# Office Ergonomics - State of the Art and Recommendations 2001

Safety and Health Administration (OSHA) in January 2001, and then repealed by Congress in March 2001, has many business owners wary. While the final format of these standards is still in debate, wide sweeping ergonomic legislation is inevitable. Under the burden of these ever-changing office-ergonomic standards, small business owners have to balance productivity, financial survival, legitimate employee ergonomic needs, potential Worker's Comp claims, and vague ergonomic legislation.

The existing and proposed state and Federal OSHA requirements are serious, but compliance should not cause panic and can be inexpensive. [Recently repealed regulations are not going to go away, the punitive measures will be modified and they will be back.] "With a little understanding and creativity, business owners can make office work spaces ergonomically correct, meet current and future OSHA requirements, while spending very little money in the process."

**Good Ergonomics**
**Is Smart Business**

Common sense solutions improve profits and employee wellness

Existing state OSHA ergonomic regulations effect every business. The small business owner has to balance productivity, financial survival, legitimate employee ergonomic needs, potential Worker's Comp claims, and vague ergonomic legislation.
With a little understanding and creativity, a business owner can comply with current regulations and stay ahead of current and future OSHA requirements, while spending very little money in the process.

Following some simple ergonomic guidelines can improve the bottom line of small businesses while upgrading the overall wellness of their employees.

Ergonomics is fitting jobs and tools to the wide variety of people who use them to reduce work-related injuries. Good ergonomics makes the fit between worker and his or her equipment seamless while reducing muscular stress or strain.

## *Office Ergonomics*



Most office-related injuries are musculoskeletal disorders (MSDs) resulting from muscle-tendon strain and nerve pinching. This is usually associated with repeated strained muscle actions of the neck shoulders, arms, forearms or wrists. When the employer understands how and where common ergonomic failings result in injury, prevention focuses on common sense solutions and is relatively easy. Help is available on websites and by telephone.

OSHA: MSD Good discussion as well as federal regulation being reworked:
www.osha.com
JAN (Job Accommodation Network): good resource:
www.jan.wvu.edu
Telephone 1-800-526-7234
***definitely worth checking*
Americans With Disabilities, Accommodations
Telephone + 1-800-232-9675

University of California, San Diego, Occupational Medicine and Ergonomics expert Dr. John Gillick* says the most important areas to address to insure an ergonomically friendly work environment are:

1. Workstation height and shape,
2. Chair type and fit,
3. Keyboard and mouse,
4. Computer monitor and document holder placement,
5. Telephone placement and type of receiver,
6. Writing instruments,
7. Adjustable keyboard tray or another height adaptation device,
8. Other common desk tools,
9. Portable computers,
10. Company vehicles, and,
11. Back-ups and written inventory.

According to ergonomic specialists, proper sizing, placement and usage of office furniture and equipment is paramount in maximizing production and employee ergonomic safety, as well as controlling workers' comp injury/insurance rates and meeting OSHA regulations.

Proper sizing, placement and usage of office furniture and equipment is paramount in maximizing production and employee ergonomic safety, while decreasing workers' comp injury/insurance rates and meeting OSHA regulations.

**Workstation height and shape**

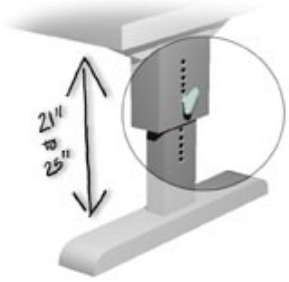
The height of the office employee's workstation table is a key ergonomic consideration. Current standard desk and work table height is still 29 to 30 inches. This is the same height desk that the workers of the 1950's used to rest their forearms and elbows on during writing or telephoning. Usually they also had a low pull-out typewriter table to one side. This standard work platform is at least six inches too high for the average sized office worker in 2000. It lacks forearm or upper torso support. The desk top holds the monitor, keyboard and reference materials leaving a sparse work area.

Workers must shrug their shoulders and hold their arms up to utilize a standard height desktop. This leads to tightness in neck and shoulder muscles, resulting in a painful workday. Accommodating workers to the 29 to 30 inch desktop has become awkward and expensive. The desk space is now smaller, yet holds a monitor screen, keyboard, pointing device, telephone base, and a small writing space along with number pads reference materials, etc. Accommodation today necessitates adjustable chairs, footstools, keyboard trays, separate forearm supports, special writing areas and separate telephone base stands.

The correct height for an office work platform is in the vicinity of 24 inches, depending on the length of the worker's arms, legs, and torso. Rarely is more than 25 inches clearance needed for the worker's knees, this translates to a platform height of 26 inches for a six foot four inch male. This height is based upon the "relaxed elbow height" (REH), or the point where a sitting worker's hands settle comfortably onto the desktop with the feet on the floor, the shoulders relaxed and the thighs and forearms parallel to the floor. REH is usually about waist height.

