



CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS

# Ergonomics Program

California State University  
Dominguez Hills

RISK MANAGEMENT/ENVIRONMENTAL HEALTH  
and  
OCCUPATIONAL SAFETY

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## Contents

Introduction .....	4
Purpose .....	4
Responsibilities .....	5
Managers.....	5
Employees .....	5
Risk Management/Environmental Health and Occupational Safety (RM/EHOS).....	6
Physical Plant.....	6
Exposures Awkward Postures.....	6
Repetitive Motions.....	6
Forceful Exertions.....	6
Pressure Points.....	6
Vibration.....	6
Prevention.....	7
Good Body Posture .....	7
Engineering Controls .....	7
Administrative Controls .....	7
Job enlargement .....	7
Job rotation.....	7
Work breaks.....	7
Training .....	7
Personal Protective Equipment (PPE) .....	7
Ergonomic Equipment Purchases .....	8
Purchase Justification.....	8
Workstation Assessment .....	8
General Computer User Guidelines .....	9
Placement Zone.....	9
Wrist Rest .....	9
Chair .....	9
Work Surface.....	9
Monitor .....	10
Keyboard .....	10

Other Input Devices .....	10
Document Holder .....	10
Footrest .....	11
Eyewear .....	11
Exercises .....	11
Industrial Ergonomics .....	11
Manual Material Handling .....	11
When Lifting Objects .....	11
Preventing Back Injuries:.....	12
Hand Tools.....	12
Training .....	13
New Employee Orientation.....	13
Online Training .....	13
Medical Management.....	13
Definitions.....	14
Twelve Tips for an Ergonomic Computer Workstation .....	15

## Introduction

Ergonomics is the study of people and their interaction with the elements of their job or task including equipment, tools, facilities, processes, and environment. It is a multidisciplinary field of study integrating industrial psychology, engineering, medicine, and design.

In a more practical sense, ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population. Effective and successful "fits" assure high productivity, avoidance of illness and injury risks, and increased satisfaction among the workforce. When aspects of the work or workplace insult the human body, the result is often a musculoskeletal disorder (MSD). To help avoid musculoskeletal disorders, work demands should not exceed the physical capabilities of the worker. Musculoskeletal disorders are also known by several other names including:

- CTDs (cumulative trauma disorders)
- RSIs (repetitive stress or repetitive strain injuries)
- RMIs (repetitive motion injuries)
- Overuse syndrome

The most common, recognizable name for musculoskeletal disorders is cumulative trauma disorders or CTDs. Whatever the name used, these injuries belong to a family or group of wear and tear illnesses that can affect muscles, nerves, tendons, ligaments, joints, cartilage, blood vessels or spinal discs of the body. Musculoskeletal disorders do not include slips, trips and falls, cuts, motor vehicle accidents or other similar accidents; although a close look at the reasons for acute injuries often reveals design problems that can be corrected.

## Purpose

The purpose of the California State University, Dominguez Hills (CSUDH) Ergonomics Program (Program) is to improve employee wellbeing through the reduction of workplace discomfort and the identification and control of ergonomic hazards that may result in personal occupational injuries or illnesses. This program is focused to be in compliance with California Code of Regulations (CCR), Title 8 §5110 and CSUDH policy and procedures.

The program consists of the following elements:

- Worksite analysis/assessment
- Hazard prevention and control
- Training and education
- Medical management

This program is managed through a combination of ergonomic control strategies to include, but not limited to the following:

- Assessment for and the reduction of cumulative trauma risk factors
- Involvement of administrators, supervisors and personnel in ergonomic planning
- Claims management as it is related to workplace cumulative trauma injuries
- Full evaluation of ergonomic interventions
- Resource identification to maintain knowledge of trends and effective work practices pertaining to ergonomics
- Actively support the dynamic nature of the program, recognizing new hazards, newly developed products and research findings to assist in guiding further planning and interventions for the Ergonomics Program.

## Responsibilities

### Managers

Managers will support the efforts of identifying and controlling ergonomic risk factors on campus by:

- Actively participate and support the ergonomic program.
- Provide adequate funding and time for ergonomic activities such as training, workstation assessments, and implementation of control measures, workplace modifications, and ergonomic equipment.
- Authorize assessment of the workstation if hazards are suspected.
- Effectively promotes the use of good ergonomic procedures.
- Coordinate with RM/EHOS to implement corrective actions, when necessary.

