



OVERSEAS INDUSTRIAL  
TECHNICAL INSTITUTE

PROFESSIONAL REQUIRED TODAY. LET'S MOVE AHEAD WITH US.

1

# NEBOSH

# INTERNATIONAL GENERAL CERTIFICATE IN OCCUPATIONAL HEALTH AND SAFETY

## Element 6: Musculoskeletal health

Overseas Industrial Technical Institute  
version 1.3



LEARNING  
PARTNER

GOLD

1584



# SCOPE OF LEARNING

- ❖ 6.1 Work-related upper limb disorders
- ❖ 6.2 Manual handling
- ❖ 6.3 Load-handling equipment



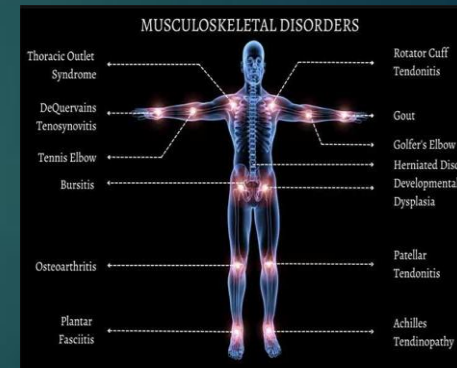
# 6.1 WORK-RELATED UPPER LIMB DISORDERS



## MUSCULOSKELETAL DISORDERS AT WORK

Musculoskeletal disorder (MSD) is a common term which is explained as relating to muscles and the skeleton. Thus, the musculoskeletal system involves the:

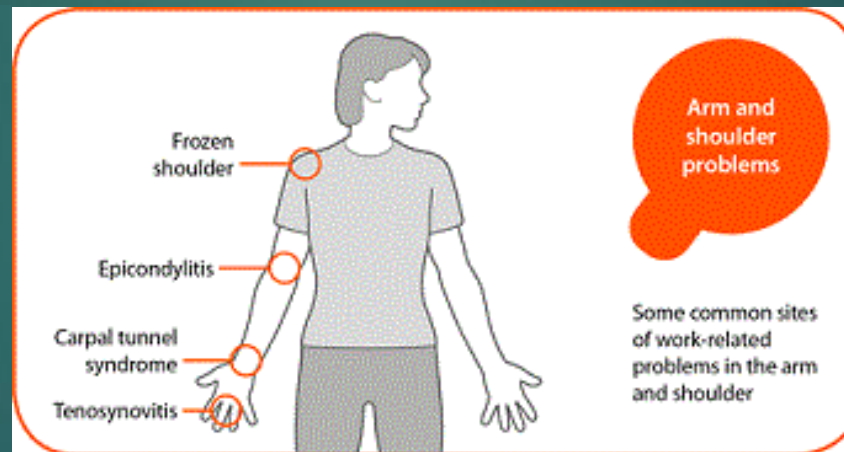
- Muscles
- Bones
- Joints - the place of union between two or more bones
- Bursa - fluid sac between the muscles and bones that form in areas of friction
- Ligaments - a fibrous band of tissue connecting bones
- Tendons - a fibrous band of tissue connecting muscle to bone .





## WORK RELATED UPPER LIMB DISORDERS (WRULD)

WRULDs is a cumulative term for a group of occupational diseases that consist of musculoskeletal disorders triggered by direct exposure in the work environment affecting the muscles, tendons, nerves, capillary, joints and bursae of the hand, arm, wrist and shoulder. RSI (Repetitive Strain Injury) is typically utilised to explain WRULDs. .





## TYPICAL EXAMPLES OF REPETITIVE OPERATIONS TYPICAL EXAMPLES OF REPETITIVE ACTIONS THAT CAUSE WRULDS INCLUDE:

- Repetitive finger such as keyboard operation
- Hand, or arm movements such as bricklaying
- Twisting movements, e.g. check out operators
- Squeezing, e.g. using pliers, scissors
- Pushing, pulling, lifting or reaching movements, e.g. assembling packing boxes.
- Work on a production line, e.g., assembly of small components



## Ill Health Effects of Poorly Designed Tasks and Workstations

The ILO (1996) identified the most common injuries and diseases caused by repetitive or poorly designed work.

