



## Grocery Warehousing Ergonomics



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Grocery warehouse operations perform three main functions: receiving bulk goods from suppliers; order picking to select desired goods from within the warehouse; and shipping goods to the customers. This eTool\* describes example ergonomic hazards and solutions related to Order Picking, which accounts for a large number of musculoskeletal disorders (MSDs). The areas addressed are [Transport](#), [Storage](#), [Packaging](#), and [Work Practice](#).



This eTool emphasizes [Traditional Order Picking](#), which is the most common. However, many of the examples are also applicable to the other types of Order Picking: [Flow Through](#), [Belt Picking](#) and [Cross-Docking](#).

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## Traditional Order Pick System

The Traditional Order Pick System is used by many distributors today. In this system, pallets of product are taken from the dock, where they have arrived from the producer, and are placed in racking slots. Selectors then remove a specified amount of product from the slots and place them on pallets so they can build loads of goods as per customer specification. The selector moves the pallet from slot to slot collecting the specified goods using some sort of lift and transport device. Generally, this device is a pallet jack but in some warehouse operations a fork lift may be used. The pallet jack is often capable of carrying two pallets at a time and the selector can sometimes ride on the device from slot to slot. After a palletized load is fully assembled, it is wrapped with a plastic material and loaded into a truck for delivery to the customer's facility.

The advantages of this type of system are that it allows tremendous amounts of product to be stored in reduced floor space since much of the product is stored in overhead slots. Product handling is minimized since it is lifted only once from the slot to the destination pallet. Product is moved using a pallet and mechanical means for most of the operation. Large orders can be filled as full pallets with little manual lifting. Employees are also provided frequent micro-breaks as they move from one slot to another.

The disadvantages of this system are that Selectors are exposed to a number of musculoskeletal stresses including heavy lifting, bending, reaching, twisting, etc. Because employees move about the warehouse, development of mechanical aids to assist with heavy lifting or reducing awkward postures is difficult.



**Incoming product is stored in racks and loads are built by removing product from rack storage.**

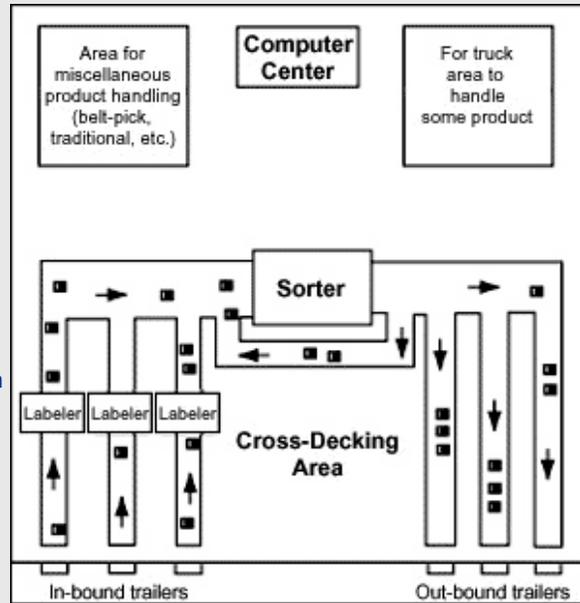
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## Flow Through System

In a flow through system, product is received at an in-bound dock, broken down, and placed on a conveyor system. The product is coded immediately after arrival and moved via conveyor to a sorting area where it is sent to the appropriate out-bound truck for shipping. Product is not stored or palletized during this process.

The advantage of this system is that there is reduced handling of product. This is especially true if a full pallet is requested but is also true when loads are broken down since this function can be done at a single specified site where the use of lifting aids and other mechanical equipment is more feasible.

The principle disadvantage of this system is that it is very floor space intensive and it involves an extreme degree of coordination to get all product to the right place at the right time.



Flow Diagram of Cross-Docking.

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## Belt Pick System

In a belt pick system, pallets of product are taken from the dock and placed on a belt or in racking slots. Selectors then remove a specified amount of product, as per customer order, from the slots and place it on a conveyor belt that runs down the center of the slot aisle. Product from each aisle comes to a central area where the product is removed from the belt and placed on a pallet. After a palletized load is fully assembled, it is usually wrapped with a plastic material and loaded into a truck for delivery to the customers facility.

Some advantages of this system are that since the employee works at a defined space the use of lift devices and assists is more practical. Hoists or lift assists can be placed along the line to help employees. The height of the receiving conveyor can be maintained at a level which minimizes bending and elevated reaches. The final palletizing station can be designed in a manner to eliminate torso bending and elevated reaches by using platforms, turntables and lifts. Fixed workstation positions allow lift-assist devices to be mounted at these stations.

