



**RQF LEVEL 3**



**MATSW301**  
**MANUFACTURING**  
**TECHNOLOGY**

**SMAW**  
**on Mild Steel**

***TRAINER'S MANUAL***

*October, 2024*



# SMAW ON MILD STEEL



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## ACRONYMS

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**CBT/A:** Competency Based Training and Assessment

**MMA/MMAW:** Manual Metal Arc Welding

**RTB:** Rwanda TVET Board-RTB

**SMAW:** Shielded Metal Arc Welding

**TQUM Project:** TVET Quality Management Project

## INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled "**MATSW301: SMAW on Mild Steel.**" Trainees enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labor market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainees through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer trainees opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that trainees review the key reading and the points to remember section

## **MODULE CODE AND TITLE: MATSW301: SMAW ON MILD STEEL**

**Learning Outcome 1: Prepare for SMAW operation**

**Learning Outcome 2: Apply SMAW on mild steel**

**Learning Outcome 3: Perform post-operation activities**

## Learning Outcome 1. Prepare for SMAW Operation



**Indicative contents**

**1.1. Introduction to SMAW**

**1.2. Identification of safety and security measures**

**1.3. Selection of materials, tools and equipment**

**1.4. Setting up of SMAW equipment**

**Key Competencies for Learning Outcome 1 : Prepare for SMAW Operation**

<b>Knowledge</b>	<b>Skills</b>	<b>Attitudes</b>
<ul style="list-style-type: none"><li>• Explanation of basic concept of SMAW operation</li><li>• Explanation of the advantages and disadvantages of SMAW</li><li>• Identification of types of hazards</li><li>• Identification of the application of SMAW</li></ul>	<ul style="list-style-type: none"><li>• Selecting materials, tools and equipment</li><li>• Setting the welding machine</li><li>• Selecting power supply</li><li>• Preventing of hazards</li></ul>	<ul style="list-style-type: none"><li>• Paying attention while Selecting materials, tools and equipment</li><li>• Being precise while setting the welding machine</li><li>• Being attentive while selecting power supply</li><li>• Having Safety-Consciousness while controlling hazards</li></ul>



**Duration: 20hrs**

**Learning outcome 1 objectives:**



By the end of the learning outcome, the trainees will be able to:

1. Define correctly the term SMAW as used on mild steel welding works
2. Describe properly application of SMAW as used on mild steel
3. Identify correctly the advantages and disadvantages of SMAW as used on mild steel
4. Describe properly safety and security measures applied at workplace
5. Apply efficiently safety and security measures of SMAW operation
6. Select effectively materials, tools and equipment used in SMAW on mild steel
7. Set correctly SMAW equipment as used in SMAW process



**Resources**

Equipment	Tools	Materials
<ul style="list-style-type: none"> <li>• AC/DC welding machine</li> <li>• Welding cables</li> <li>• Electrode holders</li> <li>• Earth clamps</li> <li>• Extension cables</li> <li>• Work bench</li> <li>• Hoarding</li> <li>• Electrode dry oven</li> <li>• projector kit</li> <li>• personal computer</li> <li>• projector screen</li> </ul>	<ul style="list-style-type: none"> <li>• Marking tool</li> <li>• Measuring tools</li> <li>• Clamping tools</li> <li>• Cutting tools,</li> <li>• Accessories tools</li> <li>(Hammers, Files, Anvil, Soft brush, Phase tester, Plier, Screw driver, Tong, Wire brush, paint roller)</li> <li>• Duster</li> <li>• spirit level</li> <li>• string rope/string line</li> <li>• drawing instruments set</li> </ul>	<ul style="list-style-type: none"> <li>• Mild steel sheet meta</li> <li>• Mild steel plate</li> <li>• Mild steel hollow section</li> <li>• Mild steel bars, Mild steel profiles</li> <li>• Mild steel electrode, Discs</li> <li>• Mastics</li> <li>• Sanding paper</li> <li>• Thinner</li> <li>• petrol,</li> <li>• Anti-rust</li> <li>• Paints</li> </ul>

<ul style="list-style-type: none"> <li>• handout, PPE, first aid kit, air compressor, Fume extractor</li> </ul>	<ul style="list-style-type: none"> <li>• scraper</li> </ul>	
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**Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Prepare the Classroom and workplace.
- Avail material, tools and equipment related to SMAW welding.
- Avail safety sign and symbols related to SMAW welding at workplace.
- Have some videos, photos showing SMAW welding operation, safety sign and setting up SMAW welding equipment.



## Indicative content 1.1: Introduction to SMAW



Duration: 5 hrs



### Theoretical Activity 1.1.1: Introduction to SMAW process on mild steel



#### Notes to the trainer:

- Trainer may use small groups to describe SMAW process on mild steel.
- Pictures, videos or figures related to SMAW process can be used as didactic material.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity, engage trainee's in grouping and ask them to answer the following questions:

- a) What do you understand by the term SMAW?
- b) What do you think about welding principles based on SMAW?
- c) What could be the advantages and disadvantages of SMAW.
- d) Find out the applications of SMAW.

**Step 2:** Ask trainees to write the findings on papers.

**Step 3:** Facilitate the presentation of trainees' findings

**Step 4:** Provide expert view and clarify ideas using didactic materials

**Step 5:** Ask trainees to read the **key reading 1.1.1.** in trainee manual



#### Points to Remember

- Even if it is named Shielded metal arc welding (SMAW), it is also known as manual metal arc welding (MMA or MMAW), or stick welding,

- Even if SMAW process has advantages it has some disadvantages like more defects and insufficient penetration.
- Remember that SMAW process has some applications such as repair works, construction, bridge construction.



## Indicative content 1.2: Identification of Safety and Security Measures



Duration: 3 hrs



### Theoretical Activity 1.2.1: Identification of safety and security measures in SMAW process



#### Notes to the trainer:

- Trainer may use small groups to identify the safety and security measures in SMAW process
- Pictures or videos related to the types of hazards and prevention/control of hazard can be used as didactic material.



#### Key steps:

**While delivering this activity, pass through the following steps:**

- Step 1:** Introduce the activity, ask trainees to answer the following questions:
- a) What do you understand by the term hazard?
  - b) What hazards that could be found in SMAW workplace?
  - c) What do you think about signs and symbols that should be used at SMAW workplace?
- Step 2:** Ask trainee to write answers provided on the paper/flipchart.
- Step 3:** Facilitate trainees to present their answers.
- Step 4:** Provides expert view and clarify ideas by using didactic materials.
- Step 5:** Ask trainees to read the key reading 1.2.1 in trainee manual.



