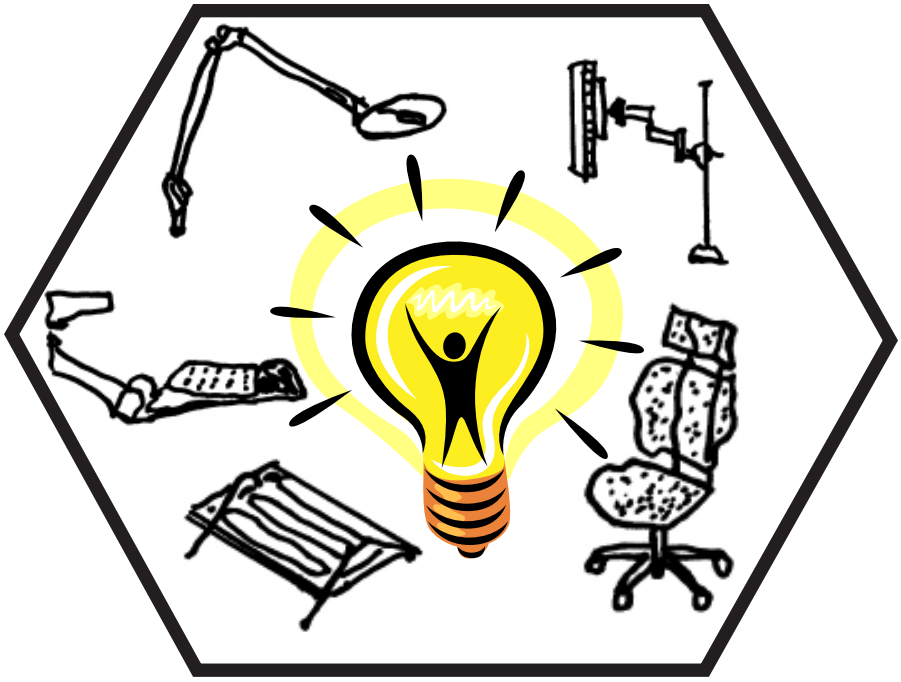
Office Furniture NOW!™

Ergonomics in the Office

What You Need to Know



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History of Office Ergonomics

Ergonomics is "the study of designing equipment and devices that fit the human body and its cognitive abilities", per Wikipedia.[1] The term ergonomics, from Greek Ἔργον, meaning "work", and Νόμος, meaning "natural laws," first entered the modern lexicon in 1857 and was popularized by the British psychologist Hywel Murrell in 1949. It arose out of scientific studies performed during World War II to minimize pilot error by carefully designing cockpit controls to be logical and differentiable, instead of confusing. After the War, the science of designing the work environment to fit the worker and take his limitations and capabilities into account continued. This multidisciplinary science - ergonomics - incorporates contributions from psychology, engineering, biomechanics, industrial design, graphic design, operations research and anthropometry (the study of the measurement of the human individual) . Today we can benefit from the knowledge gained from this interdisciplinary approach, if only we choose to act on this knowledge.

Much of what we know about workplace ergonomics comes from studies commissioned by major American office furniture manufacturers like Herman Miller, Steelcase, and Allsteel. Studies like these form the basis for this article.

Ergonomic Chairs

"Back pain is second only to the common cold as a cause of work loss."[2]

— University of Missouri study

Niels Diffrient, deceased in 2013, is seen as the father of contemporary ergonomic seating. He was an industrial designer who coined the phrase "human factors engineering" which is what we know today as "ergonomics." Mr. Diffrient designed, over the course of half a century, all kinds of equipment, computers, trucks, and airplane interiors. He worked on designing the iconic tractor seat for John Deere, the Princess telephone and the Polaroid SJXJ-70 camera. What fun! He spent much of his professional life systematically researching how the user interacts with his surroundings and incorporating his findings into practical designs.

Diffrient is best known for pioneering the use of ergonomics in dozens of office furniture designs. In the field of furniture design, mostly in ergonomic seating, he won 24 awards, including the Chrysler Award for Innovation and the Smithsonian Cooper-Herwitt National Design Award for Product Design. The Knoll Diffrient Chair (1979) and the Humanscale Freedom Chair (1999) are perhaps his most famous chairs. Knoll[3] said his chairs were "early examples of seating thoroughly informed by anatonomical research and quantitative studies of workplace behavior. The chairs responded to the human body - increasing comfort and ensuring user well-being" and that he "pioneered numerous breathroughs, from pneumatic cylinders for seat height adjustment to weight-activiated automatic recline." These features are used in most contemporary ergonomic chair design, to this day. Led by Diffrient's work, other major chair manufacturers created their own ergonomic chairs based on his and their own research.

Niels Diffrient, the father of ergonomic seating.

The Original Humanscale Freedom Chair 1999 Designed by Niels Differient

The Humanscale Freedom Chair with Headrest

Why Buy Ergonomic Chairs?

It is a fact that improper seating can lead to injured and unproductive employees and cost companies a huge amount of money in lost work days, unproductive time and worker compensation claims. Specifically, per OSHA[4],it can cause these woes:

- Back, neck and shoulder pain
- Fatigue
- Restricted circulation
- Swelling
- Numbness
- Neck pain

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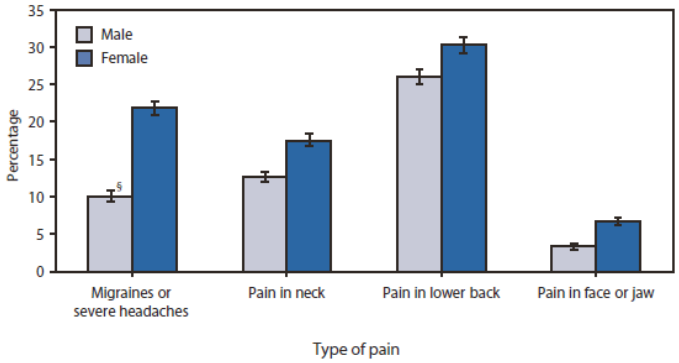
The following table was based on a study by the U.S. Government interviewing almost 28,000 American adults and shows what percentage of American adults reported pain by various categories in the last three months[5] A good ergonomic chair, used properly, has been show to reduce back and neck pain amongst office workers.



