

# Hazards Overview - Module 1

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Special Warehouse  
Worker Hazards  
in Structural Steel  
Fabricating and  
Supply Companies



Fabricated elements ready for shipping

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## OSHA Grant Information

*This material was produced under grant number SH-26316-SH4 from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trades names, commercial products, or organizations imply endorsement by the U.S. Government.*

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## Program Development

This program was developed by faculty and students in the School of Planning, Design and Construction at Michigan State University in conjunction with the American Institute of Steel Construction - Safety Committee and the University of Puerto Rico

March 2015

**MICHIGAN STATE**  

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**UNIVERSITY**



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## **Learning Outcomes: Participants shall be able to:**

- Identify special characteristics of steel fabricating and supply companies which vary from other industries that involve warehousing activities
- Identify key warehousing activities which take place in steel companies
- Identify and recognize broad hazards which may exist in warehousing activities in steel companies
- Develop a hazard map

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## Special Characteristics of Steel Companies

- ❑ Must load, unload, move, fabricate, paint, load, store and ship large, heavy, long, irregular shapes
- ❑ Individual beam and column members may weigh several tons and large column sections could approach 10 tons



Columns and beams loaded  
For shipping

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## Special Characteristics of Steel Companies

- ❑ Steel coils handled in steel service centers may routinely weigh 10-20 tons or more with the largest weighing up to 50 tons



Ten ton steel coils



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## Special Characteristics of Steel Companies

- ❑ Once fabricated with connection material each shape becomes a custom shape that may be difficult to stack, store, and load
- ❑ Material is received from trucks or rail
- ❑ Requires movement of material from the truck or rail to storage area within the shop or in an outside yard
- ❑ Material must be stacked and stored



Fabricated beam with connection work

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## Special Characteristics of Steel Companies

- ❑ Material must be moved within the shop to stations for various operations; such as cutting, punching, shearing, drilling, welding, shot blasting, or painting.
- ❑ Some parts are moved by hand such as rolling for certain shop operations
- ❑ Material must be moved between work stations



Fabricated beams



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## Special Characteristics of Steel Companies

- ❑ Finished material must be moved to storage and loading areas
- ❑ Finished material must be stored and loaded for shipping

