

Computer Mouse Fatigue: (Getting M.A.D. with your Mouse)

Why it occurs:

Tips for getting relief

It's the 4:30 pm in the office, near the end of the day and you have been word processing, doing web-based research and firing off emails all day. You don't even notice that you are rubbing your wrist and if you look around the office you'll see others are doing the same or massaging fingers. This is Computer Mouse Fatigue and, if you are lucky, right now, it is an ache and not a condition.

There is a lot of misunderstanding about RSI; it happens to those who have an arm weakness, that it is an illness or you have to be a computer nerd on the computer all day. Many non-nerds are at computers all day, which is why in Holland office computers switch themselves off after 6 hours of accumulative use, by law! RSI is the collective name for symptoms that can be associated with deterioration of the musculoskeletal system. Clinical onset RSI, where there is an underlying illness, should be differentiated from Mechanical Onset RSI (MORSI). It could be anticipated in the absence of the mechanical wear people unwittingly expose themselves to when using computers that they could be MORSI symptom and problem free. When you understand the extent of the physical load (work) you are asking your mousing arm to perform you'll realize that fatigue and MORSI are not simply bad luck. Neither are they your problem because you think you work too hard. MORSI, from the understanding that we have today, for many is a mechanical inevitability. While you continue to mouse with a design that has not fundamentally changed since the 1960's and your work habit assumes your mouse can do you no harm or you are just unaware of the clinical evidence that is around today, your risk and exposure to MORSI will remain high. MORSI affects millions of people around the world and costs employers and insurers billions of dollars. But not one dollar of the billions spent has made or can make an injured arm whole again. The costs in human suffering, pain, employment anxiety and even self-esteem, are immeasurable. MORSI, by procedural modification that employs best-known practice, can be avoided. In Sweden MORSI is called Mouse Arm Disease:

Please Don't Get M.A.D!

GRIP:

Presently all computer mice except one, The Designer Appliances Inc, Quill™ Mouse, require you to apply a constant grip in order to point and move your screen cursor. While we seldom look at ourselves in these terms, our bodies are mechanical devices and are subject to the same physics that wears out a car if it is not maintained properly. Unlike car parts, arms are not so easily replaced. Biomechanics, the science that understands the mechanical activity of muscles and bones and can measure it using numbers, tells us that a one-ounce force applied by the thumb tip puts ten ounces of pressure on the joint at the base of the thumb. One ounce is very little and fingers and thumbs, when gripping a mouse, can and typically do, apply much more. But if just one ounce of grip is applied (each second) for a total of three hours a day, it is equivalent to 6,700 lbs of grip (if it were all applied for one second) or 3.38 Tons of 'mouse grip' a day, some 750 Tons a year. We were designed to occasionally climb trees, not hang from them!

Vertical Mice & Ergonomics:

The, so-called, ergonomic vertical mice seem like a good idea. But are they when you look at the work that the hand is required to do and are not just focused on one design aspect, that of hand position? Untwisting the wrist is a good thing, as it eliminates muscle tension created in the forearm. But it does not solve or address muscular issues in the fingers and hand. Untwisting the wrist at a cost of increasing the amount of grip required by fingers and the thumb so as to hold the device may not actually be a good thing. Even wrist twisting palm down mice bore most of the weight of the hand on the top of the mouse, with the thumb and pinkie finger providing most of the grip. Some vertical mice require extra grip to provide accuracy and control or just because the hand now has to support itself, as it is no longer resting on the mouse. This can be demanding for those who have hand injuries and for those who don't it is likely to contribute

further towards the imbalances that can occur between the muscles that open and close the hand, which will be explained below.

One patent called “ergonomic computer mouse” states: “so that said mouse is securely gripped between thumb and fingers, and is easily maneuvered by flexing the straight fingers and the thumb, and the hand is in a relaxed untwisted, and naturally upright position.” Part of the patent objective cited is: “A hand holding the ergonomic computer mouse will be in a naturally upright and relaxed position, without requiring twisting of the hand, wrist or forearm. As a result, fatigue, discomfort, and pain are minimized or eliminated even after a long period of continuous use.”

These are impressive claims, yet the manufacturer, in marketing the product, simply states that the product untwists the wrist and is more comfortable and that it is patented of course! Questions that biomechanics’ might ask are; can a muscle that is working, as in gripping, be considered as being physically relaxed? Will constantly and securely gripping any object, for long and continuous periods, eliminate fatigue and discomfort and remove pain?

