

ELEMENT 3 – MUSCULO-SKELETAL HAZARDS AND RISK CONTROLS

- 3.1** Explain work processes and practices that may give rise to work-related upper limb disorders and appropriate control measures.
- 3.2** Explain the hazards and control measures which should be considered when assessing risks from manual handling activities.
- 3.3** Explain the hazards and controls to reduce the risk in the use of lifting and moving equipment with specific reference to manually-operated load moving equipment.
- 3.4** Explain the hazards and the precautions and procedures to reduce the risk in the use of lifting and moving equipment with specific reference to powered load handling equipment.

3.1 ERGONOMICS – AN INTRODUCTION

Although defined in 1963 as “the fitting of the task to the man”, ergonomics developed as a co-ordinated subject during World War II. This involved scientists, engineers, psychologists, physiologists and doctors working together to consider the effects of work-related tasks on people.

Action then needs to target the ergonomic issues identified, staff should be encouraged to look out for the effects of their work on themselves and give suggestions for improvement.

POSTURE

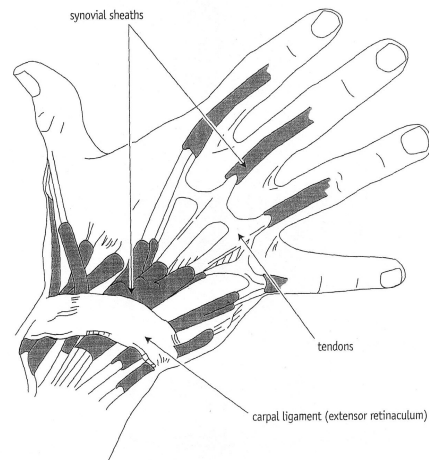
- Postures should not require high levels of static effort to sustain them.
- Variations in working posture should be permitted but not at the expense of operator comfort or performance.
- Designers should consider the use of either sitting or standing postures early in their decision-making.
- Sitting down while working reduces the degree of static work required of the body.
- The operator should be able to adopt an upright and forward-facing posture.
- If standing, the body weight should be borne by both feet equally.
- The posture should be balanced so that additional muscle activity is not required to support or stabilise the body as a whole, or individual limbs, such as would result from leaning forwards.
- The head should remain reasonably upright or slightly inclined to the front.
- The hands should not have to pass above elbow height on a regular basis or for extended periods of time.
- The largest (appropriate) muscle groups should be used to apply necessary forces in a direction which is compatible with their structure.

3.2 WORK RELATED UPPER LIMB DISORDERS

The concept of repetitive strain injuries or upper limb disorders associated with work is not new. Repetition is just one factor which may increase the risk of injury. The terms RSI and ULD do not relate to just one type of injury or condition but to a range of conditions which can be brought about by work which exerts stresses on the upper limbs of the body.

Work and play can affect the likelihoods of ULDs; certain hobbies and sports can be as damaging as certain work activities such as knitting and home computer use.

Tenosynovitis - This is where the lining of the synovial sheaths that protect the tendons become inflamed, it normally occurs in the hand and wrist. The tendons should be able to move freely in their sheath but repetitive movement and trauma events like a heavy blow can also result in damage and injury. Forceful gripping, with the hands away from their neutral position or away from the body, can increase the risk of injury. The signs and symptoms include pain, swelling, weakness in gripping ability and a cracking noise during movement.



Trigger Finger - If the tendons in the fingers are damaged this tends to be known as trigger finger. The tendons most at risk are the flexors which are the ones which allow the hand to form a fist. After injury smooth movement can prove difficult.

Carpal Tunnel Syndrome - The tendons which move the fingers, the median nerve and blood vessels all pass together through the hand and forearm through a carpal tunnel under the main capital ligaments. The median nerve gives sensation to the thumb, palms and a majority of the fingers.

Dupuytren's Contracture - This is caused by the thickening of the fibrous fan of the palm of the hand. The thickening and tightening of this causes the hand and fingers to bend. Repeated minor injuries can lead to this condition such as a carpenter using a chisel (banging it with his hand). This can also be a congenital condition.

