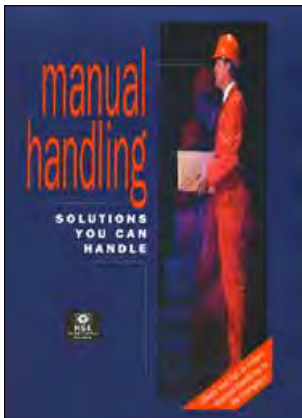


# Manual handling

Solutions you can handle



**This is a free-to-download, web-friendly version of HSG115 (First edition, published 1994). This version has been adapted for online use from HSE's current printed version.**

You can buy the book at [www.hsebooks.co.uk](http://www.hsebooks.co.uk) and most good bookshops.

**ISBN 978 0 7176 0693 1**

**Price £7.95**

This book shows you many examples of how you can avoid or reduce the risk of injury from manual handling and how simple and straightforward many of the solutions are.

it should be read by all employers, but particularly those in medium and small-sized businesses, whose employees might be at risk of injury when handling loads at work.

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## Preface

*Recent figures for the Reporting of Diseases and Dangerous Occurrences Regulations 1995 indicate that manual handling causes more than a third of the work-related injuries reported each year. In addition to those injuries which are reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) there are significant numbers that are not. This is due to two factors:*

- *employers failing in their legal duties to comply with RIDDOR; and*
- *some manual handling injuries being accumulative and not the result of a single accident.*

*Injuries can harm occasional load handlers as well as those who handle loads regularly. The injuries happen not only in industries associated with 'heavy work' such as mining, agriculture, construction and engineering. They happen in all industries and services.*

*These injuries are costly. Costs to employers come from loss of output and disruption, sickness payments and from compensation claims leading to increased insurance premiums. Employees bear cost from loss of earnings, pain and sometimes permanent incapacity. Everyone has to contribute to the cost of medical treatment and social security benefits for those injured.*

*Modern medical and technical knowledge of the causes of manual handling injuries and their investigation has shown that these injuries can be reduced or prevented, usually by very simple steps.*

*The Manual Handling Operations Regulations 1992 (as amended) set out a framework for employers to reduce the risk of manual handling injury. Where employers cannot avoid manual handling where there is a risk of injury they must assess their manual handling operations and take steps to reduce the risk of injury to the lowest level reasonably practicable. (For a fuller description of the Regulations and where further guidance on them is available see page 37 of this book.)*

*This book will help employers to avoid manual handling (in which case no further action is needed) or to reduce the risk of injury in areas where their assessment shows there is a risk.*

# About this book

## ***Who should read this book?***

All employers, particularly those in medium and small-sized businesses, whose employees might be at risk of injury handling loads at work.

## ***How does this book help?***

First, it shows you many examples of how you can avoid or reduce the risk of injury from manual handling, and how straightforward many of the solutions are. In most cases there is no need for a complicated or expensive solution. In fact, simpler solutions are often better - easier to implement and easier for employees to follow.

Secondly, you will see that you may be using some of the solutions already without realising how they have reduced the risk of injury. All the solutions in this book are ones that employers are using now in a whole range of industries.

## ***Who to involve in deciding what solution to use***

To make sure that any solutions you choose work well, you should involve your employees and their representatives in any decisions that you make. They know first hand what the risks are in your workplace and will be able to give advice on the practical solutions for controlling them.

## ***Are the solutions to all manual handling problems included?***

No. There are simply not enough pages to show you solutions to every manual handling problem. However, the book contains some solutions that you can use straight away. It also contains ideas that you can adapt or combine to help you arrive at the solution best suited to your workplace. All that is needed in most cases is a little thought and common sense.

## ***How is the book set out?***

The book has been set out to allow you to find what you need quickly without having to read it from cover to cover. Each of the sections concentrates on a particular topic and in most cases the illustrations speak for themselves\*.

There is not intended to be a clear distinction between the sections and many examples could easily fit into more than one of them. The important thing is getting a few ideas you can use rather than worrying about definitions too much.

## ***Is this all I need to do?***

Yes, unless you find that injuries are still occurring or you make changes in your business. For example if you are buying new equipment, opening a new workplace or altering an existing one, think about the manual handling risks at the planning stage. Try to get equipment or lay out the workplace so that the amount of manual handling is kept to the minimum.

*\* The illustrations are intended only to show the principles involved in the solution. They do not suggest or imply design characteristics for manual handling equipment or good working practices. They are included simply to assist the reader to visualise some potential solutions. Further information is given in the text.*

# Avoiding manual handling

*Can I avoid manual handling? This is the first question you should ask. Avoidance is the best solution to manual handling as it is the equivalent of prevention and this is always better than the cure. If any manual handling can be avoided then you have dealt with it. The law requires you to go no further.*

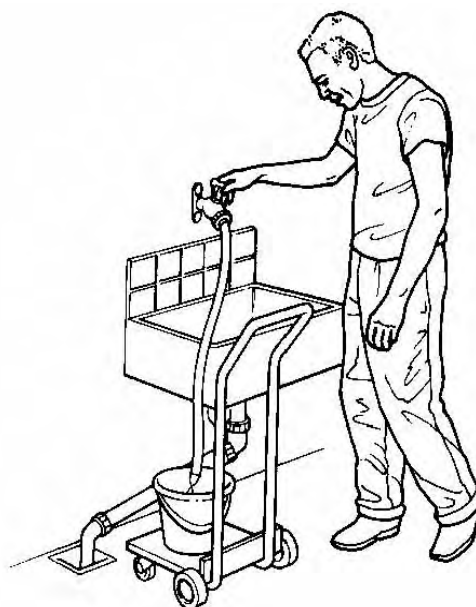
*Avoidance means that jobs are done in a different way to eliminate or minimise handling. Avoidance solutions range from the very simple to the more complicated.*

- *On a simple level putting a length of hose-pipe on a tap and filling on the floor avoids the need to raise a full bucket from a sink.*
- *An intermediate example is to palletise materials so they do not have to be manually handled, they can be moved with a lift truck.*
- *More complicated is to lay your workplace out in a way that would minimise the amount of repeated handling. This does not eliminate manual handling altogether but it certainly reduces it.*

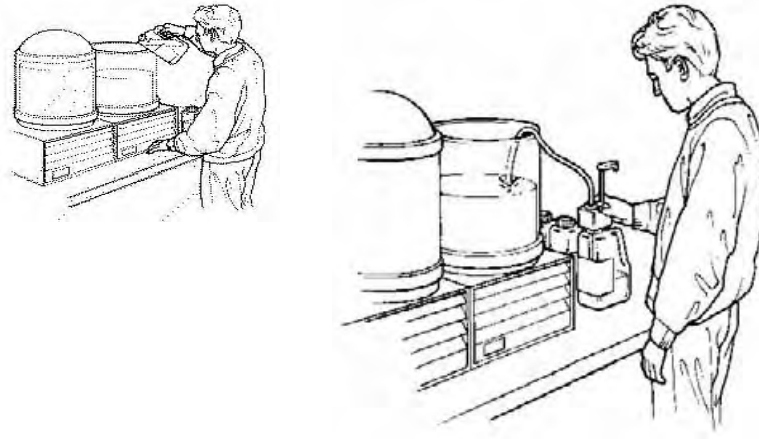
*In many cases where loads have to be handled total avoidance is not possible. However, in many jobs avoidance can play a part mixed with other steps you take to reduce the risk of injury.*

*Although the following solutions are very different from one another they all reduce or eliminate the risk of injury, often very simply. This, particularly when the solution is simple, means you handle things more efficiently and save money.*

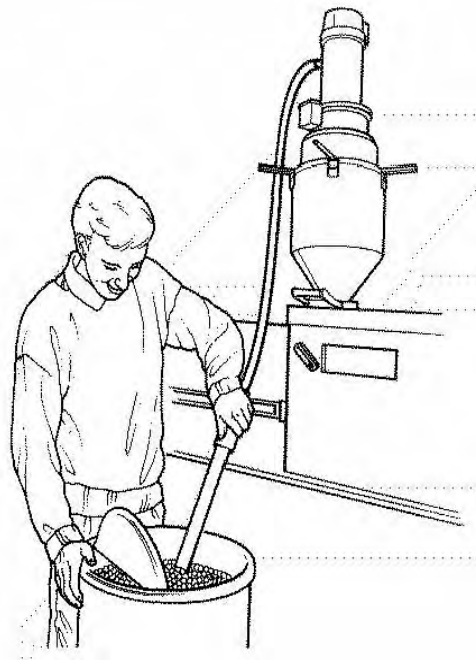
- *Put a length of hose-pipe on a tap and fill buckets on the floor - this avoids the need to raise a full bucket from a sink.*



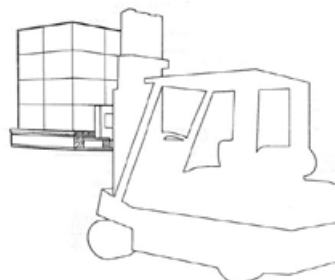
- Pump juice from a bulk container to a dispenser to save some awkward handling.



