



Ergonomics in the Workplace

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One way to keep workers safe is through ergonomics. This science of fitting workplace conditions and job demands to the capabilities of employees is critical to maintaining a safe workplace and reducing injuries.

- Ergonomic principles are used to improve the "fit" between the worker and the workplace.
- A practical approach to ergonomics considers the match between the person, the equipment they use, their work processes and the work environment.
- A person's capabilities, physical attributes and work habits must be recognized to improve ergonomic factors in the workplace.

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1-866-206-5851



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Ergonomic Statistics

- 90% of all office workers use personal computers.
- In 2009, work-related musculoskeletal disorders exceeded 14 million cases.
- Carpal tunnel syndrome comprises 13% of all workplace injuries.
- Women outnumber men 3 to 1 in sustaining carpal tunnel syndrome.
- Work-related musculoskeletal disorders account for \$20 billion in direct costs each year and \$100 billion in indirect costs.

The Benefits of a Workplace Ergonomic Program

- Decreased injuries, illnesses and workers' compensation costs
- Increased efficiency at work
- Increased physical well-being
- Increased employee morale

Ergonomic-Related Injuries

These injuries can affect muscles, tendons, nerves, joints and spinal disks and include:

- Cumulative trauma disorders
- Repetitive stress injuries
- Repetitive motion injuries

Some examples include:

- Tendonitis
- Tennis elbow
- Carpal tunnel syndrome
- Neck and back injuries
- Strains/sprains
- Bursitis
- Thoracic outlet syndrome
- Trigger finger

Body Stress — the precursor to musculoskeletal disorders, this can manifest itself by exhibiting stress in:

- Muscles
- Nerves
- Tendons
- Ligaments
- Cartilage
- Joints
- Spinal discs

Symptoms include:

- Muscle fatigue or pain that disappears with rest
- Aching, burning, numbness, stiffness or tingling — especially if these symptoms worsen with continuation of the task that causes them.
- Decreased range of motion
- Decreased grip strength
- Loss of balance
- Deformity
- Swelling
- Cramping
- Redness
- Loss of color

Causes include:

- Repetitive motion, such as lifting
- Your angle or alignment to the activity
- How long you do the activity, especially if you do it without a break
- Contact stress caused by any sharp or hard object putting localized pressure on a part of the body — this will irritate local tissues and interfere with circulation and nerve function
- Awkward posture — any deviation from the “neutral” body position
- Static posture — occurs when one position is held for a prolonged period of time and can lead to discomfort and injury
- Temperature extremes, whether heat (resulting in increased fatigue and heat stress) or cold (constricting blood vessels and reducing sensitivity and coordination of body parts)
- Psycho-social issues

Ergonomic Adjustments in the Office

There are key adjustments that should be made in an office setting to ensure the most ergonomic benefits possible.

Chairs

- Adjust the height of the chair's seat so that the thighs are horizontal, feet rest flat on the floor, and arms and hands are comfortably positioned at the keyboard.
- If the chair is too high, use a footrest. This takes pressure off the back of the thighs.
- Armrests should be adjustable in both the up/down and inward/outward positions and be padded.
- Adjust the backrest so that it supports the lower back and fits the curvature of the spine. Seat pans should also be adjusted for proper slope and comfort.
- Seat cushions should be firm, not soft.
- Utilize chair mat to decrease carpet resistance and provide more maneuverability.

Document Holders

- Position a document holder close to the computer monitor at the same level and distance from the eye to avoid constant changes of focus.
- Rotate position of document holder to opposite side of screen periodically.

Computer Monitors

- Adjust the display so that the top of the screen is slightly below eye level when sitting at the keyboard.
- Position the screen to minimize glare and reflection from overhead lights, windows and other light sources.
- Place the screen so that windows are not directly in front of or behind the employee when seated.
- Set the contrast and brightness of the screen at a comfortable level. (This may have to be done more than once a day, as the light in the room changes.)
- Place the keyboard at a height and distance that keeps the elbows comfortable.
- The keyboard should be flat, or tilted slightly downward away from the body in order to keep the lower arms, wrists and hands in a straight line.
- Hands should be essentially flat, with no twisting of wrists to the side, or upward or downward.
- Split keyboards – those with each half rotated outward at the “ZXCVB” base of the keyboard

- may work well for broad-shouldered users, but poorly for smaller or hunt-and-pick type typists.
- The mouse should be large enough so that the hand fits comfortably over it.
- The mouse should be let go when it is not being used.
- Hand strain can be reduced by occasionally using function keys, instead of the mouse.

Desk Lighting

- Close the drapes or adjust blinds to reduce glare.
- Adjust desk lamp or task light to avoid reflections on the screen. Light sources should come at a 90-degree angle, with low watt lights rather than single high watt.
- The task lighting should not be less than light at screen.
- Reduce overhead lighting (where possible) by turning off lights or switching to lower wattage bulbs.

Ergonomic Control Strategies

Engineering Controls

Insist on appropriate initial design of the work station or work area
 Improve the design of the existing work area or equipment with appropriate adjustments
 Provide necessary equipment and accessories

Administrative Controls

- Limit extended work hours
- Provide mini-breaks
- Provide Personal Protective Equipment
- Adjust and maintain appropriate work pace and stress levels, including:
- Improve work processes

- Improve posture and habits
- Modify wrist and hand motions
- Improve neck and back postures
- Place equipment and materials where appropriate
- Make sure tools match the task
- Improve work techniques and habits

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Ergonomic Review

One of the best things you can do to establish and maintain a sound ergonomic workplace is to ask yourself a few simple questions:

- How is your workspace organized?
- What kind of equipment and tools do you use?
- What body positions do you use?
- How often do you repeat a motion?
- Do you take breaks?
- Does your task change, and how often?

Once you know those answers, see how they fit in with established ergonomic "zones" (see Fig. 1 below):

Comfort — 75 to 80% of work

This zone has the least potential for repetitive motion injuries and is an ideal state for heavy and frequent lifts.

- Elbows are close to the side of your body.
- Minimum distance reaches or bends.
- Arms are bent at the elbow at 90 degrees.
- Back and neck are in the normal S-curve position.

Caution — 15 to 20% of work

- Arms extend slightly away from the body.
- Torso or neck is bent.
- Arms may extend but elbows aren't locked.
- Reach extends to head or knee level.
- No reaches behind the body.
- Elbows stay below shoulder level.
- Knees are slightly flexed, never locked.

Danger — 5 to 10% of work

Light, small, infrequent lifts may be performed in this zone, such as taking small, light objects from a high shelf or from the floor.

- Reaches extend overhead and to floor level.
- Elbows locked and far away from the body.
- Elbows are above the shoulders.
- Torso or neck is bent more than 15 degrees.
- Arms extend behind the body.
- Torso is twisted.

