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Construction Skill Development Council

Participant Handbook

Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Construction Painting

Reference ID: **ID: CON/Q0503, Version 4.0**
NSQF Level 3.5

Construction Painter and Decorator

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Disclaimer

"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

Shri Narendra Modi
Prime Minister of India

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Certificate

COMPLIANCE TO

QUALIFICATION PACK- NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CONSTRUCTION SKILL DEVELOPMENT COUNCIL OF INDIA

for

SKILLING CONTENT:PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/Qualification Pack:'Construction Painter and Decorator'

QP No.' CON/Q0503, Version 4.0 NSQF Level 3.5'

Date of Issuance: Aug 16th 2019
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Authorised Signatory
(Construction Skill Development Council)

Acknowledgements

This participant's handbook meant for Construction Painter and Decorator is a sincere attempt to ensure the availability of all the relevant information to the existing and prospective job holders in this job role. We have compiled the content with inputs from the relevant Subject Matter Experts (SMEs) and industry members to ensure it is the latest and authentic. We express our sincere gratitude to all the SMEs and industry members who have made invaluable contributions to the completion of this participant's handbook.

This handbook will help deliver skill-based training in the field of construction painting. We hope that it will benefit all the stakeholders, such as participants, trainers, and evaluators. We have made all efforts to ensure the publication meets the current quality standards for the successful delivery of QP/NOS-based training programs. We welcome and appreciate any suggestions for future improvements to this handbook.

About this book

This participant handbook has been designed to serve as a guide for participants who aim to obtain the required knowledge and skills to undertake various activities in the role of a Construction Painter and Decorator. Its content has been aligned with the latest Qualification Pack (QP) prepared for the job role. With a qualified trainer's guidance, the participants will be equipped with the following for working efficiently in the job role:

- Knowledge and Understanding: The relevant operational knowledge and understanding to perform the required tasks.
- Performance Criteria: The essential skills through hands-on training to perform the required operations to the applicable quality standards.
- Professional Skills: The ability to make appropriate operational decisions about the field of work.

The handbook details the relevant activities to be carried out by a Helper Mason. After studying this handbook, job holders will be adequately skilled in carrying out their duties according to the applicable quality standards. The handbook is aligned with the following National Occupational Standards (NOS) detailed in the latest and approved version of Helper Mason QP:

Compulsory NOS:

- CON/N0505: Apply OBD, acrylic and emulsion paints on various finished masonry surfaces
- CON/N0506: Apply paint on metallic/structural steel fabricated assemblies
- CON/N0507: Apply, paint ,varnish & polish on wooden windows, doors, partitions, panels & other wooden surfaces
- CON/N0510: Carry out minor repair of various painting faults
- CON/N8001: Work effectively in a team to deliver desired results at the workplace
- CON/N8002: Plan and organize work to meet expected outcomes
- CON/N9001: Work according to personal health, safety and environment protocol at construction site
- DGT/VSQ/N0102: Employability Skills 60 Hours

The handbook has been divided into an appropriate number of units and sub-units based on the content of the relevant QP. We hope it will facilitate easy and structured learning for the participants, allowing them to obtain enhanced knowledge and skills.

Symbols Used


Key Learning Outcomes


Exercise


Notes


Unit Objectives


Activity

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It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed https://www.skillindiadigital.gov.in/content/list

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1. Introduction to the Job Role of a Construction Painter and Decorator

Unit 1.1 Introduction to Construction Painting

Unit 1.2 Role and Responsibilities of a Construction Painter and Decorator

Key Learning Outcomes

By the end of this module, participants will be able to:

- Explain role and responsibilities of construction painter and decorator.
- Explain expected personal attributes required from this job role.
- Explain about course content, mode of learning and duration of course.
- Discuss future possible progression and career options for construction painter and decorator.

Unit 1.1 Introduction to Construction Painting

Unit Objectives

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

- Give an overview of the construction sector.

1.1.1 Construction Industry

The construction industry is the oldest and one of the largest in the world, with a market size of over 10 trillion dollars. Construction has traditionally been a contracting sector, and the industry consists of a huge number of small businesses. Currently, the building industry is one of the main economic sectors. It contributes significantly to the national economy and employs a substantial number of people. The construction industry contributes significantly to the growth and enhancement of the economy while also playing a pivotal role in the overall development of the nation. Construction activities hold a crucial position in shaping a country's infrastructure and industrial progress. Construction encompasses the creation of various structures such as hospitals, schools, residential areas, office complexes, houses, along with essential facilities like water supply, sewerage, drainage systems, as well as the construction of transportation networks like highways, roads, ports, railway tracks, and dams. When we consider its broad scope, construction activity emerges as a fundamental catalyst for socio-economic advancement. Notably, construction stands as the second largest employment-generating sector in India, following agriculture. This sector comprises a diverse range of businesses, including small, medium, and large enterprises, all engaged in different types of projects. As a result, a varied workforce is required to meet the demands of this sector. Construction industry is broadly divided into two major sub-sectors: -

1. Real estate & infrastructure construction; and
2. Rural construction

1.1.2 Real Estate & Infrastructure Construction

Only 30% of India's population resides in urban areas. According to the latest projections from the Government of India, urban development in the country is poised to surge at an impressive rate of 38%. The existing Indian urban infrastructure and services, established during the British colonial era, are ill-equipped to adequately address such burgeoning demands.

Fig 1.1.1 Township construction

Fig 1.1.2 Bridge construction

Approximately INR (Rs.) 43,55,000 crores is projected to be necessary for urban development over the upcoming two decades. A significant portion of this amount, nearly 45%, is earmarked for the construction of urban roadways. The Twelfth Five Year Plan outlines that 48% of these funds are

expected to originate from private sources, capitalizing on various national policy initiatives designed to restore investor confidence. To expedite the pace of urban development throughout the nation, the government has undertaken various measures, allocating a substantial sum of INR (Rs.) 13,400 crores under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Additionally, for the enhancement of small and medium-sized towns, the government has launched the Urban Infrastructure Development Scheme, involving an investment of INR (Rs.) 6,700 crores, aimed at addressing the infrastructural requirements of these smaller urban centers.

Government initiatives under urban development

Through the implementation of the 'City Challenge Competition,' a subset of Smart Cities (as part of the Smart Cities Mission, encompassing fewer than 100 cities) will be designated based on their ability to align funding with their capacity to achieve multifaceted goals in urban infrastructure development. These objectives include ensuring access to clean and safe water sources, effective sanitation and solid waste management, streamlined and effective

Fig 1.1.3 Building construction site

Fig 1.1.4 Industrial Building construction site

public transportation, accessible housing options for marginalized populations, efficient power distribution, robust IT connectivity with a specific focus on e-governance and citizen engagement, as well as prioritizing the well-being, safety, and security of residents, along with promoting healthcare, education, and fostering a sustainable urban environment.

- The Swachh Bharat Mission (SBM) is aimed at eradicating open defecation, implementing scientific municipal solid waste management, eliminating manual scavenging, and fostering a shift in behavior towards healthy sanitation practices.
- The expansion of heritage cities focuses on improving the quality of life with a strong emphasis on hygiene, waste management, tourism, heritage preservation, and maintaining the essence of the city's identity.
- The Indian Government plans to establish several new airports in the upcoming years to enhance local connectivity.
- The Sagarmala project is launched to develop India's ports and inland waterways, promoting port-led growth and industrialization along the coastlines. The project entails an investment of INR 670 billion.
- The Indian Government has allocated Rs 50,000 crore for the development of 100 smart cities across the country. A list of 98 cities was shortlisted for the smart cities project in August 2015.
- Ambitious road network projects are underway, including the expansion of the road network by 2020 and the construction of 15,000 kilometers of new roads by 2017.
- The Sagarmala project is launched to develop India's ports and inland waterways, promoting port-led growth and industrialization along the coastlines. The project entails an investment of INR 670 billion.

- The Indian Government has allocated Rs 50,000 crore for the development of 100 smart cities across the country. A list of 98 cities was shortlisted for the smart cities project in August 2015.
- Ambitious road network projects are underway, including the expansion of the road network by 2020 and the construction of 15,000 kilometers of new roads by 2017.

Various Indian railway initiatives have been initiated, encompassing the establishment of new railway stations, high-speed rail networks, modernization of rolling stock, improved port-rail connectivity, and other measures aimed at enhancing railway development and connectivity.

1.1.3 Rural Construction

Rural Construction: This sub-sector aims at the constructional requirements of rural India and Construction of rural households, warehouses, village roads etc.

Fig 1.1.5 Rural roads

Fig 1.1.6 Rural house

Rural infrastructure serves as a vital component of both rural growth and a sustainable strategy for poverty alleviation. The proper development of infrastructure in rural areas not only enhances the rural economy but also plays a crucial role in supporting effective poverty reduction initiatives. By strategically expanding infrastructure in rural regions, we can bolster the rural economy and elevate the overall standard of living. This approach contributes to increased productivity, higher agricultural incomes, improved employment opportunities, and various other positive outcomes.

Government initiatives under rural development

- The Bharat Nirman initiative is dedicated to enhancing rural connectivity across diverse geographical landscapes in India, encompassing coastal, mountainous, backwater areas, tribal regions, plains, hills, deserts, swamps, and more, spanning over 6 lakh villages.
- Central to the Bharat Nirman initiative is the construction of rural housing, with the government committed to providing adequate housing for rural communities.
- The Pradhan Mantri Gram Sadak Yojna (PMGSY) is designed to ensure road connectivity to every village, making it a cornerstone of rural infrastructure development.
- Facilitating the transfer of technology from the workshop to the field, including the dissemination of information on the cost-effective and environmentally friendly (CEEF) construction of buildings in both rural and urban areas.

- The improvement and elevation of workforce skills are emphasized, creating a skilled pool of individuals capable of undertaking various construction services in both rural and urban contexts.

1.1.4 Types of Construction:

a. Building construction:

Building construction is the act of adding a structure to the undeveloped ground and adapting it for various uses, including residences, commercial buildings, garages, etc. The bulk of building construction projects involve minor improvements, such as adding a room, renovating a bathroom, enhancing a porch, etc.

There are differences between building construction projects, but there are some aspects and procedures that are universal. For example: design considerations, a budgetary estimate, and ethical and legal factors.

In the case of commercial building construction, multiple strategies are utilised. They consist of Design & Build, Cost Estimating, Competitive Bidding, Contract Management, Construction Management, and Design-Build Bridging.

The governments of all states and nations have enacted laws and regulations governing the construction of both commercial and residential buildings. During the designing and building processes, these norms and regulations must be properly adhered to. The materials required for the construction process should be readily accessible at the construction site. Brick construction is the most common technique of house construction in India.

b. Industrial Construction:

Industrial construction represents a minor portion of the construction sector. Even so, it is regarded as quite vital. Planning the layout of an industry, establishing industrial sectors, installing heavy machinery, and planning and constructing the size of an industry are the procedures involved in industrial construction.

Fig. 1.1.7 Industrial Construction Site Plan

Infrastructure, power transmission and distribution, metallurgy and material handling, medicine, petroleum, chemical, power generation, manufacturing, etc. are the primary aspects to be considered.

This form of building requires extremely specific knowledge of planning, cost estimation, design, and construction. When a large construction business launches a project, it typically assigns the task of ensuring the project's success and safety to a team. Architects and civil engineers are employed to assist in the planning of construction projects.

In this instance, construction entails the construction or assembly of infrastructure.

Large-scale building projects necessitate the completion of several jobs by a large number of individuals. Different jobs are provided to different teams. For instance, a Project Manager is

responsible for Project management, while a Construction Manager oversees Project construction. Additional examples include Design engineer, Project architect, and Financial Advisor. If a project is to be conducted successfully, the following must be ensured: Effective planning, successful scheduling, budgeting, construction site safety, availability of building materials, and logistics are essential for a successful construction project (that is transport of raw materials, etc.).

c. Infrastructure Construction

Infrastructure, often known as heavy civil or heavy engineering, consists of massive public works, dams, bridges, highways, railroads, water or wastewater systems, and utility distribution. Civil engineering encompasses the design, building, and maintenance of the physical and naturally built environment, such as roads, bridges, canals, dams, tunnels, airports, water and sewage systems, pipelines, and railways.

Fig. 1.1.8 Under Construction Bridge

The infrastructure sector is an important economic driver in India. The sector is largely responsible for driving India's overall growth, and the government has placed a great deal of emphasis on implementing laws that will expedite the establishment of world-class infrastructure in the country. The infrastructure sector consists of power, bridges, dams, highways, and the development of urban infrastructure. In other words, the infrastructure sector functions as a catalyst for India's economic growth by driving the expansion of associated industries such as townships, housing, built-up

1.1.5 Market Segment of Construction Industry

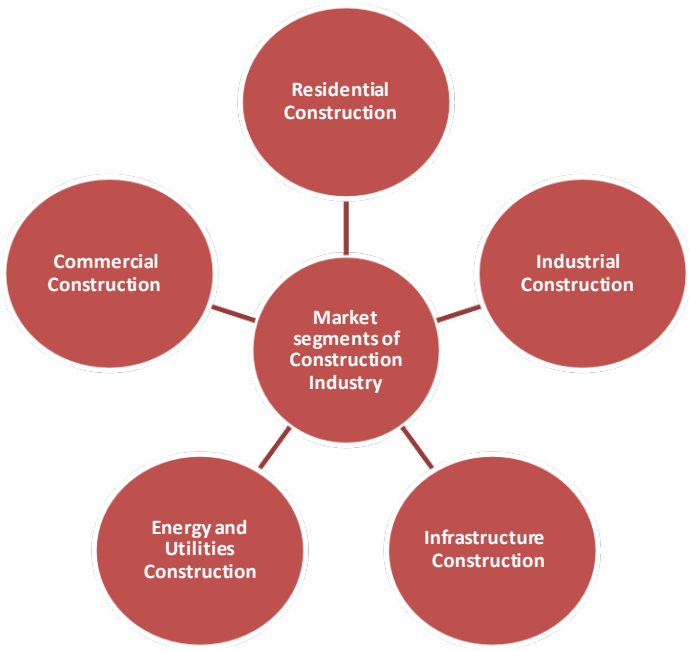

Fig. 1.1.9 Market segments of construction industry

Notes

Scan the QR code to watch the video

http://y2u.be/1WVzo2UFyo8

Types of Construction

Unit 1.2 Role and Responsibilities of a Construction Painter and Decorator

Unit Objectives

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

- Explain role and responsibilities of construction painter and decorator.
- Explain expected personal attributes required from this job role.
- Discuss future possible progression and career options for construction painter and decorator.

1.2.1 Role of a Construction Painter and Decorator

A Construction Painter and Decorator applies various kinds of paints on masonry, metal and wooden surfaces. In addition to this they also apply varnishes on the wooden surface. Preparing the surface and cleaning up after painting is also an integral part of the job

The role of Construction Painter and Decorator is further detailed as:

- Preparing old and new masonry, metal & wooden surfaces for painting works
- Selecting proper materials and tools for the task
- Apply paints, varnishes and polishes using proper procedures and operating proper tools
- Identify and rectify defects in painting

1.2.2 Responsibilities of a Construction Painter and Decorator

At any construction site, the painter plays a vital role as follows:

- Apply paint to various surfaces like metal, wood or masonry
- Mix, match, and apply paint, varnish, shellac, enamel and other finishes.
- Scrape, prime, or seal surfaces prior to painting.
- Clean walls to ensure proper adherence.
- Cover surfaces with cloth or plastic to ensure protection.
- Calculate amounts of required materials and estimate costs.

- Remove fixtures such as pictures, doorknobs, lamps and electric switch covers prior to painting.
- Apply several coats according to paint directions.
- Apply touch-ups or second coats.
- Remove paint splatters when finished.
- Clean up all equipment, including brushes and spray guns.
- Work on ladders to reach high ceilings or walls.

1.2.3 Personal Attributes for Job Role of Construction Painter and Decorator

A construction painter and decorator in addition to his skills should also possess certain personal attributes such as:

- Ability to work in a well-organized and accurate manner;
- Awareness of safety issues, especially when working at heights;
- Ability to work as a part of team;
- A good level of fitness;
- Awareness of personal hygiene;
- Hard working and reliable;
- Courteous and dedicated;
- Good Communication Skills.

1.2.4 Career Progression of Construction Painter and Decorator

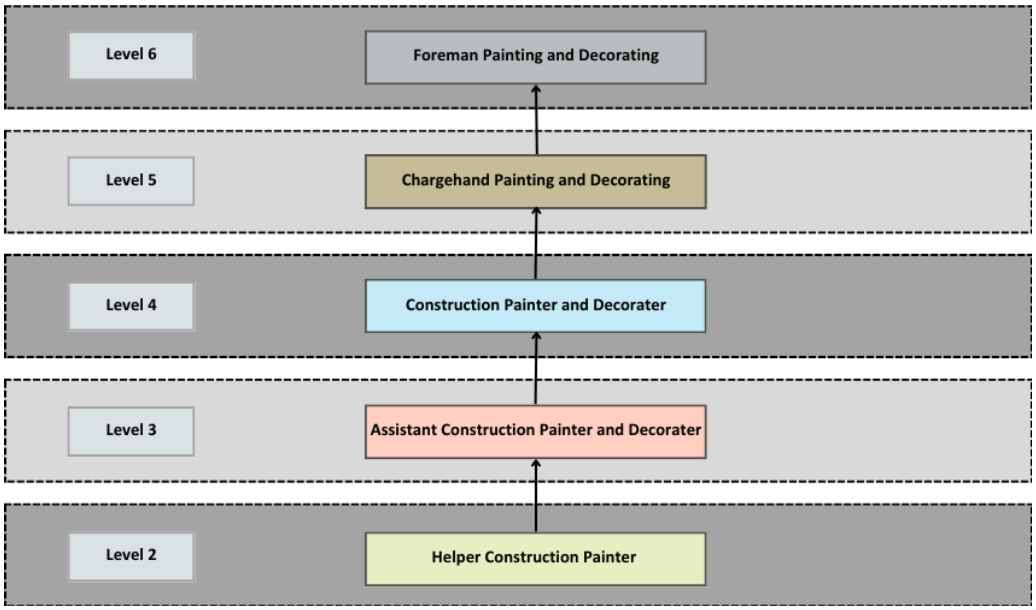

Fig 1.2.1 Career progression for painting and decorating occupation

Exercise

Answer the following questions.

- Show the career path of a Construction Painter and Decorator.
- What are the roles and responsibilities of a Construction Painter and Decorator?
- State few personal attributes required by Construction Painter and Decorator.
- What are the different types of construction? Name them.

Notes

Scan the QR code to watch the video

http://y2u.be/MkRhIoyXfl8

Role of a Construction Painter and Decorator

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2. Core/Generic Skills

Unit 2.1 – Basic principles of measurement, geometry and arithmetic calculation

(CON/N0505)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Apply the basic principles of measurement, geometry and arithmetic calculation relevant to painting work.
- Roughly estimate paint requirement by measuring the surface.

Unit 2.1 Basic Principles of Measurement, Geometry and Arithmetic Calculation

Unit Objectives

By the end of this unit, participants will be able to:

- Apply the basic principles of measurement, geometry and arithmetic calculation relevant to painting work.
- Roughly estimate paint requirement by measuring the surface.

2.1.1 Different System of Measurement

There are two systems of measurement used are:

1. **Metric MKS system; and**
2. **Inch/FPS system.**

Metric System	Inch System
i. It is based on meter as the standard unit of measurement. ii. A meter contains 10 equal parts called a decimeter. iii. Decimeter is divided into 10 parts called centimeters and a centimeter is divided into 10 parts called millimeters. iv. Most usually used system of measurement in the world	i. It is based on the foot as the standard unit of measurement. 1. A foot is divided into 12 similar parts called inches. 2. Inch system does not have the decimal based benefit of the Metric System. 3. Fractions of foot cannot be written as decimal inches. 4. For example, in the metric system, 5 millimeters = 0.5 centimeters = 0.05 decimeters = 0.005 meters. But 5 inches = 0.416667 which is feet = 0.138889 yards and so on.

Table 2.1.1 Difference between metric and inch system

2.1.2 Measurement System

This system is much easier. It consists of a series of basic units corresponding to mass, distance and volume and utilizes prefixes to denote multiples of units being used.

Basic Unit	Measuring
Metre/meter	Distance
Kilogram	Mass
Litre/liter	Volume

Table 2.1.2 Basic metric system unit

Prefix	Symbol	Number
Giga-	G	1,000,000,000
Mega-	M	1,000,000
Kilo-	K	1,000
Hecto	H	100
Deca-	D	10
(none)		1
Deci-	D	0.1
Centi-	C	0.01
Milli-	M	0.001

Table 2.1.3 Metric system units prefix and their meaning

2.1.3 Inch System

Length or distance

Lengths and distances are measured in inches, feet, yards and miles: 12 inches = 1 foot

3 feet = 1 yard

1760 yards = 1 mile

2.1.4 Conversion between Metric and Inch Systems

There are various approximations used for conversion of units. For example:

- 1 meter is approximately equal to 1 yard.
- 1 mile is approximately equal to 1.5 KM's and a KM is approximately equal to 2/3 of a mile.
- 2 pounds (lb) make up 1Kg.)

Weight, mass, length, volume, and temperature used for measurement conversions.

Metric to Imperial Conversion chart		
Convert	To	Multiply by:
Kilometers	Miles	0.62
Kilometers	Feet	3280.8
Meters	Feet	3.28
Centimeters	Inches	0.39
Millimeters	Inches	0.039
Liters	Quarts	1.057
Liters	Gallons	0.264
Milliliters	Ounces	0.0338
Celsius	Fahrenheit	(Temperature (C) + 32)*9/5
Kilogram	Tons	0.0011
Kilogram	Pounds	2.2046
Grams	Ounces	0.035
Grams	Pounds	0.002205
Milligrams	Ounces	0.000035

Table 2.1.4 Conversion from metric to imperial system

Imperial to Metric Conversion chart		
Convert	To	Multiply by:
Fahrenheit	Celsius	(Temperature (F) - 32)*5/9
Inches	Meters	0.0254
Inches	Centimeters	2.54
Inches	Millimeters	25.40
Feet	Meters	0.30
Yards	Meters	0.91
Yards	Kilometers	0.00091
Miles	Kilometers	1.61
Tons	Kilograms	907.18

Table 2.1.5 Conversion from imperial to metric system

2.1.5 Basic Mathematical Calculations

In construction painting works, there are several basic mathematical calculations that are commonly used to determine quantities, costs, and dimensions. Here are some of the most common calculations:

1. Area Calculation: To determine the amount of paint required, you need to calculate the surface area to be painted. For simple rectangular surfaces, one can use the formula:

   Area = Length × Width

   For more complex shapes, one may need to break them down into smaller rectangular or geometric sections and calculate their areas individually.

2. Volume Calculation: If you're painting three-dimensional objects, such as columns or tanks, you'll need to calculate the volume to estimate the paint required. The formula for the volume of simple shapes like cylinders and rectangular prisms is:

   Volume = Base Area × Height

3. Paint Coverage Calculation: Paint coverage refers to how much area a gallon of paint can cover. This depends on factors such as paint type, surface texture, and color. Generally, paint cans indicate their coverage in square feet per gallon (sq ft/gal).

4. Dilution Calculation: Sometimes, paints are diluted with water or other solvents to achieve the desired consistency. To calculate the amount of paint thinner or water needed, you can use ratios. For example, if you want to dilute a paint with a ratio of 1:4 (1 part paint to 4 parts thinner), you'd use 1 unit of paint for every 4 units of thinner.

5. Cost Estimation: To estimate the cost of paint, you'll need to know the cost per gallon of the paint you're using and the total gallons required. Multiply the cost per gallon by the number of gallons needed.

6. Tape and Masking Calculation: If you're using tape or masking materials to protect certain areas from paint, you'll need to calculate the length of tape required. Measure the length of the area to be taped and multiply by the number of sides to be taped.

7. Conversion Calculations: Sometimes, you might need to convert between different units, such as feet to meters, inches to centimeters, or gallons to liters. Make sure you're using the appropriate conversion factors.

