

# **BACK AND LIFTING SAFETY**

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**Lifting Hazards and Some Ideas on How to Reduce Your Risk of Lifting Injury**



# **BACK AND LIFTING SAFETY**

**By the end of this slideshow you will be able to:**

- Identify the types of lifting that may cause injuries
- Review ergonomics principles used in reducing lifting hazards and preventing injuries
- Contact L&I resources for assistance

# STATISTICS ON LIFTING INJURIES

- There are 50,000 WMSDs in Washington every year.
- How many of them are due to lifting?

**17,000 ... That's 34%!**

*Source: SHARP technical report No. 40-6-2002*

**This means that about 1/3 of WMSDs are attributed to lifting.  
That makes it one of the largest single sources  
of injury in Washington workplaces.**

# **STATISTICS ON LIFTING INJURIES**

## **Lifting Injuries Aren't Just Back Injuries**

### **LIFTING RESULTS IN:**

**30% of  
Shoulder  
WMSDs**



**22% of  
Elbow  
WMSDs**

**43% of  
Back  
WMSDs**

**13% of  
Hand/Wrist  
WMSDs**

# **STATISTICS ON LIFTING INJURIES**

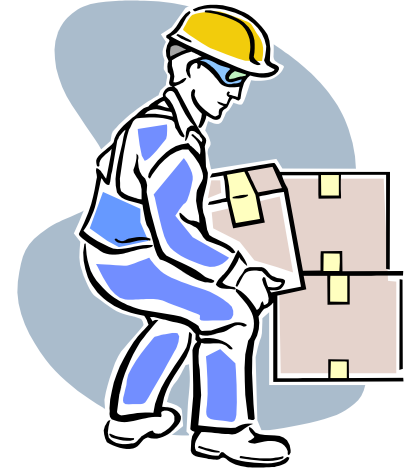
## **Lifting Injuries Aren't Just Due to Aging**

**“Overexertion in lifting a heavy object is the most frequent single type of injury for those under 18 resulting in lost work-time.”**

