

# A guide to Healthy Computing

How to reduce costs and improve  
productivity in the workplace.

# Contents

Why Ergonomics Matter .....	3
An Industry Leader for More than 25 Years .....	4
Products Designed to Fit Naturally .....	4
Building a Comfortable, High-Performance Mouse .....	5
How to Choose a Mouse .....	6
Building a Comfortable High-Performance Keyboard .....	7
The Comfort Curve Option .....	7
How to Choose a Keyboard .....	8
Compact Keyboards for Traveling and Mobile Computing .....	8
Setting Up a Desktop Workspace .....	9
How to Set Up a Laptop Workspace .....	10
Looking Ahead and More Information .....	11

# Why ergonomics matter

**How users sit, type, swipe, point, and click—and the products they use to do these things—can affect daily performance and long-term health.**

Odds are you and your employees spend quite a bit of time at a computer, whether at work or at home. And while you may not think of computer work as something that is physically demanding, the truth is, an improperly designed workspace can cause neck, shoulder and back pain, eye strain, headaches, poor circulation in the arms and legs, fatigue, and in many cases even debilitating Repetitive Strain Injuries (RSIs).

Costs associated with workplace injuries can be high. Altogether, RSIs represent 62 percent of all North American workers' compensation claims and result in nearly \$15 to \$20 billion in lost work time and medical claims each year, as reported by OSHA.

One study found that 50% of participants reported RSIs during the first year of their new job; 68% of the reported RSI symptoms were deemed to be severe enough to be classified as a musculoskeletal disorder.<sup>1</sup>

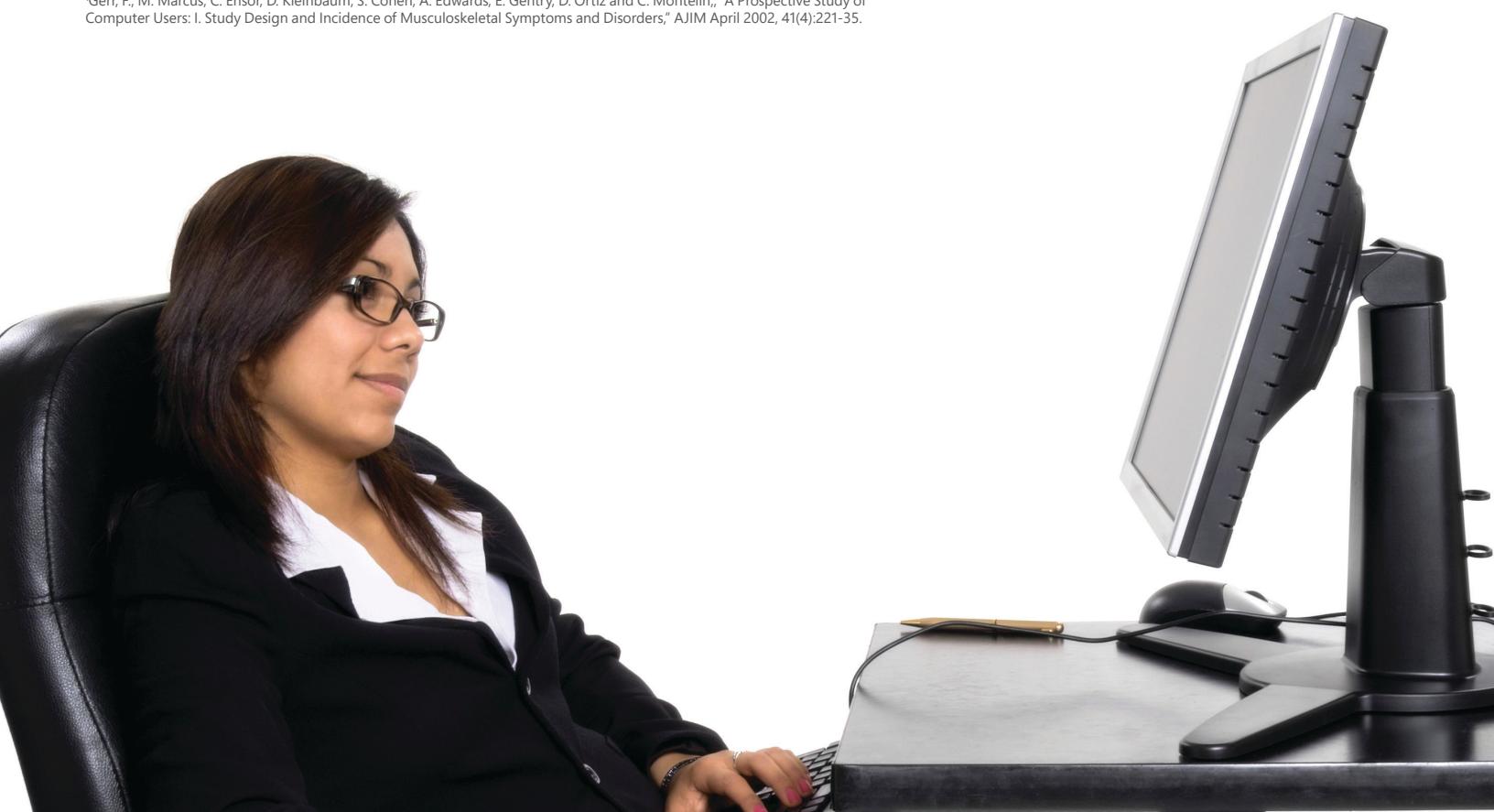
Fortunately, there are ways to prevent or mediate the discomfort and injuries that can be associated with computer use, such as using computer peripherals that are ergonomically designed.

