







Participant Handbook

Furniture and Fittings

Sub-Sector Modular Furniture

Occupation

Production-Modular Furniture

Reference ID: FFS/Q5103, Version 1.0

NSQF Level 4



Lead Assembler Modular Furniture

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Furniture & Fittings Skill Council

Address: 407-408, 4th Floor, DLF City Court, MG Road, Sikanderpur

Gurugram-122002, Haryana, India

Email: info@ffsc.in

Phone: +91 124 4513900

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If we have to move India towards development then Skill Development should be our mission.

Shri Narendra Modi Prime Minister of India







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The preparation of this handbook would not have been possible without the Furniture & Fittings Industry's support. Industry feedback has been extremely encouraging from inception to conclusion and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant handbook is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

About this book

This Participant Handbook is designed for providing skill training and /or upgrading the knowledge level of the Trainees to take up the job of an "Lead Assembler Modular Furniture (Option: Lock Installer)" in the Furniture & Fittings Sector.

This Participant Handbook is designed based on the Qualification Pack (QP) under the National Skill Qualification framework (NSQF) and it comprises of the following National Occupational Standards (NOS)/topics and additional topics.

- (FFS/N5103) Assembling and installation of different parts of the modular furniture
- (FFS/N8601) Ensure health and safety at workplace
- (FFS/N8501) Maintain work area tools and machines
- (FFS/N8801) work effectively with others
- (FFS/N5703) Carry out lock installation activities
- (FFS/N5704) Perform lock repairing and servicing

Symbols Used



Key Learning Outcomes



Activity



Summary



Tips



Notes



Unit Objectives

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1. Introduction

Unit 1.1 Introducing the Furniture & Fittings Sector in India

Unit 1.2 Common Furniture Styles

Unit 1.3 Defining Modular Design of Furniture



- Key Learning Outcomes 🙄



At the end of this module, you will be able to:

- 1. Discuss the Furniture & Fittings sector in India
- 2. Discuss the common furniture styles
- 3. Define the Modular Design of Furniture

Unit 1.1 Discussing the Furniture & Fittings Sector in India

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss an overview of the Furniture & Fittings sector in India

An Overview of the Furniture & Fittings sector in India

Currently, India is the 14th largest market in the world for the Furniture and Fittings sector, as stated by HKTDC Research. The Indian middle-class population and business organizations are gradually recovering from the temporary market decline, which was driven by recent economic reforms and measures like Demonetization, introduction of the GST (Goods and Services Tax) and advent of the Long Term Capital Gains Tax.

The GDP (Gross Domestic Product) of India, for the fiscal year 2018-19, has been forecasted to grow by 7-7.5% by the Economic Survey of India (2017-18). This can be attributed to the rise of per capita income level and the subsequent growth in consumption by the urban and semi-urban middle-class population. The choice and consumption of middle-class population in India are now driven by need, quality and convenience, rather than affordable prices. Middle-class households are now interested in enhancing their lifestyle standards by decorating their homes with modern and chic furniture, fixtures and fittings. The Furniture & Fittings sector in India has been forecasted, by TechSci Research, to beat INR 3200 crores by 2019.

Apart from the rising consumption of middle-class households, expansion of the Tourism and Hospitality sector would also substantially contribute towards the mammoth growth of the Furniture & Fittings sector. According to recent reports by KPMG India, the current Furniture & Fittings sector in India comprises the following segments:

- 85% Unorganized
- 15% Organized

The key market players contributing towards the 15% organized chunk are:



Fig. 1.1.1: Key market players in India for Modular Furniture

- On the basis of the area of applicability, the major subsectors in the Indian Furniture & Fittings sector are:
 - O Home Furniture segment (comprises furniture used to furnish and decorate Indian homes)
 - O Office Furniture segment (comprises furniture used in commercial spaces)
 - O Contract segment (caters to the need of Tourism & Hospitality industry)

Notes [
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Unit 1.2 Common Furniture Styles

– Unit Objectives 🧖



At the end of this unit, you will be able to:

1. Identify and learn about the common furniture styles

Common Furniture Styles

The common styles of furniture are:

A. Before the 20th Century:

Style	Characteristics	Images
Jacobean	 Geometric, symmetrical design and strong emphasis on rectilinear lines and shapes Ornate carvings, influenced by the Classical era and detailed geometric motifs Physically and visually heavy Very close to the ground level 	
William and Mary	 Replaced the orthogonal, rectilinear Jacobean style with soft curves and graceful spirals Physically lighter and sleeker, as compared to the Jacobean style Visually disconnected from and higher off the ground Implemented Dovetails joints to incorporate softer features in furniture 	
Queen Anne	 Geometric, symmetrical design and strong emphasis on rectilinear lines and shapes Ornate carvings, influenced by the Classical era and detailed geometric motifs Physically and visually heavy Very close to the ground level 	

Style	Characteristics	Image
Pennsylvania Dutch	 Influenced by American and German culture Straightforward and utilitarian style Incorporated straight lines and tapered legs Less use of ornate curves Decorated with colourful folk painting on the cases, generally depicting natural sceneries or geometric patterns Often polished, finished and varnished with veneer (thin, decorative piece of fine wood) 	
Chippendale	 Pioneered by English cabinet-maker Thomas Chippendale Highly elegant and classy, this style incorporates the important features of Gothic, Chinese and Rococo influence Pointed arches, wooded lattice and S-shaped curves were adopted from the Gothic culture Fretwork design and Jappaning were adopted from the Chinese culture Rococo influence brought about designs like broad chair seats, decorated with interlacing ribbon backs Stained Maple was used, instead of Mahogany, Walnut and Cherry Wood, in order to reduce cost Such furniture were often finished with clear wax coating Easily recognized from designs like the Balland-Claw foot and Chair backs decorated with ribbon and shell motifs 	
Hepplewhite	 Pioneered by English designer George Hepplewhite Very graceful and influenced by the Neoclassical style Delicate appearance due to extensive use of veneers with contrasting colours (Marquetry) Presence of decorative motifs like elegant swags, tapered legs, curling ribbons, feathers, urns, trees, etc. Use of narrow vertical strips of wood glued to a heavy background clot called 'Tambours' Incorporates simple geometric shapes like circle and primary curves 	

Style	Characteristics	Image
Sheraton	 Marked with the use of thinner legs Visually lighter as compared to other styles Characterized with Rectangular Chair and Sofa backs Characterized with Cabinets and dressers with rectilinear features Flaunts the presence of ornate and delicate lines and contrasting veneers, influenced by the Neoclassical style The legs are usually tapered, often resembling columns of a Greek temple in appearance 	
Federal	 Incorporates the borderline features of the Sheraton and the Hepplewhite styles Depicts strong use of ornate inlay, tapered legs, straight lines and delicate feature 	
American Empire	 Characterized by traditional ornamentation, rustic decoration and dark finish Depicts a strong presence of Roman and Greek motifs Visually heavy, thus communicating strength and durability Highly decorated, to depict prosperity 	
Victorian	 This style was greatly influenced by Queen Victoria's love for heavy, ornate decoration This style primarily includes a mixture of the Gothic, Neoclassical and Rococo features Usually characterized by dark pieces of furniture, heavy fabrics and chinaware and glassware as accessories 	

Style	Characteristics	Image
Scandinavian Contemporary	 Involves basic, utilitarian style Primarily built out of natural wood Influenced by less ornate details Defined strongly by modern, clean, solid pieces Designed to occupy less space, in a clutter-free manner 	HIM
Arts and Crafts Movement	 Rectilinear style, often characterized with occasional vertical and elongated features Incorporated hand finish during the final stages of production In general, minimal decoration is done, so that the emphasis is on the natural look and craftsmanship This style is simple and utilitarian 	

B. Post 20th Century:

- **O** Antique
- **O** Traditional
- **O** Vintage
- O Rustic
- O Art Deco
- O Retro
- O Modern
- **O** Contemporary
- O Modular

Style	Characteristics	Image
Antique	 A piece of furniture is considered "Antique", if it is at least 100 years old Generally built out of wood Antique furniture comprises ornate details and specific motifs that help in determining their date of origin and thus, their prices 	

Style	Characteristics	Image
Traditional	 This style incorporates the best features of styles like Queen Anne, Chippendale and Sheraton Significant features are the elegant ornamentation, straight lines and gently tapered legs 	
Vintage	 Younger in age as compared to Antique, this style of furniture flaunts the most prominent features of a particular detail associated with a certain period Incorporates a very charming, delicate, lightweight style Wood is painted in light pastel colours like Wool White, Beryl Green, Santa's Gray, Mauve, Oriental Pink, etc. 	
Rustic	 Emphasizes on homespun, worn out, handcrafted or natural materials Typical building materials comprise wood, reclaimed timber, stone, bamboo, etc. Characterized by warmth, cosiness and homely feeling Other materials include Hide, Cotton and Linen 	
Art Deco	 Characterized by geometric and angular patterns Typical examples of such patterns are ziggurats, pyramidal, triangular, trapezoidal, zigzagged, chevron, sunburst, sweeping curves, stepped forms, etc. Harmonizes jazzy patterns with materials like glass, chrome, mirrors, etc. 	

Style	Characteristics	Image
Retro	 This style bears the look of having been built between the 1950s and the 1980s This style simply imitates previous fashion trends Evokes nostalgic feelings and memories related to a particular era or place 	
Modern	 Characterized by smooth surfaces, minimal decoration, standardized dimensions, neutral design and combination of different materials in an ad hoc manner Common materials are Steel, Vinyl, Plastic and Leather However, the use of natural materials is predominant Prominent use of monochromatic colour palettes Marked by a balance between aesthetics, utility and affordability 	
Contemporary	 This style is ever-changing and adapts itself with time Contemporary style pertains to the style most popular nowadays Although referred to synonymously, the Contemporary style is completely different from the modern style of furniture The Modern style refers to a particular era (1900s), while the Contemporary style walks hand-in-hand with the changing time 	
Modular	 Specific form of portable furniture aimed at saving space Highly utilitarian and cost-effective Divided into numerous small and solid units, which can be connected horizontally, vertically and matrixwise, using a simple series of steps All small parts or "modules" in a system are reusable and scalable 	

otes 🗐	 	

Unit 1.3 Defining the Modular Design of Furniture

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Define and explain Modularity
- 2. Recall the characteristics of Modular Furniture
- 3. Classify Modular Furniture according to design

1.3.1 Defining and Explaining Modularity

Modularity is an approach of designing furniture, which involves subdividing a system into numerous small building blocks, or elementary components, commonly known as "**modules**" or "**skids**". These elementary modules, building blocks or skids can be autonomously created for developing various systems. In simple words, Modularity enables us to develop and administer a system by the "divide and rule" policy.

The procedure, in which a system can be broken down or subdivided into modules, is called "Functional Allocation". Modular furniture can not only be assembled from small modules but also be dismantled into them, thus making repeated assembly and disassembly possible. For re-assembling specific pieces of furniture (say, modular bed), entire sets of modules are available and sold in the market in the form of prefilled packages. Modularity is a popular concept applicable not only in building furniture but also in the following areas:

- Architecture
- Designing and building Heavy Vehicles
- Aerodynamics
- · Building Heavy Machinery
- Manufacturing Computer Hardware
- Developing and testing Software using OOPS (Object-oriented Programming System)concept

1.3.2 Characteristics of Modular Furniture

Modular Furniture and their components exhibit the following characteristics:

- **1. Reusability -** The same modules can be arranged and built up according to various designs or matrices for developing diverse types of furniture.
- **2. Discreteness -** Individual modules or skids have autonomous properties and are functionally distinct from the other modules in the matrix.
- **3. Adaptability** An existing modular design can be broken down into its modules, which can be reconstructed into another modular design, serving a different purpose.
- **4. Scalability -** A modular design is scalable, i.e., its size, shape and dimensions can be varied by rearranging, increasing or decreasing (as per requirement) the number of modules used in building it.
- **5. Simplicity** As the term suggests, modular designs are very simple to understand and easy to build. This is because, the first step in building a design is to understand the individual, small building blocks.

- **6. Reliability -** Modular designs are very precise, accurate and highly reliable. This is because, each design is created and built using discrete modules, which are precise in terms of individual dimensions, make and specifications.
- **7. Cost Minimization and Space Utilization** Modularity helps in reducing training, operational (assembling, installing and dismantling) and maintenance costs. The very purpose behind modularity is space management.

1.3.3 Classifying Modular Furniture According to Design

According to design, Modular Furniture can be classified into the following:

- Single-bodied
- Multi-bodied
- Universal for completion
- · On a frame
- · For hanging

Notes			

Summary



- India is the 14th largest market in the world for the Furniture and Fittings sector, as stated by HKTDC Research.
- The Indian middle-class population and business organizations are gradually recovering from the temporary market decline.
- The GDP (Gross Domestic Product) of India, for the fiscal year 2018-19, has been forecasted to grow by 7-7.5% by the Economic Survey of India (2017-18).
- Middle-class households are now interested in enhancing their lifestyle standards by decorating their homes with modern and chic furniture, fixtures and fittings.
- The Furniture & Fittings sector in India has been forecasted, by TechSci Research, to beat INR 3200 crores by 2019.
- According to recent reports by KPMG India, the current Furniture & Fittings sector in India comprises the following segments:
 - O 85% Unorganized
 - O 15% Organized
- Furniture styles can be broadly categorized into: Before and After the 20th Century
- Modularity is an approach of designing furniture, which involves subdividing a system into numerous small building blocks
- Modular Furniture can be classified according to the design.

Activity



- The trainer asks students to play a "Word Game", where they will have to speak out words about Furniture and Fittings, as and when they appear in their minds.
- The trainer asks students to name few places at home and office, where modular furniture are widely used.
- The trainer, from his/her laptop, shows few ppt slides and asks the students to identify the furniture styles and the era that they belong to.

Exercise



Match the Furniture Styles with the Features:

Furniture Style	Feature		
Queen Anne	Fretwork design and Jappaning were adopted from the Chinese culture	[]
Chippendale	Emphasizes on homespun, worn out, handcrafted or natural materials	[]
Sheraton	Prominent use of monochromatic colour palettes	[]
Rustic	Very close to the ground level	[]
Modern	Evokes nostalgic feelings and memories related to a particular era or place	[]
Retro	Decorated with colourful folk painting on the cases, generally depicting natural sceneries or geometric patterns	[]
Art Deco	Incorporated the use of comfortable cushions and winged backs on chairs and lounges	[]
Modular	Divided into numerous small and solid units, which can be con-nected horizontally, vertically and matrixwise, using a simple series of steps	[]
Jacobean	Harmonizes jazzy, geometric and angular patterns with materi-als like glass, chrome, mirrors, etc.	[]
Pennsylvania Dutch	The legs are usually tapered, often resembling columns of a Greek temple in appearance	[]











2. Discussing the Job Description of the Lead Assembler Modular Furniture

Unit 2.1 The Job Responsibilities of a Lead Assembler Modular Furniture

Unit 2.2 Skills Required and Personal Attributes Expected in a Lead Assembler Modular Furniture



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. List the job responsibilities of Lead Assembler Modular Furniture
- 2. Discuss the skills required and personal attributes expected in a Lead Assembler Modular Furniture

Unit 2.1 Discussing the Job Description of the Lead Assembler **Modular Furniture**

Unit Objectives



At the end of this unit, you will be able to:

1. List the key job responsibilities of Lead Assembler Modular Furniture

A Lead Assembler Modular Furniture is responsible for pulling together various products in modular furniture by fitting together and assembling the furniture parts (modules), installing the furniture appropriately after assembling and conducting post installation check of the final installed furniture at the client's location or site.

The main job responsibilities of Lead Assembler Modular Furniture are:

- Reading and interpreting AutoCAD and general construction blueprints
- Conducting field measurement of a site in preparation for installation
- Completing furniture assembly and installation, according to known specifications and blueprints
- Conducting post installation inspection, according to the manufacturer's guidelines, for expected operability of the furniture
- · Providing instructions and site direction to the team members and subordinates for fulfilling client's requirements on time
- Unloading modules, tools and tackles from the vehicle and deliver the product / modules at the site for assembly and installation
- Assembling and installing all types of modular systems, thus actively participating in operations like placement and staging, levelling, touch-up and wipe-down of the products at the client's site
- Conducting and attending pre-installation huddles, as and when required
- Completing repair services on time
- Completing all assembly / installation / service / repair documentation
- Adhering to safety procedures and safety drills and training sessions, as laid down by the employer
- Promoting and adhering to safe work practices and behaviour
- Reporting accidents and anomalies on site to concerned authorities
- Actively spotting out and rectifying unsafe work conditions, which may lead to accidents and injuries
- Adhering to and completing assigned duties by deadline
- Completing the designated duties, and others, as assigned from time to time

Notes 🗏			
	 	 	
 	 	 	

Unit 2.2 Skills Required and Personal Attributes Expected in a Lead Assembler Modular Furniture

- Unit Objectives



At the end of this unit, you will be able to:

- 1. List the skills required in a Lead Assembler Modular Furniture
- 2. List the personal attributes expected for the job role

2.2.1 Skills Required in Lead Assembler Modular Furniture

Core and Generic Skills:

- O Being able to understand and write in basic English language
- O Being able to communicate fluently in the local language of the state and in basic Hindi
- O Being able to effectively communicate with clients, colleagues and supervisors
- **O** Being able to read, interpret and even prepare basic documents on assembly, installation, troubleshooting and repair / service operations
- O Being able to read and interpret safety guidelines laid down by the employer organization
- O Preparing and discussing task lists and schedules
- O Reading and abiding by instruction manuals and manufacturer's instructions

Professional Skills:

- O Taking appropriate and prompt decisions
- O Exhibiting strong presence of mind and alacrity
- O Having an inherent ability to learn fast
- O Planning, organizing and prioritizing the assigned duties / task / project into small components
- O Having a service-oriented, customer-centred approach
- O Able to work in a team
- O Being able to identify and troubleshoot common issues and errors
- O Being able to identify defects and adopt necessary measures, if any
- O Ability to think critically and analytically, thus applying domain knowledge in the process
- O Being able to identify and resolve basic issues

Technical Skills:

- O Outstanding domain knowledge
- O Basic knowledge and grasp on Carpentry and Hardware
- O Basic knowledge in Computer, including MS office Suite, Internet, Computer Design tools like AutoCAD, etc.
- O Good practical knowledge in operating CNC machine and related power and hand driven tools
- **O** Deep understanding of the steps involved in preassembly preparatory activities, assembly, installation, post-installation checks and troubleshooting
- O Ability to spot out common defects in modules and final product
- O Ability to identify common errors and issues with the equipment and tools

2.2.2 Personal Attributes Expected for the Job Role -

- Considerably high aptitude, analytical and critical reasoning
- Positive approach towards work
- "Team player" attitude
- General physical fitness
- Ability to perform need-based strenuous activities like shifting, lifting and pushing heavy objects
- Ability to stand or sit for long duration
- Good attention to minute details

Notes 🗐			

Summary



- A Lead Assembler Modular Furniture is responsible for pulling together various products in modular furniture by fitting together and assembling the furniture parts.
- Like all job roles, that of a Lead Assembler Modular Furniture comprises specific job responsibilities, skills and personal attributes.
- Skills are comprised of Core or Generic Skills, Professional Skills and Technical Skills.

Activity



• The trainer asks students to prepare a list, comprising job responsibilities and skills mandatory for Lead Assemblers of Modular Furniture.

Exercise



Classify the following into Job Responsibility (JR), Skill (S) and Personal Attribute (PA) by ticking the Correct Option:

1.	Conducting field measurement of a site in preparation for installation	[JR, S, PA]
2.	Preparing and discussing task lists and schedules	[JR, S, PA]
3.	Planning, organizing and prioritizing the assigned duties / task / project into small components	[JR, S, PA]
4.	Good practical knowledge in operating CNC machine and related power and hand driven tools	[JR, S, PA]
5.	Unloading modules, tools and tackles from the vehicle and deliver the product / modules at the site for assembly and installation	[JR, S, PA]









3. Identifying the Various Types of Furniture Accessories, Fittings, Joinery, and Estimating the Quantities Required

Unit 3.1 Types of Joinery

Unit 3.2 Technique of Touch Up, Sanding, Polishing Furniture for Proper Finishing, if Needed

Unit 3.3 Get Requisite Approval on the Cost Budget and Timelines before Work Initiation



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Identify the basic wooden joints such as:
 - Butt Joint
 - Dowel Joint
 - Half lap Joint
 - Dovetail Joint
 - Rabbet Joint
 - Mortise and Tenon Joint
 - Housing Joint

Unit 3.1 Types of Joinery

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss the basic wooden joints

3.1.1 Explaining Joinery -

Wood joinery is one of the most basic concepts in Woodworking. As a person working in the Furniture & Fittings sector, one cannot achieve much without the knowledge and use of joinery. The joints are used either to bring pieces together or to make a firm structure. The most basic joint involves two parts butted together and connected with a fastener like a screw or adhesive.

3.1.2 Butt Joint -

The butt joint is the most basic of joints. In this joint two members are simply butted together. In most cases carpenters glue the boards together and further strengthen it with screws or nails. One can even use this humble joint to glue two boards together side by side to make a wider panel. These joints can be used in making simple boxes or frames.

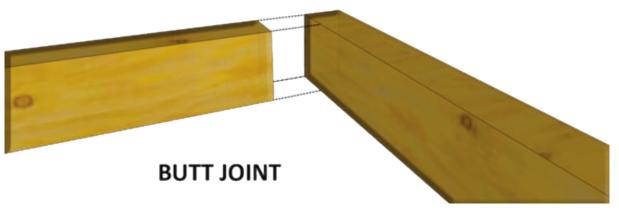


Fig 3.1.1.1: Butt Joint

3.1.3 Dowel Joints

Another way of strengthening the butt joint is by adding wooden pegs called dowel pins. Accurate matching holes should be drilled on both edges. Dowel pins are short bamboo sticks that fit in the drilled holes. This joint is further secured with an adhesive.

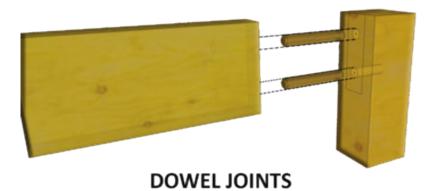


Fig 3.1.2.1: Dowel Joint

3.1.4 Half Lap Joints —

Aside from the basic butt joint, the half - lap joint is your simplest choice for joining pieces together. A notch is cut out of one board, and a similar notch is cut out of another. The two pieces are overlapped and glued together.

Some variations of a half lap joint include:

- Cross-Lap Joints
- "T"-Lap Joints
- Corner-Lap Joints



Fig 3.1.3.1: Half Lap Joint

3.1.5 Dovetail Joints —

The dovetail joint is used for fine woodworking. It is most commonly used in drawers. Triangular sections called "tails," are cut on one member. The receiving member is cut into "pins." The pins fit inside the tails and are glued into place.

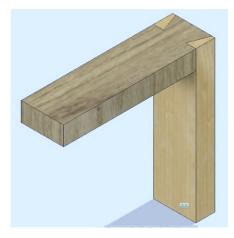


Fig 3.1.4.1: Dovetail Joint

3.1.6 Rabbet Joint —

A rabbet is simply an open-sided recess cut along the edge or across the end of one member. Usually only one member of the mating parts is rabbeted.

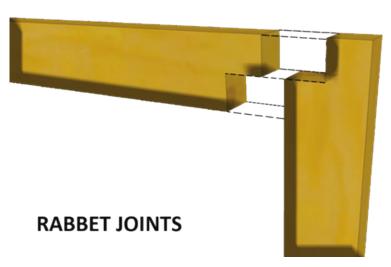


Fig 3.1.5.1: Rabbet Joint

3.1.7 Mortise and Tenon Joint _____

The mortise and tenon often used in the assembly of tables, chairs and furniture. It consists of the tenon (stub), cut on one piece of wood, and a mortise (a hole) cut into a receiving piece of wood. The tenon is inserted into the mortise, then glued or nailed in place.



Fig 3.1.6.1: Mortise and Tenon Joint

- 3.1.8 Housing Joint ———

A housing joint can also be called a dado joint. A dado joint is made by cutting a recess across the face of a member. The end of another member is then inserted and secured into the recess.

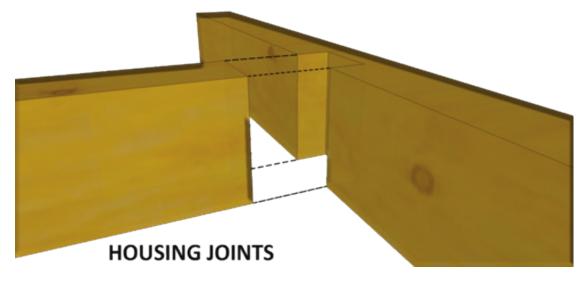


Fig 3.1.7.1: Housing Joint

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Unit 3.2 Technique of Touch Up, Sanding, Polishing Furniture for Proper Finishing, if Needed

Unit Objectives



At the end of this unit, you will be able to:

- 1. Learn various types of material used in carpentry
- 2. Demonstrate how to assemble parts made of the various types of materials
- 3. Practise the different types of finishes

3.2.1 Assembling Parts (Parts Made Of Wood, MDF, Plywood, Laminates and Sub-Assemblies of Different Material and Fittings etc.)

In carpentry, wood is the material. Carpenters use seasoned wood to prepare furniture.

Here, we will discuss the types of material which are widely used by the carpenters.

Solid Wood:

Solid wood refers to the timber that is used to build structures.

- Timbers are the raw materials that are seasoned to produce workable wood.
- Timber or the log of the tree is the first material that is processed to produce beams.
- Generally, the logs are cut horizontally to make beams.
- Beams are then sent to designated places for seasoning.





Fig 3.2.1.1: Log and Beam

Engineered Wood:

Engineered wood is commonly known as composite wood.

- This is a type of wood which incorporates various chemicals, fibres, sawdust and adhesive to prepare desired type from the solid wood.
- In other words, solid wood is further processed to engineered wood.
- There are many types of engineered wood available in the market.

Some of the most important types of engineered wood are –

- Plywood
- High Density Fibre (HDF)
- Medium Density Fibre (MDF)
- Veneer
- Laminates
- Block-board



Fig 3.2.1.2: Sample of engineered wood

Plywood

Plywood is a form of engineered wood where thin slices or layers of wood are glued together to form a sheet.

Thickness:

• MR grade (Moisture Resistant) = 3, 4, 6, 8, 12, 15, 18, 21, 25 mm | Size: 6' x 3', 6' x 4', 7' x 3', 7' x 4', 8' x 3' & 8' x 4' (for both MR & BWR Grade)



Fig 3.2.1.3: Plywood

Plywood is used to build interior walls, ceilings, doors and cupboards in structural construction. Furniture pieces like wardrobes, side boards of cabinets, drawer bottoms can be made. Apart from these plywood is used in decorating railway coaches and trams etc.

High Density Fibre (HDF)

Thickness: 9, 11, 12, 17, 18 & 25mm | **Size:** Standard and common size 8 x 4 feet HDF, also known as Hardboard, is made up of highly-compressed wood fibres. The higher magnitude of compression makes hardboard denser and harder.

Medium Density Fibre (MDF)

Thickness: 2.3, 4, 8, 12 & 15mm | **Size:** Standard and common size 8 x 4 feet MDF is another form of engineered wood, which is denser than plywood.

- MDF is produced by gluing residuals of softwood or hardwood with binders like resin or wax.
- High temperature and pressure is required to procure MDF.



Fig 3.2.1.4: MDF Sample

Advantages of using MDF:

- It's stronger than particle board
- It's cheaper than plywood and remains undamaged due to change in weather
- MDF doesn't swell usually if it comes in contact with water or humid weather
- It has smoother surface without any grain or knot which allows users to cut it into various shapes and forms
- Smooth surface is ideal for painting
- MDF is good substance for veneering

Veneer

Thickness: 4 mm | Size: Standard and common size 8 x 4 feet

Veneer is the thin slice of wood (typically lesser than 4mm) which is glued to form plywood sheet.

- Veneer is widely used to produce the outermost layer of door, cupboard and other furniture.
- Veneer is smooth and well-polished slice of engineered wood.

Veneers are of following types depending upon their purpose:

- Raw Veneer It has no backing on it. You can make any side as its face and vice versa. Keep in mind that both the sides of veneer have different appearance when finished. This difference of appearance is due to the cell structure of the wood which is different on both sides.
- Paper Backed Veneer This type of veneer is backed with paper. The best part of paper backed veneer is its availability in large sizes, or sheets. Before putting a backing, all smaller pieces are joined together making it easy to get sheets of the required size. Paper backed veneers have less possibility of cracking which makes it helpful to use in veneer curves and columns.
- Phenolic Backed Veneer It is very uncommon type of veneer. Mostly, it is used for composite or manmade wood veneers. It is gaining popularity as it helps in saving the natural resource. The phenolic backed veneer is available in sheets and can be used for curves as it does not crack if handled with care.
- Laid Up Veneer It is also called raw veneer which is joined together to get larger pieces. It is very time consuming process and requires very careful handling. There is no need to use any expensive machinery or tool to join these pieces. You can easily get veneers laid up to any size, shape and design manually.
- Reconstituted Veneer It is made from fast-growing tropical species. Raw veneer is cut from a log, and dyed if necessary. After drying the sheets are laminated to form a block. Then this block is sliced so that the edges of the laminated veneer become the "grain" of the reconstituted veneer.
- **Wood on Wood** It is commonly called 2-ply. It is a decorative wood veneer face with a utility grade wood backer applied on the opposite direction to the face veneer.



Fig 3.2.1.5: Sample Veneer

Laminates

Thickness: 0.6 mm to 1.5 mm | Size: Standard and common size is 8'x 4'



Fig 3.2.1.6: Decorative laminates

Decorative laminates are usually used for furniture surfaces and wall paneling. This includes cabinets, tables, showcases etc. The laminates are easy to maintain but exposure to water may cause warping or ballooning. Decorative laminates are used in the cubical toilets, kitchen or laboratory tables to resist moisture.

Laminates are made by compressing thin layers of flat papers and plastic resins. The upper layer is printed with decorative textures, patterns and colours. The typical size of laminate sheets are 8" by 4". These sheets are pasted on plywood, block board or MDF with adhesive.

Block-board

Thickness: 16, 19 & 25 mm | **Size:** 6' x 3', 6' x 4', 7' x 3', 7' x 4', 8' x 3' & 8' x 4'

Block-boards are fusion of softwood strips, which are sandwiched between veneer boards under high pressure.

- These types of engineered wood have a general width of 25mm.
- Other than engineered wood, there are several other materials which are also used in furniture fittings. They are –

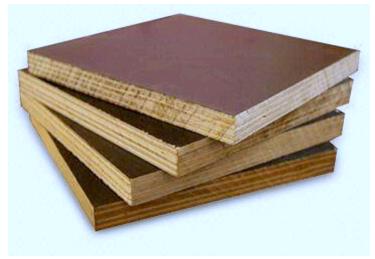


Fig 3.2.1.7: Block board

Particle Board

Thickness: 9 mm to 25 mm | **Size:** 8x4', 8x6', 8x3', 9x6', 9x3', 6x4', 6x3', 6x2.5'

Chipboard, commonly known as particle board is a man-made or engineered wood which is manufactured by gluing chips, shaving or even saw dust. These are pasted with the help of suitable binders like resin. It is extensively used across the world to manufacture furniture that is not exposed to moisture and humidity. Particle boards that come with a layer of lamination done on its surface to make it more enduring is known as pre-laminated board. Particle board is a useful product to prepare cabinet, interior decorations, roof and partition constructions.





Fig 3.2.1.8: Samples of particle board (chipboard)

Boiling Waterproof Plywood

Thickness: 4, 6, 9, 12, 16, 19, 25 mm

Size: 6'x3', 6'x4', 7'x3', 7'x4', 8'x3' & 8'x4' (for both MR & BWR Grade)

BWR is a type of engineered wood resistant to high temperature and moisture. BWP is manufactured by gluing thick layers of wood at right angles using Phenol formaldehyde (PF) resin.



Fig 3.2.1.9: Stack of Boiling Waterproof Plywood

Some of the advantages of BWP are:

- It is better than solid wood in handling water exposure. Therefore, BWP is the first preference to manufacture kitchen cabinets, laboratory tables and other useful items
- It is free from termites or borer attacks
- It is stronger and more endurable than MDF or particle board and is leeser prone to warping
- It can be covered with laminates or veneer as per clients' requirement

Edge Bands (PVC Tapes)

The edges of a panel, made of plywood, MDF or particle board need to be covered, secured, decorated so that the furniture look good and hide the rough edges. To give furniture a clean and polished finish, edge banding is used. Edge banding, used for modular furniture, is made up of PVC materials. Edge bands are available in circular bangle form. The length of the roll or the bangle is typically 15 meters (50 feet) and the width varies from 7/8 inches to 2 inches. In certain cases, aluminium edge bands are also used to protect the modular furniture.





Fig 3.2.1.10: Edge bands or PVC Tapes

Metals (Mild Steel and Stainless Steel): Mild steels are used in combination with the wooden members to manufacture furniture. Mild steel or simply iron are subjected to powder coating or colour coating, whereas, stainless steels are subjected to matt polish or gloss polish.

Hardware: Hardware commonly denotes the hinges or the channels used in furniture fittings. For
example, telescopic channel and auto hinge are hardware which are used to install drawer and doors
respectively.

3.2.2 Cleaning /Sanding/ Finishing as Needed for the Installed Product

This is the last step of manufacturing furniture. Wood polishing is a significant procedure that a carpenter should be aware of. Polishing protects the wooden surface from apparent damages from water, humidity and gives a glossy look to the furniture. Polishing can be performed in many ways. Few of the widely used polishing methods are discussed below.

French Polishing (Gala Polishing): This is the most common type of polishing method exploited by the carpenters. In this process:

- Gala is melted and mixed with chemicals to produce the coating material.
- The coat is applied to the finished items such as chair, table, bed, drawer to preserve the wooden surface.



Fig 3.2.2.1: Sample of a French Polished product

Sand Polish: In case of sand polishing, sandpaper is used as the instrumental polishing agent. Sandpaper is rubbed on the finished furniture to make the surface smooth and make it more appropriate for colour coating.

Stain Application: Stain application refers to the dyeing process, where specific dye or colour is applied on the finished furniture. There are several dyes available in the markets which are used in stain polishing. Some of the most important dyes are —

- a. Touchwood
- b. Melamine
- c. Lacquer
- d. Polyurethane (P.U.)

Amongst the list of dyes, P.U or polyurethane is widely used as the stain-polishing agent. Stain coating requires a specific set-up. The set-up should be:

- · Free of dust
- Exhaust fan should be installed in the room where stain application (specially P.U.) is performed

There should be a series of perforations on the wall opposite to the exhaust fan. These perforations should be well-mounted with foam. A carpenter should always use protective materials like glass, gloves, mask at the time of stain polishing.



Fig 3.2.2.2: Sample of a Stain Application (acrylic) finish

- Stain coating requires a specific set-up. The set-up should be
 - a) Free of dust
 - b) Exhaust fan should be installed in the room where stain application (specially P.U.) is performed



Fig 3.2.2.3: Dyeing Room with Exhaust

- c) There should be a series of perforations on the wall opposite to the exhaust fan. These perforations should be well-mounted with foam
- d) A carpenter should always use protective materials like glass, gloves, mask at the time of stain polishing

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Unit 3.3 Get Requisite Approval on the Cost Budget and **Timelines before Work Initiation**

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss how to get requisite approval on the cost budget and timeline before work initiation
- 2. Assess the requirement of hardware fittings and tools and equipment (hand / power tools)
- 3. Identify the cost of material (seasoned wood)
- 4. Plan and organize the activities the activities/steps to be taken to execute the work in accordance with the timeline and the sequence

Costing and budgeting are very essential aspects that one should calculate at the beginning of any project. Budgeting depends on many parameters, such as -

- Quantity of material
- Quality of material
- · Complexity of design
- · Size of the model
- Structural complexity of the product
- Polishing and Dyeing process
- · Colour coat used
- Transport cost

Let us have a look at the costing in terms of material.

- Chief material in terms of carpentry is wood.
- The cost of wood depends on the seasoning procedure.
- The seasoning procedure is mainly of two types

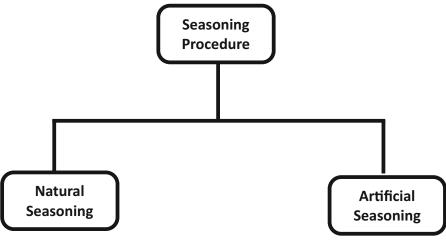


Fig 3.3.1: The 2 types of Seasoning

Let us have a look at the costing in terms of material. Chief material in terms of carpentry is wood. The cost of wood depends on the seasoning procedure. The seasoning procedure is mainly of two types:

Natural Seasoning: Natural seasoning is the process of do away with the water-portion by allowing the wood to receive good amount of air. It might take 3-7 years to season wood naturally. The naturally seasoned wood contains 5-7% water, reducing the chances of damages.

Artificial Seasoning: Artificial seasoning is comparatively expensive. It takes only 1-1.5 months to season wood artificially. This process is also known as Clean and Dried process.

Importance of Seasoning

Seasoning of wood is absolutely essential. Wood contains water before seasoning. The water present in the wood makes wood fragile and more susceptible to damages. It also increases the chance of getting damped. Therefore, seasoning is required to get rid of the watery part.

Stacking

Stacking wood is an essential procedure. In case of natural seasoning, the logs are stacked in such a place, where the stack of wood receives sufficient amount of air. There should be adequate gap between the logs to allow the air to pass through. In case of artificial seasoning, wood is stacked in a room with high temperature and good air-ventilation.

Significance of Timeline

Timeline is the timeframe or the duration of a project. Every project has a specific timeline. For example, if a bed has to be made, there would be a timeline. The bed should be made within the given timeline. The timeline of a project depends on many things such as, complexity of the project, size and materials used. The timeline should be estimated beforehand to have a definite time of completion of the project.

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Summary

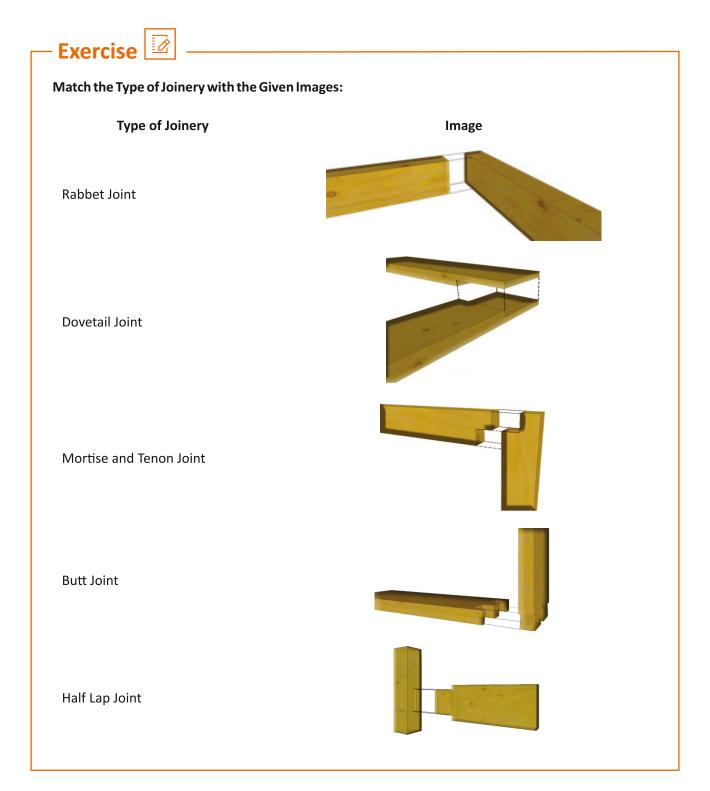


- Wood joinery is one of the most basic concepts in woodworking.
- The butt joint is the most basic of joints.
 - O In this joint two members are simply butted together.
 - O In most cases carpenters glue the boards together and further strengthen it with screws or nails.
- Another way of strengthening the butt joint is by adding wooden pegs called dowel pins.
- Aside from the basic butt joint, the half-lap joint is your simplest choice for joining pieces together.
- A rabbet is simply an open-sided recess cut along the edge or across the end of one member. Usually only one member of the mating parts is rabbeted.
- The mortise and tenon often used in the assembly of tables, chairs and furniture.
- Costing and budgeting are very essential aspects that one should calculate at the beginning of any project.

Activity



- The trainer takes the students to the laboratory for a practice session. They have to identify the various types of woodworking joints.
- After the first activity, the students practise the techniques of Touch-up, Sanding, Polishing and Finishing on pieces of wood provided by the trainer.













4.Understanding Site Measurements

Unit 4.1 The Process of Site Measurement For Project Level

Unit 4.2 Measurement of Length, Width & Depth in MKS & FPS System and Its Application and Undertake Measuring Accurately



- Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Explain the process of site measurement for project level work
- 2. Explain measurement in MKS & FPS system

Unit 4.1 The Process of Site Measurement For Project Level Work

Unit Objectives



At the end of this unit, you will be able to:

- 1. Define Site Measurement
- 2. Comply with the process of site measurement for project level work

Defining Site Measurement

- The term "Site" implies an area or premises, where a structure, like building or a piece of furniture, is constructed.
- The term "Measurement" implies "determining the physical quantity or dimensions of an object or place, in terms of numbers and units, with the help of tools and equipment".
- The dimensions that are required to be measured during assembling and installing modular furniture are:
 - O Length and Breadth (includes radius and diameter of circles)
 - O Height, Depth and Thickness
 - O Area
 - O Volume
 - O Weight
 - O Density
 - O Viscosity
 - O Temperature
 - **O** Time
 - O Electric
- "Unit" is defined as "a standard amount of a physical quantity, specified multiples of which are used to express amounts of that physical quantity".
- "Site Measurement", thus, can be defined as "the process of establishing dimensions of a place, in terms of numbers and units, with the help of tools and equipment".

Understanding the Process of Site Measurement For Project Level Work

A. The Process Steps:

The process of Site Measurement varies according to the below criteria:

- O Requirements and Specifications of the Project
- O Site location
- O Availability of resources, like time, manpower, funds and equipment
- O Constraints and limitations involved in the project

However, the general steps involved in measuring a site are:

- **Step 1:** Make a drawing of the room that needs to be measured. Mark the windows, doors and other openings of the room on the drawing as well. Leave enough space to write down the measurements.
- **Step 2:** Always measure the room starting clockwise. Measure the room from the left side of the room on the first wall and work from left to right.
- **Step 3:** Sketching the features of each room, including doors, windows, skylights, ventilators and positions of fixtures and fittings like lighting, power outlets, fireplaces, brackets, shelves, etc.
- **Step 4:** Naming each wall, room and fixture differently, with a different colours. It is recommended that the names are given sequentially
- **Step 5:** Showing the interrelationship of the units and labeling each of them
- **Step 6:** Deciding what dimensions are required to show on the sketch
- **Step 7:** Using appropriate dimension lines to indicate the overall dimensions of the site as well of individual units and fixtures
- **Step 8:** Measuring with the help of appropriate Measuring Tools (like Measuring Tape, Callipers, etc.) and sticking to a particular unit (either MKS or FPS system)
- **Step 9:** Writing down the dimensions, thus measured, along the particular Dimension Lines and followed by the respective units
- Step 10: Preparing elevations on the basis of the dimensions measured
- **Step 11:** Taking additional notes, in a separate block on the rough outline, using a separate pen. In case of insufficient space, a separate sheet of paper may be used for taking notes

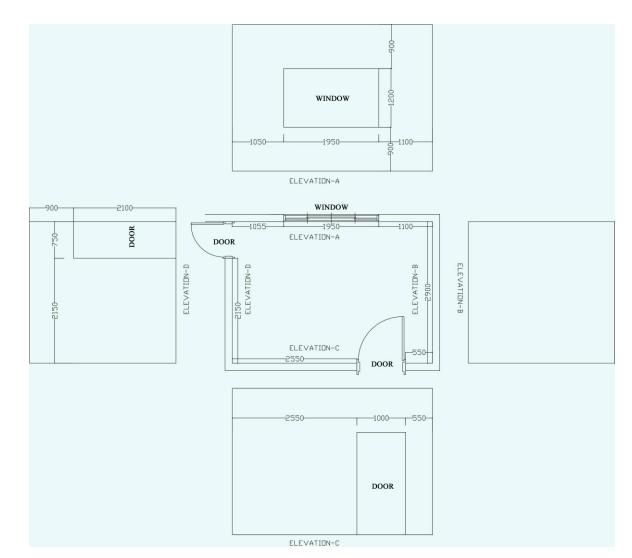


Fig 4.1.1: A sample of site measurement sketch

- **B.** Methods adopted while measuring a site:
 - Understanding the Process of Site Measurement for Project Level Work
- Rise and Run Method: In the "Rise and Run" method, "Rise" denotes the change in the measurement of height of an object and "Run" denotes the change in the measurement across an object. This methods helps in comparing the change in the height of the object (Rise) with the change in the dimension horizontally across it (Run).
 - The primary benefit of this method is simplicity, in terms of concept and application. This method is extremely convenient since 2D dimensions are easy to translate while preparing the rough sketch.

Let us take an example of measuring an erect door to explain this method.

- **Step 1:** Measure down to the door, keeping yourself perpendicular (at right angles) with the adjacent wall.
- **Step 2:** Measure across the door. Use a Measuring Tape for this purpose and align the tape end up to one side of the room.

Step 3: Next, hold the tape at right angles to this line, to get the distance to the door.

Step 4: Finally, compare the readings using the formula:

Slope = Rise/Run

• **Triangulation Method:** The Triangulation method helps in determining the location of an object by measuring angles to it w.r.t known points, at either end of a fixed baseline, in the site. The location of the object can be easily determined as the 3rd point of a triangle with one known side (distance between the two ends of the fixed baseline) and two known angles (angles of the object w.r.t the two known points).

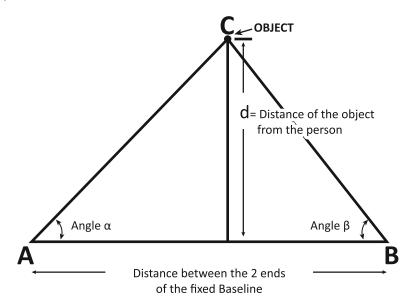


Fig. 4.1.2 Triangular Method

Let us take an example of determining the location of an erect door to explain this method.

Step 1: Determine the distance of the fixed baseline by measuring the linear distance between two chosen corners of the room. The person, who is conducting the measurement (in this case, you), would be standing on the baseline perpendicular to the adjacent walls of the door.

Step 2: Measure the angles from the two ends of the baseline, using the Rise and Run method.

Step 3: With the help of the two known angles (angles of the door w.r.t the two ends of the baseline) and the one known side (distance between the two ends of the fixed baseline), calculate the perpendicular distance of the door from yourself. This is the location of the door in the room w.r.t yourself.

Formula to be used:

- 2. $d = AD \tan \alpha$
- 3. $d = BD \tan \beta$

Given:

- 1. $\tan \alpha = d/AD$
- 2. $\tan \beta = d/BD$
- 3. Distance (AB) between the two ends A and B of the fixed baseline = AD + BD

C. Extracting and Using information from Engineering Drawings

A technical sketch or engineering drawing comprises the following elements:

- i) Title Block,
- ii) Main Contents and
- iii) Notes.

The steps involved in reading and interpreting a technical drawing / sketch are:

- **1. Start with reading the Title Block.** This indicates the context in which the drawing must be perceived. The Title block provides information about the following:
 - O General tolerances
 - O Projection details for the item. component to be manufactured
 - O Scale used in the drawing
 - O Status of the drawing (Preliminary, Approved, etc.)
 - O Name of the component or assembly
 - O Contact details of the drawing owner
 - O Mass
 - O Units used in the drawing
 - O Sheet number and number of sheets

2. Read the Notes.

- O The notes should lie outside the Title Block.
- O The information provided by the notes are preferred to that provided by the Title Block and hence, the Notes supersede the Title Block information.
- O In case of conflicts, the Notes are considered correct over the Title Block.

3. Read the Bill of Material (BOM).

- O The Bill of Materials is a list of the components and the corresponding quantities that make up the general assembly of the item being installed.
- O The BOM is usually tabulated on the first page.
- **4.** Ensure that you have all the relevant pages for the drawings. Drawings could be part of series and hence the entire series should be present in order to be able to read, understand and interpret the drawing.
- 5. Understand and interpret the difference between Visible Lines, Hidden Lines and Phantom Lines.
 - O Visible lines indicate an edge is visible in the relevant view
 - O Hidden lines indicate the edge is behind a face
 - O Center lines indicate the geometric center of the assembly
 - O Dimension lines allow for the placement of the dimension value, with arrowheads at each end

Name of the Line	Type of Line	Image of the Line
Visible Lines	Continuous thick line	
Hidden Lines	Dashed thick line	
Center Lines	Chain thin line	
Dimension Lines	Continuous thin line with arrowhead at the ends	R

6. Understand and interpret the projections, sections and details.

- O View the drawing itself, regardless of the dimensions, trying to visualize how and what the assembly looks like in 3D.
- O Use the sections and details as a start point and you will soon realize that the details and sections have been created to highlight important components or features.
- **O** Few sketches are accompanied with Isometric projection drawings for easy comprehension.
- 7. With the aid of the BOM, find out the components in the drawing in order to understand the role each component plays.
- 8. Find out the notes that have arrows pointing towards the assembly. These information are extremely vital to the assembly and its functionality.
- 9. Use the dimensions in the drawing to comprehend the size of the component/Assembly and even use a tape measure or ruler to estimate the size. The sketch may or may not be drawn to the scale.

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Unit 4.2 Measurement of Length, Width & Depth in MKS & FPS System, Its Application, Undertake Measuring Accurately

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the various types of Units in Measurement
- 2. Underline the MKS and the FPS system of measurement
- 3. Identify tips to measure accurately

Types of Units in Measurement

- Measurement is the process of determining the magnitude of and quantifying a physical parameter.
- The method of measuring physical parameters is called Metrology.
- Each physical parameter is estimated and expressed in numerical values, along with Units. For example, the units for temperature are Kelvin, Celsius, Fahrenheit, etc.
- Units of measurement are of two types: System International (SI) and the Centimeter Gram Second (CGS).

A. System International

This comprises the Base Units, measuring the Base Quantities and the Derived Units, measuring the Derived Quantities. Base Quantities are those physical quantities, which are distinct and are independent of other physical quantities. Derived Quantities are those physical quantities, which result from the Base Quantities.

Base Quantities: Length, Time, Mass, Electric Current, Temperature, Amount of Substance and Luminous Intensity.

Derived Quantities: Velocity, Acceleration, Area, Volume, Force, Capacitance, Density, Electric Charge, Voltage, Energy, Work, Resistance, etc.

Examples of SI units are: (Both Base and Derived Quantities)

Physical Quantity	SI Unit
Length, Width, Height, Depth	Meter
Time	Second
Mass	Kilogram
Temperature	Kelvin
Electric Charge	Coulomb
Force	Newton
Electric Current	Ampere
Electric Power	kiloWatt
Energy	Joule
Luminous Intensity	Candela
Plane Angle	Radian
Solid Angle	Steradian

Table. 4.2.1: Physical Quantities and their respective SI units

B. CGS Unit

Examples of CGS units are:

Physical Quantity	CGS Unit
Length, Width, Height, Depth	Centimeter
Time	Second
Mass	Gram
Temperature	Kelvin
Electric Charge	Franklin
Force	Dyne
Electric Current	Biot
Energy	Calorie

Table. 4.2.2: Physical quantities and their respective CGS units

The MKS and FPS System of Measurement

The FPS system, or the Foot - Pound - Second system, comprises the following: Parameter Name of the Unit Measure

Parameter	Name of the Unit	Measure	
	Inch	1/12th	ft
	Foot	1	ft
Length	Yard	3	ft
	Mile	5280	ft
	Nautical Mile	6080	ft
Area	Acre	43,560	Sq. ft
	Fluid Ounce	1/20th	Pint
Volume	Pint	1	Pint
Volume	Quart	2	Pint
	Gallon	8	Pint
	Ounce	1/16th	Lb
Waight	Pound	1	Lb
Weight	Stone	14	Lb
	Ton	2240	Lb

Table. 4.2.3: The FPS system of measurement

The MKS system, or the Meter - Kilogram - Second system, comprises the following:

Length	Weight	Volume	
1 Km = 1000 m	1 Kg = 1000g	1 kL = 1000 L	
1 m = 0.001 Km	1 g = 0.001 Kg	1 L = 0.001 kL	
1 m = 100 cm	1 g = 100 cg	1 L = 100 cL	
1 cm = 0.01 m	1 cg = 0.01 g	1 cL = 0.01 L	
1 m = 1000 mm	1 g = 1000 mg	1 L = 1000 mL	
1 mm = 0.001 m	1 mg = 0.001 g	1 mL = 0.001 L	

Tips to Measure Accurately

• Determine what physical quantity you need to measure.

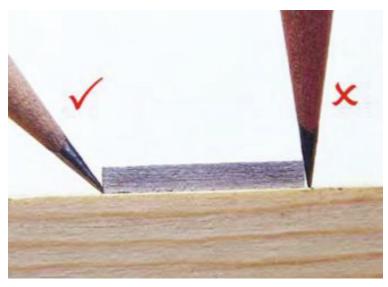
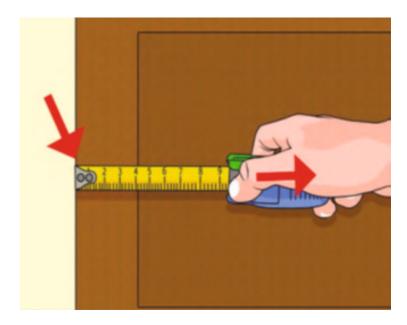
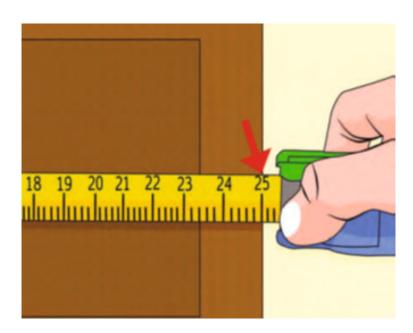


Fig 4.2.1: Hold the pencil correctly for marking

- Select the appropriate tools to measure the said physical quantity. For ex select a commercial measuring tape to measure length of a table.
- Align the tool along the side of the object under measurement (say, aligning the tape along one side of a table whose length is being measured).



Clasp the hook of the tape to the work piece and pull out the spool to the other end



Tip the measuring slide of the tape down against the work piece

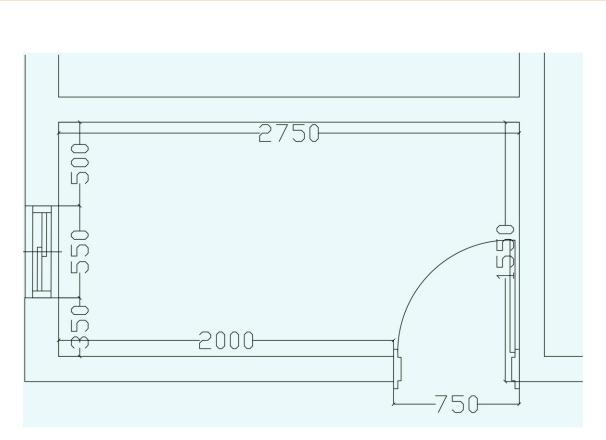


Fig 4.2.2: MKS Measuring System

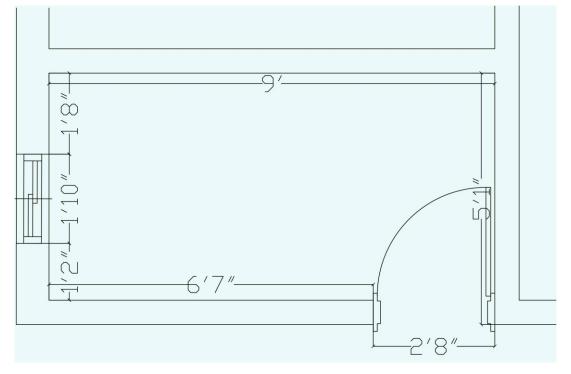


Fig 4.2.3: FPS Measuring System

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Summary



- "Site Measurement" can be defined as "the process of establishing dimensions of a place, in terms of numbers and units, with the help of tools and equipment".
- Site Measurement can be conducted by the Rise & Run Method and the Triangular Method.
- A technical sketch or engineering drawing comprises of the following elements: Title Block, Main Contents and Notes.
- Measurement is the process of determining the magnitude of and quantifying a physical parameter.
- Each physical parameter is estimated and expressed in numerical values, along with Units.
- Units of measurement are of two types: System International (SI) and the Centimeter Gram Second (CGS).
- Base Quantities are those physical quantities, which are distinct and are independent of other physical quantities.
- Derived Quantities are those physical quantities, which result from the Base Quantities.
- Metric systems are of two types: the MKS and the FPS.
- Datum is a point, line or edge, depending on the shape of the work piece from which measurements are taken.

Activity



• The trainer takes the students on a visit to a construction site, where they get to observe the various parameters and processes related to site measurement. They closely observe how the Rise and Run and the Triangular methods are applied there.

Exercise



Fill in the blank boxes:

Name of the Quantity	SI Unit	CGS Unit
Length		
Time		
Mass		
Force		
Electric Current		
Temperature		
Energy		
Electric Charge		

Complete the following:

1.	1 mile	=	feet
2.	1 Gallon	=	litres
3.	1Ton	=	grams
4	1 day	=	second











5.Assembling and Installation of Different Parts of Modular Furniture

Unit 5.1 Definition and Types of Modular Furniture
Unit 5.2 Different Layouts of Modular Furniture Location
Unit 5.3 Different Process Involved In Assembling and
Installation of Products and Various Appropriate Fittings
Unit 5.4 Different Types of Tools and Equipment And the
Processes of Operating the Same



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Underline the definition and types of modular furniture
- 2. Identify the types of layout
- 3. Illustrate the process involved in assembling and installing modular cabinet
- 4. Use different types of tools and equipment
- 5. Identify different modular furniture in a kitchen

Unit 5.1 Definition and Types of Modular Furniture

Unit Objectives



At the end of this unit, you will be able to:

- 1. Recall the definition of modular furniture
- 2. Identify the different types of modular furniture

Modular Furniture: Modular furniture is an assembly of various parts or panels. All these panels are assembled together uniformly to install the modular furniture.



Fig 5.1.1: Modular Cabinet



Fig 5.1.2: Modular Wardrobe



Fig 5.1.3: Modular Cabinet



Fig 5.1.4: Modular Wardrobe

- The most popular modular furniture for home is modular kitchen. Customization in furniture is possible according to the need. Modular bedroom, living room, shelf, almirah are available in long range.TV show case, study desk are also few of the notable modular furniture
- Modular office is extremely popular in modern workplaces. Chairs, desks, workstations, conference tables, storage, partitions, filing cabinets and cubicle are the most popular furniture

Types of Modular Furniture: Modular furniture has a vast range in terms of its types. The type of modular furniture depends on the site or place of installation. For example, modular furniture in a bedroom would contain bed, sofa, cabinet, and bookcase whereas an office-room will comprise of modular furniture such as chair, desk, cubicle, and workstation.

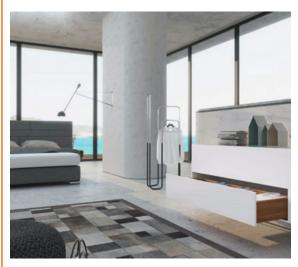


Fig 5.1.5: Sample modular furniture in a bedroom



Fig 5.1.6: Sample modular furniture in a living room



Fig 5.1.7: Sample modular furniture in a restroom



Fig 5.1.8: Sample modular furniture in a kitchen



Fig 5.1.9: Sample modular furniture in an office

$Fewimportant\,types\,of\,Modular\,Furniture$

- Modular sofa
- Modular bed
- Modular cabinet
- Modular cubicle
- Modular cupboard
- Modular TV case
- Modular study desk
- Modular bookcase
- Modular seats (multiple designs such as 3 seater, 4 seater, zig-zag seats etc.)

