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## SAFETY WORKPLAN Manual Materials Handling

If you are responsible for supervising crews who handle, lift, carry, or move material, there are risks you need to be aware of to help your employees understand these risks and how to handle materials safely.

### What's at Stake

Manual materials handling can cause strains, sprains, and other soft-tissue injuries, including back injuries and repetitive motion injuries. Other injuries can come from chemical exposure, falling objects, moving equipment, and overhead hazards. These injuries cause employees pain, limit their ability to lift, reduce mobility, and can keep them out of work for weeks or months.

### 5 Steps to Take

Here are five ways you can help reduce the risk of manual materials handling injuries.

#### Step 1: Do a Hazard Assessment

- *Identify Jobs Requiring Heavy Lifting*
  - Raising and lowering heavy materials to different levels increases the risk of Musculoskeletal Injuries (MSIs).
  - Bending and twisting when lifting heavy materials also increases the risk of injuries.
- *Identify Jobs Requiring Overhead Work*
  - Holding unsupported materials above the shoulders fatigues the shoulders and neck and can result in serious injury.
- *Identify Repetitive Tasks*
  - Repeatedly lifting and positioning materials, especially at a fast pace with little time for rest and recovery periods, increases the physical stress on the same muscles and soft tissues.
- Identify other hazards
  - Chemicals
  - Overhead hazards
  - Slip, trip, and fall hazards
  - Unsafe stacked and stored material

**Read More on Page 2** ▶

## Step 2: Use Engineering Controls

The best way to reduce the chance of injury is to remove the hazard. Some materials handling engineering controls include:

- Keep materials off the ground to reduce stressful bending and lifting.
- Install platforms for raising materials to different work heights.
- Provide tools and equipment to support materials when overhead lifting and holding is done.
- Install or use mechanical lift aids such as, conveyor systems, forklifts, pallet trucks, etc.

## Step 3: Use Work Practice Controls

Work practice controls don't remove the hazard completely, but they can help reduce the risk of injuries and accidents. Here are some examples.

- Stage materials near where they will be used.
- Plan lifts and moves to save time and effort.
  - Decide or know in advance where the materials are to be placed when they're delivered.
- Practice job rotation to give workers a break from repetitious work.
- Require workers take short breaks to give muscles and joints time to recover from the strain.
- Clearly mark aisles and passageways.
- Ensure there's enough lighting throughout the work area.

## Step 4: Provide Personal Protective Equipment

PPE for manual materials handling can protect your head, eyes, hands and feet. These body parts are most susceptible to injury.

- Hard hats must be worn whenever there are:
  - Overhead obstructions, such as beams or racks.
  - Low clearance heights.
  - Falling object hazards.
- Gloves must be worn when cuts, burns and other hand injuries are possible. Common scenarios requiring glove use include:

## TOOLS

Use the Manual Materials Handling Checklist on page 3 to carry out your own materials handling inspections.

Give workers the How to Stack and Store Materials Safely Handout on page 4.

- Moving wood, such as pallets, that might have splinters.
- Handling metal objects that could have burs or sharp edges.
- Holding and moving hot or cold materials.
- Moving and handling hazardous chemicals.
- At a minimum, eye protection is required:
  - When there's a risk of flying or falling objects.
  - In dirty and dusty environments.
  - When handling chemicals.
- Safety shoes should be worn to protect feet against:
  - Stepping on nails, or other sharp objects.
  - Crushing hazards, i.e. moving equipment and rolling materials (barrels, drums).
  - Chemical hazards.
  - Slip and fall hazards.

## Step 5: Provide General Safety Training

You need to provide general materials handling training to any members of your crew involved in materials handling. At a minimum, workers need to walk away with an understanding of:

- The hazards of materials handling.
- How materials handling injuries occur.
- How to safely stack materials to avoid creating hazardous conditions, such as unstable stacks and objects that protrude into aisles or walkways.
- The PPE they must wear.
- What lifting aids/devices are available and how to safely use them.
- Other steps they must take to protect themselves. ❖

## ABOUT US

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## POLICIES AND PRACTICES

# Materials Handling Checklist

You need to perform evaluations of your materials handling procedures, equipment and operations annually or sooner after major changes occur in the workplace. This tool will help you keep up-to-date. Use this Checklist to conduct a general review of materials handling compliance, and ensure you're free from incidents and citations. Any "no" answers should be investigated and corrected.

