

Lifting: *Manual Handling in the Manufacturing Industry*

INTRODUCTION: “Manufacturing” covers a wide range of industries including: textiles, clothing, footwear, electronics, motor vehicle assembly, food processing, pulp and paper, wood products and metal products.

Many common manual handling injuries that occur in manufacturing industries are: sprains and strains, back injuries, foot injuries and abdominal hernias. Back pain is a common experience. It can be caused or aggravated by manual handling activities at work, and body postures that are adopted during work.

This booklet aims to help those people with little or no occupational health expertise to identify manual handling problems and prevent injuries. Using the approach set out in the detailed publication, *Manual Handling: Guidelines for the Workplace*, it gives practical advice and shows through examples how manual handling risks can be first be identified, then assessed and controlled in manufacturing industries.

UNDERSTANDING MANUAL HANDLING TASKS in your workplace.

Every workplace has manual material handling tasks. Understanding what those tasks are, how frequently your employees do them, and what impact those tasks have on your employees overall wellbeing will help you determine how much of a risk these tasks pose to your employees.

When determining if a task poses a risk to employees from manual material handling, the following diagram may be helpful. Following the steps of Identify, Assess, Control, Evaluate and Design, you should be able to reduce many of your manual material handling related injuries.

IDENTIFY those tasks with manual material handling. Begin by reviewing job analyses of each position, and determine if employees are required to manually handle objects as part of their job. Once you have reviewed the job analysis, review the actual work being done. You may find that an employee is required to move much more than their job description states they should. Watching the work being done is also a great way to determine if assistive devices, such as carts or dollies, would be useful.



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ASSESS each of those tasks to determine what the actual stress is from manual material handling. It may be that while an employee has to move a few things throughout a shift, those items may be difficult to maneuver. Understand the physical properties, such as weight, size, shape, physical state (fluid, solid, gas), and what the task requires of the employee with relation to the object.

Asking the right questions will help you identify the risks in your workplace. Not only should you ask yourself these questions while conducting a hazard survey, asking the employees that do the work is also important.

- 1. Is the work strenuous? (Is there high turn-over in this position? Do employees transfer out of these jobs quicker than others? Do the people who perform these tasks call in sick more frequently than the others?)*
- 2. Does anyone have to lift, carry, push or pull any loads? (If yes, are they awkward or heavy?)*
- 3. Are mechanical aids, e.g. lifting equipment, readily available and being used?*
- 4. Can the system of work (job design) be improved, e.g. workload spread evenly throughout the shift; heavy, tiring tasks alternated with light tasks?*
- 5. Is lifting done at waist level, or is it high or low?*
- 6. Are the heaviest and/or most frequently used items stored at waist height?*
- 7. Can the work layout be improved e.g. more storage space to relieve cramped conditions?*
- 8. Is all the equipment, including lifting aids, maintained regularly and in good working order?*
- 9. What injuries or problems have already occurred in this area? Are any related to manual handling?*
- 10. Are there any administrative barriers to getting the task done safely? Are there any physical barriers to getting the task done safely? Are there any perceived barriers to getting the task done safely?*
- 11. What training and education is provided?*

CONTROL the tasks that pose the highest risk to employees. Once you have identified those tasks with the highest risk, work to find solutions that make the job safer. This may be mechanizing the equipment, or finding lifting aids, or eliminating a specific process. Whatever the solution is, discuss it with employees before you implement it. They understand how the process works, and can help you understand how a change may impact their task completion. It may slow them down. If this is the case, plan and prepare for that. Don't assume that your solution will not impact the workflow, at least in the short term. Give your employees time to adjust, and training on the new equipment, process, or policy.

EVALUATE the controls that have been put into place. Once the change has been implemented and employees have adjusted to it, evaluate the change to determine that it is having the desired outcome. If you implemented a new piece of equipment, but employees didn't get the proper training, they may not be using it correctly, negating any positive benefit you may have hoped for. If the change didn't have the desired effect, re-design and try again. It is important that the changes you implement provide some sort of return, not just on your monetary investment, but on the employee investment in learning a new system. If the system changes you made don't show some positive change, or in contrast, actually shows a decrease in safety, letting it continue can actually be worse than having done nothing at all.

DESIGN all new systems with safety in mind. This isn't actually part of your processes for identifying and controlling hazards, but it is important to note that when you are designing a new task, or re-designing an old task, keeping safety in mind is important. If you install a new piece of equipment, but don't consider sound ergonomic principals, it may become necessary to invest much more down the road to make the equipment fit your employees.

RISK IDENTIFICATION: Identifying the risks associated with lifting and moving objects is one of the most important steps in addressing hazards in your workplace. If you understand the multiple dynamic issues that may be impacting your workforce, you may be able to address the lifting issues without much disruption. This chart has been created to give you a better idea of some of the issues that you should look at when evaluating the risk posed by the work your employees do.