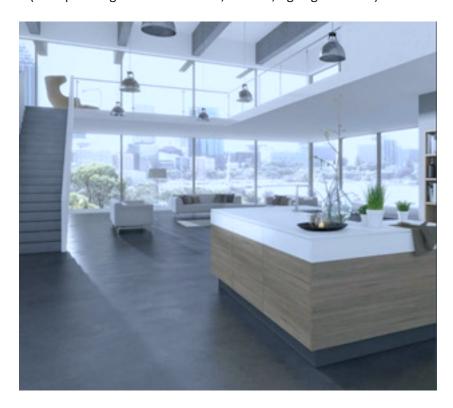


Fig 5.1.10: Modular living room furniture

Unit 5.2 Different Layouts of Modular Furniture Location

- Unit Objectives lacksquare



At the end of this unit, you will be able to:

1. Identify the places where modular furniture are essential

Modular furniture is found in almost all places – be it school, college, household or work place. Each place has different set of requirement of furniture. Here, we will discuss five layouts where furniture is essential and found in abundance.

Five Layouts:

- Bedroom
- Living room
- Restroom
- Office
- Kitchen

1. Bedroom:



Fig 5.2.1: Bedroom

A bedroom consists of different modular furniture, such as:

- Bed
- Sofa
- Bookcase
- Shelf
- Almirah
- Cabinet
- Drawer
- Chair
- Showcase

2. Living Room:



Fig 5.2.2: Livingroom

A living room consists of different modular furniture, such as:

- Sofa
- Study desk
- Showcase
- Bookcase
- Chair
- Table
- Drawer
- Cabinet
- TV case
- Shelf

3. Restroom:



Fig 5.2.3: Restroom

A Restroom consists of different modular furniture, such as:

Towel hanger

- Cosmetics shelf
- Wooden floor mat
- Drawer
- Restroom cabinet

4. Office



Fig 5.2.4: Office Room

A office room consists of different modular furniture, such as:

- Chair
- Table
- Kiosk
- Cabinet
- Cubicle
- Workstation
- Desk
- Almirah
- Drawer
- Partition

5. Kitchen:



Fig 5.2.5: Kitchen

A kitchen consists of different modular furniture, such as:

- Kitchen cabinet
- Shelf
- Kitchen drawer
- Table
- Chair
- Garbage pullout
- Cutlery treys
- Cup tray
- Spoon hanger
- Cupboard

In the next unit, we will discuss more on the modular kitchen as it is the commonest place, found in every household. As a lead assembler, one should know the various modular furniture usually installed at kitchen.

5.2.1 Different Types of Modular Furniture in the Kitchen ——

Culinary affair is the commonest and the most needful affair of every household. Every kitchen consists of different components and items. Furniture is one of the most vital culinary component that contribute to the aesthetic and functional set-up of a kitchen. Let us see various types of furniture found in kitchen.

1. Garbage Pullout:



Fig 5.2.1.1: Garbage pullout

- Garbage pullout is a sub-assembly that comes with modular kitchen set-up
- · Garbage pullout, like drawers, is installed on a pair of cleat
- This is used to store the garbage such as empty packets, vegetable skin, food residual, etc.



Fig 5.2.1.2: Garbage pullout cleat

2. Cutlery Tray:



Fig 5.2.1.3: Cutlery tray

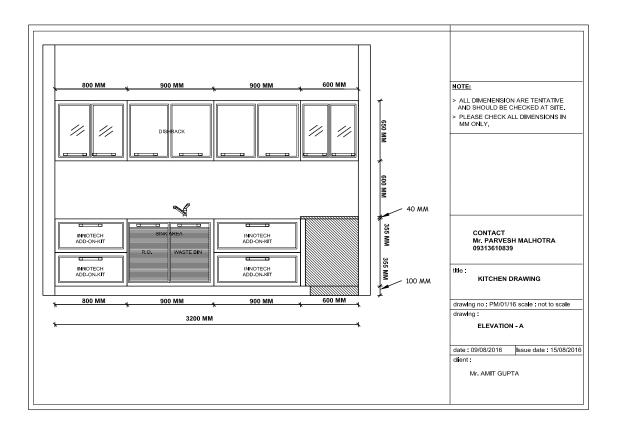
- Cutlery trays have different slots to store spoon, fork, knife and other kitchen items
- Cutlery trays come in different shapes and sizes as per requirement of the user
- The basic idea behind cutlery tray installation is to avoid shabby appearance of the items like spoon, fork, etc.



Fig 5.2.1.4: Cutlery tray slots

3. Kitchen Cabinet:

- · Kitchen cabinet is one of the most useful kitchen furniture
- Kitchen cabinet is used to store various items such as bottles, packets, dry food, cereals, etc.
- In the next unit, we will discuss the details of assembly and installation of kitchen cabinet



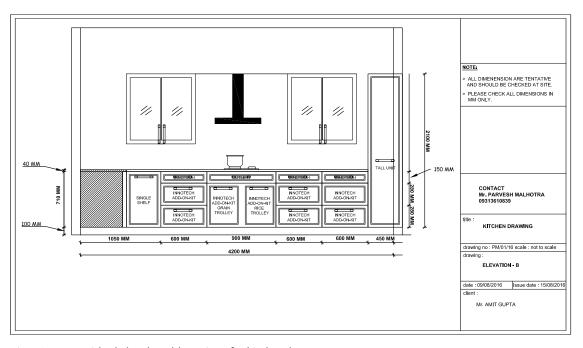


Fig 5.2.1.5: An ideal sketch or blueprint of a kitchen layout

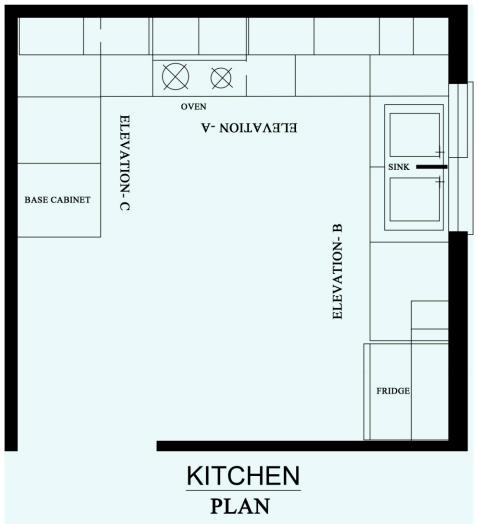


Fig 5.2.1.7: Kitchen Plan

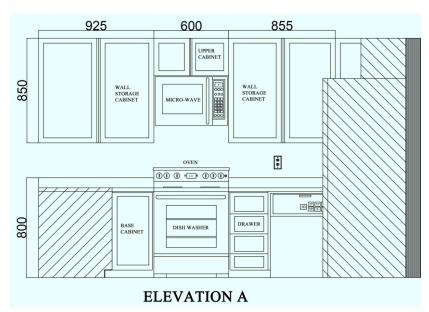


Fig 5.2.1.8: Elevation Layout

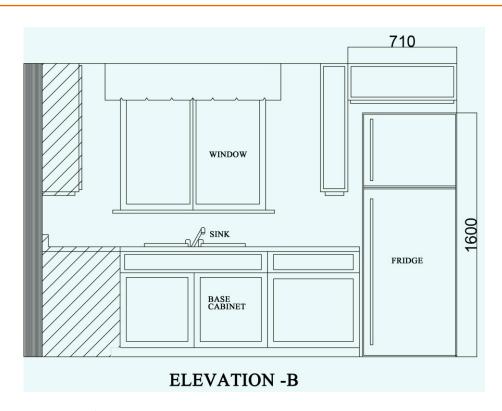


Fig 5.2.1.9: Elevation Layout

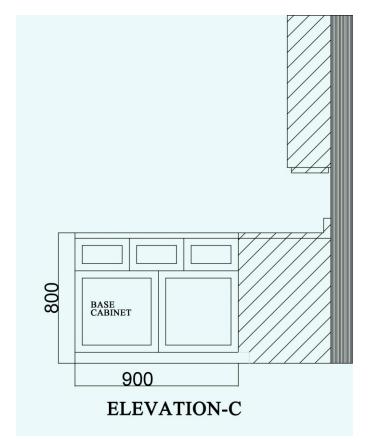


Fig 5.2.1.10: Elevation Layout

4. Kitchen Drawer:







Fig 5.2.1.6: Kitchen drawer sample

- Kitchen drawer is an integrated part of kitchen cabinet
- Kitchen drawer is the safest place to store jars, bottles, tins and packeted food
- Drawers prevent the stored items from insects
- In the next unit, we will discuss the kitchen drawer in details







Fig 5.2.1.7: Bottle Pull Out

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Unit 5.3 Different Process Involved In Assembling and Installation of Products and Various Appropriate Fittings

Unit Objectives



At the end of this unit, you will be able to:

1. Illustrate the different processes involved in assembling and installing products like the basic cabinet

5.3.1 Integrate Sub-assemblies like Cabinet Accessories

Recheck- Measurement, Alignments as Per Design Drawing And Identify Slots For Placing Each Furniture

A carpenter's drawing is a detailed drawing of the finished product. It is a sketch or drawing of a particular work piece. This drawing is incomplete without geometrical dimensions, angles and other specifications in it. A good carpenter's drawing is the sketch of the work piece with dimensions.

Blue prints use various symbols to represent the components of the object. An intermediate carpenter must have understanding of these symbols. Blue prints help a carpenter to:

- Understand size and shape of a work piece
- Understand the techniques that are required to construct or repair a work piece
- Understand and select the construction scale as per the kind of timber is specified in the drawing
- Understand the type of material apart from wood like screws, nails etc. required to construct a particular work piece
- Understand possible errors and omit them

Another important aspect of assembling is identifying slots for installation of various parts. The parts like shelves, drawer are installed on the slot or the cabinet structure. Therefore, a lead assembler must be able to identify the slots for installation.

Cabinet's Components and Cabinet Doors

A cabinet is storage furniture where different items like books, CD are kept. Cabinet is one of the most common furniture in every household. A cabinet is an assembly of various parts or components. The components are—

- Top
- Bottom
- Side
- Back
- Partition
- Shelf
- Drawer
- Shutter



Fig 5.3.1.1: Sample Cabinet

Top: Top is the uppermost part of a cabinet. It is the upper surface made up of wood. Mostly, the top is protected by plywood cover.

Bottom: Bottom is the lower most surface or the base of a cabinet. The structure of a cabinet is assembled on the base or the bottom. Therefore, bottom of a cabinet has to be firm enough. Bottom is made up of material like hardwood to make it strong and firm.

Side: Side is the wooden structure that is fixed to the sides of a cabinet. It is Interesting to observe that a cabinet without side are called a shelf.

Back: This is a wooden structure used as the back support of the cabinet. Back of a cabinet prevents dust and keep the items inside the cabinet clean.

Partition: A cabinet is made up of various sub-assemblies like drawers, shelves and doors. Partition, as the name suggests, segregates one sub assembly from the other. For example, it segregates the drawer from the shelf.

Shelf: Shelf is a wooden structure that looks like a slice of wood which is used to keep items like books on it. A shelf is one of the most important parts that a lead assembler has to assemble in a cabinet.

Drawer: Drawer is another important sub-assembly part. A drawer has different parts as well. A lead assembler should assemble these parts first to construct the drawer. The parts of a drawer are –

- Back
- Sides
- Front
- Handle
- Lock



Fig 5.3.1.2: Drawer Structure

Shutter: Shutter is assembled to the cabinet with the help of hinges. Shutter adds security to the cabinet. Different parts like lock, handle are assembled on the shutter at the time of installation. The number of shutter depends on the size of the cabinet. In case of small cabinets, one shutter is enough to cover the cabinet space; however, if the cabinet is bigger in size, two shutters might be needed.

The type of shutter depends on the requirement or the organization policy. A cabinet shutter can be open outward type or sliding type. However, open inward is a strict no in case of cabinets.

Different Kitchen Designs:

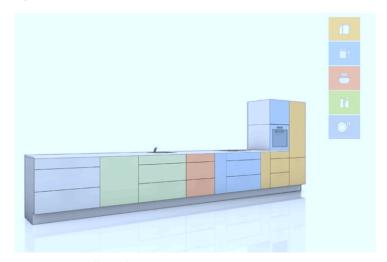


Fig 5.3.1.3: Galli Kitchen Layout

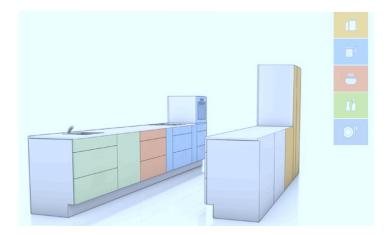


Fig 5.3.1.4: Gallery Kitchen Layout



FIG 5.3.1.5: L Shape kitchen layout

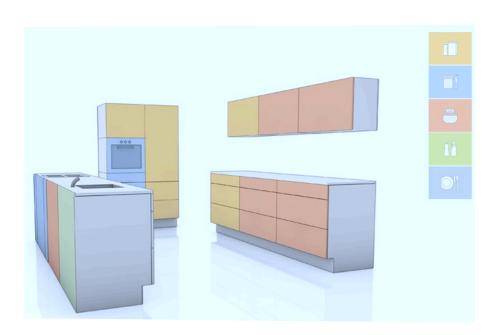


Fig 5.3.1.6: Island Kitchen Layout

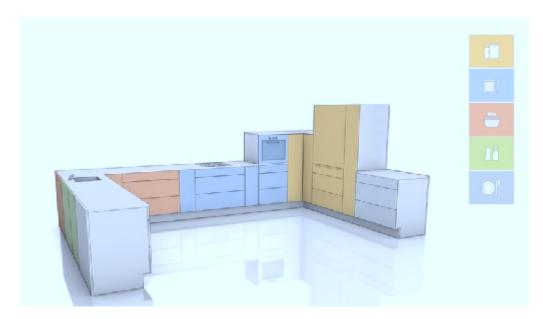


Fig 5.3.1.7: U Shape Kitchen Layout

The kitchen work triangle increases efficiency and ease of working as it is basically the placement of the cooktop, sink, and fridge in most appropriate accessible way within a standard proportion in the kitchen. To work comfortably even during the rush hours, make sure to keep this area unobstructed by avoiding the addition of narrow aisles, islands, and so on.



Fig 5.3.1.8: Work space

Create Marking to Assemble Different Parts

Step 1: Marking



Fig 5.3.1.9: Marking

- O Mark cabinet layout lines onto the wall
- · Carefully measure and plan your space
- You may prefer to create a new layout to better suit your purposes

- Get brochures from cabinet company
- It will tell you what standard sizes are available (this usually means 12" or 300 mm wide at a minimum, with larger cabinets at 3" or 900 mm increments)
- You want to have them tune up all your sizes, take a printout so that you can make copies, and include them with your bid request

Step 2: Sample Cabinet (Measurement)



Fig 5.3.1.10: An artist's impression of a Kitchen Cabinet

Draw a layout of your cabinet plans

- It doesn't need to look like something an architect would draw, but it should be enough to give you an idea of how everything will line up and fit together
- Check the cabinet heights, especially for upper cabinets
- If one of your cabinets will go over your sink or stove, make sure to allow space underneath it for working and to attach lighting or a stove hood
- Check how your range hood will fit with any upper cabinets above the stove
- Check that upper cabinets line up appropriately with lower cabinets, and allow for windows and other features in the wall

- If you are especially tall or short, check how far up you can comfortably reach
- Many upper cabinets are designed to have a space between the tops and a standard height ceiling, while others will extend all the way to the ceiling
- Most systems have special cabinets to go under the sink, in corners and in other special locations. Learn how these work and incorporate them into your layout
- Consider how you use your kitchen (or other workspace
- Millimeter or MM is the CGS unit of measurement which is now used in drawings and hardware details provided by companies.

Specified Joinery Techniques and Required Adhesives /Screws

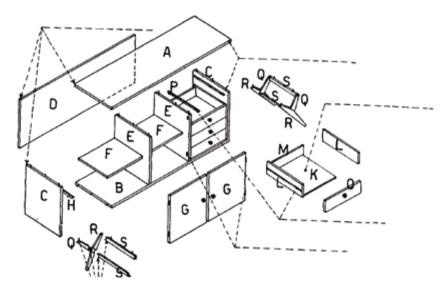


Fig 5.3.1.11: Cabinet Parts

In our last discussion, we have come to know about the sub-assembly names of a cabinet. Here, we will discuss the technique of joining the sub-assemblies.

Step 3

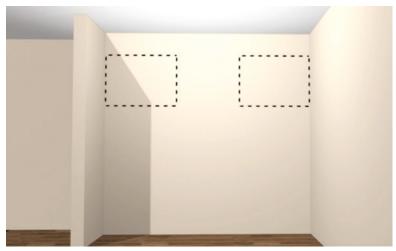


Fig 5.3.1.12: Upper Cabinets are constructed first

- The first aspect of installation should be the upper cabinets. Lower cabinet will be assembled on the basis of upper cabinet construction
- Make certain that you support the upper cabinets somehow as you remove the screws that support them
- If the upper cabinets are a one-piece unit, you may have to separate them to avoid damaging adjacent walls since there will be no room to turn them as you bring them down

Few Important Tips:

- · Mark upper cabinet area carefully for drilling
- In case there is any existing cabinet or fixture, remove them
- Ensure that the cabinet is not installed too high to reach easily

Step 4



Fig 5.3.1.13: All necessary equipment and tools must be gathered

- Make a list of necessary equipment
- Obtain all your materials and supplies for the project
- Also get an idea of your options for finish, styles, materials, and hardware options
- Arrange the tools properly for smooth work flow
- In many cases, it is possible to get a custom size to match your needs, but it is always much less costly to use their standard sizes

- Don't forget screws to screw the cabinets to the walls and shims with which to level the cabinets
- The necessary tools for assembling cabinet are:
 - O Measuring Tool
 - O Marking Tool
 - O Drilling Machine
 - **O** Chisel
 - O Saw
 - O Rasp/File
 - O Nails/Screws
 - O Hammer
 - O Screw Driver
 - O Hinges
 - O Handles
 - O Lock
 - O Knobs



Gather the parts



Prepare the parts for assembling



Start making the cabinet structure



Prepare the cabinet structure



Add partition to the structure



Add shelves on both sides of the partition



Finish the cabinet construction

- · Assemble the cabinets, but do not put the doors on yet
- Most modular cabinets come with instructions and go together just like kit bookcases
- Take the time to make sure that the cabinets are assembled as securely, squarely and evenly as you can

Ensure To Remove Cabinets, Fixtures and Other Fittings from Existing Settings on Worksite

- Remove the old cabinets, if there were any. At the back of the cabinets, you will generally find screws or nails holding them to the walls
- Empty the cabinets completely first. It is much easier to work inside them and remove them without loose items rattling around inside
- Remove the doors and shelves before unscrewing the cabinets from the walls. Most shelves simply lift off of pegs. Some may need to be unscrewed or pried off their supports. In either case, it will help to have them out of your way

Fasten Boxes/Pieces of Furniture to the Surface/Wall Taking Utmost Care of Alignment and Obstructions

Step 6



Mark the space for installing upper cabinet



Plane the surfaces using a shimmer



Drill pilot holes and fix the cabinet



Maintain spacing between the cabinets

- Plumb down from the ceiling and use a measuring tape to mark the height of the cabinet brace or rail you will fasten through
- Since the new cabinets will conceal the wall after they are installed, you can simply tap a small nail through it to locate the studs
- Measure either 16 or 24 inches (40.6 or 61.0 cm) to find other studs in your wall, since these are typical stud spacing
- Calculate the distance from the edge of a wall cabinet to the stud(s) behind it. Mark these spots on the back of the cabinet, and drill pilot holes from the back of the cabinet. Be sure to allow for the "ears" on the front of the cabinet

Few Important Tips:

- Start on one end or in a corner and install the upper cabinets. There are two methods you can use. Either way, get help lifting and supporting them until they are screwed in.
- The first method, called the French Cleat method, consists of screwing a support, or cleat, to the wall at an appropriate height that allows you to hang the cabinets on the cleat
- The second method will require a partner. Create a support jack by screwing a short length of a 2x4, or other sturdy scrap wood across the end of another 2x4. If you like, cover the end with a rag or old towel to use as a cushion. Have your helper use this T of wood with the bottom end against the floor, and the top against the bottom of the cabinets to support the cabinets while you level them and screw them to the wall

Step 7







Drill for power outlets



Test set-up

- Mark the locations of your clamp for the lower cabinets, then bring in the cabinets and set them into place
- It is easier to shim the others up to this height than to shorten the tall one

- Always secure the cabinets firmly to studs before loading them with their contents.
- Secure cabinets to each other as well as the wall.
- Drill pilot holes in the cabinet frame and screw together with good wood screws





Shim the surfaces

Fix the lower cabinet to the wall

- Level the top of the cabinets by shimming under and behind them
- Screw the lower cabinets to the wall. You can often screw right through the spacers

- Remember that you will install a counter top on the cabinets, so you want this reasonably level and all the joints to be flush
- Look at the appearance of the cabinet fronts and make sure those are even



Kitchen cabinet set-up





Attach counter top

Place the counter top on the cabinet

- The counter top should be the next task once the cabinets have been completed
- Test fit the counter top
- Cut it to length if required, and cut out the sink opening and the opening for the stove (hob) if it will be built in
- For post formed (laminate on particle board) counter tops, you will get better results cutting it to length with a "finish", or "plywood" blade rather than a ripping or combination circular saw blade
- For cutting a sink opening, invert your sink at the location it will go, mark the outline of the outside rim lightly with a pencil, then make another mark about 5/16 inch (0.8 cm) inside this line for your cut
- Place masking tape on the outside of the cut mark, and use a jigsaw to make your cut. If you cannot "plunge" your jigsaw (starting inside the cut line), you may drill a 1/2 inch (1.3 cm) hole to drop your blade into to start your cut
- Place the counter top on top of the lower cabinets. Screw it in from underneath, making sure that the screws you use are not so long that they will break through the material to the top

- · You may need to cut the counter top short so that it will set in if it is between two walls
- If you allow a 1/4 inch (0.6 cm) on the overall length, you can caulk the ends after it is installed
- Cutting with the counter top upside down will reduce chipping, but make sure you support the piece until the cut is complete
- Seal all cut surfaces of post formed counter tops before installing to prevent moisture from swelling the material later if your caulking fails to seal
- More durable counter tops can be made from synthetic marble (Corian, etc.), natural granite or other stone, cement backer board or plywood covered with ceramic tile



Lower cabinets with counter top



Sealing counter top

Apply sealant around the sink to fix it

- Begin closing the joints once the counter top has been finished
- Apply silicone or sealant like m- seal around the sink cut-out and lowers the sink into place
- Check the fit and location, and then secure it into place with the brackets underneath. Apply sealant around the rim of the sink
- Apply sealant around the edges of the counter top and between the backsplash and the wall
- In modular furniture assembly and installation, sealant works as a filler to join the gaps







Install door

Attach doors

- To attach doors with the cabinet wall, use hinges
- Fix the hinge to the door and cabinet wall with the help of drilling machine



Kitchen cabinets with door

- Measure and mark properly before drilling; drilling is irreversible
- Keep spaces left for drawer installation

Step 12: Installing drawers



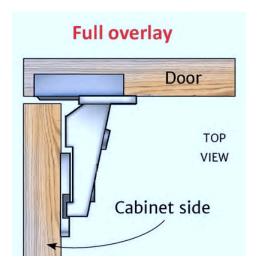
- Install drawers in the required slots
- Place the drawers on the cleats with accurate alignment
- Recheck alignment and smoothness of the drawer

Step 13

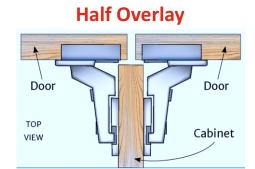


Attach doors to the upper cabinet

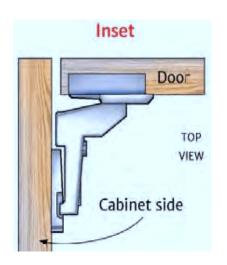












Installation of Hinges

- · Mark and measure the dimensions of the doors and cabinet wall to install hinges
- · Attach hinges to the door
- Install doors to the upper cabinet

Step 14







Install handles to the doors and drawers

- · Mark the joining areas with a pencil
- · Drill the joining areas to fit in the screws
- · Clean the holes carefully and place the handle with accurate alignment to the drilled holes
- · Put the screws in the holes and fit it in

Ensure to Gather All the Tools Post Installation and Place Accordingly

In this chapter, we have come across various tools and equipment which are used to prepare kitchen cabinet. The list of equipment essential for kitchen cabinet preparation is:

- Measuring Tool
- · Marking Tool
- · Drilling Machine
- Chisel
- Saw
- Rasp/File
- Nails
- Hammer
- Screw Driver
- Hinges
- Handles
- Lock
- Knobs
- Floor Guard
- Shimmer

A lead assembler usually carries a tool kit where he/ she stores all the tools and equipment. After assembling and installation, the lead assembler should gather all the tools and place them in the tool kit. The advantages of maintaining this habit are:

- The tools are safely placed and portable
- Tools are stored together which negates the possibility of misplacing
- The equipment box should have different slots to place different tools such as a slot for keeping knife, another slot for keeping drilling machine, a specific slot for keeping saws and so on
- · This is known as proper maintenance of the equipment which keeps the tools safe and sound

Remove all the Debris from the Site and Clean the Work Area In Accordance With Organization Policy

- After installation is done, ensure that you clear all the debris or waste materials from the site
- Separate the recyclable wooden pieces from the waste particles
- Gather damaged nails or screws on the ground and remove from site
- Check for sharp wooden bits on the floor and remove from site
- Use a broom to clear the saw dust from the area
- Dump all the wooden pieces in a plastic bag and put it in the dustbin

Debris	Image
Removing sharp wastes like broken nails or screws is essential. Collect all the sharp waste manually and collect it in a safe place to dispose.	
	Sharp Waste
Saw dust needs to be cleaned from the work place by using vacuum cleaner. Suck the saw dust and wooden powder by the vacuum cleaner and dispose it in the designated place to keep the work station clean.	
	Saw Dust

Steps of Debris Collection:

1. Use a broom to sweep the saw dust and other waste generated during assembling and installation



Fig 5.3.1.14: Use broom to swep the waste





Fig 5.3.1.15: Collect waste from different parts of the workplace

3. Dump the collected waste in a particular bin/ place to dispose



Fig 5.3.1.16: Collect the waste in a particular bin



Fig 5.3.1.17: Waste collection







Fig 5.3.1.19: Saw dust collector

Take Note of Inputs/ Feedback Received To Incorporate In Future and Complete the Procedural Documents Post Completion and Undertake Customer Signoff Digitally or On Paper

When we were children and used to read in lower classes, what used to happen on the day of result out? We all used to be very nervous. The reason was solely not the tension of the marks but the parent-teacher meeting as well. Now, when you look back, could you realize why parent-teacher meeting used to take place? Was that only to scare the students? No! The main reason was to share a feedback.

In case of lead assembling, feedback is very significant. Good feedback help the organization to improve the service provided. Moreover, implementation of good feedback earns the trust and respect of the customers.

Each organization has a set of parameters on which customers share their feedback. Usually, a feedback form is given to the customers which they fill in to share their opinion. Here is a sample feedback form.

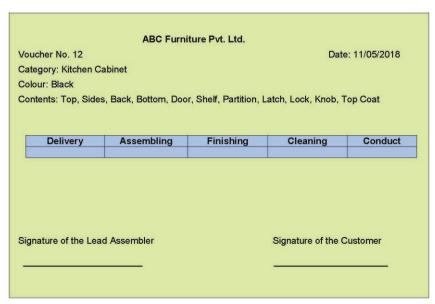


Fig 5.3.1.20: Sample Feedback Form

Unit 5.4 Different Types of Tools and Equipment and the **Processes of Operating the Same**

- Unit Objectives 🥝



At the end of this unit, you will be able to:

- 1. Identify and use the hand tools used in carpentry
- 2. Identify and use the power tools used in carpentry
- 3. Use woodwork adhesives
- 4. Identify and use fastening tools and connectors



Fig 5.4.1: Tools

_ **5.4.1** Hand Tools ______

Tools	Image
1. Measuring Tools: Measuring tools are used by a carpenter to measure the area and extent of cutting an object. Common measuring tools include: Tape Measure Steel Rule Zig-Zag Rule Folding Rule Try Square Mitre Square Firm Joint Callipers Spring Joint Calliper	Measuring Tape
 2. Marking Tools: Apart from the pencil, there are other marking tools used by a carpenter to sketch cutting lines on the object. Common Marking tools include: Steel Scriber Marking Knife Marking Gauge Mortise Gauge Cutting Gauge Chalk Line 	Marking Pencil
3. Hand saws: The carpenter uses a variety of hand saws to carry out activities like rough cutting, curved cutting, straight cutting, fine cutting etc. Common Hand saws include: Rip saw Cross cut saw Panel saw Tenon saw Fret saw Key hole saw	
	Saws

Tools	Image
 4. Bench Plane: The Bench Plane acts as the base for levelling wooden surfaces. Common Bench Planes include: Jack Plane Smoothing Plane Trying Plane Rebate Plane Grooving and Plane 	David Physics
5. Hammers and Mallets: A good quality Steel hammer is used to drive nails whereas mallets are used for chiselling. Common Hammers include: Claw Hammer Ball Pein Hammer Cross Pein Hammer Straight Pein Hammer Wooden Mallet	Hammer Mallet Claw Hammer

Tools	Image	
	TARLEY	
 6. Screwdrivers: Screwdrivers are used to tighten and loosen screws. Some common screwdrivers include: Flat Head Screwdriver Phillips Screwdriver Offset Screwdriver 	Set of Screwdrivers Slotted Phillips Pozic	driv
	Torx Security T Hexa Hexa Different Types of Screwdriver Tips	

Tools Image 7. Chisels and Gouges: Chisels are tools that are used to remove waste materials whereas gouges are used for complex carving. Some common items include: • Bench Firmer Chisel • Bevel Edge Chisel Socket Chisel Paring Chisel Chisel Mortise Chisel Gouges Chiselling wood 8. Drills and Braces: These are manual tools that are used to bore holes to fit wood screws and dowels. Common drilling tools include: Bradawl Gimlet Hand Drill **Ratchet Brace Hand Drill** 9. Sharpening Stones: These stones are effective in maintaining the sharp edges of a carpenter's tools. Some common Sharpening Tools are: Oil Stone Water Stone • Slip Stone Oil Stone

Tools	Image
 10. Rasps and Files: These tools are used to give shape to a piece of wood and level its rough edges. Some common Rasps and Files include: Rasp Cut File Flat File Half Round File Triangular File 	Set of Rasps
 11. Clamps: Clamps are used to hold the wooden pieces together while the glue settles. Various clamps include: T-Bar Clamp C-Clamp G-Clamp 	G-Clamp Bar Clamp
12. Pincers and Crow Bars: Pincers are used to pull out damaged nails whereas crow bars are used to open wooden crates or move heavy objects. •	Pincer Crowbar

Tools **Image** 13. Plier: Pliers are mainly used to grip and twist objects like pipe or wire. The long frontal part of the plier helps to grip or squeeze the object easily, which are difficult to do manually. Piler 14. Countersunk Bit: • It is used to make a hole to fit countersunk bit To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it • They are available in 6 to 20 millimeter size Countersunk Bit 15. Spirit Level: • It is used to check level of vertical and horizontal surfaces • When this is placed on a vertical or horizontal surface, if the bubble is at the center position, it means that the surface is perfectly level Spirit Level 16. Plumb Bob: • It is used to check level of vertical surfaces • It is conical in shape and made of iron or metal.

Plumb Bob

Tools Image

17. Bar Clamp:

- This clamp is long. Its length is from 2 feet to 7
- Big frames and models are glued and clamped in it
- It is made of bar steel and there are equidistant holes in it



Bar Clamp

18. Miter Box:

Normally, it is used to cut wood at the angle of 45°







Fig 5.4.2: Storage of tools

5.4.2 Power Tools

Tools Image

1. Power Drill

Handheld power drills are used for general purpose boring and the creation of straight, clean holes.



Power Drill

2. Automatic Screwdriver

Automatic screwdriver is a portable, handheld screwdriver regulated by power supply. Like the normal (manual) screwdrivers, the function of the automatic screwdriver is to fix screws on the work body. These tools are capable of carrying out the function on hard and rough surfaces as well.



Automatic Screwdriver

3. Circular Saw

A circular saw is a versatile handheld power tool. It is useful for making rip cuts or cross cuts. It is also useful for cutting grooves and rabbets.



Circular Saw

Tools Image 4. Power Jigsaw A jigsaw is a light and portable machine. It is used for cutting curves and circular patterns on wood. It is mostly used for intricate and decorative cuts. Power Jigsaw 5. Planer Portable planners are not used for very precise work. However it is an excellent tool for quick planning. It also makes joinery work easier. Planer 6. Router A portable router is used for moulding, grooving and rebating work in carpentry. A router bit's shape determines the type of cut it creates. Router

Tools Image

7. Miter Saw

• It is used to cut the wood at an angle



Miter Saw

8. Band Saw

- It is used for cutting precise shapes and curves
- It is a powerful tool when cutting rabbets and tenons
- You can also rip small pieces of wood and even make your own laminate strips with a band saw





Band Saw

9. Drill Press

- The drill press delivers the precise and accurate large-diameter holes
- The depth of the hole can be set. This is especially useful when a number of holes are needed to drill, all to the same depth
- The drill press also allows to use forstner bits, hole saws, and spade bits



Drill Press

10. Edge Band

- This machine is used to paste PVC tape,
 Melamine tape, Paper tape, veneer, wooden
 strips, mica strips on the edges of pre-laminated
 board
- It also trims the leading and trailing edges, trims the top and bottom flush with the wooden substrate, scrapes off any extra glue and buffs the finished edge to give a flawless finish



Edge Band

5.4.3 Fastener and Connectors

Tools Image 1. Knock Down Fittings and Fixing Nuts Nut is a fastening tool. It has coils around its body,

giving it a shape of threaded pattern. The threaded pattern helps to join the two parts of metal or wooden furniture. The common types of nuts are:

- Hexagonal Nut
- Square Nut
- Flanged Nut
- Cap Nut

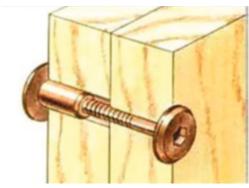


Fixing Nut

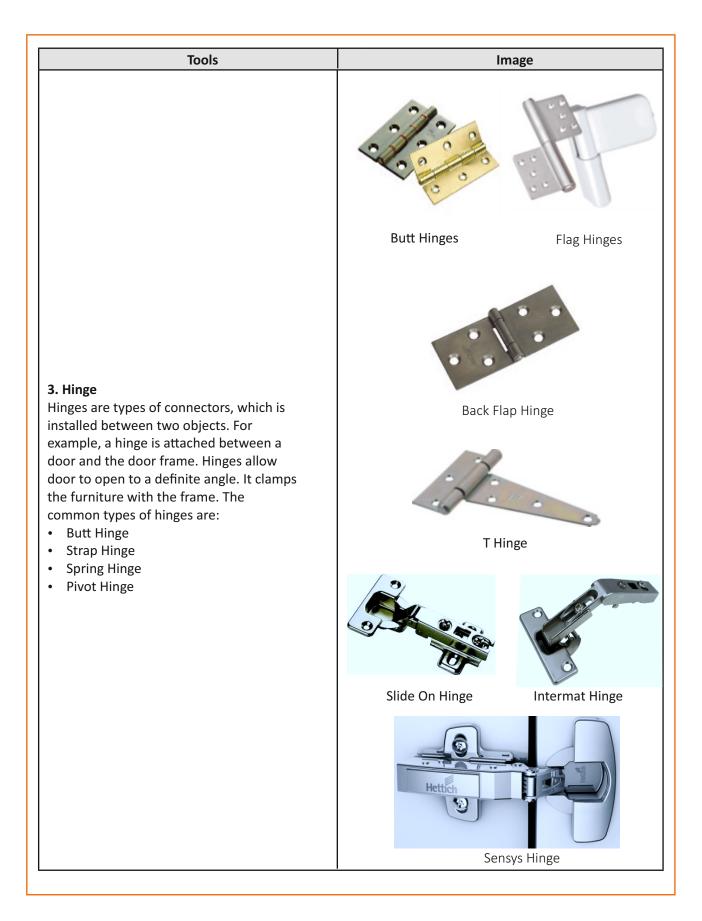
2. Bolts

Bolt looks similar to the head of a nut. Bolts are usually attached to the nuts as a joinery substance. The common types of bolts are:

- Hexagonal Headed Bolt
- Square Headed Bolt
- Round Headed Bolt
- Cylindrical Headed Bolt



Connecting Screw



4. Lock Lock is used as a security option. Different Types of locks available in the market are: Padlock (traditional key-lock system) Deadbolts (with thumb turns) Rim Lock (long latch) Furniture Lock	Lock is used as a security option. Different Types of locks available in the market are: Padlock (traditional key-lock system) Deadbolts (with thumb turns)	Cylindrical Lock
		Furniture Lock

Tools	Image
5. Knob and Handle Handles and knobs are the pullers of a door or a casement. These are attached to the door to pull it easily. Common types of handles and knobs are: Cabinet Handle Drop Handle Ring Pull Handle Drawer Knob	Handle (sample) Handle (sample) Handle (sample) Different types of Knobs Knob attached with the bar
	1

Tools

Image

6. Nail

Nails are used to securely join pieces of timber or material to timber.

Nails have a head, shank and a point. Usually, the nails are made of wire or plate metal and mild steel. Common types of nails include:

- Oval wire nail
- Headless nail
- Annual ring nail
- Panel nail
- Tack
- Staples



Nails



Staples

7. Screw

A screw is a cylindrical rod carved with one or more helical or advancing spiral threads, as a lead screw or worm screw. It has a head and a point. Common types of screws include:

- · Flat head screw
- · Round head screw
- Raised head screw
- Square head screw
- Phillips or cross head screw





Flat Head Screw





Round Head Screw





Raised Head Screw





Cross Head Screw

5.4.4 Woodwork Adhesives

A wide range of wood working adhesives is available in the market. Some commonly used glues are:

- Polyvinyl Acetate
- Synthetic Resin Glue

Polyvinyl acetate or PVA has been used for decades in woodworking and carpentry workshops. You probably know it by the more common and descriptive name of white glue. The fact that PVA glue can bind a wide variety of substances has made it a popular choice amongst carpenters. White glue is not waterproof and has a set time of 60 to 90 seconds. Brands of white glue include Fevicol MR and Araldite Karpenter.

Synthetic Resin Glue or standard yellow wood glue comes in thick liquid form with a yellowish tinge. This wood working adhesive requires between 12 hours to 24 hours to dry completely. Such glues form a stronger bond between the pieces of wood than standard white glues. Synthetic Resin Glue brands include Fevicol SH, and 3M Synthetic Resin Adhesive.

Select and Apply Adhesives:

- **Step 1:** Clean the wood surfaces to be glued.
- **Step 2:** Prepare the glue as directed by the glue manufacturers.
- **Step 3:** Apply a generous amount of glue to one surface. Use a brush to spread the glue evenly.
- **Step 4:** Place the second onto the glue-covered surface.
- **Step 5:** Clamp the surface together.
- **Step 6:** Tighten the clamps making sure the excess glue oozes out all the way
- **Step 7:** Clean up the excess glue with a damp cloth.
- **Step 8:** Allow the glue to dry according to the manufacturer's instructions.
- Step 9: Remove the clamps after the glue is dry.

Technique Of Joining The Materials With Adhesives and The Quantities To Be Used

- **Step 1:** Collect all of the broken pieces and dry fit them together to make sure all of the pieces fit together.
- **Step 2:** Place small pieces in a different location for fitting together later.
- **Step 3:** Clean the break point on the pieces with a strong solvent.
- **Step 4:** You can use nail polish remover to remove all grime and debris from where the pieces will reattach.
- Step 5: Start with the largest pieces. Spread a line of glue on one of the pieces with a toothpick.
- **Step 6:** Press the two pieces together so that they fit precisely.
- **Step 7:** Hold in place for about a minute while the glue sets.
- Step 8: Wipe off any glue residue with a damp rag.
- **Step 9:** Continue to glue all the pieces in this manner.
- **Step 10:** Put the decorative item in a safe place and let the glue dry completely

Summary



- A carpenter's drawing is a detailed drawing of the finished product. It is a sketch or drawing of a particular work piece.
- A cabinet is storage furniture where different items like books, CD are kept
- Drawer is another important sub-assembly part. A drawer has different parts as well
- Marking is a significant aspect of assembling. The entire assembling process is dependent on the marking done.
- Polyvinyl acetate or PVA has been used for decades in woodworking and carpentry workshops.
- Synthetic Resin Glue or standard yellow wood glue comes in thick liquid form with a yellowish tinge.

-Activity



- The trainer divides the class into few groups and asks each group to prepare a chart on any one layout of Modular Furniture. On preparing the charts, the groups have to present the same in front of the class.
- The trainer takes the students to the laboratory for a practice session, where they practise the various steps in assembling and installing kitchen drawers and cabinets. This activity may last for few hours and may distributed over few days, according to the trainer's discretion.
- While practising in the laboratory, students identify, observe and use relevant Hand tools, Power tools, Fasteners, Adhesives and Connectors.

Exercise	

Fill	Fill in the Blanks:				
1.	Two common measuring tools are and				
2.	Two common marking tools are and				
3.	Auses hand saws to carry out activities like rough cutting, curved cutting.				
5.	. Theacts as the base for levelling wooden surfaces. [Bench Plane]				
6.	are used to give shape to a piece of wood and level its rough edges.				









6. Common Issues, Troubleshooting Knowledge and Method of Conducting Visual Inspection



Unit 6.1 Common Issues Troubleshooting Knowledge
Unit 6.2 Method of Conducting Visual Inspection for any
Errors or Damages to the Cut Components



- Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Recall the common issues troubleshooting knowledge
- 2. Demonstrate the method of conducting visual inspection

Unit 6.1 Common Issues Troubleshooting Knowledge

Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain Troubleshooting
- 2. Identify the common issues in assembly and installation of modular furniture and resolve them

6.1.1 Explaining Troubleshooting

A. Defining Troubleshooting

Troubleshooting is a systematic and sequential approach to solve problems, used to detect and resolve issues in a unit or a system. In short, Troubleshooting is the process of detecting a problem, finding its root cause and then rectifying it. With the sole purpose of bringing back a system into operation, troubleshooting techniques also focus on preventive maintenance, so that a particular issue does not appear again and what needs to be done in case it recurs.

B. General Guidelines for Troubleshooting

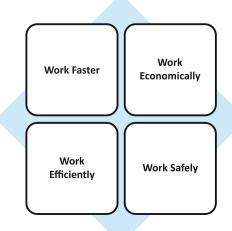


Fig. 6.1.1: The 4 aspects of successful Troubleshooting

C. Recognizing the Symptoms

1. Define and state the problem specifically.

- Verify and ensure that the system actually has a failure and is not just reacting to an external condition, like power not ON, loose switch connections, etc.
- **O** Determine if the system failure is an overall one or if any of its units has deteriorated performance.
- O Learn all symptoms of problems and issues, associated with the system and its units.

2. Elaborating the Symptoms

- O Prepare the troubleshooting log after collecting adequate background information.
- Observe how the readings in the meters / gauges and outcomes are affected by and are responding to the problem.
- Verify if any adjustment or recalibration affects the symptom.
- O Determine if the symptom has developed gradually or drastically.
- Try breaking the above processes into as many minute parts as you can.

3. Determining the probable Faults

- Use the Block Diagram / Sketch / Instruction Manual to ensure that all possible functions and modes of operation are verified.
- O Note down all possible types of faults that may occur with the system and its individual units. For ex faults may lie with the Drill Machine as well as the Drill Bits.
- O Have an open mind and do not bind yourself to the knowledge of a technician alone.
- Recall and implement past troubleshooting experience.
- Analyze and map a given symptom with the known and possible faults.

Furniture, like any other product is susceptible to damages. Wooden products like plywood get damaged by water and humidity, and thus carpenter should be well aware of the troubleshooting steps. Here, we will discuss few common issues with furniture.

- O Hardware Malfunction
- O Hardware, as discussed earlier, refers to the hinges or the channels which are assembled to the furniture at the time of installation. However, the range of hardware breakage troubleshooting does not lie strictly within the domain of hinges or channels. Some common instances of hardware malfunction are –
- Damaged edge
- O Cracks or scratches on the furniture
- O Breakage of backrest/ handle/ foot rest
- Plywood malfunction
- O Rusted metal (in cases of hinges and channels)
- Damages owing to spillage

Wooden Member Malfunction

In case of an assembly of various products (material), the raw materials used in assembling are referred to as assembling members. Wooden member is the wooden part of the assembled product. For example, a showcase has different assembling members like, wood, iron, glass and etc. If the wooden part of the showcase is dysfunctional, a carpenter should take care of that.

Damage at the Time of Delivery

Proper packing technique is essential to avoid any damage at the time of delivery of furniture. The deliverable items may be subjected to transportation which increases the possibility of damages. Therefore, to prevent damages, precautionary steps should be taken at the time of delivery. The proper technique of packing is discussed under the Quality Checking chapter.

Veneer Malfunction

Veneering is the technique of fixing slices of wood together. For example, the plywood fixation on the table is a veneering process. In case of laminated walls or floor, laminates are fused on the wood board or tile. Due to over exposure to heat, spillage, humidity, rough use – the veneering might get damaged. The plywood may get scratched, or the corner may get torn. These are very common issues with veneers. This is known as veneer malfunction.

6.1.2 Common Issues in Assembly and Installation of Modular Furniture

Common Issues	Cause	How to Solve
Scratched modules and pieces	Rough handling and excessive usage	 Using a rug to avoid scratches during handling Avoiding sliding items during assembly and installation operations Keeping sharp tools and equipment away from the modules
Missing modules and pieces	 Not unpacking and arranging the modules and pieces according to the Blueprint Clumsy and unorganized work area Not storing the modules as you proceed with the operations 	 Getting substitute modules from the vendor / manufacturer Arranging the modules and pieces as per instructions and requirement Keeping the work area free of clutter Ensuring that modules, meant for different purposes, do not get mixed up Putting aside assembled parts, as you proceed with assembly and installation
Broken modules and pieces	 Defective modules received in consignment Exerting undue force while using tools Exerting undue force while trying to fit 	Noting down the reference numbers of the broken parts and placing an order for the same with the manufacturer
Modules not fitting well	 Using the wrong size and specification of hardware, say, a wrong size or shape of screw or nut. Trying to fit mismatched modules and pieces Failing to understand the Instruction Manual and following the sketches wrongly 	Reading and thoroughly understanding the Instruction Manual, Directions of Use and Blueprints / Sketches

Common Issues	Cause	How to Solve
Skin Peeling	The upper part or the plywood surface gets peeled from the body of the furniture due to water, humidity or exposition to direct sunlight At times, the lather or clothing covers (especially in the upholstery) gets peeled owing to rough use/ prolonged use	 In case of wooden skin peel off (of furniture), use adhesives to join the defective part. If adhesive application doesn't solve the issue, replace it with new part For skin peeling of clothes or lather, it is advisable to replace the defective part
Angular Default	 Due to rough use or over exposition to heat and water, the angular portions of the modules get damaged Untidy installation or assembling may lead to angular defaults where the alignment of the angular portion goes wrong 	 Use hinges to make up for the defective angle If installation of hinge doesn't fix the issue, replace the defective part with new module
Floor Level Mismatch	At times, the modules for assembly, especially the legs which remain in contact with the floor, do not sit steadily on the floor. This might happen due to rough or uneven floor level.	 Cut the legs carefully after taking proper measurement Shimmer the end of the leg according to the floor level
Screwing alignment default	 Wrong measurement and marking lead to screw alignment default Wrong drilling or excessive drilling may cause screw alignment default Selection of wrong screw also causes screw alignment disorder 	HDE Drilling is a good solution to the screw alignment issues If HDE drilling doesn't fix the issue, replace the screw with new one

• Reject defective materials and sub-assemblies of poor quality and inform supervisor and or seniors and raise new request

It is important for a lead assembler to know the procedure of detecting the defective parts and raise new request to the supervisor. There are various formats to share the requisition. Here, we will discuss the general method (flow) of identifying defective material and format of raising requisition.

- Check for defective parts
- Note the serial numbers for the defective parts
- Record the serial numbers
- Escalate through the specified form

Requisition form varies from one organization to another organization. The specifications of the requisition form are determined by the respective authorities. However, there are a few significant specification parameters that a lead assembler must report to the supervisor. The following is an example of the requisition form.

Requisition Form

Name of the Equipment/ Mod- ule (Defective Part)	Serial Number	Nature of Defect
Legs of the bookcase	123321	Non-aligned (alignment mismatch with the level of the floor)
Top panel of the cabinet	987789	Broken
Second post of the bed	656454	Damaged during installation

Signature of the Assembling Employee	Signature of the Customer

Notes 🔲 _			

Unit 6.2 Method of Conducting Visual Inspection for any Errors or Damages to the Cut Components

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance of Visual Inspection in Assembly and Installation operations
- Discuss elaborately the method of conducting visual inspection for any errors or damages to the cut components

Quality checking is the method of conducting visual inspection for any errors or damages to the cut components. It is important to undertake quality checks at regular intervals to avoid any error detection at later stage. The quality checking parameters are as follows:

- Recheck measurement, alignments as per design drawing to avoid any damage during installation
- Conduct post installation visual and quality check with respect to placement, levelling, functioning etc. and perform touch up, cleaning /sanding/ finishing as needed for the installed product
- · Rectify any error or faults observed to comply with organizational quality standards
- There should be an ideal procedure for quality checking. The set-up is discussed below.

6.2.1 Selection of Ideal Place

There should be a specific room for quality checking. After finishing a product, the item should be taken to that room for quality checking. The room should be clean and there should be sufficient light in that room. Typically, Milk White Lights are used in the quality checking process. The walls should be strictly perpendicular to the floor surface. For example, if a table has to be checked, the table should be set in front of the vertical wall to check the straightness and smoothness of the edges. If the wall is inclined, the purpose of quality checking will not be successful.

On the same note, the floor should be levelled and there should not be any up and down (roughness) on the floor. If the floor surface is rough, smoothness of the finished product cannot be gauged. Proper lighting is required to check the polish and the finishing of the furniture. Milk White Light is the best option that should be used in quality checking of furniture.

6.2.2 Importance of Visual Inspection in Assembly and Installation Operations

Visually inspecting each step help in detecting issues in the early stages of the task. Early detection of faults and issues, in the hardware tools and the modules, helps in avoiding wastage of money, time and manpower. Visual Inspection eliminates chances of future breakdowns and major faults. This helps in avoiding serious defects in the final products, and, in turn, product recall.

6.2.3 Method of Conducting Visual Inspection For Any Errors or Damages to the Cut Components

The common methods of conducting visual inspection, during assembly and installation processes, are:

- Tallying all aspects of the assembled and installed product against the AutoCAD sketches, blueprints and approved samples
- Visually checking for defects related to:
 - O Wrong dimensions (not according to specifications in Work Order)
 - O Discolouration, Staining and Tainting
 - O Improper and inadequate Finishing
 - O Scratches
 - O Mismatched and misfit parts
 - O Warping
 - Blistering
 - Other defects
- Conducting Stability and Usage Inspection like:
 - O Load Tests
 - O Impact Tests
 - O Strength Tests
 - O Drop Tests
- Conducting Packaging Inspection for checking the appropriate packaging of all pieces and modules to protect against abrasions and proper climate controls to prevent damage during transportation

6.2.4 Proper Packing Technique

Packing refers to the final packaging before delivery. After manufacturing, quality checking is performed. Once the manufactured products are given green signal for delivery, packing comes in the picture. Packing is a tedious but significant method. If packing is not done properly, the products may get damaged at the time of delivery. There are few steps of packing. The steps are discussed below:

Packing Foam

Packing foam is used as the first protective layer around the deliverable item. The deliverable item is wrapped with the layer of packing foam to avoid scratches or any damages at the time of transportation.



Fig 6.2.4.1: Foam Packing

Cardboard Layers

After wrapping the furniture with packing foam, cardboard layers are applied as another precautionary measurement. At the time of transportation during delivery, these cardboard layers protect the wooden items from damages owing to jerks or dashes.



Fig 6.2.4.2: Layering

Corner Binder

Corner binder is one of the most important part of packing technique. The edges or the corners of furniture are more susceptible to damages. Thus, corner binders are used to meticulously wrap the edges of the deliverable items. Corner binders protect the edges from getting smashed or cracked at the time of transportation.



Fig 6.2.4.3: Corner Binder

Lamination Plastic Covering

This is a roll or sheet of lamination plastic which is used to wrap furniture. Typically, flat-surfaced wooden structures such as door are covered with lamination plastic covering.



Fig 6.2.4.4: Plastic Covering

Summary



- Troubleshooting is a systematic and sequential approach to solve problems, used to detect and resolve issues in a unit or a system.
- Prepare the troubleshooting log after collecting adequate background information.
- Observe how the readings in the meters / gauges and outcomes are affected by and are responding to the problem.
- Wooden products like plywood get damaged by water and humidity, and thus carpenter should be well aware of the troubleshooting steps.
- Hardware, as discussed earlier, refers to the hinges or the channels which are assembled to the furniture at the time of installation.
- Proper packing technique is essential to avoid any damage at the time of delivery of furniture.
- Veneering is the technique of fixing slices of wood together.
- Packing refers to the final packaging before delivery. After manufacturing, quality checking is performed.

-Activity



- The trainer divides the class into few groups. Each group selects an issue, explains its cause and suggests a tested remedy. This activity is called "Think and Share" session.
- The trainer takes the students to the laboratory and provides them with broken pieces of furniture. The students identify the defects in the furniture pieces by visually inspecting the same.
- In the laboratory, the students practise the process of packing the various components of an Upper cabinet.

Exercise



Fill in the Blanks with the correct option (in the braces):

1.	Visual Inspection eliminates chances of
	[Product Recall, Faults, Damages]
2.	does not fall under the scope of Visual Inspection.
	[Discolouration, Scratches, Delayed Delivery]
3.	is not an example of Stability and Usage Inspection.
	[Load Test, Impact Test, Viscosity Test]
4.	inspection is essential for checking the appropriate packaging of all pieces and modules to protect against abrasions and damages.
	[Aesthetic, Packaging, Quality]
5.	of faults and issues helps in avoiding wastage of money, time and manpower.
	[Early detection, Troubleshooting, Escalation]









7. Maintain work area tools and machines

Unit 7.1 Follow Safe Working Practices While at Work

Unit 7.2 Organizational Procedures for Safe Handling of Tools and Equipment

Unit 7.3 How to Respond to an Emergency Situation

Unit 7.4 Organizational Reporting Protocol

Unit 7.5 Various Types of Safety Signs and What They Mean

Unit 7.6 Deal With an Accident Which Involves Human Life

Unit 7.7 Different Types of Personal Protective Gear and Their Usage

Unit 7.8 Appropriate Basic First Aid Treatment Relevant to the Condition

Unit 7.9 Preventative and Remedial Actions to be Taken in the Case of Exposure to Toxic Materials

Unit 7.10 Maintain Appropriate Environment to Protect Stock from Pilfering, Theft, Damage and Deterioration



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Demonstrate how to follow safe working practices while at work
- 2. Discuss the organizational procedures for safe handling of tools and equipment
- 3. Discuss how to respond to an emergency situation
- 4. Recognize the organizational reporting protocol
- 5. Identify the various types of safety signs and what they mean
- 6. Recall how to deal with an accident which involve human life
- 7. Recall the different types of personal protective equipment and their use
- 8. Learn about the appropriate basic first aid treatment relevant to the condition
- 9. Illustrate how to apply the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials
- 10. Discuss how to maintain appropriate environment to protect stock from pilfering, theft, damage and deterioration

Unit 7.1 Follow Safe Working Practices While at Work

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Demonstrate the methods to follow safe working practices at all times
- 2. Demonstrate about the hazards likely to be encountered when conducting routine maintenance
- 3. Identify and discuss the maintenance procedures of tools, equipment and consumables as per manufacturer's instructions

7.1.1 Follow safe working practices at all times

Lead Assemblers for Modular Furniture may follow safe working practices by:

- · Working safely with all tools, tackles and equipment
- Using PPE appropriately and safely and storing and maintaining them, as instructed by the manufacturer
- Maintaining and storing tools and equipment in excellent working condition, according to organizational requirements and standards
- Checking all tools and the entire work area for possible hazards and risks, before starting with the task
- Conducting regular electrical inspections at the workplace by an experienced and licensed electrician
- Conducting frequent inspection of powered tools and equipment, by licensed electricians, preferably every month
- Replacing defective machinery and accessories with new ones, if deemed absolutely necessary
- Ensuring that the work area is absolutely free of clutter
- Reporting any spills to the housekeeping staff immediately
- Operating machines and equipment only with the safety guards and safety switch techniques in place
- Enforcing adequate and timely lock-out and tag-out mechanisms in powered tools and machinery
- Maintaining good ventilation and lighting conditions in the work area and reporting to concerned authorities if otherwise
- Keeping a fully equipped First Aid kit handy
- Abiding by safe ergonomic practices
- Ensuring that the power supply to all powered machinery, equipment and tools is disconnected while conducting troubleshooting, routine maintenance and repair / replacement operations
- Taking short breaks without hampering the schedule and productivity of the system
- Always abiding by safe housekeeping practices

7.1.2 Hazards Likely to be Encountered When Conducting Routine Maintenance

Preventive or Proactive Maintenance, commonly identified as Routine Maintenance, are subjected to few hazards, like:

- Electrical hazards from powered tools, while one is operating on them for checking and inspection
- Splinters, Dust and Debris during drilling holes or replacement of parts and accessories
- Working at heights, including working form hoisted cranes, trolleys and ladders, which can subject one to the risk of trips, falls and injuries
- Bumping with heavy items, like large loads and heavy machinery and tools
- Working with toxic fluxes and harmful chemicals during cleaning, repair and maintenance operations

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Unit 7.2 Organizational Procedures for Safe Handling of Tools and Equipment

Unit Objectives



At the end of this unit, you will be able to:

- 1. Comply with the organizational procedures to handle all required tools, machines, materials & equipment safely
- 2. Discuss the method to make use of the information detailed in specifications and instructions

7.2.1 Handle Tools and Equipment Safely

Every organization, where a Lead Assembler for Modular Furniture would work, has few predefined Standard Operating Procedures (SOPs) for the safe handling of the various tools and equipment. Adherence to these organizational procedures is extremely crucial for ensuring safety of the individual as well as others.

A. Safe Handling of Power Tools

Before Using

- O Appropriate measures should be taken to inspect the tool and the power supply. If the tool or any part / accessory is found defective, it must be either replaced immediately or removed from service and tagged appropriately as "Out of Service for Repair".
- Care should be taken that no defective tool must be used at any point of time.
- All repair and maintenance work must be accomplished by licensed and experienced persons.
- O Before operating Powered Tools, the Instruction Manual must be read thoroughly.
- O The guidelines and recommendations (by manufacturer) must be stringently followed, as per the Instruction Manual or Directions of Use.
- O The tools must be grounded adequately with the help of a three-pronged plug (equipped with relevant 3-wired colour coded cord) and double insulation. This helps in preventing electric shocks.
- All powered tools must be checked with a continuity tester or a Ground Fault Circuit Interrupter (GFCI), for effective grounding.
- O Powered tools must be switched off before connecting them to a power supply.
- O Powered tools must be switched off before connecting them to a power supply.