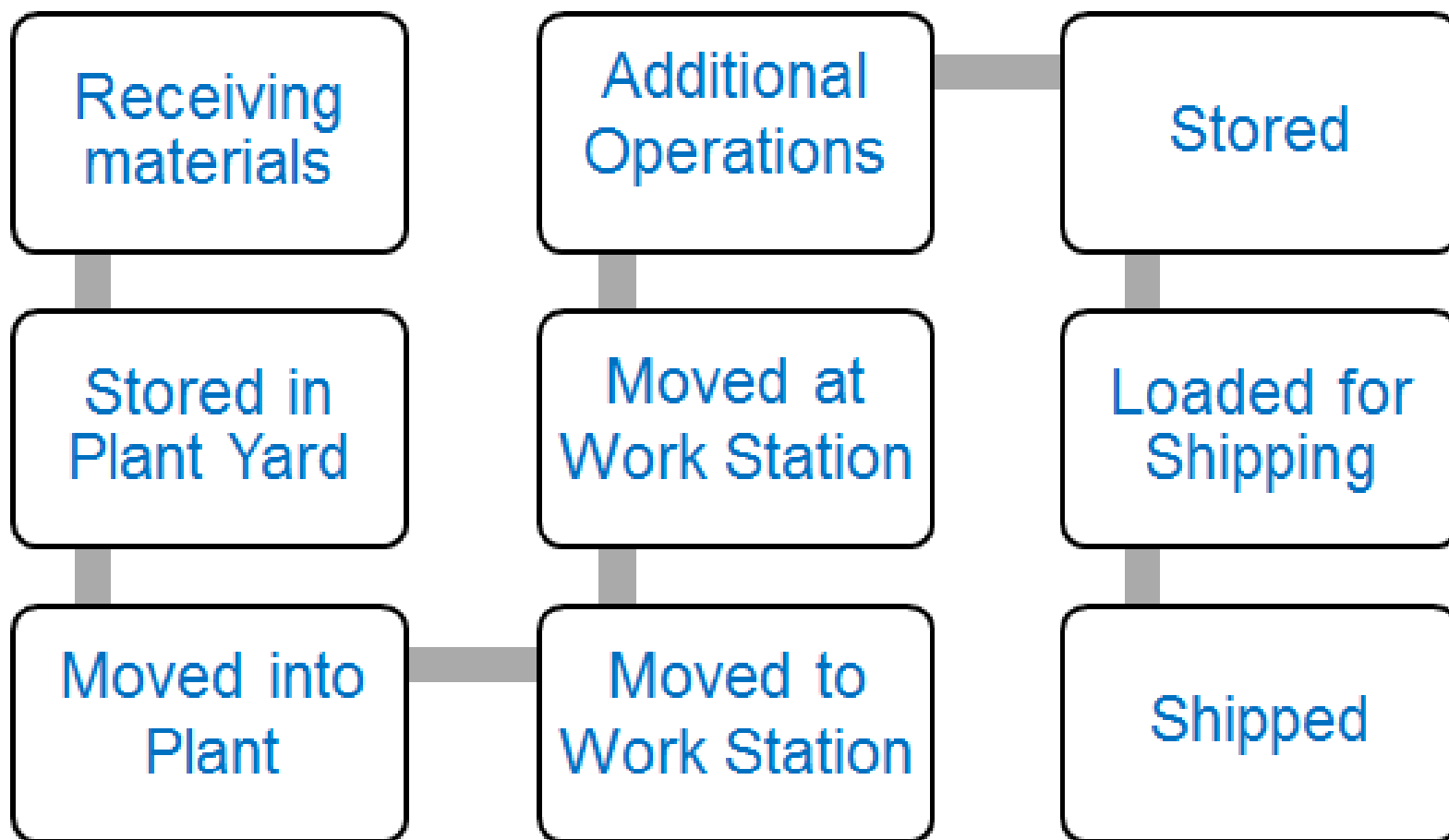


Beams ready for shipping

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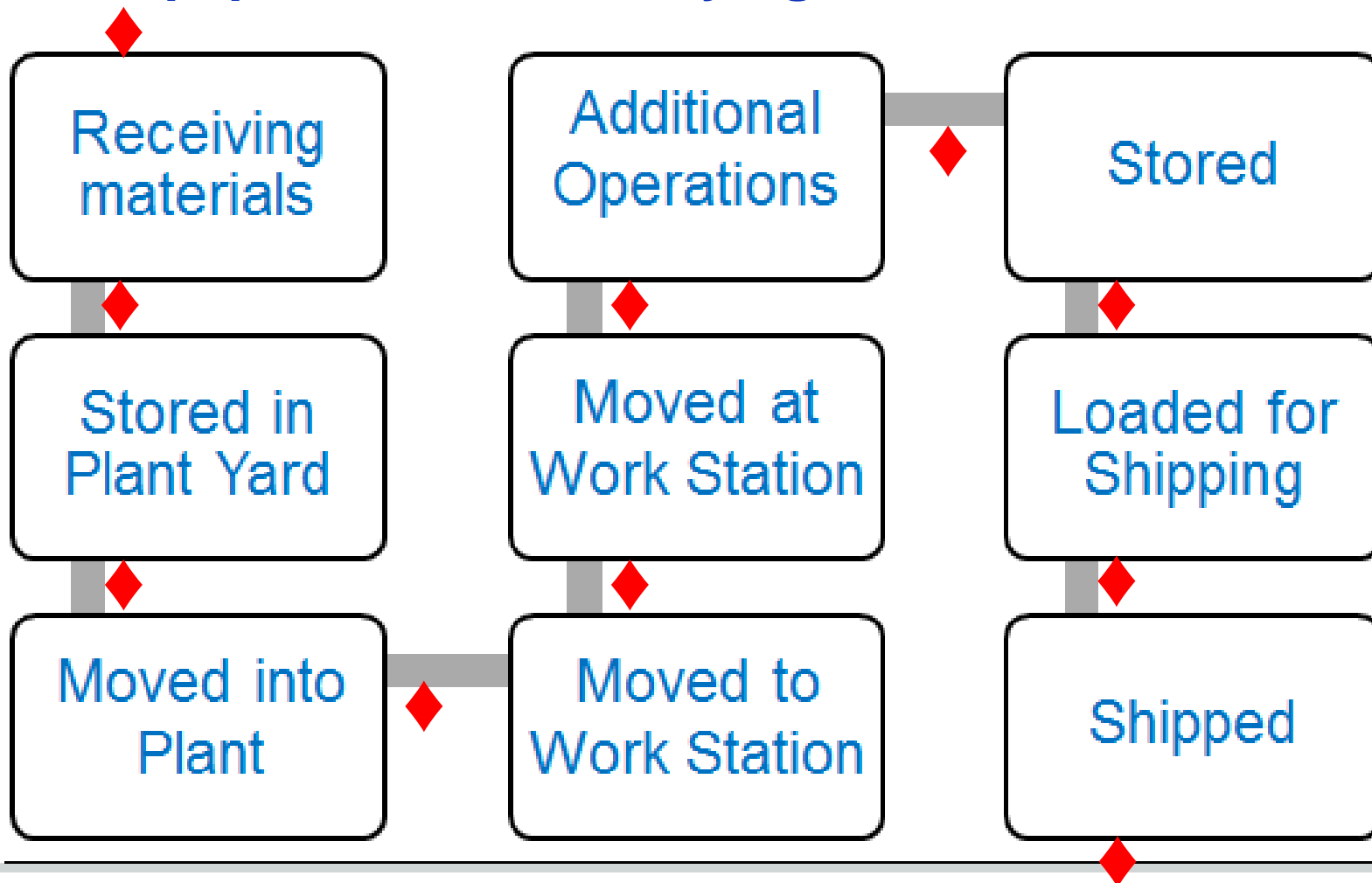
## Generalized flow of material in a fabrication plant