*Source: American Society of Safety Engineers (ASSE, 2003)*

# PAY SPECIAL ATTENTION TO...

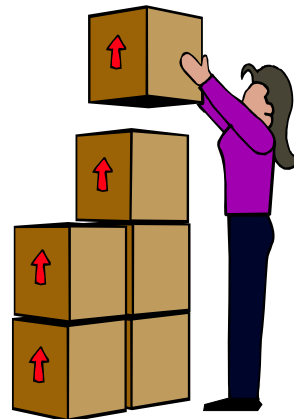
## Heavy Lifting



## Frequent Lifting



## Awkward Lifting



# HEAVY LIFTING



**This worker is adding bags of dry ingredients to a hopper in a manufacturing plant.**



# FREQUENT LIFTING



**This worker is palletizing totes of small parts in a warehouse.**

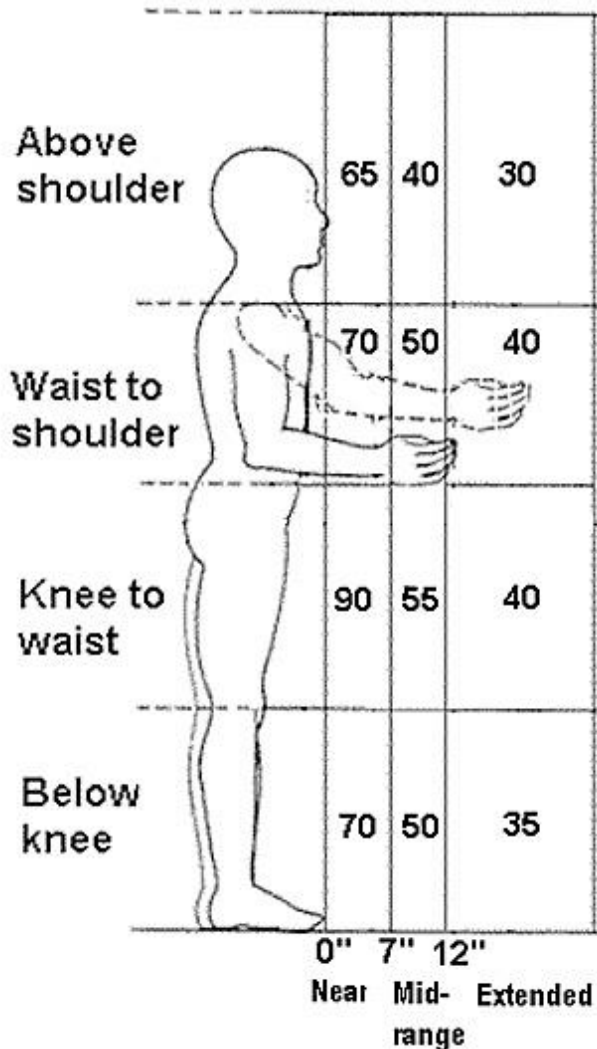
# AWKWARD LIFTING



- **Above the Shoulders**
- **Below the Knees**
- **At Arms' Length**

**This worker is lifting 50-pound bags of wet fiberglass in a manufacturing plant.**

# ANALYSIS TOOLS



- **WISHA Lifting Calculator**
- **Other Tools:**
  - ACGIH Lifting TLV
  - NIOSH Lifting Equation
  - Department of Energy's "ErgoEaser"

# PRINCIPLES FOR REDUCING HEAVY LIFTING



- **Reduce the Weight**
- **Increase the Weight**
- **Use Mechanical Assistance**
- **Slide Instead of Lift**
- **Team Lifting**

# REDUCING HEAVY LIFTING



## Reduce the Weight of the Load

This example shows using lightweight plastic pallets, which weigh from 13 to 30 pounds for a standard 40" x 48".

The traditional wooden 40" x 48" pallet weighs approximately 60 pounds.



**COSTS:** About \$30 more per unit compared with wooden pallets

**SAVINGS:** Reduced shipping costs (empty pallets are nestable so more can be shipped back in one trailer)

**Reduced pallet repair and replacement costs** (plastic is easier to clean when used in food processing)

**Fewer splinter/loose nail injuries**

# REDUCING HEAVY LIFTING



**INCREASE the Weight of the Load**

Make it so heavy no one would try to lift it

**2,000 lbs.**



# REDUCING HEAVY LIFTING

## Use Mechanical Assistance



This example shows a mobile pneumatic conveyor that can be used to move powdered and granular materials from any type of container (bags, barrels, bins, totes, etc.) to a hopper or other part of a mixing system.

The discharge (funnel shaped silver part at the top) is height adjustable.

# REDUCING HEAVY LIFTING

## Slide Instead of Lifting



This example shows how to move heavy duty batteries from one pallet to another when picking an order.

Large truck and marine batteries can weigh up to 110 pounds (this one weighs about 75 pounds). By taking the time to set the order pallet to the same height as the storage pallet, the battery can be slid rather than lifted.



# REDUCING HEAVY LIFTING



## Team Lifting

Team lifting works better on larger objects, such as the wallboard shown here.

There is a labor cost involved with team lifting, although in some jobs there is always another person around out of necessity.

# REDUCING FREQUENT LIFTING



- **Use Mechanical Assistance**
- **Avoid Unnecessary Lifting**
- **Use Mobile Storage**

# REDUCING FREQUENT LIFTING

## Use Mechanical Assistance



The example shown is palletizing using a vacuum lift at a paper mill that produces bundles of grocery bags.

The vacuum lift costs around \$10,000, but in this case it increases productivity by allowing one employee to palletize on more than one line at a time without getting fatigued.

It also allows rotation of all employees through this job, since physical capacity isn't a limiting factor.



# REDUCING FREQUENT LIFTING



## Use Mobile Storage

The example is a mobile parts rack from a gas and wood stove manufacturer. The metal parts can be fairly heavy (20 to 52 pounds). They go through several finishing and inspection steps before final assembly.

