October is National Ergonomics Month!
by Alex Proaps

In 2003, the Human Factors and Ergonomics Society (HFES) designated October of every year to be National Ergonomics Month (NEM). The purpose of NEM is to focus on promoting human factors/ergonomics to corporate executives, students, and the general public by providing information and services to the community.

What is Ergonomics?

Ergonomics derives from two Greek words: Έργον, meaning "work", and Νόμος, meaning "natural laws." Therefore, ergonomics is the science of work and a person's relationship to that work. Ergonomics is also a science that focuses on the ways in which products fit the user; specifically, how products can be designed to decrease user fatigue, stress, injury, and discomfort, and to improve safety and efficiency. Ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people.

History

Wojciech Jastrzębowski was the first to use the term in 1857 to describe the study of work, how work is done, and how to work better. In the 19th century, Frederick Winslow Taylor pioneered the "Scientific Management" method to determine the most optimum method for shoveling coal by reducing coal shovel size and weight. Frank and Lillian Gilbreth developed "Time and Motion Studies" and improved worker efficiency by eliminating unnecessary steps during bricklaying. In the 1940s, Alphonse Chapanis showed "pilot error" could be reduced with strategic, logical cockpits control placement.

Backpack ergonomics
by Alex Proaps and Becca Kennedy

Backpacks are a practical solution for carrying daily essentials. Students of all ages rely on backpacks to transport books and other items to and from school. Backpacks are generally comfortable to use because they are specifically designed to distribute the weight of the load among strong core muscles in the back and abdomen. However, when used improperly, backpacks can have negative physical consequences.

The most common cause of backpack-related pain is carrying too much weight in the bag. Hefty backpacks may require the wearer to lean forward to compensate for the backward pull of the load. This forward arching of the back can cause the spine to compress unnaturally, leading to muscle fatigue or strain in the back and shoulders.

To prevent discomfort or pain, the American Physical Therapy Association suggests the weight of a backpack is limited to less than 15% of a person's weight. A 150-lb person should not carry more than 20 lbs, and a 70-lb. child should not carry more than 10 lbs. More tips for preventing backpack-related injuries are listed in the next column.

Tips for injury prevention:
- Remove unnecessary items from the backpack.
- Pack heavy items at the bottom to transfer weight to hips.
- Place pointy or bulky items so they do not rest against back.
- Choose backpacks with two straps, which are better options than messenger bags, and use both straps to equally distribute weight.
- Choose backpacks with wide, padded straps to prevent the straps from cutting off circulation in shoulders and arms.
- Tighten shoulder straps so that the backpack is close to the body and rests slightly below the shoulders.
- Use waist straps (if available) to take pressure off the neck and shoulders.

Wide Straps

Light Load (No more than 15% of body weight)

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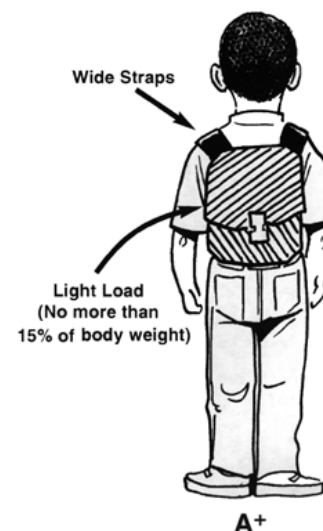
Healthy office work environments

by Alex Proaps and Becca Kennedy

Ergonomists apply anthropometric measurements to improve a user population's comfort, safety, and efficiency at work. Anthropometry is the science that measures the range of body sizes in a population and these measures are used to design workstations for sitting, standing, reaching, and bending postures: Desk height and angle, chair height, computer screen angle and location, keyboard, telephone, and mouse location and arrangement, etc. Ergonomists will also determine optimal lighting, noise and temperature conditions for workers.

Tips for Healthy Posture While Computing

By giving consideration to healthy postures when designing computer workspaces, we can mitigate common problems like lower back pain and repetitive strain injuries. The body should work in a neutral, natural position to reduce unnecessary stress and strain (see Figure 1). This can be achieved using the following tips:

1)   Position monitor so it does not cause unnecessary neck pain, shoulder pain, or eye strain. Center the monitor in front of your body to avoid awkward twisting. Place your monitor an arm's length from your position while sitting at your desk to prevent eye strain while viewing the screen.

2)   Provide enough space under the desk space for comfortable leg movement. There should be enough room so you can frequently switch working postures. Sitting in static postures for too long may result in circulation restrictions or contact stress from pressing body parts against objects. This may mean relocating objects like desktop towers or filing cabinets to give your legs enough space to stretch and move.