Ergonomics is the science of designing products and systems to optimize human well-being and performance. Ergonomists draw on many disciplines from physiology to biomechanics and industrial engineering to design products that are safe, comfortable, easy to use, and help improve perform while still look aesthetically pleasing.



Working on your computer with the wrong products and posture can result in pain, fatigue, and sometimes even debilitating injuries.

<sup>1</sup>Gerr, F., M. Marcus, C. Ensor, D. Kleinbaum, S. Cohen, A. Edwards, E. Gentry, D. Ortiz and C. Monteith, "A Prospective Study of Computer Users: I. Study Design and Incidence of Musculoskeletal Symptoms and Disorders," AJIM April 2002, 41(4):221-35.



## An industry leader for more than 25 years

Microsoft® has a long history of leadership in the PC peripherals industry, bringing the world such breakthrough innovations as:

- The first ergonomically designed mouse,
- Fixed ergonomic keyboard layout,
- Mouse scroll wheel integrated with desktop software,
- The padded keyboard palm rest,
- And the optical mouse sensor to name just a few.

Today, Microsoft continues to hold a leadership position in the input device industry in the design and production of ergonomic mice and keyboards with more than 200 patents and numerous industry awards. The company not only designs and manufactures world-class ergonomic PC peripherals, but also provides thought leadership for the industry.

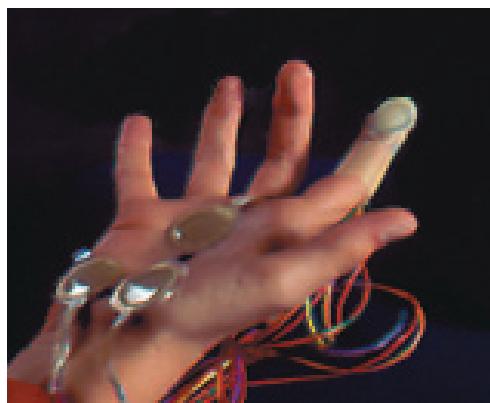
In fact, the company's ergonomists are members of ergonomic associations and consortiums worldwide, including the Office Ergonomics Research Committee, which funds research into how ergonomics improves health in the workplace.

