







Participant Handbook

Sector Furniture and Fittings

Sub-Sector Modular Furniture

Occupation

Production - Modular Furniture

Reference ID: FFS/Q5102, Version No. 1.0

NSQF Level 3



Cabinet Maker Modular Kitchen

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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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Shri Narendra Modi Prime Minister of India







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FURNITURE & FITTINGS SKILLS COUNCIL

for

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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 endeavors.

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 "Cabinet Maker Modular Kitchen" in the Furniture and 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.

- Introduction
- (FFS/N5102) Make modular kitchen
- (FFS/N8601) Ensure health and safety at workplace
- (FFS/N8501) Maintain work area, tools and machines
- (FFS/N8801) Work effectively with others
- Employability and Entrepreneurship Skills

Symbols Used



Key Learning Outcomes



Activity



Summary



Tips



Notes



Objectives

Table of Contents

| S.No | Modules and Units | Page No |
|------|---|---------|
| 1. | Make Modular Kitchen (FFS/N5102) | 1 |
| | Unit 1.1 Basic Introduction to the Responsibilities of a Cabinet Maker | 3 |
| | Unit 1.2 Make Modular Kitchen | 5 |
| | Unit 1.3 Understanding Kitchen Layout | 15 |
| | Unit 1.4 Making of Furniture and Assembling of Parts | 31 |
| | Unit 1.5 Different Types of Tools and Equipment and the Processes of Operating the Same | 87 |
| 2. | Maintain work area tools and machines (FFS/N8501) | 117 |
| | Unit 2.1 Follow Safe Working Practices While at Work | 119 |
| | Unit 2.2 Organizational Procedures for Safe Handling of Tools and Equipment | 121 |
| | Unit 2.3 Respond to an Emergency Situation | 125 |
| | Unit 2.4 Organizational Reporting Protocol | 130 |
| | Unit 2.5 Various Types of Safety Signs and What They Mean | 133 |
| | Unit 2.6 Deal With an Accident Which Involves Human Life | 143 |
| | Unit 2.7 Different Types of Personal Protective Gear and Their Usage | 144 |
| | Unit 2.8 Appropriate Basic First Aid Treatment Relevant to the Condition | 148 |
| | Unit 2.9 Preventative and Remedial Actions to be Taken in the Case of Exposure to | |
| | Toxic Materials | 153 |
| | Unit 2.10 Maintain Appropriate Environment to Protect Stock from Pilfering, Theft, | |
| | Damage and Deterioration | 155 |
| 3. | Ensure Health and Safety at Workplace (FFS/N8601) | 161 |
| | Unit 3.1 Common Health and Safety Hazards in a Work Environment and Related Precautions | s 163 |
| | Unit 3.2 Potential Risks and Threats | 170 |
| | Unit 3.3 Potential Hazards and Risks Which May Be Present at Furniture & Fittings Related | |
| | Workplace | 173 |
| | Unit 3.4 Storage and Handling of Hazardous Substances | 177 |
| | Unit 3.5 Common Health and Safety Practices at Workplace | 180 |
| | Unit 3.6 Different Risks Associated with the Use of Electrical Equipment | 185 |
| 4. | Fighting Fire (FFS/N8601) | 193 |
| | Unit 4.1 Various Causes of Fire | 195 |
| | Unit 4.2 Different Types of Fire Extinguishers and their Use | 199 |
| | Unit 4.3 Techniques of Using the Different Fire Extinguishers | 201 |
| 5. | Safe Lifting Practices and Ergonomics (FFS/N8601) | 207 |
| | Unit 5.1 Safe Lifting Practices | 209 |
| | Unit 5.2 Correct Body Postures | 211 |
| | Unit 5.3 Correct Lifting, Loading and Unloading and Handling Procedures | 215 |

























| S.No | Modules and Units | Page No |
|------|--|---------|
| 6. | Common Issues, Troubleshooting Knowledge and Method of Conducting Visual | |
| | Inspection (FFS/N8501) | 221 |
| | Unit 6.1 Common Issues Troubleshooting Knowledge | 223 |
| | Unit 6.2 Method of Conducting Visual Inspection for any Errors or Damages to the | |
| | Cut Components | 228 |
| 7. | Safe Cleaning and Waste Management Practices (FFS/N8501) | 233 |
| | Unit 7.1 Importance of Good Housekeeping | 235 |
| | Unit 7.2 Different Types of Cleaning Equipment & Substances and their Use | 238 |
| | Unit 7.3 Safe Working Practices for Cleaning and the Method of Carrying Them Out | 241 |
| | Unit 7.4 Common Types of Waste and Contaminants in Workplace | 245 |
| | Unit 7.5 Effects of Contamination on Products | 248 |
| | Unit 7.6 Different Ways of Minimizing Waste | 249 |
| | Unit 7.7 Know-How of Cleaning Process and Waste Disposal Procedures | 251 |
| 8. | Work Effectively with Others (FFS/N8801) | 257 |
| | Unit 8.1 Work Effectively with Others | 259 |
| | Unit 8.2 Importance of Effective Communication and Establishing Good Working | |
| | Relationships with Other | 269 |
| | Unit 8.3 Prepare and Organize Work | 278 |
| | Unit 8.4 Decision Making | 280 |
| | Unit 8.5 Problem Solving | 282 |
| | Unit 8.6 Manage Anger and Stress | 284 |
| | Unit 8.7 Manage Time | 287 |
| | Unit 8.8 Set Goals for Oneself and the Team | 288 |
| | Unit 8.9 Understanding Technical Drawings and Blueprints | 290 |
| 9. | Employability and Entrepreneurship Skills | 307 |
| | Unit 9.1 Personal Strength & Value System | 311 |
| | Unit 9.2 Digital Literacy: A Recap | 330 |
| | Unit 9.3 Money Matters | 335 |
| | Unit 9.4 Preparing for Employment & Self Employment | 346 |
| | Unit 9.5 Understanding Entrepreneurship | 355 |
| | Unit 9.6 Preparing to be an Entrepreneur | 382 |







































1. Make Modular Kitchen

Unit 1.1 Basic Introduction to the Responsibilities of a Cabinet Maker

Unit 1.2 Make Modular Kitchen

Unit 1.3 Understand Kitchen Layout

Unit 1.4 Making of Furniture and Assembling of Parts

Unit 1.5 Different Types of Tools and Equipment and the Processes of Operating



Key Learning Outcomes



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

- 1. Evaluate the responsibilities of a cabinet maker
- 2. Practice making modular kitchen
- 3. Describe the kitchen layout in detail
- 4. Demonstrate making of furniture and assembling of parts
- 5. Identify different types of tools and equipment

Unit 1.1 Basic Introduction to the Responsibilities of a Cabinet Maker

- Unit Objectives



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

- 1. Demonstrate the job responsibilities of a cabinet maker
- 2. List the job skills and personal attributes required

Among furniture makers, cabinet makers are wood workers with a specialty. These furniture makers construct and install cabinets in kitchens, bathrooms other locations of businesses and homes. Characteristic duties of cabinet makers involve designing customized cabinets, constructing cabinets, installing cabinetry, coordinating with clients and various other duties. As a modular kitchen cabinet maker, you have the responsibility of cutting and shaping wood, developing surfaces and fashioning a finished product.

This job role would require you to work with a vast range of tools like drum sanders, a saw table, dust extraction system etc. You would need to become familiar with a variety of hand tools like finish staplers, jigsaws, cordless drills and laminate trimmers. Cabinet makers also handle screws, nails, wood glue, dowels and other fasteners to construct finished furniture and cabinets.

Taking accurate measurements of the client's interior space proves a vital aspect of the job, whether you are constructing kitchen cabinets that effortlessly fit into the available space, or if you are constructing an item of furniture based on precise measurements. Another important aspect is creating drawings for the client that depict what the finished item will look like, as this enables the client to visualize and proceed with the project.

Job Responsibilities of a Cabinet Maker

- Make sure that all equipment necessary for your work has been cleaned and repaired, for example, skill saws, table saws, handsaws, sanding tools and all types of drilling equipment
- While carrying out measurements and markings you need to be precise, in order to ensure that resources are used efficiently and the projects remain within the budgetary restrictions
- Produce and assemble components of the cabinet, ensuring that every piece fits the specific dimensions mentioned by the client
- Confirm and double check all measurements and calculations to make sure that there is correct
 alignment in relation to hinges, doors, and side panels, etc. by using blueprints or design plans for
 reference
- Install the suitable hardware, for instance, handles and hinges, and replenish with replacement materials, when needed
- See that materials and grains are appropriately matched to create a uniform appearance for all the matching units
- Reinforce attachments and joints to optimize durability and sturdiness without causing a compromise to either functionality or aesthetic appeal
- Keep up a safe working environment by routinely cleaning and disposing of old materials, for instance screws and nails

Job Skills and Personal Attributes Required

- Cabinet maker modular kitchen should have:
- Knowledge of wood, MDF, HDF, plyboard, laminates etc.
- Knowledge of different type of hardware and adhesives used in cabinet making
- $\bullet \quad \text{Flexibility in terms of adapting their style of work to different types of furniture design}\\$
- An inclination towards aesthetics
- Good mathematical skills
- Accuracy in measurement
- Good hand-eye coordination
- A physically fit physique

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Unit 1.2 Make Modular Kitchen

Unit Objectives



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

- 1. Demonstrate the preparatory activities for cabinet making
- 2. Create records of architectural features present in the room
- 3. Evaluate the requirements of the client from supervisor

Preparatory activities for cabinet making

Take Measurements for Making Layout and Designs

- 1. Ensure that the measurements are accurate. Tools you would need include a straight edge graph paper and tape measure.
- 2. Take measurements clockwise. Make records of the overall length of each wall, working to your right around the room. Get walls, doors and windows labeled with numbers.
- 3. Confirm the width and height. Carry out horizontal measurements of walls at 36-inch height. Make a record of the vertical measurements floor to windowsill, beginning from the windowsill right up to top of window, and then proceed from the top of the window to the ceiling, after that from floor to ceiling.
- 4. Figure out the center. Designate the centerline of all permanent features in all measurements including windows, doors, oven, cooking range, sinks, walls, closets, outlets and ducts.
- 5. Consider the trim. While taking measurements of the doors and windows, take the casing into consideration as part of the door or window.

Doors and windows

- Take measurements the size of windows and doors, as well as the distance and height of each from the floor, ceiling, and edges.
- In case you intend on placing a cabinet under the window, bear in mind that the minimum distance between the window frame and the floor needs to be 90 cm, and preferably 105 cm.

Walls and floors

- Take measurements from the floor to the ceiling.
- Take the distance between walls.
- Measure from the corners to the doors.
- You would also need to make a record of any features that protrude into the room, for instance, as ventilation, radiators, special angles, pipes and any other major architectural features.

Sockets, switches, water connections

- After this, record the location of existing electrical water, switches, sockets, and gas connections.
- Bear in mind that these can be shuffled around to suit your new kitchen.
- Record the estimated position of the area where you would prefer these new switches, connections and outlets to be positioned.

Take records of architectural features present in the room or planned to be installed in the room in near future

- Before the construction process starts, the cabinet maker needs to make a record of the already existing architectural features present in the room.
- Included among these features are items like pipes special angles, chimney, ventilation window, exhaust etc.

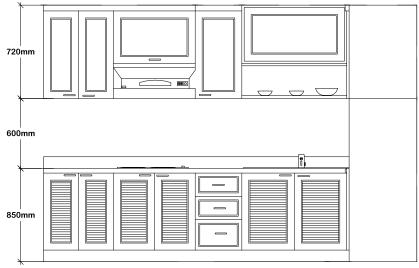


Fig. 1.2.1: Sketch diagram of elevation

- Create a sketch of the room and making note of all the architectural features present.
- You would need to maintain a log book to record the features present in the room.
- In the log book make a note of the following parameters:

| Log Book | | | | |
|-------------------------------|-----------------------------|--|--|--|
| Features | Parameters | | | |
| Elevation of the room | 21' 6" breadth x 23' height | | | |
| Height and breadth of window | 24' | | | |
| Height and breadth of door | 6' height x 2' breadth | | | |
| Position of the chimney | Above the island | | | |
| Elevation and number of sinks | 36' elevation, 2 sinks | | | |

Table. 1.2.1: Log Book

Understand the requirements of the client from supervisor

A cabinet maker 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
- Understanding the brief from the customer thoroughly in order to accommodate the specifications of the client regarding the aesthetic aspects of the cabinets being constructed.
- Discussing the projects at hand with the client/supervisor and drawing up detailed specifications as per their requests.
- Visualizing and interpreting the clients' wishes when it comes to style, color, kind of raw material requested etc., giving advice and making recommendations or providing options which meet/improve their original design.
- 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 modular kitchen cabinet maker 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

Assist in deciding the design shape of kitchen and size of kitchen cabinets with consultation of supervisor and or client

Above design or style desired by the client, it is essential to define a module so as to optimize performance and minimize the manufacturing costs of the different pieces. This way, measurements of all the components of a kitchen are set before defining the space that will house them.

Workspaces and Flow

- Several studies served to define five general areas in a kitchen:
- Storage area: utensils, appliances, cookware
- Cooking area: oven and stove
- Pantry area: canned goods, refrigerator, food storage space
- Sink area: cleaning area, cleaning supplies area
- Preparation area: preferably a sizeable counter space to carry out cooking prep

A kitchen's overall layout is the shape that is created by the positioning of the major appliances storage areas and countertop. This is what forms the floor plan and creates the kitchen's work triangle (the shape of figure that one follows while moving around the kitchen from the sink, to the refrigerator, to the oven/cooking range to prepare a meal).

Five different layouts are recognized in contemporary kitchens—the L, G, U, galley and single. Despite the fact that particular floor plans create a more efficient, spacious kitchen.

L-Shaped Kitchen



Fig. 1.2.2: L-shaped Kitchen

- L-shaped kitchens are the type of design that very popular among clients.
- This design is characterized by two counters joined together which then create a right angle in a corner of the kitchen.
- L-shaped layouts have the benefit of providing great traffic or work flow through the kitchen.
- This enables multiple people to work together while still allowing the space for others to walk through the kitchen without hampering any work.
- An L-shaped layout has two walls along which you can install cabinets and shelves both above and below the countertop, without requiring any additional floor space.
- In an L-shaped kitchen the third side can be used to accommodate wall niches for the gadgets like refrigerator, oven, microwave etc. and built-in cabinets.
- Preferably you would need to exploit corner storage space in an L-shaped layout.
- A carousel cabinet can also be installed which can hold several of items.

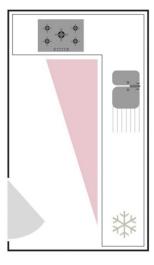


Fig. 1.2.3: Layout Plan of L-shaped Kitchen



Fig. 1.2.4: U-Shaped Kitchen

Often referred to as 'horseshoe' designs, U-shaped layouts are characterized by three walls or sections of countertop that create a semi-circle, or 'U' layout. These designs work best in big kitchen spaces that can have enough room to accommodate three countertop sections. This layout is another design that works well with a kitchen island to allow for more storage and prep space.

These layouts comprise of workspace on three adjoining walls of cabinetry. It has one open end for access. When working with kitchens that have U-shaped layouts you get the chance for symmetry within a design

The lengths of the cabinetry on a U-shaped layout can vary or be roughly the same. Both these instances allow for flexibility within the design.

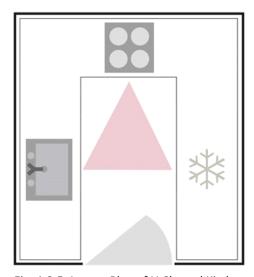


Fig. 1.2.5: Layout Plan of U-Shaped Kitchen

Straight Line Kitchen



Fig. 1.2.6: Straight Line Kitchen

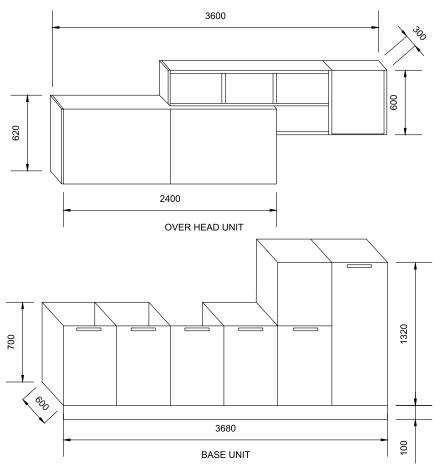


Fig. 1.2.7: Layout Plan of Straight Line Kitchen

- Kitchens in which all appliances, cabinets, and countertops are positioned along one wall is known as a straight line kitchen or a one-wall layout.
- This design allows for unhampered traffic flow.
- The work flow or triangle in this kitchen layout is not so much a triangle but rather a walk, with all the three main areas running along one side of the wall.
- Since there are no obstructions within the kitchen space, it allows for maximum openness.
- Among the various designs this is one of the easiest kitchens to design, plan, and execute.
- The entire kitchen is sectioned into three compositions which involve base cabinet, wall cabinet, and open shelves, installed in a convenient manner.

Kitchen with an Island



Fig. 1.2.8: Kitchen with an Island

Perhaps the most popular kitchen element in these years is an island that is positioned in the center of a room, with worktops on the surrounding walls. The setup gives it the appearance of an isolated island. With enough space, the element of the 'island' unit delivers a versatile space that gives homeowners the chance to easily cook, prep, eat and entertain within that space. It has the ability of acting as a 'bridge', cutting down on leg work between workstations.

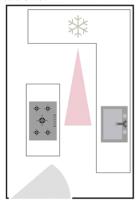


Fig. 1.2.9: Layout Plan of an Island Kitchen

Discuss with supervisor and or of client regarding placement cabinet systems, division of work zones (cooking, washing, storage etc), shifting of existing electrical outlets, switches, and water and gas connections if necessary



Fig. 1.2.10: Layout Plan of Kitchen Work zones

While making decisions regarding where to place appliances and cabinets in relation to each other, it can prove useful to think in terms of work zones. With this in mind you will focus on function rather than objects to fit in. The consequence would be an everyday-friendly and efficient kitchen.