A general question; can any individual of any background whatsoever have an idea that they call ergonomic and successfully patent it? The answer to that question is yes. The Patent process is to give individuals who have a novel and valid idea, an opportunity to exploit it for themselves: it is a form of legal monopoly. It is not the role or purpose of any Patent Office to validate the technology or substance of patent claims. They are there to check that claims are not obviously improbable or already disclosed by comparison of the patent claims to published literature that they find at the time of the application. To qualify for a patent the claims must be novel, which is to say they have not been made public before. Anecdotal and an example of a singularly dimensioned patent: In 1976 a patent was granted on a “Safety Ashtray”, which was a novel invention in regards to the protection of the user from the risk of fire at the time of smoking a cigarette. By treating this one aspect in isolation and ignoring the bigger picture, it could be imagined that corporate sales are less than the inventor might have anticipated!

This all leads to the point that there are gray areas as to who applies the term ergonomic to any product and what is the qualification for the use of the term. One University Professor publicly stated at an ergonomics conference recently that the term (ergonomic) does not always relay a reliable standard by which to judge the benefit of a product. This was concluded as being due to the abuse of the word; he was holding up an allegedly ‘ergonomic alarm clock’ at the time.

There appears to be a pound of opinion for every ounce of fact and so in the absence of any defining standard some design vertical mice that need to be gripped while others, notably authoritative bodies, advise the use of less grip. The possibility to design a mouse that does not require grip is only recently known. Pascarelli and Quilter, in their book, Repetitive Strain Injury, A Computer Users Guide (John Wiley & Sons ISBN 0-471-59533-0) in 1994 gave advice (on page 182) that you should hold your computer mouse loosely, not to rest your wrist or forearm on the mousing surface and use your whole arm and shoulder to move your mouse. In 1996, (filed months after the book came out in 1994) the patent referred to was granted. In 1998 the US Government amended the Rehabilitation act, which is discussed in more detail below. The 1998 amendments set a definitive standard that includes untwisting the wrist, but also that a mouse (input device) should not pinch or require excessive grip. It is interesting that this standard, which seeks to enable the disabled, could also be applied so that it might protect many, currently, able-bodied computer users. It is also interesting that of the hundreds of mouse products that are on sale, there is only one, Quill™ Mouse that is registered on the site as meeting the criteria.

CLICKING:

Clicking your mouse uses some of the smallest muscles of the body, those in the fingers. Word processing can easily require pressing or clicking the mouse buttons 3,000, 4,000 even 5,000 times a day. Add in hours of web surfing on top, which is mostly mouse work, then maybe 10,000 clicks a day are possible, even normal for some. In a year this is well over 2,000,000 plus clicks, based on a working year of 222 days. What extra do you do at the weekends and at night? It all adds up and we talk of a one in a million event as being rare, not when mousing.

MOUSE MILES:

You can easily travel a mile a week over your mouse mat. Moving 2 inches on your screen between 2,000,000 clicks is 63 miles or 100Km a year. Which is why Designer Appliances makes the Quill Well™ mouse mat where the feet of the Quill™ are matched to the mouse mat surface. This lowers the friction between them as much as possible. At this level of annual effort, small details make for big differences.

MUSCLE IMBALANCE:

You have two sets of muscles in the fingers, the flexor muscles that close the fingers (as when grabbing an object or gripping or clicking a mouse) and the opposing extensor muscles that open the fingers. Due to continuous grip and repetitive clicking the relative strength between these two muscle groups can become imbalanced. Constantly gripping and clicking a mouse causes the Flexor (closing) muscles to become much stronger relative to the Extensor (opening) muscles. This makes it more difficult for the, lesser used, Extensor muscles to open the hand. In this event just moving fingers without pain can be difficult and it also causes a restriction in blood flow and can make your mousing hand claw!

Try this simple test:

1. Sit in front of a table or desk that is clear of articles that you might knock over or damage you, so you can rest your hands/forearms on it (even with your eyes shut).
2. Hold your arms out in front of you as if you were about to hug someone and stretch, open, your fingers so they are pointing straight in front of you. If it hurts, anywhere in your hands or up your arms, just to do this, 'STOP'. You do not need to do the rest of this test; use your good hand to call for an appointment with a doctor.
3. Close your eyes.
4. Now relax your fingers while in this position, hands vertical, palms facing each other.
5. Keeping fingers relaxed, gently lower them to the table and rest them there.
6. Now open your eyes.

