Carpentry NTQF Level II

Learning Guide #64

Unit of Competence: Install and Replace Windows and Doors

Module Title: Installing and Replacing Windows and Doors

LG Code: EIS CRP2 M14 LO1-LG-64

TTLM Code: EIS CRP2 M14 TTLM 0919v1

LO1: Plan and prepare

Instruction Sheet	Learning Guide #64

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics.

- Obtaining and confirming work instructions,
- Following Safety requirements
- Identifying and Implementing Sign/barricade requirements
- Selecting Tools and equipment to the need of particular job
- Calculating Material quantity requirements
- Identifying, obtaining and preparing Materials appropriate to the work application
- Identifying environmental protection requirement

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Obtain and confirming work instructions,
- Follow Safety requirements
- Identify and Implementing Sign/barricade requirements
- Select Tools and equipment to the need of particular job
- Calculate Material quantity requirements
- Identify, obtain and prepare Materials appropriate to the work application
- Identifying environmental protection requirement

Learning instruction

- ✓ Read the specific objectives of this Learning Guide.
- ✓ Read the information written in the “Information Sheets 1”. Try to understand and familiarize what are being shown and discussed. Ask your teacher for assistance if you have hard time understanding them.
- ✓ Accomplished and submit “Self-checks 1” for evaluation.
- ✓ If you earned a satisfactory evaluation for "self-check 1" then proceed to “Operation Sheet 1”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Information Sheet 1.
- ✓ Read the “Operation Sheet 1” and try to understand the procedures discussed.
- ✓ Accomplish and submit “Operation Sheet 1” for evaluation.
- ✓ If you earned a satisfactory evaluation for one "Operation Sheet 1" then proceed to the next “Information Sheet”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Operation Sheet where you get unsatisfactory evaluation.
- ✓ Continue to the next “Information Sheet” and follow instruction for learning activities in “2-7”.
- ✓ After all “Self Check” and “Operation Sheet” is accomplished and evaluated proceed to “LAP Test”.

- ➢ Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to the next topic.

Information Sheet 1	Obtaining and confirming work instructions,

1.1 work instructions

Work instructions, including plans, specifications, quality requirements and operational details, are obtained, confirmed and applied using relevant information for planning and preparation purposes.

It includes:-

Plans and preparation

- worksite inspection,
- equipment defect identification,
- assessment of conditions,
- hazards and determination of work requirements

✓ What is a workplace inspection?

A **workplace inspection** is a planned event in which the **workplace** is **inspected** to identify potential hazards. It is the best way of proactively identifying hazards before they have the ability to cause an injury.

✓ How often should a construction worksite be inspected?

Provide the rationale for your recommendation. Your response **should** be at least 75 words in length. Selected Answer: **When** it comes to **inspection** of **construction** work sites, everyone one **should** be a safety officer.

✓ What is a site safety inspection?

Workplace safety inspection checklists are tools used by **safety** officers to perform critical **safety** examinations of a given **workplace**. It helps to identify potential hazards which may cause injury and harm to employees and people onsite. ... Office Environment: focus on fire **safety**, emergency evacuation and ergonomics.

- equipment defect identification,

✓ What are the types of defect?

Following are the common types of defects that occur during development:

- Arithmetic Defects.
- Logical Defects.
- Syntax Defects.
- Multithreading Defects.
- Interface Defects.
- Performance Defects.

✓ What is considered a defect?

A material **defect** is a specific issue with a system or component of a residential property that may have a significant, adverse impact on the value of the property, or that poses an unreasonable risk to people.

✓ What is defect elimination?

"**Defect elimination**" analyzes the **defect**, and then implements corrective actions to prevent future similar **defects**. A "**Defect Elimination** program" is a structured process companies adopt to become more consistent and reliable in **eliminating defects**.

What causes product defects?

- Design defects.
- Improper labeling or failure to warn.
- Manufacturing defects.
- Strict liability.
- Warranty breach.
- General negligence.

"**Defect elimination**" analyzes the **defect**, and then implements corrective actions to prevent future similar **defects**. A "**Defect Elimination** program" is a structured process companies adopt to become more consistent and reliable in **eliminating defects**. It forms part of a broader Quality Improvement program

✓ Assessment of conditions

- **Assessment Conditions**

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced by individuals using interpersonal communication skills in the workplace and include access to: office equipment.

There are **four Principles of Assessment** – Reliability, Fairness, Flexibility and Validity. In our previous Blogs we discussed the **Principles** of Reliability, Fairness and Flexibility.

Principles of Assessment

- Appropriateness. The method of assessment is suited to the performance being assessed.
- Fairness. The method of assessment does not present any barriers to achievements, which are not related to the evidence.

- Manageability. ...
- Integration into work or learning. ...
- Validity. ...
- Direct. ...
- Authenticity. ...
- Sufficient.

The primary **purpose of assessment** is to improve students' learning and teachers' teaching as both respond to the information it provides. **Assessment** for learning is an ongoing process that arises out of the interaction between teaching and learning.

✓ What are the types of inspection?

Other types of inspections

- Manufacturing. Inspections include measuring, testing, examining, or gauging the features of a process or product. ...
- Fire equipment. In most countries, regular inspections of fire equipment are compulsory. ...
- Business. ...
- Government. ...
- Road vehicles. ...
- Engineering, mechanics. ...
- Medical. ...
- Nuclear Power Plants.

✓ What is the hazard?

A **hazard** is any agent that can cause harm or damage to humans, property, or the environment. **Risk** is defined as the probability that exposure to a **hazard** will lead to a negative consequence, or more simply, a **hazard** poses no **risk** if there is no exposure to that **hazard**.

The meaning of the word **hazard** can be confusing. ... **Hazard** - a potential source of harm to a worker. Basically, a **hazard** is the potential for harm or an adverse effect (for example, to people as health effects, to organizations as property or equipment losses, or to the environment).

There are many **definitions** for **hazard** but the most common **definition** when talking about workplace health and safety is "A **hazard** is any source of potential damage, harm or adverse health effects on something or someone." ... Harm – physical injury or damage to health. **Hazard** – a potential source of harm to a worker.

✓What are hazards in the workplace?

Look for these common hazards in your office:

- poor or inadequate lighting;
- ergonomic hazards;
- extremes of temperature;
- manual handling hazards;
- slip, trip and fall hazards;
- Electrical hazards (e.g. appliances, power sockets, etc.);
- contagious illnesses spread by sick workers;
- fire hazards

✓ Types of Hazards

Hazards exist in every workplace, but how do you know which ones have the most potential to harm workers? By identifying hazards at your workplace, you will be better prepared to control or eliminate them and prevent accidents, injuries, property damage and downtime.

Firstly, a key step in any safety protocol is to conduct a thorough hazard assessment of all work environments and equipment.

