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Job Accommodation Network

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Accommodation and Compliance Series

Accommodation and Compliance Series: Ergonomics in the Workplace

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Introduction

Ergonomics is the science of fitting jobs to people. The discipline encompasses a body of knowledge about physical abilities and limitations as well as other human characteristics that are relevant to job design. Essentially, ergonomics is the relationship between the worker and the job and focuses on the design of work areas to enhance job performance. Ergonomics can help prevent injuries and limit secondary injuries as well as accommodate individuals with various disabilities, including those with musculoskeletal disorders (MSDs).

With workers' compensation costs soaring and ergonomic legislation coming to fruition in certain industries (e.g., meatpacking, nursing homes, retail stores, poultry processing), employers are implementing broad-based ergonomic programs. For those industries not covered by existing ergonomic standards, the Occupational Safety and Health Administration (OSHA) expects employers to follow Section 5(a)1, the General Duty Clause, of the Occupational Safety and Health Act (OSH Act), which says that "a place of employment must be free from recognized hazards that are causing or are likely to cause death or serious physical harm to [] employees." According to OSHA, "work-related [MSDs] currently account for one-third of all occupational injuries and illnesses reported to the Bureau of Labor Statistics (BLS) by employers every year. These disorders [] constitute the largest job-related injury and illness problem in the United States today."

The benefits of implementing an ergonomics program apply to all workers, but ergonomics can be particularly important when accommodating employees with disabilities. The Americans with Disabilities Act (ADA) mandates that employers accommodate employees with disabilities, which may include individuals with MSDs. An accommodation is any change or adjustment to a job or work environment that allows a qualified employee with a disability to participate in the job application process, to perform the essential functions of a job, or to enjoy the benefits or privileges of employment. For individuals with MSDs, accommodations may be as diverse as alternative keyboards, tool balancers, or scissor lifts. Before determining what accommodations might be effective, an employer must know the essential functions of the job in question as well as the limitations of the individual performing the job. Though not required by the ADA, a job analysis can aid in determining the essential functions of a position and is an important precursor to an ergonomic analysis.

The following document outlines how to perform an ergonomic analysis with a special emphasis on accommodations. Considerations for the worker, workstation, and work-site are highlighted. In particular, the document looks at proper ergonomic spacing, flooring, doors, and storage areas for office, industrial, service, and health care settings. Administrative controls are also addressed.

The following information summarizes several tips for completing an ergonomic analysis. The first step in an ergonomic analysis is to define the population that is to be served. For example, when implementing ergonomics for an individual who uses a mobility aid, the mobility aid and its user must be considered one unit. The type of mobility aid may change what is considered “ergonomic.” Implementing ergonomic principles for an individual with a disability can be very specific to that individual. Also, when dealing with accommodation issues in the workplace, special attention should be given to the location and set-up of assistive technology to ensure good ergonomics. Second, the individual’s workstation and work-site must be addressed.

A. Worker

General guidance on accessibility and proper ergonomic positioning can be obtained from the Americans with Disabilities Act Accessibility Guidelines (ADAAG) . Typically, anthropometric data are used to design workstations that adjust to fit the smallest member of the population (the 5th percentile female) and the largest member of the population (the 95th percentile male). However, a majority of those left outside of this range are people with disabilities. This means ergonomics is situational. Thus, when accommodating an individual with a disability, an effective analysis may need to go beyond general guidelines.

- What are the subject’s anthropometric data? Document the subject’s stature; eye, shoulder, and knee height; arm reach; leg length; and waist level. Anthropometric data are used to specify appropriate reach and space requirements for various populations.
- What psychosocial factors are influencing the worker? Document if the individual works alone, in a cubicle, or is isolated and whether the individual has freedom over workstation (e.g., radio use, decorations).
- What types of personal protective equipment (PPE) are used? Document any gloves, arm guards, hardhats, safety glasses, respirators, or shoes.

B. Workstation

1. Office

- Is the keyboard placed low enough so that the employee’s posture is ergonomic and the employee feels comfortable? It is important to maintain a neutral wrist posture and use a light touch on the keyboard. Upper arms should hang loosely by the sides with forearms parallel to the floor. Keyboard height should be between 25 and 31 inches.