3)   Place the keyboard so your wrists and forearms lay straight while typing. The elbows should be at the sides of the body and bent between 90 and 120 degrees.

4)   Select a chair that is height-adjustable, with proper back support.

Some criteria to help you find the right chair:
- Adjustable seat height (380 to 535mm).
- Tilting seat (forward and backward about 5°).
- Swiveling seat base with ~5 castors for stability.
- Adjustable backrest about 500mm in height (contoured to support lumbar curve).

- Tilting backrest for support in both a working and resting posture.
- If seat and backrest do not adjust independently, there should be a 105° angle between them.
- Footrests should be provided to allow shorter people to adjust themselves to the desk or worktop (450mm length x 350mm width).
- Armrests may prevent the user from getting close to the desk, but they can assist resting the elbows during work. If armrests are fixed they should not extend more than 250mm in front of the seat back.
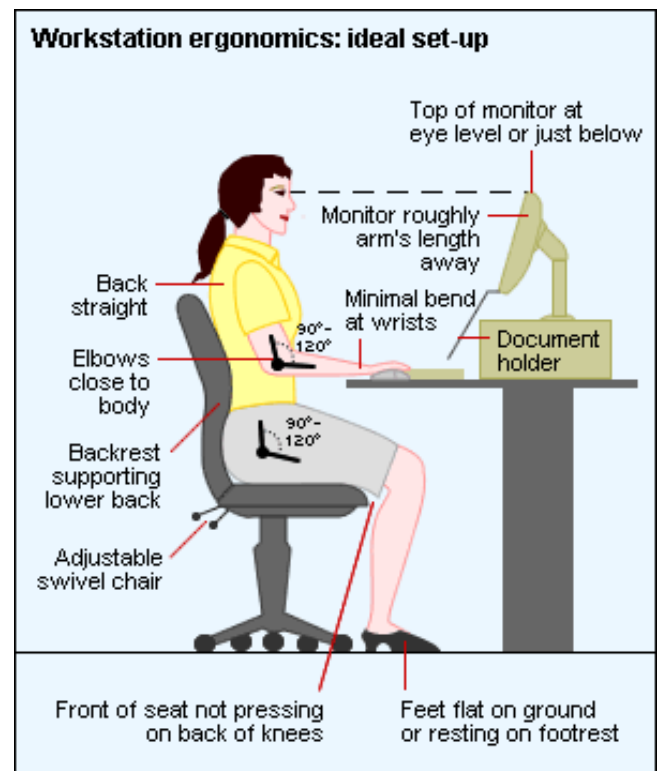

Figure 1: Example of healthy computing position.

Taking breaks and stretching

Musculoskeletal Disorders (MSDs) can develop when individuals are required to sit for long periods of time at a desk, looking at a computer screen, and typing on a keyboard. It is critical to take rest periods and stretch at work. Ergonomists recommend resting and stretching every 45 minutes. Stretches such as those indicated in the image below can reduce fatigue and injury at work. The next page illustrates some exercises you can do at your desk. You can hang it in your office as a reminder to take breaks and stretch!

Computer & Desk Stretches
Approximately 4 Minutes

Sitting at a computer for long periods often causes neck and shoulder stiffness and occasionally lower back pain. Do these stretches every hour or so throughout the day, or whenever you feel stiff. Photocopy this and keep it in a drawer. Also, be sure to get up and walk around the office whenever you think of it. You'll feel better!
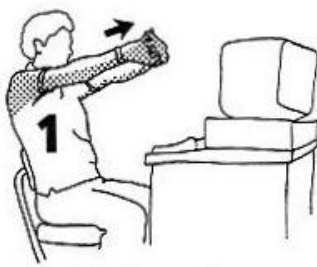
1 — 10–20 seconds 2 times

2 — 10–15 seconds

3 — 8–10 seconds each side

4 — 15–20 seconds

5 — 3–5 seconds 3 times

6 — 10–12 seconds each arm

7 — 10 seconds

8 — 10 seconds

9 — 8–10 seconds each side

10 — 8–10 seconds each side

11 — 10–15 seconds 2 times

12 — Shake out hands 8–10 seconds

Stretching © 2000 by Bob and Jean Anderson. Shelter Publications, Inc.

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Safe Computing Tips. http://www.safecomputingtips.com/ ergonomic-desk1.html

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Upcoming events

10/20 - HFES student chapter meeting in MGB 125

10/22 - ODU student organization presents the annual community Fall Spooktacular in Webb Center

10/28 - "Human Factors in the Workplace: Industry vs. Government" students-only brown bag with Dr. Neil Ganey in MGB 128

11/10 - World Usability Day event

**Old Dominion University
Human Factors and Ergonomics Society
student chapter**

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