Are the fingers of one hand more 'curled in', towards the palm, than the fingers of the other hand? If so that is typically the hand that you mouse with. This is not a diagnostic test for RSI as it will only indicate the likelihood of obvious resting posture issues and does not prove that you do not have other problems. This sort of muscular imbalance can often be fixed in about 8-12 weeks with a twice-daily exercise program using an Orthotic exercise glove. One such glove is a part of the Designer Appliances Carpal Management System (CMS). The advantage of the CMS system is a combination of exercise and removal of the cause, gripping and clicking your mouse, so that it is unlikely the problem will come back. If being treated by a Doctor or Therapist the costs of tools such as these, including the Quill Mouse and Nib Click-less software (The Virtually Hands Free™ Mousing System) and CMS, can sometimes be refunded on medical insurance.

COMPUTER ATHLETES:

The greatest challenge that computer users have to face is the acceptance that to do their work, they have to be fit to work. Hand and limb exercise, frequent breaks and the use of better tools can often avoid the onset of mechanical problems. Those who have developed problems over a number of years have to spend time, maybe months, to first repair the damage to the extent that it can be repaired. They then must adopt a maintenance fitness program similar or possibly more demanding than the able-bodied should use. The quick fix is a new arm not a new mouse. Manual laborers, because they use the larger muscles of their body, recognize fatigue more easily and necessarily take breaks. No dancer, or athlete would dare start 'their work' without first warming up the muscle groups of the body that they rely upon to earn their living nor are they about to dance or run in street sneakers or use poor quality tools. The sooner computer workers accept that they are "Computer Athletes", that the computer mouse is their tool and not a just a device for a computer, then the sooner they can adapt, adopt and implement a regime that works better for them. This will protect and allow them to deliver their best, career long, performance.

CAUSE & CONSEQUENCE:

Awareness modifies behavior, so a basic understanding of the issues that the mechanics of hard work creates can provide an appreciation of the impact that computer work has upon the body. If (Bio)mechanics is the cause, then biochemistry is the consequence. So by looking at the Biochemistry of Biomechanics we can appreciate why fatigue can go on to develop into Carpal Tunnel Syndrome and other RSI associated problems and create the misery it does for millions.

The main answer lies in the oxygen levels in your hand. While mousing, finger muscles are busy working when the rest of your body is static or sedentary. The oxygen sensor that tells the heart to pump harder and increase breathing is in the brain. Brain oxygen levels do not fall significantly when you are sitting still, even though you are working with your hands. This is because you are using small muscles, which use relatively small amounts of oxygen supplied by small blood vessels at the terminus of the circulatory system. Computer work doesn't impact oxygen levels in the arteries that feed the brain. Larger muscles, needing larger blood vessel, do because they consume a lot of oxygen. The oxygen sensor in the brain detects the decrease triggering an increase in heartbeat and respiration rate. So just by understanding muscle physiology you can appreciate what type of work nature had in mind for different muscle groups. You can then appreciate their limitations and the extent of the physical work that they capable of.

If low oxygen conditions are experienced then muscles temporarily switch over to a different biochemistry, one that does not depend upon oxygen to produce energy. This is an emergency response that happens in all muscles and is only supposed to be sustained for a few minutes. Presumably this was to help us run away from the occasional Saber Tooth Tiger, which was likely Nature's concern for us at that stage in our design. This biochemistry is known as the Lactic Acid Cycle (LAC) and produces an emergency supply of energy that muscles needs under low oxygen or crisis conditions. The trade off is that LAC produces toxins as a byproduct of making this energy. These toxins need to be removed quickly and oxygen levels returned back to normal. So there also needs to be sufficient blood circulation to bring oxygen in and wash the toxins away so they can be disposed of. If there isn't and LAC continues for too long, for example, in leg muscles then you get cramps, or the Charlie Horse reflex (or Saber Tooth Tiger's delight as they probably knew it as). So you are forced to stop so as to re-establish a normal aerobic (oxygen based) biochemistry. LAC also happens in another muscle group, heart muscle. When a blocked artery cuts off the circulation, reducing oxygen levels, it invokes the LAC process and it is this, which causes the pain and burning during a coronary.