DISCUSSION	YES	NO	N/A	COMMENTS
<b>General</b>				
Has all material handling equipment been inspected and the inspection documented?				
Is there sufficient room for pedestrians to walk around the equipment? Typically, 24-36 in/60-91 cm or more, depending on building codes and regulations.				
Are pedestrian walkways permanently marked and kept clear of materials and equipment?				
In areas of limited height, are clearance level signs posted?				
<b>Storage</b>				
Is the housekeeping in the area generally neat?				
Are floors, aisles and work areas free of slip/trip hazards or other obstructions?				
Are piles limited in height to maintain their stability and secured against sliding?				
Have all hazardous or toxic materials been handled, stored and transported in safe manner?				
Are all flammable materials stored in approved flammables warehouse or flammable cabinets?				
Have all compressed gas cylinders been transported and stored in upright position; properly secured; racked or chained?				
Are all tools, equipment and materials properly stored when not in use?				
Are materials in storage safe from causing any hazards, fires or harboring any pests?				
Are waste containers provided and are they being used?				
<b>Guarding</b>				
Are materials stored above ground level secured on the pallet by wrapping or strapping?				
Are personnel protected from small items falling from overhead racks by nets or fencing?				
Are there de-railers or bumper blocks on railroad spur tracks to prevent moving stock from hitting fixed cars or other structures?				

## How to Stack and Store Materials Safely

### WHAT'S AT STAKE?

There's hardly a workplace that doesn't handle or store materials. Whether your company has a large warehouse or a small storage room, whether you have loading docks and forklifts or just garages and pallet jacks, there's material that needs to be moved around. And you need to make sure you approach this common task with safety in mind.

### WHAT'S THE DANGER?

Manually handling objects—that is, carrying, unpacking, stacking or storing materials by hand—has its risks. Lifting objects can cause injuries from strains and sprains. Improper storing and handling of material and equipment can result in materials striking or crushing workers. Here's an example:

A 26-year-old Yale student who was working on his master's degree in technical design and production, had his dreams and his life cut short while unloading materials from a truck in advance of a theater production.

The 32 sheets of particleboard should have been placed on the floor of the truck. But instead they were loaded upright and strapped to one side. When the straps were loosened, the load toppled and the student was fatally crushed. He'd been wearing a hardhat, but it was knocked off when he was struck by the wood, which weighed at least 1,000 pounds (454 kilograms).

### HOW TO PROTECT YOURSELF

#### Personal Protective Equipment

Protecting yourself starts with the basics. Wear the right PPE. Find out what you're moving, what the hazards are and what PPE is required. This may range from head, foot and hand protection to special PPE if hazardous chemicals are involved.

#### Use Correct Lifting and Carrying Methods

Follow these four steps:

1. Study the shape and size of the load.
  - Get help if it's too much to handle yourself.
  - For large or awkward loads, use a team lift or a mechanical device.
2. Plan your route and rest stops ahead of time.
  - Before you pick it up, know where you'll put it down and if there are workers, materials, or surface hazards along your path.
  - Make sure you can see over the top of the item.
  - To change direction, turn your feet. Do not twist your body.
3. Stand with your feet about shoulder width apart to lift the object. Bend your knees, keep your back straight, grasp the item and raise it slowly.
4. Set the load down by keeping your back straight and the load close to your body. Bend your knees and move slowly and smoothly.

#### Stack Materials Safely

There are three simple steps for stacking materials safely:

1. Start with a level, solid base for a stack.
2. Observe the maximum load limits for floors, shelving, elevators and other surfaces.
3. Materials should be stacked with weight, size and shape taken into consideration so they do not fall over. For example,
  - Heavy materials should never be stacked too high.
  - While bags or boxes may be stacked in layers, cylindrical objects must be racked on solid supports to prevent them from shifting and rolling.

