

# COURSE

## SAFETY IN CONSTRUCTION INDUSTRY

BSS –DIPLOMA & Adv. Diploma

# UNIT-I

## INTRODUCTION TO CONSTRUCTION SAFETY

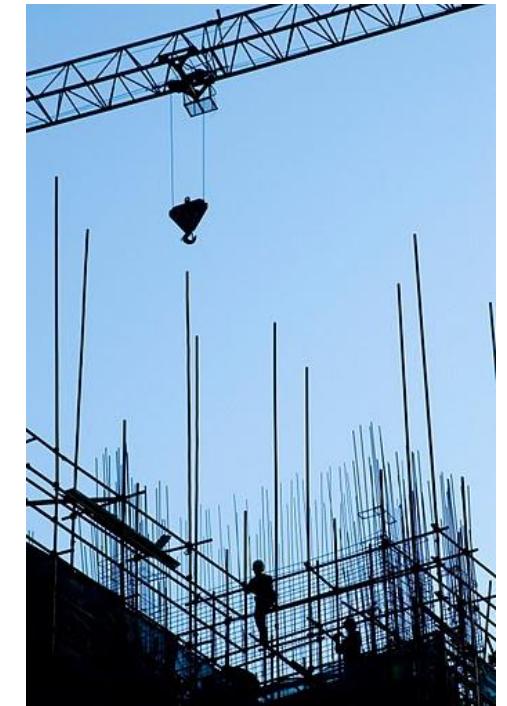
### Scope of Construction

- **Construction includes:**

- Building works
- Renovations
- Maintenance activities
- Demolition work

- **Covered by ILO standards:**

- Safety and Health in Construction Convention 1988 (C167)
- Safety and Health in Construction Recommendation 1988 (R175)



# **Construction Hazards**

**Falls from height**

**Fragile roofs**

**Falling objects, slips, trips**

**Excavations**

**Demolition**

**Explosives**

**Working in or over water**

**Working in tunnels**

**Vehicles**

**Traffic movements**

**Plant and equipment**

**Doors and gates**

**Lighting & Weather**

**Stability**

**Fire**

**Material storage**

# Excavation

Excavation – a man-made cut, cavity, trench, or depression formed by earth removal.

Whether you want to construct a commercial or a residential building, roadways, bridges, or install pipes and underground utility lines, the land needs to be inspected and prepared to ensure it provides a strong foundation. Excavation is an important part of any construction project. The process uses different tools and techniques to move soil, rock, and other material to form a cavity and prepare the area for construction. Building companies use several different types of excavation in construction. The type of excavation used depends on the material used and the purpose.

# **Excavation by Material**

## **Topsoil Excavation**

As the name suggests, this type of excavation involves the removal of the exposed or the topmost area of the earth's surface. The excavation method removes vegetation, soil, and any other decaying material that could make the land unsuitable to bear structural loads.

## **Rock Excavation**

This type of excavation is used to clear surfaces; like the rocky surfaces that impede the building process. Rock excavation is highly challenging as compared to the other types. This is because it cannot be done without the use of special equipment and techniques like drilling or blasting to remove the rock or clear a tough surface.

## **Muck Excavation**

Muck, the combination of soil and water, is often undesirable during construction and needs to be removed. Muck excavation is named after the material being removed. The muck is either moved to another area or spread out to dry.

## **Earth Excavation**

To create a foundation for buildings and bridges or construct drainage ditches various layers of earth need to be removed. Earth excavation includes the removal of soil; the layer below the topsoil, for the purpose of construction.

# **Excavation by Purpose**

## **Cut and Fill Excavation**

Also known as stripping excavation, this type of excavation in construction is used to clear large areas. The process involves the removal of wide and shallow layers of topsoil, rocks, sand, and other unwanted materials. The procedure may also include grading the land.

## **Trench Excavation**

In this type of excavation, the length of the excavated area exceeds the depth. Trench excavation is typically used to bury service lines, to install pipelines and sewer systems, or lay foundations. Shallow trenches of less than 6m or deep trenches of more than 6m are done using this type of excavation. The techniques used for this type is dependent on factors like the purpose, ground conditions, number of obstructions, and so on.

## **Basement Excavation**

Basement is typically the area below the ground level. This type of excavation is used when the construction is to be done at least partially below the ground level. Depending on the size of the property, this type of excavation can be complicated.

## **Dredging**

Sediment deposits can build up over time under water making construction, as well as the passage, difficult. The process of dredging involves excavating and removing sediments and debris from underwater to allow boats and ships to pass easily and for other construction purposes.

# Excavation Hazards

**Cave-ins are the greatest risk**

Other hazards include:

- ❖ Asphyxiation due to lack of oxygen
- ❖ Inhalation of toxic materials
- ❖ Fire
- ❖ Moving machinery near the edge of the excavation can cause a collapse
- ❖ Accidental severing of underground utility lines
- ❖ Water accumulation
- ❖ Access/Egress
- ❖ Falls
- ❖ Mobile equipment
- ❖ Over Running Of Vehicles
- ❖ Persons Falling Into The Excavation
- ❖ Materials Falling Into Excavations
- ❖ Undermining Adjacent Structures

# Water is Hazardous



**When water is present in an excavation it is extremely hazardous to enter**

**Note that these workers are not wearing hardhats to protect them from materials falling into the trench**

# Water = Cave-in Hazard



**These workers must be protected from cave-in.  
Note the water in the bottom of the trench.  
This is a very hazardous condition!**

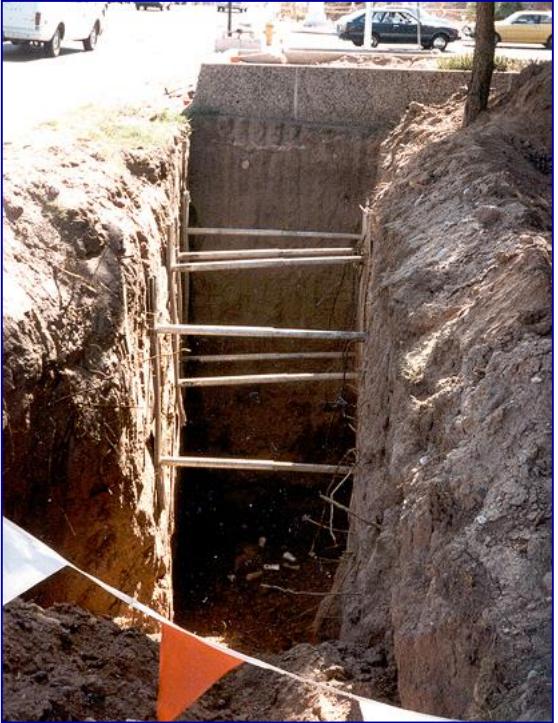
# Hazardous Atmosphere



Test excavations more than 4 feet before an employee enters the excavation for:

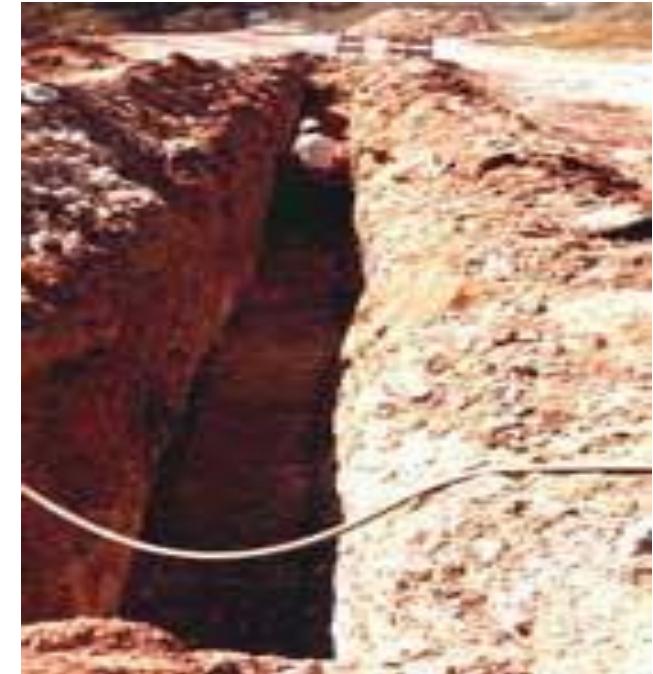
- ❖ **Oxygen deficiency**
- ❖ **High combustible gas concentration**
- ❖ **High levels of other hazardous substances**

# Cave-in Hazard



This excavation has inadequate support posts and egress access

Inadequate protective system



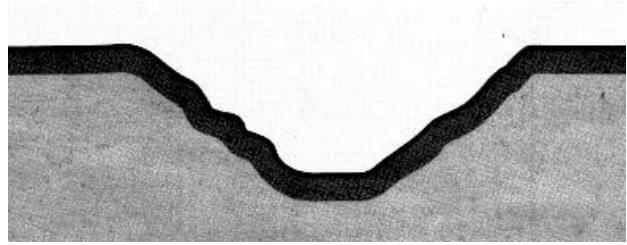
This worker is in a trench with no protective system, that is not sloped or benched and has no means of egress

# PREVENTIVE MEASURES

- ❖ PROPER INSPECTION
- ❖ PROVIDE SIGN BOARD
- ❖ BARRICADING
- ❖ SUITABLE SIDE WALL PROTECTION SYSTEM (SLOPING & BENCHING, SHORING, SHIELDING)
- ❖ DE-WATERING SYSTEM
- ❖ PROPER PPE
- ❖ CONDUCT GAS TEST (O<sub>2</sub>, CO, H<sub>2</sub>S, METHANE )
- ❖ REMOVED SOIL AWAY FROM THE SIDE
- ❖ ACCESS LADDER
- ❖ EFFECTIVE TRAINING ON EXCAVATION SAFETY
- ❖ EFFECTIVE SUPERVISION
- ❖ COMPETENT USERS
- ❖ PLAN OF THE AREA
- ❖ DETECTION EQUIPMENT, E.G. METAL DETECTORS & CABLE DETECTORS



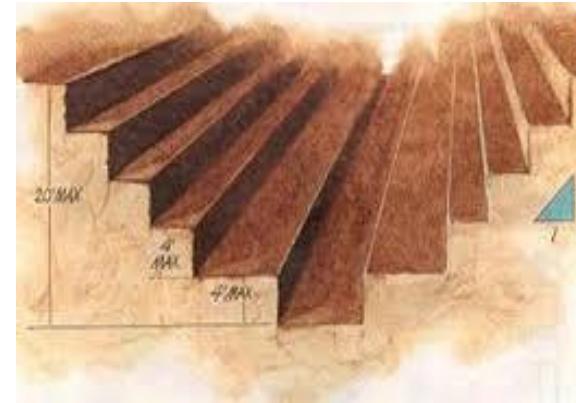
# Precautions Prevention of Collapse



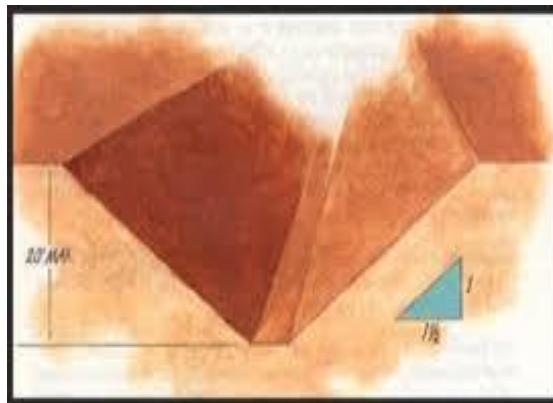
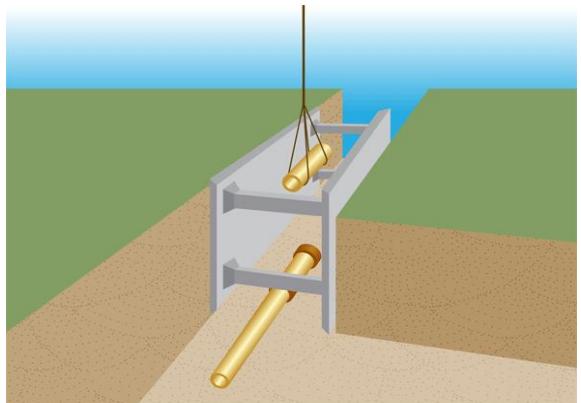
Battering



Shoring



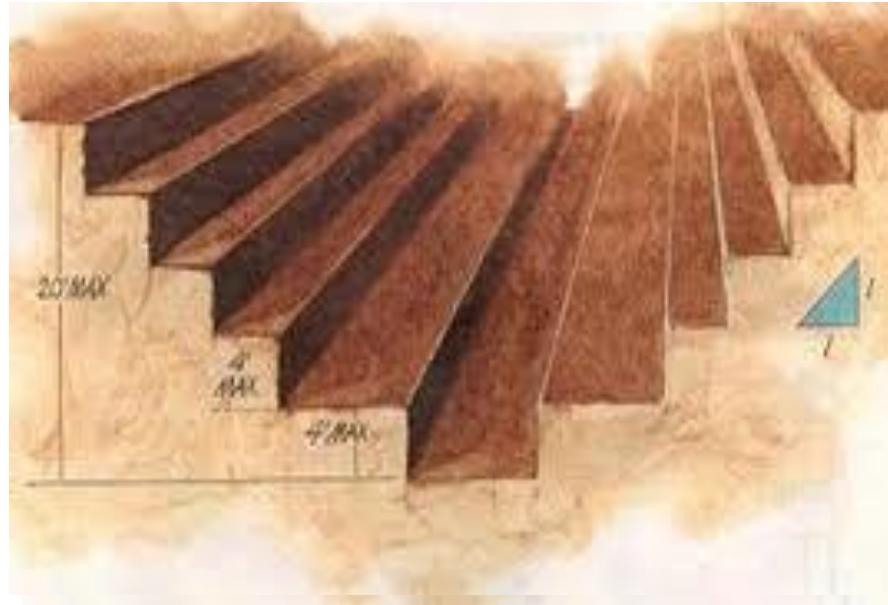
Trench box



# EXCAVATION PROTECTION SYSTEM

## BENCHING

- A METHOD OF PROTECTING EMPLOYEES FROM CAVE-INS BY EXCAVATING THE SIDES OF AN EXCAVATION TO FORM ONE OR A SERIES OF HORIZONTAL STEPS



# EXCAVATION PROTECTION SYSTEM

## SHORRING

- HYDRAULIC, TIMBER OR MECHANICAL SYSTEM THAT SUPPORT THE SIDES OF AN EXCAVATION , DESIGNED TO PREVENT CAVE-INS



# **EXCAVATION PROTECTION SYSTEM**

## **SHIELDING**

- A STRUCTURE THAT IS ABLE TO WITH STAND THE FORCES IMPOSED ON IT BY CAVE-INS, AND IN THE PROCESS, PROTECTS EMPLOYEES INSIDE THE STRUCTURE



# Factors Involved in Designing a Protective System

- Soil classification
- Depth of cut
- Water content of soil
- Changes due to weather and climate
- Other operations in the vicinity



# Shoring

- General
  - Provides a framework to work in
  - Uses Wales, cross braces and uprights
  - Supports excavation walls
- OSHA tables provide shoring data
  - Must know soil type
  - Must know depth and width of excavation
  - Must be familiar with the OSHA Tables