#### Points to Remember

- Even If there are three classifications of hazards at workplace there are others like slippery floor, objects in walkway, misused machinery and excessive noise

- Remember that before storing welding machine make sure that it is turned off.
- Remember that there are five categories of PPEs such as eye and face protection, hand protection, foot protection, hearing protection and respiratory protection



### **Practical Activity 1.2.2: Applying safety and security measures in SMAW process.**



#### **Notes to the trainer**

- The trainer may facilitate trainees to apply safety precautions by wearing PPE, using fire extinguishers, applying safety measures and positioning safety sign and symbols as required in SMAW welding.
- As a part of preparation, Trainer is recommended to have a manufacturing workshop and safety sign and symbols



#### **Key steps:**

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workplace and apply safety and security measures as required in SMAW welding.

**Step 2:** Explain the task and provide clear work instruction (Task, PPE, Time allocated).

**Step 3:** Demonstrate how to apply safety precautions based on safety standards

**Step 4:** Ask trainees to wear PPE, use fire extinguishers, apply safety measures and position safety sign and symbols

**Step 5:** Verify whether safety precautions are properly applied

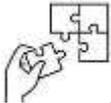
**Step 6:** Ask trainees to read key reading 1.2.1 and 1.2.2

**Step 7.** Ask trainees to perform the task provided in application of learning 1.2



### **Points to Remember**

- While preparing workplace remember to control hazards by selecting appropriate PPEs and wears them correctly
- When using fire extinguisher remember to select it based on class of fire and use PASS methods (Pull the pin, Aim the fire extinguisher, Squeeze the handle and Sweep the nozzle
- Remember to fix safety signs and symbols in the appropriate location



### **Application of learning 1.2.**

Prepare a study visit in manufacturing company near the school and request trainees to apply safety and precaution measures in that workshop by:

1. Wearing appropriate PPEs
2. Fixing safety signs and symbols in appropriate location
3. Use of fire extinguishers

### Check list/Solution for application

SN	Criteria	Indicators	Yes	No
1	Safety and security measures are applied properly at the SMAW workshop.	Ind1. Safety boot is worn		
		Ind2. Overall is worn		
		Ind3. Welding goggle is worn		
		Ind4. Welding helmet is worn		
		Ind5. Safety signs and symbols are fixed		
		Ind6. Fire extinguisher is used		
	<b>Total marks:</b>			<b>.../100</b>
<b>Passing line</b>			<b>70%</b>	



## Indicative content 1.3: Selection of SMAW Welding Materials, Tools and Equipment



Duration: 7hrs



**Theoretical Activity 1.3.1: Description of SMAW welding material, tools, equipment and accessories.**



**Notes to the trainer:**

- While delivering this content, small groups can be used where by materials, tools equipment and accessories should be described.
- Drawings, pictures and videos related to SMAW resources can be used as didactic material



**Key steps:**

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to answer the following questions:

- I. What do you understand by the terms tool, material and equipment?
  - a) How can you classify material?
  - b) What do you think about the equipment and accessories used in SMAW?
  - c) What do you think about the tools used in SMAW process?

**Step 2:** Ask trainees to write answers provided.

**Step 3:** Engage trainees in the presentation of their answers.

**Step 4:** Provides expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the **key reading 1.3.1** in trainee manual.



### Points to Remember

- Remember that In SMAW there are different categories of materials such as metals (ferrous and non-ferrous), ceramic, polymers and composites.
- Even if mild steel is a type of carbon steel it is known as low carbon steel.
- Remember that mild steel electrode is commonly used in manufacturing and automobile repairing industries.



### Practical Activity 1.3.2: Selecting SMAW welding tools, materials, equipment and accessories



#### Notes to the trainer

- This activity should take place in welding workshop and or store, and should be individual based.
- As a part of preparation, you are recommended to avail a store containing all SMAW welding tools, materials, equipment as well as their accessories.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go in welding workshop/store and select the right tools, materials and equipment used in SMAW welding.

**Step 2:** Explain the task and provide clear work instruction (Task, PPE, Time allocated).

**Step 3:** Demonstrate how to select tools, materials and equipment used in bending operation and explains the selection criteria.

**Step 4:** Ask trainees to select tools, materials and equipment used in SMAW process and monitor the procedures.

**Step 5:** Verify whether the material, tools, equipment and accessories are correctly selected

**Step 6:** Ask trainees to read key **reading 1.3.1**

**Step 7.** Ask trainees to perform the task provided in application of learning 1.3.



### Points to Remember

- Also remember that while selecting materials, tools and equipment for SMAW welding you must focus on Material Compatibility, Weld Type and Joint Configuration, Durability and Reliability, safety, cost and compliance with standards.



### Application of learning 1.3.

The school has a task of making windows and doors. Ask trainees to go the welding workshop to select SMAW welding materials, tools, equipment and accessories required for making a window as well as prepare workshop by applying safety precautions at workplace.

### Checklist

SN	Criteria	Indicators	Yes	No
1	Selecting appropriate tools, materials and equipment for SMAW	Ind1. Mild steel square bar is selected		
		Ind2. Mild steel plate is selected		
		Ind3. Welding electrode is selected		
		Ind4. Electrode holder is selected		
		Ind5. SMAW welding machine is selected		

		Ind6.Angle grinding machine is selected		
		Ind7.cutting disc is selected		
<b>Total marks:</b>				<b>...../100</b>
<b>Passing line</b>				<b>70%</b>



## Indicative content 1.4: Setting up of SMAW Equipment



Duration: 8 hrs



### Theoretical Activity 1.4.1: Identification of power supply for SMAW machine



#### Notes to the trainer:

- While delivering this content, small groups can be used to identify power supply and SMAW machine
- Drawings, pictures or videos should be used as didactic material while identifying power supply and SMAW machine



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity, ask trainees to answer the following questions:

- a) What do you think about the difference between single phase, bi phase and three phase?
- b) What do you understand by term polarity?
- c) What do you think about straight and reverse polarities?

**Step 2:** Ask trainees to write answers provided on papers.

**Step 3:** Engage trainees in presenting their answers.

**Step 4:** Provide expert view and clarify ideas by using didactic materials.

**Step 5:** Ask trainees to read the key reading 1.4.1 in trainee manual.



### Points to Remember

- In power supply, there are different power sources depends on the number of phases as single, bi and three phase.
- While setting up SMAW welding machine, remember first to Plug in the Machine, secondly turn on and Grounding the Machine, next Filler Rod Selection, and lastly Amperage Selection



### Practical Activity 1.4.2: Setting up SMAW equipment



#### Notes to the trainer

This activity is individual based; trainer may demonstrate trainees how to set up SMAW equipment. As a part of preparation; you are recommended to:

- Have a well-organized welding workshop
- Avail SMAW welding equipment to be used in demonstration.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go in the welding workshop to set up SMAW welding equipment to be used while making a mild steel window.