## Products designed to fit naturally

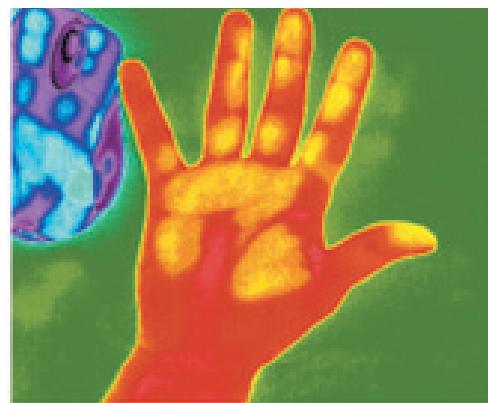
When you consider the fact that the average user has their hands on a mouse or keyboard for more than six hours a day, properly designed products are more important than ever.

Microsoft designs tools such as ergonomic mice and keyboards to help you spend time at the computer comfortably, for long periods of time. The company's products undergo rigorous design and testing processes conducted by an on staff Certified Ergonomist. Using state-of-the-art tools such as pressure sensor gloves and infrared thermography imaging that records the various amounts of heat given off by the body, we are able to create products that work seamlessly with your body's natural posture and functions.

Only those products that have a clinically proven ergonomic benefit are granted a distinguished "Ergonomist Approved" stamp. This might seem like a lot of trouble to go to for something as utilitarian as a keyboard or mouse, but Microsoft is passionate about building products that make your life easier, safer, and more comfortable.



Pressure Sensor Glove



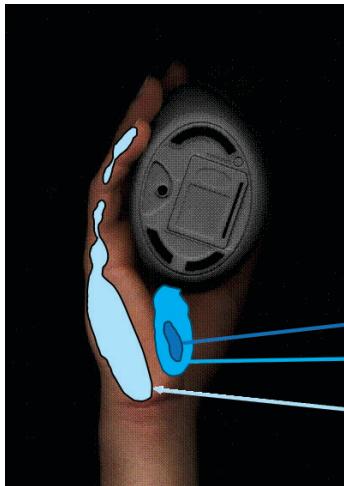
Infrared Hand image

# Building a comfortable, high-performance mouse

Designing input devices that allow users to comfortably and effectively scroll, point, click, and select requires a great deal of precision and expertise. Microsoft goes to great lengths to ensure that its mice not only provides efficient, precise control, but also feels good doing it, whether in light use or for long stretches at a time.

Microsoft has combined some breakthrough ideas in mouse comfort with some of the concepts that have made the Natural® line of keyboards so successful. One key benefit is that it helps to get the sensitive area of the hand out of contact with the desktop.

## Natural Wireless Laser Mouse 7000



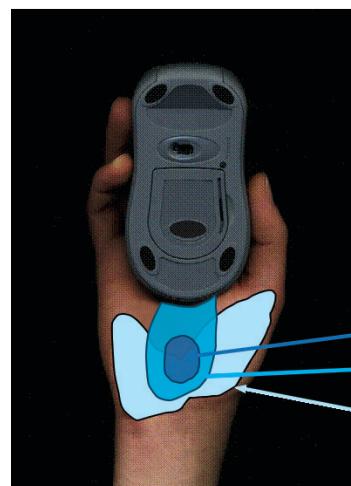
- Designed to promote a more natural posture and to relieve pressure on carpal tunnel area.
- No contact in sensitive area

Carpal Tunnel Pressure  
Sensitive to External Force

- Very High
- High

Hand Contact Area

## Traditional Mouse



- Traditional mouse posture can result in pressure on carpal tunnel area.
- Contact in sensitive area

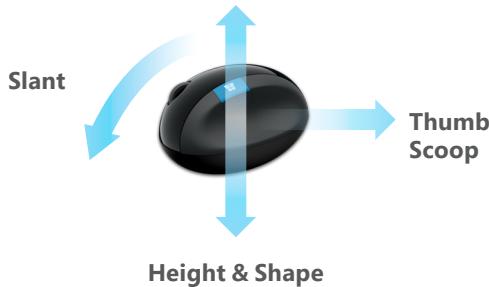
Carpal Tunnel Pressure  
Sensitive to External Force

- Very High
- High

Hand Contact Area

The Natural Wireless Laser Mouse 7000 pictured above is an earlier generation of the ergonomic mouse. The design has evolved over time to produce multiple ergonomic mice, most recently with the Sculpt Ergonomic Mouse. It has been designed from the ground up to fit the relaxed posture of the hand. The unique baseball-like size provides just the right amount of surface area for the palm to rest on comfortably. And the elevated thumb scoop and the curves on the top of the mouse encourage a vertical wrist posture that reduces carpal tunnel pressures and reduces the effort required to hold fingers straight over the buttons.