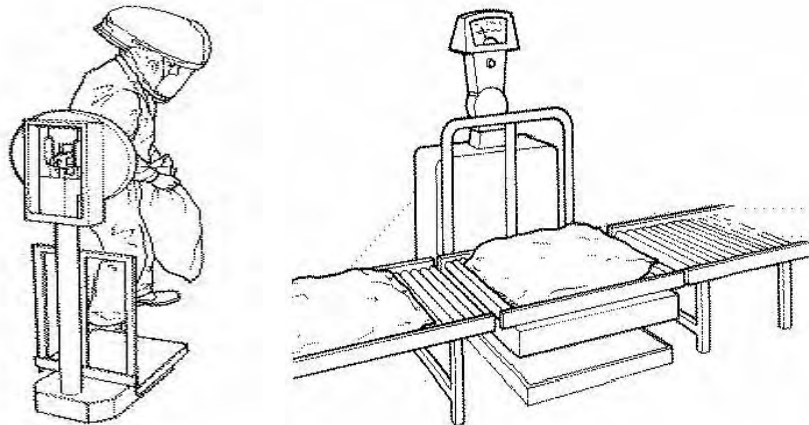
- Feed material into a machine from a bulk bin or drum by suction or pumping to save workers having to climb steps carrying loads. This reduces the risk of trips and falls as well as avoiding manual handling and improves the efficiency of your process. Consider this solution wherever you have to transfer powders, granules and liquids.



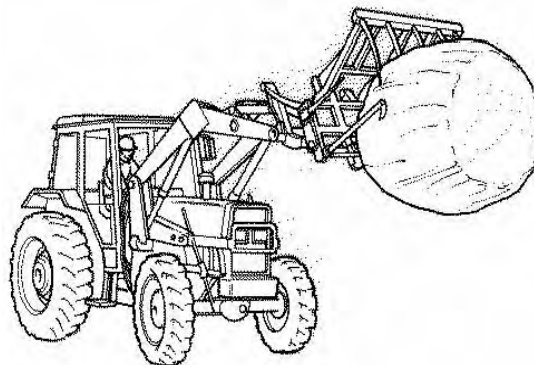
- Palletise materials so they do not need to be manually handled. You can use a lift truck.



- Organise your workplace in a way that reduces the amount of repeated handling. This does not eliminate manual handling altogether but it certainly reduces it and things are moved more economically. A supermarket reorganised its procedures for receiving some major lines. They arranged to keep the stock on pallets from the point of delivery to display on the shop floor. This reduced the number of manual handling operations from six to three.
- There were two accidents at a pub during delivery of barrels, which were manually handled down a slope to the cellar. When the pub was refurbished there was enough space to build the store at ground level. This does not eliminate manual handling but makes the risk of injury far less.
- In a filling line, 25 kg sacks had to be lifted from the filling point to a weighing machine on the floor and then onto a 1 m conveyor. Raising the weighing machine so it was in line with the conveyor eliminated at least one manual handling step.



- In a nursing home side guards were fitted to the beds of patients who were vulnerable to falling out of bed. This meant carers did not have to lift patients back into bed and reduced the potential for sometimes fatal injuries to patients.
- Manual handling of bales on farms can cause injuries. Many farms now use large round bales, which must be handled by tractor.



- There were several accidents at a local authority depot where building materials are handled. The authority has now arranged for the materials to be delivered direct from the builders' merchants to its work sites. At the depot there is no indication that a manual handling problem has been solved because there is nothing to see. But direct deliveries do avoid a lot of unnecessary handling.



## Redesigning the load

*This section looks at a variety of ways objects can be modified - making them easier to move or handle.*

*Can you change an object's:*

- size?
- shape?
- form (eg solid to liquid)?
- weight?
- sides, surfaces or edges?

*These are all features of a load.*

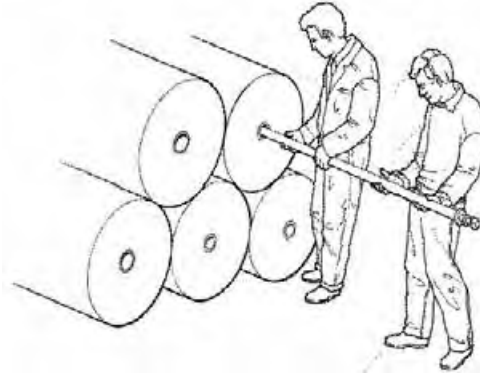
*Thinking about the following may help too:*

- the material an object is made from (for example type, strength, quality or cleanliness);
- inclusion of handles or hand grips;
- equipping the load to aid mechanical handling;
- information or symbols printed on the object.

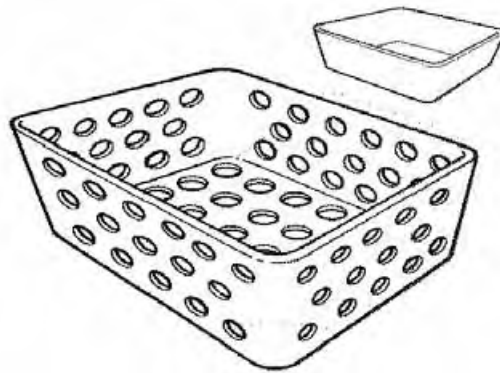
*Most of this section focuses on the selection and design of objects, but ends with a reminder that sometimes you need to modify or control the nature of a load by introducing working procedures.*

### Changing the weight

- Using aluminium reel bars instead of steel will reduce their weight by half.



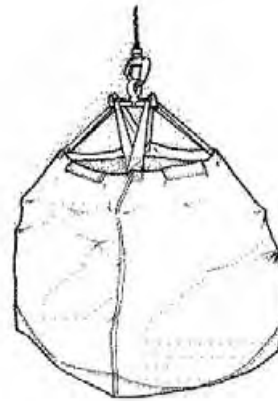
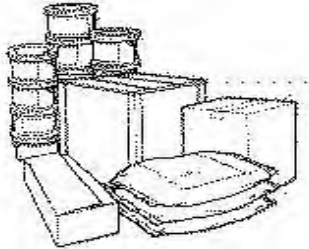
- Drilling holes in metal trays reduces their weight.



- Using metal bins with plastic bag inserts means you don't need to lift the bin.

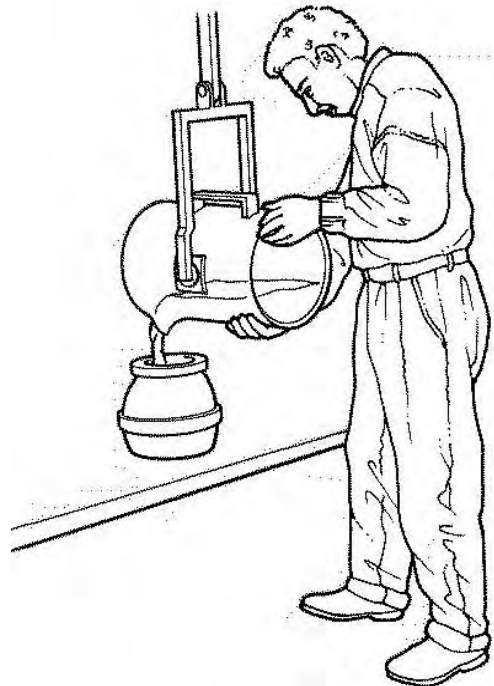


- Some companies buy in loads sub-divided into smaller loads. Examples include smaller gas cylinders and using 25 kg rather than 50 kg sacks. Or, moving to bulk handling and using trolleys, cranes and lift trucks means you don't need to handle a number of small objects often (see *Mechanical handling aids*).



### Taking the weight out of the load

- Supporting or suspending loads makes the job easier.

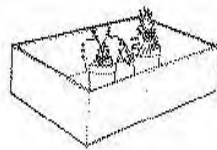


### Changing the size of an object

- A pottery where Plaster of Paris was poured into moulds stopped using their large heavy pourer and used a small watering can instead. This was continually refilled by a hose running into the watering can from a large supply tank. Gravity played its part! Could you attach a hose to fill a container or use a smaller, more manageable pouring container?



- Sometimes the problem is an inappropriately-sized container for the job. This basket only needed to be a quarter of the size of the original. Consider the sequence of the operation too. For example move the plants before you water them rather than after.



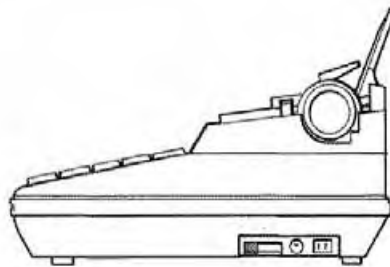
### Movement of a load

- Avoid loads in containers shifting unexpectedly. Using packing material may also reduce damage to contents.

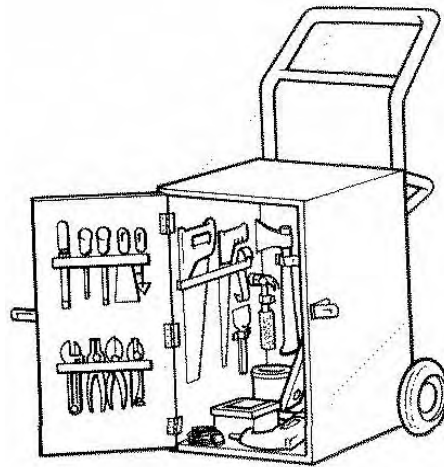


### Handles, wheels and spouts

- Select containers with handles or hand grips. When you are handling open sacks folding the upper edge several times forms a surface which is easier to grip.
- Some objects have a heavier side (for example the back of a typewriter). When these objects are placed in a container you need to decide which is the heaviest side. Positioning handles or hand grips on the heaviest side enables the bulk of the weight to be held close to your body.



- Put it on wheels! You can place a heavy tool box on wheels and push it along using a handle.



