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सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
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Construction Skill Development Council

Facilitator Guide



Fabricator

Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Fabrication

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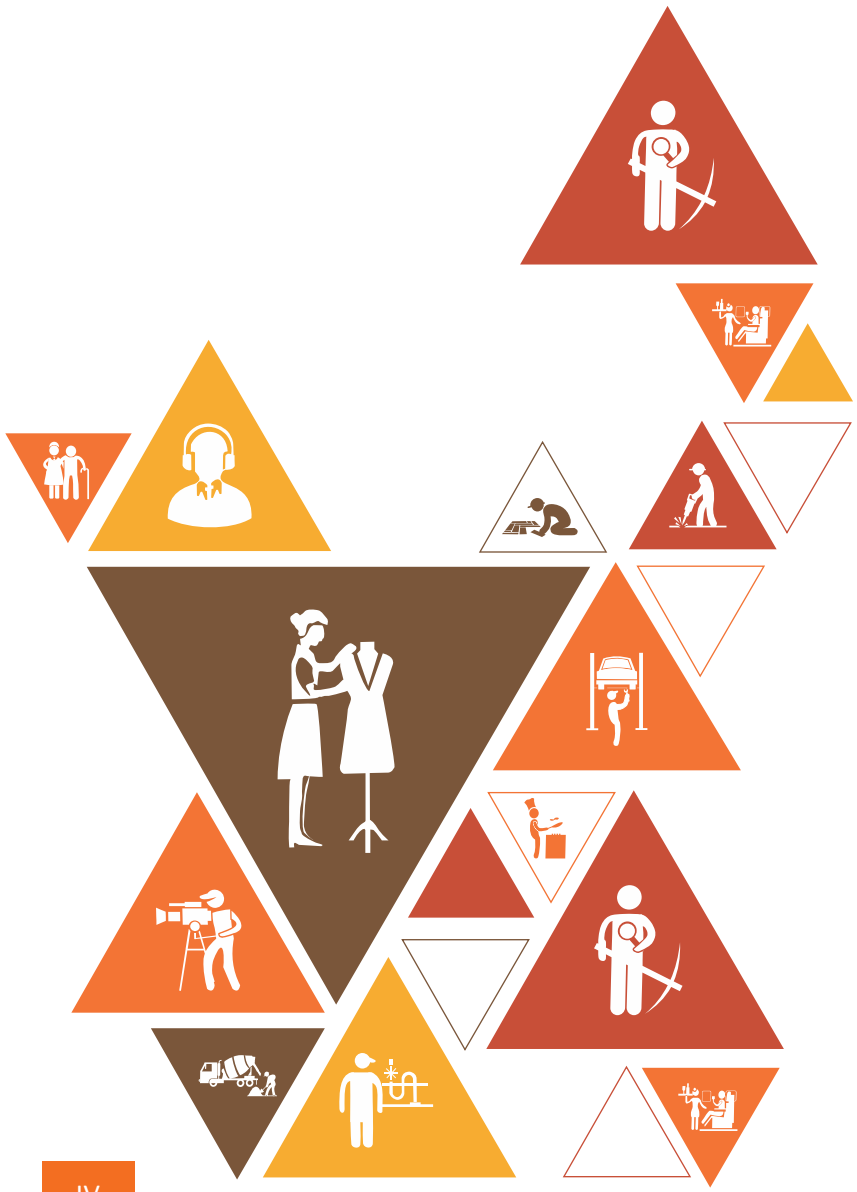
Disclaimer

"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



Acknowledgement

We are thankful to all organizations and individuals who have helped us in the preparation of this Facilitator Guide. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving the quality, coherence and content presentation of chapters. This Facilitator Guide will lead to the successful rollout of the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert for the content and for helping us in the preparation of this Facilitator Guide.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome suggestions from users, industry experts and other stakeholders for any improvement in future.

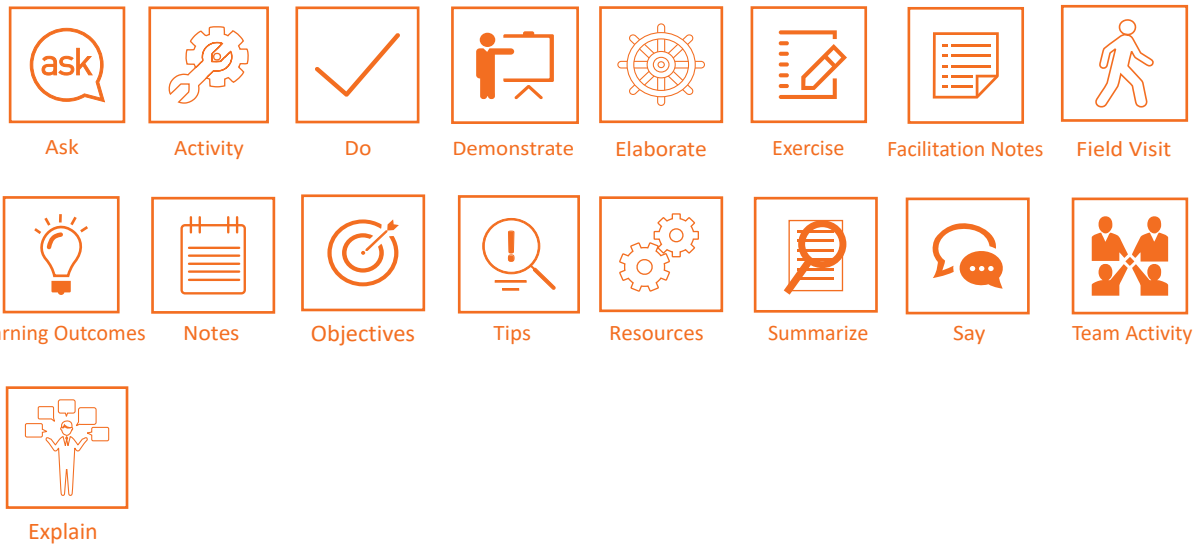
About the Book

The objective of the guide is to provide an approach map for interacting with the trainees undergoing training in this job role. The course aims to provide both theoretical and practical knowledge to the trainees and also to guide them about Fabricator. The guide is neither a substitute nor a complete road map, but an aid to help to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the guide. The guide is just to indicate how to proceed in covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension of the following aspects:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore.
- **Performance Criteria:** Pick up the required aptitudes through hands-on preparation and play out the required operations inside the predetermined measures.
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work.

The job will also include judging comprehension and also help them learn more through hands-on training. But it has to be ensured that these are following the knowledge imparted and time spent on each unit. It is expected that irrespective of the region, knowledge of all aspects will be imparted to trainees.

Symbols Used



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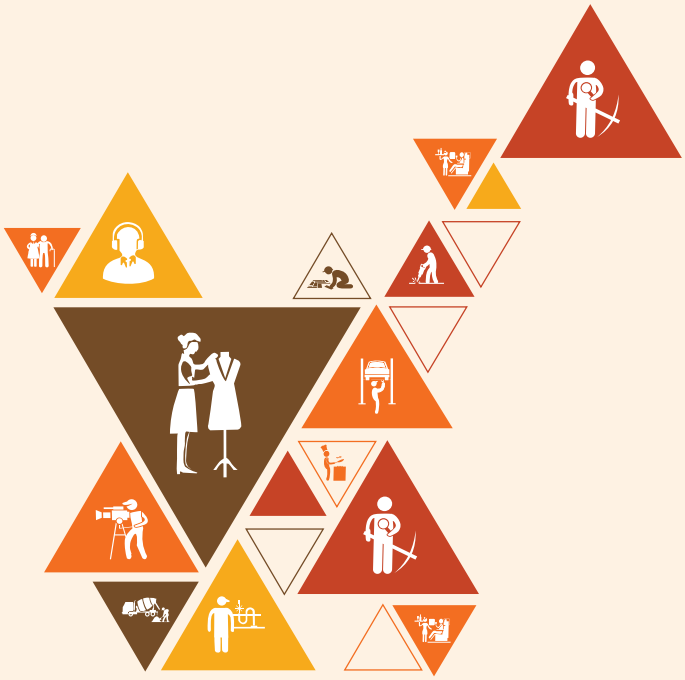
1. Introduction of onstruction Sector and Fabricator Job Role

Unit 1.1 - Construction Industry in India

Unit 1.2 - About Fabrication Occupation



Bridge Module

Key Learning Outcomes

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

1. Explain role description/ functions of the job role- fabricator.
2. Define the personal attributes required in fabrication occupation.
3. Explain future possible progression for role of fabricator.

Unit 1.1: Construction Industry in India

Unit Objectives

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

1. Describe the size and scope of the construction industry and its sub-sectors
2. Compare urban and rural construction
3. Observe and outline modernization of construction
4. Know about major occupations in the construction sector

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.

Say

- Let's begin with an ice-breaking session, introduce yourself and ask participants to introduce themselves.

Explain

Introduction to Major Occupations in Construction Sector:

- Explain about construction sector in India
- Compare urban and rural construction types
- Observe and outline modernization of construction
- Know about major occupations in the construction sector

Notes for facilitation

- Use the Fabricator PHB and refer unit 1.1 to explain Construction Industry.
- The construction industry in India is a critical driver of economic growth, encompassing various sectors such as real estate, infrastructure, and rural construction. Let's take a closer look at each of these segments:
    - **Real Estate Sector:** The real estate sector in India includes the development of residential,

commercial, and industrial properties. It has a substantial impact on urbanization and provides essential spaces for living, working, and recreation. Key Points are:

- **Residential Properties:** The demand for housing, especially in urban areas, remains high due to rapid urbanization and population growth.
- **Commercial Properties:** The growth of industries and businesses fuels demand for office spaces, retail outlets, and commercial complexes.
- **Industrial Properties:** As manufacturing and industrial sectors expand, there's a need for well-designed industrial facilities and warehouses.

o **Infrastructure Development:** India's focus on infrastructure development is crucial for economic progress and improving the quality of life for its citizens. Key Points are:

- **Transportation**: Roadways, highways, railways, airports, and ports are being developed to improve connectivity.
- **Energy:** Investment in power plants and renewable energy projects is essential for meeting the energy needs of a growing economy.
- **Urban Development:** The "Smart Cities Mission" aims to create sustainable and efficient urban centers.

o Rural construction focuses on developing infrastructure and facilities in rural areas to bridge the urban-rural divide and improve the living standards of rural communities. Key Points are:

- **Housing:** Initiatives like "Pradhan Mantri Awas Yojana - Rural" aim to provide affordable housing to rural populations.
- **Rural Infrastructure:** Building roads, schools, healthcare facilities, and water supply systems enhances rural living conditions.

- The construction sector encompasses a wide range of job opportunities across various occupations. Here are some major occupations in the construction industry along with a few job roles under each occupation:

o **Civil Engineers:** Civil engineers play a key role in designing, planning, and overseeing construction projects. They ensure projects are completed safely, efficiently, and according to specifications.

- **Structural Engineer:** Designs and analyzes the structural components of buildings and infrastructure projects.
- **Geotechnical Engineer:** Evaluates soil conditions and provides recommendations for foundation design.
- **Transportation Engineer:** Designs roads, highways, and transportation systems to ensure smooth mobility.

- **Architects:** Architects are responsible for designing the overall layout, aesthetics, and functionality of buildings and structures.
    - **Residential Architect:** Designs homes and residential buildings, focusing on functionality and aesthetics.
    - **Commercial Architect:** Specializes in designing commercial spaces, offices, and retail complexes.
    - **Landscape Architect:** Plans outdoor spaces, parks, and landscapes within construction projects.
- **Construction Managers:** Construction managers oversee the entire construction process, including budgeting, scheduling, and coordinating various teams.
    - **Project Manager:** Manages all aspects of a construction project, from planning to completion.
    - **Site Manager:** Supervises on-site activities, ensuring safety and efficient progress.
    - **Estimator:** Calculates project costs and prepares budgets for construction projects.
- **Electricians:** Electricians are responsible for installing and maintaining electrical systems in buildings and structures.
    - **Residential Electrician:** Installs electrical systems in homes and residential complexes.
    - **Commercial Electrician:** Works on electrical installations in commercial buildings and offices.
    - **Industrial Electrician:** Focuses on electrical systems in factories and industrial facilities.
- **Plumbers:** Plumbers install, repair, and maintain water supply and drainage systems in buildings.
    - **Residential Plumber:** Handles plumbing systems in homes and residential buildings.
    - **Commercial Plumber:** Works on plumbing installations in commercial spaces and offices.
    - **Pipefitter:** Installs and maintains pipes in industrial settings.
- **Welders and Fabricators:** Welders and fabricators join and shape metal parts to create structures and components.
    - **Structural Welder:** Welds and assembles metal parts for construction projects.
    - **Pipe Welder:** Specializes in welding pipes for plumbing and industrial systems.
    - **Sheet Metal Fabricator**: Crafts metal components used in construction projects.
- **Surveyors:** Surveyors measure and map out the land, providing crucial data for construction projects.

- **Land Surveyor:** Measures and defines property boundaries and topography.
- **Quantity Surveyor:** Estimates materials and costs for construction projects.
- **Geodetic Surveyor:** Uses advanced techniques to map larger areas and create accurate models.

o **Construction Laborers:** Construction laborers perform various physical tasks on construction sites to support other professionals.

- **Concrete Worker:** Pours, levels, and finishes concrete for foundations and structures.
- **Carpenter:** Constructs and installs wooden components in buildings.
- **Mason:** Lays bricks, stones, and other masonry materials to build structures.

- Each of these major occupations within the construction sector offers a wide range of job opportunities and career paths. From engineering and design to hands-on labor, the construction industry provides diverse roles that contribute to building the world around us.

Say

- Let us now perform an activity based on various market segments of the construction industry.

Team Activity

- **Purpose:** The objective of this activity is to introduce participants to the different market segments within the construction industry.
- **Resources Required:** Presentation materials (slides or handouts) explaining market segments in the construction industry, internet access or library resources for research, whiteboard or flip chart with markers, printed construction industry reports or data (optional but helpful), worksheets for students to complete during the activity.
- **Tentative Duration:** 60-90 minutes
- **Methods/Procedure:**

o **Step 1:** Introduction- Begin the activity by discussing the importance of understanding market segments in the construction industry. Explain that market segmentation helps professionals identify specialized opportunities and areas of expertise within the broader field of construction.

o **Step 2:** Presentation- Deliver a presentation on the different market segments within the construction industry. Include information on residential construction, commercial construction, industrial construction, infrastructure development, and specializations like green building, renovation, and restoration. Use visual aids to make the information more engaging and accessible.

o **Step 3:** Group Research- Divide the students into small groups and assign each group a

specific market segment to focus on. Provide the groups with access to the internet or library resources to conduct research on their assigned market segment. They should explore the scope, current trends, major players, challenges, and potential career opportunities within their segment.

- **Step 4:** Group Presentation- Each group presents their findings to the rest of the class. Encourage them to use visuals, statistics, and examples to support their presentation. Allow for a short Q&A session after each presentation to clarify doubts and exchange insights.
- **Step 5:** Reflection and Discussion- Lead a class discussion to debrief the activity. Encourage students to share their thoughts on which market segments they find most appealing and why. Discuss the skills and qualifications required for different market segments and how students can prepare to excel in their chosen area.

- Expected Outcome: By the end of this classroom activity, students are expected to:
  - Understand the concept of market segmentation in the construction industry.
  - Identify the various market segments within the construction field, including residential, commercial, industrial, infrastructure, and specialized sectors.
  - Analyse the characteristics, opportunities, and challenges associated with each market segment.
  - Gain insights into potential career paths and specialization options within the construction industry.
  - Reflect on their interests and skills to make informed decisions about their vocational course and future career goals in construction.

Notes

Unit 1.2: About Fabrication Occupation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain role description/ functions of the job role- fabricator.
2. Define the personal attributes required in fabrication occupation.
3. Explain future possible progression for role of fabricator.

Resources to be used

- **Theory**
    - **Training Kit** - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.

Explain

- Explain the role description/ functions of the job role- fabricator.
- Reiterate the personal attributes required in fabrication occupation.
- Explain the future possible progression for role of fabricator.

Career Progression Path

- Show and explain the various stages of career progression path.
- List down the important mile stones in the progression path.
- Discuss the advantages of the career progression path.

Elaborate

- About the necessity of defining roles and responsibilities.
- List the roles and responsibilities of a Fabricator in detail.
- Correlate the roles and responsibilities of a Fabricator.
- About the necessity of personal attributes.
- List the personal attributes of a Fabricator in detail.
- Correlate the roles, responsibilities and personal attributes of a Fabricator.
- Show and explain the various stages of career progression path.
- Discuss the advantages of the career progression path.

Notes for facilitation

- Use the Fabricator PHB and refer unit 1.2 to explain about Fabrication related Occupation.
- **Roles and Responsibilities of a Fabricator:**
    - **Material Preparation:** Select and prepare materials for fabrication, including cutting, shaping, and measuring.
    - Reading Blueprints: **Interpret engineering drawings and blueprints to understand project** requirements.
    - **Operating Machinery:** Operate welding, cutting, and other fabrication equipment safely and efficiently.
    - **Welding:** Perform welding tasks, ensuring strong and accurate welds.
    - **Quality Control:** Inspect fabricated parts for quality, accuracy, and adherence to specifications.
    - **Layout and Assembly:** Assemble parts according to blueprints, ensuring proper alignment and fit.
    - **Safety Compliance:** Follow safety protocols and guidelines to maintain a safe work environment.
    - **Troubleshooting:** Identify and resolve issues or defects in fabricated components.
    - **Communication:** Collaborate with team members and supervisors to meet project deadlines and goals.
    - **Documentation:** Maintain records of materials used, work completed, and inspections conducted.
- **Correlation of Roles and Responsibilities:**
    - The ability to read blueprints is essential for understanding project requirements and ensuring accurate fabrication.
    - Proper material preparation is directly linked to the quality of the final product.
    - Effective communication skills are crucial for collaborating with team members and supervisors.
- **Personal Attributes of a Fabricator:**
    - **Technical Proficiency:** Strong skills in welding, machinery operation, and blueprint reading.
    - **Attention to Detail:** Precision is vital in fabrication to ensure accuracy and quality.
    - **Safety Consciousness:** A commitment to safety protocols and guidelines.
    - **Problem-Solving Skills:** The ability to identify and troubleshoot issues during fabrication.
    - **Team Player:** Collaboration and effective communication within the team.
    - **Adaptability:** Ability to work with various materials and adapt to changing project needs.
    - **Time Management:** Efficiently manage time to meet project deadlines.

- **Physical Stamina:** Fabrication can be physically demanding, so endurance is essential.

- **Career Progression Path Stages:**
  - **Entry-Level Fabricator:** Begin as an entry-level fabricator, gaining hands-on experience and skills.
  - **Fabricator II:** Progress to a more skilled role, taking on complex projects and demonstrating expertise.
  - **Lead Fabricator:** Assume a leadership role, supervising junior fabricators and overseeing projects.
  - **Fabrication Supervisor:** Transition into a management role, responsible for project planning and team management.
  - **Fabrication Manager:** At the managerial level, manage entire fabrication departments or facilities.

- **Advantages of the Career Progression Path:**
  - **Skill Development:** Offers opportunities to develop a wide range of technical skills.
  - **Increased Responsibility:** Provides a path to leadership and management roles.
  - **Higher Earnings:** Advancement often comes with increased pay and benefits.
  - **Job Security:** Skilled fabricators are in demand across various industries.
  - **Personal Growth:** Allows for continuous learning and growth within the field.

Say

- Let us now perform an activity based on various career opportunities available for a Fabricator.

Activity: Exploring Career Opportunities for Fabricators

- **Purpose:** This activity aims to acquaint participants with various career prospects within the field of Fabrication. It will emphasize the roles, responsibilities, and potential career progression for Fabricators.
- **Resources Required:** PowerPoint Presentation, Handouts or printouts of job descriptions.
- **Tentative Duration:** 60 Mins
- **Procedure:**
  i. **Introduction:** Begin by highlighting the significance of Fabricators in various industries, stressing their crucial role in creating fabricated components.
  ii. **Objective:** Explain that the activity aims to explore diverse employment opportunities available to Fabricators and inspire participants to consider different career paths.

iii. **Initial Thoughts:** Encourage participants to share their initial thoughts on what they believe the roles and responsibilities of a Fabricator entail.

iv. **Job Opportunities Handouts:** Distribute handouts or printouts containing information about various employment opportunities in the field of Fabrication, categorized according to different career levels and specializations.

v. **Discussion:** Go through each opportunity, elaborating on roles, responsibilities, and the requisite skills. Discuss how each career path aligns with different aspects of fabrication.

vi. **Group Activity:** Divide participants into small groups.

vii. **Assignment:** Assign each group a specific employment opportunity from the handouts. Instruct them to discuss key aspects, including qualifications, skills, and potential career progression for that role.

viii. **Group Presentation:** Each group presents a brief researched explanation of the assigned employment opportunity to the entire group.

ix. **Summary:** Summarize the key points presented by each group, highlighting the wide range of career paths available to Fabricators. Emphasize the importance of Fabricators in various industries.

Expected outcome: Participants will gain insights into the diverse career opportunities within the Fabrication field, comprehend the specific roles and responsibilities of Fabricators, and be motivated to explore potential career trajectories within this dynamic industry.

Exercise

Key Solutions to PHB Exercise

A. Short Answers:

1) **Answer:** The primary sub-sectors within the construction industry include residential construction, commercial construction, industrial construction, and civil engineering construction.

2) **Answer:** Urban construction typically involves projects in densely populated areas with limited space, while rural construction takes place in less densely populated and more open areas.

3) **Answer:** One modernization trend in the construction industry is the adoption of Building Information Modelling (BIM) for better project planning and management.

4) **Answer:** Project managers play a major role in project planning within the construction sector.

5) **Answer:** The primary responsibility of a fabricator in construction is to prepare, assemble, and weld components to create structural elements according to specifications.

B. Fill-in-the-Blanks Questions:

1) Precision and attention to detail are essential attributes for fabricators.

2) Adaptability is False for success in a fabrication occupation.

3) In modern construction, the use of digital technologies like Building Information Modelling (BIM) enhances efficiency.

4) Major occupations in the construction sector include architects, engineers, project managers, and construction workers.

5) The future progression for a fabricator may involve becoming a senior fabricator, specializing in a specific area, or even starting their own business.

C. True/False Questions:

1) **False -** The construction industry has a significant impact on India's economy.

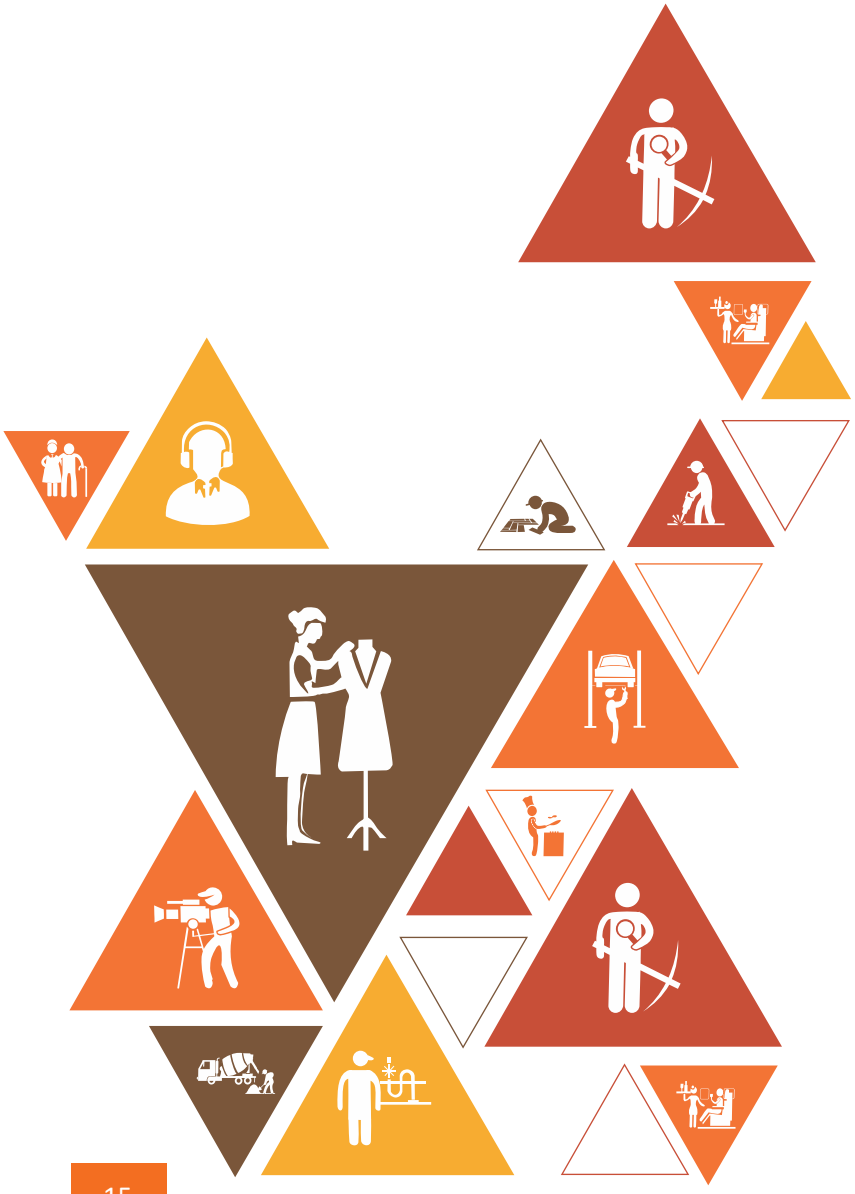
2) **False -** Infrastructure development is indeed a part of the construction industry in India.

3) **False -** Skilled labor shortage is a significant challenge faced by the Indian construction industry.

4) **False -** The construction industry's growth is closely related to economic factors.

5) **False -** Sustainability practices have a growing role in the Indian construction industry.