#### Store Materials Correctly

1. Pay attention to what materials and other substances are stored together. Some examples:
  - A fire might occur if flammable materials and fuels or solvents are placed close to each other.
  - Incompatible chemicals might explode.
  - Do not store liquid chemicals above dry ones.
2. Know how to properly store chemicals and other potentially hazardous materials. Read the safety data sheet (SDS).
3. Make sure there is adequate space in storage areas for an emergency escape route, emergency equipment and personnel.

#### FINAL WORD

*To stack and store materials safely you must use your body, engage your mind, and use equipment the right way. ❖*

### TEST YOUR KNOWLEDGE

1. It's important to check out the route you'll be taking before committing yourself to a lift, because other workers or objects could be in the way.
 

True  False
2. Which of the following is an example of a safe lifting technique?
  - a. Straight back
  - b. Bent back
  - c. Straight legs
  - d. Twisting back
3. When stacking items on shelves, you should place the heaviest items on the highest shelves.
 

True  False
4. Many materials are incompatible and should not be stored together because of the danger of explosions or other reactions.
 

True  False

## How to Handle Handcarts Safely

### WHAT'S AT STAKE?

It's a rare workplace that doesn't have some sort of handcart for moving stock and equipment. From wheelbarrows and furniture carts to dollies and pallet jacks, handcarts help do a job better and faster, and they help to prevent back injuries caused by lifting heavy items.

### WHAT'S THE DANGER?

Compared to a piece of heavy equipment, a handcart doesn't seem like one of the big dangers of the workplace. But anyone who has ever operated one for any length of time will tell you there are a surprising number of ways to be injured. Hazards include:

- Struck by falling loads.
- Back strain if you move the handcart the wrong way or lift materials incorrectly.
- Cuts and pinch points.
- Foot injuries from hand trucks running over your foot.
- Injuries caused when an operator loses control of the handcart on an incline.

### HOW TO PROTECT YOURSELF

9 Easy Ways to Safely Operate a Handcart

1. Inspect to Protect
  - Is it in good mechanical condition overall?
  - Are the brakes working?
  - Tag and place faulty equipment out of service.
2. Safe Stack
  - Keep the center of gravity low by putting heavier objects on the bottom.
  - Use strapping to hold a load in place.
  - Keep load height low enough so you have a clear view ahead.
  - Don't exceed the weight capacity.
3. Pay Attention!
  - Keep your feet clear of the wheels, even when loading.
  - Stay alert to pinch point hazards to prevent injuries to your hands.
  - Stick to designated traffic lanes, and stop and look at intersections.
4. Riding Not Allowed
  - Don't ride on a cart made for a walking operator.
  - Never carry passengers.
5. Push It!
  - Unless the cart is designed for pulling, push it.
  - It's easier on your back!
6. Loading and Unloading
  - Bend your knees instead of your back.
  - Don't pick up more than you can easily handle.
7. Smooth Operator
  - Keep the handcart ahead of you when going down a hill.
  - Stay away from the edges of loading docks or other platforms.
  - Make sure the dock plate and landing strip are wide enough to accommodate the cart's wheels.
8. PPE Please
  - Wear your PPE- gloves and safety shoes, and other PPE required to protect against the material being handled and other hazards.
9. Free Parking
  - Park and store handcarts where they will not create tripping hazards.
  - Don't block exits or emergency equipment such as fire extinguishers.

### FINAL WORD

*Just as its name implies, a handcart is a handy piece of equipment. Following a few simple tips can help you use them safely. ❖*

## TEST YOUR KNOWLEDGE

1. Pulling a handcart is easier on your back than pushing it.  
 True  False
2. Don't block exits or emergency equipment when parking the handcart.  
 True  False
3. Keep the center of gravity low by putting heavier objects on the top.  
 True  False
4. Keep the handcart ahead of you when going down a hill.  
 True  False

### What Would You Do?

Bill, your co-worker, likes to get the job done quickly and efficiently, particularly when using a handcart to unload a trailer. He stacks heavy boxes so high that he can't see where he is going and the other day he nearly ran into one of the office workers. What would you do?