While Using

- O Issues, like a tool getting heated too soon or appearance of sparks, must be inspected and rectified by a licensed electrician only.
- All power cords must be kept clear of tools and the path along which the tool will operate.
- Approved extension cords, with proper specifications, power requirement (for the tool) and dimensions must be used, to prevent overheating and fraying of the cord.
- Outdoor work must be done with the help of outdoor extension cords labelled with "W-A" or "W".
- O Cords must be suspended over the work area to mitigate trips and falls.

- Octopus connections must be avoided by deploying a power bar or power distribution, comprising multiple receptacle plugs.
 - O While unplugging the tool from the socket, the plug must be pulled gently and not the cord. Forcibly pulling the cord leads to fraying and subsequent risk of electric shocks.
 - The entire work area must be kept dry and away from heat, sharp edges and oil, to avoid damage of insulation.
 - O Cords, instead of knots, may be looped, using a twist lock plug.
 - O Ensure to use Insulated tape for connecting wires and avoid using masking tape.

B. Safe Handling of Hand Tools

- The user must ensure that he / she is adequately trained in the secure usage of hand tools.
- Appropriate and accurate choice must be made on the right tool for the task.
- The user must deploy the correct techniques of handling and using the hand tools thus selected for the task.
- The user must operate hand tools by keeping the wrist straight.
- Hand tools must be thoroughly inspected before use and must be repaired immediately or replaced, whenever necessary.
- The user must ensure that handles of axes, hammers, saws and chisels must fit tightly into the head of the tool, to avoid accidental injuries.
- One must always pull on pliers or wrench.
- Worn jaws of pliers, pipe tools and wrenches must be replaced immediately.
- All hand tools must be kept in a robust toolbox, in a clean and dry place, away from the work area.
- While using hand tools, one must wear appropriate PPE, according to the types of hazards involved in the task. This includes protective gloves of appropriate material, heavy aprons, safety goggles and face shields.
- When not in use, sharp and cutting tools must be covered with appropriate sheaths to avoid injuries.

C. Adhere to relevant occupational safety policies while handling sharp tools to make and install furniture and fittings

Occupational Safety Policies, while handling sharp tools, can be implemented via the Hierarchy of Control:

- a. Elimination Removing the sharp tool hazard completely from the work area
- b. Substitution Replacing the sharp tool hazard with a comparatively less hazardous one
- c. Isolation Isolate the sharp tool hazard by controlling general access or guarding it
- **d. Engineering Control -** Redesign the sharp tool hazard to mitigate or remove the risk
- e. Administrative Control Encouraging safe working practices via policies, SOPs and training
- f. Sharps Management This includes the following:
 - Classifying the broken bits from sharp tools as "Sharps"
 - Disposing of sharps into appropriate Sharp container
 - Using appropriate PPE to safeguard oneself while handling sharp tools and broken bits

D. Perform basic safety checks before operation of all machines, tools and electrical equipment

A Lead Assembler must perform basic safety checks before operating all equipment as a part of the Standard Operating Procedures. Before starting with the basic safety checks, one must go through the Instruction Manual, Manufacturer's Recommendations and Directions of Use thoroughly. These documents are essential because one can find detailed and stepwise instructions about the maintenance and operating procedures as well as emergency shutdown and tag-out mechanisms in them. In case a machine or tool is marked with a lock or tag, it must not be removed and not used. Machines and tools, that are floor or bench-mounted, must be anchored or firmly clamped to a robust foundation, before maintenance operations. In case a machine does not have safety valves or guards on, one must not operate that for maintenance purpose. Check out for frayed out electric cables or loose live prongs in plugs. Ensure that power supply is off, before one starts maintenance operations.

7.2.2 The Health and Safety Implications Of Not Handling Tools Properly

The implications of Improper handling of tools and equipment are:

- Powered tools must never be carried by pulling the power cords.
- Powered tools must never be operated unless one is aware of the technique of use, the hazards and limitations involved.
- A running tool must never be left unattended. One must not leave behind a running powered tool, unless it has been duly switched off and disconnected from the power supply.
- Loose clothing, gloves, long hairdo and jewellery must never be worn while operating powered tools.
- Powered tools must never be exposed to wet conditions, unless they are properly earthed by GFCI.
- One must avoid tying the power cords into knots because knots may lead to short circuits and electric shocks.
- A 3-pronged plug, with the 3rd prong broken, must never be used.
- Extension Cords must never be used as permanent wiring.
- Powered tools must never be operated in an area comprising explosive gases or vapors.
- Powered tools must never be cleaned with flammable agents.
- One must never attempt to catch a falling hand tool.
- Excessive force or undue pressure must never be imposed on hand tools.
- The job or work piece must never be handheld while using a screwdriver or any cutting tool.
- Sharp tools must never be carried in one's pocket.
- No hand tool must be used for electrical work, unless it is specially designed and adequately insulated for doing so.
- Bulky and heavy gloves must never be worn while using hand tools.
- · Hand tools must never be thrown.
- Hand tools must never be left on high platforms and elevated places like ladders and scaffolding, because bumping against such structures may cause the tools to fall on someone and cause fatal injuries.

7.2.3 Method to make use of the information detailed in specifications and instructions

A Lead Installer must read thoroughly the specification sheet to obtain concrete information on the following:

- The Table of Contents, as the name suggests, briefs the reader / user about what information does the specifications comprise
- The name, address and contact details of authorized experts, who are responsible for preparing the specifications, deviations and updates
- The significance, scope and purpose of the specification
- The intended use of the specification
- Glossary of important terms and abbreviations
- Test methods for measuring all specified characteristics
- Material requirements in terms of rate and quantity, targets and tolerances
- Drawings, sketches, photographs and illustrations
- Safety requirements and guidelines / instructions on the same
- Quality Control and Assurance standards, requirements and performance testing criteria
- Expected TAT / deadline for delivery of the project
- Rejection, inspection and correction provisions
- Relevant annexes and appendices

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Unit 7.3 How to Respond to an Emergency Situation

- Unit Objectives



At the end of this unit, you will be able to:

1. Explain the procedure of responding to an emergency situation

How to Respond to an Emergency Situation

An Emergency can be defined as "a serious, unexpected, and often dangerous situation requiring immediate action." Responding to an Emergency situation, while working at the site, involves the following steps:

A. Evaluating the Emergency

- One must remain calm and composed during an emergency situation because stress during an emergency complicates things and confuses a person.
- One must critically and rationally think and evaluate the severity of the emergency and determine, what requires to be done on immediate basis.
- One must look for additional help by calling up the emergency toll free number, which would help the caller reach an official or 'dispatcher'.
- The emergency dispatcher aims at providing immediate and appropriate help, depending on the nature and degree of emergency.
- One must help the dispatcher by answering his / her questions and providing the dispatcher with the accurate location and nature of emergency.
- It is recommended that one should call from a GPS equipped phone, so that the dispatcher is able to track the location, even if the caller is unable to speak.
- One must determine the nature of the emergency, i.e. if it is a medical, mental health or behavioural emergency.
- One must assess the immediate threats, for example, in case a person is severely injured from a running machine, the machine must be turned off immediately to prevent others from getting hurt as well.

B. Handling the Emergency

- Extremely high casualties must be reported to the Occupational Health and Safety Committee (OHSC).
- One must move farther from the emergency spot and help others do the same.
- Evacuation Plans must be adopted and Escape Routes must be taken.
- Secondary Hazards must be eliminated or mitigated, at least. For example, a car accident involves the risk of a violent explosion and fire outbreak resulting from spilled fuel.
- One must help the other victims and take appropriate measures to help the specially abled ones.
- One must never feel guilty if nothing can be done to help the others.
- Once the emergency team arrives, it must be provided with all required and relevant information.
- In case nothing can be done to mitigate the severity of the situation, one must provide support to the others by comforting them, inquiring about their medical history, noting events as they occur, etc. These information may prove crucial for the emergency response team.
- A First Aid kit must be used, wherever applicable.

- One must try reviving a seemingly unconscious victim by rubbing the chest, pinching the earlobes, providing Cardiopulmonary Resuscitation (combination of chest compression and artificial respiration)
 - One must avoid moving a severely injured victim and provide only the basic first aids.
 - Only the emergency services can properly handle and move such victims.

C. Undertake first aid activities in case of any accident, if required and asked to do so

- First Aid is an emergency care or treatment given to an ill or injured person before regular medical aid can be obtained.
- Before administering First Aid to a victim, one must check the category and degree of emergency and then apply the techniques duly.
- Stop and look at the scene and the person before responding.
- Ask yourself the following questions:
 - O Is the scene safe for you to enter?
 - O What happened exactly?
 - O What is the casualty?
 - O What is the category and nature of the emergency?
 - O Is the accident fatal for the victim?
 - O Is anyone else available at the place to help?
- Do the following if the victim is conscious and injury is not fatal:
 - O Ask for the victim's consent to administer first aid.
 - O Put on appropriate PPE, if possible.
 - O Interview the victim to ask basic medical questions, so that accurate information may be provided to the Emergency Medical Team, once it arrives.
 - O Conduct a thorough check for undetected injuries.
 - O Administer appropriate care and technique.
- If the victim is unconscious, try reviving the person by addressing him / her, rubbing shoulders, hands or the sole of feet.
- Fetch the AED and use it, along with Artificial Respiration.

D. List of names (and job titles if applicable), and the contact details of all the people responsible for health and safety in a workplace

- As an important part of the emergency management procedure, any workplace must elect a Safety Committee, which comprise responsible and senior people from all departments and teams.
- This committee would act as the legislative body, the authority and the first point of contact for reporting any hazard, potential risks / threats and emergency situations at the entire workplace.
- This committee would also be responsible for conducting training sessions, safety audits and drills, to help all employees prepare themselves for emergency and unprecedented situations.
- The list of the committee members, their designations and job titles, as well as contact numbers must be listed and circulated among all staff members.
- The Safety Committee must comprise important members from the following departments:
 - O Supervisor / Manager / Team Lead from each project
 - O Security Services
 - O Reception / Front Desk
 - O Building Operations and Maintenance team

O Emergency Medical Services

- O Counseling and Psychological Services team
- This list must be put up for easy display at prominent parts of the workplace, in the form of an Emergency Escalation Matrix and must be updated regularly.
- Furthermore, this list must be mandatorily included in every First Aid kit available in the workplace premises, so that a person treating a victim with first aid techniques may summon additional help and report the accident.

Few Emergency Toll-free numbers are:

100	Police
101	Fire
101	
102	Ambulance
108	Disaster Management
181	Women's Helpline
1097	AIDS Helpline
1098	Child Abuse Helpline

E. Follow agreed work location procedures in the event of an emergency or an accident

- Emergency procedures and related protocols vary according to the work locations and the nature of work.
- A worker must abide by the agreed work location procedures, in case of emergencies and accidents.
- A worker, on joining, must be adequately briefed on the Occupational Health Hazards and the procedures to deal with the same.
- All agreed work location procedures must be standardized and laid down under Standard Operating procedures, commonly known as SOPs, for general access.
- Each case of emergency and accident must be reported appropriately, to concerned authority, by filling up relevant forms.
- Usage of First Aid kit and Fire Extinguishers must be reported to concerned authority after each use
- Any incident of an unlabelled chemical bottle, or waste container, or illegible label, must be reported to the Supervisor or concerned authority immediately.

F. Respond promptly and appropriately to an accident situation or medical emergency

- One must respond to an accident or emergency situation with a calm and composed mind. Presence of mind is very crucial under such circumstances.
- Medical help must be sought by calling the in-house medical team (if any), the Safety Committee, or the Emergency toll-free number.
- Appropriate first aid treatment must be administered to anyone in need, by a trained person / colleague.
- In case a victim cannot be adequately treated by first aid, and the emergency team is yet to arrive on the spot, the victim must be taken to the emergency ward of the nearest hospital.
- Ambulance services may be summoned by calling up the toll-free number for the same.

- The Environmental Health and Safety (EHS) department must be notified about the accident within 48 hours of the Supervisor being informed.
 - Care should be taken that a seriously injured victim must not be moved and one must wait for the emergency team to arrive.

G. Participate in emergency procedures

- Raising Alarm: Fire Alarms can either have a "Break Glass" or a "Pull / Push" mechanism. In the "Break Glass" system, the glass sheet must be forcefully hit with clenched fist. One must repeat the process till the glass breaks. In the "Pull / Push" systems, one must smash the glass first and then either pull down or push up the lever to raise the alarm.
- Safe and efficient evacuation: Appropriate evacuation procedures (already discussed in the previous chapter) must be adopted for general public and for specially abled persons. Specially abled persons must be helped to evacuate the place by providing them access to Wheelchairs and other aids.
- **Correct Assembly Point:** Proper instructions must be given to the workers about the location of and the directions to the correct assembly point in the workplace. Information about this must be provided during mock evacuation drills and training sessions as well.
- **Roll call:** Once everybody has evacuated the building / workshop and arrived at the Assembly Point, Roll call or Head Count must be done to ensure that nobody is left behind in the affected area. This must be done mandatorily to ensure that everybody within the premises is safe.
- Correct return to work: Evacuation must be conducted in a very organized, streamlined and
 noiseless manner. Likewise, everybody, who had evacuated the workplace, must return to his / her
 respective locations / positions / seats, following normal or emergency routes, depending on
 whether the situation has been restored to normal or not. Once everybody is back in place,
 another Roll call is conducted.

H. State methods of accident prevention in the work environment

One must stay aware and updated about the various methods of accident prevention in the work environment. Few of these are:

- Training in health and safety procedures One must be trained in the industrial health and safety procedures through drills and training sessions. Apart from the procedures popular in the industry, every organization has its own set of procedures and protocols, laid down and standardized in the form of Standard Operating Procedures (SOPs).
- **Using health and safety procedures -** Ergonomic practices, use of PPE, hygiene and importance of good housekeeping practices must be promoted among workers.
- Use of equipment and working practices- Proper use, storage and maintenance of PPE, as well as
 medically recommended lifting, carrying and transporting practices must be taught and promoted
 among workers.
- Safety notices, advice and instructions from colleagues and supervisors- Workers must always keep their eyes open, so that they do not miss out safety notices, advice and instructions being circulated around them. Such safety notices, plans and instructions are often displayed for general public access at prominent and common places at workplace.

I. Check and ensure general health and safety equipment are available at work site

Workers must ensure the availability of general and safety equipment like Fire extinguishers, First aid equipment, safety instruments and clothing (Personal Protective Equipment) as well as safety installations like neon-enabled and glowing fire exits, exhaust fans, etc. All such equipment must be in good operating condition and must be periodically maintained.

J. Comply with restrictions imposed on harmful chemicals inside work area during working hours

Few hazardous chemicals in the workplace are recommended for restricted and expert use only. These chemicals must be stored in cool, dry and clean storage locations, in containers made of compatible materials and labelled with relevant Directions of Use, Precautionary Measures, Ingredients and Hazard Warnings.

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Unit 7.4 Organizational Reporting Protocol

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Gain knowledge on the 6Cs of Reporting Protocol
- 2. Identify and report any hazards and potential risks/ threats to supervisors or other authorized personnel
- 3. Report accident/incident report to authorized person

7.4.1 The 6Cs of Reporting Protocol

The general highlights of the Organizational Reporting Protocol, commonly known as the 6Cs, are:

- **1. Communicate First -** The first source of information during emergency is the preferred source. Crises are time-bound and hence it is important to communicate promptly.
- **2. Communicate Rightly -** Distortion of information due to panic must be avoided. Proper, accurate information must be provided to concerned authorities and this can save lives.
- 3. Communicate Credibly Integrity and truthfulness must never be forgotten during emergencies.
- **4. Communicate empathetically -** One must wear the shoes of the victims while communicating emergencies.
- **5. Communicate to instigate appropriate action -** Communicating to the right authorities help in taking the necessary action.
- **6. Communicate to promote respect -** Communicating with the victims with respect help in earning their trust and thus eases the disaster management process.

7.4.2 Identify and Report any Hazards and Potential Risks / Threats to Supervisors or other Authorized Personnel

Hazards and potential risks / threats can be identified and then reported to supervisors or other authorized persons in the following ways:

Verbal report to supervisor or authorized persons

Filling up and presenting a Hazard Report form Discussing the issue at a staff meeting

Fig. 7.4.2.1: The process of reporting a hazard or potential risk

While identifying and reporting a hazard / potential threat / potential risk, one must describe the following:



Fig. 7.4.2.2: The 4 aspects to be considered while identifying and reporting a hazard

7.4.3 Report accident/incident report to authorized person

Reporting an accident / incident to an authorized person can be best done with the help of the Hazard Reporting form. The common format of the Hazard Reporting form is given below:

Part A: To be completed by the Worker

Details Required:

- Name of Worker
- Designation
- Date of filling up the form
- Time of incident / accident
- Supervisor / Manager Name
- Work Location / Address
- Description of the hazard / what happened (Includes area, task, equipment, tools and people involved)
- Possible solutions to prevent recurrence (Suggestions)

Part B: To be completed by the Supervisor / Manager

Details Required: Results of Investigation (Comment on if the hazard is severe enough to cause an injury and mention the causes of the incident / accident)

• Part C: To be completed by the Supervisor / Manager

Details Required: Actions taken / Measures adopted (Identify and devise actions to prevent further injury, illness and casualty)

Action	Responsibility	Completion Date

- Notes			
Notes			

Unit 7.5 Various Types of Safety Signs and What They Mean

- Unit Objectives



At the end of this unit, you will be able to:

1. Identify and interpret the various safety signs

Various Types of Safety Signs and What They Mean

Safety Signs are aimed at alerting people on the existing hazards and imminent risks involved with them. The various safety signs are given below:

Emergency escape route signs: to display emergency exits

Fire equipment safety signs: to indicate the location of fire equipment and convey compliance with fire precaution regulations

Prohibition safety signs: to indicate prohibited actions

Supplementary safety signs: to indicate additional information to be followed by employees

Safety equipment signs: to emphasize on the protective equipment to be worn

1. Prohibition Signs

Image	Significance
	This is a sign to signify "No access for unauthorized person(s)" beyond a particular point
	This is a sign which indicates "Smoking and Naked Flaming" is disallowed in that particular area

Image	Significance
	This is a "No Smoking" sign. No one should smoke in an area where this signboard is put up by the authority.
	This sign symbolizes "No pedestrian is allowed beyond this point".
	This symbol refers to the water which is not drinkable. The symbol, in short, implies "Not Drinkable Water".
NEWS TO SEE SEE SEE SEE SEE SEE SEE SEE SEE SE	There are different classes of fire and each class of fire requires different extinguisher. The class of fire which are not extinguishable by water is denoted by this sign which signifies "Do not extinguished with water".

2. Warning Signs

Image	Significance
	This symbol signifies "High Temperature or Flammable Materials".
	This particular symbol refers to the materials which are potential explosive. This symbol is called "Explosive Material" symbol.
	This is a symbol which is labelled on "Toxic Materials" as a precaution.
	This symbol refers to the substances which are corrosive and harmful to us. It damages the skin severely. This sign is embalmed on "Corrosive Materials".

Image	Significance
	This is a sign to signify the "Radioactive Materials". Radioactive materials are very harmful and can even cause death.
	This is "Overhead Load" symbol. In case of overloaded box/crane/ crate, this sign is used.
	This sign refers to "Industrial Vehicle". The vehicles which are used only for the industrial purposes (for example transportation of goods) are labelled with the "Industrial Vehicle" symbol.
	This sign implies to "Electricity Danger". In case of high voltage, this sign is commonly used to beware the passers-by/ users/ workers.
	This is a "General Danger" sign. In case of "work in progress"/ "men at work", this symbol is used.

Image	Significance
	This is a sign to denote "Laser Beam Danger". Laser beams are harmful for us and exposure to laser beams may cause blindness.
	This sign refers to "Danger Drop". If a landing/ floor abruptly ends or in case of low height of balcony wall/ grill, this sign is used.
<u></u>	If there is any obstacle laid on the floor, the "Obstacle Ahead" sign is used.

3. Mandatory Signs

Here is a table of signs which are commonly used as a precaution for the workers. The utility of the signs are described in the "Significance" column beside the images.

Image	Significance
	Eye protection must be worn

Image	Significance
	Safety helmet must be worn
	Ear protection must be worn
	Respiratory equipment must be worn
	Safety boots must be worn
	Safety gloves must be worn

Image	Significance
	Safety harness must be worn
	Face protection must be worn
	Safety overalls must be worn

4. Emergency Escape Signs

There are certain situations which are considered to be emergency situations. Fire, earthquake, flood, tsunami, civilian disturbance, riot, bomb threat are the examples of emergency situations. In these cases, people are prone to panicking. However, panic deteriorates the situation. Therefore, every organization plans for emergency evacuation. At the time of emergency, workers should adjourn at the safe evacuation place. There are different signs (directions) used to guide the employees to safe place. The signs used for this purpose are as follows:



Fig 7.5.1: Go to the left for safe evacuation



Fig 7.5.2: Go to the right for safe evacuation



Fig 7.5.3: Go down for safe evacuation



Fig 7.5.4: Go up for safe evacuation

5. First Aid Signs

In every organization, first aid is a mandatory. Especially, in the organizations that deal with different types of hand and power tools, first aid is a compulsory. In the following table, the symbols and their significance are discussed.

Significance are discussed.			
Image	Significance		
	This is a general symbol for first aid. Generally, this sign is used to denote first aid room, first aid box.		
+	This is the "First Aid Stretcher" symbol. In case of accidents, where the victim is unable to stand up on feet and walk, first aid stretcher is used.		
	This symbol signifies "Eye wash".		
	This is a "Safety Shower" sign.		
	This is the "Emergency Telephone" sign. In case of accidents, when the first aid is required on an immediate basis, this telephone is used.		

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Unit 7.6 Deal With an Accident Which Involves Human Life

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss how to deal with accidents that involve human life

How to Deal With an Accident Which Involves Human Life

An accident, that may lead to the loss of human life, falls under the "Critical" and "Possible" categories of the Risk Assessment Matrix, as mentioned in section 3.2.2. Thus, considering the degree of severity, one may follow the below steps while dealing with an accident that involves the loss of human life:

- Turn off and stall the source of the accident. For example, in case a severe accident has occurred due to a running machine, the machine must be turned off and stopped first, to prevent other people from getting injured in the same manner.
- One must not panic and not allow anybody else to panic at the scene. Maintaining a calm and composed attitude is extremely crucial for bystanders.
- One must assess the severity of the accident and promptly decide if emergency services must be summoned.
- One must look over the accident scene carefully, to gather information for the emergency services personnel.
- One must take initiatives to keep the accident spot clear, so that the victim/s are not asphyxiated with lack of breathing air. Alarms may be raised, if possible, to notify and warn everyone else at the work area about the accident.
- Before approaching the victim for extending help and support, one must ensure that the spot and the victim's body is safe for one to touch and access. For example, in case of electrocution, the main power supply must be switched off before touching the victim's body.
- A seemingly unconscious victim may be revived to consciousness by rubbing the chest, artificial respiration or pinching the earlobes.
- Such a victim must be asked if he / she requires any assistance.
- One must provide the best possible assistance to the victim, before summoning emergency services.
- The victim must not be removed from the spot (unless there are imminent dangers like fire or electrocution) before the arrival of the emergency team.
- The legs of a victim in shock must be raised to mitigate the impact.
- One must use encouraging and comforting words to help the victim in reviving.

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Unit 7.7 Different Types of Personal Protective Gear and Their Usage

Unit Objectives



At the end of this unit, you will be able to:

1. Identify the different types of PPE and discuss their use

Different types of Personal Protective Gear and their usage

Personal Protective Equipment, commonly termed as PPE, is specialized clothing or equipment worn and used by employees for safeguarding themselves against Occupational Health and Safety hazards. Such clothing are aimed at protecting different parts of the body, like hands, eyes, ears, face, feet, head, etc.

Here is a table of personal protective equipment that are widely used.

- Hand Gloves Used for protecting the hands from harmful and corrosive chemicals, extreme temperatures, sharp and contaminated objects. For example, Nitrile gloves are used for protecting the hands against solvents, oils, greases, tar, acids and alkalis. Gloves made of natural rubber or Latex are used for protection against contaminations and biohazard risks. Asbestos gloves are worn while dealing with extremely hot materials.
- **Safety Shoes** These are made of highly durable and robust material and protect the feet from injuries due to cuts and bruises.
- Safety Goggles These protect the eyes from harmful radiation, dust particles and splinters.
- Masks and Face Shields- These are worn especially during welding, gas cutting and brazing
 operations, in order to protect the face from direct flame, extreme temperatures, dust particles and
 splinters.
- Apron This protects the clothes from dust and other impurities. These are often heat-resistant and anti-abrasive in nature.
- **Ear Muffs** These are used in extremely noisy places like factories and workshops, in order to protect the ears from deafening.
- **Respirators** These masks, if of the FFP3 (Filtering Face Piece Grade-3) specification, allow a maximum air pollutant leakage of 5% only and filter 99% of all particles measuring up to 0.6 µm.

Name	Function	Image
Head Protection Safety Helmet)	 Head injury can impair a worker for the lifetime. Wearing safety helmet is the easiest way to avoid such situations. Safety helmet is used to – Protect head from falling objects and knocks Reduce risk of head bumping against fixed objects like exposed pipes and beams Protect head from accidental electrical hazards Safety helmet comes in different forms. Some helmets include other protective 	Safety Helmet
	elements such as goggles, earmuffs attached to it. Safety helmet should be worn on the head, not on any hat or cap.	
Eye Protection	Eye is one of the most sensitive organs of the body. Woodwork is a job which comes with various hazards related to eye damage. For example, saw dust, small pieces of sharp objects may cause damage to the eye. Therefore, eye protection must be used. Some widely used eye protection are—	
	Safety Goggle	Safety Goggle
	Safety Spectacle	1
	Facemask	
	These protections should be worn to avoid any damage owing to wood dust, metal chips in the process of sawing, drilling, grinding, and chiselling.	Safety Spectacle
		To the same of the
		Facemask

Name	Function	lmage			
Hearing Protection	Woodworking machines such as drilling machine, circular saw, and jigsaw create a lot of noise. Short exposure to the noise may cause temporary hearing loss and long exposure may lead to permanent hearing loss. Therefore, hearing protection is an essential PPE for a wood worker. Some important hearing protection are—				
	Single Use Earplug: They are made of waxed cotton, foam, silicon rubber or fibre glass wool. They are self- forming and, when properly inserted they work as well as most modelled earplugs.				
	Pre-formed or Modelled Earplugs: These are small fibre plugs that are inserted to the ear and used in case of severe noise. They can be either disposable or reusable. Reusable plugs should be cleaned after using. Never use plugs which are used by somebody else.	Pre-formed or Modelled Earplug			
	Ear Defender or Earmuff: These are used to cover the entire ear and connected to a band that fits over the top of the head. These are used when the noise is excessively high.	Ear Defender or Earmuff			
Hand Gloves	These are used for protecting the hands from harmful and corrosive chemicals, extreme temperatures, sharp and contaminated objects. For example, Nitrile gloves are used for protecting the hands against solvents, oils, greases, tar, acids and alkalis. Gloves made of natural rubber or Latex are used for protection against contaminations and biohazard risks. Asbestos gloves are worn while dealing with extremely hot materials.	Hand Gloves			

Name	Function	Image
Safety Shoes	Wood workers, who face possible foot or leg injuries from the falling or rolling objects or from crushing or penetrating materials, should wear protective footwear.	
	Safety shoes are used to protect the feet from heavy objects, such as tools that might roll onto or fall on the workers' feet	C. C. C.
	 It is also used while working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes 	Safety Shoes
	It also protects feet from hot, wet or slippery objects	

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Unit 7.8 Appropriate Basic First Aid Treatment Relevant to the Condition

Unit Objectives



At the end of this unit, you will be able to:

1. Recall the importance of first aid in emergency management and the techniques of administering the same

Principles of First Aid

- · Act calmly and logically.
- Be in control both of yourself and the problem.
- Be gentle but firm.
- Speak to the casualty kindly but purposefully.
- Build up trust through talking to the casualty throughout the examination and treatment.
- Avoid giving any misleading information.
- Never leave the casualty alone and continue to talk to him/her until the ambulance or doctor arrives.
- Continuously reassure the casualty.
- Send the casualty to a hospital or doctor by the quickest means of transport.
- Always inform the police about serious accidents.
- Inform relatives of the casualty.

Objectives of First Aid

- Preservation of life by promptness of action
- Relief from pain
- · Prevention of the worsening of illness or injury
- Enhancement of chances of recovery
- Protection of the unconscious or semi-conscious

Appropriate Basic First Aid Treatment Relevant to the Condition

Importance of FirstAid in emergency management can be elaborated through the following points:

A. For heavy bleeding -

- Put pressure on the wound with whatever is available to stop or slow down the flow of blood.
- As soon as possible, call the Emergency Toll Free number or get someone else to do it.
- Keep pressure on the wound until help arrives.



Fig 7.8.1: Treating heavy bleeding (put pressure on the wound)

B. For burns-

- Cool the burn under cold running water for at least ten minutes.
- Loosely cover the burn with cling film or a clean plastic bag.
- Call and summon the Emergency Services if needed.



Fig 7.8.2: Treating burns (cool the burn under cold running water)

C. For broken bones-

- Encourage the person to support the injury with their hand, or use a cushion or items of clothing to prevent unnecessary movement.
- Continue supporting the injury until help arrives.
- Call and summon the Emergency Services if needed.



Fig 7.8.3: Treating broken bones (use a cushion to heal the fracture)

D. For Heart Attack / Stroke -

- Think FAST. Face: is there weakness on one side of the face? Arms: can they raise both arms? Speech: is their speech easily understood? Time: to call Emergency helpline.
- Provide CPR (Cardiopulmonary resuscitation) as applicable.
- Immediately call medical/ambulance helpline or get someone else to do it.



Fig 7.8.4: Cardiopulmonary Resuscitation

E. For Head Injury -

- Ask the victim to rest and apply a cold compress to the injury (e.g. ice bag).
- If the victim becomes drowsy or vomit, call Medical helpline or get someone else to do it.
- Call and summon the Emergency Services if needed.



Fig 7.8.5: Apply a cold compress to the injury

F. For Electric Shocks -

- Switch Off the Main Power Supply immediately
- Free the victim of his clothes
- Give artificial respiration and oxygen if needed
- In case of Burns, apply ice and burn cream and rush to the hospital depending on the severity of the burn
- Call and summon the Emergency Services if needed.



Fig 7.8.6: Do not touch the victim of a electric shock directly, use non-conducting materials

G. For Eye Injuries -

- In case of chemical exposure, the eyes must not be rubbed. Instead, the eyes must be washed with lots of water. If the irritation / pain does not subside even after flushing the eyes continuously for 15-20 minutes, medical help must be sought.
- In case of a blow to the eye, the injured eye must be treated with a cold compress, without imparting any pressure to it.
- If the pain persists, accompanied with bleeding, bruising or impaired vision, one must seek medical help immediately.
- In case of a foreign particle in the eye, it must not be rubbed. Instead, the upper lid must be pulled down and blinking must be repeated, very briskly.
- One must rinse the affected eye with an eyewash, if the foreign particle persists.
- If pain persists even after rinsing, the eye must be closed gently, bandaged lightly and medical help must be sought.



Fig 7.8.7: Wash the injured eye cleanly and use proper eye rinsing elements

The essential contents of a First Aid Kit are:

- Basic first aid notes
- Disposable gloves
- Resuscitation mask
- Individually wrapped sterile adhesive dressings
- Sterile eye pads (packet)
- Sterile coverings for serious wounds
- Triangular bandages
- · Safety pins
- Small, medium and large sterile non-medicated wound dressings
- Non-allergenic tape
- Rubber thread or crepe bandage
- Scissors
- Tweezers
- Suitable book for recording details of first aid provided
- Sterile saline solution
- Plastic bags for disposal
- The name and telephone number of workplace first aid officers, and the phone number and address of the emergency services should be either in or near each first aid kit
- Reusable items, like scissors and tweezers, need to be thoroughly cleaned using warm soapy water or an alcohol swab after each use.



Fig 7.8.8: Essential first aid item

Besides these, adequate and medically prescribed Oxygen supply must be help in hand at the workplace.

Unit 7.9 Preventative and Remedial Actions to be Taken in the Case of Exposure to Toxic Materials

Unit Objectives



At the end of this unit, you will be able to:

1. Discuss the preventative and remedial actions to be administered in cases of exposure to toxic materials

Preventative and Remedial Actions to be Taken in the Case of Exposure to Toxic Materials

A. Toxic Solvents

A Lead Assembler of Modular Furniture is often exposed to toxic solvents like acetone, chloroform, gasoline, carbon tetrachloride, diethyl ether, ethyl alcohol and methyl (ethanol), toluene, benzene, ethers, trichlorethylene, dichloroethane, tricresyl phosphate, nitroparaffins, tetralin, decalin, etc. Exposure of the body to toxic solvents can be via Ingestion, Skin Contact and Inhalation.

The more volatile a toxic solvent is, the higher are its chances of poisoning the respiratory system. Apart from administering appropriate first aid techniques, one must seek medical help and report the concerned supervisor.

Remedial actions for exposure to toxic solvents:

- In case of inhalation of toxic solvents or resulting fumes, moving the victim to fresh air immediately, thus exposing the person to adequate oxygen supply.
- In case of skin contact with toxic solvents, the affected area must be washed thoroughly with lukewarm water and soap.
- In case of ingestion, vomiting must be instigated and the stomach must be washed.
- Activated charcoal may be administered in case of ingestion and inhalation.
- In case the eye is affected, it must be splashed and rinsed off with cold water till the effect subsides.

Preventative actions for exposure to toxic solvents:

- Appropriate PPE, like protective chemical-resistant gloves, respiratory masks (for protection against toxic fumes), aprons, etc. must be worn.
- Initiatives must be taken to provide adequate ventilation to the work area.
- Any spillage of toxic chemicals must be wiped off immediately with wet cloth.
- The containers must be closed tightly after every use, to prevent spillage or leakage of fumes.
- Solvents must be kept away from naked flames, in a cool and dark place.
- All solvents must be stored in neatly labelled containers and provided with MSDS (Material Safety Data Sheets).

B. Toxic Flux

Flux is an agent for chemical cleaning, purifying or flowing. Fluxes are extensively used in extractive metallurgy, furniture manufacture and metal joining techniques. Few common fluxes are Beeswax, Lead, Paraffin Wax, Borax, resin, Palm Oil, Cryolite, Unslaked Lime, Common Salt, Solder, etc.

The most toxic fluxes are Acid fluxes (which may comprise harmful agents like Hydrochloric acid, Ammonium chloride, Zinc chloride, etc.), Resin fluxes (which may lead to Asthma), Molten Solder fluxes (which can cause severe burns on the skin), Lead and Mercury fluxes (which are very easily absorbed by the body and cause countless health issues and even death).

Remedial actions for exposure to toxic fluxes:

- The victim must be carefully removed from the exposure area, to a well-ventilated place.
- In case of skin contact or eye injury with toxic fluxes, the affected area must be washed thoroughly with generous amount of water for at least 15-20 minutes.
- In case of ingestion, vomiting must not be induced unless prescribed by a physician.
- Ingestion must be treated with a drink of cold water or milk.
- In case of inhalation, adequate breathing support must be provided to the victim.
- Washing of the skin and the eye must be followed by a suitable skin or eye ointment.
- In case of difficulty in swallowing and unconsciousness in the victim, no oral remedy must be administered to prevent choking.
- Medical help must be summoned in case of severity.

Preventative actions for exposure to toxic fluxes:

- Appropriate PPE must be used while working with toxic fluxes.
- The Directions of Use provided by the supplier / manufacturer must be strictly abided by.

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Unit 7.10 Maintain Appropriate Environment to Protect Stock from Pilfering, Theft, Damage and Deterioration

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify risks like theft, pilfering, damage and deterioration in the workshop
- 2. Identify methods of surveillance that helps in maintaining appropriate environment to protect stock against such risks
- 3. Illustrate how to maintain a clean and hazard-free working area

7.10.1 Theft, Pilfering, Damage and Deterioration in the Workshop

Any workshop is comprised of raw material, countless tools, equipment, heavy machinery, cleaning equipment, PPE, documents, cash and several other important properties. A workshop and its security is threatened by the following factors, which can be mitigated and even eliminated with the help of apt surveillance processes:

- **Theft** Apart from raw materials, deliverable Finished Products, tool, machinery and equipment, important documents like database, manuals and blueprints, which are considered the Intellectual properties of the workshop, are exposed to the risk of theft.
- **Pilfering** Pilfering involves the theft of items, which are of comparatively lesser importance, in terms of cost and utility. For example, theft of petty cash, stationery items, tiny machine parts, screws, nails, adhesives, etc. is considered Pilfering.
- **Damage and Deterioration** Properties in a workshop may be damage and get deteriorated due to multiple factors. These factors can be natural or man-made. For example, cases of Sabotage and Vandalism are brought about by human miscreants.

Damages and deterioration can occur naturally, over time, due to wear and tear of tools, equipment and products, as well as poor inventory management. Man-made factors can be unintentional and may occur due to human errors and fatigue.

7.10.2 Methods of Surveillance and Monitoring

The common methods of Surveillance and Monitoring are:

- Closed Circuit Television (CCTV) Camera
- Security Guards at the entrance and exit
- Access Control for workshop database and Intellectual Property
- Biometric Access (Fingerprint Access) for visitors and staff members
- Handheld Metal Detectors (used by Security Guards)
- Checking ID cards manually and Frisking
- Quality Inspection and Audit for checking deterioration and damage of equipment, raw materials and finished products

7.10.3 Maintain a Clean and Hazard Free Working Area

A. Handle materials, machinery, equipment and tools safely and correctly

- Workers should never carry tools up or down a ladder in a way that inhibits grip.
- Tools should be hoisted up and down using a bucket or strong bag, rather than being carried by the worker.
- Tools should be carefully handed over from one worker to another and must never be tossed. Pointed tools should be passed either in their carrier or with the handles toward the receiver.
- Workers carrying large tools or equipment on their shoulders should stay alert of clearances, while turning and manoeuvring around the workplace.
- Pointed tools, such as chisels and screwdrivers, should never be carried in a worker's pocket. Recommended ways to carry them are:
- In a toolbox, pointed down in a tool belt or pocket tool pouch
- In the hand with the tip always held away from the body
- Tools should be put away when not in use. Leaving tools unattended on an elevated structure such as a scaffold poses a significant risk to workers below. This risk increases in areas with heavy vibration.

B. Use correct handling procedures

- Lack of knowledge in correct handling procedure can lead to Musculoskeletal Disorders. Handling involves lifting, lowering, pushing, pulling and carrying. Correct handling techniques involve:
- Lifting, by taking into consideration:
 - Nature of load
 - O Individual capacity
 - O Environmental condition
- Reduce the amount of twisting and stooping while handling things manually
- Do not lift from floor level or above shoulder height, especially for heavy loads
- Adjust storage areas to mitigate the need to execute such motions
- Consider how you can mitigate transporting load across distances
- Evaluate the weight to be carried and identify if the worker can move the load safely or needs assistance
- Identify if the load can be broken down into smaller, lighter components

C. Maintain tools equipment and consumables

- It is essential that in order to keep tools, equipment and consumables in good working condition, they must be subjected to periodic maintenance.
- The frequency of maintenance depends upon the following factors:
 - O The manufacturer's instructions and recommendations
 - O The intensity and degree of use
 - O The physical working conditions like temperature, humidity, weathering, etc.
 - O The severity of potential risks and threats arising from unprecedented but likely malfunction

D. Use cleaning equipment and methods appropriate for the work to be carried out

- Cleaning tools and equipment must be selected according to the nature of task, surface and the required intensity of cleaning.
- Delicate surfaces must not be treated with strong and corrosive cleaning agents like acids and alkalis.
- On the contrary, surfaces that require intensive cleaning cannot be treated with mild cleaning agents.
- Cleaning equipment, especially the powered ones, come with Instruction Manuals, which not only explain the steps involved in using the, but also comprise Precautionary Measures, Dos and Don'ts of handling them. For example, Vacuum Cleaners must never be used on wet surfaces.

E. Ensure safe and correct handling of materials, equipment and tools

- Supervisors must inspect the ongoing tasks in the work area to ensure safe and correct handling of materials, equipment and tools.
- Surprise Audits must be conducted from time to time to ensure that all safety measures, like ergonomic procedures and safe handling of powered tools, are being adhered to by the workers.
- Checklists and inspection sheets must be maintained at the workplace to keep a track of the maintenance and audit schedules.
- Workers must refer to SOPs from time to time, to ensure that they do not deviate from the safety protocols in handling materials, equipment and tools.

F. Store cleaning equipment safely after use

- Cleaning tool and agents, which fall under the same category, must be kept and stored together.
- Cleaning agents must be stored in a cool, dry place in containers of compatible materials.
- Flammable liquids and gases must be stored in pressure-safe containers with appropriate labels on.
- Such flammable substances must be stored in secluded and well-ventilated places, at least 50 feet away from sources of heat or flame.
- Places for storing chemicals must contain a book of all MSDS sheets.
- Chemical cleaning agents must be stored in secure shelve or in a locked cupboard.
- Sharp equipment must be stored in sheaths or designated racks.
- Powered equipment must be turned off, when not in use.

G. Deal with work interruptions

- Interruptions can hamper a Lead Assembler's productivity, by stalling the seamless flow of tasks and disturbing his / her focus.
- A Lead Assembler must maintain a log of the regular interruptions and discuss the same with the supervisor, to devise solutions.
- In case an interruption result in any protocol deviation, the same may be reported to the concerned personnel in the Escalation Matrix.
- However, short breaks can bust stress and increase one's productivity; they are recommended in the workplace and are not considered interruptions.

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Summary



- One must always abide by safe practices at work.
- Adherence to SOPs is extremely crucial for ensuring safety of the individual as well as others.
- One must handle, store and operate on powered tools very carefully.
- One must remain calm and composed during an emergency situation.
- Organizational Reporting Protocol is guided by the 6Cs of emergency communication.
- An accident, that may lead to the loss of human life, falls under the "Critical" and "Possible" categories of the Risk Assessment Matrix.
- Personal Protective Equipment, commonly termed as PPE, is specialized clothing or equipment worn and used by employees for safeguarding themselves against Occupational Health and Safety hazards.
- Basic knowledge of first aid treatment must be imparted to all.
- One must know about the preventative and remedial actions to be administered in cases of exposure to toxic materials.

Activity



- The trainer takes the students on a field visit to a nearby furniture workshop, so that they can observe the various safe working practices adopted by the workers.
- The trainer invites an industry veteran to the class to interact with the students and clarify their doubts on the importance of responding to emergency situations while at work.
- The trainer provides each student with a Hazard Report Form and asks them to fill the form carefully so that they do not get confused in future when they are asked to fill up this form.
- The trainer makes the students participate in a mock session, where they get to observe and practise basic First Aid techniques.
- The trainer shows, from his laptop, few ppt slides comprising images of various safety and warning signs. The students identify and interpret the same.

Exercise



Write Briefly on the Following:

- 1. Safety while handling powered tools
- 2. Responding to an emergency situation
- 3. Organizational Reporting Protocol
- 4. Various Safety Signs and their meanings
- 5. Different types of PPE and their uses
- 6. First Aid treatment at work
- 7. Preventative and remedial actions against toxic materials









8.Understanding the Organisational Context

Unit 8.1 Understand the Meaning of Organizational Context for the Job Role

Unit 8.2 Understand the Organizational Context While Assembling and Installing Modular Furniture

Unit 8.3 Understand the Organizational Context While Ensuring Health and Safety at Workplace

Unit 8.4 Understand the Organizational Context While Maintaining The Work Area, Tools And Machines

Unit 8.5 Understand the Organizational Context While Working Effectively with Others

Unit 8.6 Escalation Hierarchy



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Interpret the meaning of Organizational Context for the Job Role
- 2. Recall the organizational context while assembling and installing modular furniture
- 3. Comply with the organizational context while ensuring health and safety at workplace
- 4. Comply with the organizational context while maintaining the work area, tools and machines
- 5. Comply with the organizational context while working effectively with others

Unit 8.1 Understand the Meaning of Organizational Context for the Job Role

Unit Objectives



At the end of this unit, you will be able to:

1. Recall the meaning of Organizational Context for a Lead Assembler

Understand the meaning of Organizational Context for a Lead Assembler

Organizational Context, as the name suggests, is defined as the knowledge of the organization and its processes. The various elements of organizational context are:

- Mission
- Vision
- · Organizational Structure
- Standard Operating Procedures and Policies
- · Organizational Behaviour

Mission

- O A formal summary of the aims, goals (long and short term) and values of an organization
- O Describes the fundamental purpose (why it exists) behind running an organization, in terms of benefits to itself and the public
- Example: The mission statement of Woodpecker Furniture is "to create millions of happy homes by meeting customer's expectations...."

Vision

- An organization's road map, which indicates its plans and directions for transformation and growth
- Example: The vision of Hammel Furniture is "We aim at being one of the best furniture manufacturers of storage and dining furniture, designed with functionality, high quality and affordable prices in mind....."

Organizational Structure

- O Defines how task allocation, coordination and supervision are routed towards achieving organizational goals and targets
- Example: In a Divisional Structure, an organization groups all the workers into teams, based on similar or same products, projects or clients

Standard Operating Procedures and Policies

- O Commonly known as SOP, this is a set of stepwise instructions to help workers in carrying out routine functions
- O Before one works on any routine task, it is recommended that he / she refers to the relevant SOP first

Organizational Behaviour

- O Defines the way people interact within teams
- This helps the management in getting maximum output from each worker within a team

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Unit 8.2 Understand the Organizational Context While Assembling and Installing Modular Furniture

Unit Objectives



At the end of this unit, you will be able to:

1. Comply with the organizational context while assembling and installing modular furniture

Understand the Organizational Context While Assembling And Installing Modular Furniture

- Learning about various organizational processes, rules, codes: There is a set of Standard Operating Procedures (SOPs) for the assembly and installation of each modular furniture or unit. As a part of the organizational context, a Lead Installer must thoroughly learn, abide by and refer to the SOP, before starting an operation. Apart from the SOPs, a Lead Installer must also thoroughly read and follow the Instruction Manuals and Directions of Use for the tools, equipment and chemicals required for assembly and installation of modular furniture. In case of accidents and deviations from protocols, the Lead Installer must report the same according to the standard Escalation Hierarchy.
- Knowing the organizational procedures and formalities: A Lead Installer must understand that successful Assembly and Installation does not involve doing the work alone, mechanically. There are few other important aspects of the Assembly and Installation processes, that a Lead Installer must consider. Procedures and formalities like appropriate documentation, accepting client's payment, reporting, calling up and asking for the clients' permission before reaching their home for installation, greeting the client on visit, using PPE, etc. must be learned and completed during work.
- Recognizing statutory responsibilities under organizational legislation and regulations: A Lead Assembler must abide by all clauses in his / her job responsibilities and code of conduct, which are considered statutory as per the organizational legislation and regulations. The role and responsibilities of a Lead Assembler, depending on the situation and the phase of the project, must switch between that of a Team Player and a Team Leader. During the process and during each phase of the project, the Lead Assembler must identify the mandatory clauses in his / her job responsibilities and play the role accordingly. It is important that on the initiation of an assignment or project, the Lead Assembler is subjected to an induction or a training session, on his / her work area and related responsibilities.
- Gathering information about the organization's clients: Generally, Lead Assemblers are grouped in the organizational hierarchy as per the clients and assignments they are working in. It is extremely crucial for a Lead Assembler to understand the requirements and specifications of a given assignment or task, before laying hands on it. Apart from reading the Work Order carefully, a person can also gather relevant and fruitful information about the assignment or job by knowing and understanding the client he / she would be working for. This can be accomplished by interacting with senior colleagues and supervisors, who have worked for the same client / s previously. Knowing the organization's clients help not only in understanding the project better, but also in handling objections, if any.
- Getting acquainted with the various types of designs of the products: Apart from the general style of furniture available in the market as "popular trends", any business organization, that manufactures, assembles and installs modular furniture, design their own products. An organization's own products are unique, in terms of type of design, make, style and utility. The more unique and special a product, the more difficult it is for its competitors to replicate its design and features. This uniqueness of the products helps an organization build or strengthen its brand value and reputation in the market. In order to assemble and install a given product accurately and as per the given specifications, a Lead Assembler must get familiarized with the various types of designs of the products available with the organization.

- Familiarizing about the relevant safety and security procedures to be followed: While carrying out the assembly and installation operations, Lead Assemblers must take adequate safety and security measures, to protect themselves and others in the workplace against potential risks and hazards. Such procedures include SOPs, Instruction Manuals, Dos and Don'ts of carrying out the operations as well as using, storing and maintaining PPE.
 - One must never miss or avoid Mock Drills and Safety Training Sessions, because these are the sessions, where the actual safety measures, during different disasters, hazards and emergencies, are enacted, simulated and demonstrated practically.
- Learning about assembly process/ product line: The Assembly Line is a manufacturing and sequentially progressing process, which comprises of parts and components getting added at every stage until the final finished product is obtained at the end of the line. Automatically moving the semi-finished assembly from one work station to another, sequentially, involves less time and labour. Each worker and machine works on one part and these parts are finally put together to make the finished object. This manufactures a product much faster than with handcrafting-type methods, where one person makes, assembles and installs the whole object.
 - The components and parts that get added at each stage are often interchangeable. Interchangeable parts / components have almost identical specifications, which ensures that a part / component of one Assembly will easily fit into another, keeping the efficiency of the Line intact. This reduces the Cost of Manufacturing of a product to a great extent, thus leading to the production of more affordable products. The Assembly Line process is faster than workers manually carrying parts to a stationary point for assembly operations. One of the most prominent areas of application of the Mechanical Assembly process is assembling Modular Furniture.
- Learning about terminology, abbreviations, symbols, dimension matrix etc.: As a part of the profession, Lead Assemblers must be well aware of the common glossary of terms, symbols abbreviations and Dimension matrices available with the employer organization. A Dimension Matrix helps in mapping a given furniture with the standard dimensions and guidelines for manufacture and repair.
 - O **Designing Tables -** General Dimension Matrix:
 - O **Designing Chairs-** General Dimension Matrix:
 - O **Designing Average Adult Beds -** General Dimension Matrix:
 - O Designing Desks:

Type of Table	Height (Inches)	Length (Inches)	Width / Depth (Inches
Coffee, Rectangular	15-17	36-60	18-24
Coffee, Round	15-17	36-42 (diameter)	36-42 (diameter)
Dining, Rectangular	28-30	60-80	36-42
Dining, Round	28-30	40 (minimum diameter)	40 (minimum diameter)
Writing	28-30	36-40	20-24

o Designing Chairs- General Dimension Matrix:

Parameter	Standard Dimensions
Seat Width	16"-20"
Seat Depth	15"-18"
Seat Height from the floor	16"-18"
Slope of Seat Front to Rear	5-8 degrees
Armrest Height above Seat	7"-9'
Armrest Length (full armrest)	8" (minimum)
Armrest Width	2" (average)
Seat Back height	12"-16' (above seat)
Seat Back Recline Angle	0-5 degrees (formal), 10-15 degrees (casual)

o Designing Average Adult Beds - General Dimension Matrix:

Parameter	Standard Dimensions (Inches)
Height to top of mattress	16-24
Best mattress height for si ng	17-18
Best mattress height for changing sheets	24
Acceptable toe room	6-8

o Designing Desks

Type of Desk	Height (Inches)	Width (Inches)	Depth (Inches)
Children's Desk	15-17	36-60	18-24
Computer Desk	20-22	24-30	18-20
Secretary Desk	24-28	24-60	20-30
Table Desk	28-30	60-80	36-42
Writing Desk	28-30	30-48	20-30
Writing Desk	28-30	36-40	20-24

• Understanding proper disposal system for waste and by-product: Lead Assemblers must be well aware of the waste and the by-products procured during the assembly and installation processes. Waste must be sorted into appropriate categories, disposed of in designated places and treated according to their physical and chemical nature. Lead Assemblers must learn to identify symbols for hazardous waste and take appropriate measures by wearing PPE and carefully handling and treating the waste.

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Unit 8.3 Understand the Organizational Context While Ensuring Health and Safety at Workplace

- Unit Objectives



At the end of this unit, you will be able to:

1. Recall the organizational context while ensuring health and safety at workplace

Understand the organizational context while ensuring health and safety at workplace

This is accomplished by a Lead Installer in the following manner:

- Abiding by organizational procedures for safe handling of equipment and machine operations
- Understanding how to respond to emergency situation in line with organisational procedures
- · Learning about the reporting protocol and documentation required
- Knowing whom to contact in case of an emergency
- Knowing where to get the list of contact in case of an emergency in the organization

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Unit 8.4 Understand the Organizational Context While Maintaining The Work Area, Tools And Machines

Unit Objectives



At the end of this unit, you will be able to:

1. Recall the organizational context while maintaining the work area, tools and machines

Understand the organizational context while maintaining the work area, tools and machines

This is accomplished by a Lead Installer in the following manner:

- · Abiding by the relevant legislation, standards, policies, and procedures followed in the company
- Understanding the expectations and responsibilities of the job role
- Knowing the organization's rules, codes, guidelines and standards
- Recognizing statutory responsibilities, organizational legislation and regulations
- Knowing the details of the contact person in case of queries on procedure or products
- Learning about the method to handle tools and equipment safely and the health and safety implications of not doing so
- Knowing and abiding by the relevant health and safety requirements applicable in the work place
- Knowing who to approach for support in order to obtain work related instructions, clarifications and support
- Learning the importance of following health, hygiene, safety and quality standards

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Unit 8.5 Understand the Organizational Context While Working Effectively with Others

- Unit Objectives



At the end of this unit, you will be able to:

1. Interpret the organizational context while working effectively with others

Understand the organizational context while working effectively with others

This is accomplished by a Lead Installer in the following manner:

- Knowing and abiding by the legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions
- Understanding the reporting structure, inter-dependent functions, lines and procedures in the work area thoroughly
- Learning about the relevant people and their responsibilities within the work area
- Identifying the escalation matrix and procedures for reporting work and employment relate issue clarifications and support

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Unit 8.6 Escalation Hierarchy

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain the hierarchy of an organization
- 2. Assess the importance of reporting

8.6.1 Hierarchy of an Organization

Organizational hierarchy refers to the pyramid of ranks or posts in an organization. In an organization, every employee has to report to the immediate boss. In case of escalations, the employee should put it forward to the immediate boss. Here, we will see the escalation hierarchy in the furniture industry.



Fig. 8.6.1.1: Common Escalation Hierarchy in the Furniture Industry

The above flowchart explains the organizational hierarchy in a furniture fitting industry,

8.6.1.1 Order of Escalation (Reporting Hierarchy)

In a furniture fitting industry, there are two segregate wings:

• Sales and Marketing: Sales and marketing department cater to the business side of an organization. A furniture fitting industry runs on the amount of sales they make to the merchandises. There are even scopes of cross-selling that enhances the role and responsibility of the sales and marketing department.

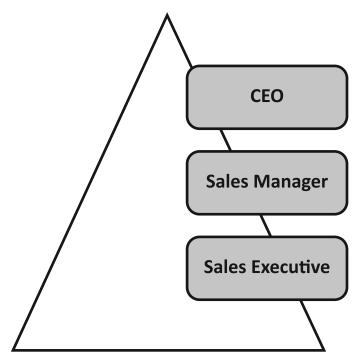


Fig. 8.6.1.1.1: Reporting Hierarchy for the Sales team

- Operations: Operations department has two wings:
 - O Quality
 - O Operations

Operations department takes care of the assembling and installing modular furniture. A Lead Assembler reports to the Supervisor. The main job of a Lead Assembler is to assemble and install different modular furniture. The Supervisor monitors the entire assembling process.

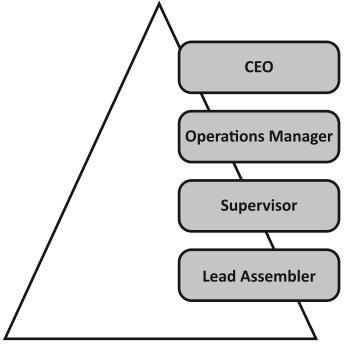


Fig. 8.6.1.1.2: Reporting Hierarchy for the Operations team

Quality management checks the quality of the product. In each organization, there are certain parameters set by the company on which assembled products are assessed.



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Summary



- Organizational Context, as the name suggests, is defined as the knowledge of the organization and its processes.
- There is a set of Standard Operating Procedures (SOPs) for the assembly and installation of each modular furniture or unit.
- A Lead Assembler must abide by all clauses in his / her job responsibilities and code of conduct, which are considered statutory as per the organizational legislation and regulations.

Activity



The trainer divides the class into few groups. Each group shares few points on any one of the following topics:

- Organizational context for the job role
- Organizational context in ensuring Health and Safety at workplace
- Organizational context in maintaining the work area and working effectively

Exercise



Write 2-3 lines on each of the following:

- 1. Mission statement and its importance.
- 2. Meaning of Organizational Context.
- 3. Implication of Vision of an organization.
- 4. Understanding the organizational context while maintaining the work area, tools and machines.









9.Safe Lifting Practices and Ergonomics

Unit 9.1 Safe Lifting Practices

Unit 9.2 Correct Body Postures

Unit 9.3 Correct Lifting, Loading and Unloading and Handling Procedures



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Recall the importance of safe lifting practices
- 2. Recognize the correct Body Postures
- 3. Recall and practise the correct lifting, loading, unloading and handling procedures

Unit 9.1 Safe Lifting Practices

- Unit Objectives



At the end of this unit, you will be able to:

1. Identify and practise the safe lifting practices

Safe Lifting Practices (as recommended by OSHA) - Dos and Don'ts

DOs

- Check the exact weight of an object before moving it.
- Always size up the load. Get help from others for heavy objects.
- Chose the flattest, straightest, and clearest route before your lift the object.
- If the load is wet or slippery, wipe it off before lifting.
- Make sure the weight of the object is stable and distributed evenly if possible.
- Stand close to the object with legs at shoulder-width stance.
- Check your footing before you pull the load close to your body. Lift with your legs, not your back.
- Use material handling equipment whenever possible.
- When unloading, do face the spot you have chosen and lower the load slowly by bending your knees.

DON'Ts

- Never lift more than you can easily handle or without knowing the weight.
- Avoid twisting your body when lifting or when carrying.
- Never lift with a rounded back and straight legs.
- Never lift from an unbalanced position.
- Never carry a load that blocks your view or is big enough for the path you are following.
- Never look down when lifting.
- Never reach over your shoulders to lift. Instead, use a step stool or platform. If possible.
- Avoid heavy lifting if you have had previous joint injuries.
- Don't bend over to load or unload a heavy object, it may hurt your back.

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Unit 9.2 Correct Body Postures

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance of Ergonomics for the job role
- 2. Identify and maintain the correct body posture while standing and working for long hours and carrying heavy materials

9.2.1 Importance of Ergonomics for the Job Role

Ergonomics, in simple terms, is the "science of work". Ergonomics is the scientific process of designing or arranging work areas, equipment and systems, so that they become apt for the people using them. Ergonomic practices aim at improving the general health and working conditions of people, thus, in turn, improving their productivity at work. Ergonomic practices help in identifying the occupational health hazards due to various environmental factors and methods of eliminating or mitigating them.

Few physical and environmental factors that are considered hazards, according to ergonomic principles, are:

- · Repetitive motions, without taking breaks
- Unsafe lifting, loading, unloading and handling practices
- Resorting to awkward working positions like stooping, twisting, bending and overhead reaching
- Staying in a particular position for a long time, with nil or little movement
- Exerting continuous pressure or abrasive force from a hard or rough surface on any part of the body
- Working under extreme temperature conditions (either too hot or too cold)
- Working with vibrating, noisy machinery for long hours

Ergonomics encourages the following practices:

- Protecting oneself
- Choosing the right equipment for one's job role and assignments
- Implementing good and safe housekeeping practices

On the whole, the benefits of Ergonomics are:

- Improved Employee Productivity
- Reduced Costs
- Improved Quality of Work
- Improved Employee Involvement
- Enhanced Safety at Work
- Nowadays, any organization takes up active initiatives in promoting ergonomic practices via frequent training programs.