In addition to its shape and size, software innovations improved the already popular scroll wheel with an accelerated scrolling option that increases scrolling speed 28 percent on average for three or more pages.



**Height & Shape** - The baseball-like design creates a neutral, relaxed posture for the wrist.

**Slant** - Provides correct wrist posture to help lower carpal tunnel pressures.

**Thumb Scope** - Aids in guiding the hand to an ergonomically correct resting position, aligning the wrist and forearm.

### Did you know?

**Microsoft is one of the few peripherals manufacturers that employs an in-house ergonomist to help design, test, and certify its products.**

# How to choose a mouse

No one mouse is perfect for every situation. Here are a few things to consider:

- **Wired or wireless.** A wireless mouse provides more freedom and less clutter on the desktop. However, a wired mouse is simpler to set up and requires no batteries.
- **Comfort.** A good mouse design pays attention to things like rubber side grips for ease of use, thumb scoops that fit the contours of the hand, and undercuts that make the mouse easy to pick up.
- **Size.** Users should be able to reach all the buttons without straining or arching their fingers, which can lead to fatigue and carpal tunnel syndrome. Smaller mice are good for confined spaces and also pack well into a briefcase for travel, while larger mice tend to have more ergonomic benefits and are ideal for a desktop workspace.
- **Surface.** If used on work surfaces such as conference or coffee shop tables or airport chairs, consider using a mouse that has BlueTrack® technology. Microsoft's BlueTrack technology has the precision of laser tracking, allowing use of the mouse on virtually any surface.
- **Left- or right-handed.** For left-handed users, look for a computer mouse with a neutral shape and programmable buttons, or one that offers dual-hand operation.
- **Brand reputation and support.** Consider the reputation for quality, software compatibility, reliability, and support offered by the manufacturer.
- **Notebook.** An external pointing device is recommended for use with notebook computers according to a study<sup>2</sup> performed by the Human Factors and Ergonomics Society following the differences in usage patterns between desktop and notebook computer users. One of their most profound findings was that notebook users who used an external pointing device reported a lower incidence of pain when compared with notebook users who used only the notebook's internal pointing device. Microsoft offers a variety of comfortable, portable and convenient notebook computer mice. Notebook-sized mice can also be beneficial for those with smaller hands. For example, research published in 2007 found benefits for right posture, forearm muscle activity and performance for children using a child-proportional mouse (a commercial notebook mouse).<sup>3</sup> Users are then likely to have less extreme postures when using a mouse that fits their hand size.

## Recommended Microsoft mice



Sculpt Ergonomic Mouse  
for Business



Microsoft Wireless Mobile  
Mouse 3500 for Business



Microsoft Wireless Mobile  
Mouse 4000 for Business



Microsoft Comfort Mouse  
4500 for Business



Microsoft Comfort Mouse  
6000 for Business



Microsoft Comfort Mouse  
3000 for Business

<sup>2</sup>Sommerich, C., "A Survey of Desktop and Notebook Computer Use by Professionals," Proceedings of the Human Factors and Ergonomics Society, 2002, 46th meeting, pp. 1124–1128  
<sup>3</sup>Johnson, P., Blackstone, J. (2007) Children and gender – differences in exposure and how anthropometric differences can be incorporated into the design of computer input devices. SJWEH Suppl. 2007; (3):26-32

## Building a comfortable keyboard

From the time the traditional QWERTY layout was developed in the early 1870s, people have tried to improve on the keyboard, generally without much success. It was Microsoft that brought the ergonomic computing to the masses with the Microsoft Natural Keyboard, in 1994. Not only is its "split" keyboard more comfortable to use and just as efficient as a straight keyboard, it also significantly reduces one of the risk factors associated with RSI—awkward posture. That's because the layout encourages a more natural wrist, hand and arm position.