Ganglion - This is a fluid bag which is normally located on the back of the hand or wrist. They are not normally painful and may not be work related. However they can be caused by adopting poor postural positions when working.

Epicondylitis - This condition is more commonly known as tennis or golfers elbow. This is an inflammation of the epicondyle which is the bony lump on the outside of the elbow. Movements which require some force from the hand, wrist and arm may contribute to this condition. Heavy repeated lifting away from the body can also be an issue.

Tendinitis - This is a condition which can affect any tendon in the body, usually it is the tendons from muscles which raise and rotate the arm and shoulder.

Factors contributing to WRULDS

- Repetition
- Duration of task
- Availability of rest breaks
- Force or grip required
- Body movements including over-reaching
- Air temperatures – muscles are more at risk when they get cold.
- Lack of space restricting body movements
- Weight of items being moved
- Speed of movements
- Use of tool which cause hand/arm vibration
- Personal factors: - pregnant or nursing mothers or those who already suffer from circulation problems could be at greater risk.
- Touching cold surfaces

3.3 DISPLAY SCREEN EQUIPMENT SAFETY



In the last 30 years manual typewriters have been replaced by computers. Along with the new technology have come new hazards which can, if not controlled, cause injuries to those using computer workstations. All of the hazards are easily identifiable and can be prevented from causing injury.

The Health & Safety (Display Screen Equipment) Regulations 1992 (as amended) set legal standards for those who use computers for a significant part of their normal daily routine. However, the standards they specify are good practice whether you use the computer for half an hour a day or seven hours a day.

These regulations mainly cover users and not everyone who uses a computer or display screen at work.

“**USER**” = Anyone who habitually uses DSE for a significant period at work.

Equipment such as calculators, cash point machines, typewriters and portable laptops are excluded from these regulations.

a. POSSIBLE EFFECTS ON HEALTH

Upper limb pains and discomfort

Prolonged static posture of the back and neck and head are known to cause muscular-skeletal problems. Awkward positioning of the hands and wrist e.g. as a result of poor working technique or inappropriate work height are further likely factors. A range of conditions affecting the arm, hand and shoulder areas linked to work activities are now described as work related upper limb disorders (WRULD). They are particularly associated with the use of fast keyboard operations for prolonged periods. This includes tenosynovitis, tendonitis, carpal tunnel syndrome and tennis elbow.

Visual Fatigue

There is medical evidence to show that DSE use is not associated with damage to eyes or eyesight, nor are existing visual defects made worse. However, "Users" / "operators" with pre-existing defects, may become more aware of them and find such work more tiring or stressful than would otherwise be the case. Temporary visual fatigue can occur through:-

- glare due to poor positioning of the VDU
- poor legibility of the screen or the source document
- unsuitable or inadequate lighting
- reduced blinking which dries the eyes making them sore

Fatigue and Stress

Many symptoms described by display screen workers reflect stresses arising from the task. They may be caused by poor job design or work organisation e.g. insufficient control of the work by the user, under utilisation of skills, high-speed repetitive working and social isolation.

Facial dermatitis

This condition is a rare occurrence and may be caused by workplace environmental conditions such as low humidity and static electricity. Symptoms such as rashes and reddened skin may occur.

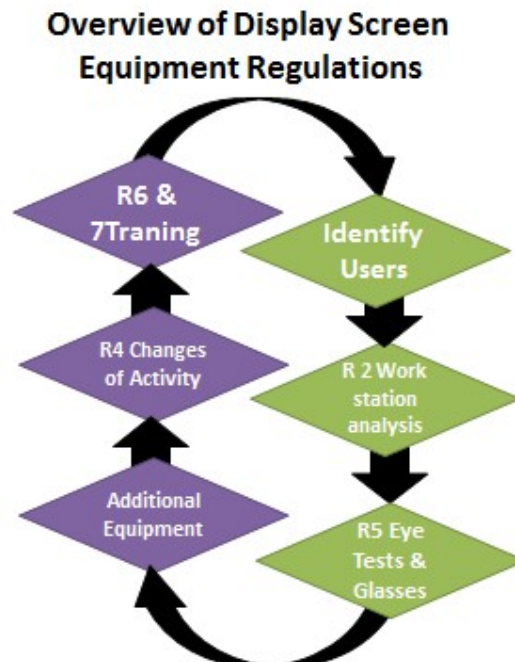
Epilepsy

This is not known to be induced by DSE work but if an individual suffers from this condition then they could be at risk. The extent of the risk will depend on their condition, the lighting, colours used and flicker rate of the screen.