A 2009 U.S. Governenment Center for Disease Control study showing just how prevalent neck and lower back pain is among adult Americans.

What to Look for in an Ergonomic Chair

If you're looking for ergonomic task chairs for yourself or other members of your team, arming yourself with a bit of information to make that critical decision is invaluable. Following is a set of important features to look for in ergonomic task chairs:

1. **Chair should have casters** - It is important that you can easily position your chair to be in the correct relationship with your desk. If not, reaching and bending to access computer compoents can lead to muscle straing and fatigue.

2. **Chairs should have strong, five-legged bases** - To provide adequate support and minimize tipping.

3. **Adaptable chair height** - Most chairs have a pneumatic hydraulic cylinder that allows them to sink down and then pop back up again with the touch of a lever. After a decade or so of use, these can break but are easily replaced at low cost.

4. **Ability to recline** - As recent research demonstrates, a 135 degree angle is the best sitting position for a body at their desk performing work. Such an angle can be facilitated by a person's task chair only if it can recline. Humanscale takes this further and recommends for best function in critical use task chairs that they have a **self-adjusting recline,** so that people don't have to remember to adjust their chairs for a good fit; it happens automatically.

5. **Adjustable lumbar support** - The ability to regulate the chair's support for the lower back. Humanscale takes this further and recommends for best function in critical use task chairs that they have **Self-Adjusting Lower Back Support**

6. **Adjustable armrests** - Studies have shown that people move around in their task chairs quite a bit as they work and this is actually a good thing. When sitting, a user's soft tissues are compressed. This pressure prevents the natural distribution of blood flow and waste products through the body's soft tissues. Your body's physiology relies on your natural movement to properly circulate your body's processes. Moving around in your chair is positive and necessary and having armrests that can reconfigure to properly support you while you do this are very useful.

7. **Armrests made of soft material with rounded edges** - To avoid nerve and blood vessel irritation in the forearm, which can cause pain or tingling in the fingers, hands and arms.

8. **Armrests attached to seat back** - This feature ensures that your armrests are naturally configured to match the position of your back support.

9. **Moveable seat** - This is particularly useful for individuals who are not as tall as the average user. For these individuals, a seat that can move backwards and forward with respect to the backrest, will allow a person of shorter stature to use the backrest and thereby more evenly distribute their bodyweight.

10. **Seat support made of gel -** This qualification is recommended by Humanscale but, obviously ignored or not considered important by, for example, Herman Miller in their Aeron chair design, which uses mesh in the seat construction, not gel.

11. **A rounded "waterfall edge"** - This reduces that blood circulation will be reduced by pressure in the back of your legs.

12. **Self-adjusting headrest** - Humanscale recommends this and it is an option on several of their chairs, like the Diffrient. Many companies' ergonomic chairs do not have headrests at all, leaving you to decide whether this feature is something important to your comfort!

13. **A seat pan properly sized for the user** - Larger-than-average-sized people need larger seatpans.

14. **Users should have a footrest if needed**- To ensure that the entire sole of the foot can rest on it (or the floor) with the back of the knee slightly higher

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than the seat of your chair. If you can't do this, you are liable to lean forward with your back unsupported to reach your computer or desk. These awkward postures cna lead to fatigue, restricted circulation, swelling, numbness and pain. On page 15 of this Ebook, you will find more details about footrests.

Chair Materials

Most ergonomic chairs have been made with foam covered with fabric. Nowadays, foam has sometimes been replaced by gel in higher quality chairs. A study has shown that making seat covers out of gel rather than foam improves a chair's overall ability to evenly distribute the body's weight by a factor of 28%.[6]

When Herman Miller invented the Aeron chair in 1994, it caused a sensation with its pellicle mesh seat, touted as being more comfortable than foam or gel because it better distributes weight and also minimize build-up of body heat between the user and the chair's surface. This chair has become a fashion icon and is still in high demand. However, a recent study[7] has shown that pellicle mesh is not superior to traditional office chairs in weight distribution unless the support structure is broken up into three sections. In addition, while mesh has a visual appearance that suggests it might be helpful in dissipating body heat, it does not actually perform this function since it is primarily the clothes of the user that trap body heat. You'll have to decide if it's comfortable for *you*!

The Herman Miller Aeron Chair 1994 with designers Don Chadwick and Bill Stumpf

Chairs for Big and/or Tall Users

While it is possible to take a measurement of many different people and then average them together, creating a model that people at the highest part of a bell curve most resemble, there are many people whose bodies are not average. They may be taller, smaller, and more heavyset, among many possibilities. Chairs are designed with a person's dimensions in mind so if someone is much taller than average, then a chair designed for the average user will not properly fit them ergonomically. In the same way that it might be too short for their legs, the chair will also not fit them in many other ways as well. Fortunately, there are several lines of ergonomic task chairs designed for individuals who are taller and larger in general.

Obesity in the Office

The office furniture manufacturer Allsteel published a short paper titled "Obesity in the Office"[8]points out how important it is that obese workers have chairs specially designed for their unique biomechanics. With obesity affecting a third of all Americans, this niche of workers cannot be ignored. Basically, obese workers experience more discomfort than non-obese workers and this discomfort increases with how obese a person is. The oversized dimensions of all parts of the physique can obstruct the neutral (safe) postures rcommended for office work. Attempts to perform work tasks (like typing on a computer) put them in an ergonomically unsafe position, causing up to a 66% rate of lower-back pain discomfort in obese call center workers. Extra fat in the buttocks and thighs make a person sit higher in the chair. This:

- Causes contact with the chair's lumbar support to be too low to be effective and
- Puts the spine in a forward position that prevents the upper back from making contact with the backrest.