9.2.2 Maintain Correct Body Posture While Standing and Working for Long Hours and Carrying Heavy Materials

While prescribing the correct body postures for Lead Assemblers of Modular Furniture, we must discuss the differences between Neutral and Awkward body postures.

In **Neutral body posture**, a person's body is aligned and balanced, at sitting, working or standing positions, thus imposing minimal stress on the body and keeping the joints aligned. Neutral postures lessen the stress exerted on the musculoskeletal system, thus promoting maximum control over the task and efficiency.

On the contrary, **Awkward body postures** move away from the neutral body postures, away from the comfort zone, towards the extremes in the range of motion. This exerts greater stress on the body's musculoskeletal system.

Few examples of Neutral and Awkward body postures are:

Working at heights/with ladder



Fig 9.2.2.1: Correct posture of working (always wear safety jackets)



Fig 9.2.2.2: Don't work with a broken ladder

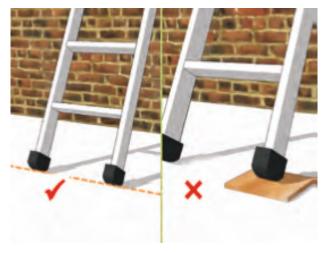


Fig 9.2.2.3: Place the ladder correctly while working with it

Working with Hand Tools





Fig 9.2.2.4: Proper technique of working with hand tools (use clamps)

Proper Technique of Lifting

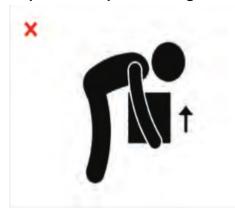




Fig 9.2.2.5: Improper way of lifting (may cause back injury) Fig 9.2.2.6: Proper technique of lifting

Personal Safety Practices



Fig 9.2.2.7: Wear safe boots, don't wear sandals or slippers

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Unit 9.3 Correct Lifting, Loading and Unloading and Handling Procedures

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the hazards associated with handling heavy loads
- 2. Demonstrate the steps to lift, carry or move heavy wooden furniture and accessories from one place to another using approved safe working practices
- 3. Practice working in a comfortable position with the correct posture

9.3.1 Hazards Associated with Handling Heavy Loads

- Weight of the heavy materials, leading to stress on muscles, discs and vertebral column
- Bad and awkward postures, like bending while lifting, and carrying load on one shoulder or with one arm
- Frequent and prolonged lifting and carrying of heavy materials
- Inadequate Handholds, like boxes without or with inappropriately shaped handles
- Environmental factors like extremely hot conditions, where the carrier gets easily fatigued by perspiration and extremely cold conditions, where the cold leads to lower muscle flexibility

9.3.2 Lift, Carry or Move Heavy Wooden Furniture and Accessories from One Place to Another using Approved Safe Working Practices

The steps involved in correct lifting, loading, unloading and handling procedures are:

- **A. Preparation:** One must prepare for lifting and handling the load, keeping in mind the following points:
 - · The heaviness of the load
 - If mechanical means like Hand Trucks are required to lift the load
 - If the load can be broken into small parts
 - The destination of the load and if the path is free of obstacles
 - If there are closed doors on the way
 - If PPE must be worn while handling the load
 - If another person is needed to help with the load
- **B.** Lifting: Lifting should be done by considering the following factors:
- Staying as close to the load as possible for ensuring better grip
- Keeping elbows and arms close to the body
- Keeping the back straight by tightening the stomach muscles

- Avoiding twisting and jerking motions while lifting
 - Asking for assistance if the load is too heavy for one person to lift
- **C.** Carrying: Carrying should be accomplished by considering the following factors,
 - One should turn by moving the feet around but not by twisting or turning the body
 - The carrier's hips, shoulders, toes and knees should face the same direction
 - Rest and short breaks should be taken for some time if the carrier is too fatigued and stressed out
- D. Settling Down: Settling down needs considering these factors,
 - The load must be put down in the same way it was picked up, but in the reverse order
 - The carrier must bend at the knees but not at the hips
 - The load must be kept close to the body to ensure a firm grip till it is completely set down
 - Hold should be released only when the load is securely set down



Fig 9.2.3.1: Steps of lifting weight (from the left)

9.3.3 Safe Handling Techniques with Tools and Equipment

A. Work in a Comfortable Position with the Correct Posture

Posture is the position in which one holds the body straight and upright against gravity while moving, standing and sitting during work. Correct posture involves teaching the body to stand, sit and move in positions. Such comfortable positions are:

- Keeping the bones and joints in the correct alignment, so that muscles are being used appropriately
- Helping the body in decreasing the abnormal wearing of joint surfaces that could result in Arthritis
- Relieves the stress on the ligaments, holding the joints of the spine together
- Preventing the spine from becoming fixed in abnormal positions
- Managing fatigue because muscles are being used more efficiently, allowing the body to Easing backache and muscular pain

B. Amount of Pressure and Tolerance to be Applied

- **Pressure:** Pressure is defined as the amount of force applied on a specific area. While working on wooden furniture, a lead assembler needs to apply pressure. For example, in assembling, joining parts with nails and adhesives is an essential task. A lead assembler must be careful while pressing one part on the other.
- **Tolerance:** Tolerance is the limit of pressure that a part or a body can endure. It is defined as the magnitude of limit of pressure that should be applied on a specific part of furniture.

Here are some essential tips regarding pressure and tolerance:

- Wrenches should not be struck with a hammer unless the wrench is designed for this purpose.
 Worn box wrenches or sockets will be exchanged for new tools. When excessive is required to free a nut or cap-screw, the pressure should be applied away from the face and body.
- A hack saw should be adjusted in the frame to prevent buckling and breaking, but should never be tight enough to break off the pin that supports the blade. The blade will be installed with the teeth pointing forward. Pressure should be applied on the forward stroke only. If the blade is twisted or too much pressure is applied, the blade may break causing injury to the user.
- To ensure greater operator safety, the power tools should be equipped with a constant-pressure switch or control that will shut off the power when the pressure is released.



Fig 9.2.3.2: Always wear PPE while working with tools



Fig 9.2.3.3: While working with power tools, don't plug in the tools haphazardly



Fig 9.2.3.4: Wear PPEs; not wearing PPE might lead to severe acident



Fig 9.2.3.5: Use floor guards; not using floor guards may damage the floor

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Summary



- One must not lift excessively heavy objects because every individual has his / her specific capacity of lifting weights.
- Ergonomics is the scientific process of designing or arranging work areas, equipment and systems, so that they become apt for the people using them.
- Neutral postures mitigate the stress exerted on the musculoskeletal system.
- Ergonomic guidelines also recommend the use of Inline Grips over Pistol Grips.
- One must abide by correct lifting, loading, unloading and handling procedures.

Activity



- The trainer divides the class into few groups. each groups prepare and presents a chart on any one of the below topics:
 - O Dos of Safe Lifting
 - Don'ts of Safe Lifting
 - O Importance of Ergonomics
 - O Neutral and Awkward postures
 - O Steps involved in correct lifting, loading, unloading and handling procedures
- The trainer invites a Physiotherapist/Yoga Expert to the class. The person demonstrates various safe working postures, movements and yoga positions and makes the students practise them.

Exercise



Answer the Following Questions Briefly:

- 1. What is Ergonomics?
- 2. What are the benefits of Ergonomic practices at work?
- 3. State any 3 safe lifting practices as recommended by OSHA.
- 4. Why is Neutral Posture preferred to Awkward Posture?
- 5. When are Inline and Pistol Grips used?
- 6. What are the hazards associated with handling heavy loads?









10. Safe Cleaning and Waste Management Practices

Unit 10.1 Importance of Good Housekeeping

Unit 10.2 Different Types of Cleaning Equipment & Substances and their Use

Unit 10.3 Safe Working Practices for Cleaning and the Method of Carrying Them Out

Unit 10.4 Common Types of Waste and Contaminants in Workplace

Unit 10.5 Effects of Contamination on Products

Unit 10.6 Different Ways of Minimizing Waste

Unit 10.7 Know-How of Cleaning Process and Waste Disposal Procedures



Key Learning Outcomes | 💆



At the end of this module, you will be able to:

- 1. Discuss the importance of good housekeeping
- Discuss the use of the different types of cleaning equipment & substances and their use
- 3. Identify the safe working practices for cleaning and the method of carrying them out
- 4. Identify the common types of waste and contaminants in workplace
- 5. Discuss the different ways of minimizing waste
- 6. Explain the effects of contamination on products

Unit 10.1 Importance of Good Housekeeping

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain why should one apply good housekeeping practices at all times
- 2. Discuss good housekeeping in order to prevent fire hazards

Apply good housekeeping practices at all times

Housekeeping in a furniture workshop involves operations related to the maintenance and cleaning of the work area, tools and equipment.

- Good housekeeping practices include, but are not limited to:
 - O Clean / tidy work areas
 - O Removal / disposal of waste products
 - O Protect surfaces from erosion, corrosion, discolouring, disfiguring, tarnishing, molding, etc.
- Good housekeeping is required to avoid accidents like:
 - O Tripping over and stumbling across loose objects on cluttered floors, stairs and platforms
 - O Bumping against unattended objects on raised platforms
 - O Slipping on wet, dirty and greasy surfaces
 - O Getting burnt with corrosive chemicals
 - O Getting punctured and cut with sharps, jagged edges (like cut tin), unsheathed cutting tools, protruding nails, etc.
- Good housekeeping is associated with the following benefits:
 - O Easy flow of materials
 - O Reduced chances of workplace accidents
 - O Reduced employee exposure to dust, fumes and debris
 - O Enhanced control over tools, equipment and other elements of inventory
 - O Optimized productivity due to efficient maintenance and timely repair
 - O Improved workplace hygiene, leading to improved employee health and, in turn, productivity
 - O Efficient space management by eliminating clutters
 - O Improved preventive maintenance and subsequent decrease in chances of property damage

Good housekeeping in order to prevent fire hazards

- The workplace must be freed from clutter and debris, since these can act as fuels and are fire hazards.
- The entire workplace must be a "No Smoking" zone, thus designated with the help of "No Smoking Signs".
- Only designated areas, outside and far from the main work area, must be allowed for smoking.
- Fire Extinguishers must be maintained properly and refilled after use.
- Electrical faults may lead to fire and hence, any electrical hazards must be reported and attended to, immediately.
- There must be easy access to the Main Power Supply Control Panel, so that electrical power can be switched off in case of electrical fires.

- All powered tools, machinery and equipment must be maintained and inspected regularly by trained professionals, to prevent fire outbreak from overheating and friction sparks.
- Fuel containers, like Gas Cylinders and flammable oils, must be enclosed and stored separately, away from the main work area.
- Emergency exits, sprinklers, fire fighting apparatus, emergency exits etc. must never be blocked.
- Materials must never be stacked in a manner, so that clearances and exit routes are blocked.
- All fire alarm systems and fire fighting equipment must be inspected regularly.



Fig 10.1.1: Do not stack the waste material at a place; dispose it regularly



Fig 10.1.2: Do not store the waste material digging a hole

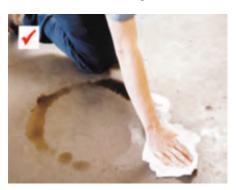


Fig 10.1.3: Good housekeeping is an essential thing



Fig:10.1.4 Always keep the tools at a safe place



Fig 10.1.5: Use waste bins to collect and dispose the waste material



Fig 10.1.6: Always keep the sharp objects like nails, screws at the allotted box; don't leave them scattered

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Unit 10.2 Different Types of Cleaning Equipment & Substances and their Use

Unit Objectives



At the end of this unit, you will be able to:

1. Identify the different types of cleaning equipment & substances and learn their use

Different Types of Cleaning Equipment & Substances and their Use

The various materials to be used by the housekeeping staff for cleaning are:

- O Cleaning Agents
- O Manual Equipment
- O Powered Equipment

A. Cleaning Agents

Solvents: A solvent is a liquid that dissolves a solid or liquid solute, resulting in a solution. The most common solvent used in everyday life is water. Water can be used to dilute any cleaning solution for easy use. Warm water dissolves soap more readily than cold water.

Detergents & Soaps: Detergents and soaps are used for cleaning because pure water cannot remove oily, organic soiling. Soap allows oil and water to mix so that oily grime can be removed during rinsing. Detergents are similar to soap, but they are less likely to form films (soap scum) and are not as affected by the presence of minerals in water (hard water).

Detergents to be used depend on:

- · Material to be cleaned
- Cleaning equipment to be used
- Type of dirt

Liquid Cleaning Agents: Liquid cleaning agents can be either diluted in a little water or used directly with a dry cloth.

Washing Soda: It is useful for emulsifying grease on drainpipes, gutters or stone surfaces. In strong concentration, it could be an irritant and injurious to skin, fabrics brushes, wood and paint. Washing soda is useful as a water softener.

Soda bars, Powders and Flakes: Nowadays soaps have been replaced by excellent synthetic soap less detergents, which are unaffected by hard water. They give instant lather. When used, care should be taken that they are thoroughly dissolved. Should know the right concentration for best results. Should be stored on open shelves in a dry storage area.

Acid: Acids are used for the removal of metal stains. Vinegar and lemon are used for the removal of tarnish of copper and brass and of mild water stains on bathtubs, etc. More resistant water stains may be removed with stronger acids such as oxalic acid or hydrochloric acid. This should be only used under strict and experienced supervision so that it is used carefully and not in excess.

Alkali: Caustic soda, sodium hydroxide and ammonia are alkalis and are used as grease emulsifiers and stain removal agents. Strong alkaline cleaning agents based on caustic soda in flakes or in liquid form are available for the cleaning, of blocked drains, and other large industrial equipment. Extreme care is to be taken in their use as they are very strong and are highly corrosive.

Absorbents: These perform the cleaning action by absorbing the stain or grease; for example starch, French chalk powders, and besan or gram flour. Their constituents vary and many are of vegetable origin. Unlike abrasives, they are not manufactured.

Toilet Disinfectants & Antiseptics: Disinfectants & Antiseptics are not strictly cleaning agents but are often used during cleaning operations. Disinfectants kill bacteria. Antiseptics prevent bacterial growth.

B. Manual and Powered Equipment

Manual cleaning tools and equipment are operated by hands while Powered equipment are connected to a power supply or battery.

- Funnel
- Rubber Spatula
- Floor Mop
- Bowl Swab
- Plastic Caddie
- Spray Bottle
- Cobweb Cleaner
- Dry Vacuum Cleaner (Commercial)
- Suction Dryer
- Dust Pan and Brush
- Bucket and Mug
- Squeegees
- · Scrubbing Brush
- Sponge
- Scraper

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Unit 10.3 Safe Working Practices for Cleaning and the Method of Carrying Them Out

Unit Objectives



At the end of this unit, you will be able to:

1. Identify and learn about the safe working practices for cleaning &the method of carrying them out

Safe Working Practices for Cleaning and the Method of Carrying Them Out

In this section, we are going to discuss few safe working practices associated with different cleaning methods. The common cleaning methods are:

- Vacuuming
- Abrasive Blasting
- Acoustic Cleaning
- · Steam Cleaning
- Flame Cleaning
- Sterilization by Autoclaving

Vacuuming

- Vacuum Cleaners must be disconnected from the power outlet, when not in use.
- Use of vacuum cleaners must be restricted to indoor use only.
- Vacuum cleaners must never be used on wet surfaces because this may damage the motors and exposes the user to electric shock hazards.
- A vacuum cleaner, which has been exposed to moisture, must be inspected and repaired (if needed) by a licensed electrician before the next use.
- A vacuum cleaner, once dropped accidentally, must be thoroughly inspected by a licensed electrician before the next use.
- A vacuum cleaner must never be pulled by the power cord and the cord must be kept away from sharp edges to prevent fraying and loss of insulation.
- Sharps and splinters, of glass, metal, wood, metal, etc. must never be cleaned using a vacuum cleaner.
- It is a recommended practice to avoid cleaning up toxic and flammable substances using a vacuum cleaner.
- A vacuum cleaner must always be stored in a cool, dry location.



Fig 10.3.1: Vacuum Cleaner

B. Abrasive Blasting

Abrasive Blasting is used in removing bulk material and contaminants from a given surface.

The most common items used in Abrasive Blasting are:

- Silica sand (crystalline)
- O Coal slag
- Garnet sand
- Nickel slag
- O Copper slag
- O Glass (beads or crushed)
- O Steel shot
- O Steel grit
- O Specular hematite (iron ore)
- O Ice cubes
- O Dry ice (solid CO₂)
- O Plastic bead media
- O Sponge
- O Sodium bicarbonate (baking soda)
- A toxic abrasive material must be, if possible, replaced with a less toxic one.
- Abrasives, which can be delivered with water, must be used in cleaning.
- The Abrasive Blasting operations must be safely contained and conducted within a restricted work area, enclosed by barriers and protective walls.
- These enclosures must be equipped with Exhaust Ventilation Systems to capture the dust thus released in the process.
- Abrasive Blasting must not be conducted under stormy or windy weather, in order to prevent the spread of toxic and hazardous materials.
- People working near the Abrasive Blasting area must wear PPE appropriate for the protection of Eyes, Ears, Face, Head, Hand and Arms and Feet.



Fig 10.3.2: Abrasive Blasting

C. Acoustic Cleaning

- Acoustic Cleaning involves the use of Sound Waves to bombard with contaminants and particulate matter on a surface and shaking them off the surface on loosening.
- The air supply to the Acoustic Cleaner must never be obstructed because cool air helps in dissipating the heat, thus, in turn, protecting the membrane against damage.
- Ear Protectors must be worn, when one is close to an acoustic cleaner.
- An acoustic cleaner must be switched on only after adopting adequate safety measures in advance.
- One must ensure that the air pressure supply to an acoustic cleaner must be shut down before service and maintenance operations.
- Under above circumstances, the power supply to the magnetic valves must be turned off as well.
- The location for acoustic cleaning must always be equipped with a platform or scaffolding.
- Maintenance work must be done by wearing protective gloves (heat resistant) and ear protectors.



Fig 10.3.3: Acoustic Cleaners

D. Steam Cleaning

- Steam Cleaning involves cleaning workshop floors, walls and machines by removing accumulated dirt and grease.
- The user must read the Instruction Manual / Directions for Use very diligently, before using Steam Cleaners.
- Few items, like Electronic goods, Untreated Wood, Marble floors, Laminate floors, etc. cannot be cleaned by Steam Cleaners.
- One must avoid cleaning up chemical spills using Steam Cleaners because certain chemicals react with water.
- It is advisable to wear protective and heat-resistant gloves while using Steam Cleaners, because steam can cause severe burns.



Fig 10.3.4: Steam Cleaning

E. Flame Cleaning

- Flame Cleaning involves cleaning a structural steel / metal / alloy surface by treating with intensely hot Oxyfuel gas flame over it, thus removing rust, mill scale, lubricants, grease and accumulated dirt from the surface.
- PPE appropriate for handling Oxyfuel, like Protective Masks, Safety Welding and Gas Cutting Goggles, Heat-resistant safety gloves, Aprons, Respirators (for emergencies), etc. must be worn during Flame Cleaning.
- Adequate ventilation must be provided in the work area, to prevent the accumulation of toxic fumes and explosion and fire hazards.
- The Flame Cleaning apparatus must be checked in advance, in order to avoid Backfeeding and Flashback hazards.
- Inspection, service and maintenance must be done by an experienced and licensed technician with the required training and experience in Gas safety.
- Safety devices, like Flashback Arrestors, Non-return Valve, Vent and Purge device, Pressure Relief device, etc. must be used to prevent hazards like fire and explosion.
- Gas Leakage detecting devices, fire alarm and fire fighting equipment must be kept handy while using Flame Cleaning operations.

F. Sterilization by Autoclaving

- Autoclaving is one of the most effective methods of sterilization or the elimination of pathogens and microorganisms from given equipment or surface.
- The process of Autoclaving involves application of pressurized steam to heat and sterilize the material that require cleaning.
- Appropriate PPE, like Apron, heat-resistant gloves, safety eyegear, etc. must be worn during the Autoclaving process.
- Sealed containers must never be autoclaved to prevent explosion hazards.
- Before operating an Autoclave, one must thoroughly read the Instruction Manual and learn about the safety lock-out mechanisms.
- The door of an Autoclave must never be opened if there is water getting drained at its bottom; this may result in accumulation of scalding water and even Superheated Steam.
- At the end of the Autoclaving cycle, one must wait for the Autoclave pressure to reach zero and the temperature at or below 121 degree Celsius, to prevent burns.
- Sharps, hazardous chemicals, radioactive materials and biomedical samples must never be autoclaved.

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Unit 10.4 Common Types of Waste and Contaminants in Workplace

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the common types of waste in the workplace
- 2. Identify the common types of contaminants in the workplace

10.4.1 Common Types of Waste in the Workplace

The most common waste materials procured in a furniture workshop can be categorized in the following:



Fig 10.4.1.1: Liquid Furniture Waste

Liquid Waste - This inclueds sludge, dirty water, organic liquids, waste water after washing.

Solid Waste - This includes industrial slag, plastics waste, wood waste, paper waste, metals, ceramics and glass.

Organic Waste - This includes biodegradable food waste, animal waste, vegetable waste, garden waste, rotten meat of animals; these can be deposited at Landfills or converted into Manure and Biogas.



Fig 10.4.1.2: Solid Waste Bin

Recyclable Waste - Paper, metals, wood, organic waste, etc., can be recycled. These must be placed in appropriate Recycling Bin and treated according to the nature of the waste. For example, organic waste can be converted into manure and Biogas.

Hazardous Waste - Such waste may be flammable, corrosive, radioactive, toxic, etc. These can potentially harm the environment, and must be placed in legibly labelled bins for appropriate treatment and disposal.



Fig 10.4.1.3: Metal Waste

10.4.2 Common Types of Contaminants in the Workplace

A Contaminant can be defined as "a substance that adversely affects the environment and its elements, through breathable air, soil, water and food". The most common types of contaminants that one comes across in daily life are:

 $\textbf{Biological Contaminants-} These \ include \ microorganisms, rodents \ and \ harmful \ insects.$

Chemical Contaminants - These comprise salts, soluble metals, toxins, pesticides, etc. These are naturally occurring or man-made.

Physical Contaminants - These include sediment and other organic matter. These can alter the physical appearance and properties of water and air.

Radioactive Contaminants - These comprise materials like Uranium, Plutonium, Radium, etc. These are extremely hazardous for the environment due to the presence of an unbalanced amount of neutrons and protons, which may result in emission of harmful radiations.

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Unit 10.5 Effects of Contamination on Products

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss the effects of common contaminants on furniture

Effects of Contamination on Products

The common effects of contamination on furniture products are:

- **Effect of Moisture -** Wood is hygroscopic in nature, i.e. it readily absorbs and accumulates moisture, leading to multiple defects, including unusual expansion of wood and open joints. This results in variations in size and creation of excessive or inadequate spacing around pre-fitted joints.
 - Metals like Iron may accumulate moisture and rust, thus leading to furniture defects like brittleness and flaking. These allow for chipping of the furniture, resulting in its wear and destruction.
- Effect of Microorganisms, Insects and Rodents Infestation by Fungi (Molds) lead to discolouration and disfiguration of furniture. Insects like Termites, Carpenter Ants, Wood Borers and Powderpost Beetles cause serious damages to wood (natural wood and its products) furniture by chewing and grinding through the furniture or building nests in it, thus rendering the furniture flimsy. Pests like Rats not only gnaw through wood, but also contaminate them chemically with their urine, faeces and hair. Steel and metallic furniture are usually unaffected by insects and rodents, but Rats can gnaw through aluminium as well. Steel and other metallic furniture are affected by Molds as well.
- **Effect of Dust** Accumulation of excessive dust on furniture lead to discolouration. Excessive dust may catch moisture and grease, thus forming greasy grime, which is often difficult to remove.
- Effect of Corrosive Chemicals Corrosive chemicals, like acids and alkalis, can destroy, disfigure, flake off, discolour, tarnish and eat through metals and wood alike. Certain chemical cleaning agents are suitable for certain types of wood and metals only. Chemicals must be implemented on furniture only after reading the MSDS sheets and Manufacturer's Instructions.

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Unit 10.6 Different Ways of Minimizing Waste

- Unit Objectives

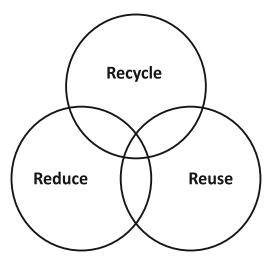


At the end of this unit, you will be able to:

- 1. Use materials to minimize waste
- 2. Demonstrate how to dispose of waste safely in the designated locations

Waste is defined as that part of a substance, which can be eliminated or discarded as no longer useful or required after the completion of a process. The most efficient method of waste minimization is to use materials to the fullest, by the 3Rs - Recycle, Reduce and Reuse.

10.6.1 Use Materials to Minimize Waste



The 3 Rs of Waste Minimization

- **Resource Optimization** Raw materials must be used to the fullest, so that minimal waste is procured while converting the raw materials into finished products.
- **Recycling of Scrap Material** Scraps, when created, must immediately be incorporated in the manufacturing process, so that they get reused completely as raw material.
- **Enhanced Quality Control** This can be implemented by minimizing the number of rejects per batch. This is easily achievable with a higher frequency of careful inspection, accompanied with constant monitoring.
- Exchange of Waste Some wastes cannot be completely eliminated from the manufacturing process. Such waste can be effectively managed via Waste Exchange techniques, where the waste procured in a certain process becomes the raw material of another, and vice versa.

10.6.1 Use Materials to Minimize Waste

Landfill

• Waste, that cannot be recycled, is deposited and a layer of soil is added on top of it

Incineration

- Involves controlled combustion of waste
- 90% volume of waste gets reduced and converted into incombustible, light-weight materials like ash, gases and heat
- Gases are released into the environment while the heat is utilized in power generation

Biogas Generation

- Organic waste are biodegradable and can be converted into Biogas in Biogas Plants, with the help of certain fungi and bacteria
- The residue, after generation of Biogas, is used as Manure
- Manure Generation and Composting
- · Organic waste are often left buried under soil beds
- They decompose into rich manure, full of nutrients and minerals

Vermicomposting

- Involves the degradation of organic waste into manure, with the help of worms
- The worms feed on the organic waste and convert them into manure

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Unit 10.7 Know-how of Cleaning Process and Waste Disposal Procedures

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the proper procedure of cleaning the work site and tools and equipment
- 2. Comply with the common waste disposal procedures

Proper Procedure of Cleaning the Work Site and Tools and Equipment

Cleaning the workshop / site, as the Lead Assembler proceeds with the assembly and installation processes, is extremely crucial. The following aspects must be taken care of while cleaning the site, tools and equipment:

A. Procedure of choosing cleaning tools and equipment

- Powered tools, meant for cleaning the floor, must be equipped with guards and filters.
- Powered scrubbing machines should come with appropriate control methods, to regulate the flow of cleaning fluids.
- Cleaning equipment, powered with Propane, are recommended for use only when the site is vacant and unoccupied, thus allowing for adequate ventilation and air circulation.
- Propane-powered cleaning tools should be equipped with ecofriendly, low-emission engines.
- All cleaning equipment, especially the powered ones, must not operate at a sound level exceeding 70 decibels.

B. Procedure of choosing cleaning agents

- Cleaning agents and fluids must have a neutral pH value (7 or closer to 7) so that they do not corrode the surfaces.
- Cleaning agents should be ecofriendly and biodegradable.
- Cleaning agents with dyes must be avoided, in order to prevent discolouration and staining of surfaces and products. In case such materials cannot be avoided, the Lead Assembler should resort to dyes, which are approved for food and cosmetics.
- Cleaning agents should have a high Ignition Point and the Ignition Point must be clearly mentioned in the Material Safety Data Sheet (MSDS).
- Cleaning agents should have minimum hazard rating (HMIS Rating). The Hazardous Materials Identification System comprises four colour codes, each representing a hazard category.

Colour Code	Meaning	Rating Scale
Blue	Health	
Red	Flammability	0 - 4, with 4 being the most
Orange	Physical Hazard	hazardous
White	Personal Protection	

- For cleaning wood and stone surfaces, cleaning agents should ideally contain water and epoxy-based (comprising epoxides) ingredients.
- For stain and spot removal, the recommended ingredients are citrus-based materials like d-Limonene and Methyl esters.
- Recommended ingredients for scale removal agents are citric, acetic and lactic acids.
- Hydrogen peroxide is the most common ingredient in Disinfectants.

10.7.1 Common Waste Disposal Procedures -

Disposal of Solid Waste

- Solid waste, once accumulated, must be labelled appropriately.
- Solid waste on the site mainly comprise debris and sharps.
- Debris in a furniture workshop comprises wood and timber splinters, saw dust, metal and glass sharps.
- Wood, timber and saw dust can be either treated at Landfill or at the Incinerator.
- Metal and Glass sharps are collected in appropriate sharp containers.
- Metal sharps are melted for recycling.
- Glass sharps are pulverized for recycling.
- Sharps, if contaminated, must be autoclaved and deactivated before disposing of into containers.
- Ferro-magnetic debris are separated using magnetic filters and treated according to their nature.

Disposal of Chemical Waste

- Common chemical wastes include:
 - O Paint
 - O Batteries
 - O Motor Oil, Oil Filters and Antifreeze
 - O CFCs and HCFCs in Aerosol Sprays and Coolants
- Paints of all categories must be recycled to the full extent.
- Empty paint containers may comprise sediments and debris, which can be separated by allowing the material to settle for some time, so that the remaining paint can be poured out from the top and the sediment at the bottom removed and treated as per norms.
- Batteries should never be treated at Landfills because they contain toxic chemicals, which may pollute the environment.
- Batteries are generally incinerated, which is a safer option as compared to Landfill.
- Hammer mills are used to break the batteries and the electrolytes are treated chemically for neutralization.
- Motor Oil and other oil-based products can be recycled into lubricating oil.
- Mercury must be isolated chemically and recycled into:
 - **O** Thermometers
 - O Paints
 - Metal halide lamps
 - O Mercury Vapor Lamps
- Lead from batteries can be recovered through controlled temperature processes and later on, refined for resale.

- Batteries containing unknown levels of Mercury are treated at Mercury Retorts.
- CFCs (Chlorofluorocarbons) and HCFCs (Hydro-chlorofluorocarbons) are either recycled or destroyed. Destruction involves one or more of the following techniques:
 - O Superheated Steam
 - O Submerged Combustion
 - O Arc Plasma
 - O Solid Alkali Reaction
 - O Incineration
 - O Electric Furnace

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Summary



- Housekeeping in a furniture workshop involves operations related to the maintenance and cleaning of the work area, tools and equipment.
- Good housekeeping practices help in reducing accidents.
- Different materials in a workshop need to cleaned by different types of cleaning agents.
- Cleaning equipment are either operated by hand or powered.
- A Lead Assembler must know the common wastes and contaminants in the workplace.
- Furniture are affected by different types of contamination.
- Waste must be minimized using teh 3Rs Reduce, reuse and Recycle.

Activity



- The trainer provides the students with few contaminated pieces of furniture. They observe the furniture carefully, identify the contaminant, and state preventative measures.
- The trainer shows, from his/her laptop, various ppt slides comprising images of different wastes. The students identify the types of waste shown and state the correct method of disposing them of.

Exercise



Answer the Following Questions Briefly:

- 1. What are the benefits of good housekeeping practices?
- 2. Name few liquid cleaning agents.
- 3. Why are acids and alkalis used in cleaning?
- 4. Name few manual cleaning equipment.
- 5. What are the common cleaning methods in a workshop?
- 6. What are the common types of waste?
- 7. What is a Contaminant? Give a few examples.
- 8. Why does Wood expand in the monsoon season?
- 9. Why do Termite-afflicted furniture turn flimsy?
- 10. What are the different ways of minimizing waste?











11. Ensure Health and Safety at Workplace

Unit 11.1 Common Health and Safety Hazards in a Work Environment and Related Precautions

Unit 11.2 Potential Risks and Threats

Unit 11.3 Potential Hazards and Risks Which May Be Present at Furniture & Fittings Related Workplace

Unit 11.4 Storage and Handling of Hazardous Substances

Unit 11.5 Common Health and Safety Practices at Workplace

Unit 11.6 Different Risks Associated with the Use of Electrical Equipment



Key Learning Outcomes | 💆



At the end of this module, you will be able to:

- 1. Discuss the common health and safety standards
- Identify the potential risks and threats
- 3. Identify the potential hazards and risks which may be
- 4. Comply with the storage and
- 5. Discuss the common health and safety practices at workplace
- 6. List the different risks associated with the use of electrical equipment

Unit 11.1 Common Health and Safety Hazards in a Work Environment and Related Precautions

Unit Objectives



At the end of this unit, you will be able to:

- 1. Differentiate between Risk, Hazard and Threat
- 2. Interpret the meaning of Occupational Hazards
- 3. Identify the common health and safety hazards
- 4. Identify the other categories of hazards
- 5. Demonstrate the use of pictograms and symbols in identifying hazards
- 6. Discuss the common methods of identifying hazards

11.1.1 Difference between Risk, Hazard and Threat

Hazard is defined as a factor, which may cause harm to people and properties alike, like electricity, inflammable products, explosive material, corrosive chemical, using heavy ladders at workplace, etc. Simply put, a Hazard is simply a condition or a set of circumstances that present a potential for harm. Risk is defined as the likeliness or the chance that a hazard can actually cause harm to somebody. For example, smokers of cigarettes run the risk of developing Cancer. The potential or imminent danger that Risks and Hazards expose the concerned premises to, is known as Threat. For example, a person, who has the potential of blowing up a building, is a threat to that building and its inhabitants.

The steps involved in Risk Management are:

- 1. Identifying Hazards
- 2. Assessing Risks
- 3. Controlling and mitigating Risks

11.1.2 Understanding Occupational Hazards

Any job role and any occupation in this world has some hazards, in varying severity, associated with it. These are called Occupational Hazards. Occupational Hazard can be defined as "a risk accepted as a consequence of a particular occupation". According to the Collins English Dictionary, it is defined as "something unpleasant that one may suffer or experience as a result of doing his or her job".

Occupational Hazards are caused by the following:

A. Hazardous Working Ambience

- Unsafe and unguarded machinery and tools
- Hazardous and unmonitored processes
- Inappropriate and inadequate ventilation
- Inappropriate and inadequate illumination
- Inappropriate and unsafe dress

B. Hazardous Behaviour and Acts

- Using unsafe and unguarded machinery and tools
- Neglecting safety guidelines while working
- Ignoring the Instruction Manual or Directions for Use
- · Unsafe lifting, loading, staging, assembling and installing
- Not adopting the prescribed ergonomic postures
- Handling Personal Protective Equipment (PPE) and Safety Devices dysfunctional

- 11.1.3 Common Health and Safety Hazards

On the basis of effects on individuals, Occupational Hazards can be broadly categorized into: Health and Safety Hazards. Examples of Health Hazards are:

- Carcinogenic factors
- Corrosive
- Toxic
- Irritant
- Factors that may lead to chronic and adverse effects on one's health

Examples of Safety Hazards are:

- Spills on floors
- Tripping hazards like loose cords and cluttered workplace Working from high or raised areas like ladders, cranes, scaffolds, rooftops etc.
- Unsafe and unguarded machinery and their moving parts
- Electrical hazards like live wires, lack of earthing, loose cables, frayed cords, wet and poorly insulated devices, etc.
- Inadequate space

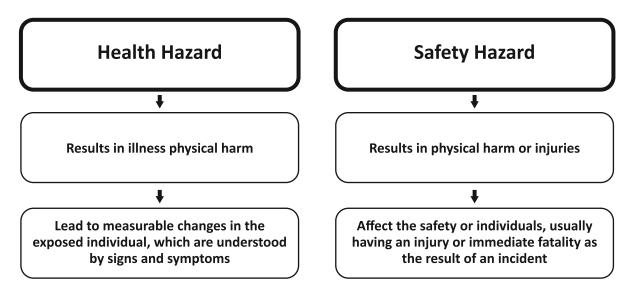
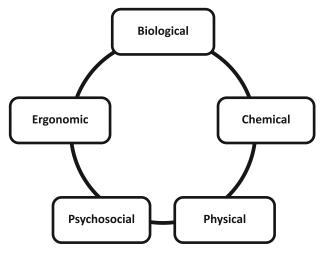


Fig. 11.1.3.1: Differences between Health & Safety Hazards

11.1.4 Other Categories of Hazards -

Apart from the ones mentioned above, Hazards can also be categorized on the basis of the Source of Energy. The types of hazards, according to the Source of Energy, are:



11.1.4.1: Various types of hazards

- **1. Biological -** These hazards are associated with working with animals, plants and their products, as well as contagious or infectious materials. Examples are:
- Body fluids like Blood, Saliva, Sweat and Semen
- Bacteria, Fungi and Viruses
- · Insect bites
- · Human and animal waste
- **2. Chemical -** These hazards occur, if, the inherent properties of materials pose harm to animal life, property or the environment as a whole. Severity of chemical hazards depends on the dosage and amount of the harmful components in a given chemical. Typical examples are:
- · Chemicals in unlabeled container
- Various types of cleaning products, chemical agents, solvents, solutions, paints, acids, etc.
- Vapours and fumes resulting from welding and gas cutting operations, as well as from strong solvents and solutions
- Harmful gases like CFCs, Acetylene, Carbon Monoxide, Sulphur Monoxide, Propane, Helium
- Insecticides and pesticides
- **3. Ergonomic -** These hazards occur, when the nature of work, body postures and working conditions exert strain on one's body. Common examples are:
- Inappropriately set up workstations and seats
- Frequent lifting by inappropriate techniques
- Repetitive and exhaustive movement
- · Exertion of excessive force
- Excessive mechanical vibration

- **4. Physical -** These hazards result from natural disasters, like earthquakes, floods, storms, etc., which cause massive loss of life and property. The hazardous factors are generally:
- Radiation
- Noise
- Dust and Debris
- Extreme temperatures (extremely high or low)
- **5. Psychosocial -** These hazards mainly result from stress in one's social and professional life. These include:
- Excessive workload
- Violence at workplace
- Sexual Harassment
- Lack of respect at workplace
- · Lack of flexibility at workplace
- Poor work relations
- Grapevine gossips

11.1.5 Common Methods of Identifying Hazards

Identification implies, that, the job is half done. In order to take adequate precautionary measures against hazards, one needs to identify the hazards commonly found in the workplace. The common methods of hazard identification are:

Job Hazard Analysis (JHA): This is a popular technique to identify the perils associated with specific tasks ina job role, in order to lessen the risk of injuries to employees. The steps involved in successfully conducting JHA are:

A. Divide the entire job role into small tasks or steps

Let us understand the concept with the help of an example, where JHA is being conducted on Carpentry work.

Steps	Hazards Associated	Recommendations
1. Loading job with tools and equipment		
2. Framing and Sheathing		
3. Prepping up and Painting		

B. Spot out the hazards associated with each step by asking questions like:

- What can go wrong with this task?
- What would be the consequences if the task went wrong?
- How could the task go wrong?
- What are the other contributing factors?
- What are the chances that this hazard will take place?

Steps	Hazards Associated	Recommendations
1. Loading job with tools and equipment	Injury from lifting, carrying, possible trip and fall	
2. Framing and Sheathing	 Injury from lifting, carrying, possible trip and fall Injury from power tools Injury from sharp objects, metal studs, wood splinters Lungs getting affected by dust and debris 	
3. Prepping up and Painting	Eye and skin injuryAccidentally touching the wet paintPaint fumes affecting the lungs	

- C. Review and discuss the scope of the hazards with the employees, who would actually do the tasks on hand
- D. Find out strategies and ways to mitigate or avoid the hazards

Steps	Hazards Associated	Recommendations
1. Loading job with tools and equipment	Injury from lifting, carrying, possible trip and fall	Abide by the recommended lifting guidelines
2. Framing and Sheathing	 Injury from lifting, carrying, possible trip and fall Injury from power tools Injury from sharp objects, metal studs, wood splinters Lungs getting affected by dust and debris 	 Abide by the recommended lifting guidelines Follow instruction manual for individual power tools, use GFCI (Ground Fault Circuit Interrupter) Use appropriate PPE
3. Prepping up and Painting	 Eye and skin injury Accidentally touching the wet paint Paint fumes affecting the lungs 	 Use appropriate PPE, including safety glasses, aprons and gloves Use "Wet Paint" sign

- **E. Review and revise JHA periodically:** JHA can be periodically reviewed and revised (if needed) by:
- 1. Hazard and Operability (HAZOP) Study: This technique involves a structured and systematic examination of an existing method / procedure, thus, in turn, identifying and assessing the associated hazards. These hazards can be easily identified in the form of Deviations in the process parameters (physical conditions and elements like flow, pressure, temperature, humidity, etc. The severity of Deviation can be illustrated with the help of specific and predetermined GuideWords. A Deviation is a manner in which the process conditions stray away from the expected values.

Guide Word + Process Condition / Parameter = Deviation. For example, No + Signal = No Signal

The steps involved in conducting HAZOP are:

- O Segregating the entire system or process into sections or components
- O Select a study node or point
- O Define the expected outcome or consequence
- O Choose a process parameter, based on the expected consequence
- O Implement a suitable Guide Word
- O Determine the Cause behind the deviation
- O Start with the cause that may lead to the worst possible consequence
- O Assess the deviations thus detected
- O Devise and prescribe action
- O Record and document information
- O Repeat the process from B

Common examples of process conditions / parameters are:

- O Temperature
- O Pressure
- O Flow
- O pH value
- O Viscosity
- **O** Time
- O Addition
- O Reduction
- O Separation
- O Signal
- O Mixing
- O Communication
- O Sequence
- O Control

• Common examples of Guide Words and their meanings are:

Guide Word	Meaning	Example
No (Not, None)	None of the desired consequence is achieved	No flow of gas through the gas cutting nozzle due to accumulated dirt
More (Higher than, More of)	Quantitative increase in a certain process parameter	More heat generated and higher temperature achieved than expected, during sawing operations
Less (Lesser than, Less of)	Quantitative reduction in a certain process parameter	Lower pressure than expected
As well as (In addition to)	All the design intentions are achieved and an additional activity takes place	All valves closed at the same time
Reverse	The logical opposite of the design intention takes place	The Power Drill continues drilling even after shutting down the power supply
Other Than	An unexpected activity takes place	Presence of liquid fuel in Gas Cylinder

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Unit 11.2 Potential Risks and Threats

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the Risk Management process
- 2. Evaluate the importance of Risk Assessment matrix
- 3. Devise Risk Control strategies

11.2.1 The Risk Management Process

Hazards indicate the presence and severity of potential risks and threats. Risk Management can be defined as the estimation and evaluation of risks, followed by the formulation of strategies to mitigate or avoid their adverse effects on a system.

The steps involved in the Risk Management process are:

- Step 1. Identify and define the risk
- Step 2. Analyze the risk in terms of likelihood and consequence
- Step 3. Assess and rank the risk in terms of severity
- Step 4. Treat the risk via Risk Response Planning
- Step 5. Monitor, track and review the risk

11.2.2 Importance of Risk Assessment Matrix

It is a good industrial practice to assess the severity and likeliness of risks, before undertaking a particular project or assignment. This can be successfully understood from a Risk Assessment Matrix or Risk Matrix. Risks can be assessed from the below parameters:

Severity: Negligible, Marginal, Critical and Catastrophic **Likeliness:** Rare, Unlikely, Possible, Likely and Certain

	Negligible	Marginal	Critical	Catastrophic
Certain	High	High	Extreme	Extreme
Likely	Moderate	High	High	Extreme
Possible	Low	Moderate	High	Extreme
Unlikely	Low	Low	Moderate	Extreme
Rare	Low	Low	Moderate	High

	Negligible	Marginal	Critical	Catastrophic
Certain	Stubbing Toe			
Likely		Fall		
Possible			Car Accident	
Unlikely			Plane Crash	
Rare				Tsunami / Earth- quake (Richter scale of 8 and above)

11.2.3 Risk Control Strategies

Once the hazards are identified and the severity of the associated risks assessed, the risks must be controlled and mitigated using appropriate strategies and programs. The various popular Risk Control Strategies are:



Fig. 11.2.3.1: Various Risk Control Strategies

- **Risk Defence** This involves implementing safeguards and protection methods to eradicate or lessen uncontrolled risk. Ex Using Personal Protective Equipment (PPE) while encountering hazardous operations.
- **Risk Avoidance** This involves averting a particular risk by discontinuing a given operation or process and replacing it with a safer option. Ex An explosive chemical can be replaced with a non-explosive or less explosive one.
- **Risk Transfer** This strategy involves transferring risks to other related areas in order to distribute the chances of loss equally or proportionately, so that one particular area does not get affected. Ex In Financial Management for an organization, its funds are invested into multiple projects involving varying degrees of risks, so that the losses (if any) incurred with one investment option can be offset with the profits earned from the remaining. This is called "Risk Distribution or Transfer". Purchasing an Insurance policy against a probable accident is also another good example.
- **Risk Mitigation** This strategy calls for reducing the impact of risks in a given operation or process, in case the vulnerable areas of the process get affected.
- Risk Retention Under this strategy, the risk associated with a given process is accepted and retained in the organization. The organization takes appropriate measures, in advance, to compensate for and finance the loss associated with the risk. This strategy typically involves two aspects Risk Retention with prior knowledge and Risk Retention without prior knowledge. Ex In Accounting, an organization keeps provision for Loss and Bad Debts (amounts, which cannot be retrieved form debtors). This is similar to buying an insurance against a probable Accident.
- **Risk Elimination** This strategy can be implemented by adopting suitable measures to curb the severity of a given risk. This can be accomplished by fixing a vulnerability or weakness in the organization, that exposes the organization and its operations to the risk. Compensatory control systems are set up to either mitigate the probability of the weakness, at its very root, or lessening the severity of its impact.

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Unit 11.3 Potential Hazards and Risks Which May Be Present at Furniture & Fittings Related Workplace

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the potential hazards and risks associated with Furniture & Fittings Related Workplace
- 2. Discuss how to get acquainted with common hazardous substances
- 3. Apply safety measures while handling glass, heavy wood, materials, chemicals etc.

11.3.1 Potential Hazards and Risks Associated with Furniture & Fittings Related Workplace

A Lead Assembler Modular Furniture is exposed to multiple Occupational Health Hazards. Potential hazards and risks are the ones, which are likely to occur, but have not occurred yet. The knowledge on the same is essential so that the trainees stay aware and alert while working hands on live assignments. These are:

- Injury (of varying severity) hazards and risks from the use of different equipment, machinery and tools
- Ergonomic injuries, fatigue and muscle stress arising from working in long shifts, in awkward and inconvenient positions, exposure to repetitive tasks and lifting as per inappropriate methods
- Biologically and chemically toxic hazards like prolonged exposure to toxic pathogens (harmful microorganisms like bacteria, fungi and moulds, viruses and their vectors and carriers), corrosive, harmful and radioactive chemicals
- Exposure to extreme temperatures and the resulting risks like Heat Stroke and Hypothermia (the condition of having fatally low body temperature)
- Prolonged or repetitive exposure to carcinogenic (causing cancer) materials like radioactive materials, radiations and waste like wood dust and formaldehyde in pressed wood
- Exposure to toxic fumes from chemical solvents and hydrocarbons
- Exposure to highly combustible materials like wood debris, straw and hay, gas cylinders, etc.
- Exposure of the eye to sharps, debris and flying splinters
- Exposure to climbing heights (trolleys, ladders, scaffolding and cranes) and the resultant risk of falling from them

11.3.2 Common Hazardous Substances that Lead Assemblers of Modular Furniture Encounter

1. Common Toxins- A Toxin can be commonly defined as a poison of plant, animal or chemical origin, that varies in severity and causes damage to plant, animal and human life.

The various types of toxins are:

- a. Chemical Toxins These include both inorganic and organic substances like:
- Mercury
- Lead

- Hydrofluoric Acid
- · Cyanides like Hydrocyanic Acid and Potassium cyanide
- Chlorofluorocarbons (CFCs) present in Cooling Fluids, Refrigerants, Aerosol Sprays, Solvents, Pesticides, Propellants, etc.
- Carbon Monoxide
- Benzene
- Methane and Methyl Alcohol
- Paints
- · Miscellaneous chemical solvents like Formaldehyde

Chemical Toxins chemically react or interfere with the various physiological processes in the body.

- **b) Physical Toxins -** These include substances, which, owing to their physical nature, adversely affect the various biological processes of the body. Common examples are:
- Coal Dust
- Finely divided Silicon dioxide
- Asbestos fibres
- Miscellaneous Air Pollutants
- c) Asphyxiating gases These are generally heavier than Oxygen and replace Oxygen in breathable air, thus suffocating the exposed victims to paralysis and even death)like Hydrogen, Helium, Argon, Nitrogen, Carbon dioxide, Butane, Propane, Sulphur dioxide, etc.
- d) Biological Toxins These include harmful microorganisms, commonly known as "Pathogens", like Viruses, Bacteria, Fungi, Parasites (like Pests, Hookworm, Tapeworm, etc.), pathogen-carrying vectors (like Mosquitoes, Flies, Beetles and Rats), poisonous animals (like Snakes, Spiders, Jellyfish, Scorpions, certain species of frogs, fish, etc.), poisonous plants(like Cassava, Opium, Datura, Hemlock, Poison Ivy, etc.)

Common effects of Toxins on human beings are:

- Nausea
- Diarrhoea
- Perspiration
- Abdominal Pain
- Thrombosis
- Seizure
- Muscle Spasms
- Confusion
- · Loss of Vision
- Suffocation
- Panic
- Necrosis
- Paralysis
- Abnormal skin colour like black, blue, green and yellow

2. Carcinogens - Carcinogens are substances, which initiate and promote the disease Carcinoma, commonly known as Cancer. Cancer occurs due to the ability of carcinogens to damage, change or mutate the genetic composition of the body, or, due to the disruption of the cellular metabolic processes in the body. These include radioactive substances like Uranium, Plutonium, Gamma radiation, X-rays, Ultraviolet radiation, Radium, etc.

The effects and sources of common carcinogens, which Lead Assemblers of Modular Furniture are exposed to, are evident from the below table:

Carcinogen	Affected Body Part	Common Sources
Passive Smoking	Lungs, Mouth	Smoke from cigarettes and cigars, exhaled by smokers
Asbestos	Lungs, Gastrointestinal tract	Construction materials, roofs, floor tiles, Fire-resistant cloths and textiles
Arsenic and its compounds	Lungs, Skin	Arsenic Alloys, few medicines, Contaminated Water, Electronic and Semiconductor devices, Insecticides, Fungicides, Smelting by- products
Benzene	Blood, Lymph nodes, Groins	Aromatic solvents, Fumigants, Paints, Rubber, Dry Cleaning agents, Adhesives, Soaps and Detergents, Printing Ink
Cadmium and its compounds	Prostate	Cadmium batteries or cells, Metal-based paint and coating, Yellow paint, Soldered surfaces or pieces
Cigarette Tar	Lungs, Mouth, Gastrointestinal tract	Different forms of tobacco consumed or inhaled by man
Chromium (hexavalent) compounds	Lungs	Paints and pigments
Exhaust Fumes	Lungs, Gastrointestinal tract, Colon, Bladder	Exhaust fumes / smokes from automobiles
Nickel and its compounds	Lungs	Nickel batteries or cells, Nickel plating and alloys, Paint, Ceramic materials, Stainless Steel welding by-product
Radium (224, 226, 238), Plutonium (239)	Bone, Liver	Self-luminous paints

Table 11.3.2.1: Carcinogens, their effects and sources

3. Combustible Materials - A material is said to be Combustible if it catches fire and burns easily. Combustible substances are also called Inflammable substances.

Combustible materials can be broadly categorized into the following:

- **Flammable solids** Examples are desensitized explosives, thermally unstable and self-reactive materials like Peroxides, Sodium (solid, metallic form), etc.
- Flammable liquids Examples are alcohols, fuel oils, acetone, solvents, paints and wood thinners
- Flammable gases Examples are Hydrogen, Butane, Methane and Acetylene, LPG, etc.
- **4. Sharps -** These include objects or devices that can puncture the skin. Common examples of Sharps are:
 - Hypodermic syringes and attached lancets / needles
 - Scalpels, Razors and Blades
 - Glass, Wood, Metal or Fibre Splinters

Sharps are considered Biological Hazards and Toxins since they are often infected from prior human or animal contact.

Notes 🗐 -			
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Unit 11.4 Storage and Handling of Hazardous Substances

- Unit Objectives



At the end of this unit, you will be able to:

1. Comply with recommended material handling procedure to control damage and personal injury

Follow recommended material handling procedure to control damage and personal injury

In order to ensure appropriate safety practices at the workplace, one must understand the importance of following recommended material handling procedure to control damage and personal injury. The essentials of the same have been discussed below:

A. Biological

- Infectious and potentially infectious materials must be inactivated by bleaching or Autoclave Sterilization during storage and before disposal.
- Infectious waste must be inactivated within 24 hours and marked with "Biohazard" symbol.
- Appropriate PPE must be worn or used while procuring, handling and disposing of infectious materials.
- Non-infectious biological waste do not need inactivation but must be put away separately in biological waste box, lined with red garbage bag
- Non-infectious biological waste include used but uncontaminated laboratory utensils, disposable clothing and gloves
- Sharps waste (including metal lancets, hypodermic needles, scalpel blades, medical instruments for cutting and piercing), used and unused, must be placed in red sharp boxes.
- Sharps boxes must be closed, when they get 3/4 full.
- Closed Sharp boxes must not be stored for more than 30 days.
- Contaminated sharps must be autoclaved and inactivated before storing for disposal.
- Penetration-resistant gloves must be worn for handling and storing contaminated sharps.

B. Chemicals

- One must read all information stated in the Material Safety Data Sheet (MSDS), before handling chemically toxic materials, so that the user is aware of the hazards involved and the necessary precautions
- All storage containers must be appropriately and accurately labelled.
- Any incident of damaged container or illegible label must be reported to the concerned authority.
- One must ensure that incompatible materials (like Acetone and concentrated Nitric Acid, Molten Wax and Water) are stored and used separately.
- To avoid destruction of containers, corrosive chemicals must never be stored in containers made of inappropriate materials.
- · Containers of corrosive materials must be closed tightly.
- Appropriate PPE must be worn while handling toxic and corrosive chemicals.
- One must never consume anything while handling toxic chemicals and can do so only after thoroughly cleansing oneself with appropriate soap and solutions.

- Chemicals that produce a lot of fumes must be used carefully, enclosed in a Fume Hood.
 - Flammable chemicals like alcohol, benzene, gasoline, Carbon disulphide, etc. must be handled only after turning off all sources of flame (burners, ovens, heaters, etc.)
 - Flammable liquids must be only heated in a flask fitted with a Reflux Condenser; they must never be heated in open containers over open flames.
 - While working with acids, one must wear acid resistant chemical gloves and clothing.
 - One must keep emergency eye wash solutions handy.
 - Dilution of acids must be done very carefully, by gradually stirring the concentrated acid into the water.
 - Ethers must not be kept open and exposed to open air, because, this would create peroxides, which are highly unstable and may lead to violent explosions.
 - All chemicals must be treated as a potential toxin and hence, one must keep appropriate antidotes nearby.

C. Radioactive

- Containers for storing radioactive materials or items contaminated with radioactivity must be labelled with "Nuclear" or "Radioactive Hazard" sign and the Radioactive tape.
- Severely contaminated items must be stored and handled under specially designated Fume Hoods and Radioactive Materials (RAM) Hood.
- Lead is considered the most appropriate material to store and contain radioactive materials.
- One must never pipette radioactive materials by mouth.
- Radioactive waste cans must remain covered at all times and must be placed in enclosed, secluded areas, away from the working premises.
- Radioactive waste cans, if contaminated with substantial external radiation levels, must be provided with additional shielding.
- While handling or storing radioactive materials, the work surface must be covered with Absorbent Paper sheet to capture contamination.
- A separate set of equipment must be dedicated to handling and storing radioactive materials and must be labelled carefully with radioactive tape.
- Radioactive materials must never be left unsecured and unattended, even for a short span of time.
- One must never leave edible items open near radioactive materials.
- One must keep on surveying the skin of the wrists while handling radioactive materials.
- Long gloves and lead-lined protective clothing must be worn.

D. Flammable and Explosive

- Appropriate PPE, like disposable gloves (generally lead-lined latex or nitrile gloves) and close-toed shoes must be worn while handling radioactive materials.
- Flammable materials must be contained, stored or transported in vapour-proof, metal or plastic containers and must be equipped with welded seams, spark / flame arrestors, pressure release valves, spring closing lids with spout covers, etc.
- Care must be taken that the flammable material does not react with the container material.
- Containers must be labelled with "Flammable" sign.
- The labeling comprises the following information:
- Name of the flammable material
- Disclaimer that the contents are flammable

- Precautions to be taken, like the fact that the container should be kept away from open flames, spark and other sources of ignition
- Storage and transportation containers for flammable substances must remain closed, when not in
 use.
- Flammable gas cylinders must be stored in a separate room
- Cylinders must be fitted with appropriate valves so that they do not run the chances of leakage
- Parts of the cylinder, like valves, hoses and container, must be checked regularly for damages.
- Compressed gases must never be stored along with or near bulk storage containers for flammable materials.
- Pieces of wood, straw and hay, saw dust, paper, cardboard etc. must be cleared off as soon as they are procured during the Furniture & Fittings operations.
- Adequate care must be adopted to ensure that the entire work area is a non-smoking zone.

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Unit 11.5 Common Health and Safety Practices at Workplace

- Unit Objectives



At the end of this unit, you will be able to:

1. Identify the common health and safety practices at workplace for Lead Assemblers of Modular Furniture

Common Health and Safety Practices at Workplace for Lead Assemblers of Modular Furniture

A. Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines

- Ensure that all emergency route maps are on display, in publicly accessible places, on all floors of the workplace
- Ensure that appropriate Fire Extinguishers are available on all the floors of the workplace
- Ask your supervisor how you may retrieve PPE and how to maintain and store the same
- Stay aware that confined spaces must bear appropriate signs, to restrict claustrophobic people from accessing them
- Learn and abide by company policy and procedures for dealing with security risks in your workplace
- Learn and abide by Company policies and procedures for making sure that security will be maintained when you go on your breaks and when you finish work

B. Ensure that health and safety instructions applicable to the work place are being followed

- Lighting should be adequate in all areas and replacement bulbs should be kept handy
- Ensure that all manual cutting tools must be honed in advance, because blunt tools can slip and lead to deep cuts
- Ensure that, while using cutting tools, the direction of cutting is always away from your body
- Arrange for frequent Safety Drills and Trainings for employees to promote safety awareness
- Have clear idea of how much authority and responsibility you have to deal with security risks, including your legal rights and duties
- · Learn and abide by company policies and procedures for maintaining security while you work

C. Check the worksite for any possible health and safety hazards

- Appoint a Safety Supervisor in workshop
- This Safety Supervisor will stay responsible for checking the worksite for potential health and safety hazards
- Have your employer develop a daily checklist for all areas, delegated to appropriate employees

D. Follow manufacturers' instructions and job specifications relating to safe use of materials specifically chemicals and power equipment

Ensure that all Chemical Solutions, used on display shelves or for Housekeeping purposes, must be
used only after referring to the relevant MSDS (Material Safety Data Sheets) or Instruction
Manuals

- Loosely fitted clothes must be completely avoided because the loose ends may get caught in powered machinery and tools and may be fatal
- Ensure that you read the Instruction Manual thoroughly before handling powered tools and equipment.

E. Follow electrical safety measures while working with electrically powered tools & equipment

- Powered tools and equipment must be inspected for any damage, before and after every use.
- The power cord must be checked carefully for any fraying, faults, cracks or loss of insulation.
- Damaged switches must be reported to supervisor and repaired immediately.
- Plugs must be checked for missing or faulty prongs / pins.