This system has its disadvantages in that all product must be handled at least twice instead of once. One employee pulls the product and places it on the belt, while another must lift it from the belt to the destination pallet. The frequency of lifting may be much higher since large orders must be placed on the belt one case at a time instead of moving them as a unit on the pallet with a mechanical device. Employees also miss out on the micro-breaks inherent in the traditional order pick system as there is no travel time between work areas.



**Employees need to double handle product. First to the conveyor and second to the pallet as shown here.**

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## Cross-Docking System

In a cross-docking system, pallets of material are received on one dock, broken down into customer specified loads while still on the dock and transferred to outbound trucks. Items are not placed in slots for storage.

A cross-docking system offers the advantage that product is generally shipped in larger quantity which minimizes the lifting of single units of product. Larger quantities are usually moved via mechanical means such as forklifts with little individual manual handling. If pallets must be broken down into smaller units, this can be performed without the confines of storage racking. This facilitates the use of lifts and other mechanical means and increases the access of employees to product.

This type of system is not practical for many grocery distribution warehouses. Their customers generally do not deal in full pallet orders and the diversity of product requires more floor space than is practical. This system also requires a high level of coordination of incoming and outgoing product.



**Pallets are not stored in racks in this system. Product is directly transferred on the dock or warehouse floor.**

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### Transport Techniques

Employees usually move materials through the warehouse on pallet jacks. A pallet is placed on the Pallet Jack and merchandise is removed from a storage area called a slot or pick bin, then placed on the pallet. Many of these loads, especially in refrigerated or freezer warehouses, are extremely heavy. Weights upwards of 80 to 100 pounds are not uncommon.

- [Placing boxes on pallets](#)
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#### Placing Boxes on Pallets



##### Potential Hazards:

- Employees repeatedly bend forward at the waist to place boxes on the lowest level of pallets (Fig. 1).
- The heaviest units are placed on the bottom layer for stability. This work process requires employees to lift the heaviest loads using the worst body postures.



Fig. 1:

Bending required to reach boxes.

##### Possible Solutions:

- Raise the height of the bottom level to allow employees to keep the load close to the body (Fig. 2). This will minimize bending of the torso.



Fig. 2:

Use of a forklift raises the height of the boxes.

- Provide height-adjustable picking equipment (Fig. 3) so loads can be maintained at a height that

minimizes bending at the waist. This pallet jack raises up to 10 inches, while many others raise eight inches or less.

- Educate employees about the hazards of bending while moving heavy loads. Ensure the use of proper lifting techniques.



**Fig. 3:**  
Pallet jack with higher than normal fork elevation.

- Stack extra empty pallets on the pallet jack to elevate the bottom of the load (Fig. 4).



**Fig. 4:**  
Stacked pallets elevate the load.

- Place a palletizer on the forks of the pallet jack to keep product at waist height (Fig. 5).



**Fig. 5:**  
A palletizer on a Pallet Jack.  
[View Animation](#)

- When possible, utilize power equipment rather than manual to reduce ergonomic stresses.

Back belts: The effectiveness of back belts in reducing the risk of back injury among heal workers remains unproven. If workers falsely believe they are protected when wearing belts, they may attempt to lift more than they would without a belt. This poses a risk of injury to the worker (See [Back belts: Do They Prevent Injury?](#) (DHHS) (NIOSH) Publication No. 94-127).

**Potential Hazards:**

- Over long periods of time the solid rubber wheels of pallet jacks and forklifts can develop flat spots resulting in unstable loads and poor handling. Employees can experience stress to the hands and arms from difficulty in steering and stopping.
- Worn floors create ruts and bumps.

**Possible Solutions:**

- Provide periodic maintenance of pallet jacks and fork lifts so they can operate with the minimum amount of hand, arm, and finger force.
- Provide training to Selectors so they recognize the early signs of mechanical breakdown. This will allow them to report problems or difficulties with the machine before the problems lead to injury.
- Keep floors well maintained (e.g. no ruts or bumps) to reduce force when using manual materials handling equipment and whole body vibration/shock from driven equipment.

For more information, refer to the following:

- [Powered Industrial Trucks \(Forklifts\)](#), Safety and Health Topics Page.

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### Storage

Most goods in the grocery warehouse are stored for a period of time. Racking is used to expand the amount of storage that is possible. Metal racks are used for storage and the area created within the racking is called a pick bin or slot. Slots range in size, depending on the products stored.