The three main zones are, in relevance to the working triangle, are: **storage** (fridge/freezer and dry storage), **washing** (sink, dishwasher) and **cooking** (cooking hob, oven, chimney, microwave). Placing them well is crucial to achieving an ergonomic work triangle, with a natural workflow and everything within reach.

The following are basic tips to bear in mind when planning your work zones:

Cooking zone:

Steer clear of crossing the kitchen with hot and heavy pans and pots. Consider positioning the oven and hob in proximity to the worktops and sink.

Washing zone:

The sink can be considered as a vital area in the kitchen. Arrange to have the fridge near at hand which would allow for easy food prep. The proximity to the hob would make it simpler to do tasks like draining pasta and washing vegetables etc.

Storage zone:

In terms of storing items, there should be enough storage for all the food - both in the fridge and for dry goods. Positioning a worktop next to the fridge and high cabinets allows you to unpack shopping bags easily.

Placement cabinet systems

As regards cabinet sizing, a host of factors come into play, as you would need to design the kitchen efficiently in terms of the space.

Base Cabinet Sizes

This type of cabinetry serves as the foundation or base for countertops and other surfaces. It is positioned at floor level and often comes with one drawer and a series of shelves or a set of drawers stacked one on top of the other, as per the needs and preferences of the client. As base cabinets are installed on at floor level, they tend to carry a lot of weight, with sinks and counters installed on top of them.

The measurement of standard base cabinets is 34.5" H and 36" H from the floor to the top of the countertop when a countertop is installed.

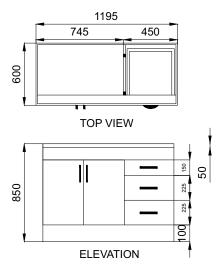


Fig.1.2.11: Base kitchen cabinet dimensions

Wall Cabinet Sizes

Wall cabinets have a design that allows it to function as both storage of kitchen supplies and food items. In comparison to base cabinets, wall cabinets give a lot more variety in sizing. Picking the optimal height for the wall cabinets is contingent on the height of the kitchen ceiling and client preferences.

Generally, wall cabinets are available in 30", 36" and 42" in height. Most commonly tall pantries are 24" deep, but 12" deep alternatives are also available for smaller spaces.

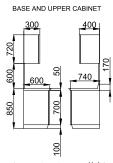


Fig. 1.2.12: Wall kitchen cabinet dimensions

Tall Cabinet Sizes

Tall cabinets mostly comprise of pantry cabinets with a variety of oven cabinets and storage options. Tall cabinets are typically 84" H, 90" H, and 96" H.

Previously existing appliances for instance dishwashers, refrigerators etc. can simply be moved while deciding out the positions of new cabinetry in the kitchen by means of relocating the electrical outlets and switches.

Frequently a new kitchen layout takes into account shifting the sink and other water connections to a new location. To achieve this you would need to move the plumbing system, including the sink vent along with these fixtures and appliances.

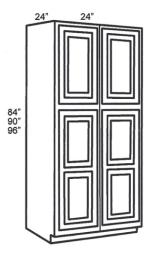


Fig. 1.2.13: Tall Cabinet Sizes

| Notes 🗐 —— | | |
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Unit 1.3 Understand Kitchen Layout

Unit Objectives



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

- 1. Identify different kitchen layouts
- 2. Analyze and study the drawing (2d/3d) and designs
- 3. Arrange materials and fittings hardware

Study the design & drawing (2D/3D) prepared by supervisor to further understand the requirement and specifications for the work to be done

The job of a Cabinet Maker is practically impossible without the skills of reading, studying and interpreting work orders, technical drawings and blueprints.

Ability to Interpret Work Specifications Accurately

- 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
 - o Forms and Annexures
 - o Date and time to execute the work order
 - o Information about the location and entities to execute the work order
 - o The person to whom the work order is assigned
- Job Orders are the work orders circulated internally within the organization.
- 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:
 - $\circ \quad \text{Quantity of the product to be manufactured, assembled, installed or repaired}$
 - Quantity of the raw material to be used, along with its Price per unit and the number of units required
 - o 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

Study the drawing (2D/3D) and designs and understand the requirement Blueprint and its Parts

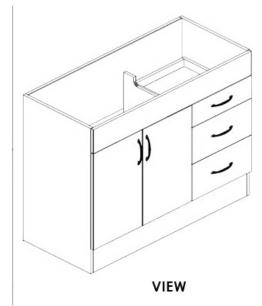


Fig. 1.3.1: Blueprint design of a cabinet

- The requisite for reading a Blueprint is interpreting 1st and 3rd angle drawings.
- A Blueprint is a 2D (two dimensional) miniature / replica of the actual work piece, prepared by scaling down the actual measuremee with the product to be developed.
- It comprises the required technical specifications as well as the techniques of preparation.
- The essential parts of a Blueprint are:

Elevation View

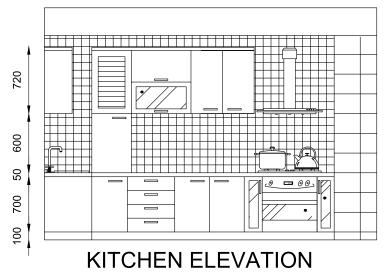


Fig. 1.3.2: Elevation sketch of kitchen

- Vertical display of one side of the project, from north, south, east or west
- Gives an idea about how the complete structure will look after installation
- Helps in determining the height dimensions

Plan View

- Horizontal display of the proposed job looking down from above
- This view is usually on a horizontal plane 30 inches (75 centimeters) above the floor
- · Helps in determining the length and width dimensions

Section View

· 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.
- 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.
- o 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

This indicates the context in which the drawing must be perceived. The Title block provides information about the following:

- General tolerances
- o Projection details for the item. component to be manufactured
- Scale used in the drawing
- o Status of the drawing (Preliminary, Approved, etc.)
- o 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.
- 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

- 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.
- o 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

- View the drawing itself, regardless of the dimensions, trying to visualise how and what the assembly looks like in 3D.
- 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.
- 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.

Assist in listing out required raw material, furniture, hardware to meet quality standards Raw materials required for modular kitchen cabinets

Some of the raw materials involved in constructing modular kitchen cabinets are listed below:

Solid Wood:

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

- Timbre is the raw materials that are seasoned to produce workable wood.
- Timbre 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.

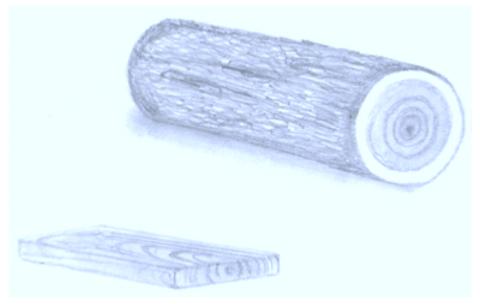


Fig. 1.3.3: Log and Beam

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 –

- a) Plywood
- b) High Density Fibre (HDF)
- c) Medium Density Fibre (MDF)
- d) Veneer
- e) Laminates
- f) Block-board



Fig. 1.3.4: 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.



Fig. 1.3.5: 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)

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)

- 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. 1.3.6: MDF Sample

Advantages of using MDF:

- · It is stronger than particle board
- · It is less expensive than plywood and remains undamaged due to change in weather
- MDF does not 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

- Veneer is the thin slice of wood (typically lesser than 3mm) 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. 1.3.7: Sample Veneer

Laminates

Laminated wood is typically used to prepare flooring tiles. Generally, photographs or designs are glued on the thin slice of wood to produce laminates.



Fig. 1.3.8: Decorative laminates

Decorative laminates are usually used for furniture surfaces and wall panelling. This includes cabinets, tables, showcases and etc. The laminates are easy to maintain nut exposure to water may cause warping or balooning. 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

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 –

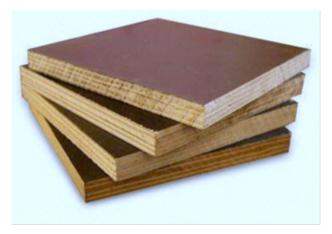


Fig. 1.3.9: Block board

Chipboard

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. 1.3.10: Samples of particle board (chipboard)

Boiling Waterproof Plywood

BWD 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. 1.3.11: 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 lesser 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. 1.3.12: 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.

Organize materials and fittings hardware required for manufacturing/assembling in a sequence as per requirement

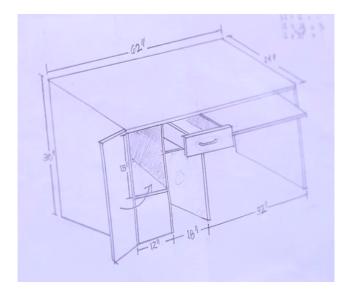


Fig. 1.3.13: Blueprint sketch of a cabinet

- · Start by keeping the MDF, plywood or any similar material ready for the side panels of the cabinet
- Cut and keep the base panel, top bracers and face panels ready.
- Next you will need adhesive/glue for the top braces
- Then keep nails of the appropriate size ready to make the back panel
- After that you will need corner brackets and screws to reinforce the connections
- With regard to cabinet drawers keep ball-bearing slides, affordable roller-bearing slides, hidden undermount slides, or even classic wooden slides
- A rail the piece of the cabinet's frame structure located at the top and bottom of the door.



Fig. 1.3.14: Stile

• Stile is the piece of the cabinet's frame structure located on the left and right of the door.

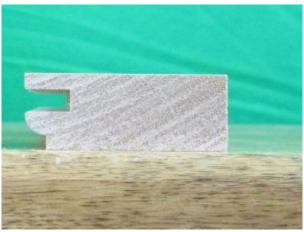


Fig. 1.3.15. Hinge

• Always use cabinet door hinges of a superior quality as they go through rigorous wear.

Support in quality check of materials (MDF, HDF, Plywood, laminates, solid wood, adhesives etc.) before initiating work

The required components of the cabinets, irrespective of type, should be checked for any damages like chips, loose threads and dents to make sure that all of the materials that will be utilized are of high quality that stands up to international standards. In case there are any items do not pass this inspection process, those particular raw materials must be labeled as "DEFECTIVE" and should be discarded appropriately.

Dividers – When constructing cabinets dividers can be made either of prefabricated wood or other base materials. See to it that every divider used is free from any defects of pre-production anomalies to prevent using defective products.

Prefabricated Glass – Glass-based cabinets rely on glass to give them the overall style of each cabinet piece. Prefabricated glass involved in these items need to be meticulously inspected for any blisters, cracks, damages and other known production anomalies at the time of the molding process.

Sliders – Sliders on closet drawers or cabinet drawers in general rely on the slider and its components. Every slider's assembly should be inspected systematically to guarantee that all of the required elements are complete and are in working condition.

Prefabricated Steel – Raw materials required for steel cabinets must consist of damage and dent-free steel panels. Fire-proof steel panels must be examined in regards to any early signs of corrosion to make sure that all of the steel elements are ready for assembly.

Door Hardware – Hinges, fasteners and other hardware that are required for cabinet doors must be carefully examined for any pre-production anomalies to ensure that all of the kitchen hardware is free from any defects.

Wood – When it comes to wood, the pieces have to be minutely examined for any holes, splinters, dents and any other known pre-production anomalies that could have occurred during the process. In the wooden cabinet manufacturing business there is a zero-tolerance policy for using defected wood because of the multitude of risks it could carry.

Support in quality check of materials (MDF, HDF, Plywood, laminates, solid wood, adhesives etc.) before initiating work

Visual Inspection

All ready cabinets must undergo an in-depth visual inspection to gauge whether the cabinets on queue show early signs of cracks, damage, wear, bubbles, blisters or even minor flaws not noticeable during stage of the assembly inspection. Every cabinet must be identified according to its specifications and product code to ensure efficient segregation and distribution.

Surface Inspection

Irrespective of the type of cabinet, each cabinet on queue will be completely examined with regard to the surface quality and coat (if applicable). Almost all cabinets tend to have a smooth surface both externally and internally to avoid splinters (wood variety) and water damage. In case there is any cabinet that does not pass the coating analysis, correct re-coating must be achieved to save time on the production queue.

Weight and Measurement Inspection

The aim of this inspection process is to precisely weigh and measure the various types of cabinets that come under a specific category. By this we can ensure that all of the cabinets are accurate and identical as per the given product specifications. Despite the fact that not all of the cabinets will weigh the same, it is strictly compulsory that manufacturers convey the maximum gross weight of every cabinet for documentation purposes. If there are items that go beyond the weight limit these particular items will be labeled as "DEFECTIVE" and will then be withdrawn.

Support in assessment for minor repairs or changes required in materials w.r.t roughness, size, alignment, hardware etc.

Machines used in woodworking are dangerous, particularly when used improperly or without proper safeguards. Workers operating woodworking equipment suffer the following common injuries: laceration, amputation, severed fingers, and blindness.

- Chemicals used in finishing stage and wood dust are health hazards, and people in the woodworking industry are prone to suffer from respiratory and skin diseases.
- PPE is vital to your personal well being.
- In case you fail to adhere to personal protective measures you could sustain an acute and/or chronic injury that might, in later years, have the potential to negatively affect your earnings and quality of life.
- Thus, it is compulsory that the PPE recommendation is followed in regard to all machine operations and where any safety sign is indicated.
- Before entering a machine shop or performing any activity recognized as requiring PPE, the worker must be wearing the appropriate personal protective equipment; which could include:

Eye Protection



Fig. 1.3.16: Eye Protection

Woodworkers are required to wear safety glasses, goggles or face shields at all times in areas where small flying fragments or dust can be encountered.

Hearing Protection



Fig. 1.3.17. Hearing Protection

Due to the high level of sound pollution in furniture making environments, hearing protection must be worn at all times.

Protective Footwear



Fig. 1.3.18. Protective Footwear

In woodworking environments appropriate footwear must be worn at all times. Closed shoes with leather uppers or safety boots are appropriate.

Protective Clothing



Fig. 1.3.19. Protective Clothing

While you are working in the machine, it is important to remember that shop you should not wear loose clothing or jewelry.

Hairnet



Fig. 1.3.20. Hairnet

It is important to remember to wear a hairnet because while you are working in the machine shop, your hair may become entangled in the moving parts of some machines.

Gloves



Fig. 1.3.21. Gloves

Gloves act as a practical safety equipment item which could be utilized for handling sheet material such as melamine board, or for handling or stacking rough sawn timber.

Respiratory Protection



Fig. 1.3.22: Respiratory Protection

As a wood worker you should be sure to wear appropriate respiratory protection when you are performing work that creates debris and dust.

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Unit 1.4 Making of Furniture and Assembling of Parts

Unit Objectives



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

- 1. Practice making of furniture and assembling of parts
- 2. Recall the measurement of length, width & depth in mks & fps system
- 3. Demonstrate knowledge of different work zones in kitchen
- 4. Apply the technique of joining the materials with screws, staples, or adhesives
- 5. Explain the technique of touch up of furniture
- 6. Practice smoothening of outer surface of furniture

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:
 - Length and Breadth (includes radius and diameter of circles)
 - Height, Depth and Thickness
 - o Area
 - o Volume
 - o Weight
 - o Density
 - 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:
- Requirements and Specifications of the Project

- Site location
- · Availability of resources, like time, manpower, funds and equipment
- 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.

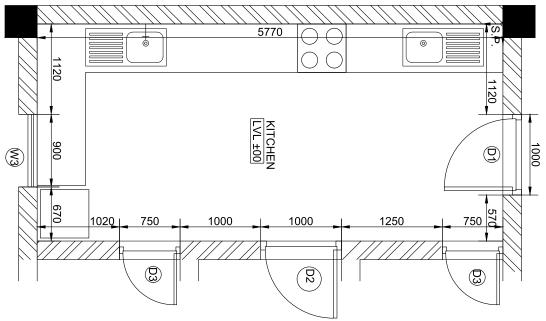


Fig. 1.4.1: Sample drawing for unit measurement

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.

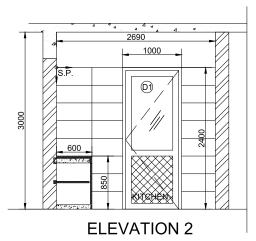


Fig. 1.4.2: A sample drawing for site measurement with readings

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

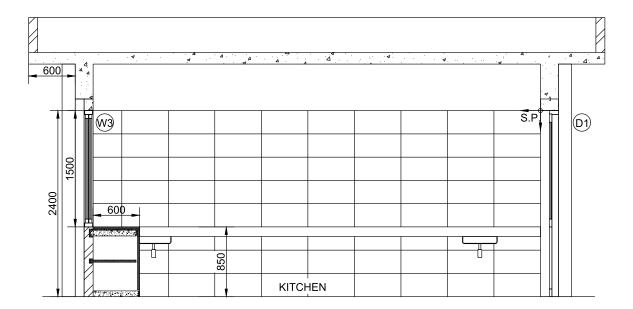
Step 7: Using appropriate dimension lines to indicate the overall dimensions of the site as well of individual units and fixtures

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



ELEVATION-1

Fig. 1.4.3: A sample of site measurement sketch

B. Methods adopted while measuring a site:

The following are the methods used to measure a site:

Rise and Run Method:

- o Let us take an example of measuring an erect door to explain this method.
- Measure down to the door, keeping yourself perpendicular (at right angles) with the adjacent wall.
- o Then, measure across the door.
- o Use a measuring tape for this purpose and align the tape end up to one side of the room.
- o Next, hold the tape at right angles to this line, to get the distance to the door.

• This method is extremely convenient since 2D dimensions are easy to translate while preparing the rough sketch.

• Triangulation Method:

- o This method requires 2 fixed points, say, the corners of a room.
- o Say, you need to measure the dimensions of a door.
- o Measure the same from the 1st and the 2nd corners, respectively.
- o Translate the measurements back to the rough outline by using imaginary circles.
- o The radius of the circles is the dimensions of the door.
- o The point of intersection of both circles determines the precise location of the door.
- o This method works very well for angles sites.