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F. Ensure safe handling and disposal of waste and debris

- All walkways should be cleared of clutter and debris, to avoid trips and falls.
- Any spill should be cleared off immediately and 'Wet Floor' or 'Work in Progress' signs should be used in appropriate places.
- Store equipment, Tools and Chemicals should be stored appropriately, abiding by all instructions provided in the Instruction Manual and 'Directions for Use'.

G. Follow emergency and evacuation procedures in case of accidents, fires, natural calamities For Fire Outbreak:

The emergency and evacuation procedures are:

- A clear passageway must be present to all escape routes.
- Signage like escape routes should be clearly marked.
- Enough exits and routes must be there for all people to escape
- Emergency doors, that open easily, must be present.
- Emergency lighting (Infrared lights for night and blurred vision) must be present.
- All people at the workplace must be given brief instructions about the positions of the escape routes.
- Brief instructions must also be given regarding the availability and use of fire extinguishers.
- The workplace must have a safe meeting point or assembly area for the staff.
- Nobody should use the Elevator during fire.

Correctly demonstrate rescue techniques applied during fire hazard:

A. Responding to Fire

- The Fire Alarm System must be initiated and an alert must be raised.
- A safe evacuation path must be identified before dealing with the fire.
- The appropriate class of Fire Extinguisher must be chosen.
- The P.A.S.S technique must be adopted for extinguishing the fire.
- Immediate evacuation must be initiated if the extinguisher is exhausted and the fire still exists.
- Call the workplace security or the local emergency services.
- Summon the fire fighting services at the earliest.
- Stay as far as possible from smoke, because smoke may comprise toxic gases.
- Cover your mouth and nose with a damp cloth to protect yourself. If possible, help your colleagues (those who are with you) to repeat the same.

- Look out for the nearest emergency exit routes and call out for people, who you can take along with you.
- While opening a door, first touch the door with the back side of your palm.
- Keep doors open, after you open them.
- Start moving out of the building and ask your colleagues to do so.
- Always use a staircase and not the elevator.
- Do not rush.
- As you move out of the building, gather people, whoever you come across.
- Always move downstairs and avoid returning to the burning premises, till the firefighters arrive.

B. Initiate Evacuation

- Stop your work but safely and without spreading panic.
- Gather and carry only the most important items like cell phone.
- Leave the workplace through the nearest door bearing an "Exit" sign.
- Report to the designated Assembly Area.
- Await instructions from the Safety Committee.
- Incorporate first aid treatment to anyone in need.

For Natural Calamities / Disasters:

A. Earthquake

- The emergency and evacuation procedures are:
- Quickly shutdown any hazardous operations or processes and render them safe.
- Notify others in the area by raising an alarm if they have not heard it while you are evacuating yourself.
- Exit the room.
- Take jackets or other clothing needed for protection from the weather.
- If possible, close windows and doors as you leave, but do not lock the doors and emergency exit
 routes.
- Exit the building, walk to the nearest safe exit route. Do not run. Do not use elevators.

B. Flood and Storms

- The emergency and evacuation procedures are:
- Stay alert, avoid panicking and monitor the surroundings with eyes and ears open.
- Move to the high grounds and help others move before the flood strikes.
- Accumulate disaster supplies like:
 - O Canned, dry, ready-to-eat and packaged food, which do not require refrigeration or cooking
 - O Liquid cash
 - O Drinking water in clean containers
 - O First Aid Kit
 - Essential clothing
 - O Flashlights
 - O Adequate batteries
- Instruct people around you not to drive

- Do not walk or swim through flooded water
- Shut off the Mains Supply (electricity) at the circuit breakers
- Stay alert for evacuation calls and help people identify alternate routes of getting there

For Accidents:

The emergency and evacuation procedures are:

- Summon emergency medical help by calling up the Safety Committee officials or the toll-free number.
- Check and examine the site, to gather as much information (location, nature and severity of injuries, casualty if any, hazards present, etc.) as possible, so that the same can be provided to the emergency team, once it arrives.
- One must inform the immediate supervisor about an injury or illness.
- If possible, workers may treat themselves to first aid or ask colleagues to do so.
- One must extend help and assistance to others.

The general steps involved in carrying out an evacuation are:

- Stop your work but safely and without spreading panic.
- Gather and carry only the most important items like cell phone.
- Leave the workplace through the nearest door bearing an "Exit" sign.
- Report to the designated Assembly Area.
- Await instructions from the Safety Committee.
- Incorporate first aid treatment to anyone in need.

Evacuation and emergency procedures for the specially-abled:

- The Visually Impaired
 - O Announce the type of emergency
 - O Offer your arm for help
- With Impaired Hearing
 - O Turn lights on/off to gain the person's attention, or indicate directions with gestures, or write a note with evacuation directions
- People with Prosthetic Limbs, Crutches, Canes, Walkers, etc.
 - Evacuate these individuals along a route specially designated as injured persons.
 - Assist and accompany to evacuation site if possible.
 - O Use a sturdy chair, or a wheeled one, to move the person to an enclosed stairwell.
 - O Notify emergency crew of their location.

Hazard Report Form				
Name:	Date:			
Location:				
Tool/ Equipment:				
Description of the hazard:				
Suggested corrective action:				
Signature:				
Supervisor's remarks:				
Corrective action taken:				
Signature of Supervisor: Date:				

Fig 11.4.1: Sample form of reporting hazards

Unit 11.6 Different Risks Associated with the Use of Electrical Equipment

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the different risks associated with the use of electrical equipment
- 2 Demonstrate how to free a person from electrocution

11.6.1 Different Risks Associated with the Use of Electrical Equipment

The risks associated with the use of electrical equipment are extended to both the user and his / her surroundings in the workplace, to people and properties alike. Few of such risks are:

- Fatal Electrocution accidents
- · Non-fatal electric shocks leading to serious burn injuries
- Non-fatal yet severe shocks leading to damages caused to the internal tissues and vital organs like the heart and the brain
- Falls from ladders, cranes and scaffolding and resulting mechanical injuries due to electric shocks
- Health issues like muscle spasms, nausea, unconsciousness and palpitations
- Non-fatal yet painful static electric shocks
- Fire outbreaks and explosions caused by the sudden ignition of flammable materials

11.6.2 Demonstrate how to free a person from electrocution _

Electrocution, to put simply, is injury or death caused by electric shock. The following procedure must be adopted while freeing a victim from electrocution:

1. Approach

- The first step is to approach the spot to find out if you run the risk of electrocution as well.
- Summon help from a colleague, who is trained in treating electrocution victims.

2. Inspect

- Examine the accident scene to ensure if the source of electrocution is still active.
- Examine if the victim is still in contact with the source of shock.



Fig 11.6.2.1: Approach the victim and inspect the accident from a safe distance

3. Disconnect

- Disconnect the main power supply of the area.
- Avoid any electrical conductors in the surroundings.
- Touch the victim only if all power sources have been deactivated.

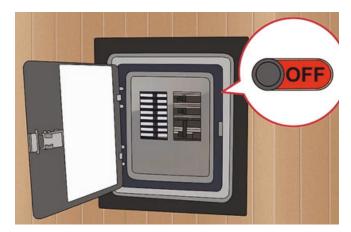


Fig 11.6.2.2:: Disconnect the source of power

4. Insulate

- In case it is impossible to deactivate the power supply, the victim must be removed from the vicinity of the live power source.
- This should be done by wearing appropriate insulating PPE.

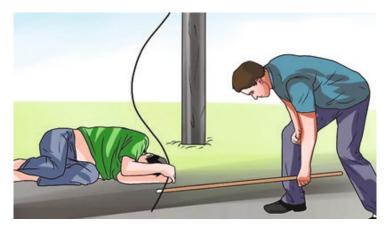


Fig 11.6.2.3: Use insulators to approach the victim of electrocution

5. Rescue

- The victim must not be removed in case of neck or spine injury.
- The area must not be crowded to allow sufficient breathing air.
- The victim's breathing rate and pulses must be checked.
- CPR may be incorporated if required.



Fig 11.6.2.4:: Perform CPR if required

6. Recollect

- Never touch the victim or the surroundings without disconnecting the main power supply.
- Wear appropriate insulating gloves and shoes, to protect yourself from electric shocks.

11.6.3 Good Hygiene Practices

Maintaining personal hygiene is very important for you. Your personal hygiene not only affects you, it affects others too. Good hygiene practices inloude:



Fig 11.6.3.1:Proper Hygiene Practices

Oral Hygiene

- Brush your teeth at least twice a day
- Floss at least once each day, for inter-dental care
- Use a tongue scraper to keep your tongue clean

Skin Hygiene

- Shower, bath or wash your body thoroughly with soap and water
- Take bath once or twice a day
- Avoid sharing towels

Hair Hygiene

- Wash your hair every day, with soap or shampoo
- Comb your hair
- Oil your hair regularly

Nail Hygiene

- Clean your nails by thoroughly removing dirt from them
- Trim your nails often and preferably, keep them short

Feet Hygiene

- Wash your feet with warm water and soap
- Scrub the heel of your foot with a pumice stone to prevent it from cracking
- Powder your feet before putting on socks to prevent perspiration and foul smell

Keep Yourself Fit

The wise Italians say, "Men sana in corpore sano" (Sound mind in a sound body).

Working with wood is very physically demanding. Prolonged standing, climbing, bending, and kneeling often are necessary. A wood worker often has to stand on ladders. So you have to be physically fit and strong. Keeping the weight in check and ensuring proper exercise will keep you fit and happy.



Fig 11.6.3.2: Work out daily to stay fit

Summary



- Hazard is defined as a factor, which may cause harm to people and properties alike.
- Risk is defined as the likeliness or the chance that a hazard can actually cause harm to somebody.
- The potential or imminent danger that Risks and Hazards expose the concerned premises to, is known as Threat.
- Any job role and any occupation in this world has some hazards, in varying severity, associated with it.
- Symbols, labels and pictograms help in cautioning people against hazards.
- Job Hazard Analysis is a popular technique to identify the perils associated with specific tasks in a job role.
- Risk Management can be defined as the estimation and evaluation and mitigation or avoidance of risks.
- PPE are tools and apparatus that protect the user against occupational hazards.
- One must understand the importance of storage and handling of hazardous substances.

Activity



- The trainer divides the class into few groups. Ask each group to think about and share few points on any one of the following topics:
 - O Occupational Hazards for Lead Assemblers and how to reduce the same
 - O How to save an electrocuted victim
 - O Common Chemical Hazards
 - O Common Electrical Hazards
 - O Types of Toxins
 - O Storage and handling of sharps
 - O Storage and handling of inflammable materials
 - O PPE used while handling biologically hazardous materials
 - O Storage and handling of Radioactive materials
 - Treating infected waste
- The trainer shows, from his/her laptop, few ppt slides comprising images of different hazardous substances. The students identify the categories of each substance and prepare a list on how each substance must be stored and handled.



Sta	State if the following statements are TRUE or FALSE:						
1.	PPE is optional for the workers in a factory.	[T/F]					
2.	Toxic materials fall under hazard.	[T/F]					
3.	Modularity is an approach of designing furniture, which involves subdividing a system into numerous small building blocks, or elementary components.	[T/F]					
4.	Decision-making falls under Core & Generic Skills.	[T/F]					
5.	HAZOP can be defined as the estimation, evaluation and mitigation of risks.	[T/F]					











12. Fighting Fire

Unit 12.1 Various Causes of Fire

Unit 12.2 Different Types of Fire Extinguishers and their Use

Unit 12.3 Techniques of Using the Different Fire Extinguishers



Key Learning Outcomes 👸



At the end of this module, you will be able to:

- 1. Identify the various causes of fire
- Discuss the different types of fire extinguishers and their use
- 3. Practice the techniques of using the different fire extinguishers

Unit 12.1 Various Causes of Fire

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the various sources of fire
- 2. Identify the various causes of fire in the workplace
- 3. Discuss the methods of extinguishing fire
- 4. Comply with the appropriate procedure in case a of fire emergency

12.1.1 Various Sources of Fire

Fire is the result of a reaction primarily involving oxidation of combustible substances. When oxidation of combustible substances takes place, heat and light are produced, leading to Fire. 3 things are essential for a fire to occur and these can be represented by 3 arms of a triangle.

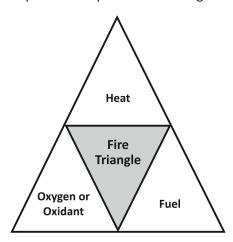


Fig. 12.1.1.1: The various sources of Fire as per the Fire Triangle

12.1.2 Various Causes of Fire in the Workplace

The various causes of Fire in the workplace are:

- **Common Fire Hazards** These include combustible and inflammable materials like waste paper, cardboards, wood, saw dust, hay, straw, liquid fuels, gas cylinders, etc.
- Faulty Electrical Wiring This is one of the most common causes of fire outbreaks in the workplace. Faulty Electrical Wiring includes:
 - O Outdated and frayed wires and cables
 - **O** Misuse of portable heaters, which includes putting them extremely close to inflammable surfaces like upholstery, couches, chairs, desks, rugs and carpets
 - Misuse of Extension Cords by plugging in appliances into Extension Cords and not directly into outlets
 - O Misuse of cords by letting them run under rugs (made of combustible fibre)
 - O Removal of the Grounding Plug from a cord, in order to use it in a two-pronged electrical outlet

- O Installation of lamps and light bulbs with a wattage specification, too high for the existing outlets
- **Faulty Electrical Equipment** Short Circuit faults occur, when the circuit in an electrical apparatus allows a current to travel along an accidental path with NIL or extremely low resistance.
 - Short Circuit is caused by internal breakdown of equipment, resulting in the deterioration of insulation.
 - O Short Circuit is also caused by insulation failure due to lightning surges, overloading of equipment due to overheating, physical damage, etc.

Depending on the source, fires can be classified into the following:

• Class A: fires involving solid materials such as wood, paper or textiles



Fig 12.1.2.1: Class A Fire

• Class B: fires involving flammable liquids such as petrol, diesel or oils



Fig 12.1.2.2: Class B Fire

• Class C: fires involving flammable gases like propane, butane, methane, etc.



Fig 12.1.2.3: Class C Fire

• Class D: fires involving combustible metals like sodium, magnesium, potassium, lithium, titanium, aluminium, etc.



Fig 12.1.2.4: Class D Fire

• Class F: fires involving cooking oils such as in deep-fat fryers



Fig 12.1.2.5: Class K Fire

- 12.1.3 Learning the Methods of Extinguishing Fire -

The most common methods for extinguishing fire are:

- Cooling the Burning Material
- Cutting out the Oxygen Supply from the Fire
- Removing Fuel from the Fire
- Using a Flame Inhibitor (like Fire Extinguishers that chemically react with the burning material and extinguishes the fire)

Among the above, using Fire Extinguishers is the most popular method of extinguishing fires.



Fig 12.1.3.1: Fire Extinguishing Code

12.1.4 Follow appropriate procedure in case of a fire emergency

Dos	Don'ts
Switch off the isolation switch to stop the electric supply. This will prevent the spreading of fire.	Do not place combustible items like cotton waste - oil soaked cotton or oil, near the brazing or electrical points. These are highly inflammable and even a small spark may start a fire.
Use a wooden stick to switch off the isolation switch to protect yourself from an electric shock.	Do not keep the LPG cylinder's regulator switched on.
Check electrical sockets and switches to ensure there are no loose wires.	Do not use water on electrical fires.
Use appropriate Fire Extinguishers to put out Fire.	

Notes 🗐 —			

Unit 12.2 Different Types of Fire Extinguishers and their Use

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss the different types of fire extinguishers and their use

12.2.1 Different Types of Fire Extinguishers -

The main types of Fire Extinguishers and their uses are:

• Water - For extinguishing wood, cloth, plastics, coal, textile, paper and fires from other solid combustible materials



Fig 12.2.1.1: Water Extinguisher

• Powder - For extinguishing fires from solid combustible materials, liquid, gas and electrical sources



Fig 12.2.1.2: Dry Chemical Powder (DCP)

• Foam - For extinguishing fires from combustible solid and liquid materials



Fig 12.2.1.3: Foam Extinguisher

• Carbon dioxide (CO₂) - For extinguishing fires from liquid and electrical sources



Fig 12.2.1.4: Carbon dioxide Extinguisher

• Sand - For extinguishing fires dry combustible substances like leaves, branches, pieces of wood etc.



Fig 12.2.1.5: Sand



Unit 12.3 Techniques of Using the Different Fire Extinguishers

- Unit Objectives

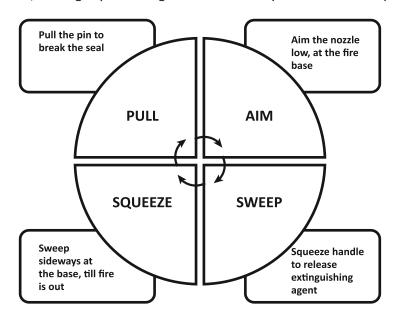


At the end of this unit, you will be able to:

1. Demonstrate how to use the various appropriate fire extinguishers on different types of fires

A. Demonstrate the correct use of a fire extinguisher

The method, in general, of using any fire extinguisher is defined by the P.A.S.S technique:



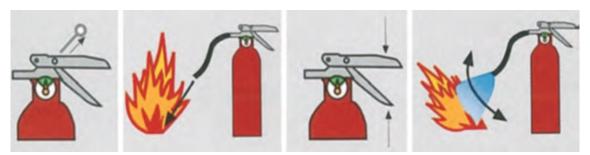


Fig 12.3.1: PASS Technique

B. Use the various appropriate Fire Extinguishers on different types of fires correctly

- Water
 - After ensuring that the extinguisher is full (by checking if the Pressure Gauge is pointing at the green area), the Safety Pin must be removed, which in turn would break the seal.
 - O For a fire spreading horizontally, the hose of the Water Extinguisher must be aimed at the base of the fire and the jet of water must be moved across the area of the fire.
 - For a fire spreading vertically, the hose of the Water Extinguisher must be aimed at the base of the fire, thus moving the jet gradually upwards, following the direction of the fire.

- O The lever must be gradually squeezed to discharge the extinguisher.
- O The user must move closer to the diminishing fire, gradually, applying the extinguishing agent at the same time.
- O The user must look out for any hot regions that may reignite.
- O The user must note that Water Extinguishers are suitable for Class A fires only.

Powder

- O After ensuring that the extinguisher is full (by checking if the Pressure Gauge is pointing at the green area), the Safety Pin must be removed, which in turn would break the seal.
- O For extinguishing fires from flammable solid materials, the hose of the Powder Extinguisher must be aimed at the base of the fire and moved gradually across the area of the fire.
- O For extinguishing fire from spilled liquids, the hose of the extinguisher must be must be aimed at the near edge of the fire and moved with a brisk sweeping movement, thus driving the fire towards the far edge till all the flames have been put out.
- O For extinguishing fire from flowing liquids, the hose of the Powder Extinguisher must be aimed at the base of the fire and be swept upwards, till all the flames have been put out.
- O The lever must be gradually squeezed to discharge the extinguisher.
- O The user must move closer to the diminishing fire, gradually, applying the extinguishing agent at the same time.
- O The user must look out for any hot regions that may reignite.
- O The user must note that Powder Extinguishers are suitable for Class A, B and C fires only.
- A Powder Extinguisher must be used differently, depending on the class of the fire it is being used on.

Foam

- O After ensuring that the extinguisher is full (by checking if the Pressure Gauge is pointing at the green area), the Safety Pin must be removed, which in turn would break the seal.
- O For extinguishing fire from flammable liquids, the hose of the Foam Extinguisher must be aimed at a vertical surface near the fire and must never be sprayed directly at the fire, to prevent the fire from being pushed and spread to the surrounding areas.
- O For using Foam Extinguisher on live Electrical Fires, it must be tested to 35 kV, keeping a safe distance of 1 km.
- For putting out fire from combustible solid materials, the hose must be aimed at the base of the fire, moving across the entire area of the fire.
- **O** Foam Extinguishers are suitable for both Class A and B fires. However, the technique of application differs for both the classes.
- O Foam Extinguishers help in putting out fires by accumulating a thick foam blanket across the entire surface of the fire.
- O This built-up foam blanket prevents re-ignition of fire.

CO₂

- After ensuring that the extinguisher is full (by checking if the Pressure Gauge is pointing at the green area), the Safety Pin must be removed, which in turn would break the seal.
- O While putting out fire from flammable liquids, the hose of the CO₂ extinguisher must be aimed at the base of the fire and briskly move across the area.
- O The user needs to ensure that the CO₂ jet does not splash the burning liquid.
- O For extinguishing live electrical fire, the power supply must be switched off, if it is safe to do the same, and then, the hose must be aimed directly at the fire.
- O Adequate care must be taken to extinguish the fire completely, since reignition is possible while using CO_2 extinguishers.
- O These extinguishers are suitable for using on Class B and E fires. However, the technique of application differs for both the classes.

Wet Chemical

- After ensuring that the extinguisher is full (by checking if the Pressure Gauge is pointing at the green area), the Safety Pin must be removed, which in turn would break the seal.
- O The heat source must be turned off.
- O The lance must be held at an arm's length from the body, thus maintaining a safe distance with the fire.
- O The nozzle, at this juncture, must be at least 1 m away from the source of fire.
- O The lever must be squeezed slowly to discharge the extinguishing agent.
- The spray must be applied in gentle round movements, allowing the wet chemical to enter the fire gradually, thus preventing hot molten fats and oils from splashing on to the user.
- O The user must ensure that the entire fire has been extinguished, since wet chemical may instigate re-ignition.
- O These extinguishers are suitable to put out Class A, B and F fires.

Notes	ı		

Summary



- 3 things are essential for a fire to occur and these can be represented by 3 arms of a triangle: Heat, Oxygen / Oxidant and Fuel.
- The common fire hazards include combustible and inflammable materials like waste paper, cardboards, wood, saw dust, hay, straw, liquid fuels, gas cylinders, etc.
- The main types of Fire Extinguishers are: Water, Foam, Powder, CO₂ and Wet Chemical.
- Different fire extinguishers have different techniques of usage.

Activity



• The trainer provides the participants with a fire extinguisher and teach them how to use it. Then, the trainer arranges for a fire drill session and asks the students to demonstrate the P.A.S.S technique of extinguishing fire. Before applying the P.A.S.S technique, the students select the class of fire extinguisher appropriate for the given type of fire.

Exercise 🔯

Answer the following Questions:

- 1. What are the 3 components of the Fire Triangle?
- 2. How does Faulty Electrical Wiring take place?
- 3. Name few common Fire Hazards.
- 4. What is a Short Circuit? Why does a Short Circuit often lead to fire?
- 5. What are the different classes of Fire?











13. Work effectively with others

Unit 13.1 Work Effectively with Others

Unit 13.2 Importance of Effective Communication and Establishing Good Working Relationships with Other

Unit 13.3 Prepare and Organize Work

Unit 13.4 Decision Making

Unit 13.5 Problem Solving

Unit 13.6 Manage Anger and Stress

Unit 13.7 Manage Time

Unit 13.8 Set Goals for Oneself and the Team

Unit 13.9 Understanding Technical Drawings and Blueprints



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Discuss the importance of working effectively with others to achieve organizations goals
- 2. Discuss the importance of effective communication and establishing good working relationships with other
- 3. Prepare and organize work
- 4. Evaluate the importance of decision making
- 5. Estimate the importance of Problem Solving
- 6. Manage anger and stress
- 7. Manage time
- 8. Prepare goals for oneself and the team
- 9. Interpret Technical Drawings and Blueprints

Unit 13.1 Work Effectively with Others

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance of working effectively with others to achieve organization's goals
- 2. Identify the responsibilities and objectives of the role
- 3. Estimate their own roles and responsibilities
- 4. Evaluate the importance of having correct understanding of work task and objective
- 5. Recall how to keep work area clean and tidy and its importance
- 6. Abide by the applicable quality standards for assigned work task and objective
- 7. Discuss the principle of furniture and fittings manufacturing and installation
- 8. Understanding the importance of discipline and ethics for professional success
- 9. Underline what constitutes disciplined behavior for a working professional
- 10. Demonstrate responsible and disciplined behaviour at the workplace

13.1.1 Importance of Working Effectively with Others to Achieve Organizations Goals

It is a common yet important saying that "United we stand, divided we fall". A Lead Assembler must work effectively with the other members in the team to achieve the common organizational goals and targets.

A. Best Practices in the Industry

- Knowing the areas of strength of each team member and assign roles accordingly
- Discussing but never argue
- Think out-of-the-box to impart creativity amidst chaos
- Accepting and learning from mistakes
- Sharing a common mission and vision to align oneself and the team with the organization targets
- Staying alert, humble and polite
- Respecting diversity and differences
- · Listening attentively and actively
- Staying precise and curt while communicating
- Avoiding backstabbing and gossips
- Apologizing for mistakes committed by oneself
- · Avoiding jargons and explaining technical concepts, using real-life examples
- Sharing, exchanging and transferring knowledge
- Abiding by discipline and decorum

B. Principles of Team Work

Team work is defined as the "actions of individuals, brought together for a common purpose or goal, which subordinate the needs of the individual to the needs of the group". Each person on the team puts aside his or her individual needs to work towards the larger group objective. The interaction among the members and the work they complete is called teamwork. Team work is extremely important for the Lead Assembler to accomplish hi job responsibilities efficiently. The sum of the efforts undertaken by each team member for the achievement of the team's objective is called team work. Every member in a team has to perform and contribute in his best possible way to achieve a common predefined goal. Individual performances do not count in a team and it is the collective performance of the team workers which matters the most.

C. Benefits of Team Work

- Promotes Creativity and Learning
- Combines Complementary Strengths
- Builds Trust
- · Teaches Conflict Resolution Skills
- Promotes a Wider Sense of Ownership
- · Teaches Effective Risk Management

D. Components of Team Work

- Effective Communication
- · Active Listening
- · Resolving Conflict
- Diversity
- Motivation

E. Dos and Don'ts of Effective Team Work

Dos:

- Be willing to collaborate
- Keep an open mind towards learning from other team members
- Control your ego
- Step up to be a leader and step down to be a team member when needed

Don'ts:

- Don't take things personally
- Don't underestimate a team member
- Don't get involved in gossip and grapevine conversation
- Don't show your back to criticism

F. Tips to Promote Effective Team Work

1. Share information with team wherever and whenever required to enhance quality and productivity at work place

- A team must follow a very effective and strong communication cycle.
- Accurate and undistorted information must be shared with the team, so that all members in the team are perfectly aligned with the task requirements and expectations.
- O Sharing accurate information eliminates communication gaps between the Lead Assembler and the other members in the team.
- O This is also effective in managing emergency situations, since it is very crucial to impart accurate and appropriate instructions while handling such circumstances.

2. Work together with co-workers in a synchronized manner

- O A Lead Assembler must be an excellent team player, because it is practically impossible to accomplish a project or task without proper synchronization.
- O The various stages in a project must be treated discretely and yet, there must exist a seamless link or flow between them, in other words, synchronization.
- The deadline for delivery of the entire project can be met only if each component of the project is delivered on time.
- O The outcomes of each stage of a project become the inputs to the next one and the process must continue in a synchronized manner until the final product is obtained.

3. Show respect to other and their work

- Appreciation for other team members works as "Positive Reinforcement", i.e. it encourages and rewards them for their performance and contribution towards the project.
- O Appreciation for others in the team promotes mutual respect, which is one of the most important aspects in good team work.
- O Showing respect to others would imply that one shall earn respect and appreciation in return.
- Thus habit promotes collaboration in a team to boost productivity and improve quality of work.

4. Respond politely to customer queries and other team members

- O Customer Centricity is one of the most vital personal attributes that a Lead Assembler must have, since a Lead Assembler must interact with innumerable clients in daily life.
- A client may have several doubts and queries, which the Lead Assembler must listen proactively and clarify politely.
- O By responding politely to all queries of clients, a Lead Assembler fulfils the following:
 - Understand customer requirements and time lines and respond as per their needs— Answering customer's queries helps in understanding the task requirements very clearly. This, in turn, helps in working with less confusion and interruptions and in delivering the task perfectly on time.
 - Being courteous with customers and ability to handle different types of customers Different customers have different types of nature. The nature of customers can range between being very polite to extremely demanding and critical of whatever you do.
 - Being aware of different customer cultures / faiths and responding appropriately Irrespective of the culture, colour, nationality, creed and economic status, a customer is always the King for a Lead Assembler. Respecting diversity implies that Customer Centricity should be practised, irrespective of the customer's background. A Lead Assembler must always remain neutral and truly professional while dealing with customers from diverse backgrounds.
 - Work and deliver output as per client requirement and satisfaction The end result of any
 project is ultimate client delight. Meeting client's requirements about a project and
 exceeding the client's value expectations help in retaining a client and earning his / her
 loyalty.
- O This behavioural trait must not only be practiced with one's clients, but also with the other team members as well.

5. Display courteous behavior at all times

- O Come what may, one must always display courtesy to clients, supervisors and colleagues alike.
- O This must be practiced to secure long term working relationship with them.

13.1.2 Responsibilities and Objectives of the Role

A Lead Assembler of Modular Furniture, like any other job role, has a standard set of responsibilities and objectives, which sometimes may vary between organizations. Although covered in previous sections of the handbook (Unit 2.1), let us recapitulate the responsibilities and objectives of the role of a Lead Assembler Modular Furniture.

A. Responsibilities and Objectives

- Reading and interpreting AutoCAD and general construction blueprints
- Conducting field measurement of a site in preparation for installation
- Completing furniture assembly and installation, according to known specifications and blueprints
- Conducting post installation inspection, according to the manufacturer's guidelines, for expected operability of the furniture
- Providing instructions and site direction to the team members and subordinates for fulfilling client's requirements on time
- Unloading modules, tools and tackles from the vehicle and deliver the product / modules at the site for assembly and installation
- Assembling and installing all types of modular systems, thus actively participating in operations like placement and staging, levelling, touch-up and wipe-down of the products at the client's site
- · Conducting and attending pre-installation huddles, as and when required
- Completing repair services on time
- Completing all assembly / installation / service / repair documentation
- Adhering to safety procedures and safety drills and training sessions, as laid down by the employer
- Promoting and adhering to safe work practices and behaviour
- Reporting accidents and anomalies on site to concerned authorities
- Actively spotting out and rectifying unsafe work conditions, which may lead to accidents and injuries
- Adhering to and completing assigned duties by deadline
- Completing the designated duties, and others, as assigned from time to time

B. Follow organizational policies and procedures

- A good employee is expected to respect and follow the organizational policies and procedures.
- Such policies involve adherence to Standard Operating procedures, safety guidelines, Instruction manuals, HR policies etc.
- Adherence to and respect for the organizational mission and vision are mandatory to align a person with the organizational goals and targets.
- Following organizational policies and procedures make a person an integrated part of the organization, thus making him / her a family member.

C. Adhere to time lines and quality standards

- Deadline, TAT adherence and quality assurance are important aspects of project management.
- While working on a project, one must maintain a borderline between the delivery time and the quality standards required by the client as well as directed by the organization.
- It is important to deliver the project on or before the deadline, but care must be taken that one does not deviate from the client's specifications and quality standards.

D. Follow work place dress code

- Dress Code helps a person in identifying himself or herself as an inseparable component of the organization.
- Maintaining the dress code helps in strengthening the security of the organization. Dress code mandates that only authorized persons are allowed to access and control the premises.
- Adhering to the organization's dress code is an important part of Work Ethics in the work area.

13.1.3 Own Roles and Responsibilities

Apart from the responsibilities related to the job role, a person working or aspiring to work as a Lead Assembler of Modular Furniture has to fulfill few roles and responsibilities on a personal front. These are:

- Working as a good **Team Player**, so that one's personal objectives and aspirations align perfectly with those of the team
- Working as a good **Team Leader**, so that one's leadership skills, instructions and timely reviews help in eliminating errors and delivering the tasks on time
- Working as a good **Quality Inspector**, so that one is able to identify defects in the products under process (Work-in-progress), to avoid recall of the final and finished products

13.1.4 Importance of Having Correct Understanding of Work Task and Objective

A Lead Assembler of Modular Furniture must understand the client's requirements thoroughly and have appropriate and correct understanding of the work task, in terms of:

- Objectives of the task / assignment
- Specifications as per the Blueprint and AutoCAD drawings
- Phase-wise feedback on the task provided by the client
- TAT adherence, in terms of phase-wise and final delivery of the finished products
- Working with the sole aim of putting in one's best efforts to abide my all client requirements, thus, in turn, completely satisfying the client and earning appreciations
- Ensuring that there is no communication gap between the Lead Assembler and the client in understanding requirements and specifications, by providing the client with daily or weekly (as prescribed by the organization) updates on the different phases of the assignment

13.1.5 How to Keep Work Area Clean and Tidy and Its Importance

As discussed earlier, keeping one's work area clean and tidy carries the following benefits:

- Preventing accidents at the work area and the corresponding injuries
- · Allowing for easy flow of materials
- Reducing a worker's exposure to Occupational Hazards
- Improving the worker's control on the various tools and equipment
- · Improving productivity

Generally speaking, the work area can be kept clean and tidy in the following manner:

A. Keep work area in a tidy and organized state

- Control Dust and Debris
- Clear Clutter and Spills to avoid Slips, Trips and Falls
- Follow a specific frequency of cleaning operations
- Maintain a written set of guidelines on cleaning and tidying the work area, in the form of SOPs (Standard Operating Procedures)
- Store tools and equipment appropriately, in their designated storage locations
- Store and maintain PPE appropriately
- Effectively move waste materials to designated locations and treat them duly

B. Keep work area safe

- Encouraging the practice of looking out for signs like "Wet Floor" or "Cleaning Under Progress".
- Avoiding storage of heavy objects at high and raised areas
- Reporting each incident of spill (oil, grease, chemical, etc.) to the housekeeping staff on time
- Encouraging the practice of reading Directions of Use and MSDS sheet before using any chemical
- Preventing Fire and Electrical Hazards

13.1.6 Applicable Quality Standards for Assigned Work Task and Objective

Quality, according to the ISO 8402-1986 standard, can be defined as "the totality of features and characteristics of a product or service that bears its ability to satisfy stated or implied needs".

A Lead Assembler of Modular Furniture must implement the applicable quality standards for the assigned work task, via a well-known mechanism called Quality Control or QC.

The primary objectives of Quality Control and management are:

- Eliminating gaps between the specifications of the accomplished tasks and the client's requirements, thus ensuring that the worker has fully understood the client's requirements
- Eliminating chances of product recall (return of the delivered product consignment, partially or wholly, to the workshop, by the client)
- Identifying defects in the process of assembly and installation
- Identifying defects in the products (work-in-progress stage)

All quality control and management standards, across industries and across nations, are based on the principles developed by an autonomous body called the International Organization for Standardization, commonly known as the ISO.

The seven Quality Management principles (QMP), directed and standardized by the ISO 9000: 2015 and ISO 9001:2015 are:

Customer Focus

- · Recognizing the needs of existing and potential customers
- Exceeding customer expectations

Leadership

• Setting up mission, vision and goals for the organization and the team

- Empowering team members
- · Adhering to all aspects of quality

Engagement of People

- Utilizing and appreciating people's abilities and contributions
- Encouraging knowledge sharing, learning and upgradation of skills

Process Approach

- Dividing and conquering an assignment / project by breaking it down into small tasks
- Utilizing resources optimally

Improvement

Aiming for continual improvement (KAIZEN)

Evidence-based Decision Making

- Taking apt and correct decisions on time, to save time and money
- Supporting decisions with adequate evidence and data

Relationship Management

- Efficient Vendor Management to manage costs, allocate resources and create values
- Identifying clienst and vendors as 'Partners' to secure long term relationships

Few ISO standards, related to the Furniture & Fittings industry are:

ISO 21015:2007	Workplace Chairs	Method of testing the stability, strength and durability
ISO 24496:2017	Workplace Chairs	Determination of Dimensions
ISO 21016:2007	Workplace tables and desks	Method of testing the stability, strength and durability
ISO 3055:1985	Kitchen Furniture and Equipment	Coordinating and organizing sizes
ISO 5970:1979	Chairs, tables and desks for educational institutions	Functional Sizes
ISO 7171:1988	Storage Units (commercial and domestic)	Method of testing the stability, strength and durability

13.1.7 Reporting Procedure in Case of Deviations

Like any other job role, in any other industry, a Lead Assembler of Modular Furniture is required and expected to abide by a specific reporting procedure, in case non-compliance or non-conformity occurs in any of the standard operating procedures. Non-compliance or Non-conformity occurs through **Protocol Violations** and **Protocol Deviations**.

A **Protocol Deviation** is said to have occurred, when there is a minor or moderate divergence from the sanctioned design, blueprint, and processes in the organization. Under such circumstances, one must alert certain personnel, holding designated positions, arranged and organized in the form of a hierarchy, known as the **"Escalation Matrix"**. This Escalation Matrix is segregated into multiple levels and a case of deviation

13.1.8 Principle of Furniture and Fittings Manufacturing and Installation

The principles of Furniture and Fittings Manufacturing and Installation comprise the following:

Knowledge of:

- O The various organizational processes, rules, codes, guidelines and standards and escalation hierarchy and matrix
- O The statutory responsibilities under organizational legislation and regulations
- O Information about the organization clients
- O The various types of designs of the products
- The about assembly process / product line
- O The proper disposal system for waste and by-product

• Adherence with:

- O The relevant safety and security procedures to be followed
- O The organization procedures and formalities to be completed during work

· Knowledge of:

- O About furniture making terminology, abbreviations, symbols, dimension matrix etc.
- O These have been explained in details in Chapter 11, under Organizational Context.

13.1.9 Importance of Discipline and Ethics for Professional Success

The importance of Discipline and Ethics, to achieve professional success can be elaborated with the help of the following elements. These are known as the pillars of workplace discipline and ethics:

Professionalism

- Defined as the competence or skill expected of a professional
- Emphasizes on the importance of Grooming, which adds to one's confidence level and enhances personality
- Emphasizes on the importance of Effective Communication Skills and strong Interpersonal Skills, which help the person in carrying out activities in a team

Respecting others

- Emphasizes on appreciating and admiring other colleagues for their contribution towards a task
- Emphasizes on the need of complimenting
- This helps in boosting team spirit and improves work culture

Reliability and Accountability

- Measure of how responsible a worker is towards his / her job role and assigned tasks
- Dedication and Determination
- Measure of how focused, committed and sincere a worker is towards the job role and responsibilities

Integrity

• Having honesty and strong moral principles are very crucial for a worker

Humility

One must be formal, firm, yet cordial, polite and humble while dealing with peers and colleagues

13.1.10 What Constitutes Disciplined Behaviour for a Working Professional

Discipline can be defined as the "the practice of making people obey rules or standards of behaviour, and punishing them when they do not". The below are examples of Disciplined Behaviour for a worker:

- Working in a team, in a coordinated manner, to achieve common targets and goals
- Maintaining confidentiality while working in confidential projects
- Maintaining confidentiality about one's appraisal and performance ratings
- Promoting the good use of constructive feedback to improve oneself
- · Accepting criticism on a positive note
- Respecting diversities at work
- Discouraging and condemning the following:
 - O Aggressive and abusive behaviour like screaming or personal insults
 - O Harmful gossip
 - O Physical, mental and sexual harassment
 - O Impossible targets
 - O Unrealistic demands and unjust criticism
 - O Stalking
 - O Bullying

13.1.11 Demonstrate responsible and disciplined behaviors at the workplace

Learning about discipline alone does not make one disciplined at the workplace. One must implement what has been learned, by demonstrating responsible and disciplined behavior at the workplace.

Such disciplined behaviour includes the following:

- **O Punctuality** This is the behavioral trait that encourages a person to be always "On Time". Punctuality inculcates the habit of deadline adherence and effective time management, thus completing tasks as per given time and standards. Practising punctuality can be an efficient tool in delighting customers and earning their retention and loyalty.
- O Avoiding Wastage A Lead Assembler must stick to the policy of "Zero Wastage". Resources must be properly planned, allocated and utilized to the fullest. Such resources include people, time, raw materials and money. Wastage of time, by loitering unnecessarily, idling and gossiping, etc. must be condemned and prevented.
- O Integrity and Honesty An employee with high standards of ethics, honesty and moral values is considered a valuable asset to the organization.

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Unit 13.2 Importance of Effective Communication and Establishing Good Working Relationships with Other

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the components of Effective Communication
- 2. Define the various components of the Communication Cycle
- 3. Identify the types of Communication
- 4. Identify the barriers in communication
- 5. Assess the importance of Active Listening
- 6. Illustrate how to develop Core and Generic Skills

13.2.1 Components of Effective Communication

Effective Communication is a two way information sharing process, which involves one party sending a message that is easily understood by the receiving party. A Lead Assembler, with Effective Communication skills, can work more efficiently and earn appreciation more commonly.

- Oral / Verbal Communication
- Clarity & Concision
- Confidence
- Respect
- Right Medium
- Empathy
- Politeness
- & Precision
- Non-verbal Communication
- · Active Listening
- Open to Feedback

13.2.2 Various Components of Communication Cycle

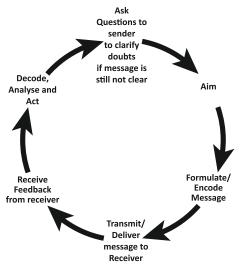


Fig. 13.2.2.1: The Communication Cycle

13.2.3 Types of Communication –

Verbal or Oral Communication

• Involves the use of language spoken verbally or orally to convey messages

Written Communication

• Involves the art of writing to convey messages. This includes letters, emails, reports, etc.

Non-verbal Communication

• Involves the use of Body Language and gestures to convey messages

13.2.4 Barriers in Communication

The following factors hinder Effective Communication and are hence called "Barriers".

- Use of Jargon and Technical terms
- Lack of attention, interest, distractions, or irrelevance to the receiver
- Differences in Perception
- Physical disabilities like Hearing Ailments or Impaired Speech
- Cultural & Language Differences and Unfamiliar accents
- Expectations and prejudices leading to false assumptions or stereotyping

13.2.5 Importance of Active Listening

Active Listening is the process by which an individual secures information from another individual or group.

Display active listening skills while interacting with others at work:

- The steps involved in Effective and Active Listening are:
- · Facing the speaker and maintaining an eye contact
- · Attentively listen and comprehend the information given by the speaker
- Staying attentive yet relaxed
- · Keeping an open, receiving mind
- · Listening to the words and trying to visualize what the speaker is saying
- · Never interrupting or imposing your "solutions"
- Waiting for the speaker to pause to ask clarifying questions
- Asking questions only to ensure understanding
- Communicate clearly on the issues being faced and clarify queries
- Trying to empathize with the speaker
- · Providing the speaker with constructive feedback

The barriers in Active Listening are:

- Distractions
- Noise
- Interruptions
- Prejudice and Preconceived Ideas
- Lack of Interest in the conversation

13.2.6 Different Type of People That One is Required to Communicate and Coordinate within the Organization

A Lead Assembler must communicate and coordinate not only with clients, but with peers and supervisors in the organization as well. The elements of communicating effectively with clients, peers / colleagues and supervisors are:

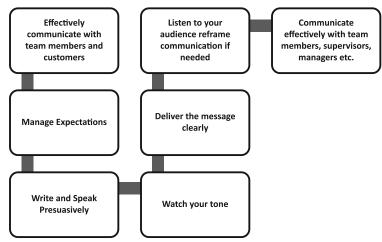


Fig. 13.2.6.1: Elements of Effective Communication

A. Coordinate and cooperate with colleagues to achieve work objectives

- Listen actively with minimal barriers
- Build trust, but do not get too casual
- Be aware of your tone
- Watch your body language
- Participate and coordinate
- Ask questions to clarify
- · Discuss task lists, schedules and activities
- · Share best practices with peers

B. Effectively Communicate with Supervisors

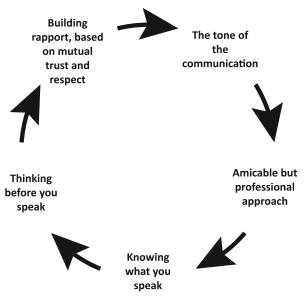


Fig. 13.2.6.1: Elements of Effective Communication

Tips to effectively communicate with supervisors:

A. Seek assistance from supervisor or any such appropriate authority as and when required

- One's supervisor is supposed to be one's mentor and guide at work.
- Assistance and guidance must be sought from the supervisor whenever needed.
- Ask questions to clarify doubts.

B. Ask questions and seek clarifications on work tasks whenever required

- Question must be asked to clarify doubt and to narrow down communication gaps with one's supervisor.
- This must be done to get a clear idea about the responsibilities expected by one's supervisor.
- Having a clear idea about one's tasks helps in fulfilling targets successfully.
- Seek and obtain clarifications on policies and procedures, from the supervisor or other authorized personnel.
- If the Lead Assembler has doubts about the organizational policies and SOPs, they can be clarified by the supervisors or other authorized personnel.

- Address the problems effectively and report if required to immediate supervisor appropriately.
- Identify and report any possible deviations to appropriate authority.
- Receive instructions clearly from superiors and respond effectively on the same.
- Accurately receive information and instructions from the supervisor related to one's work.

C. Effectively Communicate with Clients

- Communicate clearly, precisely and politely
- Empower the client by putting adequate value to his / her views
- Recognize the client as a "Partner" and not just "customer"
- Know and learn about the client
- Resolve service issues and concerns promptly
- Exceed client's expectations through impeccable deals and service
- Keep in touch and update the client on existing and upcoming deals and offers
- Empathize with the client and apologize, in case of grievance and complaint
- Stay honest in dealing with customer
- · Negotiate fairly, politely but firmly

13.2.7 Expressing and Addressing Grievances Appropriately and Effectively

Grievance, according to the Dictionary, is "a complaint or a strong feeling that one has been treated unfairly".

A. Follow escalation matrix in case of any grievance

- Before complaining and expressing grievance, be very clear of the objectives, i.e. why do you require to complain and what do you want to achieve in the long run
- Follow the Escalation Matrix for Internal Grievance Resolution
- At each level of the matrix, write an email to the designated official, according to the guidelines and formats provided.
- Follow up with the concerned official, if the complaint or grievance is not addressed within the standard TAT at that escalation level.
- Document all records of emails and phone calls, till the issue is duly addressed and closed.
- If the concerned official, at a certain level, does not address the grievance within the TAT, "escalate" and carry forward the issue to the next level.
- Repeat the process from 2-6.
- On resolution of the grievance, thank the concerned authority over phone or email, whichever is applicable.

B. Addressing Worker's Grievance (for the team lead or supervisor; here, the Lead Assembler)

- Hold a formal yet private meeting with the worker.
- Acknowledge the grievance and empathize.
- Maintain confidentiality of the entire matter.
- Invite witnesses, if deemed absolute necessary.
- Depending on the complexity of the grievance, continue with further investigation.

- Gather information to support your decision.
- Take the final decision.
- · Convey your decision to the worker.
- Escalate the matter to the immediately next level, if the worker is not happy with the decision taken.

C. Addressing Client's Grievance

- Do not contradict with or prevent the client from talking.
- Listen actively and patiently.
- Apologize (even if you are not wrong) and empathize with the client.
- Listen to the grievance / complaint with an open mind.
- Promise that you will get back to him / her with a permanent solution, at the earliest.
- Keep your promise and respond to the client with a solution within the standard TAT.
- If you are unable to resolve the issue on your own, escalate the same to your next level.
- Follow up with the concerned officials till the grievance is addressed and the issue resolved.
- Inform the client over email or phone that his / her grievance has been taken care of.

13.2.8 Importance and Need of Supporting Co-Workers Facing Problems for Smooth Functioning of Work

Team Work is extremely crucial for successfully carrying out an assignment. An important aspect of effective team work is supporting co-workers facing problems, for ensuring smooth functioning of the assignment. Supporting a co-worker is vital because:

- **Confidence:** Going out of one's way to help and support co-workers will have a marked effect on their confidence and give them a sense of pride in their work, but it is likely to improve engagement, productivity and eagerness to maintain high standards at workplace.
- Improved Communication: If you are supportive and friendly towards a colleague, he/she will see you as an approachable person, hence marinating smooth communication and increasing productivity.
- **Team Spirit:** A supportive environment undoubtedly leads to a better working atmosphere. It helps in creating a sense of community and team spirit, which works as a reminder that everyone is striving towards one unified goal.
- **Support from a grateful co-worker, in return:** To repay your support and help, the colleagues, who you helped and supported, will help you in your work, as a token of gratitude.

13.2.9 Importance and Ways of Managing Interpersonal Conflict Effectively

Interpersonal Conflict can be defined as a serious quarrel or disagreement between two or more persons. Conflict Management is extremely crucial in maintaining a good work environment and the standard productivity of the organization.

The five stages involved in resolving a conflict are:

• Identifying a safe place and time to talk

- Clarifying individual perceptions involved in the conflict
- Arranging for a discussion with witnesses, if required
- · Adopting an active and empathetic listening approach
- Searching for options with the aim of a win-win outcome
- Arriving at a conclusion agreed upon by all parties in the conflict

The common strategies involved in managing Interpersonal Conflict are:

- Collaborating
- Accommodating
- Avoiding
- Competing
- Compromising
- Forcing

13.2.10 Core and Generic Skills

Core and Generic skills, associated with any profession or job role, comprise of Speaking, Listening, Reading and Writing Skills. The 4 essential components of language skills are:

- Reading
- Writing
- Speaking
- Listening

Listening and speaking skills have already been covered under Effective Communication. Let us now discuss the importance of Reading and Writing skills for the profession of Lead Assembler of Modular Furniture. A Lead Assembler must develop these skills not only in English, but in Hindi or any other local language of the state.

A. Importance of Reading Skills for Lead Assembler

- The role and responsibilities of a Lead Assembler of Modular Furniture comprises the following:
- Reading and understanding job specifications
- Reading and understanding the package details as per company procedures
- Reading instructions and interpreting the ones for assembling/installation and for the safe use of machine and tools
- Reading internal information documents sent by internal teams
- Reading all organizational and equipment related health and safety manuals and documents
- Reading and understanding safety related documents
- Reading instructions, provided in Hindi or any other local language, from supervisor, colleague or client
- Reading and understanding manufacturer's instructions
- Interpreting pictorial representations and written signs or instructions
- Reading and interpreting numbers, written in Hindi or any other local language
- Reading and understanding the implication of safety symbols and basic warning signs, wherever applicable

Tips to develop good reading skills:

- Reading a newspaper daily (English or any local language)
- Reading instruction manuals, directions for use, labels, etc. and trying to grasp the meaning
- Asking oneself questions while reading and after reading
- Discussing with a colleague or family member, to ensure if you have understood the right meaning of the material thus read
- Taking notes while reading newspaper and magazines
- Making notes of popular words

B. Importance of Writing Skills for Lead Assembler

- The role and responsibilities of a Lead Assembler of Modular Furniture comprises the following:
- Documenting the information communicated / observations if any related to process and procedures
- Documenting the records related to assembling and installation
- Preparing the reports and information documents to internal departments/internal teams
- Writing in Hindi or local language
- Filling up logs, forms and formats in local language or Hindi for recording quantity and quality of work figures, defects and other related information, etc. whenever needed

The role and responsibilities of a Lead Assembler, in this context, include:

- Document the information communicated / observations if any related to process and procedures
- Document records related to assembling and installation
- Write reports, information documents to internal departments/internal teams
- Read and understand the package details as per company procedures
- Read instructions and interpret such as those for assembling/installation and for the safe use of machine and tools
- Read internal information documents sent by internal teams
- Write in Hindi or local language
- Fill formats, logs and forms related to work in local language or Hindi/English
- Document measurement appropriately whenever required
- Read all organizational and equipment related health and safety manuals and documents
- Read and comprehend safety related documents
- Fill logs, forms and formats in local language or Hindi for recording quantity and quality of work figures, defects and other related information, etc. whenever needed
- Document measurement appropriately whenever required
- Read instructions from supervisor provided in local language or Hindi
- Read and understand manufacturer's instructions and job specifications
- Interpret pictorial representations and written signs or instructions
- · Read and interpret numbers written in Hindi or local language
- Understand safety symbols and basic warning signs wherever needed

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Unit 13.3 Prepare and Organize Work

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance and benefits of preparing, planning and organizing work
- 2. Discuss the steps involved in preparing, planning and organizing Work
- 3. Discuss the methods adopted to prepare, plan and organize work

13.3.1 Importance of Preparing, Planning and Organizing

Work

One must learn the importance of preparing and planning, in advance, an assignment, so that it can be accomplished in a very organized manner. The importance and benefits of the same are:

- Planning helps in making quick and correct decisions by providing a person with adequate guidelines
- Planning helps in preparing a person for the worst outcomes and unexpected situations, thus helping the person in exercising better control in that situation
- Preparing and planning helps in optimally allocating resources like raw materials, finances, time and manpower.
- Preparing and planning helps in identifying, quantifying and defining goals, so that appropriate methods can be adopted to complete the assignment on time and in an organized manner.

13.3.2 Steps Involved in Preparing, Planning and Organizing Work

The various steps involved in preparing, planning and organizing work are:

- Developing objectives and goals
- Designing methods (tasks) to meet these objectives and goals
- Determining and allocating resources needed to accomplish tasks
- Determining a timeline, over which the entire project / assignment will be carried out
- Evaluating each task, according to its outcomes
- Monitoring and tracking the evaluation process of each task
- Finalizing the plan
- Distributing the plan among all concerned people in the team

13.3.3 Methods Adopted to Prepare, Plan and Organize Work -

While assembling and installing different parts of modular furniture

- Plan, organize and prioritize the work order and jobs received
- Ability to organize and conduct installation in optimal manner
- Plan to utilize time and equipment effectively
- Ability to concentrate on task and ability to complete with time limits
- Assist in record keeping and proper documentation

- While ensuring health and safety at workplace
- Plan and organize own work in a way that all activities are completed in time and as per specifications
- Plan word as per job specification
- Plan and organize cleaning and maintenance activities

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Unit 13.4 Decision Making

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the requirements of decision making
- 2. Identify the steps involved in the decision making process

13.4.1 Requirements of Decision Making

Decisions at workplace must be taken promptly, based on the best available researches and data gathered from relevant field experiences. Such data provide 'Evidence' and help a person in making appropriate decisions.

The requirements of efficient decision making process are:

- · One must have adequate yet controlled access to correct and reliable data
- One must follow appropriate processes in analyzing data
- One must take decisions promptly, based on the analysis of collected data (for example, trend analysis)
- While taking decisions, apart from analyzing the researched data, one must rely on practical experiences as well

The role and responsibilities of a Lead Assembler, in this context, include the following:

- Ability to troubleshoot common concerns faced
- Analyze critical points in day to day tasks through experience and observation, and identify control
 measures to solve the issue
- Find damaged and/or defective products and hardware and perform minor repairs or reject them
- Take decisions of once own roles and responsibilities
- Decide on to accept or reject a work piece on the basis of quality parameter
- Decide on material requirement for related to once work

13.4.2 Steps involved in the Decision Making Process

The steps involved in the general decision making process are evident from the below diagram:

- 1. Identify the goal, i.e. what needs to be decided
- 2. Gather information from researches and field experiments (evidences)
- 3. Identify the alternatives
- 4. Weigh and measure all evidences against each alternative
- 5. Select the most appropriate alternative (with maximum weightage)
- 6. Take suitable actions to realize the alternative and take decision
- 7. Review the decision in terms of the results achieved

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Unit 13.5 Problem Solving

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the steps involved in solving a problem, using analytical and critical thinking abilities
- 2. List the strategies adopted by a Lead Assembler for solving problems at workplace

13.5.1 Steps Involved In Solving A Problem

A Problem can be defined as a difficult or unexpected situation, regarded as unwelcome and needing to be dealt with and overcome. In a broader sense, problems can take the form of complex puzzles and riddles.

- Identify the problem
- Understand everyone's interests
- List the possible solutions (options)
- Evaluate the options
- Select an option or options
- · Document the plan
- Monitor and evaluate

13.5.2 Strategies Adopted by a Lead Assembler for Solving Problems at Workplace

A. Solving Problems while assembling and installation of different parts of modular furniture

- Supporting the supervisor and peers in solving problems, by discussing the possible solutions (Options)
- Quickly identifying the common causes of errors and helping in resolving the same (Troubleshooting)
- Implementing domain knowledge and monitoring the daily tasks through experience and observation, for identifying control measures to solve issues
- Providing the team with suggestions to further streamline the flow of operations at work
- Implementing reasoning skills for identifying and resolving basic problems
- Utilizing the acquired knowledge of the process and applying the information gathered from observation, experience, reasoning, or communication to act efficiently

B. Solving Problems while ensuring health and safety at workplace

- Identifying defects in materials, tools and equipment and ways to resolve them on time
- Ensuring timely correction of errors for minimizing rejection of pieces or rework
- Analyzing the situation and taking appropriate actions while dealing with team members
- Analyzing, evaluating and deploying the information gathered from observation, experience, reasoning, or communication to act efficiently

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Unit 13.6 Manage Anger and Stress

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the common methods involved in managing anger
- 2. Identify the effects of stress
- 3. Identify how can one manage work stress

13.6.1 Common Methods Involved in Managing Anger

Anger can be defined as a strong feeling of annoyance, displeasure, or hostility. The common reasons for anger are:

- When one is scolded or harshly criticized by one's clients or supervisors
- · When one does not get due appreciation at work
- When one does not get what he / she wants
- When someone irritates or provokes without any reason
- When things do not go according to the plan

The methods involved in managing anger are:

- Move yourself away from the situation
- · Divert yourself in other activities like exercise, reading, listening to music
- · Take a deep breath and think before you speak
- Count from 1 to 10 slowly
- Use humour or jokes to reduce anger
- Exercise, yoga and meditation also help in anger management

13.6.2 Effects of Stress

Stress can be defined as a state of mental or emotional strain or tension resulting from adverse or demanding circumstances. Stress Management must be learned and practised at all phases of one's work life, especially in fields that involve intensive labour, focus and client interaction.

Effect of Stress on one's mind, body and behaviour are:

A. Body

- Lethargy
- Palpitation and increased heart rate
- Headache
- Indigestion
- Insomnia or prolonged sleep

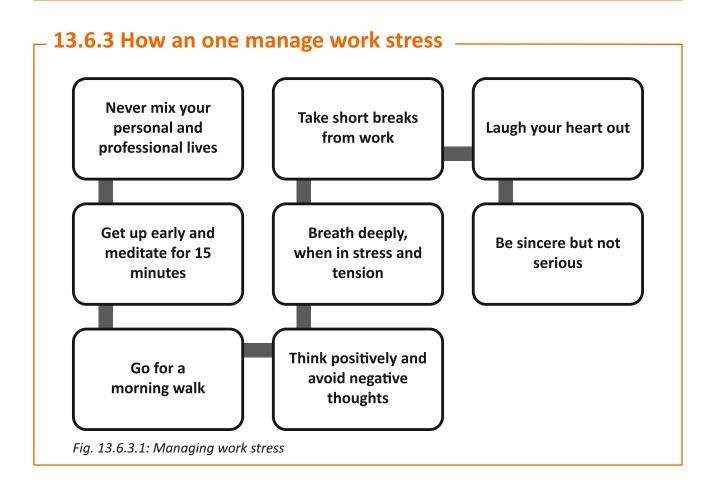
B. Mind

- Anxiety
- Nervousness

- Depression
- Constant Tension
- Lack of focus
- Feeling of exhaustion

C. Behaviour

- Short temper
- Irritability
- Development of bad habits like smoking and drinking
- · Avoidance of friends and family
- Eating more (Stress Eating) or less



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Unit 13.7 Manage Time

- Unit Objectives



At the end of this unit, you will be able to:

1. Explain the importance of managing time

13.7.1 Importance of Managing Time

Time Management is about managing yourself. It is about making a commitment to be more organized, maintain your focus and use your time to your best advantage.