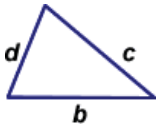
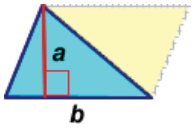
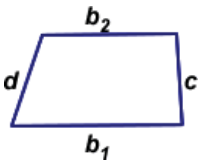
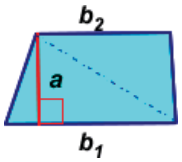
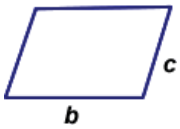
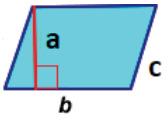
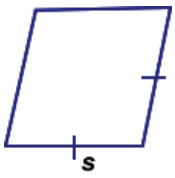
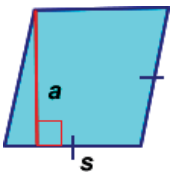
8. Gradient and Slope Calculations: If you're working with inclined surfaces, you might need to calculate gradients or slopes. The formula for calculating the slope is:

Slope = Vertical Rise / Horizontal Run

2.1.6 Area, Volume and Perimeter of Geometrical Shapes

Units	Perimeter	cm	m	ft.
	Area	cm^2	m^2	Sq. ft
	Volume	cm^3	m^3	Cub. ft

Table 2.1.6 Area, volume and perimeter units

Polygon / Circle	Perimeter(P)	Area(A)	Sides
Triangle	P = b + c + d 	A = 1/2 a x b = 0.5 a x b 	a=altitude b=base c,d=sides
Trapezoid	P = b1 + b2 + c + d 	Area = 1/2 a x (b1 + b2) = 0.5 a x (b1 + b2) 	a= altitude b1,b2=base
Parallelogram	P= 2b + 2c 	Area = b x h 	a= altitude b=base
Rhombus	P = 4s 	A= a x s 	a= altitude s=side

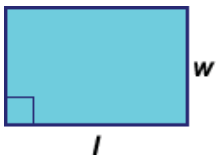
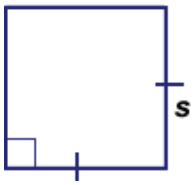
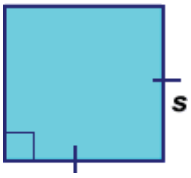
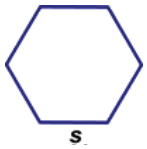
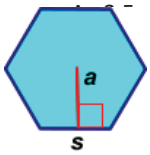
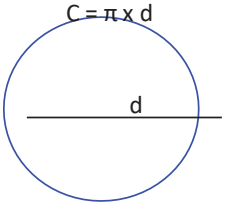
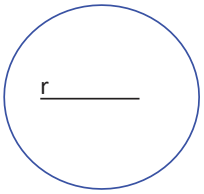
Rectangle	P = 2l + 2w 	A = l x w 	l=length w=width
Square	P = 4s 	A= s^2 	s= side length
Regular polygon Pentagon has five sides Hexagon has six sides Heptagon has seven sides Octagon has eight sides Nonagon has nine sides Decagon has ten sides	P = ns P=5s P=6s  P=10s	A= 1/2 a x n x s = 0.5a x n x s A=2.5 a x s A= 3.0 a  s A=5.0 a x s	a = length s = side length n = No. of sides n=5 n=6 n=7 n=8 n=9 n=10
Circle	C = Circumference C = π x d 	A = Area A = π x r2 	r= radius of circle d= diameter of circle

Table 2.1.7 Area and Perimeter of Geometrical Shapes

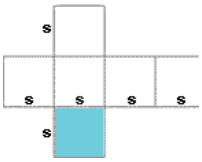
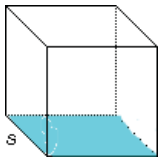
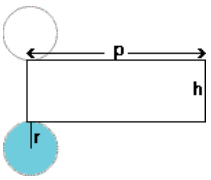
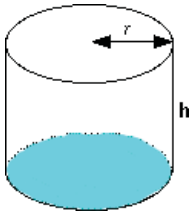
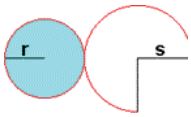
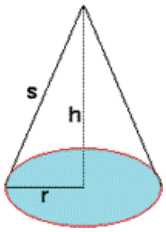
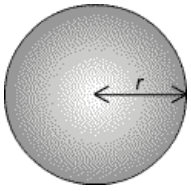
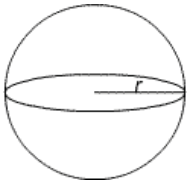
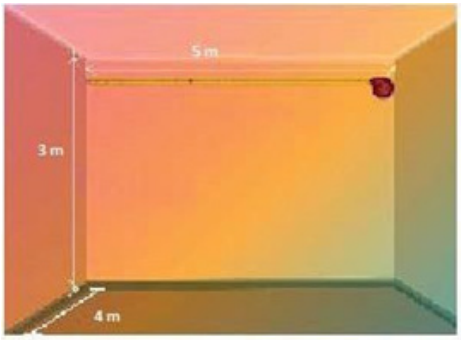
Geometric Shape **B** = area of the **b**ase **P** = **p**erimeter of the base	**Surface Area**	**Volume**	**Sides**
Cube **s** = side length	A = 2B + Ph SA = $2(s^2) + (4s)s = 6s^2$ 	Volume = Bh Volume = s^3 	**s** = side length
Cylinder	SA = $2(\pi r^2) + (2\pi r)h$ 	V = Bh V = $\pi r^2 h$ 	**B** = area of base **P** = perimeter of base **r** = radius of base **h** = height
Cone	SA = $\pi r^2 + \pi rs$ 	V = 1/3 B x h = 0.33 B x h 	**B** = area of base r = radius of base h = height of cone
Sphere	SA = $4\pi r^2$ 	V= 4/3 πr^2=1.33 πr^2 	**r** = radius of circle

Table 2.1.8 Volume of Geometrical Shapes

2.1.7 Measurement of Paint Area and Paint Requirement

Before beginning painting ceiling, walls, woodwork, windows or doors, one need to estimate the amount of paint. Considering the following:

1. Width of the room = 4m or 4000mm
2. Length of the room= 5m or 5000 mm
3. Height of the room = 3m or 3000mm
4. Height of door = 2.1m or 2100mm
5. Width of door = 1m or 1000 mm
6. Height of window = 1.5m or 1500mm
7. Width of window = 1m or 1000mm



Now to compute the quantity of paint required for painting of 1 coat, we must obtain the area on which the paint is to be applied.

Thus

1. Area of long walls = length x width
   = 3m x 5m= 12m2
2. Area of short walls = 4m x 5m = 20 m2
3. Total area of 4 walls = (2 x 15) + (2 x 12) m2
   = 30 + 24 m2
   = 54 m2

Now,

The door & windows need not be painted thus removing the surface area of doors & windows room the area of walls.

- Area of door = 2.1m x 1 m = 2.1 m2
- Area of 1 window = 1.5m x 1m = 1.5 m2
- Total area of 1 door & 2 windows = (2.1 x 1) + (1.5 x 2) = 2.1 + 3.0 = 5.1 m2
- Further,
- The ceiling has to be painted, thus area of ceiling = length x width of room = 5m x 4 m = 20m2

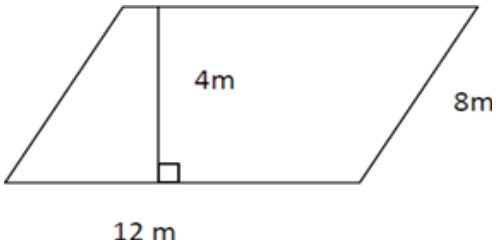
Thus,

Total area of painting = Area of 4 walls + Area of ceiling - Area of door & windows = 54 + 20 - 5.1 = 74 - 5.1 = 68.9m2

Generally an area of 10-12 m2 is covered by 1 litre of paint. Here let us assume that 1 litre paint covers 10 m2 area. Thus for 68.9 m2, we require 6.89 litres or 7 litres of paint.

Exercise

1. Explain the calculations used in construction painting works.
2. Differentiate between metric system and inch system.
3. Multiple Choice Questions
   a. What is the area of the parallelogram?



(a) 38m² (b) 42m² (c) 48m² (d) 54m²

(b) How much area is covered by 1 litre of paint?

(a) 10-12 m² (b) 5-10m² (c) 8-10m² (d) 15-20m²

(c) 1 yard=

(a) 3 feet (b) 10 feet (c) 10 foot (d) 30 feet

Notes

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http://y2u.be/oAtDAoqdExw

Different System of Measurement

http://y2u.be/efr2pFdJZco

Conversion between Metric and Inch Systems

http://y2u.be/VI1VWQywjyM

Area, Volume and Perimeter of Geometrical Shapes

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3. Painting Tools and Materials

Unit 3.1 – Tools and materials used in painting works

Unit 3.2 – Storing and handling of painting tools and materials

Key Learning Outcomes

By the end of this module, participants will be able to:

- List different painting tools (such as brushes, rollers, painting bucket, stirrers, scrapers, sand papers, putty blades, etc.)
- Select different painting materials and mixing ingredients
- Demonstrate mixing of different painting materials and mixing ingredients such as paint, primer, base colour, tint base, colorants, varnishes, enamel
- Demonstrate use of power tools to remove rust (rust scale), weld slag, flux and weld spatter

Unit 3.1 Tools and materials used in painting works

Unit Objectives

By the end of this unit, participants will be able to:

- List different painting tools (such as brushes, rollers, painting bucket, stirrers, scrapers, sand papers, putty blades, etc.)
- Select different painting materials and mixing ingredients
- Demonstrate mixing of different painting materials and mixing ingredients such as paint, primer, base colour, tint base, colorants, varnishes, enamel
- Demonstrate use of power tools to remove rust (rust scale), weld slag, flux and weld spatter

3.1.1 Tools and Accessories Required For Painting Work

Tool	Image	Use of tool
Paint brush		A paintbrush is a hand held tool which is used to apply paint or sealers to paintable surfaces.
Rollers		Paint rollers paint faster and smoother and give a good finish.
Step ladder		Enable access to elevated areas.
Sand paper		Sanding is done prior to painting to correct improper functions, remove stains and help to obtain a smooth finish.

Putty knife or scraper		To remove loose paint or to apply filler, putty knife or scraper is used.
Wire brush		The bristles are made of wire. Loose material of flaking paint from masonry can be removed using a wire brush.
Masking tape		It is also known as painters tape is used to mask off areas that should not be printed
Steel wool		Its main purpose is to remove corrosion from metal surfaces.
Paint tray		It is used to place rollers loaded with paint
Drop cloths		Paint can harm furniture, floors, and shrubbery so to protect them drop clothes is used.

Table 3.1.1 Tools and Accessories Required For Painting Work

1. Paint Brush

A paintbrush is a brush used to apply paint or sometimes liquid on a surface. It is usually formed by fastening the bristles to a handle with a ferrule.

Two things should always be kept in mind while choosing a paint brush, first what is the type of job and second one is what type of paint is required.

Generally there are three types of bristles:

Fig 3.1.1 Paint brush

- **Synthetic bristle**

Synthetic bristle is used for Water-based paints rather than solvent-based ones. It gives smooth finishes. It's a very rigid wearing bristle that soaks only a small amount of water. It won't swell up and a tramline painting is attained by using it.

- **Natural Bristle**

Natural Bristle uses solvent-based paint, permitting paint to be brushed on easily with few brush marks. It is used on skirting boards, doors and wall surfaces. Structure of this type of brush is such that it can absorb large amounts of paint and the split ends help to produce a fine finish.

- **Combined synthetic and natural bristle**

This type of brush is a mixture of synthetic and natural bristles. It can paint of any type and give a superfine finish.

a b

Fig 3.1.2 Types of Brushes: a) Synthetic and Natural Bristle Brush b) Combined Synthetic & Natural Bristle Brush

Different types of brush's sizes are available:

Brush width	Application on	Image
25mm	Cutting around glass or window frames	
50mm	Skirting boards, architraves, door frames and panel doors	
75mm	Large flush panel doors	

100mm - 150mm	Walls and ceilings	

Table 3.1.2 Types of brush's sizes

2. Paint Brush

Painting on a large surface area needs a paint roller. It completes work quickly and easily, and comes in short, medium or long stack:

1. Short pile - for fine and flat surfaces
2. Medium pile - for smooth surfaces (but can be used on walls)
3. Long pile - for very textured surfaces, or even surfaces outside the home

Other types of roller

a. Foam roller: Form rollers are used to give gloss finish to paint or varnish.

b. Radiator roller: Radiator rollers are used on a small area of a wall and those places where foam roller cannot be reached. It is also used on fixed furniture.

a b

Fig 3.1.3 Types of Rollers: a) Foam roller b) Radiator roller

3.1.2 Materials Required For Painting

Material	Image	Use of material
Paint		Paint is used to provide color and texture to masonry, wood or metal surfaces.
Primer		Primer is a preparatory coating applied to the surface prior to painting. It is used for increasing paint durability by increasing adhesion. Additionally it is used for providing protection to the surface being painted.
Putty		Putty is a cementious material, which is applied onto a plastered wall before painting. It is used as a filler or sealant to fill gaps, holes & cracks on surfaces.
Varnish		Varnish is a transparent protective material that is used as a finishing layer on wooden surface.
Wood filler		This is used to fill holes and dents on the wooden surface.
Cleaning solution		It is used to clean the masonry, metal and wooden surface before starting the painting.
Thinner		This is used to reduce the viscosity of the paint and for housekeeping purposes.

Table 3.1.3 Materials Required For Painting

Notes

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http://y2u.be/uEYcpdavZi0

Tools and Accessories Required For Painting Work

http://y2u.be/KMfhjxjCKHY

Types of Paint Brushes

Unit 3.2 Storing and handling of painting tools and materials

Unit Objectives

By the end of this unit, participants will be able to:

- Demonstrate how to store painting tools and materials properly.
- Show how to handle painting tools and material

3.2.1 Storing and handling of painting tools and materials

Because of flammability characteristics of paints, varnishes or thinner, a lot of care is needed for handling and storing.

- Store paints, varnishes, thinners, etc. according to their flammability characteristics. Paints of the quantity that can be used in maximum one day should be stored.
- The storage area where the paints are stored should be properly ventilated in order to avoid accumulation of flammable vapours

Fig 3.2.1 Storage of painting material

- The areas of paint storage and application must be free from any and all sources of ignition such as open flames, smoking etc.
- At the end of each workday or at the end of each work shift always collect, store, and remove combustible waste products. The waste and residue should always be disposed in closed containers made from metal or any other material that will not catch fire easily. All waste and residue including spills should be removed on high priority as they pose a danger of fire hazard.

- Keep floors clear of tools and portable equipment to avoid injury. Always secure tools, materials and equipment where a tripping hazard exists.
- Make sure to always use PPE while handling painting tools and materials.
-
- Following points must be followed in order to ensure safety while working
- Read, understand and follow all safety and operational instructions provided by the manufacturer.
- Make sure there is good ventilation with the door, window or exhaust fan.
- Prefer always used the prescribed personal protective equipment such as nose mask, jumpsuit, safety harness to ensure safety of self and others.
- Always use correct and prescribed respiratory apparatus while suing spray and other methods of painting
- Make sure that when pouring solvent from one container to another, there is no spillage and that the task is completed with care.
- It is very important to clean solvent spills immediately.
- Avoid washing hands with paint thinners and solvents
- Do not allow painting in areas where heat related works are going on. These may include welding, cutting, use of machines generating heat etc.
- Paints and other flammable liquids should only be stored in well ventilated sheds made of non-combustible materials like metal
- Fire extinguishers should be installed in work areas and storage locations.

Exercise

- Explain the various types of brushes used in painting works.
- List and explain the materials required for painting.
- List any five most commonly used tools in construction painting works.
- Explain the storing and handling of painting tools and materials in brief.
- Explain the different types of brush's sizes available.

Notes

Scan the QR code to watch the video

http://y2u.be/xS4X6kX_3u0

Storing and handling of painting tools and materials

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4. Application of Paint on Masonry Surface

Unit 4.1 – Application of paint on masonry surface

(CON/N0505)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Interpret sketches and working drawings for painting works
- Describe various methods of surface preparation
- Describe the checks to be carried out for visual inspection of area prior to and after the painting work
- Demonstrate mixing of different painting materials and mixing ingredients (such as paint, primer, base colour, tint base, colorants, varnishes, enamel, etc.)
- Demonstrate the application of primer coat and final coat using OBD, acrylic and emulsion paint as per specification
- Demonstrate application of tackifier solvents for recoat work
- Demonstrate the various checks conducted prior to, during and after painting works to ensure its quality
- Demonstrate cleaning of surface of each dried coat appropriately before application of the subsequent coat

Unit 4.1 Application of paint on masonry surface

Unit Objectives

By the end of this unit, participants will be able to:

- Interpret sketches and working drawings for painting works
- Describe various methods of surface preparation
- Describe the checks to be carried out for visual inspection of area prior to and after the painting work
- Demonstrate mixing of different painting materials and mixing ingredients (such as paint, primer, base colour, tint base, colorants, varnishes, enamel, etc.)
- Demonstrate the application of primer coat and final coat using OBD, acrylic and emulsion paint as per specification
- Demonstrate application of tackifier solvents for recoat work
- Demonstrate the various checks conducted prior to, during and after painting works to ensure its quality
- Demonstrate cleaning of surface of each dried coat appropriately before application of the subsequent coat

4.1.1 Sketches and Working Drawings

Common types of drawings used in construction painting works:

1. **Architectural Plans:**

Provide a detailed overview of the building's layout, including walls, doors, windows, and other architectural features that will be painted.

2. **Elevation Drawings:**

Show the vertical views of the building's facades, indicating the location and size of surfaces to be painted.

3. **Section Drawings:**

Offer cross-sectional views that reveal the construction details of walls, ceilings, and other surfaces, helping painters understand how to prepare and paint these areas.

4. **Detail Drawings:**

Focus on specific architectural elements like moldings, trims, and ornamental details, providing guidance on paint application and finish.

5. **Reflected Ceiling Plans (RCP):**

Display the layout of ceilings, light fixtures, and other overhead features that may require paint.

6. Finish Schedules:

List the type of finishes, colors, and application methods for different areas of the building.

7. Room Finish Plans:

Detail the finishes for each room or space, including wall colors, ceiling treatments, and any special paint requirements.

8. Painting Plans:

Offer a dedicated plan showing the extent of painting work, color codes, and specific areas requiring different paint applications.

9. Color Boards or Palettes:

Provide physical samples of paint colors and finishes for reference.

10. Paint Legends:

Display symbols and codes used in drawings to represent different types of paints, primers, and finishes.

11. Sectional Details:

Offer enlarged views of specific construction details, such as corners, joints, and connections that need careful paint application.

12. Faux Finish Samples:

Display examples of faux finishes or decorative painting techniques to guide painters in achieving the desired effect.

13. Mural or Decorative Art Designs:

Present sketches or plans for murals, decorative artwork, or intricate painting designs that may be required.

14. Stencil Patterns:

Provide templates for stencilled patterns or designs that will be applied to surfaces.

15. Mock-Up Drawings:

Outline where mock-up sections will be created to test paint colors and finishes before full-scale application.

16. Safety and Access Drawings:

Indicate safety measures, scaffolding, and access points needed for painters to work at elevated or difficult-to-reach areas.

17. Specifications and Notes:

Include written instructions and notes about paint types, application methods, surface preparation, and quality standards.

18. Weather and Temperature Guidelines:

Specify acceptable weather conditions and temperature ranges for painting to ensure optimal results.

4.1.2 Interpreting sketches and working drawings

Interpreting sketches and working drawings for construction painting works involves understanding the information presented in these drawings to effectively plan and execute the painting process. Here's a breakdown of how to interpret these drawings:

1. Architectural Plans and Elevations:
    - Identify the areas of the building that require painting, such as walls, ceilings, columns, and other architectural elements.
    - Note the dimensions and proportions of surfaces to be painted.
    - Pay attention to any labels or symbols that indicate paint colors, types, and finishes.
2. Section Drawings and Details:
    - Analyze the cross-sectional views of walls, ceilings, and other surfaces to comprehend their composition and structure.
    - Understand how paint layers will interact with other building materials, such as drywall, plaster, or concrete.
    - Note any special paint treatments, such as textured finishes or decorative techniques.
3. Finish Schedules and Room Finish Plans:
    - Refer to the schedules to determine the color and finish specifications for each area of the building.
    - Identify different paint layers (primers, base coats, topcoats) and their application order.
    - Match paint colors and finishes to their corresponding areas on the architectural plans.
4. Painting Plans and Color Legends:
    - Study the painting plans to understand the scope of work, such as which surfaces are to be painted and which areas are left untouched.
    - Refer to the color legends to decode the symbols or codes representing various paint colors, types, and finishes.
5. Faux Finish Samples and Decorative Art Designs:
    - Examine these drawings to grasp the intended artistic effects, textures, or patterns that need to be applied.
    - Understand the steps and techniques required to achieve the desired faux finishes or decorative elements.
6. Stencil Patterns and Mural Designs:
    - Interpret these drawings to understand where stencils or murals will be applied.
    - Note the intricate details, proportions, and colors of the designs.

7. Safety and Access Drawings:
    - Identify safe access points, scaffolding, or platforms required for painters to work at elevated areas.
    - Understand any safety precautions or guidelines specified in these drawings.
8. Specifications and Notes:
    - Read the written instructions and notes accompanying the drawings to understand the specific requirements for paint types, application methods, and quality standards.
    - Note any critical information related to surface preparation, priming, and finishing.
9. Weather and Temperature Guidelines:
    - Pay attention to the recommended weather conditions and temperature ranges for painting to ensure optimal paint adhesion and durability.
10. Mock-Up Drawings:
    - Understand where mock-up sections will be created to test paint colors and finishes before full-scale application.

    Interpreting these drawings requires a combination of visual analysis, technical knowledge, and attention to detail. It's essential to collaborate closely with architects, contractors, and other stakeholders to ensure that the painting process aligns with the design intent and meets the project's specifications.

4.1.3 Masonry Surfaces and Their Types

Masonry is a term used for building structure constructed from bricks, stones, marbles, granites, concrete blocks, tiles etc. thus, a surface made from the above mentioned materials is called a masonry material

Masonry surfaces are of three types:

1. **Brick/block surface:** Brick or cement blocks are the main constituents of brick or block surfaces held together with cement, mortar or adhesive laid in courses with mortar joints to form walls. Preparatory works may include cleaning, application of sealant etc.

Fig 4.1.1 Brick surface

2. **Concrete surface:** Concrete is a most versatile building material, it is used for construction of almost all the structural elements of the building such as beams, columns, slabs, walls, lintels etc. . Preparatory work may include cleaning the surface, patching and application of sealant etc.

Fig 4.1.2 Concrete surface

3. **Plaster surface:** Plaster is generally used as a protective and decorative coating of walls and ceilings. Cement, sand and water are the three basic components of plaster for preparing this surface for painting, the surface is cleaned and putty is applied.

Fig 4.1.3 Plaster surface

4.1.4 Process for painting masonry surface

Painting masonry surfaces requires careful preparation, the right materials, and proper technique to ensure a long-lasting and visually appealing finish. Here's a step-by-step process for painting masonry surfaces:

Step 1: Gather Materials and Tools:

- Paint suitable for masonry surfaces (acrylic, latex, elastomeric, mineral-based)
- Primer compatible with masonry and paint type
- Paint rollers, brushes, or sprayers
- Painter's tape
- Drop cloths or plastic sheets
- Paint tray
- Cleaning solution, scrub brush, and hose (for cleaning)

- Patching compound and putty knife (for repairs)

Step 2: Prepare the Surface:

- Inspect the Surface: Check for cracks, chips, loose mortar, or any signs of damage. Address repairs before painting.
- Clean the Surface: Power wash or scrub the surface to remove dirt, debris, mould, and mildew. Allow the surface to dry completely.

Step 3: Prime the Surface:

- Apply Primer: Apply a masonry primer using a roller, brush, or sprayer. Priming ensures good paint adhesion and uniform coverage.
- Step 4: Patch and Repair: Fill Cracks and Holes: Use a suitable patching compound to fill cracks and holes. Smooth the patched areas with a putty knife and let them dry.

Step 5: Painting:

- Cutting In: Start by "cutting in" the edges and corners of the masonry surface with a brush, ensuring a neat boundary between the painted and unpainted areas.
- Using a Roller: Dip the roller into the paint tray and remove excess paint. Apply paint to the masonry surface using a "W" or "M" motion for even coverage. Work in sections.
- Spraying (Optional): If using a sprayer, follow the manufacturer's instructions for proper application. Maintain consistent pressure and overlap each pass for an even finish.

Step 6: Applying Additional Coats (if needed):

- Drying Time: Allow the first coat to dry according to the paint manufacturer's instructions. Typically, this can take a few hours to a day.
- Apply Second Coat: If necessary, apply a second coat for improved coverage and color depth. Follow the same painting technique as before.

Step 7: Finishing Touches:

- Remove Tape: Carefully remove painter’s tape while the paint is still slightly wet to avoid peeling.
- Inspect for Touch-ups: After the final coat dries, inspect the painted surface for any missed spots or uneven areas. Touch up as needed.

Step 8: Cleaning and Maintenance:

- Clean Tools: Clean brushes, rollers, and other painting tools immediately after use to prolong their lifespan.
- Regular Maintenance: Periodically inspect the painted surface for signs of wear, and repaint as needed to maintain protection and appearance.

Remember that different surfaces and paint types may require slight variations in this process. Always follow the manufacturer’s instructions for the specific paint and primer you’re using. Proper surface preparation and application techniques are key to achieving a successful and durable painted masonry finish.

Each of these points are described in detail in further sections.

4.1.5 Preparatory Works – First Stage of Painting Work

Preparatory works are activities that are to be carried out before starting the painting works in order to achieve desired results in terms of the quality of painting. These are:

1. Obtaining & understanding instruction:

Prior to commencing any work it is important to know the outcome that is required. This requirement is communicated through instructions, specification sheets and other output parameters, some details provided in the instruction are:

- Texture of paint
- Colour of paint
- Location of paint
- Thickness of paint
- Timeline etc.

Some other general instructions may include

- Checking for humidity, water seepage & repair of the same
- Checking for cracks & undulations on the surface

Selection of material: This topic has been covered in the previous unit.

2. Cleaning of Area:

3. Covering of surface

Internal surfaces:

- All movable objects including curtains, curtain rod, wall hangings, portrait etc. should be removed before painting works.
- The items that cannot be shifted or moved to a different location should be covered properly using a plastic sheets etc. to avoid any damage due to paint.
- Nails should be pulled out and disposed off safely & holes should be filled.
- The door fixtures should be properly covered. If covering is not possible then remove the fixture and store in the proper location. Masking tape can be used to cover doors and windows or ceiling that cannot be removed.
- To protect the floor from splatters of paint, floors should be completely covered with can- vas.
- Trash cans with plastic bags should be prepared to throw the waste.
- Clean the room thoroughly. Cobwebs should be wiped down.
- Drop cloths are arranged in such a manner that all areas are entirely covered.

Exterior surfaces:

- Before painting, 14 days should be given to newly plastered surfaces for curing.
- The surface to be painted should be free from dust, grease and any loose materials.

- Wire brush should be used to remove any fungus and algae completely.
- On previously painted surface sanding is done so that old paint can be removed. This is necessary for better adhesion of new paint.
- Any surface coated with cement paint should be cleaned by scrubbing with wire brush, and washed with water
- Constant dampness should be avoided on the exterior surface. If you are painting in rainy seasons then the drying time for paints is about 2-3 days of sunshine.

Masking of surface

- Masking of surfaces refers to covering the corners of objects so that they do not get damaged during painting. For immovable objects such as doors, large tables that will be covered by plastic sheets, but to secure the corners masking is done.

Fig 4.1.1 Masking Surface

4. Preparation of Masonry Surface:

Cleaning of surface

Cleaning of surface is the most important step in the preparation of masonry surface as it removes all impurities like dust, loose materials etc. that can deteriorate the quality of work. This is done by:

- Remove all loose materials by scrubbing wire brush.
- Use sandpaper to scrape off old paints from the surface.
- Use cleaning kits to remove grease oil etc.
- Remove loose materials from holes, cracks etc.
- Apply putty to fill all holes, cracks etc. It should be kept in mind that filling should not cause undulation in the level of surface.

