Environmental Ergonomics in an Office Workplace

Wellness

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The definition of ergonomics has expanded to include not only the physical layout of workstations, but also the environment in which workers spend their workdays.

Think of how fortunate you are to have an office job. Only a century ago, office jobs were uncommon, reserved mainly for the elite. The majority of people worked at jobs that required tedious and strenuous activities for most of the day.

It was during this time that the field of ergonomics (or human factors) was born. By applying simple biomechanical principles, early ergonomists were able to identify and combat the sources of many musculoskeletal disorders.

The classic adage by which ergonomists live is: "Fit the task to the worker." It has expanded to a more holistic definition, which includes environmental ergonomics. This extends beyond the physical layout of a workstation to the environment in which employees spend their entire working day. Environmental ergonomics in office workplaces comes with a whole new set of challenges that need to be considered.

There are three common design principles regarding the environmental ergonomics in an office workplace – climate, lighting and noise – and we will help you recognize these principles as they are implemented in your own office, offering a better understanding of how and why to address them if you observe shortcomings.

Climate

People work most productively when they are in a comfortable climate. The climate of your office either can have a positive or negative impact on workplace productivity and comfort. To better understand this, you first should realize that the climate you perceive consists of three main components: air temperature, air humidity and air movement.

Each of these components carefully needs to be adjusted to best suit the working environment. By maintaining a comfortable climate in your office, you can increase the productivity of your employees.

The best air temperature depends on the season. A range of 68-75°F (20-24°C) generally is preferable, but contrast to the outside temperature also may play a role depending on the season. For example, in the summer, an office at 68°F presents a large contrast to the outdoor temperature and may feel uncomfortably cold, and the reverse might be true for 75°F in the winter. Right around 73°F tends to be the temperature at which the majority of people feel comfortable. Depending on the size of your office, you also could experiment with the temperature, determining which temperature is preferred by the most employees.

There is less control over air humidity, although it is an easy measure to take. An increased level of humidity tends to increase the level of perceived temperature. As humidity changes with the seasons, so will the humidity in your office.

In winter, we recommend that you keep the humidity above 30 percent, while in the summer the humidity range should be between 40-60 percent. If your HVAC system allows for control of humidity, we recommend keeping it

within these ranges. Otherwise, investing in a humidifier or dehumidifier may be a cost-effective alternative to help maintain the comfort and productivity of your employees.

Air movement typically is minimal in an office setting. The recommendation is to keep drafts below 0.2m/s, which is equivalent to a light breeze. If your workstations are placed in the paths of vents or open windows, this could be exceeded. We recommend selecting an office layout that accounts for the layout of vents to minimize the effect of these drafts.

Lighting

Adequate lighting is essential for any indoor workspace. To keep costs low, it is a common practice to use the minimal amount of lighting needed for whatever task is being performed. An office work surface is considered to be a "fine work" situation, for which medium-to-high levels of light are needed, specifically in the 45-65 foot-candles (500-700 lux) range. The minimum was chosen to best enable computer workstation work, while the maximum was chosen to reduce the likelihood of glare and maintain the most beneficial contrast ratio.

It should be noted that the range of 45-65 foot-candles primarily applies to the actual work surface. Background and general lighting can be significantly lower, around 30 percent of the minimum value required for the workstation levels, e.g. 15 foot-candles. Adequate and adjustable work surface lighting then can be used to reach the workstation specific levels, which may help save on electricity costs.

Glare from surrounding light sources can be a major issue, depending on the positioning of computer monitors. You may have experienced this phenomenon before when a lamp (or the sun) behind you reflects off your screen, or maybe when the light source is in front of you, directly shining in your eyes. Not only does this impede your ability to see the screen, but it may cause you to squint, leading to eye strain, or requiring awkward postures to eliminate the effect.

The maximum recommended contrast that should exist in the field of view is 10:1. Ideally, light sources (including windows) should be positioned to either the left or right. With the line of sight perpendicular to the light source, the amount of direct and indirect (reflected) glare is reduced. Where possible, avoid the use of reflective colors and surfaces, or the use of direct lighting (versus diffuse) to minimize the chances of glare. Workstations generally should be placed away from windows due to the high contrast and glare caused by sunlight.

Office lighting is one small aspect of the office experience. Poor design and placement can reduce productivity and lead to eyestrain.

Noise

Hopefully, your office is a relatively peaceful place. Did you know that there is a comfortable range of noise that promotes concentration and avoids distractions?

The volume of a typical office usually is between 40-60 dB, and the sources of this noise range from computer fans to copy machines to people speaking around you. Generally, higher levels of noise can result in impaired alertness and annoyance both of which decrease performance. Reducing background noise, however, has been shown to reduce typing errors.

Maintaining a lower level of background noise also is important for understanding conversations you have with your colleagues or on the phone. A normal conversation typically is held at volumes between 60-65 dB. To understand speech correctly, we recommend that background noise be at least 10 dB lower.

However, even when speech is at 60 dB and background noise is at 40 dB, people typically only comprehend about 80 percent of speech. Using a separate room with minimal background noise would help maximize speech comprehension for meetings.

We recommend keeping background noise between 48-55 dB, which has been shown to reduce noise-related errors. However, keeping background noise between 54-59 dB will help mask distracting conversations. To reduce background noise coming from office equipment, we recommend moving louder equipment into a separate room that is separated from offices and cubicles. Sound-absorbing dividers and carpeting also can help reduce noise from conversations colleagues in nearby offices and cubicles are having with visitors or on the phone.

The environmental factors discussed here are one piece of the puzzle in office ergonomics. Every aspect of the work place from the chair, workstation layout, mouse, keyboard and other items should be optimally designed and positioned based on the tasks that are performed and a variety of personal factors. The goal of ergonomics is to design and set up workplaces that are free of health and safety risks, comfortable and productive.

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