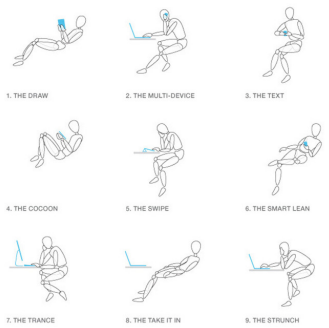
Ergonomics

Posture Support in a Changing Workplace

As technologies and trends transform work processes, understanding the impact on postures is crucial for helping people work safely, comfortably and productively.



AS TECHNOLOGIES AND TRENDS TRANSFORM WORK PROCESSES, UNDERSTANDING THE IMPACT ON POSTURES IS CRUCIAL FOR HELPING PEOPLE WORK SAFELY, COMFORTABLY AND PRODUCTIVELY.

Ever since the 1980's, the demands of computer work intensified, and ergonomic researchers focused on gaining a deep understanding of the biomechanics of sitting so solutions could be developed that contribute to a healthier day at work.

More than three decades later, office chairs have evolved from simple sitting devices to ergonomic tools that adjust to fit the size and shape of people's bodies and their work processes. Because many office workers spend up to 80% of their day sitting, body stresses and strains that affect productivity, health and wellbeing remain a focus of study and scrutiny.

While some manufacturers still advocate seating solutions that are optimized for upright and static postures, findings from an accumulating body of research conducted since the early 1990s discredits that approach. As Professor Dr. Peter Vink at TU Delft (Delft University of Technology) in The Netherlands, states: "We know that a 'static upright sitting' point of view is harder to defend as there is evidence that reclining postures reduce the load measured in the intervertebral discs."

Another ergonomics researcher, Peter Johnson, associate professor of Environmental and Occupational Health Sciences at the University of Washington, shares a similar point of view: "One of the goals in modern ergonomics is to promote posture variability, as we now know being constrained to one posture, even if comfortable, can be detrimental to the health of certain structures in the body," he says.

A truly ergonomic office chair must simultaneously support the body and provide unrestricted natural movement. This reality has become even more important because of profound changes now occurring in how people work and the tools they use. Instead of spending most of the workday in one chair at one desk using one computer to do one-person work, many people now shift rapidly between individual, focused tasks and collaboration with others. Instead of working in cubicles, they are often in open-plan or team settings, turning frequently to engage with others or see information on whiteboards, monitors and walls.

The highest-impact change that's affecting work processes is technology. Instead of using just a desktop PC, many workers now use multiple devices — laptops, tablets and smartphones — throughout the workday. According to research conducted by the RJI Insight & Survey Center, the percentage of U.S.

adults who use both smartphones and tablets more than doubled between 2012 and 2013, increasing from 21% in to 46%.

Whenever work, work tools and/or the workforce significantly change, it's important to rethink how the fundamentals of ergonomics apply. To reassess the office chair from the perspective of current realities, Steelcase researchers released a global posture study in 2013, observing more than 2,000 people in 11 countries who worked in a range of work settings. Their next step was to systematically characterize the changes they observed and analyze the impact in order to gain insights into ergonomic support for people at work today.

THREE MAJOR INFLUENCES ON POSTURE

TECHNOLOGY

A key finding of the Steelcase posture study was that newer, smaller touch- based technologies — i.e., smartphones and tablets — are dramatically changing work postures. With devices in hand, people shift between tasks and devices, creating unprecedented variability in postures. Of the 30 different postures that Steelcase researchers observed, nine were entirely new. On the surface, this could be perceived as healthy, since prolonged static sitting is known to be potentially harmful. However, the researchers determined that many of the postures driven by the new smaller devices were causing pain and contributing to unhealthy stresses and strains on the body.

PHYSIOLOGY

Another influence that Steelcase researchers identified is changing workforce demographics. An increase in globalization plus rising obesity trends in both North America and Europe are bringing greater physical diversity into the workplace.

SOCIOLOGY

A third influence that the researchers observed was generational. With five generations now in the workplace, there is greater diversity in postural preferences, from casual reclined to formal upright — and everything in between.

Informed by these insights, the Steelcase team saw a significant opportunity to improve how bodies and chairs interact when people are shifting positions and technologies. Because bodies at work are moving

more than ever before, for proper support their chairs need to move with them in an integrated way.