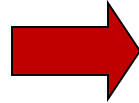
By placing them on mobile racks, the parts can be moved from process to process with minimal lifting.

# REDUCING DURATION OF LIFTING

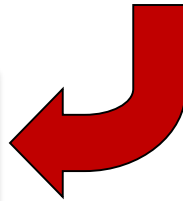
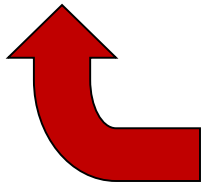


- **Rotate to Other Jobs**
- **Use Mechanical Assistance**

# REDUCING DURATION OF LIFTING



**Rotate to  
Non-Lifting  
Tasks**



# **REDUCING AWKWARD LIFTING/REACHING**



- **Remove Obstacles**
- **Slide Closer**
- **Reduce Shelf Depth**
- **Reduce Package Size**
- **Use Mechanical Assistance**
- **Team Lifting**

# REDUCING AWKWARD LIFTING/REACHING



Along with object weight, lifting frequency and duration, the distance between the hands and the low back when lifting is one of the main factors in determining whether a lift is a hazard or not.

The longer the reach required to lift an object, the more of a load it places on the low back and the greater the risk of injury.



# REDUCING AWKWARD LIFTING/REACHING



## **Remove Obstacles**

This shows removing the side of a tote can reduce the reach in many cases, although there will still be some awkward lifting. It's one of the cheapest solutions, since it requires only the time to cut out the side of the tote.

Bins with flip-down sides are also available, so that as they fill up the sides can be flipped-up into place to hold the boxes in place.

# REDUCING AWKWARD LIFTING/REACHING



## **Slide Objects Closer**

This example shows an order picking using an inexpensive metal hook, made in-house, to pull a box close to the edge of the shelf before lifting it. This works well for lighter items.

Heavier items would need to be stored lower and slid closer using both hands.

# REDUCING AWKWARD LIFTING/REACHING



## Reduce Shelf Depth

While it's possible to simply reduce the depth of shelves, you also give up some storage space this way, or you have to buy a lot of narrow shelving units.

Gravity flow racks can be a good solution, since they allow you to store a lot of boxes on a single deep rack. They use a variety of types of rollers that allow boxes to roll forward as the front box is taken away.

# REDUCING AWKWARD LIFTING/REACHING

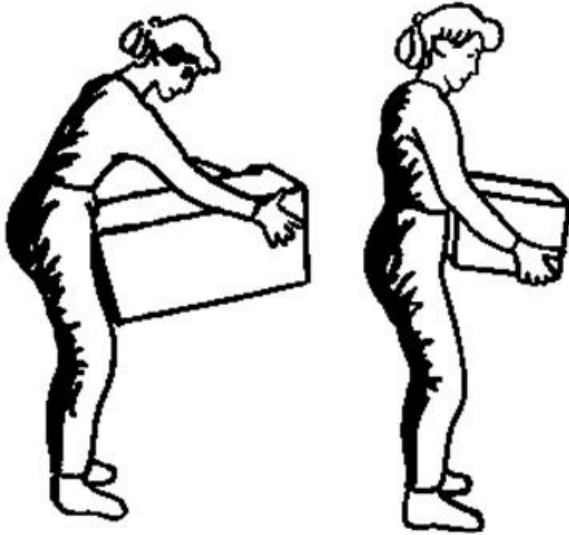
## Reduce Shelf Depth

The examples shown are designed to fit into existing standard racks, so new gravity flow racks won't need to be purchased and installed.



The costs of these systems range from about \$60 per lane to a little over \$200 per lane depending on depth and width of lanes.

# REDUCING AWKWARD LIFTING/REACHING



## Reduce Package Size

The drawings show the difference between lifting a large box with many items in it versus lifting a smaller box with fewer items in it. Not only will this reduce the weight, but it will also reduce the reach necessary to pick up the box. Costs to implement this idea will vary.