**Step 2:** Explain the task and provide clear work instruction (Task, PPE, Time allocated)

**Step 3:** Demonstrate how to set up SMAW welding equipment. While demonstrating, explain the setting criteria for SMAW equipment and Provide more explanations where necessary.

**Step 4:** Verify whether the SMAW equipment are correctly settled.

**Step 5:** Ask trainees to read key reading 1.4.2. and ask clarifications where necessary

**Step 6:** Ask trainees to perform the task provided in application of learning 1.4



**Points to Remember**

- When supplying power, it is important to know that there are different power sources depends on the number of phases as single, bi and three phase.
- For efficiency of setting up SMAW welding machine, set up steps must be followed.



**Application of learning 1.4.**

Together with trainees, visit the nearest Agakiro welding workshop which is looking for a person who can set up welding equipment for starting operation and ask them to set up welding equipment by:

- Plugging in the Machine
- Turning on and Grounding the Machine
- Selecting appropriate Filler Rod,
- Selecting appropriate Amperage

**Checklist**

SN	Criteria	Indicators	Yes	No
1	Setting up correctly SMAW equipment	Ind1. Welding machine is plugged in		
		Ind2. Welding machine is turned on		
		Ind3. Welding machine is grounded		

		<b>Ind4. Amperage is selected/set</b>		
		<b>Ind5. Filler rod is selected</b>		
		<b>Ind6. Welding electrode is fixed</b>		
<b>Total marks:</b>		<b>..... /100</b>		
<b>Passing line</b>		<b>70%</b>		



Learning outcome 1 end assessment

Written assessment

- I. Read carefully the table below and answer the question by matching the description in column B and their welding terms in column C and write answers in the provided column A

Answer	Description welding terms	Welding terms
1.....C	1. A material used to fill the joint between two base materials during welding	A. Electrode Holder
2.....D	2. The chemical coating on the welding rod that affects arc stability and weld quality	B. Ground Clamp
3..... B	3. A clamp that provides a stable electrical connection to the workpiece and ensures proper grounding	C. Filler Material
4..... F	4. Minimizes the risk of electric shock and equipment malfunction.	D. Electrode Coating
5..... A	5. A component that holds the welding rod and conducts the welding current to it.	E. Base Material
6.....E	6. The material being welded, which needs to be compatible with the chosen electrode	F. Inspect welding equipment regularly
		G. Grinding machine
		H. Battery power generate

Answers:

- 1. ....C
- 2. ....D
- 3. .... B
- 4. .... F
- 5. ....A
- 6. ....E

- II. Read careful the following statements and choose by encircling the letter corresponding to the correct answer

1. **SMAW in welding stand for....**

- A) Shielded Metal Arc Welding
- B) Submerged Metal Arc Welding
- C) Shielded Metal Alloy Welding
- D) Submerged Metal Alloy Welding

**Answer:** A) Shielded Metal Arc Welding

2. **Which of the following is a primary component of the SMAW process?**

- A) An inert gas shield
- B) A non-consumable tungsten electrode
- C) A consumable electrode covered with flux
- D) A carbon dioxide shield

**Answer:** C) A consumable electrode covered with flux

3. **In SMAW, what is the purpose of the flux coating on the electrode?**

- A) To increase the melting point of the electrode
- B) To provide a protective gas shield and slag
- C) To conduct electricity more efficiently
- D) To remove impurities from the base metal

**Answer:** B) To provide a protective gas shield and slag

4. **What is the main function of the slag produced during SMAW?**

- A) To provide additional filler metal

- B) To protect the weld from contamination and oxidation
- C) To improve the appearance of the weld bead
- D) To increase the speed of welding

**Answer:** B) To protect the weld from contamination and oxidation

**5. Which type of current is typically used for SMAW?**

- A) Direct Current (DC)
- B) Alternating Current (AC)
- C) Both DC and AC
- D) None of the above

**Answer:** C) Both DC and AC

**III. Read carefully the following statement below and answer by true if the statement is correct or false if is wrong**

1. Shipping hammer and wire brush are welding materials .....
2. Biological and chemical are the types of hazards.....
3. In this straight polarity, the electrode is connected to Negative connection of the machine and the job is connected to the positive connection of the welding generator.....

**Answers:**

1. False
2. True
3. False

## Practical assessment

MM company won a tender of manufacturing doors and window made in mild steel using SMAW welding. Before the start of work, they want to organize their welding workplace and they want to hire a skilled person in that job. Ask trainees individually to prepare the workplace by selecting tools, materials and equipment and also you have to remain the SMAW machine well set before using it. The activity should be done in 30 min as wells applying safety and security measures at workplace.

All resources are available at workplace.

Criteria	Indicators	Yes	No
<b>Safety, Health, Environment and security measures are effectively applied at work place</b>	<b>Ind1.</b> Safety boot is worn		
	<b>Ind2.</b> Overall is worn		
	<b>Ind3.</b> Welding goggle is worn		
	<b>Ind4.</b> Welding helmet is worn		
<b>SMAW Equipment, tools and materials are properly selected according to the work to be performed</b>	<b>Ind1.</b> Mild steel square bar is selected		
	<b>Ind2.</b> Mild steel plate is selected		
	<b>Ind3.</b> Welding electrode is selected		
	<b>Ind4.</b> Electrode holder is selected		
<b>Setting up of SMAW equipment is correctly done refer to the manual guide</b>	<b>Ind1.</b> Welding machine is plugged in		
	<b>Ind2.</b> Welding machine is turned on		
	<b>Ind3.</b> Welding machine is grounded		
	<b>Ind5.</b> Amperage is selected and set		
<b>Total marks:</b>		<b>..... /100</b>	
<b>Passing line</b>		<b>70%</b>	



### Further information to the trainer

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## Learning Outcome 2: Apply SMAW on Mild Steel



### Indicative contents

**2.1 Interpretation of drawing**

**2.2 Preparation of the work piece**

**2.3 Applying of SMAW**

**2.4 Inspection of the weldment**

**2.5 Finishing of the product**

### Key Competencies for Learning Outcome 2 : Apply SMAW on Mild Steel

Knowledge	Skills	Attitudes
<ul style="list-style-type: none"><li>• Description of drawing interpretation in SMAW</li><li>• Identification of workpiece preparation</li><li>• Description of Applying SMAW on mild steel</li><li>• Description of welding defects and weldment inspection</li><li>• Identification of finishing the product</li></ul>	<ul style="list-style-type: none"><li>• Interpreting drawing</li><li>• Measuring and Marking workpiece</li><li>• Cutting workpiece</li><li>• Preparing edge</li><li>• Making tack and full weld</li><li>• Grinding welded areas</li><li>• Polishing welded workpiece</li><li>• Applying Protection on welded workpiece</li></ul>	<ul style="list-style-type: none"><li>• Paying Attention while interpreting drawing</li><li>• Being precise while marking and taking measurement</li><li>• Being precise while cutting and preparing edge.</li><li>• Being smart while protecting workpiece</li></ul>



**Duration: 80hrs**

**Learning outcome 2 objectives:**



By the end of the learning outcome, the trainees will be able to:

1. Interpret neatly the workpiece drawing to be used in SMAW
2. Prepare correctly the work pieces used in SMAW on mild steel
3. Apply effectively welds on mild steel using SMAW
4. Inspect effectively weldment applied on mild steel
5. Finish properly welded product based on welded product



**Resources**

<b>Equipment</b>	<b>Tools</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• Fume extractor</li> <li>• AC/DC welding machine</li> <li>• Welding cables</li> <li>• Electrode holders,</li> <li>• Earth clamps</li> <li>• Extension cables,</li> <li>• Work bench</li> <li>• Fan</li> <li>• Hoarding</li> <li>• Electrode dry oven</li> <li>• PPE</li> <li>• First aid kit</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring tools</li> <li>• Marking tools</li> <li>• Clamping tools</li> <li>• Cutting tools</li> <li>• Accessories tools (Hammers, Files, Anvil, Soft brush, Phase tester, Plier, Screw driver, Tong, Wire brush, paint roller)</li> <li>• Duster</li> <li>• sprit level</li> </ul>	<ul style="list-style-type: none"> <li>• Mild steel sheet metal</li> <li>• Mild steel plate</li> <li>• Mild steel hollow section</li> <li>• Mild steel bars</li> <li>• Mild steel profiles</li> <li>• Mild steel electrode</li> <li>• Discs</li> <li>• Mastics</li> <li>• Sanding paper</li> <li>• Thinner</li> <li>• Petrol</li> <li>• Anti-rust</li> </ul>

<ul style="list-style-type: none"> <li>• Air compressor</li> </ul>	<ul style="list-style-type: none"> <li>• string rope/string line</li> <li>• drawing instruments set</li> <li>• scraper</li> </ul>	<ul style="list-style-type: none"> <li>• Paints.</li> </ul>
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**Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Prepared classroom and workshop
- Avail all necessary material, tools and equipment related to SMAW welding operations.
- Prepare videos, photos showing how to interpretation of drawing, preparation of the work piece, inspection of the weldment and finishing the product.



## Indicative content 2.1: Interpretation of Drawings



Duration: 5 hrs



### Theoretical Activity 2.1.1: Description of workpiece drawing



#### Notes to the trainer:

- During this activity, small groups may be used while describing workpiece drawing
- Drawings, pictures and videos should be prepared to be used as didactic material.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity, ask trainees to answer the following questions:

- What do you understand by the following terms?
  - Fabrication drawing
  - Dimensions
  - Symbols
- What could be the cutting list that can be found on workpiece drawing?
- What information that should be found on title block

**Step 2:** Ask trainee to write answers provided.

**Step 3:** Engage trainees in the presentation of findings.

**Step 4:** Provide expert view and clarify ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key reading **.2.1.1 in trainee manual**



### **Points to Remember**

- Fabrication drawings (also called detail or part drawings used to communicate the design intent to the “fabricator”).
- Title block information such as company name and address, part number, material and mass
- Dimensioning gives the size information to a drawing. And are done basing on different types



## Indicative content 2.2: Preparation of the Work piece.



Duration: 28hrs



### Practical Activity 2.2.1: Preparing work piece



#### Notes to the trainer

- The trainer may facilitate trainees to prepare workpiece by selecting tools, materials and equipment required in SMAW for preparing work pieces.
- As a part of preparation, Trainer is recommended to have a manufacturing workshop and mild steel materials (mild steel plate and mild steel hollow square bar with different sizes)



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go in the welding workshop and prepare the work pieces of used to make a window frame.

**Step 2:** Explain the task and provide clear work instruction (Task, PPE, Time allocated)

**Step 3:** Demonstrate how to prepare a work piece, while demonstrating; explain the preparation steps of work piece.

**Step 4:** Ask trainee to prepare the work piece following the provided instructions.

**Step 5:** Monitor the work and provide more explanations where necessary.

**Step 6:** Verify whether the work piece is correctly prepared.

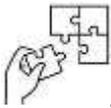
**Step 7:** Ask trainees to read **key reading 2.2.1.**

**Step 8:** Ask trainees to perform the application of learning 2.2



### Points to Remember

- While Preparing workpiece remember to apply the techniques of measuring, marking, clamping and cutting processes
- Even if there are vertical welding position, horizontal welding position and overhead welding position for Pipe Welding we use 4 groups of welding positions: 1G (**Horizontal rolled position**), 2G, 5G and 6G
- Even if edge preparation has some Advantages it has disadvantage such as Sharped workpieces can cause accident like injuries, even death.



### Application of learning 2.2.

Manufacturing workshop located near the school wants to fabricate five hundred (500) windows and doors frames made in mild steel. Ask trainees, to prepare the work pieces of one window and door by respecting the following dimensions:

- The window has 600x1200(mm),
- The door has 1000x2100 (mm)

Criteria	Indicators	Yes	No
<b>1. Workpiece is correctly prepared</b>	<b>Ind1.</b> workpiece is measured		
	<b>Ind2.</b> workpieces is cut		
	<b>Ind3.</b> workpiece edge is cut		
	<b>Ind4.</b> Workpiece dimensions are respected		
<b>Total marks:</b>		<b>...../ 100</b>	
<b>Passing line</b>		<b>70%</b>	



## Indicative content 2.3: Applying of SMAW.



Duration: 30hrs



### Practical Activity 2.3.1: Applying tack and full weld on workpieces



#### Notes to the trainer

- The trainer may facilitate trainees to position workpiece and apply tack and full weld using different welding position used in SMAW welding.
- As a part of application of SMAW, Trainer is recommended to have a manufacturing workshop, SMAW welding machine and mild steel materials.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workshop and apply tack and full weld in different welding positions as required in SMAW welding.

**Step 2:** Demonstrate how to make tack and full weld on work piece. While demonstrating, explain the key steps of making tack and full weld on work piece.

**Step 3:** Ask trainee to select all required tools, materials and equipment required for making tack and full weld

**Step 4:** Ask trainee to perform tuck and full weld on work piece using different welding positions.

**Step 5:** Monitor the trainee's activity and Provide more explanations where necessary.

**Step 6:** Assess if the work piece is correctly joined using tack and full weld.

**Step 7:** Ask trainees to read key reading in 2.3.1, for more clarification.

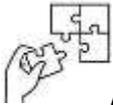
**Step 8:** Ask trainees to perform the application of learning 2.3



#### Points to Remember

- While delivering this activity remember to tell them about welding positions such as horizontal and overhead welding position.

- Even if there are vertical welding position, horizontal welding position and overhead welding position for Pipe Welding we use 4 groups of welding positions: 1G (**Horizontal rolled position**), 2G, 5G and 6G
- Before applying full weld on workpiece remember to prepare edge and apply tack weld.
- While striking the arc technique remember to follow the following techniques such as Dragging electrode across work piece like striking a match, lift electrode slightly after touching work piece.



### Application of learning 2.3.

Your school wants to make windows and doors for classrooms, as trained trainee in preparing workpieces and Applying SMAW welding fabricate one door and window by:

- Preparing workpieces
- Positioning workpieces
- Applying tack and full weld

SN	Criteria	Indicators	Yes	No
	<b>1.2. tack and full weld are correctly applied</b>	<b>Ind1.</b> workpieces are positioned		
		<b>Ind2.</b> Tack weld is applied		
		<b>Ind3.</b> full weld is applied.		
<b>Total marks:</b>				<b>7</b>
<b>Passing line</b>				<b>70%</b>



## Indicative content 2.4: Inspection of the Weldment



Duration: 7 hrs



### Theoretical Activity 2.4.1: Description of welding defects



#### Notes to the trainer:

- While delivering this content, small group should be used to discuss on types of defect, their causes and their remedies.
- The Use of picture or video related to welding defect is recommended.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity, ask trainees to answer the following questions:

- i. What could be the types of welding defect you know?
- ii. What should be the possible causes and remedies for the given welding defects on question a?

**Step 2:** Ask trainees to write answers provided on papers/flipchart.

**Step 3:** Facilitate the presentation of trainees' findings

**Step 4:** Provides expert view and clarify ideas using didactic materials

**Step 5:** Address any questions or concerns.

**Step 5:** Ask trainees to read the **key reading 2.3.1.** in trainee manual.



#### Points to Remember

- Even if all welding defects is irregularity in the welded joint those irregularities can be avoided by increasing amperage, using proper electrode and cleaning base metal

- Remember that there are other Types of defects by testing machine such as leakage, slag inclusion, cracks



### Practical Activity 2.4.2: Inspecting welded product



#### Notes to the trainer

- The trainer may facilitate trainees to inspect welded products using different methods in SMAW.
- As a part of application of SMAW, Trainer is recommended to have a manufacturing workshop, welded products and testing machine.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go in SMAW welding workshop to inspect of welded product.

**Step 2:** Explain the task and provide clear work instruction

**Step 3:** Demonstrate how to make inspection of weldment on work piece; while demonstrating, explain the defects to inspect and way of correcting them.

**Step 4:** Ask trainees to inspect welding defects on provided work piece.

**Step 5:** Ask trainees to correct the welding defects.

**Step 6:** Monitor the work and provide more explanations where necessary.

**Step 7:** Verify if the work piece is correctly joined.

**Step 8:** Ask trainees to read key reading in 2.4.2.

**Step 9:** Ask trainees to perform the application of learning 2.4.



### Points to Remember

- While testing welding defects remember that we use two main types known as NDT ( Non-Destructive Testing and DT (Destructive Testing)
- Remember that common NDT Testing are: Ultrasonic testing, Liquid penetrant testing and magnetic particle testing and depend on type of welding type.
- Remember that there are common welding defects such as incomplete penetration, lack of Fusion-Bridging the gap, Undercut and slag inclusion, underfill, overlap, cracks, burn through and porosity.



### Application of learning 2.4.

A manufacturing workshop located near your school has finalized fabrication of steel benches and needs to (check) the quality of their welding joints. Ask trainees to inspect welded product in workshop by:

- Applying safety and security measures
- inspecting welded product

SN	Criteria	Indicators	Yes	No
2	Inspecting welded product	Ind1.weldment defects are properly inspected		
		Ind2. weldment defects are properly eliminated		
<b>Total marks:</b>		<b>6</b>		
<b>Passing line</b>		<b>70%</b>		



## Indicative content 2.5: Finishing of the Product



Duration: 7 hrs



### Theoretical Activity 2.5.1: Description of finishing of welded product



#### Notes to the trainer:

- While delivering this content, small group may be used,
- For preparation purpose, you are recommended to:
  - ✓ To avail all tools, materials and equipment required for finishing, cleaning and protection of welded products.
  - ✓ Avail pictures or video of welded products at finishing, polishing and cleaning stage.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity, ask trainees to answer the following questions:

- I. What could be the categories of finishing product
- II. What do you understand by types of metal protection?

**Step 2:** Ask any trainee to write answers provided on flipchart/paper.

**Step 3:** Facilitate learners in the presentation of provided answer

**Step 4:** Provide expert view and clarifies ideas by using didactic materials.

**Step 5:** Address any questions or concerns.

**Step 6:** Ask trainees to read the key reading 2.5.1 in the trainee manual.



### Points to Remember

- While Cleaning welded surface remember to use different techniques such as Chipping out the slag, Brushing, Grinding, Sanding, Polishing
- Remember to apply different techniques of Correcting welding defects such as Straightening, Grinding and re-welding.



### Practical Activity 2.5.2: Applying finishing techniques



#### Notes to the trainer

- The trainer may facilitate trainees to apply finishing works to welded products using different methods in finishing.
- As a part of application of finishing, Trainer is recommended to have a manufacturing workshop, welded products and grinding and polishing equipment.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workshop and apply grinding and polishing on welded product as required by finishing in SMAW welding.

**Step 2:** Ask trainee to select all required tools, materials and equipment required for making grinding and polishing.

**Step 3:** Demonstrate how to make polishing and grinding welded product. While demonstrating, explain the key steps of making polishing and grinding on welded product.

**Step 4:** Ask trainees to perform grinding and polishing on welded product using different techniques.

**Step 5:** Monitor the trainee's activity and provide support where necessary.

**Step 6:** Check if the product is correctly finished by grinding and polishing.

**Step 7:** Ask trainees to read key reading in 2.5.2.

**Step 8:** Ask trainees to perform the application of learning 2.5



### Points to Remember

- Even if grinding is one of finishing the welded products there can be a re-welding process where a grinded part can be re-welded for the correction of defects.
- While cleaning the weldment remember to use chipping hammer and steel metallic brush.
- Even if metal protection is important in order to prevent corrosion, wear, and other forms of degradation there are some maintenance tips like regular inspection, cleaning and repair or recoating.



### Practical Activity 2.5.3: Applying protection on welded product



### Notes to the trainer

- The trainer may facilitate trainees to apply protection on welded products using different methods of metal protection.
- As a part of application of finishing, Trainer is recommended to have a manufacturing workshop, welded products and painting equipment.



### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workshop and apply protection on welded product as required by finishing in SMAW welding.

**Step 2:** Ask trainee to select all required tools, materials and equipment required for making grinding and polishing.

**Step 3:** Demonstrate how to apply protection on welded product. While demonstrating, explain the key steps of protecting welded product.

**Step 4:** Ask trainees to perform metal protection by painting and galvanizing.

**Step 5:** Monitor the trainee's activity and provide support where necessary.

**Step 6:** Check if the product is correctly protected.

**Step 7:** Ask trainees to read key reading in 2.5.3.

**Step 8:** Ask trainees to perform the application of learning 2.5



### Points to Remember

- Even if metal protection is important in order to prevent corrosion, wear, and other forms of degradation there are some maintenance tips like regular inspection, cleaning and repair or recoating.



### Application of learning 2.5

Mandry workshop located near your school fabricated five hundred windows and hundred fifty doors and wants to perform metal protection of those products. Ask your trainees to:

- Applying grinding and polishing on welded product
- Applying coating and painting the products

## Checklist

SN	Criteria	Indicators	Yes	No
1	Grinding and polishing are properly applied	Ind1. workpiece is grinded		
		Ind2. Finished workpiece is polished		
2	Product is correctly protected	Ind1.Procedures of painting and galvanizing are followed		
		Ind2. product is painted		
		Ind3.Finished product is galvanized		
Total marks: /100				.....
Passing line				70%



## Learning outcome 2 end assessment

### Written assessment

I. **Read careful the following statements and choose by encircling the letter corresponding to the correct answer**

1. **In which welding position is the weld bead placed horizontally across the workpiece?**

- A. Flat position
- B. Horizontal position
- C. Vertical position
- D. Overhead position

**Answer:** B. Horizontal position

2. **Which of the following positions is the most difficult for a beginner due to gravity affecting the weld pool?**

- A. Flat position
- B. Horizontal position
- C. Vertical position
- D. Overhead position

**Answer:** D. Overhead position

3. **What type of joint is created when two pieces of metal are joined end-to-end?**

- A. Butt joint
- B. Corner joint
- C. T-joint
- D. Edge joint

**Answer:** A. Butt joint

4. **Which joint configuration is formed when the edges of two plates are joined at a 90-degree angle?**

- A. Butt joint
- B. Corner joint
- C. T-joint
- D. Edge joint

**Answer:** B. Corner joint

5. Which of the following processes is typically used to remove slag and improve the appearance of a weld bead?

- A. Grinding
- B. Painting
- C. Welding
- D. Drilling

**Answer:** A. Grinding

6. Which of the following is a primary reason for applying a protective coating to a weldment?

- A. To enhance the weld's color
- B. To prevent corrosion and environmental damage
- C. To increase the weld's weight
- D. To make the weldment easier to cut

**Answer:** B. To prevent corrosion and environmental damage

7. The function of the coating elements found in SMAW welding electrode is to:

- A. Provide mechanical and metallurgical properties of the weld deposit
- B. Shield the molten metal from oxygen and nitrogen
- C. Keep the arc established when using direct current
- D. Produce a slag coverage to protect the solidifying weld metal

**Answer:** B. Shield the molten metal from oxygen and nitrogen

II. Read carefully the table below and answer the question by matching the description in column B and their welding terms in column C and write answers in the provided column A.

Column A (Answers)	Column A	Column B
1.....	1. Flat (1G) Welding Position	A. A weld formed where two pieces of metal are joined side by side, with one piece overlapping the other.
2.....	2. T-Joint	B. A common welding defect where the weld metal has eroded the base metal at the edges, leading to a groove.

3.....	3. Butt Joint	C. The process of removing the residue left after welding to ensure a clean and smooth weld finish.
4.....	4. Weaving Technique	D. A welding position where the workpiece is placed horizontally, and the welder applies the weld on the top surface.
5.....	5. Vertical (3G) Welding Position	E. A technique where the welder moves the electrode side to side, creating a wider weld bead, often used in vertical or overhead positions.
6.....	2. Undercut	F. A joint formed by placing two metal pieces edge to edge and welding them together along the seam.
7.....	3. Horizontal (2G) Welding Position	G. A welding position where the workpiece is positioned vertically, and the weld is applied from bottom to top or top to bottom.
8.....	4. Lap Joint	H. A weld formed where two pieces of metal intersect at a 90-degree angle, forming a "T" shape.
9.....	5. Slag Removal	I. A welding position where the workpiece is positioned above the welder, and the weld is applied overhead.
10.....	6. Overhead (4G) Welding Position	J. A welding position where the workpiece is flat, and the weld is applied to the top side.

**Answer:**

1. Flat (1G) Welding Position — J
2. T-Joint — H
3. Butt Joint — F
4. Weaving Technique — E
5. Vertical (3G) Welding Position — G
6. Undercut — B
7. Horizontal (2G) Welding Position — D
8. Lap Joint — A
9. Slag Removal — C
10. Overhead (4G) Welding Position — I

## Practical assessment

MM company is a manufacturing company located near your school and won a tender of fabricating 500 doors and 200 windows and they want to hire a skilled person in that job. Ask your trainees to fabricate one window and one door in four hours, all required tools and materials are available in workshop ask the trainees to perform the task by:

- Preparing work pieces
- Applying tack and full weld
- Applying finishing techniques and
- Applying metal protection

## Checklist

SN	Criteria	Indicators	Yes	No
1	Safety ,Health , Environment and security measures are effectively applied at work place	Ind1. Safety boot is worn		
		Ind2. Overall is worn		
		Ind3. Welding goggle is worn		
		Ind4. Welding helmet is worn		
2	Workpiece is correctly prepared	Ind1.workpiece is measured		
		Ind2.workpieces are cut		
		Ind3.workpiece edge is cut		
		Ind4.Workpiece dimensions are respected		
3	Tack and full weld are perfectly applied	Ind1.workpieces are positioned		
		Ind2.Tack weld is applied		
		Ind3.full weld is applied.		
2		Ind1. Finshed product is grinded		

	<b>Grinding and polishing are correctly applied</b>	<b>Ind2.</b> Finished product is polished		
<b>3</b>	<b>Applying protection</b>	<b>Ind1.</b> Procedures of painting and galvanizing are followed		
		<b>Ind2.</b> Product is painted		
		<b>Ind3.</b> Finished product is galvanized		
<b>Total marks:</b>				<b>...../100</b>
<b>Passing line</b>				<b>70%</b>



### Further information to the trainer

American Welding Society. (2018). The welding handbook (9th ed.). American Welding Society.

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## Learning Outcome 3: Perform Post-Operation Activities



**Indicative contents**

**3.1. Cleaning of tools, equipment and workplace**

**3.2. Storing of tools and equipment**

**3.3. Report**

**Key Competencies for Learning Outcome 3 : Perform Post Operation Activities**

<b>Knowledge</b>	<b>Skills</b>	<b>Attitudes</b>
<ul style="list-style-type: none"><li>• Description of Cleaning techniques at workplace for SMAW process</li><li>• Description of storing methods of tools and equipment used in SMAW process</li><li>• Description of reporting work</li></ul>	<ul style="list-style-type: none"><li>• Cleaning workplace for SMAW</li><li>• Re-arranging of tools and equipment for SMAW</li><li>• Shelving tools and equipment for SMAW</li><li>• Hanging tools and equipment for SMAW</li><li>• Reporting the work done</li></ul>	<ul style="list-style-type: none"><li>• Being cleanliness while cleaning workplace</li><li>• Being vigilant while using cleaning products</li><li>• Being organized while arranging tools and equipment</li></ul>



**Duration: 20hrs**

**Learning outcome 3 objectives:**



By the end of the learning outcome, the trainees will be able to:

1. Describe clearly the cleaning techniques used at workplace in SMAW process.
2. Clean properly tools, equipment and workplace used in SMAW process.
3. Store effectively tools and equipment used in SMAW process.
4. Report properly the work done as per template.



**Resources**

Equipment	Tools	Materials
<ul style="list-style-type: none"> <li>• PPE,</li> <li>• first aid kit,</li> <li>• air compressor,</li> <li>• Fume extractor</li> <li>• Blower</li> </ul>	<ul style="list-style-type: none"> <li>• Metallic wire brush</li> <li>• Painting brush</li> </ul>	<ul style="list-style-type: none"> <li>• cloth rug</li> <li>• bloom</li> <li>• thinner</li> <li>• mop and soap</li> <li>• water</li> <li>• chemical liquid</li> </ul>



**Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Avail welded products.
- Prepare necessary finishing tools, materials and equipment.
- Avail well prepared welding workshop
- Having ready storing shelves.



## Indicative content 3.1: Cleaning of Tools, Equipment and Workplace



Duration: 8 hrs



### Practical Activity 3.1.1: Cleaning of tools, equipment and workplace



#### Notes to the trainer

- The trainer may facilitate trainees to Clean used tools, equipment and workplace
- For the effectiveness, avail all tools, materials and equipment required for cleaning workplace.



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workshop and clean used tools, equipment and workplace by applying cleaning techniques after SMAW welding.

**Step 2:** Ask trainee to select all required tools, materials and equipment required for cleaning

**Step 3:** Demonstrate how to clean tools, equipment and workplace.

**Step 4:** Ask trainees to clean tools, equipment and workplace.

**Step 5:** Check if the tools, equipment and workplace are correctly cleaned.

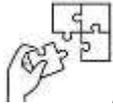
**Step 6:** Ask trainees to read key reading in 3.1.1. in trainee manual

**Step 7:** Ask trainees to perform the application of learning 3.1



#### Points to Remember

- Always ensure the welding machine is turned off and unplugged from the power source before cleaning.
- Use a wire brush to remove any spatter, dirt, or flux residue from the electrode holder. Ensure the insulation is intact



### Application of learning 3.1.

The school wants to clean tools, equipment and workshop at the end of work. Ask your trainees to go in SMAW workshop and apply cleaning techniques to clean tools, equipment and workplace after SMAW process.

#### Checklist

SN	Criteria	Indicators	Yes	No
2	Tools, equipment and workplace are properly cleaned	Ind1. Tools are cleaned		
		Ind2. Equipment are cleaned		
		Ind3. Workplace is cleaned		
<b>Total marks:</b>				...../
<b>100</b>				
<b>Passing line</b>				<b>70%</b>



## Indicative content 3.2: Storing of Tools, Materials and Equipment



Duration: 7 hrs



### Practical Activity 3.2.2: Storing materials, tools and equipment



#### Notes to the trainer

- The trainer may facilitate trainees to store tools, materials and equipment by shelving, rearranging and hanging them in store.
- Avail all tools, materials and equipment required for storing tools and equipment in store.
- Avail some picture of video presenting storage of tools and equipment for SMAW



#### Key steps:

**While delivering this activity, pass through the following steps:**

**Step 1:** Introduce the activity and ask trainees to go to workshop/store and rearrange tools materials and equipment for SMAW.

**Step 2:** Demonstrate how to re-arrange, shelving and hanging materials, tools and equipment

**Step 3:** Ask trainee to select all required tools, materials and equipment required for shelving, rearranging and hanging tools and equipment of SMAW.

**Step 4:** Ask trainee to perform shelving, rearranging and hanging tools materials and equipment in workshop/store following guidelines for storing.

**Step 5:** Monitor the trainee's activity and Provide more explanations where necessary.

**Step 6:** Assess if the product is correctly finished using grinding and polishing.

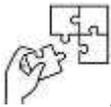
**Step 7:** Ask trainees to read key reading in 3.2.1. in trainee manual

**Step 8:** Ask trainees to perform the application of learning 3.2



### Points to Remember

- Even if there are the benefits of storage shelves of materials there are also some disadvantages such as Shelves get crowded.
- too many items on open shelves represent clutter and disorganization, Open shelves require maintenance.
- Unlike cabinets that secure dust, open shelves are prone to dust, Open shelves are hazardous and Visitors can view open shelving items.
- While shelving remembers to label shelves for easy identification of tools and materials
- While moving heavy objects use a forklift, crane or other mechanical lifting equipment. Mechanical lifting equipment must only be used by fully qualified people.
- Remember to store flammable materials from heat to avoid fire
- Remember to store electrodes in a dry place to prevent moisture absorption
- The PPE such as gloves, helmet and aprons must be stored in a clean dry area to ensure they remain effective.



### Application of learning 3.2.

Suppose that your school purchased new tools, materials and equipment need to be stored in SMAW welding. Ask trainees to go in SMAW store to perform store keeping work by:

- Rearranging tools materials and equipment
- Hanging tools, materials and equipment
- Shelving materials tools and equipment

## Checklist

SN	Criteria	Indicators	Yes	No
	<b>Materials, tools and equipment are effectively stored</b>	Ind1. Materials, Tools and equipment are rearranged		
		Ind2. Materials, Tools and equipment are hanged		
		Ind3. Materials, Tools and equipment are shelved		
	<b>Total marks:</b>			<b>...../100</b>
	<b>Passing line</b>			<b>70%</b>



## Indicative content 3.3: Reporting



Duration: 5 hrs



### Theoretical Activity 3.3.1. Reporting the work done



#### Notes to the trainer:

- Trainer may guide trainees to make report of the Work done.
- For providing enough skills you are recommended to avail Report template.



#### Key steps:

#### While delivering this activity, pass through the following steps:

**Step 1:** Introduce the activity and ask trainees to go in welding workshop/classroom and demonstrate trainees how to prepare a report of produced ten mild steel windows four mild steel door and tables.

**Step 2:** Explain the task and provide clear work instructions (Task, Time allocated).

**Step 3:** Demonstrate trainees how to prepare a report of the work done.

**Step 4:** Inspect whether work done is appropriately reported clarifications if any.

**Step 5:** Ask trainee to read key reading 3.3.1. in trainee manual.

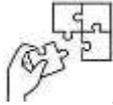
**Step 6:** Ask trainee to perform the task provided in application of learning 3.3.



#### Points to Remember

- While describing the reporting the work done you must focus to the form of report.
- In preparation of report of work done use a professional format, with a cover page, table of contents, headers, and consistent font styles
- While preparing report begin with a concise introduction outlining the purpose and scope of the report.

- Technical report should be presented with three main parts including recommendation and conclusion.
- The language and layout of a report is important to ensure that the information is accurate and easily understandable.



#### Application of learning 3.4.

Welding workshop of your school have produced four mild steel tables, six mild steel window and ten mild steel doors, you are requested to ask trainees to prepare report of the work done by doing the following tasks:

- Prepare report
- Fill up report template
- Reporting the work done

#### Checklist

Criteria	Indicators	Yes	No
Report is properly generated according to the work done	Ind1. Report is prepared		
	Ind2. Report template is filled		
	Ind3. Form of report is respected		
	Ind4. All Report parts are described		
<b>Total marks:</b>	<b>...../100</b>		
<b>Passing line</b>	<b>70%</b>		



## Learning outcome 3 end assessment

### Written assessment

I. Read careful the following statements and choose by encircling the letter corresponding to the correct answer

1. Why is it important to clean welding tools and equipment regularly?

- A. To improve their appearance
- B. To ensure optimal performance and safety
- C. To increase their weight
- D. To decrease their lifespan

**Answer: B. To ensure optimal performance and safety**

2. Which of the following should be used to remove slag and metal deposits from the welding electrode holder?

- A. A wire brush
- B. A solvent
- C. Sandpaper
- D. A damp cloth

**Answer: A. A wire brush**

3. What is the primary consideration when storing welding electrodes?

- A. Storing them in a wet environment
- B. Keeping them in a dry, moisture-free environment
- C. Leaving them exposed to sunlight
- D. Storing them loosely in an open container

**Answer: B. Keeping them in a dry, moisture-free environment**

4. How should welding machines be stored when not in use?

- A. In a clean, dry area with proper ventilation
- B. Outdoors, exposed to the elements
- C. In a damp, unventilated area
- D. In direct sunlight

**Answer: A. In a clean, dry area with proper ventilation**

5. Where should flammable materials, such as solvents or fuels, be stored in relation to welding equipment?
- A. In a designated, well-ventilated, and fire-resistant storage area away from welding equipment
  - B. Next to the welding equipment for easy access
  - C. On top of the welding machine
  - D. In the same area as the welding cable

**Answer: A. In a designated, well-ventilated, and fire-resistant storage area away from welding equipment**

**III. Read carefully the table below and answer the question by matching the description in column C and their reporting terms in column B and write answers in the provided column A.**

Column A (Answers)	Column B	Column C
1.....	1. Executive Summary	A. A section of a technical report that briefly summarizes the key points, findings, and recommendations.
2.....	2. Inventory Management	B. The process of safely and efficiently moving materials within the workplace, often using specialized equipment.
3.....	3. Tool Organization	C. The act of examining tools and equipment to ensure they are in good working condition before and after use.
4.....	4. Conclusion Section	D. A step in workplace cleaning that involves removing dust, debris, and particles from floors and surfaces.
5.....	5. Sweeping and Vacuuming	E. A concise section at the end of a technical report that summarizes the main findings and suggests future actions.
	6. Report Formatting	F. The proper arrangement and storage of tools in designated areas to ensure easy access and maintain a tidy workspace.
	7. Material Handling	G. The proper formatting of a technical report, including headings, subheadings, font style, and layout.
	8. Disposal of Waste	H. The systematic process of tracking and managing the quantity, location, and use of materials and tools.

	<b>9. Inspection of Tools</b>	I. A detailed list outlining the tasks to be completed, often used for organizing work and ensuring nothing is overlooked.
	<b>10. Task List</b>	J. The process of discarding unwanted or hazardous materials in a safe and environmentally responsible manner.

### Practical assessment

MM Ltd is a manufacturing company that has workshop located in Muhanga city, the company has a shortage of workers who are in charge of organizing the workshop as a big challenge to them. Is in that line the company had a partnership with your school to be in charge of the issue. Ask trainees to go to the workshop to help them in cleaning workshop, storing tools materials and equipment as well as make a report of the work done within two hours. All resources required are available in the company workshop.

#### Checklist

SN	Criteria	Indicators	Yes	No
1	SMAW equipment are properly cleaned and stored according to the machine operational manual	<b>Ind1.</b> SMAW equipment is maintained		
		<b>Ind2.</b> Workplace is cleaned		
		<b>Ind3.</b> Work is reported		
2	<b>Store materials, tools and equipment</b>	<b>Ind1.</b> Materials, Tools and equipment are well rearranged		
		<b>Ind2.</b> Materials, Tools and equipment are well hanged		
		<b>Ind3.</b> Materials, Tools and equipment are well shelved		
3	<b>Report is properly generated according to the work done</b>	<b>Ind1.</b> Report is prepared		
		<b>Ind2.</b> Report template is filled		
		<b>Ind3.</b> Form of report is respected		
		<b>Ind4.</b> All Report parts are described		

	<b>Total marks:</b>	...
	<b>/100</b>	
	<b>Passing line</b>	<b>70%</b>



### Further information to the trainer

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