

# Manual Materials Handling

## Introduction

Manual material handling operations are carried out in most industrial plants. Each handling task poses unique demands on the worker. However, workplaces can help workers to perform these tasks safely and easily by implementing and upholding proper policies and procedures.

## Legislation

Regulations respecting Industrial Establishments (O. Reg. 851/90), made under the Occupational Health and Safety Act. The section that deals with material handling is as follows:

Section 45:

Materials, articles or things,

- a) required to be lifted, carried or moved, shall be lifted, carried or moved in such a way and with such precautions and safeguards, including protective clothing, guards or other precautions as will ensure that the lifting, carrying or moving of the material, articles or things does not endanger the safety of any worker
- b) shall be transported, placed or stored so that the material, articles or things:
  - (i) will not tip, collapse or fall
  - (ii) can be removed or withdrawn without endangering the safety of any worker
- c) to be removed from a storage area, pile or rack, shall be removed in a manner that will not endanger the safety of any worker

**Note:** Sections 46-66 also refer to Materials Handling.

## Hazards

To assess the hazards of manual material handling operations, consider the load, the task, the environment in which the task is performed, and the operator. When these factors interact with each other, they can create hazards that result in injuries.

A load may be hazardous because of:

- weight
- size
- shape (making it awkward to handle)
- coupling (type of grip on the load)
- slippery or damaged surfaces
- absent or inappropriate handles, and
- imbalance (i.e., changing centre of gravity)

The task or method of handling may be hazardous when it involves:

- lifting or lowering
  - repetitively
  - quickly
  - for extended periods of time
  - while seated or kneeling
  - immediately after prolonged flexion
  - shortly after a period of rest
- an inability to get close to the load

- moving the load over large distances
- accuracy and precision required because of
  - fragile loads, or
  - specific unloading locations
- materials positioned too low or too high
- hazardous movements or postures (e.g., twisting, extended bending and reaching)
- multiple handling requirements (e.g., lifting, carrying, unloading)

Environmental factors include:

- temperature (beyond a 19–26°C range)
- relative humidity (beyond a 35–50% range)
- lighting
- noise
- time constraints (e.g., machine-paced work or deadline pressures)
- physical conditions such as
  - obstacles
  - floor surfaces (e.g., slippery, uneven or damaged)

Operator characteristics that affect the handling of loads include:

- general health
- physical factors
  - height
  - reach
  - flexibility
  - strength
  - weight
  - aerobic capacity
- pre-existing musculoskeletal problems
- psychological factors
  - motivation
  - stress

## Control Measures

The best control measure is to eliminate the need for workers to perform manual handling tasks. Since this is not always possible, design manual handling tasks so that they are within the workers' capabilities. Considerations include the load itself, the design of the workstation and work practices. Providing mechanical handling devices or aids can often eliminate the task itself or ease the demands on the worker.

## Task Design

### The Load

Reduce the weight of the load by decreasing the:

- size of the object (specify size to suppliers)
- weight of the container (e.g., plastic is lighter than steel)
- capacity of containers
- load in the container

Conversely, consider increasing the weight of the load so that it may only be handled mechanically. This can be done by the use of:

- palletized loads, and
- larger bins or containers

Decrease the load on the worker by:

- limiting the number of objects he/she is required to handle during the day
- designating heavier loads as team lifts (i.e., two or more persons)
- changing the size and shape of the load so that the worker can get closer to the load's centre of gravity

## Work Station Design

Reduce the distance over which the load has to be moved by relocating production and storage areas.

Design work stations so that workers:

- can store and handle all material between knuckle and shoulder height; waist height is most desirable
- can begin and end handling material at the same height
- can face the load and handle materials as close to the body as possible
- do not have to handle loads using awkward postures or an extended reach, and
- do not handle loads in confined spaces that prevent them from using good body mechanics

Facilitate access to material by:

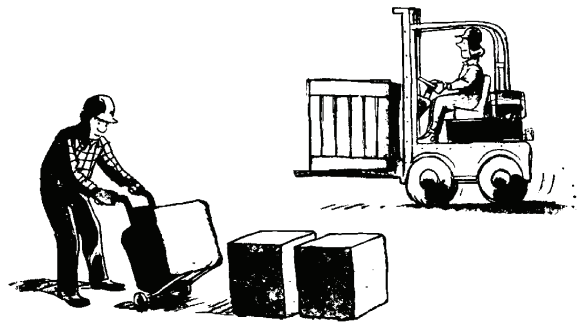
- providing workbenches and other work stations with toe cut-outs, so that workers can get closer to the load
- supplying bins and totes with removable sides
- removing obstructions, such as unnecessary railings on bins