- Are the space dimensions within the workstation sufficient? The top of the computer monitor should be level with the operator's eyes and positioned at a comfortable viewing distance. (This is task specific.) Repositioning with an adjustable monitor arm is an option. The monitor should be placed directly in front of the chair and over the center of the workstation knee well. Screen height should be between 33 and 42 inches, the angle of the monitor screen should be between 0 and 7 degrees, and viewing distance should be between 18 and 28 inches.
- Is the chair properly adjusted? A fully adjustable seat and adequate legroom should be provided. In general, the clearance between the top of the seat pan and the bottom of the work surface should be about 11 inches with about 24 to 32 inches provided horizontally at the knee and ankle respectively. The seat should be large (minimum of 18.2 inches wide) and fully padded. It should be covered with a porous roughly textured moisture absorbing material. The seat pan height and depth should be adjustable as well as the angle and height of the seat back. A properly designed backrest should support the upper and lower spine. A stable five-leg base and seat swivel helps with reaching items located to the sides of the workstation. If seating adjustments are such that the employee's feet do not touch the ground an adjustable footrest should be provided.
- Is glare diffused with panel diffusers and/or glare screens? Task lighting with a dimmer control should help, and adjustable blinds can taper excessive sunlight.

2. Industrial

- Is the work surface adjustable? The surface should be sturdy enough for workers to lean on for balance and should have rounded work surface corners and edges. Work surfaces should be between 25 and 34 inches from the floor for seated and 33 to 45 inches from the floor for standing. Work surfaces should be less than 2 inches thick, and knee space should be 30 inches wide by 19 inches deep.
- Is the pace setting appropriate? Document what body parts remain idle and what body parts are in steady motion.
- Are forceful exertions, such as gravity, friction, and reaction forces, present? Document any lifting, moving, reaching required and whether these forceful activities are associated with extreme upper or lower body movements.

- Are the "proper" tools available? Tools that are pneumatic; tools that can be used in either hand; tools with pistol shaped handles for power grips; tools with round edges, padded handles, spring activation, and space between closed handles will reduce palm stress and grip force. Newer tools equipped with tool wraps and tool balancers/positioners are also helpful.

3. Service

- Are work surfaces adjustable? Work surfaces should meet the needs of workers with different heights, reach ranges, and standing/sitting limitations.
- Is traffic flow designed to most effectively meet the needs of workers, contractors, and customers? Document the most frequently traveled areas and whether goods are stored in an accessible place.
- Are repetitive job tasks rotated among several workers throughout a shift? Document activities such as lifting, typing, tagging, taping and bar coding.
- Is anti-fatigue matting available in areas where individuals must stand for long periods of time? If available, document whether the matting is properly fixed to the floor.
- Are mechanical aids available for use whenever possible? Compact lifting devices, carts, and other light weight material lifts should be available for lifting and moving boxes and other materials.
- Is a preventive maintenance program in place for all equipment?

4. Health Care

- Have employees been trained in the proper use and selection of patient lifting and transfer devices? Is there periodic re-training and evaluation on the use of this equipment? Patients can be grouped according to limitations making the availability of similar equipment in areas of close proximity. Shower chairs can be used for toileting and showering reducing the amount of transfers into and out of wheelchairs. Lift teams can be created for specific areas of the facility. Group experienced, trained employees with new employees to re-enforce proper lifting and transferring techniques.
- Are laundry and food carts pushed rather than pulled? Do carts have an oval or round push bar around waist height? Are powered push/pull devices available for use with beds and heavy or multiple carts? Some manufactures have a motorized option available on a hospital bed.

- Are there different height laundry folding tables for different size employees? Do laundry personnel use spring loaded bottoms in carts for dispensing linens? Existing folding tables can be retrofitted with height adjustable table legs.
- Have job task analysis been performed to identify awkward postures and motions in all jobs? Examination of past injury reports can identify areas of concern to address first. Look for tasks involving reaching, bending, prolonged static postures, forceful exertions, and heavy lifting.

5. General

- What equipment is fixed/moveable and where is it located in relation to the worker?
- Does the job include repeated and sustained exertions? Document whether the job entails stagnant postures for prolonged periods, repetitive motions, and whole body exertions (lifts, pushes, pulls, etc.).
- What is the duration and frequency of awkward postures? Awkward postures include flexion (side to side), extension (upward bending), and deviation (outward bending) of the hand/wrist; flexion past 90 degrees and arm rotation of the elbow; reaching overhead, behind the body, and across the body with the shoulder; forward flexion and extension greater than 30 degrees of the neck; and bending and twisting greater than 20 degrees with the trunk.
- What are the general environmental factors? Document noise levels, ventilation, flooring material, lighting, air quality, and temperature variations, specifically when the worker is exposed to temperatures greater than 75 degrees or less than 50 degrees.