Fig 4.1.2 Cleaning of surface

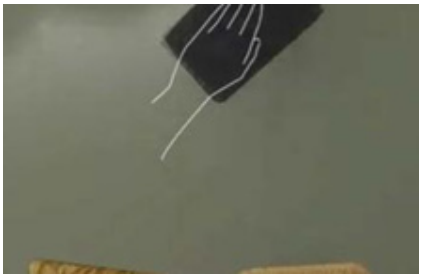

Fig 4.1.3 Sanding of surface

For exterior surfaces

- To fill the cracks on external walls, cement mortar should be used in placed of putty.
- Mixture of cement and sand in the ratio 1:3 is the formula to fill the cracks on the exterior surfaces.
- External drainage systems must be checked for faults like rusted pipes, leakages etc. and the same should be brought to the notice of superiors for repairs.
- Roof should be checked for cracks, especially near the parapet and roof junction

Fig 4.1.4 Scraping of surface

- Use wire brush or broom to clean and apply cleaning solution on the exterior walls if required.
- Always wear proper PPE while using chemicals and cleaners.

Application of putty/Cement mortar

- To fill the cracks and holes in internal and external surfaces
- Take the required quantity of putty in the mixing pan.
- Add sufficient quantity of water to putty and mix thoroughly so that mix becomes semi solid paste.
- In case of external masonry surfaces mix cement and sand in the ratio of 1 :3 in a mixing pan
- After dry mixing add water to make a semi solid paste Remove all loose material from the crack/ hole and ensure that it is clean

Fig 4.1.5 Applying putty on surface

- Use a putty knife to fill holes & cracks with solid paste. Apply pressure to compact the paste in the hole.
- Fill the paste till the entire crack or hole is filled.

5. Preparation of Paint:

Selection of paint

Depending upon the purpose of the paint and desired finish, paint manufacturers add different chemicals into the paints. These chemicals affect various parameters of painting which make the selection of paint an essential step in obtaining desired paint finish

Various factors involved in for choosing paint:

- Color: Pigment is the colouring agent of the paint; this is what gives the colour to the sur- face. When paints are stored for some time pigment will settle down at the bottom of the container, thus before using such paints care should be taken to shake and stir the paint.
- Spreadability: While selecting the paint keep in mind how far the paint will spread or stretch and therefore how much you need to buy.

- Binder: Binder allows the paints to stick to the surface. Paints are generally named after its binder e.g. latex paints are water based paints while alkyd paints are oil based paints.
- Base: There are 2 types of bases
  - Oil base and
  - Water base.

The difference between the two occurs in the drying time they required. While the water based paints are quick to dry, brush marks may be found on the surface if adequate care is not taken. On the other hand oil based paints take some time to dry but these will spread out more evenly without leaving brush marks.

- Gloss: The ratio of pigment to binder tells about the gloss or finish of the surface. Gloss plays an important role in selecting the paint as more quantity of binder in the paint will result in high gloss finish and if the percentage of pigment in the paint is higher than that of binder finish will be dull and flat.
- Primer: Primer is the first coat applied on a finished surface. It provides a smooth, solid base for applying paints. As the primer after tinting takes the required colour of the finished surface tinting reduces the number of coats of paints required. Primers can hide imperfections in porous surfaces like patched drywall, masonry, concrete.
- Viscosity: Viscosity of paint indicates the thickness of the paint.

Procedure for mixing the paint with thinner

1. Obtain a container in which to thin the paint

- Take a bucket in which we can mix the paint and thinner properly.
- As oil-based paints can be difficult to remove, thus bucket may not useful for any other work

2. Add the paint to the container

- Put the required amount of paint which has to be thinned in the container.
- Eliminate any large lump of dried paint and remove them in an old paint can or trash bag.

Fig 4.1.6 Adding paint in container

3. Add the paint thinner to the paint

- Thinning oil-based paints requires primary agents such as Turpentine or mineral spirits.
- Add the thinner based on how much paint was placed in the container.
- To get the required viscosity, add the turpentine in a ratio of approximately 3 parts paint to 1 part thinner.

Fig 4.1.7 Applying thinner in paint

4. Mix and evaluate the paint

- Once turpentine has been added to paint, carefully blend the two products. Mix effectively the paint and turpentine together by any kind of stir-stick. As with the container, don't use anything to stir the paint that you will need to use for any other purpose after this job is finished.
- With the help of a paintbrush apply a small amount of the paint to the surface onto which it will be applied. If the paint still appears too thick, continue adding small amounts of turpentine until the paint reaches the required consistency.

Fig 4.1.8 Mixing paint and thinner

5. Mixing of base color with colorant: Three things are essential to change paint colors:

- a paint color mixing chart
- craft colorants (acrylic for latex and oil-based for alkyd paints)
- white paint

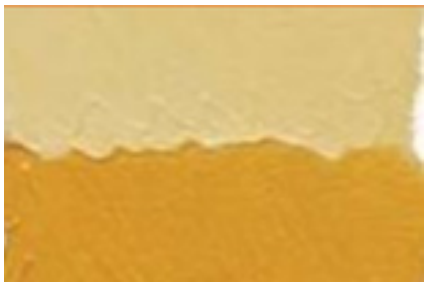

Fig 4.1.9 Adding Colorant

Lighten Up the Color

White colour is added to paints in order to lighten the shade of paint. However, a significant quantity of white paint would be required if significant change in shade is required.

Darken the Color

Depending on the original color of the paint, one can mix black or gray paint to darken the color of the paint. For dark colors we use black paint and for light shades gray paint is used.

However care should be taken that the paint used for lightening or darkening (white, black or gray) has a compatible specification and base as the original color.

Fig 4.1.10 Lighten the color

Intensify the Color

To make the custom paint color more authentic, add more base color to it.

For example, to intensify a tan color, mix some orange or yellow color to it. Mix more green color, to brighten it up a sage green color.

Tone Down the Color

In order to tone down the colour, its complement colour should be added in appropriate quantity. The colors directly opposite to each other on a colour wheel are called complements. A colour wheel is shown as an example. Stir the colorant into the base, until the desired shade comes, then shake

4.1.5 Application of Paint

After the preparatory work is completed, the next step is to apply paint. There are 4 steps for completing the painting work. These are detailed out as follows:

1. Apply Primer Coat

- Primer is coated on any unpainted surface like drywall, unpainted wood, and metal or even over oil paint. It locks or seals the cracks and also gives a layer to which
- Paint can stick. On masonry surfaces both oil-based and latex-based primers can be used. However location of surface should be considered while selecting the primer.
- In order not to form sediment in the bottom of the can, stir paint primer regularly.

Fig 4.1.11 Primer

- Pour primer into the paint tray. Do not overfill the tray to the point that the angled part of the tray with ridges is covered with primer.
- Then start applying paint primer around the wall. After the priming process is completed, a paint roller can be applied which eliminates all the streaks. Remove the excess paint primer and then begin to cover the rest of the wall. Make sure to overlap what you just did with the paint- brush.

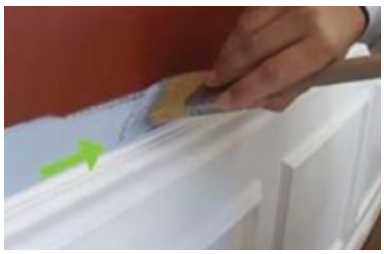

Fig 4.1.12 Priming

- Dip the paint roller into the primer and roll the roller to and fro a few times. Evenly thick layer should be maintained, but not dripping primer when you pick it up.
    - Consider using a roller with an extension rather than a step ladder for this part. A roller with an extension is safer and it will also make your job a bit easier.

Fig 4.1.13 Moving roller in primer

- One coat of primer is sufficient, and sanding is generally not necessary between the sealer and primer coats.
- All the mortar joints in the wall should be covered by primer; it is necessary to brush down these joints.
- Before applying the paint, leave the primer to dry completely. Leaving it to dry for about one day is a safe duration of time.

Fig 4.1.14 Priming Work

2. Apply Paint Coat

Both oil-based and latex-based paints will work well on masonry that increases the wall's ability to repel moisture.

Applying paint on the wall

- Pour paint into the tray. Before applying paint around the wall, change the garbage bag in the tray or get a new tray. Then, pour about one to two inches of paint into the tray.
    - To give a smooth finish, paintbrush should be used to remove excess paint that runs down the sides and into the rim of the paint bucket.
- Begin lining the edges of the wall. Dip paintbrush into the paint. It should be well-coated in paint, but not dripping. Then start painting along the edges of walls and fixtures. Try to create straight even lines.

Fig 4.1.15 Paint Tray

Fig 4.1.16 Applying paint on wall

Apply paint

To apply with a paint roller:

- Pour paint into the roller tray until it is nearly full.
- Roll the roller up and down to cover all sides. Do not immerse the roller into the paint such that paint enters the inside of the roller or sticks to its handle, however one may have to use the bottom of the paint tray to get the roller to rotate.
- Now paint can be applied to the surface using the roller, in order to avoid drip marks one must spin the roller by twisting the handle.
- Let the paint spread around. Centrifugal force will help in spreading the paint quickly.
- Paint trapped in the roller should be removed by applying pressure on it, which is useful in completing the job quickly.
- Don't apply roller into corners, this can be done with a brush.

Fig 4.1.17 Applying paint using roller

Fig 4.1.18 Applying paint using brush

To apply with a brush:

- Dip the brush into the paint can. Don't dip more than an inch. If it is done, there will be wastage of paint and it will make it harder to clean brush later.
- To prevent drips, shake the brush off against inside wall of the can.
- Then apply coat to the surface to be painted.
- Start at the top and drag downward.

- While painting with brush, it is beneficial to keep bristles above the handle. In order to avoid dropping of paint on the handle it is recommended that large amount of paint should not be taken in the bristle at any given time; this will help in optimizing the use of paint.

Second paint coat

- Normally a single paint coat is needed for repainting surfaces, but for fresh surfaces or the surfaces that need considerable levelling and removal of undulations, two paint coats are required.
- Finish Coat: It is the top most coat. Generally the second coat is the finish coat, it is applied in the same manner as the first coat
- Allow the paint to dry. At least one day is required for paint to dry, so leave it for drying. It is strongly recommended not to replace pictures, furniture, or other items until the paint is completely dry.

Tips

- Paint thinner can easily clean oil based paints from brushes and rollers.
- Sealers, primers, and paints should be used in a well ventilated area. This will reduce the effect of harmful vapors.

4.1.6 Defects Identification and Repairing

There are many factors that may cause defects in painting works. For the determination of the causes and remedial works, one should understand that several defects may occur simultaneously.

For the purpose of achieving good painting work, a painter and decorator should understand the causes of defects and take necessary steps to rectify it. Paint defects can occur during the following stages:

- Paint storage;
- Application and drying and
- Expected useful life.

4.1.7 Housekeeping and Maintenance Work

Housekeeping and storing

- Remove masking when finished. For a clean edge, pull the tape off the wall at a 90 degree angle. If there are more than two coats, re-masking is needed; otherwise, despite being cut cleanly by the tape the paint layers may tear in a ragged fashion.

Fig 4.1.19 Removing masking tape

- If paint splatters or runs onto baseboards and other surfaces, use a wet sponge or cloth to clean it immediately. Oil based paints can be cleaned by paint thinners, while water based paints can be washed away by water.
- Having finished painting, clean the tools properly so that the paint in them does not dry up and make the tool useless
    - Make sure to clean paint applicator (brush, roller, etc.) to remove up as much retained paint as possible.
    - When working with water based paints, simply immerse the tool into water, take out the tool and squeeze the water out of it. This will remove the paint and water from the tool. Allow the tool to dry completely before reuse
    - The tools should be wrapped in plastic or kept submerged in the paint in order to prevent drying.
    - If the tools cannot be cleaned right away, they should be kept immersed in water so that the paint in them does not dry and render the tool useless.
    - Use thinner instead of water to clean tools and hands while working on oil-based paints.

Fig 4.1.20 Paint Splatter

Fig 4.1.21 Cleaning paint brush

Fig 4.1.22 Cleaning paint brush

4.1.8 Tips and Warnings to Remember

Tips

- Make sure coats will not exceed the recommended number and allow the required amount of drying time between coats.
- Before starting painting on the whole surface, test the paint color on a small area of the wall during the day to see how the color will look.
- For each color there should be one separate paint tray.
- For interior surfaces, latex primer is the best choice. In comparison to oil or shellac primers it dries faster and it is also more durable.
- Color advice:

- Light shade colors such as cream, yellow etc. make the room feel bigger whereas dark shade colors such as gray maroon etc. make the room feel small.
- White color is coated in ceilings as it makes it appear higher.

- To clean the walls use sponge type mop.
- On changing the color, change the paintbrush also.
- Clean the new roller to remove any impurities on the surface that may contaminate the paint by applying and removing the masking tape on it.
- Remove any foreign matter such as hair, bristle, clump of dust etc. from the paint in order to avoid defects on painted surface

Warnings

- Fire alarms and smoke detectors must be properly covered and should not be painted on, the covering work should be done before commencing the painting works as they might go off if dust or practical from spray paints reach them. However, care should be taken to remove the covering as soon as the painting work is over.
- Masking tape should be removed as soon as painting work is over.
- As oil paints are flammable, they should be stored in fireproof cabinets
- Lead paints should never be used.
- Store the paint cans such that they do not spill
- Painting should be done in well ventilated surroundings in order to avoid accumulation of flammable vapors, but care should be taken that dust does not blow on the wet painted surface.
- It's possible that lead paint dust or chips are produced while sanding or scraping chips off of an old wall. Lead dust and chips are toxic and dangerously toxic for children. It will be needed to make absolutely sure that children are not exposed to the dust or chips to pre- vent lead poisoning.
- While replacing electrical outlets or switches, turn off the circuit breaker or remove the fuse. Do not put anything (e.g. your hand, a screwdriver, a paintbrush) inside an energized electrical box.
- Make sure to put the stepladder on a strong base.
- To avoid lead poisoning, don't heat lead paint.
- Important safety and usage information is inscribed on the can, so read it carefully before painting. Some painting-related chemicals are toxic and we need to be more careful about avoiding contact.

Exercise

- List the common types of drawings used in construction painting works.
- List the different types of different masonry surfaces.
- Explain the process for painting masonry surfaces in brief.
- Write the process of housekeeping and maintenance work.

Notes

Scan the QR code to watch the video

http://y2u.be/LY8CfY2nj1k

Sketches and Working Drawings

http://y2u.be/aX740OxcbcA

Masonry Surfaces and Their Types

http://y2u.be/RDwPYXT1KcA

Process for painting masonry surface

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

5. Painting on Structural Steel Fabricated Assemblies

Unit 5.1 – Application of paint on structural steel fabricated assemblies

(CON/N0506)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Explain simple sketches related to metallic/structural painting works
- Roughly estimate paint requirement by measuring the surface
- List different painting tools
- Select different painting materials and mixing ingredients
- Demonstrate mixing of different painting materials and mixing ingredients such as paint, primer, base colour, tint base, colorants, varnishes, enamel
- Describe the visual checks to be carried out for inspection of surface prior to painting
- Demonstrate various visual checks to be carried out for inspection of surface prior to painting
- Demonstrate use of power tools to remove rust (rust scale), weld slag, flux and weld spatter
- Demonstrate base surface preparation for metal surface before painting
- Select base colour and other colourants suitable for colour match
- Demonstrate mixing of specified amount of paint material with additives as per specified ratio
- Demonstrate process for effective mixing and dilution of paints and adjustment of viscosity as per standard procedure
- Perform application of primer coat to finishes/levelled fabricated/structural steel assembly with uniform thickness and as per specifications
- Perform application of appropriate primer coat for rusted metal surfaces

Unit 5.1 Application of paint on structural steel fabricated assemblies

Unit Objectives

By the end of this unit, participants will be able to:

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- Demonstrate process for effective mixing and dilution of paints and adjustment of viscosity as per standard procedure
- Perform application of primer coat to finishes/levelled fabricated/structural steel assembly with uniform thickness and as per specifications
- Perform application of appropriate primer coat for rusted metal surfaces

5.1.1 Process of Painting on Steel Assemblies Surface

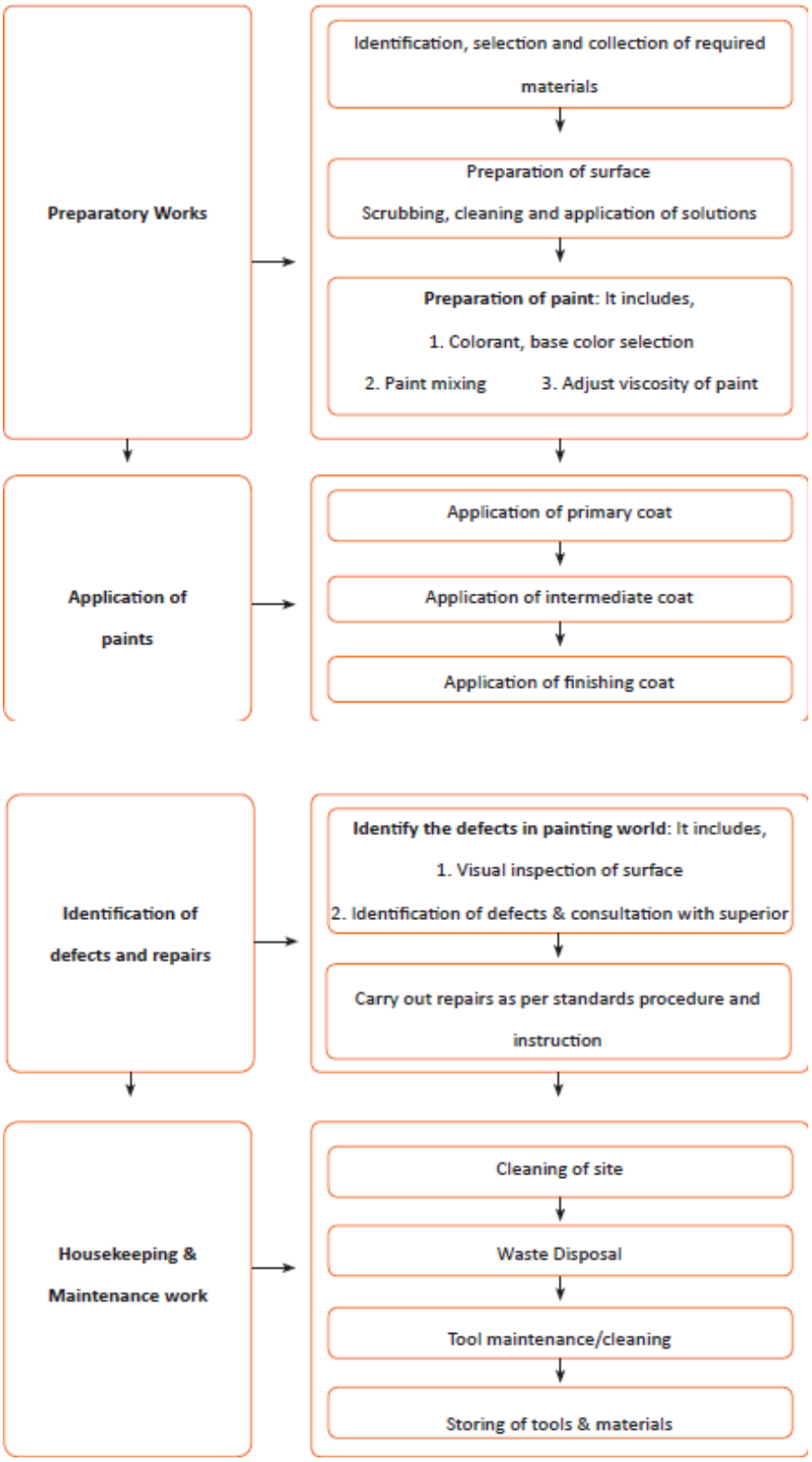

Fig 5.1.1 Process of painting metal surface

5.1.2 Preparation of Surface

Exposure of variations in temperature and moisture tends the metal surface to rust and wear out with time. It is strongly recommended to paint the metal surfaces to protect and prolong the life of the surface.

General preparation

1. First of all, detect the areas of rusts, damage, stains etc.
2. Perform painting works in well ventilated surroundings.
3. Do not forget to line the trash can with a plastic bag to throw waste.
4. Metal surfaces should be free from any and all foreign particles including dust, corrosion etc.
5. Metal shavings must be cleaned off before commencing the painting works.
6. Make sure to wrap weld joints or welded areas by using masking tape.

Fig 5.1.2 Cleaning metal surface

Surface Preparation:

1. Stripping the Surface:

- Always wipe away paint, dust and rust particles by damp cloth.
- Using the wire brush remove the old paint from the surface and remember to wipe dust and paint particles away with a damp cloth.
- Stripping large surfaces will go much faster with a wire brush and then use the sandpaper to get in the nooks and crannies.

Fig 5.1.3 Cleaning rusty metal surface

2. Clean the surface of the metal:

- Completely clean all paint dust with a damp cloth and scrape off any hunks of remaining paint.
- To give metal a thorough rub down, use fresh cloth to cleaning off all loose paint, dirt, grease and grime from the surface.
- Sand down the metal until it is as smooth as possible. After sanding, clean it with a damp cloth to remove any dust particle.
- It is recommended to wear safety goggles and a mask while performing surface preparation.
- Use the coarse grade sandpaper or a wire brush to rough up the surface. Wipe down with a damp cloth or sponge to remove all traces of dust.

Cleaning of nuts, bolts and field rivet heads

- Firstly, take acetic acid for cleaning.
- Then pour acetic acid into the bucket and add nuts and bolts in the bucket.
- Make sure to check regularly to see how the cleaning process is going, from a few hours to a day, depending upon how bad your parts were before you started.
- Then wash with water and quickly put the parts in some ammonia and leave it for a few minutes to neutralize any of the acid that might be left.
- Final step is to use a towel to wipe and spread them out in the sun to finish drying. Remember if exposed to any further moisture, it will rust again.

Another method is of cleaning using Muriatic Acid

- Acetic acid can be replaced with muriatic acid.
- 31.45% Hydrochloric Acid or muriatic acid is stronger and works faster. Put some acid, enough to submerge the parts in a plastic container, and gently agitate at every fifteen minutes interval until it is clean.
- This acid can be reused more than once. Make sure not to pour used acid back into container with unused acid contamination.
- Muriatic acid should be used outside only because the vapours will rust any unpainted metal in range and it is also not good for painted surfaces.

Fig 5.1.4 Cleaning solution for metal surface

Jet washing of bigger metal surfaces

Jet washing is the process in which high pressure water jets are used to remove paint, rust, primers and other coatings from a bigger metal surface. It creates a perfectly clean (free from chemicals and non-visual contamination) surface on which new coatings can be applied.

Fig 5.1.5 Jet washing of metal surface

5.1.3 Application of Paint

Priming the Surface

Priming the surface helps to make a bond between the topcoat and the metal. Primer and paint should be compatible with each other. Choose an oil-based primer that is compatible with acrylic paint (which works best on metal).

- Primers are available in bucket but nowadays it is available in spray can for the ease of use.
- Apply one coat of primer.
    - Spray the primer evenly onto the surface of the metal until it is completely spread around the surface.
    - Do not use spray primer on a windy day if working outside.
- Then apply a second coat of primer. Metal usually oxidise easily so a double coat of primer is the best course of action.
- Generally, 1-2 coats are sufficient.
- Carefully apply primer on a clean and dry surface and leave the coat to dry before application of the next coat.
- Sand paper should be used before applying successive coats so that after second coating surfaces come out as a smooth one.

Fig 5.1.6 Priming of metal surface

Finish Coat

- Select & use paint that is compatible with the primer.
- Confirm the thickness of coat required from the specification and apply paint accordingly.
- Check and confirm the thickness of the coat through trails/test runs.
- Proceed to paint the entire section as per requirement.
- Allow the paint to dry before commencing the second coat.

5.1.4 Painting Rusted Steel

Steel is an alloy of iron and carbon, however there are some other materials present in the mixture like manganese and tungsten etc. steel is more corrosion resistant than iron, but it may get affected by corrosive agents over time. Rusted steel should be prepared before painting.

- Remove loose rust with a wire brush.

Fig 5.1.7 Cleaning by wire brush

- Sand the surface using sandpaper. To avoid get- ting particles on the surface during the painting Wash the surface with a degreasing cleaner.

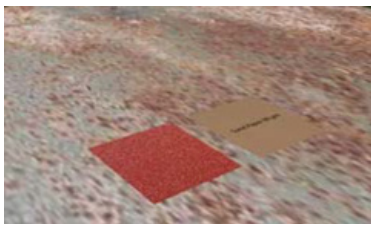

Fig 5.1.8 Sandpapers

- Use a scrub brush to scrub the surface and rinse clean with water.

Fig 5.1.9 Priming Material

- To remove the slight rusty finish that appears after cleaning steel, wet a cloth with paint thinner and wipe it over the surface of the steel.
- Put the steel on a drop cloth or cover the area around the steel with drop cloths, to avoid getting paint on it.
- Make sure don't use a paint sprayer or spray paint cans for the rust inhibitor, because they will not reach into all the small pores on the steel's surface. Brush a rust-inhibiting primer onto the metal.
    - According to product directions, allow the primer
    - Repeat, if necessary.

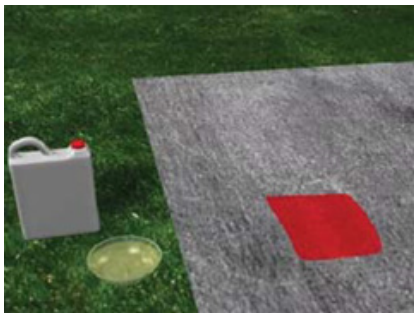

Fig 5.1.10 Priming of metal surface

- As steel is mostly exposed to climatic conditions and open surroundings thus, choose a matte, semi-gloss or glossy finish, according to preference, then applies 2 coats of paint by any of the brush or paint roller.
    - Move your hand to and forth in smooth motions during application. This will provide a professional-looking finish and avoid drips on the steel surface.

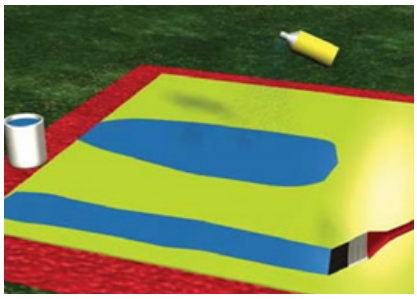

Fig 5.1.11 Painting of metal surface

After completion of work, do the cleaning and housekeeping activities, as we discussed in previous unit.