Over the years, Microsoft has continued to refine and expand its keyboard designs, adding features to make users more productive and to fit personal computing styles. For instance, the company's ergonomists have identified the functions people use most, and integrated those into our keyboards. That's why you'll find shortcut keys like a search button, forward and back keys, and media keys on some of the keyboards.

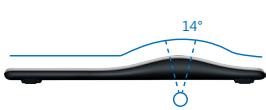
Other advances in the split keyboard include an increased gable angle, a padded palm rest, a palm lift, curved key bed, and a natural arc design.



Microsoft Sculpt Ergonomic Keyboard

### Gable Angle

Designed to put arms, wrists, and hands into a better position and use a more natural handshake posture while typing.\*



### Natural Arc

Adds a gentle curve to the key layout to support fingers of different lengths.



### Palm Rest and Lift

The rest helps prevent wrists from dropping too much while typing and reduces contact pressure while hands rest on it. While the removable palm lift provides reverse tilt to the keyboard which helps wrist extension.



## The comfort curve option

The split keyboard is a great idea backed by powerful science, but not everyone has the same perception of what's comfortable. Some people still prefer a straight keyboard. That's why Microsoft introduced the Comfort Curve concept.

A Comfort Curve keyboard is a hybrid between a traditional straight keyboard and a split keyboard. Rather than the 12-degree curve of a Microsoft Natural keyboard, Microsoft built the Comfort Curve with a 6-degree curve. And instead of being split into two distinct halves, the keys remain in one contiguous arc. By doing this, Microsoft was able to produce a keyboard that provides some ergonomic benefits of improved posture and comfort, but with a more familiar look and feel. The results speak for themselves. In a Microsoft survey, 94 percent of Comfort Curve users said they would recommend it to their friends and family.

### Covered Key Bed

Allows keys to remain in a contiguous arc, rather than being split into two distinct keyboard halves.



\*Natural Ergonomic Keyboard 4000 shown.

# How to choose a keyboard

There are many great options for keyboards. Here are some things to consider:

**Wired or wireless.** A wireless keyboard provides more freedom and less clutter on the desktop. However, a wired keyboard is simpler to set up and requires no batteries.

**Comfort.** There are three main types of keyboards: split, curved, and straight.

- Split keyboards are the least stressful on hands and wrists, but they do take some getting used to. If long term use of the keyboard is necessary though, it might be worth making the transition to spare wear-and-tear on tendons and muscles.
- A curved design combines some of the familiarity of a straight keyboard with some of the ergonomic benefits of a split keyboard.
- And a straight keyboard, with or without palm rests, has a traditional feel *without* the ergonomic benefits of a split or curved design.

**Size.** If the keyboard is going to be used in a work environment where the user spends a lot of time, they might want to choose a larger, more ergonomically designed keyboard. However, for traveling and mobile computing, a compact keyboard without the 10-key pad is easy to pack and still provides some ergonomic benefits.

**Brand reputation and support.** Consider the reputation for quality, software compatibility, reliability, and support offered by the manufacturer.

## Compact keyboards for traveling and mobile computing

In an increasingly mobile business world, it is important that employees are aware of the ergonomic options on the go. Whether on the road, in the air, or working in a hotel room, there are ergonomic keyboards available to increase comfort and productivity. Keyboards such as the Arc Keyboard and the Bluetooth Mobile Keyboard 6000 are small and compact so your employees always have an external keyboard to bring with them while traveling.

Ultimately, no single keyboard is ideal for everyone and users need to choose the keyboard that works best for him or her. That's why Microsoft offers a variety of ergonomic keyboard designs to suit various preferences in terms of size, shape, and configuration.