The hands have no such reflex or low oxygen warning mechanism. So toxins are produced and can build up if oxygen levels fall. We do not know nor are we alerted as to when this happens. If toxins are not quickly removed they can become attached to muscle fibers, possibly irreversibly. This can cause them to loose their elasticity, shape and form. This restricts blood flow even further, adding to the inhibition of circulation, oxygen delivery and toxin removal. It is likely that by working without regular breaks that we often come close to the edge, going over it and returning intermittently and never even noticing.

FUNCTIONAL NEUTRAL:

Functional Neutral is defined as a posture that allows muscles to work under neutral tension or no load, hence Functional (in) Neutral. Muscles are always under revs and at rest they are the equivalent of being at tick over; they are never switched off. Functional Neutral, working as close to tick over as possible, is now considered to be good practice and an objective that can help to define ergonomic standards. It makes it easier to understand the issues and so evaluate products and protocols to see if they are truly ergonomic.

As posture is the result of muscle tensioning and alignment, then the activity of each muscle group, in back's, leg's, neck, hand's, etc. when in the various postures we adopt for work, can be checked and be compared to the Functional Neutral objective. So an examination of posture on a Functional Neutral basis should give us some clues and direction as to how we work. Fundamentally there are two types of Postures that are defined on the basis of the activity of the muscle groups used while they are subject to them. These are Dynamic and Static Postures.

Dynamic Posture (DP) is working under a regime in which muscles are tensed (contracted) for a short period and then relaxed. When muscles are cycled in this way it provides a time interval in between muscle contractions known as Nano-breaks. During a Nano-break biochemical recovery (re-aeration of tissues and removal of waste product) can occur. Repetitive muscular contractions aids circulation as each the contraction / relaxation cycle acts as if a pump. When muscles contract they constrict the blood vessels within them squeezing the blood out. When muscles relax, the blood vessels re-expand and so fresh blood rushes in. This process ensures that deep and distant (from the heart) tissue is provided with an adequate blood supply and is the reason why runners pump their arms when running. The biceps in particular act as a “secondary heart” to ensure there is a copious blood supply throughout the arm, though all muscles contribute to the process to a greater or lesser extent.

In computer input terms; DP is clicking mice and also keyboard entry.

Static Posture (SP) is working under conditions in which muscles are contracted and held tense. This, subject to the task involved, can be for long periods, which in biochemical terms is more than a few minutes. Tensed muscles not only consume more oxygen and produce more waste but, as explained above, they do so under slow or even arrested blood circulatory circumstances due to the constriction of blood vessels within the muscle when they contract.

Again, in computer input terms, SP is the “Grip Posture” that is applied to muscles of the fingers, hands and wrist (lower arm).

The debate has raged over the existence (at all) of RSI and not wishing to fuel the debate, do simply ask that people read the “study” methodology before reading the conclusions. On the basis of statistics “we’ll all be lucky to get out of this world alive”. One study frequently pointed to as showing no correlation between injury and mousing was performed in Europe, a highly regulated ergonomic work environment. The study subjects only used computers for some 2 hours a day. That particular study, rather than exonerate the mouse, was actually a testament to good ergonomic practice, manage it correctly and it doesn’t occur.

There is no doubt that there exists an empirical connection between the hand that holds the mouse and the fact (our own website survey demonstrates this) that it is usually and primarily the mousing or dominant hand that becomes injured first and worst! Arguments that mouse related complications are associated with problems in both sides of the neck and shoulder could be explained on the basis of Posture Compensation, though this statement is based upon my opinion as part of this overall analysis and not study or literature. Posture compensation is when the body employs different muscles groups to cover for damage in the primary muscle group responsible for an activity, to allow for their recovery. Damage a calf muscles and you use “thigh area muscles” to lift the leg higher so as to be able to walk. A limp is Postural Compensation that is an instinctive response (you do not think about limping). Those who have had cause to limp in the past know the “back up” muscles involved tire and ache very easily and if it was a pre-limp habit to walk 5 miles a day, it isn’t a “post limp” one.