Exercise

1. What happens when enamel is applied to metals?
   a. Paint will not adhere
   b. Longer time to dry
   c. Creates bubbling and accumulates air inside
   d. It will peel off when exposed to sun
2. A number of steel bars had been left in the rain and had rusted. What would you do with them?
   a. Brush them with steel brush and use them since a little rust is good for adhesion
   b. Pour oil on them to remove the rust
   c. Apply rust inhibitor
   d. Apply rust remover
3. Write the method of cleaning nuts and bolts by acetic acid.

Notes

Scan the QR code to watch the video

http://y2u.be/4Nb1yJu89g8

Process of Painting on Steel Assemblies Surface

http://y2u.be/rTZABHZh6JE

Preparation of Surface

http://y2u.be/UvIdP4tXQ60

Application of Paint

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6. Painting and Polishing Of Wooden Surface

Unit 6.1 – Application of paint on wooden surface

(CON/N0507)

Key Learning Outcomes

By the end of this module, participants will be able to:

1. Calculate the amount of paint, varnish and other painting materials required for painting work
2. Explain standard specifications of all tools, equipment and components required for painting work
3. Describe various defects seen on wooden material and methods adopted for rectification prior to painting
4. Perform the visual checks to be carried out for physical inspection of surface for suitability
5. Discuss the process of base surface preparation for the wooden surface (such as application of bleaching agent, treating of warped or strained surface, use of fillers, sandpapers, grinder and so on)
6. Demonstrate the preparation of base surface preparation of the wooden surface using suitable methods.
7. Discuss the methods to prepare paint and varnish using various constituents as per specification
8. Demonstrate the method for application of wood fillers and putty on the required wooden surface
9. Demonstrate the method for application of primer coat/ paint/ varnish/ polish on the required wooden surface.
10. Demonstrate application of lacquer or other sealers as per specification

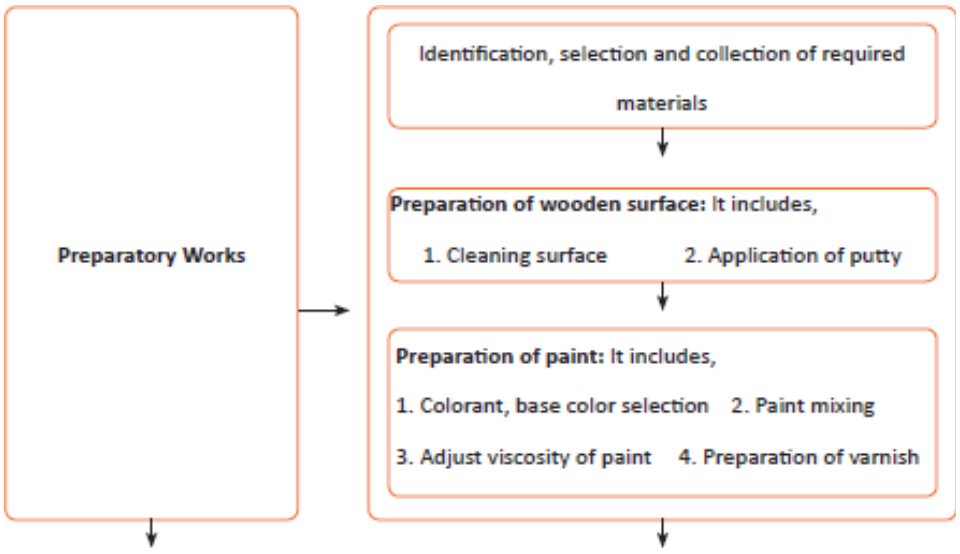
Unit 6.1 Application of paint on wooden surface

Unit Objectives

By the end of this unit, participants will be able to:

- Calculate the amount of paint, varnish and other painting materials required for painting work
- Explain standard specifications of all tools, equipment and components required for painting work
- Describe various defects seen on wooden material and methods adopted for rectification prior to painting
- Perform the visual checks to be carried out for physical inspection of surface for suitability
- Discuss the process of base surface preparation for the wooden surface (such as application of bleaching agent, treating of warped or strained surface, use of fillers, sandpapers, grinder and so on)
- Demonstrate the preparation of base surface preparation of the wooden surface using suitable methods.
- Discuss the methods to prepare paint and varnish using various constituents as per specification
- Demonstrate the method for application of wood fillers and putty on the required wooden surface
- Demonstrate the method for application of primer coat/ paint/ varnish/ polish on the required wooden surface.
- Demonstrate application of lacquer or other sealers as per specification

6.1.1 Process of painting wooden surface



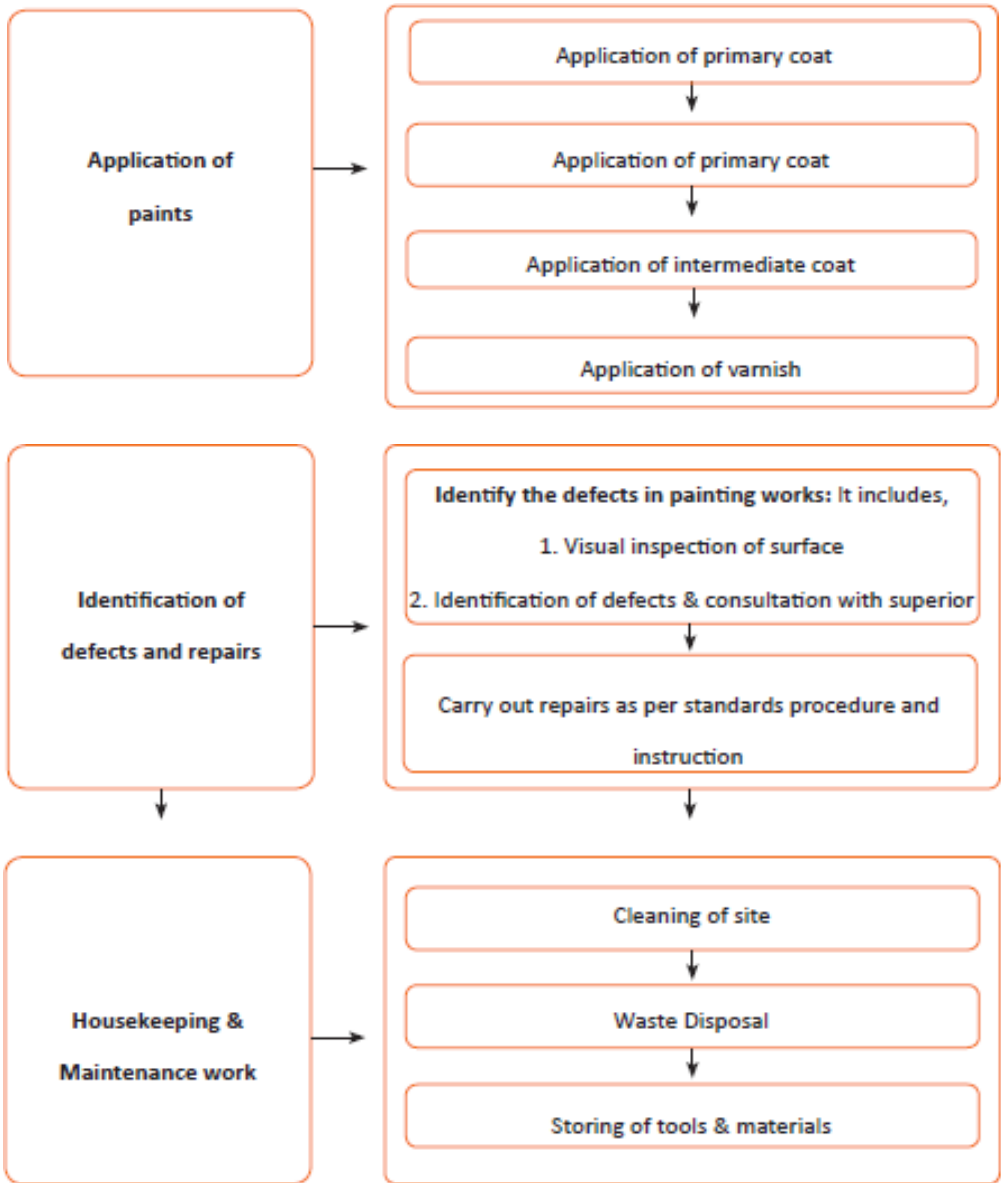


Fig 6.1.1 Process of painting wooden surface

6.1.2 Preparation of Varnish

The thinner should always be mixed with the first coat of varnish so that it is absorbed by the wood and bonds deeply into the surface of the wood.

- Oil-based varnishes generally have to be mixed with paint thinner, such as turpentine.
- Unlike Oil-based varnishes, acrylic and water-based varnishes have low-odour and can be mixed with water.
- It is easy to use spray for varnishes. They do not need brushes and they do not need to be thinned.

Follow the manufacturer's guidelines for mixing thinner with varnish.

6.1.3 Preparing Wood for Painting

1. **Removing old paint from wood:** Before adding a new coat, remove the old coat. Use a putty knife or scraper and remove as much paint as possible. Residual paint is to be removed through sanding done by fine sandpaper.

- Chemical strippers are to be used only in case of oil based stains or where oil paints are used previously.
- Scrape as much off as possible and then clean rest of the loose paint and grime with the help of cleaning solution. Wash lightly.

Fig 6.1.2 Removing old paint

2. **Fill large holes and gouges by wood filler:** Before filling, seal big holes and gouges by wood filler. Fill nail holes with it too. Use an exterior spackling compound for small, shallow imperfection.

Fig 6.1.3 Applying wood filler on holes

3. **Prepare the paint and varnish:** Blend the thinner with paint and varnish to attain the required viscosity, as we discussed previously in unit 4.

4. **anding of wood:**

   Sanding is carried out in 2 stages:

   - Using coarse sandpaper, sand away a larger portion of the surface.

- Using fine sandpaper, sand the residual paint or stain.
- Use finer sandpaper to clear off residual paints. Coarse sandpaper is used to remove larger parts of the stains or old paints. It is also used for smoothening the surface. The sandpaper must always be used in the direction of the grains and not opposite to it

Fig 6.1.4 Sanding of surface

5. **Cleaning wooden surfaces:** Cleaning shall be done firstly by dry cloth to remove coarse or larger impurities followed by cleaning with damp cloth to remove fine dust particles from the surface. Also, note that the sufficient time must be given to the damp wood to dry before progressing to the next step.

   - Dirt on the surfaces prohibits paint or primer to adhere properly. If the surface is free from dirt, paint does its job magnificently.

Fig 6.1.5 Cleaning surface by dry cloth

6. Masking of wood: Apply the tape to those parts that are to be left unpainted. If it requires painting the wood in different colors, tape off after having primed all the wood and leave specific sections, for painting with one color at a time.

Fig 6.1.6 Masking of surface

6.1.4 Application of Paints

Apply primer on the wood

Primer enhances the intensity of color and gives a rich look on the surface of wood. Before applying the final coat of the primer, check whether wood grains are raised. If yes, then sand the area with fine sandpaper.

Fig 6.1.7 Applying primer

Painting wooden surface

1. Selection of paint: Most paints are water-based or latex paint.

Alternatives and additions: Oil-based paint is a long-lasting paint. It dries slowly, leave fewer brush marks. Adding Conditioner or Extender makes latex paint to slow down drying and reduce brush marks.

Fig 6.1.8 Paint

2. Use high quality paint and brushes: Don't use low quality paint and brushes because when the paint underperforms, the whole work requires painting frequently.

    - Always select bristle brushes over foam brushes as there is less chances of crating air bubbles on the painted surface.

Fig 6.1.9 Paint brush

3. Collecting paint paintbrush: Immerse the paintbrush into the paint bucket such that three fourth lengths of the bristles are in the paint. Further, tap both sides of the brush on the side of the paint bucket to remove any excess paint from the brush. The brush should have just the right amount of paint for covering the small portion of the entire job.

Fig 6.1.10 Loading paint brush in paint

4. Applying the paint on wood: Starting from the top, move the brush in short strokes, move down to the bottom of the surface to cover the area properly, repeat the procedure three to four times, taking care that the time interval in consequent strokes is not too large.

Fig 6.1.11 Applying paint

Tipping: In this phase the tip of an empty brush is used to stroke the freshly painted surface in order to minimize the brush stroke appearance. It is also important to know that when a slow drying paint is used, the brush strokes flatten out before the drying is completed.

Repetition of the process: Depending on the type or quality of paint as well as the finish required, apply more than one coat. Use very fine sandpaper before applying final coat. This will give the final coat a nice surface to grip onto.

Fig 6.1.12 Applying second coat of paint

Applying varnish on surface

1. Protectant is used in many paints to safeguard it against water and wear.

- To protect the paint on the wooden surface, sealers or varnishes are applied.

Fig 6.1.13 Varnish Box

2. Preparation of varnishes for first coat: It does not need any preparation but thinning is required for the first coat, varnish has to be thinned to required consistency so as to seal the wooden surface.

- Paint thinner is mixed with oil-based varnish in the ratio 1:1, such as turpentine.
- When water or acrylic based varnishes are used, water shall be mixed in varnish for thinning. Usually equal amounts of water and varnish are mixed for general works, the specification otherwise is instructed by superior at site.

Fig 6.1.14 Varnish Preparation

3. Preparing old painted surface: This is done by sanding the old paint and then cleaning the surface by cloth (dry and then damp) application of other methods of cleaning can be done after receiving proper instructions from site seniors.

Fig 6.1.15 Sanding of surface

4. Finishing: Usually three coats of varnish are applied; this may also be instructed by site supervisor.

Fig 6.1.16 Applying varnish

As discussed in the previous chapter, follow the cleaning and storing practices after completing the work.

Exercise

- Write the process of preparing wood for painting.
- Write the process of varnish preparation.
- Explain the importance of applying primer on the wood.
- Explain in brief the process of painting the wooden surfaces.

Notes

Scan the QR code to watch the video

http://y2u.be/B4glGMiHxDI

Process of painting wooden surface

http://y2u.be/b2LU4fBa4sE

Preparing Wood for Painting

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7. Defects in Painting

Unit 7.1 – Identification and Repairing of defects in painting

(CON/N0510)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Discuss the various checks to detect natural defects/ painting defects with respective remedial action.
- Demonstrate the various checks to detect natural defects/ painting defects with respective remedial action.
- Identify common painting defect (orange peel, blushing, fading, spotting and water marks, discoloration, chalking, cracks, seeds, runs, fish eyes/ beads, blemished metallic finish, pin holes, abrasive marks, peeling, putty marks, blisters and shrinkage)
- Demonstrate the method to polish/ rectify the defects with appropriate compound.
- Demonstrate stripping and applying of putty and paint.
- Demonstrate the various methods to flatten the defects and provide suitable remedy

Unit 7.1 Identification of defects in painting

Unit Objectives

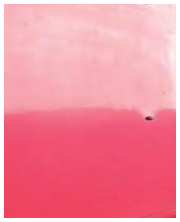
By the end of this unit, participants will be able to:

- Discuss the various checks to detect natural defects/ painting defects with respective remedial action.
- Demonstrate the various checks to detect natural defects/ painting defects with respective remedial action.
- Identify common painting defect (orange peel, blushing, fading, spotting and water marks, discoloration, chalking, cracks, seeds, runs, fish eyes/ beads, blemished metallic finish, pin holes, abrasive marks, peeling, putty marks, blisters and shrinkage)
- Demonstrate the method to polish/ rectify the defects with appropriate compound.
- Demonstrate stripping and applying of putty and paint.
- Demonstrate the various methods to flatten the defects and provide suitable remedy

7.1.1 Paint Defects

Paint defects are imperfections or irregularities that can occur on painted surfaces due to various factors during the painting process. These defects can affect the appearance, durability, and overall quality of the painted finish. Understanding different paint defects is essential for identifying their causes and implementing corrective measures. Here are some common paint defects:

Defect	Image	Cause	Prevention	Repair
Orange peel		• When top coat is more viscous than required for painting. • Use of improper thinner	• Sufficient drying time should be provided between paintings of two coats. • Use of the recommended painting system.	• In case of minor problem, sand down the peel and repaint. • Polish with a fine polishing paste and finish with a high gloss polish.

Stains		• Caused due to dust being washed down by water along any.	• Remove the paint from affected area and prepare the surface again • Use a dirt-resistant paint method.	• Clean the walls and prepare the surface to receive paint. • Repaint with appropriate system.
Fading or discoloration		• The main cause of this defect is the reaction of sunlight on pigments of paint. • Caused due to reaction of pigments in sunlight can also be caused due to contaminants & water seepage.	• Repair water leakage. • Make sure the surface is dry before painting • And apply oil-based paint.	• Repair water seepage. Make sure the surface is dry before painting. And apply an alkaline-resistant or oil- based paint.
Chalking		• Caused due to application of paints over: • Oil grease • Dust & rust • Old paint surface without removing oil paints	• Ensure proper surface preparation • Sufficient drying time between two coats • Sanding of sur- face for application of another coat	• Prepare surface and repaint.

Chipping		• The cracks develop throughout the entire paint surface. • Cracking occurs due to use of paint that has low adhesion. • Improper surface preparation and cleaning. • Not proper mixing of paint material	• Maintain and protect the finish with quality, • non-silicone polish or wax • Never dry wipe the surface. • Uniform mixing of paint materials.	• Allow the surface to dry fully and then rub it down to make it ready for repainting.
Runs		● Application of excessively thick coat. ● Use of the wrong thinner. ● Excessive dilution of paint.	● Apply finish coat using recommende d thinner. ● Do not apply thick coats. ● Increase viscosity of paint if required	● Remove paint film, sand, clean and repaint.
Fish-eyes		• Oil, wax, grease or silicone contamination • Use of polishes or aerosol sprays containing silicone (e.g. interior cleaners or dressings) • Insufficient cleaning	• Thoroughly clean with a suitable wax and grease remover.	•

Pinholes		• Solvent popping that has been sanded to open the top • Improper drying method (tanning of newly applied finish) • Improper surface cleaning or preparation. (Moisture on • surface)	• Do not sand solvent pop or completely • remove defect before repainting	• Pinholes or small craters can only be repaired successfully by thorough sanding of the substrate or by filling the areas.
Poor adhesion		• Applying paints on smooth surfaces like grease, oils etc. • Application over loose particles like rust or dust. • Not removing the old gloss paint layer. • Applying paint on dried paint surface.	• Ensure proper surface preparation before painting.	• Remove all coats with poor adhesion. • Thoroughly sand and clean the substrate. • Repaint using the correct choice of primer.
Peeling		• Peeling is caused by moisture on the wall, poor surface preparation and using the wrong painting method. • This defect occurs on walls as well as wood	• Check & repair water seepage, repair surface using putty. • Clean the surface & use alkali resistant base coat/ seals for painting.	• Carryout surface treatment preparation before repainting.

		or metal surfaces. • Improper cleaning & surface • preparation	• Patch surface defects with putty. • Clean thoroughly	
Putty marks		• Application of finish coat directly over puttied surfaces • These are caused due to application of thick coat of putty and or application of paint on wet putty.	• For new walls the curing should be done for 14 days • Always apply a thin layer of putty and allow it to dry. • Always use primers on a putty surface. • Cracks in plaster should be filled with cement sand mortar.	• Apply an extra coat of primer or use sealer.
Blistering		• Caused by trapped moisture or gases in paint film.	• Smooth sand the surface and then repaint it. • Prevent it by following the specified recoating time • Make sure your top coat isn't too thick	• Sand down and remove the paint layers back to a sound substrate. Be prepared to strip the areas where necessary. • Refinish the paint work.

Shrinkage		• A heavy ridge of paint along the edges is caused by too much paint on the brush.	• Remove the excess paint by taping the brush on the side of the container.	• Do not apply additional paint and allow the paint to dry before applying the next coat.

Table 7.1.1 Paint defects, causes and their prevention

7.1.2 Repairing Of Paint Defects

Tools and materials required for repairing

- sandpaper
- cloth
- scraper
- wood sealer
- topcoat
- paint

Repairing procedures

1. **Drips:** Drips are excess paint flowing down the painted sur- face. These are caused due to poor painting technique employed by the painter.

Procedure for correcting drip

- Drips may look unsightly but can be easily removed
- Use a sandpaper or scraper to remove the drip marks from the surface. Till the surface is smooth
- Apply fresh paint on the surface.

2. **Stains:** Stains are patches of different colour or shades on painted surface. These may hap- pen due to multiple reasons such as

- Exposure to moisture
- Incorrect preparation of surface
- Old surface repainted work etc.

Procedure for correcting stains

- Clean the stained area of the surface
- Stain undertake surface treatment work depending upon the stain
- Repaint the treated surface

3. **Gritty Finish:** Gritty finishes occur due to presence of impurities in paint, settled pigments etc. It can be avoided by properly storing the paint and stirring the old paint before use.

Procedure for correcting gritty finish

- Sand the affected area using fine sandpaper
- Repaint the area using properly mixed old paint of fresh paint.

4. **Removing Wrinkled Paint:** This defect is caused by painting a fresh coat on an undried paint. The drying time between 2 paints is very little and thus fresh painting is carried on a virtually wet paint surface. This can be avoided by allowing the paint to dry completely before commencing the second coat.

- Procedure for correction:
- Remove the wrinkled paint using suitable method or by method instructed
- Paint the first coat again and leave it to dry off completely
- Apply the second coat of paint after the first coat has dried up

5. **Eliminating Brush Marks:** This defect is caused due to bad workmanship. It is most likely to happen when quick drying paints are used.

Procedure for correction

- Scrap the paint from the surface.
- Apply paint as per instruction taking care to avoid same mistakes again.

6. **Improving Poor Coverage:** This defect is caused due to applying less coats of painting. It may also be caused due to improper technique of using paint brushes.

Procedure for correction:

- Remove the paint from the surface using suitable of instruction
- Apply or repaint the area as per requirements specification or instructions

7. **Hiding Filler that shows Through:** This defect arises due to incorrect filler showing through surface preparation. In locations where filling is done it should ensure that priming is carved out properly before applying paint.

Procedure for correction:

- Remove the paint in affected area by using suitable method or as per instruction
- Apply primer to filler
- Repaint the entire wall as per specifications & instruction

8. Dealing with a Bleeding Knot: This defect arises only on wooden surfaces where proper surface preparation is not carried out. It is possible that if proper sealant is not applied; the wood may have secret resins. This resin may show up on the surface of the paint.

Procedure for correction:

- Remove the paint in affected area by using suitable method or as per instruction
- Apply wood sealants on the affected area
- Apply prime
- Repaint the surface as required

Exercise

- Multiple Choice Questions

I. Most common cause of paint defects?

a. Product expires

b. Surface preparation

c. Weather condition when applied

d. Mixture of thinner and base paint

II. Paint conditions where there is formation of white powders on the surface?

a. Efflorescence

b. Peeling

c. Chalking

d. Blistering

III. Paint conditions where there is formation of crusty white salt on the surface?

a. Efflorescence

b. Peeling

c. Chalking

d. Cracks

IV. A very common paint problem caused either by moisture or poor adhesion?

a. Peeling

b. Blistering

c. Wrinkling

d. Chalking

V. Paint conditions where there is a chemical reaction when paint is applied on hot surface?

a. Alligatoring

b. Peeling

c. Wrinkling

d. Bubbling

VI. A number of steel bars had been left in the rain and had rusted. What would you do with them?

a. Brush them with steel brush and use them since a little rust is good for adhesion

b. Pour oil on them to remove the rust

c. Apply rust inhibitor

d. Apply rust remover

VII. Why do we put primer before painting?

a. Adhesion

b. Uneven surface filler

c. Dries earlier

d. Dust proofing

VIII. Bubbles in the paint film, or resins from knots in the timber being attracted to heat, or paint being used on surfaces which have extreme heat. Identify this defect.

a. Circling

b. Cratering

c. Blistering

d. Alligatoring

IX. A powdery deposit being formed on a dry paint film surface. The powder is unbound pigment. Identify this defect

a. Efflorescence

b. Chalking

c. Cissing

d. Alligatoring

Notes

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http://y2u.be/jyswruAkmCY

Paint Defects

http://y2u.be/xq6OL9cz_Z8

Repairing Of Paint Defects

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8. Teamwork and Effective Communication at Workplace

Construction Skill Development Council

Unit 8.1 – Effective Communication and Teamwork

Unit 8.2 – Working Effectively and Maintaining Discipline at Work

Unit 8.3 – Maintaining Social Diversity at Work

(CON/N8001)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Demonstrate effective communication skills while interacting with co-workers, trade seniors and others during the assigned task.
- Interpret work sketches, formats, permits, protocols, checklists and other work-related requirements which are to be conveyed to other team members
- Demonstrate effective reporting to seniors as per applicable organisational norms.
- Explain effects and benefits of timely actions relevant to painting and decoration work
- Explain importance of team work and its effects relevant to painting and decoration work.
- Demonstrate team work skills during assigned task.

Unit 8.1 Effective Communication and Teamwork

Unit Objectives

By the end of this unit, participants will be able to:

- Elucidate own roles and responsibilities.
- Explain the importance of effective communication.
- Explain different modes of communication used at the workplace.
- Elucidate the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
- Demonstrate how to pass on work-related information/requirements clearly to the team members.
- Show how to report any unresolved problem to the supervisor immediately.

8.1.1 Communication at Workplace

The communication process refers to the steps involved in the exchange of information, ideas, thoughts, or messages between individuals or groups. It is a dynamic process that involves a sender, a receiver, a message, and various channels to convey the information effectively. The communication process typically follows these steps:

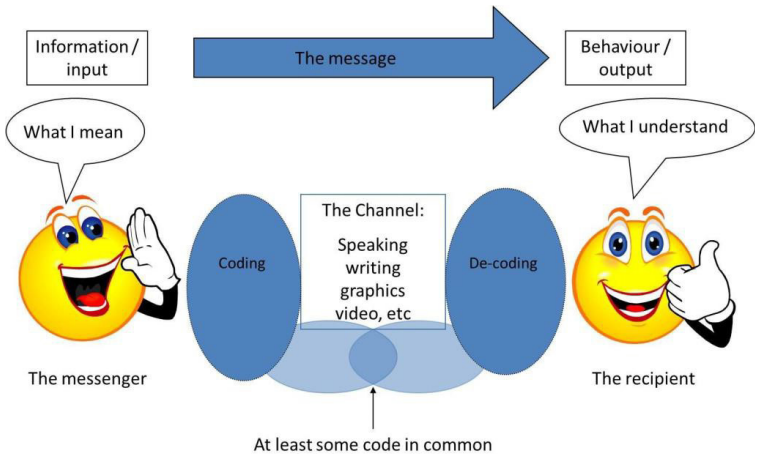

Fig 8.1.1 Effective Communication – Two-way Process

Sender: The person or entity starting the communication.