Obese workers sitting in an inadequate chair then slump, stressing the lower back, pelvis, upper back, shoulders and neck. Excess fat in the abdomen prevent contact with the edge of the worksurface, causing strains in the effort to reach their worksurface.

Chairs sized and constructed to accommodate obese people are made. They are often referred to as "bariatric" or "big and tall" chairs. They are larger and more heavy-duty to accommodate more weight and have larger- and wider-than-normal adjustment ranges to accommodate obese people. Typical chairs usually have a 19" seat, whereas big and tall chairs are made with a 21" seat (or more) for lots of room. Standard office chairs are usually rated for up to 250lbs.; office chairs for the big and tall are weight-rated for 350lbs, although some chairs are rated up to 450lbs. They are built to last, with seat padding and chair components - like cylinders and frames - designed for larger people. Like in a good ergonomic chair, waterfall (sloping) seat fronts reduce pressure behind knees, which aids both circulation and comfort. They have lumbar support with enough depth (outward curve) and/or adjustability to achieve complete contact with the curve of the lower back when set at the proper height above the seat. Additionally, they have armrests which can be set high and wide enough to accommodate abducted arm positions.

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Although with more limited choices, big and tall office chairs are available in task, executive, ergonomic and guest styles. They are more expensive than a comparable regularly-sized chair.

Buying an Ergonomic Task Chair

There are a lot of considerations that should go into choosing the correct ergonomic task chair for each employee. These choices have a measurable impact on your company's productivity, health and bottom line. Unlike the type of task chairs you will find at a big-box office-supply store, a high quality ergonomic office chair is designed to last for decades. At Office Furniture NOW!, every Furniture Consultant has had many experiences selling good ergonomic chairs to clients who are tired of returning their $100 Office Depot or Office Max chair every year because it broke. A quality ergonomic chair should last a lifetime with minimal maintenance.

Many of the design features engineered by leading manufacturers like Humanscale, Steelcase and Herman Miller are available from lesser known vendors who achieve a top quality chair with a less expensive price tag. You can procure a top quality ergonomic chair without having to pay close to $1,000 asked by major manufacturers for their newest model. Office Furniture NOW! Furniture Experts have years of experience in selecting (and using!) great task chairs. We sit in the same types of chairs that we sell and so this functional experience, as well as extensive feedback from our repeat customers, gives us a unique perspective to assist you in choosing your task chair. Schedule a consultation and start the conversation about how we can help you find the right ergonomic task chair for your office at the right price.

Office Furniture NOW's Try-Before-You-Buy-Program

At Office Furniture NOW! we are big believers in sitting in the chair(s) you might buy. That's one reason why we have such a big showroom with so many available options. We take that a step further, however. We will lend you chair(s) to take back to your office and let your co-workers try out. We've found this to be a very valuable program, leaving you happy with both your chairs and with us! Just ask your Furniture Consultant for details on this program.

Office Furniture NOW!'s Task Chair Selection

We have hundreds of ergonomic chairs from which to choose. With Good-Better-Best selections on new, used and refurbished chairs, our selection is broad and unique.

New

We carry an excellent selection of new ergonomic task chairs and we can deliver and install them to you in any quantity. In the new ergonomic task chair category, Office Furniture NOW! specializes in offering brands that are less known, but offer classic design and great quality at a much lower price than you would get from a new brand-name task chair. As a result of this, you can get the same look, comfort and durability you would get from chairs that you already recognize. We have task chairs and executive desk chairs in Good-Better-Best price and quality categories. We even have some that are made with the same mesh design as the famous Aeron™ chair from Herman Miller. Many of our new ergonomic task chairs offer designs that you will be familiar with and will easily be able to imagine in your office, whatever your office's "look" is. When you buy a new chair, you have many options from which to choose, from fabric and trim colors to arm style. Fabric is a particularly interesting option, as choosing a specific color of fabric will allow you to customize the look of your chairs to suit your workspace. If you have an office area with huge wide open spaces that seems a little drab, you will be surprised at how much style effect putting in 150 new task chairs with a tasteful, bright color will have.

Gently Used

Durability and good ergonomics are factors that make task chairs a great buy when you're getting them used. If you want to get a great price on a top-of-the-line used task chair, we have wide and constantly changing selection of premium used task chairs, including those from top-tier manufacturers like Herman Miller, Steelcase and Knoll. These used task chairs are classics. Due to their outstanding ergonomic design, they are well suited to people who will be performing in a high workload environment where functionality and comfort are critical. Used task chairs are a great deal and so they move quickly through our warehouse. Give us a call and ask what we have available today.

Selecting from our broad inventory of gently used task chairs is a great way to offer your large team the benefits of high quality office chairs without overly impacting your company's finances. When you choose used office chairs from us, you are selecting from an expertly chosen inventory - we buy less than 10% of used product we see. Whether you require one used task chair, or many dozens of used task chairs, we can get you started with a set of premium chairs at a fraction of the price of new. All used chairs from Office Furniture NOW! have been checked and, if necessary, cleaned and repaired.