In particular, the researchers realized that the interface between the body's core and limbs and the chair needed to be reassessed.

SUPPORTING THE CORE:

A SYSTEMIC APPROACH

Ergonomists have recognized for decades that a healthy solution to prolonged sitting is a highly supportive chair that enables users to effortlessly change postures, from upright to reclined, regardless of their size. This can help reduce the static load on the spine. In addition, a backrest that changes shape, mimicking the way the spine changes shape, benefits the user by providing continuous contact and support.

Past research has shown that when people remain in one position, muscles and ligaments supporting the back and become fatigued. In contrast, every movement transfers support of the upper body to new muscles and ligaments, allowing the strained ones to relax and recuperate. As a result, people will feel less fatigued. Researchers have also shown that motion is important for distributing nutrients. Similar to a sponge transferring liquid in and out through compression and release, changing the position of the body pushes used fluids out of the discs and draws in fresh nutrients.

As an integrated system, people's bodies move in an interconnected way, and the recent Steelcase posture study amplified an important insight: When people are moving often in their chairs, optimal support is achieved when the chair seat and back are connected and also move in a synchronized way, providing consistent core and lumbar support.

The posture study also revealed that an effective chair backrest for today's workers needs to support a broader range of postural preferences

SUPPORTING THE LIMBS

With new technology devices in the workplace, the Steelcase posture study confirmed that people move their arms much more and in different ways than when they are simply keyboarding at a desktop computer. These observations, in correlation with recent findings from ergonomics researchers, determined that a new design approach for arms and armrests was particularly important from an ergonomic standpoint. Among office workers, shoulder and neck discomfort are one of the most

common complaints, often referred to as cumulative trauma disorders (CTDs), repetitive strain injuries (RSIs) or work- related musculoskeletal disorders (WMSDs). Over the stretch of a day's work and especially when repeatedly performed day after day, muscular stress and strains can accumulate and may ultimately lead to discomfort and/ or injury. "For the arms, the literature is clear about cumulative trauma disorders," notes Professor Vink. "Repetitive movements of the arms and hands in awkward positions can lead to disorders and pain."

Moreover, inadequate arm support may cause people to sit in ways that eventually cause discomfort elsewhere, especially in the neck and shoulders. Lack of arm support may also exacerbate injury caused by leaning on sharp worksurface edges.

Unlike keyboards and laptops that promote relatively upright postures and symmetry between the arms, newer touch-based devices are causing work to become asymmetrical and also contributing to excessive neck flexion. Both these conditions point to the need for a more adaptive approach to arm

support and a greater range of motion.

Based on his work in ongoing work in upper-body occupational ergonomics, Professor Johnson has noted that "the forces and stresses on the body, muscles and joints can be magnified when asymmetrical work is not properly supported."

Proper ergonomic arm support requires products sized to users, ensuring maximum arm-to-armrest surface contact. This is particularly challenging and important for global products because body dimensions can vary widely in different parts of the world.

Historically, the elbow rest height has determined armrest height range, and the hip breadth dimension has determined the distance between the armrests. Using Caesar anthropometric data as the body measurement sampling and including applicable allowances, a 5th percentile male requires a distance

between arms of 13.3" and a 95th percentile female requires 20.6". Fitting to this range is an important benchmark, especially given the broader range of body diversity among today's workers.

For conventional keyboard use, ergonomists have long recommended that arms be supported naturally from the shoulder, close to the body, avoiding unhealthy abduction of the shoulder, forearms and/or wrists.

This means that armrests should adjust sufficiently in from the edge of the seat pan to support smaller users. Additional width adjustment range also enables better support of smaller, handheld devices by allowing them to be brought to proper eye level, avoiding awkward postures and unhealthy neck flexion.

THE BOTTOM LINE :

A REVISED SCIENCE OF SEATING

Effective chair design starts with understanding the science of seating and the interface between human bodies and their chairs. Different types of work require different solutions, and concepts of dynamic support in chair design are evolving to keep pace with changing work processes and tools. New devices have created corresponding body postures that require a different kind of ergonomic support, opening new opportunities for increasing the health and wellbeing of users. As new technology devices,new demographics and new work processes continue to create a new body language of work postures, the need to actively support workers in chairs that move as their bodies move has become more complex, as well as more important than ever.

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