Problems to look for when making an assessment	Ways of reducing the risk of injury
<p><i>Does the task involve:</i></p> <ul style="list-style-type: none"> • Holding loads away from the body? • Twisting, stooping or reaching upward? • Large vertical movement? • Long carrying distances? • Strenuous pushing or pulling? • Repetitive handling? • Insufficient rest or recovery time? • A work rate imposed by a process? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> • Use a lifting aid? • Improve workplace layout to improve efficiency? • Reduce the amount of twisting and stooping? • Avoid lifting from floor level or above shoulder height, especially heavy loads? • Reduce carrying distances? • Avoid repetitive handling? • Vary the work, allowing one set of muscles to rest while another is used? • Push rather than pull?
<p><i>Is the load:</i></p> <ul style="list-style-type: none"> • Heavy or bulky? • Difficult to grasp? • Unstable or likely to move unpredictably (such as animals)? • Harmful, e.g., sharp or hot? • Awkwardly stacked? • Too large for the handler to see over? 	<p><i>Can you make the load:</i></p> <ul style="list-style-type: none"> • Lighter or less bulky? • Easier to grasp? • More stable? • Evenly stacked? <p>If the load comes in from elsewhere, have you asked the supplier to help, e.g., by providing handles or smaller packages?</p>
<p><i>Are there limitations with the work environment?</i></p> <ul style="list-style-type: none"> • Restrictions on posture? • Bumpy, obstructed or slippery floors? • Variations in floor levels? • Hot / cold / humid conditions? • Gusts of wind or other strong air movements? • Poor lighting conditions? • Restrictions on movements from clothes or personal protective equipment (PPE)? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> • Remove obstructions to free movement? • Provide better flooring? • Avoid steps and steep ramps? • Prevent extremes of hot and cold? • Improve lighting? • Provide protective clothing or PPE that is less restrictive? • Ensure your employees' clothing and footwear is suitable for their work?

Problems to look for when making an assessment	Ways of reducing the risk of injury
<p><i>Handling Devices:</i></p> <ul style="list-style-type: none"> • Is the device the correct type for the job? • Is it well maintained? • Are the wheels on the device suited to the floor surface? • Do the wheels run freely? • Is the handle height between the waist and shoulders? • Are the handle grips in good condition and comfortable? • Are there any brakes? If so, do they work? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> • Adjust the work rate? • Provide equipment that is more suitable for the task? • Carry out planned preventive maintenance to prevent problems? • Change the wheels, tires and/or flooring so that equipment moves easily? • Provide better handles and handle grips? • Make the brakes easier to use, reliable and effective?
<p><i>Organizational Factors:</i></p> <ul style="list-style-type: none"> • Is the work repetitive or boring? • Is the work machine or system-paced? • Do workers feel the demands of the work are excessive? • Have workers little control of the work and working methods? • Is there poor communication between managers and employees? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> • Change tasks to reduce the monotony? • Make more use of workers' skills? • Make workloads and deadlines more achievable? • Encourage good communication and teamwork? • Involve workers in decisions? • Provide better training and information?

PRINCIPLES OF PREVENTING MANUAL HANDLING INJURIES.

Reduce the amount of manual handling.

Reduce the amount of bending, forward reaching, and twisting in all tasks.

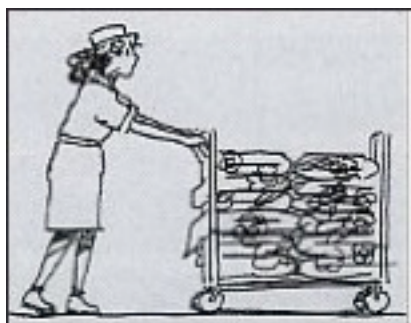
Keep all equipment in good working order.

Keep the work environment safe.

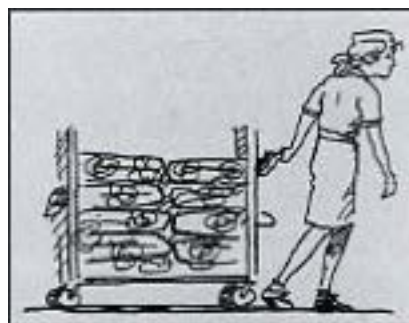
Ensure that suitable training and education in manual handling is provided for all staff.