- Castors on the base of a bucket allow the cleaner to push it rather than lift.



- You can eliminate the heavy and dangerous job of pouring hot water out of a large kettle by supplying the kettle with a tap which can be opened without moving it.

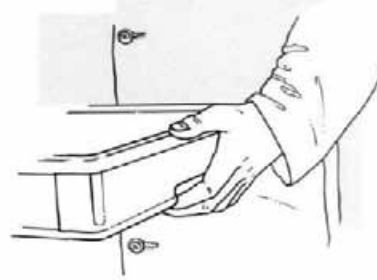


## Protect your hands

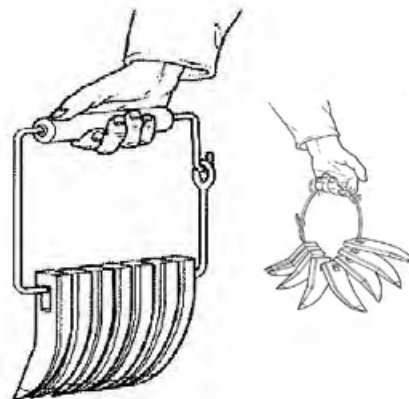
- Some loads have surfaces likely to puncture, cut, bruise or scratch the handler. Use wrapping or wear gloves.



- Avoid trapping your hands by using scalloped handles.



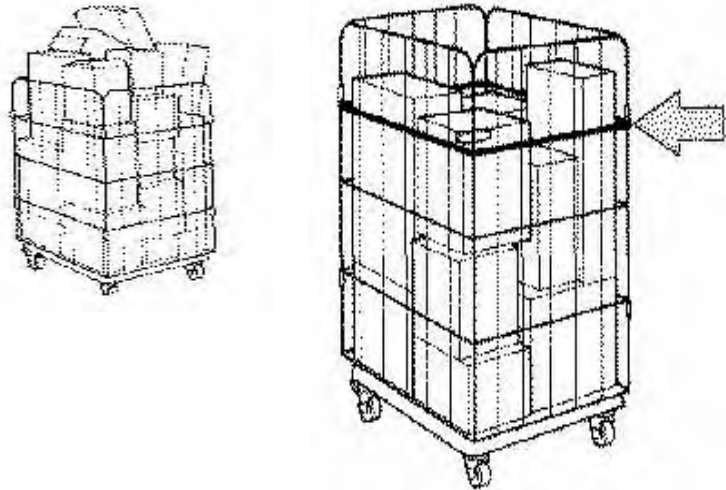
- String or wire is valuable when it forms a handle, but may require padding to avoid it cutting into your hands.



- String it up! Stringing is particularly useful for paintings, boards, or other flat and reasonably slim objects. Fit a loop of strings over both of the bottom corners of the object to be carried. There should also be sufficient slack to enable you to reach the string when you are holding the object under your arm.

## Information and procedures

- Order your supplies in easy to carry packages!
- Some companies have introduced an arbitrary guideline on the maximum level in containers. This avoids extremely heavy or unstable loads. One example of this was not to add a load to a roll cage if its bottom surface is above a specified horizontal bar on the cage.



- Limiting the maximum number of crates being moved on a trolley is another example.



## Redesigning the task

One of the most successful ways of improving manual handling tasks is to look at the layout and organisation of the job itself. This is the next thing to do after you have considered whether the task can be avoided or redesigned the load. By identifying how and why each bit of load handling is done you can often reorganise the layout so that goods are moved at the most favourable heights, directions etc. You may be able to get rid of some operations altogether. This section extends some principles introduced in the avoidance section and introduces some more. Where the task cannot be avoided you should make it less difficult if possible. This means looking at how you can reduce the amount of bending, stooping, stretching, pushing and pulling required to perform each task. Try to reduce how often the task is done and how long it takes. You can see how the examples will lead to efficiency gains as well as reducing the potential for injury.

### Improving the task layout

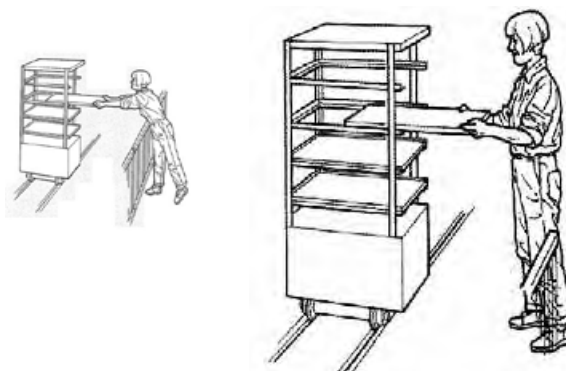
- Examining the various handling sequences that make up a task with a view to improving the overall layout can make a significant difference to the lifter. Manual handling problems in a barrel and kegg room where the kegs had to be pushed, pulled and lifted to clean them were reduced. The installation of a roller conveyor at floor level allows the kegs to be moved more easily and providing a barrel washer at floor height eases some of the lifting.



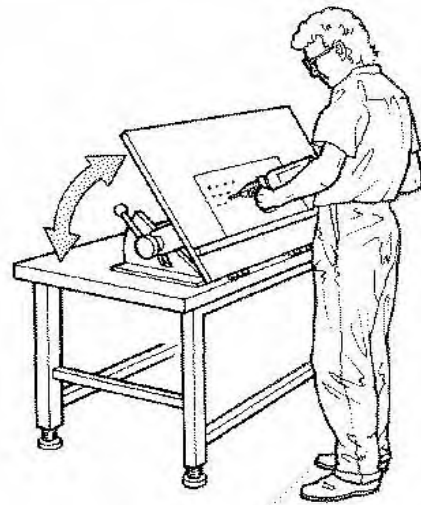
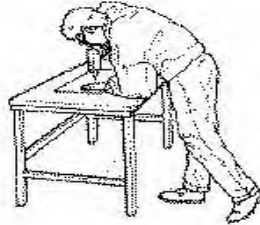
### Reduce reach distances

Lifting at arms' length is likely to be more strenuous than lifting close to the body. Where an obstruction prevents you from approaching the load you can often rearrange the workplace so you can get as close as possible.

- Steel separator trays had to be put into a fixture for transfer into a steam cooker. Operatives could not adopt good postures while loading the fixture because a metal barrier, provided for safety reasons, was blocking their way. By providing an access gate, with suitable safety interlocks, the distance between the operatives and the fixture was substantially reduced.



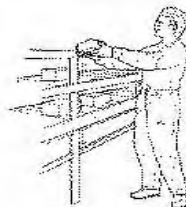
- A tilted work table. You can reduce the distance between you and your work by putting the table at a more vertical angle. The table is adjustable in height and angle to suit the particular job.



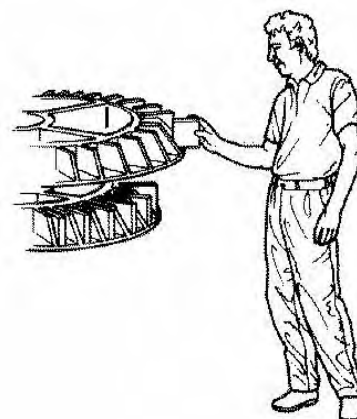
### Reduce upward reaching

*Lifts above shoulder height are awkward and cause more strain on the lifter:*

- Where people of different sizes use the same workstation you could provide a simple platform to raise the smaller person to avoid lifts above shoulder height. At a loading station on an assembly line you can bring in a platform when the shorter person works. You should position it so that it does not constitute a tripping hazard, it must also be large enough to allow the person to move without falling off.



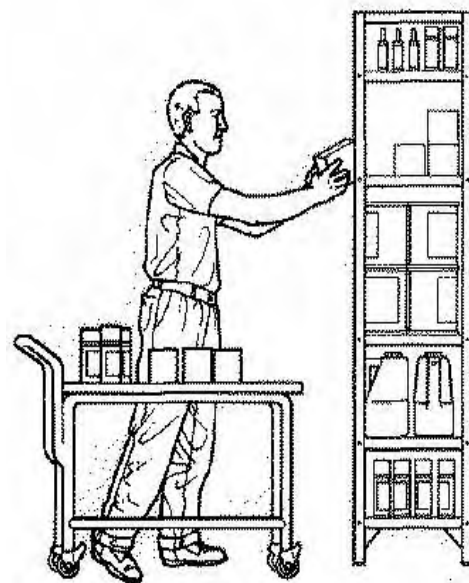
- The rearrangement of this jig allows the operator to reach the items much more readily. By using the shoulder height of the smaller operatives as a guide to the maximum lift height you can often rearrange the way the task is set out to reduce the amount of reaching.



## Reduce large vertical movements

*If something has to be lifted from a low level to high level it may be best to use a hoist (see Mechanical handling aids). Consider if such a large lift is actually necessary or whether you can avoid the load being put near the floor in the first place so that you avoid subsequent lifting. Try to maintain the height of an object throughout its processing.*

- Using shelving systems with a trolley minimises the lifting you have to do. Although the same goods are on the shelves in the 'before' picture the load is reduced by arranging how they are stored. Heavier items are kept at a height between mid-thigh and mid-chest where you can handle them with the least risk of injury. The lowest and two upper shelves are used to store lighter articles.



## Reduce twisting

- You can often arrange the most important areas of work so people do not need to twist to carry something from one place to the next. Items were positioned behind a seated worker which meant she had to twist to reach them. By rearranging the workplace the amount of twisting has been reduced.
- Consider which regions around your body are used when you carry out lifting when you are sitting down. The best zone is directly in front of you within forearm reach. Try to avoid using areas at the sides especially where two hands are needed.