Message: The information that the sender wishes to share.

Encoding: Choosing the medium to send a message.

Channel: The medium used to send a message.

- Receiver: The person or entity to whom the message is sent.
- Decoding: Understanding the message received.
- Feedback: The receiver's response to the message.

The 7Cs of communication are essential principles to follow for effective and impactful communication:

- Clear: Be assertive about what needs to be communicated, whether verbally or in writing
- Concise: Use simple words and say only what's needed
- Concrete: Use exact words, phrases, Use facts and figures
- Correct: Use correct spellings, language and grammar
- Coherent: Words should make sense and should be related to the main topic
- Complete: A message should have all the needed information
- Courteous: Be respectful, friendly and honest

Fig 8.1.2 7Cs of Communication

8.1.2 Type of Communication at Construction Worksite

Communication at a construction worksite is crucial for ensuring efficiency, safety, and coordination among workers, supervisors, and other stakeholders.

Several types of communication are utilized to facilitate smooth operations and enhance safety at construction sites.

Some common communication methods include:

- **Verbal Communication:** This involves face-to-face conversations, discussions, and instructions between workers, supervisors, and managers on the site. Verbal communication is essential for conveying immediate instructions and clarifications.
- **Hand Signals:** Hand signals are commonly used in noisy construction environments where verbal communication may be difficult. Workers use specific hand gestures to communicate instructions or warnings to each other.
- **Written Communication:** Written communication includes various documents, such as construction plans, safety guidelines, work permits, and daily progress reports. Written communication helps in conveying detailed information and serves as a reference for all stakeholders.
- **Radios and Walkie-Talkies:** Two-way radios and walkie-talkies are popular communication tools at construction sites, especially for larger projects. They allow instant communication between workers and supervisors across different areas of the site.
- **Visual Communication:** Visual aids, such as signs, symbols, and safety posters, are used to convey important information and warnings. These aids help in reminding workers of safety protocols and hazard awareness.
- **Digital Communication:** Construction sites may use digital communication platforms like mobile apps or messaging services to facilitate real-time communication, share updates, and coordinate tasks.
- **Meetings and Toolbox Talks:** Regular meetings and toolbox talks are conducted to discuss project progress, safety updates, and address any concerns or questions raised by workers.
- **Project Management Software:** Construction companies often use project management software that enables seamless communication between project teams, provides updates, and tracks tasks and schedules.
- **Emergency Communication Systems:** In case of emergencies, construction sites may have emergency communication systems like alarms or sirens to alert workers and initiate evacuation procedures.

Effective communication at construction sites plays a vital role in preventing accidents, minimizing delays, and ensuring the successful completion of projects. It is essential for all team members to be well-versed in the various communication methods used to maintain a safe and productive worksite.

8.1.3 Adverse Effects of Poor Communication

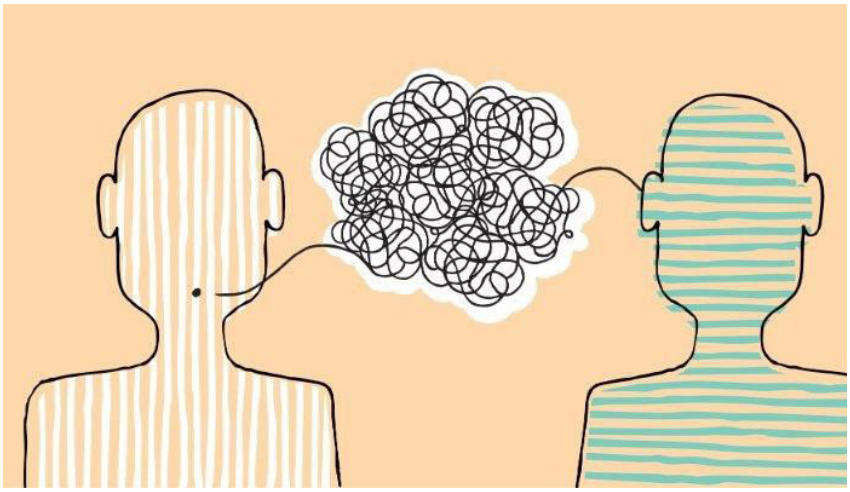

Fig. 8.1.3 Adverse Effects of Poor Communication

Poor communication at a construction workplace can lead to various adverse effects, some of which include:

1. **Safety Risks:** Inadequate communication about safety protocols, hazards, and instructions can increase the risk of accidents and injuries at the construction site.
2. **Misunderstandings:** Miscommunication among workers, supervisors, and managers can lead to misunderstandings about tasks, timelines, and project requirements, resulting in errors and delays.
3. **Inefficiencies:** Poor communication can cause delays in project progress, resource allocation, and decision-making, leading to inefficiencies and increased project costs.
4. **Decreased Productivity:** Lack of clear communication can hinder workers' ability to perform their tasks efficiently, reducing overall productivity at the construction site.
5. **Cost Overruns:** Miscommunication about project budgets, timelines, and scope can lead to cost overruns and financial losses for the construction project.
6. **Quality Issues:** Inadequate communication regarding construction specifications and standards may result in quality issues and subpar workmanship.
7. **Safety Violations:** Poor communication about safety guidelines and procedures may lead to safety violations and non-compliance with safety regulations.
8. **Increased Conflicts:** Communication gaps can create conflicts and tensions among workers and teams, negatively impacting the construction site's working environment.
9. **Lack of Coordination:** Insufficient communication between different construction teams and subcontractors can lead to a lack of coordination, hindering the seamless progress of the project.
10. **Client Dissatisfaction:** Poor communication with clients can lead to misunderstandings, unmet expectations, and client dissatisfaction with the construction project.
11. **Project Delays:** Miscommunication about project timelines and tasks can result in delays, affecting project completion dates and potentially leading to contract disputes.

12. **Reputation Damage:** Repeated instances of poor communication at a construction site can damage the reputation of the construction company, impacting future projects and business opportunities.

13. **Health and Environmental Concerns:** Lack of proper communication about hazardous materials, waste disposal, and environmental regulations can result in health and environmental risks.

To mitigate these adverse effects, construction companies should prioritize effective communication strategies, ensure clear and consistent information flow, and foster a culture of open and transparent communication among all stakeholders involved in the construction project.

Role of Active Listening at Construction Site:

Active listening is a critical skill at a construction site as it lays the foundation for effective communication, promotes safety, and fosters a cohesive and productive work environment. Construction projects involve numerous tasks, complex instructions, and potential hazards, making it essential for workers to actively listen and comprehend information accurately.

Hearing	Listening
Receiving any message through ears is known as hearing.	On the other hand explanation of the received message can be labeled as listening.
	
Function of hearing is just to receive the verbal message.	Listening involves decoding or interpretation of the message.

Table 8.1.1 Role of Communication

Understanding instructions correctly is crucial for project success. Active listening ensures that workers grasp the requirements, specifications, and safety measures provided by supervisors and project managers. It minimizes the risk of miscommunication and mistakes that could lead to delays, rework, or even accidents.

Safety is of paramount importance in the construction industry. Active listening helps workers' pay attention to safety briefings, hazard warnings, and emergency procedures. By actively engaging in safety protocols, workers can protect themselves and their colleagues from potential risks, accidents, and injuries.

Teamwork is vital on construction sites, where multiple professionals collaborate to achieve project objectives. Active listening fosters a culture of open communication, where workers feel comfortable sharing ideas, concerns, and feedback. It promotes mutual respect, trust, and inclusivity, leading to

better collaboration and problem-solving.

Adaptability is essential in the dynamic construction environment. Active listening keeps workers informed about changes, updates, and unexpected challenges. Being receptive to new information enables them to adjust their approach and work efficiently, ensuring project progress remains on track.

Moreover, active listening enables construction professionals to build strong relationships with team members, clients, and stakeholders. By understanding and acknowledging others' perspectives, workers demonstrate empathy and enhance client satisfaction

Overall, active listening at a construction site enhances safety, teamwork, productivity, and client relations. It empowers workers to communicate effectively, respond to challenges proactively, and contribute to the successful completion of construction projects.

8.1.4 Teamwork at Workplace

Teamwork is of utmost importance in various aspects of life, whether it's in the workplace, sports, education, or personal relationships.

Fig. 8.1.4 Teamwork at Workplace

Here are some key reasons highlighting the importance of teamwork:

- **Achievement of Common Goals:** Teamwork brings together individuals with diverse skills and expertise to work collectively towards a shared objective. When team members collaborate effectively, they can accomplish more than what could be achieved individually.
- **Enhanced Creativity and Innovation:** Working in a team allows for the exchange of different perspectives and ideas. This diversity fosters creativity and innovative problem-solving, leading to better solutions and approaches.
- **Improved Productivity:** Team members can divide tasks based on their strengths and expertise, leading to improved efficiency and productivity. This distribution of workload ensures that each aspect of a project is handled by the most suitable team member.

- **Shared Responsibility and Accountability:** In a team, each member has a specific role and responsibility. This sense of accountability motivates individuals to perform their best and take ownership of their contributions.
- **Effective Decision Making:** Teams can pool their knowledge and insights to make well-informed decisions. When diverse viewpoints are considered, the decisions tend to be more balanced and comprehensive.
- **Support and Motivation:** Team members can provide emotional support and motivation to each other, boosting morale during challenging times and celebrating achievements together.
- **Learning and Skill Development:** Teamwork allows individuals to learn from one another, acquire new skills, and improve existing ones. This continuous learning enhances personal and professional growth.
- **Building Trust and Camaraderie:** Effective teamwork strengthens the bond between team members, fostering trust, respect, and camaraderie. This positive team dynamic contributes to a harmonious work environment.
- **Adaptability and Resilience:** Teams are often better equipped to handle changes and uncertainties as they can brainstorm strategies and adapt collectively to new situations.
- **Efficient Problem Solving:** When faced with complex challenges, teamwork enables the pooling of resources and expertise, leading to more comprehensive and efficient problem-solving.
- **Synergy and Performance:** The collective efforts of a high-performing team create a synergy where the overall performance is greater than the sum of individual contributions.
- Improved Work-Life Balance: Effective teamwork can distribute workloads and responsibilities, reducing the burden on individual team members and promoting a better work-life balance.

In conclusion, teamwork is vital for achieving success, fostering innovation, and creating a positive and supportive work culture. Emphasizing the importance of teamwork enables organizations and individuals to harness the full potential of collaboration, leading to remarkable achievements and overall well-being.

6.1.5 The 5Cs of Teamwork

The 5Cs of teamwork are fundamental principles that contribute to effective and successful collaboration within a team. These principles help create a positive team dynamic and foster a cohesive and high-performing group.

Fig. 8.1.5 Effective and Successful Collaboration

The 5Cs of teamwork are:

1. **Co-operation**

   Without cooperation between team members, no group will survive. Cooperation is intimately linked to effective communication and self-assurance. Better communication and a transparent and healthy work environment necessitate some degree of clarity and trust.

2. **Compromise**

   Work relationships are not exempt from the necessity of reaching compromises on particular issues. If our peers' or managers' argument is valid and can contribute to greater performance, we may be required to concur. It is acceptable that not everyone can be on the same page at all times. To manage such circumstances, we must examine the situation and consider potential outcomes.

3. **Communication**

   Considered vital for organising the individual and group efforts of the team. Communication is essential for conflict resolution and problem-solving, and companies must support healthy communication within and between teams. Communication must be open, honest, and timely so that every team member knows what to do and how to do it.

4. **Confidence**

   Team members should have confidence in their skills. The leader must provide the team with a clear and simple explanation of the project, each member's responsibilities, and the final objective. It is essential to remember that confidence does not develop in the blink of an eye. It must be constructed step by step.

5. **Commitment**

The demands and interests of the team take precedence above individual concerns. Every action should contribute to the overall corporate objective.

By embracing the 5Cs of teamwork, teams can cultivate an environment of trust, respect, and collaboration, leading to enhanced performance and achievement of shared objectives.

6.1.6 Consequence of Poor Teamwork

Poor teamwork at a construction site can have significant consequences that impact project outcomes, timelines, safety, and overall project success.

Some of the key consequences of poor teamwork include:

Delayed Project Completion: Lack of effective collaboration and coordination among team members can lead to delays in project progress. When tasks are not properly assigned or synchronized, the project timeline may be extended, resulting in increased costs and client dissatisfaction.

Fig. 8.1.6 Poor Teamwork

Reduced Productivity: Poor teamwork can result in inefficiencies and a decrease in overall productivity. Team members may duplicate efforts, make mistakes due to miscommunication, or lack the support needed to perform their tasks efficiently.

- **Lower Quality Work:** Inadequate teamwork can lead to a decline in the quality of work performed. Without effective collaboration and accountability, errors and defects may go unnoticed, compromising the final deliverables.
- **Increased Rework:** Miscommunication and lack of coordination can result in rework and additional costs. Correcting mistakes and addressing issues that arise due to poor teamwork can be time-consuming and financially burdensome.
- **Safety Hazards:** Construction sites are inherently hazardous environments, and poor teamwork can exacerbate safety risks. When team members fail to communicate effectively or work together safely, it can lead to accidents, injuries, and even fatalities.
- **Conflict and Tension:** Poor teamwork may create a negative work environment characterized by conflict, tension, and lack of trust among team members. This can hamper communication and cooperation, further hindering progress.
- **Budget Overruns:** When teamwork is lacking, projects may experience cost overruns due to inefficiencies, rework, and delays. This can strain the project budget and negatively impact the overall financial performance.
- **Missed Opportunities:** Poor teamwork can result in missed opportunities for innovation, improvement, and optimization. Team members may not leverage their collective expertise and diverse perspectives to identify and capitalize on potential opportunities.
- **Client Dissatisfaction:** Clients expect a well-coordinated and smoothly executed project. Poor teamwork can lead to client dissatisfaction due to missed deadlines, quality issues, and breakdowns in communication.
- **Reputation Damage:** Repeated instances of poor teamwork on construction projects can damage the reputation of the construction company, leading to a loss of trust among clients and stakeholders.

In summary, poor teamwork at a construction site can have serious consequences on project outcomes, timelines, safety, and overall project success. It is essential for construction teams to prioritize effective collaboration, communication, and coordination to mitigate these adverse effects and ensure the successful completion of projects.

Notes

Unit 8.2 Working Effectively and Maintaining Discipline at Work

Unit Objectives

By the end of this unit, participants will be able to:

- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
- Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
- Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
- Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
- Demonstrate ways to work together with co-workers in a synchronized manner.

8.2.1 Discipline at Work

Discipline at work refers to the adherence to rules, policies, and professional standards within a workplace. It involves employees maintaining a responsible and focused approach to their work duties, following established protocols, and upholding ethical principles.

Here are some key aspects of discipline at work:

1. **Punctuality:** Being punctual is a fundamental aspect of discipline. Employees are expected to arrive at work and meetings on time, ensuring smooth operations and respect for others' time.
2. **Following Policies and Procedures:** Employees must follow the company's policies, procedures, and guidelines related to various aspects of work, such as safety, communication, and data privacy.

Fig. 8.2.1 Discipline at Work

3. **Professional Conduct:** Discipline at work involves maintaining professional conduct and demeanor in all interactions with colleagues, clients, and stakeholders.
4. **Meeting Deadlines:** Adhering to deadlines and delivering work on time is a critical aspect of discipline, as it ensures the timely completion of projects and tasks.
5. **Respect for Authority:** Discipline requires showing respect for supervisors, managers, and leadership, following their directions, and seeking guidance when needed.
6. **Self-Discipline:** Individual employees should possess self-discipline to stay focused on their tasks, avoid distractions, and prioritize their responsibilities.
7. **Quality of Work:** Disciplined employees take pride in their work and strive for excellence, ensuring the delivery of high-quality output.
8. **Compliance with Company Values:** Employees should align their actions with the company's values and ethical standards, promoting a culture of integrity and trust.
9. **Conflict Resolution:** Handling conflicts and disagreements in a respectful and constructive manner is an essential part of discipline, maintaining a harmonious work environment.
10. **Accountability:** Disciplined employees take ownership of their actions, admit mistakes, and work towards rectifying any errors they may make.
11. **Adherence to Dress Code:** Following the organization's dress code and appearance guidelines contributes to maintaining a professional and cohesive image.
12. **Attendance and Leave Management:** Discipline includes managing attendance and leave in accordance with company policies and providing prior notice when taking time off.
13. **Use of Resources:** Disciplined employees use company resources responsibly and efficiently, avoiding wastage and abuse.

Discipline at work is crucial for creating a productive and positive work environment. It fosters a sense of responsibility, reliability, and accountability among employees, leading to improved performance and overall organizational success. Employers should also provide clear expectations, guidance, and support to encourage and reinforce a culture of discipline within the workplace.

8.2.2 Time Management

Time management is not about working harder; rather, it is about working smarter so that employees do not overburden themselves and create unnecessary strain.

By effectively managing their time, employees will meet deadlines, increase their effectiveness, become more productive, and produce superior work.

Fig. 8.2.2 Time Management

By effectively managing their time, employees will meet deadlines, increase their effectiveness, become more productive, and produce superior work. They will also have a higher degree of job satisfaction because they will experience less stress, which will help them advance in their careers and reduce your company's staff turnover.

Time management at construction by workers is essential for ensuring that individual tasks and responsibilities are completed efficiently, contributing to the overall success of the project. Here are some time management tips that construction workers can follow to optimize their productivity:

1. **Daily Planning:** Begin each workday with a clear plan of tasks to be completed. Prioritize the most critical tasks and allocate time accordingly.
2. **Set Goals and Deadlines:** Set specific and achievable goals for each workday or week. Establish personal deadlines for completing tasks to stay focused and motivated.
3. **Minimize Distractions:** Limit distractions during work hours, such as personal phone use or excessive socializing. Stay dedicated to tasks at hand to maximize productivity.
4. **Use Tools and Equipment Efficiently:** Familiarize yourself with the tools and equipment required for each task and use them efficiently to avoid wasted time.
5. **Organize Work Area:** Keep your work area clean and organized. A well-organized workspace minimizes the time spent searching for tools or materials.
6. **Time Tracking:** Track the time spent on each task to identify areas where efficiency can be improved and to better estimate future project timelines.
7. **Collaborate with Team Members:** Communicate and coordinate with other team members effectively to ensure a smooth workflow and prevent delays caused by miscommunication.
8. **Break Tasks into Smaller Steps:** For larger tasks, break them down into smaller, manageable steps. This approach helps in maintaining focus and progress.
9. **Take Short Breaks:** Incorporate short breaks into your workday to recharge and avoid burnout. However, ensure that the breaks are kept within reasonable limits to maintain productivity.
10. **Adapt to Changes:** Construction projects often encounter unforeseen challenges or changes. Be flexible and adaptable to adjust your schedule as needed without compromising quality.
11. **Avoid Multitasking:** Instead of trying to tackle multiple tasks simultaneously, focus on completing one task at a time to ensure better quality and efficiency.
12. **Learn Time-Saving Techniques:** Seek out and learn time-saving techniques specific to your tasks or trade. Efficiency comes with experience and knowledge.

1. **Seek Feedback:** Ask for feedback from supervisors or experienced colleagues on ways to improve your time management skills.
2. **Reflect and Improve:** Regularly assess your time management and productivity. Identify areas for improvement and actively work towards refining your approach.

By implementing these time management practices, construction workers can optimize their work efficiency, meet project deadlines, and contribute to the overall success of the construction project.

8.2.3 Interpersonal Conflicts at Construction by Workers

Interpersonal conflicts among construction workers can arise due to various reasons, and if left unaddressed, they can negatively impact the work environment, team morale, and project progress.

Some common causes of interpersonal conflicts at construction sites include:

- Communication Issues: Miscommunication, misunderstandings, or poor communication skills can lead to conflicts among workers, especially when instructions are unclear or not effectively conveyed.
- Differences in Work Styles: Workers may have different approaches to completing tasks, leading to clashes in how work should be performed.
- Competition for Resources: Limited resources, such as tools, equipment, or materials, can create tensions and conflicts when workers need to share or prioritize their use.
- Personal Differences: Diverse backgrounds, personalities, and work habits can lead to clashes in values, beliefs, and interpersonal dynamics.
- Role Ambiguity: Unclear or overlapping roles and responsibilities can cause conflicts between workers who are unsure about their tasks or areas of authority.
- Working Conditions: Challenging working conditions, tight deadlines, and long hours can contribute to stress and tensions among workers.
- Safety Concerns: Differences in safety practices or attitudes towards safety can lead to conflicts, especially when one worker perceives another's actions as risky.
- Leadership Issues: Conflicts can arise when workers feel their supervisors or managers are not effectively leading or addressing issues.
- Past Conflicts or Grudges: Lingering issues from past conflicts that were not adequately resolved can resurface and escalate over time

Fig. 8.2.3 Interpersonal Conflicts

To manage and resolve interpersonal conflicts at construction sites, the following steps can be taken:

Open Communication: Encourage open and honest communication among workers to address concerns and resolve misunderstandings promptly.

- **Conflict Resolution Training:** Provide conflict resolution training to workers to equip them with skills to address and resolve conflicts constructively.
- **Establish Clear Roles and Expectations:** Clearly define roles, responsibilities, and performance expectations to reduce ambiguity and prevent conflicts.
- **Promote Team Building:** Organize team-building activities to foster better understanding and collaboration among workers.
- **Mediation and Third-Party Intervention:** Utilize mediation or involve a neutral third party to help facilitate discussions and find solutions when conflicts are difficult to resolve within the team.
- **Encourage Respect and Empathy:** Foster a culture of respect and empathy where workers understand and appreciate each other's perspectives and backgrounds.
- **Address Safety Concerns:** Ensure that safety protocols are well-communicated and followed to reduce safety-related conflicts.
- **Regular Feedback and Performance Reviews:** Provide regular feedback and conduct performance reviews to address any performance-related conflicts.

By proactively addressing interpersonal conflicts and promoting a positive work culture, construction teams can maintain a harmonious work environment, improve collaboration, and enhance overall project outcomes.

Fig. 8.2.4 Positive Work Culture

Notes

Unit 8.3 Maintaining Social Diversity at Work

Unit Objectives

By the end of this unit, participants will be able to:

- Discuss the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
- Demonstrate effective implementation of gender-neutral practices at the workplace.
- Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

8.3.1 Gender Sensitivity

Gender sensitivity is the act of being sensitive towards people and their thoughts regarding gender. It ensures that people know the accurate meaning of gender equality, and one's gender should not be given priority over their capabilities.

Women are an important source of labour in many sectors, yet they have limited access to resources and benefits. Women should receive the same benefits and access to resources as men. A business can improve its productivity and quality of work by providing better support and opportunities to women.

Fig. 8.3.1 Gender Equality

Important Terms

Gender Sensitivity-Gender sensitivity is the act of being sensitive to the ways people think about gender.

Gender Equality - It means persons of any gender enjoy equal opportunities, responsibilities, and rights in all areas of life.

Gender Discrimination – It means treating an individual unequally or disadvantageously based on their gender, e.g. paying different wages to men and women for similar or equal job positions.

Fig. 8.3.2 Gender Discrimination

Strategies for Enhancing Gender Equity

To enhance gender equity, one should:

- Follow gender-neutral practices at all levels at work.
- Participate together in decision-making.
- Help in promoting women's participation in different forums.
- Assist women in getting exposure to relevant skills and practices.
- Assist women in capacity building by mentoring, coaching or motivating them, as appropriate.
- Assist in the formation and operation of women support groups.
- Assist in the implementation of women-centric programmes.
- Combine technical training with reproductive health and nutrition for coffee farming households.
- Assist in making a work environment that is healthy, safe, and free from discrimination.

Bridging Gender Differences

Men and women react and communicate very differently. Thus, there are some work differences as both genders have their style and method of handling a situation.

Although, understanding and maturity vary from person to person, even between these genders, based on their knowledge, education, experience, culture, age, and upbringing, as well as how one's brain functions over a thought or problem.

In order to bridge the gap, one should:

- Not categorize all men and women in one way.
- Be aware of the verbal and non-verbal styles of communication of every gender to avoid any miscommunication and work better.
- Be aware of partial behaviour and avoid it.
- Encourage co-workers of different genders to make room by providing space to others.
- Ways to reduce Gender Discrimination
- Effective steps against sexual harassment by the concerned authorities and general public.
- Gender stereotypes are how society expects people to act based on their gender. This can only be reduced by adopting appropriate behaviour and the right attitude.
- Objectification of females must be abolished.

Fig. 8.3.3 Promoting Gender Sensitivity at Workplace

Ways to Promote Gender Sensitivity in the Workplace

- Practices that promote gender diversity should be adopted and promoted.
- All genders should receive equal responsibilities, rights, and privileges.
- All genders should have equal pay for similar or the same job roles/ positions.

- Strict and effective workplace harassment policies should be developed and implemented.
- An open-minded and stress-free work environment should be available to all the employees, irrespective of their gender.
- Women should be encouraged to go ahead in every field of work and assume leadership roles.
- Follow appropriate measures for women's empowerment.
- Men should be taught to be sensitive to women and mindful of their rights.

8.3.2 PwD Sensitivity

Some individuals are born with a disability, while others may become disabled due to an accident, illness or as they get old. People with Disabilities (PwD) may have one or more areas in which their functioning is affected. A disability can affect hearing, sight, communication, breathing, understanding, mobility, balance, and concentration or may include the loss of a limb. A disability may contribute to how a person feels and affect their mental health.

Fig. 8.3.4 Disability-Friendly Workplace

Important Terms

- Persons with Disabilities (PwD) – Persons with Disabilities means a person suffering from not less than 40% of any disability as certified by a medical authority.
- Types of Disability:
  a. Blindness – Visually impaired
  b. Low Vision

c. Leprosy Cured

d. Hearing impairment

e. Locomotor disability

f. Mental retardation

g. Mental illness

PwD Sensitivity

PwD sensitivity promotes empathy, etiquette and equal participation of individuals and organizations while working with individuals with a disability, e.g. sensory, physical or intellectual.