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## ◆ Equipment Use-Identifying Points of Risk



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## Material Handling Equipment commonly used:

- Rail for receiving and shipping
- Trucks for receiving and shipping
- Powered Industrial Trucks (Forklifts)
- Carts
- Overhead cranes
- Mobile cranes
- Jibs
- Industrial magnetic lifting devices
- Slings, wire ropes and alloy chains
- Lifting hardware
- Process equipment (not in curriculum)
- Humans



Mobile crane used to load material for shipping

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## Material Handling Equipment Safety Considerations

- Directly applicable OSHA Standard
- Manufacturer's guidelines
- Steel company guidelines

• Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
• Standard Number:	<u>1910</u>
• Title:	Table of Contents
• GPO Source:	<u>e-CFR</u>

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**PART 1910 -- OCCUPATIONAL SAFETY AND HEALTH STANDARDS**

**Subpart A -- General**

Sec.

1910.1 Purpose and scope.

1910.2 Definitions.

1910.3 Petitions for the issuance, amendment, or repeal of a standard.

1910.4 Amendments to this part.

1910.5 Applicability of standards.

1910.6 Incorporation by reference.

1910.7 Definition and requirements for a nationally recognized testing laboratory.

1910.8 OMB control numbers under the Paperwork Reduction Act.

**Subpart B -- Adoption and Extension of Established Federal Standards**



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## Material Handling Equipment Safety Considerations

- Equipment specific information such as load limit charts
- Operating manuals
- Operator training
- Inspection requirements
- Safe operating practices
- Personal Protective Equipment (PPE)
- Equipment servicing and maintenance
- Routine adjustments
- Guards
- Energy source (electrical, diesel, hydraulic, magnetic)

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## Hazards can flow from moving of materials:

- Struck by and caught between
- Dropped loads
- Tipping of loads or stored materials



Overhead crane used to move material in shop

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## Hazards can flow from moving of materials:

- Musculoskeletal injuries (back injuries, strains and sprains) related task ergonomics, lifting practices, repetitive tasks
- Pinches
- Cuts and scrapes from sharp edges
- Slips and falls

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## Material Storage Considerations

- ❑ Storage and stacking of irregular shapes
- ❑ Storage of containers (bolts, hardware, welding materials etc.)
- ❑ Storage of chemicals such as paints, solvents, lubricants
- ❑ Racking systems
- ❑ Stability of stored material