Measurement of Length, Width & Depth in MKS & FPS System and its application and undertake measuring 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 |
| 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 |

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 | |

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

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.

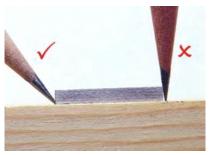


Fig. 1.4.6: Correct positioning of pencil for marking

- 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).





Fig. 1.4.7: Align the measuring scale

Fig. 1.4.8: Mark the wood



Fig. 1.4.9: Use measuring tape correctly

Steps of Measurement:

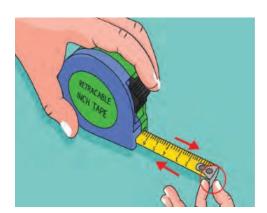


Fig. 1.4.10: Measuring Tape

Hold the tape with one hand and pull out the ribbon with the other hand

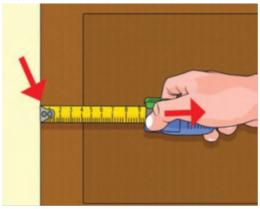


Fig. 1.4.11: Positioning the tape on the work-piece correctly

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

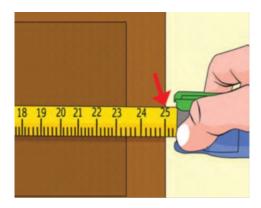


Fig. 1.4.12: Positioning the tape on the work-piece correctly

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

Knowledge of cabinet making process and ability to work with different types of materials

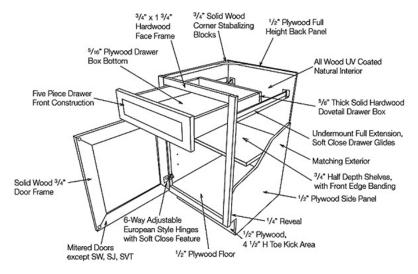


Fig. 1.4.13: Cabinet Composition

Cabinet's Components and Cabinet Doors

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

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



Fig. 1.4.14: 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 cabinet maker has to assemble in a cabinet.

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

- Back
- Sides
- Front
- Handle
- Lock



Fig. 1.4.15: 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:

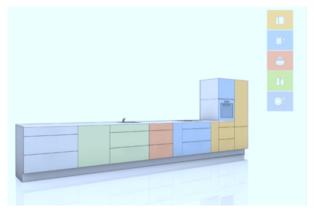


Fig. 1.4.16: Straight Kitchen Layout

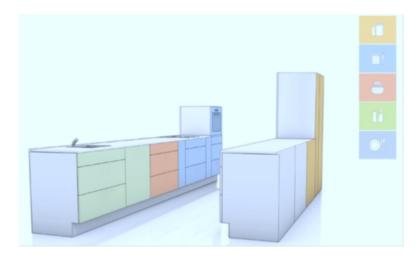


Fig. 1.4.17: Gallery kitchen layout



Fig. 1.4.18: L Shape kitchen layout

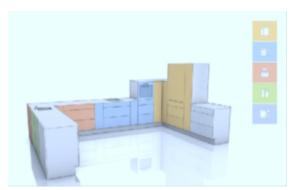


Fig. 1.4.19: U Shape Kitchen Layout

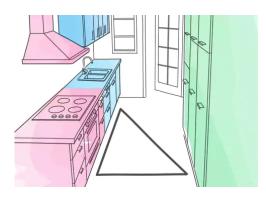


Fig. 1.4.20: Kitchen Work Triangle

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. 1.4.21: Marking

- 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

Few Important Tips:

- Get brochures from cabinet company
- It will tell you what standard sizes are available (this usually means 12" wide at a minimum, with larger cabinets at 3" 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



Fig. 1.4.22: Sample Cabinet (Measurement)

- Draw a layout of your cabinet plans
- It does not 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

Few Important Tips:

- 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)

Specified Joinery Techniques and Required Adhesives /Screws

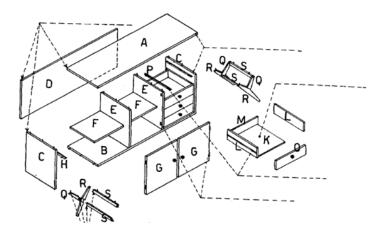


Fig. 1.4.23: Cabinet Parts

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.

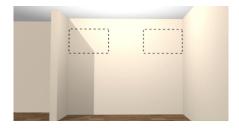


Fig. 1.4.24: Site measurement for upper cabinet

- 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. 1.4.25: Gathering necessary tools and equipment

- 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

Few Important Tips:

- 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:
 - Measuring Tool
 - Marking Tool
 - Drilling Machine
 - Chisel
 - Saw
 - o Rasp/File

- o Nails
- o Hammer
- Screw Driver
- o Hinges
- Handles
- o Lock
- o Knobs
- o Floor Guard
- o Shimmer



Fig. 1.4.26: Gathering the parts



Fig. 1.4.27: Preparing the parts for assembling



Fig. 1.4.28: Making the cabinet structure



Fig. 1.4.29: Preparing the cabinet structure



Fig. 1.4.30: Add partition to the structure



Fig. 1.4.31: Add shelves on both sides of the partition



Fig. 1.4.32: 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

Step 6 Fasten Boxes/Pieces of Furniture to the Surface/Wall Taking Utmost Care of Alignment and Obstructions



Fig. 1.4.33: Mark the space for installing upper cabinet



Fig. 1.4.35: Drill pilot holes and fix the cabinet



Fig. 1.4.36: Plane the surfaces using a shimmer



Fig. 1.4.37: 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



Fig. 1.4.38: Install lower cabinet



Fig. 1.4.39: Drill for power outlets



Fig. 1.4.40: 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

Few Important Tips:

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

Step 8



Fig. 1.4.41: Shimming the surfaces



Fig. 1.4.42: Fixing the lower cabinet to the wahll

- 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

Few Important Tips:

- 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



Fig. 1.4.43: Kitchen cabinet set-up



Fig. 1.4.44: Attach counter top



Fig. 1.4.45: 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

Few Important Tips:

- 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



Fig. 1.4.46: Lower cabinets with counter top



Fig. 1.4.47: Sealing counter top



Fig. 1.4.48: Applying 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

Step 11 Create Markings and Install Fittings like Handles, Latch, Locks



Fig. 1.4.49: Install door



Fig. 1.4.50: 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



Fig. 1.4.51: Kitchen cabinets with door

Few Important Tips:

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



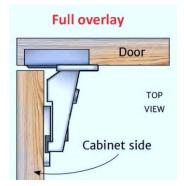
Fig. 1.4.52: Installing drawers

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

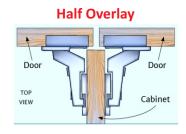


Fig. 1.4.53: Installing doors











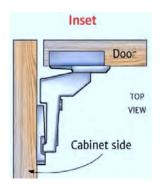


Fig. 1.4.54: Installation of hinge to attach door

- · 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



Fig. 1.4.55: Install hardware so that the doors hang properly



Fig. 1.4.56: 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

Different Types of Wood

Particle board

This type of board is made when wood chips are compressed with glue. In terms of flat-pressed particle board, the chips primarily lie parallel to the surface. Chips in the surface layer are thinner than those found in the middle layer, which makes the surface of the particle board compact and denser than the middle.

- In a particle board the amount of glue used is 10%.
- Particle boards are homogeneous possess the same degree of strength in various directions.
- Particle boards have no grain direction
- The dynamics of the particle board in the direction of the plane surface is minor.
- These boards can be coated with several different surface materials, for example melamine, laminate, veneer, paper, plastic etc.
- So as to prevent warping the boards are usually coated on both sides.

The following information should be given when ordering particle boards:

- Thickness as a nominal thickness (mm)
- Board size (mm x mm)
- Board type (e.g. P6) and surface quality according to application
- For coated particle boards either the product name or the quality of the covering of both surfaces, the methods of protecting the edges (or edge battening) and color.

Plywood

Plywood can be described as cluster of wood veneers bonded together to create a flat sheet.

Four types of plywood products include:

- Exterior
- o Structural
- Marine
- Interior

This type of wood offers all the intrinsic advantages of the original (parent) wood in addition to heightened properties in its laminated structure.

It has the capacity to accommodate the occasional short-term overload; up to twice the design load.

Cross laminated construction of plywood makes sure that wood sheets stay fairly stable no matter the changes of temperature and moisture.

Thanks to its cross laminated structure the panel shear of plywood is almost double that of solid timber.

Plywood does not have corroding properties due to its high chemical resistance.

The following information should be given when ordering plywood boards:

- Use
- Thickness as a nominal thickness (mm)
- Size of the board with the measurement of the surface veneer in the direction of the grain always mentioned first (mm x mm)
- Type of plywood
- Qualities of both surfaces, the visible surface always mentioned first

MDF

Medium Density Fibreboard (MDF) can be described as a reconstituted wood panel product. It is dry-processed fibreboard manufactured from wood fibres, as opposed to veneers or particles, and is denser than plywood and particleboard. MDF has an even density throughout and is smooth on both sides. It is reconstituted into wood sheets of a variety of lengths and widths. Bonding is attained by adding synthetic resin adhesives that have been cured under pressure and heat. Paraffin wax is an element that is added to it, which essentially assists with water repellency. MDF is developed through the use of ureaformaldehyde.

HDF

It is a wood-based product similar to MDF but exceeding its density. High Density Fibreboard has an extremely high dimensional stability, high strength characteristics.

HDF is made for usage where integrity, physical property and surface finish is vital. The average density of more than 820 kg/m3 (51 lb/ft3) ensures high core strength and face density. HDF can act as a substitute to veneer cross bands in hardwood veneered plywoods by providing a superior smooth surface to reduce potential surface defects.

Laminates

Laminate is an substitute option to hardwood cabinet systems. In laminates, the wood core is created using either granulized wood or chips which are often recycled. They are bonding with resin under high pressure. Wood laminate is a thin sheet of material employed to cover the core of a wood project with an effort to change the appearance of the material. Laminates could be of a wide range of materials, but frequently they are made veneers (thin sheets of wood).

Adhesive

In relation to the particular wood being glued together, cabinet makers need to find the right adhesive to achieve appropriate results

Here are five main types of wood glue used in woodworking:

- PVA (Poly-vinyl acetate)
- Ероху
- CA (Cyanoacrylate)
- o Hide
- Polyurethane

Poly-vinyl acetate (PVA):

Wood glue is ideal for basic woodworking projects. It is non-toxic, low-priced and readily available; it has a modest tack and cleans up with water.

CA Glue:

Cyanoacrylate (CA) glue is ideal for small repairs tasks, especially when turning or carving. Bear in mind that this wood glue dries promptly and forms a stiff, plastic-like bond.

Epoxy:

Epoxy is available in two parts: a hardener and a resin. While both components come in the liquid state, when they are combined together a chemical reaction takes place that allows the epoxy to harden.

Polyurethane:

As this type of glue cures in the presence of water, you would need to wet the two mating surfaces before you begin applying the wood glue. It bonds well to wood and many other materials, including fabric, metal, plastic etc.

Hide Glue:

Hot hide glue is developed by heating granules of hide glue in a pot with water. As it heats, the glue liquefies, and as it cools, it becomes solid.

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.

Knowledge of various types of furniture accessories, hardware fittings, joineries etc

Accessories and fitting in carpentry includes various items like handles, locks, hinges, staples, knobs and so on. A cabinet maker should have detailed information about accessories and fittings. He should also know about the fittings and how to use them.

Hinges:

Hinges are a type of bearing that connects two solid objects allowing them to open till a defined angle. They are available in several shapes, sizes and materials. Hinges are most commonly made of steel, brass and copper. The doors are classified as left handed and right handed door according to the installation of the hinges in it. The left handed doors have hinges installed to the left hand corner while the right hand doors have them on its right side.

Different Types of Hinges

Butt Hinges: These are the most commonly used hinges. They are cheap and very durable. This kind of hinge is used for doors and casements. The application method of butt hinges is very simple. The butt hinge consists of two halves called leaves and flaps. Both the parts are held together with the help of a pin. When the doors are closed both the leaves fold together. The leaves are set into recesses in the door and post. Butt hinges are of various types: broad suit butt hinge, narrow suite hinge.



Fig. 1.4.57: Butt Hinge

Another kind of butt hinge is rising butt hinge. This hinge has a helical knuckle joint due to which the shutter is raised by 10 cm on opening. It helps the door to close automatically. Majority of times these hinges are used for doors or rooms that have carpets etc.

Strap Hinges: It is a heavy duty hinge. It is used as a substitute of garent or strap hinge. This is used for ledged and braced doors and heavy doors or gates like garages, stables, gates etc.

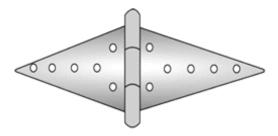


Fig. 1.4.58: Strap Hinge

Spring Hinges: Spring hinges are of two types; single acting and double acting spring hinges. Both the types of spring hinges are used in swinging doors. The single acting spring hinges are used in the doors that open in only one direction. The double acting hinges are used in the shutters or doors that open in both the directions. The door closes automatically due to the action of the spring.

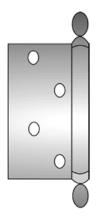


Fig. 1.4.59: Spring Hinge

H. Hinges: These are also called Parliament hinges. It is similar to the butt hinges. It also has two leaves each with a knuckle. The pin is set permanently into the knuckle of one leaf. The installation or application process of the H. Hinge is similar to the butt hinges.



Fig. 1.4.60: H Hinge

'T' Hinge: It is used for heavy and long doors, gates or battened doors. You can find the hinge in several sizes. This hinge contains a long mild steel strap which is fixed to the outside of the door and a cross bar which is hinged to the strap and altered with screw to the post of the door frame.

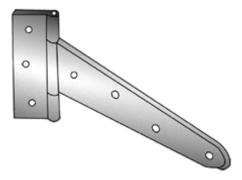


Fig. 1.4.61: 'T' Hinge

Band and Hook Hinge: It is similar to T hinge. It contains an iron strip called the band which drops on to a pin called hook. This is attached to the frame of door or window.

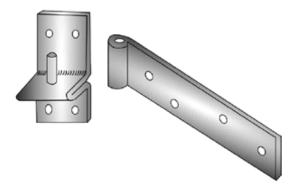


Fig. 1.4.62: Band and Hook Hinge

Pivot Hinge: It is used for windows. This hinge consist a simple plate with a pin. This pin fits into the hole in another plate.

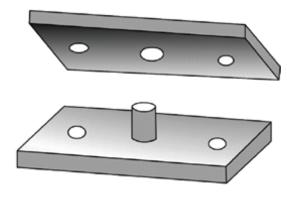


Fig. 1.4.63: Pivot Hinge

Cylinder Hinge: This hinge allows the door to open at 180 degrees. This hinge is suitable for bi-fold or concertina doors. The cylindrical hinges are invisible when the doors are closed. They are fitted into the holes drilled in the wood.

The application process or installation process of Hinges:

- Placed hinge at a distance equal to its own length from the top or bottom edge of the door. If the door is framed, it is aligned with the edge of the rail or door.
- Now, mark the position of the hinge and the depth of the recess with a try square and marking gauge.
- Make saw cuts across the waste.
- Cut along the back edge of the recess with a chisel and mallet before paring out the waste.
- Fit each hinge and insert screws.

Hasps and Staples:



Fig. 1.4.64: Hasps and Staple

The hasp and staple are used in a combination with a pad lock. They are fixed in doors that are less used or opened. They take time to open. The hasp is screwed to the door of a casement and the staple is screwed to the frame. To make it more secure, these type should be attached with a bolt and nuts rather than screws.

Barrel Bolts

The barrel bolts contain a plate with a round bolt. The bolt engages in a staple. The plate is attached with screws to the inside of the door of window and the staple is attached to the frame. Barrel bolts are often used to lock casements.

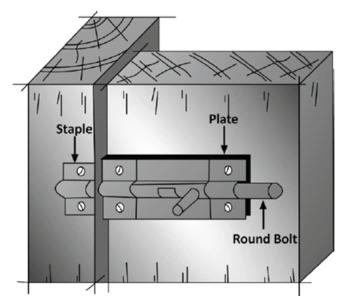


Fig. 1.4.65: Barrel Bolts

Tower Bolt

A tower bolt consists of a plate with a flat bolt fitted in the bolt engaged in a staple or in a striking plate in the frame. The plate and the bolt usually fixed on the door or casement.

The case and fastener is among the commonly used fittings.

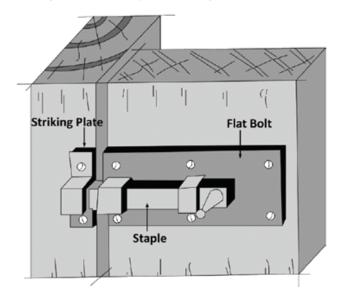


Fig. 1.4.66: Tower Bolt

Locks and Fittings:

There are several kinds of locks and fittings available in market. Locks are majority used for doors and casements. It is important to know the way the doors will open before actually ordering the locks and fittings.

Commonly used Locks and Fittings

Mortise locks

A mortise lock contains a stock, face plate, latch bolt and a handle. The handle fits into the bush and there is a lock bolt which is moved with a key. Two bolts fit in the striking plate which is attached by the screws of the door post. The mortise lock fits in to a mortise in the edge of the door. The stroke should fit tightly against the sides of the mortise so that the door itself faces the strain not the screw which only holds the lock in position. This type of lock can only be installed in door with enough thickness to receive a mortise. It is different to force open, since they are installed inside.