The three most important tools for good time management are:

- Attendance
- Discipline
- Punctuality

Tips to manage one's time effectively:

- Sticking to one's plan
- Maintaining a daily To-Do list
- Allocating one's time wisely
- · Adhering to and respecting deadlines
- · Avoiding wasting time

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Unit 13.8 Set Goals for Oneself and the Team

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the meaning of Goal Setting
- 2. Discuss the steps involved in setting goals for oneself and the team

13.8.1 Meaning of Goal Setting



Fig. 13.8.1.1: Goal Setting

Goals are targets that are laid down for a person or a team of people to achieve over a predetermined period of time. A goal need not always be something that one plans to achieve on a long term. It is a recommended practice to break one's targets into small goals, which are easier to achieve on a daily basis. If a person meets the daily short targets, it will be easy for him / her to meet the long term targets as well.

13.8.2 Steps Involved In Setting Goals For Oneself And The Team

The steps involved in setting goals are:

Step 1: Identify your goals - Introspect what you want to achieve in life, both on the personal and professional fronts.

Step 2: Time bound - Decide on a date by when you want to achieve the goal. Set and meet daily, weekly and monthly goals. This will make it easy in setting and meeting bigger goals.

Step 3: Plan - Decide how you will achieve your goal. Make a list of things you have to do to reach your goal.

Step 4: Work towards your goal - Planning alone will not help and you also have to put in efforts to achieve your goal.

Step 5: Measure your progresses - This will help you check whether you are moving closer to your goal or away from it. If you have drifted away, you will know that you must be back on track towards reaching your goal.

Step 6: Achieve your goal - Achieve your goal and feel a sense of achievement.

Unit 13.9 Understanding Technical Drawings and Blueprints

- Unit Objectives

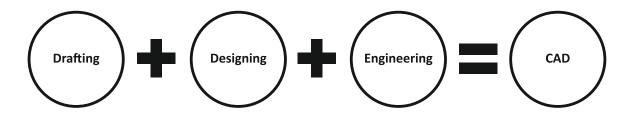


At the end of this unit, you will be able to:

- 1. Discuss basic AutoCAD
- 2. Practise how to read and interpret 2D / 3D Drawings

13.9.1 Basic AutoCAD

Computer-aided Design, commonly known as CAD, controls the manufacture of parts and accessories, according to specifications given by the client. This software defines the mechanical dimensions, commonly known as "specifications" of furniture accessories, parts or modules. CAD can also be used to enhance the productivity and accuracy of the machines. CAD helps in preparing the blueprint of any modular furniture or module / accessory / part. AutoCAD is one of the most popular software that implements computer-aided design. The latest version of AutoCAD, AutoCAD 23.0, has been released on March 22, 2018.



Important AutoCAD Commands

QSAVE	saving the current drawing in default format
ARC	creating an arc
ZOOM	increasing or decreasing the magnification of view in the current viewpoint
WBLOCK	writing an object or a block to a new drawing file
STRETCH	stretching objects crossed by a selection window or polygon
EXPLODE	breaking a compound object into its component objects
ERASE	deleting objects from a drawing
DIMSTYLE	creating and modifying dimension styles
CIRCLE	creating a circle
REDRAW	refreshing the display in the current viewpoint
FILLET	rounding and filleting (cutting into strips) the edges of objects

VIEW	saving and restoring named views, camera views, layout views and preset views	
MTEXT	creating a multiline text object	
GROUP	creating and managing saved sets of objects called "groups"	
BLOCK	creating a block from selected objects	
HATCH	filling an enclosed area or selected objects with a hatch pattern, solid fill or gradient fill	
JOIN	joining similar objects to form a new, single, unbroken object	
MOVE	moving objects along a specific direction, for a specific distance	
INSERT	inserting a new block object or drawing into the current drawing / draft	
OFFSET	creating concentric circles, parallel lines and parallel curves	
LINE	creating straight line segments	
PAN	adding a given parameter with grips to a dynamic block definition	

13.9.2 Reading and Interpreting 2D / 3D Drawings

The job of a Lead Assembler is practically impossible without good skills of reading, studying and interpreting work orders, technical drawings and blueprints.

A. Ability to Interpret Work Specifications and Interpret them Accurately

A **Work Order** is a task, job or assignment, which can be assigned to a person for completion. A work order may be issued from the client's end or circulated internally within the organization. Work Orders comprise details and specifications of a certain job per work-piece. It explains the client's expectations about the assignment.

The essential components of Work Orders are:

- Instructions and Guidelines
- Cost Estimates
- Forms and Annexures
- Date and time to execute the work order
- Information about the location and entities to execute the work order
- The person to whom the work order is assigned

Job Orders are the work orders circulated internally within the organization. A Job Order is prepared during the initial stages of an assignment / project and is connected with the final Bill of Materials.

The essential components of a Job Order are:

- Quantity of the product to be manufactured, assembled, installed or repaired
- Quantity of the raw material to be used, along with its Price per unit and the number of units required
- The types of labour needed (casual or skilled), rate per hour or per unit and amount required

Machine utilization of each machine involved in carrying out the assignment, the rate and the amount.

B. Study the drawing (2D/3D) and designs and understand the requirement

• The Blueprint and its Parts

- O The requisite for reading a Blueprint is interpreting 1st and 3rd angle drawings.
- O A Blueprint is a 2D (two dimensional) miniature / replica of the actual work piece, prepared by scaling down the actual measurements.
- O A Blueprint is a plan, proportionate with the product to be developed.
- O It comprises the required technical specifications as well as the techniques of preparation.
- O The essential parts of a Blueprint are:

Elevation View

- O Vertical display of one side of the project, from north, south, east or west
- O Gives an idea about how the complete structure will look after installation
- O Helps in determining the height dimesions

Plan View

- O Horizontal display of the proposed job looking down from above
- O This view is usually on a horizontal plane 30 inches (75 centimeters) above the floor
- O Helps in determining the length and width dimensions

Section View

O A cut-through display, showing how an object will be built

• Steps in Reading a Blueprint

· Determining the view

- O The Elevation view must be studied and understood first. This is a representation of the expected outcome of the project. This view indicates the height dimensions of the work piece.
- O The Plan view comes next, which indicates the length and width dimensions of the work piece.
- O The Section view must be read at the last, to get a clear idea about the sequence of the parts to be built, in order to obtain the final product.

Understand the scale and determine the actual dimensions

- O The measurement scale is always exactly proportionate with the final product.
- This proportion is usually 1:2 ratio.
- O The Engineering Scale is used, which incorporates a ratio, where one has to follow multiples of 10.

Reading the Title Block

- O This indicates the context in which the drawing must be perceived. The Title block provides information about the following:
 - General tolerances
 - Projection details for the item. component to be manufactured
 - Scale used in the drawing
 - Status of the drawing (Preliminary, Approved, etc.)
 - Name of the component or assembly
 - Contact details of the drawing owner
 - Mass
 - Units used in the drawing
 - Sheet number and number of sheets

Reading the Notes

- O The notes should lie outside the Title Block.
- O The information provided by the notes are preferred to that provided by the Title Block and hence, the Notes supersede the Title Block information.
- O In case of conflicts, the Notes are considered correct over the Title Block.

Reading the Work Order or the Bill of Materials

- O The Work Order provides the requisite details of the assignment and the requirements of the final product.
- O The Bill of Materials is a list of the components and the corresponding quantities that make up the general assembly of the item being manufactured.
- The BOM is usually tabulated on the first page of the Blueprint / Drawing.

• Understanding the differences between the various Lines and interpreting them

- O Visible lines indicate an edge is visible in the relevant view
- O Hidden lines indicate the edge is behind a face
- O Phantom lines indicate edges of structure that are relevant but not included in the drawing
- O Phantom lines could also mean a tangent line (where a curve starts or ends)
- O Centre lines indicate the geometric center of the assembly

Understand and interpret the projections, sections and details

- O View the drawing itself, regardless of the dimensions, trying to visualise how and what the assembly looks like in 3D.
- **O** Use the sections and details as a start point and you will soon realise that the details and sections have been created to highlight important components or features.
- With the aid of the BOM / Work Order, find out the components in the drawing in order to understand the role each component plays.
- Find out the notes that have arrows pointing towards the assembly. These information are extremely vital to the assembly and its functionality.
- O Use the dimensions in the drawing to comprehend the size of the component / Assembly / Final product.

Understanding Allowances from the Blueprint

- O Allowance is the minimum clearance (positive allowance), or maximum interference (negative allowance) between parts of an Assembly.
- While preparing Blueprints and technical drawings, high degree of diligence is implemented to incorporate Allowances, thus ensuring "Zero Wastage".
- This helps in reducing the Cost of Production per unit and increasing the productivity of the assignment.

· Work instructions and specifications and interpret them accurately

- O Instructions and specifications provided to the Lead Assembler must not be read casually.
- O Instead, all sections and preferably every word must be read and understood diligently.
- O This helps the Lead Assembler and the other team members to fully understand and interpret the client's requirements and the specifications of the work piece or job.
- O This is an important step in the project / assignment since it eliminates chances of miscommunication.

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Summary



- A Lead Assembler must work effectively with the other members in the team to achieve the common organizational goals and targets.
- A Lead Assembler of Modular Furniture, like any other job role, has a standard set of responsibilities and objectives, which sometimes may vary between organizations.
- Apart from the responsibilities related to the job role, a person working or aspiring to work as a Lead Assembler of Modular Furniture has to fulfill few roles and responsibilities on a personal front.
- A Lead Assembler of Modular Furniture must understand the client's requirements thoroughly and have appropriate and correct understanding of the work task.
- A Lead Assembler of Modular Furniture must implement the applicable quality standards for the assigned work task, via a well-known mechanism called Quality Control.
- A Protocol Deviation is said to have occurred, when there is a minor or moderate divergence from the sanctioned design, blueprint, and processes in the organization.
- Discipline can be defined as the "the practice of making people obey rules or standards of behaviour, and punishing them when they do not".

Activity



- The trainer asks the students to play a game, where they sit in a circle / semi-circle and start telling a
 story in a team. The first person speaks the first sentence in the story, the second one speaks the next
 one and the process continues till the story is over. This game is aimed at teaching the students
 effective communication and active listening.
- The trainer asks the students to play a game, where they are divided into two teams, A and B. Both the teams are given a sheet of paper each and common stationery items. Each team has to make a "cantilever bridge" with the help of these resources. This activity is aimed at teaching the students Teamwork.
- The trainer holds up a sample technical drawing / blueprint and explains to the class its different parts, blocks, and their uses. He/she explains what project does the sample drawing represent and helps the class understand the drawing, and how it represents the actual item to be constructed/ assembled/installed.

Exercise

Answer the following Questions briefly:

- 1. What is AutoCAD?
- 2. What is the latest version of AutoCAD?
- 3. State the functions of the following commands in AutoCAD: QSAVE, STRETCH, DIMSTYLE, OFFSET, WBLOCK.
- 4. Name the parts of a Blueprint and state their importance.

Glossary of Important Terms

Α

Abattant - A French term used to describe a drop front secretary desk, usually with drawers or cabinet doors below

Acanthus - A carving of the acanthus leaf used to decorate furniture.

Alder - A light brown hardwood from the Birch family.

Aliphatic Resin Glue - Popular yellow woodworking glue.

Antique - An item that is at least 100 years old.

Applique - Term used to describe an applied ornamental piece.

Apron - The board placed below the underside of a chair seat, table top or shelf usually for support; also referred to as the skirt.

Arm Chair - A chair with arm rests attached to each side.

Armoire - A tall wardrobe which originated in France during the 16th century.

Arrow Foot - A cylindrical tapered foot.

Art Deco - A style period from the 1920's and 1930's featuring basic geometric patterns and lines.

Ash - A light colour hardwood used in furniture and cabinet construction.

В

Bachelor's Chest - A small chest of drawers; typically from the 18th century.

Bail - The hanging loops or ring which forms a handle.

Baize - A woollen fabric similar to felt; commonly used on gaming tables.

Backrest - The back of a chair which supports a person's back while seated.

Back Splat - Vertical slat of wood in the centre of the back of a chair.

Baker's Rack - Open, slat back shelving unit with or without a cabinet below used for storing goods in the kitchen.

Ball Foot - A full round turning used as a foot on furniture items.

Ball and Claw Foot - Carved or cast furniture foot of a claw holding a ball.

Barrel Chair - Semi-circular or barrel shaped low back chair.

Barstool - A high stool used at a bar or high counter.

Bas-Relief - A sculpture or carving that projects minimally from the background.

Bentwood - Wood that has been steam bent into curved shapes; commonly seen on rocking chairs.

Bevel - An edge which is cut at a slant to that of a main area such as that of a bevelled mirror.

Biedermeier - A style of furniture commonly produced in Austria or Germany during the early 19th century; features simple marquetry patterns.

Birch - A close grained light colour wood used in furniture and plywood construction.

Bird's Eye - A decorative feature common to Maple features small concentric circles resembling that of a bird's eye.

Blanket Chest - Low storage chest with hinged lid often referred to as a hope chest used during Colonial times.

Block front - A three section chest with the centre section set back from the end sections.

Bombe - An item of furniture such as a commode or chest with a pronounced outward or convex bulge towards the base.

Book matched - A veneering technique where two slices of veneer are glued next to each other so that grain patterns mirror each other.

Bow front - A convex front of a chest or buffet.

Box Joint - An interlocking joint commonly used to construct cabinet drawers

Bracket Foot - Decorative or plain right angled foot shaped like a bracket placed at each corner of the piece.

Brass - An alloy used for furniture handles, knobs, hinges and fasteners; also used to construct headboards and footboards.

Breakfront - A cabinet with the front centre section that protrudes forward or outward from the end sections.

Buffet - A sideboard used in the dining area for serving food or the storage of silverware and dishes.

Bun Foot - A flattened ball foot, which resembles the shape of a bun.

Bureau - A chest of drawers typically used in a bedroom.

Burl - An abnormal growth on trees usually near the base of the trunk or crotch which is usually cut for veneer because of its figured pattern.

Butler's Table - An oval table with four sides hinged upwards that fold out flat when in use.

Butt Joint - A simple but weak joint used to join two boards together at right angles.

C

Cabinet - A cupboard with doors, shelves and or drawers used for storage or display.

Cabriole - Furniture leg which curves outward from where it's attached descending in a reverse curve into an ornamental foot.

Camel Back - The broad curve and rise of the centre section of a sofa back.

Cane Webbing - Pre-woven cane machine made from individual strands of chair cane available in various widths and patterns; held in place using a tapered reed spine pressed into a groove.

Caning - Weaving or interlacing of narrow strips of the skin of the rattan palm to form chair seats, backs or sides.

Captain's Chair - A short backed, rounded arm chair with spindles.

Carnauba Wax - Wax obtained from the leaves of the carnauba palm used in waxes and polishes

Case Goods - Storage pieces typically made of wood such as dressers, bookcases, hutches, chests and desks.

Caster - Small wheel designed to allow furniture to be moved; used on chairs and antique case goods.

Catalyzed Lacquer - A highly durable reactive film finish; a lacquer with an added catalyst to accelerate a chemical reaction during evaporation.

Chaise Lounge - Long chair; sofa with one or two arm in the shape of an elongated chair for reclining.

Cherry - Hardwood obtained from the cherry tree used in furniture construction.

Chest on Chest - Tall chest consisting of two stacked chest of drawers with the upper chest being narrower than the base chest.

Cheval Mirror - Freestanding full length mirror supported by uprights on each side allowing the mirror to pivot.

Chiffonier - Tall, narrow chest of drawers commonly used to store lingerie.

China Cabinet - Display cabinet placed upon a buffet used to display or store dishes.

Chintz - Brightly coloured and polished fabric.

Chippendale - Ornate, carved style of furniture from the 18th century.

Claw Foot - Carved furniture foot resembling an animal's claw.

Club Chair - Low back upholstered chair with arms.

Coffee Table - Long, low table placed in front of seating.

Coil Spring - A conical coiled spring used in rows for seating support.

Commode - Low chest of drawers or cupboard; originally referred to a nightstand that concealed a chamber pot.

Console Table - Small or narrow table designed to be placed against or fixed to a wall.

Contemporary - Modern look or style of furniture.

Corner Blocks - Small blocks of wood glued in place to reinforce or strengthen adjoining pieces of wood.

Corner Cabinet - Triangular shaped cabinet designed for use in a corner.

Couch - Modern adaptation of a daybed; provides seating for more than one individual.

Credenza - Sideboard or buffet with doors used for storage; commonly found in an office behind a desk.

Cross Banding - Veneer applied to the edge of table tops or drawer fronts at a right angle to the face veneer.

Curio Cabinet - Tall, slender, sometimes lighted cabinet with glass doors and panels used to display collectibles.

ח

Dacron - Common trade name for polyester fibre; used as a wrap on seat cushions.

Damask - A reversible fabric with design.

Davenport - Compact writing desk features a sloped top above drawers.

Daybed - Seating unit that can double as a bed.

Deck - The foundation of a chair or sofa where the loose cushions are placed.

Density - Reference to the weight of foam used for seat and back cushions; either low density or high density.

Dentil Molding - Decorative molding utilizing evenly spaced blocks.

Dining Chair - Chair used at a dining table; available with or without arms.

Dining Table - A table, where meals are served and eaten.

Distressing - A finishing technique to make the wood appear aged or old by adding rub marks, small holes and indentations.

Dovetail Joint - Common interlocking joint noted for it's resistance to pulling apart; typically used on drawer sides.

Dowel - Round wooden pin; usually spiral fluted or reeded, used to join pieces of wood together and strengthen the joint.

Drawer - An open top box or compartment for storage that slides in and out in a cabinet.

Dresser - A chest with drawers for the storage of clothing.

Drop Leaf - A table having hinged extension leaves, supported by a bracket when in use and hang vertically against the table, when not in use.

Dust Cover - The material or fabric used to cover the bottom of a sofa or chair; also called cambric.

Ε

Ebonized - Wood stained dark and polished to simulate ebony.

Embossed - A low relief raised design such as an ornamental piece made through pressure rather than carving.

Engineered Wood - Man made sheet goods made from wood chips and glue under pressure; commonly referred to as particle board.

Entertainment Centre - Cabinet or shelving unit used to store a television, video and audio components.

Epoxy - A high strength two part adhesive consisting of a resin and hardener.

Escutcheon - A decorative or plain plate that protects the area around a keyhole.

Etagere - An open shelving unit used for display purposes.

F

Fabric - Cloth produced by weaving natural or synthetic textile fibers together.

Fall Front - A hinged door of a secretary desk that drops down to create a writing surface.

Faux Finish - Decorative finish used to imitate the look of a natural material.

Feather Banding - Narrow bands of veneer inlaid in opposing diagonal directions.

Fiberfil - Polyester filling material or cushion wrap.

Fiddle Back - The back splat of a chair that resembles the shape of a fiddle or violin.

Figuring - The natural grain patterns of woods such as curly maple.

Finger Joint - Used to join short pieces of wood at the ends to make a longer one; provides strength through increased glue surface area.

Finish - The protective coating applied to furniture to protect the substrate; common finishes include paint, lacquer and polyurethane.

Fleur De Lis - A French floral emblem or carving in the shape of an Iris or Lily.

Footrest - The brace or bar at the front of a stool for your feet.

Formica - Registered brand name of plastic laminate material.

Frame - The basic structure of an upholstered chair or sofa; usually made from a hardwood.

Front Rail The front cross piece of wood between the legs of a piece of furniture such as a chair.

Four Poster Bed - A bed with posts at each corner; may vary in height.

G

Gallery Rail - Small or low railing used around a shelf or table top.

Gateleg table - Drop leaf table with leaves supported by legs that swing out from the side like a gate.

Gilding - Decorative effect of applying gold leaf or powder to a surface.

Gimp - A fabric fold used to hide upholstery fasteners or tacks.

Glazing - Finishing step of applying and wiping off stain used to highlight wood grain and features such as carvings.

Glide - Applied to the bottom of furniture legs to protect the floor surface and make the piece easier to move around; commonly made from metal, nylon or felt.

Glue Block - A small block of wood used to reinforce a joint.

Gold Leaf - Thin leaves of gold used in gilding.

Grain - The natural patterns in wood created by the direction of fibers.

Н

Hand Rubbed Finish - An oil finish applied to a piece of furniture by hand.

Hardwood - The wood from deciduous trees (trees that lose their leaves during winter).

Harvest Table - A narrow, rectangular drop leaf table

Headboard - The upright structure attached to the head of the bed frame.

Hepplewhite - An 18th century furniture design.

Highboy - A tall or high chest of drawers upon a lowboy (base) raised on long legs; a two part case piece.

Hope Chest - A hinged top chest for the storage of items in anticipation of marriage.

Huntboard - Originally used to serve food and refreshments after a hunt; light or portable sideboard.

Hutch - An upper cabinet consisting of shelves; with or without doors placed upon a chest, desk or buffet.

ı

Inlay - Decorative technique of inserting contrasting wood veneers or materials to create a feature or design.

Intarsia - A form of inlay similar to marquetry; decorative inlaid panel or dimensional image.

J

Jacquard - Woven fabric with intricate patterns created on a loom.

Japan Drier - A drying agent or solvent used to speed up the drying time of oil based finishes.

Japanning - A finish imitating oriental lacquer work.

Κ

Kiln Dried - Lumber dried in a kiln to specified uniform moisture content.

Kneehole Desk - Desk with a recessed central area for a person's knees.

Knock Down Furniture - Unassembled furniture that a consumer assembles after purchase; also known as RTA (Ready to Assemble).

Knot - A hard cross grained piece in a board generally from a branch protrusion; may loosen over time and fall out of the board.

Koa - Acaciakoa; a hardwood endemic to the Hawaiian Islands; commonly used to construct furniture and musical instruments.

L

Lacquer - A synthetic, durable fast drying coating used to finish and protect wood.

Ladderback - A style of chair back with horizontal cross rails resembling a ladder.

Laminate - Composite material used on counter or table tops; provides a heat resistant, wipe clean surface.

Leather - Made from tanning animal hides and used for upholstery.

Linen Press - A cabinet with shelves or shallow drawers behind doors designed to store sheets, tablecloths, napkins, textiles and clothing.

Lingerie Chest - Tall narrow chest designed to store women's undergarments.

Loper - A pullout arm or slide that provides support for a fall front desk or hinged table leaf.

Loveseat - A small version of a couch designed to seat two persons.

Lowboy - A low table or chest with cabriole legs; often used alone or as the base of a Highboy.

Μ

Maple - Hardwood with a tight grain and blond colour popular in furniture construction.

Marble - A crystalline rock used on various surfaces of furniture such as table tops or desk tops.

Marguetry - Decorative technique of inlaying veneers to create a pattern or picture in furniture.

MDF - Medium Density Fibreboard; engineered wood panel made from wood fibres and adhesive exposed to heat and pressure.

Mission Style - American version of English Arts and Crafts, which emphasizes on simplicity.

Miter Joint - A joint that forms a corner with both pieces usually cut at a 45 degree angle when forming a 90 degree corner.

Modular - Interchangeable upholstered sectional seating units used to create different seating arrangements.

Molding - Decorative strip covering transitions or used for ornamentation.

Morris Chair - An early to mid-19th century version of a reclining chair with an adjustable back.

Mortise and Tenon - Furniture joint utilizing a projection (tenon) on one piece of wood inserted into a cavity (mortise) on another to join the pieces together.

Motion Furniture - Mechanized furniture allowing for the adjustment of seating position such as a recliner or rocker.

Mule Chest - A chest with drawers in the base with cabinet doors above.

N

Nesting Tables - Multiple tables graduating in height allowing one to be stored under another; usually in sets of three.

Night Stand - A low bedside table or small cabinet for use next to a bed.

Nu-kane - A man made cane manufactured from durable wood pulp based material; used in place of natural cane.

0

Occasional Tables - Generally refers to small tables such as an end table, coffee table, console or side table.

Ogee - A double curve or S shaped molding or edge detail.

Ottoman - An upholstered low stool or footrest.

Outdoor Furniture - Furniture designed specifically for outdoor use.

Ovolo - Convex molding referred to a quarter-round molding.

Р

Pad Foot - Rounded foot with a thin circular base found on cabriole legs.

Particle Board - Engineered wood product manufactured by bonding small wood particles with an adhesive and pressed into shhets.

Pedestal Desk - A desk with the top supported by two pedestals or small cabinets with drawers.

Pedestal Table - A table featuring a central pedestal or column support instead of legs.

Pembroke Table - A rectangular table with small drop leaves or flaps on each of the longest sides and drawer in front of the short side.

Pie Crust Table Top - A round table with ornamental edging resembling the crimped edge of a pie crust.

Plinth - The squared base or pedestal that supports a cabinet or piece of furniture instead of legs.

Plywood - Manufactured wood made from a series of alternating layers of wood veneer with the grain perpendicular to each other for strength.

Poplar - A soft wood from the Birch family often used as a secondary wood in furniture construction.

Q

Quarter Sawn - Wood cut from a log, which has been quartered lengthwise sometimes exposing distinctive grain patterns such as tiger striped oak.

R

Rattan - The stem of a vine like climbing palm used in the manufacture of wicker and rattan furniture.

Reeding - Carved parallel convex or beaded lines used on bed posts, table and chair legs.

Reproduction - A replica of an original piece.

RTA - (Ready to Assemble) Finished furniture items which require assembly by the consumer.

Rule Joint - A joint used between a table top and drop leaf which leaves no open space between the top and leaf when open.

Runners - Strips of wood on which drawers slide.

Rush Seat - A woven chair seat using twisted stems of marsh grass known as "Rush".

S

Saddle Arm - Chair or sofa arm style which looks like a saddle profile.

Scotch Guard - Trade name for a product to protect fabric from staining.

Seat Rail - Horizontal support directly under the seat connecting the front legs with the back of a chair.

Secretaire - French term for a free standing writing desk with a drop down writing surface with shelves or drawers below; may also have a bookcase above.

Sectional - Modular seating units used in various combinations.

Semainier - A narrow but tall chest of drawers with seven drawers; one for each day of the week.

Serpentine Front - Horizontal compound curve used on the front of case pieces or drawers where there is a centre convex section between two concave sections.

Settee - A long seat or bench with a back and arms at each end to accommodate two or more people.

Shellac - A natural resin refined and dissolved in alcohol and used as a wood finish or sealer.

Sideboard - Used in the dining area for serving food or the storage of silverware and dishes.

Side Chair - A traditional dining chair without arms used at the sides of a dining table.

Slat Back - The back of a chair which utilizes vertical slats for the back rest.

Sleeper Sofa - A sofa with a pull out mechanism converting the sofa into a bed.

Sofa - Also known as a couch; an upholstered long seat with back and arms.

Sofa Table - A slender high table placed against the back of a sofa.

Softwood - Wood or lumber from conifers or evergreen trees such as pine or fir.

Solid Wood - Generally refers to furniture that is constructed using solid wood and does not include the use of engineered wood products.

Spindle Back - A chair back consisting of multiple turnings or spindles stretching between the seat and top rail.

Steam Bent - Wood for furniture components that are bent using steam such as a chair back.

Stretchers - The horizontal braces which connect and reinforce the vertical elements together such as chair or table legs.

Swatch - A sample of upholstery fabric.

Swivel Rocker - A rocking chair that also revolves.

Т

Tambour - Flexible sliding doors or pull down front for a roll top desk; constructed from narrow pieces of wood glued to a fabric such as canvas.

Tapestry - Fabric with a woven pattern or decorative pictorial design.

Teak - Tropical hardwood popular for ship building and outdoor furniture construction.

Tempered Glass - Glass treated with heat during manufacture which breaks into pebble like pieces instead of shards or sliver, so often used for glass table tops.

Tenon - A projection at the end of a piece of wood which fits into a mortise to join the pieces together.

Trestle Table - Table supported by uprights at the ends with a stretcher between them.

Trundle Bed - A low pull out bed on wheels stored below another bed.

Trim - A decorative molding used on case goods.

Tweed - A medium to heavy woollen fabric

Twill - A fabric woven with a diagonal pattern or ribs.

U

Unfinished - Furniture that has not been stained, painted or had a finish applied to it.

Upholstery - The covering including padding, springs, webbing, foam and fabric on furniture.

٧

Vacuum Press - Used to apply pressure when veneering or gluing together uneven or odd shaped furniture parts.

Varnish - A solvent based transparent film finish used to coat furniture.

Veneer - A thin slice or slices of decorative or exotic wood glued to an inferior wood to create panels, doors and cabinet sides.

W

Walnut - A medium to dark hardwood used for furniture construction and veneering.

Webbing - Strips of elastic or woven fabric used to provide support for upholstered arms, backs and

Wicker - Term given to furnishings woven from willow, reed and rattan.

Windsor Chair - A wooden chair with a bentwood curved top and spindle back pegged into a solid, shaped seat.

Wing Back - High back upholstered chair with wing like protrusions extending above the arms from the sides near the top of the chair.

X, Y, Z

Zig-Zag Spring - A sinuous or S shaped upholstery spring used in chair, ottoman and sofa seats and backrests.

(Source: http://www.furniturecaretips.com)











Participant Handbook



Lock Installer











14. Carry Out Lock Installation Activities

Unit 14.1 The Job Description of the Lock Installer

Unit 14.2 Main Types of Locks and Units Assembled

Unit 14.3 Functioning And Types Of Various Doors/Windows

Unit 14.4 Different Tools And Equipment

Unit 14.5 Technique Of Fixing The Lock On The Door



Key Learning Outcomes | 💆



At the end of this module, you will be able to:

- 1. Discuss an overview of the job role
- 2. Explain the main types of locks and their units
- 3. Illustrate the functioning and types of various doors / windows
- 4. Underline the use of different tools and equipment
- 5. Demonstrate the technique of fixing the lock on the door

Unit 14.1 The Job Description of the Lock Installer

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss the job responsibilities of the Lock Installer

A **Lock Installer** is responsible for installations of different locks on the doors, repair and service of locks whenever required.

The job responsibilities of a Lock Installer, include, but are not limited to the following:

- Carrying out all lock installation procedures:
 - O Loading
 - O Unloading
 - O Staging
 - O Cleaning up and waste disposal
 - O Panel Assembly
- Carrying out mechanical adjustments in the following:
 - O Lock Mechanisms
 - O Drawers
 - O Slides
 - O Levelling
- Reading, studying and interpreting job orders, plans and blueprints
- Recognizing and understanding symbols and abbreviations
- Planning for the arrangement of appropriate tools, supplies and equipment required for the assignments
- Conveying project status and problems to the Supervisor on time, in a clear, concise way
- Using tools and equipment safely and accurately
- Completing required documentation on time (daily activity logs, onsite paperwork, etc.) and in a neat

Unit 14.2 Main Types of Locks and Units Assembled

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the main types of Locks
- 2. Identify the different parts of a Lock

14.2.1 Main Types of Locks _____

A **Lock** is a mechanism for keeping a door, window, cover or a container fastened and secure, with the help of a key.

In simpler terms, the Lock is a mechanism or device to keep something secured. This control access to authorised people by keeping a door fastened. This normally gets operated with the help of a key.

Due to many innovations based on different requirements, we have plenty of choices in Locks. We will understand in detail different types of locks and their working principle.

The main types of locks are:

- Pad Lock
- Rim Lock
- Mortise Lock
- Dead Bolt Lock
- Cylindrical Lock
- Furniture Locks
- Lever Handle Locks
- Interchangeable Core Locks
- Vending Locks

A. Pad Lock





Fig. 14.2.1.1: Pad Lock

The Pad Lock is the simplest type of lock and is detachable. These can be used at various places and interchanged as and when required. The common variants are:

- The common variants are:
 - O Key operated, which can be further subdivided into the following variants:
 - Key retaining
 - Non-key retaining
 - O Combination or Numbered, which comprises numbers and open when a specific combination of numbers are entered.

Since these are detachable, no separate installation process is needed. It comes in 5,6,7 and 8 levers. Generally, it is used in the Rolling Shutters in shops, Grill Doors and doors having AL-Drop, J-Bolt and Hasp & Staple.

B. Rim Lock

 $Rim\,Locks\,are\,installed\,at\,the\,edge\,of\,Door.\,These\,can\,be\,used\,for\,main\,doors\,as\,well\,as\,internal\,doors.$

The main variants are:

- O Night Latch
- O Twin Bolt
- O Tribolt
- O Verti Bolt (used even on double leaf doors)



Fig. 14.2.1.2: Rim Lock

C. Mortise Lock

These Locks are fitted inside the Door, and remain hidden. Since we need to build a Mortise (a hole or dent cut in a manner so that it receives a projection from another part, and the parts are joined securely together) in the door to fit such locks, these are called Mortise Locks.

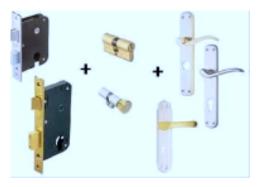


Fig. 14.2.1.3: Mortise Lock

The parts of a Mortise Lock are:

- O Body
- **O** Cylinder
- **O** Lever

The common variants are:

O Lever Mortise Lock



Fig. 14.2.1.4: Lever Mortise Lock

O Euro Profile Mortise Lock



Fig. 14.2.1.4: Euro Profile Mortise Lock

D. Dead Bolt Lock

Dead Bolt Locks are generally fitted on the Main Door. These locks house in the grooves made in door and not protruded outside. Due to this special design, it is not very easy to break them.

The common variants are:

Variant Name	Features	Image
Single Cylinder Dead Bolt	 This variant has a Key Cylinder outside and a Rosary or Thumbturn inside. Since it is not lockable from inside, there is a security threat, if someone has access to house from the window or some other way. In that case this can be opened from inside without the key. 	

Variant Name	Features	Image
Double Cylinder Dead Bolt	 This variant overcomes the security issues with the Single Cylinder variant. This lock is lockable from the inside as well. However, this variant runs the chances of the residents getting trapped inside the house in case of Fire and other emergencies, if key is not available at that very moment. 	
Lockable Thumbturn Dead Bolt	 This type of lock is a hybrid of the above two variants. This lock can be opened from the inside when people are available in house and can be locked also when everybody is outside. This feature is very useful when people leave the house for prolonged duration. Thus, even if somebody gets access inside, the lock cannot be opened from inside without the key. This variant is, hence, highly secure and flexible. 	

E. Cylindrical Lock

- Cylindrical or Knob Locks are very much in use on the Main door or internal doors, in combination with the Dead bolt.
- You must never use these locks alone for main door, since these locks involve Knobs, which are protruded outside.
- In case of any attempt of breaking such locks, it is very easy to break them away with a common hammer or similar kind of tool.
- Once the knob outside is broken, the lock is completely open.
- These locks should be used for internal doors only, like Intermediate doors, Toilets doors and office doors.

The main components of Cylindrical locks are:

- O Knob with or without key hole
- O Latch
- Deadlocking Mechanism
- O Locking Mechanism

The common variants are:

Variant Name	Features	Image
Keyless	 This variant is not provided with any locking mechanism with the help of a key. This only come with a Deadlock mechanism, which keep the door locked till the time somebody rotates the lock and opens the door. 	

Variant Name	Features	Image
Keyed	 These types of locks come with the feature of locking with a key. However, these locks should not be used for important security purposes These should only be used where there is no security threat, like internal doors. 	

F. Furniture Locks

- These are light duty locks and used in Table or Almirah drawers and for several other purposes.
- The common variants are:

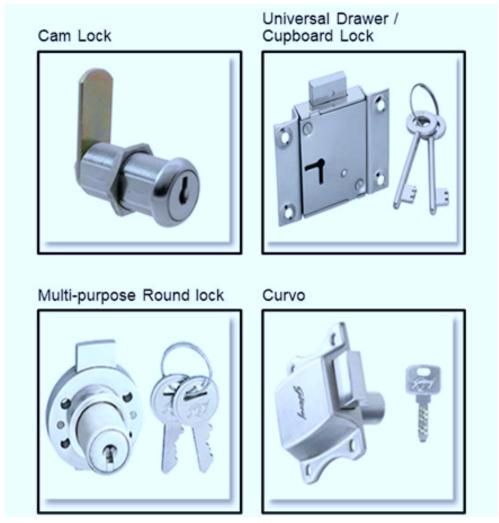


Fig. 14.2.1.5: Furniture Locks

G. Lever Handle Locks



Fig. 14.2.1.6: Lever Handle Lock

- These locks are generally used in internal doors in offices.
- These are convenient to open, due to the lever design, which is easier to hold and move down.
- These are available in both left hand and right hand designs for left side or right side opening doors.

H. Interchangeable Core Locks



Fig. 14.2.1.7: Interchangeable Core Lock

- These locks have the special feature of easy replacement of complete lock mechanism.
- These locks have two types of keys. One is used for opening and closing the lock.
- With another key, the complete lock Mechanism can be taken out and can be replaced by new lock set.
- Due to this feature, there is no need of changing the complete lock, in case you want to change the lock. These kind of locks can be installed in special housing cases only.

I. Vending Locks



Fig. 14.2.1.8: Vending Lock

- These locks are used in Vending machines.
- These locks can be taken out completely.
- The common variants are:
 - O The one is with spring latch, which can be locked without key
 - O The other one require key for locking

14.2.2 Different Parts of a Lock _

A door lock has typically 3 parts:

- Cylinder (Lock Body)
- Bolt or Latch
- Box or Strike Plate

A. Cylinder (Lock Body)

- The lock body or the cylinder is the main part of a lock.
- The lock body is the place where the key is inserted.
- When it is locked, the cylinder engages a series of spring-loaded pins, which keep the cylinder from turning.
- When a key is inserted, the pins attached to the spring go upward.
- The reverse happens when it is unlocked.
- The uneven edge of the key pushes the spring and the pins go up or down according to the direction of the movement of the spring.

B. Bolt or Latch

- This is the metal extension within the door which locks the door.
- There are two types of latches available in the market: Spring Bolt and Deadbolt.
- Spring bolt is a latch that is connected to the spring of the lock. The spring remains in a compressed state when the door is locked. When the door is opened, the compression of the spring decreases; allowing the door to open.
- Deadbolt has no spring inside the lock. When the door is slammed, the latch gets closed. This is considered to be a better option as a lock in comparison to the spring bolt.

C. Box or Strike Plate

- The bolt extends from the cylinder into a small square shaped hole, called the "Box".
- It is designed to hold the bolt securely in the doorframe when the lock is engaged.
- The metal, which extends from the cylinder to the box, is known as Strike Plate.
- This is an added prevention to the lock system.

Unit 14.3 Functioning And Types Of Various Doors/Windows

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Define a Door and its functions
- 2. Identify and describe the various parts of a Door
- 3. Inspect the different types of Door Functions
- 4. Inspect the different types of Lock and the types of Door to install them in
- 5. Identify the type and alignment of Lock as per functioning of Door

14.3.1 Defining a Door and its functions -

A Door is defined as a "a hinged, sliding, or revolving barrier at the entrance to a building, room, or vehicle, or in the framework of pieces of furniture, like the cupboard". Door is a key feature of any building, whether it is a home or commercial building. It is provided for controlling access to that building / room, for air circulation and light.

The common functions of Door are:

- Serving a connecting links between the different external and internal points of a building
- Enabling air circulation, ventilation and light
- · Enabling views outside
- Serving as barrier to noise
- Controlling the flow of traffic

14.3.2 Parts of a Door -

The various parts of a common Door are:

- Rail: A horizontal wood piece running parallel to Door
- Stile: A vertical wood piece joining two rails together
- Back Set: This is the distance between the opening edge of the door to the center of the key hole
- **Door Thickness:** Thickness of the door is measured at the door edge.

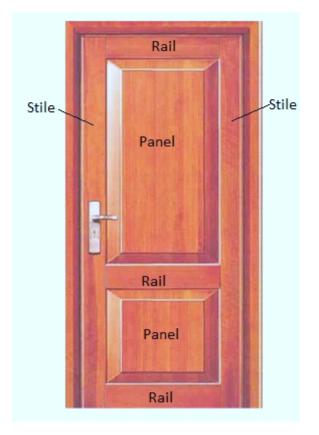




Fig. 14.3.2.1: Door Thickness and Back Set

14.3.3 Different Types of Door Functions -

Based on the use, there are many types of doors available in the market. Also, there is an effect of time on door evolution. Due to aesthetic or personal choice, some people are still using doors developed and used during ancient time. Based on operation doors as of following types –

Type of Door	Features	Image
Inward Opening	If you are standing inside of the room and door panel gets open inside the room, then it is called Inward Opening Door.	

Type of Door	Features	Image
Outward Opening	If you are standing inside of the room and door panel gets open outside the room, then it is called Outward Opening Door.	
Sliding	These types of doors slide in horizontal direction. These are very good in saving space. This are normally mounted in channel, or in suspended in rack.	
Rotating	These typically consist of three or four doors that hang on a central shaft and rotate around a vertical axis within a cylindrical enclosure. These doors allow large number of people to pass in and out.	
Left Hand Side Opening	If you are standing outside the room and door is installed with hinges on your left side, then it is called Left Hand Side Opening Door.	
Right Hand Side Opening	If you are standing Outside of the room and door is installed with hinges on your Right side, then it is called Right Hand Side Opening Door.	

14.3.4 Different Types of Lock (Left Hand and Right Hand Locks) and the Types of Door to Install Them In

Lock Type	Description	Door Type
Left Hand Lock	If the hinges are on the left, you have a left handed door. You will need a left handed (LH) lock.	Left Hand Side Opening
Right Hand Lock	If the hinges are on the right, you have a right handed door. You will need a right handed (RH) lock.	Right Hand Side Opening

14.3.5 The Type and Alignment Of Lock as per Functioning of Door

Type of Door	Position of Hinge	Alignment of Lock
Income of Opening	On the left of the Door	Left
Inward Opening	On the right of the Door	Right
Outronal On anima	On the left of the Door	Left
Outward Opening	On the right of the Door	Right
Left Hand Side	On the left of the Door	Left
Opening	On the right of the Door	Right
Right Hand Side Opening	On the left of the Door	Left
	On the right of the Door	Right

Unit 14.4 Different Tools and Equipment

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Underline the basics of different tools and equipment
- 2. Demonstrate the method to handle tools and equipment safely and the health and safety implications of not doing so
- 3. Describe the process of operating different machines

14.4.1 Different Tools And Equipment _____

Different types of tools and equipment are used to install locks. Below is a chart comprising the most important tools for lock installation.

Tool	Description	Image
Tool Box	A Tool Box prevents tools and equipment from getting scattered around and becoming unorganised.	
Peen Hammer	Hammer is a striking tool, widely used tool to drive nails inside the work piece (For example: piece of furniture / metal). The various parts of a Simple Hammer are: • Handle: It is made of strong wood and Hammer is fitted into its eyehole • Eye Hole: The hole that is made to fit the handle in it • Peen: It is the upper part of the head of a hammer, which is used in various jobs such as riveting, bending etc. • Face: The flat part of the head which is used to apply a blow • Wedge: To fit the handle in the eye hole tightly, wedge is used	0 69
Nail Puller	Nail puller is an extended part of certain hammers. Nail pullers is attached to the opposite of a hammer which has "V" shape to pull a nail out of the work piece.	

Tool	Description	Image
Measuring Tape	Measuring tape is the tool which has measuring readings in meter, centimetre or millimetre to mark a certain area for lock installation.	Constant of the second of the
Carpenter Pencil	Carpenter pencil is a form of marking tool. The pencil is used to mark the area to be cut/ drilled on the wood. Generally, the lead of a carpenter pencil is stronger than the normal pencils.	
Utility Knife	Utility knives refer to the folding or fixed blade knives that are used for cutting holes, scraping pencil and delicate crafting. Utility Knife is used for cleaning mortise joints or marking on wood.	
Standard Screw Drivers	Screw Driver is used for tightening or loosening the screws. The shank of the Standard Screwdriver is made of a steel rod and handle is made of wood or insulated material.	- Tip Blade Handle
Heavy Duty Screw Driver	This screwdriver is used for heavy work. A spinner is needed, to rotate the shank of this screwdriver.	

Tool	Description	Image
Philips Screw Driver	This Screw driver head has shape plus sign (+). The screw having head of same shape are tighten or loosen by such screw driver.	
Various Saws	A variety of saws are used to carry out activities like rough cutting, curved cutting, straight cutting, fine cutting etc. Common varieties include: Rip saw Cross cut saw Panel saw Tenon saw Fret saw Key hole saw Circular Saw Hole Cutter Saw Hole Cutter Saw	Circular Saw Hole Cutter Saw
Nail Pouch	This can be worn at the waist and contains all the nails, tools and screws required for installation. It can hold hammers, pincers as well as small parts of locks.	
Portable Ladder	Portable ladders are light, folding ladders that can be taken from one place to the other place easily.	

Tool	Description	Image
H ir h fr	Hinges are types of connectors, which is installed between two objects. For example, a hinge is attached between a door and the door frame. Hinges allow door to open to a definite angle. It clamps the furniture with the frame. The common types of hinges are: Butt Hinge Piano Hinge Parliament Hinge Spring Hinge Concealed Hinge Flag Hinge Back Flap Hinge	Butt Hinge Piano Hinge
		Parliament Hinge
		Spring Hinge
		Concealed Hinge
		Back Flap Hinge

Tool	Description	Image
		Auto Hinge
		Flat
	A screw is a cylindrical rod carved with one or more helical or advancing spiral threads, as a lead screw or worm screw. It has a head and a point. Common types of screws include:	Round Head
Screws	 Flat head screw Round head screw Raised head screw Square head screw Phillips or Cross head screw 	Raised Head
		Crossed Head
		Philips Screw

Tool	Description	Image
Drillers	These are manual tools that are used to bore holes to fit wood screws and dowels. Common Drillers are: Bradawl - It is used on soft wood and when shallow holes and screw holes are to be done. Gimlet - It has a helical tip and is used to make deep holes of 10 mm to 50 mm diameter. Auger - It has a helical tip and is used to make big and deep holes to insert bolt etc. into it. The shack is twisted up to considerable length. Centre Bit - It is used to make shallow wide holes. In the centre of the bit there is a helical point, which becomes footing for making a hole in the wood. Expansion Bit - An adjustable cutter is there in this wit. By adjusting it, holes of many shapes can be made. Counter Sink Bit - It is used to make a hole to fit countersink bit. To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it.	Bradawl Gimlet Auger Centre Bit
		Counter Sink Bit
Spirit / Water Levelling	Spirit or water levelling tools have flat surfaces to minimize the quantity of bubbles after spirit or water application. This are used to measure the straightness and proper state of a vertical or horizontal surface. Such tools are made of wood or aluminium and have two spoil level tubes – one vertical and the other horizontal, which are filled with spirit. The tube is not filled completely with spirit due to which a bubble forms. When this is placed on a vertical or horizontal surface, if the bubble is at the center position, it means that the surface is perfectly level.	

Tool	Description	Image
Studs	Stud is ornamental extension which covers the nail-head or any sharp piercing. One end of a stud is attachable to the nail and the other end is blunt, which covers the sharp piercing.	
Jacks	Jack is used to lift heavy metals or body a bit from the working plane (floor or bench). To install a lock, the door or window should be lifted from the floor level. Jack serves the purpose of lifting the door from the ground.	
Connectors	These are also made of Steel. It is used to connect two wood parts in such a way that can be separated later on, if needed.	
Chisels	Chisels are tools that are used to remove waste materials complex carving. Chisels are of three types; Light Duty Chisels, Heavy Duty Chisels and Special Chisels. Light Duty Chisels include: Firmer Chisel Bevel Chisel Paring / Long Chisel Chopping Chisel (wider chisel) Heavy Duty Chisels include: Mortise Chisel Socket Chisel Special Chisels, or Gouges, are used in round moulding and curving. The blades are bent inside and the cutting angle is inside or outside. Its cross section is circular.	Bevel Face Blade Handle Shoulder Ferrul Steel Hoop Cutting Angle 30 Bevel Chisel Paring Chisel Chopping Chisel

Tool	Description	Image
		Socket Chisel Special Chisels or Gouges
Floor Guard	Floor Guard is used to protect the floor. For example, if the lock installer has to drill or chisel door, he/ she must use floor guard to protect the floor. Otherwise, drilling and chiselling can damage the floor.	
Tapes	Tapes are used to adjoin two parts tightly. These tapes have adhesive on one side of which helps the bodies to adhere.	

14.4.2 Method to Handle Tools and Equipment Safely and the Health and Safety Implications of Not Doing So _

Method to handle Tools and Equipment safely

A. Safe Handling of Powered Tools

Before Using

- O Appropriate measures should be taken to inspect the tool and the power supply. If the tool or any part / accessory is found defective, it must be either replaced immediately or removed from service and tagged appropriately as "Out of Service for Repair".
- O Care should be taken that no defective tool must be used at any point of time.
- O All repair and maintenance work must be accomplished by licensed and experienced persons.
- O Before operating Powered Tools, the Instruction Manual must be read thoroughly.
- O The guidelines and recommendations (by manufacturer) must be stringently followed, as per the Instruction Manual or Directions of Use.
- O The tools must be grounded adequately with the help of a three-pronged plug (equipped with relevant 3-wired colour coded cord) and double insulation. This helps in preventing electric shocks.
- All powered tools must be checked with a continuity tester or a Ground Fault Circuit Interrupter (GFCI), for effective grounding.
- Powered tools must be switched off before connecting them to a power supply.

While Using

- O Issues, like a tool getting heated too soon or appearance of sparks, must be inspected and rectified by a licensed electrician only.
- All power cords must be kept clear of tools and the path along which the tool will operate.
- O Approved extension cords, with proper specifications, power requirement (for the tool) and dimensions must be used, to prevent overheating and fraying of the cord.
- Outdoor work must be done with the help of outdoor extension cords labelled with "W-A" or "W".
- O Cords must be suspended over the work area to mitigate trips and falls.
- Octopus connections must be avoided by deploying a power bar or power distribution, comprising multiple receptacle plugs.
- O While unplugging the tool from the socket, the plug must be pulled gently and not the cord. Forcibly pulling the cord leads to fraying and subsequent risk of electric shocks.
- O The entire work area must be kept dry and away from heat, sharp edges and oil, to avoid damage of insulation.
- O Cords, instead of knots, may be looped, using a twist lock plug.



Fig. 14.4.2.1: Different Power Tools

B. Safe Handling of Hand Tools

- The user must ensure that he / she is adequately trained in the secure usage of hand tools.
- Appropriate and accurate choice must be made on the right tool for the task.
- The user must deploy the correct techniques of handling and using the hand tools thus selected for the task.
- The user must operate hand tools by keeping the wrist straight.
- Hand tools must be thoroughly inspected before use and must be repaired immediately or replaced, whenever necessary.
- The user must ensure that handles of axes, hammers, saws and chisels must fit tightly into the head of the tool, to avoid accidental injuries.
- One must always pull on pliers or wrench.
- Worn jaws of pliers, pipe tools and wrenches must be replaced immediately.
- All hand tools must be kept in a robust toolbox, in a clean and dry place, away from the work area.
- While using hand tools, one must wear appropriate PPE, according to the types of hazards involved in the task. This includes protective gloves of appropriate material, heavy aprons, safety goggles and face shields.
- When not in use, sharp and cutting tools must be covered with appropriate sheaths to avoid injuries.



Fig. 14.4.2.2: Different Hand Tools

C. Safe Storage of Tools and Equipment

The basic idea behind Safe Tool storage is:

- They should not touch with each other, hence no damage to edge or tool
- They should not get rusty
- They should not get lost or taken away without knowledge (in case of team environment)
 - O Edge or Tool Protection: The storing location of tool should be such that one tool should not touch with other tool. Since Edge of Tool is very brittle (due to hardness), it is prone to damages very easily. Hence proper edge cover should be used. If edge covers are not available, then edge should be wrapped in Cloth.
 - O Rust Protection: Every time after using the tool, it should be cleaned and oiled with appropriate lubricant before storing. It will keep them safe from rust. We also need to ensure the storage location is free from water ingress, which may cause rust to metal part and damage to wood also.

D. Perform basic safety checks before operation of all machines, tools and electrical equipment

- A Lock Installer must perform basic safety checks before operating all equipment as a part of the Standard Operating Procedures.
- Before starting with the basic safety checks, one must go through the Instruction Manual, Manufacturer's Recommendations and Directions of Use thoroughly.
- These documents are essential because one can find detailed and stepwise instructions about the maintenance and operating procedures as well as emergency shutdown and tag-out mechanisms in them.
- In case a machine or tool is marked with a lock or tag, it must not be removed and not used.
- Machines and tools, that are floor or bench-mounted, must be anchored or firmly clamped to a robust foundation, before maintenance operations.
- In case a machine does not have safety valves or guards on, one must not operate that for maintenance purpose.
- Check out for frayed out electric cables or loose live prongs in plugs.
- Ensure that power supply is off, before one starts maintenance operations.

E. Tools Maintenance

Maintaining the tools is very important work for any Carpenter. With little knowledge and investment you can keep your tools maintained, which will give good return in terms of uptime.

- **Purpose of Tool Maintenance:** The purpose of Tool Maintenance is very obvious; your tool should be in workable condition all the time. Practising some maintenance of tools' cutting edges and alignment of machines will ensure tool good condition and world class quality.
- **Maintaining Sharpness:** For cutting, it is necessary that your all tool should remain in perfect sharpness. For that, you need to timely inspect your tools for sharpness and should take appropriate action based on the sharpness of edge.
- **Hand Tools:** Chisel, Gouges and Planes come in this category. You should have sharpening system for sharp the tool to correct shape and then you can do manual sharpening with oil stone for getting the perfect edge.
- Alignment: Normally, machines remain perfectly aligned till the time somebody is making some changes in them. But due to inherent vibration during working it is inevitable that its parts will get misaligned. Using any Power tool in misalignment is very dangerous. First it will not give you desired result for cutting or any other operation the machine is made for. Also it may cause accident due to misalignment.
- **Circular Saw:** It is important to inspect the Saw blades every now and then. After sometime you will come to know the frequency of getting blade blunt (in number of hours of use). Then you can simply sharp them whenever they cross those many hours of working. It is always wiser to invest little more on quality spares. Good quality blades require re-sharpening less frequent. End of the day you will save money in low frequency of sharpening.
- **Drill Bits:** Drill bits also get blunt. You can do two thing for getting quality output. one, buy good quality bits even with some extra cost. Two, get the drill bit sharpening system installed, if your usage of drill bit is very high.



Fig. 14.4.2.3: Different types of Driils

- Cleaning of Saw Blades: It is very common to have pitch stuck to saw blade, whether it is power
 saw of hand saw. Due to that extra heat is generated, which damage the edge sharpness. Apart
 from that this becomes the reason of excessive vibration, which deteriorate quality if cut. There
 are some special cleaner available in market, which can be used for removing the pitch. The Pitch
 removers increase life of tool and also give long life to sharpness. In this way you save money on
 sharpening and replacement of blades.
- Working Surfaces: With Tool condition, it is also necessary to have good working surface. Working surface should be free from any rust or wood pitch. You can use some good quality special chemical which are designed for keeping these surfaces free from all this.
- **Tips for Tool Maintenance:** There are few tips which you can follow for keeping your tools and equipment up to date and in perfect condition.
 - O Always clean your machine before leaving your workplace. Note down any issue noticed while machine cleaning. Self-machine cleaning gives very good opportunity to know any abnormality in machine.
 - O Always inspect your machine before starting the operation. There might be some breakage in tool or blade, which might cause a serious accident.
 - **O** Make plan for blade re-sharpening based on previous experience. You can keep one spare blade sharpened for replace. That will increase up time of your machine.
 - O Make plan for machine oiling and other minor repair. Keep on adding any minor repairs you had to do in between, in this repair plan. Adhere to that plan. This preventive maintenance plan shall ensure 100% uptime of your machine.

The Health and Safety implications of not handling tools properly

Tools and equipment, if not stored, used and maintained properly, may turn out to be extremely hazardous for the health and safety of Lock Installers.

• Hazards from Power Tools: Common accidents, leading to major cuts, abrasions, lacerations, amputations, electrocution, burns and fractures

- Such accidents take place from:
- O Touching the cutting, drilling, or grinding components
- O Getting caught in moving parts
- O Suffering electrical shock due to improper grounding, equipment defects, or operator misuse
- O Being struck by particles that normally eject during operation
- O Touching hot tools or work pieces
- O Falling in the work area
- O Being struck by falling tools
- Hazards from Hand Tools: Hand tools range from hammers, mallets, scissors, razors, saws, and knives
 to pruners, chisels, and snips. While these tools are very different and can be used for a wide variety of
 jobs, they have some common hazards and safety precautions. Hazards include deep cuts,
 lacerations, amputation, etc.

Such accidents take place from:

- O Failure to use the right tool
- O Failure to use a tool correctly
- O Failure to keep edged tools sharp
- O Failure to replace or repair a defective tool
- Failure to store tools safely

14.4.3 Process of Operating Different Machines

A. Process of operating Drilling Machine:

Drilling can be done using various drilling machines such as hand drills, drill bits etc. Hand drill is the most common used drilling machine to make holes/bores on the door for lock installation.

The steps involved in operating a Drilling machine are:

- Mark the work area for drilling with the help of a carpenter pencil and measuring tape
- Set the work piece tightly between the clamps of a vice
- Place the tip of the drilling blade on the markings made for drilling
- Grasp the steady handle tightly; do not lose your grasp while drilling
- Grasp the other handle (operating handle) with the other hand. This wheel needs to be turned while drilling
- Turn the operating handle gently to make bore on the wooden surface
- Give pauses after regular intervals to clean the waste from the drilled hole
- Drill till the desired depth is reached
- Finally clean the hole carefully for further activities

Other than hand drills, power drills are also widely used. This is less time-consuming and accurate method of drilling. A power drill is operated manually; however, the rotation of the wheel is controlled by electric source. Once the trigger is pressed, the drilling blade starts rotating. The rotation of the drilling blade create bore on the wall/ furniture.

B. Choose Appropriate Drill Blades, Depending On The Thickness Of The Door

Before starting with the Drilling operations, a Lock Installer must select the appropriate Drill blade, commonly known as "Drill Bit". One of the most important criteria for selecting drill bits is the thickness of the door on which the hole must be drilled.

Length / Thickness of Door - Determines how much deep or thick the hole must be bored

Bit Name	Characteristics	Image
Centre Bit	It is used to make shallow wide holes. In the centre of the bit there is a helical point, which becomes footing for making a hole in the wood. Its spur or scriber which is on the edge of the hole to be made makes a marking. Then the cutter completes the hole. It is available in sizes varying from 3 to 50 mm.	
Expansion Bit	An adjustable cutter is there in this wit. By adjusting it, holes of many shapes can be made. There is a helical centre point in it as well, which makes footing for making a hole. Holes of 12 mm to 75 mm diameter can be made on the wood with it.	
Counter Sink Bit	It is used to make a hole to fit countersink bit. To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it. They are available in 6 to 20 mm size.	
Hinge Boring Drill Bit	This bit is used for fixing concealed hinges and mostly this is used with diameter 35 mm.	35mm

C. Drill Appropriate Holes On The Door Using The Drill Machine

Drilling appropriate holes on the door depends on the below factors:

• **Type of Point required -** Determines if the Drill Bit is to be applied for heavy duty or general drilling operations





Fig. 14.4.3.1: Different Drill Bits

• Material of the Drill Bit - The material constructing the bit

Material	Applications
High Speed Steel (HSS)	General purpose, carbon steel, ferrous and nonferrous metals
Cobalt	Stainless steel, armour plating, and other harder metals
Carbide	Difficult or abrasive materials like cast iron, fibreglass, and nonferrous metals

• Bit Coating - The coating provided to the bit to reduce drilling friction and improve tool life

Material	Applications
Black Oxide	Most common coating type. Helps retain drilling lubricants. Not recommended for nonferrous metals like aluminium.
Tin coated	Titanium Nitride provides extra lubrication at the drill point, for higher drilling speeds and longer tool life.
TiAlN (Titanium - Aluminium nitride alloy) coated	Titanium Aluminium Nitride, most effective when higher drill speeds and feed rates are required. Works well on stainless steel, titanium, ferrous metals, and high temperature alloys.
Bright finish	No surface coating. Flutes are polished for improved chip removal. Works well for nonferrous materials like aluminium.