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- [High Locations](#)
- [Double or Triple Slots](#)
- [Reaching](#)
- [Aisle Width](#)



#### Low Locations



##### Potential Hazards:

- Palletized product is stored in pick bins. Typically pallets are placed on the floor (Fig. 1), which requires employees to bend at the waist to access palletized loads that come to the warehouse stacked only a few feet high, or may be unloaded to the point where they are only a few feet high. Even when these pallets are stored in taller slots (Fig. 1), employees must bend at the waist to access product. This is a significant problem since the heaviest product is usually in the shortest stacks.
- Low racking can force employees to bend at the waist to access loads. Loads in bottom bins (Fig. 2), will require forward torso bending to reach under the rack, even when the top levels of the stack are at waist height or higher.



Fig. 1:  
Bending required to reach boxes under racking.



Fig. 2:

**Possible Solutions:**

- Whenever possible, elevate the pallets within a slot bin. The best technique is to place a palletizer into a tall bin (Fig. 3). A palletizer will lower in height under the weight of a full pallet, then will raise the load as items are removed. The use of a turntable (Fig. 4) allows employees to reposition the load. This keeps the load close to the body.



**Fig. 3:**  
A palletizer.



**Fig. 4:**  
Palletizer with turntable.

- Pallets that do not have product stacked above waist height may be elevated by placing other empty pallets under the load. Care must be taken so the top level of the heavy product is not raised higher than mid-chest height (Fig. 5).



**Fig. 5:**  
Empty pallets stacked to raise product to waist height.

- Raise the bottom level of racking so loads are at heights where torso bending is not necessary (Fig. 6).



**Fig. 6:**  
Raised shelving.

- Provide a device such as a forklift with a built-in

vacuum hoist . The strong suction can lift up to 150 lbs (Fig. 7).



**Fig. 7:**  
**Vacuum hoist.**

## High Locations



### Potential Hazard:

- Employees often reach above shoulder height (Fig. 8) to access products on upper shelves. This causes stress to the shoulders and back. Additionally, lifts above shoulder height often require awkward hand and wrist postures.



**Fig. 8:**  
**Reaching above shoulder height.**

### Possible Solutions:

- Use elevated rack locations as the overstock storage area. Pallets of product should be lowered to more appropriate heights prior to being selected. Selections should be performed with arms close to the body.
- Provide employees with "Pick Sticks" or "Bow Peep" hooks to pull small, light-weight product closer to the edge prior to lifting (Fig. 9).



**Fig. 9:**  
**"Bow Peep" hook.**

**Potential Hazard:**

- Double or triple slotting (Fig. 10 and 11) used to maximize shelving space so the greatest amount of product can fit in the smallest amount of space may increase ergonomic stressors such as bending and elevated reaches. Workers may be forced to bend at the torso to reach under low racking to access product (Fig. 10). This product may be stacked at desirable heights that would not otherwise, if not for racking interference, require workers to bend at the torso. Workers must reach above shoulder height to access materials placed on three-tier racking (Fig. 11) or to access tall, palletized loads placed on two-tiered shelving. In general bottom and top racking in three tiered systems creates significant access issues.



**Fig. 10:**  
Double slotting.



**Fig. 11:**  
Triple slotting requires elevated reaches to access product.

**Possible Solutions:**

- Provide full slotting, especially for product that is heavy or bulky, so employees can have better access without undue reaching or bending (Fig. 12).
- Slower moving product that is fairly compact can be warehoused using gravity fed flow racks (Fig. 13). These racks allow highly condensed usage of warehouse space. However, hazards are created by this type of racking since it must be loaded by hand from the back of the rack. This can require repeated elevated reaches, repeated bending of the torso, as well as using box openers to cut open shipping boxes. Also, Selectors must pull product over the stop lips that keep the product from sliding out onto the floor. Heavy product in the slot creates additional pressure when lifting boxes over the stop lips.



**Fig. 12:**  
Full slotting.



**Fig. 13:**  
Gravity fed flow racks.

**Potential Hazard:**

- Product is often removed from the front of pallets first. This leaves the remaining product stacked in the back of pallets, where employees must reach (Fig. 14) to access and lift product. This creates additional stress on the shoulders and back.



**Fig. 14:**  
Reaching to the back of the pallet.

**Possible Solutions:**

- Develop a product rotation process where pallets are regularly turned using a forklift or pallet truck after the majority of product has been removed. This involves pulling the pallet out of the slot, turning it 180 degrees and replacing it into the slot.
- Place pallets on turntables (Fig. 15) so the pallet can be turned and optimal access to the product can be maintained at all times.



**Fig. 15:**  
For optimal access, place product on turntable.

- Roller and channel devices allow the load to be pulled out for better access. Addition of a turntable at the end of such a device will allow the pallet to be turned and then replaced into the slot with the load closer to the front.
- Provide wider slots, especially for heavier product, so Selectors can walk into the slot and access all sides of the pallet. Stockers should be trained to leave at least 16 inches between pallets so there is enough space for Selectors to move around the pallet during selection.