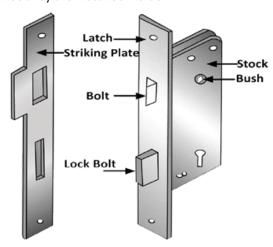


Fig. 1.4.67: Mortise locks

Application or installation of Mortise locks

The door furniture contains two leaf plates: two hands and a spindle. The spindle is fit in the one hand and secured in the other by a pin. Be careful to fix the handle inside the door. This makes the lock more secure as it cannot be loosened from the outside. The leaf plates are attached to both the sides of the door with screws.

Rim locks

Rim locks have a latch bolt operated by a handle and a lock bolt which is operated by a key. You can operate the lock from both inside and outside the door. The lock is attached with screws to inside face of the door and the boot shoot into a staple. There is a face plate which is attached with screws to the door edge. The outer side of the door has two round plates; one to hold the handle and other to cover the key hole. The handles have a square spindle which fits into the brush of the lock.

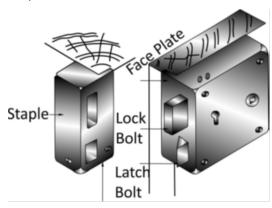


Fig. 1.4.68: Rim locks

Rim lock is available in one more type, 'Cylinder Rim Night Latch'. This lock consists of a latch, a locking cylinder and a staple. The face plate which is a part of the shell is attached to the spindle and fixed in the cylinder. The latch is operated from outer side by a key which rotates the spindle. The spindle moves the bolt mechanism inside the latch. The bolt may also be shot back from the staple by turning the knob of the latch inside. The locking arm is used to fix the bolt in place so that it cannot be operated from either side by key or the knob.

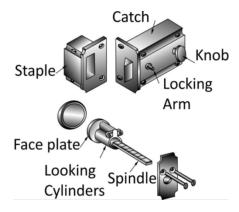


Fig. 1.4.69: Cylinder Rim Night Latch

Pad locks

Pad locks have a ring which locks into a body. The locking mechanism can be either a lever mechanism or a locking cylinder as in the case of mortise lock.

Handles and Knobs:

Knobs and handles allow easy access to doors, windows, casements and other furniture items. Designer knot and handles make the furniture piece more decorative and stylish. Handles are functional piece of hard ware. They are highly used to enhance the beauty of drawers and cabinets etc.

While selecting handles and knobs, it is important for you to take appropriate its size and shape. The style, size and shape of the handles and knobs should be in scale to your work piece and the interior of the place.

Knobs are generally of small size and mostly used for drawers or kitchen cabinets.

Given below are some commonly used knobs and handles with their application or installation procedure in brief:

Cabinet Handle

The classic handle for cabinet is suspended from two pivots one at each end. This kind of handle is available in variety of sizes and forms.

Drop Handle

A single handle with a tear drop shaped or decorative finger grip is suspended from the center of a drop handle. It is mostly fixed in the center of a small drawer.

Ring pull Handle

In construction this handle is similar to tear drop shaped handle. There is a ring that hangs from the top of a backing plate.

Door or drawer knob

It is a round shaped knob that is made of wood, metal or ceramic. This knob is mostly used for furniture ranging from wardrobes to collectors cabinets. The application method is a screw that is projecting from its back. The other method is by fixing an ordinary screw or a machine screw passed through the cabinet front from the knob.

Flush handle

A pivoted ring or D- Shaped handle lies flush with a thick solid- brass back support plate. This plate is recessed into the drawer front and fixed with countersunk wood screws.

Drawer Pull

It is one piece handle. They are originally used on military chests. They are counted as strong screw fixed handles for cup boards and chests of drawers.

D- Handle

They are handles made of wood, metal or plastic. They suit perfectly to all simple modern and stylish furniture. They are invariably made with threaded inserts for machine- screw attachment.

Sliding-Door Handle

These handles are generally circular or rectangular shaped. They have finely shaped finger grips which are made for gluing into over lapping sliding doors.

Types of Joineries

Wood joinery is one of the most basic concepts in woodworking. As a modular kitchen cabinet maker one cannot achieve much without using joints.

- The joints are used either to bring pieces together or to make a firm structure.
- The most basic joint involves two members butted together and connected with a fastener like a screw or adhesive.

Butt Joint:

The butt joint is the most basic of joints.

- In this joint two members are simply butted together.
- In most cases cabinet maker glues 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.

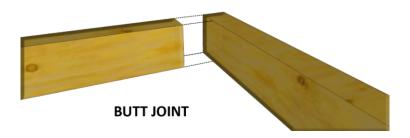


Fig. 1.4.70: Butt Joint

How to Make a Square-end Butt Joint



Fig. 1.4.71: Butt Joint

Follow these steps to make a square-ended butt joint.

- **Step 1.** Start by measuring out the lengths you want your board to be.
- Step 2. Use a marking knife to mark a straight line across the wood where you are going to cut it.
- **Step 3.** Use a bench stop to support your workpiece and saw off the waste.
- Step 4. Trim the end edges with a plane. This will give a smooth surface for gluing.
- **Step 5.** Similarly, cut the second wood piece to size. Make certain that the ends of the two boards are cut as square as possible.
- **Step 6.** Secure the first piece in the vice.
- **Step 7.** Apply some glue to the top of the secured wood piece.
- **Step 8.** Place your next piece of wood directly over your first piece.
- **Step 9.** Make sure the components are aligned properly. Use Try square to check the edges.
- Step 10. Now clamp the parts together.
- **Step 11.** You can even hammer in some nails or add some screws.
- **Step 12.** Leave it to dry.

How to Make a Mitre-end Butt Joint

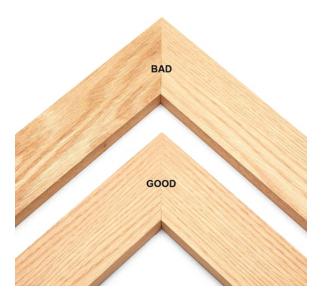


Fig. 1.4.72: Miter Joint

A common miter is set at a 45 degree angle.

Procedure to make a Mitre-end Butt Joint:

- **Step 1.** Mark the cutting lines with a knife and mitre square.
- **Step 2.** Make a 45-degree angle cut on each of the two boards to be joined. Square the adjacent side.
- **Step 3.** Cut off the waste with a tenon saw.
- Step 4. Trim the cut ends with a plane.
- **Step 5.** Apply glue to the joining parts.
- **Step 6.** Clamp the pieces together.
- **Step 7.** Leave the glue to set.
- **Step 8.** Reinforce the joint by driving in some nails at an angle.

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.

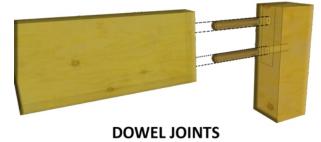


Fig. 1.4.73: Dowel Joint

How to Make a Dowel Joint

The dowel joint is used to make a variety of other wood joints. It uses dowels pins, which are glued into holes drilled in the mating surfaces of the wooden pieces.

You can either use ready- made dowels or cut your own to suit your purpose. Cutting dowels is really quite simple.

- **Step 1.** Take a piece of bamboo of the requisite size.
- **Step 2.** Steady the wood with a bench stop.
- **Step 3.** Use a fine-toothed saw to cut the dowels to length. Remember dowels are cut a little short of the drilled hole to give the glue space and to ensure a right 'fit'.
- **Step 4.** Use a chisel to chamfer the ends.

Once you've prepared your dowel pins, start drilling the holes.

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- Step 2. Mark the drilling points. Evenly space the position of the holes.

The number and spacing of these dowels and holes will depend on the width of the wooden pieces.

- **Step 3.** Position the brace or hand drill accurately on the point of drilling.
- **Step 4.** Drill a hole to the required depth. Remember, the hole must be slightly deeper than half the length of the dowel.
- **Step 5.** Similarly, drill matching holes in the other piece.
- **Step 6.** Apply a little glue on the joining faces and into each hole with a brush or stick.
- **Step 7.** Coat one end of the pre-cut dowels with glue and insert into the holes.
- Step 8. Tap them with a mallet.
- **Step 9.** Bring the two wooden pieces together.
- **Step 10.** Insert the other end of the dowels into the matching holes on the second piece.
- **Step 11.** Tap the pieces together with the mallet.
- **Step 12.** Put clamps across the dowels and tighten.
- **Step 13.** Wipe off the excess glue with a damp rag.
- **Step 14.** Let the glue dry.

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. 1.4.74: Half Lap Joint

How to Make a Cross Lap Joint

In a Cross lap joint each board is neatly interlocked with the other one. Let's understand the procedure to make a cross lap joint step by step:

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- Step 2. Use a try square and marking knife to mark the width of the lap on the wooden piece.
- **Step 3.** Set a marking gauge to half the thickness of the wood.
- **Step 4.** Scribe a line on the edges between the marked lines.
- **Step 5.** Support the board against the bench stop. Saw along the marked line to the depth of the gauged line.
- **Step 6.** Clamp the board and use a chisel to cut out the waste wood.
- **Step 7.** Ensure the cut out area is flat.
- **Step 8.** Similarly, cut the lap joint on the second piece of wood.
- **Step 9.** With lap joints cut from each piece of stock, you can put the two pieces together to form the cross half lap joint.
- **Step 10.** To strengthen this joint you can use some additional reinforcement like screws, bolts, or glue.

How to Make a "T" Lap Joint

A "T" Lap joint is a strong framing joint.

The procedure to make a "T" lap joint:

- **Step 1.** Cut out the cross member as described for cross lap joint.
- **Step 2.** Now, use the underside of the upright member. Measure and mark the width of the lap from the edge. This shoulder will indicate the length of the cut.
- **Step 3.** Use a marking gauge to mark the thickness of the cut.
- **Step 4.** Saw along the marked lines, cutting out the waste from the upright member.
- **Step 5.** Use a chisel and hammer to expel the waste.
- **Step 6.** Ensure the cuts are smooth.
- **Step 7.** Once both the wooden pieces are ready, create a tight interlocking joint by overlapping the wooden pieces.
- **Step 8.** You can either glue or screw the boards firmly in place.

How to Make a Corner Lap Joint

Procedure to construct a Corner Lap joint:

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- **Step 2.** Trace the lap on each piece of wood, just as you had for the cross-lap joint.
- **Step 3.** Saw along the cutting line.
- **Step 4.** Next, use a chisel and hammer to remove the remaining waste wood.
- **Step 5.** Scrape the surface smooth.
- **Step 6.** Once both the boards are cut in the similar manner, create a tight interlocking joint by overlapping the wooden pieces.
- **Step 7.** You can either use glue or screw the wooden pieces firmly in place.

You have successfully made a Corner-Lap joint.

Dovetail Joints:

The dovetail joint is used for fine woodworking.

- The dovetail joint 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.

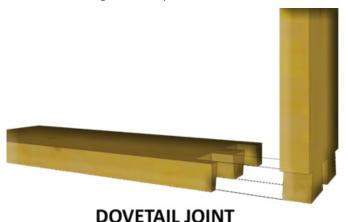


Fig. 1.4.75:Dovetail Joint

How to Make a Single Dovetail Joint

The procedure to make a Single Dovetail Joint:

Let's start by marking and cutting out the tail.

- Step 1. Use two wooden pieces cut and trimmed to size.
- Step 2. Adjust the marking gauge to the thickness of the pin member.
- Step 3. Using the marking gauge, scribe the shoulder line all the way round the tail member.
- Step 4. Clamp the tail member, scribed end up, in a bench vise.
- Step 5. Use a dovetail template to mark out the dovetail. You can even scribe the tail freehand, marking the taper at the required dovetail angle.
- Step 6. Remember to mark out the waste by shading it with a pencil. This will help you avoid cutting away the wrong part of the joint.

- **Step 7.** Use a tenon saw to cut along the cutting lines. While cutting, it is important to cut on the waste wood side of the line. It should be possible to see the marking out lines after the saw has been used.
- **Step 8.** Turn the wood sideways in a vice. Use a tenon saw to remove the waste material from the side.
- **Step 9.** Once again swap the wood, and remove the material from the other end.
- **Step 10.** If required, use a firmer chisel to finish the joint. Use a G Clamp to hold the wood firmly. Place a scrap wood underneath to protect the surface of the bench from the chisel.

The tail side of the joint is now complete.

Let's go on to mark and cut the pins now.

- **Step 11.** The pins that go between the tails should be an exact fit. Take the tail member and adjust the marking gauge to the thickness of the tail member.
- **Step 12.** Using the marking gauge, scribe the shoulder line all the way round the material. This will determine the exact depth of the pins.
- **Step 13.** Mark the waste to avoid confusion.
- **Step 14.** Clamp the tail member in the vice, putting the scribed side up.
- Step 15. Use the tail member as a template and mark out the size and position of the pin.
- Step 16. Use a tenon saw to cut straight down on the waste side of the cutting line.
- **Step 17.** Use a coping saw to cut out the socket between the pins.
- **Step 18.** A coping saw might not get to the exact depth, to this end use a chisel and hammer to finish the joint, if it is needed.
- **Step 19.** All you have to do is fit the tail in the pin socket. Use a mallet to assemble the parts together. The joint should fit together perfectly, if care has been taken when marking out and cutting the two sides.
- **Step 20.** This is the time to check for any cracks in the wood that might occur if the fit is too tight. If necessary, take the joint apart and use a chisel to correct it.
- Step 21. Now you can bond the joint together with glue. Use a try square to check if it is still square.
- **Step 22.** Use a brush to apply glue to the joining parts.
- **Step 23.** Clamp the parts together.
- Step 24. Remove the excess glue with a damp cloth.
- **Step 25.** Leave the glue to dry.
- **Step 26.** Some nails can be added in the dovetail pin to keep the joint closed and square while it dries.

How to Make a Through Dovetail Joint

The steps to make a Through Dovetail Joints:

Let's first start by marking and cutting out the tails, just as we had for a single dovetail joint.

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- **Step 2.** Set the marking gauge to the thickness of the wood.

- **Step 3.** Using the marking gauge, mark the shoulder line for the tails all around the end of the tail member.
- **Step 4.** Clamp the tail member, scribed end up, in a bench vise.
- **Step 5.** Use a dovetail template to mark out the dovetails. The size and number can vary according to the width of the boards being joined.

If you are scribing them freehand, ensure you keep the tails of the same size and equally spaced.

- **Step 6.** Scribe the line first with a sharp blade, and then darken with a pencil if desired. It should look like this when you're done.
- Step 7. Mark the waste to avoid confusion.
- **Step 8.** Use a tenon saw to cut along the waste side of the cutting lines.
- **Step 9.** Reset the work piece and trim the wood from both sides.
- **Step 10.** Once the dovetails have been cut out you can use a chisel to clean up the joints or remove some excess wood.

The tail member is ready. Now the procedure to make the pins:

- **Step 1.** Set the marking gauge to the thickness of the tail member.
- **Step 2.** Scribe a shoulder line around all faces and sides of the pin member.
- **Step 3.** Secure the pin member in a vice and then line up your tail member on top.
- **Step 4.** Use the dovetails as a template and mark lines on the pin member.
- Step 5. Mark out the waste.
- **Step 6.** Cut out the pins. Use a tenon saw to cut the straight lines and a cooping saw to cut along the bottom edge.
- **Step 7.** Once again use a chisel and hammer to remove any excess wood from the joint to ensure a perfect fit.
- **Step 8.** Use a mallet to assemble the parts together. If the joint was marked out accurately you will have a perfect fit.
- **Step 9.** Make sure the joint is flush and square before applying the glue.
- **Step 10.** Apply glue to the joining parts and fix the tails in the pin sockets.
- **Step 11.** You can even use a nail on each pin can be inserted to help keep the dovetail joint strong and square until the glue dries.

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.

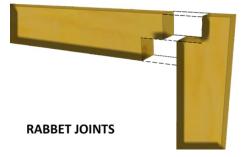


Fig. 1.4.76: Rabbet Joint

How to make a rabbet joint

In a Rabbet joint, a rectangular recess is cut along the edge of a workpiece. The edge of another wooden piece is then set in a rabbet cut. Generally the width of the rabbet should be equal to the thickness of the butting member and the depth should be about one half to two thirds the thickness.

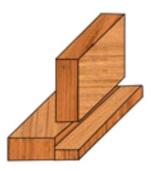




Fig. 1.4.77: Rabbet Joint

The procedure to make a Rabbet joint:

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- Step 2. Set the marking gauge approximately to one third the thickness of the rabbeted member.
- **Step 3.** Scribe a line on the side and bottom edges.
- **Step 4.** Reset the marking gauge to the thickness of the butting member.
- **Step 5.** Run the marking gauge against the end of the rabbet member to scribe a shoulder line on the back face and edges.
- **Step 6.** Set the wooden piece in the vise.
- **Step 7.** Support the board against the bench stop. Saw along the marked line to the depth of the gauged line.
- **Step 8.** Trim the rabbet with a plane.
- **Step 9.** Use a brush to apply glue to the joining parts.
- Step 10. Clamp the parts together.
- **Step 11.** Remove the excess glue with a damp cloth.
- **Step 12.** Leave the glue to dry.

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.

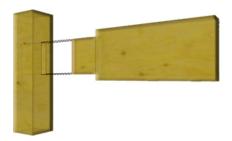


Fig. 1.4.78: Mortise and Tenon Joint

Types of Mortise and Tenon Joint

Mortise and tenon joints are made in various types. Some commonly used types are as follows: **Common or Through Mortise and Tenon Joints-** They are simple mortise and tenon joints. In this variation the mortise passes entirely through a piece.

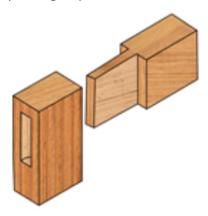


Fig. 1.4.79: Through Mortise and Tenon Joints



Fig. 1.4.80: Assembled Through Mortise and Tenon Joints

Stub Mortise and Tenon - The stub or stopped mortise and tenon joint are made with a blind mortise. The recess is not cut through and through. As a result the tenon of this joint does not show on the outside face.