Achieving REH for each employee may be complicated by multiple size employees, high employee turnover rates and by multiple users for a single desk space. In the long run, the most economical remedy is use of work platforms that are adjustable (24 inches +/- three inches) to REH.

The shape of the work surface is also quite important. Desk-bound employees have safe zones, which follow an arch from the relaxed elbow 6 to 14 inches in front of the body (and to the sides with a swivel chair). This is where repetitive tasking is done with the least amount of injury or strain to the neck, shoulders or forearms. Work platforms that are a curved "L" or a horseshoe "U" shape may provide multiple safe zones, provided the workers can freely and fully rotate their legs under the platform. All keyboarding, writing, phone work, stapling, etc. must be done in safe zones (at waist level) to avoid injury.




**Office chair, types and fit**

For employees who spend most of the day seated at workstations a comfortable fitting chair is a necessity. Well designed chairs have six multi-adjust features:

1. pneumatic height adjustments (with optional shaft lengths);
2. free floating backrest with tilt tension adjustment/lock;
3. adjustable backrest height and lumbar support;
4. independent seat tilt and seat depth slider;
5. adjustable forearm rests should adjust (height, width and lateral) to touch the worker's sides at waist level (REH).

**Modular furniture that hook to partitions, can easily meet the appropriate height adjustments between 20 to 30 inches and have corner pieces and low drawer modules: Steelcase, BLK**

**Adjustable furniture, separate pieces:**

**www.virco.com -- commercial quality**

**www.ikea.com -- home quality**

**Fully adjustable chairs:**

**e.com -- excellent quality, good value per**

**.com -- reasonably good, often governme**

**.com -- expensive, good contender**

Cost doesn't determine the fit -- expensive doesn't mean better. One size, even one manufacturer's model, rarely adjusts to all employees. There should be a choice of chairs, with workers switching chairs as needed. The height should be adjusted so that the workers' feet rest firmly on the ground with their knees at equal height with their hips, and their elbows supported close to the body at a height where the shoulders are relaxed.

**Keyboard and mouse**

Most computers come with a standard straight keyboard and a mouse pointing device. Casual office and home computer users may find these standard issue items adequate and "familiar." Some users even become attached to them, as they would to a favorite old pair of tennis shoes. However, most keyboard users must twist their forearms and outward-turn their wrists to use a straight keyboard. The standard mouse also requires twisting , pinching and repeated forearm elevation. These actions are frequent causes of wrist, forearm, shoulder and neck strain.

A split-contour keyboard (i.e., Microsoft's Natural) is a better and safer ergonomic design protecting against wrist and forearm pains and strains. Employees with persistent strains can further benefit from a split-folding keyboards (i.e., Kinesis Maxim, Goldtouch, Ergologic) which keep the forearms and wrists in a more neutral, thumbs-upward position.


Keyboards should have gel-type wrist rests available. Elbows and forearms should be supported in some other fashion, most conveniently by multi-adjustable chair armrests which touch the worker's sides.

The classical pointing device, the mouse, is a common ergonomic problems in the workplace. For mouse use, the wrist must be twisted thumb down with the mouse pinched between the thumb and the small finger. It then must be physically moved by the wrist and forearm, which also stresses the shoulder and neck muscles. If the pointer device is operated higher than keyboard level or beyond elbow length from the body, mouse usage stresses are magnified.

To minimize strain, any pointer device should be placed next to the keyboard. Changing to a large-ball trackball (i.e., Logitech MarbleMouse, retail $29) or a touchpad next to the keyboard can be quite effective in removing mouse-related strain injuries. Recommendation: Throw out the classical mouse with the hand coffee grinder. Minimize usage of the pointer devices by using keyboard strokes. Have several different pointing devices for employees to choose between.

**Computer, monitor and document holder**

Monitor placement depends on the height of the employee and the desk height. The center of the monitor screen should be no more than an arm's length distance from the user's face and at an elevation that has the individual's head and neck in a comfortable position. Too high or low placement of the monitor, as well as wearing bi-focal glasses, can strain the operator's neck, forehead or eye muscles. Even slight strain over a period of time can cause neck and shoulder pain. With the 30-inch desks, a monitor placed on the computer's central processing unit (CPU) or a stand is often too high. However, with a 22 to 25 inch desktop, the monitor might need a platform to bring it into comfortable position. Under normal circumstances, the CPU is best placed under the desk.