**Aisle Width****Potential Hazard:**

- Aisle width may be insufficient for access to faster-moving product. This may create congestion (Fig. 16) that forces Selectors to stop farther from the pick slot and carry product longer distances to the pallet jack. Selectors may be tempted to carry multiple parcels at the same time to save trips.



**Fig. 16:**  
Congested aisle.

**Possible Solutions:**

- Increase the width of aisles where fast-moving product is located. This will allow

more pallet jacks to get closer and will reduce the distance that loads must be carried.

- Stagger the start times for Selectors at the beginning of the day so that fewer Selectors hit the same slots at the same time. Five to 10 minute start differentials should provide adequate spacing for sufficient disbursal of Selectors.

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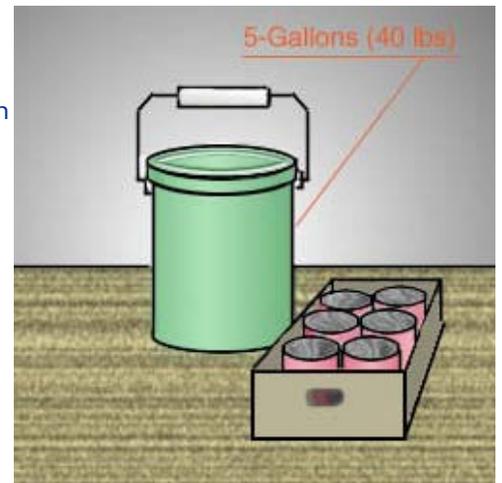
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### Packaging

Products vary in weight — potentially up to 100 pounds — and are shipped to the warehouse in a variety of containers, including boxes, bags, and cans. The shape, weight, and/or material of the package can greatly affect the stress that a grocery warehouse employee experiences.

- [Heavy Containers](#)
- [Inadequate Handhold](#)
- [Plastic Wrapping](#)
- [Wooden Pallets](#)
- [Wrapping Pallets](#)
- [Opening Boxes](#)



### Heavy Containers

#### Potential Hazard:

- In cold or freezer warehouses many boxes are excessively heavy (Fig. 1), they may weigh as much as 100 pounds. Manually lifting loads in this weight range places great stress on the employee's muscles. Back injuries, such as muscle strain and disc injury, can occur when repeatedly lifting heavy objects.



Fig. 1:  
Heavy Boxes.

#### Possible Solutions:

- Work with suppliers to provide product in smaller, lighter containers (Fig. 2).
- Improve access to heaviest items. Employees should be able to access these items without bending at the waist, pulling the elbows away from body while reaching, or twisting. Redesigning storage racks and transport devices can greatly improve the employee's ability to maintain these neutral

postures.

- Provide handhold cutouts or handles on all heavy products.
- Work with suppliers to ensure that container integrity will be adequate so the box, bag, or bucket will not accidentally break, rip, or pull apart during lifting operations.
- Load pallets with lighter product in the center and heavier on the outer edges to ensure easier access and lifting of the heavier items (Fig. 3).

to regulate ergonomics.”

### Domino Cuts Sugar Packages

Domino Sugar reduced its bundled packages of sugar from 60 pounds to 40 pounds, below OSHA's suggested limit of 50 pounds. This change will make the bundles easier to handle and reduce the total weight of each by 33 percent. All three of its manufacturing locations have adjusted their packaging equipment to accommodate the weight modification. The first shipments of 40-pound bundles began in June.

### Poll Shows Public View of OSHA's Priorities

The National Commission on Ergonomics

Fig. 2:

Some suppliers are willing to modify weight of packages.

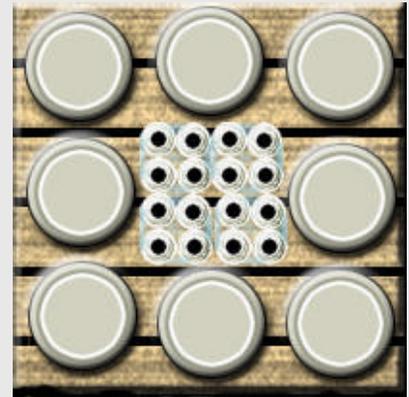


Fig. 3:

Heavier packages on outside.

## Inadequate Handhold



### Potential Hazard:

- Many packages do not have handles or handle cut-outs (Fig. 4). This makes heavy cases difficult to grasp and/or retrieve. This can also force employees to use awkward postures when lifting product. Without hand cut-outs or handles, employees must press on the sides of boxes, slip fingers under the lips of products, or grasp the loose material of bags to gain control. These techniques place strain on the hands and shoulders.