These five basic principles will:

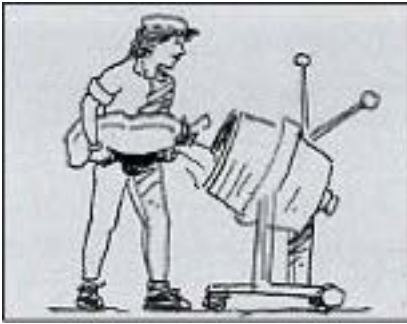
- Help you identify which manual handling tasks pose a risk to health and safety (risk identification).
- Make you aware of some of the possible solutions to common manual handling problems (risk control). Some examples of these principles are illustrated in the following pages.



pushing



pulling



holding



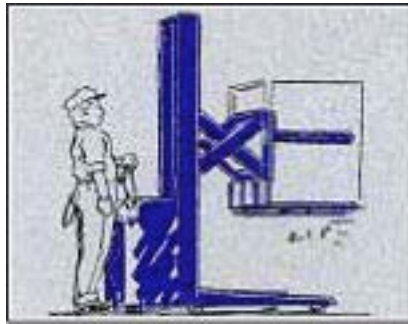
lifting

EXAMPLE: Unloading cartons

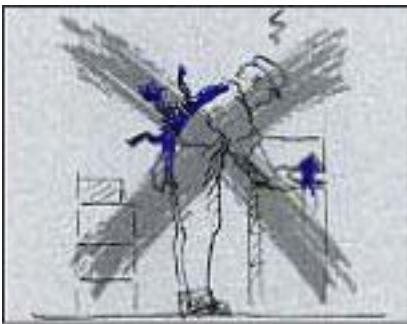
By increasing the size and weight of the load and mechanizing, manual handling can be reduced and productivity increased.



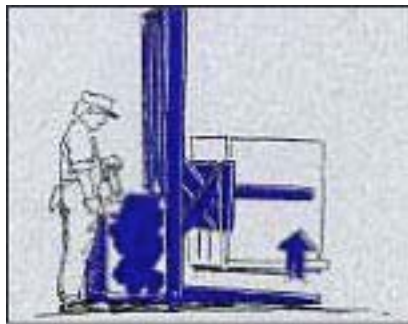
Opening 24 cartons of a commodity with a knife.



Using a forklift and tilting machine to lift and open a 1-ton container eliminates the repetitive manual handling and the risk of knife injury.



Lifting 24 20-pound cartons from a pallet and carrying them to the storage bay.

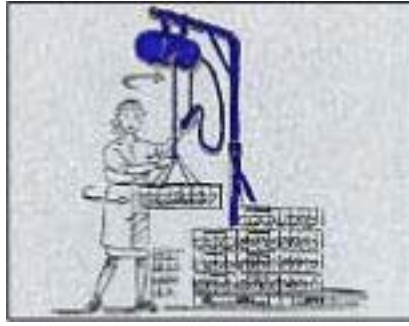


Lifting and moving the 1-ton container with a hand-operated forklift, makes the job a lot less strenuous and reduces the time spent on unloading pallets.

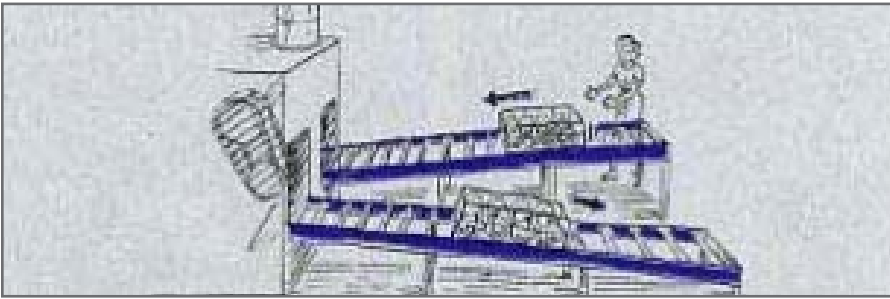
EXAMPLE: Degreasing metal components



Lifting 50-lb. baskets of metal components and carrying them to and from a degreasing machine.



Using a hoist to lift the baskets on to the roller conveyor, eliminates the heavy lifting.

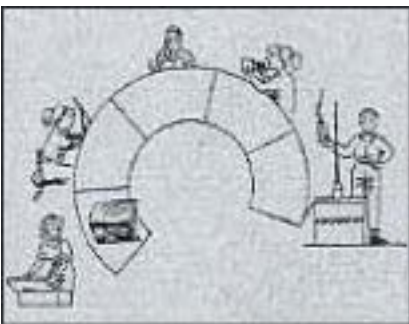


The conveyor is on an angle, so that the baskets can be slid easily over the rollers to and from the degreasing machine.

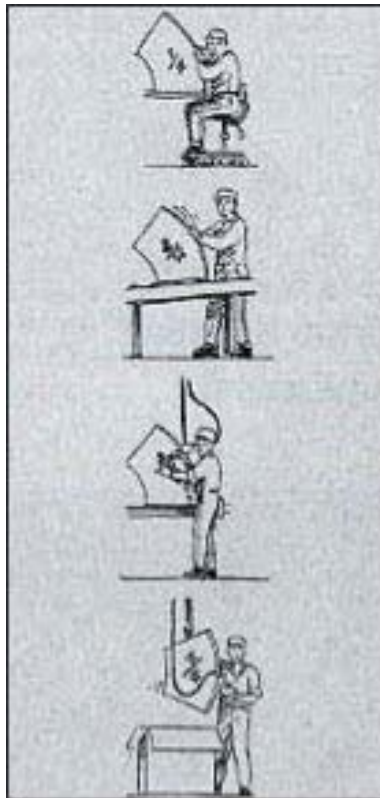
JOB ROTATION: Job rotation can be used to reduce the amount of manual handling that each employee does throughout the work shift. Job rotation can help prevent sprains and strains by providing employees with a change of activity. The ideal combination of jobs includes a variety of sitting, standing and walking activities.



Each employee does a single repetitive job over the whole work shift, e.g. an assembly task.



Each employee has a variety of jobs throughout the work shift — assembly, packing and machining tasks.



Each job is designed so that it includes a variety of activities, e.g., 1st class machinist • setting up machine • loading machine • checking machine • inspecting parts • loading parts to be taken away.

MECHANICAL AIDS: Mechanical aids can make the job easier, decrease the risk of injury and improve employee morale. They range from simple inexpensive aids such as handles, slings, levers and hooks to more expensive aids such as lifters, rollers, magnets, conveyors, platforms, hoists and cranes.

It is important that, where possible, the people doing the job are consulted so that the most appropriate and cost-effective mechanical aids are purchased. When new manual handling aids are introduced, it is essential that employees are trained to use them safely.

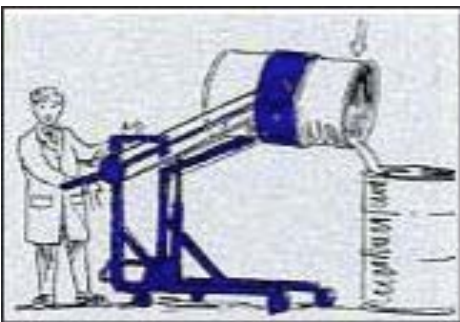
Drum handling equipment



Manual handling of a 50-gallon drum.



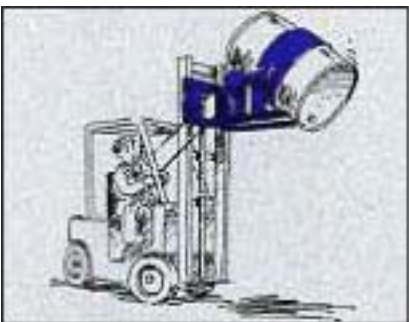
Moving the drum with a tilting drum stand reduces the effort required.



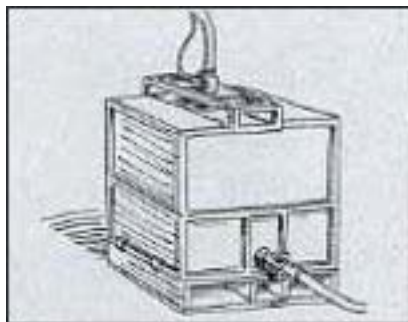
A drum lifter makes moving and emptying drums a lot easier and safer.



A drum tilting lever reduces the effort required in up-ending filled drums.



Using a forklift to move a drum eliminates the manual handling required.



For bulk handling of liquids, a container system that is transported by forklift eliminates the manual handling of drums.

EXAMPLE: Unloading bags of granules

Platforms



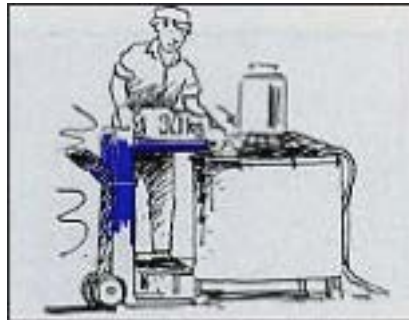
Holding the 30-lb. bag of granules while emptying the contents slowly into a process machine.

The platform is then raised. The employee stands on the steps and guides the granules but doesn't have to hold the bag.

Lifters



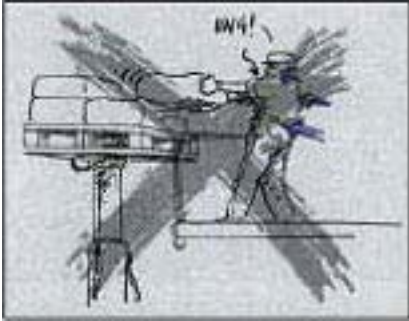
A hydraulic or power-operated lifter can be used to reduce the effort of moving. By adjusting the height of the lifter, the bags can be slid across to the lifter, rather than lifted.



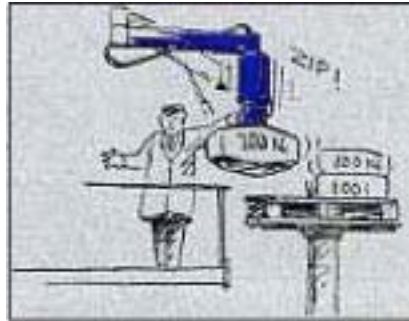
The lifter can act as a platform for holding the bags while the work is being done.

Vacuum lifters

Vacuum lifters are commonly used for picking up awkward, heavy loads, and large flat sheets, e.g., metal, glass, chip board.



Unloading 100-lb. bags from a pallet.

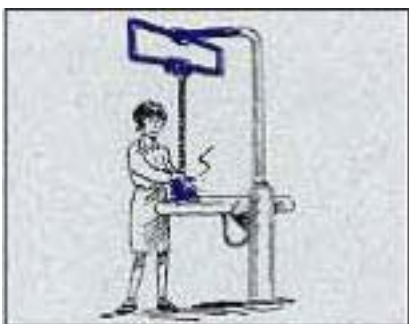


An electrically-operated vacuum lifter eliminates the heavy lifting. The mechanical arm is guided by the employee.

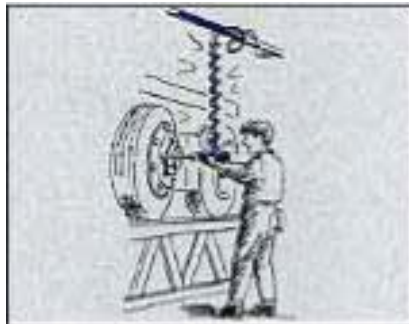
Counterbalanced equipment



Equipment that is heavy, or used continuously, can be counterbalanced to reduce the manual handling effort required, e.g., hose of the vacuum lifter, tools used on an assembly line.

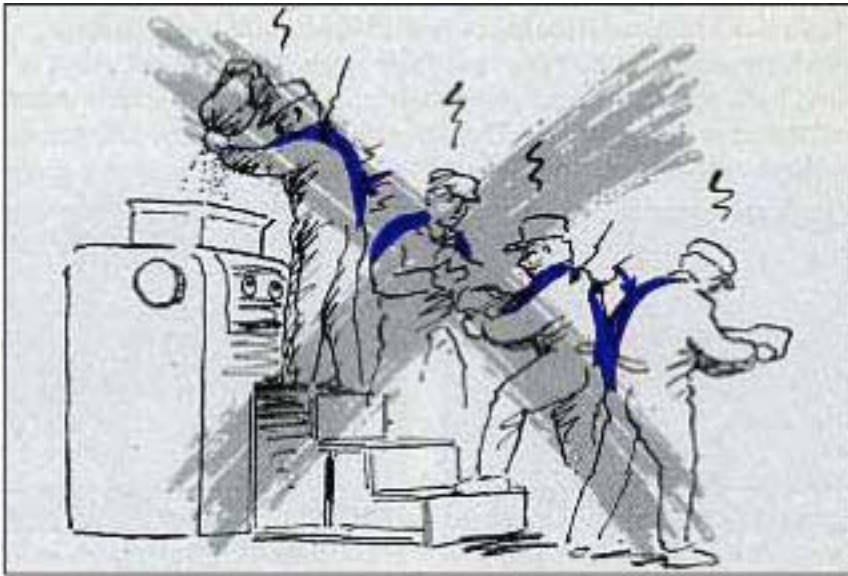


Irons used in the clothing industry can be counterbalanced to reduce the effort of lifting them continuously.

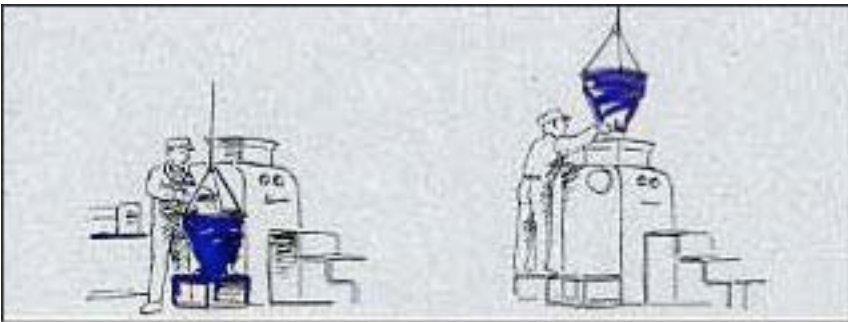


Tools that are used repetitively, such as drills and screwdrivers, can also be counterbalanced.

Hoists



Each ingredient is carried up the steps and fed in by hand.



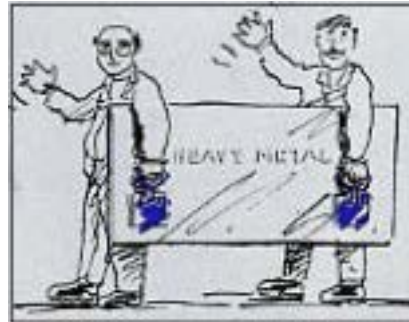
All the ingredients are put into a hopper, which is lifted with a hoist and emptied by hand. This reduces the holding and carrying work required.

Lifting magnets

Magnets can be a useful aid in the manual handling of metal products, which are generally heavy and have sharp edges. They are used widely in sheet metal workshops, engineering workshops, the motor vehicle industry and the scrap metal industry. They are particularly useful for lifting and stacking steel plate and metal sheets, which are large and awkward to carry.

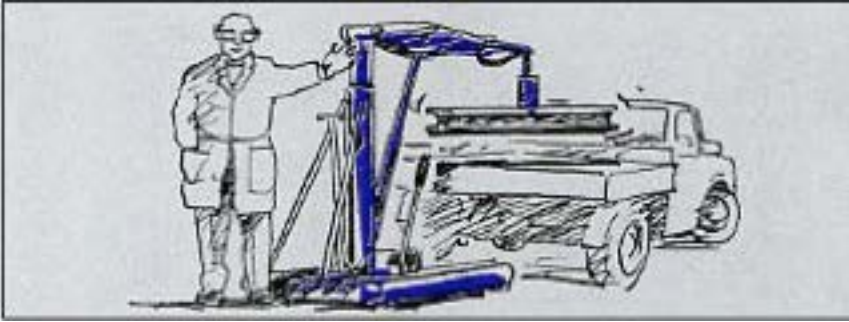


This magnet is used with a hoist, to lift one sheet or block of metal at a time from a stack.



These magnetic handles are designed for lifting and moving single sheets of metal.

Lifting magnets (cont.)



This magnet is used together with a mobile crane to unload and transfer metal products up to 2000 lbs. It makes the job easier, safer and quicker.

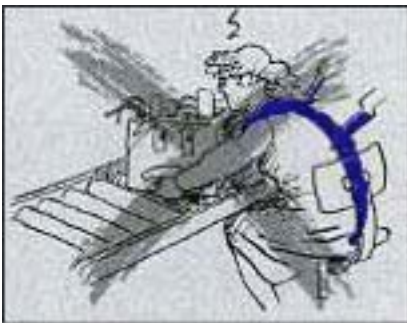
Turntables



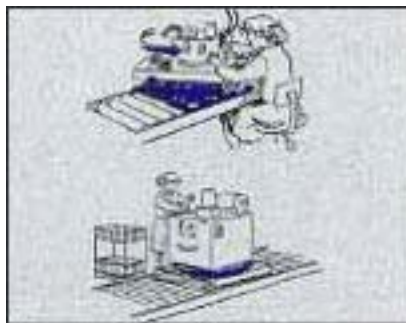
Leaning over the pallet to load and unload boxes on the far side.



A pallet hoop turntable allows the pallet to be rotated 360° and reduces the carrying or bending required — also providing toe space, to allow the load to be kept closer to the body.



Products being assembled on a line frequently need to be lifted and turned around.



A rotating turntable on the assembly line, or rotating base on the product, eliminates the need to lift, and reduces the amount of bending and twisting.

REDUCE the amount of bending, forward reaching and twisting

Design of equipment and workstations — The design of equipment and workstations dictates, to a great extent, the work postures and work methods required. Use of equipment that requires prolonged bending and twisting postures should be avoided. New equipment should ideally be tested and assessed by the employees concerned, prior to purchase.

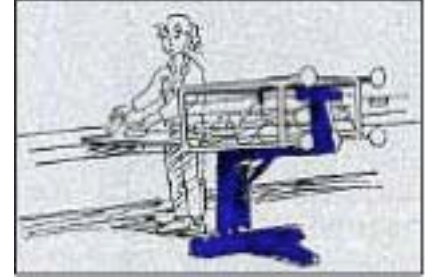
Professional ergonomic expertise may also be required.



Repetitive bending is required to empty components out of a crate and on to a conveyor belt.

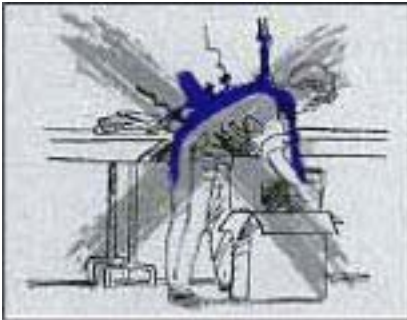


A spring-loaded base keeps the components at a convenient height.

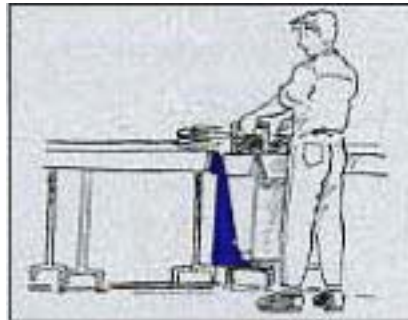


A forklift loads the crate on to a “tipper” platform, and the “tipper” is then operated to keep the components at waist height.

Employees often think of a better or easier way to do a job. There are many examples where, by working together within the organization, employees and management have been able to come up with some successful “in-house” solutions to manual handling problems.