During keyboard entry, reference documents and document holders should be in a neutral position immediately beside and level with the monitor. If reference documents are placed flat on the desktop or in a document holder that is more than one foot right or left of the monitor, the operator's chin is lowered down and toward the shoulder twisting the neck. Twisting the neck this way pinches nerves resulting in neck, shoulder, arm, wrist and hand pain and numbness. Improper placement of reference documents is also a common cause of tension headaches and pain shooting into the upper back, shoulders and arms

**Telephone, receiver and placement**

Headaches, neck, shoulder and arm-nerve problems often begin or are aggravated by holding the telephone receiver on the shoulder. Telephone receivers and speakers should be hands free except when telephone usage is only very occasional.

Working headsets should always be available and headset usage encouraged. This recommendation holds for fixed phones as well as all portable phones: office, car and home. The headsets should be interchangeable with several varieties to choose from, i.e., over the ear, over the head. For those who use a telephone frequently, the base should be firmly fixed with the dial button pad near waist level and within a half-arm's length.

**Writing instruments**

Thin, smooth barreled ball-point pens and pencils require firm pinching and heavy pressure, which may cause neck, shoulder, forearm, or wrist problems. Eliminate this by using thick writing instruments that have a high friction grip to insure an almost form-fit grip. A contoured, rubberized, and fat grip shape (about a half inch in diameter) will allow a relaxed hand to apply unstrained downward pressure with minimal pinching. The ink flow should be easy, i.e., gel ink. Some examples are Pilot's Dr. Grip Gel -- retail $6, PHD, and Sensa. Don't use stick pens or pencils in the office or at home. Consider doing a promotion with your logo on fat gel pens.

**Keyboard trays and other height adaptation devices**

If the desktop isn't lowered to keyboard level (24 inches +/-), the conventional ergonomic adaptation has been the eight-way adjustable keyboard tray ($80-$260). The tray should tilt, move up and down, in and out, and side to side. These are great for corner slots, particularly if lowering the tabletops isn't an immediate option. Place the pointer device on the tray or add on a mouse tray ($30). Slide-out, fixed-level keyboard trays are a reasonable temporary solution if they place the keyboard and pointer at relaxed elbow height.

Make arrangements for a writing surface also at about waist level and close to the operator's body. "Drawer-toppers" a rubber- backed slab of plastic or plasticized board placed over an extended drawer can provide a lower height tabletop extension for use as a writing surface holding the telephone base.

Many employees need footstools when their chair is elevated more than two inches. Ultimately, it less expensive and safer to lower the work desk heights to about 24 inches than to raise chairs and get footstools. Added keyboard trays create other problems, such as increasing the reach toward a writing surface, the telephone stand, the number pad and other desk top functions.

Best fix: an adjustable cockpit like, "U shaped, " wrap-around desktop that has height adjustable between 20 and 28 inches.

**Other common desk tools and office needs**

Drawer/file modules. When adjustable furniture is bought, the fixed or rolling drawer/file modules are separately selected. These should be no higher than 20 inches in height. The old standard 26 + inches prevents adequate adjustment of desktop height necessitating expensive accommodation add-ons to deal with injury.

Computer glasses. Those workers with eyeglasses should use a single-strength lens rather than bi- or tri-focals. Bi-focal lenses require holding the head tilted and frozen into different positions which cause neck strain, shoulder spasm and headaches. Vision should be clearest between bent-elbow and full arm length (16 inches). Reading, keyboarding and monitor viewing is all done in this range.

File location. Files and reference material are best located in an open bin at or below knee level, otherwise the worker has to raise arms to above chest level and further than bent-elbow distance to access frequently used materials. There should be a reading platform close in, at half an arm's length.

File folder weight. Accessing books, file folders and reference materials heavier than one pound should not require reaching, pulling or lifting. All books should be within an arm's length to limit workers' arm and shoulder strains. Roller bins are an inexpensive solution for holding reference documents or books.

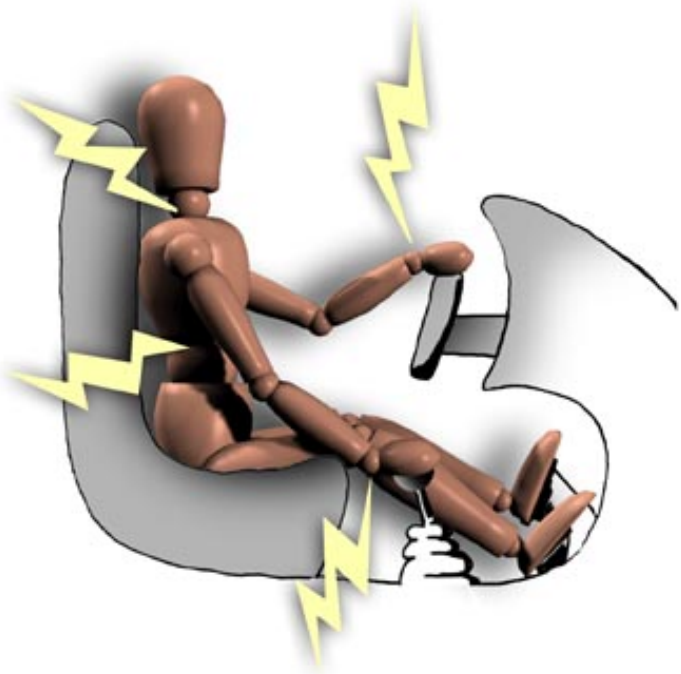
Accessory equipment. To make daily tasks safer: electric staplers should be provided, hole-punch machines should be high-quality, sharp with a long leverage arm, and copy machines and FAX should be at waist level with easy access.