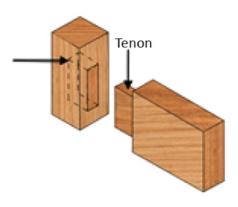


Fig. 1.4.81: Stub Mortise and Tenon Joint

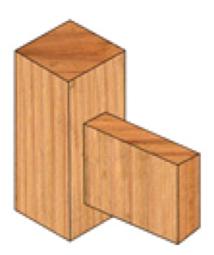


Fig. 1.4.82: Assembled Stub Mortise and Tenon Joint

Haunch Mortise and Tenon- The haunch mortise and tenon joint are often used to hide the mechanics of a joint. In this variation the tenon is cut narrower and the mortise is reduced accordingly. A small portion of the tenon base of the full width is left to form the haunch. The haunch snugly fits into a haunching recess.

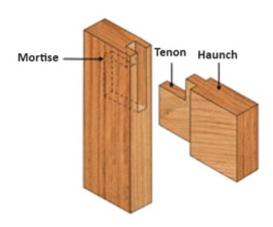


Fig. 1.4.83: Haunch Mortise and Tenon Joint



Fig. 1.4.84: Assembled Haunch Mortise and Tenon Joint

How to Make a Common Mortise and Tenon Joint

The steps to make a common mortise-and-tenon joint:

The first thing you must do is mark out the tenon.

- **Step 1.** Cut the mortise and tenon pieces to the requisite size.
- **Step 2.** Select and mark the face side and edge on both the pieces.
- **Step 3.** From the end of the tenon piece, measure and mark the length of the tenon. Remember the length of the tenon is usually only about 2/3rd of the width of the tenon member.
- **Step 4.** Using a try square and marking knife, continue to mark all the way around tenon piece.
- **Step 5.** Now you must mark out the tenon width. It should be around 1/3rd the thickness of the wood. Select a mortise chisel that matches the width you want.
- **Step 6.** Adjust the pins of a mortise gauge to the width of the chisel.
- **Step 7.** Rest the stock of the mortise gauge against the face side. Adjust the gauge until the marks it makes are the same from either side.
- **Step 8.** Now mark the tenon with the mortise gauge. Working from the face side, scribe the lines from the shoulder lines on one edge, over the end and back down to the shoulder line on the other end. This will determine the thickness of the tongue.
- **Step 9.** Use a pencil to emphasize the line for greater visibility.
- **Step 10.** Mark the waste to avoid making a mistake while cutting.

Move on to mark the layout of the mortise, on the second wooden piece.

Decide the position of the joint. Now, use the Tenon member as a guide and mark its width onto the mortise member.

Now that you have the width sorted you must mark the thickness of the mortise. The thickness will be the same as the tenon's thickness. Use the same setting of the mortise gauge as you had used for the tenon. Adjust the gauge to ensure the mortise is marked out exactly in the center.

Once, you have the layout marked carefully, you can go about cutting out the waste.

Clamp the mortise member to the work bench.

- **Step 11.** Use the mortise chisel to start the cut in the middle.
- **Step 12.** Drive the chisel with a mallet to cut half way through the hole.
- **Step 13.** Clear out all debris from inside mortise to leave a clean hole.
- Step 14. Reset the work piece.
- **Step 15.** Chop out the waste in the same way till you meet the cut out from the other side.
- **Step 16.** Set the tenon member in a vise at an angle, with the corner edge facing away from you.
- **Step 17.** Position the tenon saw inside on the waste side of the cutting line.
- Step 18. Cut down the side of the tenon all the way to the depth line. Take care not to overrun.
- **Step 19.** Reset the tenon member, so it faces you this time.
- **Step 20.** Cut down the other side.
- Step 21. Use the mallet and chisel carefully to smooth any rough edges and straighten the tenon.
- **Step 22.** Fit the tenon into the mortise to see if they fit snugly.
- **Step 23.** If required, trim tenon with a saw until the two pieces fit together.
- Step 24. Apply wood glue to the tenon and inside the mortise and join the pieces.
- **Step 25.** Clamp together until glue dries.

How to make a stub mortise and tenon joint

The following steps are used to make a Stub mortise and tenon joints:

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- **Step 2.** Select and mark the face side and edge on both the wooden pieces.
- **Step 3.** Measure the width of the mortise member to calculate the depth of the mortise and the length of the tenon. The depth of the mortise should be three-quarters of the thickness of the mortise member. This will also determine the length of the tenon. Ideally, the tenon should be kept 2-3mm short of the mortise depth.
- **Step 4.** Use a try square and marking knife to scribe a shoulder line all the around the tenon member.
- **Step 5.** Adjust the mortise gauge to the width of the chisel.
- **Step 6.** Rest the stock of the mortise gauge against the face side.
- **Step 7.** Position it in the center. Scribe the gauge lines, marking out the waste.
- **Step 8.** Next, determine the position of the mortise on the mortise member.
- **Step 9.** Mark out the width using the tenon member as a guide.
- **Step 10.** Use a try square and marking knife to square the lines across.
- **Step 11.** Use the mortise gauge with the previous setting to scribe lines between the squared lines. This will determine the thickness of the mortise recess.
- **Step 12.** In order to determine the depth of the recess use this simple trick. Set the chisel blade against the tenon length.
- **Step 13.** Apply a band of masking tape a little over the length of the tenon. This will act as a guide while you're removing the material from the recess.
- **Step 14.** Saw of the waste from the tenon just as you did for a common mortise joint.
- **Step 15.** Chop out the mortise, working from one side only.

- **Step 16.** Stop when the set tape is in level with the surface.
- **Step 17.** Ensure the bottom is level.
- **Step 18.** Fit the tenon into the mortise to see if they fit snugly.
- **Step 19.** If required, trim tenon with a saw, until the two pieces fit together.
- Step 20. Apply wood glue to the tenon and inside the mortise and join the pieces.
- Step 21. Clamp together until glue dries.

How to Make a Haunched Mortise and Tenon Joint

The procedure to construct a Haunched Mortise and Tenon joint:

- **Step 1.** Cut and trim the tenon member to size.
- **Step 2.** Select and mark the face side and edge.
- **Step 3.** Measure and mark the length of the tenon. Using a try square and marking knife, scribe the shoulder line all around the tenon member.
- **Step 4.** Set the mortise gauge to the width of the chisel.
- **Step 5.** Rest the stock against the face side, setting it in the center. Adjust the pins on the side face and scribe the tenon lines.
- Step 6. Mark the width of the tenon with a marking gauge
- **Step 7.** Mark the length of the haunch on the top edge.
- **Step 8.** Cut the mortise member to the rough length. Leave around 18 mm extra wood at the end of it.
- **Step 9.** Transfer the tenon width lines to the edge of the mortise member.
- **Step 10.** Use the mortise gauge to scribe the thickness of the mortise.
- **Step 11.** Set the marking gauge to the length of the haunch and scribe a line on the end between the mortise gauge lines.
- **Step 12.** Remove the waste from the mortise before cutting the haunch.
- **Step 13.** Apply a marker tape to the chisel to gauge the depth of cut.
- **Step 14.** Set the mortise member in a vise and saw along the cutting lines for the haunch.
- **Step 15.** Set the tenon member in the vise and cut the tenon by sawing along the cutting lines.
- **Step 16.** Try the tenon in the mortise. If the tenon does not seat properly, then deepen the mortise or the haunch groove as appropriate.
- Step 17. Apply wood glue to the tenon and inside the mortise and join the pieces.
- **Step 18.** Clamp together until glue dries.
- **Step 19.** Saw of the extra wood from the mortise member.

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.

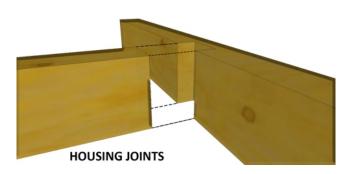


Fig. 1.4.85: Housing Joint

Types of Housing Joints

Housing joints are of different types. Some commonly used types are as follows:

Full Housing Joint: As seen below, in a full housing joint a rectangular recess is cut across the entire length of the board.



Fig. 1.4.86: Full Housing Joint

Stopped Housing Joint: The dado of a stopped housing joint (as shown below) ends some 9 to 12 millimetre short of the shelf width.



Fig. 1.4.87: Stopped Housing Joint

How to Make a Full Housing Joint

- **Step 1.** The procedure to make a full housing joint:
- **Step 2.** Use two wooden pieces cut and trimmed to size.
- Step 3. Select and mark the face side and edge.
- **Step 4.** Start by marking out a dado. Measure the wood with the tape measure to determine where you want the dado joint to sit.
- **Step 5.** Use a marking knife to scribe the bottom line of the groove.
- **Step 6.** Use a marking knife and try square to scribe lines across the width of the side member. Remember the width of the channel will be the same width as the wood to be inserted into it.
- **Step 7.** Set the marking gauge approximately to one third the thickness of the shelf member.
- **Step 8.** Scribe a line between the marks on both edges.
- **Step 9.** Once you have marked out your recess you can now cut along the lines with a saw.
- **Step 10.** Support the board against the bench stop. Saw along the marked line to the depth of the gauged line.
- **Step 11.** Use a chisel and mallet to clean out the excess wood.
- **Step 12.** Ensure the two pieces sit flush against each other.
- **Step 13.** Use a brush to apply glue to the joining parts.
- Step 14. Clamp the parts together.
- **Step 15.** Remove the excess glue with a damp cloth.
- **Step 16.** Leave the glue to dry.

How to Make a Stopped Housing Joint

The procedure to make a stopped housing joint:

- **Step 1.** Use two wooden pieces cut and trimmed to size.
- **Step 2.** Select and mark the face side and edge.
- **Step 3.** Start by marking out a dado, just as you did for the full housing joint.
- **Step 4.** Mark the width of the recess to match the thickness of the shelf member.
- **Step 5.** Use the marking gauge to mark the depth of the recess.
- **Step 6.** Make a mark where the dado will stop from the edge of your workpiece.
- **Step 7.** Cut the groove. Use a chisel to chop a cut outline at the stopped end to the required depth.
- **Step 8.** Trim the waste from the hole.
- **Step 9.** Now, saw along the scribed lines to meet the cut out hole.
- **Step 10.** Cull out the waste with a chisel.
- **Step 11.** Now take the shelf member. Set the marking gauge to the depth of the groove. Scribe a line on the back and front edge of the shelf member.
- **Step 12.** Mark the length of the groove from the end of the shelf.
- **Step 13.** Support the board against the bench stop and cut the notch with a saw.
- **Step 14.** Trim the shoulder with a chisel.
- **Step 15.** Ensure the joint fit without gaps.
- **Step 16.** Use a brush to apply glue to the joining parts.

- Step 17. Clamp the parts together.
- **Step 18.** Remove the excess glue with a damp cloth.
- **Step 19.** Leave the glue to dry.
- **Step 20.** You can also apply screws and nails to increase strength of the joint.

Knowledge of different work zones in kitchen and related parts and accessories

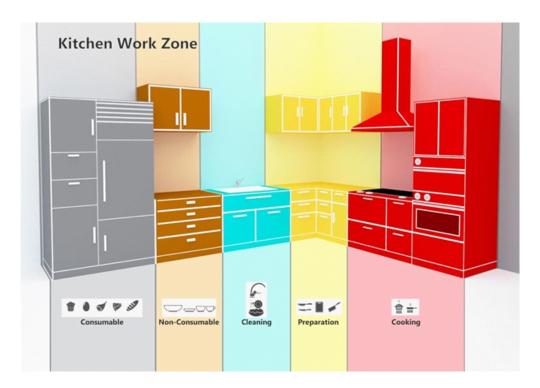


Fig. 1.4.88: Kitchen Work Zones

Work zones in kitchen

Consumables:

In this area daily food items such as bread, milk, canned drinks, cereals, fruits, vegetables, and others are stored.

Non-consumables:

This is a storage area used for placing less frequently used consumables such as cutlery, cooking utensils, glassware and others.

Cleaning:

This area includes the sink and the surrounding space that is used to store washing equipment such as liquid soap, soap, brush, garbage bin and others.

Preparation:

This area is where the food is prepared mixed before cooking. Generally items like knives, cutting boards, mixing bowls, and others are stored here.

Cooking:

This zone where you store items meant for cooking utensils such as pots, pans, cake trays and cookie cans, oven, cooking hob etc.

Placement of various kitchen parts and accessories

Cooking hob:

- Keep in mind the design of your kitchen and the size of the worktop. Ensure that you have sufficient workspace around the hob.
- Ideally you would need to place the hob as far away as you can from the edge of the cabinet run or any tall cabinets.
- While decided the positioning of the hob in relation to the sink, a minimum 60cm clearance must be maintained for safety and health reasons.

Chimney:

- For all types of cooking ranges, be it an electric cooking range, built in hob or a usual cooktop, the distance to be maintained between hob and chimney is same.
- The distance shall not be less than 26" nor more than 30".

Sink:

- In cases where the client desires the sink to be moved, the plumbing would need to be moved as well
- Ideally the dishwasher and sink need to be next to each other to allow for efficient working.
- Often when the kitchen has two sinks one sink is typically used for clean-up and a second sink for food preparation

Oven:

- Generally, an oven is situation on the floor free-standing, mounted under the bench, or mounted in the wall.
- Accessibility and visibility are the key terms to focus on.
- Small ovens can be placed in a convenient location on the counter itself, or alternatively it can be placed in a shelf below the counter.
- Ovens must never be positioned behind a door or open towards the door.

Different types of product and related work. E.g. Base Unit, Wall Unit, Crockery units, Drawers, Storage units, Partition, unit for appliances etc.

Upper Unit



Fig. 1.4.89: Stopped Housing Joint

- Wall cabinets or upper units that are typically installed above the kitchen counter, have a standard measurement of 12 to 18 inches deep.
- Making the length of the cabinet such that they go right up to the height of the ceiling is an optimal way of creating more storage space.
- Upper cabinets are utilized for storage of rarely-used items
- This type of cabinet also comes as a glass-fronted variety or open shelving for display.
- While installing the upper cabinets be sure to attach a level cleat to the wall which will act as a support to the base of the cabinets.

Base Unit



Fig. 1.4.90: Stopped Housing Joint

- Base cabinets or base units have a standard measurement of being 24 inches deep and 36 inches tall.
- This type of cabinet sits over a four inch riser referred to as a kick plate.
- This type of unit can be made up of shallow drawers, shelved cabinets, deep drawers or specialty cabinets sections like bin drawers.
- As they tend to be large, these cabinets provide bulk storage space.
- Commonly they have shelving inside for items such as cookware, pans and pots, or cleaning supplies
- Drawer type base cabinets are recommended as they make it much more easier to find items without having to dig deep into shelving
- Open Base Cabinets have no doors and feature open shelving for storing or displaying various items.

Crockery Unit



Fig. 1.4.91: Crockery Unit

- Crockery units are made not merely for their functional benefits but also for their aesthetic appeal.
- A combination of wood and glass is the preferred choice while designing a crockery unit
- In terms of colors a crockery unit typically should provide a sharp contrast to the rest of the kitchen space.

Cabinet Drawers



Fig. 1.4.92: Cabinet Drawers

- Thanks to better glide technology we have recourse to bigger drawers that can handle heavier items
- Drawers are used to store everything from cutlery, utensils, and spices to bulkier items like dishware, pans, pots and chopping blocks.
- Solid hardwood has traditionally been the choice material for drawer box fronts and sides.
- Engineered woods, such as veneered plywood, particleboard and MDF are also used.

Unit 1.5 Different Types of Tools and Equipment and the Processes of Operating

- Unit Objectives



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

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



Fig. 1.5.1: Tools used in woodworking

Hand Tools

| Tools | Image |
|--|-----------------------|
| Tools 1. Measuring Tools: Measuring tools are used by a modular kitchen cabinet maker 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 | Image Weasuring Tape |

2. Marking Tools:

Apart from the pencil, there are other marking tools used by a modular kitchen cabinet maker 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 modular kitchen cabinet maker 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



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



Tools Image 5. Hammers and Mallets: A good quality Steel hammer is used to drive nails whereas mallets are used for chiselling. Common Mammer Hammers include: Claw Hammer **Ball Pein Hammer** Cross Pein Hammer Straight Pein Hammer Mallet Wooden Mallet 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 Pozidriv Torx Security T Hexagon **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 **Hand Drill Ratchet Brace** 9. Sharpening Stones: These stones are effective in maintaining the sharp edges of a modular kitchen cabinet maker's tools. Some common Sharpening Tools are: Oil Stone Water Stone Oil Stone Slip Stone

| Table | luca |
|---|--------------|
| 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 |
| 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. | Plier |

Table 1.5.1: Hand Tools



Fig. 1.5.2: Storage of tools

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 nails are: Hexagonal Nut **Nuts and Bolts** 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 Scew

| Tools | | Image |
|--|-------------|--------------|
| | | |
| | Butt Hinges | Flag Hinges |
| | | |
| 3. Hinge | Butt | terfly Hinge |
| 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: | 6 6 | |
| Butt HingeStrap Hinge | Pivo | ot Hinge |
| Spring HingePivot Hinge | | |
| | Flush Hinge | Gate Hinge |
| | Hettich | nsys Hinge |

| Tools | Image |
|---|--|
| 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) | Cylindrical Lock Traditional Lock Furniture Lock |

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

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

Table 1.5.2: Fasteners and Connectors

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 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.

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.



Planer

Router

Table 1.5.3: Power Tools

Take the measurement as per design drawing and specification and create marking on the plyboard, MDF, HDF etc.

Once you have measured out your project, you need to create cut lines and mark out the layout. These cut lines provide guidance to the modular kitchen cabinet maker during the sequence of the operation.

Marking out is a critical part of woodwork projects. If components are marked out wrongly before being cut out, there is no chance of them fitting together when they are assembled.

Different types of marking tools are used to create guidelines for modular kitchen cabinet makers to follow before they actually begin to cut materials. This session will walk you through the commonly used marking tools in carpentry.