Exposure to Radiation During Pregnancy

Medical research shows that radiation levels from DSE do not pose significant risks to the health of the mother or unborn child. Any DSE user who is pregnant should be given the opportunity to discuss their concerns if they have any.

b. THE HEALTH AND SAFETY (DISPLAY SCREEN EQUIPMENT) REGULATIONS 1992



Suitable and Sufficient Analysis

For each workstation used by a user - This should highlight the main hazards and consider the user, the DSE equipment, the environment and the office equipment being used.

Workstation Requirements

Screen	adjustable contrast and colour, must tilt and swivel with glare minimised.
Keyboard	separate from computer and can be angled with legible keys.
Work desk	adequate space on top and below.
Chair	adjustable seat and back rest, adequate lumbar support, stable base, suitable coverings plus arm rests if required.

Other working environment issues which may need to be addressed: ventilation, noise, heat & humidity.

An amendment to the regulations was introduced in 2002 whereby the requirement to ensure the minimum standards of workstations should cover all workstations and not just those used by 'users' and 'operators' as in the original legislation. This covers employees and non employees who use these workstations. (Operator = self employed 'user')

Document Holders & Foot Rests

These should only be provided where they help reduce the risk of injury for an individual user. They do not automatically need to be issued to every "USER".

Plan Work Activity

Ideally other non keyboard work should be available to allow for breaks from the keyboard. If this cannot be achieved, adequate breaks away from the terminal must be provided. Any software used should be suitable for the tasks involved.

Eye Tests

These must be provided free of charge to users. If corrective appliances are required for DSE work then these must be paid for by the employer. (Up to the cost of basic NHS lenses and frames).

Training & Information

This should cover how the equipment can be set up to reduce the risk of injury, what the adverse effects are, how to obtain an eye test, who to report problems to and the importance of planning the work to avoid long periods at the keyboard.



Regulations 5 and 6 were amended and clarified to ensure they covered people recruited as DSE “users” since 1992, as these were inadvertently excluded from the original Regulations.

c. DISPLAY SCREEN GUIDANCE FOR USERS

- Raise or lower your seat until your forearms are horizontal. Make sure your wrists are straight when your hands are on the keyboard.
- Sit right back in the chair so that the backrest can support you.
- Form a relaxed curve in your back and adjust your backrest to provide support when in this position.
- Use a footrest if your feet do not comfortably touch the floor.
- Remove any obstructions from under the desk.
- Position your document holder, if you have one, near to the screen.
- Set your viewing distance to suit the screen character - no closer than 14 inches (36cm).
- Adjust your screen and document holder to suit your sitting position.
- Change your screen adjustments hourly to suit the differing lighting levels.
- Rest your arms and shoulders whenever your work routine allows.
- Clean your screen regularly as it will attract dust readily.
- The screen should be free from glare and reflection, if you can see your face in the screen it is in the wrong position.
- The keyboard can be tilted to improve accessibility, keep a clear space in front of the keyboard to support hands and forearms.
- Do not stay at your workstation in the same position all the time, stretch your arms and legs, look out of the window to relax your eyes.

3.4 MANUAL HANDLING



What is manual handling?

It is Transporting / Supporting a Load by Hand or Bodily Force. It includes Pulling, Pushing, Lifting, Lowering and Carrying.

What is a load?

Any Person, Animal or Item

Typical Injuries can include:-

Slipped Discs, Muscle Strains, Hernias, Fractures, Abrasions, Cuts, Sprains, Damaged Tendons and Torn Ligaments. Fingers and Toes also can be crushed by falling or unsecured loads.