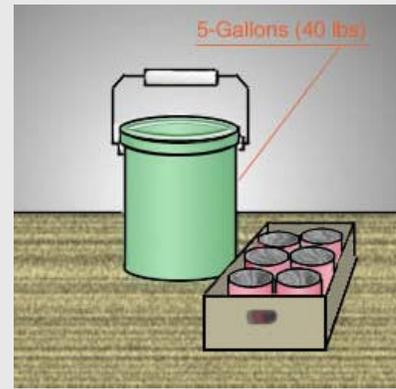


Fig. 4:

Boxes without handles are difficult to grasp.

### Possible Solution:

- Encourage suppliers to provide product in stable boxes with hand hold cut-outs or handles (Fig. 5). This is especially important for product that is extremely heavy.



**Fig. 5:**  
Examples of handhold devices.

## Plastic Wrapping



### Potential Hazard:

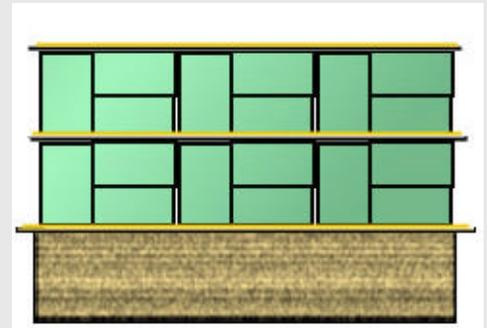
- Many cases are now packaged in plastic rather than cardboard (Fig. 6). Plastic from one package may stick to another package. The added resistance of the plastic can create additional stress to the hands, arms, shoulders, and back. Selectors often pull cases toward their body to gain better lifting advantage. Forces required to pull the cases with these restrictions may actually be greater than the weight of the case.



**Fig. 6:**  
Plastic wrapped cases.

### Possible Solutions:

- Work with suppliers to get a slip sheet between the layers (Fig. 7). This will decrease the force needed to slide product toward the employee.
- Treat these cases as if they are heavy loads and provide additional head room and space on the side of stacks for access.
- Have suppliers wrap only the sides and tops of cases, leaving the cardboard bottom exposed to facilitate sliding.



**Fig. 7:**  
Product slides easier with a slip sheet between layers.

## Wooden Pallets



### Potential Hazards:

- Wooden Pallets weigh between 40 and 70 pounds and may be lifted several times during a work shift (Fig. 8). This repeated

lifting can cause stress to the lower back.

- Splinters from handling the wood are also a hazard to the worker.



**Fig. 8:**  
Workers bend to lift pallets several times during a shift.

#### **Possible Solutions:**

- Request that suppliers provide product on lighter, plastic pallets (Fig. 9). The employees of both the warehouse company and supplier will benefit from the reduction in weight.
- Plastic pallets easily nest together to reduce the space of stacking. They also eliminate splinters and uneven surfaces that employees may step on when walking over pallets.
- Provide a pallet dispenser to reduce handling of pallets (Fig. 10). This device allows selectors to drive their pallet jack to the dispenser. An empty pallet is then automatically loaded onto the forks without manual lifting.



**Fig. 9:**  
Plastic pallets weigh between 20 to 30 lbs.



**Fig. 10:**  
Pallet dispenser.

## **Wrapping Pallets**



#### **Potential Hazards:**

- After a load has been built, it is generally wrapped with plastic to maintain its integrity during transit. Employees may be injured when performing this task manually. They must bend at the waist to wrap the bottom of the pallets while supporting the plastic dispenser (Fig. 11).
- Employees often stick their fingers into the open end of the tubes to stream off the wrap. This increases the risk of cuts to the fingers.



**Fig. 11:**  
Employee wrapping pallet.

#### **Possible Solutions:**

- Use an automatic plastic wrapping machine with palletized product sitting on a turntable (Fig. 12). This ensures the employee will not have to bend at the waist to wrap the pallet.
- If manual wrapping must be performed, use rolls that weigh as little as possible to minimize the lifting hazard. A handle (Fig. 13) will prevent employees from placing their fingers into the tube, thus decreasing the risk of cuts.



**Fig. 12:**  
Wrapping machine.



**Fig. 13:**  
Manual Wrapper.

## Opening Boxes



### Potential Hazards:

- Boxes are usually cut open using a razor knife. If the knife is too small (Fig. 14), employees may use a pinch grip, which can stress the tendons of the hands.
- The use of in-line knives (i.e., handles are in-line with the cutting blade) can cause the employee to twist the wrist while exerting finger force, increasing the risk of tendonitis and carpal tunnel syndrome.



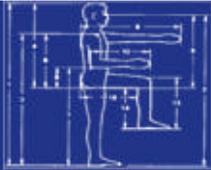
**Fig. 14:**  
This is NOT an ergonomically correct knife.

