TRAVELERS Risk Control

Ergonomics of Alternative Keyboards

When you shop at the store or online for a new computer keyboard, you are likely to see a wide variety of different designs and styles. Since the late 1980s, purchasers have sought to understand the choices in keyboard design. Which keyboard designs provide improved postures? Is one easier to use than another? Why is one flat and another split? This article provides answers to these questions and guidance to help you make the best choice for your needs.

Risk Factors That Impact Keyboard Usage

Posture: Improper posture involving prolonged, non-neutral positions of the joints may stretch, compress, and/or stress nerves, tendons or other tissues.

Repetition: When increased repetition exceeds the ability of the soft tissues to recover from this exertion.

Prolonged static exertion: Involves the sustained, active holding of a posture or a position.

Forceful exertion: Is a risk factor when muscle capacity is exceeded as a result of an activity (e.g., pressing keys harder than needed).

Localized mechanical stress: Results from pressure on external surfaces such as the sharp edges of a keyboard or desk.

All of the above risk factors have contributed to new keyboard designs aimed at improving posture of the fingers, hands, wrists and elbows. Keyboard models listed in this bulletin are all laid out in the usual “QWERTY” pattern.

Alternative Keyboard Designs

Split keyboard: Focuses on reducing hand and wrist ulnar deviation. On a conventional keyboard, the wrist is bent toward the little finger. This position causes fatigue of certain muscles, increased friction to some tendons, and adds pressure to two major nerves located in the wrist area. Split keyboards address the bent wrist through two different designs: (1) a fixed split design that aim the keys toward the elbow and (2) a design that has an adjustable hinge allowing the user to set the desired angle. Users often comment on a drop in speed and accuracy, which is normally regained within a day or two of use.

Tented keyboard: This design takes the split keyboard design one step further. The idea here is to minimize another deviation called pronation. Pronation involves rotating the hands inward toward the thumbs, thus twisting the forearm. Tented keyboards allow the user to adjust the vertical tilt of the split keys to minimize pronation. This style is seen as a moderate advantage over conventional keyboards.

Negative slope keyboard: Has extendable legs at the front of the keyboard rather than the traditional rear legs. This design is aimed at reducing another form of deviation called wrist extension by allowing the user to adjust the backward slope of the keyboard. Bending the wrist back has been proven to reduce the diameter of the carpal tunnel, increasing pressure on the median nerve and, in some cases, causing the forearm muscles to work in a shortened form. These alternate keyboards are often selected for an improvement in wrist posture, reduced arm fatigue and greater comfort.

Supportive keyboard: This keyboard has built-in wrist or palm rests. They encourage the user to straighten wrist posture and help to avoid sharp or hard edges of the keyboard and furniture. Fluid pressure in the carpal tunnel has been known to increase when constantly resting the wrists on a rest. Typists are encouraged to use the rests while pausing and not during typing to minimize the rise in carpal tunnel fluid pressure buildup.

Scooped keyboard: Keys in this design are arranged in a bowl-like shape, bringing the keys slightly closer, thus requiring less reach, and allowing for an additional row of keys that will reduce movement of the hands to other parts of the keyboard. There is no published research to support the effectiveness of this design.

Tips for Selecting an Alternative Keyboard

- Evaluate the technology and the compatibility with existing computers.
- Evaluate the fit with your existing environment.
- Consider sales, service and maintenance issues.
- Choose the features that meet the ergonomic needs of the user and their job.
- Consider if the user is a touch typist or a hunt-and-peck typist.
- Evaluate if the job requires a numeric keypad.
- Evaluate the keyboard's comfort on a trial basis for at least 2 days due to the learning curve involved with new shapes.
- Users should be trained on the proper use of a new keyboard.
- New designs might cause new problems that you need to keep an eye on.
- Contact the user frequently and get updates.
- Mechanical variations that might affect typist behavior are the length of travel for the key, the force required to depress keys, and an audible click when a key is depressed.

Beyond Alternative Keyboards

- Programmable keyboards are more common now. This design allows the user to reassign keys to bring often-used keys within closer reach.
- The use and the effectiveness of voice recognition software has increased greatly over the last 10 years. The Travelers Human Factors and Ergonomics group recommends this improvement when appropriate.

Conclusion

Anyone considering the use of an alternative keyboard should understand the pros and cons of each design. Evaluate the need based on the environment, the user and the job. More importantly, look at the whole ergonomic comfort picture, which includes the entire workstation design, the nature of the job, the user's physical condition and other non-job related factors.