



RQF LEVEL 3



MATAA301

**MANUFACTURING
TECHNOLOGY**

Aluminium Profile Assembling

TRAINER'S MANUAL

October, 2024



ALUMINIUM PROFILE ASSEMBLING



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Original published version: October 2024

ACKNOWLEDGEMENTS

The publisher would like to thank the following for their assistance in the elaboration of this training manual:

Rwanda TVET Board (RTB) extends its appreciation to all parties who contributed to the development of the trainer's and trainee's manuals for the TVET Certificate III in Manufacturing Technology, specifically for the module " MATAA301: Aluminium Profile Assembling".

We extend our gratitude to KOICA Rwanda for its contribution to the development of this training manual and for its ongoing support of the TVET system in Rwanda.

We extend our gratitude to the TQUM Project for its financial and technical support in the development of this training manual.

We would also like to acknowledge the valuable contributions of all TVET trainers and industry practitioners in the development of this training manual.

The management of Rwanda TVET Board extends its appreciation to both its staff and the staff of the TQUM Project for their efforts in coordinating these activities.

This training manual was developed:

Under Rwanda TVET Board (RTB) guiding policies and directives



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ACRONYMS

CBT/A: Competency-Based Training/Assessment

Ltd: Limited

PPE: Personal Protective Equipment

RTB: Rwanda TVET Board

TQUM Project: TVET Quality Management Project

TVET: Technical and Vocational Education Training

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled "Aluminium Profile Assembling" 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: MATAA301 ALUMINIUM PROFILE
ASSEMBLING**

Learning Outcome 1: Prepare the Workplace

Learning Outcome 2: Carry Out Aluminium Assembling Operations

Learning Outcome 3: Conduct Aluminium Post-Assembling Activities

Learning Outcome 1: Prepare the Workplace



Indicative contents

1.1 Introduction to aluminium profiles assembling process

1.2 Identification of safety and security measures

1.3 Selection of materials, tools and equipment

Key Competencies for Learning Outcome 1: Prepare the Workplace

Knowledge	Skills	Attitudes
<ul style="list-style-type: none">● Description of aluminium properties● Description of joining methods of aluminium profiles● Identification of safety and security measures during aluminium profiles assembling● Description of materials, tools and equipment used in assembling aluminium profiles	<ul style="list-style-type: none">● Applying safety and security measures in aluminium profile assembling processes.● Selecting materials, tools and equipment used in aluminium profiles assembling.	<ul style="list-style-type: none">● Having safety consciousness by following protocols and using protective equipment which are appropriate for the aluminium-related works.● Being patient as selecting materials, tools and equipment used in aluminium profiles assembling process requires careful and methodical work, which can be time consuming.● Having problem solving skills to address and resolve issues that arise during aluminium profiles assembly.



Duration: 10 hrs

Learning outcome 1 objectives:



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

1. Describe properly aluminium as a material used in aluminium profile assembling process.
2. Describe appropriately the joining methods used in aluminium profile assembling process.
3. Identify correctly the types of hazards found in aluminium profile assembling.
4. Identify properly the safety and security measures applied in aluminium profile assembling process.
5. Apply effectively the safety and security measures required in aluminium profile assembling process.
6. Identify appropriately the tools, materials, and equipment used in aluminium profile assembling process.
7. Select properly tools, materials and equipment to be used in aluminium profiles assembling process.



Resources

Equipment	Tools	Materials
<ul style="list-style-type: none"> ● Wheelbarrows ● PPE (safety shoes, grooves, helmets, glasses, ear plug, overall, dust musk) ● Fire Extinguishers ● First aid kit ● Air compressor ● Forklift ● Hand trucks 	<ul style="list-style-type: none"> ● Soft brush ● Wire brush ● Mop ● Air blower ● Tool box ● Storage bin ● Pegboards ● Shelves ● Tape measure ● T-square ● Steel ruler 	<ul style="list-style-type: none"> ● Aluminium profiles ● Rivet ● Bolts and nuts ● Screws ● Nail ● Glues ● Rubbers ● Glasses ● Nets ● Disinfectants ● Trash cans