Refurbished

Possibly the greatest service that we offer in the area of used task chairs lies in our ability to refurbish premium used task chairs. By purchasing refurbished ergonomic chairs, you access a style and quality level that you otherwise may not be able to afford, particularly at volume if you have a large team. We can refabric our gently used task chairs with the mate-

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rial of your choice or you can select from several choices we have already refurbished in popular colors. If you purchase a refurbished ergonomic task chair from Office Furniture NOW!, you can be assured that all mechanisms have been tested and, if necessary, replaced, including:

- Gas Lifts
- Paddles
- Arm pads
- Casters

We have a large, constantly changing inventory of refurbished chairs. We refurbish the following chairs, carefully selected for their durability and comfort:

- The Steelcase Criterion chair

The Steelcase Criterion Chair 1996

- The Haworth Improv chair (which we fondly refer to as "The Tank", for its heft and durability)

The Haworth Improv Chair "The Tank"

- The Steelcase Leap chair (which many of us prefer to use)

The Steelcase Leap Chair 1999

Chair Maintenance

Chairs are physical items and eventually, all chairs will probably need a little maintenance. Like other professional tools, professional task chairs need period servicing. In particular, the components of task chairs that may require servicing over the life of a chair are:

- **Pneumatic gas cylinders** - These are almost universal. Your chair's gas cylinder is the device that allows it to pop back up with the touch of a lever. If it runs out, you can purchase a replacement part for it at a reasonable cost.
- **Upholstery** - As the item that has the most contact with the user and is require to constantly move and flex throughout the day, this can wear down after a while. The best task chairs mitigate this by upholstering their chairs with high quality leather, wool and vinyl blends to avoid this, but once these materials wear down after heavy use, professional-grade task chairs are designed to be easily reupholstered.

Height-Adjustable Desks & Tables

"The latest research confirms that sitting smart, when combined with standing and walking options, can have a big impact on worker wellness and productivity."[9]

—Steelcase in "Movement in the Office"

Why Buy Sit/Stand Desks?

There's a strong trend emerging among workers nationwide: the standing desk. Many studies (and our own bodies!) show that sitting all day is bad for you. Scientists have determined that after an hour or more of sitting, the production of enzymes that burn fat in the body declines by as much as 90 percent. Extended sitting slows the body's metabolism of glucose and lowers the levels of good (HDL) cholesterol in the blood. Those are risk factors toward developing heart

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disease and Type 2 diabetes. "The science is still evolving, but we believe that sitting is harmful in itself," says Dr. Toni Yancey, a professor of health services at the University of California, Los Angeles, quoted in a New York Times Article[10] published in 2013. This same article mentioned two recently published studies in The British Journal of Sports Medicine and in Diabetologia, a journal of the European Association for the Study of Diabetes, which show that even people who lead an active lifestyle away from work suffer the same negative effects from sitting all day as people who are sedentary all the time. So, if you regularly hit the gym, you still need to spend some time standing up and moving around while at work.

Studies also show, however, that standing all day isn't better than sitting all day. Increased varicose veins and joint stress are just a few of the negative impacts on our bodies. Alternating from sitting to standing throughout the day reduces the chance of back pain and improves circulation, which are essential to productivity. It seems that THIS - periodically moving around - is what we should do to keep our bodies healthy.

Today many of us sit all day in front of our computers. However, in the 19th and early 20th centuries, office workers, like clerks, accountants and managers, mostly stood. Sitting was viewed as slacking off. And if you stand at work today, you join a distinguished lineage of standing workers, like Leonardo da Vinci, Ben Franklin, and Winston Churchill. So, get on the band wagon and explore office furniture designed to help you do what's good for you - sit AND stand! Lots and lots of people are using this type of furniture these days. So, here are the things you need to consider when selecting the right Sit-to-Stand desk or table for your office.

Pro

- **Shape.** - Look for the right shaped sit-stand table/desk for your workplace. There are tables made to fit anywhere or specialized ones made to occupy a corner.

This individual sit-stand table desk fits great in corner.

A small round table might be perfectly suited for a niche in your office.

- **Size -** Look for the right sized sit-stand table/desk for your workplace. There is single-occupancy sit-stand furniture and sit-stand tables and desks made to accommodate multiple people. Generally, height-adjustable desks are rectangular and range from 24 or 30 inches deep and 36 to 96 inches wide.

- **Special Characteristics** - Look for special characteristics of height adjustable tables and desks that are required to fulfill your special needs. For example, look for folding/nesting tables if you need to save space or increase the flexibilty of a room. Look for modular furniture that is easily re-configurable if that is your priority. Nesting/rolling height-adjustable tables can conserve precious space and allow a room to be adapted for a variety of uses.

A height-adjustable benching system may be a great choice for your business These work surfaces are independently height adjustable and allow for easy collaboration between employees.

- **Collaboration -** Look for height adjustable tables and desks that fit with the level of employee interaction/collaboration you desire. If you want privacy, perhaps a corner desk is best but if you want employees to work together, a different configuration is optimal.

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This unique height adjustable workspace comes with optional dividers to allow the user some privacy from his neighbor, as well as with mobile touch-down meeting areas to facilitate collaboration.

Adjustability - Look for height adjustable tables and desks that are easy to adjust. There are different ways to adjust the height of office furniture. Which you choose will effect what you pay for your height adjustable table or desk. It will also directly affect how often people will actually adjust their worksurface from sitting to standing and back again during the work day. The easier the height adjusts, the more it will be adjusted. If people don't adjust their sit/stand desk because a hand crank takes too much time and effort, you've wasted your investment in a piece of good ergonomic furniture. Push-of-the-button adjustability may cost more but may, actually get used, making the larger investment worthwile. Here are the main choices in how sit/stand desks and tables adjust:

- **Crank** - The manual crank lift adjusts by manually turning a crank. This table is ideal for applications requiring height adjustment with limited budgets.

Hand cranks are inexpensive and they work! They may, however, be less likely to be used than electric- or gas-operated models.

- **Electric** - Operable with the push of a button, electric lifts are available in both single-stage and dual-stage electric. Some controllers are programmable, allowing you to set the exact height at which which you want your worksurface. This can be particularly helpful if you have more than one person using a table - an individual's choice can be programmed in.

Electronic controls can be a simple up/down choice or a more complicated programmable mechanism.