Fabricated elements  
Stacked for loading

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## Other types of hazards:

- ❑ Shop operations
- ❑ Use of chemicals, solvents, and paints requiring Safety Data Sheets (SDS) and Hazard Communication (HazCom)
- ❑ Electrical hazards from use of hand tools and equipment
- ❑ De-energizing equipment for service and maintenance Lockout/Tagout (LOTO)
- ❑ The need for respiratory protections
- ❑ Need for use of Personal Protective Equipment (PPE)



PPE during fabrication



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## **OSHA Standards emphasized in this training:**

1910 OSHA General Industry Regulations

Subpart N Materials Handling

1910.176 Handling Materials

1910.178 Powered Industrial Trucks

1910.179 Overhead and Gantry Cranes

1910.180 Truck Cranes

1910.184 Slings

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## **OSHA Standards Emphasized in this training:**

1910 OSHA General Industry Regulations

Subpart S Electrical

1910.333 Selection and use of work practices

Subpart J

1910.147 The Control of Hazardous Energy (Lockout/Tagout)

Subpart I Personal Protective Equipment

1910.34 Respiratory Protection (Subpart I)

Subpart Z

1910.1200 Hazard Communication

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Frequently cited safety standards in structural steel fabrication and erection by Federal OSHA from October 2011 through September 2012

3441 - Fabricated Structural Metal					
Rank	Standard	#Cited	#Insp	\$Penalty	Description
1	1910.0134	77	31	32,640	Respiratory Protection
2	1910.1200	46	25	32,500	Hazard Communication
3	1910.0095	37	14	28,965	Occupational noise exposure
4	1910.1026	35	8	37,850	Exposure to Chromium (VI)
5	1910.0212	33	30	58,911	General requirements for all machines
6	1910.0178	30	19	38,988	Powered industrial trucks
7	1911.0215	30	15	28,984	Abrasive wheel machinery
8	1910.0305	27	17	49,600	Wiring methods, components, and equipment for general use
9	1910.0147	24	15	28,810	The control of hazardous energy (lockout/tagout)
10	1910.0303	15	13	29,241	General requirements

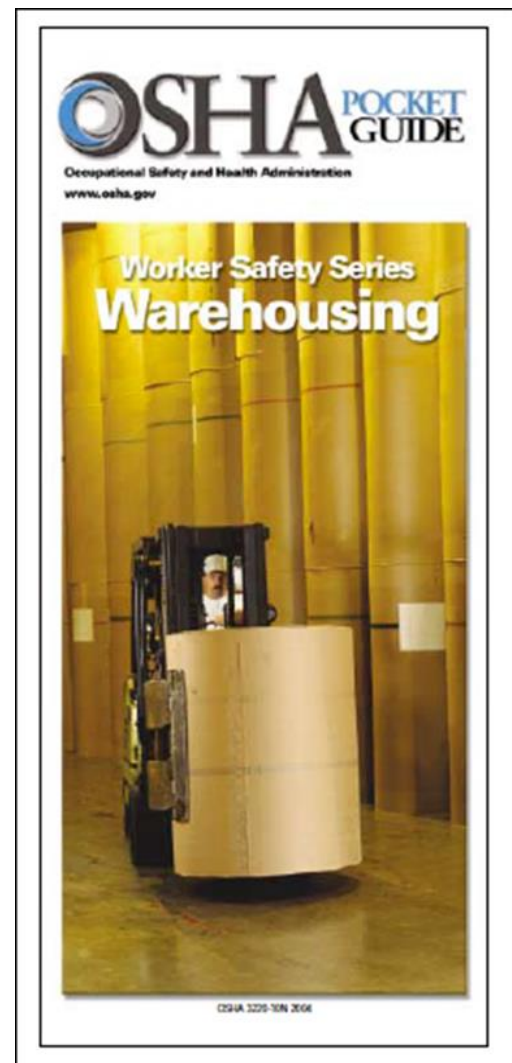
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**Warehouse operations can present a wide variety of potential hazards for the worker.**

OSHA provides several documents on other industries that have useful information on warehousing hazards that can supplement this presentation.