<ul style="list-style-type: none"> ● Pallet jacks ● Workbenches ● Screwing machine ● Drilling machine ● Cut-off machine ● Riveting machine 	<ul style="list-style-type: none"> ● Protractor ● Trammel ● Divider ● Scribe ● Chisel ● Files ● Hacksaw ● Vices ● Hammer 	<ul style="list-style-type: none"> ● Degreasers ● Cleaning cloths
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Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail materials, tools and equipment required in aluminium profile assembling.
- Have a manufacturing workshop to be prepared?
- Avail safety materials, tools and equipment related to aluminium profile assembling activities
- Avail a well-set classroom
- Avail videos and/or photos showing aluminium products and processes.



Indicative content 1.1: Introduction to Aluminium Profiles Assembling process



Duration: 3



Theoretical Activity 1.1.1: Description of aluminium materials and their joining



Notes to the trainer:

- While delivering this content, small groups can be used for describing aluminium materials and their joining methods.
- The use of images and videos about joining methods of aluminium profiles can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session, engage trainees in groups and ask them to answer the following questions:

- What do you understand by the term "aluminium" as material used in aluminium profile assembling.
- Describe different kinds of aluminium properties?
- What are the application areas of aluminium profiles?
- Describe the following aluminium joining methods
 - Riveting
 - Fastening
 - Adhesive bonding

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings.

Step 4: Provide an expert view on presentations of the groups.

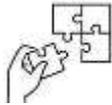
Step 5: Address any questions or concerns from the trainees.

Step 6: Ask trainees to read the key readings 1.1.1, in the trainee manual.



Points to Remember

- While describing aluminium, you should know that aluminium is corrosion resistant, it has lower toughness and ductility.
- Ensure that aluminium is mainly used in household and industrial appliances.
- While describing aluminium profile, you should know that riveting, adhesive and fastening are crucial joining methods used in aluminium profile assembling.



Application of learning 1.1.

Organise a study visit to any aluminium profiles assembly workplace located in your surrounding areas. The workers in that workplace should be fabricating aluminium products like windows, doors, and chairs. During your visit, Observe the process involved in fabricating these aluminium products. Referring to the theoretical activity 1.1.1, ask your trainees to prepare a study visit report on the following observed elements:

- I. Aluminium materials
- II. Applications of aluminium
- III. Methods of aluminium joining

Checklist:

Criteria	Indicators	Yes	No
The report on aluminium products is well done	Report on aluminium materials is done		
	Report on application of aluminium is done		
	Report on methods of joining aluminium is done		



Indicative content 1.2: Identification of Safety and Security Measures



Duration: 3 hrs



Theoretical Activity 1.2.1: Description of types of hazards, prevention of hazards and Safety signs and symbols.

Notes to the trainer:

- While delivering this content, short questions can be used for describing safety and security measures.
- The use of images and videos about prevention of hazards, safety signs and symbols can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session, engage trainees in groups and ask them to answer the following questions:

- Identify types of hazards at the aluminium profile assembling workplace
- Describe personal protective equipment (PPE) used in aluminium profile assembling.
- Describe safety measures to apply at the aluminium profiles assembling workplace.
- Describe tool, equipment and materials used in assembling aluminium profiles.
- Identify signs and symbols used in aluminium profile assembling.

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings.

Step 4: Provide an expert view on presentations of the groups.

Step 5: Address any questions or concerns from the trainees.

Step 6: Ask trainees to read the key readings 1.2.1, in the trainee manual.



Points to Remember

- Maintaining a safe and healthy work environment mechanical hazard, chemical and fire hazard should be identified and controlled as critical hazards in aluminium profile assembling.
- While describing prevention of hazards, personal protective equipment (PPE) and safety signs and symbols at the workplace should be identified as required in aluminium profile assembling.