Manual Handling Operations Regulations 1992 – Overview

Regulation 2 - Employers & Self Employed have the same duties

Regulation 4 - Risk Assessment

Eliminate hazardous manual handling where possible - "**so far as is reasonably practicable avoid risk of injury**". Where the risk cannot be eliminated a suitable and sufficient risk assessment must be carried out. The four (plus "other") key parts in this assessment must be:-

The Task / Load / Environment / Individuals / Other factors

Or "**TILE**"

The factors under each of these headings need to be considered to highlight any conditions which could increase the risk of injury. Once these are highlighted they should lead to the identification of risk control measures.

Examples:

Task – Body Movements, Frequency, Rest periods, Twisting, Stretching, Distance of Movement etc.

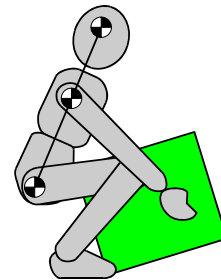
Load - Heavy, Bulky, Sharp, Moving Centre of Gravity, Hot, Human, Animal, Dirty

Environment - Space, Temperature, Ventilation, Stairs, Outdoors

Individuals – Male / Female, Height, Pregnant, State of Health, Strength and Size, Experience and Level of Training.
 Other – PPE or other clothing worn

The requirement to complete a risk assessment was amended in 2002 to ensure that the risk assessment takes into account:-

- The physical suitability of the employee
- The clothing, footwear and other personal effects worn
- The employee's knowledge and training
- Whether the employee is in a group especially at risk
- Any health surveillance results



In most cases employers following best practice in MH risk assessments would have already been meeting this requirement.

Who should carry out the assessment? A competent person.

Weights within the MH Regulations associated guidance.

	3kg	7kg	10kg	5kg
Shoulder height			20kg	10kg
Elbow height	7kg	13kg		
Knuckle height	10kg	16kg	25kg	15kg
	7kg	13kg	20kg	10kg

Note: There are no mandatory weight limits.

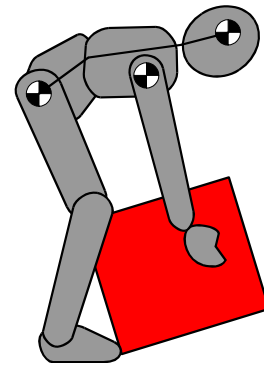
After the assessment is completed the first consideration for the employer to ascertain is can the manual handling task be eliminated, maybe through the use of mechanical equipment? If this is not possible other control measures are required. These could include:-

- Mechanical assistance
- Automation
- Avoid handling when seated
- Suitable PPE and clothing
- Provide rest periods
- Improve the task / environment
- Break down the load
- Training
- Labelling load with weight
- Two people lifts
- Good lighting
- Use of handles, etc.
- Health surveillance
- Using trolleys

Regulation 5 - Employees have a legal duty to follow training and use any equipment provided to reduce the risk.

The Principles of Kinetic Lifting

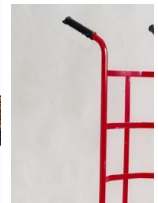
- Assess the load and environment
- Secure grip with both hands
- Bend knees
- Keep arms close to body
- Chin up as you lift
- Do not jerk
- Do not twist trunk
- Use legs to take the weight
- Keep back straight



Useful Information: HSG 121 A Pain in your Workplace, HSG 149 Safe Manual Handling in Construction.

3.5 MANUALLY OPERATED LOAD HANDLING EQUIPMENT

In some cases the use of mechanical aids may be impractical but there are a number of general and specific manual handling aids which can reduce the risk of manual handling related injuries.