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# MANUAL MATERIALS HANDLING

## How Do You Stack Up?

Stacking and storing “stuff” happens in most workplaces, and probably most often in warehouse, manufacturing, and industrial settings, where materials are constantly being moved, stacked, and stored. How stable the “stuff” is depends on how well it is stacked in the first place. Remember, moving and stacking material can be done manually or mechanically using forklifts and other lift aids.



Here are some best practices for stacking seemingly unstackable items:

### The Basics

To prevent stacked materials from falling, collapsing, rolling or sliding, you must plan the stack by looking at the object’s weight, size and shape, and how often it will be needed.

- Keep articles of the same size and weight together.
- Keep heavy and/or unstable items nearer to the floor.
- Keep items that don’t need to be used or moved a lot out of the way of items you need to get to on a regular or frequent basis.



### Bags

- To increase stability, secure bags and bundles by stacking them in an interlocking pattern or in alternating directions.
- Prevent bagged items from spilling or shifting by keeping them closed.



### All Things Round

- Place barrels, balls, rolled material and metal bars in racks to prevent them from rolling. If you don’t use racks, stack round items on solid, level surfaces.
- Block and chock bottom tiers of drums, barrels and kegs to prevent rolling or shifting in either direction.
- Band together large cylindrical objects that are stacked vertically.



### Racks and Stacks

- If you’re using racks to stack and store long items, such as metal pipes, rods, and rebar, don’t let parts stick out into aisles and walkways.
- Place planks, sheets of plywood, or pallets between tiered materials to provide a firm and flat surface.
- If materials can’t be stacked due to size, shape or fragility, store them on shelves or in bins .
- Stack only to safe heights.



Improperly stacked materials can result in serious injuries, so take a minute to plan the stack and how materials will be safely moved, stacked, and stored. ❖

## SHOP TALK

# How Memory Affects Safety Training - Part 1

**H**ave you ever given much thought to how much of the information workers understand and retain after a training session? How many times have you conducted training, or assigned online training, and automatically concluded that your employees understood exactly what you said or understood the information covered in an online course?

I would venture to say most of us focus on the compliance piece of training and don't give a lot of thought to the comprehension and retention of the training. But here are two reasons why you should.

## 1. Information Overload

The technical term is Cognitive Load, but we can think about it as information overload.

As we take in information from our surroundings, media, co-workers, and during training, our brains go through several steps before this information is committed to memory. Because of this, there are multiple opportunities for memory formation to fail.

More precisely, we gather new information into our "working memory" which then filters it and decides what to commit to our "long-term memory." Our "working memory" isn't interested in wasting its resources and it's very picky!

This makes it crucial to give learners information in chunks they can easily process. Remember, every time your training includes unnecessary information (no matter how small), you're taking up more space in your employees' "working memory." And that unnecessary information could be what ends up getting through, instead of the important technical steps you've explained.

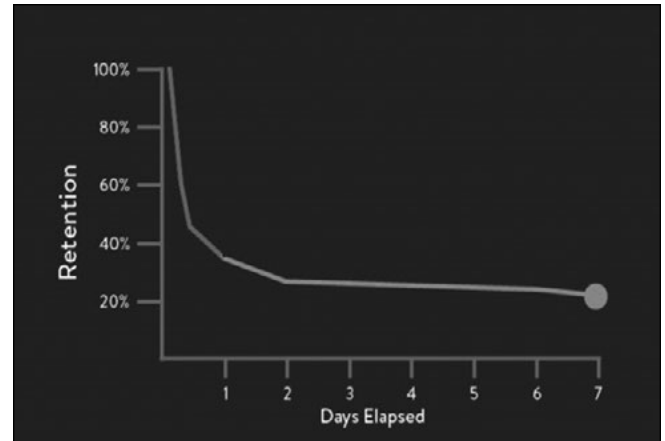
## 2. The Forgetting Curve

Let's assume the training info makes it past the learner's working memory, the question then becomes, will they be able to retain what they learn long enough to use it to safely do their job? Not according to the forgetting curve.