Injury	Symptoms	Typical causes
<b>Bursitis:</b> Inflammation of the bursa (sack-like cavity) between skin and bone, or bone and tendon.	Pain and swelling at the site of the injury.	Kneeling, pressure at the elbow, repetitive shoulder movements.
<b>Carpal tunnel syndrome:</b> pressure on the nerves, which pass up the wrist	Tingling pain and numbness in the thumb and fingers, especially at night.	Repetitive work with a bent wrist Use of vibrating tools.
<b>Tennis elbow:</b> inflammation of the area where bone and tendon are joined.	Pain and swelling at the site of the injury.	Repetitive work, often from strenuous jobs like joinery, plastering, bricklaying
<b>Tendonitis:</b> inflammation of the area where muscle and tendon are joined.	Pain, swelling, tenderness and redness of hand, wrist and/ or forearm. Difficulty in using the hand.	Repetitive movements.
<b>Trigger finger:</b> inflammation of tendons and/ or tendon sheaths of the fingers	Inability to move fingers smoothly with or without pain.	Repetitive movements. Having to grip too long, too tightly, or too frequently.



## ERGONOMICS AND WORKSTATIONS

Factors Increasing the Risk to Ill-Health Condition As regards to all occupational hazards, the hazard factors revolve around the task, the equipment and the environment where the work is undertaken, and it gets aggravated by individual factors too.

### The Task

- Strenuous pulling or pushing
- Repetitive handling
- Insufficient rest or recovery
- A work rate imposed by the process

### The Environment

- Lighting
- Glare
- Ventilation
- Obstacles
- Temperature
- Space available

### Equipment

- the shape of the equipment and how this affects ease of use
- the scope available for the user to adjust the equipment to suit their personal requirements





## ERGONOMICS AND WORKSTATIONS

Ergonomics is the study of how people, equipment, and their environment interact.

When designing a new workplace, selecting and installing new equipment, or evaluating tasks or procedures, ergonomics should be taken into account.

Inadequately built workstations and repetitive jobs may result in musculoskeletal problems characterized by aches, soreness, swelling, and subpar performance. People are more likely to suffer from work-related upper limb disorders (WRULDs) if they perform repetitive movements, maintain an uncomfortable posture, and lack proper rest breaks.



## CONTROL MEASURES MANY ACTIVITIES INVOLVE SIGNIFICANT ERGONOMIC RISK.

For example, bricklaying on a construction site involves several of the risk factors noted above: the work is repetitive; awkward posture and twisting is necessary; rest periods may be infrequent; and the work area may be extremely cold and windy, or hot, humid and airless. In general terms, the control of ergonomic risk can be achieved by introducing changes to:

- The task and the way that it is done;
- The tools, equipment and machinery; and
- The workplace environment to suit the individuals carrying out the work.



## DISPLAY SCREEN EQUIPMENT(DSE) AND WORKSTATIONS

Eyestrain, headaches, and diseases of the upper limbs have been linked to extended usage of display screens in the workplace.

The Health and Safety (Display Screen Equipment) Rules of 1992 mandate the performance of particular assessments. When an employee is classified as a 'user' (e.g., data inputter, word processor) and a major portion of their day involves repetitive computer use, a thorough evaluation of the workstation and activity must be conducted. Typically, this should be accomplished by the employee completing a self-assessment questionnaire alone or with the support of an occupational nurse. To enable staff to conduct an appropriate evaluation, adequate information and training must be provided



Overseas Industrial Technical Institute  
version 1.3





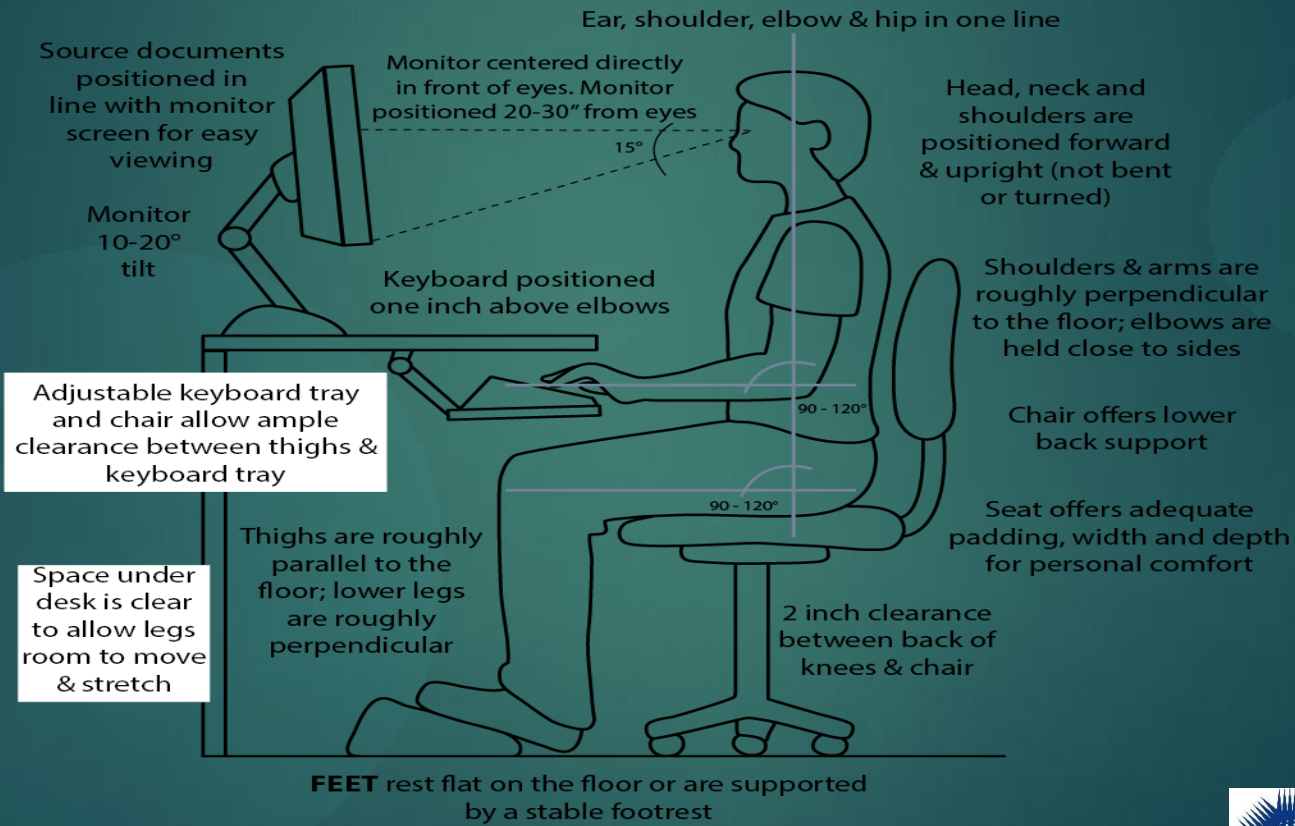
## SEATING AND POSTURE FOR TYPICAL OFFICE TASKS

1. Seat back adjustability
2. Good lumbar support
3. Seat height adjustability
4. No excess pressure on underside of thighs and backs of knees
5. Foot support if needed
6. Space for postural change, no obstacles under desk
7. Forearms approximately horizontal
8. Minimal extension, flexion or deviation of wrists
9. Screen height and angle should allow comfortable head position
10. Space in front of keyboard to support hands/wrists during pauses in keying



# DESIGNING A WORKSTATION

## THE ERGONOMIC WORKSTATION





## HO TO PROTECT WORKERS HEALTH

In law, employers must:

- do a DSE workstation assessment
- reduce risks, including making sure workers take breaks from DSE work or do something different
- provide an eye test if a worker asks for one
- provide training and information for workers

Improper usage of DSE or poorly constructed workstations or work spaces can cause neck, shoulder, back, arm, wrist, and hand pain in addition to weariness and eye strain. The causes may not always be readily apparent.

The law applies if users are, for example:

- at a fixed workstation
- mobile workers
- home workers
- hot-desking (workers should carry out a basic risk assessment if they change desks regularly)



## DESIGNING A WORKSTATION

When designing a workstation the activity and the posture required to carry out that activity should be considered. Ill health can arise from:

- Poor work position and posture;
- High levels of force (e.g. punching holes, undoing tight screws);
- High levels of repetition (e.g. pipetting, typing, assembly work);
- Awkward manual handling tasks;
- Excess bending, stretching or effort.



## DESIGNING A WORKSTATION

To minimize the risk of ill health the following general principles should be applied:

- Assess the task in order to reduce the amount of physical labor required (e.g., automate, employ properly built equipment);
- Determine who will be using the workstation (e.g., able-bodied or impaired, extremely short or tall);
- Whenever possible, maintain a neutral body position (e.g. no twisting of the neck or the back and no bent wrists). This reduces physical stress on the body, and if strength is required, muscles can exert more force in a neutral state.
- Avoid bending the head and neck forward to look at work since this demands the neck to support the head.
- Avoid bending the trunk forward, as this position requires the back and shoulder muscles to support the upper body.
- avert raising your arms and hands;
- avoid twisting of the body;
- permit alterations in posture and movement. Holding the human body in one position for an extended amount of time is unnatural.





**OVERSEAS INDUSTRIAL  
TECHNICAL INSTITUTE**

PROFESSIONAL REQUIRED TODAY.. LET'S MOVE AHEAD WITH US.

17

## 6.2 MANUAL HANDLING

Overseas Industrial Technical Institute  
version 1.3



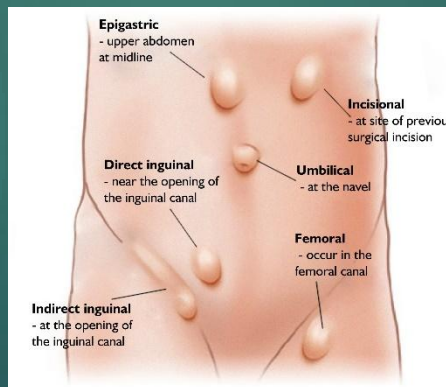
**LEARNING  
PARTNER**

**GOLD**

1584

# COMMON INJURIES CAUSED BY IMPROPER MANUAL HANDLING TECHNIQUES

- ❑ Muscular sprains and strains
- ❑ Back injuries
- ❑ Trapped Nerve
- ❑ Hernia
- ❑ Cuts, Bruising, and Abrasions
- ❑ Fractures
- ❑ Work-Related Upper Limb Disorders (WRULDs)
- ❑ Rheumatism





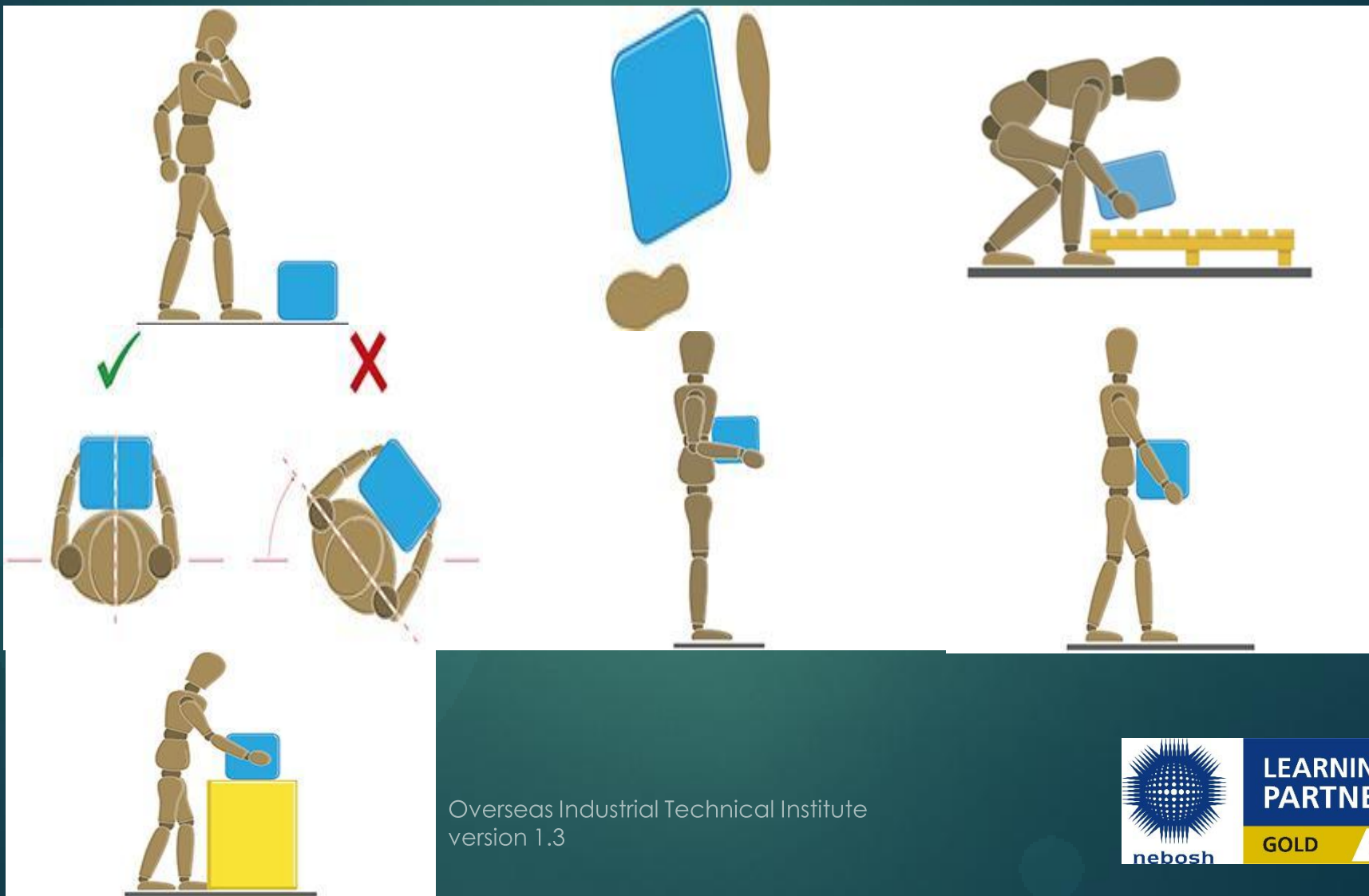
# GOOD HANDLING TECHNIQUE

## How to handle and lift loads?

- Think before handling/lifting
- Keep the load close to your waist
- Adopt a stable position
- Ensure a good hold on the load
- Slight bending of your back, hips and knees
- Don't flex your back any further while lifting
- Avoid twisting your back or leaning sideways
- Keep your head up when handling
- Move smoothly
- Don't lift or handle more than you can easily manage.
- Put down, then adjust



# GOOD HANDLING TECHNIQUE





# AVOIDING/MINIMIZING MANUAL HANDLING RISKS

## What does the law say?

The Manual Handling Regulations list the steps you must take in a clear order to prevent and deal with the risks of dangerous manual handling:

- **avoid** hazardous manual handling operations, 'so far as reasonably practicable';
- **assess** the risk of injury to workers from any hazardous manual handling that can't be avoided;
- **reduce** the risk of injury to workers from hazardous manual handling to as low as reasonably practicable.



## ASSESSING THE RISKS

### Consider risks arising from:

- The task;
- the load;
- The working environment;
- Individual capacity;
- Any materials handling equipment or handling aids used;
- How you organize and allocate work;
- The pace, frequency and duration of the work.



# RISKS AND CONTROLS

## RISKS

### The tasks

Do they involve?

- Holding loads away from the body?
- twisting, stooping or reaching upwards?
- Large vertical movement?
- Long carrying distances?
- Action pushing or pulling?
- Repetitive handling?
- Risk of sudden movement of loads?
- Insufficient rest or recovery time?
- A work rate imposed by a process?





# RISKS AND CONTROLS

## RISKS

### The loads

Are they:

- Heavy or bulky?
- Difficult to grasp?
- Unstable or likely to move unpredictably?
- Harmful, e.g. sharp or hot?
- awkwardly stacked?
- Too large for the handler to see over?







# RISKS AND CONTROLS

## RISKS

### **The working environment**

Are there:

- 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)?



# RISKS AND CONTROLS

## RISKS

### **Individual capacity**

Does the job:

- require unusual capability, eg above average strength or agility?
- pose a risk to those with a health problem or learning/physical disability?
- pose a risk to new or expectant mothers?
- pose a risk to new or young workers?
- Call for special information or training?



# RISKS AND CONTROLS

## RISKS

### Handling aids and equipment

Consider:

- 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?



# RISKS AND CONTROLS

## RISKS

### Work organization factors

Consider:

- is the work repetitive?
- is the work machine or system-paced?
- Do workers feel the demands of the work are excessive?
- Do workers have little control of the work and working methods?
- is there poor communication between managers and workers?



# RISKS AND CONTROLS

## CONTROLS

### The tasks

Can you:

- use a lifting aid
- change 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
- use powered handling devices to eliminate pushing and pulling
- avoid repetitive handling
- take steps to reduce fatigue
- vary the work, allowing one set of muscles to rest while another is used



# RISKS AND CONTROLS

## CONTROLS

### The loads

Can you make the load:

- Lighter or less bulky?
- Easier to grasp?
- More stable?
- Less harmful?
- evenly stacked?

If the load comes in from elsewhere, have you asked the supplier to help, eg by providing handles or smaller packages?



# RISKS AND CONTROLS

## CONTROLS

### The working environment

Can you:

- remove obstructions to free movement?
- provide better flooring and/or slip resistant footwear?
- avoid steps and steep ramps?
- prevent extremes of hot and cold?
- improve ventilation?
- improve lighting?
- provide suitable protective clothing or PPE that is less restrictive?



# RISKS AND CONTROLS

## CONTROLS

### **Individual capacity**

Can you:

- consider the design of the task?
- pay particular attention to those who have a physical weakness?
- take extra care of, e.g. new or expectant mothers and new/young workers?
- give your workers more information, e.g. about the range of tasks?
- provide more training?
- get advice from an occupational health advisor if you need to?





# RISKS AND CONTROLS

## CONTROLS

### Handling aids and equipment

Can you:

- provide equipment that is more suitable for the task?
- carry out planned preventive maintenance to prevent problems?
- change the wheels, tyres and/or flooring so that equipment moves easily?
- provide better handles and handle grips?
- make the brakes easier to use, reliable and effective?



# RISKS AND CONTROLS

## CONTROLS

### **Work organization factors**

Can you:

- change tasks to increase variety?
- adjust the work rate?
- make more use of workers' skills?
- make workloads and deadlines more achievable?
- involve workers in decisions?
- encourage good communication and teamwork?
- provide better training and information?



## 6.3 LOAD-HANDLING EQUIPMENT



# MANUALLY OPERATED LOAD HANDLING EQUIPMENT

Types of manually operated load handling equipment are-

- simple tools;
- wheelbarrows;
- trucks and trolleys;
- roller tracks and chutes;
- pallet trucks;
- Various types of hoists that can be used to lift people as well as other loads.



# MANUALLY OPERATED LOAD HANDLING EQUIPMENT





# TYPES OF MECHANICAL HANDLING AND LIFTING EQUIPMENT

- Conveyors and elevators
- Forklift Trucks
- Cranes





## CONVEYORS AND ELEVATORS

- Elevators take loads from one level or floor to another, whereas conveyors move things along a level that may not be perfectly horizontal. Belt, roller, and screw conveyors are three main types of conveyors. The most prevalent dangers and precautionary actions are: the in-running nip, where a hand is trapped between the rotating rollers and the belt. Protection from this hazard can be provided by nip guards and trip devices;
- entanglement with the power drive requiring the fitting of fixed guards and the restriction of loose clothing which could become caught in the drive;
- loads falling from the conveyor. This can be avoided by edge guards and barriers;
- impact against overhead systems. Protection against this hazard may be given by the use of bump caps, warning signs and restricted access;
- contact hazards prevented by the removal of sharp edges, conveyor edge protection and restricted access;
- manual handling hazards;
- noise and vibration hazards.

Screw conveyors, which are frequently used to transport highly viscous materials, must be equipped with either fixed guards or coverings to prevent unauthorized access. Humans should not be allowed to ride on belt conveyors, and emergency trip wires or stop buttons must be installed and always functional. Elevators are used to carry things between floors, such as transporting building blocks to upper floors during construction or grain sacks into a barn loft.

It is necessary to install guards at both ends of the elevator and around the power drive. The most prevalent hazard is injuries caused by falling cargo from elevators. There are also potential manual handling issues at both the elevator's feed and discharge ends.



## FORKLIFT TRUCKS

There are many hazards associated with the use of fork-lift trucks.

These include:

- overturning - high-speed maneuvering; wheels striking an object such as a curb; rapid braking; bad tyre condition leading to skidding; driving forwards down a ramp; movement of the cargo; insecure, excessive, or unequal loading; inappropriate tilt or driving along a ramp; overloading – exceeding the rated capacity of the machine;
- collisions, particularly with warehouse racking, which can cause the entire racking structure to collapse;
- the electrically powered forklift's stealthy operation can render passersby unaware of its existence;
- uneven road surface - can induce car rollover and/or musculoskeletal issues in the driver;
- overhead obstructions – a particular problem for inexperienced drivers;
- loss of load – shrink wrapping or sheeting will reduce this hazard;
- inadequate maintenance leading to mechanical failure;
- use as a work platform;
- speeding – strict enforcement of speed limits is essential;
- poor vision around the load;
- pedestrians – particularly when pedestrians and vehicles use the same roadways. Warning signs, indicating the presence of fork-lift trucks, should be posted at regular intervals;
- dangerous stacking or de-stacking technique – this can destabilize a complete racking column;
- carrying passengers – this should be a disciplinary offence;
- battery charging – presents an explosion and fire risk;
- fire – typically the result of improper maintenance leading in fuel leaks or engine/motor failure, or the use of an inadequate forklift in places where flammable substances or gases are utilized or stored;
- lack of driver training.





## FORKLIFT TRUCKS

There are also the following physical hazards:

- noise – caused by poor silencing of the power unit;
- exhaust fumes – should only be a problem when the maintenance regime is poor;
- vibrations – often caused by a rough road surface or wide expansion joints. Badly inflated tyres will exacerbate this problem;
- manual handling – resulting from manoeuvring the load by hand or lifting batteries or gas cylinders;
- ergonomic – musculoskeletal injuries caused by soft tyres and/or undulating road surface or holes or cracks in the road surface (e.g. expansion joints).



Overseas Industrial Technical Institute  
version 1.3



**LEARNING  
PARTNER**

**GOLD**

1584



## PRECAUTIONS

Regular and documented maintenance by competent mechanics is essential. However, the driver should undertake the following checks at the beginning of each shift:

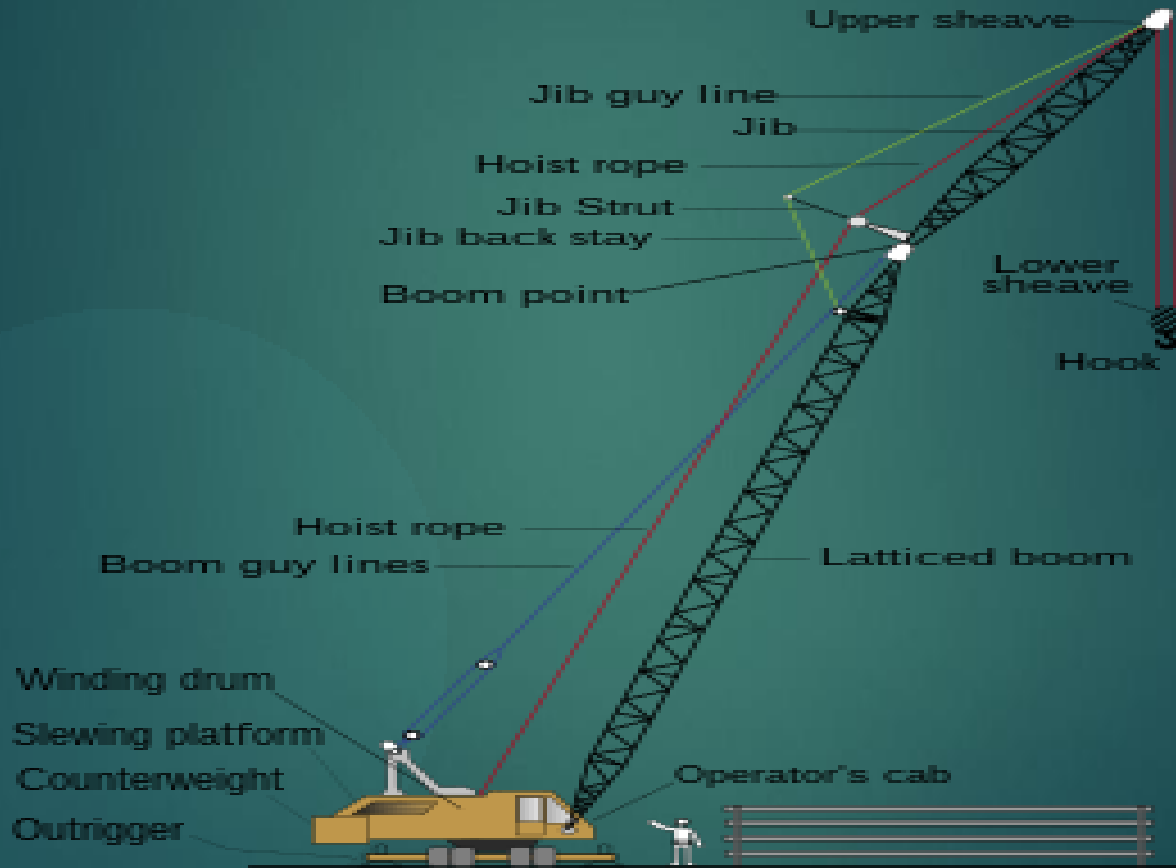
- condition of tyres and correct tyre pressures;
- effectiveness of all brakes;
- audible reversing horn and light working properly;
- lights, if fitted, working correctly;
- mirrors, if fitted, in good working order and properly set;
- secure and properly adjusted seat;
- correct fluid levels, when appropriate;
- fully charged batteries, when appropriate;
- correct working of all lifting and tilting systems.

Each week, a competent member of the organization should do a more thorough check that includes the mast and steering gear. Driver training is required and must be provided by a qualified instructor. The training session must include the site's rules, including the organization's forklift truck driver code of conduct, speed limitations, stacking processes, and reversing rules. Regular refresher training should be provided, and a complete record of all training received should be maintained.

Final consideration must be given to the selection of drivers, which must include relevant health tests and prior experience. Drivers must be at least 18 years old, and their fitness to operate a motor vehicle must be evaluated periodically (every five years after the age of 40 and every year after the age of 65 (HSG6)).



# CRANES





## THE PRINCIPAL REASONS FOR CRANE FAILURE

- overloading;
- poor slinging of load;
- insecure or unbalanced load;
- overturning;
- collision with another structure or overhead power lines;
- foundation failure;
- structural failure of the crane;
- operator error;
- lack of maintenance and/or regular inspections;
- no signaller used when driver's view is obscured;
- incorrect signals given.



# TYPICAL CAUSES OF RECENT SERIOUS INCIDENTS WITH CRANES

- mechanical failure of the brake or lifting ram;
- overturn of the crane;
- jib collapse;
- a load or dropped load striking a worker;
- sling failure.

The reasons for some of these incidents are:

- poor site induction training – not dealing with site specific risks and lasting too long (20–30 minutes maximum is sufficient time);
- problems with crane maintenance and thorough examinations;
- operators working long hours without a break;
- poor operator cabin design and too high a climbing distance;
- operator health problems;
- problems in communicating health and safety issues by crane operators on site.



# SAFETY PRECAUTIONS

During lifting operations using cranes, it must be ensured that:

- the driver has good visibility;
- there are no pedestrians below the load by using barriers, if necessary;
- an audible warning is given prior to the lifting operation.

The key aspects that apply to all cranes are:

1. Planning of safe lifting operations by a competent individual based on a thorough risk assessment;
2. Safe work procedures for installation, operation, and dismantling. The primary components of the safe system or method statement are as follows:
  - planning – involving site preparation, crane installation, and removal;
  - Selection, procurement, and usage of an appropriate crane and work equipment, including safe slinging and signaling procedures;
  - Maintenance and examination of the crane and equipment; Use ASLI (Automatic Safe Load Indicators)
  - Provision of properly trained and competent personnel;
  - Supervision of operations by individuals with the required authorities;
  - Thorough examinations, reports and other documents;
  - preventing unapproved use or movement of the crane; and
  - Ways to ensure the safety of individuals who are not lifting.
3. Monitoring of all lifting activities; and
4. The thorough examination of the crane and, when required, the notification of the HSE.



## END OF SESSION QUIZ

1. What does WRULD stand for  
(Choose the correct option)

1. Work related upper Land Disorders
2. Work Related Upper Limb Disorders



## END OF SESSION QUIZ

Which of the following is a type of WRULD?

(Choose the correct answer)

1. Hernia
2. Fracture
3. Carpal Tunnel Syndrome





## END OF SESSION QUIZ

Forklifts are access equipment used as working platforms  
(Choose the correct option)

1. True
2. False



## END OF SESSION QUIZ

Which of the following is a factor to be considered while determining the manual handling risk?

(Choose the correct answer)

1. Building size
2. The Individual capability



## END OF SESSION QUIZ

What does ASLI stand for?

(Choose the correct answer)

1. Automatic safe line indicator
2. Automatic safe load indicator