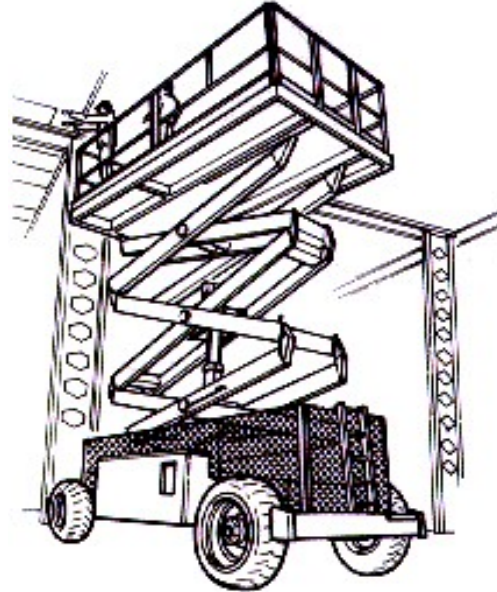


3.6 LIFTING OPERATIONS & LIFTING EQUIPMENT REGS 1998 (LOLER)

These Regulations came into effect on 5.12.98, further details are available on the practical implications in the Approved Code of Practice L113 (ISBN 0-7176-1628-2)

LOLER repealed several old regulations including the Construction (Lifting Operations) Regulations 1961. As such many of the requirements are not new but have been extended from the various industries they were specifically designed for originally.

The aim is to reduce risks from lifting equipment at work, the Regulations operate in conjunction with the Provision and Use of Work Equipment Regulations which cover all work equipment, including that used for lifting operations.



Coverage: Equipment used for lifting / lowering at work (hoists, cranes, fork lift trucks, mobile elevated platforms etc.) The definition also includes chains, slings, eye bolts etc.

Excludes: Escalators, as these are already covered by the Workplace (Health, Safety & Welfare) Regulations 1992.

If employees bring their own lifting equipment onto your premises for use at work then this equipment is also covered.

Do the regulations apply?

Equipment for lifting used at work is covered – they do not apply for equipment primarily used by members of the public e.g. shopping centre lifts. However this equipment is still covered by the Health & Safety at Work etc Act 1974.

Key points

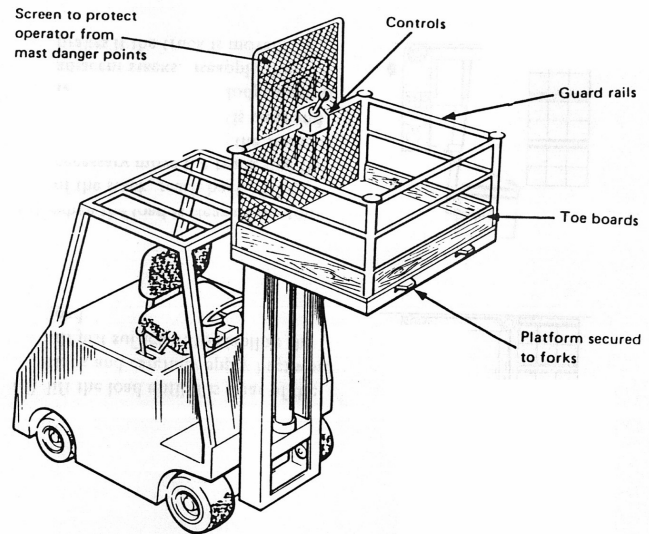
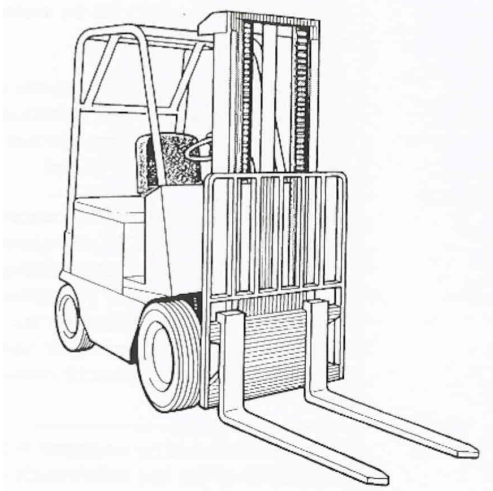
- Suitable, stable and strong enough for use – marked with the safe working loads
- Positioned to prevent/reduce risks
- Visible markings
- Operations planned and supervised – used only by competent people
- Thorough examination – every 6 months for lifting tackle / equipment used to lift people e.g. people carrying hoists and 12 months for other lifting appliances e.g. cranes, prior to first use by the employer and after any accident where the lifting gear may be damaged.
- Examination report in writing
- Examinations and inspections by competent people

Lifting equipment used in the following places is covered:

Factories, offices, shops, hospitals, hotels and places of entertainment etc.