OSHA 3220-10N 2004



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**OSHA**<sup>®</sup> Occupational Safety and Health Administration  
[www.osha.gov](http://www.osha.gov)

## Solutions for the Prevention of Musculoskeletal Injuries in Foundries



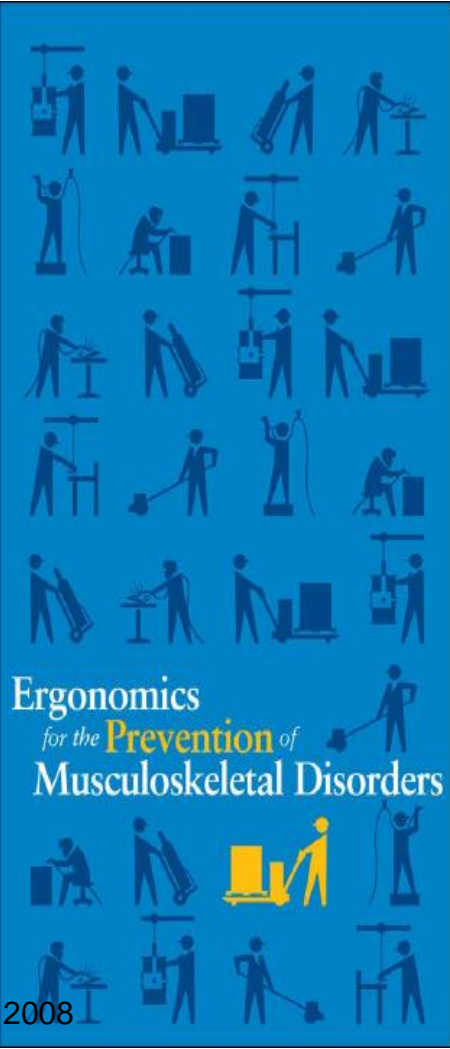
OSHA 3465-08 2012

OSHA 3465-08 2012

**OSHA**<sup>®</sup> Occupational Safety and Health Administration  
U.S. Department of Labor  
[www.osha.gov](http://www.osha.gov)

## Guidelines for Shipyards

OSHA 3341-03N 2008



## Ergonomics for the Prevention of Musculoskeletal Disorders

OSHA 3341-03N 2008



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**The 10 OSHA standards most frequently cited in warehousing were:**

1. Forklifts
2. Hazard communication
3. Electrical, wiring methods
4. Electrical, system design
5. Guarding floor & wall openings and holes
6. Exits
7. Mechanical power transmission
8. Respiratory protection
9. Lockout/tagout
10. Portable fire extinguishers

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## Summary of Key Points:

- ❑ Warehousing activities in steel companies offer unique challenges because of the size, weight, and irregular nature of the material being handled, processed, and stored
- ❑ Each point in the material handling chain offers some potential risk of injury

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## Hazard Mapping

Hazard maps can be developed to map hazards within a facility, process, or environment. Hazard maps are frequently used to assess risks of severe climate events such as tornadoes or floods, but can also be used to identify hazards in a work environment.

Key locations and/or processes can be identified, which present hazards, and the nature of those hazards can be captured through group discussion.

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## Learning Activity:

- Hazard Mapping exercise



Photo from OSHA 3686-09 2010

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## Learning Activity:

*Part A - Identify key equipment used at each material step*

*Part B - Map “caught between” and struck by” hazards at each step in the material handling chain*

This hazard mapping material was adapted from materials originally developed under grant SH-17813-08-60-F-34 from the Occupational Safety and Health Administration, U.S. Department of Labor



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## Group Learning Activity Learning Objectives:

*Participants shall be able to demonstrate ability to identify “caught between” and “struck by” hazards in the workplace.*

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## Group Learning Activity Part A

*Part A Group Activity - In groups of 4-5 Identify key equipment used at each material handling step and indicate them on the material flow map.*

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## Group Learning Activity Part B

*Part B - Map hazards – in your group now map the “caught between” and “struck by” hazards at each step in the material handling chain.*

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## Activity Materials Provided

### **Part A**

*Equipment Identification activity instructions*

*Process flow map*

*Report out template*

### **Part B**

*Hazard Mapping activity instructions*

*Process flow map*

*Report out template*