**Recommended Microsoft desktop sets and standalone keyboards**



Microsoft Sculpt Ergonomic Desktop



Microsoft Wireless Comfort Desktop 5000



Microsoft Sculpt Comfort Desktop



Microsoft Natural Ergonomic Keyboard 4000 for Business



Microsoft Comfort Curve Desktop 3000 for Business



Microsoft Comfort Curve Keyboard 3000 for Business

### Did you know?

Microsoft is the number 1 best-selling brand of ergonomic keyboards.<sup>4</sup>



Microsoft Arc Keyboard

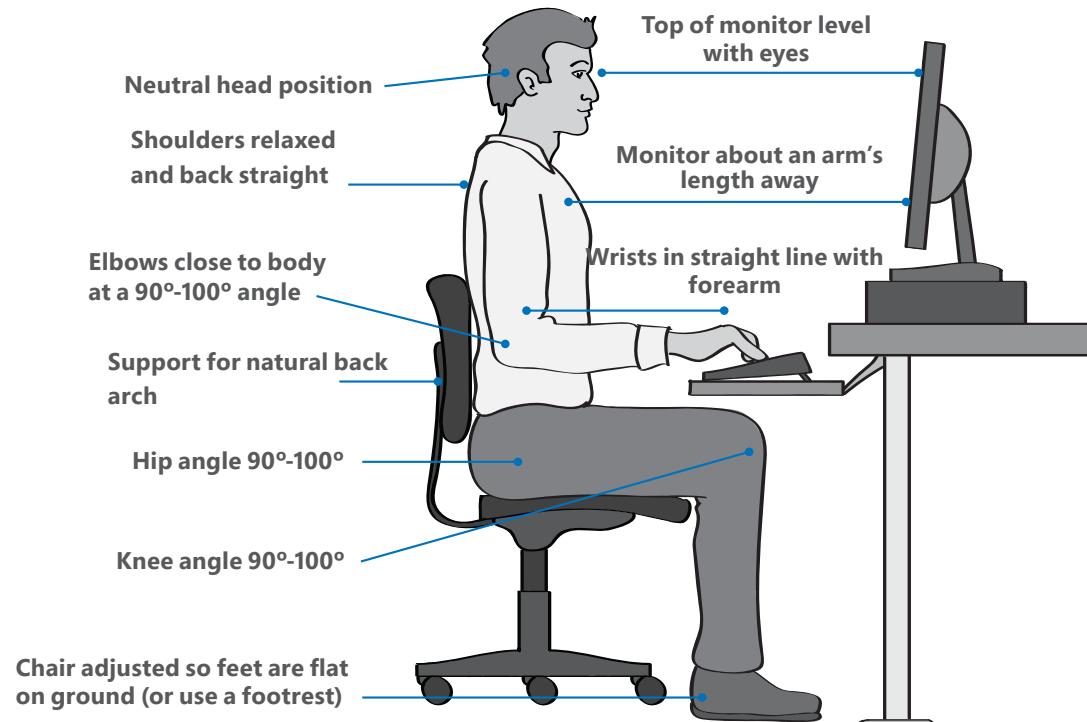
<sup>4</sup>GfK Panel Market, Sales Value 03/2005 - 10/2012 in Germany, U.K., and France. 11/2010 - 10/2012 in China (Beijing, Shanghai, Guangzhou, Chengdu, Wuhan, Shenyang, Xian), The NPD Group/Retail Tracking Service, 10/2009 – 10/2012 in U.S.

# Setting up a desktop workspace

A solid ergonomics program that includes thoughtful keyboard and mouse selection can help you take advantage of the potential cost benefits discussed earlier. When users are working at a desk it is important to avoid awkward postures and to position their body correctly. This can improve their overall productivity and also help you reduce costs associated with RSIs.

Here are some tips you can provide employees on how to properly set up an ergonomic workstation.