In a hazard assessment, it is important to be as thorough as possible because after all, you can't protect your workers against hazards you are unaware of. Avoid blind spots in your workplace safety procedures by taking into consideration these six main categories of workplace hazards.

The meaning of the word hazard can be confusing. Often dictionaries do not give specific definitions or combine it with the term "risk". For example, one dictionary defines hazard as "a danger or risk" which helps explain why many people use the terms interchangeably. There are many definitions for hazard but the most common definition when talking about workplace health and safety is:

A hazard is any source of potential damage, harm or adverse health effects on something or someone.

Harm – physical injury or damage to health.
Hazard – a potential source of harm to a worker.

Basically, a hazard is the potential for harm or an adverse effect (for example, to people as health effects, to organizations as property or equipment losses, or to the environment). Sometimes the resulting harm is referred to as the hazard instead of the actual source of the hazard. For example, the disease tuberculosis (TB) might be called a “hazard” by some but, in general, the TB-causing bacteria (Mycobacterium tuberculosis) would be considered the “hazard” or “hazardous biological agent”.

TYPES OF HAZARDS:

A common way to classify hazards is by category:

- **Biological** – bacteria, viruses, insects, plants, birds, animals, and humans, etc.,
- **Chemical** – depends on the physical, chemical and toxic properties of the chemical,
- **Ergonomic** – repetitive movements, improper set up of workstation, poor design of equipment, workstation design, (postural) or workflow, manual handling, repetitive movement.etc.
- **Physical** – Slippery floors, objects in walkways, unsafe or misused machinery, excessive noise, poor lighting, fire. radiation, magnetic fields, pressure extremes (high pressure or vacuum), noise, etc.,
- **Psychological** – Shift work, workload, dealing with the public, harassment, discrimination, threat of danger, constant low-level noise, and stress. Stress, violence, etc.,
- **Safety** – slipping/tripping hazards, inappropriate machine guarding, equipment malfunctions or breakdowns.

BIOLOGICAL HAZARD:

Wastes from hospitals and research facilities may contain disease-causing organisms that could infect site personnel. Like chemical hazards, etiologic agents may be dispersed in the environment via water and wind. Other biologic hazards that may be present at a hazardous waste site include poisonous plants, insects, animals, and indigenous pathogens. Protective clothing and respiratory equipment can help reduce the chances of exposure. Thorough washing of any exposed body parts and equipment will help protect against infection

Types of things you may be exposed to include:

- Blood and other body fluids
- Fungi/mold
- Bacteria and viruses
- Plants
- Insect bites
- Animal and bird droppings

✓ **PHYSICAL HAZARD:**

Are factors within the environment that can harm the body without necessarily touching it?

Physical Hazards Include:

- Radiation: including ionizing, nonionizing (EMF's, microwaves, radio waves, etc.)
- High exposure to sunlight/ultraviolet rays
- Temperature extremes – hot and cold

- Constant loud noise

ERGONOMICS HAZARDS:

Occur when the type of work, body positions and working conditions put strain on your body. They are the hardest to spot since you don't always immediately notice the strain on your body or the harm that these hazards pose. Short term exposure may result in "sore muscles" the next day or in the days following exposure, but long-term exposure can result in serious long-term illnesses.

Ergonomic Hazards Include:

- Improperly adjusted workstations and chairs
- Frequent lifting
- Poor posture
- Awkward movements, especially if they are repetitive
- Repeating the same movements over and over
- Having to use too much force, especially if you have to do it frequently
- Vibration

CHEMICAL HAZARDS:

Are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Some are safer than others, but to some workers who are more sensitive to chemicals, even common solutions can cause illness, skin irritation, or breathing problems.

Beware of:

- Liquids like cleaning products, paints, acids, solvents – ESPECIALLY if chemicals are in an unlabeled container!
- Vapors and fumes that come from welding or exposure to solvents

- Gases like acetylene, propane, carbon monoxide and helium
- Flammable materials like gasoline, solvents, and explosive chemicals.
- Pesticides

SAFETY HAZARDS:

These are the most common and will be present in most workplaces at one time or another. They include unsafe conditions that can cause injury, illness and death.

Safety Hazards Include:

- Spills on floors or tripping hazards, such as blocked aisles or cords running across the floor
- Working from heights, including ladders, scaffolds, roofs, or any raised work area
- Unguarded machinery and moving machinery parts; guards removed or moving parts that a worker can accidentally touch
- Electrical hazards like frayed cords, missing ground pins, improper wiring
- Confined spaces
- Machinery-related hazards (lockout/tag out, boiler safety, forklifts, etc

Some safety hazards are a function of the work itself. For example, heavy equipment creates an additional hazard for workers in the vicinity of the operating equipment. Protective equipment can impair a worker's agility, hearing, and vision, which can result in an increased risk of an accident. Accidents involving physical hazards can directly injure workers and can create additional hazards, for example, increased chemical exposure due to damaged protective equipment, or danger of explosion caused by the mixing of chemicals. Site personnel should constantly look out for potential safety hazards, and should immediately inform their supervisors of any new hazards so that mitigate action can be taken

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is a workplace inspection?
2. What is the hazard?

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 2	Following Safety requirements

2.1 Safety Requirement Specification, SRS, is documentation for **requirements** stated in the **safety standards** e.g. the standard IEC61511 "Functional **safety** – **Safety** instrumented systems for the process industry sector". A SRS must be developed during a project that involves **Safety** Instrumented Systems, SIS.

General Precautions

- Your safety is your personal responsibility.
- Always follow the correct procedures.
- Never take shortcuts.
- Take responsibility and clean up if you made a mess.
- Clean and organize your workspace.
- Ensure a clear and easy route to emergency exits and equipment.
- Be alert and awake on the job.

Basic Safety Rules

1. Stay alert - and stay alive. ...
2. Wear the right clothes - work clothes should fit properly. ...
3. Use the right tools - if you need a hammer, get a hammer. ...
4. Learn how to lift - lifting takes more than muscle; it is an art. ...
5. Don't be a prankster - practical jokes and horseplay can be dangerous, especially around heavy machinery.

2.2 Tools and Equipment

- measuring tapes/rules
- hammers, spirit levels and squares (combination/tri),
- chisels, hand saws, coping saws, saw stools,
- marking equipment, power saws and power leads, power drills, power planers, hand planes, string lines
- straight edges and may include but not be limited to nail guns, air compressors and hoses
- routers, bevels, rebate planes, molding planes, corking guns and cramps

✓ How do you measure with a measuring tape?

How to Read a Tape Measure

1. Find/read the markings. On a standard tape measure, the biggest marking is the inch mark (which generally has the biggest number, if it has them).
2. As the increments decrease, so does the length of the mark. ...
3. Read 1 inch. ...
4. Read one-half inch. ...
5. The remaining markings follow a similar pattern.

✓ What is the use of tape rule?