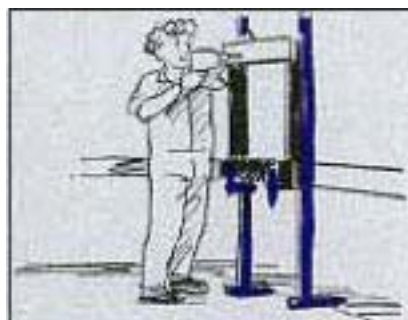
Packing a heavy welding machine on the floor.



A custom-built frame attached to the conveyor belt reduces the amount of lifting and bending required.



The drilling is done on an unstable surface in an awkward position.

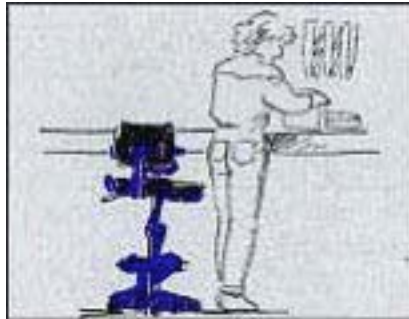


A custom-built frame that reduces the amount of holding and bending, forward reaching and twisting required.

SEATING — Sitting for prolonged periods in awkward postures while engaged in manual handling activities, e.g. inspection, light assembly tasks, can lead to back pain or aggravate an existing back problem. Good seating is often neglected in the manufacturing industry. Stools (kitchen-type) and cast-out office chairs are frequently provided. These are inappropriate in most cases because they are not the right height and do not offer good back support. The two most important features to look for in a chair are: height adjustability and a good lumbar (low back) support. Where possible, it is preferable for people to be able to change between sitting and standing postures as they wish.



Sitting with a bent back on a stool that does not provide any back support or adequate foot support.



At this workstation the employee is able to change between sitting and standing postures.

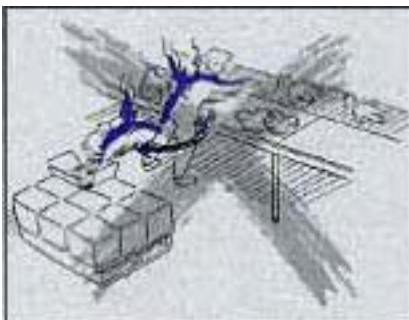


Sitting with a bent back on a kitchen-type chair that is too low and does not provide adequate low back support.

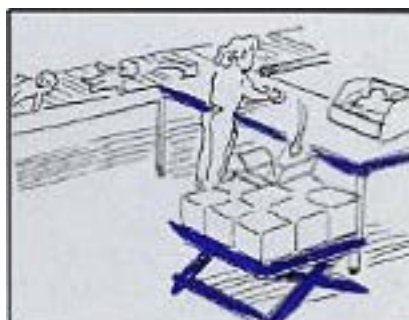


This chair is height adjustable and provides good low back support.

WORK LAYOUT



This work layout requires forward bending and reaching over the conveyor belt, as well as turning to pack the product in boxes.

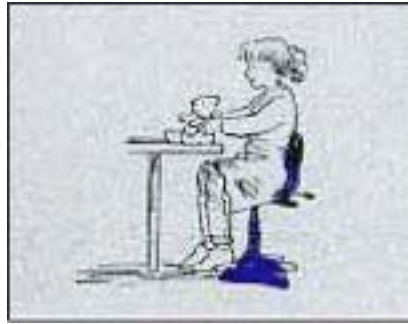


When the work is close to the body the employee can sit or stand with a straight back.

WORK LAYOUT (cont.)



Inadequate legroom under the conveyor belt forces the employee to sit side-on in a twisted position.



Adequate legroom under the conveyor allows the employee to sit with a straight back.

Get the work height right!

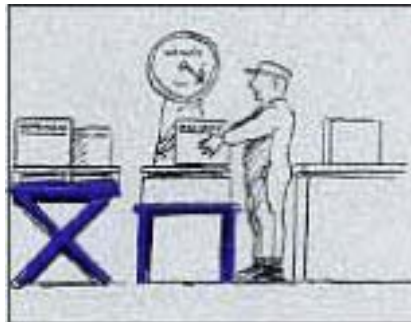


The ideal work height depends on the activity. Generally, lifting should be done in front of the body at between shoulder and midthigh height — to reduce the amount of bending and twisting of the back.



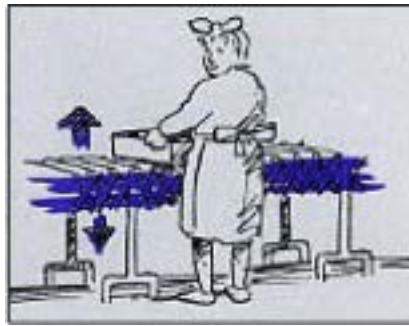
When the work height is too high, aids such as steps, stools, platforms, ladders or stairs should be provided, to reduce backward bending and twisting actions of the spine.

When the work height is too low, aids such as tables, chairs, platforms and adjustable conveyor systems should be provided, to reduce the amount of forward bending and twisting of the back required.



Scissor-lift platform and table.