Ways to be PwD Sensitive

To be sensitive to PwD, one should:

- Be respectful to all Persons with Disabilities (PwD) and communicate in a way that reflects PwD sensitivity.
- Always be supportive and kind towards a PwD with their daily chores.
- Be ready to assist a PwD to help them avail of any benefit/ livelihood opportunity/ training or any kind that helps them grow.
- Encourage and try to make things easier and accessible to PwD so that they can work without or with minimum help.
- Protest where feasible and report any wrong act/behaviour against any PwD to the appropriate authority.
- Learn and follow the laws, acts, and policies relevant to PwD.

Appropriate Verbal Communication

As part of appropriate verbal communication with all genders and PwD, one should:

- Talk to all genders and PwD respectfully, maintaining a normal tone of voice with appropriate politeness. It is important to ensure one's tone of voice does not have hints of sarcasm, anger, or unwelcome affection.
- Avoid being too self-conscious concerning the words to use while also ensuring not to use words that imply one's superiority over the other.
- Make no difference between a PwD and their caretaker. Treat PwD like adults and talk to them directly.
- Ask a PwD if they need any assistance instead of assuming they need it and offering assistance spontaneously.

Appropriate Non-verbal Communication

Non-verbal communication is essentially the way someone communicates through their body language. These include:

- **Facial expressions** - The human face is quite expressive, capable of conveying many emotions without using words. Facial expressions must usually be maintained neutral and should change according to the situation, e.g. smile as a gesture of greeting.
- **Body posture and movement** - One should be mindful of how to sit, stand, walk, or hold their head. For example - one should sit and walk straight in a composed manner. The way one moves and carries self, communicates a lot to others. This type of non-verbal communication includes one's posture, bearing, stance, and subtle movements.
- **Gestures** - One should be very careful with their gestures, e.g. waving, pointing, beckoning, or using one's hands while speaking. One should use appropriate and positive gestures to maintain respect for the other person while being aware that a gesture may have different meanings in different cultures.
- **Eye contact** - Eye contact is particularly significant in non-verbal communication. The way someone looks at someone else may communicate many things, such as interest, hostility, affection or attraction. Eye contact is vital for maintaining the flow of conversation and for understanding the other person's interest and response. One should maintain appropriate eye contact, ensuring not to stare or look over the shoulders. To maintain respect, one should sit or stand at the other person's eye level to make eye contact.
- **Touch** - Touch is a very sensitive type of non-verbal communication. Examples are - handshakes, hugs, pat on the back or head, gripping the arm, etc. A firm handshake indicates interest, while a weak handshake indicates the opposite. One should be extra cautious not to touch others inappropriately and avoid touching them inadvertently by maintaining a safe distance.

Rights of PwD

PwD have the right to respect and human dignity. Irrespective of the nature and seriousness of their disabilities, PwD have the same fundamental rights as others, such as:

- Disabled persons have the same civil and political rights as other people
- Disabled persons are entitled to the measures designed to enable them to become as self-dependent as possible
- Disabled persons have the right to economic and social security
- Disabled persons have the right to live with their families or foster parents and participate in all social and creative activities.
- Disabled persons are protected against all exploitation and treatment of discriminatory and abusive nature.

Making Workplace PwD Friendly

- One should not make PwD feel uncomfortable by giving too little or too much attention
- One should use a normal tone while communicating with a PwD and treat them as all others keeping in mind their limitations and type of disability
- Any help should be provided only when asked for by a PwD
- One should help in ensuring the health and well-being of PwD.

Expected Employer Behaviour

Some of the common behavioural traits that employees expect from their employers are:

- Cooperation: No work is successful without cooperation from the employer's side. Cooperation helps to understand the job role better and complete it within the given timeline.
- Polite language: Polite language is always welcomed at work. This is a basic aspect that everybody expects.
- Positive Attitude: Employers with a positive attitude can supervise the work of the employees and act as a helping hand to accomplish the given task. A person with a positive attitude looks at the best qualities in others and helps them gain success.
- Unbiased behaviour: Employers should always remain fair towards all their employees. One should not adopt practices to favour one employee while neglecting or ignoring the other. This might create animosity among co-workers.
- Decent behaviour: The employer should never improperly present oneself before the employee. One should always respect each other's presence and behave accordingly. The employer should not speak or act in a manner that may make the employee feel uneasy, insulted, and insecure

Fig. 8.3.5 Ramp for PwD Persons

Exercise

Answer the following questions.

- How would you communicate effectively with your team members to ensure everyone understands their roles and responsibilities in a painting project?
- Describe a situation where miscommunication led to a problem on a painting job. How would you prevent such issues in the future?
- Explain the importance of active listening in a team setting and how it contributes to successful completion of a painting job.
- What safety measures do you follow to maintain discipline and ensure a safe work environment while painting on-site?
- How do you encourage and support diversity in your team to create a positive and inclusive work environment on a painting job site?

Notes

Skill India
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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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National
Skill Development
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9. Plan and organize Work to Meet Expected Outcomes

Unit 9.1 – Prioritise work activities to achieve desired results

Unit 9.2 – Organising resources

(CON/N8002)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Explain how to plan painting activities within defined scope and duration
- Explain basic concept of productivity and sequence of working
- Carry out implementation of safety and organizational norms while working
- Explain requisition of resources, reporting for requirement of resources orally and in written to concerned authority
- Demonstrate requisition of resource citing an example
- Demonstrate oral/ written reporting procedure to senior
- Demonstrate how to handle and organize painting tools, material, fixtures and devices for painting work.
- Demonstrate how to prioritize all works/ activities
- Demonstrate optimum utilization of resources citing an example

Unit 9.1 Prioritise Work Activities to achieve Desired Results

Unit Objectives

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- Explain basic concept of productivity and sequence of working
- Carry out implementation of safety and organizational norms while working
- Demonstrate oral/ written reporting procedure to senior

9.1.1 Setting Objectives

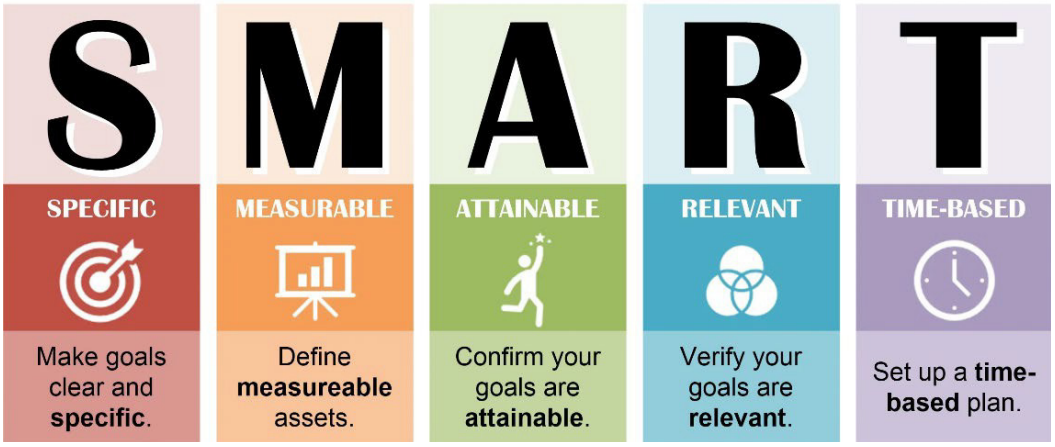

Fig. 9.1.1 SMART Goals

SMART goals are a widely used framework for setting objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound. When applied to masonry and concrete work, SMART goals can help improve project planning, productivity, and overall project success. Here's how SMART goals can be applied in the context of masonry and concrete work:

- Specific: A specific goal is clear, well-defined, and focused on a particular aspect of the tiling worker's job. It answers the questions of what needs to be accomplished and why it is essential. For example: "Improve tile cutting skills to achieve cleaner and more precise cuts."
- Measurable: A measurable goal has tangible criteria for assessing progress and determining whether the objective has been met. It quantifies the outcome, allowing the tiling worker to track their performance. For example: "Successfully cut and install 100 tiles without any wastage."
- Achievable: An achievable goal is realistic and within the tiling worker's capabilities. It considers the available resources, skills, and time. Setting an achievable goal ensures that it is challenging yet attainable. For example: "Attend a tile cutting workshop and practice cutting techniques regularly."

- **Relevant:** A relevant goal aligns with the tiling worker's job responsibilities and contributes to their professional growth and the success of their projects. It is meaningful and ties directly to their work. For example: "Improving tile cutting skills will enhance overall tiling efficiency and the quality of finished projects."
- **Time-bound:** A time-bound goal has a specific deadline for completion. It provides a sense of urgency and accountability, motivating the tiling worker to stay on track and achieve the objective within a set timeframe. For example: "Achieve this goal of improved tile cutting proficiency within the next three months."

By setting SMART goals, a Mason Tiling Worker can focus on specific areas of improvement, track their progress, and strive for excellence in their work.

Examples of other SMART goals for Mason Tiling Workers might include improving grouting techniques, enhancing knowledge of tile materials, increasing efficiency in large-scale projects, or maintaining a spotless safety record throughout the year.

9.1.2 Importance of Quality in Work for Construction Painting

Quality is a critical aspect that directly impacts the overall success and longevity of a tiling project.

Fig. 9.1.2 Efficiency for Work

Here are some reasons why maintaining high-quality work is essential for mason tiling:

- **Durability and Longevity:** High-quality tiling work ensures that tiles are correctly installed, adhered, and grouted, leading to a durable and long-lasting surface. Properly installed tiles are less likely to crack, chip, or come loose over time.
- **Aesthetics and Appearance:** Quality tiling work enhances the aesthetics and appearance of the finished space. Proper alignment, level surfaces, and uniform grout lines contribute to an attractive and visually appealing result.
- **Safety and Performance:** Well-installed tiles provide a safe and secure surface for walking and other activities. Quality work reduces the risk of tripping hazards and other accidents caused by loose or uneven tiles.
- **Water Resistance:** Quality tiling work with proper sealing and grouting ensures water resistance, especially in areas like bathrooms and kitchens. This prevents water seepage, mold growth, and potential damage to the underlying structure

- **Client Satisfaction:** Delivering high-quality tiling work results in higher client satisfaction. Clients appreciate a finished product that meets their expectations, both aesthetically and functionally.
- **Reduced Maintenance and Repair Costs:** Properly installed tiles with quality workmanship require less frequent repairs and maintenance, leading to cost savings in the long run.
- **Reputation and Referrals:** Quality work enhances the reputation of the mason tiler and the contracting company. Satisfied clients are more likely to recommend the tiler to others, leading to more business opportunities.
- **Compliance with Standards:** Quality work ensures compliance with industry standards and building codes, avoiding potential legal and regulatory issues.
- **Efficiency and Time Savings:** Well-trained mason tilers with a focus on quality work can complete projects more efficiently, reducing delays and meeting project deadlines.
- **Professionalism:** High-quality work reflects the professionalism and expertise of the mason tiler. It demonstrates a commitment to excellence and a dedication to delivering the best results.

9.1.3 Prioritization of Work

Steps for prioritizing works that have a lot of moving parts:

Fig. 9.1.3 Prioritization of Work

1. **Listing down daily task: Make a list of your daily activities. Make a list of daily tasks to be completed while considering their priority.**
2. **Recognising urgent vs. important task: Identify the task that needs immediate attention. Ensure that the work gets completed as planned without missing any commitments or dependency of completion of your work on others.**
3. **Evaluating the value of the task: The important work should be given the highest value. Identify which types of task are on top priority over the others. It will help increase your team's efficiency.**
4. **Ordering task by estimating efforts: Check and estimate efforts that will go in performing the task. Target to start the task that will require more amount of time.**

5. **Flexibility and adaptability in task completion: Change is evident. Be flexible and adapt to the priorities that may change.**
6. **Focusing on the priorities: Prioritise your task by analysing and estimating the efforts and focus on the derived priorities.**

9.1.4 Optimizing work

Schedule: Scheduling means planning an activity to take place at a particular time. Schedule should always be little flexible.

The benefits of scheduling are:

- Helps in increasing efficiency.
- Helps in decreasing stress
- Achievement of desired results as per deadlines.

Fig. 9.1.4 Optimizing Work

While scheduling one should remember to:

- Analyse how much time each task will take and schedule the task accordingly.
- Plan in such a way that multiple jobs are not assigned to the same timeline unless planning to multitask.
- It is essential to share the prepared schedule with team members for successful execution of tasks.

Multitask: Multitasking means the art of doing multiple tasks at the same time. To multitask efficiently, following things should be taken care: Allot time to routine activities before juggling with two or three tasks.

- Allot time to routine activities before juggling with two or three tasks.
- Combine the correct activities for efficient multitasking.
- Review how multitasking affects performance of tasks.

Track the work Progress: The progress of work can be tracked by

- Reviewing work progress at regular intervals.
- Analysing the performance and making amendments to the scheduling of tasks so as to streamline the plan.
- Finding out the reasons for deviation from the schedule.
- Shuffling the order of tasks to avoid boredom without affecting the sequence.

9.1.5 Planning and Organizing Work

Successful completion of work is possible if you plan and organise your time efficiently.

Timely planning will help you to overcome all challenges in the way to success:

Step 1: Planning based on scope of work: Plan work activity as per the identified scope of work like selecting appropriate worker based on a requirement of work.

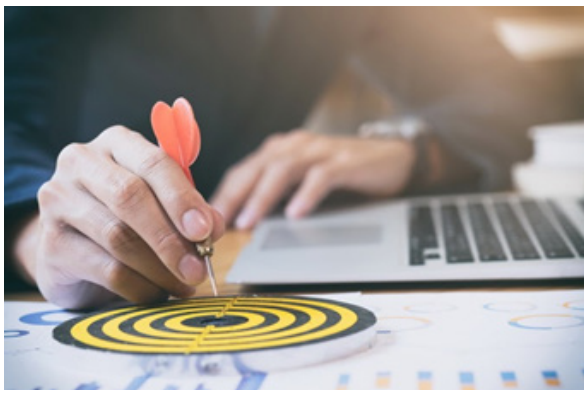

Fig. 9.1.5 Planning and Organizing Work

Step 2: Preparing a check list: List out the activities and further break it into smaller units. This will help you in keeping track and timely completion of a task. It will be possible by assigning the work to the worker and dividing the responsibility.

Step 3: Adhering to the timelines: Complete the work according to the established timelines. Allocate the work as per the completion date and make sure that it gets completed within the timeframe. Updating your calendar as per the end date of the task will help in minimizing the work load.

Step 4: Creating plan of action: Charting out action plan and analysing possible difficulties will help you keep the task on track. This is possible if you check all the required material in advance for the task as per the plan of action. It also includes arranging for replacement of worker in case of emergency.

Step 5: Communicating regularly about the updates: Give clear instructions to the team members of the desired outcome. Update them at regular intervals.

Step 6: Managing time is a key to success: Prioritising is essential to reduce stress at work and be more efficient and productive.

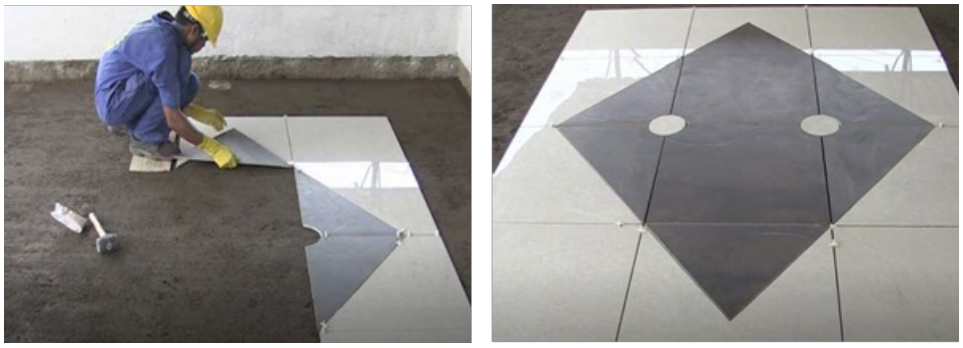

Fig. 9.1.6 Achieving Success in Tiling Work

Material planning involves checking the availability of all the raw materials that would be required in the tiling process and to ensure that they are available at the construction site. The basic materials required in tiling work are:

- Tiles
- Cement
- Aggregates
- Water
- Grout

The mason tiling should check with his supervisor that all these are available on the site in the required quantity.

- Quality of the materials is as per the standards
- Material is accessible at the site to minimize the distance to carry and avoid unnecessary delay.
- Stacking and storing as per the guidelines.
- Reporting the material shortage in advance to the supervisors so that it can be arranged in advance.

Proper material planning helps in:

- Utilising manpower to avoid wastage of time due to unavailability of the material.
- Curtailing the project cost by minimizing delay.
- Achieving the deadlines.
- Reducing the wastage of material due to unavailability of other necessary material.

Work Planning

- Division of work among the team members
- Assigning the work as per individual capability and skills.

- Allocating sufficient manpower to complete the task as per the work plan
- Providing all the workers necessary tools and equipment required for the work.
- Organising work output so that all the processes are completed without any delay for the other.
- Mentoring and guiding all the workers as and when required.

Fig. 9.1.7 Material needed for Work

Notes

Unit 9.2 Organising resources

Unit Objectives

By the end of this unit, participants will be able to:

- Explain requisition of resources, reporting for requirement of resources orally and in written to concerned authority
- Demonstrate requisition of resource citing an example
- Demonstrate how to handle and organize painting tools, material, fixtures and devices for painting work.
- Demonstrate how to prioritize all works/ activities
- Demonstrate optimum utilization of resources citing an example

9.2.1 Organisation of Resources

Organising is a process of engaging co-workers and developing a productive relationship amongst them for the purpose of completing a given task. Organising and planning are the two most important factors for efficient and successful job.

- Organising includes:
- Identification of activities.
- Grouping and classification of activities
- Identification of appropriate tools, equipment and materials before starting work
- Identification and arranging proper Manpower.
- Assignment of duties to appropriate people.
- Creation and delegation of responsibilities among co-workers for completion of work.
- Coordination of work among the team and across teams.
- Organising training or providing guidelines to avoid damage of equipment.
- Planning and organising work environment to avoid accidents.
- Organising resources to avoid waste of materials.

Fig. 9.2.1 Organization of required Resources

Being organised helps to:

- Make better decisions.
- Identify available resources.
- Anticipate needs and problems.
- Get work done accurately by avoiding costly mistakes.
- Be more efficient and productive.
- Complete desired tasks and activities.

9.2.2 Monitoring

Monitoring is done to ensure that everything goes according to set rules and timelines

Steps for Monitoring

- Prioritising work activities & create a work plan for completing own work
- Measuring actual work progress of self and sub ordinates at regular intervals
- Comparing actual work done with the plan and identifying the gaps if any
- Taking corrective measures to rectify the gaps.

Fig. 9.2.2 Monitoring of Work

9.2.3 Optimising use of Resources

Resources can be used in an optimum way by following the guidelines mentioned below.

- Analyse the capabilities of individuals and the characteristics job requirements
- Match the right people with the right job
- Rotate jobs to avoid boredom
- Rotate people to give them varied experience and training opportunities
- Make provisions for absenteeism

Fig. 9.2.3 Optimising use of Resources

Exercise

Answer the following questions.

- What do you understand about the SMART goal?
- What are the benefits of material planning?
- What is work planning?
- What are the benefits of work planning?

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10. Maintaining a Safe, Hygienic and Secure Working Environment

Unit 10.1 – Hazards and Emergency Situations

Unit 10.2 - Safety Drills, PPEs and Fire Safety

Unit 10.3 - Hygiene and Safe Waste Disposal Practices

Unit 10.4 - Infectious Disease and Its Cure

(CON/N9001)

Key Learning Outcomes

By the end of this module, participants will be able to:

- Explain the types of hazards at the construction sites
- Identify the hazards specific to the painting and decoration work
- Recall the safety control measures and actions to be taken under emergency situation
- Explain the classes of fire and types of fire extinguishers
- Demonstrate the operation of fire extinguisher.
- Demonstrate different methods involved in providing first aid to the affected person.
- Explain the importance of worker participation in safety/mock drills
- Demonstrate the use of all Personal Protective Equipment (PPE) like helmet, safety shoe, safety belt, safe jackets and other safety equipment.
- Explain the reporting procedure adopted in case of emergency situations
- Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories
- Explain different types of wastes produced at a construction site including their disposal method
- Explain the purpose and importance of vertigo test at construction site
- Demonstrate vertigo test
- List out basic medical tests required for working at construction Site
- Explain the types of ergonomic principles adopted while carrying out specific task at the construction
- Explain the benefits of basic ergonomic principles used at construction sites.
- Explain the importance of housekeeping
- Demonstrate housekeeping practice followed after painting and decoration works.

Unit 10.1 Hazards and Emergency Situations

Unit Objectives

By the end of this unit, participants will be able to:

- Understand the types of hazards at the construction sites and identify the hazards specific to the domain related works.
- Recognize the safety control measures and actions to be taken under emergency situations.
- Know the reporting procedure to the concerned authority in case of emergency situations.

10.1.1 Hazards at Workplace

Hazards versus Risk: A hazard possesses the potential to induce harm, whereas risk pertains to the probability of harm occurring as a result of being exposed to that hazard.

Fig. 10.1.1 Hazards versus Risk

Workplace Hazards Types: Workplace hazards can vary depending on the type of work and the industry.

Fig. 10.1.2 Workplace Hazards

Here are some common types of workplace hazards that can be found in various workplaces:

Fig. 10.1.3 Risk Associated with Hazards

- **Physical Hazards:**
  - Slips, trips, and falls
  - Falling objects or materials
  - Contact with moving machinery or equipment
  - Noise and vibration
  - Extreme temperatures (hot or cold)
  - Poor ergonomics leading to musculoskeletal disorders
- **Electrical Hazards:**
  - Electrical shock or electrocution
  - Short circuits or electrical fires
  - Fire and Explosion Hazards:
  - Combustible materials
  - Electrical equipment malfunctions
  - Inadequate fire safety measures
- **Vehicle-Related Hazards:**
  - Accidents involving vehicles or heavy machinery
  - Forklift incidents in warehouses and industrial settings
  - Chemical Hazards:
  - Exposure to toxic or hazardous substances (e.g., chemicals, fumes, gases)
  - Skin contact with irritants or corrosive materials

- Chemical spills or leaks

- **Psychosocial Hazards:**
  - Workplace stress and pressure
  - Bullying or harassment
  - Job insecurity
  - Long working hours and inadequate rest breaks

Identifying and mitigating workplace hazards is essential to ensuring the health and safety of employees. Employers should conduct regular risk assessments and implement appropriate safety measures and training to minimize the risks associated with these hazards.

10.1.2 Hazard Identification and Risk Assessment (HIRA):

Hazard Identification and Risk Assessment (HIRA) is a systematic process used to identify potential hazards in a workplace or any activity and assess the associated risks.

The primary goal of HIRA is to proactively identify and evaluate potential dangers to prevent accidents, injuries, and adverse health effects. It is a fundamental component of occupational health and safety management.

Fig. 10.1.4 Risk Assessment

The HIRA process typically involves the following steps:

- Conduct a comprehensive site survey to identify potential hazards at the construction site.
- Involve workers, supervisors, and safety personnel in the hazard identification process.
- Prioritize hazards based on their severity and likelihood of occurrence.
- Assess the risks associated with each identified hazard, considering potential consequences and exposure frequency.
- Implement appropriate control measures to reduce or eliminate the identified risks.
- Use the hierarchy of controls (elimination, substitution, engineering controls, administrative controls, and PPE) to address hazards effectively.

- Provide necessary training and awareness programs for workers on identified hazards and safety protocols.
- Regularly review and update the hazard identification and risk assessment as the construction progresses.
- Maintain proper documentation of the hazard identification and risk assessment process.
- Foster a culture of safety and encourage workers to report any new hazards or safety concerns.

HIRA is an ongoing process that requires the involvement and cooperation of all stakeholders, including workers, supervisors, safety officers, and management.

It helps create a safer work environment, reduces the likelihood of accidents, and contributes to improved overall occupational health and safety

Fig. 10.1.5 Risk Management Process

Hazards Specific to Domain-Related Works in Construction:

1. Roofing Hazards: Roofers face the risk of falls from heights, especially if proper fall protection measures are not in place.
2. Demolition Hazards: Demolition work involves risks of flying debris, structural collapses, and exposure to hazardous materials.
3. Welding and Cutting Hazards: Welders are exposed to sparks, fumes, and electrical hazards during welding and cutting processes.
4. Crane and Heavy Equipment Hazards: Improper operation of cranes and heavy machinery can lead to struck-by and caught-in accidents.
5. Scaffolding Hazards: Improperly assembled/unstable scaffolding poses fall risks for workers.
6. Concrete and Masonry Hazards: Workers involved in concrete pouring and masonry work face risks of heavy lifting injuries and ergonomic issues.
7. Highway and Roadwork Hazards: Road construction workers are at risk of being struck by vehicles passing through the work zone.
8. Electrical Installation Hazards: Electricians face the dangers of electric shocks and arc flashes during installation and maintenance work.
9. Painting Hazards: Painters may encounter risks from working at heights, using chemicals in paints, and exposure to fumes.
10. Tunneling Hazards: Workers involved in tunnel construction face risks of collapse, flooding, and exposure to harmful gases.

Different domain-related works have their unique risks, and it's essential to tailor safety measures accordingly to ensure a safe work environment for all employees.

10.1.3 Workplace Warning Signs:

Workplace warning signs are essential visual cues used in various environments to convey important information, instructions, or potential hazards.

These signs play a crucial role in promoting safety, providing guidance, and preventing accidents.

Safety signs are essential visual cues used to convey critical safety information and promote safety awareness in various environments.