### Possible Solution:

- Use ergonomic razor-knives that require less wrist bending, and have substantial handles that require less finger force for control (Fig. 15).



**Fig. 15:**  
Ergonomically correct knives.



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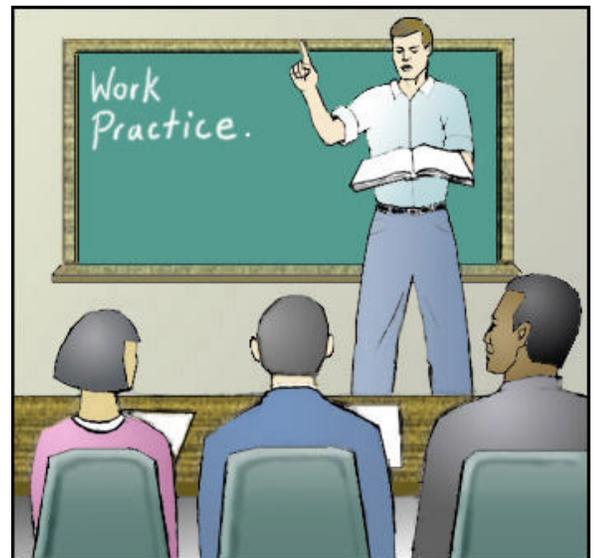
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### Work Practice

Management and staff employees should be aware of good work practices that minimize the possibility of injury. Items such as the patterns for pallet unloading, break schedules, training, or the number of hours worked can greatly influence the potential for injury.

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- [Taking Shortcuts](#)
- [Unexpected Exertions](#)
- [Holding Objects While Lifting](#)
- [Skipping Break Periods](#)
- [Working Overtime](#)
- [Using Improper Footwear](#)
- [Utilizing Medical Programs](#)
- [Training New Employees](#)



### Depalletizing



#### Potential Hazards:

Selectors encounter many racking situations in the typical warehouse and often depalletize in ways that expose them to unnecessary stressors. Depalletizing is where material is removed from a pallet where it has been stacked, usually in multiple layers. There are two common techniques of depalletizing (layer-by-layer and pyramiding) and either technique may be used depending on racking and product types.

- In a layer-by-layer technique selectors remove all cases from one layer before the cases from the next layer are removed (Fig. 1). This technique requires employees to reach to the back of a palletized load and pull an item forward. This process moves the load closer to the body prior to lifting, but it can also create back and shoulder hazards if cases are extremely large or heavy. Also, weak or small handles, stacks above shoulder height, or cases that do not slide easily can stress the shoulder, back, and possibly the knee during reaching and pulling motions.
- In the pyramiding technique cases are removed in a diagonal pattern from the top front to the rear back (Fig. 2). This technique is preferred when



**Fig. 1:**  
**Bending required to reach boxes.**

weight, size, and handle types are like those mentioned above. In these situations the employee can limit forward reaching and pulling by moving closer to the load and lifting the closest container, often leaving the remaining stack in a pyramid shape. Pyramiding is not suggested if the pallet is unstable or in an area with little clearance space for employees. Many of the new racking systems, such as the push-back model, are elevated on slides and tightly packed into a pick slot. These configurations limit stability and accessibility, forcing employees to reach considerable distances across empty portions of the pallet to access and lift loads. Even lighter loads can create considerable stress to the shoulder, back, and knee when held away from the body.



Fig. 2:

Pyramid depalletizing method.

#### Possible Solutions:

- An evaluation of each racking situation should be performed either by management or by a trained employee to determine the least stressful method of depalletizing. An appropriate selection should consider the nature of the load, the weight of the load, and the type of racking system used.
  - Employees should generally use a layer-by-layer technique in push-back racking systems where employee access is limited, and pyramiding creates longer reach distances. Examples best suited for layer-by-layer depalletizing are:
    - Boxed product, preferably with handles or cutouts
    - Lighter boxes that slide fairly easily
    - Product stacked below shoulder height (measured with the pallet on the rack)

A layer-by-layer approach can be made easier using the following methods:

- Use a hook to pull product from the back of pallets, allowing the arm to stay closer to the body, and reducing stress to the shoulder
- Order product, such as bagged produce, with slip sheets between the layers to facilitate sliding
- Order produce in boxes rather than bags. Boxes are easier to slide than bagged product and boxes are usually packaged in smaller quantities so the overall package is lighter.
- Place a slip sheet made of low friction material on partially emptied layers to facilitate sliding of product from the back of the pallet
- Pyramiding on a push-back system may be acceptable for lighter product such as toilet tissue or styrofoam plates. Product on push-back systems should be stacked low enough so reaches above head height are not required.
- Pyramiding may be acceptable for heavier items or items that do not slide easily, such as bagged onions, if the pallet is placed on the floor or another solid support that provides adequate access and the pallet itself does not present a hazard if walked on to provide easier access. Plastic pallets will provide a better base than wood slat pallets.
- For lighter loads stacked above shoulder height, it may be possible to use a combined approach. The top layers can be pulled down the sides in a controlled fall using the pyramid technique. When stack height drops

below shoulder level, product can be removed in a layer-by-layer fashion.