Marking Tools: While a flat pencil may be a carpenter's best friend, there are other marking tools that help him/her draw precise cutting lines. Take a look at some other marking tools that come in handy to draw precise reference lines.

- Steel Scriber
- · Marking Knife
- Marking Gauge
- Mortise Gauge
- Cutting Gauge
- Chalk Line

Pencil

- The carpenter's pencil is flat and wide it tends to have a harder tip than standard pencils.
- It is used to leave a clear but temporary mark on wood. Most carpenters use the pencil only for the preliminary marks.
- These marks are then etched on the wood using other marking tools.
- It is quite simple to use.
- Hold the pencil just as you would hold a standard pencil while writing.
- Measure and mark both ends, where the wood is to be cut.
- Use a steel rule to draw a line from mark to mark.
- You can also draw a line along the try square.
- Do not press the pencil unreasonably hard as it may break the lead.
- Use a chisel or a jack plane to sharpen your pencil.



Fig. 1.5.3: Carpenter's Pencil

Marking Knife

- While a pencil is used for the preliminary marks, a marking knife allows you to make a clean scribed line
- A marking knife is made of steel.
- It is pointed at one end and has a sharp blade or knife at the other end that forms the cutting edge.
- The pointed end works like a scriber and the blade is used to create a registration line for a chisel or saw.

- Hold the knife tightly as you would a pen, with one finger on top of the blade to guide your hand. Run the flat face of the blade against the steel rule or Try square.
- Always run the knife on the waste side of the preliminary mark.
- The more distinct the line, the better the cutting tool will find and keep its mark.
- Use water or oil stone to sharpen the knife if it becomes blunt.

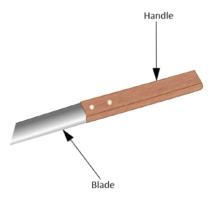


Fig. 1.5.4: Marking Knife

Marking Gauge

- A marking gauge is usually made of sheesham wood.
- It consists of a wooden beam on which a wooden stock slides.
- This block can be adjusted at the required measurement, using a thumb screw.
- The beam is provided with a spur or steel pin at its far end.
- Simply set the marking gauge by loosening the screw and shift the stock at the requisite distance from the spur.
- Use a steel rule to take the measurements.
- Once you have set the stock tighten the thumb screw to secure it.
- Push the marking gauge in a manner that the spur touches the wooden piece at all times, making a continuous scratch.
- Remember the side should be at the right angle to make a parallel line on the wooden piece.

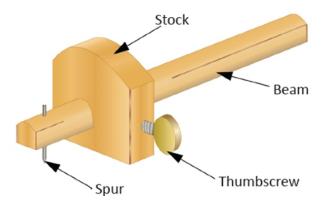


Fig. 1.5.5: Marking Gauge

Mortise Gauge

- A mortise gauge is a marking gauge with two spurs- one of which is movable and can be adjusted on the required position using a screw.
- You can push it forward much like the marking gauge making two parallel lines at the same time.
- It is mostly used while marking the wood for the mortise and tenon joints.
- Use a triangular file to sharpen the marking, mortise and cutting gauge.

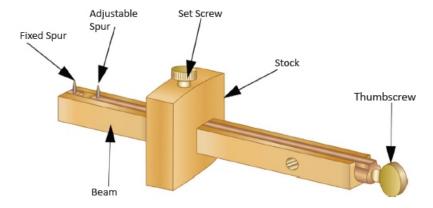


Fig. 1.5.6: Mortise Gauge

Cutting Gauge

- Cutting gauge looks and functions much like marking gauge but in this case the steel spur is replaced with a cutting knife.
- The cutting knife is held with an aid of a wedge.
- You can adjust the length of the knife by loosening this wedge.
- It is mostly used to make deep marks while making grooves, rabbet and dovetail joints.
- In addition to this, you can also use it to cut off thin strips of plywood or wood pieces up to 3mm in thickness.
- Use a triangular file to sharpen the marking, mortise and cutting gauge.

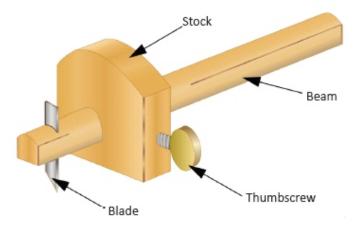


Fig. 1.5.7: Cutting Gauge

Chalk Line

- Every now and then you will have to work with a board of an uneven surface.
- It becomes impossible to mark accurately on such surfaces.
- A chalk line is used to mark uneven surface or when you need to mark off a long area.
- It consists of a strong thread. You simply need to wet the thread slightly and dip it in coloured chalk powder.
- Now hold or tie the thread on one side and tightly hold it on the other end.
- A pluck of the string will give you a puff of chalk and an instant straight line.

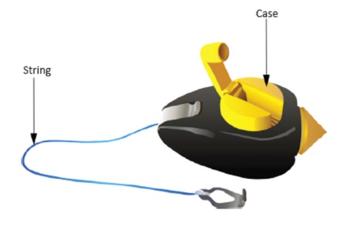


Fig. 1.5.8: Chalk Line

Precautions

- You must maintain the marking tools in a good condition for them to operate properly.
- Keep these basic tips in mind while working with these tools:
- Never throw tools to the ground.
- Always keep tools clean and lubricated.
- Store tools in appropriate cases.
- Choose the face side and face edge carefully.
- Do not use too much pressure while using your pencil.
- Keep the pencil sharpened at all times.
- Do not use your scriber to pierce holes in the wood.
- Use water or oil stone to hone the cutting edge of a marking knife.
- Fill in the cut with a dark pen or pencil if you have trouble seeing where the woodworking knife made its mark.
- While gauging, you must ensure that the stock is held firmly against the wood.
- The side of the wooden piece must be trued to get accurate marks.
- Use a triangular file to whet gauge spurs.
- Dip the chalk line completely in the colored chalk powder.
- Keep the chalk line string straight and taut while marking.

Cut the pieces as per marking and shape oversized material to required dimensions by using appropriate tools. E.g. cutter machine, saw, edge banding, edge sander, planer, adhesives etc.

As a cabinet maker for modular kitchens, you will have to rely on both traditional hand tools and modern power tools. A general collection of power driven hand held tools includes tools that cut wood, drill holes, shape and finish your work. A familiarity with these tools will prepare you to choose the right tool for the right job.

Let us take a quick look at some power driven handheld tools:

Drills: Carpenters use a handheld power drill for general purpose boring and the creation of straight, clean holes.

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. A

Jig Saw: 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.

Portable Router: A portable router is used for molding, grooving and rebating work in carpentry. A router bit's shape determines the type of cut it creates.

Portable Sander: Portable sanders are used for sanding flat and curved surfaces.

Portable Planners: Portable planners are not used for very precise work. However it is an excellent tool for quick planning. It also makes joinery work easier.

Wood cutting machine

A wood cutting machine is a multi-operation mechanical material cutting machine that serves the function of cutting wooden articles. Its setup it dependent on a rotating shaft fitted with a cutter, which rotates in opposite direction to that of wood movement.



Fig. 1.5.9: Wood cutting machine

Planer

This machine is utilized in the initial stages of developing the wood, producing square edges and flat faces. Surface planing machines have a rigid main frame acts as a supports for the outfeed and the infeed table. A cutterblock is positioned between the two tables and fixed on ball bearings. This machine is used for both thickness and surface planing.



Fig. 1.5.10: Wood Planing Machine

Saw

A circular saw is indispensible to workers in the woodworking industry. It is available in two basic styles, direct-drive and worm-drive. The three basic saw cuts used by wood workers are the rip cut plunge cut and crosscut.



Fig. 1.5.11: Circular Saw

Edge Banding

Edge Banding is the process employed to finish the thickness or sides of material like particle board, MDF and plywood. It is used to create visually appealing and durable trim edges during finish carpentry. Edge banding involves either a hardwood or veneer that is pre-sanded. For modular furniture the machine that applies edge banding is called an Edgebander.



Fig. 1.5.12: Edgebander

Edge sanders

Edge sanders can be described as the ideal electrical woodworking power tool utilized for smoothing and finishing. Two standard types available are portable floor sanders and belt sanders.



Fig. 1.5.13: Edge Sander

Arrange and check combination of assembling parts manufactured at work site to rectify defects if any

- 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.

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
 - Scratches
 - o Mismatched and misfit parts
 - o Warping
 - Blistering
 - Other defects
- Conducting Stability and Usage Inspection like:
 - Load Tests
 - Impact Tests
 - o Strength Tests
 - 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

Technique of joining the materials with screws, staples, or adhesives and the quantity to be used

The cabinet maker should assist in selection of adhesives/screws/ hardware as per requirement and follow the instruction received for fastening the required furniture parts, wherever required.

Keep the following in mind while joining the materials with screws, staples, or adhesives:

- Typically PVA glue bonds through a chemical reaction within the wood's cell structure.
- The glue needs to sufficiently enter the wood cells on both sides before it can chemically join the two parts.
- Nonetheless, there is no requirement for excess glue to remain in between the parts.
- When using PVA glue, you can use as many clamps and as much pressure as possible.
- Epoxy glue, on the other hand, bonds on top of the wood, not within the cell structure.
- Epoxy glue requires some glue-line thickness for proper strength.
- Bear in mind that overclamping will squeeze out too much glue and fail to achieve an optimal bond.
- Precisely made joints that fit well together, are best glued with PVA glue.
- For joinery is not so perfect in alignment and smoothness you can use 24-hour.
- Glue can be applied by using a brush, roller, scraper etc.
- Several cabinet workshops employ staples to fasten wood pieces together.
- High pressure is needed to squeeze out all excess glue and produce a zero glue-line thickness with PVA glue.
- Often fastening with staples serves as merely a temporary procedure until the glue in a joint can cure. At other times, the staple is the key fastener for a joint.

Technique of touch up of furniture for proper finishing

- This is one of the last steps of manufacturing furniture. The cabinet maker should assist in cleaning, sanding and finishing of manufactured product. Wood polishing is a significant procedure that a cabinet maker 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 furniture makers.
 - o 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. 1.5.14: Sample of a French Polished Cabinet

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



Fig. 1.5.15: Sand Polish

- **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.



Fig. 1.5.16: Finish using Dye Stain

- 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
 - 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 modular kitchen cabinet maker should always use protective materials like glass, gloves, mask at the time of stain polishing

As sist in smoothening of outer surface of furniture by using plane, rasp file etc.

Smoothening using Plane

- Hand planes are tools employed to shape wood using muscle power that drives the cutting blade over the wood surface.
- It is possibly the most versatile plane a woodworker can possess in their hand tool collection.
- It serves to produce two or more perfectly flat surfaces that can then be glued together with ease
- Mainly they consist of two parts- a sharpened metal plate and body. The body can be made of wood, metal or combination of both.
- Generally all planes are used to reduce the thickness of, flatten or impart a smooth surface to a rough piece of timber or lumber.
- Most planes fall within the categories (by size) of block plane, smoothing plane, and jointing plane.
- Planing wood along its side grain serves to create thin shavings rising above the surface of the wood, as the edge of the plane iron is pushed forward, retaining a smooth surface.



Fig. 1.5.17: Hand Plane

Smoothening using Files and rasps

- Files and rasps are available in various lengths and are measured from the point to the end of the tang.
- For best control, files and rasps should be held with both hands.
- Files and rasps used in woodworking are ideal for fine control and precise removal of material with little or no tear-out.
- A file can be described as a hardened metal bar that is equipped with ridges (or teeth) machined into it at an angle. Any file can be used to shape wood
- A rasp is used to shape and to refine sawn curves.
- Handling a rasp efficiently entails skilled hand-eye coordination
- Files have the function of smoothing away the shaping marks left by power tools or rasps.



Fig. 1.5.18: Files and Rasps for Woodworking

Gather all the tools form the work site and place appropriately

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

- 1. Measuring Tool
- 2. Marking Tool
- 3. Drilling Machine
- 4. Chisel
- 5. Saw
- 6. Rasp/File
- 7. Nails
- 8. Hammer
- 9. Screw Driver
- 10. Hinges
- 11. Handles
- 12. Lock
- 13. Knobs
- 14. Floor Guard
- 15. Shimmer

A cabinet maker usually carries a tool kit where he/she stores all the tools and equipment. After assembling, construction and installation, the cabinet maker 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. 1.5.19: Use broom to sweep the waste

2. Collect waste from different parts of the work station and sweep them toward a particular direction



Fig. 1.5.20: Collect waste from different parts of the workplace

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



Fig. 1.5.21: Collect the waste in a particular bin



Fig. 1.5.22: Waste collection



Fig. 1.5.23: Waste collection for sharp objects



Fig. 1.5.24: Saw dust collector

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Summary

- As a modular kitchen cabinet maker, you have the responsibility of cutting and shaping wood, developing surfaces and fashioning a finished product.
- To will need to creating drawings for the client that depict what the finished item will look like, as this enables the client to visualize and proceed with the project.
- Keep up a safe working environment by routinely cleaning and disposing of old materials, for instance screws and nails.
- Cabinet maker modular kitchen should have:
 - o Knowledge of wood, MDF, HDF, plyboard, laminates etc.
 - Before the construction process starts, the cabinet maker needs to make a record of the already existing architectural features present in the room.
 - A cabinet maker must understand the client's requirements thoroughly and have appropriate and correct understanding of the work task.
- Five different layouts are recognized in contemporary kitchens—the L, G, U, galley and single.
- Perhaps the most popular kitchen element in these years is an island that is positioned in the center of a room, with worktops on the surrounding walls.
- Base Cabinet Sizes: This type of cabinetry serves as the foundation or base for countertops and other surfaces.
- Work Order is a task, job or assignment, which can be assigned to a person for completion.
- The requisite for reading a Blueprint is interpreting 1st and 3rd angle drawings.
- Timbre is the raw materials that are seasoned to produce workable wood.
- All ready cabinets must undergo an in-depth visual inspection.
- Chemicals used in finishing stage and wood dust are health hazards
- The term "Site" implies an area or premises, where a structure, like building or a piece of furniture, is constructed.
- 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
- Hinges are a type of bearing that connects two solid objects allowing them to open till a defined angle.
- While installing the upper cabinets be sure to attach a level cleat to the wall which will act as a support to the base of the cabinets.
- Once you have measured out your project, you need to create cut lines and mark out the layout.
- Early detection of faults and issues, in the hardware tools and the modules, helps in avoiding wastage of money, time and manpower.
- Typically PVA glue bonds through a chemical reaction within the wood's cell structure.
- Hand planes are tools employed to shape wood using muscle power that drives the cutting blade over the wood surface.
- Files have the function of smoothing away the shaping marks left by power tools or rasps.
- A cabinet maker usually carries a tool kit where he/she stores all the tools and equipment.
- After installation is done, ensure that you clear all the debris or waste materials from the site

Activity



Name of the Activity: Practice Session

Tools: Straight edge graph paper and tape measure.

Methodology:

- The trainer will announce that there will be a practice session on the following topics:
 - o Take Measurements for Making Layout and Designs
 - □ Doors and windows
 - □ Walls and floors
- The trainer will first demonstrate to the class the proper methods of conducting the tasks.
- A group of three trainees will then carry out the procedure
- The trainer will guide the trainees where needed.

-Activity



Name of the Activity: PPT Session

Tools: Table, chair, pen, paper, computer, internet

Methodology:

The trainer will announce that the trainees will make a PPT on the given topic:

- Different types of Wood
- o Different types of modular kitchen cabinets/units
- The Trainer will divide the Trainees into groups of 3 members each.
- All the members will have to works on their PPTs.
- The trainees will need to do online research on the topic.
- The Trainer will appreciate the best PPT in the class.

Activity



Name of the Activity: Practice Session

Tools: Marking knife, glue, workpiece, bench stop, clamp, hammer, nails

Methodology:

- The trainer will announce that there will be a practice session.
- The trainees will have to make a:
 - o Square-end Butt Joint
- The trainer will first demonstrate to the class the proper methods of conducting the tasks.
- A group of three trainees will then carry out the procedure
- The trainer will guide the trainees where needed.

– Exercise

| Fill in the bl | anks appro | priately: |
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| | in the blanks appropriately. | |
|-----|--|----------|
| 1. | A cabinet maker must see that materials andare appropriately matched to create a uniform appearance for all the matching units. (food, grains, shavings) | а |
| 2. | Before the construction process starts, the cabinet maker needs to make a of the already existing architectural features present in the room. (example, PPT, record) | е |
| 3. | A kitchen's overallis the shape that is created by the positioning of the majo appliances storage areas and countertop. (layout, theme, lighting) | r |
| 4. | are the work orders circulated internally within the organization (Employee Orders, Supervisor Orders, Job Orders) | |
| 5. | wood is commonly known as composite wood. (Edge, Elevated, Engineered) | |
| 6. | BWD is a type of engineered wood resistant to high temperature and (moisture, light, sound) | · |
| 7. | Due to the high level of sound pollution in furniture making environments, protection must be worn at all times. (facial, hearing, oral) | |
| 9. | is the process of determining the magnitude of and quantifying a physical parameter. (Investigation, Measurement, Analysis) | ıl |
| 10. | A cabinet maker should haveinformation about accessories and fittings (scanty, detailed, interesting) | |
| 11. | cabinets or base units have a standard measurement of being 24 inches deep and 36 inches tall. (Tall, Crockery, Base) | Э |
| 12. | The carpenter's pencil is flat and wide it tends to have a harderthan standard pencils (tip, eraser, saw) | . |
| 13. | protects the wooden surface from apparent damages from water, humidite and gives a glossy look to the furniture. (grinding, scavenging, polishing) | y |
| Ans | wer in brief: | |
| 1. | Give one feature each of the U-shaped kitchen, and L-shaped kitchen layouts. | |
| 2. | Give 2 examples of appropriate personal protective equipment in a woodworking environment. | |
| 3. | Name the different Types of Hinges. | |
| 4. | What is Edge Banding? | |









2. Maintain Work Area Tools and Machines

Unit 2.1 Follow Safe Working Practices while at Work

Unit 2.2 Organizational Procedures for Safe Handling of Tools and Equipment

Unit 2.3 Respond to an Emergency Situation

Unit 2.4 Organizational Reporting Protocol

Unit 2.5 Various Types of Safety Signs

Unit 2.6 Deal With an Accident Involving Human Life

Unit 2.7 Different Types of Personal Protective Gear

Unit 2.8 Basic First Aid Treatment Relevant to the Condition

Unit 2.9 Preventative and Remedial Actions for Exposure to Toxic Materials

Unit 2.10 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. Practice 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 2.1 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

2.1.1 Follow safe working practices at all times

Cabinet makers 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

2.1.2 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 2.2 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

2.2.1 Handle tools and equipment safely

Every organization, where a cabinet maker 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

- 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.
- Before operating Powered Tools, the Instruction Manual must be read thoroughly.
- The guidelines and recommendations (by manufacturer) must be stringently followed, as per the Instruction Manual or Directions of Use.
- 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.
- o 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.
- o 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.
- 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 cabinet maker 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.