Safety Signs are generally divided into 4 Categories along with their Colour Codes:

Fig. 10.1.6 Workplace Warning Signs

- Red
- Blue
- Yellow
- Green

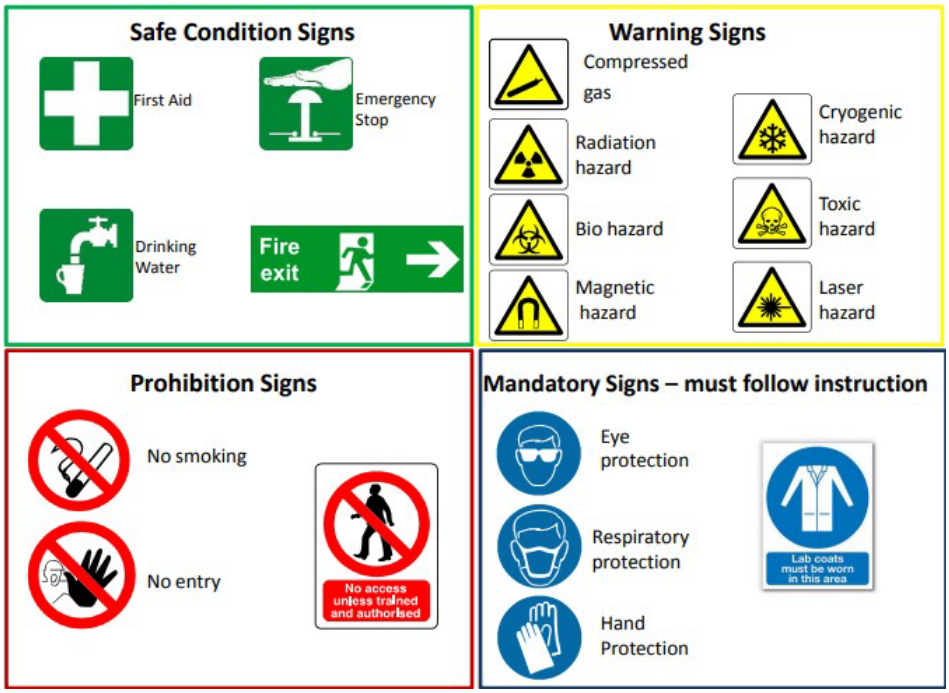

Fig. 10.1.7 Four Types of Safety Signs and their Colour

10.1.4 Emergency Response Plan (ERP)

An Emergency Response Plan (ERP) is a comprehensive document that outlines procedures, protocols, and responsibilities to be followed in the event of emergencies or critical incidents.

The ERP is designed to ensure the safety and well-being of individuals, property, and the environment during emergencies.

Fig. 10.1.8 Emergency Response Plan (ERP)

10.1.5 Reporting Emergency

Reporting procedures in case of emergency situations at a construction site play a crucial role in ensuring the safety of workers and facilitating a swift and coordinated response. The specific reporting procedure may vary depending on the construction site's policies and the type of emergency.

Fig. 10.1.9 Emergency Situations

However, here are general steps to follow when reporting an emergency situation at a construction site in India:

1. **Assess the Situation:** Quickly assess the nature and severity of the emergency while ensuring your safety and the safety of others, if possible.
2. **Activate the Alarm:** If the construction site has an alarm or emergency alert system, activate it to alert other workers and personnel about the emergency.
3. **Call Emergency Services:** Dial the appropriate emergency services number in India, which is 112, to connect to Police, Fire, and Medical emergency services.
4. **Provide Essential Information:** When calling emergency services, provide the operator with the following information:
    - The type of emergency (e.g., fire, collapse, injury).
    - The exact location of the construction site, including the address or nearby landmarks.
    - Any specific hazards or risks present at the site.
    - The number of people involved or injured (if known).
5. **Notify On-Site Personnel:** Inform the on-site supervisor, safety officer, or designated emergency response team members about the emergency.
6. **Follow the Construction Site's Emergency Response Plan:** Comply with the specific reporting procedures outlined in the construction site's Emergency Response Plan. This may involve contacting a specific individual or department responsible for handling emergencies.
7. **Cooperate with Authorities:** Once emergency services arrive at the construction site, cooperate fully with the authorities and follow any instructions provided by them.
8. **Inform Contractors or Site Management:** If the construction site involves multiple contractors or has site management, inform them about the emergency situation.

9. **Document the Incident:** After the emergency has been addressed, document the incident thoroughly, including the details of the emergency, response actions taken, and any injuries or damages incurred.
10. **Review and Improve Procedures:** After the emergency situation has been resolved, review the response and reporting procedures to identify any areas for improvement and make necessary adjustments to the Emergency Response Plan.

It is essential for all personnel working at the construction site to be familiar with the site's specific emergency response procedures and protocols. Regular training, drills, and awareness programs can help ensure that everyone knows how to respond effectively in case of emergencies, reducing the risk of injuries and minimizing damage to property.

Notes

Unit 10.2 Safety Drills, PPEs and Fire Safety

Unit Objectives

By the end of this unit, participants will be able to:

- Explain the classes of fire and types of fire extinguishers.
- Demonstrate the operating procedure of the fire extinguishers.
- Explain the importance of participation of workers in safety drills.
- List out basic medical tests required for working at construction site.
- Explain the purpose and importance of vertigo test at construction site.
- Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.
- Demonstrate use of PPEs as per work requirements.

10.2.1 Fire Triangle & Fire Types

Fire is a chemical reaction that occurs when a substance combines with oxygen and releases heat, light, and various combustion products.

It is a rapid oxidation process that can lead to destructive consequences if not controlled.

The fire triangle is a simple model used to illustrate the three essential components necessary for a fire to occur. These three components must be present simultaneously for a fire to ignite and sustain itself.

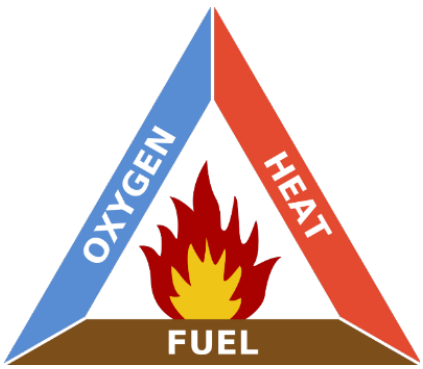

Fig. 10.2.1 Fire Triangle

There are several types of fires, categorized based on the fuel involved. The four main classes of fires are:

A		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
B		Flammable Liquids	Grease, Oil, Paint, Solvents
C		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
D		Combustible Metal	Magnesium, Aluminum, Etc.
K		Commercial Cooking Equipment	Cooking Oils, Animal Fats, Vegetable Oils

Fig. 10.2.2 Types of Fires

It is essential to use the appropriate extinguishing agents and follow proper fire safety protocols based on the type of fire to ensure effective firefighting and minimize risks to life and property. Fire safety training and understanding the different types of fires are crucial for individuals to respond safely and efficiently in the event of a fire emergency.

10.2.2 Fire Safety

Fire safety is a set of actions aimed at reducing the amount of damage caused by fire.

Fire safety procedures include both those that are used to prevent an uncontrolled fire from starting and those that are used to minimise the spread and impact of a fire after it has started. Developing and implementing fire safety measures in the workplace is not only mandated by law but is also essential for the protection of everyone who may be present in the building during a fire emergency.

Fig. 10.2.3 Fire at Construction Site

The basic Fire Safety Responsibilities are:

- To identify risks on the premises, a fire risk assessment must be carried out.
- Ascertain that fire safety measures are properly installed.
- Prepare for unexpected events.
- Fire safety instructions and training should be provided to the employees.

Prevention of a Workplace Fire:

- Workplace fire drills should be conducted regularly.
- If one has a manual alarm, one should raise it.
- Close the doors and leave the fire-stricken area as soon as possible. Ensure that the evacuation is quick and painless.
- Turn off dangerous machines, and don't stop to get personal items.
- Assemble at a central location. Ascertain that the assembly point is easily accessible to the employees.
- If one's clothing catches fire, one shouldn't rush about it. They should stop, descend on the ground, and roll to smother the flames if their clothes catch fire.

10.2.3 Fire Extinguisher

A fire extinguisher is a portable firefighting device designed to control and extinguish small fires. It is an essential tool for fire safety, allowing individuals to respond quickly to fires before they become unmanageable.

Fire extinguishers work by discharging a firefighting agent onto the fire, either by cooling the fuel, smothering the flames, or interrupting the chemical reaction required for combustion. Each fire extinguisher is specifically designed to combat certain classes of fires.

The most common types of fire extinguishers are:

1. Water Fire Extinguisher (Class A):
    - Suitable for Class A fires involving ordinary combustible materials such as wood, paper, cloth, plastics, and rubber.
2. Foam Fire Extinguisher (Class A and Class B):
    - Effective for Class A fires (ordinary combustibles) and Class B fires (flammable liquids and gases).
3. Dry Powder Fire Extinguisher (Class A, Class B, and Class C):
    - Versatile extinguisher suitable for Class A, B, and C fires.
4. Carbon Dioxide (CO2) Fire Extinguisher (Class B and Class C):
    - Suitable for Class B fires (flammable liquids and gases) and Class C fires (energized electrical equipment).
5. Wet Chemical Fire Extinguisher (Class K):
    - Specifically designed for Class K fires involving cooking oils and fats.

Fig. 10.2.4 Types of Fire Extinguishers

Fire extinguishers should be placed in easily accessible locations throughout buildings, construction sites, vehicles, and other facilities. Regular maintenance, inspection, and employee training on how to use fire extinguishers properly are essential components of fire safety programs. Remember, fire extinguishers are designed for small fires only. For larger fires or situations beyond your control, evacuate the area immediately and call the appropriate emergency services.

Using Fire Extinguisher:

Using a fire extinguisher properly can be instrumental in quickly extinguishing small fires and preventing them from spreading. When using a fire extinguisher, remember the acronym "PASS," which stands for Pull, Aim, Squeeze, and Sweep.

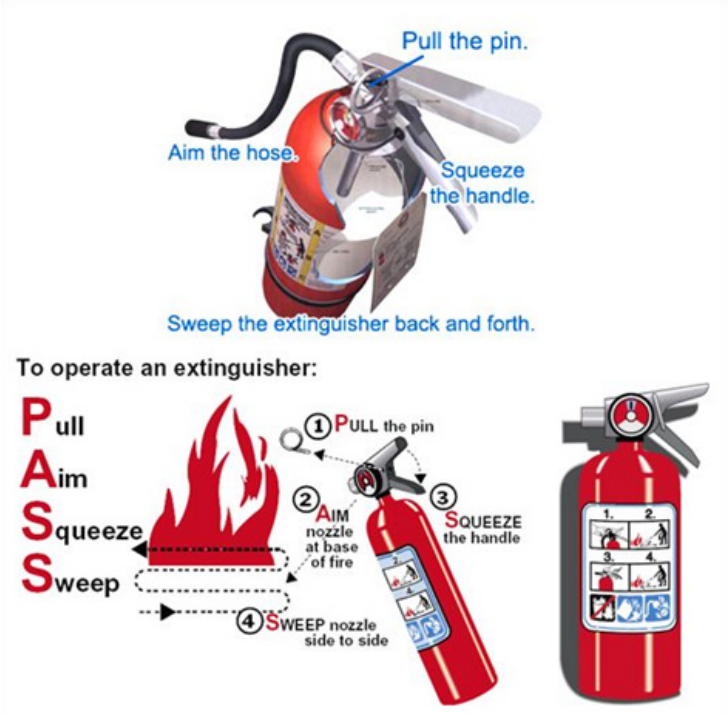

Fig. 10.2.5 Using a Fire Extinguisher

Remember the following important tips:

- Only use a fire extinguisher on small fires that are contained and not spreading rapidly.
- Make sure you are using the right type of fire extinguisher for the specific class of fire (e.g., Class A, B, C, K).
- Always maintain a safe distance from the fire and avoid getting too close to the flames.
- Never turn your back on a fire, and be prepared to evacuate if the fire becomes too large or uncontrollable.
- If the fire does not respond to the extinguisher or starts to grow rapidly, evacuate the area immediately and call the fire department.

10.2.4 Safety Drills and Its Importance for Workers

The participation of workers in safety drills at a construction site is of utmost importance to ensure a safe working environment and reduce the risk of accidents or incidents. Construction sites are inherently hazardous places, and safety drills play a crucial role in preparing workers to respond effectively to emergencies.

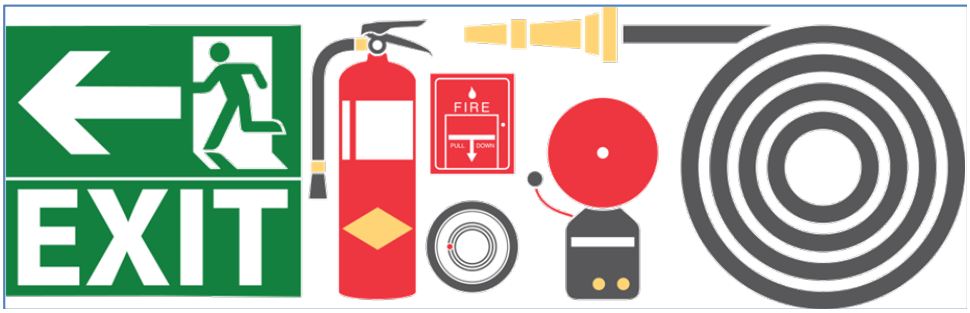

Fig. 10.2.6 Components related to Safety Drill

Here are some specific reasons why worker participation in safety drills is vital in a construction site setting:

1. **Familiarization with Site-Specific Procedures:** Construction sites can have unique layouts and hazards. Safety drills allow workers to become familiar with site-specific emergency procedures, such as evacuation routes, muster points, and the location of emergency equipment.
2. **Practicing Response to Common Construction Hazards:** Safety drills provide an opportunity to practice responding to emergencies related to common construction hazards, such as falls, structural collapses, confined space incidents, and electrical accidents.
3. **Building Muscle Memory for Critical Tasks:** By participating in safety drills, workers develop muscle memory for critical safety tasks, such as donning personal protective equipment (PPE), using fire extinguishers, or performing emergency rescues. Muscle memory helps workers react quickly and instinctively during real emergencies.
4. **Testing Effectiveness of Emergency Plans:** Safety drills allow construction site managers to assess the effectiveness of the site's emergency response plans and identify any gaps or weaknesses that need to be addressed.
5. **Boosting Confidence and Reducing Panic:** Regular participation in safety drills can boost workers' confidence in their ability to handle emergencies, making them less likely to panic and more likely to respond calmly and rationally.
6. **Team Coordination and Communication:** Safety drills encourage teamwork and coordination among workers. It helps them practice effective communication during emergencies, which is essential for a coordinated and efficient response.

7. Compliance with Regulations: Construction sites are subject to various safety regulations and standards. Worker participation in safety drills ensures that the construction site is compliant with safety requirements.
8. Preventing Injuries and Fatalities: The ultimate goal of safety drills is to prevent injuries and save lives. Properly trained and prepared workers are more likely to respond effectively to emergencies, reducing the severity of incidents.
9. Emergency Response Performance Evaluation: Safety drills provide an opportunity to evaluate how well workers respond to emergencies and identify areas that need improvement or additional training.
10. Promoting a Safety Culture: Encouraging worker participation in safety drills sends a strong message about the importance of safety at the construction site. It fosters a safety-first culture and instills a sense of responsibility for safety among all workers.

By actively involving workers in safety drills, construction site management can significantly enhance the site's emergency preparedness, improve response capabilities, and create a safer working environment for everyone involved.

Evacuation:

Evacuation at a construction workplace/site is a crucial aspect of ensuring the safety of all workers and visitors in case of emergencies. Construction sites can be hazardous environments with various potential risks, making preparedness and efficient evacuation procedures essential.

Fig. 10.2.7 Emergency Evacuation

10.2.5 Medical Examination for Construction Workers

The government has mandated that industrial enterprises undertake annual health checkups on their employees. In accordance with the Factories Act of India from 1948, both contractual and permanent employees in manufacturing businesses are required to undergo periodic health examinations. These examinations aim to protect the health and safety of factory workers.

The type of medical examination varies according to an employee's job description or the nature of the industrial process in which he is involved. For instance, if an employee works in the food

business, their hands are routinely inspected for skin disorders. If someone is involved in a hazardous manufacturing process, chest X-rays may be part of the medical checkup.

Consequently, depending on the nature of the production process and the job profile, an employee may be subjected to all standard and specific tests.

In addition, the frequency of medical examinations varies. According to the Maharashtra Plant Rules, for instance, if the factory is involved in the production of lead, workers are inspected once every month.

Medical Check-up Prior to Employment: A young person must have a pre-employment medical examination by a Certifying Surgeon to determine and confirm his fitness to work in a factory, according the Factories Act of 1948. The certificate of fitness is only valid for one year from the date it was issued.

Fig. 10.2.8 Medical Examination for Construction Workers

Medical Examinations for Workers in Hazardous Occupations: According to the Factories Act, a plant that engages in hazardous procedures is required to have its employees examined by a competent medical professional prior to employment and on a recurrent basis thereafter. Workers employed in a "hazardous process" are medically tested once before to employment by a Factory Medical Officer to determine their physical fitness and appropriateness for employment in a hazardous process.

Once every six months, the health status of all workers exposed to occupational health hazards must be determined.

Form 7 is completed, and if the medical findings reveal any abnormality or unsuitability of a person employed in the hazardous process, or if the worker has manifested signs and symptoms of a notifiable disease (as specified in the Third Schedule of the Factories Act), the worker must be removed from the process for health protection and cannot be employed in the same process. Alternatively, if the worker is totally handicapped, he or she will receive appropriate rehabilitation. Only after obtaining a Fitness Certificate from the Certifying Surgeon and Form 7 in accordance with the Factories Act may a withdrawn employee be rehired for the same process.

List of Recommended Medical Tests under the Factories Act:

1. Complete Physical Examination
2. Blood Group, Rh factor
3. Blood CBC, ESR, RBS
4. Urine Test (Routine & Microscopic)
5. Creatinine
6. Electrocardiogram (Computerised ECG)

7. Chest X-Ray (Standard Size)
8. Lung Function Test
9. Vision Test (Screening)
10. Audiometric Test
11. HIV & HBS Tests

10.2.6 Vertigo Test

Vertigo is a symptom, not a condition in and of itself. Vertigo is a sort of dizziness that is frequently described as the sensation that one is spinning or that the world is spinning around them, especially when they alter their position.

Vertigo affects people of all ages. Middle ear pathology is typically the culprit in younger patients. The danger of falls and associated sequelae necessitates a specialised assessment of the elderly. The key to arriving at a diagnosis is distinguishing vertigo from other causes of dizziness or imbalance, as well as distinguishing central causes of vertigo from peripheral causes.

Vertigo is a symptom that is associated with numerous medical disorders. Your doctor may require one or more tests or procedures to better understand your underlying issue. Numerous of these tests require specialised equipment and experienced personnel.

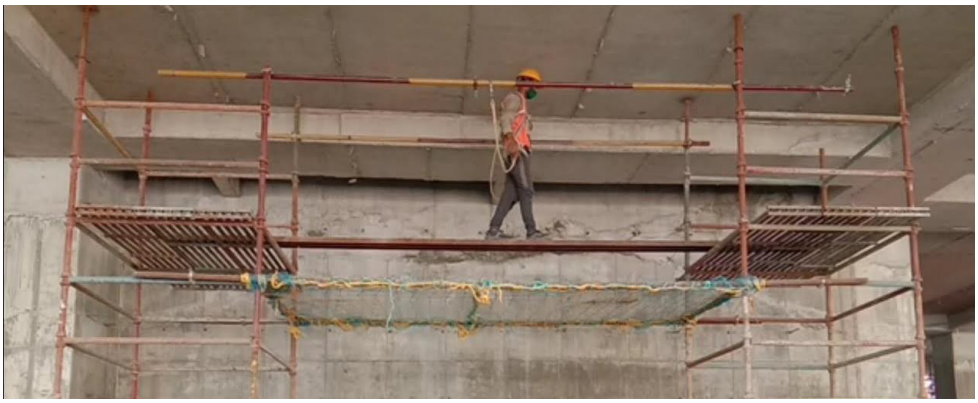

Fig. 10.2.9 Vertigo Test for Construction Workers

Some exams are brief and painless, while others are lengthy and unpleasant Your doctor can recommend the relevant tests for your condition

10.2.7 Basic Ergonomic Principles

Basic ergonomic principles involve designing and arranging workspaces, equipment, and tasks to optimize efficiency, productivity, and worker well-being.

Ergonomics aims to reduce the risk of musculoskeletal disorders (MSDs) and other work-related injuries by ensuring that the work environment fits the worker's capabilities and needs.

Construction sites can be physically demanding and involve various tasks that may lead to musculoskeletal disorders (MSDs) and other injuries if not properly addressed. Here are some basic ergonomic principles to consider at a construction site:

- Proper Lifting Techniques:
  - Train workers in proper lifting techniques to avoid back injuries. Encourage the use of mechanical lifting aids, such as cranes or hoists, for heavy or awkward loads.
- Worksite Organization:
  - Arrange tools, equipment, and materials to minimize excessive reaching or bending.
  - Keep frequently used items within easy reach to reduce unnecessary movement.
- Tool Selection:
  - Provide ergonomic tools with appropriate grips and handles that reduce hand and wrist fatigue.
  - Choose tools that require less force to operate to prevent overexertion.

By applying these basic ergonomic principles at construction sites, employers can create a safer and more comfortable working environment, reduce the risk of work-related injuries, and improve the overall well-being and productivity of construction workers.

10.2.8 First Aid

First aid refers to the immediate and initial care given to an injured or ill person before professional medical help arrives. It is crucial in emergencies to stabilize the injured or sick individual and prevent their condition from worsening.

First aid aims to preserve life, alleviate pain, and promote recovery.

Here are some key points about first aid:

Objectives of First Aid:

- **Preserve Life:** The primary objective of first aid is to assess the situation and provide immediate care to save lives.
- **Prevent Further Harm:** First aid measures aim to prevent the injured person's condition from worsening.
- **Relieve Pain:** First aid techniques can provide pain relief to the injured or ill person.
- **Promote Recovery:** Properly administered first aid can help promote the person's recovery and reduce the severity of injuries or illnesses.

Fig. 10.2.11 First Aid to Injured Person

Common First Aid Procedures:

- Assessment: Assess the situation and the injured or ill person's condition. Ensure your safety and the safety of others.
- CPR (Cardiopulmonary Resuscitation): If the person is not breathing or their heart has stopped, perform CPR to maintain blood flow and provide oxygen.
- Bleeding Control: Apply pressure to stop bleeding from wounds and injuries.
- Wound Care: Clean and dress wounds to prevent infection and aid healing.
- Fracture and Sprain Care: Immobilize fractures and provide support for sprains to prevent further damage.
- Burn Care: Cool burns with running water and cover with a clean, non-stick dressing.
- Choking Response: Perform abdominal thrusts (Heimlich maneuver) on a choking person to clear their airway.
- Seizure Management: Keep the person safe during a seizure and provide comfort afterward.

First Aid Kits:

A well-stocked first aid kit is essential in homes, workplaces, and vehicles. It should contain items such as adhesive bandages, gauze pads, antiseptic wipes, adhesive tape, scissors, tweezers, CPR mask, disposable gloves, and pain relievers, among others.

Note: While first aid can be lifesaving, it is not a substitute for professional medical care. In emergencies, call for professional help (e.g., emergency services) as soon as possible, especially for serious injuries or illnesses.

Fig. 10.2.12 First Aid Kit

It is crucial to receive formal first aid training to effectively administer first aid and respond appropriately in emergency situations. Proper training ensures that you can provide the most appropriate care and support to those in need until professional help arrives.

10.2.9 Ensure Electrical Safety at Construction Sites

Electrical safety is important because hazards such as arc flash and shock can result in death if you are exposed to them.

Fortunately, the likelihood of this occurring is relatively low

However, the control measures that prevent these hazards require careful management, attention to detail and technical competence.

Fig. 10.2.13 Electrical Hazards

- Conduct regular inspections of electrical equipment and wiring to identify any potential hazards or defects.
- Ensure all electrical installations and equipment meet relevant safety standards and codes.
- Provide proper training to construction workers on electrical safety practices and procedures.
- Clearly label electrical panels, switches, and outlets for easy identification.
- Use ground fault circuit interrupters (GFCIs) to protect against electric shock in wet or damp environments.
- Avoid overloading electrical circuits and outlets by distributing loads evenly.
- Keep electrical cords and cables away from heavy machinery, sharp objects, or areas with high foot traffic.
- Store electrical tools and equipment properly when not in use to prevent damage and accidents.
- Use insulated tools and personal protective equipment (PPE) when working with electricity.
- Have a clear emergency plan in place in case of electrical accidents or incidents and ensure workers are familiar with it.

Fig. 10.2.14 Electrical Safety

10.2.10 PPE and Its Importance

Personal Protective Equipment (PPE) plays a crucial role in the construction industry to protect workers from potential hazards and ensure their safety on the job. PPE is designed to shield workers from various risks, such as falling objects, electrical hazards, chemical exposure, noise, and more.

Fig. 10.2.15 PPEs in Construction Industr

Importance of PPE in Construction Industry:

1. Hazard Protection: PPE serves as a barrier between workers and potential workplace hazards, preventing injuries and illnesses.
2. Legal Compliance: Regulatory authorities require the use of appropriate PPE in construction to meet safety standards and comply with regulations.
3. Injury Prevention: PPE can significantly reduce the risk of injuries and accidents, protecting workers' health and well-being.
4. Risk Reduction: PPE mitigates the risk of exposure to harmful substances, noise, dust, and other occupational hazards.
5. Enhanced Productivity: When workers feel safe and protected, their confidence and efficiency increase, leading to improved productivity.

Types of PPE in Construction Industry:

Injury Protection	Description	PPE
Head Injury Protection	Head injuries can occur due to falling or flying objects, stationary objects, or contact with electrical wires. Hard hats provide protection against such injuries by shielding the head. Electrician's hard hat is commonly made of nonconductive plastic. It is accompanied by safety goggles for additional eye protection.	

Foot and Leg Injury Protection	Safety shoes, especially those made of leather, provide essential foot protection. They offer protection against various risks, including falling or rolling objects, sharp objects, wet and slippery surfaces, molten metals, hot surfaces, and electrical hazards. Proper use of safety shoes enhances safety measures for workers in hazardous environments like construction sites.	
Eye and Face Injury Protection	Spectacles and goggles provide protection against hazards like flying fragments, large chips, hot sparks, radiation, and splashes from molten metals. Special helmets or shields offer additional protection for the face and eyes in hazardous environments. Spectacles with side shields and face shields enhance eye safety by preventing exposure to various risks. These protective gears also safeguard against partides, sand, dirt, mists, dust, and glare, promoting overall eye health and safety.	
Protection against Hearing Loss	Hearing protection can be achieved through earplugs or earmuffs. Prolonged exposure to high noise levels can lead to permanent hearing loss, physical strain, and mental stress. Self-forming earplugs made of materials like foam, waxed cotton, or fibreglass wool are commonly used as they offer a good fit. For better fit and protection, workers should be fitted with moulded or prefabricated earplugs by a specialist.	
Hand Injury Protection	Hand protection is crucial for workers exposed to hazardous substances through skin absorption, serious wounds, or thermal burns. Gloves are commonly used as protective gear for hands. Electricians often use leather gloves with rubber inserts when working on electrified circuits. Kevlar gloves are employed when stripping cable with a sharp blade to prevent cuts and injuries.	