### Employees

Employees are an essential element to the success of the ergonomics program. Employee participation in the program will occur only during company time and include:

- Participating in ergonomic training.
- Notifying their department supervisors and/or managers of their reasonable needs to improve their workstation.
- Using equipment correctly.
- Promoting a “safety culture” by using proper working techniques.
- Cooperate with the department managers, supervisors, or RM/EHOS to identify symptoms of Cumulative Trauma Disorder (CTD) and other ergonomically related concerns and reporting of recommendations for corrective actions.
- Report early signs and symptoms of work-related CTDs to their supervisor.
- Implementing recommendations based on the ergonomic workstation assessment survey performed by RM/EHOS.

## **Risk Management/Environmental Health and Occupational Safety (RM/EHOS)**

Risk Management/EHOS will:

- Coordinate the ergonomics program to reduce cumulative trauma injuries at CSUDH.
- Provide guidance on modifying the workplace to minimize the potential for injuries and illnesses.
- Provide ergonomics training for employees, supervisors, and managers.
- Analyze and report trends in injury or incidence rates, and injury severity.
- Evaluate individual and departmental workstations upon request.
- Provide assistance and advice on the selection of furniture and equipment.

### **Physical Plant**

Physical plant will

- Integrate ergonomic considerations into work space planning, workstation design, and building modifications in conjunction with RM/EHOS. Design for optimal environmental factors such as temperature, noise, vibration, and lighting during facility planning.

### **Exposures**

#### **Awkward Postures**

Reaching, twisting, bending, working overhead, pinch grips, holding of fixed positions, squatting, kneeling

#### **Repetitive Motions**

Same types of motions performed over and over again using the same muscles, tendons, and joints (typing data entry, transposing, exercise, hobbies, etc.)

#### **Forceful Exertions**

Amount of muscular effort expended to perform work, load shape, grip type, effort required, length of time of the continuous force, number of times load is handled per hour, body posture.

#### **Pressure Points**

Sides of fingers, palms, wrists, forearms, elbows, knees (i.e. resting forearms or wrists against sharp edges on a desk or work table)

#### **Vibration**

Motion, from minimal to excessive, caused usually as a result of an operating motor, tool such as sanders, grinders, chippers, routers, drills, saws, etc.

## Prevention

Prevention is the key to reduce or eliminate the risk of developing a cumulative trauma disorder. Prevention includes the use of good body mechanics, good ergonomic design (engineering controls), and the use of administrative controls. Early intervention makes a difference for employees who experience symptoms such as pain, numbness, tingling, or tenderness in the fingers, hands, arms, or muscle pain in the back, shoulders, or other parts of the body from lifting or other body motions. It is important for employees to report early signs and symptoms of work-related CTDs to their manager and/or supervisor and to follow up with RM/EHOS for evaluation.

## Good Body Posture

Using good body posture is important for minimizing the risk of developing a CTD. Equipment, tools, and furniture are an important part of the work environment. Since frequent use of these items does have a significant impact on job performance and overall health, good body posture is essential when equipment, tools, and furniture are used.

## Engineering Controls

Engineering control measures should be addressed as the first line of defense to eliminate or reduce ergonomic hazards that employees are exposed to. It is important to design out the problem when this approach is feasible.

## Administrative Controls

### Job enlargement

- Have employees perform more parts of a job rather than one specific task repeatedly.

### Job rotation

- Cross-train employees to perform other jobs. Rotate employees in jobs that use different muscle groups, if possible.

### Work breaks

- Have employees take frequent short breaks from repetitive tasks throughout the day.

### Training

- Training provides information for mitigating ergonomic hazards, strategies to improve a workstation layout, and stress reduction exercises.

## Personal Protective Equipment (PPE)

Although not recognized as an effective means of controlling hazards and do not take the place of engineering or administrative controls, there are acceptable forms of PPE, which include kneepads and various types of gloves including anti-vibration.

## **Ergonomic Equipment Purchases**

Ergonomic equipment recommended as a result of an ergonomic assessment conducted by the Risk Management/Environmental Health and Occupational Safety (RM/EHOS) department will be approved and purchased by the employee's department. Ergonomic equipment purchased will be the property of the department that purchased the equipment.

As part of the ergonomic workstation evaluation procedure, RM/EHOS will initially evaluate the employee's current equipment including, but not limited to chair, keyboard, articulating keyboard tray, headset and/or ancillary equipment. In some cases, the employee may have been issued ergonomic or adjustable equipment that may need to be properly adjusted for fit and function and not replaced.

## **Purchase Justification**

Ergonomic equipment, both industrial and clerical, inherently due to technical advancements and engineering costs, is more often than not, expensive. It is for this reason that this type of equipment will not be purchased without management review and approval and after an ergonomic workstation assessment has been conducted. Ergonomic equipment will not be recommended for replacement or purchase for any of the following rationales:

- Decorative reasons such as style or color
- Functional equipment will not be replaced due to age of the equipment
- Other department work stations have replaced equipment

## **Workstation Assessment**

The purpose of the workstation assessment is to ensure computer users are using proper ergonomic practices at their workstation or when a computer user is experiencing some type of biomechanical stress. The assessment can help management and RM/EHOS determine which workstations and individuals should be targeted for further evaluation or additional ergonomic needs. Workstation assessments can be requested at any time, but the assessment must be authorized by the employee's supervisor/manager.



## General Computer User Guidelines

The following guidelines are intended to help computer users understand and reduce health risks associated with computer workstations. Since no two bodies are identical, different styles, models and sizes of furniture and accessories may be needed.

During the workstation assessment, equipment adjustments (monitor height, keyboard, chair, etc.) with the employee will be made at that time. RM/EHOS will provide guides and review proper workstation set up during the assessment. Any recommendations following the assessment will be forwarded to employee's supervisor and/or manager for further corrective actions. General guidelines for setting up a workstation are listed below.

### Placement Zone

The placement zone is the area in which an employee performs most routine tasks, whether repetitive movements (e.g., typing at a keyboard) or less frequent movements (e.g., lifting). Work should be arranged to be within easy reach and usual work located within 12 inches of the employee. Frequently used materials should be located within arm's distance from the operator employee (18 inches at the maximum). Such an arrangement reduces potential stress to the back, shoulders, and arms by avoiding awkward postures and positions.

### Wrist Rest

- When resting use a wrist rest for support to help maintain a neutral wrist.
- Use a wrist rest for cushioning to protect the wrist from resting on a hard or sharp work surface.

### Chair

Some of the key items to consider in an ergonomic chair are:

- Use a chair that is stable, mobile, swivels, and allows for operator movement.
- Use a chair that provides proper lower back support. The back support should be easy to adjust backward, forward, up, and down. A properly adjusted chair is important to help reduce or prevent stress on the back.
- Use a chair that has an adjustable seat height. Raise or lower the chair to a comfortable height such that the thighs are parallel to the floor and the knees are at a 90 – 110 degree angle. Rest the feet flat on the floor or use a footrest.
- Use the armrests if they allow maintaining elbows at a 90 – 100 degree angle. If the armrests obstruct sitting posture, then adjust the armrests, or get a chair that allows proper posture, or use a chair without armrests.
- Use a chair with an adjustable seat pan allowing the back of the legs to not contact the front of the seat pan.

### Work Surface

- Adjust the work surface so that the keyboard is at the correct height to maintain proper posture (i.e., elbows at keyboard height with the forearms parallel to the floor).
- Use a table large enough to hold the keyboard, monitor, wrist rest, mouse or trackball, and a document holder for all necessary documents.
- Keep adequate clearance under the table for leg length, knee height, and thighs.

## Monitor

- Position the monitor directly in front of you.
- Position the monitor at a comfortable viewing distance from the eyes, typically arm's distance (18-24 inches, but may vary due to monitor size and corrective lenses); the proper viewing height should reflect the top of the display screen at 2" to 3" above the users eye level height; and the viewing angle should be approximately 15-30 degrees below the horizontal line of sight.
- Use a monitor that tilts and rotates.
- Use a monitor that has adjustable contrast and brightness.
- Adjust the contrast to a high level and the brightness to a low level to minimize or prevent eyestrain.
- Keep the screen clean because dust reduces character clarity and reflects light.
- Adjust and position the monitor to minimize glare and reflections from overhead lights, windows, etc. or use anti-glare screens.

## Keyboard

- Use a keyboard that is detached from the monitor.
- Position the keyboard directly in front of you.
- Position the keyboard approximately at elbow height.
- Adjust the keyboard angle to a comfortable position; a slight negative angle should exist for the keyboard placement to allow for maximum comfort and neutral positioning of the user's hands on the keyboard.
- The control to adjust the angle is located at the rear of the keyboard.
- Hands should glide over the keys. Use a light touch for typing, keeping the hands and fingers relaxed.

## Other Input Devices

- When using a mouse, trackball, or special keypads, place the wrist in a neutral position.
- When using a mouse, trackball, or special keypads, rest the arm and hand close to the body and at a natural elevation - not reaching forward or raising the shoulder.
- Locate the input device adjacent to the keyboard so it can be accessed without stretching or leaning over to one side.
- Use the whole arm to move the input device instead of just the wrist.
- If the arm is resting on the table edge (hard work surface) when using the mouse or trackball, then use a mouse pad rest to provide cushion.

## Document Holder

- Use a document holder that has an adjustable height.
- Use a document holder large enough to support the documents the operator uses.
- Position the document holder beside and parallel to the display screen.
- Position the document holder at the same height and distance as the display screen. Such positioning minimizes the amount the operator has to turn his/her head to look from the document to the display screen and reduces eye muscle fatigue by maintaining the same focal distance.
- Document holders that rest under the monitor and have an angled platform in line with the screen and operator are also acceptable.

## Footrest

A footrest may be necessary if the operator cannot rest his/her feet comfortably on the floor.

- Use a footrest that has an adjustable height and heel stop.
- Use a footrest that is large enough to allow for operator movement.

## Eyewear

Employees should have eye check-ups on a regular basis.

## Exercises

- For the eyes, look away from the work to a distant point at least every hour.
- For the body, stretch the neck, shoulders, back, legs, arms, and fingers at least twice a day. Stand up and walk around often to increase blood flow circulation.

## Industrial Ergonomics

When ergonomics is applied at an industrial work area (e.g., workshops, labs, and equipment repair areas) it is referred to as "Industrial Ergonomics." It can encompass all other workstations except a general office workstation. The CTD risk factors are still relevant, only the setting is different. As mentioned previously, good body posture should always be employed to minimize muscle tension and body strain.

## Manual Material Handling

Manual material handling involves sitting, lifting, lowering, and carrying objects; it may also involve getting up and down from a standing position. All of these movements involve using the back. To avoid the risk of developing back problems, ergonomic principles should be applied while using the back. If ergonomics is ignored, daily stresses on the muscles, joints, and disks in the back can eventually cause a CTD in the back. For objects that are too heavy or bulky for safe manual handling by employees, mechanical lifting devices must be used for lifting and moving.

## When Lifting Objects

To minimize the risk of developing a CTD in the back, employees should follow these guidelines:

- Keep the back/torso erect with the natural curve of the spine intact.
- Keep the load close to the body.
- Lift and carry a heavy load with two hands instead of one.
- Bend at the knees to lift objects, not the back.
- Store loads above knee heights, but below shoulder height.
- Avoid bending forward or backward or twisting while lifting or carrying the load.
- Do not lean forward, backward, or to either side without support.
- Avoid lifting, pushing, or pulling a load that is too heavy. Always get assistance when needed. The maximum weight of the load that can be handled will vary for each employee.

## Preventing Back Injuries:

- Avoid lifting, bending, or reaching whenever you can. Use a cart, dolly, cranes, hoists, lift tables, and other lift-assisting devices.
- Place objects off the floor, ideally waist high.
- Test the weight of an object, before lifting, by picking up a corner.
- Get help if the load is too heavy for you to lift it alone.
- When lifting an object:
  1. Take a balanced stance, feet shoulder width apart.
  2. Squat down to lift, get as close as you can to the object
  3. Get secure footing and a good grip, and then hug the load.
  4. Lift gradually using your legs, keeping the load close to you and keeping the back and neck straight.
  5. Once standing, change directions by pointing your feet and turn you whole body. Avoid twisting at the waist.
  6. To put a load down, use these guidelines in reverse.