Notes



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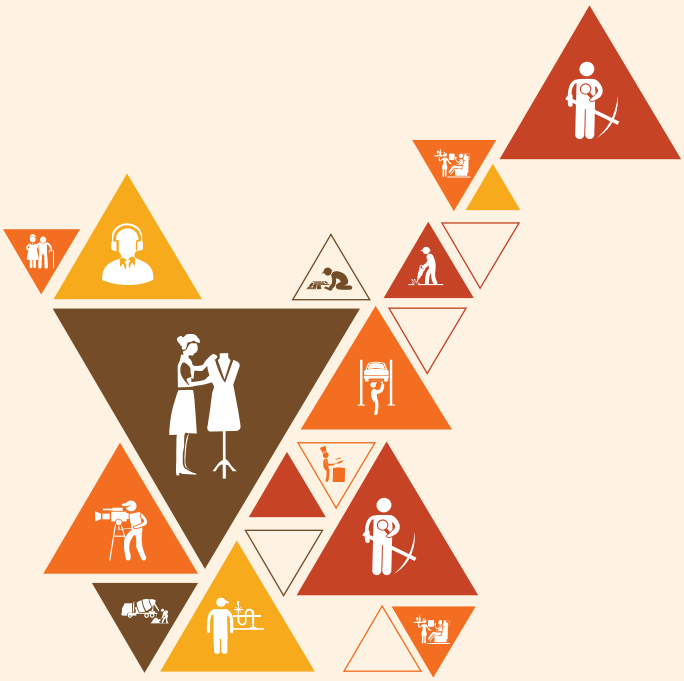
2. Generic Mathematical Skills

Unit 2.1 - Unit Conversion and Measurement

Unit 2.2 - Basic Geometrical Shapes and its Properties



Key Learning Outcomes

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

1. Explain brief on metric system of measurement;
2. Explain briefly inch system of measurement;
3. Perform basic arithmetic calculations;
4. Know about basic geometrical shapes;
5. Calculate area, volume and perimeter of different shapes;
6. Know about Pythagoras theorem;
7. Perform basic calculations using Pythagoras theorem.
8. Calculate problems using trigonometric functions.

UNIT 2.1: Unit Conversion and Measurement

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain brief on metric system of measurement; and
2. Understanding inch system of measurement.

Resources to be used

- **Theory**
  - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Calculator, conversion charts, measurement tapes

Do

- Perform basic mathematical calculation
- Identify the different types of shapes

Notes for facilitation

- Use the Fabricator PHB and refer unit 2.1 to explain Unit Conversion and Measurement.
- The metric system of measurement is widely used in fabrication in construction due to its simplicity, precision, and global acceptance. In this system, measurements are based on powers of 10, making calculations and conversions straightforward. Key metric units commonly used in construction fabrication include millimeters (mm), centimeters (cm), and meters (m). Here's a brief overview of its application.

Metric Unit	Common Use in Construction Fabrication
Millimeters	Precise measurements for components and detailing.
Centimeters	Intermediate measurements for elements like rebar.
Meters	Larger measurements for structural components like beams.

- In some regions, including the United States, the inch system of measurement is still prevalent in construction fabrication. This system is based on inches, feet, and yards. Here's an overview of its application.

Inch System Unit	Common Use in Construction Fabrication
Inches	Smaller measurements for details like bolt diameter.
Feet	Intermediate measurements for elements like structural beams.
Yards	Larger measurements for items such as road widths or pipelines.

Activity

- **Name:** "Understanding Metric and Inch Measurements in Fabrication"
- **Purpose:** The purpose of this activity is to familiarize fabricators with the metric and inch measurement systems, both of which are commonly used in the fabrication of structural components. This knowledge will enable fabricators to work effectively with diverse measurement units in the fabrication process.
- **Resources Required:**
  - Metric measuring tools (e.g., tape measures, rulers)
  - Inch measuring tools (e.g., tape measures, rulers)
  - Various fabrication materials (e.g., steel beams, plates)
  - Whiteboard or flip chart
  - Markers
- **Tentative Duration:** 45-60 minutes
- **Procedure:**

1. **Introduction (5 minutes):**
   - Start by highlighting the importance of precise measurements in fabrication. Explain that fabricators encounter two primary measurement systems: the metric system and the inch system, both widely used in the industry.
2. **Metric System Overview (10 minutes):**
   - **Discuss the essential aspects of the metric system:**
     i. Base 10 system
     ii. Standard units like meters, centimeters, and millimetres
     iii. Utilization of metric measuring tools for accurate measurements
   - Show examples of metric measurements on the whiteboard.

3. **Inch System Overview (10 minutes):**
    - **Discuss the key features of the inch system:**
        i. Commonly used in the United States and certain other regions
        ii. Units such as inches and feet, often with fractional representation
        iii. Use of inch measuring tools for precise measurements
    - Show examples of inch measurements on the whiteboard.
4. **Hands-On Activity (15 minutes):**
    - Form participants into pairs or small groups.
    - Provide each group with a range of fabrication materials (e.g., steel beams, plates).
    - Instruct them to measure the length, width, and thickness of these materials using both metric and inch measuring tools.
    - Have each group record their measurements on the whiteboard.
5. **Conversion Challenge (10 minutes):**
    - Ask the groups to select one measurement (e.g., length) and convert it from metric to inch or vice versa.
    - Discuss the conversion process and any challenges encountered.
    - Highlight the importance of accurate measurement conversions in fabrication projects involving different measurement systems.
    - Engage in a group discussion where participants share their experiences and insights regarding the differences between the metric and inch systems in the context of fabrication.
    - Encourage them to discuss situations where they might encounter both systems in their fabrication work.

Expected Outcome:

- Fabricators will gain a practical understanding of both metric and inch measurement systems.
- They will be proficient in accurately measuring fabrication materials using both systems.
- Participants will develop the skills to convert measurements between the metric and inch systems, enhancing their adaptability in fabrication projects that use different measurement units.

Notes

UNIT 2.2: Basic Geometrical Shapes and its Properties

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Perform basic arithmetic calculations;
2. Know about basic geometrical shapes; and
3. Calculate area, volume and perimeter of different shapes.

Resources to be used

- **Theory**
  - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Calculator, conversion charts, measurement tapes

Do

- Explain basic arithmetic calculations;
- Demonstrate basic geometrical shapes; and explain them
- Calculate area, volume and perimeter of different shapes.

Notes for facilitation

- Use the Fabricator PHB and refer unit 2.2 to explain Basic Geometrical Shapes and its Properties.
- **Utilizing Basic Arithmetic Calculations in Fabrication:** As a Fabricator in construction, you'll frequently employ basic arithmetic calculations to ensure precise measurements, cuts, and material estimates. This includes addition, subtraction, multiplication, and division. These calculations are fundamental for tasks like determining material quantities, project costing, and verifying measurements, all of which contribute to the accuracy and efficiency of fabrication work.
- **Understanding and Applying Basic Geometric Shapes in Fabrication:** In your role as a Fabricator, understanding various geometric shapes and their practical applications is crucial. Common shapes encountered in construction include rectangles, squares, circles, triangles, and trapezoids. Recognizing these shapes and their properties aids in planning and executing tasks such as cutting, shaping, and assembling structural components. For example, you might use rectangles for cutting

steel sheets or circles for creating pipe sections. A solid grasp of geometric shapes enhances precision in fabrication work.

- **Calculating Area, Volume, and Perimeter for Diverse Shapes in Fabrication:**
    - **Area Calculation:** Fabricators frequently need to determine the surface area of materials like steel plates or concrete slabs. Calculating area ensures accurate material estimation for construction projects. For instance, calculating the area of a steel plate helps determine how much coverage it provides in a structural application.
    - **Volume Calculation:** Calculating volume is essential when working with materials like concrete, welding fillers, or determining the capacity of containers. Fabricators use volume calculations to ensure they have the right amount of material for specific tasks, contributing to the structural integrity of the final product.
    - **Perimeter Calculation:** Fabricators use perimeter calculations to measure the length of various components, such as reinforcing bars or structural elements. Accurate perimeter calculations assist in cutting, shaping, and assembling materials precisely, aligning with construction specifications.

Activity -1

Mathematical skills - Practice

Conduct a group activity.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub activity	Skill Practice	Time	Resources
1	Measure the size of the classroom in metric system by using a tape measure	2 Hours	Tape measure, stationary items (pen, marker, scale and notebook)
2	Measure the size of the classroom in imperial system by using a tape measure	2 Hours	

3	Convert the following: • 100000 mm into …… mts, and • 1000mts into ……. mm. • 100 inches into …… ft. • 10000 sft into ……. m2 • 1m3 into …… mm3	1 Hour	
4	• Solve the below: • 300-200+100x50-30/5 = …… • 100-20/3+15-150 = …… • 1.5-0.2/4+2.8-1500+15000 = ……	1 Hour	

Table 2.2.1 – Mathematical skills

Specific Instructions:

- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of measuring the classroom with a tape measure before commencing the exercise.
- Use the unit conversion table for the activity.
- Give hints on the method of converting the units easily.
- Assist them wherever, it is necessary during the activity.
- At end of the process ask each one of them to mention the experience they had in activity.
- Clarify doubts, if any.
- Check and observe that all the steps followed by the participants.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved for mathematical conversion of units, calculation of area/volume and squaring of corners.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1) The base unit for measuring length in the metric system is the “meter.”
2) The metric unit commonly used for measuring mass is the “gram.”
3) The metric system typically uses the “liter” as the unit for measuring volume.
4) In the inch system, 1 foot is equivalent to 12 inches.
5) To calculate the volume of a rectangular prism, you multiply its length, width, and height together. The formula is: Volume = Length × Width × Height.

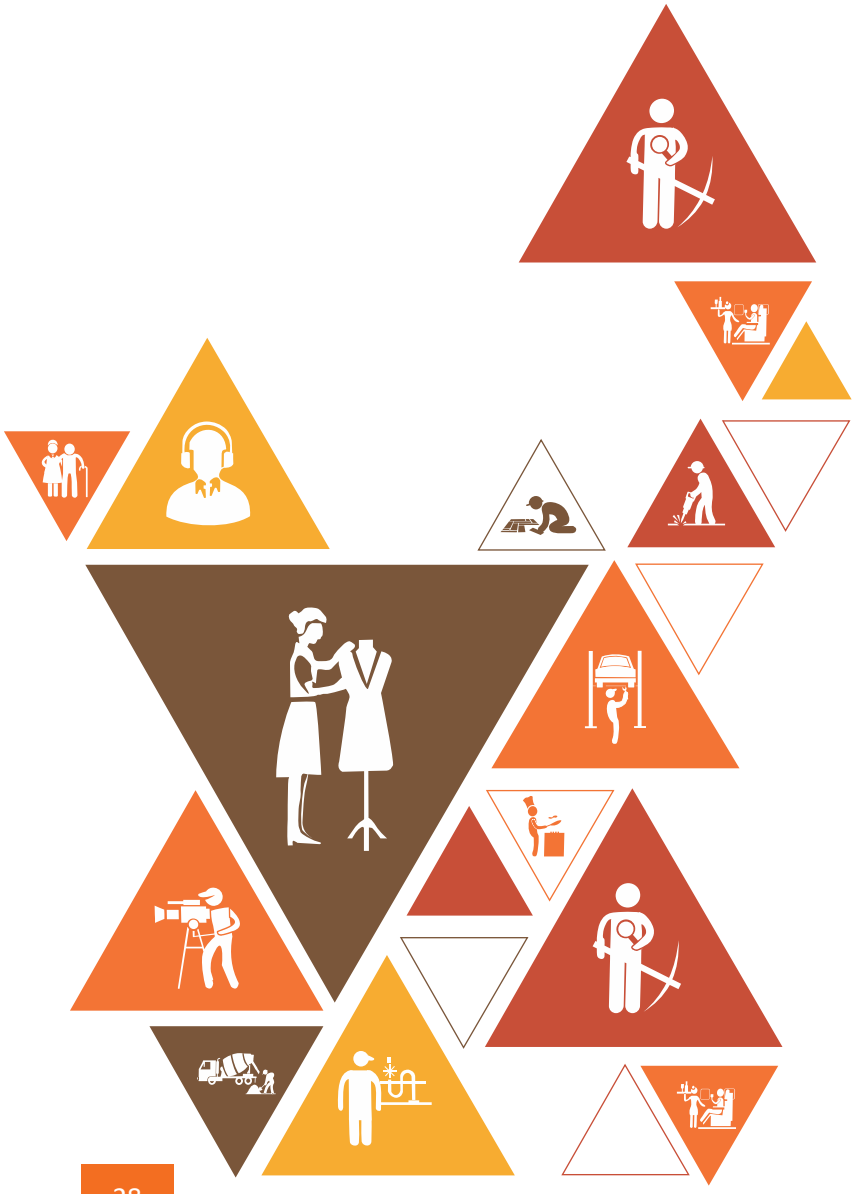
Fill-in-the-Blanks Questions:

1) Fahrenheit
2) 1,000
3) Mass
4) 36
5) True

True/False Questions:

1) True
2) False
3) False
4) True
5) True

Notes



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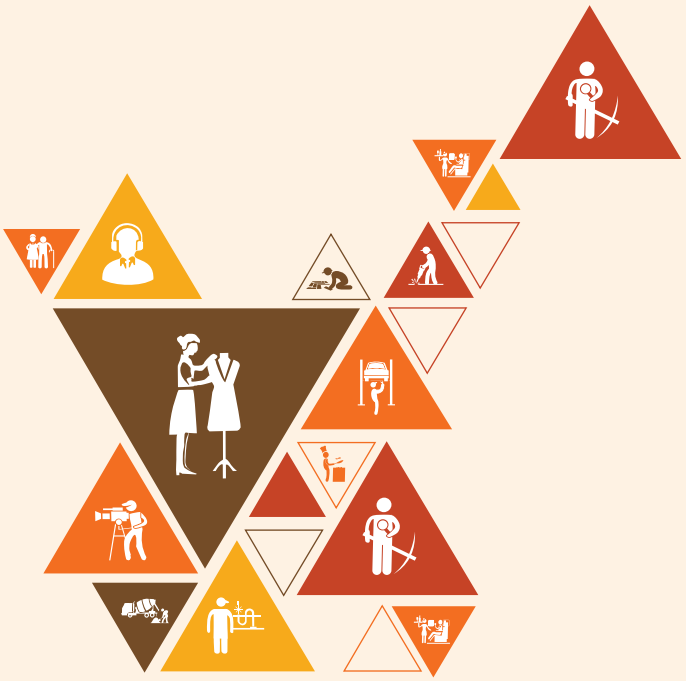
3. Inspect the Fabrication Materials and Conduct their Surface Cleanin

Unit 3.1 - Blueprint Interpretation and Material Identification

Unit 3.2 - Material Handling and Quality Control

Unit 3.3 - Surface Cleaning and Preparation



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Key Learning Outcomes

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

1. Read and interpret blueprints/ working drawings/shop drawings/ specification details related to the fabrication activities
2. Identify different components/ sections like columns, I-beams, girders, trusses, channels, angles, plates, hollow section and other mild steel (MS) components/ accessories required in the steel fabrication work with respect to the specifications/ drawings
3. Locate the appropriate sections based on sizes, dimensions, and design in the warehouse/ storing yard for further processing which may involve grinding, wielding, cutting, bending, drilling, punching, burning or melting
4. Ensure that there are correct identity marks/heat number on the structural sections as per the organizational norms
5. Confirm that quality inspection has been conducted by the quality department for the required materials
6. Ensure the fabrication material has no physical damage like distortion, bending, cracks etc.
7. Ensure that the materials are loaded, shifted and unloaded to the fabrication yard/ workshop safely, following standard practices
8. Inspect the surface of the materials/ sections to determine the types of impurities on it
9. Obtain approval for employing different methods of surface cleaning from the concerned authority
10. Estimate the quantities of the materials required for the surface cleaning purpose
11. Initiate indent procedures for the required cleaning materials as per the organizational norms
12. Ensure appropriate surface cleaning procedures like heating, chemical cleaning, scrubbing, water jet, abrasion etc. are adopted as per the requirements/ instructions
13. Confirm the compliance of prepared clean surface with technical details or instructions

UNIT 3.1: Blueprint Interpretation and Material Identification

Unit Objectives

At the end of this module, trainer will ensure that participant will be able to:

1. Read and interpret blueprints, working drawings, shop drawings, and specification details related to fabrication activities.
2. Identify different components and sections like columns, I-beams, girders, trusses, channels, angles, plates, hollow sections, and other mild steel (MS) components and accessories required in steel fabrication work based on specifications and drawings.

Resources to be used

- **Theory**
  - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
  - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Develop or provide training materials on how to read and interpret blueprints, including symbols, notations, and scales commonly used in construction and steel fabrication drawings.
- Conduct interactive sessions or workshops where learners can practice interpreting blueprints under the trainer's guidance.
- Teach learners about the various elements found in blueprints, such as views (elevation, plan, section), dimensions, notes, and legends.
- Explain how to identify the scale used in the blueprint and how to use it for measurements.
- Provide learners with a variety of blueprints, working drawings, shop drawings, and specification details commonly encountered in steel fabrication.
- Assign exercises and projects that require learners to interpret these blueprints independently and discuss their findings in class.

- Dedicate specific training sessions to the identification of different steel components and sections, such as columns, I-beams, girders, trusses, channels, angles, plates, and hollow sections.
- Provide visual aids and actual steel samples for hands-on learning.
- Familiarize learners with the importance of specifications in steel fabrication work and how to extract essential information from them.
- Have learners practice cross-referencing specifications with blueprints to ensure compliance.
- Emphasize safety practices related to steel fabrication, including the handling and use of steel components and machinery.
- Ensure that learners understand the importance of adhering to safety regulations and guidelines.
- Teach learners about industry-specific quality standards and codes related to steel fabrication.
- Discuss the significance of maintaining quality in fabrication work.
- Create mock steel fabrication projects and case studies for learners to work on collectively or individually.
- Encourage them to apply their blueprint reading and component identification skills to real-world scenarios.
- Provide regular feedback on learners' progress in interpreting blueprints and identifying steel components.
- Conduct assessments, quizzes, or practical exams to evaluate their understanding and skills.
- Arrange visits to steel fabrication shops or construction sites to give learners hands-on experience in identifying components and interpreting blueprints in a real-world setting.
- Compile a list of recommended books, websites, and other resources that learners can refer to for further self-study and skill enhancement.
- Encourage learners to stay updated with the latest developments in steel fabrication technology and blueprint reading techniques through ongoing professional development.

Notes for facilitation

- Use the Fabricator PHB and refer unit 3.1 to explain Blueprint Interpretation and Material Identification.
- **Developing Blueprint Reading Materials:** Training materials are essential for teaching learners how to read and interpret blueprints accurately. These materials should cover symbols, notations, and scales commonly used in construction and steel fabrication drawings.
- **Interactive Blueprint Interpretation Sessions:** Interactive workshops and sessions under the trainer's guidance allow learners to practice interpreting blueprints effectively. This hands-on

approach enhances their understanding and skills.

- **Understanding Blueprint Elements:** Blueprints contain various elements, including elevation, plan, section views, dimensions, notes, and legends. Learning to recognize and interpret these elements is crucial for blueprint comprehension.
- **Scale Identification and Measurement:** Identifying the scale used in blueprints is fundamental. It helps learners accurately measure distances and dimensions depicted in the drawings, ensuring precision in fabrication.
- **Providing a Variety of Drawings:** Learners benefit from exposure to different types of blueprints, including working drawings, shop drawings, and specification details commonly encountered in steel fabrication. This diversity prepares them for real-world scenarios.
- **Assigning Blueprint Exercises:** Assigning exercises and projects that require independent blueprint interpretation and group discussions reinforces the learning process, encouraging learners to apply their knowledge actively.
- **Identifying Steel Components:** Dedicate training sessions to teach learners how to identify various steel components, from columns and I-beams to trusses and hollow sections. Hands-on learning with visual aids and samples enhances understanding.
- **Importance of Specifications:** Specifications play a crucial role in steel fabrication. Learners should understand how to extract essential information from specifications and cross-reference them with blueprints to ensure compliance.
- **Emphasizing Safety Practices:** Safety is paramount in steel fabrication. Training should stress the importance of following safety regulations when handling steel components and machinery to prevent accidents.
- **Quality Standards in Fabrication:** Teaching learners about industry-specific quality standards and codes ensures that fabricated structures meet desired quality levels, emphasizing the importance of maintaining quality throughout the process.
- **Mock Projects and Case Studies:** Mock projects and case studies provide practical experience and encourage learners to apply blueprint reading and component identification skills to real-world situations.
- **Feedback and Assessment:** Regular feedback, assessments, quizzes, and practical exams help gauge learners' understanding and progress in blueprint interpretation and steel component identification.
- Hands-on Visits: **Organizing visits to fabrication shops or construction sites gives learners valuable** hands-on experience, allowing them to apply their skills in a real-world setting.
- **Recommended Resources:** A curated list of books, websites, and resources empowers learners to continue self-study and skill enhancement beyond the training program.
- **Professional Development:** Encouraging ongoing professional development keeps learners updated with the latest advancements in steel fabrication technology and blueprint reading techniques, ensuring their expertise remains current.

Activity -1

- **Name:** Blueprint Interpretation and Component Identification Challenge
- **Purpose:** This practical activity aims to reinforce learners' skills in reading and interpreting blueprints while simultaneously enhancing their ability to identify various steel components used in steel fabrication projects. By completing this challenge, learners will become more proficient in understanding and applying specifications and drawings in a real-world context.
- **Resources Required:**
- Blueprints, working drawings, and shop drawings
- Steel fabrication specifications
- A variety of steel components (e.g., columns, I-beams, girders, trusses, channels, angles, plates, hollow sections)
- Markers, pencils, and rulers
- Timer or clock
- **Tentative Duration:** 60-90 minutes
- Procedure:

i. Introduction (10 minutes):

a. The trainer provides an overview of the activity's objectives, emphasizing the importance of blueprint interpretation and component identification in steel fabrication.

ii. Blueprint Interpretation (20 minutes):

a. Learners are given a set of blueprints, working drawings, and shop drawings related to a steel fabrication project.

b. They must individually or in pairs read and interpret these documents, focusing on dimensions, views, notes, and legends.

iii. Component Identification (20 minutes):

a. After interpreting the blueprints, learners are presented with a collection of steel components, including columns, I-beams, girders, trusses, channels, angles, plates, and hollow sections.

b. Using the specifications and drawings they interpreted earlier, they must correctly identify and label each component.

iv. Matching and Verification (15 minutes):

a. Learners compare their identified components with a provided answer key to check for accuracy.

b. Any discrepancies or questions are discussed with the trainer.

v. Report and Discussion (15 minutes):

a. Each learner or pair presents their findings, explaining how they interpreted the blueprints and identified the components.

b. The trainer facilitates a group discussion, addressing any common challenges or misconceptions.

Expected Outcome:

- Learners will demonstrate improved skills in reading and interpreting blueprints.
- Learners will accurately identify and label various steel components commonly used in steel fabrication.
- Increased confidence in applying blueprint reading skills to practical tasks.
- Improved ability to cross-reference specifications and drawings for accurate component identification.
- A deeper understanding of the importance of precise interpretation in steel fabrication projects.

Activity -2

- **Name:** Blueprint Interpretation and Component Identification Challenge
- **Purpose:** This practical activity aims to reinforce learners' skills in reading and interpreting blueprints while simultaneously enhancing their ability to identify various steel components used in steel fabrication projects. By completing this challenge, learners will become more proficient in understanding and applying specifications and drawings in a real-world context.
- **Resources Required:**
  - Blueprints, working drawings, and shop drawings
  - Steel fabrication specifications
  - A variety of steel components (e.g., columns, I-beams, girders, trusses, channels, angles, plates, hollow sections)
  - Markers, pencils, and rulers
  - Timer or clock
- **Tentative Duration:** 60-90 minutes

Procedure:

i. **Introduction (10 minutes):**

   a. The trainer provides an overview of the activity's objectives, emphasizing the importance of blueprint interpretation and component identification in steel fabrication.

ii. **Blueprint Interpretation (20 minutes):**

   a. Learners are given a set of blueprints, working drawings, and shop drawings related to a steel fabrication project.

   b. They must individually or in pairs read and interpret these documents, focusing on dimensions, views, notes, and legends.

iii. **Component Identification (20 minutes):**

   a. After interpreting the blueprints, learners are presented with a collection of steel components, including columns, I-beams, girders, trusses, channels, angles, plates, and hollow sections.

   b. Using the specifications and drawings they interpreted earlier, they must correctly identify and label each component.

iv. **Matching and Verification (15 minutes):**

   a. Learners compare their identified components with a provided answer key to check for accuracy.

   b. Any discrepancies or questions are discussed with the trainer.

v. **Report and Discussion (15 minutes):**

   a. Each learner or pair presents their findings, explaining how they interpreted the blueprints and identified the components.

   b. The trainer facilitates a group discussion, addressing any common challenges or misconceptions.

Expected Outcome:

- Learners will demonstrate improved skills in reading and interpreting blueprints.
- Learners will accurately identify and label various steel components commonly used in steel fabrication.
- Increased confidence in applying blueprint reading skills to practical tasks.
- Improved ability to cross-reference specifications and drawings for accurate component identification.
- A deeper understanding of the importance of precise interpretation in steel fabrication projects.

Notes

UNIT 3.2: Material Handling and Quality Control

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Locate the appropriate sections in the warehouse or storing yard based on sizes, dimensions, and design for further processing, which may involve grinding, welding, cutting, bending, drilling, punching, burning, or melting.
2. Ensure that there are correct identity marks and heat numbers on the structural sections as per organizational norms.
3. Confirm that quality inspection has been conducted by the quality department for the required materials.
4. Ensure that the fabrication material has no physical damage like distortion, bending, cracks, etc.
5. Safely load, shift, and unload materials to the fabrication yard/workshop following standard practices.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
    - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Provide training on how the warehouse or storing yard is organized, including the layout, sections, and storage methods based on sizes, dimensions, and design requirements.
- Explain the importance of efficient storage to streamline further processing.
- Conduct practical demonstrations of material handling techniques, such as lifting, shifting, and unloading materials using appropriate equipment and tools.
- Ensure that learners understand the correct procedures and safety measures.

- Explain the significance of identity marks and heat numbers on structural sections.
- Provide examples of organizational norms and standards for marking materials.
- Collaborate with the quality department to provide training on quality inspection procedures for materials.
- Ensure learners understand the criteria for assessing material quality.
- Present examples of physical damage that can occur to fabrication materials, such as distortion, bending, cracks, etc.
- Teach learners how to detect and assess physical damage during material inspection.
- Conduct safety training sessions focusing on safe material handling, including the use of personal protective equipment (PPE) and adherence to safety protocols.
- Address potential hazards and precautions related to material handling.
- Organize practical exercises where learners can apply their knowledge by locating and handling materials within the warehouse or storing yard.
- Evaluate their ability to follow correct procedures and safety guidelines.
- Familiarize learners with the quality control procedures specific to your organization, including documentation and reporting requirements.
- Provide examples of quality control checklists and reports.
- Engage learners in role-playing scenarios to simulate real-world situations in material handling.
- Encourage problem-solving and decision-making skills in handling unexpected challenges.
- Regularly assess learners' progress through quizzes, practical assessments, and observation during material handling tasks.
- Provide constructive feedback to help them improve their skills.
- Evaluate learners' safety practices during material handling tasks and provide guidance on areas for improvement.
- Emphasize the importance of safety in every aspect of the process.
- Explain the importance of proper documentation related to material handling, including inventory records, inspection reports, and material tracking.\
- Ensure learners are aware of and understand your organization's policies and procedures regarding material handling, storage, and quality control.
- Present learners with mock scenarios and case studies related to material handling and warehouse management to test their problem-solving abilities.