Whole Body Protection	Full-body protection is essential for workers to safeguard against heat and radiation hazards. Whole-body PPE includes materials like rubber, leather, synthetics, plastic, fire-retardant wool, and cotton. Maintenance staff working with high-power sources like transformer installations and motor-control centers are often required to wear fire-resistant clothes for added safety.	

Table 10.2.1 Types of PPE in Construction Industry

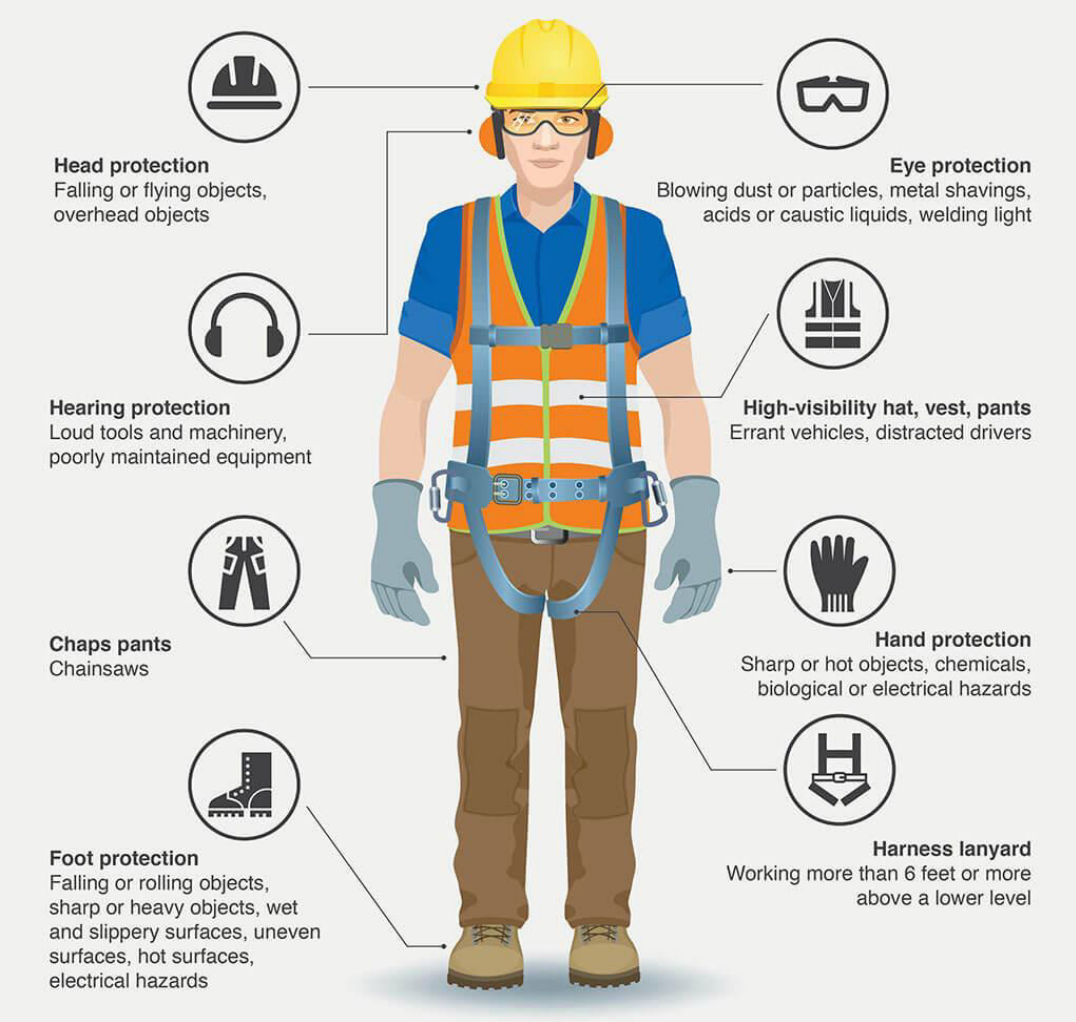

Fig. 10.2.16 A Construction Worker with proper PPEs

Care and Maintenance of PPE:

- Regular Inspection: PPE should be inspected before each use to ensure it is in good condition and free from damage.
- Proper Storage: Store PPE in a clean, dry, and designated area away from direct sunlight and chemical exposure.
- Cleaning: Clean PPE regularly according to the manufacturer's guidelines to maintain its effectiveness.
- Replacement: PPE should be replaced when damaged, worn out, or beyond its usable life as specified by the manufacturer.
- Training: Provide training to workers on the proper use, care, and limitations of PPE.
- Comfort and Fit: Ensure that PPE fits properly and is comfortable for the worker to encourage consistent use.

PPE is essential for protecting workers from harm, but it is also the last line of defence.

Care and Maintenance of Tools & Equipment:

- Regularly inspect tools and equipment for signs of damage or wear.
- Keep tools and equipment clean and free from dirt and debris after each use.
- Store tools and equipment in a dry and secure location, protected from weather elements.
- Follow manufacturer's instructions for battery-operated tools regarding charging and storage.
- Train workers on proper tool usage, care, and maintenance to ensure safe and efficient operation

Notes

Unit 10.3 Hygiene and Safe Waste Disposal Practices

Unit Objectives

By the end of this unit, participants will be able to:

- Follow the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
- Understand the importance of housekeeping works
- Keep an eye on safe housekeeping practices
- Understand different types of waste at construction sites and their disposal method
- Know safe waste disposal practices followed at construction site

10.3.1 Personal Hygiene and Cleanliness

Personal hygiene and cleanliness are essential practices that involve maintaining cleanliness and taking care of one's body to prevent the spread of germs, illnesses, and maintain overall well-being. These practices are crucial for promoting good health and preventing the transmission of infectious diseases.

Fig. 10.3.1 Personal Hygiene

Here are some key aspects of personal hygiene and cleanliness:

- **Regular Bathing or Showering:** Regular bathing or showering helps to keep the body clean and remove dirt, sweat, and bacteria from the skin.
- **Handwashing:** Proper handwashing with soap and water is one of the most effective ways to prevent the spread of germs and infections.

- **Oral Hygiene:** Brushing teeth twice a day and flossing regularly help maintain good oral health and prevent dental problems.
- **Trimming Nails:** Keeping nails clean and trimmed prevents the accumulation of dirt and germs under the nails.
- **Hair Care:** Regularly washing and maintaining hair cleanliness can prevent scalp issues and promote healthy hair.
- **Wearing Clean Clothes:** Wearing clean clothes helps prevent the spread of germs and keeps the body fresh.
- **Proper Use of Personal Protective Equipment (PPE):** In certain situations, such as during a pandemic or when handling hazardous materials, using appropriate PPE like masks, gloves, and safety gear is crucial for personal protection and hygiene.
- **Handling Food Safely:** Properly handling, preparing, and storing food helps prevent foodborne illnesses.
- **Cough and Sneezing Etiquette:** Covering the mouth and nose with a tissue or elbow when coughing or sneezing helps prevent the spread of respiratory droplets containing germs.
- **Managing Menstrual Hygiene:** Properly managing menstrual hygiene is essential for women's health and well-being.
- **Cleaning and Disinfecting Surfaces:** Regularly cleaning and disinfecting frequently-touched surfaces, such as doorknobs and handles, helps prevent the spread of germs.
- **Managing Personal Waste:** Properly disposing of waste and using clean and sanitary facilities help prevent the spread of infections.

Maintaining personal hygiene and cleanliness is not only important for individual health but also for public health. It is essential for reducing the risk of contagious diseases and maintaining a hygienic living and working environment. By practicing good personal hygiene and cleanliness, individuals can contribute to a healthier and safer community.

Importance of Informing on Personal Health Issues

The importance of reporting to the designated authority about infectious diseases and injuries are:

- The infectious diseases can spread and affect the health of other workers at the farm.
- The infectious diseases can be spread to the consumers if the bacteria and viruses spread through the produces.
- The injuries should be timely reported and should be taken care of immediately. If not timely reported it may worsen and may cause severe diseases and even death.

Fig. 10.3.2 Infectious Disease

10.3.2 Workplace Cleanliness and Sanitization

Workplace cleanliness and sanitization are crucial for creating a safe, healthy, and productive work environment.

Clean and sanitized workplaces not only reduce the risk of the spread of infections and illnesses but also contribute to employee well-being and morale.

Fig. 10.3.3 Workplace Cleanliness

Here are some important aspects of workplace cleanliness and sanitization:

1. Regular Cleaning Routine: Establish a regular cleaning schedule for the workplace, including workstations, common areas, restrooms, and shared equipment. Cleaning should be done daily or as needed, depending on the nature of the workplace.
2. Surface Disinfection: Regularly disinfect frequently-touched surfaces, such as doorknobs, light switches, keyboards, and shared equipment. Use EPA-approved disinfectants that are effective against viruses and bacteria.
3. Hand Sanitizing Stations: Place hand sanitizing stations at convenient locations throughout the workplace to encourage employees and visitors to maintain hand hygiene.
4. Restroom Hygiene: Maintain clean and well-stocked restrooms with proper sanitation supplies. Regularly clean and disinfect restroom surfaces to prevent the spread of germs.
5. Waste Management: Provide clearly marked waste disposal bins and ensure proper waste segregation. Regularly empty trash bins and dispose of waste appropriately.
6. Kitchen and Break Areas: Maintain cleanliness in kitchen and break areas by regularly cleaning countertops, sinks, and shared appliances. Encourage employees to clean up after themselves.
7. Ventilation and Air Quality: Ensure proper ventilation to improve indoor air quality. Clean air filters regularly to remove dust and allergens from the air.
8. Personal Protective Equipment (PPE): Provide appropriate PPE, such as masks and gloves, for employees when needed, especially during pandemics or when handling hazardous materials.

9. Educate Employees: Educate employees about the importance of workplace cleanliness and hygiene practices. Encourage them to follow hygiene guidelines and protocols.
10. Workplace Signage: Display hygiene-related signage, such as handwashing instructions, cough etiquette, and reminders about cleaning protocols, to reinforce good practices.
11. Cleaning and Sanitization Training: Train cleaning staff and employees responsible for workplace cleanliness on proper cleaning and sanitization techniques and the correct use of disinfectants.
12. Workplace Wellness Initiatives: Implement workplace wellness programs that promote good health and hygiene practices among employees.

By prioritizing workplace cleanliness and sanitization, employers can create a healthier and safer environment for their employees, clients, and visitors. Regular cleaning and sanitation efforts help prevent the spread of infections, reduce absenteeism, and foster a positive work culture focused on employee well-being and productivity.

10.3.3 Implement Good Housekeeping Practices at Construction Site

Implementing good housekeeping practices at a construction site is essential to maintain a safe, organized, and efficient working environment. Proper housekeeping helps prevent accidents, reduces the risk of injuries, and enhances productivity.

Here are some effective ways to promote good housekeeping practices at construction sites:

1. Designate Storage Areas:

Fig. 10.3.4 Designated Areas

Assign specific areas for storing tools, equipment, and materials. Keep these areas organized and ensure that items are returned to their designated places after use.

2. Regular Cleanup:

Fig. 10.3.5 Clean-up Debris and Waste

Schedule regular cleanup sessions throughout the workday to remove debris, waste, and hazards from the construction site. Encourage all workers to participate in keeping the site clean.

3. **Dispose of Waste Properly:** Provide clearly marked waste disposal bins and containers. Train workers to segregate waste materials correctly, including hazardous materials, to ensure safe disposal.

Fig. 10.3.6 Disposing of Waste

4. **Keep Walkways Clear:** Ensure that walkways, access routes, and emergency exits are clear of obstructions at all times. Remove trip hazards and obstacles to prevent accidents.

Fig. 10.3.7 Clear Walkways

5. **Store Flammable Materials Safely:** Store flammable materials, such as fuel, solvents, and gases, in designated storage areas away from potential ignition sources. Follow safety guidelines for their storage and handling.

Fig. 10.3.8 Store Flammable Safely

6. **Prevent Slips, Trips, and Falls:** Regularly inspect the site for slippery surfaces, loose debris, and uneven terrain. Address potential hazards promptly to reduce the risk of slips, trips, and falls.

Fig. 10.3.9 Prevent Hazards

7. **Control Dust and Debris:** Use dust control measures, such as wetting down surfaces, using dust collectors, or providing personal protective equipment (PPE), to reduce airborne dust and debris.

Fig. 10.3.10 Wetting Down Dust

8. **Proper Material Handling:** Train workers on proper material handling techniques to prevent injuries caused by lifting, carrying, or moving heavy objects.

Fig. 10.3.11 Material Handling with Safety

9. **Secure Tools and Equipment:** Ensure that tools and equipment are properly stored, secured, and maintained when not in use. Avoid leaving them unattended or in precarious positions.

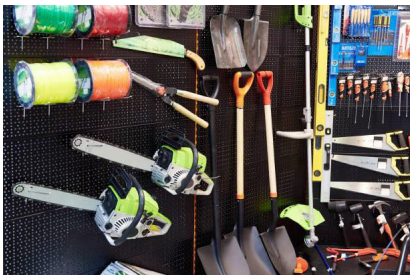

Fig. 10.3.12 Securing Tools & Equipment

10. **Inspect and Maintain Equipment:** Regularly inspect machinery, vehicles, and equipment to identify potential issues or defects. Perform maintenance and repairs promptly to ensure their safe operation.

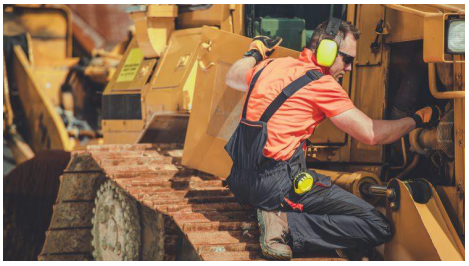

Fig. 7.3.13 Inspect and Maintain Equipment

Fig. 7.3.14 Good Housekeeping and Safety relevance

Remember that good housekeeping is an ongoing effort and requires the commitment and cooperation of all workers and management. By prioritizing cleanliness and organization at the construction site, you can create a safer and more productive work environment for everyone involved.

10.3.4 Handwashing

Handwashing is a simple yet highly effective practice that involves cleaning one's hands with soap and water to remove dirt, germs, and other harmful microorganisms.

Proper handwashing is one of the most important measures to prevent the spread of infectious diseases, including common colds, flu, gastrointestinal infections, and respiratory illnesses.

Proper Handwashing Technique:

- Wet Hands: Wet your hands with clean, running water (warm or cold).
- Apply Soap: Apply enough soap to cover all hand surfaces.
- Rub Hands Together: Rub your hands palm to palm to create lather. Continue rubbing the backs of your hands, between your fingers, and under your nails.
- Scrub for at least 20 Seconds: Scrub your hands for at least 20 seconds. Singing "Happy Birthday" twice is a useful timer.
- Rinse Thoroughly: Rinse your hands thoroughly under clean, running water.
- Dry Hands: Dry your hands using a clean towel or air dry them. If possible, use a paper towel to turn off the faucet to avoid recontamination.

Fig. 10.3.13 Handwashing

When to Wash Hands:

- Before preparing or eating food
- After using the restroom
- After coughing, sneezing, or blowing your nose
- After touching surfaces in public places
- After handling garbage or waste
- After caring for someone who is sick
- Before and after tending to wounds or injuries

10.3.5 Avoid Bad Habits

Avoiding bad habits like smoking, drinking alcohol, and addiction to tobacco and gutkha is essential for maintaining good health and well-being. These habits can have severe negative impacts on physical health, mental health, and overall quality of life.

Here are some reasons to avoid these habits:

- Understand the health risks associated with smoking, drinking alcohol, and using tobacco and gutkha.
- Seek support from family, friends, or support groups to help quit these habits.
- Replace bad habits with healthier alternatives, such as exercise, hobbies, or mindfulness practices.
- Set specific and achievable goals to gradually reduce and eliminate these habits.
- Avoid triggers or situations that may tempt you to engage in these bad habits.
- Practice stress management techniques to cope with stress without turning to harmful substances.

Fig. 10.3.14 Avoid Bad Habits

- Stay informed about the benefits of quitting and the negative impacts of these habits.
- Use nicotine replacement therapies or medications to aid in quitting smoking.
- Find healthy ways to socialize and relax without relying on alcohol or tobacco.
- Celebrate small milestones and successes in your journey to quit these bad habits.

10.3.6 Waste Types at Construction Sites

Construction sites generate various types of waste during the building process.

Some common types of waste found at construction sites include:

1. Concrete and Bricks Waste: Excess or damaged concrete, bricks, blocks, and precast elements.
2. Wood Waste: Includes timber offcuts, pallets, and packaging materials.
3. Metal Waste: Scrap metal from structural elements, reinforcement bars, and metal packaging.
4. Plastic Waste: Packaging materials, plastic sheets, and pipes.
5. Cardboard and Paper Waste: Packaging materials and documents.
6. Glass Waste: Broken or excess glass from windows, doors, and mirrors.

7. Asphalt Waste: Leftover asphalt from road or pavement construction.
8. Paints and Chemicals: Unused or leftover paints, solvents, adhesives, and other construction chemicals.
9. Electrical Waste: Old or damaged electrical components, cables, and wiring.
10. Insulation Materials: Unused or waste insulation materials.
11. Hazardous Waste: Materials containing asbestos, lead, mercury, or other hazardous substances.
12. Packaging Waste: Cardboard boxes, plastic wraps, and other packaging materials.

Fig. 10.3.15 Construction Wastes

Proper waste management and disposal methods are crucial to handle these various types of waste responsibly and minimize their impact on the environment. Recycling, reusing, and responsible disposal in designated landfills or waste treatment facilities are some of the ways to manage construction site waste effectively.

10.3.7 Waste Management

The collection, disposal, monitoring, and processing of waste materials is known as waste management. These wastes affect living beings' health and the environment. For reducing their effects, they have to be managed properly. The waste is usually in solid, liquid or gaseous form.

- Waste management is important because it decreases waste's impact on the environment, health, and other factors. It can also assist in the reuse or recycling of resources like paper, cans, and glass. The disposal of solid, liquid, gaseous, or dangerous substances is the example of waste management.
- When it comes to trash management, there are numerous factors to consider, including waste disposal, recycling, waste avoidance and reduction, and garbage transportation. Treatment of solid and liquid wastes is part of the waste management process. It also provides a number of recycling options for goods that aren't classified as garbage during the process.

Fig. 10.3.16 Waste Management

10.3.8 Methods of Waste Management

Construction waste management is crucial for reducing environmental impact and promoting sustainable practices in the construction industry. The 5Rs framework offers a systematic approach to managing construction waste, focusing on reducing waste generation and maximizing resource efficiency. The 5Rs stand for: Reduce, Reuse, Recycle, Recover, and Residuals. Here's how each of these methods is applied in construction waste management:

1. **Reduce:**
    - Design for Minimal Waste: Employ design strategies that aim to minimize waste generation during the construction phase. This includes accurate quantity estimation, optimizing material use, and choosing construction methods that generate less waste.
    - Prefabrication: Prefabrication and modular construction techniques can significantly reduce on-site waste by producing components off-site with precise measurements and minimal material wastage.
    - Waste Audits: Conduct waste audits to identify the major sources of waste and implement measures to reduce waste generation.
2. **Reuse:**
    - Salvage and Reuse Materials: Salvage and reuse materials from demolition or renovation activities that are still in good condition and can be repurposed in other projects. This includes

doors, windows, fixtures, and lumber.

- Temporary Structures: Utilize temporary structures and materials that can be disassembled and reused in other projects to reduce waste.

3. **Recycle:**

- On-Site Recycling: Set up on-site recycling facilities to process construction waste, such as concrete, wood, metal, and plastics, into reusable materials like aggregates, mulch, or recycled content products.
- Use Recycled Content: Incorporate recycled content materials, such as recycled concrete aggregate or reclaimed wood, in new construction to reduce the demand for virgin resources.

4. **Recover:**

- Energy Recovery: Some non-recyclable construction waste can be converted into energy through waste-to-energy processes, helping to minimize landfill disposal and generate electricity or heat.
- Anaerobic Digestion: Organic waste can be processed through anaerobic digestion to produce biogas, which can be used as a renewable energy source.

5. **Residuals Management:**

- Landfill Diversion: For waste that cannot be reduced, reused, recycled, or recovered, focus on diverting it from landfills and explore alternative disposal methods that have a lower environmental impact.
- Responsible Disposal: Ensure that waste that ends up in landfills is disposed of responsibly, adhering to local regulations and guidelines.

Fig. 10.3.17 Waste Bin Types and their Colour

By implementing the 5Rs framework, construction companies can minimize waste generation, conserve resources, reduce environmental pollution, and move towards a more sustainable and environmentally friendly approach to construction waste management.

10.3.9 Waste Management on a Construction Site

On the construction site, one must be mindful of how they handle waste and garbage. Having a plan for managing these goods is necessary to protect the safety of both workers and the general public. Here are some waste management strategies:

- Before disposing of them in the dumpster, place any hand tools in containers with lids.
- Place empty paint cans in the trash instead than spilling them down drains or onto pavements.
- Rinse disposable cups and other food containers before placing them in a recycling bin. This will help prevent litter from being blown onto the property during windy or rainy weather.
- Recycle equipment and other metal objects by utilising a magnet or air compressor to remove all non-metal components, such as nails, screws, nuts, bolts, electrical wiring, etc. These are then segregated by category prior to proper recycling.
- Insulation should be disposed of in the garbage as opposed to being poured down drains or onto pavements, as it can clog sewer systems.
- Use a tarp to pile dirt, rocks, bricks, and other heavy things into the bed of a truck before hauling them away when the work is complete. This will make future clean-up easier.
- Instead of discarding excess lumber, wrap it in plastic to prevent it from becoming wet and infected with termites.
- Use a leak-proof container or urn to transfer hazardous liquids away for proper disposal; this will keep the workers and others on-site dry and healthy.
- Regularly cleaning up will reduce the amount of debris.
- Using trash cans with lids to prevent rubbish from falling to the ground.
- On your site, provide workers with safety vests for simple identification and protection from concealed threats such as electrical cables and sharp instruments.
- Ensure that there is a designated space for recyclable materials such as glass, plastic, cardboard, and metal containers so that they may be sorted later

It is necessary to have a plan for waste management on construction sites, which are typically untidy places.

Exercise

- Describe the different types of hazards commonly found in the construction industry.
- What are the key steps in handling emergency situations at a construction site, and how should incidents be reported to the concerned authority?
- What are the basic principles of first aid, and how can employees be trained in administering first aid?
- Explain the fire safety measures that should be implemented at a construction site, including fire extinguisher usage and evacuation procedures.
- Why is personal protective equipment (PPE) important in the construction industry, and what are the essential care and maintenance practices for PPE?
- How can good housekeeping practices be effectively implemented at a construction site to improve safety and organization?
- What are safe waste disposal practices that should be followed in the construction industry to protect the environment and prevent health hazards?

Notes

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Annexure

Annexure of QR Codes for Construction Painter and Decorator

Chapter Name	Unit Name	Topic Name	URL	QR Code	Page no.
1. Introduction to the Job Role of a Construction Painter and Decorator - Construction	Unit 1.1 Introduction to Construction Painting	Types of Construction	http://y2u.be/1WVzo2UFyo8	Types of Construction	09
	Unit 1.2 - Role and Responsibilities of a Construction Painter and Decorator – Construction	Role of a Construction Painter and Decorator	http://y2u.be/MkRhIoyXfI8	Role of a Construction Painter and Decorator	14
2. Generic Mathematical Skills (CON/N0505)	Unit 2.1 - Basic principles of measurement, geometry and arithmetic calculation	Different System of Measurement	http://y2u.be/oAtDAoqdExw	Different System of Measurement	27
		Conversion between Metric and Inch Systems	http://y2u.be/efr2pFdJZco	Conversion between Metric and Inch Systems	27
		Area, Volume and Perimeter of Geometrical Shapes	http://y2u.be/VI1VWQywjyM	Area, Volume and Perimeter of Geometrical Shapes	27

3. Painting Tools and Materials	Unit 3.1 Tools and materials used in painting works	Tools and Accessories Required For Painting Work	http://y2u.be/uEYcpdavZi0	 Tools and Accessories Required For Painting Work	36
		Types of Paint Brushes	http://y2u.be/KMfhjxjCKHY	 Types of Paint Brushes	36
	Unit 3.2 Storing and handling of painting tools and materials	Storing and handling of painting tools and materials	http://y2u.be/xS4X6kX_3u0	 Storing and handling of painting tools and materials	40
4. Application of Paint on Masonry Surface (CON/N0505)	Unit 4.1 Application of paint on masonry surface	Sketches and Working Drawings	http://y2u.be/LY8CfY2nj1k	 Sketches and Working Drawings	61
		Masonry Surfaces and Their Types	http://y2u.be/aX740OxcbcA	 Masonry Surfaces and Their Types	61

		Process for painting masonry surface	http://y2u.be/RDwPYXT1KcA	Process for painting masonry surface	61
5. Painting on Structural Steel Fabricated Assemblies (CON/N0506)	Unit 5.1 Application of paint on structural steel fabricated assemblies	Process of Painting on Steel Assemblies Surface	http://y2u.be/4Nb1yJu89g8	Process of Painting on Steel Assemblies Surface	73
		Preparation of Surface	http://y2u.be/rTZABHZh6JE	Preparation of Surface	73
		Application of Paint	http://y2u.be/UvIdP4tXQ60	Application of Paint	73
6. Painting and Polishing Of Wooden Surface (CON/N0507)	Unit 6.1 Application of paint on wooden surface	Process of painting wooden surface	http://y2u.be/B4glGMiHxDI	Process of painting wooden surface	86

		Preparing Wood for Painting	http://y2u.be/b2LU4fBa4sE	Preparing Wood for Painting	86
7. Defects in Painting (CON/N0510)	Unit 7.1 Identification and Repairing of defects in painting	Paint Defects	http://y2u.be/jyswruAkmCY	Paint Defects	100
		Repairing Of Paint Defects	http://y2u.be/xq6OL9cz_Z8	Repairing Of Paint Defects	100

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