## Reduce stooping

Many industries use a cart with high sides for moving material around. This inevitably means that items at the bottom are difficult to reach. You either have to clamber into carts or lean over.

- A container with a removable side allows you to reach the bottom easily. You could use folding, sliding or completely removable sides.



- By using blocks or other supports to raise pallets above the ground you can reduce stooping when you are stacking and destacking a pallet with heavy items. Arrange things carefully to avoid tripping hazards. For example, ensure an empty pallet is always kept in position over the supports to avoid a tripping hazard.



## Reduce long carrying distances

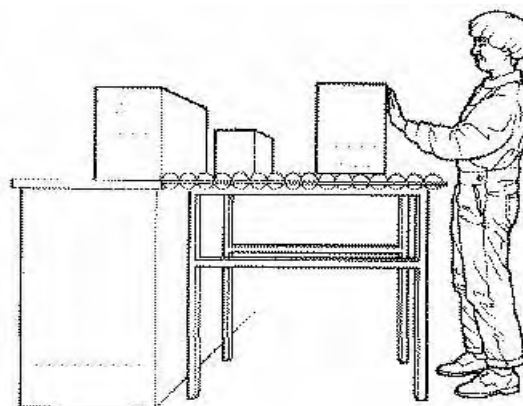
*A wide variety of trolleys and barrows is available to reduce the amount of carrying you need to do (see Mechanical handling aids). Using a sliding table to bring an item from one workstation to another can avoid the need to carry it.*

- Considering the placement of the various workstations in a factory carefully can reduce the need to carry items long distances. By arranging delivery and storage to be near to the point of use you can often make improvements in efficiency as well as reducing the amount of load carrying. For example when bricks are delivered on to a building site you could store them next to the area where they will be used. You need to plan early to make sure you can achieve this (see *Avoiding manual handling*).

## Pushing and pulling

*Where you need to push or pull a heavy load by hand arrange it so the hand position is at mid-chest height.*

- Generally people can exert more force towards and away from their bodies than sideways. This shows a good arrangement for moving cartons onto the conveyor line.



## Improve the work system

- One method of reducing the amount of lifting you have to do is using job rotation. This should not be used as a substitute for improving the task itself but it may be appropriate, particularly when the task requires a fixed posture for long periods of time. Paying attention to the design of the job so that it involves a series of related but different tasks may greatly reduce the amount of lifting and also produce a more efficient and versatile workforce.

## Provide sufficient recovery time

- Some manual handling tasks are too physically demanding for some people to carry them continuously. Although experienced workers learn how to pace themselves to minimise such effects, many physically tiring tasks need to include a schedule of work and rest breaks. A rest phase is any period of light activity such as record keeping, that alternates with physically demanding activities.

# Mechanical handling aids

*This section gives examples of the many handling aids available to help you with your manual handling operations. The aids vary from simple, manually-operated tools to power-assisted trucks and lifting devices.*

*When selecting handling aids take into account how they will be used and, wherever possible, the personal preferences of the people who will use them. Remember, however, that many of these aids are available in a wide variety of powered and non-powered forms and how they are going to be used will affect whether or not they are successful.*

*The types of handling aids described are:*

- simple tools;
- trucks and trolleys;
- roller tracks and chutes;
- lifting devices;
- pallet trucks;
- conveyors.

*All of them 'lighten the load' and make things more efficient - this can lead to fewer injuries and higher productivity. When used in the right place these aids can pay for themselves in a short time.*

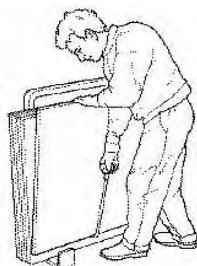
*The handling aids are referred to by names which are commonly used in industry. You can find manufacturers of such equipment by referring to trade directories which may be held by your own purchasing department or through your local library.*

*Remember that the use of handling aids can create different kinds of risks. For example some handling aids need maintenance and the law requires certain lifting machines and tackle to be examined. You may need to consider the segregation of pedestrians from vehicles. It is always important to weigh up all the costs and benefits of using handling aids.*

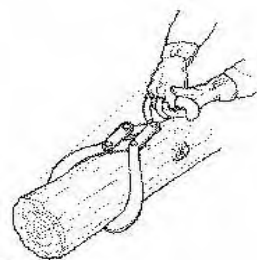
## Simple tools

*All kinds of simple tools help you with manual handling. They can help you to grip the load and provide leverage to reduce the actual weight you need to lift. Sometimes using them means you can avoid lifting the load entirely although some manual handling is still needed.*

- Lifting hooks can help to lift sheets of steel or glass, timber boards and large awkward loads. Log tongs will help lift logs and other devices can be used for cylindrical loads. These tools help to grip the load and reduce the need for bending. They can also speed up the job and repay their cost very quickly.

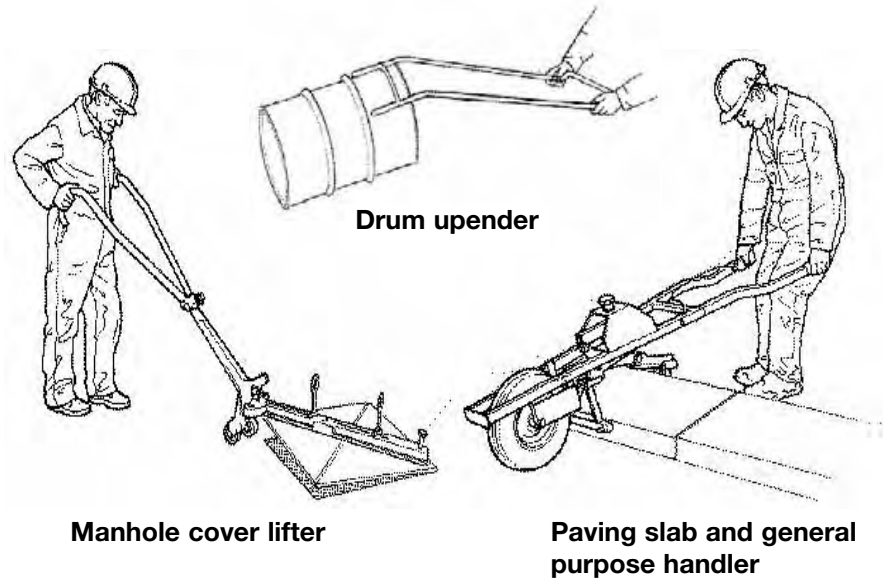


**Lifting hooks**



**Log tongs**

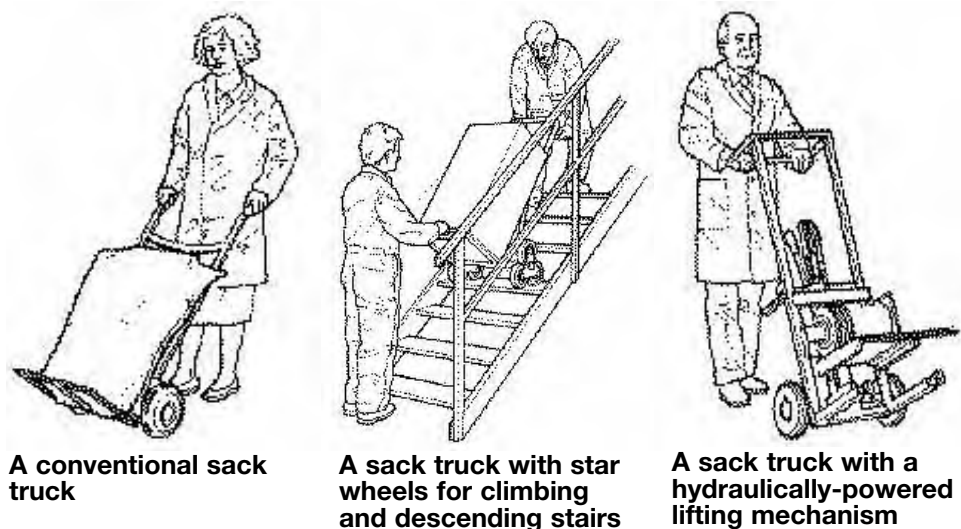
- Tools such as drum upenders, manhole cover lifters and paving slab and general purpose handlers provide leverage and reduce the amount of effort required. Sometimes you can avoid lifting completely but the load is still manually handled. These operations can cause strains and other injuries if you handle heavy loads without appropriate handling aids.



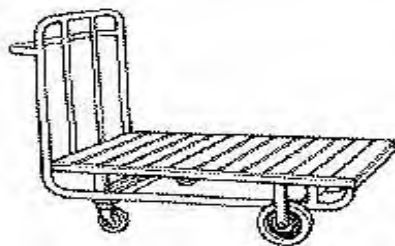
## Trucks and trolleys

*Trucks and trolleys allow one person to transport loads between different locations. Using trucks and trolleys will increase the efficiency of many manual handling operations several-fold as well as reducing the load. They can be inexpensive and come in all shapes and sizes to suit your workplace and the load. Remember that pushing or pulling a truck or trolley is still a manual handling operation. Trucks and trolleys are often pushed by manual effort, but battery-powered equipment is also available.*

- Sack trucks transport loads by balancing them on a single axle. Some trucks have lifting mechanisms which allow loads to be raised and lowered and others are fitted with special wheels for climbing and descending stairs.