The forgetting curve describes how the brain's ability to hold on to information decreases over time. Hermann Ebbinghaus and his research in memory and forgetting, is credited with the creation of the curve in 1885.

He discovered that from the point when you learn a piece of information (100% retention), retention begins to drop exponentially. What that means is, without follow-up, about **70%** of what we learn is forgotten within 24 hours of learning it. On top of that, some studies show that total retention a month later is only around 10-20 %.

**Employees are likely forgetting up to 70% or more of what they learn in a training session!**



## 3. Retention Factors

There are various factors that can affect the rate of forgetting and the level of retention, some good, some not so good. Here are four of them to keep in mind when it comes to training employees.

1. *Meaningfulness*: the more meaningful the content, the easier it is to remember. If the content doesn't make sense or isn't relevant enough, it's going to be harder for workers to learn the material.
2. *Practice*: active practice or rehearsal enhances retention—that's why actors study their lines, and why you practice before giving a presentation. But there is one type of practice that yields better learning results. It's known as the spacing effect or spaced repetition, and refers to regularly spaced practice exercises. Studies have shown the effect of spaced repetition is significant and is especially beneficial when learning unfamiliar material and during fast presentation rates.
3. *Interference*: an interference during learning is always negative. It happens when a learner tries to remember old material while learning new material. Old material can slow the learner's speed of learning and memory performance. It can also cause the learner to have problems with distinguishing similar concepts and can cause students to forget items they remembered clearly for years.
4. *Transfer*: knowledge transfer takes place when prior learning or old material makes new learning easier. When old and new tasks or material have more in common, a transfer effect is likely to happen.

Anything you can do to lessen the negative effects of interference and bump up the positive factors of meaningfulness, transfer and practice, the more successful your training will be. In our next shop talk we will look at ways to do that! ❖

FATALITY REPORT

Stacked Sand Bags Lead to Worker's Death

A 56-year-old man was fatally injured when he was struck by and buried underneath a 4,000-pound bag of sand. On the day of the accident, the victim was trying to patch a hole in a large bag of sand, called super-sacks. The sand was "tap hole" sand, used in an electric arc furnace during the molten metal pouring process.

The super-sacks were stored shrink wrapped onto pallets, and stacked two pallets high. As the victim was patching the hole at ground level, the sand in the bag shifted, making the second tier of super-sacks unstable. The 4,000-pound super-sack stored on top, fell and struck the victim before burying him underneath and killing him.

Final Word

Investigators found the super-sacks were double stacked and not stacked in a way that would prevent sliding and collapse.

The sacks were not stacked, blocked, interlocked or limited in height, leaving them unstable and unsecured and creating an unstable condition which exposed employees to a dangerous, and ultimately deadly, hazard. ❖



The lower tiered super-sack of tap hole sand (white circle) where the hole was located.

SPOT THE SAFETY VIOLATION

When Ingenuity Goes Too Far... and Too High



One of the safety violations in this image is almost screaming at you, it's so obvious. Never, and I mean never, use a forklift to lift a person, especially if that person is sitting inside another forklift, and that forklift is lifting yet another piece of heavy equipment! It's a trifecta of a disaster waiting to happen.

Some forklifts are designed to lift personnel but this is clearly not one of them. Other hazards in this image include:

1. Overhead power lines, which we don't know for sure, but it's a safe bet to say they haven't been de-energized.
2. No traffic control - unless you count all the bystanders and gawkers.
3. It doesn't appear there are wheel chocks, or anything else, holding the bottom forklift in place to keep it from rolling away.
4. The weight of the second forklift, the man in the forklift, and the equipment being lifted is likely well over the rated capacity of the lift.

Operating a forklift comes with its own set of safety challenges, there's no need to add more!. ❖