- **Gas** - The gas lift mechanism utilizes gas spring mechanisms for fast and effortless operation. A paddle allows for simple, smooth and seamless adjustment.

A gas life is easy to operate but less precise than a programmable electric model.

- **Pin** - Manual lifts can incorporate a pin adjustment. The pin adjustment is perfect for applications that require special heights but are not adjusted on a frequent basis, because making the adjustment is a bit of a pain.

Pin mechanisms are mechanically simple and inexpensive but take a work to adjust.

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- **Fixed** - Fixed versions of height-adjustable tables and desks allow for continuity of design. You have the freedom to specify fixed and height adjustable in the same office while maintaining a consistent base style.

Weight Capacity - Make sure the lift mechanism can accommodate the weight you need to lift. Most tables support about 120 lbs., but some are made that accommodate much more. Be aware that everything on the desk - computers, books, coffee maker - all figure into this weight.

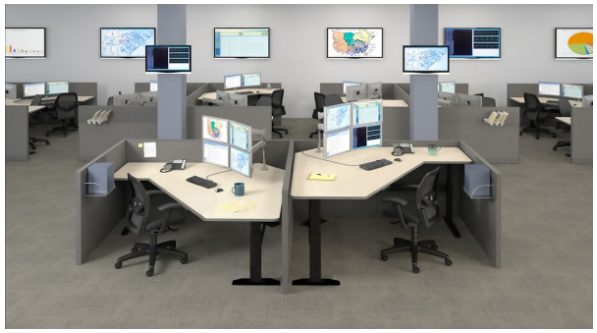
Compatability with Electronic Devices - Make sure the adjustable height tables/desks can accommodate your electronic devices. In this electronic age, hard drives, monitors, phones, and video screens are only a few of the devices that take up room on a desk or table. Choose a table or desk large enough to fulfill your needs.

Accommodating multiple computer screens needs quite a bit of space on a table.

Keyboards, phones and computer monitors are just a few devices to accommodate.

Matching Furniture Options - If you want to furnish a whole office, make sure that the sit-stand height adjustable table or desk you want to buy comes with matching office furniture choices. Many manufacturers make ONLY sit-stand desks for individual sale which does not allow for good integration into an office environment. It is aesthetically pleasing for different office furniture components to "match" to give your office a coherent look.

Darran is one manufacturer which integrates height adjustable desks and tables into its complete furniture lines.



Divider panels and paper management can be purchased to match height-adjustable work areas.

Budget - Look for height adjustable tables and desks that fit within your budget. The type of adjusting mechanism (gas, electric, pin, crank or) will make a table more or less expensive, with crank and pin mechanisms being the least expensive and electric the most. The size, shape and type of metal, surface materials, and colors will all effect price. Like most office furniture, the more you opt for custom options, the higher the price and the longer the lead time.

Consider retrofitting the furniture you own - You can replace desks with new height-adjustable ones or you can also just buy the bases and retrofit your existing worksurfaces with them, particularly if you have modular worksurfaces like those that come with cubicles. A qualified furniture installer should be consulted, because some modifucations to your worksurfaces probably need to be made to accommodate the movement of your table. This option is

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generally less expensive than buying all new furniture.

Table bases with motors can be retrofit into your current worksurface.

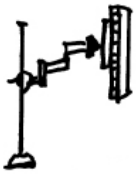
Computer Monitor Arms

"The Body Will Adjust…to Put the Eyes at the Right Distance from the Work at Hand."[11]

— Herman Miller Solutions Essay, 2011

Why Buy Monitor Arms?

A great deal of research has been done about the optimum office configuration to reduce worker discomfort and injury and to increase productivity in the workplace. How people sit in relation to the tools they use, like computer monitors, is an important area of study and has taught us the following things about the human interface with computers.



There are two dimensions that affect viewing a computer monitor:

- Eye height in the seated position and
- Distance from the monitor.

Because people vary in height and body proportions, seated eye height in the U.S. can vary by as much as eleven inches, based on the differences between the 5th percentile of women and 95th percentile of men. With a stationary monitor, few people are sitting at the correct height in relation to their monitor and some people may be as much as 11 inches out of whack!

Additionally, personal preference and individual physical limitations play a significant role in this dynamic, particularly when comparing people who wear corrective lenses and those who don't, and older people versus younger people. The best viewing height for most people is slightly below their eye height, giving you a slightly downward gaze. People who wear bifocals, however, like to look at their monitor 15 to 20 degrees lower than non-bifocal wearers. That's quite a difference! Without the ability to adjust the monitor, a bifocal wearer often lefts up his or her head and cranes his neck, which increases the potential for back and neck problems. As our population ages, there will be more and more bifocal wearers and the importance of addressing this issue will increase.

Viewing distance can pose even more problems. Research shows that when people are given the freedom to choose the distance their monitor is from their eyes, the range is huge: 20 to 39 inches. This distance changes with age and with the time of day. Visual acuity and the ability to compensate for glare is ten times less at age 70 than at age 20. People of all ages like the screen closer when fatigued. An individual is happiest and healthiest if he can keep the screen at the optimum distance and height for him. With a stationary monitor, this is just not possible.

When people can't adjust their tools to their body, the negative consequences in terms of health, cost and productivity can be huge. Hunched shoulders and craned or scrunched necks can cause neck and back discomfort or pain which costs companies an estimated $7.4 billion a year in workers aged 40 to 65 years old., according to the National Center for Health Statistics in 2009.[12] Per a 2003 article in the Journal of the American Medical Association[12], back pain was second only to headaches in causing people to miss work. [13]

Input devices are another problematic area in today's working environment: People are using at lot of different devices at work, from keyboards and mouses to laptops to touch screen monitors to tablets and smart phones. Each requires a different ergonomic formula to reduce negative health effects and lost productivity. Luckily, ergonomic designers are continually coming up with tools to make these fit the human user and not the other way around

Additionally, the workplace trend towards creating collaborative workspaces where people can share information and work together aggravates these challenges. Having a group of people looking at one monitor puts a strain on individuals' necks, backs and eyes.