- General purpose trucks can often be used to move and support larger loads than sack trucks. They can be flat-topped or fitted with a variety of sides and wheels to suit different uses. The wheels can be fitted with swivels to improve manoeuvrability. Some platform trucks can be fitted with detachable tug units. This can reduce the unit cost and can help to reduce congestion and obstacles in busy production areas. The platform can be designed to be raised or lowered - this further reduces the manual handling because it reduces bending when you are loading and unloading. Trucks can have big wheels for use on rough ground. When fitted with removable sides they can be used for bulk loads like sand and gravel. Balance trucks have a central axle with swivel wheels at each end so they can spin around their centres. This makes them highly manoeuvrable so they can be used in restricted spaces.



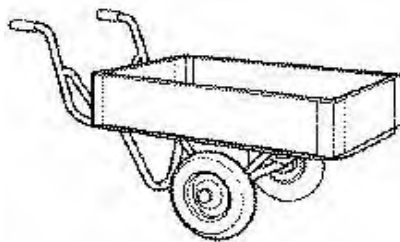
**Platform truck**



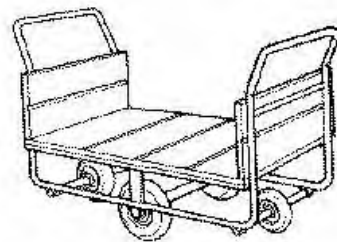
**Platform truck with  
detachable tug unit**



**Platform truck with raising  
and lowering platform**



**Hand truck**

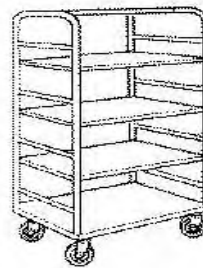


**Balance truck**

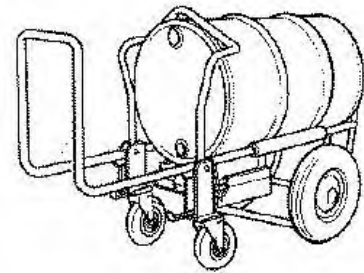
- There is no clear distinction between general purpose trucks and trolleys. Trolleys tend to be of lighter weight construction and designed for more specific applications. Container trolleys allow mixed loads to be carried. A supermarket trolley is a simple example. Shelf trolleys can have fixed or removable shelves. You can find them in offices for moving files and paper and canteens and food factories for moving crockery and products. Drum trolleys are useful for transporting drums. Brakes can be fitted to trucks and trolleys to keep them stationary and may be necessary where the ground slopes. Garment rails can be used in clothes factories, shops and theatres. Think about the types of trucks or trolleys you need for your applications.



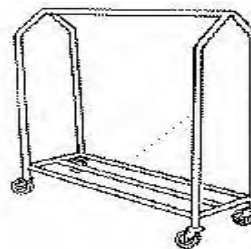
**Container trolley**



**Shelf trolley**



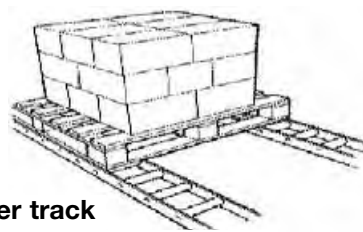
**Drum trolley**



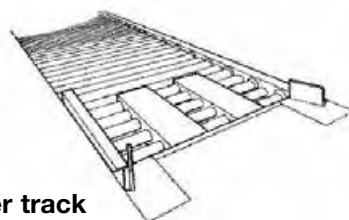
**Garment trolley**

### **Roller tracks and chutes**

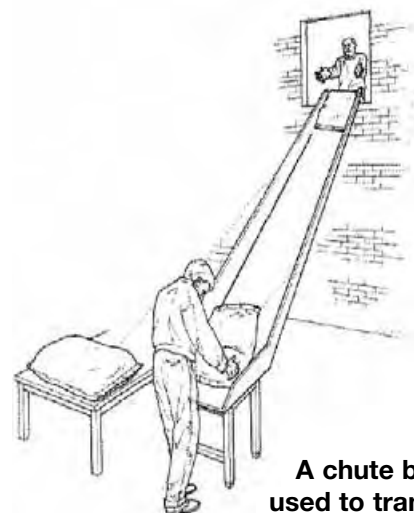
- Roller tracks and chutes allow heavy and bulky loads to be moved manually or by gravity under their own weight. They can be portable or set into the floor. Carefully designed work areas with appropriate tracks and chutes can reduce the number of manual handling tasks and the effort required (see *Redesigning the task*). When using tracks, ensure the potential for creating a tripping hazard is kept as low as possible. Using gentle gradients can ensure you can move the load with very little effort. Chutes are normally used instead of tracks where significant changes of level, for example movement between floors, are involved. Spiral chutes are typically used for sacks but almost any kind of load can be handled on a straight chute.



**Roller track  
handling palletised loads**



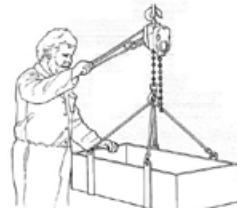
**Roller track  
sunk into a factory floor**



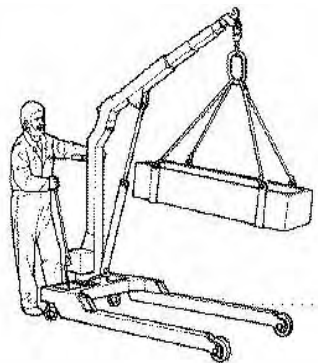
**A chute being  
used to transfer  
sacks from a high to low level**

## Lifting devices

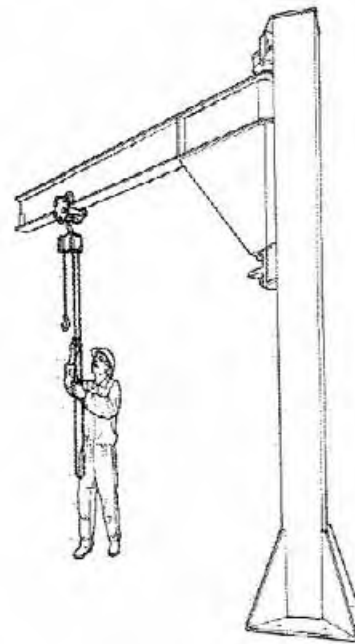
- Lifting devices or lifting machines come in a wide range of forms, for example chain or rope blocks can be suspended from fixed points or beams. Mechanical advantage is used to raise the load. These devices are for general use in workshops and on building sites. Manual effort is used to transfer the load but it is normally raised and suspended by hydraulic power. You often find these cranes used in garages to lift engines out of cars and in hospitals to lift patients. A chain block fitted to a moving trolley on a runway beam or pillar jib will ease the transfer of the load after it has been raised off the ground.



**Manually-operated lever hoist**

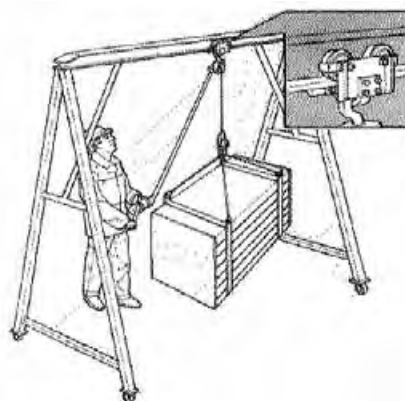


**Manually-operated crane or engine lift**

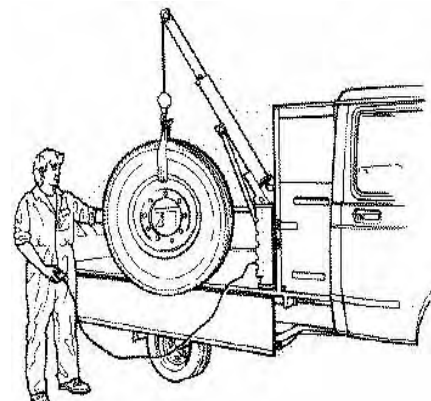


**Chain block fitted to moving trolley on a pillar and jib**

- Using an electric hoist to raise the load will further reduce the amount of effort you need. Using mobile powered cranes and overhead travelling cranes to lift, transfer and put down the load can increase efficiency and eliminate manual handling. You can find various lifting devices in factories, building sites, farms, hospitals and all workplaces where the movement of loads is required. Many vehicles are fitted with cranes and platforms which can be raised and lowered to reduce manual handling. The full range of lifting devices and their application is too wide to describe in this book.