3.7 MECHANICALLY OPERATED LOAD HANDLING EQUIPMENT

3.7.1 FORK LIFT TRUCKS



PRINCIPLE - COUNTER BALANCE

- All companies must train users to a known standard on any FLT with a counter balance.
- Standards are set out in ACOP
- Covered by Provision And Use of Work Equipment Regulations and LOLER

OPERATOR HEALTH

- Disability does not automatically exclude any individual
- If glasses are normally worn they must be worn when operating FLT
- Stable mentality which normally requires operators to be over 18 years of age

RATED CAPACITY PLATE (RCP)

Every FLT and attachment must have a RCP fitted and not just painted on. This will tell the driver not only the weights that can be lifted but also the load centre which is appropriate. Extended forks can be fitted but must have their own RCP which must then be followed. The load must be as near to forks as possible or the force it exerts on the truck will be increased.

Rated Capacity	
Load Centre	Weight
50 cms	500kg
75 cms	400kg
100cms	300kg

This plate shows that if the centre of the load is 50cms from the face of the forks it can lift a load of 500kg, but if the load centre is 100 cms away the weight that can be lifted is reduced to 300kg.

What are the main hazards which may cause a fork lift truck to tip either laterally or longitudinally?

LONGITUDINAL

MOVEMENT OF LOAD
HIGH LEVEL OBSTRUCTIONS
HARSH BRAKING
MOVING WITH THE LOAD RAISED
TRENCHES OR KERBS
LOAD BLOCKING VISION AHEAD

LATERAL

OFF CENTRE LOAD
UNEVEN FLOOR
GRADIENTS
TYRES FLAT OR DEFLATED
OBSTRUCTIONS
FAST CORNERING

All operators should be taught not to jump out if the FLT tips over as they could be crushed to death.

PRE-OPERATIONAL CHECKS

The following components should be checked prior to the truck being used on a daily basis; normally the check will be recorded on a checklist.

Tyres	Forks	Hydraulics
Battery or Fuel	Chains	Brakes
Horn / Warning Lights		

FLTs can be fuelled by Battery, LPG or Diesel.

WORKING PLATFORM - The FLT should never be used to raise people above the ground unless a proper purpose-built working platform is fitted. Even in these cases the manoeuvres must be co-ordinated from the ground and the truck must never be moved with a person in the raised position.

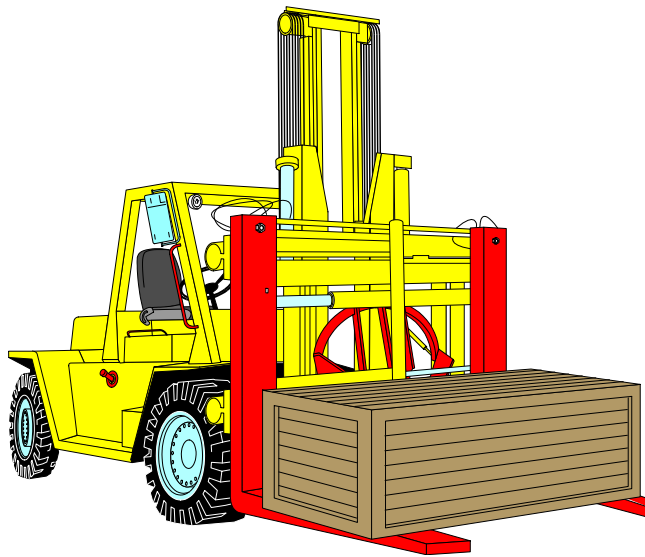
A Few Hazards

- Overloading
- Uneven load
- Deflated tyres
- Hydrogen Gas – from charging of electric batteries
- Battery Acid – burns from batteries
- Contact with battery terminals – electric shock
- Changing gas cylinders – fire/explosion
- Fumes – from diesel truck
- Collisions – electric trucks are very quiet
- Undercutting – dragging a load rather than lifting it
- Lifting with only one fork
- Crushing & Impact