**Portable computers in the office**

Computer stations with laptops must be given the same ergonomic scrutiny that permanent stations receive. Portable computer users are prone to the same ergonomic injuries as employees at conventional computer stations. In addition, they have the added stress of a narrower straight keyboard and the low, fixed elevation of a small monitor screen. Adding an external keyboard, external pointing trackball, and a larger monitor to the portable computer station are ways to make them safer. For these users also, the keyboard trays, document holders, and chairs, must have user-friendly ergonomics. A practical way to insure this is to set up an ergonomic "docking station."

**Company vehicles**

Company vehicles should have automatic transmissions, not stick, for safety and ergonomic reasons. Many back, neck, shoulder, wrist and knee injuries are aggravated by stick shift vehicles. Employees driving their own vehicles for company-related business or deliveries should likewise be encouraged to use automatic vehicles.



**Back-up equipment and written inventory**

Keep an up-to-date, written inventory of ergonomic equipments bought and used. This is a good OSHA trail to keep. It also keeps track of equipment that is in use or is available for loaners. Encourage employees to use loaners and trial test before purchase. Recycle equipment around the office. As the phrase goes, "one person's trash is another's treasure."

Lastly, create an employee-participation program. Listen to employee suggestions and encourage them to problem-solve ergonomic challenges. Encourage employees to price-shop solutions for the office as well as for fellow employees.

Many have home offices and may wish to get similar equipment for the home if they find something they like. Help the employee get a discounted price by buying through the company.

The most important part of keeping the workplace injury-free is including employees in decisions regarding their comfort and safety. This makes them participants in the safety maintainence. An open dialogue between employer and employee is key in dealing with and ultimately preventing workplace injuries.

**Employee Health Considerations**

With work hour flexibility and a quality health plan, most employees will visit their own health care specialist to problem solve before considering a problem to be work comp related.

**Non-work site prevention's**

Keeping the workplace ergonomically friendly is a big step in injury prevention. Helping employees stay ergonomically safe at home will also help prevent worker's comp claims – there will be less opportunity for injuries to occur at all. Remember most musculoskeletal disorders (MSD)s are from cumulative trauma - trauma accumulated during the entire 168 hours per week, not just the 40 hours at work. However unfair, if work contributes to the injury, Work Comp law holds the employer responsible for returning the employee to "pre-injury status" -- the condition of the employee before the work contributes to the injury.

Activities outside work can make workers more vulnerable to injury, can aggravate work injuries, and can slow recovery from injuries. These outside activities may be second jobs or a busy home improvement project. Common non-work aggravators are: sleep position (stomach sleeping, flat back sleeping, sleeping twisted), over-vigorous recreational endeavors (running, weight lifting, dancing, off-road bicycling), and hobbies (gardening, painting, knitting, needlepoint). Identifying and addressing these aggravating issues by an astute worker's comp health professional can speed employee recovery and prevent relapse.

Exercise and regular fitness maintenance such as walking, swimming, low impact aerobics, etc. should be encouraged; but high impact activities such as off-road biking, high impact aerobics, city-street running, racket ball and softball may contribute to employee MSDs.

Injury prevention and general health maintenance, particularly allergy control and sleep hygiene, should be encouraged and promoted. Making simple health maintenance literature available (such as those on websites such as Simple-Ergonomics.com and many others) will go a long way toward keeping the employee less vulnerable to work place injuries.

* ***This article is based upon work and research on ergonomics by Dr. John Gillick, Clinical Professor, non-salaried, Internal Medicine and Anesthesiology at the University of California, San Diego, where he practices Occupational Medicine and does clinical ergonomic and fibromyalgia research. Dr. Gillick is American Board Certified in Preventive Medicine with Occupational Medicine, Internal Medicine and Anesthesiology. (drgillick@Simple-Ergonomics.com)***