## Work Practices

### Lifting and Lowering

Eliminate the need to lift or lower manually by providing and ensuring proper use of:

- lift trucks, cranes, hoists, scissor lifts, drum and barrel dumpers, stackers, work dispensers, elevating conveyors, articulating arms and other mechanical devices
- gravity dumps and chutes
- power lift tail gates on trucks, and hand trucks to ensure easy transfer of material from the truck to ground level
- portable ramps or conveyors to lift and lower loads on to work stations



## Pushing and Pulling

Eliminate pushing or pulling by ensuring the use of:

- powered conveyors, powered trucks, slides, chutes, monorails, air tables and similar mechanical aids

Make loads easier to push or pull by ensuring the use of:

- carts, hand trucks and dollies with large diameter casters and good bearings, and
- grips or handles on loads or mechanical aids, placed to provide optimal push force and prevent awkward postures

Instruct employees to:

- push rather than pull
- avoid overloading – limit the load pushed or pulled at one time
- ensure the load does not block vision
- never push one load and pull another at the same time



## Carrying and Holding

Reduce carrying and holding forces by:

- evaluating the work flow – determine if heavy loads can be moved mechanically over any distance
- converting the operation into a pushing or pulling task
- providing carts, slings or trolleys
- providing portable containers in which to place awkward loads
- providing grips or handles on loads
- limiting the distance over which the load is moved

## Environmental Factors

Maintain an optimum environment by ensuring that:

- the temperature of the work area is at an acceptable level
- in a hot environment
  - workers take frequent breaks away from the heat
  - workers drink frequently from liquids provided near the work site
- in a cold environment,
  - workers wear good insulating clothing
  - loads are easy to handle when gloves and heavy clothing are worn
- humidity is at an acceptable level
- lifting instructions can be heard in a noisy environment
- lighting levels are adequate for the work place
- the layout of the work area provides better access to the load
- the aisles are clear of obstacles
- signs are posted where there are gradients in the slope of the floor; whenever possible, limit such slopes to 10 degrees

## Storage

Provide proper storage facilities such as:

- storage boxes and containers that can be lifted mechanically rather than requiring manual handling
- avoid deep shelving that make retrieving or placing a load difficult
- racks or shelf trucks to store material, thus eliminating the need for lifting the containers
- storage bins and containers with fold down sides for easier access to loads

When storing loads, employees should:

- store loads in easy to access locations
- store loads between knuckle and shoulder height

## Personal Factors

### Clothing

Wear appropriate clothing and safe, comfortable shoes:

- clothes that are comfortable around the hips, knees and shoulders, and that do not have exposed buttons or loose flaps, and
- non-slip shoes with broad based low heels. Safety footwear is essential when handling heavy loads on a regular basis



## Fitness

Encourage workers to remain in good physical condition by participating in regular exercise programs. To stay healthy, Health Canada's Physical Activity Guide recommends 60 minutes of light effort, or 30 minutes of vigorous effort, every day.

Incorporating exercise is easier than you think. For example:

- use the stairs, not the elevator
- walk instead of driving
- stretch or exercise between TV shows

The following tips can also enhance fitness:

- use good body mechanics when sitting, standing, lifting, etc. For example, when lifting:
  - maintain a curve in the lower back
  - stabilize the back by lightly contracting the stomach muscles
- take regular task breaks to avoid or reduce muscle fatigue
- get adequate sleep on a good mattress
- eat sensibly; follow the Canada Food Guide

## General Precautions

Instruct employees to take the following precautions when handling loads:

- test the weight of the load to ensure it can be lifted securely; if not, make adjustments
- grip the load securely
- protect hands against pinch points
- practice good team lifting
- get help with awkward loads
- always use the mechanical devices and aids provided
- don't rush or cut corners

## Maintenance

Establish a preventive maintenance program, with input from equipment manufacturers, to ensure that the following is completed on a regular basis:

- cleaning of wheels and bearings on hand carts and other mechanical aids
- lubricating as necessary
- replacing worn and defective wheels and casters
- checking that all mechanical aids work efficiently

## Training

Traditional training has focussed on proper lifting methods and safe work procedures. More recently, workplaces have introduced fitness and back education approaches. In combination with job and workplace design changes, these approaches are effective in preventing accidents and injuries.

On the job demonstrations and practice sessions are the best methods of training. Cover basic manual materials handling procedures, and the proper use of mechanical aids and techniques. Regularly reinforce the proper techniques to ensure their continued use.

The objectives of material handling training are to teach the worker:

1. how to identify hazardous loads or handling tasks
2. the proper selection and use of mechanical handling aids
3. safe postures and manual lifting techniques to minimize strain
4. safe lifting techniques

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