Notes for facilitation

- Use the Fabricator PHB and refer unit 3.2 to explain Material Handling and Quality Control.
- **Organizing Warehouse Layout:** Comprehensive understanding of how to strategically organize a warehouse or storing yard is pivotal for the efficient functioning of steel fabrication operations. This includes delving into the intricacies of designing layout plans, demarcating sections, and implementing storage methods that precisely align with the varying sizes, dimensions, and design specifications of the materials. Such organizational acumen plays a vital role in optimizing the workflow, minimizing operational bottlenecks, and ultimately enhancing productivity within the steel fabrication process.
- **Efficient Storage Importance:** It's imperative to grasp the profound significance of efficient storage practices within the context of steel fabrication. Efficient storage is the linchpin that streamlines the entire production process. When materials are meticulously organized and readily accessible, delays are mitigated, and the workflow becomes a well-oiled machine. Consequently, this contributes to cost savings, timely project completion, and overall operational excellence.
- **Material Handling Demonstrations:** Practical demonstrations are indispensable in mastering the art of material handling in the realm of steel fabrication. These hands-on sessions encompass a spectrum of vital techniques, ranging from the safe lifting, shifting, and unloading of materials to the adept utilization of specialized equipment and tools. Through these demonstrations, participants not only acquire practical skills but also cultivate the confidence needed to execute these tasks proficiently.
- **Safety Measures Emphasis:** An unswerving emphasis on safety measures is non-negotiable when it comes to material handling, irrespective of the industry. By inculcating a culture of safety, we ensure that every facet of material handling adheres to correct procedures and safety protocols. This unwavering commitment to safety serves as the bedrock of operational integrity, safeguarding personnel, property, and the overall success of the steel fabrication process.
- **Identity Marks Significance:** Comprehending the importance of identity marks and heat numbers etched onto structural sections is paramount. These markings are the compass that guides the journey of materials through the fabrication process, ensuring they are accurately identified, tracked, and used in accordance with established industry standards. Neglecting these marks can lead to costly errors and mismanagement of resources.
- **Marking Standards Examples:** Providing tangible examples of organizational norms and standards for material marking augments the understanding of learners. By illustrating specific marking standards and practices, we empower individuals to apply this knowledge effectively within their work environment, fostering consistency and compliance.
- **Quality Inspection Training:** Collaboration with the quality department to deliver comprehensive training on material quality inspection procedures is pivotal for maintaining high standards. This training equips individuals with the tools to assess and validate material quality, ensuring that only materials meeting specified criteria are integrated into the fabrication process.

- **Material Quality Criteria:** Familiarity with the criteria used to assess material quality empowers individuals to make informed decisions during inspections. It enables them to differentiate between materials that meet the required standards and those that do not, ensuring that only the highest-quality materials are used in fabrication.
- **Detecting Physical Damage:** Recognizing and evaluating physical damage that fabrication materials may incur is a crucial skill during inspections. This proficiency empowers individuals to identify issues such as distortion, bending, cracks, and other forms of damage accurately, allowing for prompt corrective action and preventing potential defects in fabricated products.
- **Safety Training Focus:** Concentrating on safety training is paramount to ensuring that all material handling activities are executed with the highest regard for safety. This includes comprehensive training on the correct usage of personal protective equipment (PPE) and the unwavering adherence to safety protocols during every phase of material handling.
- **Addressing Hazards:** In-depth coverage of potential hazards and precautionary measures associated with material handling is essential. By proactively addressing these hazards and instilling a culture of vigilance and safety, we create an environment where the well-being of personnel takes precedence, promoting safe material handling practices.
- **Practical Exercises:** Practical exercises provide learners with the opportunity to apply their knowledge in real-world scenarios. These exercises encompass locating, handling, and organizing materials within the warehouse or storing yard, allowing participants to translate theoretical knowledge into practical skills. They serve as an invaluable platform for skill development and mastery of correct procedures and safety guidelines.
- **Quality Control Procedures Familiarization:** Gaining familiarity with organizational quality control procedures extends beyond the inspection process. It encompasses the comprehensive understanding of documentation requirements, reporting protocols, and the overall quality assurance framework that governs the fabrication process.
- **Quality Control Examples:** Concrete examples of quality control checklists and reports are instrumental in facilitating comprehension of documentation requirements and best practices. By providing real-world examples, learners gain practical insights into the documentation processes integral to maintaining quality standards.
- **Role-Playing Scenarios:** Engaging in role-playing scenarios immerses learners in simulated real-world material handling situations. These scenarios are designed to replicate the challenges and complexities that can arise during material handling tasks. They encourage problem-solving and the development of critical decision-making skills, empowering participants to navigate unexpected challenges effectively.
- **Progress Assessment:** Continuous assessment through quizzes, practical evaluations, and observation is essential for tracking and enhancing learners' progress. Regular assessments not only gauge knowledge retention but also provide insights into areas requiring improvement, ensuring that participants are well-prepared and competent.

- **Feedback and Improvement:** Constructive feedback is a cornerstone of skill development. It provides learners with valuable insights into their material handling skills and overall competence. By acknowledging areas for improvement and offering guidance, we empower individuals to continually enhance their abilities.
- **Safety Practice Evaluation:** Evaluating safety practices during material handling tasks is pivotal. This evaluation not only identifies areas for improvement but also underscores the paramount importance of safety throughout the entire material handling process. It ensures that safety remains a constant and unwavering focus.
- **Documentation Importance:** The importance of proper documentation cannot be overstated. This encompasses the meticulous maintenance of inventory records, inspection reports, and material tracking records. These documents serve as a critical record of materials' journey through the fabrication process, aiding in organization, accountability, and quality control.
- **Policy Awareness:** Ensuring that all participants are well-informed and fully comprehend organizational policies and procedures pertaining to material handling, storage, and quality control is essential. This awareness lays the foundation for consistency, compliance, and adherence to established protocols.
- **Mock Scenarios and Case Studies:** Engagement in mock scenarios and case studies is an invaluable learning tool. These scenarios place learners in hypothetical yet realistic material handling and warehouse management situations. They serve as a testing ground for problem-solving abilities, critical thinking skills, and the application of acquired knowledge in practical settings.

Activity -1

- **Name:** "Material Handling and Inspection Challenge"
- **Purpose:** The purpose of this practical activity is to assess and enhance participants' skills in locating, inspecting, and safely handling materials within a warehouse or storing yard for subsequent steel fabrication processes. This activity aims to ensure that participants can effectively identify suitable sections, verify their quality, and transport them to the fabrication area adhering to safety and organizational standards.
- **Resources Required:**
    - Various steel sections and components
    - Warehouse or storing yard space
    - Identity marks and heat numbers on steel sections
    - Inspection checklists and reports
    - Quality inspection equipment (e.g., calipers, measuring tools)
    - Safety equipment (PPE, barriers, lifting equipment)
    - Timer or clock

- **Tentative Duration:** 60-90 minutes
- **Procedure:**

i. Introduction (10 minutes):

a. The trainer provides an overview of the Material Handling and Inspection Challenge, explaining its objectives and relevance to steel fabrication processes.

ii. Locate Appropriate Sections (15 minutes):

a. Participants are given a list of specific steel section requirements based on sizes, dimensions, and design specifications.

b. They must locate the designated sections within the warehouse or storing yard and place markers to identify them.

iii. Inspect Identity Marks (10 minutes):

a. Participants check the identity marks and heat numbers on the located steel sections to ensure they align with organizational norms and standards.

b. They use provided checklists and inspection tools to verify the markings' accuracy.

iv. Quality Inspection Confirmation (10 minutes):

a. Participants are given a list of materials and components.

b. They must confirm that each item has undergone a quality inspection by the quality department, using inspection reports as reference.

v. Physical Damage Assessment (10 minutes):

a. Participants inspect the located sections for any physical damage, such as distortion, bending, cracks, or other defects.

b. They document any issues identified using provided inspection forms.

vi. Material Handling (15 minutes):

a. Participants are required to safely load, shift, and unload the identified sections following standard material handling practices.

b. They must adhere to safety protocols and wear appropriate PPE throughout the process.

vii. Report and Discussion (10 minutes):

a. Participants review their findings and discuss any challenges faced during the activity.

b. The trainer leads a group discussion on the importance of accurate material handling and inspection.

Expected Outcome:

- Participants will demonstrate improved skills in locating materials based on size, dimensions, and design specifications.
- They will accurately verify identity marks and heat numbers on steel sections in compliance with organizational norms.

- Participants will confirm that quality inspections have been conducted on the required materials.
- They will effectively identify and document physical damage or defects in fabrication materials.
- Participants will showcase safe and proficient material handling practices following standard procedures.
- The activity will promote awareness of the critical role of precise material handling and inspection in steel fabrication processes.

Activity -2

- **Name:** "Steel Material Sorting Challenge"
- **Purpose:** The purpose of this practical activity is to develop participants' skills in efficiently sorting and categorizing steel materials based on their characteristics and suitability for various fabrication processes. This hands-on exercise aims to enhance their ability to make informed decisions regarding material selection and allocation.
- **Resources Required**:
  - Assorted steel materials (sheets, beams, pipes, etc.)
  - Warehouse or large workspace
  - Sorting tables or designated sorting areas
  - Identification labels or tags
  - Timer or clock
  - Safety equipment (PPE)
- **Tentative Duration:** 60-90 minutes
- **Procedure:**

i. Introduction (10 minutes):

a. The trainer introduces the Steel Material Sorting Challenge, explaining its objectives and relevance to steel fabrication operations.

ii. Material Characteristics Overview (15 minutes):

a. Participants are provided with an overview of various steel material characteristics, including size, thickness, shape, and quality standards.

b. They learn about the specific requirements for different fabrication processes.

iii. Sorting Criteria Assignment (10 minutes):

a. Participants are divided into teams, and each team is assigned a specific fabrication

process (e.g., welding, cutting, bending).

b. Each team is provided with a list of sorting criteria, such as size, thickness, and quality standards, relevant to their assigned process.

iv. Material Sorting Challenge (25 minutes):

a. Teams are presented with a selection of assorted steel materials in the warehouse.

b. They must sort the materials into designated categories based on the assigned sorting criteria.

c. Participants can use identification labels or tags to mark each sorted category.

v. Time-Limited Sorting (15 minutes):

a. A timer is set for a specific duration (e.g., 15 minutes).

b. Teams must complete the sorting challenge within the allotted time, simulating a real-world scenario with time constraints.

vi. Quality Check (10 minutes):

a. After sorting, teams conduct a quick quality check on the materials in their assigned categories.

b. They identify any materials that do not meet the quality standards and separate them.

vii. Discussion and Evaluation (15 minutes):

a. Teams present their sorted categories and explain the reasoning behind their choices based on the assigned sorting criteria.

b. The trainer evaluates their decisions and provides feedback.

viii. Debrief and Reflection (10 minutes):

a. The trainer leads a debriefing session in which participants discuss the challenges faced, lessons learned, and strategies for improvement.

b. Participants reflect on the importance of accurate sorting for efficient fabrication processes.

Expected Outcome:

- Participants will develop practical skills in sorting steel materials based on specific criteria relevant to various fabrication processes.
- They will enhance their decision-making abilities regarding material selection and allocation.
- Teams will gain experience in working collaboratively and efficiently under time constraints.
- Participants will recognize the critical role of precise material sorting in streamlining steel fabrication operations and ensuring quality outcomes.

Notes

UNIT 3.3: Surface Cleaning and Preparation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Inspect the surface of the materials/sections to determine the types of impurities present.
2. Obtain approval for employing different methods of surface cleaning from the concerned authority.
3. Estimate the quantities of the materials required for the surface cleaning purpose.
4. Initiate indent procedures for the required cleaning materials as per organizational norms.
5. Ensure appropriate surface cleaning procedures like heating, chemical cleaning, scrubbing, water jet, abrasion, etc., are adopted as per the requirements/instructions.
6. Confirm the compliance of the prepared clean surface with technical details or instructions.

Resources to be used

- **Theory**
  - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
  - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Develop or compile training materials that cover the various aspects of surface cleaning and inspection.
- Include visual aids, diagrams, and real-life examples to facilitate understanding.
- Administer a pre-training assessment to gauge participants' existing knowledge of surface cleaning and inspection.
- Use the assessment results to tailor the training to participants' needs.
- Present a thorough explanation of surface inspection techniques, including visual inspection, non-destructive testing methods, and impurity identification.

- Use practical examples and case studies to illustrate different types of impurities commonly encountered in steel materials.
- Explain the importance of obtaining approvals for employing different methods of surface cleaning from the relevant authority.
- Provide information on the regulatory requirements and procedures for obtaining such approvals.
- Teach participants how to estimate the quantities of materials required for surface cleaning based on project specifications and surface area calculations.
- Conduct exercises that involve estimating material quantities for cleaning scenarios.
- Explain the organizational norms and protocols for initiating indent procedures to acquire cleaning materials.
- Provide guidance on documentation and approval processes involved in material procurement.
- Demonstrate various surface cleaning methods such as heating, chemical cleaning, scrubbing, water jet, abrasion, and more.
- Describe the situations where each method is appropriate and the precautions to be taken.
- Organize hands-on sessions where participants can practice surface cleaning techniques using mock materials and equipment.
- Supervise and provide feedback during these practical exercises to ensure proper skill development.
- Emphasize the importance of confirming the compliance of the prepared clean surface with technical details or instructions.
- Explain how to document and report on compliance and any deviations.
- Administer a post-training assessment to evaluate participants' understanding of surface cleaning and inspection concepts.
- Assess their ability to apply the learned techniques and procedures.
- Review the post-training assessment results and provide individual or group feedback.
- Offer remediation for areas where participants may require additional support or clarification.
- Encourage participants to stay updated with the latest developments in surface cleaning technology and inspection methods.
- Provide recommendations for additional resources and training opportunities for ongoing professional development.
- Periodically evaluate the effectiveness of the training program by seeking feedback from participants and assessing their performance in real-world scenarios.
- Make necessary adjustments to the training materials and methods based on feedback and outcomes.

Notes for facilitation

- Use the Fabricator PHB and refer unit 3.3 to explain Surface Cleaning and Preparation.
- **Training Material Development:** The training begins with the development or compilation of comprehensive training materials covering various aspects of surface cleaning and inspection. These materials serve as the foundation for the entire training program, ensuring that participants have access to well-structured content.
- **Visual Aids and Real-Life Examples:** To enhance comprehension, visual aids, diagrams, and real-life examples are incorporated into the training materials. These elements make complex concepts more accessible and relatable to participants, facilitating a deeper understanding of surface cleaning and inspection principles.
- **Pre-Training Assessment:** Before the training commences, a pre-training assessment is conducted to gauge participants' existing knowledge in surface cleaning and inspection. This assessment helps trainers identify knowledge gaps and tailor the training content to meet the specific needs of participants.
- **Customizing Training:** Using the results of the pre-training assessment, the training is customized to address the unique requirements and knowledge levels of participants. This ensures that the training effectively meets individual learning objectives.
- **Surface Inspection Techniques:** Participants are guided through an in-depth explanation of various surface inspection techniques, including visual inspection, non-destructive testing methods, and impurity identification. This comprehensive coverage equips them with a broad skill set for surface assessment.
- **Practical Illustrations:** To reinforce learning, practical examples and case studies are integrated into the training. These real-life scenarios help participants recognize and differentiate different types of impurities commonly encountered in steel materials, enhancing their ability to identify and address such issues.
- **Regulatory Approvals:** The importance of obtaining approvals for employing different surface cleaning methods is emphasized. Participants learn about the regulatory requirements and procedures necessary for obtaining approvals from relevant authorities, ensuring compliance with industry standards.
- **Quantity Estimation:** Training includes teaching participants how to estimate the quantities of materials required for surface cleaning, taking into account project specifications and surface area calculations. Practical exercises in quantity estimation for cleaning scenarios enhance their proficiency.
- **Indent Procedures Guidance:** Participants are guided through organizational norms and protocols for initiating indent procedures to acquire cleaning materials. This includes detailed explanations of documentation and approval processes involved in material procurement.
- **Surface Cleaning Methods Demonstration:** Various surface cleaning methods, such as heating,

chemical cleaning, scrubbing, water jet, and abrasion, are demonstrated. Participants learn when each method is appropriate and the precautions necessary for safe and effective implementation.

- **Hands-On Practice:** Hands-on sessions are organized to allow participants to practice surface cleaning techniques using mock materials and equipment. These practical exercises are closely supervised to ensure participants develop the necessary skills and confidence.
- **Compliance Confirmation:** The training emphasizes the importance of confirming the compliance of prepared clean surfaces with technical details or instructions. Participants are taught how to document and report on compliance and address any deviations effectively.
- **Post-Training Assessment:** After the training, a post-training assessment is administered to evaluate participants' understanding and application of surface cleaning and inspection concepts. Their ability to apply learned techniques and procedures is assessed.
- **Feedback and Remediation:** Based on the post-training assessment results, individual or group feedback is provided to participants. Areas where participants may require additional support or clarification are identified, and remediation strategies are offered.
- **Continuous Learning Promotion:** Participants are encouraged to stay updated with the latest developments in surface cleaning technology and inspection methods. Recommendations for additional resources and ongoing professional development opportunities are provided.
- **Training Program Evaluation:** The training program's effectiveness is periodically evaluated by seeking feedback from participants and assessing their performance in real-world scenarios. Adjustments to training materials and methods are made based on feedback and outcomes.

Activity

- **Name:** Surface Cleaning Techniques Evaluation
- **Purpose:** The purpose of this practical activity is to familiarize participants with various surface cleaning methods and their application. Participants will gain hands-on experience in inspecting the surface of materials for impurities, estimating material quantities, obtaining necessary approvals, initiating indent procedures, and ensuring compliance with technical instructions. The activity aims to enhance their practical skills and understanding of surface cleaning processes.
- **Resources Required:**
  - Assorted steel materials with surface impurities (real or simulated)
  - Surface cleaning equipment and materials (e.g., heat source, chemicals, scrubbing tools, water jet equipment, abrasive materials)
  - Mock approval forms and documentation
  - Quantity estimation worksheets

- Safety equipment (PPE)
- Timer or clock
- Training area with designated cleaning stations

- **Tentative Duration:** 90-120 minutes
- **Procedure:**

i. Introduction (10 minutes):

a. The trainer introduces the Surface Cleaning Techniques Evaluation activity, outlining its objectives and relevance to surface cleaning and inspection processes.

ii. Impurity Identification (15 minutes):

a. Participants are presented with a variety of steel materials, some of which have surface impurities (real or simulated).

b. They are instructed to inspect the surfaces and identify the types of impurities present, such as rust, oil, or paint.

iii. Approval Process (10 minutes):

a. Mock approval forms are provided, simulating the process of obtaining approval for employing different surface cleaning methods.

b. Participants complete the approval forms based on the identified impurities and chosen cleaning methods.

iv. Quantity Estimation Exercise (15 minutes):

a. Participants are given quantity estimation worksheets and are asked to estimate the quantities of cleaning materials required for the assigned cleaning methods.

b. They consider factors like surface area, type of impurities, and cleaning method effectiveness.

v. Indent Procedures Simulation (10 minutes):

a. Participants initiate indent procedures for the required cleaning materials following organizational norms.

b. They complete the necessary documentation, including indent requests and approvals.

vi. Surface Cleaning Stations (30 minutes):

a. The training area is set up with designated cleaning stations, each equipped with the necessary cleaning materials and equipment for different cleaning methods (e.g., heating, chemical cleaning, scrubbing, water jet, abrasion).

b. Participants rotate through the stations, practicing the chosen cleaning methods on

materials with identified impurities.

vii. Compliance Verification (15 minutes):

a. After cleaning, participants confirm the compliance of the prepared clean surfaces with technical details or instructions.

b. They document their findings and ensure they have met the specified cleaning requirements.

viii. Discussion and Debrief (15 minutes):

a. Participants gather for a group discussion to share their experiences and challenges encountered during the activity.

b. The trainer leads a debriefing session, emphasizing key takeaways and lessons learned.

Expected Outcome:

- Participants will develop practical skills in identifying surface impurities and selecting appropriate surface cleaning methods.
- They will understand the approval process for employing different cleaning methods and be able to complete approval forms.
- Participants will gain proficiency in estimating the quantities of cleaning materials required based on specific cleaning scenarios.
- They will become familiar with organizational indent procedures for material procurement.
- The activity will enhance participants' ability to apply surface cleaning techniques effectively, ensuring compliance with technical instructions.
- Participants will gain hands-on experience in surface cleaning and verification, promoting their understanding of the importance of clean surfaces in fabrication processes.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1. The primary purpose of reading and interpreting blueprints in steel fabrication is to understand and translate the design and technical specifications into practical steps and actions for the fabrication process.
2. Confirming the compliance of a clean surface with technical details or instructions is important to ensure that the cleaned surface meets the required quality, safety, and performance standards.
3. Typical methods used for identifying different steel components in fabrication include visual inspection, measurement, reference to blueprint specifications, and sometimes the use of identification marks or labels.
4. It is essential to locate appropriate sections in the storing yard based on size and design to streamline further processing and ensure that the right materials are used for specific fabrication tasks.
5. The role of quality inspection in the fabrication process is to assess the quality, integrity, and compliance of materials and workmanship with specified standards, ensuring that the final product meets the required quality criteria.

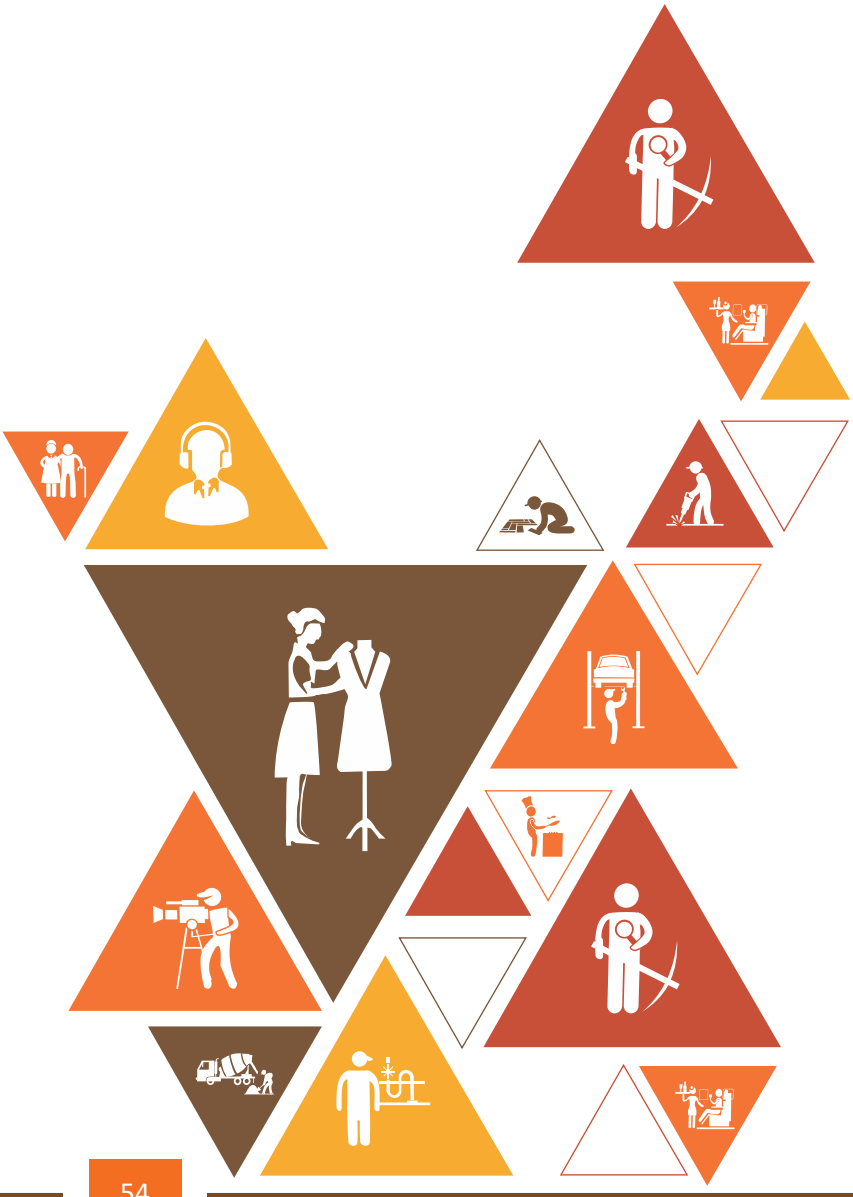
Fill-in-the-Blanks:

1. Identifying different components in steel fabrication is crucial for aligning the work with design requirements.
2. Surface cleaning procedures may include heating, chemical cleaning, scrubbing, water jetting, or abrasion.
3. The compliance of a prepared clean surface with technical details ensures adherence to project specifications.
4. To estimate the quantities of materials required for surface cleaning, fabricators must consider project requirements.
5. Initiation of indent procedures is essential to procure necessary cleaning materials for cleaning.

True/False Questions:

1. **False:** Identifying steel components in fabrication is necessary to ensure that the materials are used correctly and in the right locations, even if they are standardized.
2. **False:** Quality inspection is required not only for the final product but also for raw materials and throughout the fabrication process to maintain quality standards.
3. **False:** Surface cleaning methods like heating and chemical cleaning often require approval to ensure safety, quality, and compliance with regulations.
4. **False:** Estimating cleaning material quantities may require ongoing monitoring and adjustments based on changing project needs.
5. **False:** Compliance with technical details is essential for both aesthetic and structural purposes, ensuring the overall quality and performance of the fabricated structure.

