

IDENTIFICATION

TOPIC TITLE: Materials Handling, Storage, Use, and Disposal

MINIMUM TIME: 30 minutes

OBJECTIVES

Terminal Objective:

Given best practices and current OSHA and industry information regarding worksite illnesses, injuries, and/or fatalities, the student will be able to recognize how to protect themselves from hazards associated with material handling.

Enabling Objectives:

1. Identify types of material handling equipment.
2. Describe hazards associated with material handling activities (e.g., storage, use, and disposal).
3. Identify methods to prevent hazards associated with material handling equipment.
4. Recognize employer requirements to protect workers from material handling hazards.

INSTRUCTOR MATERIALS AND RESOURCES

- PowerPoint presentation: *Materials Handling, Storage, Use, and Disposal*
- Knowledge Check Answer Key: *Materials Handling, Storage, Use, and Disposal*

STUDENT MATERIALS

- Fact Sheet
- Knowledge Check: *Materials Handling, Storage, Use, and Disposal*

TEACHING PROCEDURES ---Preparation, Presentation, Application, Evaluation

Anticipatory Set (Focus Attention/Gain Interest)

Estimated Time: ?? hours

Key Points

Methods

Handling and storing materials involves operations such as hoisting steel with a crane, driving a truck loaded with concrete blocks, manually carrying bags, and stacking drums, lumber or loose bricks. Improper handling and storing of materials can cause costly injuries.

Workers frequently cite the weight and bulkiness of objects being lifted as causes of their injuries. Bending, twisting and turning are movements that cause back injuries. Back injuries account for over 20 percent of all occupational illnesses. The majority of over-exertion cases with lost-workdays are due to lifting, pushing/pulling, and carrying. Those cases represent 27 percent of all lost-workday cases.

PPT slides #1 – #3

Presentation (Instruction)

Estimated Time: ?? hours

Key Points

Methods

I. Types of Materials Handling Equipment

A. Conveyors

B. Cranes

C. Slings

D. Powered Industrial Trucks

PPT slides #4 – #5

II. Hazards Associated with Materials Handling Activities

A. Factors cited by workers as contributors to injuries

1. Major contributors – weight and bulkiness of objects
2. Other common contributors – bending, twisting, and turning movements.

PPT slides #6 – #14

B. Hazards

1. Improper operation of equipment, such as forklifts, cranes, and work trucks
2. Accumulated materials or clutter that present tripping hazards, fire/explosion hazards, or hazards associated with the harboring of rats and other pests
3. Unsafe conditions of materials or containers, such as protruding nails, dry rot, or deteriorated containers
4. Flammability or toxicity of some materials
5. Weight of materials in excess of capabilities of lifting equipment, floors, or storage shelves
6. Improperly cutting of binding ties or other devices that secure bundles or bound materials
7. Falling objects from improper handling or storage
8. Lifting, pushing, pulling, or otherwise manually moving large, heavy items
9. Improperly stacked materials that have a potential to slide, fall, or collapse leading to struck-by or crushed-by incidents
10. Struck-by or caught-in/-between hazards related to equipment, machinery, or falling loads

C. Injuries associated with materials handling

3. Commonly reported injuries
 - a. Sprains, strains, tears
 - b. Soreness and pain
 - c. Bruises and contusions
 - d. Cuts, lacerations, and punctures
4. Events or exposures leading to injuries include, but are not limited to:
 - a. Contact with objects and equipment
 - b. Overexertion
 - c. Falls, slips, trips, or loss of balance
 - d. Transportation incidents
 - e. Exposure to harmful substances or environments
 - f. Repetitive motion

III. Preventing Hazards Associated with Material Handling Equipment

PPT slides #15 – #34

A. Cranes

1. Handling and storing materials often involves operations such as hoisting tons of material, steel, and concrete with cranes. Only thoroughly trained and competent workers are permitted to operate cranes.
2. Use the following methods to eliminate or reduce hazards of crane operations:
 - a. Operators should know how much they are lifting, how much it weighs, the rated capacity of the crane, and when a load is safe to lift.
 - b. Always check for crane load chart and do not exceed load limits for the operating conditions.
 - c. A qualified person must inspect equipment that has been modified, repaired, or adjusted and must inspect equipment post-assembly and at least every 12 months; equipment not in regular use must be inspected if idle for 3 months or more.
 - d. A competent person must begin visual inspection of equipment prior to each shift that must be completed before or during the shift. A monthly inspection must also be completed before equipment can be used.

B. Slings

1. A sling commonly connects a crane hook to a load and is an important rigging tool.
2. To eliminate or reduce hazards, slings need to be:
 - a. Inspected every day before they are used and whenever service conditions change that could warrant another inspection;
 - b. Removed from service if they are found damaged or defective in any way; and,
 - c. Lubricated in the field to lengthen its useful service.

- d. Selected for use based on the requirements of the job. Wire rope slings are used to hoist materials. Alloy steel chain slings are the best choice for hoisting very hot materials.
- e. Do not shorten slings with knots or bolts or other makeshift devices and do not kink sling legs.

