

Spotlight on Ergonomics: Designing Healthy Work Environments



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Today's modern workplace is dominated by an increasing presence of technology. Employees spend much of their time answering emails, writing reports, and participating in web conferences—all of which require prolonged periods of computer use. For the average worker, this has led to an increase in musculoskeletal complaints such as eyestrain, lower back pain and wrist discomfort. A recent study published in the *Journal of the American Medical Association* surveyed roughly 29,000 computer users and found that 52.7 percent were working with at least one form of daily musculoskeletal discomfort. The average lost productive time among those experiencing discomfort was more than 5.2 hours per week.

These eye-opening statistics shed light on the growing number of work-related issues stemming from prolonged computer use. More and more organizations are beginning to see the link between worker discomfort, lost productive time and cost. Proactively addressing discomfort levels therefore becomes an important business strategy.

Ergonomics Defined

Ergonomics is the applied science of fitting the physical environment to the worker. When ergonomic design principles are applied to a space, employee comfort improves, risk of injury decreases, and worker efficiency is enhanced.

Workstation design has rapidly evolved within workplaces as computer use has drastically increased across all job functions. Traditional corner workstations designed to accommodate the depth of large computer monitors are often no longer necessary as flat panel monitors have become the new standard. Research on lower back pain has taught us about the importance of movement and dynamic sitting. Developments in the area of lighting technology, combined with an improved understanding of the visual system, have had dramatic implications with respect to lighting design.

Without guidance, proper work tools, and training, however, employees tend to self-diagnose their discomforts and reconfigure their workstations themselves, often yielding poor results, some of which are even worse than those of the original, flawed configurations. This practice not only negatively impacts the aesthetics of the space, but ultimately costs organizations thousands of dollars per workstation in costly retrofits, not to mention the costs associated with worker injury and lost productivity.

Fundamental Design Challenges

Our population ranges in height from less than 5'0" tall to more than 6'6" and yet the standard work surface height is fixed at 29.5", which correlates to the seated elbow height of a 6'4" male, representing less than 5 percent of our population. Simply stated, the majority of work surface heights in modern offices are simply too high for most. As a result, employees are forced to conform their bodies to an inappropriate fixed height by shrugging their shoulders, raising their chairs, and leaning forward to type and mouse. These awkward postures require excessive muscle effort and lead to discomfort and fatigue.

Standard desk height, however, is just one area of ergonomic concern. The need to accommodate individual differences with respect to monitor positioning, lighting requirements, and chair design are just as critical. Workers should have control over their environments, including their hand and wrist position, monitor position, and individual light level. Individual control combined with high quality ergonomics training will consistently yield safe and productive workers.



Poor ergonomics. High-risk posture.

Without the right ergonomic tools, the average worker spends most of the day in a hunched-forward posture, putting strain on the back, shoulders, neck, forearms and wrists and increasing the risk of injury.



Great ergonomics. Healthy posture.

The right tools allow workers to lean back in their chairs for full back support, while also eliminating neck, shoulder, forearm and wrist stress. A comfortable, low-stress posture reduces injury risks and improves productivity.

Hand & Wrist Posture

While postural problems and their associated injury mechanisms are fairly complex, design solutions aimed at improving hand and wrist posture are relatively simple to implement. Applied ergonomics research has shown us that a 'hands in lap posture' is the ideal keyboard and mouse position for those who are able to type proficiently. Lowering the keys and angling them slightly away from the body reduces shoulder shrugging and helps to straighten the wrists. Bringing the tools closer to the body affords the user the ability to properly utilize their chair backrest. Installing an articulating keyboard support is the most cost-effective means of achieving postural improvement. Employees may respond negatively to this solution at first, either because they have had a bad experience with a poorly designed

keyboard support that interfered with their knees or because they were never shown how to properly use the device. With training, organizations can expect a 90 percent acceptance rate. Rejection rates among users without training typically exceed 50 percent. The behavioral changes required to utilize the keyboard system correctly will not occur through installation alone.

Task Seating

Selecting a chair that is easy to adjust, provides support and promotes movement is critical for maintaining healthy body posture. The typical office worker will likely spend more time sitting in his or her chair than he or she will spend anywhere else, with the exception of perhaps his or her bed. Frequent postural shifts are recommended to minimize static muscle contractions and fatigue. Today's most innovative task chairs feature self-adjusting recline mechanisms which automatically tension the backrest based on the user's body weight. These designs drastically simplify the operation of the chair and have been shown to promote movement that is critical for maintaining spinal health. Look for a chair that also has an adjustable seat pan, backrest and adjustable armrests.

Monitor Positioning

Providing computer users with flexible monitor positioning is another important strategy for maintaining high levels of operator comfort. Because we tend to look downward naturally at -15 degrees, the top line of text on the monitor should be no higher than eye level and at about an arm's reach from the body. Multiple monitor setups are challenging from an ergonomics perspective because they impact body alignment. Adjustable flat panel monitor arms can be used to aid with proper positioning and alignment and can also help to free up previously used desk space for writing or referencing tasks.

Task Lighting

Most office environments are drastically over-lit from an ambient perspective (creating tremendous energy waste), and yet are simultaneously under-lit from a task perspective. Monitors are best viewed in dimly lit settings because they emit light. Paper documents, however, reflect light and therefore require light in order to be viewed. Herein lies an obvious conflict with single-source lighting schemes for computer workstations—a single light source will not be able to provide appropriate lighting for both a monitor and paper documents. Age is a factor as well. As we get older, the corneal lens hardens and the process of accommodation becomes increasingly difficult. Focusing on near-field objects becomes increasingly challenging. By the time an individual reaches the age of 61, they require at least 250 percent more contrast to view the same documents as they did in their 20s. To solve these dilemmas, many organizations are employing a dual-source lighting scheme by lowering ambient light levels and providing users with controllable task lights. This approach has been shown to significantly reduce visual symptoms and reduce by up to 60 percent the energy requirements for lighting.

Training

Workstation design changes are often met with opposition because it is human nature to resist change. Improvements should therefore be accompanied by sound ergonomics training. Involving employees in the change process has been shown to significantly reduce injury rates and the associated lost productive time.

Widespread Benefits

Challenging your organization to design high performance work environments that accommodate 95 percent of the population will not only improve worker comfort and reduce costs, but will also preserve the original design vision of the space. Enhancing the human experience will quickly differentiate your company from the competition while attracting higher-quality candidates and resulting in higher levels of employee retention.

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