Notes



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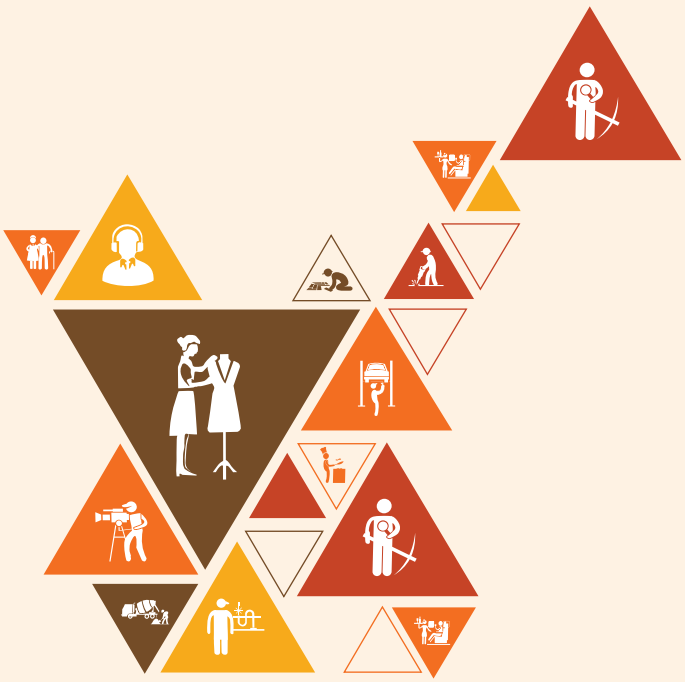
4. Conduct Joint Preparation, Connection Activities and Repair Work in Fabricated Assemblies

Unit 4.1 - Fabrication Fundamentals

Unit 4.2 - Fabrication Bed and Equipment Preparation

Unit 4.3 - Quality Control and Repair



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Key Learning Outcomes

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain common terminologies, drawings, and symbols relevant to fabrication work.
2. Explain requirements for preparation of fabrication bed/platform.
3. Demonstrate clamping and anchoring of the sections/work piece to the platform/bed as per standard practices.
4. Describe the parts and components of welding equipment and their functions.
5. Explain welding and bolting methods and their applications.
6. Explain the different welding parameters and their correlations.
7. Explain positions and patterns of welding.
8. Describe consumables used in welding, their selection, and storage.
9. Explain the concept of customisation of jigs and fixtures.
10. Discuss the procedures involved in edge/joint preparation during the fabrication of a steel structure.
11. Interpret fabrication blueprints/shop drawings and specifications for details required for edge/joint preparation.
12. Explain the concept of root gaps and how to include them in measurement.
13. Explain the concept of shrinkage of material and adjusting shrinkage into measurement.
14. Explain the various types of defects arising in the components of various shapes and sizes, their causes, and effects.
15. Explain the various methods for rectification of various defects along with the sequence of each activity.
16. Explain the use of various tools, equipment, and consumables required for repair work and their basic maintenance.
17. Prepare a sample estimate of the quantities of consumables, tools, and equipment required for edge/joint preparation.
18. Demonstrate the methods to measure and mark the sections for edge preparation as per provided technical details and standard procedures.
19. Demonstrate the process of edge preparation of a work piece/section as per requirements.
20. Demonstrate welding/bolting method to connect two components/assemblies as per drawings and specifications.
21. Inspect the proposed component/assemblies for distortions, change in dimensions, or other defects.
22. Prepare an estimate of the time, materials, tools, manpower required for repair work of a given component/assemblies.
23. Demonstrate the application of corrective operations like grinding, welding, heating, jacking, etc., to repair given defective component/assemblies.

UNIT 4.1: Fabrication Fundamentals

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain common terminologies, drawings, and symbols relevant to fabrication work.
2. Describe the parts and components of welding equipment and their functions.
3. Explain welding and bolting methods and their applications.
4. Explain the different welding parameters and their correlations.
5. Explain positions and patterns of welding.
6. Describe consumables used in welding, their selection, and storage.
7. Explain the concept of customisation of jigs and fixtures.
8. Discuss the procedures involved in edge/joint preparation during the fabrication of a steel structure.
9. Interpret fabrication blueprints/shop drawings and specifications for details required for edge/joint preparation.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
    - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Prepare a comprehensive glossary of common terminologies, drawings, and symbols relevant to fabrication work. Distribute this glossary to participants before the training to help them familiarize themselves with essential terms.
- Provide a detailed description of the parts and components of welding equipment and their functions. Use visual aids and actual equipment for a hands-on understanding.
- Explain welding and bolting methods, including their applications and when to use each method. Use real-world examples to illustrate their practical usage in fabrication.

- Teach participants about the different welding parameters, such as voltage, current, and travel speed, and how they correlate to welding quality and effectiveness. Conduct practical demonstrations if possible.
- Explain the various welding positions (e.g., flat, horizontal, vertical, overhead) and welding patterns (e.g., fillet welds, groove welds). Demonstrate how these positions and patterns are applied in fabrication work.
- Describe the consumables used in welding, including electrodes, filler metals, and shielding gases. Provide guidance on their selection based on project requirements and storage to maintain their integrity.
- Explain the concept of customizing jigs and fixtures for specific fabrication tasks. Showcase examples and discuss the advantages of tailored fixtures.
- Discuss the procedures involved in edge/joint preparation during the fabrication of a steel structure. Cover topics like bevelling, chamfering, and cleaning. Use practical demonstrations or videos to illustrate these processes.
- Guide participants in interpreting fabrication blueprints and shop drawings. Explain how to extract the necessary details required for edge/joint preparation, including weld symbols and dimensions.
- Organize practical exercises or workshops where participants can apply their knowledge of welding equipment, methods, and edge/joint preparation. Provide guidance and supervision during these hands-on sessions.
- Encourage participants to ask questions and engage in discussions to clarify any doubts or concerns related to fabrication concepts and techniques.
- Conduct assessments or quizzes to evaluate participants' understanding of the training material. Provide constructive feedback and address any areas of weakness.
- Compile a list of recommended books, websites, and other resources that participants can refer to for further self-study and skill enhancement in fabrication.
- Offer ongoing support and assistance to participants as they apply their newly acquired knowledge and skills in their fabrication work.
- Periodically evaluate the effectiveness of the training program by seeking feedback from participants and monitoring their performance in real-world fabrication tasks. Make necessary adjustments to the training materials and methods based on feedback and outcomes.

Notes for facilitation

- Use the Fabricator PHB and refer unit 4.1 to explain Fabrication Fundamentals.
- **Comprehensive Glossary of Fabrication Terminologies:** Prepare a comprehensive glossary of common terminologies, drawings, and symbols relevant to fabrication work. This resource is

distributed to participants before the training to familiarize them with essential terms, ensuring a strong foundation in fabrication language and concepts.

- **Welding Equipment Components and Functions:** Provide a detailed description of the parts and components of welding equipment and their functions. Utilize visual aids and actual equipment to offer participants a hands-on understanding, allowing them to identify and operate welding machinery effectively.
- **Welding and Bolting Methods Exploration:** Explore welding and bolting methods, explaining their applications and when to use each technique. Use real-world examples to illustrate how these methods are practically applied in various fabrication scenarios, enhancing participants' decision-making skills.
- **Understanding Welding Parameters:** Teach participants about different welding parameters, including voltage, current, and travel speed, and their direct correlations with welding quality and effectiveness. Whenever possible, conduct practical demonstrations to provide a tangible understanding of parameter adjustments.
- **Welding Positions and Patterns Demystified:** Demystify welding positions (e.g., flat, horizontal, vertical, overhead) and welding patterns (e.g., fillet welds, groove welds). Demonstrate how these positions and patterns are employed in real-world fabrication work, aiding participants in becoming proficient welders.
- **Consumables in Welding:** Describe the consumables used in welding, such as electrodes, filler metals, and shielding gases. Offer guidance on selecting these consumables based on project requirements and provide insights into proper storage practices to maintain their integrity.
- **Customization of Jigs and Fixtures:** Explain the concept of customizing jigs and fixtures for specific fabrication tasks. Showcase practical examples and discuss the advantages of tailored fixtures in improving efficiency, accuracy, and safety in the fabrication process.
- **Edge/Joint Preparation Procedures:** Discuss the procedures involved in edge/joint preparation during the fabrication of steel structures. Cover critical aspects like bevelling, chamfering, and cleaning. Utilize practical demonstrations or instructional videos to visually illustrate these processes for enhanced comprehension.
- **Interpreting Fabrication Blueprints:** Guide participants in interpreting fabrication blueprints and shop drawings, emphasizing how to extract essential details necessary for edge/joint preparation. This skill is crucial for ensuring that fabrication work aligns with design specifications.
- **Hands-On Practical Exercises:** Organize practical exercises or workshops where participants can apply their knowledge of welding equipment, methods, and edge/joint preparation. Provide hands-on experience, guidance, and supervision to reinforce their skills and confidence.
- **Interactive Discussions and Q&A:** Encourage participants to actively engage in discussions and ask questions to clarify doubts and concerns related to fabrication concepts and techniques. Foster a collaborative learning environment to address individual queries effectively.

- **Assessment and Feedback Mechanism:** Implement assessments or quizzes to evaluate participants' comprehension of the training material. Provide constructive feedback and address any areas of weakness, ensuring that participants continually improve their skills and knowledge.
- **Resource Compilation for Further Learning:** Compile a list of recommended books, websites, and other resources that participants can refer to for self-study and skill enhancement in fabrication, fostering continuous learning beyond the training program.
- **Ongoing Support and Application:** Offer ongoing support and assistance to participants as they apply their newly acquired knowledge and skills in real fabrication work, ensuring a smooth transition to practical applications.
- **Continuous Program Evaluation:** Periodically assess the effectiveness of the training program by seeking feedback from participants and monitoring their performance in real-world fabrication tasks. Make necessary adjustments to training materials and methods based on feedback and outcomes, ensuring the program remains relevant and impactful.

Activity

- **Name:** "Welding Equipment Hands-On Demonstration"
- **Purpose:** To provide participants with a practical understanding of the parts and components of welding equipment and their functions.
- **Resources Required:**
  - Various welding equipment (welding machine, welding helmet, electrodes, welding clamps, etc.)
  - Safety gear (protective eyewear, gloves, welding aprons)
  - Welding materials (metal sheets, electrodes, filler metals)
  - Visual aids (diagrams or posters of welding equipment components)
- **Tentative Duration:** 1-2 hours
- **Procedure:**

i. Introduction (10 minutes):

a. Begin with a brief introduction to the importance of understanding welding equipment in fabrication work.

b. Explain that the purpose of this activity is to gain hands-on experience with welding equipment components.

ii. Safety Instructions (5 minutes):

a. Emphasize the importance of safety when handling welding equipment.

b. Instruct participants on the proper use of safety gear and the importance of a well-ventilated workspace.

iii. Components Overview (20 minutes):

a. Display visual aids or diagrams showing the various components of welding equipment, such as the welding machine, electrode holder, ground clamp, and welding helmet.

b. Explain the function of each component, highlighting their roles in the welding process.

c. Encourage participants to ask questions for clarification.

iv. Demonstration (30 minutes):

a. Conduct a live demonstration of setting up and using welding equipment.

b. Show how to connect the welding machine to the power source, attach the electrode holder and ground clamp, and adjust welding parameters (voltage, current, etc.).

c. Weld a sample joint or seam on a metal sheet to illustrate the welding process.

d. Explain the significance of proper electrode selection and storage.

v. Hands-On Practice (30 minutes):

a. Divide participants into small groups, providing each group with their welding equipment setup.

b. Instruct participants to replicate the setup and practice welding on metal sheets under supervision.

c. Rotate participants within groups to ensure everyone gets a chance to practice.

d. Provide guidance and address questions during the practice session.

vi. Discussion and Q&A (15 minutes):

a. Gather participants for a group discussion on their experiences during the hands-on practice.

b. Encourage them to share their observations, challenges, and lessons learned.

c. Open the floor for questions and answers regarding welding equipment.

Expected Outcome:

- Participants will have a practical understanding of welding equipment components, their functions, and the basics of setting up and using welding equipment. They will also gain hands-on experience in handling welding equipment safely and effectively, setting a strong foundation for future welding activities in fabrication work.

Notes

UNIT 4.2: Fabrication Bed and Equipment Preparation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain requirements for preparation of fabrication bed/platform.
2. Demonstrate clamping and anchoring of the sections/work piece to the platform/bed as per standard practices.
3. Prepare a sample estimate of the quantities of consumables, tools, and equipment required for edge/joint preparation.
4. Demonstrate the methods to measure and mark the sections for edge preparation as per provided technical details and standard procedures.
5. Demonstrate the process of edge preparation of a work piece/section as per requirements.
6. Demonstrate welding/bolting method to connect two components/assemblies as per drawings and specifications.
7. Inspect the proposed component/assemblies for distortions, change in dimensions, or other defects.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
    - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Explain the essential requirements for preparing a fabrication bed or platform. Cover topics like cleanliness, levelness, and stability of the bed. Discuss how these factors contribute to successful fabrication.
- Demonstrate the correct clamping and anchoring techniques for securing sections or workpieces to the fabrication bed. Highlight standard practices and the importance of stability during fabrication.

- Provide a practical exercise where participants can prepare a sample estimate of the quantities of consumables, tools, and equipment required for edge/joint preparation. Discuss factors that affect these estimates, such as project scope and specifications.
- Demonstrate various methods for measuring and marking sections accurately for edge preparation. Emphasize the use of technical details and standard procedures to ensure precision.
- Walk participants through the process of edge preparation for a workpiece or section. Show the steps involved, such as bevelling, chamfering, or cleaning, and explain the significance of each step.
- Demonstrate welding and bolting methods for connecting two components or assemblies as per provided drawings and specifications. Ensure participants understand the proper techniques and safety precautions.
- Explain the procedure for inspecting proposed components or assemblies for distortions, changes in dimensions, or other defects. Emphasize the importance of quality control in fabrication work.
- Organize hands-on sessions where participants can practice clamping, anchoring, edge preparation, and connection methods on actual sections or workpieces.
- Supervise and provide guidance during practical exercises to ensure participants develop the required skills.
- Emphasize safety protocols throughout the training, particularly when using tools and equipment. Ensure participants are aware of and follow safety guidelines.
- Teach participants how to document and report their work, including measurements, marking, defects, and welding/bolting records. Emphasize the importance of clear and accurate documentation.
- Encourage participants to ask questions and engage in discussions to clarify doubts and concerns related to fabrication bed preparation and edge/joint preparation techniques.
- Conduct assessments or practical exams to evaluate participants' understanding and skills in fabrication bed and edge preparation. Provide constructive feedback and address any areas of weakness.
- Compile a list of recommended books, websites, and other resources that participants can refer to for further self-study and skill enhancement in fabrication techniques.
- Offer ongoing support and assistance to participants as they apply their knowledge and skills in real fabrication projects.
- Periodically assess the effectiveness of the training program by seeking feedback from participants and monitoring their performance in real-world fabrication tasks. Make necessary adjustments to the training materials and methods based on feedback and outcomes.

Notes for facilitation

- Use the Fabricator PHB and refer unit 4.2 to explain Fabrication Bed and Equipment Preparation.
- **Essential Requirements for Fabrication Bed Preparation:** Participants will learn the critical factors involved in preparing a fabrication bed or platform. Topics covered include cleanliness, levelness, and stability of the bed, and how these elements contribute to successful fabrication projects.
- **Clamping and Anchoring Techniques:** This segment demonstrates the correct methods for securing sections or workpieces to the fabrication bed. Emphasis is placed on standard practices and the significance of stability during fabrication to ensure precision and safety.
- **Sample Estimate Preparation:** Participants engage in a practical exercise to estimate the quantities of consumables, tools, and equipment needed for edge/joint preparation. Discussions cover factors affecting estimates, including project scope and specifications.
- **Measuring and Marking Methods:** Various techniques for precise measurement and marking of sections for edge preparation are explained. The use of technical details and standard procedures to maintain accuracy is highlighted.
- **Edge Preparation Process:** Participants are guided through the step-by-step process of edge preparation, encompassing activities like bevelling, chamfering, and cleaning. The importance of each step in achieving quality fabrication is emphasized.
- **Welding and Bolting Methods:** This section demonstrates welding and bolting techniques to connect components or assemblies as per provided drawings and specifications. Safety precautions and proper techniques are underscored.
- **Quality Control and Inspection:** The procedure for inspecting proposed components or assemblies for distortions, dimensional changes, or defects is explained. The role of quality control in ensuring the integrity of fabrication work is discussed.
- **Hands-On Practical Sessions:** Participants engage in hands-on sessions where they practice clamping, anchoring, edge preparation, and connection methods on actual workpieces. Supervision and guidance are provided for skill development.
- **Safety Protocols:** Safety measures are reinforced throughout the training, especially when handling tools and equipment. Participants are educated on safety guidelines and encouraged to adhere to them.
- **Documentation and Reporting:** The importance of documenting work, including measurements, marking, defects, and welding/bolting records, is stressed. Clear and accurate documentation is discussed as a critical aspect of the fabrication process.
- **Interactive Learning:** Participants are encouraged to ask questions and engage in discussions to clarify doubts and concerns related to fabrication bed and edge/joint preparation techniques.
- **Assessments and Feedback:** Participants undergo assessments or practical exams to evaluate their understanding and skills in fabrication bed and edge preparation. Constructive feedback is provided, and areas needing improvement are addressed.

- **Resource Compilation:** A list of recommended books, websites, and other resources is compiled to aid participants in further self-study and skill enhancement in fabrication techniques.
- **Ongoing Support:** Participants are assured of ongoing support and assistance as they apply their knowledge and skills to real-world fabrication projects.
- **Program Evaluation:** The training program's effectiveness is periodically assessed by gathering feedback from participants and monitoring their performance in actual fabrication tasks. Necessary adjustments to the training are made based on feedback and outcomes.

Activity

- **Name:** Edge Preparation Workshop
- **Purpose:** This practical workshop aims to provide participants with hands-on experience in various aspects of edge preparation for fabrication. Participants will learn essential skills related to preparing workpieces, measuring and marking, and connecting components.
- **Resources Required:**
  - Fabrication bed/platform
  - Workpieces or sections
  - Clamping and anchoring tools
  - Consumables, tools, and equipment
  - Technical details and standard procedures
  - Welding and bolting equipment
  - Inspection tools and gauges
  - Safety gear (PPE)
  - Training materials and diagrams
- **Tentative Duration:** 4-6 hours (can vary based on complexity)
- **Procedure**:

  i. **Fabrication Bed/Platform Preparation (30 minutes):**

  a. Begin with an overview of the requirements for preparing a fabrication bed/platform. Discuss cleanliness, levelness, and stability.

  b. Participants inspect and prepare the fabrication bed/platform under the trainer's guidance.

ii. **Clamping and Anchoring (30 minutes):**

a. Demonstrate correct clamping and anchoring techniques for securing sections/ workpieces to the fabrication bed. Emphasize standard practices and stability.

b. Participants practice clamping and anchoring on provided workpieces.

iii. **Estimating Consumables (30 minutes):**

a. Explain the importance of estimating consumables, tools, and equipment for edge/joint preparation.

b. Participants work in pairs to prepare a sample estimate based on provided scenarios.

iv. **Measuring and Marking (30 minutes):**

a. Demonstrate methods for precise measurement and marking of sections for edge preparation. Use technical details and standard procedures.

b. Participants practice measuring and marking on workpieces.

v. **Edge Preparation Process (1-2 hours):**

a. Walk participants through the step-by-step process of edge preparation, including bevelling, chamfering, and cleaning.

b. Participants perform edge preparation on workpieces under supervision.

vi. **Welding/Bolting (1 hour):**

a. Demonstrate welding and bolting methods to connect two components/assemblies as per provided drawings and specifications.

b. Participants practice welding or bolting as directed.

vii. **Inspection and Quality Control (30 minutes):**

a. Explain the procedure for inspecting proposed components/assemblies for distortions, dimensional changes, or defects.

b. Participants inspect their workpieces and report findings.

viii. **Review and Discussion (30 minutes):**

a. Review the workshop's key concepts and address questions or concerns from participants.

b. Discuss the importance of safety and documentation in fabrication work.

- **Expected Outcome:** Participants will gain practical experience in fabrication bed/platform preparation, clamping and anchoring techniques, estimating consumables, measuring and marking, edge preparation, welding/bolting methods, and quality control. They will be better equipped to perform these tasks in real-world fabrication projects with precision and safety.

Notes

UNIT 4.3: Quality Control and Repair

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain the concept of root gaps and how to include them in measurement.
2. Explain the concept of shrinkage of material and adjusting shrinkage into measurement.
3. Explain the various types of defects arising in the components of various shapes and sizes, their causes, and effects.
4. Explain the various methods for rectification of various defects along with the sequence of each activity.
5. Explain the use of various tools, equipment, and consumables required for repair work and their basic maintenance.
6. Prepare an estimate of the time, materials, tools, manpower required for repair work of a given component/assemblies.
7. Demonstrate the application of corrective operations like grinding, welding, heating, jacking, etc., to repair given defective component/assemblies.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- **Practical**
    - Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags.

Do

- Begin by explaining the concept of root gaps in welding and fabrication. Discuss their significance in ensuring weld quality.
- Use diagrams and examples to illustrate how to measure and include root gaps accurately.
- Explain the concept of material shrinkage during welding or heating processes. Discuss why it's essential to account for shrinkage in measurements.

- Provide practical examples and calculations to help participants understand the impact of shrinkage.
- Describe various types of defects that can occur in components of different shapes and sizes, such as cracks, porosity, distortion, etc.
- Explain the causes and effects of each defect, emphasizing their impact on structural integrity.
- Present various methods for rectifying defects in components, including grinding, welding, heating, jacking, and others.
- Discuss the sequence of activities for each method, ensuring participants understand the order of operations.
- Explain the use of various tools, equipment, and consumables required for repair work. Cover items like welding machines, grinders, jacks, and safety gear.
- Discuss basic maintenance practices for these tools and equipment to ensure longevity.
- Guide participants in preparing an estimate for repair work on a given component or assembly. Include time, materials, tools, and manpower.
- Provide a real or simulated scenario for estimation practice.
- Conduct a hands-on demonstration of corrective operations like grinding, welding, heating, and jacking.
- Allow participants to observe and, if possible, practice these repair techniques under supervision.
- Summarize the key concepts covered in the training, addressing any questions or concerns from participants.
- Encourage discussion on real-world repair challenges and solutions.

Notes for facilitation

- Use the Fabricator PHB and refer unit 4.3 to explain Quality Control and Repair.
- **Explaining Root Gaps:** Start by introducing the concept of root gaps in welding and fabrication. Stress their critical role in achieving high-quality welds. Use visual aids, diagrams, and practical examples to help participants grasp the importance of accurately measuring and including root gaps in welding processes.
- **Understanding Material Shrinkage:** Explain the phenomenon of material shrinkage that occurs during welding or heating processes. Emphasize why it's crucial to factor in shrinkage when taking measurements. Provide real-world scenarios and calculations to illustrate how shrinkage affects dimensions and fit.
- **Identifying Defects:** Describe the different types of defects that can manifest in components of varying shapes and sizes, such as cracks, porosity, and distortion. Clarify the root causes and consequences of each defect, underlining their potential impact on structural integrity.

- **Rectification Methods:** Present a range of methods for rectifying defects in components, including grinding, welding, heating, and jacking. Ensure participants understand the specific sequence of activities involved in each method, fostering clarity in implementing repair techniques.
- **Tools and Equipment:** Discuss the usage of various tools, equipment, and consumables required for repair work, such as welding machines, grinders, and safety gear. Highlight basic maintenance practices to prolong the lifespan of these tools and ensure safe operation.
- **Estimating Repair Work:** Guide participants in the process of creating a comprehensive estimate for repair work on a given component or assembly. Cover various aspects, including time, materials, tools, and required manpower. Provide practical scenarios for estimation practice.
- **Hands-On Demonstration:** Conduct practical demonstrations of corrective operations like grinding, welding, heating, and jacking. Allow participants to observe and, if feasible, practice these repair techniques under your supervision, fostering hands-on learning.
- **Review and Discussion:** Summarize the key concepts addressed during the training, addressing any questions or concerns participants may have. Encourage open discussion regarding real-world repair challenges and potential solutions, promoting knowledge exchange and problem-solving.
- **Expected Learning Outcome:** By the end of this training, participants will possess a comprehensive understanding of root gaps, material shrinkage, defect identification and rectification, tool usage, estimation of repair work, and hands-on repair techniques. They will be well-equipped to address defects and repair components effectively in fabrication projects.

Activity

- **Name:** "Welding and Repair Simulation"
- **Purpose:** This practical activity aims to provide hands-on experience in addressing common defects and performing repair work on a fabricated component. Participants will apply their knowledge of root gaps, material shrinkage, defect rectification methods, and tool usage.
- **Resources Required:**
  - Fabricated steel component with simulated defects
  - Welding equipment (welding machine, electrodes, safety gear)
  - Grinding equipment (grinder, safety gear)
  - Heating equipment (torch, safety gear)
  - Jacking equipment (hydraulic jack, safety gear)
  - Measuring tools (calipers, rulers)
  - Consumables (welding rods, grinding discs)

- Safety equipment (helmets, gloves, goggles)
- Repair documentation (instructions and specifications)

- **Tentative Duration:** 4 hours
- **Procedure:**

i. **Introduction (15 minutes):** Start with a brief overview of the practical activity's goals and safety precautions. Emphasize the importance of following safety guidelines throughout the exercise.

ii. **Component Inspection (30 minutes):** Participants examine the fabricated steel component, identifying simulated defects such as cracks, porosity, and distortion. Discuss the potential causes and effects of these defects.

iii. **Measurement and Root Gap Assessment (30 minutes):** Instruct participants to measure and document the dimensions of the defects. Explain how to calculate and incorporate root gaps into their repair plans.

iv. **Defect Rectification (1.5 hours):** Demonstrate corrective operations like grinding, welding, heating, and jacking. Allow participants to practice these techniques on the defective component under your supervision. Emphasize the correct sequence of activities for each method.

v. **Estimation Exercise (45 minutes):** Provide participants with a real or simulated scenario for estimating the time, materials, tools, and manpower required to repair the component. Encourage them to prepare detailed estimates based on their observations.

vi. **Documentation (15 minutes):** Discuss the importance of accurate documentation during repair work. Participants should record measurements, repair methods applied, and any deviations from the original specifications.

vii. **Review and Discussion (30 minutes):** Conclude the practical activity with a review session. Participants can share their experiences and challenges encountered during the repair process. Discuss best practices and lessons learned.

Expected Outcome:

By the end of this practical activity, participants will have gained practical skills in addressing defects and performing repair work on fabricated components. They will understand how to measure, assess root gaps, rectify defects, estimate repair requirements, and document their work effectively.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1. The primary purpose of interpreting fabrication blueprints and shop drawings in construction fabrication is to understand and communicate the specific requirements and dimensions of the fabricated components or structures.
2. Understanding common terminologies, drawings, and symbols in fabrication work is important to ensure clear communication, precise execution of tasks, and compliance with design and safety standards.
3. Key considerations when selecting consumables for welding in construction include the type of welding process, the material being welded, electrode or filler metal compatibility, and the desired weld properties.
4. Clamping and anchoring are essential when working on a fabrication bed/platform to secure and stabilize the workpiece, ensuring accuracy and safety during fabrication.
5. In welding, the significance of adjusting welding parameters lies in achieving the desired weld quality, including penetration, bead shape, and fusion, based on the specific welding process and material.