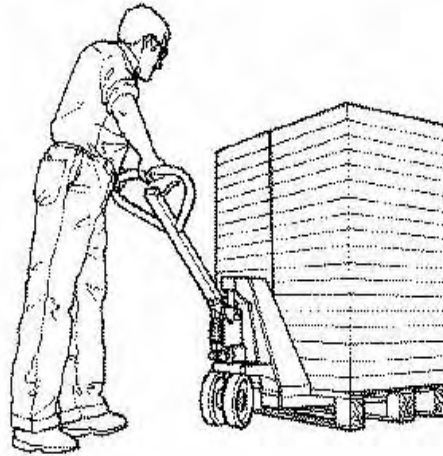
**A manually-operated hoist on a moving trolley on a mobile gantry**



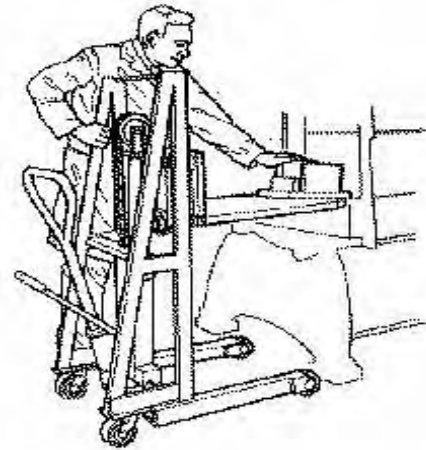
**An electric hoist on a vehicle**

## Pallet and stacker trucks

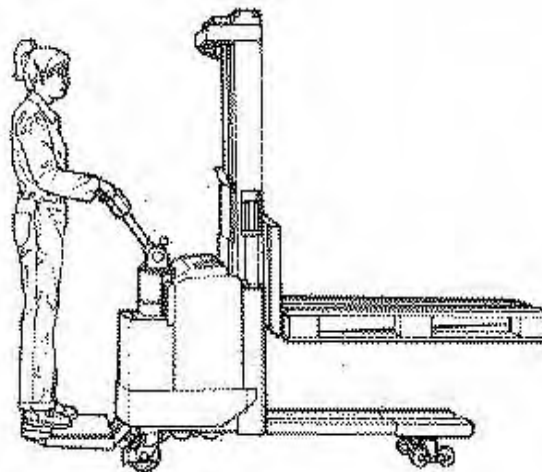
- Pallet trucks are moved by pedestrians. Manual effort is required to transfer the load but hydraulic power is normally used to raise and lower the load. They can be used in fairly congested and confined areas and are designed to move different types of loads. Stackers can be manually operated or powered and pedestrian-controlled and ride-on versions are available. Stackers are a high lift type of pallet truck - they are typically used for placing and removing loads on storage racking and vehicles.



**A pallet truck**



**A manually-operated stacker truck being used for tool and die changing operations at a power press**



**A battery-operated ride-on stacker truck, raising a pallet**

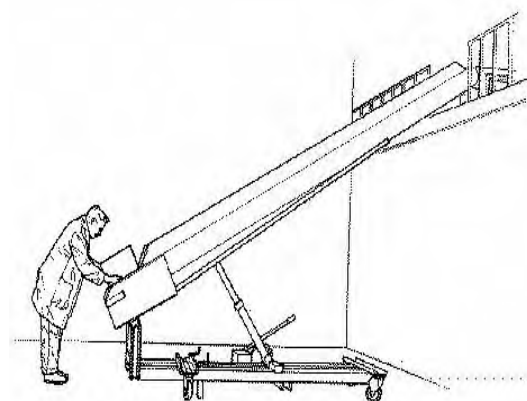
## Portable conveyor

- Portable conveyors are used to transport loads between places at the same level or different heights. Different types can transport a wide variety of loads including bulk materials like sand and grain. Using portable conveyors can significantly reduce (and often avoid) manual handling. The height of the conveyor at loading and unloading points is important. Recommended heights to reduce manual handling efforts are:
  - around 0.9 m above floor level when light loads which can normally be lifted with one hand, for example cans, are loaded (you will need to provide suitable seating);
  - around 0.75 m above floor level when heavier loads, normally lifted with two hands, like cases and cartons, are loaded;
  - around floor level when heavy loads, like drums, are loaded onto conveyors, either by rolling or by lifting devices or lift trucks.

You can set up portable conveyors for occasional or semi-permanent use in different work areas. Some versions have wheels to increase their mobility. They can be used to move loads at the same level and some types can be inclined, for example by hydraulic rams, to adjust the height of transfer to suit the particular application. You can use portable conveyors virtually anywhere for any load, for example loading vehicles, sorting materials in agriculture and in the postal service.

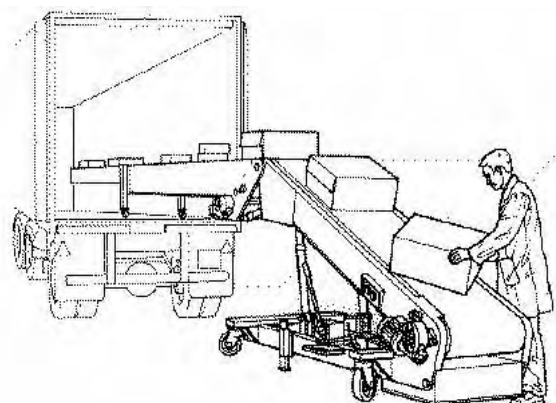
You can set non-powered roller conveyors on a slight incline to allow loads to move under their own weight or without a gradient so you can push loads along them.

A series of conveyors connected together becomes a conveyor system (see *Automation*).



**A hydraulically-lifted mobile belt conveyor**

**A mobile belt conveyor with articulating boom to assist in vehicle loading operations**



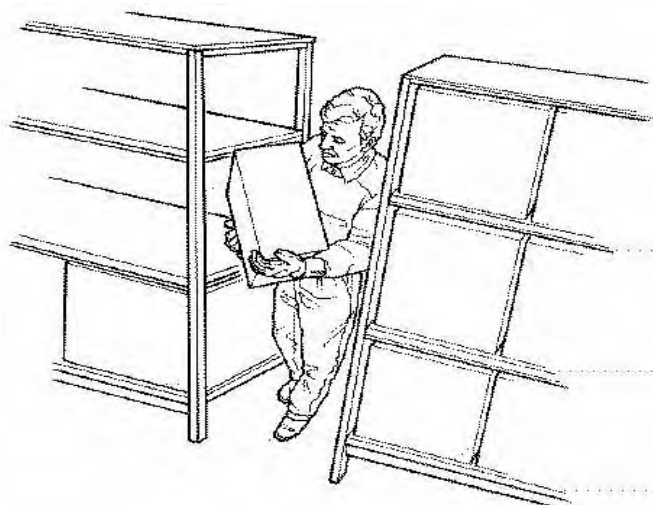
## Environmental effects

*Manual handling is not just about looking at the task, the load and handling aids. You can very often improve manual handling tasks by looking carefully at the environment in which they are carried out. When you complete an assessment of the task try to consider whether the working environment will always be the same; sometimes it may be more congested. For operations outside, weather conditions may be important. This section describes the various factors that may need to be considered, suggests ways of making improvements and gives examples.*

### Space constraints

*If you don't have enough space when lifting you are likely to use awkward postures which increase the risks of injury. It is not enough just to allow room for access, the body movements involved in lifting will require additional space. Storage areas are often the biggest offenders, with articles kept at all heights from floor to ceiling and excessively narrow aisles. Consider areas with restricted headroom carefully if manual handling tasks will be needed - it is likely that aids for lifting and carrying will be necessary.*

- The effect of having to manipulate the load through a narrow opening. Increase the width - this not only allows you to carry the item more easily, but will also allow it to be taken off and put on the shelving.



### Uneven, slippery or unstable floor

*Floors which are likely to cause you to lose your balance need to be improved. This is a particular problem for example in the food industry where accumulations of food and fat can make floors very slippery. Although good housekeeping is extremely important in keeping these hazards under control you will need additional precautions. Using cleated surfaces, special floor coatings and grids to stop surface contamination becoming a slipping hazard can be very effective.*

- When surface conditions are uneven, providing large boards to cover the area can overcome a temporary problem and allow you to use wheeled handling aids. Where you use trestles or platforms to help you reach, you need to ensure they are securely held in place. The use of mobile platforms instead of ladders when you have to handle materials will reduce the risk of injury.

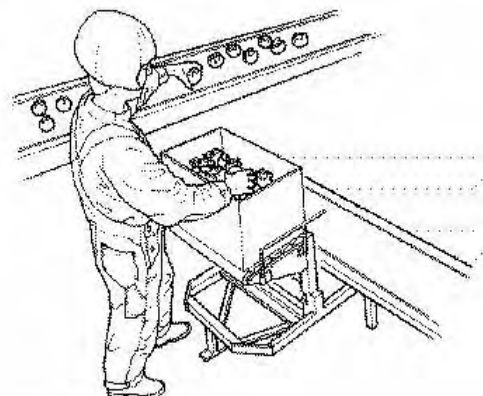
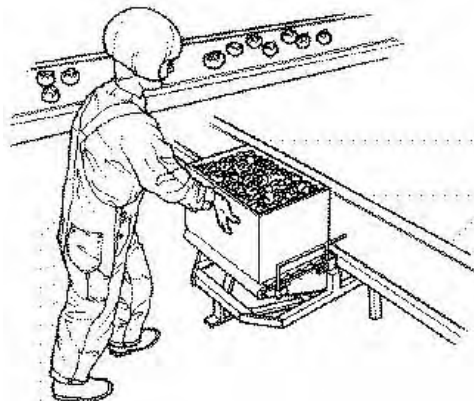
## Variations in level of floors or work surfaces

Carrying loads up steps can be made easier by using various lifting aids, where there are only a few steps a ramp may allow you to use wheeled handling aids. On longer flights of stairs you may be able to incorporate narrow ramps within the steps so you can use wheeled devices - don't forget to consider the force needed to move loads this way - a brake may be necessary on downward slopes.

- Even a simple wedge-shaped ramp can make a big difference - reducing the force you need to move a wheeled trolley for example. Normally, it is recommended that the gradient on a ramp is no more than 1:15.



- You can get a variety of aids to help minimise lifting between work surfaces of different heights. The device lowers a filled carton from one conveyor to the next.