# Trench Shield



A trench shield was built around this work area

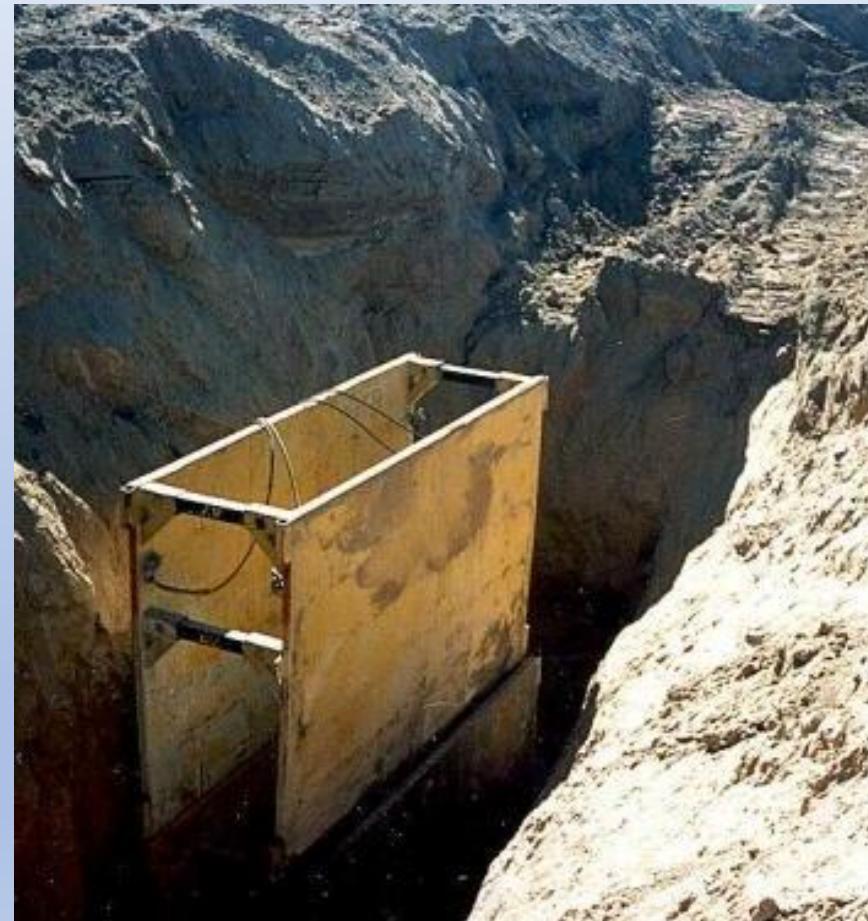
# Hydraulic Trench Support



- Using hydraulic jacks the operator can easily drop the system into the hole
- Once in place, hydraulic pressure is increased to keep the forms in place
- Trench pins are installed in case of hydraulic failure

# Materials and Equipment

- **Equipment** used for protective systems must not have damage or defects that impair function.
- **If equipment is damaged**, the competent person must examine it to see if it is suitable for continued use.
- **If not suitable**, remove it from service until a professional engineer approves it for use.



# Protection from Vehicles

- Install barricades
- Hand/mechanical signals
- Stop logs
- Grade soil away from excavation
- Fence or barricade trenches left overnight



# Spoils

- Don't place spoils within 2 feet from edge of excavation
- Measure from nearest part of the spoil to the excavation edge
- Place spoils so rainwater runs away from the excavation
- Place spoil well away from the excavation



# **SITE CONDITION SHALL BE CHECKED BEFORE STARTING EXCAVATION**

- TRAFFIC
- NEAREST STRUCTURES AND THEIR CONDITION
- SOIL TEST
- OVER HEAD AND UNDER GROUND UTILITIES ( TELEPHONE LINES,ELECTRONIC LINES,WATER LINES, OTHER PIPE LINES )

# EXCAVATION

## PROTECTION OF PEOPLE FALLING

- BARRICATION AND TOE BOARD
- GOOD LIGHT AND SIGN
- CROSSING POINT
- ACCESS LADDER
- LADDER TO EXTANTS 1 MTR ABOVE EDGS OF EXCAVATION



# EXCAVATION

- **PROTECTION FROM VEHICLES**

- FENCE OR BARRICATION
- HAND OR MECHANICAL SIGNAL
- STOP LOGS
- GRADE SOIL AWAY FROM EXCAVATION
- GOOD LIGHTS



# Protection from Falls, Falling Loads, and Mobile Equipment

- Install barricades
- Use hand / mechanical signals
- Grade soil away from excavation
- Fence or barricade trenches left overnight
- Use a flagger when signs, signals and barricades are not enough protection

# Competent Person

**Must have had specific training in and be knowledgeable about:**

- Soils classification
- The use of protective systems
- The requirements of the standard

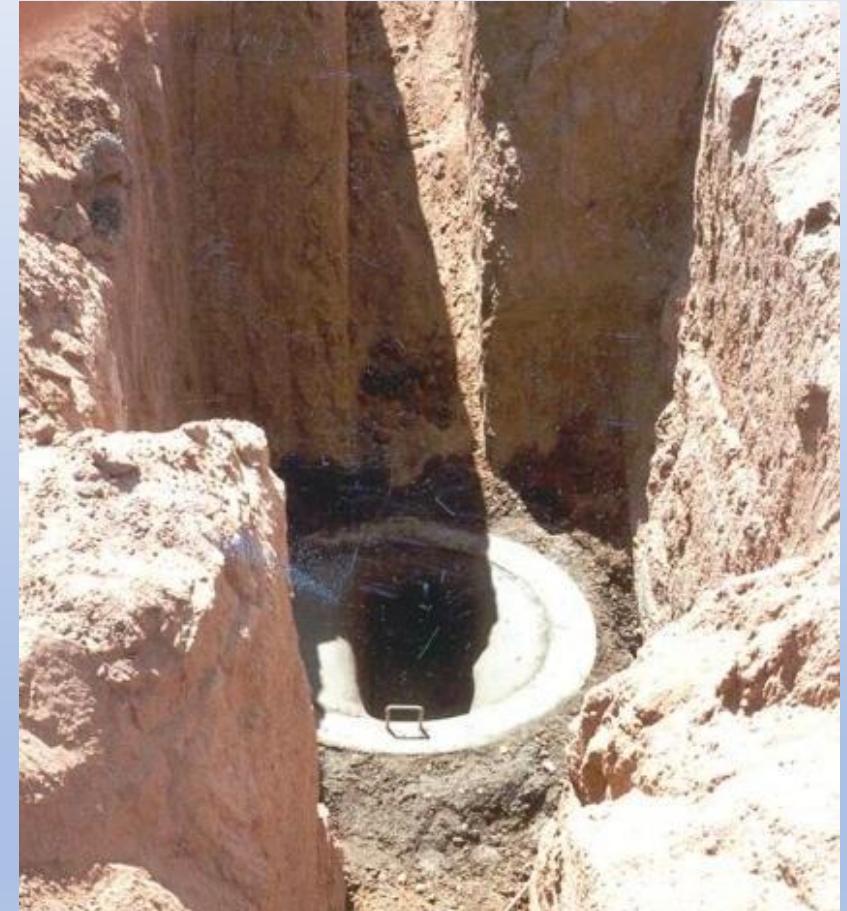
**Must be capable of identifying hazards, and authorized to immediately eliminate hazards**



# Inspections of Excavations

A competent person must make daily inspections of excavations, areas around them and protective systems:

- Before work starts and as needed,
- After rainstorms, high winds or other occurrence which may increase hazards, and
- When you can reasonably anticipate an employee will be exposed to hazards.



# Inspections of Excavations

If the competent person finds evidence of a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions:

- ❖ Exposed employees must be removed from the hazardous area
- ❖ Employees may not return until the necessary precautions have been taken



# Site Evaluation Planning

Before beginning excavation:

- Evaluate soil conditions
- Construct protective systems
- Test for low oxygen, hazardous fumes and toxic gases
- Provide safe in and out access
- Contact utilities
- Determine the safety equipment needed



# What is Piling?

Piling is defined as being foundations that are driven or bored through the ground along a certain length of area to carry and transfer loads to soil considered to be weak in structure due to the soil conditions. Essentially this means that piles are generally used when the bearing capacity of the soil is considered to be inadequate for the structural load of heavy construction. The piles transfer the load to the solid ground located at a depth.

# Means of Egress

A stairway, ladder, or ramp must be present in excavations that are 4 or more feet deep, and within 25 feet of the employees



**The ladder should extend 3 feet above the excavation**

# Access and Egress



**These two ladders which are lashed together are not an adequate means of egress**

**The ladder should extend 3 feet above the top of the excavation**

# **EXCAVATION**

- **GENARAL TIPS**

- ANY EXCAVATION OR TRENCH 4 FEET OR DEEPER SHALL BE CONSIDERED ON A CONFINED SPACE
- IF THE WORK ARROUND THE TRAFFIC PEDESTRIAN SAFETY VERY IMPORTANT
- A COMBITANT PERSON INSPECT EXCAVATION ON DAILY CHECK ADJACENT AREA FOR POSSIBLE CAVE-IN FAILAURE OF PROTECTIVE SYSTEM AND EQUIPMENT, HAZHADOUS ATMOSPHERE OR OTHER HAZARDOUS CONDITION.
- IDENTYFY THE UNDER GROUND UTILITIES BY USING SITE MAP, UTILITIES DETECTORS, SIGN BOARD AND ROUTE MARKS

# Summary

- The greatest risk in an excavation is a cave-in.
- Employees can be protected through sloping, shielding, and shoring the excavation.
- A competent person is responsible to inspect the excavation.
- Other excavation hazards include water accumulation, oxygen deficiency, toxic fumes, falls, and mobile equipment.

## UNIT-II

### INTRODUCTION TO FABRICATION YARD

**Metal fabrication** is the creation of metal structures by cutting, bending and assembling processes. It is a value-added process involving the creation of machines, parts, and structures from various raw materials.

Typically, a fabrication shop bids on a job, usually based on engineering drawings, and if awarded the contract, builds the product. Large fab shops/yard employ a multitude of value-added processes, including welding, cutting, forming and machining.

As with other manufacturing processes, both human labor and automation are commonly used. A fabricated product may be called a *fabrication*, and shops specializing in this type of work are called *fab shops/yard*.

# HOT WORK

## DEFINITION

- ANY WORK WHICH INVOLVE THE USE OF NAKED FLAME OR A SOURCE OF IGNITION OR SPARK GENERATING POTENTIAL, CAPABLE OF IGNITING A COMBUSTIBLE OR EXPLOSIVE MATERIALS IS CLASSIFIED AS HOTWORK



# **Hot Work - Potential Hazardous Consequences**

## **Property Damage (Fire / Explosion)**

- Creating an ignition source (flame, heat, sparks, non-intrinsically safe equipment, molten metal or direct flames) in a combustible atmosphere (flammable materials/vapors) leading to fire or explosion.
  - Caution must be taken when working near openings or cracks in walls, flooring, open doorways and windows.
- Impinging heat to surrounding process equipment, causing possible thermal expansion resulting in the release of hydrocarbons,
- Arc from welding, possibly setting off fire detection / mitigation systems (i.e., deluge systems, alarms resulting in possible unit shut downs, etc.)
- Interference with other simultaneous work in close proximity (e.g., work involving breaking containment and potential release of combustible gases while hot work is present.)

# Hazards associated with welding equipment:

- Damage and defective parts, if not replaced prior to start of the job
- Improper grounding
- Oxy-fuel equipment
  - If oxy-acetylene cylinders do not have sufficient material in the cylinders pre-or to start of the job, backflow can happen if one cylinder goes empty during operation which can cause:
    - A system pressure imbalance.
    - Mixing of oxy and fuel inside the hose.
  - Flashback caused by reverse flow of gas through the torch and back through to the hose, regulator and/or cylinder, potentially causing an explosion
  - Fire or explosion caused by ignition of flammable/combustible vapors/materials present in processing equipment such as tanks, vessels and piping, etc., that have void spaces or liners (i.e., double-walled tanks and piping, double-bottom tanks)

# Personal Injury (Safety / Human Health)

Hot work presents direct personnel hazards to those involved in the task, or working nearby.

- Skin/eye burns and electric shock are potential direct hazards. A hot surface or a spark can burn skin, either by contact or from radiated heat. The eyes are particularly sensitive to burning, including that from light radiation - “arc eye”.
- Potential of personnel overexposure to welding or flame cutting fumes, especially:
  - If ventilation is inadequate.
  - Inappropriate or insufficient PPE.
- Injuries from sparks, etc., to personnel working in the area or passing nearby (or at a lower level below the work) may occur if the area is not properly isolated or access is restricted and there is no additional protection such as a fire blanket.
  - While the direct hazards of hot work are important, the risks from fires and explosions are typically more significant, especially in operational areas.

## **Chemical Release / Environmental Impact (On-Site)**

In addition to the Property Damage and Personal Injury consequences stated above, facilities must also consider the potential for escalation that could result in environmental damage or additional personal injuries occurring on-site.

- Environmental damage due to releases to the air, soil, or bodies of water resulting from hot work related fires, explosions, equipment damage, etc.
- Personnel injuries due to the release of flammable, combustible vapors, or toxic materials due to products of combustion resulting from hot work related fires.
- Personal injuries due to fire escalation or explosions resulting from hot work related fires.

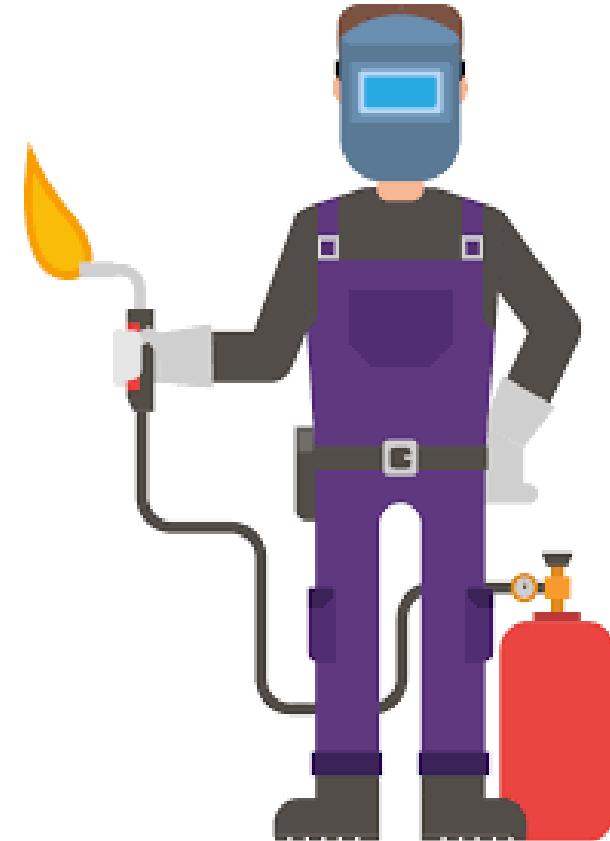
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- Personal injuries due to fire escalation or explosions resulting from hot work related fires.

## SAFETY ARRANGEMENTS

- BOOTH PREPARATION
- PROPER INSPECTION
- CHECK THE HOT WORK PERMIT
- TEST FOR OXYGEN LEVEL
- TEST FOR LEL
- TRAINED/ EXPERIENCED WORKER
- PROPER SUPERVISION
- KEEP COMBUSTIBLE AWAY
- FIRE WATCH AND SUITABLE EXTINGUISHER
- PROPER VENTILATION & ILLUMINATION
- PROPER HOUSEKEEPING



## Blasting Procedure

- The Blast Cleaning Abrasive shall be Natural Garnet, which shall be dry and free of oil, grease and other harmful materials at the time of use.
- All areas that can be injured by the blast shall be protected by suitable masking.
- Clean, dry compressed air shall be used for nozzle blasting. Moisture separators, oil separators, traps or other equipment may be necessary to achieve this requirement.
- The minimum pressure at the nozzle of the pressure type blasting machine should be 80-100 psi.
- Material being blasting shall have at least 3 degree above the dew point.
- Blasting shall not be carried-out if Relative Humidity is above 85%.