## Hand Tools

Improper hand tool selection or improper use of tools can cause CTDs. Hand tools should fit the employee's hand; employees with small hands or who are left-handed may need tools designed specifically for these situations. Hand and wrist posture are important because they affect how much force the muscles must produce to hold objects. When selecting and purchasing hand tools, these guidelines should be followed:

- Select tools that allow the wrist to be held straight and that minimize twisting of the arm and wrist. Good working posture can be maintained when properly designed tools are used.
- Select tools that allow the operator to use a power grip, not a pinch grip. Minimal muscle force is required to hold objects in a power grip posture. The pinch grip requires excessive fingertip pressure, and can lead to a CTD.
- Avoid tools that put excessive pressure on any one spot of the hand (i.e., sides of fingers, palm of the hand).
- For power or pneumatic tools, select tools with vibration dampening built in whenever possible. Provide personal protective equipment such as gel-padded-gloves to reduce exposure to vibration.

## **Training**

### **New Employee Orientation**

All new employees attend new employee orientation. Included in the new employee orientation is information provided by RM/EHOS designed to inform new employees about the CSUDH Ergonomics Program.

### **Online Training**

California State University, Dominguez Hills staff and faculty have access to online training courses through SkillPort. Courses titles include office ergonomics, industrial ergonomics and ergonomics in the workplace. A complete summary of the courses offered is available on the Risk Management/EHOS website.

### **Medical Management**

All work related injuries or symptoms are managed through the Workers' Compensation Manager in Human Resources. Human Resources can provide guidance to supervisors who have an employee who is under doctor care for to ensure employees do not aggravate the medical condition. Managers will also ensure corrective actions at the workstation have been implemented to prevent such injuries or symptoms from reoccurring.

## Definitions

**Controls** are any action used to minimize and/or eliminate risk. Controls can be classified into the following types:

- **Engineering Controls** – actual physical changes made to the workstation, equipment, materials or facilities that usually results in the elimination of a hazard(s) as a result of the change implemented.
- **Administrative Controls**– interventions aimed at reducing exposure to hazards without actual physical changes being made to the workstation and/or equipment. Types of administrative controls can be:
  - Job rotation
  - Rest breaks
  - Limits on work hours
  - Cross-training
  - Staffing level changes
- **Personal Protective Equipment**–generally thought to be the least effective of the three types of controls; involves the proper use of protective devices (gloves, supports, pads) to assist in attempting to decrease the risk of exposure to the hazard.

**Cumulative Trauma Disorders (CTDs)** is the term for health disorders arising from repeated biomechanical stress on the body due to ergonomic hazards. CTDs are disorders of the muscles, tendons, and/or nerves that develop from or are aggravated by exertions or movement of the body of a repetitious nature. CTDs are also referred to as repetitive motion injuries, repetitive strain injuries, repetitive trauma disorders, and overuse injuries.

**Ergonomics** is the field which is involved in conducting research regarding human characteristics and applying that information to the design or operation of products or systems for optimizing human performance, health, and safety (also known as human factors engineering). It is essentially fitting the job elements and equipment to the person to enhance human performance.

