of motion of surrounding joints
  • inability to work and function at home
Work Related Musculoskeletal Disorders

- Myofascial pain of neck/upper back
- Shoulder bursitis
- Rotator cuff tendonitis
- Lateral epicondylitis (tennis elbow)
- Thumb tendonitis
- Carpal tunnel syndrome
- Forearm and Wrist tendonitis

- Pitcher’s Shoulder (Rotator Cuff Tendinitis) and Bursitis
- Tennis and Golfer’s Elbow (Epicondylitis)
- Low Back Pain
- Carpet Layer’s Knee (Bursitis)
WHY WORRY ABOUT ERGONOMICS?

• Work Related Musculoskeletal Disorders (WMSDs) accounted for 30% of the injuries and illnesses with days away from work in 2006 according to the Bureau of Labor Statistics.

• Though in 2006, there was a decrease in injuries and illnesses due to repetitive motion by 13% and a decrease of number of cases of carpal tunnel syndrome by 21% as compared to 2005.
CARPAL TUNNEL SYNDROME

• CARPAL TUNNEL SYNDROME (CTS)
• Occurs with repetitive motion of hands & wrists--especially with high force levels.
• Incidence up to 15% in certain industries.
• A “natural” keyboard and good wrist support can help most PC users avoid problems
• GOOD NEWS: Have dropped about 30% since 1990--which most attribute to strong workplace ergonomics programs
When the lining around the tendons is inflamed, there is less space for the median nerve and it becomes compressed.
CARPAL TUNNEL SYNDROME

Symptoms may include: Pain, Numbness, Tingling, “Funny Feeling” in the fingers (thumb, index and middle fingers), hand or wrist.

CTS is one of the most common job-related injuries.

CTS accounts for ~10% to 17% of repetitive strain injuries.

CTS strikes ~ three times as many women as men.

CTS results in more than 2 million visits to physician’s offices each year.

* From YourMedicalSource.com
THE NEUTRAL POSITION

- **Neutral Posture (GOOD)**
  Defined as the position our bodies take in the absence of gravity (e.g., in space)
- **Position in which repetitive stress injury is least likely to occur**
- **Static Positions (BAD)**
  Muscles become fatigued when blood flow is reduced
THE NEUTRAL POSITION
A NEUTRAL POSTURE

- While sitting, your head is balanced naturally over your shoulders. Your shoulders are relaxed and your forearms and thighs are parallel to the floor, at a 90 angle to upper arms and lower legs.
MORE NEUTRAL POSTURES

• WRIST POSTURE – NOT BENT OR TWISTED
WORKSTATION DESIGN

• **INCLUDES:**
  • CHAIR
  • MONITOR
  • KEYBOARD AND KEYBOARD TRAY
  • MOUSE
  • DESK
A GOOD CHAIR

• ADJUSTABLE FOR:
  • HEIGHT
  • SEAT DEPTH
  • SEAT ANGLE
  • BACK SUPPORT (LUMBAR)
  • ARM RESTS
  • TILT
What to Look for in a Good Ergonomic Chair

A good ergonomic chair should fit users comfortably and support different working positions

• Generous cushions and waterfall edge that encourage movement and circulation

• Supportive foam that prevents “bottoming out” and pressure points.

• Soft edges on cushions that promote comfort in different seated positions. They also protect surrounding worksurfaces.

• The chair back that does not hinder arm movement while seated

• Adjustment knobs that are intuitive and easy to grip

• Simple, east-to-reach adjustments (for ADA accessibility.)

• Arms that are recessed to allow the user to get close to the worksurface. Four-way adjustable arms include height, arm support width, fixed rotation and pad slide.

• Removable/retrofittable arms that adapt the chair to the users’ preferences and enable easy upgrades.

• Pneumatic seat height adjustment that includes optional cylinder sizes to accommodate different users.

• Synchronized tilt that mimics the body’s movement without straining the back. Good ergonomic tilts do not cause the front edge of the chair to rise during recline, ensuring proper circulation to the legs.

• Tilt tension that adjusts the recline resistance to the user’s preferred amount.

• Tilt lock that supports the back in the upright position and variable position stop tailors the recline range.

• Back height adjustment that controls the height of the entire back for lumbar and upper back support. (about 3”-4” covers the full lumbar range.)

• Forward tilt that creates a forward incline of the seat and back with the ability to recline and lock in this mode. Forward tilt allows the chair to support the body in the position most people assume when typing.

• Seat depth adjustment that changes the seat depth to accommodate different height users.

• Five star base and casters that provide stability and mobility.
• POSITION THE MONITOR:
• Directly in front of body
  About 18-30 inches away from body (arm’s length)
  Top of monitor about eye level, or slightly below
KEYBOARD TRAY

- KEYBOARD TRAY
- Should be easily adjustable for HEIGHT and TILT
- Should allow for right or left hand placement of MOUSE
- Should be stable
“NATURAL” KEYBOARDS

- Three types: Fixed split, Adjustable split & “Sculptured”
- Awkward wrist postures minimized with 15 to 25 horizontal degree key split AND 8 to 66 degree vertical incline.
- Key Layout Design Changes Have:
  - increased comfort (81% of users)
  - improved postures
  - reduced muscle activity
  - lowered carpal tunnel pressure in lab settings
- Obtained primarily to alleviate an injury
The MOUSE

- The mouse should be at the same level and distance as the keyboard.
- The mouse should fit the hand. They do come in sizes!
- Also, track balls require less index finger work.
OTHER OPTIONS

- A RollerMouse
- UltraLite Zero Tension Mouse
- Wireless Vertical Mouse
COMPUTER ACCESSORIES

- FOOTREST
- TELEPHONE HEADSET
WRIST RESTS

• Buy rest that is even with top of keyboard
• Material should be “medium-soft” (foam--gel mix) so foam doesn’t break down. AVOID hard plastic types
• DON’T leave wrists on rest...which compresses carpal tunnel. Palm rest instead.
• Changing typing habits more critical than wrist support
• MOST APPROPRIATELY USED TO REST HANDS DURING PAUSE IN TYPING
• LEARN TO TYPE CORRECTLY WITH “FLOATING WRISTS” FIRST!!!
MODEL COMPUTER WORKSTATION

- Keyboard trays WITH wrist support.
- Split "Natural" keyboards to facilitate neutral wrist angle
- Fully adjustable ergonomic chair
- Document holder to minimize head / eye & neck movements
- Corner desk units to position monitor directly in front of employee
- Foot rest where requested.
- Re-organization of working materials within employee arm reach.
- Alternative pointing devices (e.g., scrolling mouse or trackball devices
ERGONOMICS

• ANY QUESTIONS?