## Other environmental conditions

*Extremes of temperature tend to make any manual handling task more difficult. Factors such as excessive dust, noise or rain may encourage people to rush a job so they can get out of the area as quickly as possible. This will make them less careful and less aware of good lifting techniques. Attention to ideas for improving the task will help control the risk.*

### **Ventilation problems or gusts of wind**

- Where you have to handle bulky objects in high winds you may have problems trying to maintain your balance. You may need to provide windbreaks. Some operations will only be safe when there is little wind.

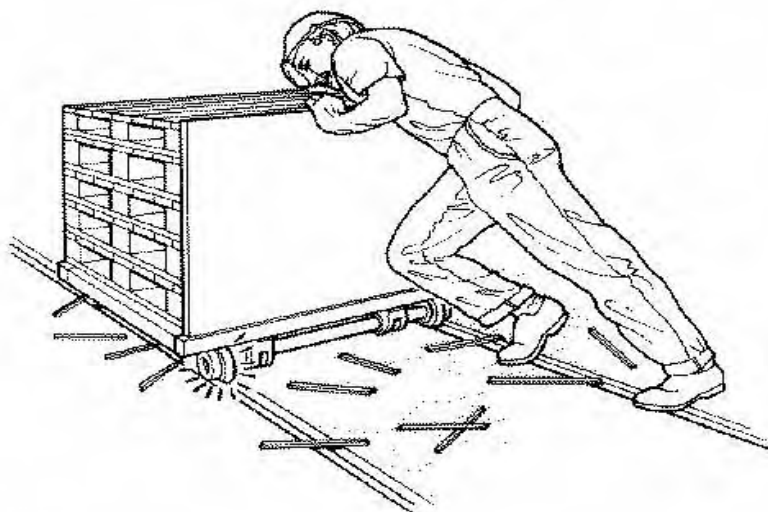
You can transport large sheets of hardboard by keeping them banded in packs and using mechanical means until they are at the site where they will be used.

### **Poor lighting**

- Poor lighting will make the floor surface more difficult to see, so there is more risk of tripping or slipping. Where you need accurate placement of loads the lighting of the area is important. Poor lighting is not only low levels of light, but also sudden changes in the lighting level or badly positioned lights which cause glare.

### **Maintenance**

- Items which are not properly maintained will often require more force to use than is really necessary. Guide rails that get out of alignment or clogged with debris and wheels that require lubrication are common and you can improve them at very little cost. Clearing the rails and greasing the bearings in the wheels of this system for transporting pallets greatly reduces the muscular strength required and reduces the risk from overloading and slipping.



# Automation

*Automation can avoid or reduce the need for manual handling, make operations more efficient and reduce the likelihood of injury.*

*Manual handling tasks may be automated in many different ways. For example you can use a powered lifting device to automatically lift and suspend a load which can allow it to be moved to another location much more easily (see Mechanical handling) . Or you can fully automate the movement of loads around work areas and eliminate the need for manual handling, for example by using robotic and conveyor systems.*

*When you automate handling systems you may need to make substantial changes in working patterns and practices. For example you often need manual handling at loading and unloading points to support systems and allow them to be used efficiently and to capacity. Consider the demands on people carrying out these tasks and design handling activities accordingly. Look at the effects that automation can have on associated processes and manual handling activities too.*

Consider these four ways of automating manual handling:

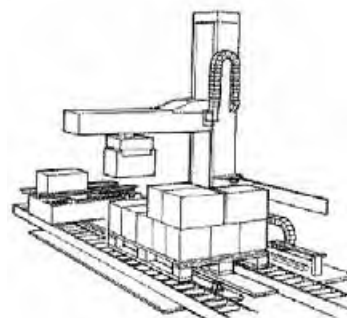
- palletisation;
- vacuum handling;
- lift trucks;
- conveyor systems.

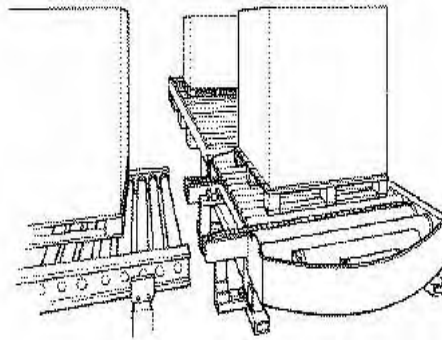
*Automation normally increases productivity but may introduce different kinds of risks. It is important, therefore, to ensure that you maintain handling systems adequately and that you protect people from risks associated with them. In some cases you will need to meet legal requirements, such as statutory examinations on lifting equipment. Also you should separate pedestrians from moving vehicles, such as lift trucks where you need to, and protect people from the risks associated with machinery hazards.*

## Palletisation

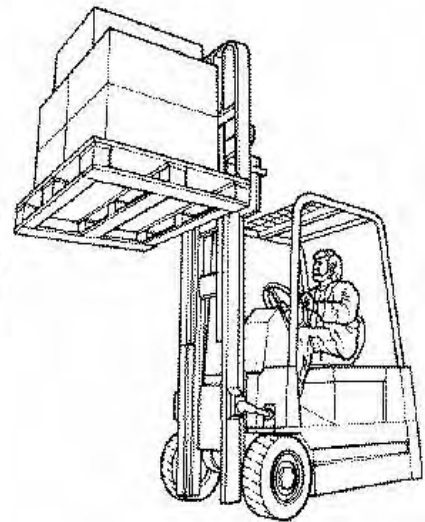
- Pallets are a convenient way of transporting a wide variety of loads between different locations. They allow you to use specialised equipment for handling and, when you use them with pallet racking, they can help store loads. They are widely used to make unit loads for transport and distribution. There is a wide variety of handling equipment available for handling palletised loads, (for example lift trucks, lift tables, turntables and conveyors). Specialised machinery, (for example robotic workstations and pallet inverters) can help to form and break down unit loads. You can set up complete systems to automatically form and transport palletised loads between production areas and distribution or storage points. You can eliminate manual handling operations by using such systems.

**A robotic workstation forming a palletised load (for clarity the perimeter fencing has not been shown in the sketch)**





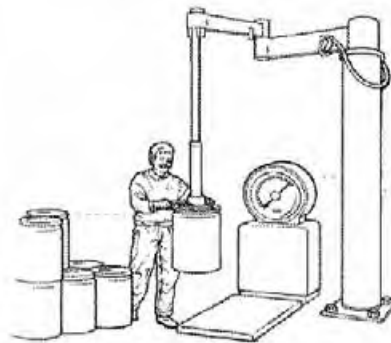
**A roller conveyor with turntable transporting a palletised load**



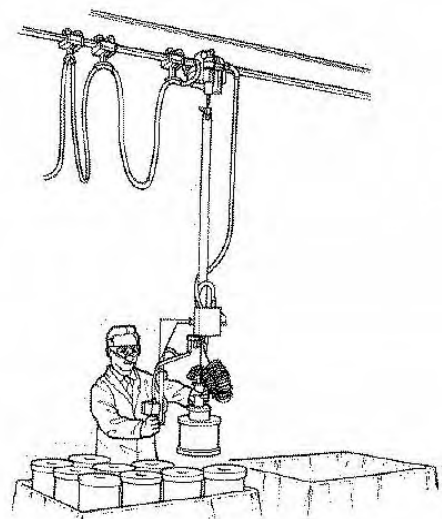
**A lift truck raising a palletised load to place it on storage racking**

### Vacuum handling

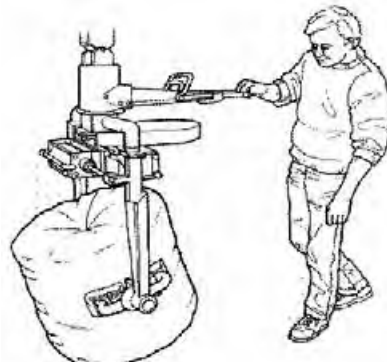
- Vacuum handling systems give you a means for automating lifting operations and assist in the manual positioning of loads. You can suspend the vacuum handling head from a pillar and jib system, which allows you to move loads within a set area relative to the jib. Or you can use an overhead rail system, which may be designed to suit the work area so you can transport loads around it. Lifting heads are available for handling a wide variety of loads, for example drums, sacks and boxes. The loads are normally gripped by manually operated controls which apply power to the lifting head. You can position loads by hand while they are suspended.