Fill-in-the-Blanks:

1. Level
2. Machine
3. Bolting
4. Customization
5. Materials

True/False Questions:

1. **False:** A CNC machine is primarily used for cutting and bending reinforcement bars on construction sites, but its use may vary depending on the specific project requirements.
2. **False:** The selection of accessories for a bending machine depends on factors beyond the diameter of the reinforcement bar, such as the shape of the bend and the machine's capabilities.
3. **True:** Workers should prioritize maintaining correct body posture while handling reinforcement bars to prevent injuries and strain.
4. **False:** The standard procedure for tagging and stacking reinforcement bars is essential for construction safety and quality, as it helps maintain organization and traceability.
5. **False:** Electrical safety measures are necessary when working with power tools on construction sites to prevent accidents and ensure worker safety.

Notes

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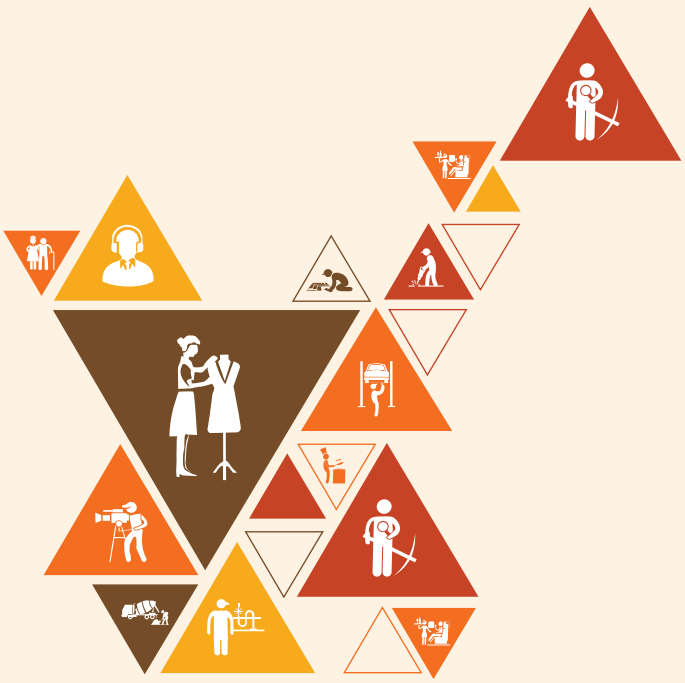
Construction Skill Development Council

5. Erect Structural Steel Assemblies at Construction Sites

Unit 5.1 - Rigging Plans and Safety Measures

Unit 5.2 - Erection Techniques and Alignment

Unit 5.3 - Connection and Communication



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Key Learning Outcomes

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain basic sketches / schematic working drawing relevant to rigging works.
2. Explain how to interpret lifting plans and schedules.
3. Describe the precautions and measures required in lifting and movement of heavy components and materials.
4. Install shoring, bracing and guying materials.
5. Demonstrate how to communicate efficiently to the signalman or operator for precise movement of assemblies.
6. Demonstrate how to place the steel assemblies/ components to its accurate location and adjustments as per erection requirement.
7. Explain applicable tolerance to respective erection job.
8. Explain sequence of erection works as per proposed work method statement.
9. Explain checks to be carried out to ensure readiness of base for erections.
10. Explain checks required for alignment and positioning of the erected elements.
11. Demonstrate how to do proper alignment of the erected steel assembly/ component.
12. Perform installation of temporary connections using appropriate tools.
13. Perform tightening of bolted connections to the specified tolerance and torque using appropriate torque wrench.

UNIT 5.1: Rigging Plans and Safety Measures

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain basic sketches/schematic working drawings relevant to rigging works.
2. Explain how to interpret lifting plans and schedules.
3. Describe the precautions and measures required in lifting and movement of heavy components and materials.
4. Install shoring, bracing, and guying materials.

Resources to be used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
    - Stud Wrenches, Open-End Wrenches, Crescent Wrenches, Hammer, Nibbler, pliers, Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Measuring tape, Plumb Bob, Spirit level, Chalks line, Try square, Water level, Tower crane, Mobile crane, Forklift, Scissor lift, Hydraulic jacks, Electric Wire Rope Hoist, Electrical winch, Electrical chain hoist, derrick, Lifting accessories, Belts, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, Safety Helmet , Safety goggles , Safety shoes, Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags

Do

- Create a set of basic sketches and schematic working drawings relevant to rigging works, including examples of rigging configurations and equipment placement.
- Explain the purpose and importance of lifting plans and schedules in rigging operations. Discuss how to read and interpret these documents, emphasizing safety considerations and load capacities.
- Describe the precautions and safety measures required when lifting and moving heavy components and materials, including topics like load calculations, center of gravity determination, rigging equipment inspection, and personnel safety.
- Demonstrate the proper installation of shoring, bracing, and guying materials for stabilizing structures or components during rigging operations.
- Use visual aids, diagrams, and practical examples to illustrate these concepts and techniques

effectively.

- Organize practical sessions or workshops where participants can practice reading sketches, interpreting lifting plans, and applying safety measures during rigging simulations.
- Provide hands-on training with rigging equipment and demonstrate the correct methods for installing shoring, bracing, and guying materials.
- Ensure that participants are aware of safety regulations and guidelines related to rigging work, emphasizing the importance of adherence to these standards.
- Conduct assessments or quizzes to evaluate participants' understanding of rigging sketches, lifting plans, safety measures, and installation techniques.
- Offer constructive feedback to help participants improve their skills and knowledge in rigging operations.
- Compile a list of recommended books, websites, and other resources that participants can refer to for further self-study and skill enhancement in rigging.
- Encourage participants to stay updated with the latest developments in rigging technology and safety practices through ongoing professional development.
- Periodically evaluate the effectiveness of the training program by seeking feedback from participants and assessing their performance in real-world rigging tasks. Make necessary adjustments to the training materials and methods based on feedback and outcomes.

Notes for facilitation

- Use the Fabricator PHB and refer unit 5.1 to explain Rigging Plans and Safety Measures.
- **Basic Sketches and Schematic Drawings:** These visual aids provide participants with a clear understanding of rigging configurations and equipment placement. Participants will learn to create and interpret these sketches, which are fundamental for effective rigging planning and execution.
- **Lifting Plans and Schedules:** Explaining the purpose and significance of lifting plans and schedules is crucial. Participants will grasp the importance of these documents in ensuring safety, managing loads, and adhering to schedules during rigging operations.
- **Safety Precautions in Lifting:** In-depth guidance on safety measures during heavy lifting and movement is essential. This topic covers load calculations, determining the center of gravity, rigging equipment inspection, and personnel safety, all of which contribute to accident prevention.
- **Installation of Stabilizing Materials:** Participants will learn how to correctly install shoring, bracing, and guying materials. These are essential for stabilizing structures or components during rigging operations, ensuring safety and preventing accidents.
- **Visual Aids and Practical Examples:** Effective training relies on visual aids, diagrams, and practical examples. These aids enhance participants' understanding of complex rigging concepts and

techniques.

- **Practical Workshops:** Practical sessions and workshops provide hands-on experience, allowing participants to apply their knowledge of sketches, lifting plans, and safety measures in simulated rigging scenarios.
- **Hands-On Training:** Practical demonstrations of rigging equipment and installation techniques are vital. Participants will gain firsthand experience in handling rigging equipment and ensuring its proper installation.
- **Safety Regulations and Guidelines:** Participants will be educated on safety regulations and guidelines specific to rigging work. Emphasizing compliance with these standards is crucial for preventing accidents.
- **Assessment and Feedback:** Assessments and quizzes will gauge participants' understanding of rigging concepts. Constructive feedback will help participants identify areas for improvement and enhance their rigging skills.
- **Resource Compilation:** Providing participants with a list of recommended resources, including books and websites, will support ongoing self-study and skill development in rigging.
- **Professional Development:** Encouraging participants to stay updated with the latest developments in rigging technology and safety practices through ongoing professional development ensures they remain knowledgeable and competent in rigging work.
- **Program Evaluation:** Regularly assessing the training program's effectiveness through participant feedback and real-world performance evaluations allows for necessary adjustments to enhance future training sessions.

Activity

- **Name:** " Rigging Simulation"
- **Purpose:** This activity aims to provide participants with hands-on experience in rigging operations, including interpreting drawings, understanding lifting plans, and applying safety precautions.
- **Resources Required**:
- Rigging equipment (dummy loads, ropes, slings, shackles, etc.)
  - Lifting plans and schedules
  - Sketches and schematic drawings
  - Shoring, bracing, and guying materials
  - Safety gear (hard hats, gloves, safety glasses, etc.)
  - Instructor or facilitator

- **Tentative Duration:** Half a day (4 hours)
- **Procedure:**

  I. **Introduction (30 minutes):** The instructor provides a brief overview of the activity, emphasizing its purpose in reinforcing theoretical knowledge.

  II. **Equipment Familiarization (30 minutes):** Participants are introduced to rigging equipment, including slings, shackles, and ropes. They learn how to inspect and handle these tools safely.

  III. **Interpreting Drawings (30 minutes):** Participants review basic sketches and schematic working drawings relevant to rigging operations. The instructor explains key elements and symbols.

  IV. **Understanding Lifting Plans (45 minutes):** Participants are given lifting plans and schedules. They work in pairs or small groups to interpret the documents, identifying key information such as load capacities, rigging configurations, and safety measures.

  V. **Safety Precautions (45 minutes):** The instructor discusses safety precautions and measures required when lifting and moving heavy components and materials. This includes load calculations, center of gravity determination, and equipment inspection.

  VI. **Practical Rigging (1.5 hours):** Participants engage in rigging simulations. They select appropriate equipment, configure rigging setups based on drawings and lifting plans, and execute a series of lifting and movement tasks.

  VII. **Installation of Stabilizing Materials (30 minutes):** Participants practice the correct installation of shoring, bracing, and guying materials on simulated structures or components.

  VIII. **Safety Review (15 minutes):** The instructor conducts a safety review, emphasizing lessons learned during the practical rigging exercise.

  IX. **Discussion and Q&A (30 minutes):** Participants share their experiences, ask questions, and discuss challenges encountered during the activity.

Expected Outcome:

- Participants gain practical experience in rigging operations, including the ability to interpret drawings and lifting plans, apply safety precautions, and install stabilizing materials. This hands-on activity reinforces theoretical knowledge and prepares participants for real-world rigging tasks.

Notes

UNIT 5.2: Features of Reinforcement and Interpretation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Discuss various features of One-way slab and Two-way Slab.
2. Interpret drawings, sketches, and BBS to get the details of reinforcement components required for the cage fabrication of various RCC structures.

Resources to be used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
    - Stud Wrenches, Open-End Wrenches, Crescent Wrenches, Hammer, Nibbler, pliers, Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Measuring tape, Plumb Bob, Spirit level, Chalks line, Try square, Water level, Tower crane, Mobile crane, Forklift, Scissor lift, Hydraulic jacks, Electric Wire Rope Hoist, Electrical winch, Electrical chain hoist, derrick, Lifting accessories, Belts, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, Safety Helmet , Safety goggles , Safety shoes, Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags

Do

For Discussing Various Features of One-way and Two-way Slabs:

- Develop detailed training materials or presentations that cover the key features of one-way and two-way slabs, including definitions, load distribution, design considerations, and differences between the two types of slabs.
- Use diagrams, sketches, and real-world examples to visually explain the concepts. Visual aids can significantly enhance understanding.
- Encourage interactive discussions with participants. Ask questions to gauge their understanding and facilitate group discussions on specific topics.
- Provide practical examples and case studies that showcase the application of one-way and two-way slabs in real construction projects.
- Highlight the differences between one-way and two-way slabs in terms of design, load distribution, and construction requirements. Use practical scenarios for comparison.

- If possible, organize hands-on exercises where participants can create simple one-way and two-way slab models using materials like cardboard or foam to understand load distribution and structural behavior.
- Allocate time for participants to ask questions and seek clarification on any topics related to one-way and two-way slabs.

For Interpreting Drawings, Sketches, and BBS for Reinforcement Components:

- Develop training materials that include drawings, sketches, and BBS for various RCC (Reinforced Concrete) structures.
- Explain the symbols, notations, and conventions commonly used in construction drawings, sketches, and BBS.
- Provide a step-by-step guide on how to interpret these documents. Break down the process into manageable steps.
- Organize practical exercises where participants are given drawings, sketches, or BBS sheets and are required to identify and list the reinforcement components needed for cage fabrication.
- Review the participants' interpretations and provide feedback. Correct any misunderstandings and reinforce correct practices.
- Include drawings and BBS for a variety of RCC structures, such as beams, columns, slabs, and foundations, to expose participants to different scenarios.
- Share real-world examples where misinterpretation of drawings or BBS led to construction issues or failures to emphasize the importance of accurate interpretation.
- Teach participants how to document their findings accurately and professionally.
- Conduct assessments or quizzes to evaluate participants' ability to interpret drawings, sketches, and BBS accurately.
- Compile a list of recommended resources, books, or websites that participants can use for further study and practice.

Notes for facilitation

- Use the Fabricator PHB and refer unit 5.2 to explain Features of Reinforcement and Interpretation.
- **For Discussing Various Features of One-way and Two-way Slabs:**
    - **Develop Detailed Training Materials:** Prepare comprehensive training materials or presentations that delve into the essential features of one-way and two-way slabs. Cover topics such as their definitions, load distribution mechanisms, key design considerations, and the fundamental differences that distinguish one from the other.

- **Utilize Visual Aids:** Employ a variety of visual aids, including diagrams, sketches, and real-world examples, to enhance participants' comprehension. Visual representations help clarify complex concepts related to slab behavior and design.
- **Encourage Interactive Discussions:** Foster an interactive learning environment by actively engaging participants in discussions. Pose thought-provoking questions to gauge their understanding and facilitate group discussions that focus on specific aspects of one-way and two-way slabs.
- **Illustrate with Practical Examples:** Enhance learning by presenting practical examples and case studies that demonstrate the real-world application of these slab types in construction projects. These examples offer participants valuable insights into how theory translates into practice.
- **Highlight Key Differences:** Emphasize the distinctions between one-way and two-way slabs concerning design principles, load distribution mechanisms, and construction requirements. Use practical scenarios and examples to draw meaningful comparisons that reinforce learning.
- **Hands-on Learning:** Whenever feasible, organize hands-on exercises where participants can create simple models of one-way and two-way slabs using materials like cardboard or foam. This tactile experience helps participants grasp load distribution and structural behavior concepts.
- **Question and Answer Sessions:** Allocate dedicated time for participants to ask questions and seek clarification on any topics related to one-way and two-way slabs. Addressing queries enhances comprehension and retention.

- **For Interpreting Drawings, Sketches, and BBS for Reinforcement Components:**
  - **Develop Comprehensive Training Materials:** Create training materials that encompass a wide range of drawings, sketches, and BBS sheets relevant to various RCC structures. These materials should serve as a comprehensive resource for participants.
  - **Explain Symbols and Notations:** Ensure participants grasp the symbols, notations, and conventions frequently used in construction drawings, sketches, and BBS. A solid foundation in these fundamentals is crucial for accurate interpretation.
  - **Provide a Step-by-step Guide:** Offer participants a systematic, step-by-step guide on how to interpret construction documents. Break down the interpretation process into manageable stages, making it easier to follow and understand.
  - **Hands-on Practical Exercises:** Arrange practical exercises where participants are presented with actual drawings, sketches, or BBS sheets. Task them with identifying and listing the reinforcement components required for cage fabrication. This hands-on experience reinforces their interpretative skills.
  - **Review and Feedback:** After participant's complete practical exercises, review their interpretations and provide constructive feedback. Correct any misconceptions or errors while emphasizing the importance of precision and accuracy.
  - **Diverse RCC Structures:** Include a diverse range of drawings and BBS sheets covering various RCC structures, such as beams, columns, slabs, and foundations. Exposure to different scenarios broadens participants' interpretation skills.

- **Real-world Examples:** Share real-world examples where misinterpretation of drawings or BBS led to construction issues or failures. Highlight these cases to underscore the critical importance of accurate document interpretation in construction projects.
- **Documentation Skills:** Teach participants how to effectively document their findings when interpreting construction documents. Clear and organized documentation contributes to successful project execution.
- **Assessment for Mastery:** Assess participants' ability to interpret drawings, sketches, and BBS accurately through assessments or quizzes. Use these evaluations to gauge their mastery of the interpretation skills taught during the training.
- **Resource Recommendations:** Compile a valuable list of recommended resources, including books, websites, and other references, that participants can utilize for further self-study and practice. This empowers them to continue honing their interpretative abilities beyond the training program.

Activity

- **Name:** "Steel Assembly Alignment and Erection"
- **Purpose:** To teach participants the practical skills and knowledge required to accurately place steel assemblies/components during the erection process, ensuring proper alignment and adjustment as per erection requirements.
- **Resources Required:**
  - Steel assemblies or components (mock or real)
  - Erection equipment (cranes, hoists, etc.)
  - Measuring tools (levels, plumb bobs, tape measures)
  - Safety equipment (helmets, gloves, harnesses)
  - Work area with a base for erection practice
- **Tentative Duration:** 2-3 hours
- **Procedure:**
  - **Introduction (15 minutes):** The trainer provides an overview of the practical activity, emphasizing the importance of accurate assembly placement and alignment in steel erection.
  - **Equipment Familiarization (15 minutes):** Participants are introduced to the erection equipment they will be using, such as cranes and hoists. Safety protocols are reviewed.
  - **Alignment Basics (20 minutes):** The trainer explains the fundamentals of alignment, discussing the role of levels and plumb bobs in achieving precise alignment during steel erection.

- **Demonstration (30 minutes):** The trainer demonstrates the process of placing a steel assembly or component using the erection equipment. They emphasize the importance of checking and adjusting for alignment during the process.
- **Hands-On Practice (45 minutes):** Participants are divided into small groups and given the opportunity to practice placing and aligning steel assemblies or components. They use measuring tools and follow the guidance provided by the trainer.
- **Alignment Checks (15 minutes):** The trainer explains the checks required for alignment and positioning of the erected elements. Participants learn how to verify alignment accuracy.
- **Alignment Exercise (20 minutes):** Participants perform alignment checks on the erected steel assemblies or components. They make necessary adjustments to achieve proper alignment.
- **Q&A and Discussion (15 minutes):** Participants have the opportunity to ask questions and discuss challenges they encountered during the practical exercise.
- **Safety Recap (10 minutes):** The trainer reviews safety precautions and best practices during steel erection.

Expected Outcome:

- Participants should be able to accurately place and align steel assemblies/components during the erection process, understanding the importance of alignment checks and adjustments. They should also have improved knowledge of safety protocols during steel erection activities.

Notes

UNIT 5.3: Connection and Communication

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

1. Perform installation of temporary connections using appropriate tools.
2. Perform tightening of bolted connections to the specified tolerance and torque using an appropriate torque wrench.
3. Demonstrate how to communicate efficiently with the signalman or operator for precise movement of assemblies.

Resources to be used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
    - Stud Wrenches, Open-End Wrenches, Crescent Wrenches, Hammer, Nibbler, pliers, Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Measuring tape, Plumb Bob, Spirit level, Chalks line, Try square, Water level, Tower crane, Mobile crane, Forklift, Scissor lift, Hydraulic jacks, Electric Wire Rope Hoist, Electrical winch, Electrical chain hoist, derrick, Lifting accessories, Belts, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, Safety Helmet , Safety goggles , Safety shoes, Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags

Do

- **For Performing Installation of Temporary Connections:**
    - Begin by providing a comprehensive presentation or explanation of the concept of temporary connections in steel assembly. Discuss their significance and where they are typically used in construction.
    - Arrange the necessary tools and equipment for performing temporary connections, including bolts, nuts, washers, wrenches, and other relevant tools.
    - Demonstrate the step-by-step process of installing temporary connections using appropriate tools. Explain the techniques, such as proper alignment and initial tightening.
    - Allow participants to practice installing temporary connections on mock steel assemblies. Provide guidance and supervision as needed.

- **For Performing Tightening of Bolted Connections**:
    - Explain the importance of tightening bolted connections to specified tolerance and torque. Discuss why precise torque values are essential for structural integrity.
    - Introduce participants to torque wrenches and their use in achieving accurate torque values. Ensure that the torque wrenches are calibrated and functioning correctly.
    - Demonstrate the correct technique for using a torque wrench to tighten bolted connections to the specified torque values. Emphasize the need for uniform and controlled tightening.
    - Provide participants with opportunities to practice tightening bolted connections using torque wrenches. Use mock assemblies with pre-set torque requirements.
- **For Demonstrating Communication with Signalman or Operator:**
    - Organize a role-playing exercise where participants take on the roles of signalmen or operators and communicate with each other during steel assembly movements.
    - Explain the importance of clear and concise communication in ensuring the precise movement of assemblies. Discuss standardized hand signals and verbal cues.
    - Provide examples of common challenges or scenarios that may arise during assembly movements. Discuss how effective communication can address these challenges.
    - Conduct practical exercises where participants practice communication with signalmen or operators while moving mock steel assemblies. Emphasize the need for coordination and safety.
    - Assess participants' communication skills during the exercises and provide feedback for improvement. Encourage open discussions on communication challenges and solutions.
    - Stress the importance of safety during assembly movements and how clear communication contributes to safety.

Notes for facilitation

- Use the Fabricator PHB and refer unit 5.3 to explain Connection and Communication.
- **For Performing Installation of Temporary Connections:**
    - **Significance of Temporary Connections:** Begin by explaining why temporary connections are a critical aspect of steel assembly. Temporary connections are used to hold steel components in place during assembly before permanent connections, such as welding or bolting, are made. They play a crucial role in ensuring the structural stability of the assembly during construction.
    - **Tools and Equipment:** Provide participants with an overview of the tools and equipment required for installing temporary connections. These typically include bolts, nuts, washers, wrenches, and possibly spacers or shims, depending on the specific assembly requirements.
    - **Step-by-Step Demonstration:** Conduct a detailed demonstration of the installation process. Emphasize the importance of proper alignment to ensure that the final assembly fits together accurately. Explain the initial tightening process, ensuring that connections are

secure but still allow for adjustments as needed during the assembly process.

- **Hands-On Practice:** Allow participants to gain practical experience by providing mock steel assemblies and the necessary tools. Encourage them to install temporary connections following the demonstrated techniques. Provide guidance and corrections as necessary to ensure proper installation.

- **For Performing Tightening of Bolted Connections:**
  - **Importance of Torque:** Start by explaining why precise torque values are essential in the construction of steel assemblies. Bolts are designed to withstand specific loads, and achieving the correct torque ensures that the bolts provide the intended structural strength. Incorrect torque can lead to under-tightening, risking structural stability, or over-tightening, potentially damaging the components.
  - **Introduction to Torque Wrenches:** Introduce participants to torque wrenches, highlighting their role in achieving accurate torque values. Stress the importance of using calibrated torque wrenches to maintain accuracy.
  - **Torque Wrench Technique:** Demonstrate the proper technique for using a torque wrench to tighten bolted connections accurately. This includes how to set the desired torque value, the angle of rotation required, and the sequence of tightening for multi-bolt connections.
  - **Practical Application:** Provide participants with opportunities to practice tightening bolted connections using torque wrenches. Use mock assemblies with predetermined torque requirements to ensure that participants gain hands-on experience in achieving the specified torque values.

- **For Demonstrating Communication with Signalman or Operator:**
  - **Role of Communication in Safety:** Explain the fundamental role of clear and effective communication in ensuring the safety of steel assembly operations. Emphasize that communication is crucial for coordinating movements and avoiding accidents during the assembly process.
  - **Standardized Communication:** Introduce participants to standardized hand signals and verbal cues commonly used in construction and steel assembly settings. Explain how these standardized methods facilitate understanding and reduce the risk of miscommunication.
  - **Scenario-Based Examples:** Provide examples of real-world scenarios where communication challenges can arise during assembly movements. Discuss how using clear and standardized communication can address these challenges effectively.
  - **Practical Exercises:** Conduct practical exercises where participants take on the roles of signalmen or operators while manoeuvring mock steel assemblies. Focus on coordinating movements, such as lifting, lowering, or shifting components. Evaluate participants' ability to communicate clearly and efficiently.
  - **Safety Emphasis:** Throughout the training, stress the paramount importance of safety during all assembly movements. Reinforce that clear and efficient communication contributes significantly to overall safety by reducing the risk of accidents and ensuring that all team members are on the same page.

- By incorporating these detailed elements into the training program, participants will not only understand the concepts but also gain practical skills and experience in installing temporary connections, tightening bolted connections, and communicating effectively during steel assembly operations.

Activity

- **Name:** "Steel Assembly Installation and Communication Exercise"
- **Purpose:** This practical activity aims to train participants in the installation of temporary connections, precise tightening of bolted connections, and efficient communication with signalmen or operators during steel assembly movements. Participants will develop hands-on skills crucial for safe and accurate steel assembly work.
- **Resources Required:**
  - Mock steel assemblies with components and temporary connection points.
  - Assortment of bolts, nuts, washers, wrenches, and torque wrenches.
  - Calibrated torque wrenches with torque specifications.
  - Signalman or operator roles (participants can rotate through these roles).
  - Safety gear, including helmets, gloves, and safety glasses.
  - Stopwatch or timer.
  - Trainer or facilitator to oversee the activity.
- **Tentative Duration:** Approximately 2 hours
- **Procedure:**

I. Introduction (15 minutes):

a. The trainer provides an overview of the practical activity's objectives and its relevance to steel assembly work.

b. Safety precautions and guidelines, including the proper use of personal protective equipment (PPE), are discussed.

II. Temporary Connection Installation (30 minutes):

a. Participants are divided into pairs.

b. Each pair is given a mock steel assembly with temporary connection points.

c. Participants use appropriate tools (bolts, nuts, washers, wrenches) to install temporary connections on the mock assembly.

d. The trainer observes and offers guidance on correct techniques for alignment and initial tightening.

III. Tightening of Bolted Connections (30 minutes):

a. Participants are introduced to torque wrenches and their importance in achieving precise torque values for bolted connections.

b. Each pair is provided with a calibrated torque wrench with specified torque settings.

c. Participants practice tightening bolted connections on their mock assemblies to the specified torque using torque wrenches.

d. The trainer monitors the process and provides feedback on the uniformity and control of tightening.

IV. Communication Exercise (45 minutes):

a. Participants gather around a designated area with a mock steel assembly that needs precise movement.

b. Roles are assigned: some participants act as signalmen or operators, while others are responsible for guiding the assembly.

c. The trainer explains standardized hand signals and verbal cues for safe movement.

d. Participants take turns in different roles and practice communicating effectively to move the assembly according to specific instructions.

e. The trainer introduces common challenges or scenarios (e.g., obstacles, tight spaces) to test communication skills.

f. Communication skills are assessed during the exercise, and participants receive feedback.

V. Debrief and Discussion (15 minutes):

a. The trainer leads a discussion where participants share their experiences and challenges encountered during the practical activity.

b. Key takeaways related to temporary connections, bolted connections, and communication are summarized.

c. Participants discuss the significance of safety and precision in steel assembly work.