A **tape measure** or measuring **tape** is a flexible ruler and used to **measure** distance. It consists of a ribbon of cloth, plastic, fiber glass, or metal strip with linear-measurement markings. It is a common measuring tool.

✓ How to Read a Tape Measure

The humble tape measure is the world's most commonly used measuring tool, accompanying millions of tradesmen and contractors to work every single day.

Whilst the seasoned professionals amongst you will no doubt be fully aware how to read the various markings on your tape, there will be amateurs, enthusiasts or those just starting off in their careers who aren't yet so knowledgeable. We regularly get asked the

question “how do you read a tape measure”. In response to our customers, therefore, we’ve put together this simple guide that explains just that!

✓ How to Read a Metric Tape Measure

Above you'll see a picture of a metric/imperial pocket tape measure. The measurements towards the bottom of the image are metric. In other words they're in centimeters and millimeters. There are 10mm in each centimeter (shown by the ten spaces between each cm) and 100cm in each meter. Whilst the centimeters are clearly numbered, to make the blade easier to read the millimeters are not numbered. Also, whilst a few tapes show '1m' to display the 1 meter mark, the majority will show '100cm'.
When looking at the image above, the 1st small mark after the 4cm point denotes a measurement of 41mm. The next small mark in line would be 42mm, the next would be 43mm and so on. 41mm can also be referred to as 4.1cm (0.041m) but the majority of trades in the UK do tend to quote measurements in millimeters.

✓ How to Read an Imperial Tape Measure

Whilst Britain now officially operates a metric system of measurement, our nation still sees a curious mix of both metric and imperial measurements being used on a day to day basis. We measure our height in feet and inches, our weight in stones and pounds and our speed in miles per hour. Despite this almost all 21st Century technical, engineering or construction measurements are quoted in millimeters. Most manufacturers have, therefore, opted to produce UK-spec tape measures with both metric and imperial graduations.
When referring to the diagram above you'll see a series of large numbers marked 1, 2, 3, and 4. These numbers sit next to long vertical marks which represent whole inches. Put simply 1 = 1", 2 = 2" and so on. Between those numbers are a series of shorter marks which represent fractions of an inch. The mark directly in the middle of the inch denotes a measurement of 1/2" whilst the markings either side of it represent

measurements of 1/4" and 3/4" respectively. Even smaller marks then denote 1/8ths and 1/16ths (marked in red) of an inch.

A 16ft tape measure, for example, will have sixteen one-foot marks along its length and 192 one-inch marks (12 inches per foot). Each inch will then have eight 1/8th of an inch and sixteen 1/16th of an inch marks.

- 1 foot = 12 inches
- 1 inch = 16 x 1/16th of an inch, 8 x 1/8th of an inch, 4 x 1/4 of an inch or 2 x 1/2 of an inch.

✓ General Tips

The hook or 'tang' of the tape measure is the small, usually metallic component at the end of the blade. In pocket tapes (as seen in the image below), this is usually a straight piece of metal attached to the blade by a number of rivets. You will normally find (on any pocket tape of quality) that the hook 'floats'. In other words it moves in and out ever so slightly. Some people mistakenly think of this as a manufacturing defect but this is not the case.

When taking internal measurements (i.e. from the inside edge of an object such as between one internal wall and another) the hook can be pushed against the object (e.g. skirting board) providing an accurate measurement.

When taking external measurements, however, the hook can be placed around/behind the object and pulled gently towards the measurer. Not only does this keep the blade in place whilst measuring, it also guarantees an accurate measurement by compensating for the thickness of the metal hook in the measurement. Be sure to use the hook properly when using your tape measure!

Some pocket tape measures feature a case with a known length (e.g. 7cm) and some more innovative ones even take the length of the tape into account by compensating for

the case length on the blade or by using a viewing window. Most tapes, however, leave it up to the user to take the length of the case into account. When taking an internal measurement, therefore, it is important to bend the blade at the point at which it touches the object you're measuring to. Do not assume that the tape has taking the case length into account unless you are using one of the more advanced tapes mentioned above.

✓ Safety Tips

Whatever you do, never allow the blade and hook to return uncontrolled at full speed when rewinding. Whilst the ability to return the blade quickly into the case can seem like a useful function, it can be very dangerous with a number of people each year being injured by wildly flailing hooks. All manufacturers recommend that users make use of safety glasses/goggles when doing any work that requires a tape measure for exactly this reason.

✓ What is meter rule?

A **meter rule** is a device which is used to measure length of different objects. A **meter rule** of length 1m is equal to 100 centimeters (cm). On **meter rule** each cm is divided further in to 10 divisions which are called millimeters (mm). So, a **meter rule** can measure up to 1mm as smallest reading.

What are hammers used for?

Hammers are **used for** a wide range of driving, shaping, and breaking applications. The modern **hammer** head is typically made of steel which has been heat treated for hardness, and the handle (also called a haft or helve) is typically made of wood or plastic.

Hammer is widely used in mechanical industries to drive any thin metal part like nails etc. by an impact force. It is a tool which is used to create a sudden pointed force, which is further used to drive nails, remove unwanted metal parts form work piece and also in forging to create flat surfaces. Hammers are also used in our daily routine to drive nail in a wall or in wooden work piece etc.

- ✓ Types of Hammers

A hammer consist two main parts. The first one is handle and the other one is head which is a heavy metal piece mounted at perpendicular to the axis of the handle. There are many different types of hammers used in mechanical industries for different uses. Now we will discuss about it.

- ✓ Types of Hammers

A hammer is a hand tool which is used to create sudden impact force. The impact of hammer depends on the size and shape of hammers and the power given to drive it. The hammer can be classified into many types according to its shapes and size but mainly there are only two hammers types.

A. Hand Powered Hammers:

As the name implies hand hammer are powered by manually human hands. According to shape and size of heads and its different uses it has following types.

- ✓ Ball peen hammer:
- ✓ Claw hammer:
- ✓ Cross peen hammer:
- ✓ Dead blow hammer:
- ✓ Engineer hammer:
- ✓ Geologist hammer or rock pick hammer:
- ✓ Knife edged hammer
- ✓ Sledge hammer:
- ✓ Rock climbing hammer:
- ✓ Rounding hammer:
- ✓ Soft faced hammer:
- ✓ Stonemason's hammer:

- ✓ Welder chipping hammer:
- ✓ Lump hammer:
- ✓ Mechanic's hammer:
- ✓ Drilling hammer:
- ✓ **Lathe hammer:**
- ✓ **Brass hammer:**

Mechanically Powered Hammers:

- ✓ Steam hammer:
- ✓ Jack hammer:

✓ Spirit Level

A **spirit level** is used for determining horizontal and vertical **levels** and can be used on a variety of DIY projects in and around the home. A **spirit level** is used to designed to indicate whether a surface is **level** on the horizontal or vertical planes, and there are a variety of sizes and designs for every project.