- If a push back system is to be used with a pyramiding technique, equip it with a positive lock mechanism such that the pallet is held firmly in place and can not be pushed backward if an employee steps on it. This will allow employees to place one foot on the pallet to improve access and limit reaches. These postures will still not be acceptable for heavy product such as most meat items.



**Fig. 3:**  
**Push-back rack system**

- Tag slots as to what type of technique should be used and train employees about both the tagging system and selecting techniques.
- Develop systems so employees keep product that has to be lifted closer to the body, minimizing reaches and torso bending
  - Utilize a turntable in bays so pallets can be rotated to ensure that the product is close to the aisle prior to lifting
  - Create space around palletized loads so employees can access product from the side keeping it close to the body prior to lifting
  - Develop a product re-orientation process for unloading using the pyramiding technique. The turning process should turn the pallet around 180 degrees to improve access. This will place the empty portion of the pallet at the back of the slot and place product closer to the aisle. This can be done by replenishing personnel during the stocking process or by a designated individual assigned to this task.

## Taking Shortcuts



### Potential Hazard:

- Selectors tend to reach across the pallet with a load in the hand (Fig. 4) rather than walk around a pallet. This prevents keeping the load close to the body and adds significant stress to the shoulders and upper back.



**Fig. 4:**  
**Selector reaching with a load in hand.**

### Possible Solutions:

- Factor proper work practice into pick times. Time limits should not force employees to use shortcuts like reaching across a pallet instead of walking around the pallet for better access.
- Provide training to Selectors so they understand the importance of performing tasks using proper ergonomic techniques.

## Unexpected Exertions



### Potential Hazards:

- Even experienced Selectors will come upon situations where they must perform unexpected exertions. This can happen when:
  - A box weighs more than expected.
  - The box falls apart (Fig. 5), creating the need to perform quick and unexpected actions to save the load.
  - Boxes stick together and additional force is needed to separate the boxes.
  - Poor footing or slippage causes the load to be supported in an unexpected or awkward posture.
  - Quick motions occur while holding the load.



**Fig. 5:**  
**Crushed, unstable boxes.**

### Possible Solutions:

- Tag slots with case weights. This can be accomplished by noting the case weight on the slot in clear and easily read terms, or by color coding the slot to indicate the hazard. For example, the area in front of the slot can be marked with a red marker to indicate those areas where the heaviest product is stored.
- Request that the suppliers pack product in sturdy cases, appropriate for the environment.
- Clean all areas in the stocking aisles to avoid slipping. Workers should be educated on the importance of appropriate footwear.

## Holding Objects While Lifting



### Potential Hazards:

- Stickers are placed on boxes after they are selected. Often an employee holds the sticker sheet while selecting and lifting product. If employees hold these sheets while performing lifting tasks (Fig. 6), their contact with the box is reduced. This can lead to slippage and unexpected exertions, which increase the chance of injury to the back and shoulders.

- One hand may exert more force than the other, which can lead to uneven weight distribution. This increases the chance of injury to the back. The chance of straining the tendons of the hand or forearm is also increased.



**Fig. 6:**  
**Lifting while holding labels in one hand.**

#### **Possible Solutions:**

- Use a sticker dispenser that can be worn around the employee's waist. This device will allow Selectors to use both hands when lifting product.
- Provide a clipboard on the pallet jack to hold the sticker sheets rather than having employees hold the sheets in their hand while lifting.

### **Skipping Break Periods**



#### **Potential Hazard:**

- Selectors may work through their break periods if production standards are set too high. Breaks are very important in heavy, physical work. Without periodic rest periods, the body may not have adequate time to rest and recuperate. Selectors who consistently work through their breaks are at a greater risk of musculoskeletal disorders (MSDs), accidents, and reduced quality of work due to operating at higher fatigue levels.

#### **Possible Solutions:**

- Work rates that require Selectors to pick orders rapidly will benefit the company, in the short run, by reducing the number of Selectors hired. However, these benefits may be lost due to higher injury rates if work standards exceed the capabilities of individuals. A competent work-time consultant can survey work tasks and recommend an appropriate work rate.
- Ergonomic improvements may not justify an increase in pick rates. The benefits of reduced risk could easily be lost if rates are increased because the task appears to be easier.
- Incorporate a work ramp-up (break-in) period for new hires. Work rates set for experienced Selectors may be too high for those that are new to Selecting work. It is common practice to allow a gradual ramp-up work rate for new hires that increases production over several weeks, or until employees can work at the same pace as experienced workers.