Expected Outcome:

- Participants will have gained practical experience in installing temporary connections, achieving precise torque values for bolted connections, and effectively communicating with signalmen or operators during steel assembly movements. This hands-on training will enhance their skills and readiness for real-world steel assembly tasks, ensuring safety and accuracy in their work.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1. Safety considerations during steel assembly erection include ensuring a stable foundation, using proper personal protective equipment, securing loads, preventing falls, and following safety protocols and regulations.
2. A signalman plays a critical role in guiding crane operators and equipment operators during steel assembly erection. They use standardized hand signals and verbal communication to ensure safe and precise movements.
3. Securing steel components involves proper bracing, bolting, welding, or temporary connections. This ensures that the components are stable and do not shift or fall during the erection process.
4. Temporary connections hold steel components together during erection, allowing for adjustments and alignment before permanent connections are made. They ensure that the assembly remains stable during the process.
5. Proper alignment ensures that steel components fit together accurately, maintaining structural integrity and load-bearing capacity. Misalignment can lead to stress concentrations and potential failures.

Fill-in-the-Blanks:

1. The rigger plays a crucial role in guiding crane operators during steel assembly erection.
2. Temporary connections are used to hold steel components together temporarily during erection.
3. Erection of steel structures requires careful consideration of wind and weather conditions.
4. The alignment of steel assemblies ensures that they are level and in the correct position.
5. Safety helmets and harnesses are essential personal protective equipment during steel assembly erection.

True/False:

1. False (The signalman's role is significant for safety.)
2. False (Temporary connections are not meant to be permanent.)
3. False (Weather conditions can impact safety.)
4. False (Proper alignment is crucial for structural integrity.)
5. False (Safety helmets and harnesses are necessary.)

Notes

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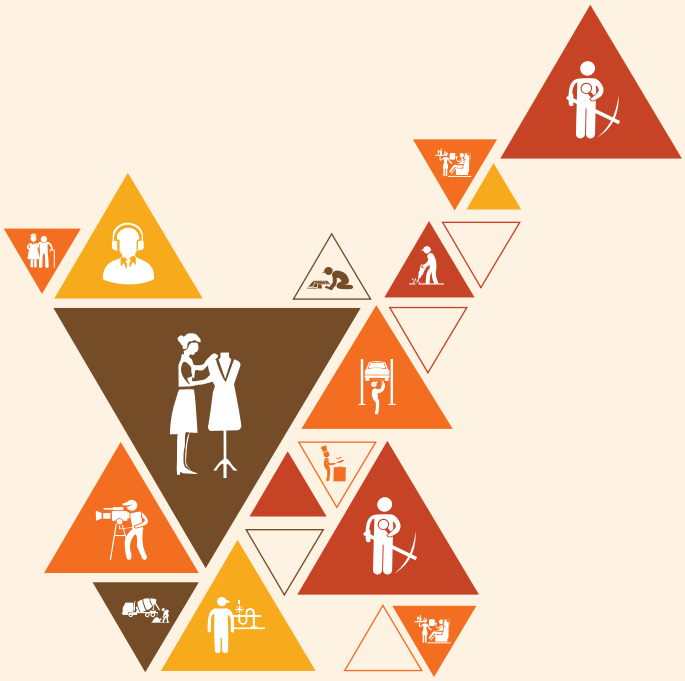
6. Communicate Effectively at Workplace

Unit 6.1 - Effective Communication and Teamwork

Unit 6.2 - Working Effectively and Maintaining Discipline at Work

Unit 6.3 - Maintaining Social Diversity at Work



CON/N8001

Key Learning Outcomes

At the end of this unit, trainer will ensure that participant will be able to:

1. Explain the effects and benefits of timely actions relevant to the task at hand with examples.
2. Explain the importance of teamwork and its effects relevant to the task at hand with examples.
3. Demonstrate teamwork skills during assigned task.
4. Explain the importance of proper and effective communication and its adverse effects in case of failure of proper communication.
5. Apply effective communication skills while interacting with co-workers, trade seniors and others during the assigned task.
6. Use appropriate writing skills and verbal communication reporting as per commonly applicable organisational norms.
7. Discuss about gender and its related concept: gender equality, gender equity (group work).
8. Discuss different types of disabilities (physical, mental, intellectual or sensory impairment).
9. Discuss the activities sensitive to the cultural diversity, disabilities and gender neutrality at the workplace.
10. Demonstrate acceptable interpersonal transactions with individuals having disabilities (physical, mental, intellectual or sensory impairment) or cultural diversity.
11. Discuss the basic rules and regulations related to gender sensitivity, disabilities, and cultural diversity, with their impact on operations of a workplace.
12. Demonstrate the process modifications required to make the workplace free from gender biases.
13. Discuss how to take initiative in resolving issues among co-workers in a given situation.
14. Discuss reporting procedure followed at the workplace.

UNIT 6.1: Effective Communication and Teamwork

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

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

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain own roles and responsibilities.
- Explain the importance of effective communication.
- Explain different modes of communication used at the workplace.
- Explain 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.
- Demonstrate how to report any unresolved problem to the supervisor immediately.

Notes for facilitation

- Use the Fabricator PHB and refer unit 6.1 to explain Effective Communication and Teamwork.
- As a Fabricator, it's vital to have a clear understanding of your specific roles and responsibilities within the construction project. This includes comprehending the structural drawings, plans, and

specifications related to the steel components you're tasked with fabricating. Your role involves transforming raw materials into finished components, ensuring they meet design and quality standards, and collaborating with other team members such as welders and inspectors to achieve project goals.

- Effective communication is the backbone of any successful construction project. As a Fabricator, you must convey and receive information accurately to ensure the correct dimensions, tolerances, and materials are used. Miscommunication can lead to costly errors, rework, and project delays. Stress the importance of clear and concise communication with colleagues, supervisors, and other tradespeople involved in the project.
- Fabricators typically use various modes of communication in their roles. This includes verbal communication during team meetings, written communication through emails or project documentation, and visual communication via drawings and blueprints. Familiarity with all these modes and the ability to switch between them as needed is essential for efficient collaboration.
- Poor teamwork can have significant consequences on a construction project. Stress the importance of working cohesively with colleagues, as fabricators often rely on the work of welders, engineers, and other team members. Emphasize how a lack of teamwork can lead to project delays, safety issues, quality problems, and increased costs. Highlight that successful projects require a unified team effort.
- Fabricators should demonstrate the ability to pass on critical work-related information to team members accurately. This includes sharing fabrication requirements, material specifications, and any changes or adjustments to the original plans. Practical demonstrations, such as explaining how to update fabrication records or relay critical measurements, can be beneficial.
- In the construction industry, prompt reporting of unresolved problems is vital for maintaining safety and project quality. Fabricators should be trained on how to report issues such as material defects, equipment malfunctions, or any potential safety hazards to their immediate supervisors or project managers. Highlight that addressing problems early can prevent accidents and costly delays.

Activity

- **Name:** "Effective Communication Workshop"
- **Purpose:** This activity aims to enhance the learners' understanding of the importance of effective communication, the various modes of communication in the workplace, the impact of poor teamwork, and practical communication skills. It also encourages them to report issues promptly.
- **Resources Required:**
  - Whiteboard and markers
  - Flipcharts and sticky notes

- Projector and screen (optional)
- Scenario cards (pre-written workplace scenarios)
- Notepads and pens
- Supervisor or facilitator

- **Tentative Duration**: 2 hours
- **Procedure:**

1. **Introduction (15 minutes):**
    - Begin with a brief introduction to the importance of effective communication in construction work.
    - Highlight the consequences of poor teamwork and communication on project outcomes, **timelines, and safety.**
2. **Modes of Communication (20 minutes):**
    - Discuss different modes of communication used at the workplace, including verbal, written, visual, and non-verbal communication.
    - Use examples to illustrate when each mode is most appropriate.
3. **Interactive Scenarios (30 minutes):**
    - Divide learners into small groups.
    - Provide scenario cards describing workplace situations involving communication challenges or teamwork issues.
    - Each group discusses how they would address the scenario and improve communication/ teamwork.
    - Groups present their solutions to the whole class.
4. **Demonstration (15 minutes):**
    - The facilitator demonstrates how to pass on work-related information clearly to team members using effective communication techniques.
    - Learners can observe and ask questions.
5. **Role-Playing Activity (30 minutes):**
    - Each group is given a different communication challenge scenario.
    - They role-play the scenario, focusing on effective communication and teamwork.
    - After each role-play, the facilitator and peers provide feedback.

6. **Reporting Issues (15 minutes):**
    - Discuss the importance of reporting issues to supervisors promptly.
    - Explain the reporting process in the workplace.
    - Encourage learners to ask questions and clarify doubts.
7. **Q & A and Discussion (15 minutes):**
    - Open the floor for questions and discussions.
    - Address any queries or concerns related to communication and teamwork.

- **Expected Outcome:** Learners will have a deeper understanding of effective communication, various communication modes, teamwork, and the significance of reporting issues promptly. They will also acquire practical communication skills to apply in their work.

Notes

UNIT 6.2: Working Effectively and Maintaining Discipline at Work

Unit Objectives

After 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.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Explain 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.

Notes for facilitation

- Use the Fabricator PHB and refer unit 6.2 to explain Working Effectively and Maintaining Discipline at Work.
- A healthy and cooperative work environment fosters teamwork, improves morale, and enhances productivity. In construction, where tasks are often interdependent, a positive work atmosphere is essential for safety and project success.
- **Tips:** Encourage open communication, resolve conflicts promptly, and promote a culture of respect among co-workers.
- Understanding the techniques, materials, tools, and safety standards relevant to the job is essential for efficient and safe work. Bar benders and steel fixers should have a solid grasp of these aspects to perform their tasks effectively.
- **Tips:** Stay updated on industry best practices, attend relevant training sessions, and seek guidance from experienced colleagues.
- Effective communication ensures that tasks are carried out correctly, on time, and safely. Poor communication can lead to mistakes, delays, and even accidents on construction sites.
- **Tips:** Practice active listening, be clear in your messages, and encourage co-workers to communicate openly.
- Supporting co-workers facing challenges is crucial for maintaining project progress and morale. A construction project's success often hinges on the ability of the team to overcome obstacles together.
- **Tips:** Offer assistance when you see a co-worker struggling, seek help when needed, and foster a culture of mutual support.
- Efficient handovers are essential to ensure smooth transitions between tasks and teams. Bar benders and steel fixers should know how to pass on materials and information effectively.
- **Tips:** Clearly communicate what is needed, provide proper documentation, and conduct thorough handover briefings.
- Synchronized teamwork is critical in construction to avoid clashes, improve efficiency, and ensure safety. Bar benders and steel fixers should know how to coordinate their tasks with other trades and workers on the site.
- **Tips:** Plan tasks together with other teams, establish clear workflows, and communicate any changes promptly to maintain synchronization.

Notes

UNIT 6.3: Maintaining Social Diversity at Work

Unit Objectives

After 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.

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Explain 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.

Notes for facilitation

- Use the Fabricator PHB and refer unit 6.3 to explain Maintaining Social Diversity at Work.
- Gender equality is the principle that all individuals, regardless of their gender, should have equal rights, opportunities, and treatment in all aspects of life. It promotes fairness and prevents discrimination based on gender, ensuring that everyone can reach their full potential.

- **Tips:** Foster a workplace culture that values diversity, provides equal opportunities, and actively combats gender bias.

- Recognizing and being sensitive to issues related to disability culture and gender requires empathy, education, and a willingness to understand the unique experiences and challenges faced by different individuals. It involves acknowledging diversity and respecting the perspectives of others.
  - **Tips:** Engage in diversity training, actively listen to others' experiences, and avoid making assumptions about people based on their gender or disability.

- Understanding the legal and organizational frameworks that address gender sensitivity and cultural diversity is essential. It involves being aware of anti-discrimination laws, company policies, and procedures that promote inclusion and fairness.
  - **Tips:** Familiarize yourself with relevant laws and policies, and ensure compliance to create a more inclusive and respectful workplace.

- Implementing gender-neutral practices involves creating an environment where individuals are treated equally regardless of their gender. This includes fair hiring practices, unbiased decision-making, and providing equal opportunities for career growth.
  - **Tips:** Review hiring and promotion processes for gender bias, promote diversity in leadership roles, and actively address any gender-related issues that arise.

- Addressing discriminatory and offensive behavior is crucial for maintaining a respectful work environment. It involves addressing such behavior promptly, professionally, and in alignment with organizational policies.
  - **Tips:** Report incidents following company procedures, engage in constructive dialogue with offenders when appropriate, and support colleagues who experience discrimination or offensive behavior.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1. Effective communication is essential in construction job roles to ensure that tasks, instructions, and safety protocols are understood and followed, preventing errors, delays, and accidents.
2. The consequences of poor teamwork on project outcomes and safety at a construction site can include project delays, compromised quality, reduced efficiency, increased safety risks, and potentially higher costs.
3. Work-related information can be passed on clearly to team members by using concise and structured communication methods, such as written instructions, diagrams, or verbal explanations, ensuring that critical details are not omitted or misunderstood.
4. Different modes of communication used in the workplace include verbal communication (spoken or face-to-face), written communication (emails, reports), visual communication (diagrams, charts), and digital communication (instant messaging, video conferences).
5. Creating a healthy and cooperative work environment among gangs of workers is important because it fosters efficient collaboration, enhances productivity, improves worker morale, and can lead to safer and more successful construction projects.

Fill-in-the-Blanks:

A. Effective communication ensures that project goals and tasks are understood by everyone.

B. Poor teamwork can lead to delays, compromised quality, and increased safety risks.

C. To ensure clarity, it's essential to provide work-related information to team members in a concise manner.

D. Communication modes include verbal, written, visual, and digital forms.

E. Creating a cooperative work environment fosters efficient collaboration and unity among workers.

True/False Questions:

1. **False:** Effective communication is important for all job roles in construction, not just supervisory roles.
2. **False:** Poor teamwork can significantly affect project timelines and safety on a construction site.
3. **False:** Passing on work-related information is crucial for effective coordination and understanding among team members.
4. **False:** Communication modes in the workplace encompass various forms, including verbal, written, visual, and digital.
5. **True:** A cooperative work environment can indeed enhance productivity and worker morale, leading to better outcomes.

Notes

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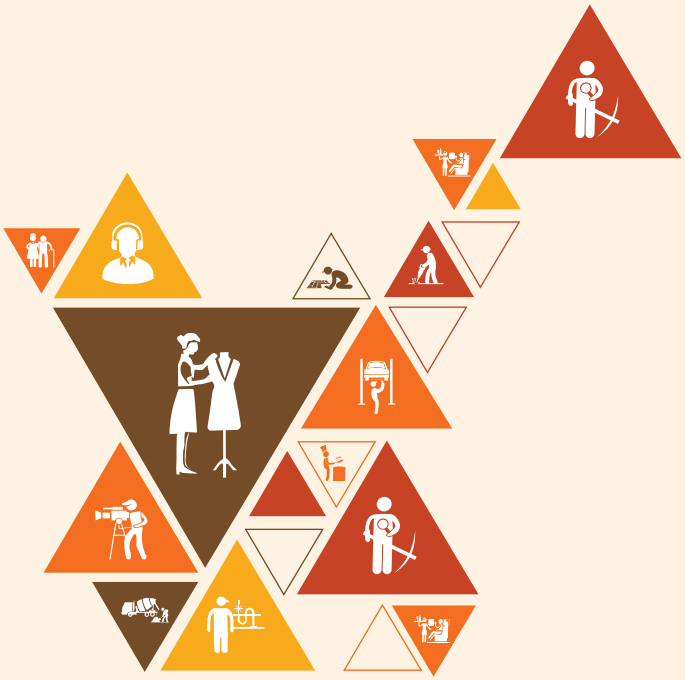
7. Follow Safety Norms as defined by organization, Adopt Healthy and Safe Work Practices

Unit 7.1 - Hazards and Emergency Situations

Unit 7.2 - Safety Drills, PPEs and Fire Safety

Unit 7.3 - Hygiene and Safe Waste Disposal Practices

Unit 7.4 - Infectious Disease and Its Cure



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Key Learning Outcomes

At the end of this unit, trainer will ensure that participant will be able to:

1. Describe the reporting procedures in cases of breaches or hazards for site safety, accidents, and emergencies as per guidelines.
2. Explain different types of safety hazards at construction sites.
3. Demonstrate how to follow emergency and evacuation procedures in case of accidents, fires, or natural calamities.
4. Discuss basic ergonomic principles as per applicability.
5. Describe the procedure for responding to accidents and other emergencies at the site.
6. Explain the importance of handling tools, equipment, and materials as per applicable norms.
7. Explain the effect of construction material on health and environments as per applicability.
8. Describe various environmental protection methods as per applicability.
9. Explain the storage requirement of waste including non-combustible scrap material and debris, combustible scrap material and debris, general construction waste and trash (non-toxic, non-hazardous), any other hazardous wastes and any other flammable wastes at the appropriate location.
10. Show how to collect, segregate and deposit construction waste into appropriate containers based on their toxicity or hazardous nature.
11. Explain how to use hazardous material in a safe and appropriate manner as per applicability.
12. Explain types of fire.
13. Describe the procedure of operating different types of fire extinguishers.
14. Show how to operate different types of fire extinguishers corresponding to various types of fires as per EHS guidelines.
15. State safety relevant to tools, tackles, and equipment as per applicability.
16. Demonstrate the use of appropriate Personal Protective Equipment (PPE) as per work requirements for Head Protection, Ear Protection, Fall Protection, Foot Protection, Face and Eye Protection, Hand and Body Protection, and Respiratory Protection (if required).
17. Demonstrate how to check and install all safety equipment as per standard guidelines.
18. List housekeeping activities relevant to the task.
19. Elucidate ways of transmission of infection Explain the ways to manage infectious risks at the workplace.
20. Describe different methods of cleaning, disinfection, sterilization, and sanitization.
21. Show how to clean and disinfect all materials, tools and supplies before and after use.
22. List the symptoms of infection like fever, cough, redness, swelling, and inflammation.

Unit 7.1: Hazards and Emergency Situations

Unit Objectives

After 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 situation.
- Know the reporting procedure to the concerned authority in case of emergency situations.

Resources to be used

- **Theory**
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
    - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Explain the types of hazards at the construction sites and identify the hazards specific to the domain related works.
- Reiterate about safety control measures and actions to be taken under emergency situation.
- Share reporting procedure to the concerned authority in case of emergency situations.

Notes for facilitation

- Use the Fabricator PHB and refer unit 7.1 to explain Hazards and Emergency Situations.
- Types of Hazards at Construction Sites (Including Domain-Related Hazards for Fabricators): Construction sites present various hazards, including but not limited to:
    - **Physical Hazards:** Falling objects, machinery, excavation risks.
    - **Chemical Hazards:** Exposure to hazardous substances, chemicals, or gases.
    - **Biological Hazards:** Exposure to infectious agents, mold, or bacteria.
    - **Ergonomic Hazards:** Strain from lifting, repetitive motions, or awkward postures.

- **Electrical Hazards:** Contact with live wires or faulty electrical equipment.
- **Fire and Explosion Hazards:** Flammable materials, faulty wiring, combustible gases.

- **Domain-Related Hazards for Fabricators might include:**
  - **Falling Hazards:** Working at heights without proper fall protection.
  - **Manual Handling Hazards:** Lifting heavy materials improperly.
  - **Hazardous Substances:** Exposure to cement dust, chemicals in mortar, etc.
  - **Tool and Equipment Hazards:** Misuse of tools, lack of proper maintenance.
- **Recognizing Safety Control Measures and Emergency Actions:**
  - **Safety Control Measures:** To mitigate hazards at construction sites, the following safety control measures can be taken:
    - Personal Protective Equipment (PPE).
    - **Training:** Ensure workers are trained in proper handling of tools, equipment, and materials to prevent accidents.
    - Safe Work Practices.
    - Ventilation and Dust Control.
  - **Emergency Actions:** In case of emergency situations at the construction site, follow these actions:
    - Evacuation.
    - First Aid.
    - Emergency Contacts.
  - **Reporting Procedures in Emergency Situations:**
    - **Internal Communication:** Notify your immediate supervisor or project manager about the emergency situation.
    - **Established Protocol:** Follow the organization's established protocol for reporting emergencies, including specific contact persons or numbers.
    - **Documentation:** If safe to do so, document the details of the emergency, including the time, location, nature of the incident, and any injuries.
    - **Cooperate with Authorities:** Provide accurate information to emergency responders and cooperate with their instructions.

Say

Let's engage in a practical activity focused on the reporting procedures that a Fabricator should follow during emergency situations. This activity underscores the importance of effective communication and coordination to ensure the safety and well-being of all individuals on the construction site.

Activity

- **Purpose:** This activity aims to provide Fabricators with hands-on experience in understanding and practicing the reporting procedures essential for effective emergency response.
- **Resources Required:** Scenario cards describing emergency situations, writing materials.
- **Tentative Duration:** 45 Minutes
- **Procedure:**
    - **Introduction:** Begin by emphasizing the significance of prompt and accurate reporting during emergencies to maintain a safe work environment.
    - **Scenario Distribution:** Distribute scenario cards, each depicting a unique emergency situation, to participants.
    - **Internal Communication Role Play:**
        - Form pairs among participants.
        - **Assign roles in each pair:** one as the Fabricator and the other as the supervisor or project manager.
        - Fabricators practice communicating the emergency to their supervisor using the established reporting procedures.
    - **Discussion on Established Protocol:**
        - Gather participants for a discussion about the organization's established protocol for reporting emergencies.
        - Emphasize the significance of adhering to these protocols for an organized response.
    - **Documentation Practice**:
        - Participants individually document the specifics of the emergency scenario assigned to them.
        - They note down the time, location, incident nature, and any injuries if applicable.
    - **Cooperation with Authorities Exercise:**
        - Present a scenario involving cooperation with emergency responders.
        - Participants engage in role-play, providing accurate information and following instructions from the responders.
    - **Group Discussion and Sharing:**
        - Participants share their experiences and insights from the role-playing exercises.
        - Facilitate a discussion on challenges faced and best practices for reporting

emergencies.

- Reflection and Conclusion:
  - Engage participants in reflecting on the significance of precise reporting for maintaining safety during emergencies.
  - Summarize the key learnings and underscore the importance of following reporting procedures.

- **Expected Outcome:** Through this activity, Fabricators will gain practical familiarity with reporting procedures during emergency situations. They will comprehend the importance of effective communication, documentation, and cooperation with authorities to ensure the safety and well-being of themselves and their colleagues on the construction site.

Notes

Unit 7.2: Safety Drills, PPEs and Fire Safety

Unit Objectives

After 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.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- 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.
- Enlist 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.

Notes for facilitation

- Use the Fabricator PHB and refer unit 7.2 to explain Safety Drills, PPEs and Fire Safety.
- **Classes of Fire:** Fires are classified into different classes based on the type of fuel involved:
    - **Class A:** Fires involving common combustible materials like wood, paper, and cloth.
    - **Class B:** Fires involving flammable liquids, gases, or greases.
    - **Class C:** Fires involving energized electrical equipment.
    - **Class D:** Fires involving combustible metals.
    - **Class K:** Fires involving cooking oils and fats, commonly found in kitchens.
- **Types of Fire Extinguishers:** Different types of fire extinguishers are designed to handle specific classes of fire:
    - **Water Extinguishers (Class A):** Suitable for Class A fires, but not for fires involving flammable liquids or electrical equipment.
    - **Foam Extinguishers (Class A and B):** Effective on Class A and B fires, but not for electrical fires.
    - **Dry Powder Extinguishers (Class A, B, C, and D):** Suitable for a range of fires, including electrical fires and flammable liquids.
    - **CO2 Extinguishers (Class B and Electrical Fires):** Effective for flammable liquid and electrical fires, but not for Class A fires.
    - **Wet Chemical Extinguishers (Class K):** Specifically designed for kitchen fires involving cooking oils and fats.
- **Operating Procedure of Fire Extinguishers:**
    - **Pull:** Pull the pin to break the seal and unlock the operating lever.
    - **Aim:** Aim the nozzle at the base of the fire where the fuel source is.
    - **Squeeze:** Squeeze the operating lever to release the extinguishing agent.
    - **Sweep:** Sweep the nozzle from side to side while directing the agent at the base of the fire until it's extinguished.
- **Importance of Participation in Safety Drills:** Participation in safety drills is important for several reasons:
    - **Familiarity:** Workers become familiar with evacuation routes and emergency procedures.
    - **Response Practice:** Workers practice how to respond to emergencies, minimizing confusion during real incidents.
    - **Efficiency:** Regular drills improve the efficiency of evacuation and emergency response.
    - **Identification of Weaknesses:** Drills help identify areas that need improvement in the emergency plan.
- **Basic Medical Tests Required for Construction Site:** Common medical tests for construction site workers include:
    - **Physical Examination:** Overall health assessment.
    - **Vision and Hearing Tests:** Ensuring good visual and auditory health.

- **Lung Function Test:** Assessing respiratory health.
- **Blood Pressure and Heart Rate Check:** Monitoring cardiovascular health.

- **Purpose and Importance of Vertigo Test:** A vertigo test assesses a worker's balance and susceptibility to dizziness, which is crucial for working at heights. Vertigo can lead to accidents and falls, making this test vital for maintaining site safety.
- **Types and Benefits of Basic Ergonomic Principles:** Ergonomic principles for construction tasks include proper lifting techniques, maintaining neutral body positions, and using suitable tools. Benefits include reducing strain, preventing musculoskeletal injuries, and enhancing overall worker well-being.
- **Demonstrating Use of PPEs:** Proper PPE usage involves:
  - Selection: Choose the appropriate PPE for the task.
  - Fitting: Ensure PPE fits correctly and comfortably.
  - Wearing: Wear PPE consistently throughout the task.
  - Adjusting: Make necessary adjustments for comfort and effectiveness.
  - Maintaining: Regularly inspect and maintain PPE to ensure it functions properly.
- Using PPE correctly safeguards workers from potential hazards like head injuries, respiratory issues, and more, contributing to a safer work environment for Fabricator.

Activity -1

Conduct a role play activity on following emergency procedure in case of accidental fire at work place.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Ask two persons who are very much interactive to participate in the role play.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub Activity	Time	Resources
Start the fire alarm	1 hour	Stationary items, Fire extinguisher, wood and paper pieces, match box
Use fire extinguisher	6 hours	
Call for medical help and carryout primary first aid for the injured person	2 hours	
Instruct co-workers to gather at the collection point	2 hours	

Table 7.2.1 - General safety at a construction site

Specific Instructions

- Select four persons from the group.
- Name the persons selected as Peron A, B, C and D.
- Explain and demonstrate the method to perform the sub activities.
- Consider Person A to be a Fabricator and the rest are co-workers.
- Start the role play and check whether it is happening as per the plan.
- Guide closely wherever needed.
- Complete the activity as per scheduled time.
- Ask the watching group to explain the steps that are performed.
- Clarify doubts, if any.

Activity -2

Conduct a skill practice activity on using ladder safely at heights with proper PPE.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- List and explain the safety guidelines followed at heights.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Sub Activity	Time	Resources
Practice wearing PPE	2 hours	Ladder, PPE
Erect the ladder	2 hours	
Practice climbing the ladder safely	2 hours	

Table 7.2.2 – Working at heights

Specific Instructions

- Show the PPE matrix that has to be followed at a construction site.
- Demonstrate the standard procedure for wearing the PPE.
- Demonstrate the important checks that are to be performed while erecting the ladder.
- Ask the participants to practice wearing PPE, check and ensure that there is no deviation of standard procedure.
- Ask the participant to practice using ladder.
- Guide and correct the participants wherever necessary.
- List the advantages of using PPE.
- Clarify doubts, if any.

Notes

Unit 7.3 - Hygiene and Safe Waste Disposal Practices

Unit Objectives

After 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

Resources to be used

- **Theory**
    - **Training Kit -** Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
    - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Explain the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
- Describe the importance of housekeeping works
- Discuss the safe housekeeping practices and ask them to follow
- Explain different types of waste at construction sites and their disposal method
- Explain safe waste disposal practices followed at construction site

Notes for facilitation

- Use the Fabricator PHB and refer unit 7.3 to explain Hygiene and Safe Waste Disposal Practices.
- **Personal Hygiene:** Maintaining personal hygiene involves practices such as washing hands before and after work, wearing clean and appropriate clothing, and using personal protective equipment (PPE) to prevent contamination and protect oneself from hazards.
- **Workplace Hygiene:** Workplace hygiene includes keeping work areas clean, organized, and free from hazards. Regular cleaning of tools, equipment, and surfaces helps prevent accidents, maintain efficiency, and promote a healthy work environment.
- **Site Sanitization:** Site sanitization involves cleaning and disinfecting shared areas to prevent the spread of germs and ensure a safe working environment. This is especially important in light of health concerns and global events.
- **Importance of Housekeeping Works:** Housekeeping works are crucial in the construction industry for several reasons:
    - **Safety:** A clean and organized workspace reduces the risk of slips, trips, falls, and other accidents.
    - **Efficiency:** Proper organization of tools, materials, and equipment improves work efficiency.
    - Prevention: Regular cleaning prevents the buildup of dust, debris, and potential fire hazards.
    - **Morale:** A clean and organized work environment boosts worker morale and job satisfaction.
- **Safe Housekeeping Practices:**
    - **Daily Clean-up:** Clean-up work areas at the end of each day to ensure a fresh start the next day.
    - **Tool Storage:** Properly store tools, equipment, and materials after use to prevent tripping hazards and damage.
    - **Waste Disposal:** Dispose of waste properly and promptly to prevent clutter and hygiene issues.
- **Different Types of Waste at Construction Sites and Their Disposal:**
    - **General Waste:** Regular construction debris like paper, packaging, and non-hazardous materials.
    - **Hazardous Waste:** Includes chemicals, solvents, paints, and materials that pose health or environmental risks.
    - **Electronic Waste:** Old or broken electronic equipment, requiring proper disposal due to environmental concerns.
- **Safe Waste Disposal Practices at Construction Site:**
    - Separation: Segregate waste into different categories for appropriate disposal.
    - Labelling: Clearly label hazardous waste containers to prevent accidents.
    - **Storage:** Store waste in designated areas to avoid contamination and health hazards.
    - **Legal Compliance:** Follow local regulations and guidelines for waste disposal.
- Maintaining personal and workplace hygiene, implementing proper housekeeping practices, and ensuring safe waste disposal contribute to a safer and more organized construction site environment, benefitting both workers and the overall project.

Activity

Safe Disposal of Waste

Conduct a role play activity.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Ask two persons who are very much interactive to participate in the role play.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub Activity	Time	Resources
Practice wearing PPE	1 hour	Waste containers, masonry pan, sample construction waste
Segregate the Wastes	2 hours	
Dispose the waste in the allocated container	2 hours	

Table 7.3.1 – Safe disposal of waste

Specific Instructions

- Ensure the participants are wearing the PPE properly.
- Select two persons from the group who are effective in communication
- Consider one as helper and the other as mason, now ask the helper to deposit the waste in one location and place the containers at another location.
- Ask the mason to instruct the helper to segregate or differentiate the type of wastes
- Then ask the mason to tell the helper to transfer the segregated waste with the help of masonry pan.
- Ensure that both the persons communicate properly by giving hints in between.
- Tell them to complete the activity on the speculated time and ensure that the wastes are properly placed in the containers and it is secured properly.

Notes

Unit 7.4: Infectious Disease and Its Cure

Unit Objectives

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

- Know different types of infectious disease that can spread/ originate at a construction site
- Understand the ways of transmission of the various infectious disease.
- Recognize the methods to check the spread of the infectious disease.
- Understand the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Clarify different types of infectious disease that can spread/ originate at a construction site
- Explain the ways of transmission of the various infectious disease.
- Mention the methods to check the spread of the infectious disease.
- Explain the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Notes for facilitation

- Use the Fabricator PHB and refer unit 7.4 to explain Infectious Disease and Its Cure.
- Infectious diseases that can spread or originate at construction sites include:
  - **Respiratory Infections:** Such as the flu, common cold, and COVID-19.

- **Skin Infections:** Like bacterial infections, fungal infections, and rashes.
- **Gastrointestinal Infections:** Including foodborne illnesses due to poor hygiene.
- **Vector-Borne Diseases:** Like mosquito-borne diseases (e.g., Zika, dengue) due to stagnant water.

- **Ways of Transmission of Infectious Diseases:**
  - **Airborne Transmission:** Respiratory infections can spread through respiratory droplets released when an infected person coughs, sneezes, or talks.
  - **Direct Contact:** Skin infections can be transmitted through direct skin-to-skin contact or contact with contaminated surfaces.
  - **Fecal-Oral Route:** Gastrointestinal infections can spread through contaminated food, water, or surfaces.
  - **Vector-Borne Transmission:** Insects like mosquitoes can carry and transmit diseases from person to person.
- **Methods to Check the Spread of Infectious Diseases:**
  - **Hand Hygiene:** Regularly washing hands with soap and water or using hand sanitizers.
  - **Respiratory Hygiene:** Covering mouth and nose when coughing or sneezing.
  - **Personal Protective Equipment (PPE):** Wearing appropriate PPE like masks and gloves.
  - **Disinfection:** Regularly cleaning and disinfecting surfaces and shared equipment.
- **Understanding Symptoms and Cure of Infectious Diseases:**
  - **Respiratory Infections:** Symptoms include fever, cough, sore throat, and shortness of breath. Treatment includes rest, fluids, and in severe cases, medical attention.
  - **Skin Infections:** Symptoms include redness, swelling, itching, and rashes. Treatment depends on the type of infection and may involve antibiotics or antifungal medications.
  - **Gastrointestinal Infections:** Symptoms include nausea, vomiting, diarrhea, and abdominal pain. Treatment involves staying hydrated and in severe cases, medical intervention.
  - **Vector-Borne Diseases:** Symptoms vary based on the disease. Treatment ranges from supportive care to specific antiviral or antibiotic medications.
- **Reporting Infectious Disease Outbreaks to Concerned Authorities:**
  - **Immediate Reporting:** If an infectious disease outbreak is suspected, immediately inform your supervisor, manager, or the designated health and safety personnel.
  - **Follow Protocols:** Follow the organization's protocols for reporting infectious diseases or pandemics, including informing co-workers who may have been exposed.
  - **Health Authorities:** If necessary, local health authorities should be contacted to ensure proper containment and response.
- Understanding, preventing, and reporting infectious diseases is crucial to maintaining a healthy and safe working environment in the Masonry industry. It protects both workers and the community from potential health risks.

Say

Let's participate in a practical activity focused on the reporting procedures that a Fabricator should follow in the event of an infectious disease outbreak. This activity highlights the critical importance of swift and accurate reporting to maintain the health and safety of everyone on the construction site.

Activity

- **Purpose:** This activity aims to provide Fabricators with hands-on experience in understanding and practicing the reporting procedures necessary for responding effectively to infectious disease outbreaks.
- **Resources Required:** Scenario cards depicting infectious disease outbreak situations, writing materials.
- **Tentative Duration:** 45 Minutes
- **Procedure:**
    - **Introduction:** Begin by discussing the vital role of immediate and accurate reporting during infectious disease outbreaks to safeguard the health of all individuals on the construction site.
    - **Scenario Distribution:** Distribute scenario cards, each portraying a distinct infectious disease outbreak situation, to participants.
    - **Immediate Reporting Role Play:**
        - Form pairs among participants.
        - **Assign roles:** one participant as the Fabricator and the other as the supervisor or health and safety personnel.
        - Fabricators practice promptly informing their supervisor or designated personnel about the infectious disease outbreak in their assigned scenario.
    - **Discussion on Protocol Adherence:**
        - Gather participants for a discussion about the organization's protocols for reporting infectious diseases or pandemics.
        - Emphasize the importance of following these protocols for effective containment.
    - **Health Authorities Interaction Exercise:**
        - Present a scenario requiring interaction with local health authorities.
        - Participants engage in role-play, contacting health authorities if necessary to ensure proper response and containment measures.
    - **Group Discussion and Sharing:**

- Participants share their experiences and insights from the role-playing exercises.
- Facilitate a discussion on challenges faced and the significance of accurate reporting during infectious disease outbreaks.

o **Reflection and Conclusion:**

- Engage participants in reflecting on the critical role of reporting procedures in safeguarding the health of the construction site community.
- Summarize the key takeaways and underline the importance of swift reporting and following established protocols.

- **Expected Outcome:** Through this activity, Fabricators will gain practical understanding of reporting infectious disease outbreaks. They will recognize the significance of immediate reporting, protocol adherence, and cooperation with health authorities in ensuring the safety and health of themselves and their colleagues on the construction site.

Exercise

Key Solutions to PHB Exercise

Short Questions:

1. Effective communication is essential in construction job roles to ensure that tasks, instructions, and safety protocols are understood and followed, preventing errors, delays, and accidents.
2. The consequences of poor teamwork on project outcomes and safety at a construction site can include project delays, compromised quality, reduced efficiency, increased safety risks, and potentially higher costs.
3. Work-related information can be passed on clearly to team members by using concise and structured communication methods, such as written instructions, diagrams, or verbal explanations, ensuring that critical details are not omitted or misunderstood.
4. Different modes of communication used in the workplace include verbal communication (spoken or face-to-face), written communication (emails, reports), visual communication (diagrams, charts), and digital communication (instant messaging, video conferences).
5. Creating a healthy and cooperative work environment among gangs of workers is important because it fosters efficient collaboration, enhances productivity, improves worker morale, and can lead to safer and more successful construction projects.

Fill-in-the-Blanks:

A. Effective communication ensures that project goals and tasks are understood by everyone.

B. Poor teamwork can lead to delays, compromised quality, and increased safety risks.

C. To ensure clarity, it's essential to provide work-related information to team members in a concise manner.

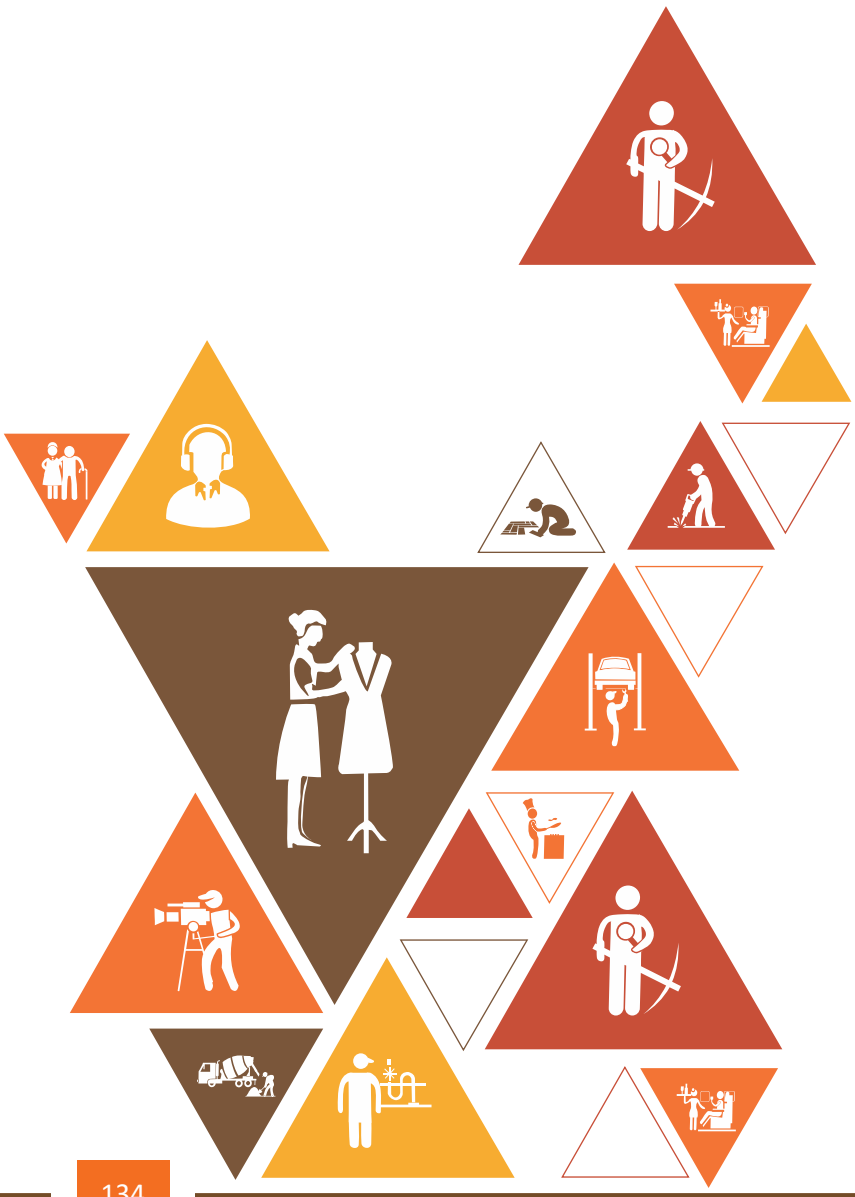
D. Communication modes include verbal, written, visual, and digital forms.

E. Creating a cooperative work environment fosters efficient collaboration and unity among workers.

True/False Questions:

1. **False:** Effective communication is important for all job roles in construction, not just supervisory roles.
2. **False:** Poor teamwork can significantly affect project timelines and safety on a construction site.
3. **False:** Passing on work-related information is crucial for effective coordination and understanding among team members.
4. **False:** Communication modes in the workplace encompass various forms, including verbal, written, visual, and digital.
5. **True:** A cooperative work environment can indeed enhance productivity and worker morale, leading to better outcomes.

Notes



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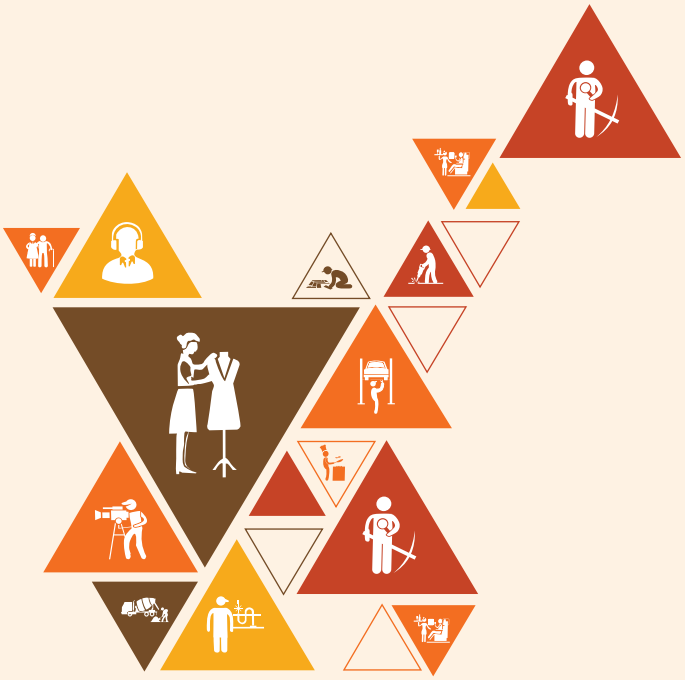
8. Employability Skills (60 Hours)

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

Scan the QR code below to access the ebook



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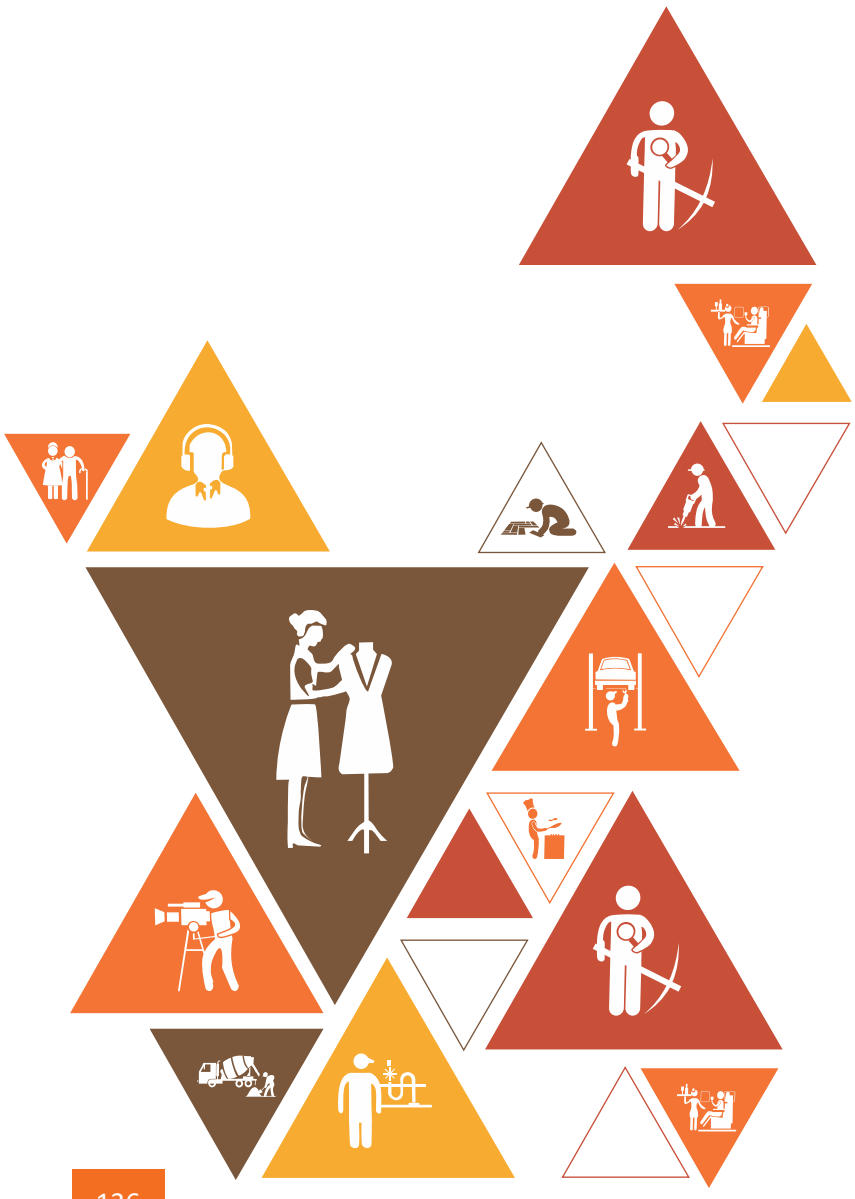

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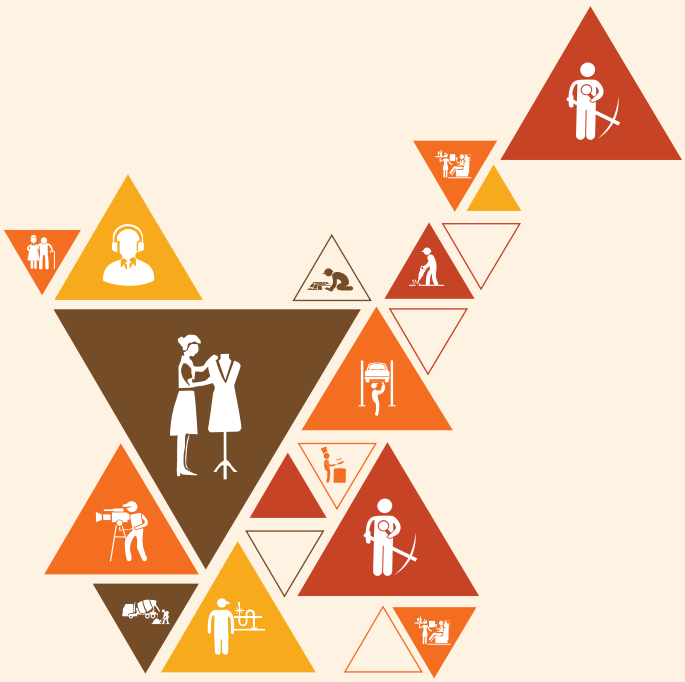
9. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - QR Codes –Video Links



Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	**Fabricator**		
Qualification Pack Name & Ref. ID	Fabricator, CON/Q1206		
Version No.	4	**Version Update Date**	31/03/2022
Prerequisites to Training (if any)	11th grade pass OR Completed 1st year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 1-year NTC/ NAC OR 8th grade pass plus 2-year NTC plus 1 Year NAC (relevant experience) OR 10th grade pass with 2 Years of experience relevant experience OR 10th grade pass and pursuing continuous schooling OR 5th Grade pass OR No formal education prescribed		
Training Outcomes	**After completing this program, participants will be able to:** • Inspect the fabrication materials and conduct their surface cleaning • Conduct joint preparation, connection activities and repair work in fabricated assemblies • Erect structural steel assemblies at construction sites • Work effectively in a team to deliver desired results at the workplace • Work according to personal health, safety and environment protocols at construction site • Employability Skills (60 Hours)		

Sl. No.	Module	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/ Aids	Duration (hours)
1	Introduction of Construction Sector and Fabricator Job Role T- 06:00 (HH: MM)	1. Overview of Construction Industry	• Understand the size and scope of the construction industry and its sub-sectors	CON/ N1210; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13. KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19. GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	T- 02:00
		2. Duties of a Fabricator	• Understand the role and responsibilities of a Fabricator				T- 02:00
		3. About Fabricating Occupation	• Recall the basic terms used in bar fabricating occupation				T- 01:00
		4. Career Progression options for Fabricator	• Explain the career progression options of a Fabricator				T- 01:00
2	Core/Generic Skills T- 04:00 (HH: MM)	1. Metric and Imperial Conversion Mastery	• To empower Learners with the capability to seamlessly and accurately convert between metric and imperial measurement systems, enhancing their versatility in construction.		Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Measurement tape	T- 02:00
		2. Exploring Geometric Shapes in Construction	• To provide Learners with a comprehensive grasp of geometric principles and shapes, enabling them to make informed decisions and excel in construction tasks.				T- 02:00

3	Inspect the fabrication materials and conduct their surface cleaning T- 11:00 P- 39:00 (HH: MM)	1. Introduction to Blueprint & Drawings Interpretation	• Trainees will develop the ability to read and interpret construction blueprints and drawings accurately, enabling effective communication and project planning.	CON/ N1210; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13. KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19. GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9	Classroom lecture, games, group participation, group activity, Charts and displays regarding MIG and SMAW welding	Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags	T- 01:00 P- 02:00
		2. Scale and Dimension Reading Techniques	• Trainees will master scale reading techniques to ensure precise dimension measurements in construction drawings, supporting accurate component sizing and placement.				T- 01:00 P- 04:00
		3. Introduction to Steel Components in Fabrication	• Trainees will gain a comprehensive understanding of various steel components commonly used in construction fabrication, allowing them to make informed decisions in component selection and application.				T- 01:00 P- 04:00
		4. Component Identification and Specifications	• • Trainees will learn to identify and select steel components based on project specifications and drawings, ensuring compliance with project requirements.				T- 01:00 P- 04:00
		5. Introduction to Material Handling	• Trainees will acquire safe and efficient material handling techniques, prioritizing workplace safety and the prevention of injuries and material damage.				T- 01:00 P- 02:00
		6. Processing Techniques i.e. Grinding, Welding, Cutting, etc.	• Trainees will develop proficiency in various processing techniques, including grinding, welding, cutting, and more, enabling them to choose and apply the appropriate method based on project needs and material characteristics.				T- 01:00 P- 04:00

		7. Marking Procedures and Standards	• Trainees will understand and apply marking procedures and industry standards with precision, ensuring accurate component identification and alignment.				T- 01:00 P- 04:00
		8. Quality Assurance in Fabrication	• Trainees will grasp the importance of quality assurance in construction fabrication, emphasizing its impact on structural integrity, and will apply quality control methods and adhere to industry standards to produce high-quality fabricated components.				T- 01:00 P- 04:00
		9. Inspecting Surface Impurities in Construction Fabrication	• Trainees will develop the skill to inspect surfaces for impurities, contributing to the overall quality of construction fabrication by identifying and addressing surface imperfections.				T- 01:00 P- 03:00
		10. Estimate the Quantities of the Materials required for the Surface Cleaning Purpose	• Trainees will accurately estimate material quantities required for surface cleaning and preparation in construction fabrication, enhancing resource planning and allocation.				T- 01:00 P- 04:00
		11. Confirming Compliance of Prepared Clean Surfaces in Construction Fabrication	• Trainees will inspect and confirm the compliance of cleaned surfaces with project specifications and cleanliness standards, ensuring that prepared clean surfaces meet the required quality criteria for construction fabrication.				T- 01:00 P- 04:00