2.2.2 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.

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

A cabinet maker 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 2.3 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?
 - 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
 - Security Services
 - Reception / Front Desk
 - o Building Operations and Maintenance team

- 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 |
| 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 2.4 Organizational Reporting Protocol

- Unit Objectives



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

- 1. Practice 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

2.4.1 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.

2.4.2 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. 2.4.2.1: 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. 2.4.2.2: The 4 aspects to be considered while identifying and reporting a hazard

2.4.3 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 |
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Unit 2.5 Various Types of Safety Signs

- 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". |
| Mark State of the | 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 as harmful for us and exposure to laser beams may cause blind ness. | | |
| | 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 2.5.1: Go to the left for safe evacuation



Fig 2.5.2: Go to the right for safe evacuation



Fig 2.5.3: Go down for safe evacuation



Fig 2.5.4: 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.

| 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 2.6 Deal With an Accident Involving 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 2.7 Different Types of Personal Protective Gear

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 elements such as goggles, earmuffs attached to it. Safety helmet should be worn on the head, not on any hat or cap. | Safety Helmet |
| 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 |
| | | P |
| | | Facemask |

| Namo | Eunction | lmage |
|-------------------------|---|---|
| Name 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. • 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. | Pre-formed or Modelled Earplug 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 | |
| | 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 2.8 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 2.8.1: 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 2.8.2: 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 2.8.3: 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 2.8.4: 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 2.8.5: 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 2.8.6: 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 2.8.7: 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 2.8.8: Essential first aid item

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

Unit 2.9 Preventative and Remedial Actions for 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 cabinet maker 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 2.10 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

2.10.1 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.

2.10.2 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

2.10.3 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
 - Individual capacity
 - 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 cabinet maker's productivity, by stalling the seamless flow of tasks and disturbing his / her focus.
- A cabinet maker 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.

A: Tackle box

| – Exercise 🔯 ––––– | |
|--|--|
| Exercise | |
| Fill in the Blanks: | |
| 1. Wood is in nature. | |
| a) Hygroscopic | b) Microscopic |
| c) Brittle | |
| A: Hygroscopic | |
| | |
| 2. 90% volume of waste gets reduced and co | onverted into incombustible, light-weight materials like |
| · | |
| a) Gas | b) Ash |
| c) Leaf | |
| A: Ash | |
| | |
| 3involves the degradation of | of organic waste into manure with the help of worms. |
| a) Caterpillar waste | b) Manure making |
| c) Vermicompost | |
| A: Vermicompost | |
| | |
| 4. It is always advisable for a furniture maker to | protect the tools from |
| a) Grease | b) Moisture |
| c) Oil | |
| A: Moisture | |
| | |
| 5is used for storing fasteners. | |
| a) Tackle box | b) Shoe box |
| c) Fastener box | |









3. Ensure Health and Safety at Workplace

Unit 3.1 Health and Safety Hazards and Precautions

Unit 3.2 Potential Risks and Threats

Unit 3.3 Potential Hazards and Risks which may be Present at Furniture and Fittings Related Workplace

Unit 3.4 Storage and Handling of Hazardous Substances

Unit 3.5 Common Health and Safety Practices at Workplace

Unit 3.6 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
- 2. Identify the potential risks and threats
- 3. Identify the potential hazards and risks which may be present at furniture and fittings related workplace
- 4. Comply with the storage and handling of hazardous substances
- 5. Discuss the common health and safety practices at workplace
- 6. List the difference risks associated with the use of electrical equipment

Unit 3.1 Health and Safety Hazards and 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

3.1.1 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

3.1.2 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

- 3.1.3 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

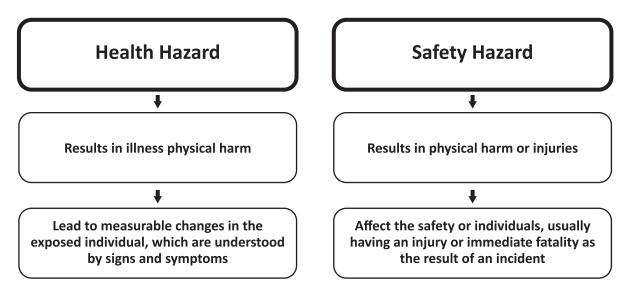
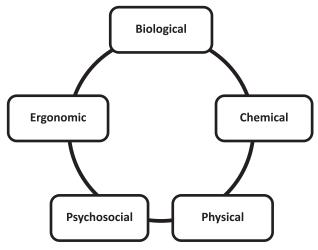


Fig. 3.1.3.1: Differences between Health & Safety Hazards

3.1.4 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:



3.1.4.1: 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

3.1.5 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:

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

Common examples of process conditions / parameters are:

- Temperature
- Pressure
- Flow
- pH value
- Viscosity
- Time
- Addition
- Reduction
- Separation
- Signal
- Mixing
- Communication
- Sequence
- 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 |

| Notes ———————————————————————————————————— | |
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Unit 3.2 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

3.2.1 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

3.2.2 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) | |

3.2.3 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. 3.2.3.1: 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 3.3 Potential Hazards and Risks which may be Present at Furniture and 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.

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

A cabinet maker 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

3.3.2 Common Hazardous Substances that Cabinet Makers 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 cabinet makers 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 3.3.2.1: 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, fueloils, 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.

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Unit 3.4 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 3.5 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 cabinet maker.

Common Health and Safety Practices at Workplace for cabinet maker

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.

•

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
 - Liquid cash
 - o Drinking water in clean containers
 - o First Aid Kit
 - Essential clothing
 - o Flashlights
 - 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
 - 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.
 - o 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 3.5.1: Sample form of reporting hazards

Unit 3.6 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

3.6.1 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

3.6.2 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 3.6.2.1: 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.

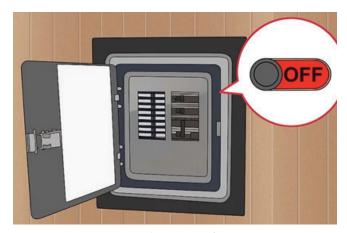


Fig 3.6.2.2:: Disconnect the source of power

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.

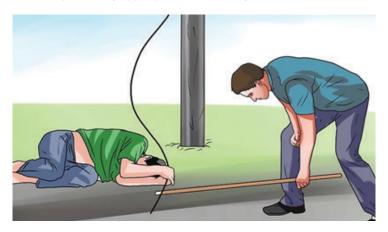


Fig 3.6.2.3: Use insulators to approach the victim of electrocution

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 3.6.2.4:: 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.

3.6.3 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 3.6.3.1: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 3.6.3.2: Work out daily to stay fit

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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 cabinet makers and how to reduce the same
 - o How to save an electrocuted victim
 - o Common Chemical Hazards
 - Common Electrical Hazards
 - o Types of Toxins
 - 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.

| Exercise | Ø |
|----------|---|
| Exercise | 0 |

A: Activated charcoa

| | KEI | | | | | |
|-------------|---|---|---------|---|--|--|
| Fill | in th | ne Blanks | | | | |
| 1. | Incorrect and irregular disposal of wood dust/wood debris can lead to | | | | | |
| | a) | Head injury | b) | Eye Injury | | |
| | c) | Bleeding Gums | | | | |
| A: E | ye I | njury | | | | |
| | | | | | | |
| 2. | | waste do not ste box lined with red garbage b | | nactivation but must be put away separately in biological | | |
| | a) | Non-infectious biological | b) | Atomic | | |
| | c) | Water based | | | | |
| A: N | lon- | -infectious biological | | | | |
| | | | | | | |
| 3. | Rep | porting an accident / incident f | to an a | authorized person can be best done with the help of the | | |
| | a) | Accident form | b) | Supervisor | | |
| | c) | Hazard reporting form | | | | |
| A: H | laza | ord reporting form | | | | |
| | | | | | | |
| 4. | Per | rsonal protective equipment is c | ommo | nly referred to as | | |
| | a) | PPE | b) | GPE | | |
| | c) | APE | | | | |
| A: F | PE | | | | | |
| | | | | | | |
| 5. | | may be administe | ered in | case of ingestion and inhalation of toxic solvents. | | |
| | a) | Saline Water | b) | Activated charcoal | | |
| | c) | Milk | | | | |











4. Fighting Fire

Unit 4.1 Various Causes of Fire

Unit 4.2 Different Types of Fire Extinguishers

Unit 4.3 Techniques of Using Different Fire Extinguishers



Key Learning Outcomes 👸



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

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

Unit 4.1 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

4.1.1 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.

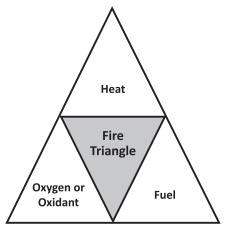


Fig. 4.1.1.1: The various sources of Fire as per the Fire Triangle

4.1.2 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:
 - Outdated and frayed wires and cables
 - 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
 - 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.
 - 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 4.1.2.1: Class A Fire

• Class B: fires involving flammable liquids such as petrol, diesel or oils



Fig 4.1.2.2: Class B Fire

• Class C: fires involving flammable gases like propane, butane, methane, etc.



Fig 4.1.2.3: Class C Fire

• **Class D:** fires involving combustible metals like sodium, magnesium, potassium, lithium, titanium, aluminium, etc.



Fig 4.1.2.4: Class D Fire

Class F: fires involving cooking oils such as in deep-fat fryers



Fig 4.1.2.5: Class K Fire

- 4.1.3 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.

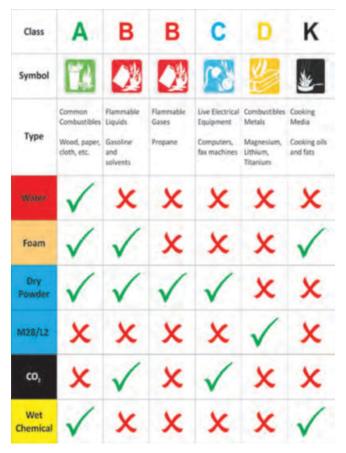


Fig 4.1.3.1: Fire Extinguishing Code

4.1.4 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 | | |
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Unit 4.2 Different Types of Fire Extinguishers

- Unit Objectives



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

1. Discuss the different types of fire extinguishers and their use

4.2.1 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 4.2.1.1: Water Extinguisher

• Powder - For extinguishing fires from solid combustible materials, liquid, gas and electrical sources



Fig 4.2.1.2: Dry Chemical Powder (DCP)

• Foam - For extinguishing fires from combustible solid and liquid materials



Fig 4.2.1.3: Foam Extinguisher

• Carbon dioxide (CO₂) - For extinguishing fires from liquid and electrical sources



Fig 4.2.1.4: Carbon dioxide Extinguisher

• Sand - For extinguishing fires dry combustible substances like leaves, branches, pieces of wood etc.



Fig 4.2.1.5: Sand

| Notes | | |
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Unit 4.3 Techniques of Using Different Fire Extinguishers

- Unit Objectives

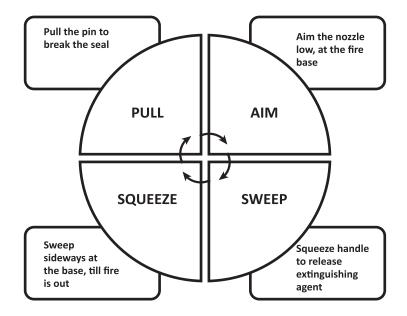


At the end of this unit, you will be able to:

1. Demonstrate how to use the various appropriate fire extinguishers on different types of fires correctly

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:



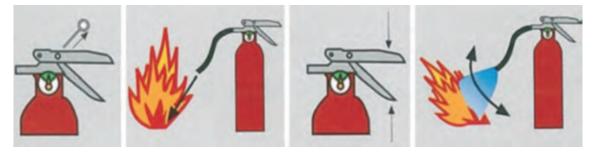


Fig 4.3.1: PASS Technique

B. Use the various appropriate Fire Extinguishers on different types of fires correctly

Water

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- For using Foam Extinguisher on live Electrical Fires, it must be tested to 35 kV, keeping a safe distance of 1 km.
- o 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.
- Foam Extinguishers are suitable for both Class A and B fires. However, the technique of application differs for both the classes.
- 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

- 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 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.
- Adequate care must be taken to extinguish the fire completely, since reignition is possible while using CO₂ extinguishers.
- 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.
- o 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.
- 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.

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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

State True or False:

| 1. | Diesel, petrol comes under class A fire. | (T/F) |
|----|--|-------|
| 2. | Class C fires involves flammable gases like propane, butane etc. | (T/F) |
| 3. | Water, powder and foam are agents used for the purpose of cooling. | (T/F) |
| 4. | PASS technique is used to handle water pressure. | (T/F) |
| 5. | Flame Inhibitor can react with the burning material to assist in extinguishing fire. | (T/F) |











5. Safe Lifting Practices and Ergonomics

Unit 5.1 Safe Lifting Practices

Unit 5.2 Correct Body Postures

Unit 5.3 Correct Lifting, Loading, 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. Practise the correct lifting, loading, unloading and handling procedures

Unit 5.1 Safe Lifting Practices

- Unit Objectives



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

1. Practice different safe lifting procedures

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 5.2 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

5.2.1 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.

5.2.2 Maintain correct body posture while standing and working for long hours and carrying heavy materials

While prescribing the correct body postures for cabinet makers, 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 5.2.2.1: Correct posture of working (always wear safety jackets)



Fig 5.2.2.2: Don't work with a broken ladder

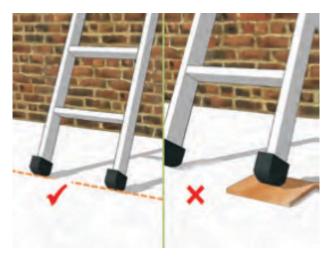


Fig 5.2.2.3: Place the ladder correctly while working with it

Working with Hand Tools





Fig 5.2.2.4: Proper technique of working with hand tools (use clamps)

Proper Technique of Lifting

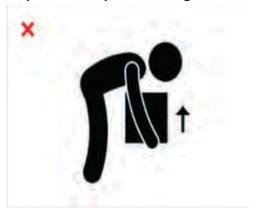




Fig 5.2.2.5: Improper way of lifting (may cause back injury) Fig 5.2.2.6: Proper technique of lifting

Personal Safety Practices

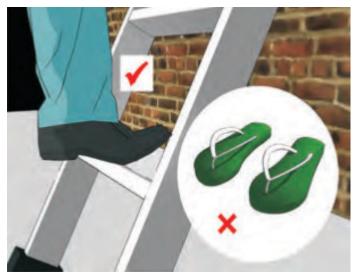


Fig 5.2.2.7: Wear safe boots, don't wear sandals or slippers

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Unit 5.3 Correct Lifting, Loading, 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

5.3.1 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

5.3.2 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 5.2.3.1: Steps of lifting weight (from the left)

5.3.3 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 cabinet maker needs to apply pressure. For example, in assembling, joining parts with nails and adhesives is an essential task. A cabinet maker 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 5.2.3.2: Always wear PPE while working with tools



Fig 5.2.3.3: While working with power tools, don't plug in the tools haphazardly



Fig 5.2.3.4: Wear PPEs; not wearing PPE might lead to severe acident



Fig 5.2.3.5: 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:
 - 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



State True or False:

1. Posture is the position in which one holds the body straight and upright against gravity while moving.

(T/F)

2. Tolerance is the limit of pressure that a machine can carry. (T/F)

3. Ergonomics, in simple terms, is the "science of work". (T/F)

4. In Neutral body posture, a person's body is no aligned and dis-balanced. (T/F)

5. A hack saw should be adjusted in the frame to prevent buckling and breaking. (T/F)









6. Common Issues,TroubleshootingKnowledge andMethod of Inspection

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



- 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

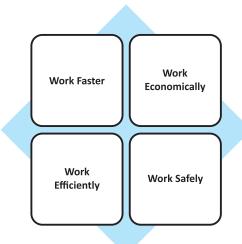


Fig. 6.1.1: The 4 aspects of successful Troubleshooting

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.
- 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.
- Determine if the symptom has developed gradually or drastically.
- o 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.
- 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.
- 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
- 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
- Cracks or scratches on the furniture
- Breakage of backrest/ handle/ foot rest
- Plywood malfunction
- 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 cabinet maker 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 cabinet maker 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 |
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Unit 6.2 Method of Conducting Visual Inspection for any Errors or Damages

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
- 2. 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)
 - Discolouration, Staining and Tainting
 - o Improper and inadequate Finishing
 - Scratches
 - Mismatched and misfit parts
 - Warping
 - Blistering
 - Other defects
- Conducting Stability and Usage Inspection like:
 - Load Tests
 - Impact Tests
 - 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:

| FIII | ill in the blanks: | |
|------|---|-------------------------|
| 1. | Troubleshooting is a approach to solve p | roblems. |
| | a) Aggression b) Sy | estematic |
| | c) Conformation deviation | |
| | | |
| 2. | is the technique of fixing slices of | wood together. |
| | a) Veneering b) Sy | estematic |
| | c) Adhesive | |
| | | |
| 3. | . Packing foam is used as thearound th | e deliverable item. |
| | a) First protective layer b) Su | upplement |
| | c) Head start | |
| | | |
| 4. | a roll or sheet of lamination plastic u | used to wrap furniture. |
| | a) Lamination plastic b) Ca | arbon paper |
| | c) Plastic | |
| | | |
| 5. | . Corner binder is used to protect the of | the furniture. |
| | a) Paint b) C | orners |
| | c) Look | |
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7. Safe Cleaning and Waste Management Practices

Unit 7.1 Importance of Good Housekeeping

Unit 7.2 Different Types of Cleaning Equipment & Substances

Unit 7.3 Safe Working Practices for Cleaning and their Methods

Unit 7.4 Common Types of Waste and Contaminants in Workplace

Unit 7.5 Effects of Contamination on Products

Unit 7.6 Different Ways of Minimizing Waste

Unit 7.7 Know-How of Cleaning 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
- 2. 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 7.1 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:

- 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:

- 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
- 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 7.1.1: Do not stack the waste material at a place; dispose it regularly



Fig 7.1.2: Do not store the waste material digging a hole



Fig 7.1.3: Good housekeeping is an essential thing



Fig 7.1.4 Always keep the tools at a safe place



Fig 7.1.5: Use waste bins to collect and dispose the waste material



Fig 7.1.6: Always keep the sharp objects like nails, screws at the allotted box; don't leave them scattered

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Unit 7.2 Different Types of Cleaning Equipment & Substances

- 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:

- Cleaning Agents
- Manual Equipment
- 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 7.3 Safe Working Practices for Cleaning and their Methods

Unit Objectives



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

1. Identify the safe working practices for cleaning & 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 7.3.1: 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
- o Garnet sand
- Nickel slag
- Copper slag
- Glass (beads or crushed)
- Steel shot
- o Steel grit
- Specular hematite (iron ore)
- o Ice cubes
- Dry ice (solid CO₂)
- o Plastic bead media
- o Sponge
- 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 7.3.2: 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 7.3.3: 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 7.3.4: 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 7.4 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

7.4.1 Common types of waste in the workplace

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



Fig 7.4.1.1: 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 7.4.1.2: 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 7.4.1.3: Metal Waste

7.4.2 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 7.5 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 7.6 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.