Consequently, the occurrence of “mouse neck” injuries could be supposed as being due to damage that occurs in the lower arm muscles, which the body then “locks” into non-pain precipitating fixed postures and so uses the shoulder and upper arm muscles to compensate and move the mouse. If the user is not responding to the ache or pains in their lower arm then the work that created the lower arm trauma will undoubtedly result in shoulder or neck trauma. This need not be limited to one side as Postural Compensation is a billiard ball effect. A problem in the ball of the left foot of my ex-ballerina wife was eventually (though easily, when I got her to one of the biomechanists who helped develop the Quill Mouse) traced to a hip displacement on her right side. The hipbone was most definitely connected to the foot bone in that case.

What I can testify to personally are observations of Postural Compensation like processes due to bad workstation layout. I am frequently “challenged” as to my views when I visit people (even and especially relatives). People often claim to have neck and shoulder problems that aren’t due to mousing, as they do not have hand or wrist issues. A 10 second “mouse audit” of their workstation reveals that they are either working extended (mouse situated too far forward) or abducted (too far to the side) or working like Chad’s, the keyboard and the mouse set high or seat

to low, so mechanically it is not easy to manipulate the mouse with the hand and much of the work is performed by the shoulder. In the "Chad" position they are also hunched when typing.

The reality is that the problem causing issues are now identified even if not yet quantified to statistical satisfaction. Their impact has been quantified however; we know that millions of people are living with pain in their lives that might be avoided by matching how we work with how our body's need to function. Our objective must be to help those at risk (those already injured already know) to understand the potential damage that they capable of inflicting upon themselves. We currently stare right at the iceberg and argue how much of it is hidden from "ergonomic deckchairs" aboard the Titanic. Whereas if consequences due to passive mousing were found then, as with passive smoking, there would be a whole different approach to the problem. Achievements that employ the principle of "there is no gain without pain" should be at the users option and health beneficial, not a consequence of earning an honest living.

If we apply reason and understanding of how the body works to how we work at work in regards to posture we can effectively exonerated DP and so keyboard and mouse clicking as a "causal factors" in their own right of RSI, CTS problems. This isn't to say that once the damage spiral starts that then do not contribute or do not accelerate the process, but the damage onset can be reasonably correlated with SP and gripping mice. DP can lead to an over development of the flexor (opening) muscles of the hand, relative to the extensor (closing) muscles, causing the hand to claw. This is easily remedied with exercise and guaranteed to be by the use of an Orthotic exercise glove.

In headline terms: The real problem is working in non neutral postures and qualified opinion that is not my own estimates that using a computer mousing for more than 20 hours a week will likely lead to a diagnosable injury within 2-5 years.

So 4:30pm comes and the discomfort that is now an integral part of the computer users experience is not perceived but still it produces subliminal reflexes that make us rub or stretch unconsciously. But as this spiral of events continues to twirl, we start to notice things but we do not necessarily connect them with the day's work we have just performed. There's no applause from a thrilled audience, no medals or laurel leaves, just covert warning signs that start with an ache or a twinge. They are early or maybe even late indications of a process we can't master caused by a mouse that we once thought tame.

Symptoms:

- **Fatigue & Loose of Stamina.** If your hands tire more easily than they used to, or you are now noticeably less able to do the amount of work you once did, or have aches in your arms after playing sports or hurt after other recreational activities that did not hurt before.
- **Pain in the mousing arm** as aches, burning sensations to shooting pains, all of which can occur during or after work or wake you up at night.
- **Weakness:** Especially in the hands and forearms so lifting ordinary objects is a strain.
- **Sensations** such as tingling in the fingers, or numbness, your arm or part of it, feels as if it is has fallen asleep. Are you more sensitive to the cold in your hand?
- **Accuracy & Clumsiness:** Are you making more typing errors and have to concentrate harder to hit the right keys? Dropping and knocking things over? You don't feel in control of your hands and cooking, chopping and open jars is a problem to dead weight hands?
- **Over sensitivity:** do you get sensations that aren't there? Like wearing a watch or jewelry when you are not, or a gentle touch causes tender muscles to feel like they are burning? Pain after opening a door or using a vacuum cleaner? Women are more prone to symptoms during their menstrual period.
- **More Self aware and Unconscious Rubbing & Massage:** Does something in your arm just 'not feel' right? Do you catch yourself rubbing or massaging the same spot on

numerous occasions? If others talk about their pain does it trigger the sensation of pain in these places for you?

Fatigue associated with computer use is suspected of being linked to potentially serious and long-term problems such as Carpal Tunnel Syndrome. If any of the above symptoms give your cause for concern then do not wait, see a qualified medical practitioner immediately.