Luckily, monitor arms that address how different people work with which devices are available. They also let people adjust devices to fit different visual abilities and different body sizes

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and proportions. Articulating monitor arms let YOU adjust the height, distance and angle of your monitor (or other device) to your needs, letting you move frequently without compromising correct ergonomic relationship to your work and your ability to focus on that work.

Monitor arms can also accommodate multiple monitors. According to Herman Miller, NEC Display has noticed an increase in mulitiple monitor use from 1 percent in 2008 to 30-40 percent in 2012.[14] I'm typing this, for example on my left screen while ready this Herman Miller article on my right screen!

Besides these ergonomic advantages, monitor arms have another great use: they give you more space to work on. Even with the old cathode tube monitors gone, a monitor takes up precious space on your desk. A monitor arm lifts your computer above your workspace, giving you more area to work on. With ever-shrinking office sizes, every inch of worksurface space matters. By floating your monitor(s) above your worksurface, you have access to your whole desk space, not just the space in front of and to the side of your monitor(s). How great is *that*?

Product Choices

Ergonomic computer monitor arms on the market have a variety of options to choose from. Generally, the more monitor arms and the more adjustments available, the higher the price. Prices range from $60 to over $600. Here are some options for your flat panel monitor arms:

- **Tilt** - Vertical tilt vs. no vertical tilt
- **Pivot** - Pivot with adjustment vs. pivot with a tool adjustment vs. no pivot

A highly-adjustable two monitor option

- **Monitor Rotation** - Rotate option to use the length of the monitor to scroll down the page for word processing.
- **Mounting Option** - Grommet mount vs. clamp mount - Grommets are the holes in your desk that wires go through.

A clamp-mounted minimally-adjustable single monitor arm

A grommet-mounted 6-monitor arm unit.

- **Colors** typically available
  - Brushed aluminum
  - Shiny aluminum
  - Aluminum paint or
  - Black paint finish

A black and brushed alumimum non-adjustable two monitor option

- **Number of Screens** - Single, double and up to eight monitors. Three monitors and up are more or less fixed but still float above the desk and can be tilted.

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A highly-adjustable brushed aluminum two monitor option that is grommet-mounted

Ergonomic Keyboard Systems

"A negatively sloped adjustable keyboard tray maximizes neutral hand, wrist and upper body postures."
— Professor Alan Hedge, Cornell University

Why Buy Keyboard Systems?

Scientists have found that using a keyboard in a flat position on a person's desk without an ergonomic keyboard tray causes users to adopt an unhealthy posture hunching over their work area. Typing is an example of a repetitive motion and if performed at the wrong angle, this can cause carpal tunnel syndrome, problems in the neck and problems in the lower back as well. Ergonomics experts have determined that working with a keyboard on an ergonomic keyboard tray that tilts away from the user at a slight angle (0° to -15°) is the best way to encourage users to adopt the correct posture. Many keyboard trays are articulating - they have one or more "joints" - so that the angle can be adusted to a comfortable position for each individual user. Jonathan Puleio, M.Sc., C.P.E. says in a Humanscale article that that

> "Applied ergonomics research has shown us that a 'hands in lap posture' is the ideal keyboard and mouse position for those who are able to type proficiently. Lowering the keys and angling them slightly away from the body reduces shoulder shrugging and helps to straighten the wrists. Bringing the tools closer to the body affords the user the ability to properly utilize their chair backrest. Installing an articulating keyboard support is the most cost-effective means of achieving postural improvement."[15]

Besides causing health problems, hunching over to reach a keyboard can negate the benefit of other ergonomic tools like a good chair and monitor arm, which is why Humanscale states that "in many ways, an articulating keyboard support forms the centerpiece of the ergonomic workstation."[14] It works in conjunction with a monitor arm and task chair to literally bring the work directly to the user, allowing him to lean back in his chair and maintain healthy ergonomic posture. These two photos from Humanscale's website clearly demonstrate the problem.

Aside from helping users to work more comfortably, keyboard trays also help with efficiency. Just like you may wish to use a flat panel monitor arm to lift your monitor away from your immediate desk space when you are not using it, an ergonomic keyboard tray allows you to do the same thing. If you need flat space for writing or reading materials not on your computer at work, keyboard trays allow you to simply slide the keyboard (and often mouse) under your desk for later use. Many of these trays are extremely thin but also rigid thus maximizing knee space and ensuring a steady typing surface.

Product Selection

When shopping for a keyboard system, look for the following features:

- **Tilt variability** - Look for custom tiltability so you can adjust the tilt to be comfortable for *you*. This also ensures one keyboard tray can serve many users.
- **Knee clearance** - Look for a thin profile to ensure maximum knee clearance.

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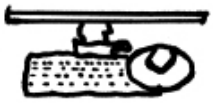
- **Strength and stability** - Our keyboard trays are made of high strength metal and are designed for maximum rigidity to ensure a stable typing surface.

- **Mousepad attachment** - Many keyboard systems include a mousepad attachment, allowing you to keep your mouse next to where your hands already are. This has the additional benefit of offering a tilted surface area for your mouse movements as well, helping you to maintain good ergonomic posture.

- **Finish** - Availability usually includes black, white and silver.

- **Slideaway under desk** - Most ergonomic keyboard trays will slide under your desk when not in use, freeing up your desk space for other activities.



- **Built-in gel pads** - Many ergonomic keyboard trays have built-in gel pads in front of the keyboards to provide comfortable and healthy support to your wrists while typing.

- **Condition - New or Used** - Office Furniture NOW! often has a sizeable collection of used keyboard trays which can give you cost savings of 40-60% off the price of a comparable new ergonomic keyboard tray.