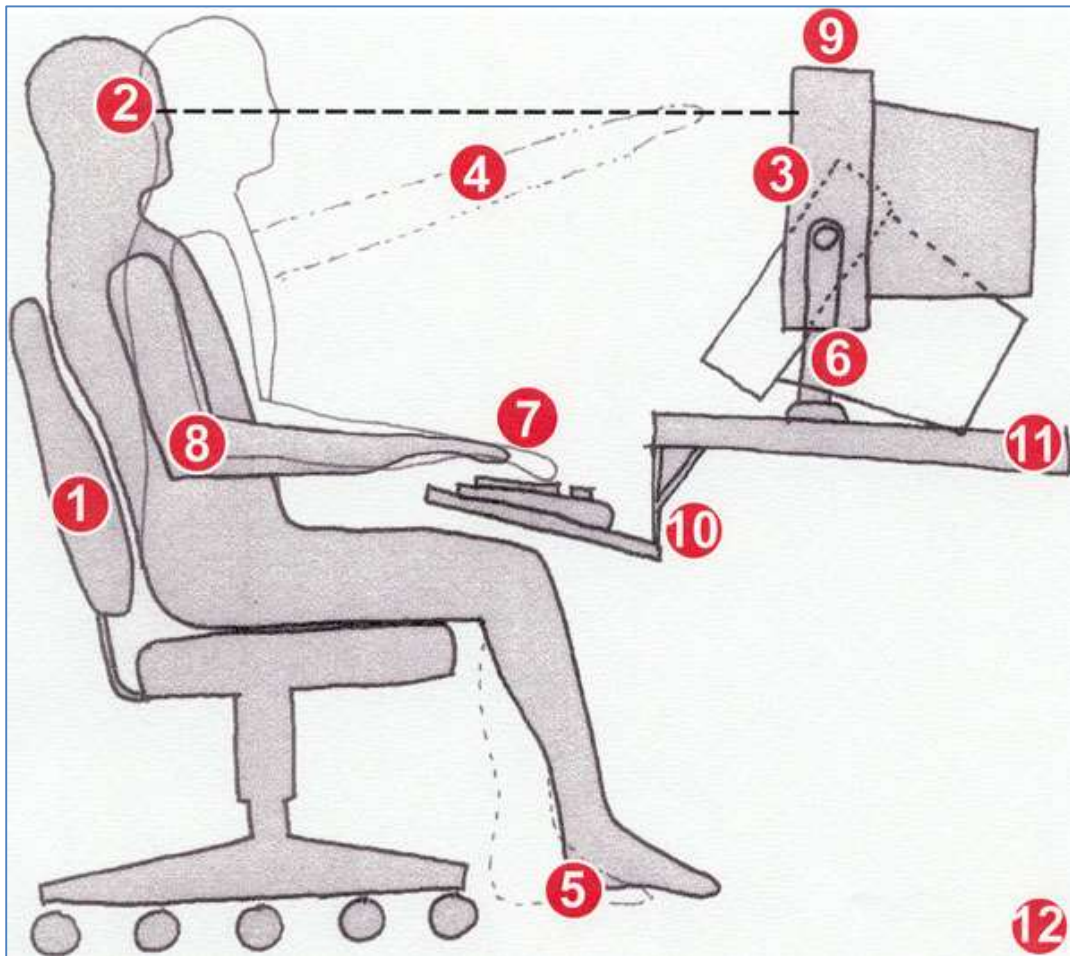
**Ergonomic Hazards** are workplace conditions that pose a biomechanical stress to the worker. Such hazardous workplace conditions include, but are not limited to, faulty workstation layout, improper work methods, improper tools, and job design problems that include aspects of workflow, speed, posture, force requirements, and work/rest cycles. They are also referred to as "stressors".

**Personal Protective Equipment (PPE)** is equipment or other items worn on or attached to the body and used for the purpose of controlling CTD risk. This form of hazard control is the least effective method to control risk. *Note: Splints or wrist braces not considered to be PPE.*

**Repetitive Motion** means to perform the same motion continuously that can be classified as a hazard to the worker(s).

**Worksite Analysis** is the breaking down of the complete working environment into components including personnel, workstation, workplace layout, equipment, supplies, and procedures for the purpose of identifying possible hazards and developing solutions for eliminating or controlling these hazards.

## Twelve Tips for an Ergonomic Computer Workstation



1. Use a good chair with a dynamic chair back and sit back in this
2. Top of monitor casing 2-3" (5-8 cm) above eye level
3. No glare on screen, use an optical glass anti-glare filter where needed
4. Sit at arms length from monitor
5. Feet on floor or stable footrest
6. Use a document holder, preferably in-line with the computer screen
7. Wrists flat and straight in relation to forearms to use keyboard/mouse/input device
8. Arms and elbows relaxed close to body
9. Center monitor and keyboard in front of you
10. Use a negative tilt keyboard tray with an upper mouse platform or downward tiltable platform adjacent to keyboard
11. Use a stable work surface and stable (no bounce) keyboard tray
12. Take frequent short breaks (microbreaks)

Source: Cornell University Ergonomics Web. Used with permission for nonprofit educational purpose.