B. Process of operating Chisel:

Chisels are tools that are used to remove waste materials complex carving. The steps involved in operating a chisel are:

Bevel Edge Chisel (Commonly used to remove waste from Dovetail Joint)

- O Place the wooden frame or furniture piece firmly on the work bench
- O Hold the handle of the chisel and place the bevelled edge on the woodwork
- O Place the chisel at an angle with the woodwork
- O Tap on the top of the chisel with a mallet. Do not use excessive power to remove waste. It will damage the work piece
- O Take out the chisel on a regular basis and remove the waste product
- O Keep on chiselling till the desired result is achieved

Mortise Chisel (Mostly used to cut deep mortis)

- O Make an outline on the woodwork with a marking knife for chiselling
- O Place the chisel on the outline with a slightly slanting angle
- O Tap on the top of the wooden handle of the chisel. These chisels can endure hard blows as well
- O Make a series of shallow chisel cuts perpendicular to the surface
- O Tap the back of the chisel to remove wooden slices
- O Control the depth and breadth of the cut by lowering and raising the handle
- O Continue chiselling till the desired depth and shape are achieved

Firmer Chisel (Generally used for rough and heavier work)

- O Place the woodwork on the workbench
- O Fix the edge of the chisel firmly against the woodwork
- O Tap shortly and rapidly on the handle of the mallet to make slices
- O Remove the slices (chips) on a regular interval
- O Keep on chiselling till the desired result is achieved

Unit 14.5 Technique Of Fixing The Lock On The Door

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Describe the tool kit used in installation of locks
- 2. Demonstrate how to install and fix various types of locks on the door

14.5.1 Tool Kit for Lock Installation

Apart from regular Tools, A Lock Technician require some special tools for installing Lock.

This kit contains-

- Pilot Drill
- Cutter Holder (Shank)
- Cutter Blade Range (from 15.5 to 55 millimetre) 12 nos.

Pilot Drill is used for making pilot hole in the door. Due to this pilot hole it becomes easy to place the shank, while making bigger hole. Shank is a Cutter holder, which hold all 12 types of cutter as and when required. Tip diameter of shank is equal to diameter of Pilot Drill. Cutter are used for making bigger hole to install lock body in door. Cutter lengths are in incremental, according to normal lock diameter available in market. This diameter starts from 15.5 millimetre and goes up to 55 millimetre.

A Lock technician should always take good care of this kit, since without any of the kit tool it is very difficult to install the lock.

14.5.2 Process Flow for Fixing the Lock on the Door —

The process flow for fixing the lock on the door is given below:

- Phase 1: Identify the type of Lock as per the Design and Functioning of the Door / Window
- Phase 2: Place The Lock Marker If Provided In The Lock Set On The Designated Location
- Phase 3: Place The Front Portion Of The Lock With The Logo Upward, In The Front Part Of The Door
- Phase 4: Place The Lock Retainer Plate On The Other Side Of The Door
- **Phase 5:** Secure The Lock Retainer On The Other Portion Of The Door With Lock Fixing Screws With Screwdriver
- Phase 6: Place The Latch Assembly On The Door Frame As Per The Alignment Of Lock On The Door
- Phase 7: Mark The Area Latch Assembly Unit Using A Marker
- Phase 8: Make Chippings On The Door Using A Chisel To Ensure The Latch Fits In The Door
- Phase 9: Secure The Latch With Screws
- Phase 10: Ensure Lock Body Is Aligned In Accordance With Door Latch
- Phase 11: Make Necessary Adjustments If The Lock And The Latch Is Not Aligned
- Phase 12: Check Functioning Of Lock By Using The Key

14.5.3 Steps Involved for Installation of Locks on the Door ____

After getting an overview on the process flow, let us now describe the steps involved in the installation of the common types of lock:

A. Night Latch

SI. No.	Step	Image
01	Stand inside the room of the door on which lock is to be fitted.	
02	Fold the marker along the dotted line and place at the edge of the inner side of the Door panel.	Name of the state
03	Take a Center Punch for Marking on points given in marking sheet.	NIGHTLATCH PROBLEMENT OF VINCENTIAL PROBLEMS STREET, THE LAND OF THE CONTROL OF T

SI. No.	Step	Image
04	Mark at points A, B and C using a center punch.	Makes And Andrews Andr
05	Drill 12mm deep and 3mm diameter holes at point A, B and C.	
06	Inspect the hole made by drill	0.0
07	Now make a pilot hole at point 'C' as shown.	

SI. No.	Step	Image
08	Drill the hole to complete depth of door	
09	Use pilot hole as a guide and make 52 mm diameter hole from the outer side, using Point C as Center Point	
10	Drill the cutter up to 20 mm deep.	
11	Drill a 11mm diameter through hole at points A and B	

SI. No.	Step	Image
12	Drill a 17mm diameter through hole at center B, while doing so the points may cut each other. This is how the through hole will look like from inside.	
13	This is how the through hole will look like from outside.	
14	Ensure correct key hole position before inserting the lock in hole.	
15	Insert the round portion of the lock from outside keeping the key hole in correct position.	

SI. No.	Step	Image
16	Place the lock retainer plate from inside of the door.	
17	Tight the retainer plate with the help of lock fixing screw.	
18	Check the screw length against thickness of Door.	
19	If the thickness of the door is slightly less it can be adjusted by cutting the screws accordingly.	

SI. No.	Step	Image
20	Cut the flat strip such a way it projects only about 5 mm from lock retaining plate.	
21	Insert the lock in hole.	
22	Place the latch assembly from the inside of the door.	
23	It should be placed in such a way the flat strip goes smoothly into the slot on the back portion of the latch assembly.	

SI. No.	Step	Image
24	By holding the lock in the same position, mark around the flange for the latch assembly.	
25	Mark for screw holes also.	
26	Drill two flange holes.	1
27	Make the recess for the flange in such way that the flange is flushed with the surface.	

SI. No.	Step	Image
28	Now place the latch assembly on the recess and check whether it is ok.	
29	Now fix the latch assembly on the door using screws.	
30	Now place the receptacle on the door frame, aligning it with the height of the lock body.	
31	For marking, it is advisable to place the receptacle slightly lower to take care of door sag in future.	

SI. No.	Step	Image
32	Mark the outline of the receptacle flange and receptacle hole. Note: If the gap between the door and the frame is more than 3mm, then the making of recess on the door frame should be avoided.	
33	Now tighten the receptacles using screws on the door frame.	
34	Once lock installation is complete, check functioning of lock using the keys.	
35	This is how the door will look from outside after installation of the Night Latch.	

B. Rim Lock



Installation Position of Rim Lock on Door

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	
02	Fold the marking paper along the dotted line and place at the edge of the inner side of the door panel.	DAMPER TO SERVICE TO S
03	Locate points A, B, C on Marking Paper. Mark at points A, B, C using a center punch. Take Drill machine with 3 mm Drill.	

SI. No.	Step	Image
04	Drill 12mm deep holes at point A,B and C.	
05	Now again locate Point 'A' as per Marking paper.	
06	Make a pilot hole at point 'A'.	
07	Take 30 mm diameter cutter for making a hole in door.	

SI. No.	Step	Image
08	Use pilot hole as a guide. Make the hole only half of the Door Thickness	
09	Now make the same Diameter hole from other side.	
10	Locate the shank in Plot hole and start cutting.	
11	Hole is made from both the sides of the door. This is intentionally done to avoid any damage to the door panel.	

SI. No.	Step	Image
12	Clean the hole.	
13	Put the ultra-cylinder into the Rose.	
14	Insert the assembly into the hole from the front panel of the door.	
15	Now mark on the flat strip (tongue).	

SI. No.	Step	Image
16	Screw according to the thickness of the door.	
17	Insert the cylinder with rose into the hole made in the door panel.	
18	While inserting ensure the direction of key hole is correct.	
19	Now place the lock retainer plate on the inner panel of the door.	

SI. No.	Step	Image
20	Fix it using lock fixing screw.	
21	Ensure that the marking on the lock cover plate is aligned with marking on the spindle.	ting atr
22	Follow instructions given on the sticker also.	
23	Place the latch assembly from the inside of the door.	

SI. No.	Step	Image
24	The Placement should be in such a way that the flat strip goes well into the slot on back portion of the latch assembly.	
25	By holding the lock in the same position, mark around flange.	
26	Do marking for screw holes also.	
27	Drill two flange holes.	

SI. No.	Step	Image
28	Make the recess for the flange in such way that the flange is flushed with the surface.	
29	Now place the latch assembly on the recess made and check whether it is ok.	
30	Fix the latch assembly on the door using the help of the screws.	
31	Now place the receptacle on the door frame, aligning it with the height of the lock body	

SI. No.	Step	Image
32	It is advisable to place the receptacle slightly lower to take care of door sag in future.	
33	Mark the outline of the receptacle flange.	
34	Mark the hole of receptacle and tighten the receptacles using screws on the door frame.	
35	Once lock Installation is complete, check functioning of lock using the keys.	

SI. No.	Step	Image
36	This is how the door will look from outside after installation of the Rim Lock.	

C. Cylindrical Lock

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	
02	Place the marker at the edge of the inner side of the door. Note: The recommended height for the fitment of this look is 36 inches from the floor.	

SI. No.	Step	Image
03	Mark the center of the hole as per the marker.	
04	And also mark back set on the face of the door panel and door thickness.	
05	Now drill a pilot hole at marked points on the face of the door panel.	
06	Then drill a pilot hole at marked points on the thickness of the door.	

SI. No.	Step	Image
07	With pilot hole as a guide bore a 54mm through hole on the face of the door panel .	-
08	With pilot hole as a guide bore a 24mm through hole on the thickness of the door.	
09	Now insert the latch bolt into the 24mm through hole.	
10	Make around the flange and lock fixing screws.	

SI. No.	Step	Image
11	As per the marking drill a hole for lock fixing screws.	
12	Chisel the recess for the flange.	
13	Again insert the latch bolt into the 24mm through hole.	
14	And tighten it firmly with the lock fixing screws.	

SI. No.	Step	Image
15	Now remove inner knob.	
16	It should be done pressing the spring lock inside the hole with help of strip provided.	
17	Now remove the knob, cover plate and lock retainer plate.	

SI. No.	Step	Image
18	Insert the outer now from the outside of the door panel.	
19	Align it with the latch bolt.	
20	Now fix the lock retainer plate from the inner side of the door panel.	
21	And tight it using screws.	

SI. No.	Step	Image
22	Insert the cover plate.	
23	And press it firmly till you here a 'Click' sound.	
24	Now insert the inner knob of the lock.	
25	And press it tightly till you here a 'Click' sound.	

SI. No.	Step	Image
26	Place the striker plate on the door frame.	
27	And mark screw holes, rectangular slot for latch bolt and recess for the striker plate.	
28	Chisel the slot for latch bolt.	
29	Recess for the striker plate.	

SI. No.	Step	Image
30	Now place the striker on the recess made on the door frame.	
31	And tight them with screws firmly.	
32	After completing the installation of the lock check for the smooth functioning.	
33	Check for the smooth functioning of Knob.	

SI. No.	Step	Image
34	Check for the smooth functioning of Latch bolt.	
35	Check for the smooth functioning of Press button.	

D. Mortise Lock

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	

SI. No.	Step	Image
02	Fold the marker along the dotted line and place at the edge of the inner side of the panel.	STER BYTHE BOTH STEEL BYTHE BYT
03	Locate points A, B and C on Marking Paper.	HARRIEDOX G. C.
04	Mark at points A, B and C using a Center Punch.	MORTISE LOCK 4 L E V E E MIN HANDS STOP G G G G G G G G G G G G G
05	Draw two parallel lines 16mm apart joining the two horizontal lines in the center of the door thickness.	

SI. No.	Step	Image
06	The parallel line marking can be avoided if the Lock Technician get used to select the right blade.	
07	Drill a through and through holes of 16mm diameter at point A.	
08	Drill a through and through holes of 6mm diameter at point B and 4.5mm at C.	
09	Join the holes made at point B and C in such a way it becomes a key shaped hole.	

SI. No.	Step	Image
10	It becomes a key shaped hole.	
11	Drill a 15.5mm diameter through hole at points A.	
12	Make the hole from both the sides to avoid chipping.	
13	Do marking for making Mortise.	

SI. No.	Step	Image
14	By using mortise kit as shown make an appropriate marking on edge of the door.	
15	Drill pilot holes at all the points marked.	
16	Use the appropriate blade to make a slot.	SOSA PARTIES
17	Make a slot of 16 millimetre width and 65 millimetre deep as shown here.	

SI. No.	Step	Image
18	Clean it properly with Chisel.	
19	This is how the slot looks after making.	
20	Now insert the mortise lock into the slot.	
21	Mark the flange along the borders.	

SI. No.	Step	Image
22	Mark points for the screw holes on the thickness of the door.	
23	Drill a hole for the screws and recess for the flange.	
24	The flange is flushed with the surface.	
25	Check that the angular face of the latch bolt is facing towards the door frame.	

SI. No.	Step	Image
26	Rotate it by 180 degree with the help of screw driver.	
27	Now insert the lock into the slot.	
28	Fix it with the screws.	
29	Now insert the square shank into the hole marked A.	Control of the second of the s

SI. No.	Step	Image
30	Press it fully.	
31	Place both the handle.	
32	Cover plates facing each other aligning it with the square shank.	
33	Fix the handle cover plates with the help of screws.	

SI. No.	Step	Image
34	Place the striker plate on the door frame aligning with the lock.	
35	Make appropriate markings on the door frame.	
36	Keeping striker plate slightly lower is always better this will take care of door sag in future.	
37	Make a 14 millimetre deep rectangular slots on the door frame as per the marking on the latch bolt as well as the dead bolt.	

SI. No.	Step	Image
38	Fix the striker plate with screws after making a recess to flush it with the door frame.	
39	If the gap between the door and the frame is more than 3mm, then the making of recess on the door frame should be avoided.	
40	Once the lock is fixed, check for the smooth functioning using the keys.	
41	This is how the door will lock from outside after installation of the Mortise lock.	

Summary



- A Lock Installer is responsible for installation of different locks on the doors, repair and service of locks, whenever required.
- A Lock is a mechanism for keeping a door, window, cover or a container fastened and secure, with the help of a key.
- The main types of locks are: Pad Lock, Rim Lock, Mortise Lock, Dead Bolt Lock, Cylindrical Lock, Furniture Locks, Lever Handle Locks, Interchangeable Core Locks and Vending Locks
- A door lock has typically 3 parts: Cylinder (Lock Body), Bolt or Latch and Box or Strike Plate
- A Lock Installer must be aware of the safe handling and storage of Hand Tools, Power Tools, Connectors, Fasteners and Consumables.
- Apart from regular tools, a Lock Technician requires some special tools for installing Lock, namely, Pilot Drill, Cutter Holder (Shank) and Cutter Blade.
- A Lock technician should always take good care of this kit, since without any of the kit tools it is very difficult to install the lock.
- Pilot Holes must be carefully marked and drilled, so that the entire installation process does not go wrong.

Activity



- The trainer takes the students to the laboratory and gives them dismantled locks. The students identify the various units of the locks and state the functions of each.
- The trainer takes the class for a visit to a nearby Lock Repair and Servicing workshop, where they are required to observe and learn about the following:
 - O Different tools and equipment (manually operated and powered) used by Lock Installers
 - Process of operating each tool
 - O Safety precautions undertaken while operating each tool
 - O PPE worn and used, if any
- The trainer takes the students to the laboratory and divides the class into few groups (depending on the batch size). He/she demonstrates the installation process for each type of lock discussed in class and Participant Handbook. After the demonstration, the trainer asks each group of students to repeat the same.

Exercise



Match the Type of Lock with Images:

Type of Lock

Single Cylinder Dead Bolt

Mortise Lock

Vending Lock

Rim Lock

Pad Lock

Image





















15. Perform Lock Repairing and Servicing

Unit 15.1 Process of Operating Different Locks

Unit 15.2 Method to Check Warranty of Lock

Unit 15.3 Troubleshooting for Lock Installers

Unit 15.4 Handling And Storage Of Different Tools And Equipment

Unit 15.5 Quality Assurance for Lock Installer

Unit 15.6 Waste Disposal, Cleaning and Maintenance



Key Learning Outcomes | 💆



At the end of this module, you will be able to:

- 1. Discuss the process of operating different locks
- Learn about the method to check warranty of lock
- 3. Discuss troubleshooting for Lock Installers
- 4. Discuss the quality inspection and safety procedures
- 5. Discuss the method to identify the length of the flat strip while fixing the lock on the door
- 6. Discuss methods of waste disposal, cleaning and maintenance

Unit 15.1 Process of Operating Different Locks

– Unit Objectives 🥒



At the end of this unit, you will be able to:

1. Demonstrate the process of operating different locks

A. How to Operate the Common Cylindrical Lock

• Operating the Keyed variant:

Locking	Press the inside Push Button and close the door
Unlocking from inside	Rotate the inside knob
Unlocking from outside, when Push Button is pressed	Use the key

• Operating the Keyless variant:

Locking	Press the Push Button from inside
Unlocking from inside	Facility provided from outside. If required, use Screw Driver in the outside knob slot and turn the knob

B. How to Operate the Common Night Latch

• Operating the Inside Opening variant:

Unlatching	The Lock can be unlatched from outside by key and by knob from inside
Latching	By closing the door
Safety Catch	Can be used to keep the bolt in latched or unlatched position
Deadlocking	The bolt gets automatically deadlocked each time the door is shut, thus preventing the latch bolt being forced open from outside

· Operating the Outside Opening variant

Unlatching	The Lock can be unlatched from outside by key and by knob from inside
Latching	By closing the door
Safety Catch	Can be used to keep the bolt in latched or unlatched position
Deadlocking	The bolt gets automatically deadlocked each time the door is shut, thus preventing the latch bolt being forced open from outside

C. How to Operate the Common Rim Lock

• Operating the Outside Opening variant

Latch Bolt	Operable from inside by the Latch Bolt puller
Lattin Boit	Operable from outside by the key
Deadlocking	Operable from outside by key and from inside by the knob
Safety Catch	Can be held back internally by the Safety Catch knob

• Operating the Inside Opening variant

Latch Bolt	Operable from inside by the Latch Bolt puller
Lattin Bolt	Operable from outside by the key
Deadlocking Operable by key from both inside and outside	
Safety Catch	Can be held back internally by the Safety Catch knob

D. How to Operate the Common Mortise Lock

Handle / Knob	Turn the handle / knob in order to retract the latch, if the door is unlocked	
Day / Night Switch	Locks the door from outside and holds it in unlocked condition from inside, or engage to keep both sides unlocked	

Unit 15.2 Method to Check Warranty of Lock

- Unit Objectives



At the end of this unit, you will be able to:

1. Examine the warranty of lock prior to initiating work service

15.2.1 Checking Warranty of Lock Prior to Initiating Work Service

Warranty is defined as "a written guarantee, issued to the purchaser of an article by its manufacturer, promising to repair or replace it if necessary within a specified period of time". On purchase of lock, the retailer / shop provides the user with a Warranty Card, which specifies the tenure, terms and conditions of the Warranty extended to the user. The image of a common Lock Warranty card and its important parts are given below:

WARRANTY

This product offered by
year from the proven date of purchase. It is warranted to be free from defects in material
or workmanship for a period of one year from the proven date of purchase. During this
period of warranty, if the product is proved to be defective in material or workmanship,
the product will be repaired or replaced or substituted by a similar product at the
discretion of the Company.

Please turn over to see detailed terms and conditions of Warranty.

The proud owner of this (Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Helpline nos. 3 (from all mobiles & landlines), The OOC CAACAAO (Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 24 hour Product can register this warranty with the Company by calling 2

(Please fill the details in the Warranty	Card and keep safely.	
	Name:	Date of Purchase:	
	Address:	Cash Memo No. or Invoice No.:	
(3)		Product:	$\left \begin{array}{c} 5 \end{array} \right $
	Tel:	Product Code & Model:	
	Mob:	Name & Address of Shop:	
(E-mail:		
4	Ticket No:		

Terms and Conditions of Warranty

- This Warranty is applicable for a period of one year from the proven date of purchase. The customer should retain the warranty card (after filling the details required therein including the product code/model) along with the cash memo or invoice.
- 2. There should be no amendments /corrections on the warranty card or the cash memo/invoice.
- In case repair or replacement of the product is carried out, the period of warranty would continue from the original date of purchase. The original warranty card should be returned with the defective products in case of replacement. The warranty card with the new product should be filled and kept safely by mentioning the original date of purchase.
- 4 Replaced parts/products would be the property of the company.
- To get service under this warranty, the product should be delivered to the nearest Godrej Distributor or Dealer or Authorised Service Dealer (ASD). Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel.: 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD.
- In case a technician is required to visit the place of installation, Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel.: 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD & register your request for service.
- 7. Visit charges as per the prevailing prices list, would be applicable if the location is within the municipal limits of the city/town of the Godrej Distributor or Dealer or Authorised Services Dealer. For locations outside the municipal limits of the city/town of the Godrej Distributor or Dealer or Authorised Service Dealer, traveling and other incidental expenses are payable by the customer.
- Surface finish and/or shade of the product is not covered under this warranty.
- In case of a product that requires installation, damage to the product or non-operation of product due to effects of weather on door and frame or sag on account of loosened hinges are not covered under this warranty.
- 10. Warranty on the product would not be applicable under the conditions including but not limited to:
 - a) Misuse/mishandling/negligence/improper installation/improper application/improper repair/ tampering
 - b) Failure to follow instructions of use.
 - c) Installation with unapproved accessories.
 - d) Modification to the product or removal/alteration of parts and components.
 - e) Entry or seepage of liquids/oils/chemicals.
 - f) Non-functioning of lock due to use of key other than company make or entry of foreign material in the key hole.
- g) Breakage of plastic parts.
 - h) Damage due to accidents /fire/robbery/natural calamities.
 - i) Damage due to harsh environmental conditions.
 - Damage or incompatibility due to inappropriate operational environment, including external electro-magnetic fields, direct sunlight, high humidity and vibration (in case of electro-mechanical and electronic locks).
 - k) Damage due to third party peripherals (in case of electro-mechanical and electronic locks).
 - Damage due to battery leakage (in case of electro-mechanical and electronic locks).
- m) Failures or defects in consumables such as LEDs/batteries (in case of electro-mechanical and electronic locks).
- In case a product, which does not require installation, is found to be dead on arrival i.e non-operational (except for reasons as mentioned in Points 8 & 10 above), within a period of one week, the same would be replaced after verification at the sales outlet.
- 12. In case a product, which requires installation, is found to be non-operational (except for reasons as mentioned in Points 8, 9 & 10 above) within one week after installation, the same would be replaced after verification by the nearest Godrej Distributor or Dealer or Authorised Service Dealer (ASD). Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel.: 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD and registration of your request for service.
- The company reserves the right to modify the design of the products without prior notice in pursuance of its policy of continuous technical improvement.
- 14. Decision of Godrej Locks Division on the admissibility of the claim under warranty would be final and binding.
- Maximum liability under the warranty would be limited to the cost of the product. This warranty expressly excludes any claim for incidental or consequential loss or damage.
- Any representations, warranties or promises inconsistent with or in addition to the warranties contained herewith are unauthorised and shall not be binding on Godrej.
- 17. This warranty is valid in India only
- This warranty is issued at Mumbai and Courts at Mumbai shall have exclusive jurisdiction over matters covered or flowing from this warranty.
- 19. This Company reserves its rights to amend the above terms and conditions without notice.

Fig. 15.2.1.1: Sample Warranty form

No.	Interpretation / Meaning for Lock Installer	
1.	The tenure, in years, over which the warranty of service is valid	
2.	The modes (toll free phone number, email address, online registration, SMS services, etc.) through which the Warranty may be availed	
3.	Personal Details of the consumer, who has made the purchase. This helps the company in keeping a track of purchasers.	
4.	Token / Ticket number issued to the consumer, while availing the service request; this is an unique number and changes with every new request. This helps the company in identifying a particular customer.	
5.	Details of the product (specifications, model type, model number, barcode number, etc.), Invoice / Bill / Cash Memo number, shop or showroom address, etc. This helps the company in identifying the product, which needs repair, replacement or servicing.	
6.	This section lists and explains the scenarios, under which the Warranty facility cannot be availed by the consumer.	

Unit 15.3 Troubleshooting for Lock Installers

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain Troubleshooting for Lock Installers
- 2. Identify the different Lock Problems and Faults
- 3. Discuss problem identification procedures
- Discuss about Warping in doors
- 5. Demonstrate the dismantling and assembling procedures
- 6. Explain the method of checking the lock functioning with the key

15.3.1 Explaining Troubleshooting -

- Troubleshooting is a systematic and sequential approach to solve problems, used to detect and resolve issues in a unit or a system.
- In short, Troubleshooting is the process of detecting a problem, finding its root cause and then rectifying it.
- With the sole purpose of bringing back a system into operation, troubleshooting techniques also
 focus on preventive maintenance, so that a particular issue does not appear again and what needs to
 be done in case it recurs.

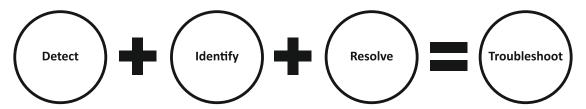


Fig. 15.3.1.1: Troubleshooting Process

15.3.2 Knowledge Of Different Lock Problems / Faults

Troubleshooting is an important part of a Lock Installer's job and it is impossible without good practical knowledge of the different lock problems / faults, their root causes and remedies.

The common Lock Problems / Faults are:

- Dead Bolt
- Key does not enter the lock
- Breakage of knob spring
- Damaged lock AL drop
- Bend in lever
- Turning Lock Cylinder
- Door Lock moves slowly

- Misaligned Latch
- Key is broken off and stuck in lock

Name of Problem / Fault	Description	
Deadbolt Stuck	Deadbolt is malfunctioning and not operating the way it normally does.	
Key does not enter the lock	The key, while entering the lock slot, seems to be stuck somewhere and does not enter the lock fully.	
Breakage of knob spring	The Knob Spring being broken, does not allow the latch to return to its protruded state, when the knob is not being turned manually.	
Damaged lock AL drop	The AL Drop in the lock is misaligned, tampered, bent or broken.	
Bend in lever	A set of levers in the Lever Tumbler Lock prevents the bolt from moving into the lock. Such locks come in 3 or 5 lever variants. These levers, if bent, prevents the functioning and movement of the locking bolt.	
Turning Lock Cylinder	While unlocking the door, the entire lock cylinder is turning, which should not be the case.	
Door Lock moves slowly	Locks moving slower than usual and seems stuck up inside.	
Misaligned Latch LATCH BOLT MISALIGNED STRIKE PLATE	Latch and Strike Plate are not aligned with each other.	

Key is broken off and stuck in the lock	Due to excess pressure exerted while unlocking a lock, the key is broken off and stuck in the lock.
Key does not work properly	Deadbolt is not engaging properly with the Strike Plate.

15.3.3 Problem Identification Procedures —

There are three stages in which a Lock Installer identifies lock problems and faults. These are:

- Detection of Problem / Fault by identification of symptoms
- Determination of Root Cause
- Resolving the Problem / Fault

Method To Identify Process And Product Problems:

Detection of problem can be carried out with the help of the description given in topic 2.3.2. The remaining two stages are laid down below:

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
	Dirt accumulation Rusting	Check the Set Screws
		Cleaning and lubricating the Dead Bolt lock
		Checking the alignment of Deadbolt and Strike Plate
		Dismantling both the Deadbolt and Strike Plate
Deadbolt Stuck		Filing the Deadbolt
		Rechecking alignment
		Assembling and mounting the assembly on the door
		Operating and rechecking the Deadbolt functioning
		Replacing Deadbolt, if the above process fails

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
		Removing the lock
	Dirt and Grime accumulation in the lock Lock in need of lubrication	Blowing dust out of the inner and outer lock cylinders and pin holes with the help of canned air
		Brushing away dirt and grime, using a scrubber or a brush
Key does not enter the lock		Blowing off the remaining dirt using canned air
		Lubricating the lock assembly with the help of a silicon or graphite based lubricant (avoid saturation and just add lubricant sufficient to ensure smooth moving of parts)
		Assemble and mount the lock assembly on the door
Bend in lever	 Excess use, pressure and friction while operating the lock Internal levers of the lock getting worn out over time 	Depends on the lever to be removed
	The Set Screws, meant to hold the cylinder in place, are loose or broken	Removing the faceplate at the door's edge
		Locating the cylinder set screws
Turning Lock Cylinder		Tightening the set screws by turning clockwise, so that the key slot is absolutely vertical
		Replacing the faceplate, if needed
	The lock may be frozen or dirty; the small internal units may have worn out or are broken	Lubricating the keyhole by applying graphite-based lubricant
		Operating the lock few times to make the lubricant work
Door Lock moves slowly		Applying Lock "De-icers" for frozen locks, which also help in dissolving grime and dirt sediments
		Dismantling the lock as a last resort, to find out if any internal unit is jammed or broken
		Replacing the said internal units, if required

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
	Due to excess pressure while locking or unlocking, the key has broken and a broken part is stuck inside the key slot	Trying to grip and pull the key straight out, using Pliers (Needle Nose or Long Nose)
Key is broken off and stuck in the lock		Inserting a Coping Saw Blade into the key slot and trying to yank the key out
Stuck in the lock		Removing the cylinder, as a last resort
		 Inserting a firm wire into the cam slot at the cylinder's back and pushing the key out
	The knob has worn out over time	Loosening the Set Screws on the knob's leg
		Holding the knob on the other side of the door
		Turning the knob clockwise, till it fits firmly
Door Knob is loose		Tightening the set screws until you feel them lying on the flat side of the spindle; the knob should turn freely now
		Removing the knob and checking the spindle, if the above does not work
		Replacing the lock, if the entire lock is worn out

15.3.4 Problem Identification Procedures -

A. What is Warping of Door?

Warping is a condition when the door becomes twisted or distorted and becomes hard to open or close.



Fig. 15.3.4.1: Warped door

B. Why does Warping Happen?

Warping takes place due to the following reasons:

- Exposure of the door to moisture (especially during the monsoons) or excess heat
- · Finishing on only one side of the door or different finishing on both sides of the door

C. How can a Warped Door be Fixed?

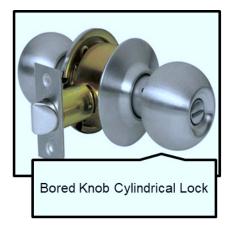
A Warped Door can be fixed by:

- Reheating the door to dry off the accumulated moisture; this is called Curing
- Applying pressure on the door to remove distortion and to realign the door to its original shape and dimensions
- · Applying at least two coats of Finish on both the sides of the door

15.3.5 Assembling Procedures ———

Assemble the lock system after the repair as per the standard procedure

A. Assembling Cylindrical Lock



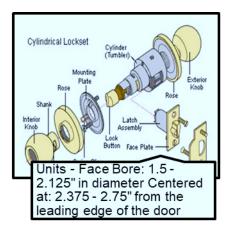




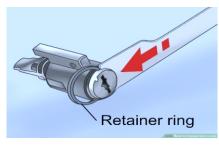


Fig. 15.3.5.1: Assembling process

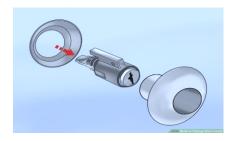
1. How to place the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

SI No.	Steps	Image
1.	Fixing the strike plate along with latch	
2.	Fixing the interior knob with the rose, and mounting plate to the latch	
3.	Testing with the key	

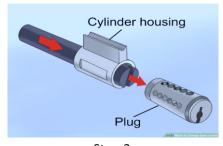
2. How to place The Lock Retainer Plate On The Other Side Of The Door



Step 1

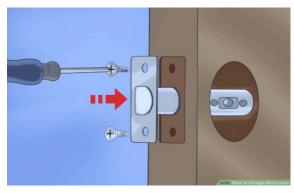


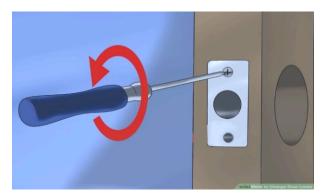
Step 2



Step 3

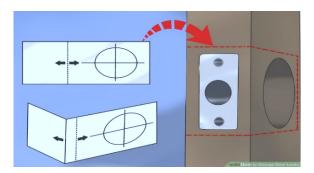
3. How to place the Latch Assembly On the Door Frame as per the Alignment of Lock On the Door





Step 1 Step 2

4. How to mark the Area Latch Assembly Unit using a Marker



5. How to Make Chippings On The Door Using A Chisel (To Ensure The Latch Fits In The Door

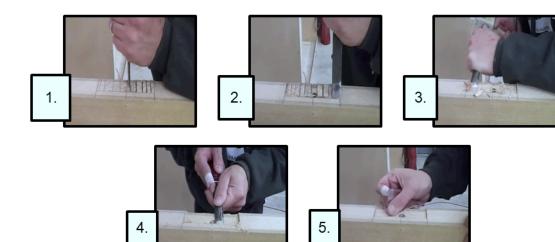


Fig. 15.3.5.2: Chipping process

B. Assembling Mortise Lock



Fig. 15.3.5.3: Common Mortise Lock

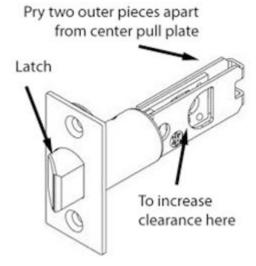


Fig. 15.3.5.4: Mortise Lock - Latch Plate, Latch, Latch Screws, latch Plate Mortise

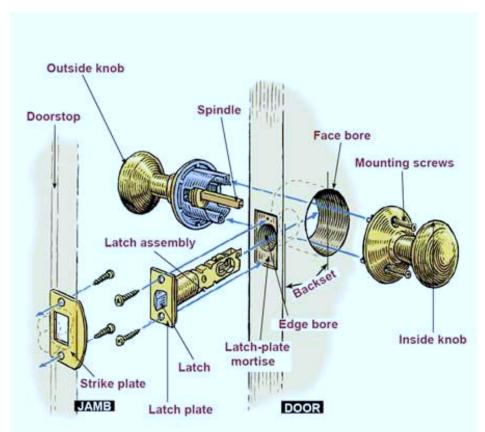


Fig. 15.3.5.5: Area Latch Assembly - Mortise Lock

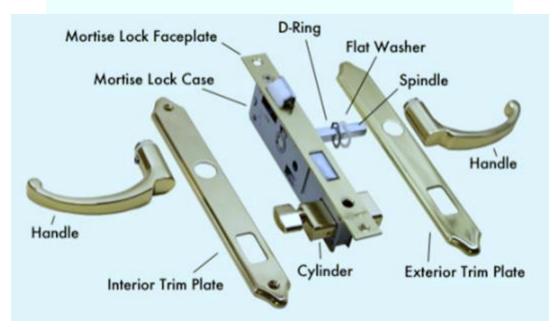


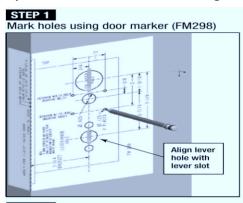
Fig. 15.3.5.6: Area Latch Assembly - Mortise Lock

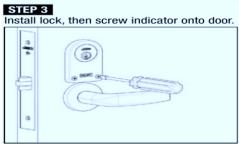
1. Technique Of Fixing The Lock On The Door





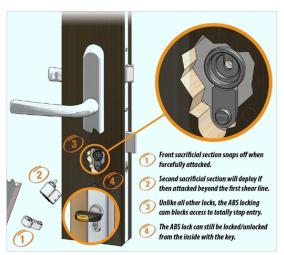
2. How to place the Lock Marker on the Designated Location





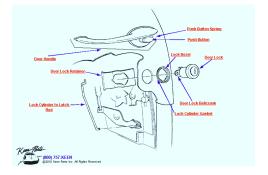




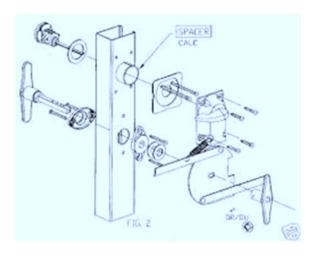


4. How to place The Lock Retainer Plate On The Other Side Of The Door

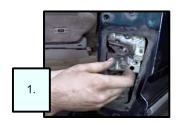




5. How to secure the Lock Retainer on the Other Portion of the Door (with the help of Lock Fixing Screws)



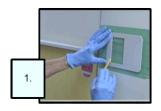
6. How to place the Latch Assembly On the Door Frame as per the Alignment of Lock On the Door

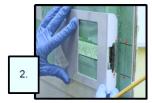


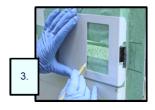




7. How to mark the Area Latch Assembly Unit using A Marker



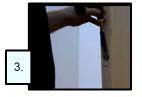




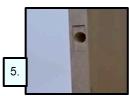
8. How to Make Chippings On The Door Using A Chisel (To Ensure The Latch Fits In The Door)



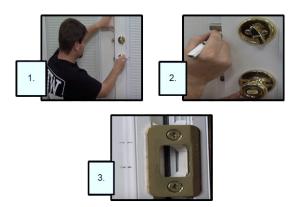








9. How to check if the Lock Body Is Aligned With Door Latch



10. Necessary Adjustments required if The Lock And The Latch Is Not Aligned

- The first thing to do is look at the door from the inside when it is closed.
- There should be an even gap across the top and down the latch side.
- This gap occurs between the door and the frame or jamb.
- It should be about an eighth of an inch and be consistent.
- A properly aligned door will allow the lock and deadbolt to work correctly.

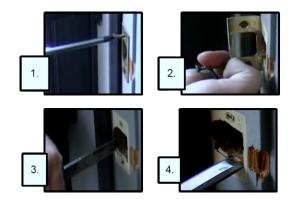
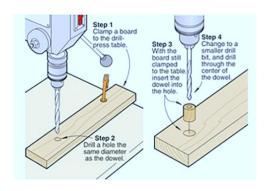
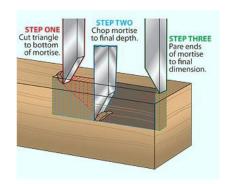


Fig. 15.3.5.7: How to make necessary adjustments if the Lock and the Latch is not aligned

11. How to Drill Appropriate Holes On the Door (using Drill machine) for installing Mortise Lock

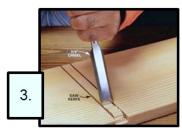


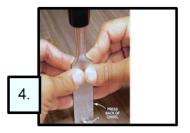
12. How to Use Chisel on a Door for installing Mortise Lock





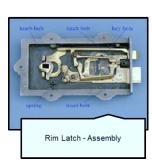


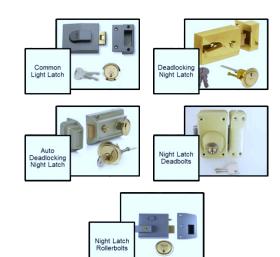




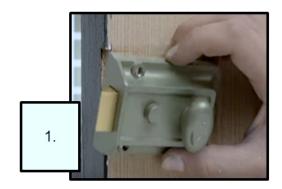
C. Assembling Rim Latch Lock

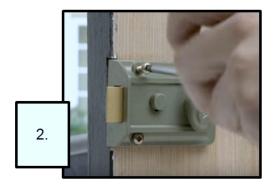






1. Technique Of Fixing The Lock On The Door





2. How to place the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

- Use a sharp chisel along the marked lines to establish the edges of the cut-out.
- Use a sharp chisel to remove the waste wood from the edge of the door to the depth of the
 endplate thickness so that the front of the endplate will be flush with the wood down the door
 edge.
- Offer up the lock and locate the endplate into the cut-out mark the position for the handle bar and the keyhole.
- Drill the holes for the handle bar and keyhole make the bar hole at least as big as the spindle boss on the back of the lock for the keyhole, drill the top hole and cut out the shape using a thin pad saw.
- Position the rim lock on the door and secure using screws.
- Fit the door handles and key shield on the reverse side of the door.
- The door handles have to be bar type with a small screw in the 'skirt' of each handle the square bar having holes into which the screws locate.
- Close the door and mark on the door frame the position of the top and bottom of the rim lock.
- The 'staple' (which secures the lock catch and bolt when the door is closed) may have an endplate (like the lock) which will need to be recessed in to the door frame in a similar manner as for the lock endplate.
- Position the staple on the door frame and mark around it. The architrave or moulding around the door will probably need to be cut away so that the staple will fit flat, in line with the lock and hold the door closed.

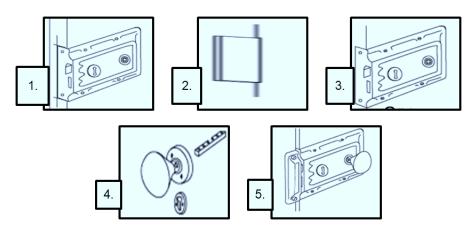


Fig. 15.3.5.8: Front portion installation process

D. Assembling Deadbolt Locks



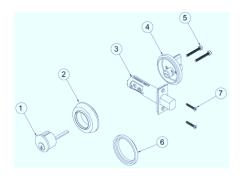
Common Deadbolt Lock

Single Cylinder Deadbolt Double Cylinder Deadbolt Communicating Deadbolt

2. Parts of Deadbolt Lock Assembly

Most basic dead bolt kits include:

- A key lock cylinder
- · A deadbolt assembly
- An interior turn assembly
- A steel strike plate (typically not necessary)
- · Mounting hardware

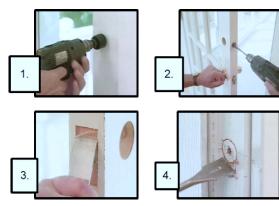


Single Cylinder Deadbolt

Double Cylinder Deadbolt

1. Technique Of Fixing The Lock On The Door

For installing the Hardware, insert the latch assembly in the hole you drilled in the door edge and fasten it with screws after predrilling for them. Next, insert the handle set and cylindrical lock or dead bolt assembly so the spindle or tailpiece aligns with the strike assembly. Typically, screws pass through the door to hold the two lockset pieces together on opposite sides. For security, be sure exposed screw heads are on the interior side of the lockset.



- 1) Use a hole saw to begin cutting the hole for the deadbolt. When the pilot bit on the hole saw comes through the other side of the door, stop cutting. Finish the hole from the other side of the door to prevent splinters. If your hole saw isn't deep enough to penetrate the exterior face of the door, use a standard bit to finish drilling the hole you'll use as a reference point.
- 2.) Use a 7/8" spade bit to drill a hole through the edge of the door for the bolt.
- 3) Dry-fit the bolt into the hole, and trace around the faceplate. Use a wood chisel to mortise the area around the faceplate so that it will be flush with the door. When using the chisel, keep the bevelled side in toward the mortised area, and tap the tool deep enough to recess the faceplate. You may need a smaller chisel to mortise the rounded corners.
- 4) Continue mortising until the faceplate fits properly. Drill pilot holes, and secure the bolt to the door with screws.
- 5) Dry-fit the cylinder and thumb-turn plate so you'll know how the pieces fit together. Fit the exterior side onto the door first, making sure the writing is upright. Then set the interior piece in place, and align the screw holes with the mounting holes inside the lock. Fasten the deadbolt in place with screws.
- 6) Mark the end of the bolt with lipstick or paint. Close the door, and turn the deadbolt several times to mark the doorframe. Use a 7/8" spade bit to drill two overlapping holes in the doorframe for the deadbolt.

3. Type And Alignment Of Lock As Per Functioning Of Door

- A deadbolt does not utilise spring loaded mechanisms to work the bolt, hence the term "dead".
- On exterior doors, typically 6 to 12 inches above the keyed entry (locking door handle) or handle set (handle and dead bolt combination) for added security.
- Double-cylinder dead bolts require keys to open the lock from the interior as well as the exterior. This makes it more secure.

4. Identification of Lock as per the Design And Functioning of the Door / Window

- Deadbolts are useful because this mechanism allows the bolt to travel pretty far most deadbolts will go a whole inch or more into your door jamb, which makes it really hard to kick the door in.
- Another benefit is that they are very hard to bypass by attacking the lock hardware itself. Hence they are used in main entrance doors.





Fig. 15.3.5.9: Identification process

5. Placing of the Lock Marker on the Designated Location



- Most doorknobs are 34 to 38 in. high, with dead bolts 6 to 12 in. above that.
- Decide for yourself what height is comfortable.
- When drilling new holes, tape the manufacturer's template in place with the lockset center line at the desired height.
- Determine the backset—the distance from the door edge to the knob centerline—and use the corresponding template marks.
- The backset can be 23/8 or 23/4 in.; many locksets accommodate both.
- Then drill 1/8-in. pilot holes through the door to center the 2 1/8-in. hole saw. At the door edge, use the template to drill a 2-in.-deep pilot hole for drilling for the strike or bolt.

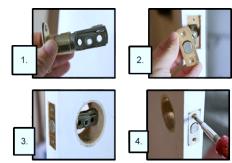
6. Placing the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

- Dry-fit the cylinder and thumb-turn plate so you shall know how the pieces fit together.
- Fit the exterior side onto the door first, making sure the writing is upright.
- Then set the interior piece in place, and align the screw holes with the mounting holes inside the lock.
- Fasten the deadbolt in place with screws. Mark the end of the bolt with lipstick or paint.
- Close the door, and turn the deadbolt several times to mark the doorframe. Use a 7/8" spade bit to drill two overlapping holes in the doorframe for the deadbolt.
- Mortise the area around the hole so the strike plate will fit flush with the doorframe.
- Drill pilot holes and secure the striker plate with screws.

7. Placing the Lock Retainer Plate On The Other Side Of The Door



8. Placing the Latch Assembly On the Door Frame as per the Alignment of Lock On the Door



Insert the latch assembly in the hole you drilled in the door edge and fasten it with screws after predrilling for them with the help of a power driller.

9. Marking the Area Latch Assembly Unit using A Marker



- Once you have decided on the correct position of the handle mark a line on the door edge and using the setsquare transfer these lines to either side of the door.
- Mark the center line on the door edge, then measure the distance from the edge of the latch plate then transfer this measurement onto each side of the door.

10. Making Chippings On The Door Using A Chisel To Ensure The Latch Fits In The Door

- Using a sharp chisel remove enough material so that the latch plate will fit flush to the door.
- Again using the countersunk drill countersink both holes to allow the reverse of the plate to fit snugly into the opening.
- With a sharp chisel remove enough material for the striker plate to fit flush to the doorframe, countersink both holes and fit the plate for the final time.
- Finally using a narrow chisel removes enough stock material from within the striker plate to allow the catch fully open once the door has been closed.



11. Ensuring Lock Body Is Aligned In Accordance With Door Latch



- Partially close the door and mark out where the catch part hits the door surround.
- Open the door and offer up the striker plate to the correct position and mark the two fixing holes with a pencil.

15.3.6 Dismantle the Lock If Required To Get A Better Understanding of the Faults (Standard Procedures)

Dismantling Procedures







- Unscrew the deadbolt mounting screws from the inside of the deadbolt with a Phillip screwdriver.
- Pull the thumb turn unit away from the inside of the door, followed by the outside cylinder unit from the outside of the door.
- Remove the adapter ring with the screwdriver if there is one present.
- Remove the screws from the deadbolt latch faceplate on the side of the door with the screwdriver.
- Pull the faceplate off of the door.
- Then use the screwdriver to pull the deadbolt latch assembly out of the door.
- Unscrew the strike plate from the door jamb.
- The strike plate may be stuck to the paint so use a screwdriver to help remove the strike plate, if needed.
- Wipe the grime from your hands with a cloth rag until you have the chance to wash them.

15.3.7 Check Functioning Of Lock By Using The Key _____

- When you insert a key, the series of notches in the key push the pin pairs up to different levels.
- The incorrect key will push the pins so that most of the top pins are still partly in the plug and partly in the housing.
- If correct key is inserted, the pin pairs align in the same level and the door unlocks.

Step 1





Step 2



Step 3



Unit 15.4 Handling and Storage of Different Tools and Equipment

- Unit Objectives



At the end of this unit, you will be able to:

- 1. Use appropriate tools and equipment to repair the lock
- 2. Discuss the tips of storing tools appropriately

15.4.1 Use Appropriate Tools And Equipment To Be Used To Repair The Lock

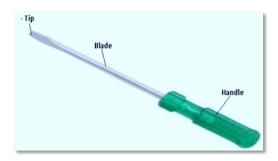






The tools required in lock repair are:

· Screw driver



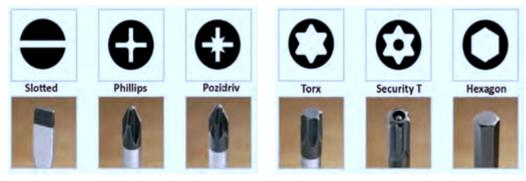
Standard Screw Driver



Heavy Duty Screw Driver

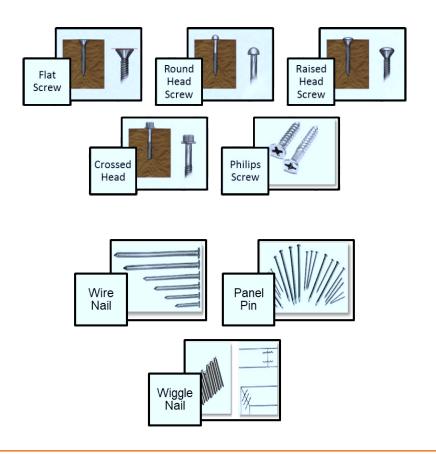


Phillips Screw Driver



Different Screw Driver Tips

• Screws, Nails, Studs, Nuts and Bolts



Handling Screw Drivers:

- You should always correct size of blade for tightening the screw.
- For very tight screws, set the screwdriver in screw and put maximum downward pressure on the screwdriver. You can strike the screwdriver end with a hammer. This trick normally gives desired result and the screw will become loose. You can also use this method for stripped out screws.
- Apply wax screw threads before putting them into wood. If wax is not available, you can apply soap also. It will make driving screws in wood very easy.
- If you need more driving force then use screwdriver of shorter shank.
- For getting more torque, you can use a crescent wrench on screwdriver blade.
- You can magnetize a screwdriver by striking its tip on a metal surface. This process realigns metal
 molecules, which makes it magnetic. It can also break screwdrivers in doing this process, so you
 need to be careful.
- Never use screwdriver in place of Pry Bar.

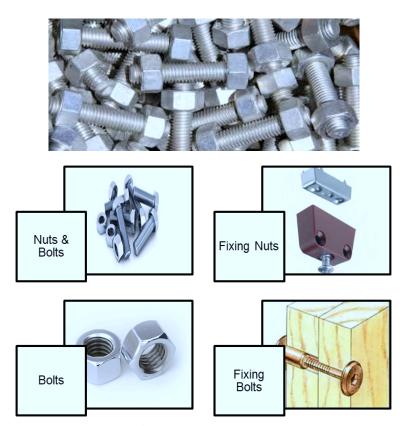
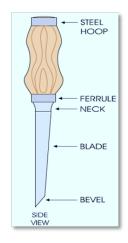


Fig. 15.4.1.1: Types of nuts and bolts

Chisel









Mortise Chisel

Socket Chisel

Special Chisels or Gouges

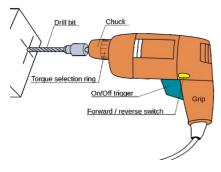
Pliers



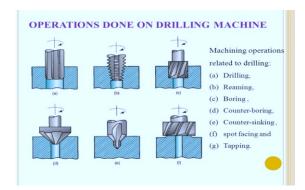
• Nail Puller



• Electric Drill and Drill Bits

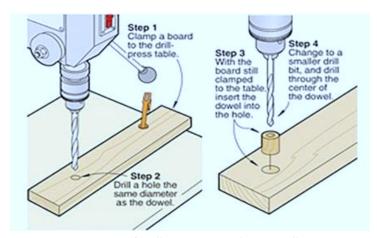


Common Electric Drill





Various Drill Bits



Process of Drilling using an Electric Drill

Special Saws

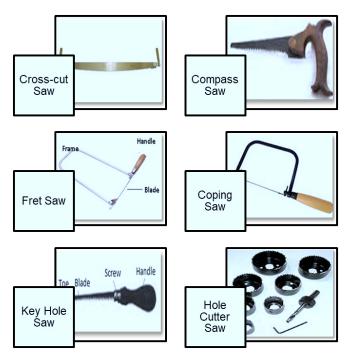
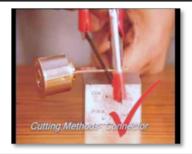


Fig. 15.4.1.2: Types of saws

Handling the Flat Strip While Fixing the Lock on the Door:

Identify the Length Of the Flat Strip and Screw to be cut as per the Thickness Of the Door

While cutting the flat strip and screw, hold them firmly using a cutting plier. Keep it on a sturdy surface and cut using sharp hacksaw blade.



While cutting, also make sure that the load does not fall on the joint, otherwise the joints may develop crack and break at a later stage.



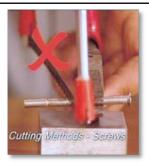
Do not cut the flat strip and screw on an uneven surface.



Do not use jumper and hammer to cut the screw.



Hold both screw and flat strip firmly while cutting.



15.4.2 Importance of Storing Tools Appropriately _

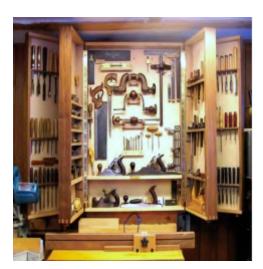


Fig. 15.4.2.1: Storing Tools

- Tools should be kept in dry conditions.
- Toolboxes also make for great tool storage, offering the primary advantage of portability.
- Use silica gel packs or rust collector.
- Clean all the tools before storing them.

Unit 15.5 Quality Assurance for Lock Installer

- Unit Objectives



At the end of this unit, you will be able to:

1. Discuss different methods of quality check during lock repair, maintenance and servicing

15.5.1 Different Methods of Quality Check

Let us consider a case, where a customer has been facing issues with the Deadbolt Lock on a door in the house. A Lock Installer is summoned. Below are the steps of how the Lock Installer would adhere to Quality Inspection during his / her visit.



A. Ensuring Proper Functioning Of The Lock Using Appropriate Methods

- Test the deadbolt by turning the twist knob to latch and unlatch the lock with the door open and then again with the door closed.
- If the twist knob lever stops in the same position for both tests, the strike plate and hole are most likely installed properly.
- If the twist knob stops short when the door is closed, the hole in the door frame has not been drilled deep enough, which could make it easier for a criminal to defeat the lock.
- Remove the strike plate from the door frame.
- Using the appropriate-sized spade bit and an electric drill, cut the hole in the door frame about 1/4 inch deeper.
- Test the latch mechanism again.
- If the twist knob stops in the same position with the door opened and closed, the hole is deep enough.
- If not, use the drill to make the hole another 1/4 inch deeper.
- Test the deadbolt latch again, if necessary.
- If the lock tests properly, re-install the strike plate and test the lock one more time to make sure the bolt is not snagging on the door frame.

B. Visually Checking The Lock For Any Fault

- A deadbolt lock is only secure when the bolt is fully extended into the door frame.
- If it is not fully extended, it is possible to unlock the door without a key.
- By inserting a key, proper functioning of the deadbolt can be checked.
- Check the hinge screws on your door.
- Over time, your door may loosen and sag, which can cause the lock latch and strike plate to become misaligned. Check if any screw is loose.

C. Conducting Visual Inspection For Any Error Or Damages During The Repairing Process

- When a door latch does not click into position, there is a problem in the alignment of the bolt and strike plate of the lock.
- Loose screws can result in a loose lock.

D. Identifying The Possible Problem / Problems In The Lock As Per The Complaints Of The Customer

- While repairing, check if the alignment of the bolt and strike plate are same or not.
- All the screws must be tightened.
- The lock should work efficiently.
- The lock should fully extend to the thickness of the door.
- There is swift movement of the cylinders of the lock.

E. Identifying The Cause Of The Fault Based On The Inspection

- If the bolt and the strike plate are misaligned, the latch will not work.
- If the screws are not tight, the lock will become loose overtime.
- If the length of the deadbolt does not correspond with the thickness of the door, the lock functioning will be affected.
- If the lock is not swift, there must be technical problems in the lock.

F. Changing The Defective Component Of The Lock As Per The Organizational Procedures

After the above procedures, if the lock continues to malfunction, then, as a last resort, the lock or its specific units (as detected via inspection) must be replaced with new ones.

Components of a Single Cylinder Deadbolt Lock are:

1. Deadbolt Cylinder	(E)
2. Outside Rosette	4
3. Deadbolt Latch	
4. Inside Rosette with Thumb turn	
5. Socket Head Machine Screws	
6. Deadbolt Ring (for Thinner Doors)	6
7. Latch Wood Screws	

emponents of a Double Cylind	er Deadbolt Lock are:		
1. Outside Double Deadbol	t Cylinder		
2. Outside Rosette			
3. Outside Deadbolt Ring (f	or Thinner Doors)	② [®]	
4. Deadbolt Latch		6	
5. Inside Deadbolt Ring (for	Thinner Doors)	3 4	
6. Inside Rosette			
7. Inside Double Deadbolt (Cylinder		
8. Socket Head Machine Sci	rews		
9. Latch Wood Screws			
s last resort, if the Lock Installestaller must escalate the issue t	er is unable to repair	the lock and the problem persists, then the Lany. This is documented using the below form:	
s last resort, if the Lock Install staller must escalate the issue t	er is unable to repair to the Retailer / Comp	the lock and the problem persists, then the Leany. This is documented using the below form:	
s last resort, if the Lock Installestaller must escalate the issue to the last of the last	er is unable to repair to the Retailer / Composite KYZ Lock and Fit		
Name of Customer: Address of Customer	er is unable to repair to the Retailer / Composite KYZ Lock and Fit	the lock and the problem persists, then the Leany. This is documented using the below form:	
Name of Customer: Address of Customer Purchase Invoice Nur	er is unable to repair to the Retailer / Composite KYZ Lock and Fit	the lock and the problem persists, then the Leany. This is documented using the below form:	
Name of Customer: Address of Customer Purchase Invoice Nun Date of Purchase:	er is unable to repair to the Retailer / Composite KYZ Lock and Fit	the lock and the problem persists, then the Leany. This is documented using the below form:	
Name of Customer: Address of Customer Purchase Invoice Nun Date of Purchase: Warranty ID:	er is unable to repair to the Retailer / Composite to the	the lock and the problem persists, then the Leany. This is documented using the below form:	
Name of Customer: Address of Customer Purchase Invoice Num Date of Purchase: Warranty ID: Date of Complaint:	er is unable to repair to the Retailer / Composite to the	the lock and the problem persists, then the Leany. This is documented using the below form: tings Pvt. Ltd. adbolt Key does not enter the lock en and Stick in Lock Broken Knob amaged AL Drop Bend in Lever	

Unit 15.6 Waste Disposal, Cleaning and Maintenance

– Unit Objectives 🥒



At the end of this unit, you will be able to:

1. Practise and follow appropriate waste disposal, cleaning and maintenance procedures

Ensuring proper Disposal System for Waste and By-product	 Recycling old locks by converting them into metal scrap, which are, in turn, reused in lock manufacturing factories. Sharps (like nails, screws, broken keys, etc.) must be disposed in sharp containers. 	
Cleaning and maintenance procedures	 Blow dust out of the keyhole. Spray the lock cylinder and opening. Lube the lock with a dry lubricant. Use WD-40 as a short term solution. 	
Using appropriate materials to clean the Tools and Equipment	 Cleaning agents (like Colin) Scrubber / Brush Hydrochloric Acid Tartaric Acid Grease Removing Agents WD-40 solution Graphite Lubricant 	Lubricant

Summary



- A Lock Installer must be adequately skilled in operating different locks.
- The warranty of a lock must be examined before initiating service.
- On purchase of lock, the retailer / shop provides the user with a Warranty Card, which specifies the tenure, terms and conditions of the Warranty extended to the user.
- Troubleshooting is the process of detecting a problem, finding its root cause and then rectifying it.
- The common Lock Problems / Faults are: Dead Bolt, Key does not enter the lock, Breakage of knob spring, Damaged lock AL Drop, Bend in lever, Turning Lock Cylinder, Door Lock moves slowly, Misaligned Latch and Key is broken off and stuck in lock
- The three stages of Troubleshooting are:
 - O Detection of Problem / Fault by identification of symptoms
 - O Determination of Root Cause
 - O Resolving the Problem / Fault
- Warping is a condition when the door becomes twisted or distorted and becomes hard to open or close.
- Assembly, Dismantling and Repair of locks must be done as per standard procedures.
- Tools should be kept in dry conditions.
- Toolboxes also make for great tool storage, offering the primary advantage of portability.
- All tools must be cleaned before and after use.