Task Lighting

"Individual Control Saves Money and Your Eyes"[16]
— Herman Miller Study

Why Buy Individual Task Lighting?

Anything in the physical environment that affects the fit between a person and her work is ergonomic by nature. This includes office lighting. Without proper lighting, people squint and hunch over their work. Even the look on people's faces changes, often to a frown. Eyestrain and headaches, as well as musculoskeletal pain and neck caused by unhealthy posture, are often the result. This discomfort leads to poor productivity. One study of LEED-Certified PNC Banks by Transwestern, found that good lighting increased employee productivity by 6.7%.[17]

Good lighting is hard to ensure. Natural lighting is well-known to give people a psychological feeling of well-being and more and more new commercial buildings take this into account, especially those seeking LEED certification. However, natural lighting is inconsistent, difficult to control and, generally, inadequate for most office tasks. Good electric lighting seems like a simple answer, but it's not. For years, individually controlled overhead lighting (usually flourescent) have been used in cubicles. However, this lighting has not been adjustable, either in terms of brightness or direction. According to Herman Miller[18], what's "good" for one person is not always good for another and varies based on the following factors:

- **Age** - Vision quality varies with age. People in their twenties have eyesight that's eight times better than people in their sixties.

- **Eyesight Quality -** The quality of a person's eyesight varies *within* an age group.

- **Eye Fatigue** - People's eyes tire at different rates during the day. The more tired your eyes, the more light you need.

Because of all these factors, the best lighting has a combination of three types of light:

1. Natural lighting
2. Ambient lighting, and
3. Lighting that an individual can control, depending on his particular needs.

Trends in building design, particularly with regard to saving energy and cutting costs, is affecting how architects, building owners and tenants perceive the importance of lighting. In commercial buildings lighting usually accounts for about 35% of the energy use. Because lights emit heat, they also cause increases in the cost of space cooling, the second highest energy use category (16%)[19]. Allowing people to control their lights, educating them to turn them off when not in use and choosing light emitting diode (LED) lighting over conventional lighting all help companies save energy and reduce costs.

Another reason contributing to the need for individually-controlled lighting is the high use of computers in the modern workplace. Darkened ambient light reduces eyestrain when looking at a computer monitor but, congruently, makes it

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more difficult to view words on a printed page, causing eye-strain when doing so. Having lights that can be individually controlled, both in intensity and direction, is the best solution.

Using LED lights help earn LEED points and save money. LED lights are advantageous because they

- Can be user controlled
- Use 75% less energy and
- Last 25 times times longer than incandescent lights
- Emit light in a specific direction, reducing the need for reflectors and diffusers that can trap light[20]
- Give off 80-90% less heat than other lights

Overall, the proper mix of lighting types can cut commercial energy use in half while improving lighting quality, typically paying for itself in energy savings within a few years.[18]

So what does all this mean for your office? Investing in task lighting can save you money and increase employee productivity. Look for task lighting with the following features:

- Individual control of the light
  - The on/off switch
  - The amount of light
  - The position of light
- A broad and continuous range of brightness
- Should not be hot to the touch
- Energy efficiency - LED lighting

There are many good task lights on the market with these characteristics which will address the needs of workers of all ages, with different eyesight and varied use of technology. In other words, these lights are ergonomic, allowing people to alter the environment to fit their individual human needs.

Foot Rests

Optimally, your feet should be flat on the floor but often, because of the height of your desk, computer and/or chair, this is not possible. Footrests offer relief from prolonged inactive sitting by:

- Keeping your posture in alignment with the rest of your body
- Reduce circulatory problems like varicose veins and blood clots by keeping your blood circulating. Rocking foot rests are particularly beneficial in helping you keep blood circulating.
- Reduce back problems by helping you sit all the way back in your chair, which helps keep you from slouching which puts undue pressure on your spine and back.
- Help shorter people reach the floor, reducing back and neck discomfort.

Foot rests come in many shapes and levels of adjustability. Their purpose is to relieve pressure on the lower back.

Correct Ergonomic Posture

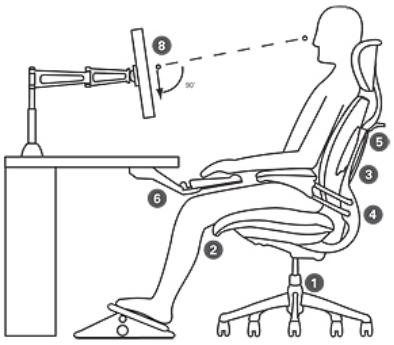

Illustration from Humanscale's Ergo Gear Guide found at the end of this Ebook.

Many studies had been undertaken to determine how an office worker should be situated in his or her workspace in relation to his tools. The 20th and 21st century "tool" is now, for white collar workers, primarily his computer. Now, as a mobile workforce with electronic devices evolving at a tremendous pace, even this notion is becoming outdated. People are now studying ergonomics in relation to laptop, tablet and smartphone use. As the studies comie in, we'll update this Ebook! Sometimes research has displaced popular assumptions. For example, for many years, task chair designers and manufacturers produced diagrams showing an upright, 90 degree posture as the most healthy and productive way to sit throughout the day. Recent studies have concluded that a more ergonomic posture for seated office workers is a 135 degree angle. This information comes from years of work by researchers who ex-

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amined MRI images, and photos of the postures of astronauts in zero gravity and people working underwater.

There are many details to consider when putting all the ergonomic tools at our fingertips to work. Rather than trying to list them all here, please refer to the attached "Ergo Guide" put together by one of our vendors, Humanscale. It's the last page of this book.

Training: A Necessity

"Ergonomic training is most effective when it's paired with regular reminders."