C. Work-site

1. Spacing

- Is additional surface and maneuvering space provided for assistive devices? Provide a minimum of 30 inches by 48 inches of maneuvering space at workstations and storage areas. There should be 48 inches of clear space between work surfaces, and objects below 80 inches above the floor are typically inaccessible. Objects protruding more than 4 inches from the walls should be removed.
- Are extra electrical outlets for workers using powered assistive technology available?
- Are distances between entrances, work areas, restrooms, and office equipment minimized?

- Are walkways blocked? Obstructed walkways should be opened to eliminate the potential for trips and falls. At least one clear path of travel (without stairs) at least 36 inches wide, except for a minimum of 60 inches in two-way halls and 32 inches through doorways should be provided. Allow a minimum of 60 inches of clear, level floor space in front of and behind a door and 18 inches on the latch side of the door.

2. Flooring

- Is non-slip flooring secure?
- Are proper treads, handrails, and detectable warnings installed?
- Do the walls and floors have a color contrast?
- Have changes in floor level been identified with visual and texture contrast?
- Has ramp slope been minimized and any threshold with a rise greater than 0.25 inch been ramped? Carpet pile deeper than 0.5 inch should be avoided and abrupt changes in friction eliminated.

3. Doors

- Are door closers adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch? (This is measured to the leading edge of the door.)
- Is door hardware, such as levers or pull handles, provided? These should be installed 36 to 48 inches above the floor and have a shape easy to grasp.
- Do doorways provide at least 32 inches of level clearance?
- Are kick plates installed 12 to 18 inches above the floor?
- Do the inside and outside of doors provide 60 inches of clear floor space and 18 inches to the latch side?
- Are automatic and power assisted doors provided where necessary? Revolving doors should be avoided.

4. Storage

- Are materials stored in an accessible area, between 15 inches and 48 inches above the floor?
- Are drawers accessible? Avoid drawers deeper than 12 inches. Deep storage should have Lazy-Susan carousels, pull-out shelves, or drawers with full extension bearing slides.

- Are hard-to-reach materials labeled? Materials should have visible labels and color codes.
- Do electrical wires dangle? Hazardous hanging electrical wires should be avoided and others hidden from view.
- Are electrical outlets accessible? Electrical outlets should be provided at least 15 inches above the floor.
- Are all casters appropriate to the floor covering?
- Are items placed in the most “accessible” place possible? Position storage for pushing rather than pulling, pulling rather than carrying, carrying rather than lowering, and lowering rather than lifting. Make storage available for intermediate transporting and transferring of materials.

5. Other

- Is an accessible area of rescue assistance established?
- Are accessible drinking fountains provided?
- Is clear space for a forward or side approach provided for vending machines? Vending machines should be on an accessible route and within accessible reach ranges.

D. Administrative Controls

- Are employees properly trained in ergonomic principles? Training should include proper lifting techniques, adequate maintenance and correct equipment use, and neutral postures.
- Are rest breaks built into the workday? To reduce stress on eye muscles, an individual should look away from the workstation and refocus on an object at least 25 feet away and blink often. Rest breaks should also include simple, brief exercises such as shoulder shrugs, neck rolls, ankle rotations, leg extensions, overhead stretches, hand shakes, and finger spreads.
- Are job tasks varied? An individual should alter positions every 45 minutes, e.g., distribute tasks between right and left hands, alternate between intensive fine motor and gross motor manipulation, and change between sitting and standing.

Additional JAN Resources

- [Ergonomic Assessment Providers](#)
- [Ergonomic Software](#)

- [Ergonomic Equipment](#)

Situations and Solutions:

A journalist with bilateral carpal tunnel syndrome was limited to two hours of typing and writing per day.

His employer purchased writing aids and an alternative keyboard; installed speech recognition software; allowed him to take breaks throughout the day; and provided him with office equipment to rearrange his workstation.

A customer service agent for an insurance company was pregnant and experiencing significant leg and back pain when sitting for long periods of time.

She also needed to use the restroom frequently. The employer provided an adjustable workstation to enable the employee to alternate between sitting and standing positions. The employer also allowed her to take more frequent rest breaks by dividing her existing thirty-minutes of break time into several smaller increments of time so she could use the restroom as-needed.

An employee with focal hand dystonia mentioned difficulty keeping up with prolonged writing tasks.

The employer provided ergonomic writing aids as an accommodation.

A social worker with chronic fatigue syndrome experienced headaches and photosensitivity.

Accommodations included changing the lighting in her workstation from fluorescent lighting to task lighting, adding a glare guard to her computer monitor, providing window blinds, and implementing other workstation changes to enhance ergonomics.

A sales clerk with cubital tunnel syndrome lost the ability to move her right hand.

The individual needed to use the computer to create reports. Her employer purchased a left-handed keyboard, foot mouse, forearm supports, an articulating keyboard and mouse tray, and an ergonomic chair.

An office worker with a bleeding disorder was limited in the amount of time she could work at a keyboard.

JAN suggested using speech recognition software to decrease keyboarding time and suggested implementing an ergonomic workstation.

A drafting engineer had third degree burns to 80% of his body.

He was limited in sitting for extended periods. He was accommodated with an ergonomic workstation, including a sit/stand work station.

A clerical worker provided by a staffing agency needed an ergonomic set up for her workstation.

The staffing agency provided the ergonomic equipment and the employer had its IT department install it.

An insurance clerk was experiencing pain in her back, neck, and hands from sitting for long periods of time doing computer work.

She was accommodated with speech recognition software, an ergonomic chair, and an adjustable sit/stand workstation.

An office worker in a hospital was experiencing muscle weakness in his neck and arms due to ALS

His employer called JAN looking for product ideas, specifically information on ergonomic chairs with a high back, neck rest, and arm rests. JAN was able to e-mail a vendor list for equipment so the employer could make an informed decision.

A veteran with head and neck injuries and post-traumatic stress disorder (PTSD) was working as a graphic designer in a cubicle environment.

He had chronic pain, which was exacerbated by using a computer mouse, and PTSD, which was exacerbated by noise. The employer preferred to have the designer work in the office with his team, but there were no private offices available. Instead, the employer provided an ergonomic mouse and a noise canceling headset.

A technical consultant was having difficulty using the computer in the afternoons due to fatigue.

He was accommodated with speech recognition and an ergonomic workstation.

A computer operator was experiencing weight loss and gastrointestinal limitations as a result of having HIV.

She was provided with an ergonomic chair with extra padding and began to change seating positions often. This prevented her from getting sores from sitting in one position for prolonged periods of time. Employee's workstation was also moved closer to a restroom to provide her better access. Total cost to move employee to another workstation was virtually nothing.

A clerical worker who stamped paperwork for several hours a day was limited in pinching and gripping due to carpal tunnel syndrome.

The individual was accommodated with adapted stamp handles. Anti-vibration wrap was placed around the stamp handles. In addition, tennis balls were cut and placed over the wrapped handles to eliminate fine motor pinching and gripping.

A customer service representative with arthritis had difficulty typing for long periods.

The individual was accommodated with an ergonomic keyboard and tablet computer.

A clerical worker with scoliosis has sitting and standing restrictions.

Because the worker is required to work at a desk a majority of the time, the worker was accommodated with an ergonomic workstation evaluation, ergonomic chair, and a sit/stand computer workstation.

A butcher with carpal tunnel syndrome had limitations in grasping and handling tools and other objects, especially various sizes of knives.

He was accommodated with a set of ergonomic knives.

A mechanic with a bending restriction due to a low back impairment has problems accessing the engine compartment and low task areas of vehicles.

The mechanic was accommodated with a tire lift, a mechanic's low task chair, and a specialty creeper designed to support the body while accessing engine compartments.

An individual employed as a patient rights advocate had carpal tunnel syndrome and fibromyalgia.

She had difficulty keyboarding, writing, and transporting supplies to presentations. The employer installed speech recognition software for word processing, provided her with writing aids, and gave her lightweight portable carts to assist with transporting materials.

A truck driver with thoracic outlet syndrome was having difficulty driving for long periods of time and unloading bags at his delivery destination.

The employer installed a small crane in the back of the trailer and provided him with a lightweight aluminum hand truck to help him unload materials. The employer also provided the employee a steering wheel spinner knob to eliminate prolonged grasping of the steering wheel and an anti-vibration seat to cut down on fatigue.

An insurance clerk with arthritis from systemic lupus erythematosus was experiencing pain in her back, neck, and hands from sitting for long periods of time doing computer work.

She was accommodated with speech recognition software, an ergonomic chair, and an adjustable sit/stand workstation.

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