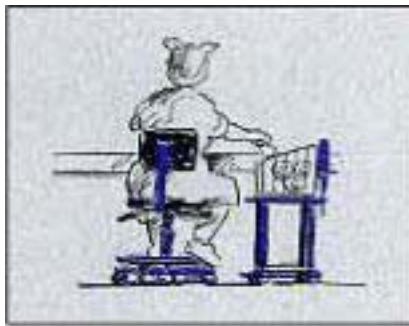
Get the work height right! (cont.)



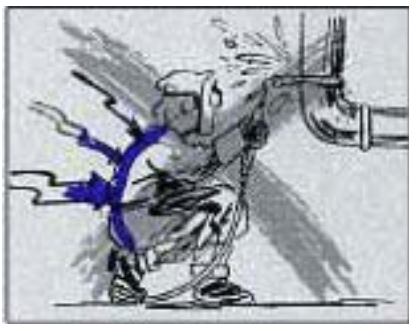
Height-adjustable conveyor system.



Use a table.



Use a chair.



Working close to ground level requires bending and twisting, and can be fatiguing.

Using a small stool on castors — or a box — may reduce the effort, as well as the bending and twisting.

Get the work height right! (cont.)

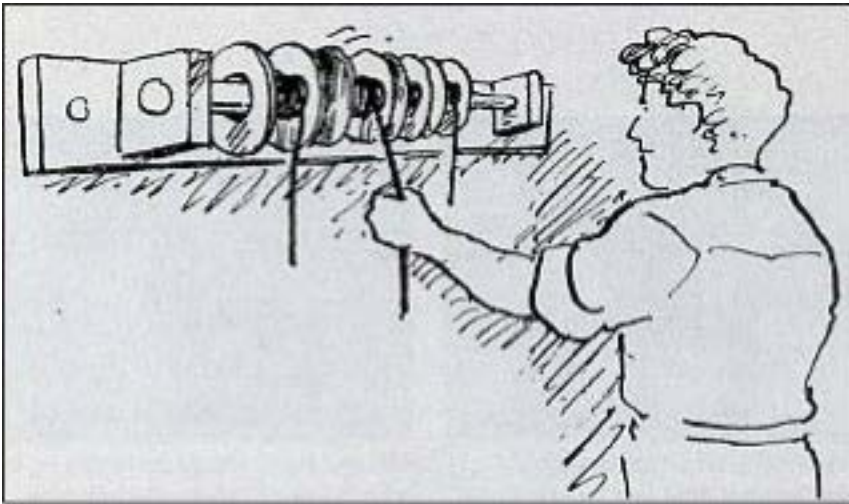


This inspection task involves repetitive forward reaching. There is static loading of the neck, arms and back.



The forearm supports and the back support of the chair reduce the static loading, and reduce the amount of forward reaching required.

STORAGE: All frequently used components should be stored within easy reach — within 16 in. of the body. When large numbers of components need to be on hand, e.g., assembly tasks, then the method of storage needs consideration.



Wire, tubing and hose can be stored on reels and fixed at a convenient height.



A foot-operated conveyor system brings the components up to a convenient height.



Components can be stored on rotating turntables.

KEEP ALL EQUIPMENT IN GOOD WORKING ORDER. Unexpected or forceful actions required due to faulty or poorly maintained equipment can lead to strains and injuries. All equipment should be maintained on a regular basis and repaired promptly when necessary.

- What are the maintenance procedures at your workplace?
- Is equipment and machinery maintained to a checklist?

KEEP THE WORK ENVIRONMENT SAFE. Slips, trips and falls during manual handling activities can lead to serious injury. Uneven or slippery floor surfaces, trailing hoses and cords, and obstacles on the ground are common hazards. Pathways, access ways and work areas need to be marked and kept clear so that collisions can be avoided. Manual handling injuries can be avoided by regular maintenance and housekeeping procedures.



Pushing a trolley over an uneven surface can require a forceful action. Torn floor coverings are also a tripping hazard.

Having the correct wheels on the cart is also important. If you have an uneven surface and small wheels, the cart will not glide smoothly over the surface, which will require that the operator push with more force. Keeping the wheels maintained and in good working order will also help reduce the amount of push force required to move the cart.

PROVIDE SUITABLE EDUCATION AND TRAINING. Employees should get appropriate education and training in manual handling techniques so that they are able to choose the best technique for each particular situation. Training and education is more than teaching people how to lift correctly. The broad aims of training and education are:

1. To ensure that each employee has the skills and knowledge to be able to do their job safely.
2. To ensure that each employee has an understanding of the principles of back care and the prevention of injury, which is relevant to their particular situation.
3. To ensure that each employee has an understanding of the many factors that can cause back pain and injury.
4. To encourage each employee to take an active role in the prevention of manual handling injuries at work.



Using mechanical aids when they are available.



Using the correct lifting method when possible by: bending the knees, keeping the back straight and keeping the load close to the body.