If you're the customer, you can request smaller packaging from the supplier and probably pay a little more per item due to their increased packaging costs.

# REDUCING AWKWARD LIFTING/REACHING



## Use Mechanical Assistance

This is an electric hoist on a trolley attached to a boom. It has a 250-pound capacity, so they can actually move two bags at a time, which helps with productivity.

The cost for the light duty hoist, trolley, I-beam and jib mounting is about \$1,000.

# REDUCING AWKWARD LIFTING/REACHING

## Team Lifting

Team lifting can help to reduce the reach required to pick up a large object, since workers no longer need to place their hands at the object's center of gravity (balance point). Remember, it's not as effective as a piece of lifting equipment and an employee who is trained in how to use it properly.



# REDUCING AWKWARD LIFTING/REACHING



- **Use Mechanical Assistance to Raise the Load**
- **Add Handles**
- **Arrange Storage**
- **Avoid Unnecessary Lifting**



# REDUCING AWKWARD LIFTING/REACHING

## Use Mechanical Assistance to Raise the Load



This is a relatively common device used in industry – a scissor-lift cart. The height of the cart is adjusted hydraulically, in this case with a foot pedal, although powered adjustment mechanisms are also available. These carts cost about \$1,500.



Workers can bring objects up to a better height for lifting, although the best use is to place the cart at the same height as the shelf or table the object is being transferred to or from, and then slide it over rather than lifting. Carts with rollers or roller balls are available to help make the sliding transfer easier.

# REDUCING AWKWARD LIFTING/REACHING



## Add Handles

This shows the difference in lifting posture between picking up a box from the bottom, and picking it up using handles near the top of the box. In this case, this product is shipped in a box with pre-cut handles, so it doesn't cost anything to use them. There's still some bending, but the box is now lifted from above the knees, rather than below them.

There are a couple of other good ideas in this photo as well. The box has been stacked on an empty pallet to raise it up a little (sometimes even raising something just 6" can make a difference in posture). The bottom pallet has also been designed with some toe space below the load deck to allow workers to get closer to the objects they're lifting.

# REDUCING AWKWARD LIFTING/REACHING



## Rearrange Storage

The example shown is a from a lumberyard, where they took stock of all heavy items and rearranged their storage to place those items on shelves between knee and shoulder level.

The higher items can often be slid down to waist level before lifting them.

# REDUCING AWKWARD LIFTING/REACHING

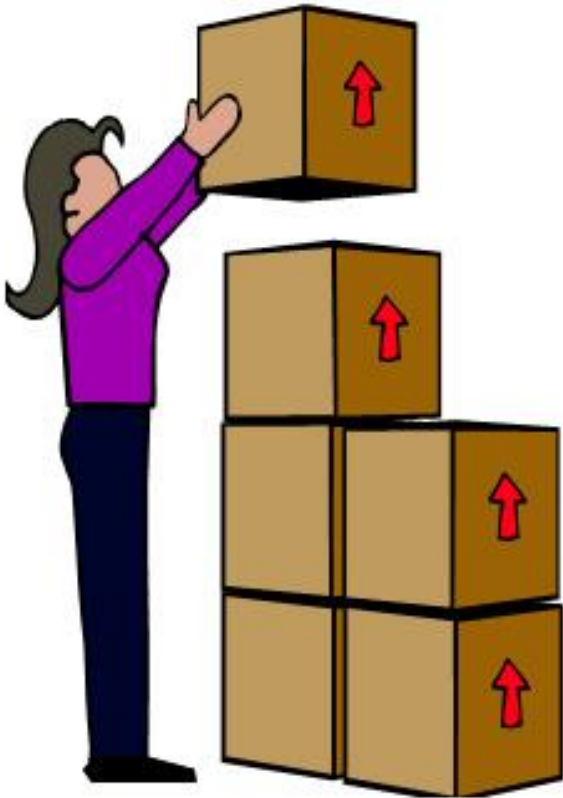
## Avoid Unnecessary Lifting

This is an example of a commercial product designed to allow mechanics to hang wheels off the sides of the lift when working on brakes, hubs, etc.