Activity



The trainer gives the students defective/faulty locks. The defects/faults in the locks are:

- Dead Bolt
- Key does not enter the lock
- Breakage of knob spring
- Damaged lock AL drop
- Door Lock moves slowly
- Misaligned Latch
- Key is broken off and stuck in lock

After visually determining the fault, students have to state the following:

- The name of the fault/defect
- · Characteristics of the fault/defect
- Method to identify the fault/defect
- · Remedial action and preventative maintenance
- Tools to be used for repairing the lock

Exercise

Answer the following questions:

- 1. Make a list of common problems associated with the locks.
- 2. How to check the warranty of a lock?
- 3. How should one check a lock with the help of a key?
- 4. Write down the steps of fixing lock on a door.
- $5. \quad What are the \, necessary \, adjust ments \, required \, if the \, lock \, and \, the \, latch \, is \, not \, aligned \, properly?$





16. Employability and Entrepreneurship Skills

Unit 16.1 Personal Strength & Value System

Unit 16.2 Digital Literacy: A Recap

Unit 16.3 Money Matters

Unit 16.4 Preparing for Employment & Self Employment

Unit 16.5 Understanding Entrepreneurship

Unit 16.6 Preparing to be an Entrepreneur



Key Learning Outcomes



At the end of this unit, you will be able to:

- 1. Explain the meaning of health
- 2. List common health issues
- 3. Discuss tips to prevent common health issues
- 4. Explain the meaning of hygiene
- 5. Discuss the purpose of Swacch Bharat Abhiyan
- 6. Explain the meaning of habit
- 7. Discuss ways to set up a safe work environment
- 8. Discuss critical safety habits to be followed by employees
- 9. Explain the importance of self-analysis
- 10. Discuss motivation with the help of Maslow's Hierarchy of Needs
- 11. Discuss the meaning of achievement motivation
- 12. List the characteristics of entrepreneurs with achievement motivation
- 13. List the different factors that motivate you
- 14. Discuss the role of attitude in self-analysis
- 15. Discuss how to maintain a positive attitude
- 16. List your strengths and weaknesses
- 17. Discuss the qualities of honest people
- 18. Describe the importance of honesty in entrepreneurs
- 19. Discuss the elements of a strong work ethic
- 20. Discuss how to foster a good work ethic
- 21. List the characteristics of highly creative people
- 22. List the characteristics of highly innovative people
- 23. Discuss the benefits of time management
- 24. List the traits of effective time managers
- 25. Describe effective time management technique
- 26. Discuss the importance of anger management
- 27. Describe anger management strategies
- 28. Discuss tips for anger management
- 29. Discuss the causes of stress
- 30. Discuss the symptoms of stress
- 31. Discuss tips for stress management
- 32. Identify the basic parts of a computer
- 33. Identify the basic parts of a keyboard
- 34. Recall basic computer terminology
- 35. Recall basic computer terminology

- 36. Recall the functions of basic computer keys
- 37. Discuss the main applications of MS Office
- 38. Discuss the benefits of Microsoft Outlook
- 39. Discuss the different types of e-commerce
- 40. List the benefits of e-commerce for retailers and customers
- 41. Discuss how the Digital India campaign will help boost e-commerce in India
- 42. Describe how you will sell a product or service on an e-commerce platform
- 43. Discuss the importance of saving money
- 44. Discuss the benefits of saving money
- 45. Discuss the main types of bank accounts
- 46. Describe the process of opening a bank account
- 47. Differentiate between fixed and variable costs
- 48. Describe the main types of investment options
- 49. Describe the different types of insurance products
- 50. Describe the different types of taxes
- 51. Discuss the uses of online banking
- 52. Discuss the main types of electronic funds transfers
- 53. Discuss the steps to prepare for an interview
- 54. Discuss the steps to create an effective Resume
- 55. Discuss the most frequently asked interview questions
- 56. Discuss how to answer the most frequently asked interview questions
- 57. Discuss basic workplace terminology
- 58. Discuss the concept of entrepreneurship
- 59. Discuss the importance of entrepreneurship
- 60. Describe the characteristics of an entrepreneur
- 61. Describe the different types of enterprises
- 62. List the qualities of an effective leader
- 63. Discuss the benefits of effective leadership
- 64. List the traits of an effective team
- 65. Discuss the importance of listening effectively
- 66. Discuss how to listen effectively
- 67. Discuss the importance of speaking effectively
- 68. Discuss how to speak effectively
- 69. Discuss how to solve problems
- 70. List important problem solving traits
- 71. Discuss ways to assess problem solving skills
- 72. Discuss the importance of negotiation

- 73. Discuss how to negotiate
- 74. Discuss how to identify new business opportunities
- 75. Discuss how to identify business opportunities within your business
- 76. Explain the meaning of entrepreneur
- 77. Describe the different types of entrepreneurs
- 78. List the characteristics of entrepreneurs
- 79. Recall entrepreneur success stories
- 80. Discuss the entrepreneurial process
- 81. Describe the entrepreneurship ecosystem
- 82. Discuss the purpose of the Make in India campaign
- 83. Discuss key schemes to promote entrepreneurs
- 84. Discuss the relationship between entrepreneurship and risk appetite
- 85. Discuss the relationship between entrepreneurship and resilience
- 86. Describe the characteristics of a resilient entrepreneur
- 87. Discuss how to deal with failure
- 88. Discuss how market research is carried out
- 89. Describe the 4 Ps of marketing
- 90. Discuss the importance of idea generation
- 91. Recall basic business terminology
- 92. Discuss the need for CRM
- 93. Discuss the benefits of CRM
- 94. Discuss the need for networking
- 95. Discuss the benefits of networking
- 96. Discuss the importance of setting goals
- 97. Differentiate between short-term, medium-term and long-term goals
- 98. Discuss how to write a business plan
- 99. Explain the financial planning process
- 100. Discuss ways to manage your risk
- 101. Describe the procedure and formalities for applying for bank finance
- 102. Discuss how to manage your own enterprise
- 103. List important questions that every entrepreneur should ask before starting an enterprise

Unit 16.1 Personal Strength & Value System

Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain the meaning of health
- 2. List common health issues
- 3. Discuss tips to prevent common health issues
- 4. Explain the meaning of hygiene
- 5. Discuss the purpose of Swacch Bharat Abhiyan
- 6. Explain the meaning of habit
- 7. Discuss ways to set up a safe work environment
- 8. Discuss critical safety habits to be followed by employees
- 9. Explain the importance of self-analysis
- 10. Discuss motivation with the help of Maslow's Hierarchy of Needs
- 11. Discuss the meaning of achievement motivation
- 12. List the characteristics of entrepreneurs with achievement motivation
- 13. List the different factors that motivate you
- 14. Discuss the role of attitude in self-analysis
- 15. Discuss how to maintain a positive attitude
- 16. List your strengths and weaknesses
- 17. Discuss the qualities of honest people
- 18. Describe the importance of honesty in entrepreneurs
- 19. Discuss the elements of a strong work ethic
- 20. Discuss how to foster a good work ethic
- 21. List the characteristics of highly creative people
- 22. List the characteristics of highly innovative people
- 23. Discuss the benefits of time management
- 24. List the traits of effective time managers
- 25. Describe effective time management technique
- 26. Discuss the importance of anger management
- 27. Describe anger management strategies
- 28. Discuss tips for anger management
- 29. Discuss the causes of stress
- 30. Discuss the symptoms of stress
- 31. Discuss tips for stress management

16.1.1 Health, habits, hygiene: What is Health

As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy — it also means you need to be at peace emotionally, and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

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Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

Tips to Prevent Health Issues

Taking measures to prevent ill health is always better than curing a disease or sickness. You can stay healthy by:

- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- · Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditatio

How many of these health standards do you follow? Tick the ones that apply to you.

1.	Get minimum 7-8 hours of sleep every night.	
2.	Avoid checking email first thing in the morning and right before you go to bed at night. $ \\$	
3.	Don't skip meals – eat regular meals at correct meal times.	
4.	Read a little bit every single day.	
5.	Eat more home cooked food than junk food.	

6.	Stand more than you sit.	Ш
7.	Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day.	
8.	Go to the doctor and dentist for regular checkups.	
9.	Exercise for 30 minutes at least 5 days a week.	
10.	Avoid consuming lots of aerated beverages.	
 W	hat is Hygiene ———————————————————————————————————	
	oer the World Health Organization (WHO), "Hygiene refers to conditions and practices	that
help ens	p to maintain health and prevent the spread of diseases." In other words, hygiene m uring that you do whatever is required to keep your surroundings clean, so that you re chances of spreading germs and diseases.	eans
kitc ove	instance, think about the kitchen in your home. Good hygiene means ensuring that hen is always spick and span, the food is put away, dishes are washed and dustbins are rflowing with garbage. Doing all this will reduce the chances of attracting pests like rakroaches, and prevent the growth of fungus and other bacteria, which could spread disc	e not ts or
Hov	w many of these health standards do you follow? Tick the ones that apply to you.	
1.	Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week.	
2.	Wear a fresh pair of clean undergarments every day.	
3.	Brush your teeth in the morning and before going to bed.	
4.	Cut your fingernails and toenails regularly.	
5.	Wash your hands with soap after going to the toilet.	
6.	Use an anti-perspirant deodorant on your underarms if you sweat a lot.	
7.	Wash your hands with soap before cooking or eating.	
8.	Stay home when you are sick, so other people don't catch what you have.	
9.	Wash dirty clothes with laundry soap before wearing them again.	
10.	Cover your nose with a tissue/your hand when coughing or sneezing.	
	how healthy and hygienic you are, by giving yourself 1 point for every ticked statemen take a look at what your score means.	nent!
You	r Score	
	/20: You need to work a lot harder to stay fit and fine! Make it a point to practice $\mathfrak g$ sits daily and see how much better you feel!	good
	4/20: Not bad, but there is scope for improvement! Try and add a few more good habi	ts to
14-2	20/20: Great job! Keep up the good work! Your body and mind thank you!	

Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

What are Habits

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

- Always having a positive attitude
- Making exercise a part of your daily routine
- Reading motivational and inspirational stories
- Smiling! Make it a habit to smile as often as possible
- Making time for family and friends
- Going to bed early and waking up early

Some bad habits that you should quit immediately are:

- Skipping breakfast
- Snacking frequently even when you are not hungry
- Eating too much fattening and sugary food
- Smoking, drinking alcohol and doing drugs
- Spending more money than you can afford
- Worrying about unimportant issues
- Staying up late and waking up late

Tips



- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health so good hygiene will help you stay strong and healthy!

16.1.2 Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

Non-Negotiable Employee Safety Habits

Every employee is obligated to follow all safety protocols put in place by the employer. All employees must make it a habit to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

Tips



- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

16.1.3 Self Analysis - Attitude, Achievement Motivation: What is Self-Analysis

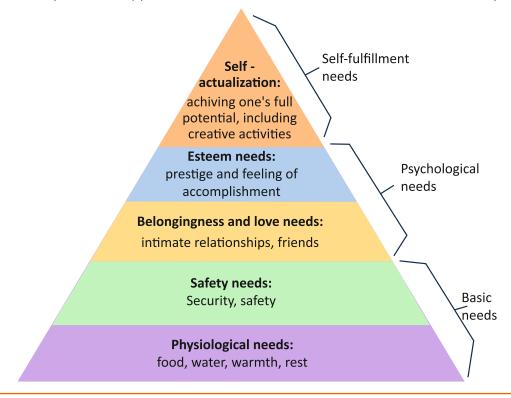
To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within yourself that need to be further developed, changed or eliminated. You can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

What is Motivation

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires — people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

Maslow's Hierarchy of Needs

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called self-actualization needs). Between the physiological and self-actualization needs are three other needs — safety needs, belongingness and love needs, and esteem needs. These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.



As you can see from the pyramid, the lowest level depicts the most basic needs. Maslow believed that our behaviour is motivated by our basic needs, until those needs are met. Once they are fulfilled, we move to the next level and are motived by the next level of needs. Let's understand this better with an example.

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation — a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

What Motivates You ———————————————————————————————————
What are the things that really motivate you? List down five things that really motivate you. Remember to answer honestly!
I am motivated by:

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

- Unafraid to take risks for personal accomplishment
- Love being challenged
- Future-oriented
- Flexible and adaptive
- Value negative feedback more than positive feedback
- Think about it:
- How many of these traits do you have?

- Very persistent when it comes to achieving goals
- Extremely courageous
- Highly creative and innovative
- Restless constantly looking to achieve more
- Feel personally responsible for solving problems
- Can you think of entrepreneurs who display these traits?

What is Attitude

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

How to Cultivate a Positive Attitude

The good news is attitude is a choice. So it is possible to improve, control and change our attitude, if we decide we want to! The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

What Are Your Strengths and Weaknesses

Another way to analyze yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Weaknesses	



- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

16.1.4 Honesty & Work Ethics: What is Honesty

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty – one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

Qualities of Honest People -

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

- 1. They don't worry about what others think of them. They believe in being themselves they don't bother about whether they are liked or disliked for their personalities.
- 2. They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.
- 3. They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.
- 4. They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.
- 5. They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves. Let's look at how being honest would lead to great benefits for entrepreneurs.

- Honesty and customers: When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.
- Honesty and employees: When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.
- Honesty and investors: For entrepreneurs, being honest with investors means not only sharing strengths but also candidly disclosing current and potential weaknesses, problem areas and solution strategies. Keep in mind that investors have a lot of experience with startups and are aware that all new companies have problems. Claiming that everything is perfectly fine and running smoothly is a red flag for most investors.
- Honesty with oneself: The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

What are Work Ethics

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behavior in the workplace. Some elements of a strong work ethic are:

- **Professionalism**: This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.
- **Respectfulness**: This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.
- **Dependability**: This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.
- **Dedication**: This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.
- **Determination**: This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.
- **Accountability**: This means taking responsibility for your actions and the consequences of your actions, and not making excuses for your mistakes.
- **Humility**: This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

How to Foster a Good Work Ethic

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty**: All work assigned to a person should be done with complete honesty, without any deceit or lies.
- Good attitude: All team members should be optimistic, energetic, and positive.
- **Reliability**: Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits**: Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times, etc.
- **Initiative**: Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness**: Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.

- **Respect**: Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity**: Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency**: Efficient employees help a company grow while inefficient employees result in a waste of time and resources.



- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

16.1.5 Creativity & Innovation: What is Creativity

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse



- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

16.1.6 Time Management: What is Time Management

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

- Greater productivity
- Better professional reputation
- Higher chances for career advancement
- Higher efficiency
- Reduced stress
 - Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Substandard work quality
- Stalled career

- Inefficient work output
- Poor professional reputation
- Increase in stress and anxiety

Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They set daily objectives
- They modify plans if required, to achieve better results
- They are flexible and open-minded
- They inform people in advance if their help will be required
- They know how to say no

- They break tasks into steps with specific deadlines
- They continually review long term goals
- They think of alternate solutions if and when required
- They ask for help when required
- They create backup plans

Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a "Do Not Disturb" sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don't reply to chat messages and disconnect from social media sites.

- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyze the log to help you understand how efficient you are, and how much time is wasted every day.
- Create time management goals to reduce time wastage.



- Always complete the most important tasks first.
- Get at least 7 8 hours of sleep every day.
- Start your day early.
- Don't waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

16.1.7 Anger Management: What is Anger Management

Anger management is the process of:

- 1. Learning to recognize the signs that you, or someone else, is becoming angry
- 2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.

Extreme anger can:

- **Hurt you physically**: It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.

This is why anger management, or managing anger appropriately, is so important.

Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

- 1. Take a deep breath from your diaphragm (don't breathe from your chest)
- 2. Visualize your breath coming up from your stomach
- 3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)
- 4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

Tips for Anger Management

The following tips will help you keep your anger in check:

- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful.
- Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.



- Try to forgive those who anger you, rather than hold a grudge against them.
- Avoid using sarcasm and hurling insults. Instead, try and explain the reason for your frustration in a polite and mature manner.

16.1.8 Stress Management: What is Stress

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do

- Pessimism
- Negative self-talk
- All in or all out attitude
- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioral symptoms of stress.

Cognitive Symptoms	Emotional Symptoms	
Memory problems	Depression	
Concentration issues	Agitation	
Lack of judgement	Irritability	
Pessimism	• Loneliness	
Anxiety	Anxiety	
Constant worrying	Anger	

Physical Symptoms	Behavioral Symptoms	
Aches and pain	Increase or decrease in appetite	
Diarrhea or constipation	Over sleeping or not sleeping enough	
Nausea	Withdrawing socially	
• Dizziness	Ignoring responsibilities	
Chest pain and/or rapid heartbeat	Consumption of alcohol or cigarettes	
Frequent cold or flu like feelings	Nervous habits like nail biting, pacing etc.	

Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.



- Force yourself to smile even if you feel stressed. Smiling makes us feel relaxed and happy.
- Stop yourself from feeling and thinking like a victim. Change your attitude and focus on being proactive.

Unit 16.2 - Digital Literacy: A Recap

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the basic parts of a computer
- 2. Identify the basic parts of a keyboard
- 3. Recall basic computer terminology
- 4. Recall basic computer terminology
- 5. Recall the functions of basic computer keys
- 6. Discuss the main applications of MS Office
- 7. Discuss the benefits of Microsoft Outlook
- 8. Discuss the different types of e-commerce
- 9. List the benefits of e-commerce for retailers and customers
- 10. Discuss how the Digital India campaign will help boost e-commerce in India
- 11. Describe how you will sell a product or service on an e-commerce platform

16.2.1 Computer and Internet basics: Basic Parts of a Computer



- **Central Processing Unit (CPU)**: The brain of the computer. It interprets and carries out program instructions.
- Hard Drive: A device that stores large amounts of data.
- **Monitor**: The device that contains the computer screen where the information is visually displayed.
- Mouse: A hand-held device used to point to items on the monitor.
- **Speakers**: Devices that enable you to hear sound from the computer.
- **Printer**: A device that converts output from a computer into printed paper documents.

Basic Parts of a Keyboard



Shift Space Enter Arrow Keys

- Arrow Keys: Press these keys to move your cursor.
- Space bar: Adds a space.
- Enter/Return: Moves your cursor to a new line.
- Shift: Press this key if you want to type a capital letter or the upper symbol of a key.
- **Caps Lock**: Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- **Backspace**: Deletes everything to the left of your cursor.

Basic Internet Terms

- The Internet: A vast, international collection of computer networks that transfers information.
- The World Wide Web: A system that lets you access information on the Internet.
- **Website**: A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage**: Provides information about a website and directs you to other pages on that website.
- **Link/Hyperlink**: A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- Web Address/URL: The address for a website.
- Address Box: A box in the browser window where you can type in a web address.



- When visiting a .com address, there no need to type http:// or even www. Just type the name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl + Enter to go to www.apple.com)
- Press the Ctrl key and press the + or to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

16.2.2 MS Office and Email: About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- Microsoft Word: Allows users to type text and add images to a document.
- Microsoft Excel: Allows users to enter data into a spreadsheet and create calculations and graphs.
- Microsoft PowerPoint: Allows users to add text, pictures and media and create slideshows and presentations.
- Microsoft Outlook: Allows users to send and receive email.
- Microsoft OneNote: Allows users to make drawings and notes with the feel of a pen on paper.
- Microsoft Access: Allows users to store data over many tables.

Why Choose Microsoft Outlook

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- **Integrated search function**: You can use keywords to search for data across all Outlook programs.
- Enhanced security: Your email is safe from hackers, junk mail and phishing website email.
- Email syncing: Sync your mail with your calendar, contact list, notes in OneNote and...your phone!
- Offline access to email: No Internet? No problem! Write emails offline and send them when you're connected again.



- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

16.2.3 E-Commerce: What is E-Commerce

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing

- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- Business to Business (B2B): Both the transacting parties are businesses.
- **Business to Consumer (B2C)**: Businesses sell electronically to end-consumers.
- Consumer to Consumer (C2C): Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B)**: Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A)**: Online transactions conducted between individuals and public administration.

Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers:

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers:

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.



- · Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

Unit 16.3 - Money Matters

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance of saving money
- 2. Discuss the benefits of saving money
- 3. Discuss the main types of bank accounts
- 4. Describe the process of opening a bank account
- 5. Differentiate between fixed and variable costs
- 6. Describe the main types of investment options
- 7. Describe the different types of insurance products
- 8. Describe the different types of taxes
- 9. Discuss the uses of online banking
- 10. Discuss the main types of electronic funds transfers

16.3.1 Personal Finance - Why to Save Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- **Become financially independent**: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- **Get out of debt**: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- **Be prepared for surprise expenses**: Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially stressed.
- Pay for emergencies: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.

- Afford large purchases and achieve major goals: Saving diligently makes it possible to place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.



- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

16.3.2 Types of Bank Accounts, Opening a Bank Account: Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

- Current Accounts
- Savings Accounts
- Recurring Deposit Accounts
- Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Savings Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)

Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual needs to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhaar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!



- Select the right type of account.
- Fill in complete nomination details.
- Ask about fees.
- Understand the rules.
- Check for online banking it's convenient!
- Keep an eye on your bank balance.

16.3.3 Costs: Fixed vs Variable: What are Fixed and Variable Costs

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services.

A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences Between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs	
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the output changes.	
Nature	Time related.	Volume related.	
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced.	
Unit cost	Inversely proportional to the number of units produced.	Remains the same, per unit.	
Examples	Depreciation, rent, salary, insurance, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.	

Tips



• When trying to determine whether a cost is fixed or variable, simply ask the following question: Will the particular cost change if the company stopped its production activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is probably a variable cost.

16.3.4 Investment, Insurance and Taxes: Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- Bonds: Bonds are instruments used by public and private companies to raise large sums of money – too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- Small Savings Schemes: Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.
- **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance – Life Insurance and Non-Life or General Insurance.

Life Insurance

Life Insurance deals with all insurance covering human life.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- Unit-Linked Insurance Plan (ULIP): Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.

- Money Back Life Insurance: While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.
- Whole Life Insurance: It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four Wheeler Insurance and Two Wheeler Insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- Marine Insurance: This insurance covers goods, freight, cargo etc. against loss or damage during transit by rail, road, sea and/or air.

Taxes -

There are two types of taxes – Direct Taxes and Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable.

Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- Capital Gains Tax: This tax is payable whenever you receive a sizable amount of money. It is usually of two types short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.
- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.
- Corporate Tax: Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services.

Some examples of Indirect Taxes are:

- Sales Tax: Sales Tax is levied on the sale of a product.
- **Service Tax:** Service Tax is added to services provided in India.
- Value Added Tax: Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- Excise Duty: Excise Duty is levied on all goods manufactured or produced in India.



- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

16.3.5 Online Banking, NEFT, RTGS etc: What is Online Banking

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

- Find out an account balance
- Transfer amounts from one account to another
- Arrange for the issuance of cheques
- Instruct payments to be made
- Request for a cheque book
- Request for a statement of accounts
- Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose to:

- Transfer funds into your own accounts of the same bank.
- Transfer funds into different accounts of the same bank.
- Transfer funds into accounts in different banks, using NEFT.
- Transfer funds into other bank accounts using RTGS.
- Transfer funds into various accounts using IMPS.

NEFT-

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following information:

- Recipient's name
- Recipient's account number
- Recipient's bank's name
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account. In order to complete this registration, you will require the following information:

- Name of the beneficiary
- Beneficiary's bank address
- Beneficiary's account number
- Beneficiary's bank's IFSC code

IMPS -

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, the you need to:

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

For the beneficiary to receive the transferred money, he must:

- 1. Link his mobile number with his respective account
- 2. Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

- 1. The beneficiary's mobile number
- 2. The beneficiary's MMID

3. The transfer amount

4. Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

Differences Between NEFT, RTGS & IMPS -

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Upto 10,000 – ₹2.5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15 above 2 – 5 lacs – ₹25 above 5 – 10 lacs –	above 2 – 5 lacs – ₹25 above 5 – 10 lacs –₹50	Upto 10,000 – ₹5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15



- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

Unit 16.4 - Preparing for Employment & Self Employment

Unit Objectives



At the end of this unit, you will be able to:

- Discuss the steps to prepare for an interview
- Discuss the steps to create an effective Resume
- Discuss the most frequently asked interview questions
- Discuss how to answer the most frequently asked interview questions
- Discuss basic workplace terminology

16.4.1 Interview Preparation: How to Prepare for an Interview

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

- 1. Research the organization that you are having the interview with.
 - Studying the company beforehand will help you be more prepared at the time of the
 interview. Your knowledge of the organization will help you answer questions at the
 time of the interview, and will leave you looking and feeling more confident. This is sure
 to make you stand out from other, not as well informed, candidates.
 - Look for background information on the company. Ty and find an overview of the company and its industry profile.
 - Visit the company website to get a good idea of what the company does. A company
 website offers a wealth of important information. Read and understand the company's
 mission statement. Pay attention to the company's products/services and client list. Read
 through any press releases to get an idea of the company's projected growth and stability.
 - Note down any questions that you have after your research has been completed.
- 2. Think about whether your skills and qualifications match the job requirements.
 - Carefully read through and analyze the job description.
 - Make a note of the knowledge, skills and abilities required to fulfill the job requirements.
 - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
- 3. Go through the most typical interview questions asked, and prepare your responses.
 - Remember, in most interviews a mix of resume-based, behavioral and case study questions are asked.
 - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
 - Practice these answers until you can express them confidently and clearly.

4. Plan your attire for the interview.

- It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
- Ensure that your clothes are clean and well-ironed. Pick neutral colours nothing too bright or flashy.
- The shoes you wear should match your clothes, and should be clean and suitable for an interview.
- Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.

5. Ensure that you have packed everything that you may require during the interview.

- Carry a few copies of your resume. Use a good quality paper for your resume print outs.
- Always take along a notepad and a pen.
- Take along any information you may need to refer to, in order to fill out an application form.
- Carry a few samples of your work, if relevant.

6. Remember the importance of non-verbal communication.

- Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
- Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
- Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.

7. Make a list of questions to end the interview with.

- Most interviews will end with the interviewer(s) asking if you have any questions. This
 is your chance to show that you have done your research and are interested in learning
 more about the company.
- If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
- Some good questions to ask at this point are:
 - What do you consider the most important criteria for success in this job?
 - O How will my performance be evaluated?
 - O What are the opportunities for advancement?
 - O What are the next steps in the hiring process?
- Remember, never ask for information that is easily available on the company website.



- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

16.4.2 Preparing an Effective Resume: How to Create an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a resume that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

Khyati Mehta

Breach Candy, Mumbai – India Contact No: +91 2223678270 Email: khyati.mehta@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

Profile Summary

- A Floor Supervisor graduated from University of Delhi having 6 years of experience in managing a retail outlet.
- Core expertise lies in managing retail staff, including cashiers and people working on the floor.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

Educational Qualifications

• <Enter qualification> <enter date of qualification> from <enter name of institute> with <enter percentage or any other relevant scoring system>.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills

<Enter your technical skill here, if applicable>

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used

- Contribution
- Description

Example:

Academic Projects

Project Title: <*Insert project title*>

Organization: < Insert the name of the organization for whom you did the project>

Platform used: <*Insert the platform used, if any*>

Contribution: <*Insert your contribution towards this project>* **Description**: <*Insert a description of the project in one line>*

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

< Insert your extracurricular activity here. E.g.: Member of ______, played (name of sport) at ______ level, won (name of prize/award) for ______>

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

Date of birth

Gender & marital status

Nationality

Languages known

Example:

Personal Details

Date of birth: 25th May, 1981
 Gender & marital status: Female, Single

Nationality: Indian

• Languages known: English, Hindi, Tamil, French



- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

16.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website or through a quick online search.
- Ask intelligent questions that show your ability to think critically.



- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

16.4.4 Work Readiness - Terms & Terminologies: Basic Workplace Terminology

Every employee should be well versed in the following terms:

- Annual leave: Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's services to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- Curriculum Vitae (CV)/Resume: A summary of a candidate's achievements, educational background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- Freelancer/Consultant/Independent Contractor: A person who works for him or herself and pitches for temporary jobs and projects with different employers.
- Holiday: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.

- **Internship**: A job opportunity offered by an employer to a potential employee, called an intern, to work at the employer's company for a fixed, limited time period.
- **Interview**: A conversation between a potential employee and a representative of an employer, in order to determine if the potential employee should be hired.
- **Job Application**: A form which asks for a candidate's information like the candidate's name, address, contact details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- **Job Offer**: An offer of employment made by an employer to a potential employee.
- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies.
- Lay Off: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- Letter of Agreement: A letter that outlines the terms of employment.
- **Letter of Recommendation**: A letter written for the purpose of validating the work skills of a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- Minimum wage: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- Offer of Employment: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or employee terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for the job, or is currently or was previously too highly paid.
- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.
- Paternity Leave: Leave granted to a man who has recently become a father.
- Recruiters/Headhunters/Executive Search Firms: Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.
- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

Unit 16.5 - Understanding Entrepreneurship

Unit Objectives ©



- Discuss the concept of entrepreneurship
- Discuss the importance of entrepreneurship
- Describe the characteristics of an entrepreneur
- 4. Describe the different types of enterprises
- 5. List the qualities of an effective leader
- 6. Discuss the benefits of effective leadership
- 7. List the traits of an effective team
- 8. Discuss the importance of listening effectively
- 9. Discuss how to listen effectively
- 10. Discuss the importance of speaking effectively
- 11. Discuss how to speak effectively
- 12. Discuss how to solve problems
- 13. List important problem solving traits
- 14. Discuss ways to assess problem solving skills
- 15. Discuss the importance of negotiation
- 16. Discuss how to negotiate
- 17. Discuss how to identify new business opportunities
- 18. Discuss how to identify business opportunities within your business
- 19. Explain the meaning of entrepreneur
- 20. Describe the different types of entrepreneurs
- 21. List the characteristics of entrepreneurs
- 22. Recall entrepreneur success stories
- 23. Discuss the entrepreneurial process
- 24. Describe the entrepreneurship ecosystem
- 25. Discuss the purpose of the Make in India campaign
- 26. Discuss key schemes to promote entrepreneurs
- 27. Discuss the relationship between entrepreneurship and risk appetite
- 28. Discuss the relationship between entrepreneurship and resilience
- 29. Describe the characteristics of a resilient entrepreneur
- 30. Discuss how to deal with failure

16.5.1 Concept Introduction, (Characteristic of an Entrepreneur, types of firms/Types of enterprises): Entrepreneurs and Entrepreneurship

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

- 1. It results in the creation of new organizations
- 2. It brings creativity into the marketplace
- 3. It leads to improved standards of living
- 4. It helps develop the economy of a country

Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- · Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

It often means discarding the material and starting again. To select right bit size, hold the screw under a bit. If only the screw threads are visible, it means bit size is perfect.

How to use a drill machine





STEP 1: Insert the chuck key into the small hole on the side of the chuck and turn it counterclockwise until the chuck can accommodate the drill bit. Slide a bit into the chuck.

STEP 2: Turn the key in a clockwise direction to tighten the chuck. Make sure the bit is secured tightly.

STEP 3: Mark the position where you intend to drill. Use a hammer and nail punch to produce a small indentation at that point. This will prevent the drill from slipping.





STEP 4: Turn on the power to the drill. Position the tip of the drill bit in the indentation, and start drilling at a low speed. Increase the speed of the drill gradually. Keep both hands on the drill as you apply pressure to the trigger. Keep the drill perpendicular to the object you are drilling to.

STEP 5: Stop the drill when you have drilled to your desired depth. Remove the drill bit from the hole with the bit rotating at a slow speed.

16.5.2 Leadership & Teamwork: Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

- 1. **Pragmatism**: This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
- 2. **Humility**: This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
- 3. **Flexibility**: It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
- 4. **Authenticity**: This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
- 5. **Reinvention**: This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
- 6. **Awareness**: This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

- 1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
- 2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
- 3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
- 4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
- 5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problem before they turn into real problems.
- 6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
- 7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.



- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most talented people to keep them motivated.
- Earn your team's respect.

16.5.3 Communication Skills: Listening & Speaking: The Importance of Listening Effectively

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

How to Listen Effectively

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

How to Listen Effectively -

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

How to Speak Effectively

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times.
- Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be
 careful not to speak too slowly because this can come across as stiff, unprepared or even
 condescending.
- Remember to pause at the right moments.



- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

16.5.4 Problem Solving & Negotiation skills: What is a Problem

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

1. Goals 2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

How to Solve Problems

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

Step 1: Identify the problemStep 2: Study the problem in detailStep 3: List all possible solutionsStep 4: Select the best solution

Step 5: Implement the chosen solution Step 6: Check that the problem has really been solved

Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

Being open minded

Being proactive

Having a positive attitude

Asking the right questions

Not panicking

Focusing on the right problem

How to Assess for Problem Solving Skills

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

- 1. **Application forms**: Ask for proof of the candidate's problem solving skills in the application form.
- 2. **Psychometric tests**: Give potential candidates logical reasoning and critical thinking tests and see how they fare.
- 3. **Interviews**: Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
- 4. **Technical questions**: Give candidates examples of real life problems and evaluate their thought process.

What is Negotiation

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.	
Step 2: Discuss the Problem	This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.	
Step 3: Clarify the Objective	Ensure that both parties want to solve the same problem and reach the same goal.	
Step 4: Aim for a Win-Win Outcome	Try your best to be open minded when negotiating. Compromise and offer alternate solutions to reach an outcome where both parties win.	
Step 5: Clearly Define the Agreement	When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.	
Step 6: Implement the Agreed Upon Solution	Agree on a course of action to set the solution in motion	



- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away sometimes reaching an agreement may not be possible

16.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."

Peter Drucker

The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

A business opportunity means a good or favourable change available to run a specific business in a given environment, at a given point of time.

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

1. Identify Market Inefficiencies

When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.

2. Remove Key Hassles

Rather than create a new product or service, you can innovatively improve a product, service or process.

3. Create Something New

Think about how you can create a new experience for customers, based on existing business models.

4. Pick a Growing Sector/Industry

Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.

5. Think About Product Differentiation

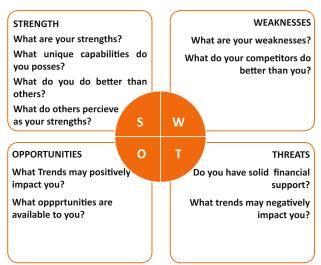
If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within

Your Business

1. SWOT Analysis

An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:



Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. Establishing Your USP

Establish your USP and position yourself as different from your competitors. Identify why customers should buy from you and promote that reason.

Opportunity Analysis

Once you have identified an opportunity, you need to analyze it.

To analyze an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea



- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

16.5.6 Entrepreneurship Support Eco-Syetem: What is an Entrepreneur

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

- 1. **The Traditional Entrepreneur**: This type of entrepreneur usually has some kind of skill they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
- 2. **The Growth Potential Entrepreneur**: The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
- 3. **The Project-Oriented Entrepreneur**: This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
- 4. **The Lifestyle Entrepreneur**: This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills they know how to evaluate their cash flow, sales and revenue
- They are willing to take great risks
- They are very proactive this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

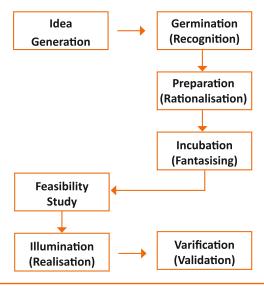
Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to-door and offered a money back guarantee with every pack that was sold. He charged Rs. 3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

- **Stage 1**: Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.
- **Stage 2**: Germination or Recognition. In this stage a possible solution to the identified problem is thought of.
- **Stage 3**: Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.
- **Stage 4**: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.
- **Stage 5**: Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.
- **Stage 6**: Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.
- **Stage 7**: Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

Take a look at the diagram below to get a better idea of this process.



Introduction to the Entrepreneurship Ecosystem

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts.

An entrepreneurship ecosystem comprises of the following six domains:

- 1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.
- 2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.
- 3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.
- 4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.
- 5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.
- 6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem. The six domains and their various elements have been graphically depicted.

Early Customers

- Early adopters for proof-of-concept
 - Expertise in productizing
 - Reference customer
- Distribution channels

First reviews

Leadership

- Unequivocal support
- Open door for advocate Social legitimacy
- Entrepreneurship strategy
- urgency, crisis and challenge

Government

- e.g. Investment, support Institutions
- e.g. for R&D, jump start funds Regulatory framework Financial support e.g. Tax benifits incentives
- Research institutes
- Venture-friendly legislation
- property rights, and labour contract enforcement, • e.g. Bankruptcy,

Networks

Entrepreneure's networks

Policy

- Diaspora networks
- Multinational corporations

Financial Capital

Micro-loans

Venture capital funds

friends and family Angel investors,

Finance

Market

- Public capital markets Private equity Debt
 - Zero-stage venture capital

Entrepreneurship

Success Stories

Visible successes

Culture

Human

 Later generation family Serial entrepreneures

Skilled and unskilled

Labour

Capital

General degrees (professional and academic)

Educational Institutions

Specific entrepreneurship training

- Wealth generation for founders
 - International reputation

Societal norms

Supports

- Tolerance of risk, mistakes, failure
- Innovation, creativity, experimentation
- Social status of entrepreneur
- Wealth creation
- Ambition, drive, hunger

Transportation & logistics Telecommunications

Infrastructure

- Energy
- Zones, incubation centers, clusters

Support Professions

- Legal
- Accounting
- Investment bankers

non-profits

Entrepreneur-**Business plan** contests

promotion in

 Entrepreneurship
 Conferences Non-Government Institution

friendly association

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustainability of the environment.

Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

- To easily get loans
- To easily find investors
- To get tax exemptions
- To easily access resources and good infrastructure
- To enjoy a procedure that is free of hassles and is quick
- To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

- Make investment easy
- Support new ideas
- Enhance skill development
- Safeguard the ideas of entrepreneurs
- Create state-of-the-art facilities for manufacturing goods

Key Schemes to Promote Entrepreneurs

The government offers many schemes to support entrepreneurs. These schemes are run by various Ministries/Departments of Government of India to support First Generation Entrepreneurs. Take a look at a few key schemes to promote entrepreneurship:

SI. Name of the Scheme

- 1. Pradhan Mantri MUDRA Yojana Micro Units Development and Refinance Agency (MUDRA),
- 2. STAND UP INDIA
- 3. Prime Minister Employment Generation Programme (PMEGP)
- 4. International Cooperation
- 5. Performance and Credit Rating
- 6. Marketing Assistance Scheme
- 7. Reimbursement of Registration Fee for Bar Coding
- 8. Enable Participation of MSMEs in State/District level Trade Fairs and Provide Funding Support

- 9. Capital Subsidy Support on Credit for Technology up gradation
- 10. Credit Guarantee Fund for Micro and Small Enterprise (CGFMSE)
- 11. Reimbursement of Certification Fees for Acquiring ISO Standards
- 12. Agricultural Marketing
- 13. Small Agricultural Marketing
- 14. Mega Food Park
- 15. Adivasi Mahila Sashaktikaran Yojana
- 1. Pradhan Mantri MUDRA Yojana, Micro Units Development and Refinance Agency (MUDRA),

Description

Under the aegis support of Pradhan Mantri MUDRA Yojana, MUDRA has already created its initial products/schemes. The interventions have been named 'Shishu', 'Kishor' and 'Tarun' to signify the stage of growth/development and funding needs of the beneficiary micro unit/entrepreneur and also provide a reference point for the next phase of graduation/growth to look forward to:

- a. Shishu: Covering loans upto Rs.50,000/-
- b. Kishor: Covering loans above Rs. 50,000/- and upto Rs.5 lakh
- c. Tarun: Covering loans above Rs. 5 lakh to Rs.10 lakh

Who can apply?

Any Indian citizen who has a business plan for a non-farm sector income generating activity such as manufacturing, processing, trading or service sector and whose credit need is less than Rs.10 lakh can approach either a Bank, MFI, or NBFC for availing of MUDRA loans under Pradhan Mantri Mudra Yojana (PMMY).

2. Stand Up India

Description

The objective of the Standup India scheme is to facilitate bank loans between Rs.10 lakh and Rs.1 crore to at least one Schedule Caste (SC) or Scheduled Tribe (ST) borrower and at least one woman borrower per bank branch for setting up a Greenfield enterprise. This enterprise may be in manufacturing, services or the trading sector. In case of non-Individual enterprises at least 51% of the shareholding and controlling stake should be held be either an SC/ST or Woman Entrepreneur.

Who can apply?

ST, SC &Women

3. Prime Minister Employment Generation Programme (PMEGP)

Description

The Scheme is implemented by Khadi and Village Industries Commission (KVIC), as the nodal agency at the National level. At the State level, the Scheme is implemented through State KVIC Directorates, State Khadi and Village Industries Boards (KVIBs) and District Industries Centres (DICs) and banks. The Government subsidy under the Scheme is routed by KVIC through identified banks for eventual distribution to the beneficiaries/entrepreneurs in their bank accounts.

Nature of assistance

The maximum cost of the project/unit admissible under manufacturing sector is Rs.25 lakh and under business/service sector is Rs.10 lakh. Levels of funding under PMEGP

Categories of beneficiaries under PMEGP	Beneficiary's contribution (of project cost)	Rate of Subsidy (of project cost)
Area (location of project/unit)		Urban Rural
General Category	10%	15% 25%
Special (including SC / ST / OBC / Minorities / Women, Ex-servicemen, Physically handicapped, NER, Hill and Border areas, etc.	05%	25% 35%

The balance amount of the total project cost will be provided by Banks as term loan as well as working capital.

Who can apply?

Any individual, above 18 years of age. At least VIII standard pass for projects costing above Rs.10 lakh in the manufacturing sector and above Rs.5 lakh in the business/service sector. Only new projects are considered for sanction under PMEGP. Self Help Groups (including those belonging to BPL provided that they have not availed benefits under any other Scheme), Institutions registered under Societies Registration Act,1860; Production Co-operative Societies, and Charitable Trusts are also eligible. Existing Units (under PMRY, REGP or any other scheme of Government of India or State Government) and the units that have already availed Government Subsidy under any other scheme of Government of India or State Government are NOT eligible.

4. International Cooperation

Description

The Scheme would cover the following activities:

- a. Deputation of MSME business delegations to other countries for exploring new areas of technology infusion/upgradation, facilitating joint ventures, improving market of MSMEs products, foreign collaborations, etc.
- b. Participation by Indian MSMEs in international exhibitions, trade fairs and buyerseller meets in foreign countries as well as in India, in which there is international participation.
- c. Holding international conferences and seminars on topics and themes of interest to the MSME.

Nature of assistance

IC Scheme provides financial assistance towards the airfare and space rent of entrepreneurs. Assistance is provided on the basis of size and the type of the enterprise.

Who can apply?

- a. State/Central Government Organisations;
- b. Industry/Enterprise Associations; and
- c. Registered Societies/Trusts and Organisations associated with the promotion and development of MSMEs

5. Performance and Credit Rating for Micro and Small Enterprises

Description

The objective of the Scheme is to create awareness amongst micro & small enterprises about the strengths and weaknesses of their operations and also their credit worthiness.

Nature of assistance

Turn Over	Fee to be reimbursed by Ministry of MSME
Up to Rs.50 lacs	75% of the fee charged by the rating agency subject to a ceiling Rs.15,000/-
Above Rs.50 lacs to Rs.200 lacs	75% of the fee charged by the rating agency subject to a ceiling of Rs.30,0001-
Above Rs.200 lacs	75% of the fee charged by the rating agency subject to a ceiling of Rs.40,000/-

Who can apply?

Any enterprise registered in India as a micro or small enterprise is eligible to apply.

6. Marketing Assistance Scheme

Description

The assistance is provided for the following activities:

- a. Organizing exhibitions abroad and participation in international exhibitions/trade fairs
- Co-sponsoring of exhibitions organized by other organisations/industry associations/ agencies
- c. Organizing buyer-seller meets, intensive campaigns and marketing promotion events

Nature of assistance

Financial assistance of up to 95% of the airfare and space rent of entrepreneurs. Assistance is provided on the basis of size and the type of the enterprise. Financial assistance for cosponsoring would be limited to 40% of the net expenditure, subject to maximum amount of Rs.5 lakh.

Who can apply?

MSMEs, Industry Associations and other organizations related to MSME sector.

7. Reimbursement of Registration Fee for Bar Coding

Description

The financial assistance is provided towards 75% reimbursement of only one-time registration fee and 75% of annual recurring fee for first three years paid by MSEs to GS1 India for using bar coding.

Nature of assistance

Funding support for reimbursement of 75% of one time and recurring bar code registration fees.

Who can apply?

All MSMEs with EM registration.

8. Enabling Participation of MSMEs in State/District Level Trade Fairs and Provide Funding Support

Description

Provide marketing platform to manufacturing MSMEs by enabling their participation in state/district level exhibitions being organized by state/district authorities/associations.

Nature of assistance

1. Free registration for participating in trade fairs

Note: The selection of participants would be done by the MSME-DIs post the submission of application.

- 2. Reimbursement of 50% of to and fro actual fare by shortest distance/direct train (limited to AC II tier class) from the nearest railway station/bus fare to the place of exhibition and 50% space rental charges for MSMEs (General category entrepreneurs).
- 3. For Women/SC/ST entrepreneurs & entrepreneurs from North Eastern Region Govt. of India will reimburse 80% of items listed above in Point (2).

Note: The total reimbursement will be max. Rs.30,000/- per unit for the SC/ST/Women/ Physically Handicapped entrepreneurs, while for the other units the max. limit will be Rs.20,000/- per person per MSME unit.

Note: The participant is required to submit follow-up proofs post attending the event to claim reimbursement. The proofs can be submitted after logging in online under the section "My Applications" or directly contacting a DI office.

Who can apply?

All MSMEs with EM registration.

9. Capital Subsidy Support on Credit for Technology Upgradation

Description

MSMEs can get a capital subsidy (~15%) on credit availed for technology upgradation.

Nature of assistance

Financial assistance for availing credit and loan.

Who can apply?

- 1. Banks and financial institutions can apply to DC-MSME for availing support.
- 2. MSMEs need to directly contact the respective banks for getting credit and capital subsidy.

How to apply?

If you are a financial institution, click on the "Apply Now" button or else you can also directly contact the Office of DC-MSME. You can view the contact details of Office of DC-MSME. If you are an MSME, directly contact the respective banks/financial institutions as listed in the scheme guidelines.

10. Provision of Collateral Free Credit for MSMEs

Description

Banks and financial institutions are provided funding assistance under this scheme so that they can in turn lend collateral free credit to MSMEs.

Nature of assistance

Funding support to banks and financial institutions for lending collateral-free credit to MSMEs.

Who can apply?

Banks and financial institutions can apply to office of DC-MSME/MSME-DIs for availing support. MSMEs need to directly contact the respective banks for getting credit.

11. Reimbursement of certification fees for acquiring ISO standards

ISO 9000/ISO 14001 Certification Reimbursement.

Description

The GoI assistance will be provided for one-time reimbursement of expenditure to such MSME manufacturing units which acquire ISO 18000/ISO 22000/ISO 27000 certification.

Nature of assistance

Reimbursement of expenditure incurred on acquiring ISO standards.

Who can apply?

MSMEs with EM registration.

12. Agricultural Marketing

Description

A capital investment subsidy for construction/renovation of rural godowns.

Creation of scientific storage capacity and prevention of distress sale.

Nature of assistance

Subsidy @ 25% to farmers, 15% of project cost to companies.

Who can apply

NGOs, SHGs, companies, co-operatives.

13. Small Agricultural Marketing

Description

Business development description provides venture capital assistance in the form of equity, and arranges training and visits of agri-preneurs

Farmers' Agriculture Business Consortium

Business development description provides venture capital assistance in the form of equity, and arranges training and visits of agri-preneurs.

Nature of assistance

Financial assistance with a ceiling of Rs.5 lakh.

Who can apply

Individuals, farmers, producer groups, partnership/propriety firms, SGHs, agri-preneurs, etc.

14. Mega Food Park

Description

Mechanism to link agricultural production and market to maximize value addition, enhance farmers income, create rural employment.

Nature of assistance

One-time capital grant of 50% of project cost with a limit of Rs.50 crore.

Who can apply

Farmers, farmer groups, SHGs.

15. Adivasi Mahila Sashaktikaran Yojana

Description

Concessional scheme for the economic development of ST women.

Nature of assistance

Term loan at concessional rates upto 90% of cost of scheme.

Who can apply

Scheduled Tribes Women.



- Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.
- Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

16.5.7 Risk Appetite & Resilience: Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as "low", "medium" and "high." The company's entrepreneur(s) have to evaluate all potential alternatives and select the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a startup with a revolutionary concept will have a very high risk appetite. The startup can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors
- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Strong social connections
- Skill to learn from setbacks
- Ability to look at the bigger picture
- Ability to diversify and expand
- Survivor attitude
- Cash-flow conscious habits
- Attention to detail



- Cultivate a great network of clients, suppliers, peers, friends and family. This will not only
 help you promote your business, but will also help you learn, identify new opportunities
 and stay tuned to changes in the market.
- Don't dwell on setbacks. Focus on what the you need to do next to get moving again.
- While you should try and curtail expenses, ensure that it is not at the cost of your growth.

16.5.8 Success & Failure: Understanding Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don't know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily — maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price... and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive — push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money.

I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another startup. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs to be more prepared before they begin their journey! Thank you for all your insight!



- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps don't make decisions hastily.

Unit 16.6 - Preparing to be an Entrepreneur

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss how market research is carried out
- 2. Describe the 4 Ps of marketing
- 3. Discuss the importance of idea generation
- 4. Recall basic business terminology
- 5. Discuss the need for CRM
- 6. Discuss the benefits of CRM
- 7. Discuss the need for networking
- 8. Discuss the benefits of networking
- 9. Discuss the importance of setting goals
- 10. Differentiate between short-term, medium-term and long-term goals
- 11. Discuss how to write a business plan
- 12. Explain the financial planning process
- 13. Discuss ways to manage your risk
- 14. Describe the procedure and formalities for applying for bank finance
- 15. Discuss how to manage your own enterprise
- 16. List important questions that every entrepreneur should ask before starting an enterprise

16.6.1 Market Study/The 4 Ps of Marketing/ Importance of an IDEA: Understanding Market Research

Market research is the process of gathering, analyzing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- Primary information. This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- Specific: This is precise and involves structured, formal interviews. Conducting specific research is the more expensive than conducting exploratory research.

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- Public sources: These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- Commercial sources: These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- Educational institutions: These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place. Let's look at each of these 4 Ps in detail.

Product

A product can be:

A tangible good
 An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

- What does the customer want from the product/service?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered.

The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

- What is the value of the product/service to customers?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.

Some questions to ask yourself are:

- Where should you promote your product or service?
- What is the best medium to use to reach your target audience?
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them
- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date



- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

16.6.2 Business Entity Concepts: Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- Accounting: A systematic method of recording and reporting financial transactions.
- Accounts payable: Money owed by a company to its creditors.
- Accounts Receivable: The amount a company is owed by its clients.
- Assets: The value of everything a company owns and uses to conduct its business.
- Balance Sheet: A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- Bottom Line: The total amount a business has earned or lost at the end of a month.
- Business: An organization that operates with the aim of making a profit.
- Business to Business (B2B): A business that sells goods or services to another business.
- Business to Consumer (B2C): A business that sells goods or services directly to the end user.
- Capital: The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- Cash Flow: The overall movement of funds through a business each month, including income and expenses.
- Cash Flow Statement: A statement showing the money that entered and exited a business during a specific period of time.
- Contract: A formal agreement to do work for pay.
- Depreciation: The degrading value of an asset over time.
- Expense: The costs that a business incurs through its operations.
- Finance: The management and allocation of money and other assets.
- Financial Report: A comprehensive account of a business' transactions and expenses.
- Fixed Cost: A one-time expense.
- Income Statement (Profit and Loss Statement): Shows the profitability of a business during a period of time.
- Liabilities: The value of what a business owes to someone else.
- Marketing: The process of promoting, selling and distributing a product or service.
- Net Income/Profit: Revenues minus expenses.
- Net Worth: The total value of a business.
- Payback Period: The amount of time it takes to recover the initial investment of a business.
- Profit Margin: The ratio of profit, divided by revenue, displayed as a percentage.
- Return on Investment (ROI): The amount of money a business gets as return from an investment.

- Revenue: The total amount of income before expenses are subtracted.
- Sales Prospect: A potential customer.
- Supplier: A provider of supplies to a business.
- Target Market: A specific group of customers at which a company's products and services are aimed.
- Valuation: An estimate of the overall worth of the business.
- Variable Cost: Expenses that change in proportion to the activity of a business.
- Working Capital: Calculated as current assets minus current liabilities.
- Business Transactions: There are three types of business transactions. These are:
 - O Simple Transactions Usually a single transaction between a vendor and a customer. For example: Buying a cup of coffee.
 - O Complex Transactions These transactions go through a number of events before they can be completed. For example: Buying a house.
 - O Ongoing transactions These transactions usually require a contract. For example: Contract with a vendor.

Basic Accounting Formulas

Take a look some important accounting formulas that every entrepreneur needs to know.

1. The Accounting Equation: This is value of everything a company owns and uses to conduct its business.

Formula:

Assets = Liability + Owner's Equity

2. Net Income: This is the profit of the company.

Formula:

Net Income = Revenues – Expenses

3. Break-Even Point: This is the point at which the company will not make a profit or a loss. The total cost and total revenues are equal.

Formula:

Break-Even = Fixed Costs/Sales Price – Variable Cost per Unit

4. Cash Ratio: This tells us about the liquidity of a company.

Formula:

Cash Ratio = Cash/Current Liabilities

5. Profit Margin: This is shown as a percentage. It shows what percentage of sales are left over after all the expenses are paid by the business.

Formula:

Profit Margin = Net Income/Sales

6. Debt-to-Equity Ratio: This ratio shows how much equity and debt a company is using to finance its assets, and whether the shareholder equity can fulfill obligations to creditors if the business starts making a loss.

Formula:

Debt-to-Equity Ratio = Total Liabilities/Total Equity

1. Cost of Goods Sold: This is the total of all costs used to create a product or service, which has been sold.

Formula:

Cost of Goods Sold = Cost of Materials/Inventory – Cost of Outputs

8. Return on Investment (ROI): This is usually shown as a percentage. It calculates the profits of an investment as a percentage of the original cost.

Formula:

ROI = Net Profit/Total Investment * 100

9. Simple Interest: This is money you can earn by initially investing some money (the principal).

Formula:

A = P(1 + rt); R = r * 100

Where:

A = Total Accrued Amount (principal + interest)

P = Principal Amount

I = Interest Amount

r = Rate of Interest per year in decimal; <math>r = R/100

t = Time Period involved in months or years

10. Annual Compound Interest: The calculates the addition of interest to the principal sum of a loan or deposit.

Formula:

$$A = P (1 + r/n) ^ nt:$$

Where:

A = the future value of the investment/loan, including interest

P = the principal investment amount (the initial deposit or loan amount)

r = the annual interest rate (decimal)

n = the number of times that interest is compounded per year

t = the number of years the money is invested or borrowed for

16.6.3 CRM & Networking: What is CRM

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM -

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
 - O Increased sales
 - O Identification of customer needs
 - O Cross-selling of products
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

16.6.4 What is Networking

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

16.6.5 The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people
- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships



- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

16.6.6 Business Plan: Why Set Goals

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

• These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

- These goals are built on your short term goals.
- They do not need to be as specific as your short term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5 year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and businesslike way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.

Your Executive Summary should include:

• The Mission Statement: Explain what your business is all about.

Example: Nike's Mission Statement

Nike's mission statement is "To bring inspiration and innovation to every athlete in the world."

- Company Information: Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- Growth Highlights: Mention examples of company growth. Use graphs and charts where possible.
- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

- A description of the nature of your business
- The market needs that you are aiming to satisfy
- The ways in which your products and services meet these needs
- The specific consumers and organizations that you intend to serve
- Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

- Your industry description and outlook
- Information on your target market
- The needs and demographics of your target audience
- The size of your target market
- The amount of market share you want to capture
- Your pricing structure
- Your competitive analysis
- Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis.

Your Organization & Management section should include:

- Your company's organizational structure
- Details of your company's ownership
- Details of your management team
- Qualifications of your board of directors
- Detailed descriptions of each division/department and its function
- The salary and benefits package that you offer your people
- The incentives that you offer

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfill the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- **Market penetration strategy**: This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy**: This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy**: These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy**: These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- A salesforce strategy: This strategy focuses on increasing the revenue of the enterprise.
- A breakdown of your sales activities: This means detailing out how you intend to sell your products or services will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture.

The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your longterm goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

Step 1: Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.

Step 2: Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.

Step 3: Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.

Step 4: Make a spending plan. This means write down in detail where your money will come from, and where it will go.

Step 5: Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.

Step 6: Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips



- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be concise and realistic.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

16.6.7 Procedure and Formalities for Bank Finance: The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for startups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of startups, offering funding to thousands of startups every year.

What Information Should Entrepreneurs Offer Banks for Funding

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- Business Brochure: A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan

- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

- Good cash flow
- Adequate shareholders' funds
- Adequate security
- Experience in business
- Good reputation

The Procedure

To apply for funding the following procedure will need to be followed.

- 1. Submit your application form and all other required documents to the bank.
- 2. The bank will carefully assess your credit worthiness and assign ratings by analyzing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
- 3. The bank will make a decision as to whether or not you should be given funding.

Tips



- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

16.6.8 Enterprise Management - An Overview: How to Manage Your Enterprise

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you

put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation.

Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers. This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can also hire a marketing agency if you feel you need help in this area.

Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips



- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

16.6.9 20 Questions to Ask Yourself Before Considering Entrepreneurship

- 1. Why am I starting a business?
- 2. What problem am I solving?
- 3. Have others attempted to solve this problem before? Did they succeed or fail?
- 4. Do I have a mentor or industry expert that I can call on?
- 5. Who is my ideal customer?
- 6. Who are my competitors?
- 7. What makes my business idea different from other business ideas?
- 8. What are the key features of my product or service?
- 9. Have I done a SWOT analysis?
- 10. What is the size of the market that will buy my product or service?
- 11. What would it take to build a minimum viable product to test the market?
- 12. How much money do I need to get started?
- 13. Will I need to get a loan?
- 14. How soon will my products or services be available?
- 15. When will I break even or make a profit?
- 16. How will those who invest in my idea make a profit?
- 17. How should I set up the legal structure of my business?
- 18. What taxes will I need to pay?
- 19. What kind of insurance will I need?
- 20. Have I reached out to potential customers for feedback?

Tips



- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

- 1. A mentor is a trusted and experienced person who is willing to coach and guide you.
- 2. A customer is someone who buys goods and/or services.
- 3. A competitor is a person or company that sells products and/or services similar to your products and/or services.
- 4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.

- 5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.
- 6. A company is said to break even when the profits of the company are equal to the costs.
- 7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.
- 8. There are two types of taxes direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.
- 9. There are two types of insurance life insurance and general insurance. Life insurance covers human life while general insurance covers assets like animals, goods, cars etc.











Address: 407-408, 4th Floor, DLF City Court, MG Road

Sikanderpur Gurugram - 122002, Haryana, India

Email: info@ffsc.in

Web: www.ffsc.in

Phone: +91 124 4513900

Price: