

APPENDIX V

Other Workplace Ergonomics

There are a variety of other work settings where ergonomic practices are important (e.g., manual material handling, custodial work, maintenance, gardening, etc.).

Principles for Manual Material Handling (MMH) Work Design

Force and Weight Limits for MMH tasks:

OSHA, the Occupational Safety and Health Administration, does not presently have a standard that specifies quantitative force limits for manual material handling operations, however, the Agency references the Revised NIOSH (National Institute for Occupational Safety and Health) Lifting Equation, which provides a mathematical means of evaluating MMH tasks for risk of injury. NIOSH has shown through research that a task having a Lifting Index greater than 3.0, as calculated using the Lifting Equation, can clearly be linked to an increased risk of back and other injuries.

The NIOSH Lifting Equation recommends a maximum lifting limit of 51 pounds, termed the Load Constant. The Load Constant represents the maximum load that nearly all healthy workers should be able to lift under optimal conditions. Non-optimal conditions (such as lifting frequently, poor grip quality, twisting of the torso or reaching while lifting, lifting from floor level or above shoulder level, long task duration, and the need for significant control in lifting and/or placement of the load) significantly reduce the load that can be safely lifted. Based on the parameters of the lifting task, the equation provides a Recommended Weight Limit (RWL).

Information on the Lifting Equation can be found at:

<http://www.cdc.gov/niosh/docs/94-110/>

While adherence to the NIOSH criteria is not mandated by OSHA, the Agency addresses employee exposure to ergonomic, and other recognized but non-regulated hazards, under the General Duty Clause of the OSH Act. The General Duty Clause requires that “each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.”

Eliminate the Need for Heavy MMH

The optimal solution to MMH-related problems is to eliminate the need for heavy MMH. In general, two means exist to accomplish this:

- The use of mechanical aids such as hoists, lift trucks, lift tables, cranes, elevating conveyors, gravity dumps, carts, and chutes, which can eliminate (or at least significantly decrease) physical stresses due to MMH.
- To eliminate heavy MMH, change the work area layout to make all materials available at work level and as close as possible to the work point. Accomplishing this objective can involve either a change in work level height or the level of the worker, or a change in the layout of the task area.

Decrease MMH Demands

If MMH cannot feasibly be eliminated, then attempts should be made to decrease the MMH demands of the job. There are several means by which this principle of work design can be accomplished:

- Decrease the weight of the object being handled. Assigning the handling to two or more people, by distributing the load into two or more containers, or reduce the weight of the object by reducing the capacity of the container or the container weight (e.g., using plastic drums rather than metal drums).
- Change the type of MMH activity so the demands of the job can be decreased. Lifting, lowering, pushing, pulling, carrying, and holding are all types of MMH activity. It is preferable for a job to require lowering rather than lifting, to require pulling rather than carrying, and to require pushing rather than pulling. (examples include making several trips with lighter loads or using a cart or dolly whenever possible.)
- Changes in the work area layout can decrease MMH-related demands. Some ways in which this can be accomplished include: minimizing the horizontal distance between the starting and ending points of a lift, limiting stacking heights to the shoulder height of the worker, and keeping heavy objects at the knuckle height of workers.
- Maximizing the time available to perform the job can decrease job demands. Accomplish this by reducing the frequency of the lift, and by incorporating work/rest schedules or job rotation programs into the work design.

Minimize Stressful Body Movements

Another principle of work design is to minimize stressful body movements required by the job. Specifically, bending and twisting motions imposed on the worker should be reduced.

- Reduce bending by locating objects to be handled within the arm-reach envelope of the worker. Provide all material at the work level of the worker. Avoid using deep shelves where the worker must bend and reach to obtain objects toward the rear of the shelves.

- Locate objects within the worker's arm-reach envelope to reduce twisting motions of the back. Arrange the work area to allow sufficient space for the entire body to turn and pivot with the feet. If the worker is seated, an adjustable swivel chair should be used.
- Design considerations should allow the worker to lift objects in a safe manner. Practice and encourage the safe lifting techniques described below.

Safe Lifting and Good Body Mechanics

- If an object is too heavy for you to lift safely by yourself, get help.
- Try to handle the object close to the body.
- Use devices such as handles, grips, etc., to provide better control of the object being lifted or moved.
- Balance the contents of containers.
- Provide rigid containers for increased worker control of the object.
- Avoid lifting objects from floor level, especially those that are excessively wide.
- Use good body mechanics: **bend your legs, not your back, when lifting.**
- Never twist your back when lifting; instead, turn with your feet.

Recognize the Risk for Repetitive Motion Injury

OSHA has identified five specific situations, which create significant risks for RMI, if incurred over a period of more than two to four hours:

- Performing the same motion or motion pattern for more than two hours continuously or four hours daily.
- Maintaining an unsupported fixed or awkward posture for more than one hour continuously or four hours daily.
- Using vibrating or impact tools or equipment for more than one hour continuously or two hours daily.
- Using forceful hand exertions for more than two hours daily.
- Unassisted frequent or heavy lifting

Recovery Cycles

Ergonomists agree that the most important measures to prevent repetitive stress injuries are:

- Take frequent breaks
- Move around and change postures frequently
- Do not repeat the same motions and postures
- Avoid awkward motions and postures
- Avoid application of excessive forces, especially for protracted periods

- Avoid static loading of muscles (prolonged muscle tension)
- Perform relief exercises
- Expand the tasks each person performs to minimize the constant repetition of any one particular task

The theory behind this advises: providing recovery time; time for your body to recover from exertions. Awkward postures, repetitions, or the application of force, unless extreme, are not necessarily bad. However, when sustained over time or repeated frequently so that your body does not have time to recover, the result can be a cumulative trauma injury, perhaps leading to permanent damage.

It is critical to recognize the cumulateness of stresses and the need to balance tasks and activities. Without recovery periods, ergonomic stresses incurred during one activity become cumulative with stresses from another similar activity. For instance, hand movement stresses you incur in the lab can be cumulative with those you incur performing other activities such as using a computer keyboard or playing the piano. It is crucial to balance these activities and allow adequate recovery periods.

Anti-Fatigue Mats

Anti-fatigue mats provide relief from contact stress to the feet of the worker at standing and sit/stand workstations. Mats should be large enough for workers to stand entirely on the mat when at the workstation. Select a mat free of raised or irregular surfaces that might cause concentrated forces on the feet of the worker. Mats should be designed so they do not create tripping hazards.