This places the wheels at a better height for lifting, instead of dropping the wheels to the ground. The hanger folds flat against the lift when not in use.



# REDUCING AWKWARD LIFTING/REACHING



## Reaching Above Shoulders

- Arrange Storage
- Use Mechanical Assistance
- Use a Rolling Stair or “Safety Ladder”

# REDUCING AWKWARD LIFTING/REACHING



## Reaching Above Shoulders Arrange Storage

This shows arranging storage so that larger, heavier and more frequently used boxes are between knee and shoulder height.

In this case, the height of the shelf for heavy boxes is just above the height of the cart, so they can be slid instead of lifted.

# REDUCING AWKWARD LIFTING/REACHING



## Reaching Above Shoulders Use Mechanical Assistance

The device shown is a stacker, which is like a hand truck with a hand-cranked winch to move the platform up and down so that loads can be mechanically raised to the height they are shelved or removed from shelves.

Stackers are available with lift heights up to 12 feet. A model with a foot brake to keep it from moving when sliding loads is around \$780.

# REDUCING AWKWARD LIFTING/REACHING

**Reaching Above Shoulders  
Use Mechanical Assistance**



This example shows using a carton clamp on a forklift to split/combine two halves of a stack of bins, rather than un-stacking/stacking the top layers over shoulder height.



# REDUCING AWKWARD LIFTING/REACHING



## Reaching Above Shoulders Use a Rolling Stair

This is a simple solution, although safety is a concern when using anything like this. Safety rules don't allow going up and down ladders while carrying loads, so a rolling stair or "safety ladder" (50 degree slope or less) is required.

An added advantage is that you can put the load down before going up or down the steps.

# REDUCING AWKWARD LIFTING/TWISTING



- **Use Conveyors**
- **Provide More Space**
- **Arrange Storage**

# REDUCING AWKWARD LIFTING/TWISTING



## Use Conveyors

Conveyors such as this one are especially useful when changing directions, to help avoid twisting. This picture shows a gravity conveyor used to unload trucks in a shipping department. It allows the receiver to bring the boxes over to the computer to scan in the information and inventory the contents. The boxes can then be slid directly onto carts to be put away. Lifting only needs to occur twice, once to take the box from the truck and place it on the conveyor, and once to put the box away. This conveyor set up (gravity rollers) costs about \$600.

# REDUCING AWKWARD LIFTING/TWISTING

## Rearrange Storage



This example shows how raising the height of the upper racks can provide more room to get at products on the lower racks. This may involve installing additional racks to make up for the loss in storage space. Otherwise, if the facility can get by with the racks they currently have, then it's just labor costs to rearrange the storage.

# HOW TO FIND IDEAS

## Resources

- Your Employees
- Your Suppliers
- Your Industry Association
- Industry-Specific Equipment Catalogs
- Product Vendors
- Internet Searches

# ERGONOMICS RESOURCES

<http://www.osha.gov/SLTC/ergonomics/resources.html>



**UNITED STATES DEPARTMENT OF LABOR** OSHA

Occupational Safety & Health Administration **We Can Help**

**Ergonomics**

[Back to Home - Ergonomics](#)

**Additional Information**

**OSHA Resources**

- [Hazards and Disorders of Poultry Processing: Chicken Disassembly - Ergonomic Considerations](#). OSHA Slide Presentation. Also available as a 2 MB [PPT](#), 72 slides.
- [Occupational Safety and Health Review Commission \(OSHRC\)](#). Decides contests of citations or penalties resulting from OSHA inspections of American work places. It is an independent federal agency.
- [State Occupational Safety and Health Plans](#). Note: Many states have approved job safety and health plans; inclusion on this list does not imply that a given state's plan contains an ergonomics component.
- [Use of height adjustable beds help reduce back injuries during patient care](#). OSHA Standard Interpretation, (2000, June 15).
- [Ergonomic Programs that Work](#). OSHA Video. Provides information on evaluating ergonomic programs.