Although it is difficult to completely change how you work there are some things that you can do and the more you can do, the better it can be for you.

Adapting your Computer Work habits: A Computer Athletes Guide!

Try to follow these simple tips:

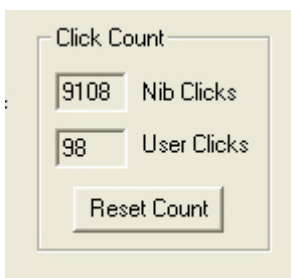
- **Take Mouse breaks.** Do not grip the mouse harder than is necessary to accurately move it around. Even at this level of grip frequent breaks should be taken and arms stretched to boost circulation and re-oxygenate the hand and finger muscles. (You can also buy a tool that needs no grip www.quillmouse.com)
- **Change of pace.** Try to move around, out of your chair, at least once every 2 hours, and stretch every 45 minutes during a 2 minutes break habit that you would be advised to develop. This gives your body a much-needed rest from being in a static posture. Even the other muscles that are not being overworked need to stretch. Arrange “off, or away from, computer work” to act and provide for breaks. Movement, or just standing, is beneficial while doing this type of work. A cordless phone allows you to roam so stretch legs and elevate cardio a little!
- **Posture & Workstation Setup:**
- **Seating:** We should sit like we stand, back slightly curved and head and neck upright. Choose a chair that fits you, so that your lower back is in contact and is supported by the back of the chair. If you cannot feel the back of the chair against your back it is likely going to hurt. Also make sure that the squab, the part that you sit on, comes forward enough to support your thighs so you do not get the sensation of falling forward; your back and neck will become tense if this is the case. Also make sure there is ‘butt space’, which is why better-designed chairs have a gap between the squab and the backrest or better still have a vertically adjustable back rest to provide a sufficient gap. Nature has blessed us with a diversity of architecture in this department and so your chair should be able to accommodate your particular model by providing it with its own space to hang out. As mentioned, your lower back should be in contact with the backrest to avoid problems.
- **Keyboard and Mouse Position:**
- The keyboard should be in front of you so your hand and wrist line is flat, do not bend hands up or down or flex wrists in any direction. Do not use wrist rest for keyboards or mice. They act as partial tourniquets, cutting off blood supply through the wrist. According to the American Academy of Orthopedic Surgeons, wrist rests double the pressure inside the Carpal Tunnel. (See link below) People can develop a dependency on these and other devices that can result in their need to relearn and readjust to new tools or better posture or procedures. The use of inappropriate devices can erode the normal capacity of the arm and so during readjustment to new techniques or tools the user may experience pain or discomfort. This is why you are advised to talk to your doctor or therapist who can advise and monitor you during the transition period, as it may be a necessary but unfortunate part of the transition process.
- When mousing, have your upper arm hanging close into your side, the elbow bent at 90° and your wrist and forearm straight and off the mousing surface. Try not to grip, this uses muscles that use up oxygen unnecessarily and try to minimize clicking for the same

reason. Allow sufficient space to move your mouse so you can use your upper arm to mouse with. This employs the larger muscles that are better designed for doing the heavier work, such that mousing is. The larger muscles also act as pumps, pushing more oxygen to the ‘circulatory terminus’ that your fingers are. (The Virtual Hands Free Mousing System removes your need to grip as well as clicking for you)

- In your mouse set up program select a low computer mouse speed and switch off or lower acceleration. Accuracy, getting there first time, is better than speed. With less acceleration you use more beneficial upper arm movement. Switch off ‘Smart Move’ if it is on. This jumps the screen pointer to the next active box when a window is opened. As well as reducing upper arm movement it also alters the position of the pointer relative to the position of the mouse on the mouse mat. This often results in you having to pick up and move the mouse as it is now out of sync and so you run out of mouse mat.
- Do not flex or bend your wrist to the left or right. The wrist has limited movement in these directions and so a small amount of repetitive motion has a large impact on the Carpal Tunnel. Keep your hand and wrist straight, which means, do not rest your wrist on the mousing surface so bending the hand up and away from the wrist. Computer mice were designed when the issues of fatigue and RSI were not understood and the Biomechanics of their use had not been studied. Back in the 1960’s, when the mouse was invented, no one expected us to be traveling a mile a week on a mouse mat and performing 2,000,000 mouse clicks and moving the equivalent of 750 tons of mouse a year.
- **Screens & VDU:** Organize your computer so that screen is 18-30 inches in front of you at a height that your eyes are level with when you head and neck are straight. If you are not a touch typist and you wear bifocals you may notice that you raise your head to look at the screen and then lower it to look at the keyboard. Or you may notice that your neck aches at the end of the day and not notice you raise and lower you head. If you have plain reading glasses that might help but sometimes the distance of the VDU, for better posture, places the viewing distance between short and long sighted prescription glasses. You can ask your optician for advice and some advise “computer spectacles”, with a focal point around 2 feet, the usual distance to your screen and allow observation of keyboard and screen with eye and not head movement.

Computer Biomechanics.

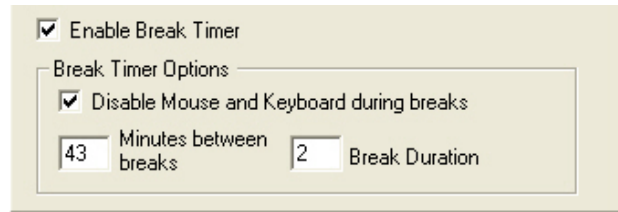
New investigations into the causes of fatigue have been made and are described as the science of Computer Biomechanics. The output of this patented scientific research is a new mouse, Quill™ Mouse that untwists the wrist so placing it in a handshake position and allows users to point and mouse without having to grip, so removing all of the Static Posture associated with that task. This saves you some 750 Tons of effort a year. Designer Appliances have also developed software (Nib™ for Pc’s McNib™ for Mac) that together with the Quill™ forms The Virtually Hands Free™ (VHF) Mousing System. It performs the majority of the mouse clicking functions for you so removing the Dynamic Posture eliminate of mousing work. This can save you some 2,000,000 mouse clicks a year during the 63-mile (or so) journey you make up on your mouse mat. In this case to travel is better than to arrive, as by maintaining movement of your mousing arm, while using your large upper arm muscles, better blood circulation is maintained. We have even introduced a Quill-Well Mouse Mat that works in concert with the low friction feet of the Quill Mouse to make those 63 miles or so seem like a stroll.



The statistics of mousing can be surprising. This is a screen capture of the “click statistics”, generated by the Designer Appliances, Nib™ software. There are 2 boxes one showing the number of clicks that the software has performed (Nib Clicks) and one showing the number of clicks the user has performed manually (User Clicks).

The VHF™ mousing system is optimized for word processing and web browsing applications and all Designer Appliances products allow you to do what you have always done, they way you have always done them, but with hands and finger muscles that are physically relaxed

during the doing. It even has an intelligent break timer to prompt you to take a break and knows if you are not working and resets itself. You can even have it lock out your PC mouse and keyboard, for those who need extra encouragement.



The VHF system is also Generally Assistive Technology protecting those who wish to avoid MORSI being beneficial to those with MORSI, or those with clinical circumstances that cause RSI or create hand disability. Whether able-bodied or otherwise all users work in the same way without modification to computers or software, working on Mac or PC platforms and the Quill™ Mouse works on Linux also. Disabilities particularly helped include motor neuron disorders, joint disorders, including arthritis and any circumstance of hand coordination impairment, as can occur in our Senior Population, where individuals cannot easily grip. With the geographic diversity of families today the need to be a part of the Internet generation, albeit the Senior Internet Generation, is as important to family unity as was once the telephone.

The Quill, The VHF System and the CMS System are the computer mouse and related systems that are registered on the Government's accessibility website (1998 amendments to the Rehabilitation Act) at www.section508.gov, search Quill or VHF etc or go to www.quillmouse.com



In 1998, Congress amended the Rehabilitation Act to require Federal agencies to make their electronic and information technology accessible to people with disabilities. Inaccessible technology interferes with an individual's ability to obtain and use information quickly and easily. Section 508 was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals. The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508 (29 U.S.C. 794d), agencies must give disabled employees and members of the public access to information that is comparable to the access available to others.

Excerpts from the Government Standards and why The Quill, VHF And CMS Mousing System are the only Mouse Products to currently comply.