**A swing jib system being used to weigh and then place drums on a pallet**



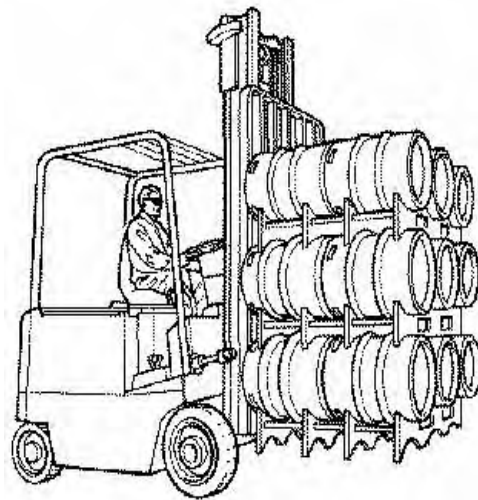
**A monorail mounted lifting head**



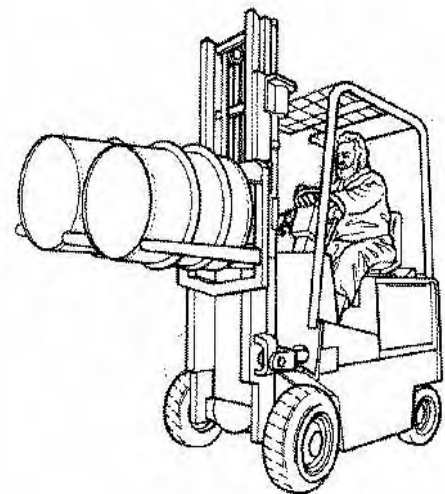
**A lifting head designed for lifting reels**

## Lift trucks

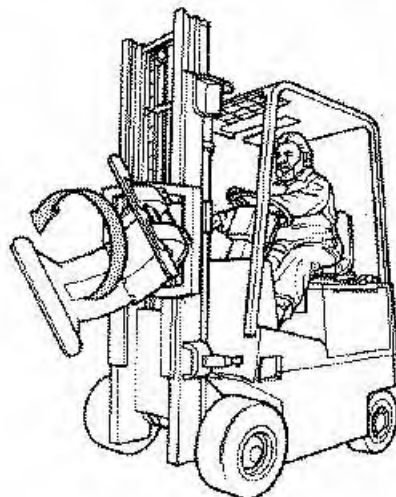
- Lift trucks provide a flexible way of handling a wide variety of loads, provided the loads are stable enough to be lifted and moved safely. You can use them particularly for handling palletised loads. Trucks with a wide range of lifting capacities and lift heights are available. They may be designed for general purposes or specific applications, such as narrow aisle work in warehouses or heavy duty work on construction sites. Their characteristics vary considerably to make them suitable for different work and it is important that you only use them in the way they are meant to be used. Different types are powered by internal combustion engines (fired by petrol, diesel or propane fuels) or by battery power. Special attachments are available for trucks so you can use them with different types of loads. For example there are attachments for handling bales, reels and drums and many attachments allow loads to be rotated so you can invert them or place them on their sides.



**A lift truck lifting a palletised load of kegs**



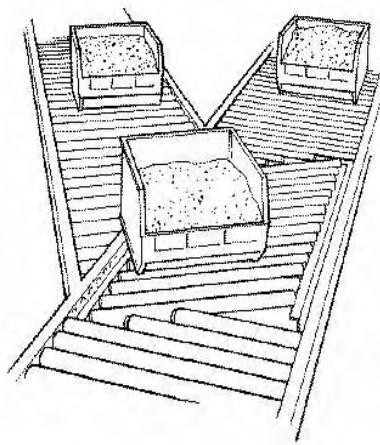
**A lift truck raising drums on a drum handling attachment**



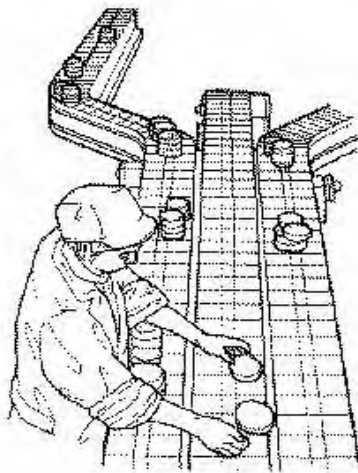
**An attachment that can clamp onto loads and allow them to be rotated (similar attachments are also available for reel handling)**

## Conveyor systems

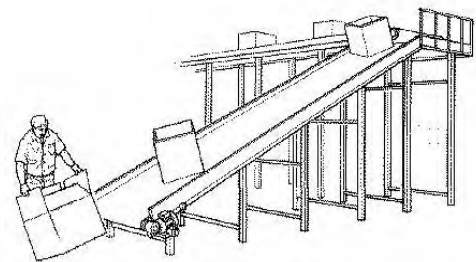
- Conveyor systems allow loads to be transported automatically around a workplace. There are many types and they each have specific characteristics making them suitable for different applications. The same types of systems are often available for heavy or light duties in a wide range of environments and you can integrate more than one type in one system. System can transfer loads between different levels, alter their direction of movement or allow loads to be positioned so that you can work on a load, combine loads or break them down. When designing systems consider associated manual handling activities to ensure that manual handling problems are not created, in particular, at loading and offloading points.



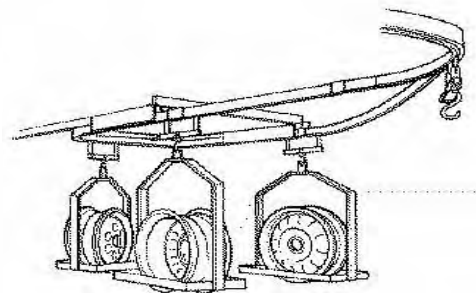
**Roller conveyor (these may have powered and free running rollers)**



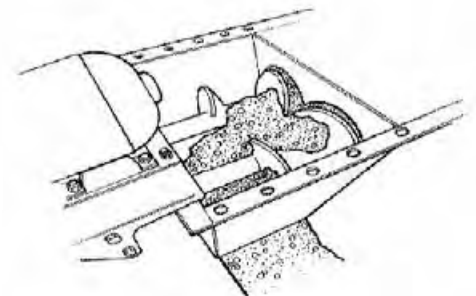
**A slat conveyor in use in the food industry**



**Belt conveyors (these may have flat or slatted belts)**



**An overhead conveyor handling wheels. Other designs of overhead conveyor are useful for transferring components and garments between workstations, in for example manufacture of machines or clothing**



**The outlet of a dual screw conveyor (guard removed). These and similar enclosed conveyor systems can reduce or eliminate manual handling when handling granules, powders etc in bulk**

# Manual handling operation regulations 1992 (as amended)

## What should employers do under the regulations?

*First, you need to be aware of what the main duties on you are:*

- So far as is reasonably practicable, *avoid* the need for manual handling jobs which involve a risk of injury to your employees. If you can avoid such jobs you will need to take no further action.
- Where it is not reasonably practicable to avoid such handling jobs, assess them to identify those that pose a risk of injury to your employees and what causes the risk.
- If the assessment shows that there are risks to your employees, take appropriate steps to *reduce* the risks to the lowest level reasonably practicable.

## Are assessments difficult?

*Not in most cases. The best advice is to use common sense in looking at the various manual handling operations that your employees carry out and weigh up whether there is a risk. The main points you have to look at are:*

- the nature of the load (for example is it heavy, bulky, hard to grasp?);
- the nature of the task (for example do your employees have to reach, bend, stoop, stretch, twist? How often?);
- the nature of the working environment (for example are there uneven or slippery floors or stairs? Is it hot, cold, windy or poorly lit?);
- individual capability (for example does the job require unusual height or strength? Could it be safely done by someone who is pregnant or has a health problem?)

*Assessments do not have to be lengthy, complicated or even written down.*

## What should employers do with the assessment?

*In short, use it as a basis for action to reduce the risk of injury. The assessment identifies what parts of your handling operations pose risks to your employees and what causes those risks. This book will give you ideas on the types of action that can be taken.*

## Where is further guidance available?

*HSE has published detailed guidance on the Regulations in Manual Handling. Manual Handling Operations Regulations 1992. Guidance on the Regulations (see Further reading). This guidance explains the Regulations and gives guidance on assessing manual handling operations, including the purpose and use of the assessment. The guidance also contains a simple assessment check-list to allow you to assess your manual handling operations quickly and simply and numerical guidelines to help you assess only those operations where there is a risk of injury.*

*Shorter guidance is available in the booklet Getting to grips with manual handling (see Further reading) which is available free from HSE Books (see back cover for details).*

# Further reading

## Priced publications

- *Getting to grips with handling problems: Worked examples of assessment and reduction of risk in the health services* Guidance HSE Books 1994 ISBN 0 7176 0622 8
- *Guide to managing health and safety in paper mills Part 3: Manual handling in paper mills* Guidance HSE Books 1998 ISBN 0 7176 0801 8
- *Manual handling in drinks delivery* HSG119 HSE Books 1994 ISBN 0 7176 0731 3
- *Manual handling in the health services* (Second edition) Guidance HSE Books 1998 ISBN 0 7176 1248 1
- *Manual handling. Manual Handling Operations Regulations 1992. Guidance on Regulations L23* (Third edition) HSE Books 2004 ISBN 0 7176 2823 X
- *Safe operation of ceramic kilns* Guidance HSE Books 1993 ISBN 0 7176 0630 9
- *Upper limb disorders in the workplace* HSG60 (Second edition) HSE Books 2002 ISBN 0 7176 1978 8

## Free publications

- *Aching arms (or RSI) in small businesses: Is ill health due to upper limb disorders a problem in your workplace?* Leaflet INDG171W(rev1) HSE Books 2003 (single copy free or priced packs of 15 ISBN 0 7176 2725 X)
- *Getting to grips with manual handling: A short guide* Leaflet INDG143(rev2) HSE Books 2004 (single copy free or priced packs of 15 ISBN 0 7176 2828 0)
- *Handling and stacking bales in agriculture* Leaflet INDG125(rev1) HSE Books 1998 (single copy free)
- *Handling heavy building blocks* Construction Information Sheet CIS37 HSE Books 1993
- *Understanding ergonomics at work: Reduce accidents and ill health and increase productivity by fitting the task to the worker* Leaflet INDG90(rev2) HSE Books 2003 (single copy free or priced packs of 15 ISBN 0 7176 2599 0)
- *Watch your back: Avoiding back strain in timber handling and chainsaw work* Leaflet INDG145 HSE Books 1993 (single copy free)

## Further information

HSE priced and free publications can be viewed online or ordered from [www.hse.gov.uk](http://www.hse.gov.uk) or contact HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995. HSE priced publications are also available from bookshops.

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