## Working Overtime



### Potential Hazard:

- Working overtime, especially when the overtime is performed as an extension of the normal workday, may overexert employees by exceeding their capabilities.

### Possible Solutions:

- Minimize overtime if at all possible. Provide part-time staff for peak periods.
- Schedule overtime on off-days instead of extending the regular work shift. This will allow a period of recovery between shifts when employees may recuperate.
- Assign overtime on a volunteer basis as much as possible.

## Using Improper Footwear



### Potential Hazard:

- Selectors are on their feet for long periods of time, possibly an entire shift. The leg muscles continually support the body, which can cause fatigue. Employees work on hard concrete surfaces, which can create contact trauma or tendon and muscle problems if proper footwear is not worn.

### Possible Solutions:

- Educate employees about proper footwear. Shoes with solid support, flex at the ball of the foot, and adequate padding will maintain foot support and provide shock absorption against foot strike while walking on hard concrete surfaces.
- Provide employees with padded shoe inserts that support the foot and cushion against foot strike.
- Shoes with non-skid soles are also important, particularly where surfaces are potentially slippery.

## Utilizing Medical Programs



### Potential Hazard:

- Without a medical management program, the presence of musculoskeletal disorders (MSDs) will probably be underestimated. With reduced awareness of MSDs, symptoms may go undetected until they become disabling injuries. Injured employees are less likely to get timely and appropriate care and restricted duty programs may not be established or utilized if proper medical management is not in place.

### Possible Solutions:

- Consult with a medical specialist who has experience in and is familiar with work-related musculoskeletal disorders (MSDs). This person may be a physician, a nurse, or other healthcare provider that is familiar with causes of musculoskeletal injuries. They should be allotted time to track injury trends, coordinate injured employee's visits to healthcare facilities, interact with the treating physicians, and interact with the ergonomic committee regarding return-to-work activities and restricted work jobs. This person can also act as the principle contact person for Workers Compensation issues, and the liaison between management, healthcare and employees.

- A relationship should be developed with a local medical clinic if an on-site specialist is not an option. It is imperative that the healthcare professionals be familiar with the type of tasks the employees perform. This will assist in diagnosis and the return-to-work process after an injury. If a clinic is used, it is important to have a responsible party on-site to act as a liaison with the medical provider.
- A return-to-work program should be developed for placement of injured workers into jobs consistent with their medical restrictions. A well constructed plan allows employees to return to work sooner and increases the chance that they will eventually return to their original job. The challenge of such a plan is to develop and categorize jobs within a facility that do not violate the restrictions given by the physician. Care should be taken to develop such a program in cooperation with any worker's unions, medical staff and contractors.
- Symptoms should be reported as soon as they start to develop. Early reporting can help address potential problems before they become serious and costly lost-time injuries.

Training New Employees 	
<b>Potential Hazard:</b>	
<ul style="list-style-type: none"> <li>• Newly hired employees may not recognize ergonomic hazards or understand effective techniques used to minimize these hazards.</li> </ul>	
<b>Possible Solutions:</b>	
<ul style="list-style-type: none"> <li>• Provide general ergonomics training and work-task specific training at the time of new-hire orientation. Explain risk factors and proper work techniques to minimize these hazards.</li> <li>• Provide appropriate video tapes of proper work practice for employees to review on a regular basis. In addition to regularly scheduled refresher training, injured employees should be retrained regarding ergonomic risks pertinent to their injuries. Provide <a href="#">Post Incident Refresher Training</a> after injuries.</li> <li>• Provide new employees with a mentor that can provide insights on the proper and most efficient methods to perform their tasks.</li> <li>• Explain the medical management system to new-hires. It is important for employees to understand how to report an injury and how the company prefers its employees to seek medical attention. This can expedite assistance, reduce costs, and improve lines of communication.</li> </ul>	

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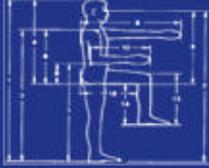
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### Post-Incident Refresher Training

- The time immediately after employees are injured where they are usually more receptive to safety related training. Employees should be reintroduced to a full refresher of pertinent training topics once they are stabilized and can return to the work- site. The experiences of some warehouses have been that employees are more receptive to the message of safety training once they have been injured. They now understand that it can happen to them and that there is a way to help minimize these hazards. Once this new attitude is established these employees often become a very forceful messenger for the safety training message.

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