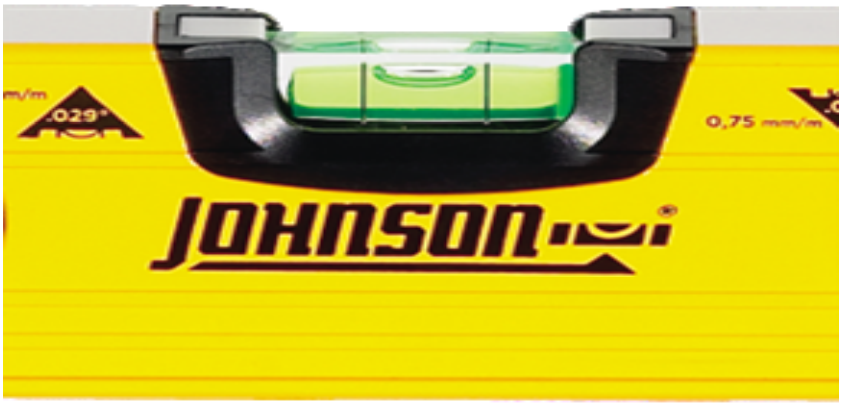

Figure 1 spirit level

✓ What is the best Spirit Level?

The Best Spirit Level

1. Stanley 43-511 Magnetic Shock Resistant Spirit Level. ...
2. Black & Decker BDSL10 Gecko Grip Spirit Level. ...
3. Kapro 227-08 Toolbox Spirit Level. ...
4. Workpro 3-piece Spirit Level Set. ...
5. Stanley FatMax 43-524 Non-Magnetic Level. ...
6. OX Tools Heavy-Duty Box Level. ...
7. TACKLIFE Aluminum Alloy Magnetic Torpedo Level.

✓ How do you measure your spirit level?

How to Check a Spirit Level for Accuracy

1. Place the level on a flat surface.
2. Make one mark at the end of the level.
3. Make another mark along the side of the level, under the vial in the center.
4. Take a reading of the bubble's position.
5. Rotate the level 180° end-to-end and align the level with your marks.

✓ marking equipment, power saws and power leads, power drills, power planers, hand planes, string lines

Marking tools

- Tracing wheel and dressmaker's paper: Dressmaker's paper is something like carbon paper, in that it transfers markings with applied pressure. ...
- Water soluble pencils: These look like colored pencils, and come in a range of colors which are suitable for different fabrics. ...
- Markers and pens: ...
- Tailor's chalk: ...
- Chalk pen: ...
- Pins:

- ✓ WOODWORKING MARKING TOOLS

Marking is a vital point in woodworking project. The most common woodworking marking tools are pencil, gauge, scriber, marking knives, awl etc. They are used for doing anything such as cutting, shaping, drilling to a piece of wood. You can draw a parallel line to the edges, jig jag line or rounds of a work piece with them.

Pencils

Pencils are essential marking tool to woodworkers. They have some limitations; for example they cannot mark a sharp line and the mark may be rubbed out. But they have some benefits such as you can easily mark a line. The pencils are great for those cases where accuracy is not important. Most of the cabinet makers use pencil for marking.

Scriber marking tool

In woodworking project a scriber which is a hand tool is used to mark lines on work pieces. This tool is used for marking wood by scratching on the surface to cutting with precision. The lines with the scriber marking tool is more accurate and sharp then the pencils or ink. Often they are used for making mortise, tenon joints, door casings etc. They are made of steel and have a sharpened point which is angle of 30 or 40 degrees. Some scribers may contain a point at both ends.

Scratch awl

The scratch awl looks like a spike which contains a tip. It is used as a point marking tool in woodworking project. It scribes a line across the timber so that a hand saw or chisel can be run properly

Gauge

The marking gauge is a significant tool among the woodworking marking tools. There are several types of gauge are used for cutting or other operations in woodworking project. Among them the marking gauge, mortise gauge and the cutting gauge are most popular gauges on the market. They scribe a parallel line to a reference edge or surface. The gauge contains a stem/beam, headstock, screw and a scribing point tool such as pin, knife or wheel. The headstock is adjustable and the distance between the

pin and headstock can increase or decrease by loosening the thumbscrew. They are more accurate marking tools than the pen or pencil.

Marking gauge

It is a most common type gauge as well as woodworking marking tools. It has a small pin which is also known as spur. The other parts of these tools are stem, stock and adjustable screw. During marking you should run the tools in line with the wood grain. If you run a line against the grain then it would possible to produce inaccurate jig jag line. Normally joiners use this tool for scribing tenons and dovetail shoulder lines. Moreover, sometimes it is also used for marking a rabbet. The stem lengths are available from 9 inches to 10.2 inches. Much larger marking gauges are known as panel gauges.

Mortise gauge

A mortise gauge has two pins where one of them is adjustable relative to each other. It is able to scribble two lines simultaneously including different widths. Normally it is used in mortise and tenon joinery project. Sometimes this gauge may contains a third pin on the opposite side so that it can be used a regular marking gauge. Therefore it is also known as combination gauge.

These gauges are available in different stem length from 6 inches to 11.5 inches.

Cutting gauge

The marking gauge with a knife instead of a pin is known as cutting gauge. It is able to mark wood against the grain with accuracy. It can cut clean and precise deep lines in the timber. You can also use this gauge to cut through thin materials like veneer.

Wheel gauges

Wheel gauge contains a round blade instead of a pin to mark a surface. As like cutting gauge it can also mark across the wood grain. For mark out mortises the wheel gauge

may also contains two round blades. Then it is known as wheel mortise gauge. The round blade contains in two separate stems. As a result they can be adjusted according to each other.

Panel gauges

The marking gauge which has a longer stem is called panel gauge. The carpenters use these tools to mark large boards to the correct width; even in center of a board. The stem length can be 12 inches to 26 inches.

Marking Knife

Joiners use marking knife to scribe a line so that they can accurately run a hand saw or chisel during making joints or other operations. It is constructed with steel blade and wood or plastic handle. They can able to mark across the grain and the line is accurate than pencils.

Others Woodworking marking tools

Some tools are not directly used as scribing but they are also known as woodworking marking tools. They are used as a guide of above marking tools. Try square, miter square, steel rule, t-bevel are such type of tools; actually they are known as measuring tools. Joiners use the try square to mark out a line at right angles to an edge. Steel rules can be used with marking knife or pencils. They are available in different lengths. Miter square is used to mark at any angles

- ✓ **power saw machine**

power tool - a tool driven by a motor. jigsaw, reciprocating **saw**, saber **saw** - a portable **power saw** with a reciprocating blade; can be used with a variety of blades depending on the application and kind of cut; generally have a plate that rides on the surface that is being cut. sawmill - a large **sawing machine**.