## Proper desktop position



Here are some other tips your employees should remember:

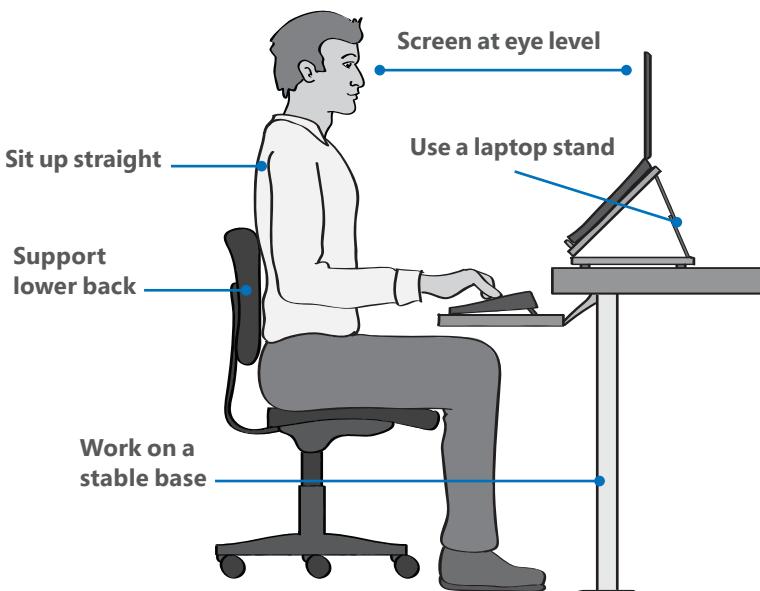
1. **Take frequent breaks.** Stand up and stretch, walk around, or at least change the type of task they are working on, like from typing to reading.
2. **Use software and hardware features** like fast scrolling and keyboard shortcuts to work more efficiently.
3. **Avoid glare** by placing their monitor away from light sources that produce glare, or add window blinds to control light levels. Ideally the monitor should be 90° from the light source, such as a window.
4. **Keep wrists in line with their forearms** and not bent upwards, downwards or to one side or the other.
5. **Do not use wrist rest areas** while typing. These are for resting on when you are not typing.

# How to set up a laptop workspace

Laptop technology was not designed to replace the existing PC workstation, but today many business professionals use laptops as an alternative to a desktop computer. When they are used daily in place of a desktop, laptops can increase the risk of developing RSIs or can make existing symptoms worse.

One key reason is that, because the keyboard is attached to the screen, it is not positioned at eye level. As a result, the user has to either place the screen too close to their eyes or stretch their arms to reach the keyboard. **The use of a separate keyboard and mouse can be key** to improving comfort while using a laptop. Even while traveling, it's a good idea to use an ergonomically designed travel keyboard to promote a more natural body posture.

Here are some other solutions to minimize the risks associated with laptop usage:



## More tips:

1. **Use a pillow**, pad, or even folded towels to raise the chair high enough so that elbows are level or slightly higher than the keyboard.
2. **Bring a power cable** to increase the brightness until it's comfortable to reduce eye strain and prevent the tendency to lean forward.
3. **Be sure to carry the laptop** and accessories in a bag that has a wide, padded strap to distribute the weight comfortably.

## Improper laptop position

Here are a few things to avoid if a proper chair, desk, or even external input devices are not available while on the road.

- **Shoulder hunched**
- **No back support**
- **Bent legs can cut off circulation**
- **Limbs not at 90°-100° angles**
- **Head and chin tilted beyond a neutral position**
- **Screen below natural eye level**



## Looking ahead

The Microsoft team of ergonomists and usability experts continually look forward, searching for new designs and technologies and striving to make the computing experience more comfortable, intuitive, and productive. From reducing the number of keystrokes to facilitating proper hand and wrist postures, ergonomics at Microsoft is one of the most important design considerations in the development of new PC accessories.

For more information on Microsoft ergonomically designed devices visit: <http://www.microsoft.com/hardware/>

## Need more information?

For more information on the costs of repetitive strain injuries, and how to avoid them, visit: <http://www.Healthy-Computing.com>.

For Microsoft ergonomic products visit:

- Keyboards - <http://www.microsoft.com/hardware/en-us/ergonomic-keyboards>
- Mice - <http://www.microsoft.com/hardware/en-us/mice>





<http://www.microsoft.com/hardware>

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