C. Forklifts

1. The four main causes of injuries involving forklifts include:
 - a. Forklift overturns
 - b. Forklift striking workers on foot
 - c. Persons crushed by forklifts
 - d. Persons falling from forklifts
2. It is illegal for anyone to operate a forklift if they are under 18 years of age or over 18 years of age and not properly trained and certified to do so.
3. Use best practices for forklift operations, including:
 - a. Driving the forklift
 - i. Slow down and sound the horn at locations where vision is obstructed.
 - ii. Look toward the travel path and keep a clear view of it.
 - iii. Don't drive up to anyone standing in front of a bench or other fixed object.
 - iv. Don't drive with the work platform elevated.
 - v. Use seatbelts with ROPS.
 - vi. Don't raise or lower the forks while the forklift is moving.
 - vii. Maintain safe distance approximately three truck lengths from the truck ahead.
 - b. Elevating workers
 - i. Don't use a forklift to elevate workers who are standing on the forks.
 - ii. Only lift personnel with approved lift platform.
 - iii. Elevate a worker on an approved lift platform only when the vehicle is directly below the work area.

- iv. Whenever a truck is used to elevate personnel, secure the elevating platform to the lifting carriage or forks of the forklift.
- v. Use a restraining means, such as rails, chains, or a body belt with a lanyard for the worker(s) on the platform.
- c. Driving on grades/ramps
 - i. Use extreme caution when driving on grades or ramps.
 - ii. Do not turn on grades or ramps.
 - iii. On grades, tilt the load back and raise it only as far as needed to clear the road surface.
 - iv. When ascending or descending grades are greater than 10%, drive loaded trucks with the load upgrade
- d. Operating speed – operate forklift at a speed that will permit it to be stopped safely.
- e. Exiting the forklift
 - i. When dismounting, set the parking brake, lower the forks or lifting carriage, and neutralize the controls.
 - ii. Exit from a stand-up type forklift with rear-entry access by stepping backward if a lateral tip-over occurs.
- f. Riding on the forklift – do not allow passengers on forklift trucks unless a seat is provided.
- g. Avoiding excess weight – do not handle loads that are heavier than the weight capacity of the forklift.
- h. Avoiding struck-by or crushed-by hazards.
 - i. Don't jump from an overturning, sit-down type forklift.
 - ii. Stay with the truck, hold on firmly, and lean in the opposite direction of the overturn.
- i. Training – do not operate a forklift without proper training and licensing.
- j. Reporting damage – any damage or problems that occur to a forklift during a shift should be reported to the supervisor.

4. When dock boards are used to bridge a loading dock and a truck so the forklift can load or unload materials, follow these requirements:
 - a. Use appropriate weight-rated platform to bridge space.
 - b. Secure portable dock boards so that they will not move.
 - c. Ensure that dock boards have handholds or some other effective way to lift, manage, or move them safely.

D. Earth-Moving Equipment

1. Includes heavy equipment such as cranes, scrapers, loaders, crawlers, bulldozers, off-highway trucks, graders, and tractors.
2. Must be equipped with seatbelts. Anyone sitting in the equipment must wear the seatbelts.
3. Any equipment with an obstructed view to the rear cannot be used in reverse gear unless that piece of equipment has a back-up signal alarm or an employee signals that it is safe to do so.
4. Operator must be properly trained.

PPT slides #35 – #36

IV. Employer Requirements

- A. Comply with OSHA standards related to materials handling, including
 1. Training requirements
 2. Inspection requirements
- B. Comply with manufacturers' requirements and recommendations for materials handling equipment.

10-hour Construction Outreach

Application (How students apply what they learn)

Estimated Time: ?? hours

Key Points	Methods
<p>Identify hazards in worksite photos and discuss possible solutions.</p> <p>Using small items (little boxes, small blocks of wood, little bags of beans, or similar items) have students practice placing materials in tiers using an acceptable method to prevent sliding, falling, or collapse (i.e., stacked, racked, blocked, interlocked, or otherwise secured).</p> <p>Using empty boxes, have student demonstrate proper lifting techniques.</p>	<p>PPT slides #37 – #39</p>

Evaluation/Summary

Estimated Time: ?? hours

Key Points	Methods
<p>Knowledge Check: <i>Materials Handling, Storage, Use and Disposal.</i></p>	<p>PPT slides #40 – #43</p>

References

OSHA Standard:

https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=Construction

- 1926 Subpart H – Materials Handling, Storage, Use, and Disposal
 - 1926.250 – General requirements for storage
 - 1926.251 – Rigging equipment for material handling
 - 1926.252 – Disposal of waste materials

OSHA Publications:

- *Material Hoist Collapse* (2014), OSHA Fatal Facts, <https://www.osha.gov/Publications/OSHA3718.pdf>
- *Materials Handling and Storage* (2002 – revised), OSHA #2236, <https://www.osha.gov/Publications/osha2236.pdf>

OSHA References/Resources:

- *Powered Industrial Trucks (Forklift)* (2008), OSHA eTool, <https://www.osha.gov/SLTC/etools/pit/index.html>
- *Wood Products: Sawmills – Lumber Storage* (2002), OSHA eTool, <https://www.osha.gov/SLTC/etools/sawmills/lumber.html>
- *Materials Handling and Storage* (1996), Construction Safety and Health Outreach Program, <https://www.osha.gov/doc/outreachtraining/htmlfiles/mathan.html>