7.6.1 Use materials to minimize waste

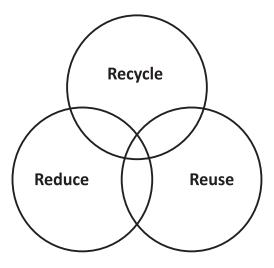


Fig 7.6.1.1: The 3 Rs of Waste Minimization

- **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.

- 7.6.1 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 7.7 Know-How of Cleaning 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 cabinet maker 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 cabinet maker 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.

- 7.7.1 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:
 - Paint
 - 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:
 - Thermometers
 - Paints
 - Metal halide lamps
 - 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
 - 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 cabinet maker 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 🔯



State True or False:

| 1. | Only designated areas, outside and far from the main work area, must be allowed for smoking. | (T/F) |
|----|---|-------|
| 2. | Detergents and soaps are not required because pure water removes oily, organic soiling. | (T/F) |
| 3. | Washing Soda is useful for emulsifying grease on drainpipes. | (T/F) |
| 4. | $Abrasive\ Blasting\ is\ used\ in\ removing\ bulk\ material\ and\ contaminants\ from\ a\ given\ surface.$ | (T/F) |
| 5. | Acoustic Cleaning involves the use of heat waves. | (T/F) |
| 6. | Avoid cleaning up chemical spills using Steam Cleaners. | (T/F) |











8. Work Effectively with Others

Unit 8.1 Work Effectively with Others

Unit 8.2 Importance of Effective Communication and Establishing Good Working Relationships

Unit 8.3 Prepare and Organize Work

Unit 8.4 Decision Making

Unit 8.5 Problem Solving

Unit 8.6 Manage Anger and Stress

Unit 8.7 Manage Time

Unit 8.8 Set Goals for Oneself and the Team

Unit 8.9 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 8.1 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

8.1.1 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 cabinet maker 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 cabinet maker 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

- o 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 cabinet maker 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

- A cabinet maker must be an excellent team player, because it is practically impossible to accomplish a project or task without proper synchronization.
- 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.
- 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

- o Appreciation for other team members works as "Positive Reinforcement", i.e. it encourages and rewards them for their performance and contribution towards the project.
- 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 cabinet maker must have, since a cabinet maker must interact with innumerable clients in daily life.
- A client may have several doubts and queries, which the cabinet maker must listen proactively and clarify politely.
- o By responding politely to all queries of clients, a cabinet maker 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 cabinet maker. Respecting diversity implies that Customer Centricity should be practised, irrespective of the customer's background. A cabinet maker 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.
- 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.

8.1.2 Responsibilities and objectives of the role

A cabinet maker has a standard set of responsibilities and objectives, which sometimes may vary between organizations. Although covered in previous sections of the handbook, let us recapitulate the responsibilities and objectives of the role of a cabinet maker.

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.

8.1.3 Own roles and responsibilities

Apart from the responsibilities related to the job role, a person working or aspiring to work as a cabinet maker 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

8.1.4 Importance of having correct understanding of work task and objective

A cabinet maker 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 cabinet maker 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

8.1.5 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

8.1.6 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 cabinet maker 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 | | |

8.1.7 Reporting procedure in case of deviations

Like any other job role, in any other industry, a cabinet maker 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

8.1.8 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
- 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.

8.1.9 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

8.1.10 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
 - Physical, mental and sexual harassment
 - o Impossible targets
 - o Unrealistic demands and unjust criticism
 - Stalking
 - Bullying

8.1.11 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.
- Avoiding Wastage A cabinet maker 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 8.2 Importance of Effective Communication and Establishing Good Working Relationships

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

8.2.1 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 cabinet maker, 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

8.2.2 Various components of communication cycle

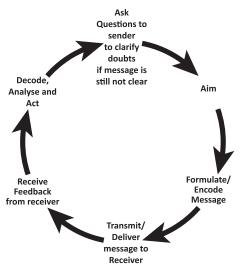


Fig. 8.2.2.1: The Communication Cycle

8.2.3 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

8.2.4 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

8.2.5 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

8.2.6 Different type of people that one is required to communicate and coordinate within the organization

A cabinet maker 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:

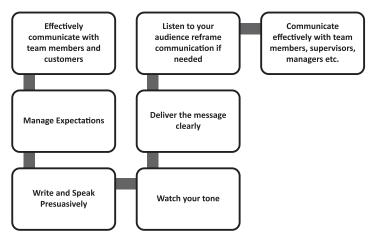


Fig. 8.2.6.1: Elements of Effective Communication

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

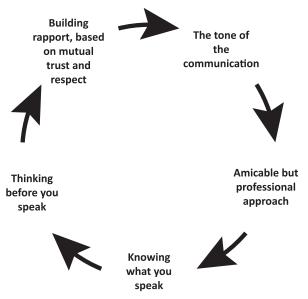


Fig. 8.2.6.1: Elements of Effective Communication

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 cabinet maker 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

8.2.7 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 cabinet maker)

- 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.

8.2.8 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.

8.2.9 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

8.2.10 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 cabinet maker. A cabinet maker 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 cabinet maker

- The role and responsibilities of a cabinet makers 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 cabinet maker

- The role and responsibilities of a cabinet maker 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 cabinet maker, 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 8.3 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

8.3.1 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.

8.3.2 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

8.3.3 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 8.4 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

8.4.1 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 cabinet maker, 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

8.4.2 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 8.5 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 cabinet maker for solving problems at workplace

8.5.1 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

8.5.2 Strategies adopted by a cabinet maker 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 8.6 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

8.6.1 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

8.6.2 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

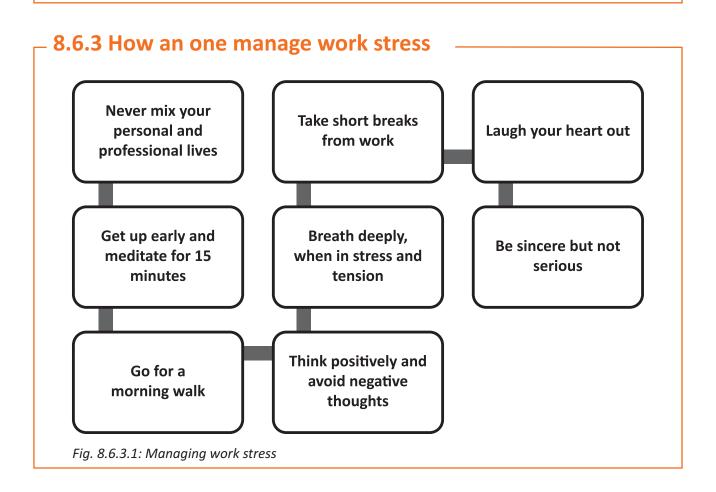
B. Mind

- 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 8.7 Manage Time

- Unit Objectives



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

1. Explain the importance of managing time

8.7.1 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 8.8 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

8.8.1 Meaning of goal setting

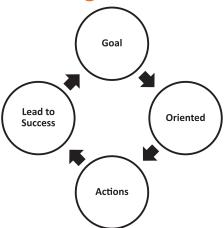


Fig. 8.8.1.1: Goal Setting

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

8.8.2 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.

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Unit 8.9 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

8.9.1 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 |

8.9.2 Reading and interpreting 2D / 3D drawings

The job of a cabinet maker 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.
- 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
- 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.
- o This proportion is usually 1:2 ratio.
- The Engineering Scale is used, which incorporates a ratio, where one has to follow multiples of 10.

Reading the Title Block

- 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.
- 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

- 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.
- o 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
- 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
- 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

- View the drawing itself, regardless of the dimensions, trying to visualise how and what the assembly looks like in 3D.
- 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.
- o Find out the notes that have arrows pointing towards the assembly. These information are extremely vital to the assembly and its functionality.
- 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.
- o 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 cabinet maker must not be read casually.
- o Instead, all sections and preferably every word must be read and understood diligently.
- This helps the cabinet maker and the other team members to fully understand and interpret the client's requirements and the specifications of the work piece or job.
- This is an important step in the project / assignment since it eliminates chances of miscommunication.

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Summary



- A cabinet maker must work effectively with the other members in the team to achieve the common organizational goals and targets.
- A cabinet maker, 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 cabinet maker has to fulfill few roles and responsibilities on a personal front.
- A cabinet maker must understand the client's requirements thoroughly and have appropriate and correct understanding of the work task.
- A cabinet maker 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 🕝 -



| Fill ir | the Blanks | | |
|--------------|--|---------|--|
| 1. 1 | Non-compliance or Non-conformity occurs | throu | igh Protocol Violations and |
| á | a) Aggression | b) | Protocol Deviations |
| (| c) Conformation deviation | | |
| A: Pr | otocol Deviations | | |
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| 2. | communication inv | olves | the use of language spoken verbally or orally to |
| (| convey messages. | | |
| á | a) Oral | b) | Physical |
| (| c) Grievance | | |
| A: Or | al | | |
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| 3. <u> </u> | , according to the Dictionar reated unfairly". | y, is ' | 'a complaint or a strong feeling that one has been |
| â | a) Grievance | b) | Conformity |
| (| c) Complaint | | |
| A: Gr | ievance | | |
| | | | |
| 4) | TAT adherence and quality assurance are im | porta | ant aspects of |
| â | a) Time management | b) | Project management |
| (| c) Company management | | |
| A: Pr | oject management | | |
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Glossary -

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.

D

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.

I

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.

K

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.

М

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.

Marquetry - 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.

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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)











9. Employability and Entrepreneurship Skills

Unit 9.1 Personal Strength & Value System

Unit 9.2 Digital Literacy: A Recap

Unit 9.3 Money Matters

Unit 9.4 Preparing for Employment & Self Employment

Unit 9.5 Understanding Entrepreneurship

Unit 9.6 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 9.1 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
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- 9. Explain the importance of self-analysis
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- 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
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- 20. Discuss how to foster a good work ethic
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- 25. Describe effective time management technique
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- 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

9.1.1 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 | Chandra and the many site | |
|---|-------------------------|--|-----------------|
| | 6. - | Stand more than you sit. | |
| | 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. | |
| | | | |
| — What is Hygiene ——————————————————————————————————— | | | |
| | | per the World Health Organization (WHO), "Hygiene refers to conditions and practices | that |
| | hel _l ens | p to maintain health and prevent the spread of diseases." In other words, hygiene more than the spread of diseases. In other words, hygiene more than the spread ing serms and diseases. chances of spreading germs and diseases. | eans |
| | kitc ove | instance, think about the kitchen in your home. Good hygiene means ensuring that then is always spick and span, the food is put away, dishes are washed and dustbins are reflowing with garbage. Doing all this will reduce the chances of attracting pests like rackroaches, and prevent the growth of fungus and other bacteria, which could spread disc | e not its or |
| | Hov | How 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. | |
| | | e how healthy and hygienic you are, by giving yourself 1 point for every ticked staten en take a look at what your score means. | nent! |
| | You | ır Score | |
| | | /20: You need to work a lot harder to stay fit and fine! Make it a point to practice soits 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 hab ir daily routine. | its to |
| | 14- | 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!

9.1.2 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



- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

9.1.3 Self Analysis - Attitude, Achievement Motivation: What is Self-Analysis

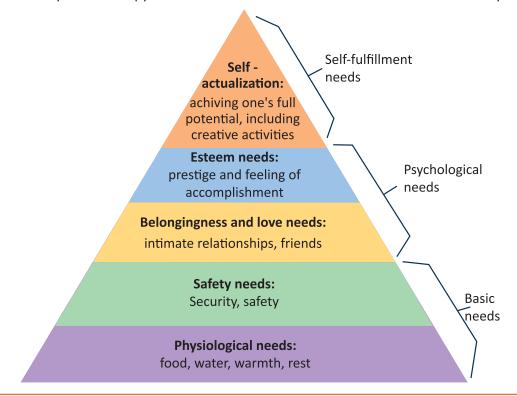
To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within 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!

| Strengths | Weaknesses | |
|-----------|------------|--|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

9.1.4 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.

9.1.5 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.

9.1.6 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.

9.1.7 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.

9.1.8 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
- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do
- 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 9.2 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

9.2.1 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



- 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.

9.2.2 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.

8.2.3 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 9.3 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

9.3.1 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.

9.3.2 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.

9.3.3 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.

9.3.4 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.

9.3.5 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 9.4 Preparing for Employment & Self Employment

Unit Objectives



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

- 1. Discuss the steps to prepare for an interview
- 2. Discuss the steps to create an effective Resume
- 3. Discuss the most frequently asked interview questions
- 4. Discuss how to answer the most frequently asked interview questions
- 5. Discuss basic workplace terminology

9.4.1 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.

9.4.2 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.

9.4.3 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.

9.4.4 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 9.5 Understanding Entrepreneurship

Unit Objectives



- 1. Discuss the concept of entrepreneurship
- 2. Discuss the importance of entrepreneurship
- 3. 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

9.5.1 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.

9.5.2 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.

9.5.3 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.

9.5.4 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

9.5.5 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

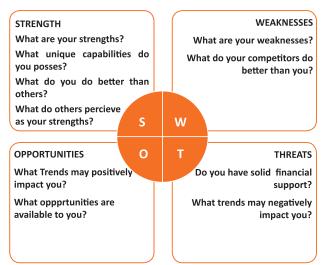
If you already have a product in mind, think about ways to set it apart from the existing ones.

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.

9.5.6 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.

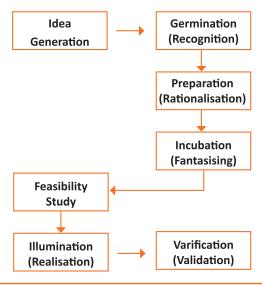
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

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.

property rights, and labour Public capital markets Venture capital funds contract enforcement, Research institutes Private equity Innovation, creativity, experimentation e.g. Bankruptcy, Venture-friendly Tolerance of risk, mistakes, failure legislation Wealth generation for founders Debt Social status of entrepreneur International reputation Ambition, drive, hunger Zero-stage venture friends and family Visible successes Wealth creation Financial Capital **Success Stories** Angel investors, Societal norms e.g. for R&D, jump start funds Micro-loans e.g. Investment, support capital Regulatory framework Financial support e.g. Tax benifits Government Institutions friendly association incentives Finance Culture Entrepreneur- Entrepreneurship Conferences **Non-Government Institution Entrepreneurship** urgency, crisis and challenge Supports **Policy** Entrepreneurship strategy Open door for advocate Unequivocal support promotion in **Business plan** non-profits Social legitimacy contests Market Human Capital Leadership Zones, incubation centers, clusters **Support Professions** Multinational corporations Investment bankers Entrepreneure's networks Transportation & logistics General degrees (professional and academic) Later generation family Serial entrepreneures Early adopters for proof-of-concept Skilled and unskilled Diaspora networks Telecommunications Accounting Specific entrepreneurship training Infrastructure Expertise in productizing **Networks** Distribution channels Reference customer Labour Energy **Educational Institutions Early Customers** First reviews

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
- b. 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.

9.5.7 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.

9.5.8 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 9.6 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

14.6.1 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.

9.6.2 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:
 - Simple Transactions Usually a single transaction between a vendor and a customer.
 For example: Buying a cup of coffee.
 - Ocomplex Transactions These transactions go through a number of events before they can be completed. For example: Buying a house.
 - 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

9.6.3 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:
 - Increased sales
 - Identification of customer needs
 - 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

9.6.4 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.

9.6.5 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.

9.6.6 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.



- 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.

9.6.7 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.



- 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.

9.6.8 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!



- 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.

8.6.9 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



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