- ✓ **Power drill**

A **power drill** is an electrical motor that rotates a replaceable **drill** bit to make a hole in wood, plastic, or metal. Alternately, a screwdriver tip can be installed to turn screws.

The **drill's** mechanism is actually quite simple: A trigger switch activates an **electric** motor, which in turn drives a rotating chuck. Numerous accessories can fit into in the chuck, allowing the **drill** to bore holes, drive screws, and sand, polish, and grind a wide variety of materials.

- ✓ **What are different types of drills?**

Impact driver: A driving tool that uses quick change bits and more torque than a standard **drill**. Rotary hammer **drill**: Engineered specifically to **drill** holes in concrete and other masonry materials.

power drills

- Corded and Cordless Drill Types.
- Power Drill Features.
- Power Drill Bits.
- Twist.
- Masonry.
- Hole Saw.
- Spade.
- Auger.

- ✓ **Power planer**

Power planers are to jack planes as portable circular saws are to handsaws. ... The **power planer** is a hand-held tool, but it operates like an upside-down stationary jointer. There's a cutter-head with a pair of sharp knives that, like a plane iron, removes shavings of stock.

A **power planer's** primary function is to smooth the surface of wood, but it can also be **used to** smooth wood's rough end grain. It's also **used for** tapering wood. If a door is too wide, for instance, make passes with a **power planer** over the side of the door, adjusting the depth gauge to give a cut of the desired depth.

Planers used for simply put, a wood **planer** is a woodworking tool, which can be **used for** producing boards of even thickness that also happen to be totally flat on either side.

- *Power planers* are to jack planes as portable circular saws are to handsaws. Both the planer and the circular saw are powerful electric-powered tools; they do much the same work that the jack plane and handsaw do, or once did, but they do it more quickly, sometimes more efficiently and accurately, and always at a higher decibel level.

The power planer is a hand-held tool, but it operates like an upside-down stationary jointer. There's a cutter-head with a pair of sharp knives that, like a plane iron, removes shavings of stock. The cutter head is aligned with the rear portion of the tool's base; the front shoe of the plane adjusts to control the depth of cut.

The power planer cuts no more than a sixteenth of an inch at a pass. The depth of cut is adjusted on most models by a control knob mounted atop the front of the planer. Some power planers come equipped with an adjustable fence.

The size of the portable power planer is determined by the tool's maximum cutting width. Most models available on the market today plane a maximum width of between three and a quarter and six and a half inches.

Operating a power planer is similar to using a bench plane, but requires much less effort: You don't need to drive the plane, rather, you guide it along the path you wish planed. Clamp the work piece securely and make sure your stance is balanced. Although little force will be required, use both hands to control the tool, with your left hand guiding the plane at the front, the right balancing the rear.

✓String lines

Line levels (or "**string**" levels) are a special brand of spirit level used for leveling across longer distances. They can be attached to a tightly pulled **string** to find level between two stakes in the ground to find level ground.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the use of hammer?

2. What is the use of spirit level?

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 3	identifying and implementing Sign/barricade requirements

3.1 Sign/barricade requirements

"**Signs**" are the warning of hazard, temporarily or permanently affixed or placed, at locations where hazards exist. "**Signals**" are moving **signs**, provided by workers, such as flagmen, or by devices, such as flashing lights, to warn of possible or existing hazards.

Barricade, from the French barrique (barrel), is any object or structure that creates a barrier or obstacle to control, block passage or force the flow of traffic in the desired direction. Adopted as a military term, a **barricade** denotes any improvised field fortification, such as on city streets during urban warfare.

It includes

- worksite inspection,
- equipment defect identification,
- assessment of conditions,
- hazards and determination of work requirements

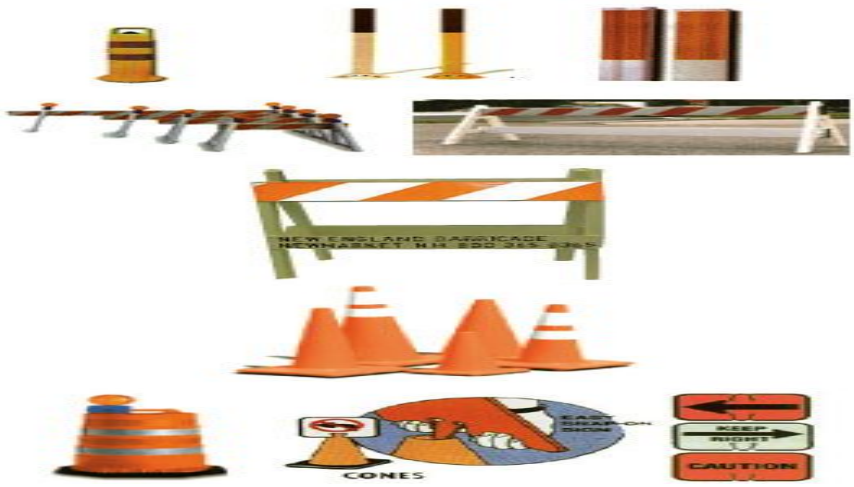

Figure 2 signs

- Signs, Signals, and Barricades

Before work begins in the vicinity of vehicular or pedestrian traffic that may endanger employees, warning signs and/or flags or other traffic control devices shall be placed conspicuously to alert and channel approaching traffic. Where further protection is needed, barriers shall be utilized. At night, warning lights shall be prominently displayed, and excavated areas shall be enclosed with protective barricades. The employer shall insure that an employee finding any crossed or fallen wires which create or may create a hazardous situation at the work area remains on guard or adopts other adequate means to warn other employees of the danger and has notified the proper authority at the earliest practical moment. Signs and symbols required by Subpart G shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist. If work exposes energized or moving parts that are normally protected, danger signs shall be displayed and barricades erected, as necessary, to warn other personnel in the area. Danger signs Danger signs shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording

Types of sign

✓ Caution signs

Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices. Caution signs shall have yellow as the predominating color; black

upper panel and borders: yellow lettering of “Caution” on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1- 1967.

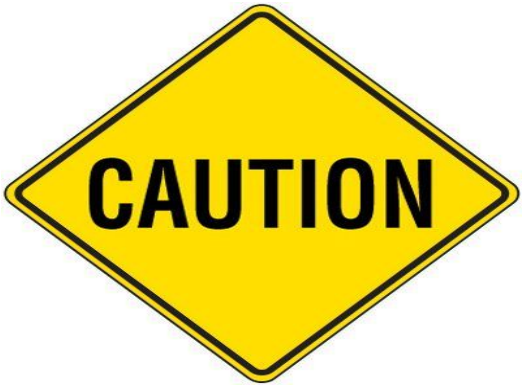

Figure 3 caution sign

- ✓ Exit signs

Exit signs, when required, shall be lettered in legible red letters, not less than 6 inches high, on a white field and the principal stroke of the letters shall be at least three-fourths inch in width.

Figure 4 exit sign

- ✓ Safety instruction signs

Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.

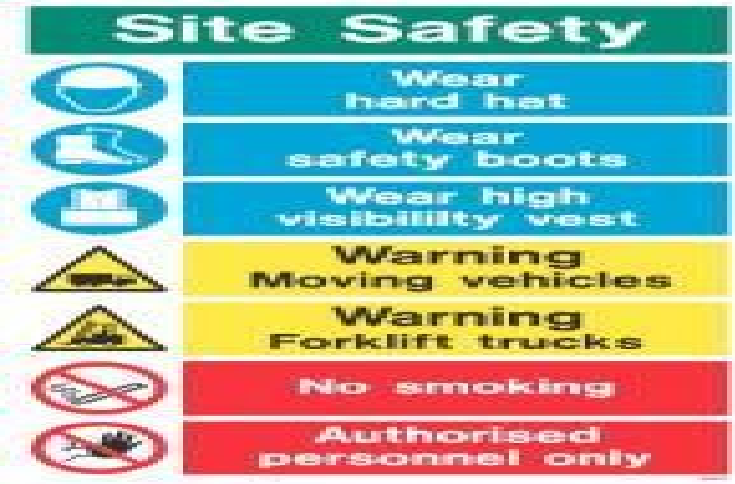

Figure 5 safety instruction sign

- ✓ Directional signs

Directional signs, other than automotive traffic signs specified in paragraph (g) of this section, shall be white with a black panel and white directional symbol. Any additional wording on the sign shall be black letters on the white background.

Figure 6 directional sign

- ✓ Traffic signs

Construction areas shall be posted with legible traffic signs at points of hazard. All traffic control signs or devices used for protection of construction workmen shall conform to American National Standards Institute D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways.

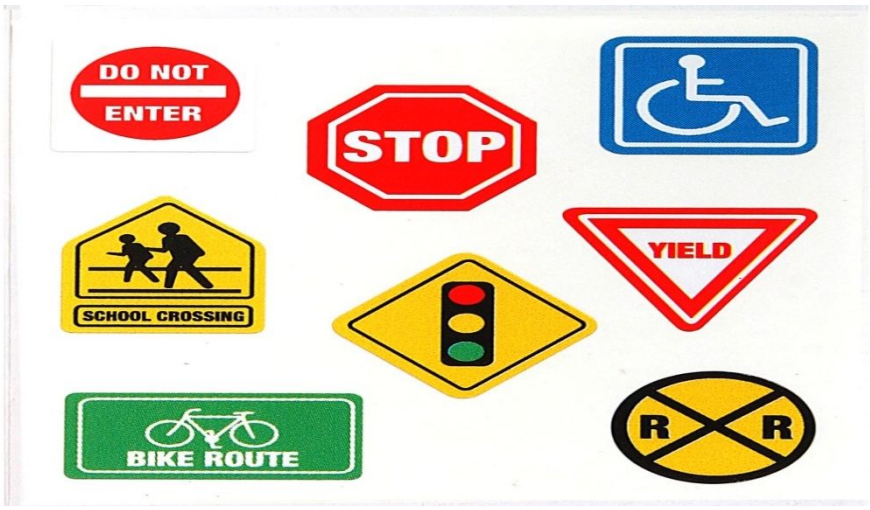

Figure 7 traffic sign

- ✓ Accident prevention tags

Accident prevention tags shall be used as a temporary means of warning employees of existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.

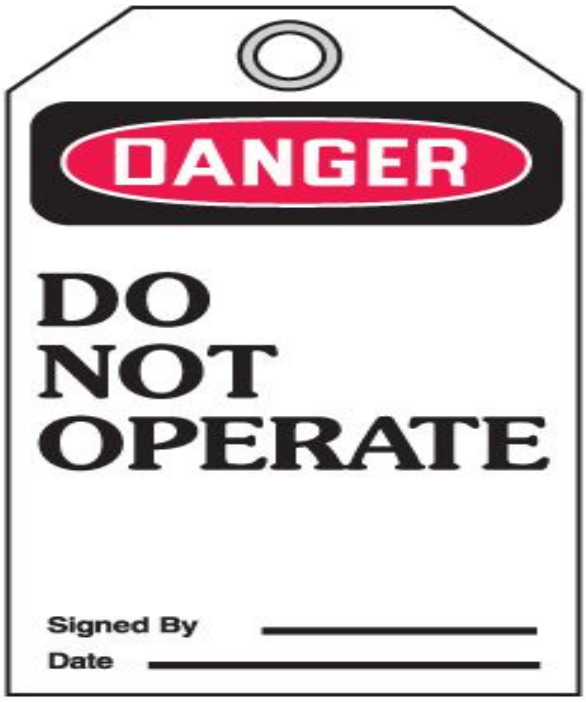

Figure 8 accident prevention tags

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. -------are the warning of hazard, temporarily or permanently affixed or placed, at locations where hazards exist.
   A. Safety
   B. Sign
   C. Barricade
   D. Signal

2. Write the types of sign

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 4	Selecting Tools and equipment

2.1 Tools and Equipment

A **tool** can be any item that is used to achieve a goal. **Equipment** usually denotes a set of **tools** that are used to achieve a specific objective. ... **Tools** are often seen to be used by animals as well. **Equipment** is only used by human beings

Tools and equipment selected to carry out tasks are consistent with job requirements, checked for serviceability, and any faults are rectified or reported prior to commencement.

Six Essential Factors to Consider Before Buying Construction Equipment

- Quality. There will be times when you will have to work in a remote location, where the weather conditions could be unpredictable, unfamiliar or harsh. ...
- Technology. ...
- Fuel efficiency. ...
- Costs. ...
- Dealer. ...
- Knowledge of using the equipment.

Equipment refers to tangible and durable assets that help **in the** production of other goods and services. Examples of **equipment** are things like **machinery**, **tools**, devices, etc. **Materials**, on the other hand, form the base of the product. This is the basic **difference between equipment** and **materials**.

- ✓ **Tools and equipment** are terms that are often used interchangeably without knowing the actual difference between tools and equipment, but in fact, they have different definitions. Tools and equipment are not only two words that are often used in day to day life, but also two utensils that are often used every day as well

What is the difference between Tools and Equipment?

Tools and equipment are two words that are often used synonymously, mainly due to the similarities of their meanings. Because of this factor, they can be used interchangeably in most instances. However, in certain cases, this may not be so.

• A tool can be any item that is used to achieve a goal. Equipment usually denotes a set of tools that are used to achieve a specific objective.

• A tool can be non-mechanical as well. However, when one says equipment, there is a certain mechanical aspect to it that cannot be ignored.

• The usage of tools among human beings runs back to millions of years. However, the use of equipment is more of a recent development.

• Tools are often seen to be used by animals as well. Equipment is only used by human beings.

• Tools are usually multipurpose. Equipment is designed for a specific task.

✓ It includes:-

- measuring tapes/rules,
- hammers, spirit levels, hole saws,
- spade bits, squares (combination/tri),
- marking equipment, power drills, hand saws,
- chisels and straight edges

And also:-

- saw stools, power saws, power leads,
- docking saws/drop saws, nail guns,
- air compressors and hoses, spanners,
- power routers, power screwdrivers and scaffolding

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the difference between tools and equipment?

2. Write the tools and equipment that we use in installation of window and door

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 5	Calculating Material quantity requirements

5.1 **Material Quantity Calculation**

- Material quantity requirements are calculated in accordance with plans, specifications and quality requirements.

✓ **Use**

We use this function for a production version of a master recipe or a process order to visually reproduce the dependencies between the following values:

- Quantity and properties of a product, such as the active ingredient proportion
- Quantity and properties of material components, that is, material items and their batches
- Operation and phase quantities
- The scrap to be expected for an operation or phase

You need this function to adjust the quantities defined in the bill of material (BOM), master recipe, or process order in the following cases:

- To calculate the component quantities if they are not proportional to the product quantity or if different active ingredient concentrations of batches must be taken into account
- To calculate the product quantity, that is, the base quantity of the master recipe or the order quantity if it must be adjusted to modified component quantities. This may be the case if, for example, a batch of a component is always used up completely.
- To calculate the expected phase scrap if you want it to be displayed in the phase data in the order (*Quantities/Activities* screen) and make it available for planned/actual evaluations carried out in the Logistics Information System
- To calculate operation and phase quantities if they are not identical to the product quantity. You may want to do this, for example, if you must take the quantity difference caused by the scrap produced into account.
- **Integration**

You enter the formulas for material quantity calculation in the master recipe or process order. If required, you transfer the formula results from the recipe to the BOM.
Material quantity calculation is always performed during further processing when you use the production version to select a recipe and BOM and then carry out scheduling. This means that it is performed, for example, when you create a process order, convert planned orders, or during product costing, but not when you carry out material requirements planning without a detailed plan.

In material requirements planning and product costing, material quantity calculation is used to calculate the material and operation quantities that are, for example, necessary for reservations or direct cost statements.
In the process order, material quantity calculation determines the order-specific quantities. The formulas for the calculation are taken from the master recipe. However, you can change them in the order and start the calculation again, if, for example, the basis for the calculation has changed due to batch determination. The quantities calculated in this way are used as the basis for reservations, scheduling, capacity requirements planning, and costing.

Prerequisites

- To be able to use material quantity calculation in a master recipe, you must have defined a production version for the master recipe.
- To transfer the data from material quantity calculation from a master recipe to the process order, you must create the process order with the corresponding production version.

To transfer the scrap calculated in material quantity calculation to the corresponding phase in the process order, you must have activated scrap management in the parameters of the relevant order type
Formula Definition

We can use the following functions in material quantity calculation to define formulas:

- The common arithmetical operators and functions as well as references to quantities and material properties
- Functions that you can use to perform material quantity calculation based on batch data

This function enables you, for example, to use material quantity calculation together with active ingredient management of the *Batch Management* component to plan the quantity structure of your orders on the basis of exact active ingredient quantities.

✓ Important Information about Value Processing

Depending on the type of value to be calculated, also bear in mind the following:

- The formulas for the product and component quantities may not mutually refer to each other.
- If you have planned a scrap quantity for a product in the material master record or the order header, the system automatically increases the product and component quantities during quantity calculation without formulas.

If you have planned a scrap quantity for a component in the material master record, the BOM, or the material list of the process order, the system automatically increases the component quantity during quantity calculation without formulas.

If you perform quantity calculation with formulas, the system does not automatically take the planned scrap quantity into account. If required, you must explicitly include it in the formula.

- The scrap quantity calculated for a phase does not automatically reduce the succeeding phase quantities. However, you can use the formulas of the operation and phase quantities to visually reproduce the quantity difference caused by the scrap produced.
- In collective orders, material quantity calculation is only supported within the leading order. Header quantities and component quantities of subordinate orders are calculated in proportion to the product quantity. For this reason, do not enter formulas for:
- Directly-produced components of the leading order
- Materials or phases of subordinate orders

✓ **Performing Material Quantity Calculation**

You can start material quantity calculation as follows during production planning:

- Automatically together with functions during which scheduling is carried out (see *Integration* above)

Material quantity calculation calculates component, operation, phase, and scrap quantities for which a formula has been defined. Product quantity calculation is not carried out during automatic material quantity calculation.

Component quantities for which no formulas are defined have already been calculated in proportion to the product quantity (for example, during order release or BOM explosion).

- Manually in the master recipe or process order

Here you decide whether the product quantity is calculated in addition to the component, operation, phase, and scrap quantities.

When you carry out product quantity calculation, the system automatically recalculates the component quantities with a formula afterwards. Note, however, that component quantities without a formula are not adjusted to the modified product quantity.

Basic Functions of Material Quantity Calculation

Use

You can use the following functions in material quantity calculation whenever you do not need to access batch data for the calculation.

Prerequisites

- To be able to use material quantity calculation in a master recipe, you must have defined a production version for the master recipe.
- To transfer the data from material quantity calculation from a master recipe to the process order, you must create the process order with the corresponding production version.
- For you to be able to take material properties into account in material quantity calculation, the following requirements must be met:
- It must be possible to enter the property as a numeric value.
- You must classify the material master record or the BOM item with a class of class type *Batch.*
- You must assign the property as a characteristic to this class and assign a value to it in the material master record or the material list as well as in the material list of the process order.

Features

The data of all materials, operations, and phases that are used in the master recipe or process order are available in material quantity calculation. When you call up material quantity calculation, you are given the following:

- The planned quantity for each operation as well as a field for any interim results
- The planned quantity for each phase, a field for the scrap to be expected, and a field for any interim results
- The planned quantity for each material, all numerical material properties as well as a field for any interim results

For materials for which you use batch determination, you are given the following in material quantity calculation:

- A line containing the original quantity of the material item for the totals record (line 4 of the example below)
- A line containing the transferred batch quantity for each batch (lines 5 to 7 of the example below)

For material properties, you are given:

- In the master recipe, the value from the BOM or, if this value is missing, the value from the material master record
- In the process order, the value from the material list of the order or, after the batch determination, the value of the batches used

If multiple values or value ranges have been defined, the system uses the lowest value.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the purpose of material quantity calculation

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 6	Identifying, obtaining, preparing, safely handling and locating Materials

6.1 safely handling and locating Materials

Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use.

- ✓ How do you do Material Handling?

Here are some effective tips in using material handling equipment:

1. Determine the most appropriate distance that should be covered.
2. Facilitate material damage reduction in order to improve their quality.
3. Reduce total manufacturing time through well-designed material movement.
4. Enhance the flow control of materials.

✓ Materials handling

The National Safety Council suggests employers relay the following information to employees to help reduce workplace incidents when handling and moving materials:

- Avoid lifting materials from the floor or while seated.
- Make use of available handling aids.
- Refrain from using sudden or jerky movements.
- Never lift a load over an obstacle.
- Perform lifts in areas with adequate footing, space and lighting.
- Modify objects and redesign jobs to make moving easier.
- Seek assistance from co-workers.
- Stay in good physical shape.
- Begin lifts close to the body.
- Use containers made of lighter materials.
- Reduce load sizes when possible.
- Do not twist or bend while lifting objects.
- Ensure repetitive, heavy and bulky lifts are not performed.
- Keep lifts between shoulder and knuckle height.
- Use conveyors, slides or chutes to eliminate pushing or pulling.

- ✓ **What Are the Different Types of Material Handling Equipment?**

The term ‘material handling equipment’ is a pretty broad one. There are plenty of situations where it’s critical to move large and often heavy materials in a production

environment. Any piece of equipment that helps with this process could be labeled ‘material handling equipment’.

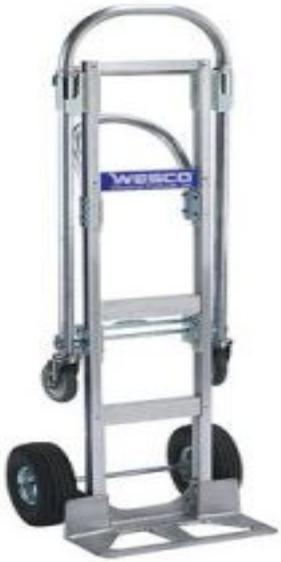

Figure 9 handling

Plenty of items fall under this definition, from tools and storage units to vehicles and major appliances. Anything that deals with the transportation, storage and control at any stage of the processing of materials can be classified as material handling equipment.

- ✓ Main Categories of Material Handling Equipment

There are 4 main categories of material handling equipment:

- Bulk material handling
- Engineered systems
- Industrial trucks
- Storage and handling equipment

Bulk Handling Material Equipment

The term ‘bulk handling equipment’ refers to the storage, control and transportation of materials by bulk, and in loose form. There are plenty of examples of this application – the handling of food, beverages, liquids; metal items (such as screws and nails) and minerals are just a few.

In general terms, these pieces of equipment primarily handle these items when they are loose. One example is a conveyor belt that is used to move items from one part of the production process to another. Drums and hoppers may be used as well, to ‘funnel’

these loose items into a stage where they can be more easily manipulated, or packaged.

Conveyor belts are used for horizontal transportation. For vertical transportation, elevators are most commonly used.

Types of bulk handling material equipment

- Bucket and grain elevators
- Conveyor belts
- Hoppers and silos
- Reclaimers
- Stackers

Engineered Systems

An engineered system is one that is typically automated. Such systems are also usually created from a variety of units. When combined, they work to enable both storage and transportation.

An ‘Automated Storage and Retrieval System’ (or a AS/RS for short) is one example of a system that is engineered. This is a large, automated device that comes complete with racks, shelves and aisles. These storage solutions are accessed by a ‘shuttle’ – a mechanized device that’s similar to a cherry picker. This device can be used by the system operator to manually select the items as needed, or the entire system can be computerized and automated.

An AS/RS can be integrated with a production facility’s existing computer network to keep on top of stock control, plus other logistical systems. It can also be integrated with other stages of the production process, so that as much automation can be offered as possible.

Types of engineered systems

- Automated guided vehicles (AGVs)
- Conveyor systems
- Robotic delivery systems

Industrial Trucks

This term is another broad definition that can be applied to many different types of equipment. Such pieces of equipment do have one thing in common, though – they all provide transportation.

The scope of this term can include both small, hand-operated devices, and large-scale motorized vehicles. Some items can be driven, while others – such as pallet trucks – simply add mobility to the materials that are being handled.

Many of these types of trucks have useful characteristics such as forks or a flat surface that can be inserted under pallets or other types of storage platforms. Other trucks need a separate item of equipment to use for lifting.

Trucks have the capability to lift via powered or manual means, and can be ridden upon in a driver's cab, or simply power-assisted when pushed. Such tucks can also be steered by human intervention, or can be completely automated, following a pre-defined track on the production floor, sunken or raised tracks, or colored strips that are laid out and sensed by optical sensors. Such automated industrial trucks also have anti-collision technology that senses when an employee or other obstacle is near.

Stacking trucks are used to stacks items, while a non-stacking truck is just used for transportation, and not for product loading.

Types of industrial trucks:

- Automated guided vehicles (AGVs)
- Hand, platform and pallet trucks
- Order pickers
- Pallet jacks
- Side-loaders
- Walking stackers

Storage and Handling Equipment

Equipment that is used for storage usually only encompasses items that are not automated. Storage and handling equipment that is automated falls under the term 'engineered systems'

Storage equipment is equipment that is used to hold products and materials when they are not being used, or when they are waiting to enter or leave the production process. These periods could be long-term, or short-term in order to allow a suitable build-up of stock or finished items.

Most items that can be described as storage and handling equipment refers to pallets, racking or shelves. Materials are stored in a neat and convenient manner to await transportation, or their entry into the production process if necessary.

Having suitable storage equipment will add to any company's production efficiency. The efficiency of any production system is maximized by the ease at which each stage of the

entire system operates. Any inefficient section creates a bottleneck that will have an effect on all other sections of the system further down the production line.

Space is also at a premium if you run a production environment. The better utilized your available space is, the more items you'll be able to store. This means you can keep your workflow in operation for much longer without worrying about re-stocking. This helps further increase your efficiency.

Types of storage and handling equipment

- Drive-through or drive-in racks
- Pallet racks
- Push-back racks
- Shelving
- Sliding racks
- Stacking frames

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the types storage and handling equipment

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

Information Sheet 7	Identifying and applying Environmental protection

7.1 Environmental protection

Environmental protection is the practice of **protecting** the natural **environment** by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural **environment** and, where possible, to repair damage and reverse trends.

Environmental requirements are identified for the project in accordance with environmental plans and statutory and regulatory authority obligations, and are applied.

Environmental Conservation is **important** because when we **protect** the **environment**, we are not **protecting** some distinct, distant entity but ourselves.

Self-Check -7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. -------- is the practice of **protecting** the natural **environment** by individuals, organizations and governments
    A. Safety
    B. Environmental protection
    C. Kaizen
    D. None

Note: **Satisfactory above – 4 out of 8 points Unsatisfactory - below 4 out of 8 point**

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The trainers prepare TTLM

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