—Herman Miller study

With regard to most ergonomic furniture and accessories - from your chair to your keyboard tray - teaching employees how to use their ergonomic tool(s) is key to having productive and happy employees. The sad truth is that without training, people don't gain the benefits they should get from your investment and you will waste a lot of the investment you've made. Regarding ergonomic keyboard trays, for example, it has been shown that companies get a 90% acceptance rate when employees are properly trained, but only a 50% acceptance without training.[21] If people aren't trained on how to adjust their chair, rather than reducing workplace pain and injury, they may actually aggravate it.

Your company can hire ergonomic consultants to come to your office and train people. This may be your best choice and Office Furniture NOW! is happy to refer you to perofessional ergonomists. However, manufacturers now have many online videos on adjusting products they make, like chairs, making this an inexpensive way to train people. With chairs having so many adjustments, it's a daunting task to try to adjust one *without* training. Learning how to optimally adjust a chair for *your* body is the other part of the equation. How high should *your* chair be? How much should it tilt back? How high should *your* armrests be? What is the best location for *your* computer monitor? Proper ergonomic training will teach you both how to adjust your ergonomic tool AND how to adjust it to fit an individual.

Office Furniture NOW! is producing videos on many of the products we sell, including computer monitor arms and ergonomic chairs. Look at relevant pages in our catalog and you'll see links to them. Major manufacturers are also putting training videos on their websites, which your employees can access from their desks.

Besides initial training, Herman Miller states that "ergonomic training is most effective when it's paired with regular reminders, at least until workers form new habits."[22] With the ongoing cycle of hiring new employees, regular and consistent ergonomic training needs to be a part of your company's ergonomic program. This will make your ergonomic investments pay off.

Conclusions

What seems to be a constant in office ergonomics, however, are these caveats:

1. We need our surroundings to be adjustable to the individual.

2. We are all individuals and our bodies, the way we work, and our strengths and limitations vary widely.

3. If we ignore these facts, we may get hurt, which can be costly, both to the individual and to the employer because of lost work days and reduced productivity.

4. By utilizing available ergonomic tools and educational materials and implementing an ergonomic training program, we can minimize costs and maximize productivity.

Here ends "Ergonomics in the Office: What You Need to Know," except for the footnotes which are on the last page of this Ebook.

Hopefully, "Ergonomics in the Office: What You Need to Know" has been informative and you've enjoyed reading it. We have more in the works which we'd love to share with you. Just send an email to experts@OfficeFurnitureNOW.com requesting them. Some of those available are:

- Conference Room Furniture: What You Need to Know
- Cubicles/Worksations: What You Need to Know

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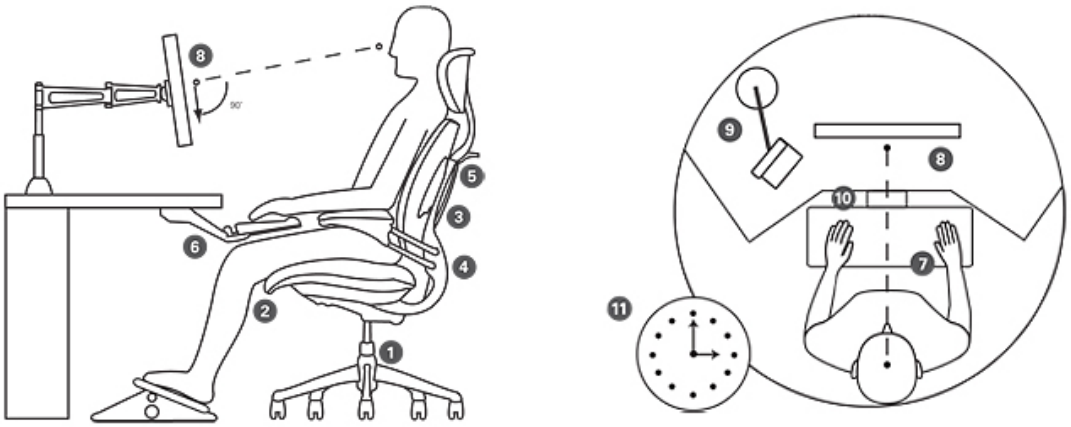
Note from Office Furniture NOW!: This "Guide" talks nothing about height-adjustable desks and should include a section titled "Stand" that encourages you to stand for 1.5-2 hours in a workday!

Humanscale's Ergo Gear Guide[23]

Use the following guidelines to maintain healthy work posture and get the most out of your ergonomic investment.



Sit

1. Raise or lower your seat so your thighs are parallel to the floor and your feet are flat on the floor or a footrest.
2. Adjust the depth of your seat pan so you have at least 2" of clearance between the back of your knees and the front of the seat.
3. Adjust the height of your backrest so it fits comfortably on the small of your back.
4. Adjust your chair's recline tension—if necessary—to support varying degrees of recline. Avoid using recline locks.
5. Lean back and relax in your chair to allow the backrest to provide full support for your upper body.

Type

6. Position your keyboard support 1 – 1.5" above your thighs and angle the keyboard so it slopes slightly away from your body. Be sure to keep your wrists in a straight, neutral posture while typing, and rest the heels of your palms—not your wrists—on a palm support.

Mouse

7. Position your mouse close to the keyboard—preferably on a mousing platform—to minimize reaching. Avoid anchoring your wrist on the desk. Instead, glide the heel of your palm over the mousing surface and use your entire arm to mouse.

View

8. Position your monitor at least an arm's length away with the top line of text at or just below eye level. Tilt the monitor away from you slightly, so your line of sight is perpendicular to the monitor.

Illuminate

9. Position your task light to the side opposite your writing hand. Shine it on paper documents but away from your monitor to reduce glare.

Align

10. Align your monitor and the spacebar of your keyboard with the midline of your body. Arrange frequently used work materials within easy reach to minimize twisting and reaching.

Rest

11. Take two or three 30- to 60-second breaks each hour to allow your body to recover from periods of repetitive stress.

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