Example Question

Identify the health hazards presented by a diesel operated fork lift truck. (Hint - safety hazards cause injuries, health hazards may lead to occupational ill-health.) (4)

Identify typical controls which could reduce the risk of operators suffering ill-health effects from these hazards. (4)



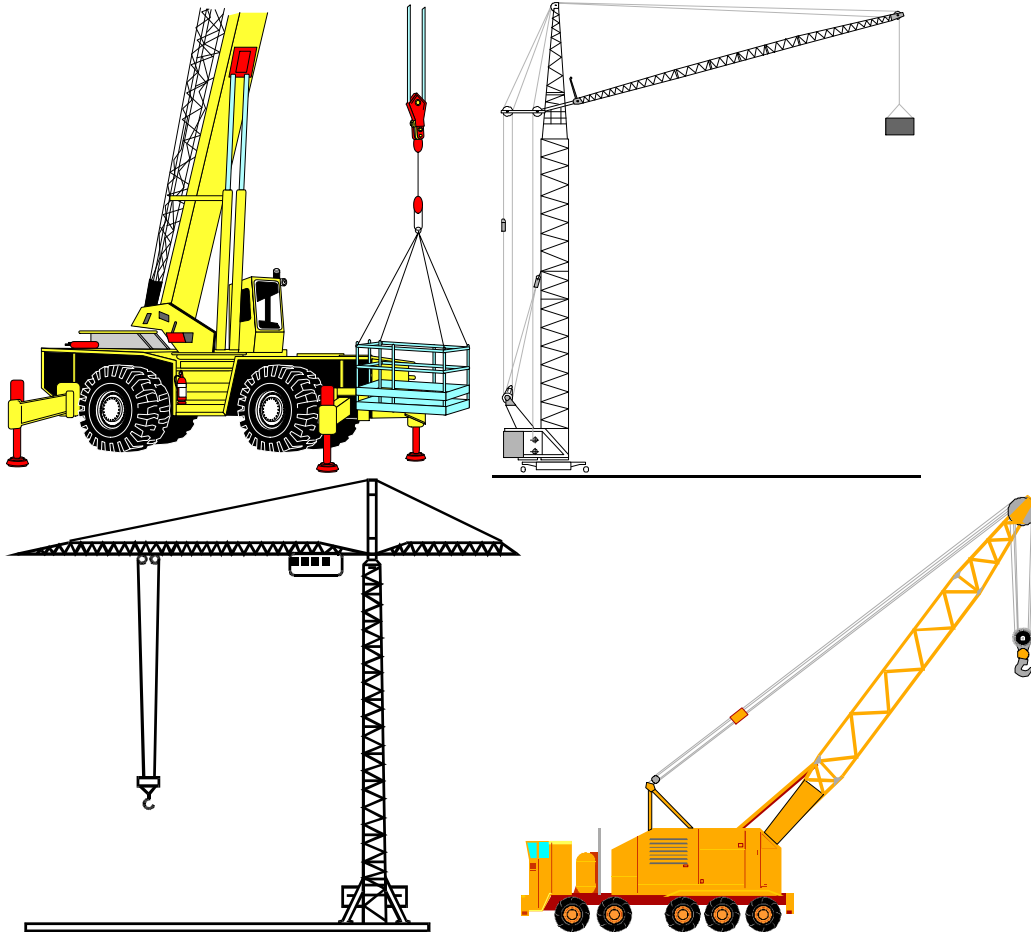
Keeping the Truck Safe When Not In Use

- Security of keys – not to be left in truck
- Park in well lit area
- Do not obstruct walkways
- Do not obstruct traffic routes
- Brakes on
- Park on level surface
- Forks pointed down and on the ground
- Remove the load

3.8 CRANE SAFETY

The same principles and hazards which apply to FLTs and other mechanical lifting equipment also apply to cranes. The risks are usually greater because of the increased weights carried and environment where they are used. It is essential that their use is controlled even more thoroughly than a fork lift truck.

The main types of crane are tower, static or fixed, mobile – either track mounted or wheel based and overhead or gantry which may be used indoors.