Guide to the Section 508 Standards for Electronic and Information Technology

Desktop and Portable Computers (1194.26) Updated: August 1, 2001

Subsection: (2) Controls and keys shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be 5 lbs. (22.2 N) maximum.

508 Comments:

How will individuals with disabilities benefit from the requirement enabling operability without tight grasping, pinching, twisting, or pressure?

Individuals with tremor, cerebral palsy, or other disabilities may have difficulty operating systems, which require fine motor control, a steady hand, or two hands to be used simultaneously for operation. Some laptop computers, for example, require two hands to simultaneously depress buttons on both sides of the laptop to open it, while other laptops can open when a user moves a single switch on the front.

Individuals with high spinal cord injuries, arthritis, and other conditions may have difficulty operating controls, which require significant strength. This provision limits the force required to five pounds and is based on section 4.27.4 of the ADA Accessibility Guidelines, codified as the ADA Standards for Accessible Design as part of the Department of Justice's regulation implementing title III of the ADA at 28 C.F.R. pt. 36, Appendix A. This provision is also consistent with the Telecommunications Act Accessibility Guidelines.

Don't just take our word for it!

----- Original Message -----

> From: "Nancy I Gilbert"

> To: <feedback@quillmouse.com>

> Sent: Saturday, December 27, 2003 12:09 AM

Subject: Thank you Quill Mouse!

You saved me from some very painful times. It was the physical therapist who recommended the Quill Mouse to my employer while I was undergoing physical therapy for repetitive motion pain. The Quill Mouse was the answer! I am pain free now, with no surgery! My kids bought me one for home use as a Christmas gift. Now I will have a happy pain-free New Year!

Mrs. Nancy Gilbert
Andover, Kansas

Nancy's Reply following a request to use her unsolicited testimony!

From: "Nancy I Gilbert" <nia7633@juno.com>

To: <tomlarge@quillmouse.com>

Sent: Tuesday, December 30, 2003 1:22 AM

Subject: Re: Thank you Quill Mouse!

Tom,

You are most welcome to use my words, name, town, anything you'd like! I cannot tell you of the horrific pain I was in before I started using the Quill Mouse. I have said numerous times, "Shame on the computer Industry for not addressing this issue". Thank God you did. I did not want surgery, but I did not want pain either, and I couldn't lift a cup of coffee, or tie my shoe. It was awful! I truly DO believe that the Quill Mouse saved me, not only from surgery, but from pain. Thank You, Thank You, Thank you!

Sincerely,

Nancy

Gilbert

p.s. anytime you need a walking, talking advertisement, you can call on me. I already pitched this to the Directors of The Boeing Company. I'm sure they thought I was a paid spokesperson, but they knew I worked for them.

Ref: [The Virtually Hands Free Mousing System](#):

I depend on this [Nib Click-less] software to make it through the day. For example, in the first 45 minutes today, I clicked 19 times and the nib clicked 534 times. Pro-rate that to a day and you can see why my hand gave out.

I have now unplugged and retired the regular Microsoft mouse, the Microsoft trackball mouse, the 3M joystick [Renaissance] mouse and the Evoluent mouse. The only mouse I will use from now on is yours. I did order a full system for my home computer too!

You guys are sitting on a marketing marvel and should shake up the industry when word gets out. I will do my part to spread the word.

Thanks for a great product.

Fred Kurtz

Rexnord
Indianapolis, IN

Industries,

Links: American Academy of Orthopedic surgeons: Issue son mouse use including wrist rests.
<http://www.pl.net/9.3health/precar.htm>

[American Journal of Industrial Medicine Volume 41, Issue 4, 2002.](#) 15 Mar 2002 abstracts of a 3 year study on computer users
<http://www3.interscience.wiley.com/cgi-bin/abstract/91016561/START>

ABC Australia Mouse the culprit link (April 2003) abstracts of an 18 month study on clicking mice.
<http://www.abc.net.au/cgi-bin/common/printfriendly.pl?/science/news/stories/s797354.htm>

BBC News On Line Health Threat Form Computer Usage; Jan 28, 2003.
<http://news.bbc.co.uk/go/em/fr/-/2/hi/health/2698119.stm>

Reviews:
<http://www.applelinks.com/mooresviews/quill.shtml>

<http://lowendmac.com/misc/03/0331.html>

<http://www.extremetech.com/article2/0,3973,1034216,00.asp>

Product Links:
<http://www.apple.com/disability/links.html>