- Blast angle should be as close perpendicular as possible but in no case greater than  $\pm 30^{\circ}$  to the work surface. Over blasting must be avoided.
- Clean, dry and oil free air shall be used to remove grit from the blasted area after blasting. It may be necessary by soft brush or by vacuum cleaning.
- The blasted area shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint oxides, corrosion products and other foreign matter.
- The surface shall be uniformly blasted to Sa 2½ for External surfaces and Sa 3 for Internal surfaces as per the Scope of work.
- Only clean gloves, rags or slings shall be used in handling blasted materials or in contact with blasted surfaces.
- Clean, dry, oil free air shall be used to remove grit from the vessels after blasting. It may be necessary to clean by brushing or vacuuming.

- INSPECT TOOLS AND EQUIPMENTS
- ELECTRIC DEVICE- INSULATED AND EARTHED
- GAS CYLINDER- UP RIGHT POSITION
- GAS REGULATOR AND PRESSURE GAUGE- GOOD CONDITION
- FLASH BACK ARRESTOR
- FIRST-AID KIT
- BARRICADE AND SIGN BOARD



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# FIRE WATCH

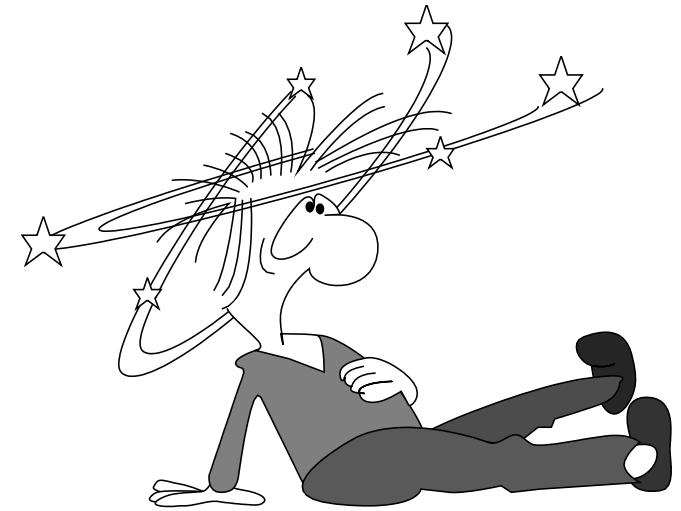
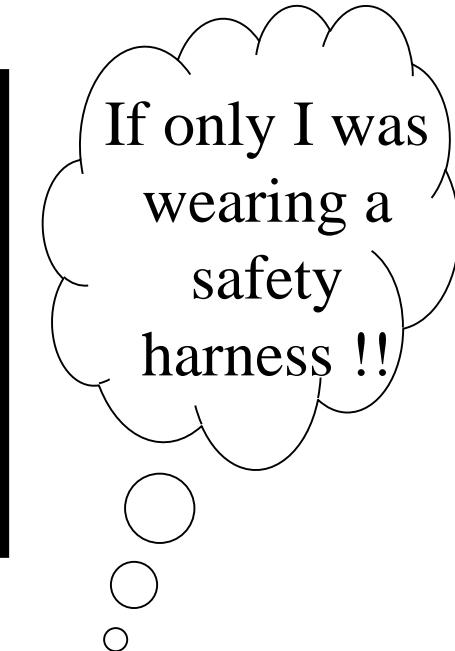
- **DEFINITION**
- A PERSON WHO IS ASSIGNED AS LOOKOUT IN HOT WORK JOB

E.g. WELDING  
CUTTING  
GRINDING



## UNIT – III

### INTRODUCTION TO WORK AT HEIGHT



## DEFINITION

WORK THERE IS A RISK OF FALL  
LIABLE TO CAUSE INJURY

ANY WORK ABOVE 1.8 METER FROM  
GROUND IS CONSIDERED WORK AT  
HEIGHT



- Work at height means work in any place where, if precautions were not taken, a person could fall down and injure themselves.
- Work above ground level.
- Working near a floor opening or unprotected edge



## Examples of working at height

- Using working platforms such as scaffolds, tower.
- Scaffolds, cherry pickers, scissor lifts and podium steps.
- Work on a roof, piece of plant or equipment.
- Using ladders or stepladders.



# **WORK AT HEIGHT**

- **HAZARDS OF WORK AT HEIGHT**

- VERTICAL HEIGHT
- FALLING MATERIALS
- WEATHER
- UN PROTECTED EDGS
- SLOPPING ROOFS



# **WORK AT HEIGHT**

- **RESULT OF FALLING FROM HEIGHT**

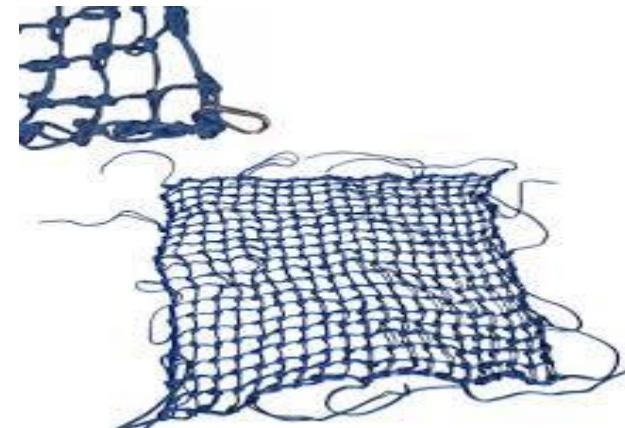
- FATALITY
- SPINAL INJURY
- MULTIPLE BROKEN BONES



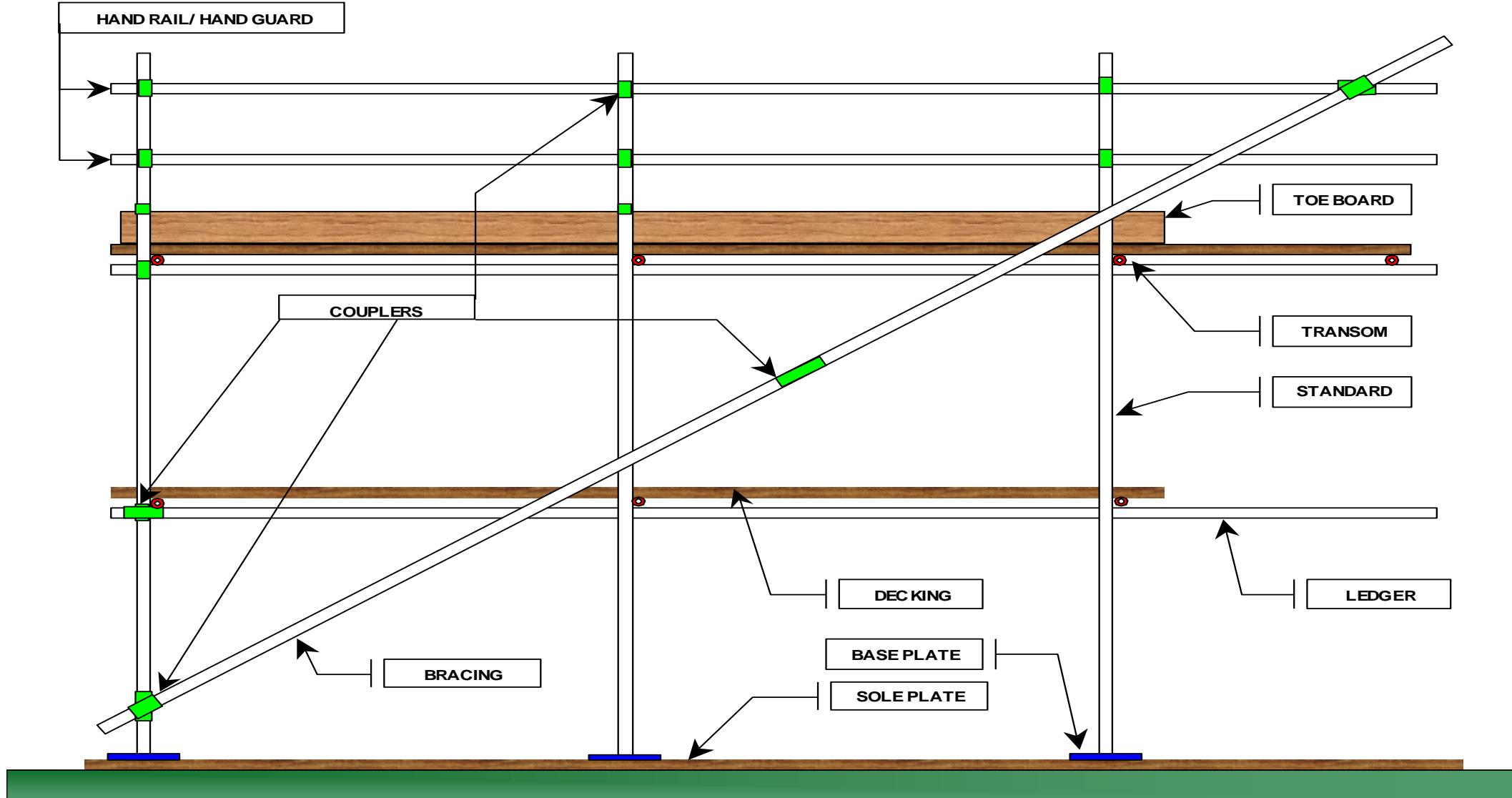
# **WORK AT HEIGHT**

## **CONTROL MEASURE FOR WORKING AT HEIGHT**

- TRAINING
- BARRICATION
- FULL BODY HARNESS
- SAFETY NETS
- PFAS-PERSONAL FALL ARREST SYSTEM
- GUARD RAILS



# SCAFFOLDING



# **SCAFFOLDING**

## **DEFINITION**

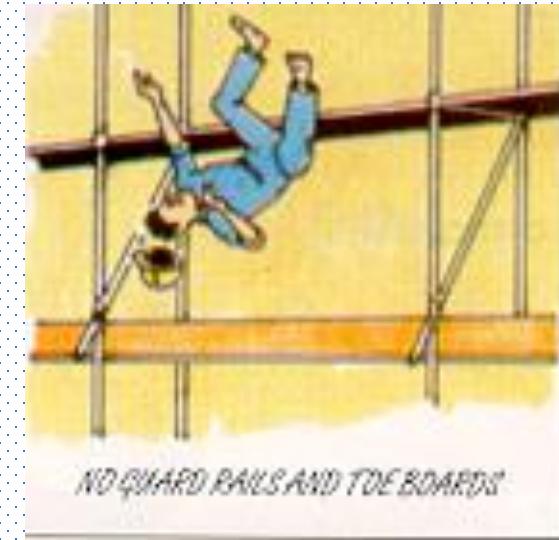
SCAFFOLDING IS A TEMPORARY ELEVATED PLATFORM MADE FOR SAFELY WORKING AT HEIGHT.

## **INTRODUCTION**

IT IS ESTIMATED THAT 2.3 MILLION CONSTRUCTION WORKERS DEAL WITH SCAFFOLDING EACH YEAR. MORE THAN 10000 WORKERS ARE INJURED AND 80 ARE KILLED IN SCAFFOLDING RELATED ACCIDENTS.

# Scaffolding

- ✓ Using ladders or scaffolding without proper fixing is crazy
- ✓ Putting up scaffolding, removing ties and taking it down again is a job for trained and experienced scaffolders. Leave it to them
- ✓ Never use incomplete scaffolding always inspect before use
- ✓ Make sure there is safe access, hand rails and toe boards at all edges
- ✓ Things fall on sites, wear your helmet



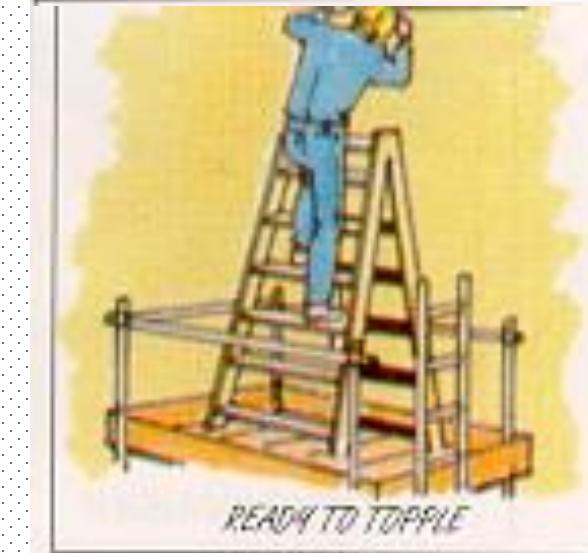
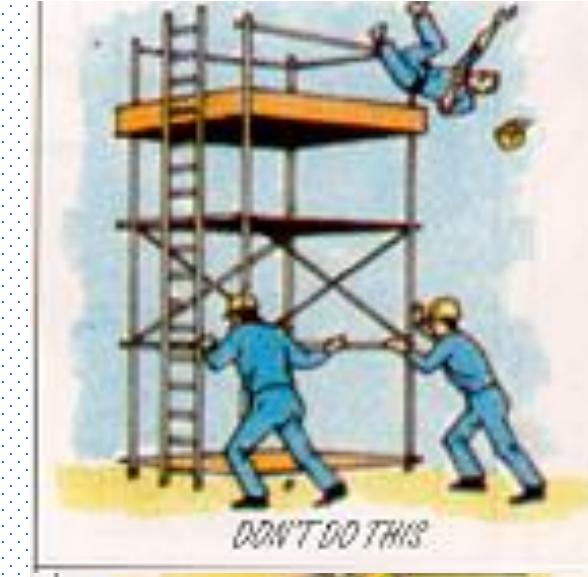
# Mobile Scaffold Towers

## Before Erection:

- ✓ Check all components are in good condition
- ✓ Check wheels for effective rotation
- ✓ Check brakes and locking devices work correctly
- ✓ Prior to erecting towers on suspended floors, ensure bearing capacity of floor is sufficient for the planned load

## Before Use:

- ✓ Ensure the tower is vertical and square
- ✓ Towers must not be used unless the wheels are locked
- ✓ Check that outriggers are set correctly and secured
- ✓ Ensure the platform is fully boarded out and guardrails and toe boards are fitted if working platform is over 2 meters



# **TYPES OF SCAFFOLDS**

- FRAME SCAFFOLDING
- TUBE AND CLAMP
- MODULAR SYSTEM SCAFFOLDS
- ROLLING SCAFFOLDING (MOBILE SCAFFOLDS)
- SUSPENDED SCAFFOLDIND

# **TYPES OF SCAFFOLDS**

## **FRAME SCAFFOLDING**



# **TYPES OF SCAFFOLDS**

## **TUBE AND CLAMP**



# **TYPES OF SCAFFOLDS**

## **MODULAR SYSTEM SCAFFOLDS**



# **TYPES OF SCAFFOLDS**

## **ROLLING SCAFFOLDING (MOBILE SCAFFOLDING)**



# **TYPES OF SCAFFOLDS**

## **SUSPENDED SCAFFOLDING**



# **TYPES OF SCAFFOLDING**

**( BASED ON WORKING LOAD)**

- LIGHT DUTY SCAFFOLD
- MEDIUM DUTY SCAFFOLD
- HEAVY DUTY SCAFFOLD
- SPECIAL DUTY SCAFFOLD

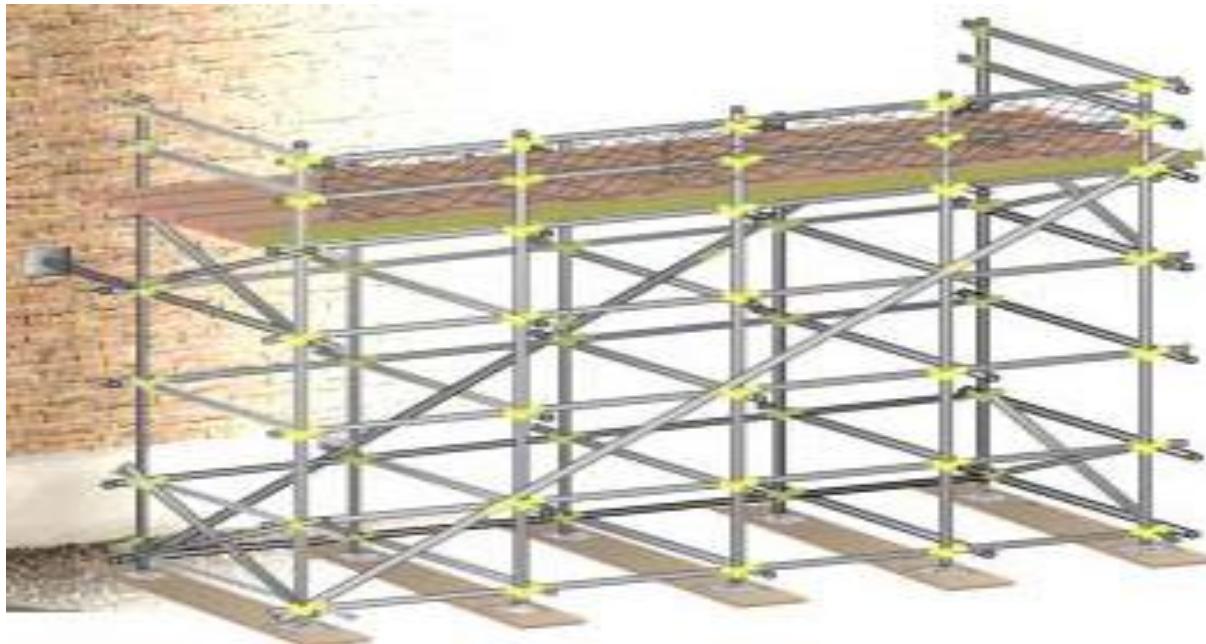
# **LIGHT DUTY SCAFFOLD**

A SCAFFOLD DESIGNED AND CONSTRUCTED TO CARRY  
A WORKING LOAD NOT TO EXCEED 150kg/ M<sup>2</sup>



# **MEDIUM DUTY SCAFFOLD**

A SCAFFOLD DESIGNED AND CONSTRUCTION TO CARRY A  
WORKING LOAD NOT TO EXCEED 200 kg/M<sup>2</sup>



# **HEAVY DUTY SCAFFOLD**

A SCAFFOLD DESIGNED AND CONSTRUCTED TO CARRY A  
WORKING LOAD NOT TO EXCEED 250kg/M<sup>2</sup>



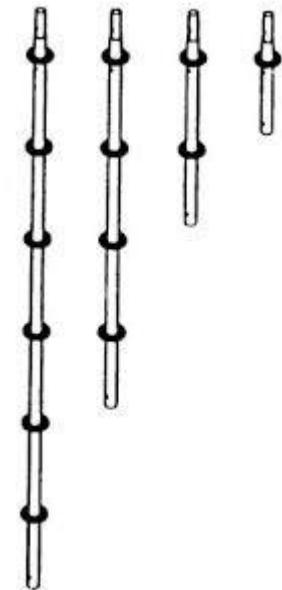
# **SPECIAL DUTY SCAFFOLD**

SCAFFOLD DESIGNED AND CONSTRUCTED TO CARRY  
SPECIFIC TYPE OF OBJECTS



# **COMMON PARTS OF SCAFFOLD**

- SOLE BOARD/ SILLS
- BASE PLATE
- STANDARD/ POST
- LEDGER
- BRACE
- TRANSOM
- COUPLER
- WORKING PLATFORM
- GUARD RAILS
- ACCESS LADDER



# **COMMON PARTS OF SCAFFOLD**

## **SOLE BOARD/SILLS**

SILVER OAK WOODEN PLANK SUPPORT BASE PLATE AT GROUND.



# **COMMON PARTS OF SCAFFOLD**

## **BASE PLATE**

IT IS A MILD STEEL SQUARE-PLATE

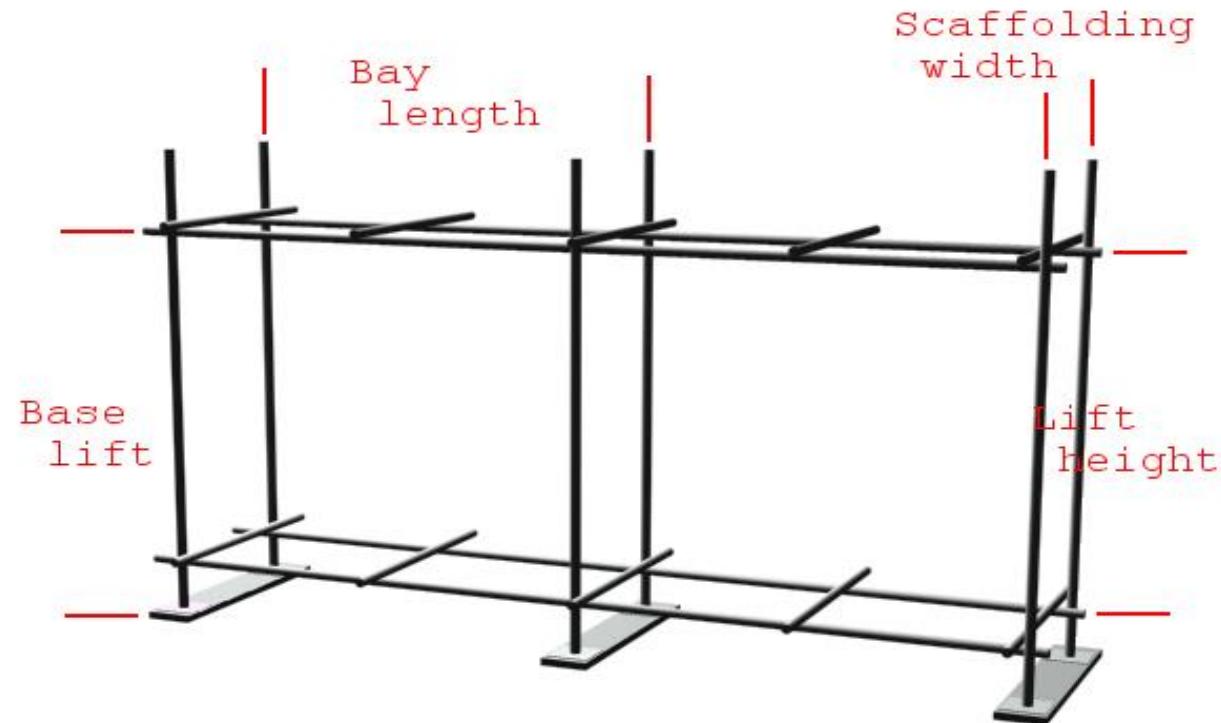
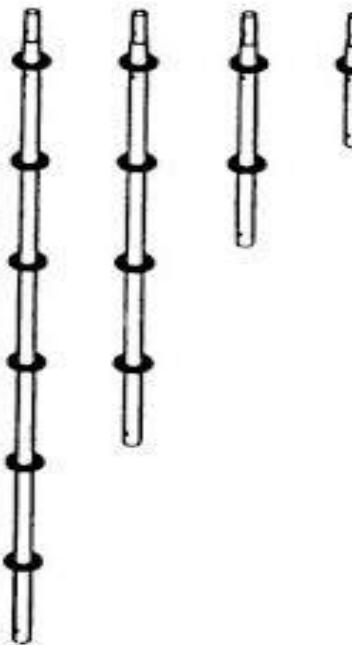


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# **COMMON PARTS OF SCAFFOLD**

## **STANDARD/POST**

IT IS VERTICAL SCAFFOLD TUBE



# **COMMON PARTS OF SCAFFOLD**

## **LEDGER**

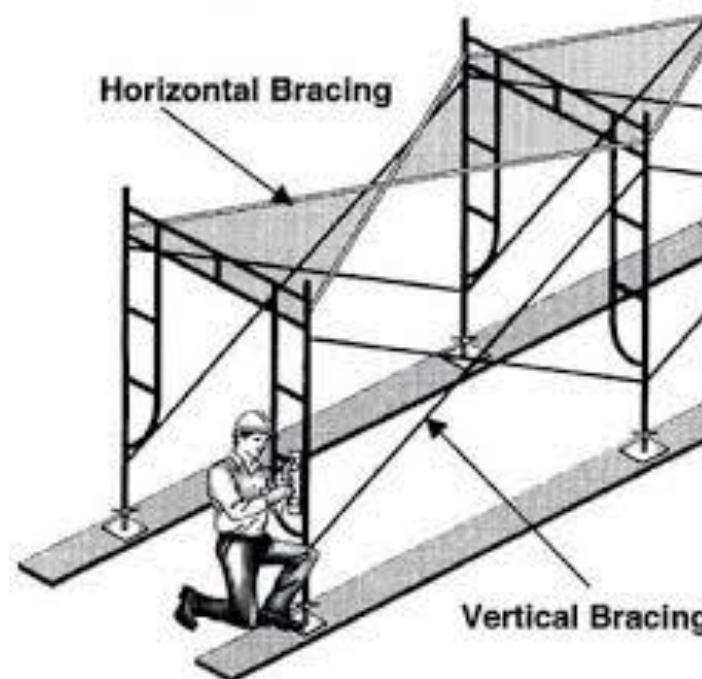
IT IS HORIZONTAL SCAFFOLD TUBE



# **COMMON PARTS OF SCAFFOLD**

## **BRACE**

A TUBE PLACED TO THE VERTICAL AND HORIZONTAL MEMBERS OF A SCAFFOLD AND FIXED TO THEM TO GIVE STABILITY.



# **COMMON PARTS OF SCAFFOLD**

## **TRANSOM**

TUBES FIXED AT RIGHT ANGLE ACROSS THE LEDGERS,  
ADJACENT TO EACH PAIR OF STANDAEDS TO SUPPORT  
THE SCAFFOLD BOARDS



builderbill



# **COMMON PARTS OF SCAFFOLD**

## **COUPLER**

A DEVICE FOR LOCKING TOGETHER COMPONENT PARTS  
OF TUBE AND COUPLER SCAFFOLD .



# COUPLER

## TYPES OF COUPLERS



# **COMMON PARTS OF SCAFFOLD**

## **WORKING PLATFORM**

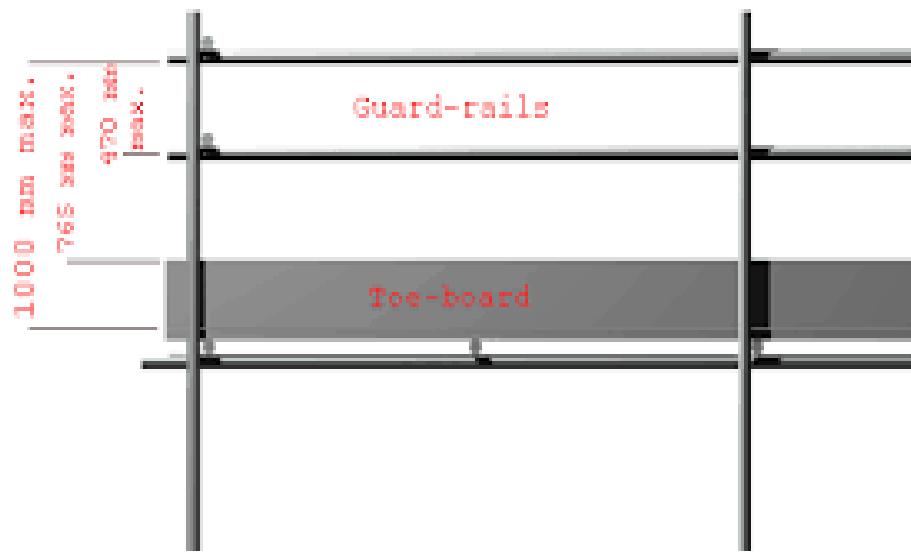
AN ELEVATED WORK SURFACE COMPOSED OF ONE OR MORE PLATFORM UNITS.



# **COMMON PARTS OF SCAFFOLD**

## **GUARD RAILS**

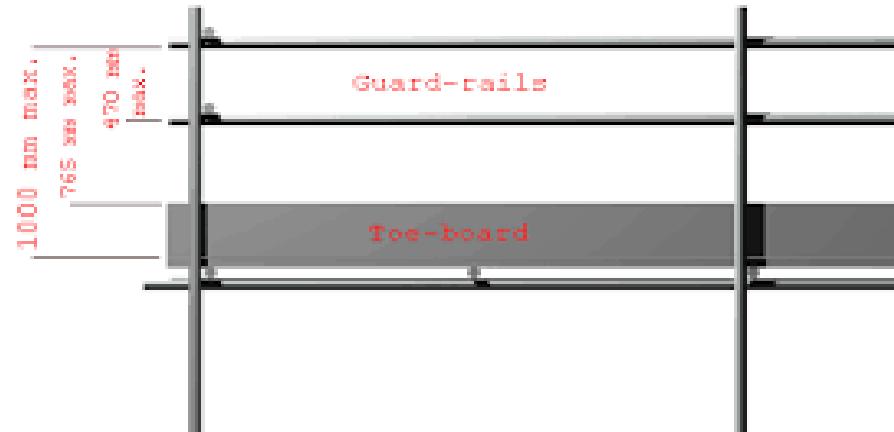
- TOP RAIL
- MID RAIL
- TOE BOARD



# **COMMON PARTS OF SCAFFOLD**

## **GUARD RAILS- HEIGHT**

- TOP RAIL
- MID RAIL
- TOE BOARD



	70 CM		TOTAL- 110 CM
	40 CM		
	15 CM		

# **HAZARDS- SCAFFOLDING**

- FALL FROM SCAFFOLD DURING ERACTION
- FALL FROM WORKING PLATFORM
- ELECTROCUTION- FROM OVERHEAD POWER LINES
- FALLING OBJECT
- SCAFFOLD COLLAPSE

# **CAUSE OF SCAFFOLD COLLAPSE**

- OVER LOAD WORK PLATFORM
- SOFT GROUND
- NOT TIED IN PROPERLY
- BRAZING INSAFFICIENT
- HIGH WIND
- INCORRECT COUPLAR
- SCAFFOLD ERECTED BY INCOMPETANT WORKERS
- SCAFFOLD NOT INSPECTED PRIOR TO USE

# **SAFETY ARRAGEMENTS -**

## **SCAFFOLD**

- USE APPROPRIATE SCAFFOLD CONSTRUCTION METHOD
- PROPER INSPECTION
- TRAINED AND CERTIFIED WORKER
- NOT EXCEED SAFE LOAD
- ERECTION ON A LEVEL GROUND
- 10 FEET SAFE DISTANCE FROM POWER LINE
- PROPER FALL PROTECTION SYSTEM

# **SCAFFOLD FALL PROTECTION SYSTEM**

- GUARD RAIL
  - a) TOP RAIL
  - b) MID RAIL
  - c) TOE BOARD
- TRAINING
- BARRICATION
- FULL BODY HARNESS
- SAFETY NETS
- SAFETY MONITORING
- PFAS - PERSONAL FALL ARREST SYSTEM

# **SCAFFOLD FALL PROTECTION SYSTEM**

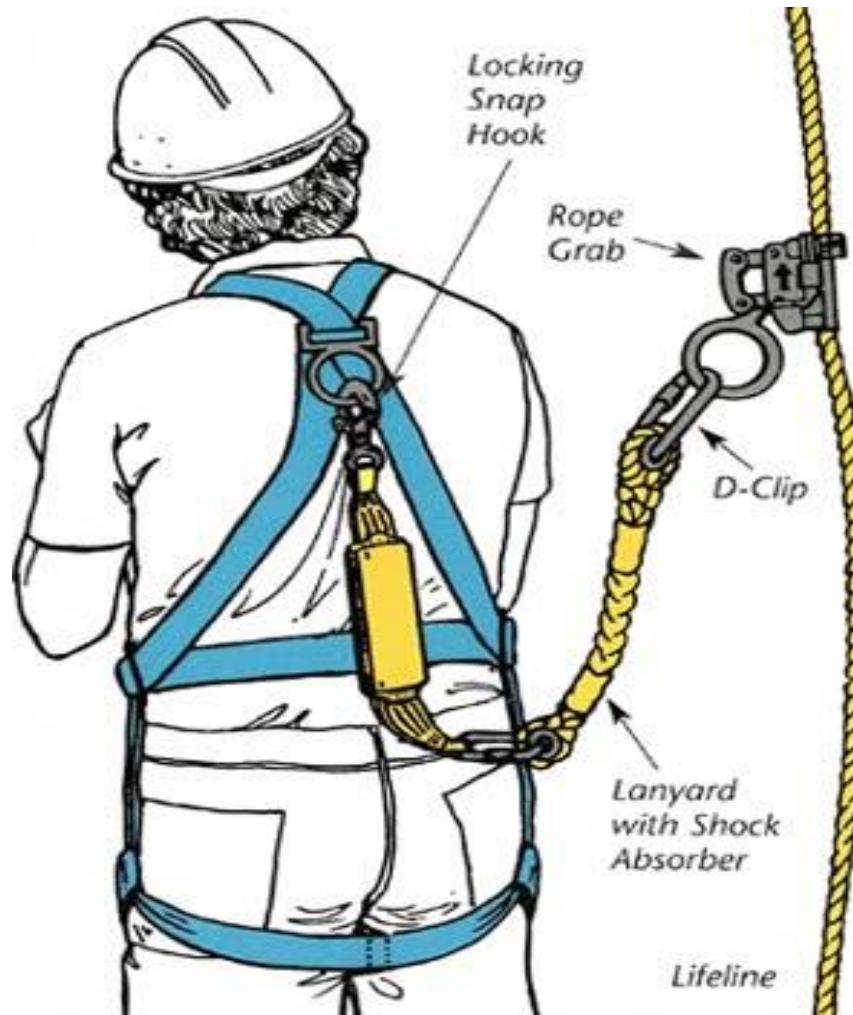
## **FULL BODY HARNESS**



Tie-Back lanyard in use

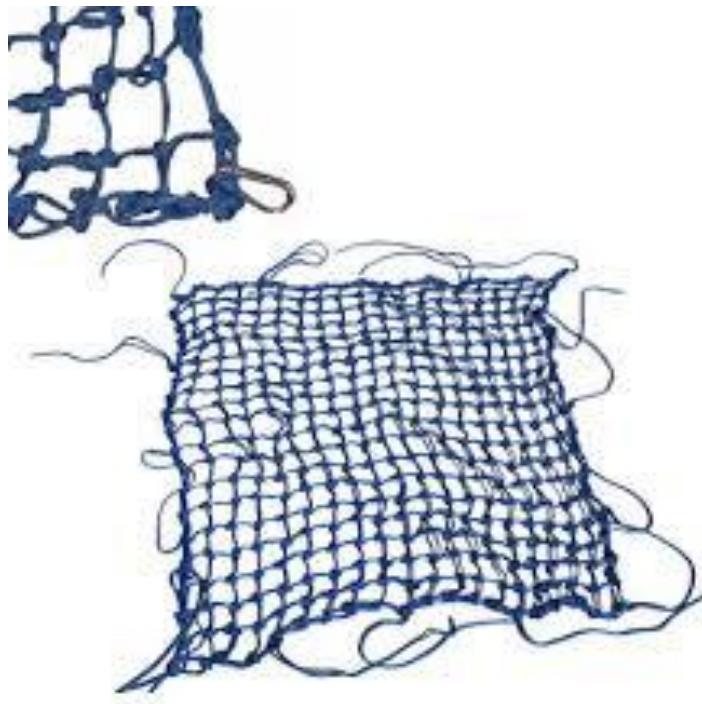
# **FULL BODY HARNESS**

## **PARTS OF HARNESS**



# **SCAFFOLD FALL PROTECTION SYSTEM**

## **SAFETY NETS**



# **SCAFFOLD INSPECTION**

## **CHECK LIST**

- CHECK FOR MISSING PLANKS ON PLATFORM
- CHECK FOR MISSING GUARD RAIL SYSTEM
- CHECK FOR PROPER ACCESS
- CHECK FOR HOUSE KEEPING ON SCAFFOLD PLATFORM  
(LOOSE MATERIALS, WORKING WASTE ETC...)
- CHECK FOR PROPER TYING OFF BUILDING

# **SCAFF TAG SYSTEM**

## **THREE TYPES OF SCAFF TAG**

- RED TAG - DON'T USE
- GREEN TAG - OK TO USE
- YELLOW TAG - CHECK WITH SUPERVISOR

**IF THERE IS NO SCAFF TAG DON'T USE THE SCAFFOLD**



# LADDER

## HAZARDS OF LADDERS

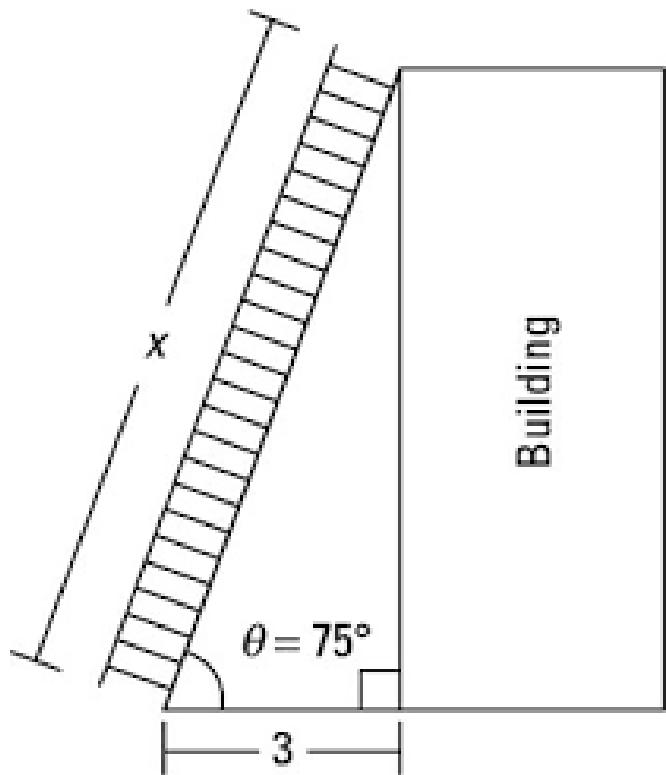
- DON'T STAND LADDER ON DRUM, BOX OR OTHER UNSTABLE BASE
- NEVER ATTEMPT TO REPAIR BROKEN LADDER
- NEVER CARRY LOAD UP LADDER HOIST IT UP
- WHEN USING THE METEL LADDER, , MAKE SURE THERE ARE NO ELECTRICAL HAZARD IN THE NEAR VICINITY
- FALLING OFF THE LADDER



# LADDER

## SAFE LADDER PLACING

LADDER SHOULD BE SET AT AN ANGLE OF ABOUT 75° OR ONE METER FOR EVERY FOUR METER RISE



### 4-to-1 Rule

Make sure you can set up your ladder at the required angle, using the 4-to-1 Rule; For every 4 feet (1.2 metres) up, place the base of your ladder 1 foot (0.3 metres) from the wall or upper support that it rests against.



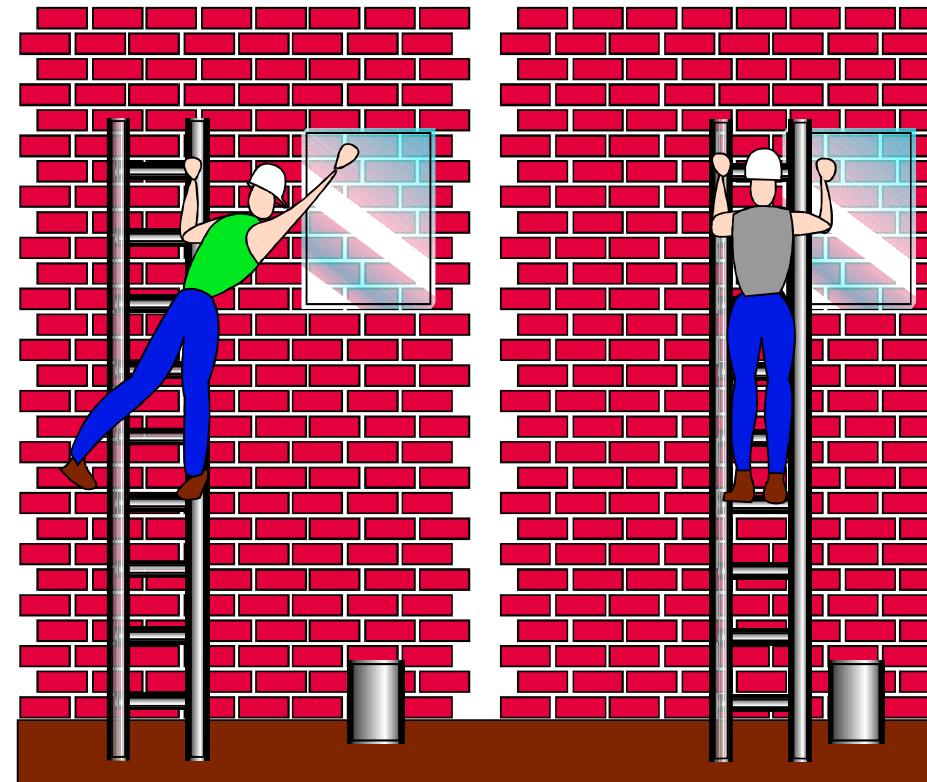
# **LADDER**

## **LADDER-SAFETY**

- USE ONLY APPROVED LADDERS
- INSPECT BEFORE USE
- ONE PERSON ONLY
- USE FALL ARREST IF > 6 FT WORKING FROM LADDER
- EXTEND 3 FEET ABOVE ACCESS OR WORKING LEVEL
- USE 4:1 LEAN RATIO
- USE 3 POINT CONTACT

# LADDER

## LADDER SAFETY



Unsafe

Safe

# **LADDER**

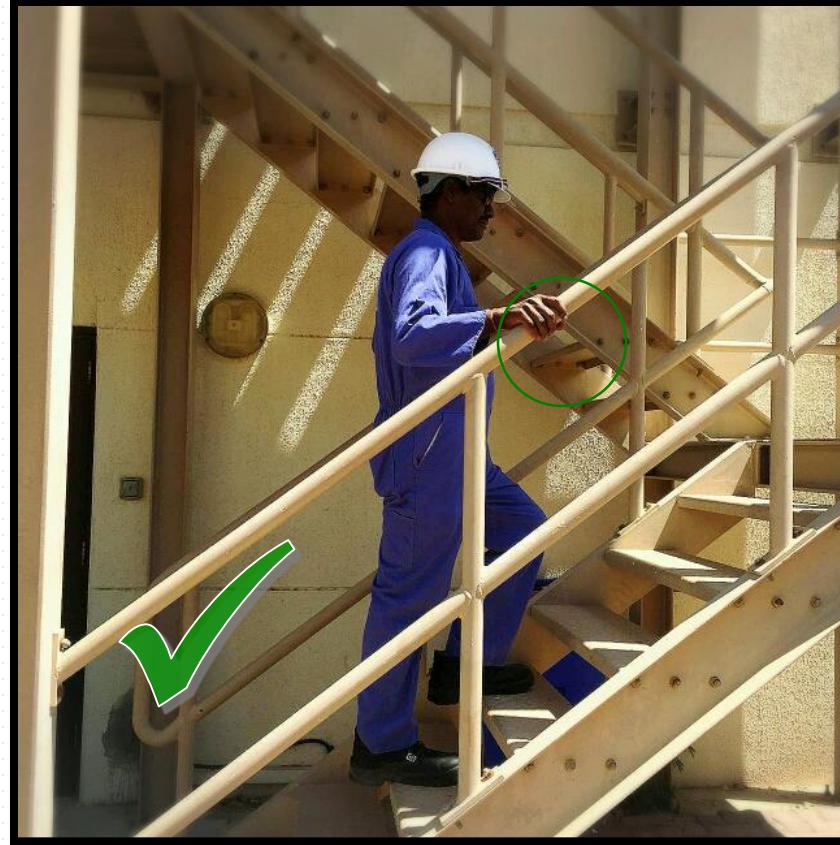
## **MONKEY LADDER**







Ascending/descending without holding handrails



Always hold handrails while Ascending/descending



Safety Harness not  
anchored, Unsafe  
working platform



Safety harness anchored,  
Safe working platform



Mobile Scaffold not approved  
(Green Tag), Brake not engaged



Working on approved scaffold (Green tag), Brake engaged while working on mobile scaffold



Unsafe access provided to work area



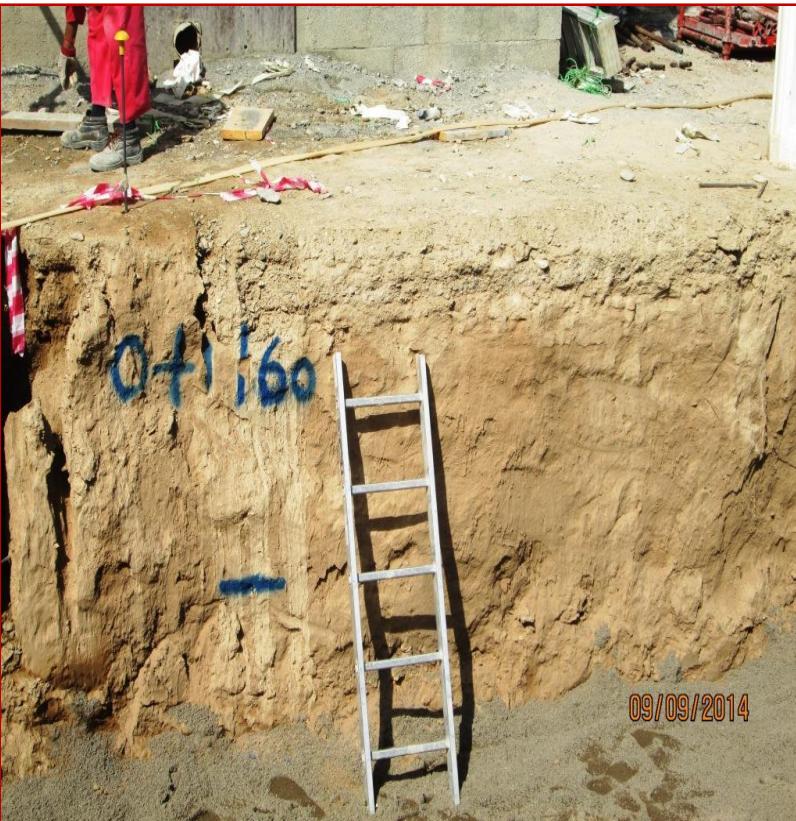
Safe access provided with a approved Green Tag.



No edge protection/handrails provided



Handrails / edge protection provided



Ladder insufficient length for the purpose, No edge protection



Properly tied ladder, 1 meter projection, Proper footing, 3-point contact



Unsafe access for deep excavations or no cross over



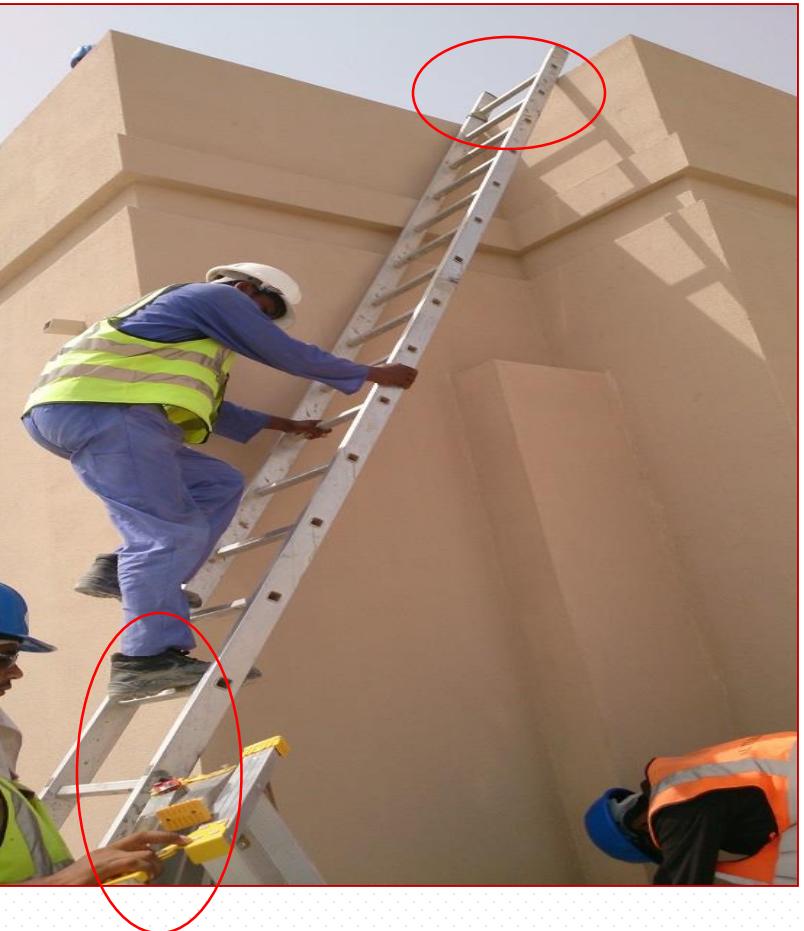
Deep excavation crossing ,Use of crossing points, Fall prevention measure, Protected edges



Platform missing on the scaffold



Fully boarded platform



Ladder at incorrect angle, person to hold the ladder, Ladder not tied, Ladder not extended on top by at least 1 meter



Ladder at correct angle, person to hold the ladder



Top rail & mid rail missing



Top rail & mid rail provided



Floor opening on pedestrian route,  
Unsafe penetration



Protected floor opening on access  
routes, Hole cover demarcated



Unsafe working platform



Safe working platform



Unsafe ladder for the activity, No person holding the ladder



Straight ladder being used, Person holding the ladder



Working on red tagged scaffold, Brakes  
not engaged while working on mobile  
scaffold



Working on approved scaffold (Green  
tag), Brake engaged while working on  
mobile scaffold



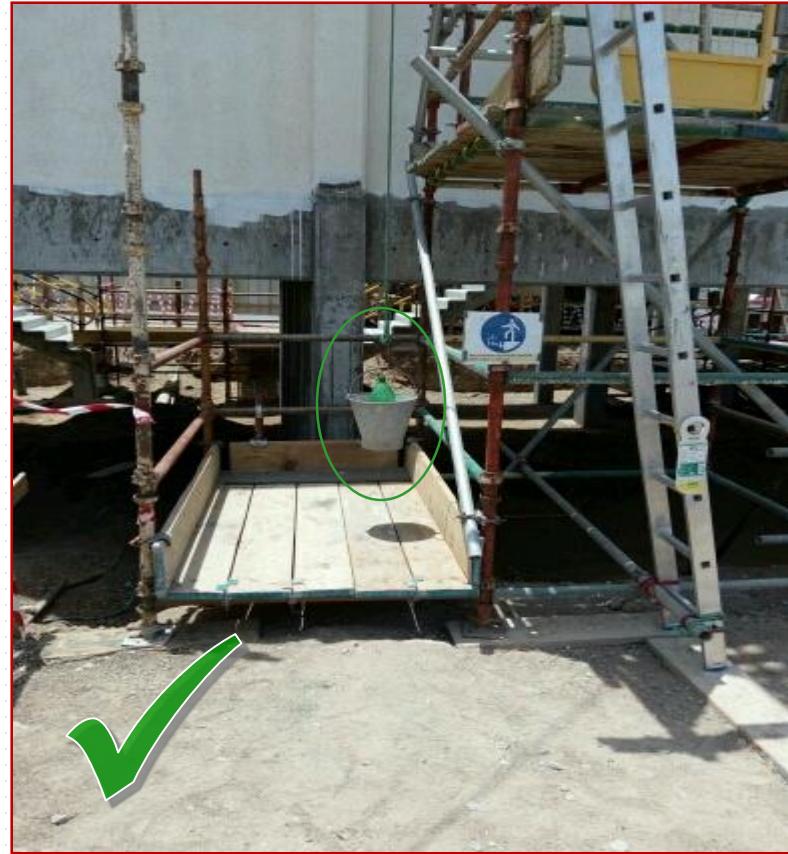
Red Tag – Do not use scaffold



Green Tag – Scaffold safe to use



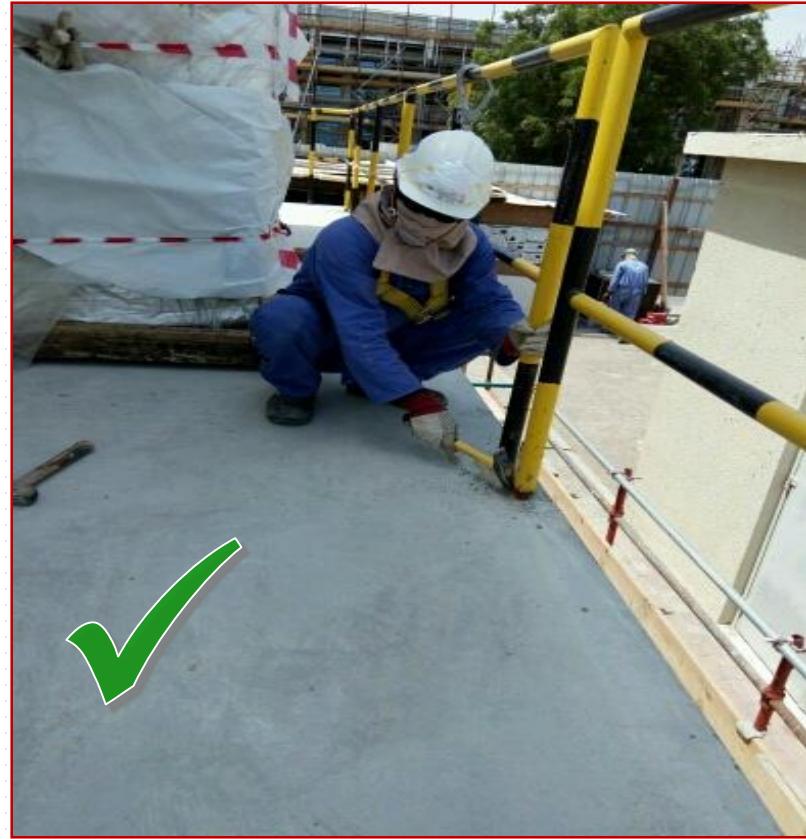
Tool carried in hand while climbing scaffold



Use safe method for shifting tools



Working at edge without any fall protection



Ensure fall protection provided while working at edge



Safety harness anchored at lower point



Proper anchoring point

## UNIT– IV

# INTRODUCTION TO MATERIAL HANDLING

### **What is Materials Handling?**

Moving goods or materials within short distances in a storage area is known as material handling (called by some materials handling).

The activity includes loading, unloading, palletizing (storing and transporting goods stacked on pallets, shipped as unit loads), as well as, de-palletizing and a number of similar operations.

Fork-lift trucks are the equipment used most frequently in material handling.

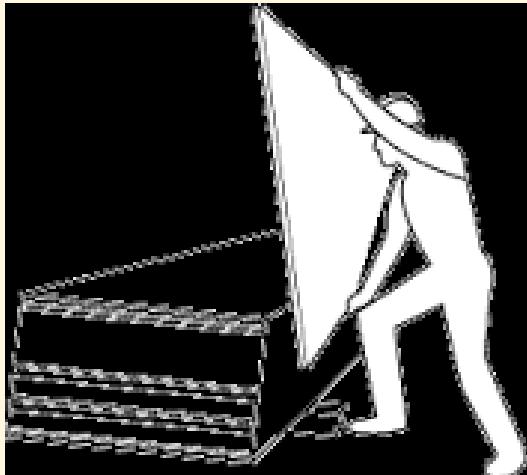
# MANUAL HANDLING



# **MANUAL HANDLING**

## **MANUAL HANDLING HAZARDS**

- TWISTING AND TURNING
- HEAVY LOAD
- DROPPING LOAD
- SHARP EDGGES
- HOT LOAD



# MANUAL HANDLING

## MANUL HANDLING INJURIES

- BACK INJURIES
- MUSCULAR SPRAIN
- CUTS AND ABRASION
- FRACTURE
- OPEN INJURIES
- SWELLING
- HERNIA
- WRULDS (WORK-RELATED-UPPER-LIMB-DISORDERS)
- CUTS, BURNS, DISLOCATIONS AND BROKEN BONES



# Manual Handling Risk Assessment

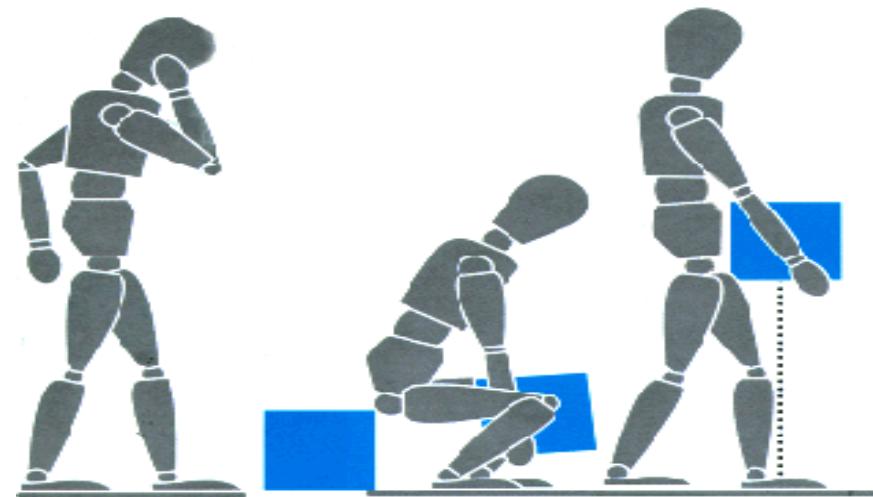
Load

Individual

Task

Environment

Remember: LITE



# Load

- Physical weight
- Size of the load
- Shape of the load
- Centre of gravity of the load
- Outside surfaces
- Stability of contents
- Other hazards - hot/cold/sharp etc

# The Individual

- 1) Sex
- 2) Physical strength
- 3) Stature (Appearance, weight; Height, etc.)
- 4) State of health
- 5) Level of training
- 6) Hazards to pregnant women
- 7) Perception of their ability

# Task

- Twisting/stooping/reaching
- Bending
- Distances involved
- Pulling and pushing of load
- Repetitive handling
- Gripping of the load
- Insufficient rest or recovery period
- Awkward positions

# The Environment

- Lighting
- Ventilation
- Obstacles
- Height of work surfaces
- Temperature (Hot/Cold)
- Floor conditions
- Space available

# Practical Measures to Avoid Manual Handling Injuries

- a) Avoid Manual Handling
- b) Risk Reduction
- c) Automation & mechanisation
- d) Team handling
- e) Training
- f) Smaller, lighter load
- g) Selection (**individual and mechanical aid**)
- h) Good Environment (**spacing ; flooring; temp; light**)

If load is too heavy get HELP!!!

# Safe Lifting Techniques

## Before lifting

- Check the load
- Plan the route of the carry
- Establish a firm grip



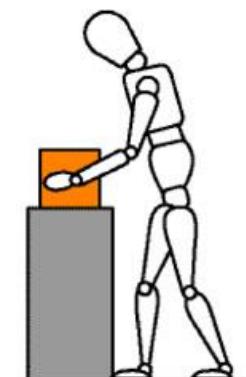
## The lift

- Bend the knees and use the leg muscles to lift
- Keep the back upright
- Keep the load close to the body
- Avoid twisting, over-reaching, jerking



## Setting down

- Use the same principles as lifting
- Maintain good balance
- Set the load down and then adjust its position using body weight



# **FORK LIFT**



© Can Stock Photo - csp16622518

# **FORK LIFT**

## **FACTORS THAT MAY CAUSE A FORKLIFT TRUCK TO OVERTURN**

- DRIVING AROUND CORNERS TOO QUICKLY
- UNEVEN LOADING OF THE FORK
- DRIVING WITH THE LOAD ELEVATED , ESPECIALLY WHEN GOING AROUND CORNERS
- UNEVEN TYRE PRESSURE
- EXCESSIVE BREAKING
- DRIVING ACROSS A SLOPE RATHER THAN STRAIGHT UP OR DOWN THE SLOPE
- COLLISION , ESPECIALLY WITH KERBS

# FORK LIFT



© Mitsubishi Forklift Briefing  
www.ForkliftBriefing.com

# **FORK LIFT**

## **FORKLIFT SAFETY**

- USE SAFE SPEED
- BE AWARE OF FORK POSITION
- WATCH OUT THE BLIND SPORTS
- SLOW DOWN AND SOUND HORN AT THE CORRNER
- CERTIFIED FORKLIFT OPERATORS ONLY
- INSPECT THE FORKLIFT BEFORE EACH SHIFTS



# **FORK LIFT**

## **PRE- USE - CHECK - FORKLIFT**

- TYRE PRESSURE
- PARKING BRAKES
- STEERING
- FUEL, OIL AND WATER SYSTEM FOR LEAKE
- BATTERIES
- LIFTING AND TILTING SYSTEM
- AUDIBLE WARNING
- LIGHTS
- MIRRORS



# **FORK LIFT**

## **PARKING RULES FOR A FORKLIFT**

- APPLY THE HAND BREAK
- LOWER THE FORK AND TIP THE FORWARD
- REMOVE THE KEY
- PARK IT ON LEVEL AREA
- DO NOT OBSTRUCT TRAFFIC
- DO NOT OBSTRUCT THE PEDESTRIANS WALKWAYS
- DO NOT OBSTRUCT THE EMERGENCY ESCAPE ROUTES



# CRANE & LIFTING EQUIPMENTS



# CRANE

CRANE IS A MECHANICAL DEVICE USED TO HANDLING MATERIALS , STRUCTURE LIFTING AND DISTRIBUTING THE LOAD

## TYPES OF CRANES

- MOBILE CRANE
- HYDRAULIC CRANE
- OVERHEAD CRANE
- GANTRY CRANE
- TOWER CRANE



# MOBILE CRANE



# HYDRAULIC CRANE



# OVERHEAD CRANE



# GANTRY CRANE



# **TOWER CRANE**



# **CRANE & LIFTING**

## **CRANE & LIFTING PTW**

- TRAFFIC PERMIT
- METHOD STATEMENT
- JOB SAFETY ANALYSIS
- TRAINING REPORT
- AREA DRAWING
- LIFTING PLAN
- THIRD PARTY CERTIFICATES
- EQUIPMENTS CERTIFICATES
- OTHER CERTIFICATES

# **CRANE**

## **MAJOR CAUSES OF CRANE ACCIDENTS**

- CONTACT WITH POWER LINES
- OVERTURNS
- FALLS
- MECHANICAL FAILURES



# **CRANE**

## **HOW DO ACCIDENTS OCCUR**

- INSTABILITY-UNSECURED LOAD, LOAD CAPACITY EXCEEDED, OR GROUND NOT LEVEL OR TOO SOFT**
- LACK OF COMMUNICATION-THE POINT OF THE OPERATION IS A DISTANCE FROM THE CRANE OPERATOR OR NOT IN FULL VIEW OF THE OPERATOR**
- LACK OF TRAINING**
- INADEQUATE MAINTENANCE OR INSPECTION**

# **CRANE & LIFTING**

## **CRANE HAZARDS**

- IMPROPER LOAD RATING
- EXCESSIVE SPEEDS
- NO HAND SIGNALS
- INADEQUATE INSPECTION AND MAINTENANCE
- UNGUARED PARTS
- UNGUARED SWING RADIOS
- WORKING TOO CLOSE TO POWER LINES
- SHATTERED WINDOWS
- NO STEPS/ GUARD RAILS WALKWAYS
- NO BOOM ANGLE INDICATOR
- NOT USING OUTRIGGERS

# **CRANE & LIFTING**

## **CRANE OPERATION- SAFETY ARRAGEMENT**

- PROPER INSPECTION
- TRAINED OPERATOR WITH VALID LICENCE
- VALID THIRD PARTY CERTIFICATE OF ALL LIFTING GEARS
- PROPER BARRICADING AND SINGH BOARD
- LOAD RATING CHART & OPERATING MANUVAL IN THE CABIN
- NEVER EXCEED SAFE WORKING LOAD (SWL)
- 6m DISTANCE FROM POWER LINE
- EXPERICNCED RIGGERS TEAM

# **CRANE & LIFTING**

## **CRANE OPERATION- SAFETY ARRAGEMENT**

- DAILY INSPECTION OF LIFTING GEARS
- PROPER COMMUMICATION & SIGNALS
- USE TAG LINE , IF NECESSARY

# **CRANE & LIFTING**

## **WHO IS RIGGER SUPERVISOR**

RIGGER SUPERVISOR IS A PERSON WHO HAS OVERALL CONTROL OF LIFTING OPERATION , MUST BE TRAINED AND EXPERIENCED



# **CRANE & LIFTING**

## **RIGGING EQUIPMENTS & SLINGS**

- WIRE ROPE
- FIBER ROPE
- SYNTHETIC WEB SLING
- WIRE ROPE WEB SLING
- CHAIN BLOCK
- D- SHACKLES
- I- BOLTS
- LIVER HOIST ( CHAIN PULLER)



# CRANE & LIFTING

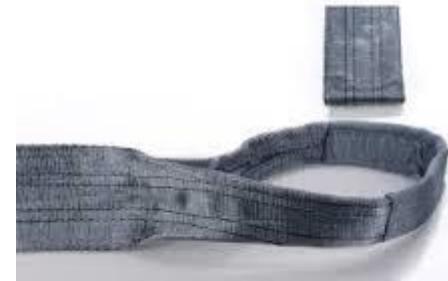
## RIGGING EQUIPMENTS & SLINGS



# CRANE & LIFTING

## COLOUR CODE - WEB SLINGS

1 TON	VIOLET
2 TON	GREEN
3 TON	YELLOW
4 TON	GRAY
6 TON	BROWN
10 TON	RED



# **CRANE & LIFTING**

## **CRANE OPERATION- SAFETY TIPS**

- NEVER WALK OR STAND UNDER ANY SUSPENDED LOAD
- ALL SIGNAL MUST BE RECEIVED FROM AUTHORIZED SIGNAL MEN
- BAD WEATHER - STOP LIFTING ( HIGH WIND AND RAIN)
- THIRD PARTY CERTIFICATION OFF ALL LIFTING EQUIPMENTS



# Lifts and Hoists

## Hazards:

- Falling objects
- Being struck by the load
- Entanglement in moving parts
- Falls from height
- Failure of the chains, slings etc.
- Being struck by moving parts of the hoist.
- Materials falling from a platform.



# Lifts and Hoists



**Chain hoist**



**Goods hoist**



**Patient hoist**

# Lifts and Hoists

## Precautions:

- Suitable for its intended use
- Preventing people getting
  - underneath the lift platform
- Maximum safe working load
- Safety devices, e.g. brakes working
- Competent operators
- Information, instruction and training
- Routine maintenance
- Routine inspection and thorough examination
- Clear visibility of landings
- No loose materials
- Area Barricade and signage
- No passengers on a goods hoist



# UNIT– V

## INTRODUCTION TO TOOLS

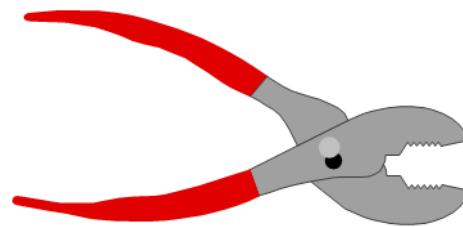
# TOOLS



A **tool** is any instrument or simple piece of equipment that you hold in your hands and use to do a particular kind of work. For example, spades, hammers, and knives are all tools.

- **TOOLS AND EQUIPMENTS ARE THREE TYPES**

- HAND TOOLS
- POWER TOOLS
- PNEUATICTOOLS



# **TOOLS**

## **COMMON HAZARDS**

- ELECTRIC SHOCK
- FLASH BURNS
- FALLING
- HAND AND EYE INJURIES
- CUT OR LOSSING A BODY PARTS
- ERGONOMIC INJURIES

# **TOOLS**

## **BASIC TOOLS SAFETY RULES**

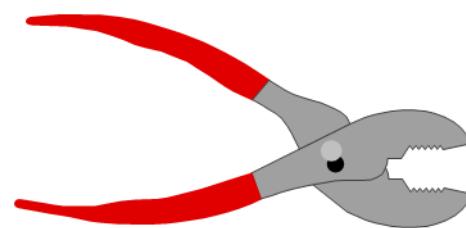
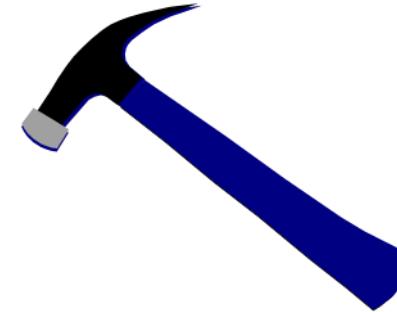
- MAINTAIN REGULARLY
- USE RIGHT TOOLS FOR THE RIGHT JOB
- INSPECT BEFORE USE
- OPERATE ACCODING TO MANUFACTURE INSTRUCTION
- USE THE RIGHT PPE'S
- USE GUARDS

# TOOLS

## HAND TOOLS

E.g...

- HAMMERS
- SCREWDRIVERS
- CUTTERS
- SPANNERS



## HAND TOOLS HAZARDS

HAZARDS ARE USULLY CAUSED BY MISUSE AND  
IMPROPER MAINTENANCE

# **TOOLS**

## **HAND TOOLS-SAFETY TIPS**

- RIGHT TOOLS FOR THE RIGHT JOB
- GOOD CONDITION
- PROPER CARE AND MAINTANANCE
- USE PROPER PPE
- AVOID USE OF MUSHROOMED HAMMER AND CHIESSEL

# TOOLS

## POWER TOOLS

TOOLS WHICH ARE RUN BY ELECTRICAL POWER SUPPLY IS KNOWN AS POWER TOOLS

- ELECTRICAL DRILLS
- ELECTRICAL GRINDER
- JIG SAW
- ELECTRICAL CUTTER



## POWER TOOL HAZARDS

- ELECTRICAL SHOCK
- CUT OR LOSSING A BODY PARTS
- BROKEN BONES
- HIT



# **TOOLS**

## **POWER TOOLS – SAFETY TIPS**

- CABLE, PLUGS, ARE IN GOOD CONDITION
- TOOLS USE WITH CORRECT POWER SUPPLY
- MAKE SURE POWER SUPPLY TO BE PROPER EARTHED
- TOOLS MUST BE SWITHCHED OFF BEFORE PLUG IN
- USE PROPER PPE
- KEEP TOOLS CLEAN AND DRY
- DISCONNECT WHEN NOT IN USE
- PROPER INSPECTION AND MAINTANANCE

# **TOOLS**

## **SAFETY TIPS- ANGLE GRINDER**

RPM SPEED MUST BE GREATER THAN THE GRINDER SPEED

VALIDITY DATE; DO NOT USE IN CASE OF EXPIRY

ANGLE GRINDER & DISENGAGED DISC



# TOOLS

## PNEUMATIC TOOLS

POWERED BY COMPRESSED AIR INCLUDES CHIPPER,  
DRILLS, SANDER.

## PNEUMATIC TOOLS HAZARDS

MAIN HAZARD IS GETTING HIT BY TOOLS  
NOICE IS AN OTHER HAZARD



# **TOOLS**

## **PNEUMATIC TOOLS - SAFETY TIPS**

- AUTHORISED OPERATOR
- REGULARLY MAINTAINED AND SERVICED
- PROTECTIVE GUARD IS CORRECLY FITTED BEFORE USE
- PROPER PPE'S
- TURN OF THE MAIN COMMPRESSED AIR SUPPLY LINE BEFORE DISCONNECTING
- LEAKAGE OF AIR SHOULDN'T TOUCH BY HANDS
- NEVER USE BODY FOR CLANING
- KEEP THE TOOL IN HORIZONTAL POSSISSION WHEN CHANGING BITS OR POINTS

# Common Injuries from Use of Tools

## ➤ Arms, Hands and Fingers

- ✓ Cuts, punctures, crushed, burns, lost part

## ➤ Eyes and Face

- ✓ Loss of sight, cuts



## ➤ Ears

- ✓ Hearing loss

## ➤ Legs, Feet and Toes

- ✓ Cuts, punctures

## ➤ Body/Skin

- ✓ Shock, burns, cuts



## General Tool Safety

- 6 Steps of Hand and Power Tool Safety
  - ✓ Inspect tools for defects or damages prior to use.
  - ✓ Wear the proper personal protective equipment.
  - ✓ Select the correct tool for the job.
  - ✓ Use the tool as per design and purpose
  - ✓ If provided , keep guards secured in place.
  - ✓ Establish a balanced working posture.
  - ✓ Clean the tool after use.



## Unsafe Acts

### ➤ Common Unsafe Acts

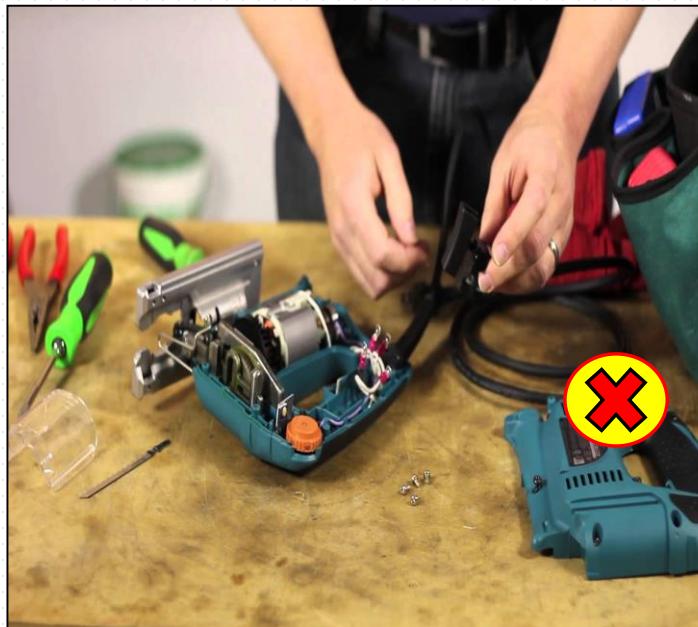
- ✓ Not carrying out pre-use inspection
- ✓ Not wearing/using proper personal protective equipment
- ✓ Using defective or damaged tools
- ✓ Improper use of tool, e.g., screwdriver as a chisel
- ✓ Removing guards
- ✓ By-passing/overriding safety switches



## Unsafe Acts

- Common Unsafe Acts (continuation)

- ✓ Unauthorized repair
- ✓ Carrying power tools by the cord (electric cable)
- ✓ Replacing drill bits/grinding discs without unplugging the tool



## Unsafe Conditions – Tools

### ➤ Common Unsafe Hand Tool Conditions

- ✓ Defective or damaged tools, e.g., cracked or missing handle, chipped screwdriver blade (tip)
- ✓ Fabricated tools (substandard)
- ✓ Damaged electrical cords and switches



## Unsafe Conditions – Power Tools

- Common Unsafe Power Tool Conditions
  - ✓ Missing handles and/or guards
  - ✓ Defective switches and plugs
  - ✓ Worn out electric cable insulation
  - ✓ Lack of inspection, preventive maintenance.
  - ✓ Two-pin plugs



## Unsafe Conditions – Workplace

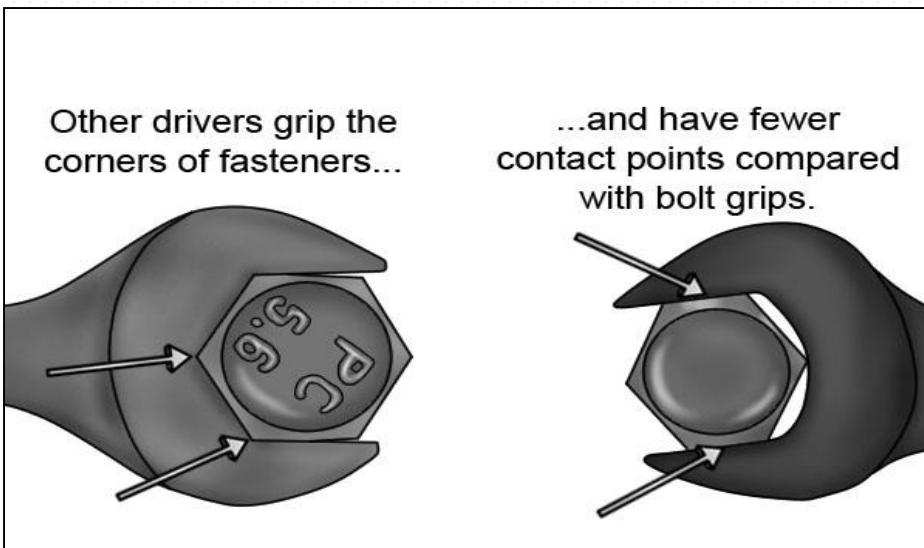
### ➤ Common Unsafe Workplace Conditions

- ✓ Poor housekeeping
  - Wet floors
  - Stray electrical cables, hoses
  - Tools or materials on floor
- ✓ Insufficient illumination
- ✓ Inadequate (indoor) ventilation



## Spanner Safety

- Do not use defective tools
- If bolt/nut size is in millimeters (or inches), use spanner size in millimeters (or inches) respectively.
- Where possible use a box spanner instead of open-end spanner or adjustable spanner.



## Spanner Safety

- Do not use pipe wrench on bolts or nuts.
- Do not use “pipe cheaters” to gain more leverage.
- Wipe clean any oil, grease or moisture from the spanner before or after using.
- Return tools to their stores after use.



# Housekeeping

- Keep floor clean and dry
  - ✓ Mop up any liquid spill or wet spot.
- Remove any tripping hazard.
  - ✓ Keep tools on work tables, racks or away from passages.
  - ✓ Lay electrical cables flat on the floor; remove kinks
  - ✓ If possible, use cable ramps.
  - ✓ If working on the floor, e.g., grinding big pipes, barricade the area.



## Working at Heights

- Use a tool belt for small tools.
- Use a tool pouch or bag to shift tools up/down an elevated work location, e.g., platforms, scaffolds.
- Do not carry tools in your hand when going up/down a ladder or stair.
- Do not pass tools to another worker by throwing them.
- Do not carry electrical tools by their electrical cable.



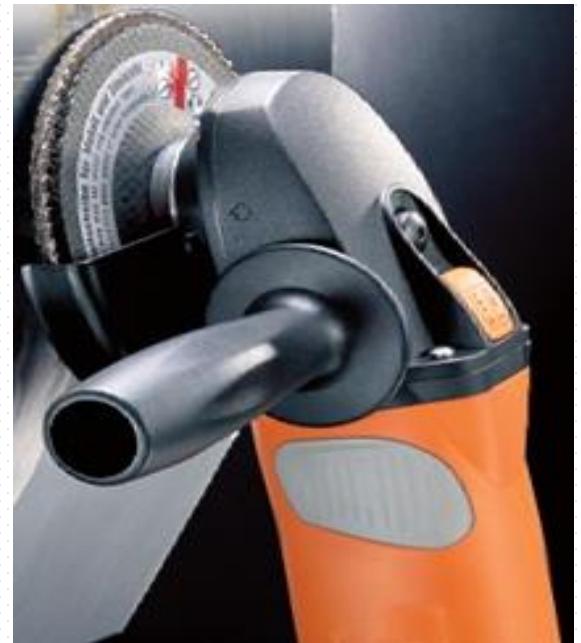
## Power Tool General Safety

- Obtain proper training
- Operate within the designed limits as recommended by the manufacturer.
- Use proper personal protective equipment; wear double eye protection when operating grinders and electric drills.
- Store power tools in a clean, dry place
- Do not use in wet or damp locations
- Work in well-illuminated areas
- Unplug when not in use.



## Abrasive Tools Safety

- Proper training on the safe operation, replacement of abrasive wheel and cleaning .
- Unplug abrasive tool prior to replacement of abrasive wheel/disc.
- Confirm spindle nut and guards are tightly secured prior to operation.
- Do not press the abrasive wheel/disc against a hard surface to stop its rotation; allow it to stop on its own.
- Do not apply excessive pressure on the abrasive tool for the purpose of speeding up the job.



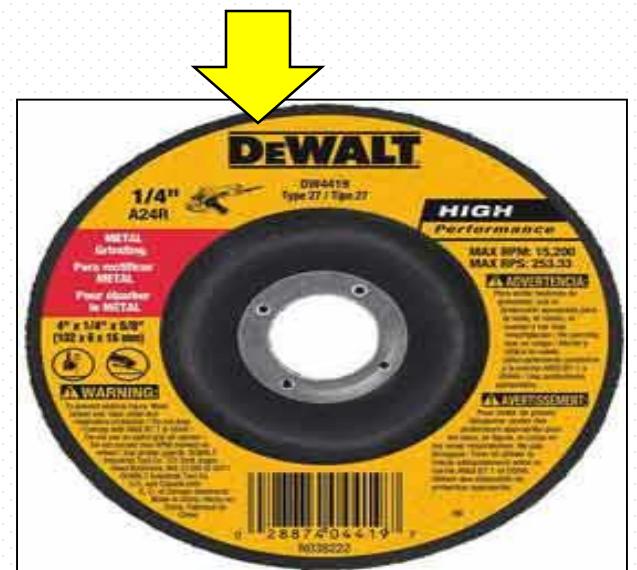
# Abrasive Wheel & Disc Inspection

## ➤ Ring Test (Abrasive Wheel)

- ✓ Insert index finger in the abrasive wheel hole
- ✓ Tap the abrasive wheel with the handle of a screwdriver
  - Dull ring sound means abrasive wheel has cracks; do not use.
  - Good ring sound means abrasive wheel has no cracks: good condition.

## ➤ Inspection

- ✓ Visual inspection for cracks, chipped edges, warped
- ✓ Speed Rating
  - Disc/Wheel speed (RPM) must be higher than speed rating of the grinder



## Responsibilities

- Supervisor
  - Guide workers on the safe use of tools; including inspection, minor maintenance and in cleaning them before returning to Stores.
  - Remove defective or damaged tools from site; send for repair, replacement and disposal.
  - Ensure work area is cleaned after the shift or working day.



# Responsibilities

- Storekeeper (Material Controller)
  - ✓ Maintain a list (inventory) of tools
  - ✓ Issue only tools that are in good condition.



Small Library Organizer Pro - Database: EquipmentTools

ITEMNAME	CATEGORY	CHECKOUT
Dell Studio - Laptop 17" - 1	Laptops	NOT_CHECKED
Husky 2.0 Running HP 30 Gallon	Compressors	CHECKED_OUT
Makita 18V Compact Lithium-Ion Drills		NOT_CHECKED
Omano OM116L School Microscope	Microscopes	NOT_CHECKED

only the ITEM\_NAME field is required and has to contain the unique name

ReadWrite Access RD Blank

Item Details CheckinOut Maintenance Image View Browser

ITEMNAME Dell Studio - Laptop 17" - 1

Barcode 1001

CATEGORY Laptops STORAGE Room 1

MANUFACTURER Dell

MODEL Dell Studio 1737 17" Intel Centrino Core 2 Duo T6400

MODELNR 1737

SERIAL SN-12324343334

DESCRIPTION Combining a high definition 17" display and the power of Intel's Core 2 Duo processor with 4GB system memory, this entertainment laptop delivers high performance in everything it does. It's also equipped with an HDMI output for easy connectivity to your HDTV. And 802.11 N wireless connectivity means fast wireless performance from even further away.

# Responsibilities

- Electrician
  - ✓ Maintain a list (inventory) of power tools
  - ✓ Carry out preventive maintenance as per schedule.
  - ✓ Carry out corrective maintenance and repair as required.
  - ✓ Provide inspection stickers or tags on all power tools, electric cables.
  - ✓ Recommend replacement or disposal of defective/damaged tools



## Responsibilities

- Worker
  - Carry out pre-use inspection of tools
  - Use tools are per design and purpose
  - Return defective or damaged tools to Storekeeper/Material Controller for replacement.
  - Carry out housekeeping at the end of each shift/day.

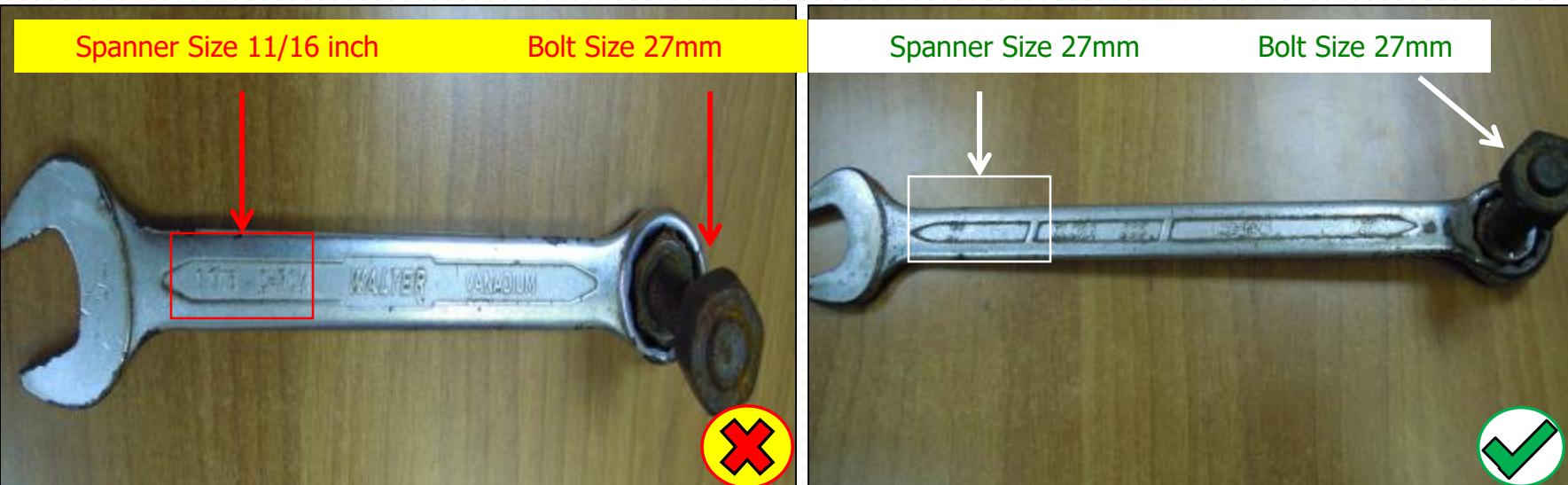


## Responsibilities

- HSE Advisor
  - Monitor workplace activity and rectify any near miss, unsafe act or condition.
  - Carry our random inspection of tools and work area.
  - Ensure workers are provided with, and are using/wearing, the personal protective equipment appropriate for the job.
  - Instruct Worker to return defective or damaged tools to Storekeeper/Material Controller for replacement.



# Pictorial Do's and Don'ts





Grinding Wheel with Cracks



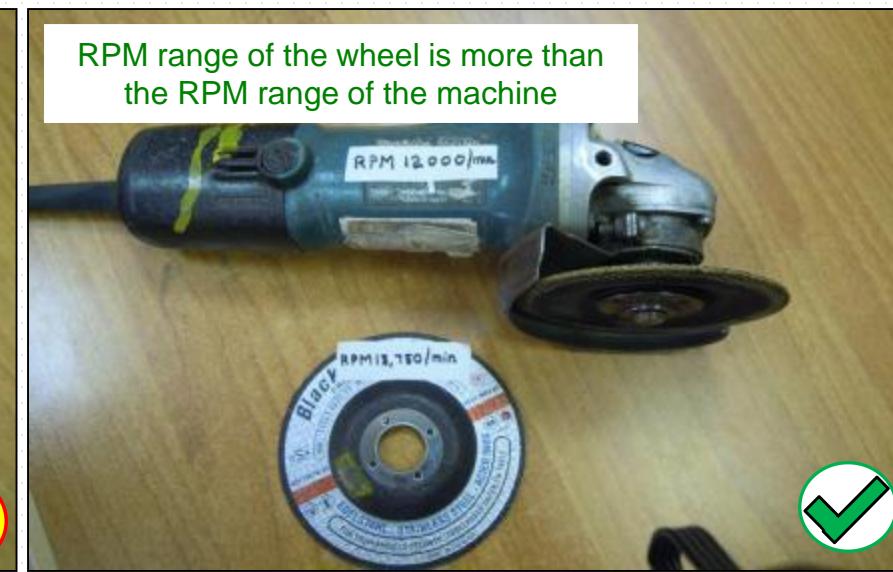
Grinding wheel in good condition



RPM range of the wheel is less than  
the RPM range of the machine



RPM range of the wheel is more than  
the RPM range of the machine





Hammers with chipped head edge  
and mushroom head



Hammer in good condition



Loose hammer handle



Hammer handle in good condition



Damaged bar bending tool



Bar bending tool in good condition



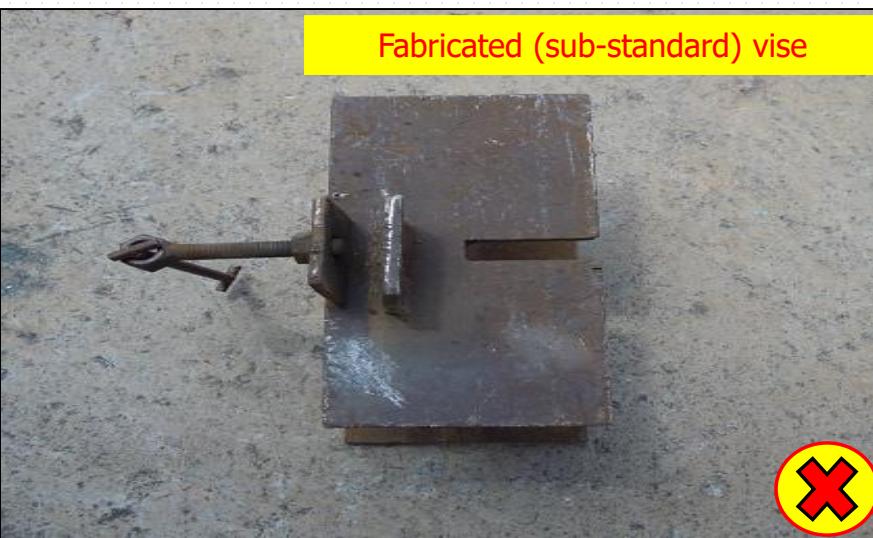
Wood cutting saw with damaged handle

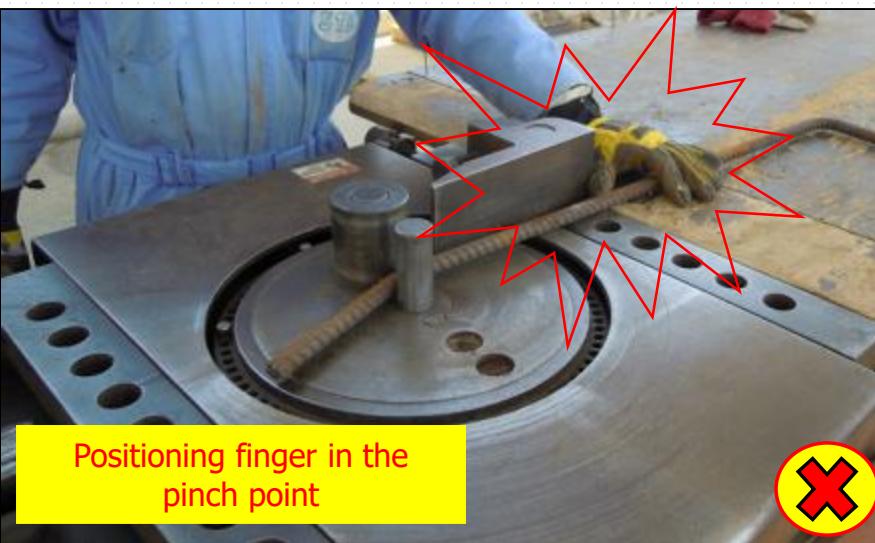


Wood cutting saw in good condition











Two-man operation for a  
one-man operation  
machine



One-man operation for a  
one-man operation  
machine



Working with non-  
insulated tool in electrical  
panel



Working with insulated  
tool in electrical panel



## Summary

- Hand and power tools are very common to any industrial facility. They can expose employees to multiple hazards if they are not maintained and used properly.
- It is important that you know how to inspect, use/operate and maintain them.

## Questions or Clarifications



*Thank You*