Cranes should only be used by trained and certificated drivers, the crane must be tested and fully examined at least every 12 months and when they are first erected. Test certificates and examination records must be kept available. The ground conditions must be suitable with no underground tunnels or overhead obstructions.

When deciding what type of crane is required, the environment needs to be considered, e.g. the amount of space on site and at access points may limit the size of crane which can gain entry. The distance and height of the lift will determine the length of the jib needed.

The Safe Use Cranes

1. Check the crane is located on suitable ground
2. Competent crane driver / slinger / signaller / banksman if required
3. Check the area is clear – no overhead obstructions
4. Check weather conditions – do not lift in strong wind
5. Select the correct and suitable sling – free from defects
6. Barrier off the area
7. Ensure agreed signals are used between the driver and slinger
8. Do not exceed safe working load of sling / crane
9. Attach the sling – check the load is even
10. Test lift – raise slightly off the ground
11. Attach tag line to guide load and keep it under control
12. If the load lifts evenly, raise the load fully and move to correct position
13. Move load slowly
14. Lower load and then remove sling
15. Check sling for signs of damage
16. Notify driver that lift has been completed
17. Return sling to correct storage area.

3.9 OTHER MECHANICAL LIFTING EQUIPMENT

There is a variety of different lifting equipment which you may encounter: including hoists, conveyors, mobile elevated platforms, cradles, cranes etc. The key hazards of all of these involve the following four components:

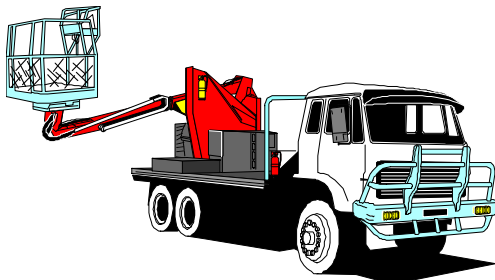
The Equipment – Is it suitable, in good condition, of sufficient strength and tested?

The Environment – Are ground conditions suitable, is there enough space to allow access, what are weather conditions like? – wind could cause problems. Is there adequate lighting, are there measures to keep others away from the danger area? Any overhead or underground obstructions?

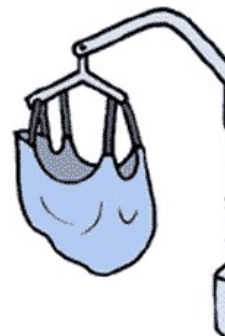
The Load – What size, shape and form does it take? Is it securely packaged? Is the centre of gravity known?

The People – Are those using the equipment and co-ordinating the lift trained? Do they have good vision around the area? Is there an agreed way of communicating to others in the area?

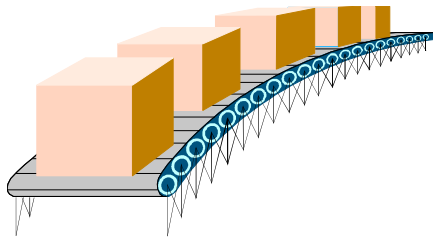
Mobile Elevated Platform



Patient Handling Hoist



Conveyor



Construction Hoist



Scissor Lift



The principles already covered in the module on fork lift trucks can be used to develop relevant precautions and controls to ensure mechanical equipment is used safely.

3.10 CONVEYORS



Hazards

- entanglement
- contact
- falling objects
- noise
- dust
- electricity
- manual handling/ergonomic

Example guards

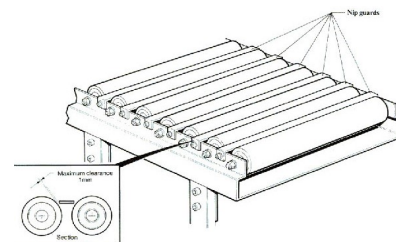


Figure 27 Jump-out roller at transfer point between belt conveyor and roller conveyor

Typical Controls

- Trip devices at nip points
- Mesh fencing/guarding to reduce the risk of becoming entangled
- Jump out rollers
- Emergency stops
- Employees should not wear loose fitting clothing
- Guards to stop items falling items
- Procedures
- Transmission parts guarded