**OSHA Publications**

- Gaines, Matt. ["Caring for Caregivers"](#) [7 MB PDF, 52 pages]. *Job Safety & Health Quarterly* 13.2(2002, Winter): 25-27.
- ["Ergonomic Updates."](#) *Job Safety & Health Quarterly* 13.4(2002, Summer).
- ["Protecting Workers from Ergonomic Injuries."](#) *Job Safety & Health Quarterly* 13.3(2002, Spring).

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**Announcements**

- [Beverage Distribution Letter from OSHA, August 18, 2011](#)
- OSHA publishes Final Ergonomics Guidelines for Shipyards [\[More...\]](#)
- OSHA Publishes Dow Chemical Company Ergonomics Case Study. [\[More...\]](#)

**Highlights**

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# LIFTING TECHNIQUES TRAINING



Training all by itself, without making changes to the workplace, is often **not** effective in preventing injuries.

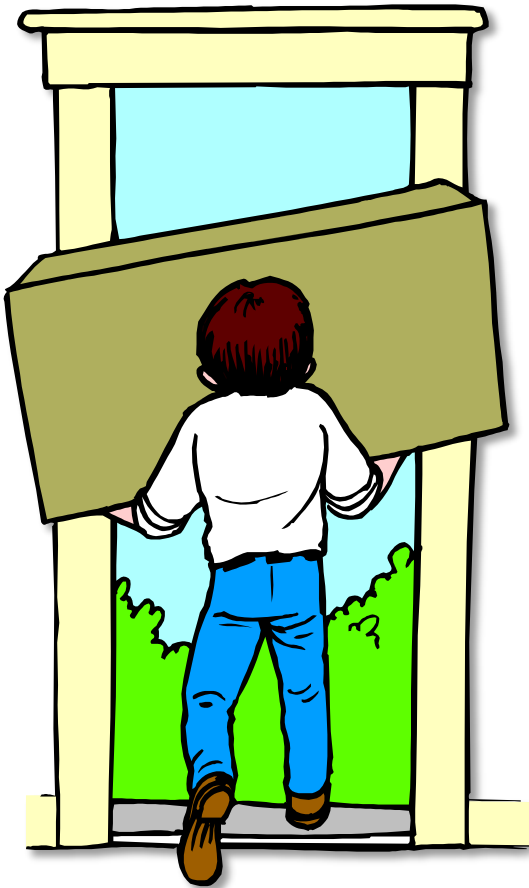
Often employees are taught “proper lifting techniques” and then sent out to work under conditions that don’t allow them to use these techniques.

Training is an important part of implementing changes, though. Showing employees how to use new equipment and explaining why it’s important to use it properly in order to prevent injuries helps to make sure the equipment gets used.

## **Additional Resource**

*Daltroy, L.H., et al. (1997). A controlled trial of an educational program to prevent low back injuries. The New England Journal of Medicine, Vol. 337, No. 5, pgs. 322-328.*

# LIFTING TECHNIQUES TRAINING



## Teaching lifting techniques to employees

- Providing training alone is not effective
- Making changes to jobs and equipment is better
- Making changes along with training is most effective



# LIFTING TECHNIQUES TRAINING



Being trained where they work, using the objects they typically lift and the equipment they use on the job helps employees to relate to what they're being taught, rather than showing them a generic lifting video.

**Make sure** that employees have learned what you're trying to teach them by having each one of them demonstrate the lifting techniques properly before leaving the class.

**Follow-up** with them to make sure they are able to use the techniques on the job.

# LIFTING TECHNIQUES TRAINING



- Job-specific, on-site, hands-on training is more effective than classroom
- Have employees demonstrate proper lifting techniques before “graduating”