4	Conduct joint preparation, connection activities and repair work in fabricated assemblies T- 45:00 P- 105:00 (HH: MM)	1. Terminologies, Drawings, and Symbols relevant to Fabrication Work	• Gain proficiency in interpreting and applying relevant terminologies, drawings, and symbols crucial for steel fabrication work.	CON/ N1211; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20,KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19. GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9	Classroom lecture, games, group participation, group activity, Charts and displays regarding MIG and SMAW welding	Drilling machine with bits,Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Grinding tools and accessories, Pliers, Files, Temperature gun/ chalk, Clamps and anchors, Vices, Forklift, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, metric tape, line dori, scale, welding gauge, hammer, punch, Safety Helmet, Safety goggles, Safety shoes, Safety belt, gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags	T- 03:00 P- 05:00
		2. Parts and Components of Welding Equipment and their Functions	• Understand the essential components of welding equipment and their functions, enabling effective operation in the fabrication process.				T- 03:00 P- 06:00
		3. Welding and Bolting Methods and their Applications	• Differentiate between welding and bolting methods, comprehending their specific applications and advantages in construction projects.				T- 03:00 P- 06:00
		4. Positions and Patterns of Welding	• Acquire the ability to recognize and execute appropriate welding positions and patterns based on construction requirements.				T- 02:00 P- 06:00
		5. Concept of Customisation of Jigs and Fixtures	• Grasp the concept of customizing jigs and fixtures for precise component alignment and fabrication efficiency.				T- 02:00 P- 06:00
		6. Procedures involved in Edge/Joint Preparation during the Fabrication of a Steel Structure	• Master the procedures involved in edge/joint preparation, a critical step in ensuring strong and secure connections in steel structures.				T- 02:00 P- 06:00
		7. Requirements for the Preparation of Fabrication Bed/Platform in Construction	• Identify the key prerequisites for creating a proper fabrication bed/platform in construction, ensuring a stable and safe working environment.				T- 03:00 P- 05:00
		8. Demonstrating Clamping and Anchoring of Sections/ Workpieces to the Fabrication Platform/Bed	• Demonstrate expertise in clamping and anchoring techniques for securing sections/ workpieces effectively to the fabrication platform/ bed.				T- 03:00 P- 06:00

		9. Estimation of the Quantities of Consumables, Tools, and Equipment required for Edge/Joint Preparation	• Develop the skill to estimate quantities of consumables, tools, and equipment needed for efficient edge/ joint preparation in fabrication projects.				T- 03:00 P- 06:00
		10. Demonstrating Methods for Measuring and Marking Sections for Edge Preparation	• Illustrate the methods for accurate measurement and marking of sections, guaranteeing precision in edge preparation.				T- 02:00 P- 06:00
		11. Demonstrating the Process of Edge Preparation in Construction Fabrication	• Proficiently execute the process of edge preparation in construction fabrication, ensuring the highest standards of quality.				T- 02:00 P- 06:00
		12. Demonstrating Welding/ Bolting to Connect Two Components/ Assemblies in Construction Fabrication	• Demonstrate the proficiency to perform welding and bolting, effectively connecting two components/ assemblies in construction fabrication.				T- 02:00 P- 06:00
		13. Concept of Root Gaps in Joint Preparation	• Understand the significance of root gaps in joint preparation and their impact on welding quality.				T- 03:00 P- 05:00
		14. Concept of Material Shrinkage in Welding	• Comprehend the concept of material shrinkage during welding processes and its implications for fabrication.				T- 03:00 P- 06:00
		15. Various Types of Defects in Fabricated Components	• Recognize various types of defects that may arise in fabricated components and understand the measures to address them.				T- 03:00 P- 06:00

		16. Methods for Rectifying Defects in Fabricated Assemblies	• Learn the methods for rectifying defects in fabricated assemblies, ensuring the quality and integrity of the final product.				T- 02:00 P- 06:00
		17. Use of Tools, Equipment, and Consumables in Repair Work	• Utilize tools, equipment, and consumables effectively in repair work, contributing to the restoration of defective components.				T- 02:00 P- 06:00
		18. Demonstration of Corrective Operations for Repairing a Defective Component/ Assembly	• Demonstrate corrective operations for repairing defective components/ assemblies in construction fabrication, maintaining project timelines and quality standards.				T- 02:00 P- 06:00
5	Erect Structural Steel Assemblies at Construction Sites T- 36:00 P- 84:00 (HH: MM)	1. Understanding Basic Sketches and Schematic Drawings for Rigging Works	• Trainees will develop the ability to interpret and explain basic sketches and schematic working drawings related to rigging operations, facilitating effective communication and planning within the team.	CON/ N0717; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14. GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9, GS10	Classroom lecture, games, group participation, group activity, Charts and displays regarding MIG and SMAW welding	Stud Wrenches, Open-End Wrenches, Crescent Wrenches, Hammer, Nibbler, pliers, Drilling machine with bits, Electric screw gun, Power hexa saw, Welding tools and accessories, Gas cutting tools and accessories, Measuring tape, Plumb Bob, Spirit level, Chalks line, Try square, Water level, Tower crane, Mobile crane, Forklift, Scissor lift, Hydraulic	T- 02:00 P- 04:00
		2. Interpreting Lifting Plans and Schedules	• Trainees will master the skill of interpreting lifting plans and schedules, ensuring the safe and efficient execution of rigging activities in accordance with project requirements.				T- 02:00 P- 04:00
		3. Precautions and Measures in Lifting Heavy Components	• Trainees will gain a comprehensive understanding of the precautions and measures essential for the safe lifting and movement of heavy components and materials during rigging operations, prioritizing workplace safety.				T- 02:00 P- 05:00

		4. Installation of Shoring, Bracing, and Guying Materials	• Trainees will acquire proficiency in the installation of shoring, bracing, and guying materials, enabling them to provide structural support and stability as required in rigging tasks.			jacks, Electric Wire Rope Hoist, Electrical winch, Electrical chain hoist, derrick, Lifting accessories, Belts, Slings, Wire ropes, Shackles, Spreader board, Chain, Link, Eye hook, Eye bolts, Bull dog grips, Clamp, socket, Safety Helmet , Safety goggles , Safety shoes, Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags PPT Required Tools & Equipments	T- 02:00 P- 05:00
		5. Rigging Equipment and Tools	• Trainees will learn about the various types of rigging equipment and tools used in the construction industry, their applications, and safety protocols for their use.				T- 02:00 P- 05:00
		6. Rigging Safety Procedures	• Trainees will understand and apply safety procedures specific to rigging activities, emphasizing the importance of a secure and hazard-free work environment.				T- 02:00 P- 05:00
		7. Placing Steel Assemblies/ Components and Making Adjustments in Structural Steel Erection	• Trainees will acquire the skills necessary to accurately place steel assemblies and components during structural steel erection and make precise adjustments to ensure proper alignment and fit.				T- 02:00 P- 04:00
		8. Understanding Applicable Tolerances in Structural Steel Erection	• Trainees will gain a comprehensive understanding of the tolerances applicable in structural steel erection, allowing them to work within specified limits and maintain alignment and structural integrity.				T- 02:00 P- 04:00
		9. Sequence of Erection Works in Structural Steel Assembly	• Trainees will grasp the correct sequence of erection works in structural steel assembly, enabling them to plan and execute each step efficiently while adhering to safety and quality standards.				T- 02:00 P- 05:00

		10. Ensuring Base Readiness for Structural Steel Erections	• Trainees will learn how to assess and ensure the readiness of the base or foundation for structural steel erections, promoting a stable and secure foundation for construction activities.				T- 02:00 P- 05:00
		11. Alignment and Positioning Checks for Erected Elements	• Trainees will develop the skills to perform alignment and positioning checks on erected steel elements, ensuring they meet design specifications and project requirements.				T- 02:00 P- 05:00
		12. Demonstrating Proper Alignment of Erected Steel Assembly/ Component	• Trainees will demonstrate the ability to achieve proper alignment of erected steel assemblies or components, contributing to the structural stability and safety of the overall construction project.				T- 02:00 P- 05:00
		13. Installation of Temporary Connections	• Trainees will acquire the skills and knowledge needed to safely and effectively install temporary connections using the appropriate tools, ensuring structural integrity during construction.				T- 02:00 P- 0:00
		14. Tightening Bolted Connections	• Trainees will master the art of tightening bolted connections to the specified tolerance and torque using an appropriate torque wrench, ensuring the reliability and stability of assembled components.				T- 02:00 P- 04:00
		15. Communication with the Signalman or Operator	• Trainees will develop effective communication skills to collaborate seamlessly with signalmen or operators, facilitating precise and controlled movements of assemblies during construction operations.				T- 02:00 P- 05:00

		16. Rigging Work with Basic Sketches and Schematic Drawings	• Trainees will gain the ability to understand and interpret basic sketches and schematic working drawings relevant to rigging works, enabling them to plan and execute rigging operations accurately.				T- 02:00 P- 05:00
		17. Interpreting Lifting Plans and Schedules	• Trainees will be proficient in interpreting lifting plans and schedules, allowing them to coordinate and execute lifting operations efficiently, while prioritizing safety and adherence to project timelines.				T- 02:00 P- 05:00
		18. Precautions in Lifting and Movement	• Trainees will understand and implement essential precautions and measures required for the safe lifting and movement of heavy components and materials, mitigating risks and ensuring a secure work environment.				T- 02:00 P- 05:00
6	Work effectively in a team to deliver desired results at the workplace T- 09:00 P- 21:00 (HH: MM)	1. Roles and Responsibilities in the Workplace	• By the end of this session, learners should be able to elucidate their own roles and responsibilities within the construction project, ensuring a clear understanding of their individual contributions to the team.	CON/ N8001; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12 GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
		2. Effective Communication at the Workplace	• The goal of this session is for learners to explain the importance of effective communication in a construction setting, highlighting its impact on project success, safety, and efficiency.				T- 01:00 P- 02:00

		3. Teamwork and Problem Reporting	• After this session, learners should be able to demonstrate the ability to effectively communicate work-related information to team members and show how to report any unresolved problems or issues to their supervisor promptly, fostering a culture of collaboration and timely issue resolution in the workplace.			T- 01:00 P- 02:00
		4. Creating a Cooperative Work Environment	• By the end of this session, learners should be able to explain the importance of fostering a healthy and cooperative work environment among gangs of workers, promoting teamwork and collaboration on construction projects.			T- 01:00 P- 02:00
		5. Knowledge Sharing and Effective Communication	• The goal of this session is for learners to elucidate techniques related to work methods, material properties, tools, tackles, and safety standards that co-workers might need, emphasizing the importance of sharing knowledge and information for improved project quality, safety, and efficiency.			T- 01:00 P- 02:00
		6. Synchronized Work and Support	• After this session, learners should be able to demonstrate the ability to work together in a synchronized manner with co-workers, support colleagues facing problems, and efficiently hand over required materials, tools, equipment, and work fronts to interfacing teams, ensuring seamless project operations and problem resolution.			T- 01:00 P- 02:00

		7. Understanding Gender Equality	• By the end of this session, learners should have a fundamental understanding of the concept of gender equality, including its importance, principles, and relevance in the workplace.			T- 01:00 P- 02:00
		8. Promoting Diversity and Inclusion	• The goal of this session is to explain how to recognize and be sensitive to issues related to disability, culture, and gender, fostering an inclusive and respectful work environment.			T- 01:00 P- 02:00
		9. Gender Sensitivity in the Workplace	• In this session, learners will discuss legislation, policies, and procedures related to gender sensitivity and cultural diversity, and understand their impact on the workplace, ensuring compliance with relevant regulations and organizational standards.			T- 01:00 P- 02:00
		10. Implementing Inclusive Practices	• After this session, learners should be able to demonstrate effective implementation of gender-neutral practices in the workplace, promoting diversity, and ensuring that all employees are treated fairly and equitably. Additionally, they should be able to address discriminatory and offensive behavior professionally and in accordance with organizational policy.			T- 00:00 P- 03:00

7	Follow safety norms as defined by organization, adopt healthy and safe work practices T- 09:00 P- 21:00 (HH: MM)	1. Types of hazards at the construction sites and identify the hazards specific to the domain related works	• • Understand and categorize various types of hazards commonly found at construction sites, including physical, chemical, biological, and ergonomic hazards. • Identify hazards specific to the domain-related works being carried out, such as electrical hazards for electricians or fall hazards for roofers. • Recognize the potential risks associated with each hazard and their impact on worker safety.	CON/ N9001; PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19 GS1, GS2, GS3, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety goggles, Nose mask, Ear protection, Safety tags, Safety Notice board	T- 02:00 P- 01:00
		2. Recognize the safety control measures and actions to be taken under emergency situation	• Familiarize oneself with safety control measures and precautions to mitigate identified hazards. • Learn the actions to be taken under emergency situations, including evacuation procedures, first aid response, and alerting the appropriate authorities. • Understand the importance of quick and effective responses in emergency scenarios to minimize harm and property damage.				T- 01:00 P- 01:00
		3. Reporting procedure to the concerned authority in case of emergency situations	• Comprehend the step-by-step reporting procedure to inform the concerned authorities in the event of emergencies, accidents, or hazardous incidents. • Learn how to provide accurate and timely information, including location, nature of the emergency, and the number of individuals affected.				T- 00:00 P- 01:00

		4. The classes of fire and types of fire extinguishers	• Explore the different classes of fires (e.g., Class A, B, C, D, and K) and their characteristics. • Identify the suitable types of fire extinguishers corresponding to each fire class and their appropriate use.				T- 02:00 P- 01:00
		5. The operating procedure of the fire extinguishers	• Understand the step-by-step procedure for safely operating fire extinguishers, including pulling the pin, aiming at the base of the fire, squeezing the handle, and sweeping from side to side. • Learn when and how to use fire extinguishers effectively to suppress fires and prevent their spread.				T- 01:00 P- 01:00
		6. The importance of participation of workers in safety drills	• Recognize the significance of active participation in safety drills and training exercises. • Understand how safety drills enhance preparedness and ensure that workers know how to respond during emergencies.				T- 01:00 P- 01:00
		7. Basic medical tests required for working at construction site	• Identify the essential medical tests that may be required before starting work at a construction site, such as physical examinations, vision tests, hearing tests, and drug screenings. • Understand how these tests contribute to worker health and safety.				T- 01:00 P- 01:00

		8. Purpose and importance of vertigo test at construction site	• Learn about vertigo tests and their relevance in assessing a worker's balance and coordination, especially for tasks involving heights. • Understand how vertigo tests help prevent accidents related to dizziness or loss of balance.				T- 00:00 P- 01:00
		9. Types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites	• Explore various ergonomic principles applicable to specific tasks at construction sites, such as proper lifting techniques, posture, and equipment adjustments. • Understand the benefits of adopting ergonomic practices, including reduced risk of musculoskeletal injuries and increased productivity.				T- 00:00 P- 01:00
		10. Use of PPEs as per work requirements	• Identify the specific PPE items required for different work conditions and tasks, such as helmets, safety goggles, ear protection, gloves, and respiratory protection. • Learn when and how to correctly wear and use PPE to safeguard against workplace hazards.				T- 00:00 P- 01:00
		11. Follow the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization	• Understand the importance of personal hygiene and the role it plays in preventing the spread of illnesses in the workplace. • Learn about best practices for maintaining cleanliness in the workplace, including sanitization measures to reduce health risks.				T- 02:00 P- 01:00

		12. The importance of housekeeping works	• Recognize the significance of housekeeping in maintaining a safe and organized work environment. • Understand how proper housekeeping practices contribute to accident prevention, improved efficiency, and overall site safety.			T- 01:00 P- 01:00
		13. Keep an eye on safe housekeeping practices	• Learn how to proactively observe and ensure the implementation of safe housekeeping practices at construction sites. • Identify potential hazards related to housekeeping and take corrective actions or report issues to maintain a safe working environment.			T- 00:00 P- 01:00
		14. Different types of waste at construction sites and their disposal method	• Identify various types of waste generated at construction sites, including non-combustible scrap, combustible debris, general construction waste, and hazardous materials. • Understand the appropriate disposal methods for each waste type, including recycling, landfill disposal, and hazardous waste disposal.			T- 00:00 P- 01:00
		15. Know safe waste disposal practices followed at construction site	• Familiarize oneself with safe waste disposal practices and regulations governing waste management at construction sites. • Learn how to segregate, handle, and dispose of different types of waste materials in compliance with environmental standards.			T- 00:00 P- 01:00

		16. Different types of infectious disease that can spread/ originate at a construction site	• Learn about various infectious diseases that can potentially spread or originate at construction sites, including respiratory infections, skin diseases, and vector-borne diseases. • Understand the health risks associated with infectious diseases and their potential impact on the workforce.				T- 02:00 P- 01:00
		17. The ways of transmission of the various infectious disease	• Explore the different modes of transmission for infectious diseases, such as direct contact, airborne transmission, and vector-borne transmission. • Recognize how infectious diseases can spread among workers and the importance of preventive measures.				T- 01:00 P- 01:00
		18. Methods to check the spread of the infectious disease	• Learn effective methods and preventive measures to control the spread of infectious diseases at construction sites, including vaccination programs, hygiene practices, and sanitation measures. • Understand the role of personal and collective responsibility in disease prevention.				T- 00:00 P- 01:00
		19. Symptoms and cure of the various infectious disease	• Identify common symptoms associated with infectious diseases and the importance of early detection. • Gain knowledge about available treatments, preventive measures, and the importance of seeking medical attention when symptoms arise.				T- 00:00 P- 01:00

		20. Procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic	• • Understand the procedure for promptly reporting outbreaks or hazards related to infectious diseases to the concerned authorities. • Learn how to provide essential information and follow reporting protocols during a disease-related emergency or pandemic.				T- 00:00 P- 02:00
8	Employability Skills (60 Hours)	1. Introduction to Employability Skills	• Discuss the Employability Skills required for jobs in various industries. • List different learning and employability related GOI and private portals and their usage.	DGT/VSQ/ N0102, PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22, PC23, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19 GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9	Classroom lecture, games, group participation, group activity, field visit	Handbook	2
		2. Constitutional values - Citizenship	• Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen. • Show how to practice different environmentally sustainable practices.				2
		3. Becoming a Professional in the 21st Century	• Discuss importance of relevant 21st century skills. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. • Describe the benefits of continuous learning.				2

		4. Basic English Skills	• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone. • Read and interpret text written in basic English. • Write a short note/ paragraph / letter/e -mail using basic English.				4
		5. Career Development & Goal Setting	• By the end of this training, participants should be able to prepare a comprehensive career development plan that distinguishes between a job and a career and outlines short- and long-term goals based on their aptitude.				4
		6. Communication Skills	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication. • Discuss the significance of working collaboratively with others in a team.				4
		7. Diversity & Inclusion	• Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD. • Discuss the significance of escalating sexual harassment issues as per POSH act.				2

		8. Financial and Legal Literacy	• Outline the importance of selecting the right financial institution, product, and service. • Demonstrate how to carry out offline and online financial transactions, safely and securely. • List the common components of salary and compute income, expenditure, taxes, investments etc. • Discuss the legal rights, laws, and aids.			8
		9. Essential Digital Skills	• Describe the role of digital technology in today's life. • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely. • Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely. • Create sample word documents, excel sheets and presentations using basic features utilize virtual collaboration tools to work effectively.			6

		10. Entrepreneurship	• Explain the types of entrepreneurship and enterprises. • Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan. • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement. • Create a sample business plan, for the selected business opportunity.				14
		11. Customer Service	• Describe the significance of analysing different types and needs of customers. Explain the significance of identifying customer needs and responding to them in a professional manner. Discuss the significance of maintaining hygiene and dressing appropriately.				8
		12. Getting Ready for apprenticeship & Jobs	• Create a professional Curriculum Vitae (CV). • Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively.				

			• Discuss the significance of maintaining hygiene and confidence during an interview. • Perform a mock interview. • List the steps for searching and registering for apprenticeship opportunities.				4

Annexure - II

Assessment Guidelines and Assessment Weightage	
Job Role	**Fabricator**
Qualification Pack	CON/Q1206
Sector Skill Council	Construction Skill Development Council of India

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the knowledge part will be based on knowledge bank of questions created by Assessment
3	Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.
5	The passing percentage for each QP will be 50%. To pass the Qualification Pack, every trainee should score a minimum of 50% individually in each NOS.
6	The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome
7	The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
8	After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
9	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack within the specified timeframe set by SSC.
10	Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N1210 - Inspect the fabrication materials and conduct their surface cleaning	30	70	-	-	100	20

CON/N1211 - Conduct joint preparation, connection activities and repair work in fabricated assemblies	30	70	-	-	100	30
CON/N0717 - Erect structural steel assemblies at construction sites	30	70	-	-	100	30
CON/N8001 - Work effectively in a team to deliver desired results at the workplace	30	70	-	-	100	05
CON/N9001 - Work according to personal health, safety and environment protocols at construction site	30	70	-	-	100	100
DGT/VSQ/N0102 - Employability Skills (60 Hours)	20	30	0	0	50	05
Total	**170**	**380**	**0**	**0**	**550**	**100**

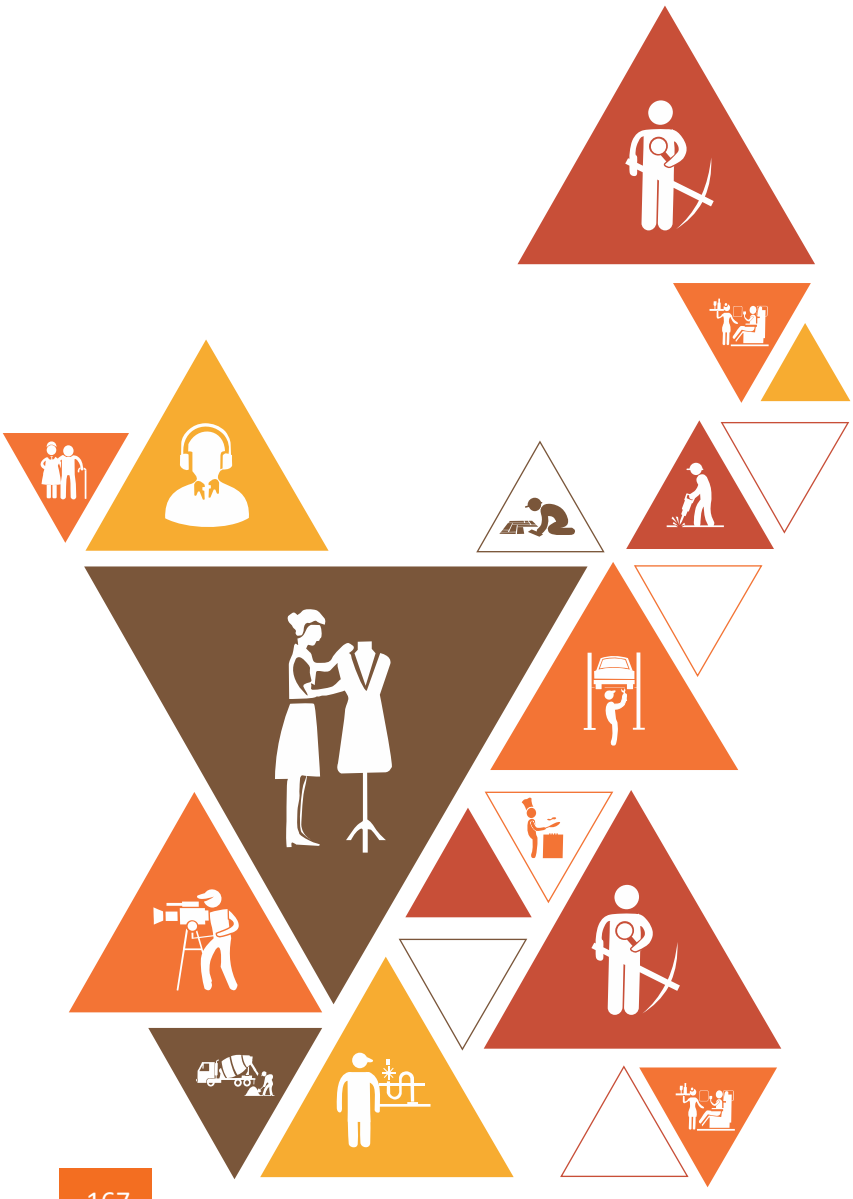
Annexure-III

Annexure of QR Codes for Fabricator

Chapter Name	Unit Name	Topic Name	URL	QR Code	Video Duration
Chapter 1: Introduction of Construction Sector and Fabricator Job Role	UNIT 1.1: Introduction to Construction Industry	Overview of Construction Sector in India	https://youtu.be/yhjDhav4Pfw	Overview of Construction Sector in India	0:13:24
	UNIT 1.2: About Fabrication Occupation	Responsibilities of Fabricator	https://youtu.be/EdRjd9Deqs	Responsibilities of Fabricator	0:01:26
Chapter 2: Core/Generic Skills	Unit 2.1 – Numeracy Skills	Different System of Measurement	https://youtu.be/H1xo5UVJKVo	Different System of Measurement	0:17:17
	Unit 2.2 – Systems of Measurements	Area, volume and perimeter of geometrical shapes	https://youtu.be/OhTubw4C0to	Area, volume and perimeter of geometrical shapes	0:16:16
Chapter 3: Inspect the Fabrication Materials and Conduct their Surface Cleaning (CON/N1210)	Unit 3.1 – Blueprint Interpretation and Material Identification	Types of Drawings in Fabrication	https://youtu.be/YbPxawXyvYE	Types of Drawings in Fabrication	0:01:03

	Unit 3.2 – Material Handling and Quality Control	Cutting, Filing, Grinding and Fitting Metal for Welding	https://youtu.be/PXmQX4rw7rM	Cutting, Filing, Grinding and Fitting Metal for Welding	0:32:18
	Unit 3.3 – Surface Cleaning and Preparation	Blast Cleaning of Steel as part of Automatic Steel Fabrication	https://youtu.be/xzW5VxmpV70	Blast Cleaning of Steel as part of Automatic Steel Fabrication	0:02:49
Chapter 4: Conduct Joint Preparation, Connection Activities and Repair Work in Fabricated Assemblies (CON/N1211)	Unit 4.1 – Fabrication Fundamentals	Welding Fabrication Basics	https://youtu.be/B4jqkbKqS0s	Welding Fabrication Basics	0:08:57
	Unit 4.2 – Fabrication Bed and Equipment Preparation	Structural Steel Fabrication	https://youtu.be/9-yd1QGwng4	Structural Steel Fabrication	0:08:55
	Unit 4.3 – Quality Control and Repair	Welding defects cause and remedies	https://youtu.be/HbL4as_wG50	Welding defects cause and remedies	0:18:19
Chapter 5: Erect Structural Steel Assemblies at Construction Sites (CON/N0717)	Unit 5.1 – Rigging Plans and Safety Measures	Reading Construction Drawings	https://youtu.be/A3v3ik-3kmks	Reading Construction Drawings	0:11:13

		Formwork, Shoring, and Bracing Requirements	https://youtu.be/fDoFkMbLFAs	Formwork, Shoring, and Bracing Requirements	0:04:02
	Unit 5.2 – Erection Techniques and Alignment	Master Craftsmen - Erecting Steel	https://youtu.be/CmTRTh-jb6mc	Master Craftsmen - Erecting Steel	0:03:06
	Unit 5.3 – Connection and Communication	Bolted Connection and Tightening Torque Basics	https://youtu.be/xcUTFcjuzOk	Bolted Connection and Tightening Torque Basics	0:21:11



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