Practical Activity 1.2.2: Applying safety and security measures



Notes to the trainer

- This activity should take place in the workshop/workplace where you are supposed to demonstrate to your trainees how to apply safety and security measures required for assembling aluminium profiles. Refer your trainees to the previous theoretical activity 1.2.1.
- Avail tools, materials and equipment that can help in applying safety and security measures.
- Have a well-organised workshop/ workplace.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

As an aluminium worker, you are requested to go to the workshop to apply safety and security measures required for assembling aluminium profiles based on application criteria.

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

Step 3: Demonstrate how to apply safety and security measures in assembling aluminium profiles and explain application criteria.

Step 4: Ask trainees to apply safety and security measures as required in assembling aluminium profiles and monitor application procedures.

Step 5: Verify whether safety and security measures required in assembling aluminium profiles are correctly applied and provide support where necessary.

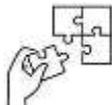
Step 6: Ask trainees to read the key readings 1.2.1.

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



Points to Remember

- While applying safety and security measures in aluminium profile assembling, ensure that you are using appropriate PPEs, safety signs and symbols. Otherwise, you will be hurt.



Application of learning 1.2.

Organise a study visit to any aluminium profiles assembly workplace located in your surrounding areas. By referring to the key readings 1.2.1 and 1.2.2., ask your trainees to help aluminium workers in that workplace to prepare PPEs, make proper placement of fire extinguishers, use safety signs and symbols, and ensure safety of tools and equipment.

Checklist:

S N	Criteria	Indicators	Yes	No
	Safety and security measures are applied	Fire extinguisher is allocated		
		PPEs are prepared		
		Safety of tools and equipment are identified		
		Safety signs and symbols are allocated		



Indicative content 1.3: Selection of Materials, Tools and Equipment.



Duration: .4 hrs



Theoretical Activity 1.3.1: Description of materials, tools and equipment



Notes to the trainer:

- While delivering this content, small groups can be used for describing materials, tools, and equipment used in aluminium profiles assembling.
- The use of images and videos showing a variety of materials, tools and equipment can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session, engage trainees in group forming and ask trainees to answer the following question:

- i. Explain the criteria to be followed while selecting aluminium profile.
- ii. Describe different types of materials used in aluminium profile assembling.
- iii. Differentiate types and uses of tools used in aluminium profile assembling.
- iv. What are the types and uses of equipment used in aluminium profile assembling works?

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings.

Step 4: Provide an expert view on presentations of the groups.

Step 5: Address any questions or concerns from the trainees.

Step 6: Ask trainees to read the key readings 1.3.1, in the trainee manual



Points to Remember

- In aluminium profile assembling process, proper identification of materials, tools and equipment with their uses will help you having the final aluminium products that meet the required standards



Practical Activity 1.3.2: Selecting materials, tools and equipment.



Notes to the trainer

- This activity should take place in a workshop/workplace where you are supposed to demonstrate to your trainees how to properly select tools, materials and equipment used for assembling aluminium profiles. Refer your trainees to the previous theoretical activity 1.3.1.
- Avail tools, materials and equipment used in assembling aluminium profiles
- Have a well-organised workshop/workplace.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

- i. As an aluminium worker, you are requested to go in the workshop to select tools, material and equipment to be used in assembling aluminium profiles based on selection criteria.

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

Step 3: Demonstrate how to select tools, materials and equipment used in assembling aluminium profiles and explain selection criteria.

Step 4: Ask trainees to select tools, materials and equipment used in assembling aluminium profiles and monitor selection procedures.

Step 5: Verify whether tools, materials and equipment used in assembling aluminium profiles are correctly selected and provide support where necessary.

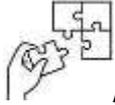
Step 6: Ask trainees to read the key readings 1.3.2.

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



Points to Remember

- While selecting materials, tools and equipment to be used in aluminium profile assembling, consider their applications, load and environmental facts, dimensions, tolerances, and mechanical properties.



Application of learning 1.3.

Organise a study visit to any aluminium profiles assembly workplace located in your surrounding areas. By referring to the key readings 1.3.1, ask your trainees to select tools, materials and equipment that must be used in manufacturing aluminium shoe racks.

Checklist:

SN	Criteria	Indicators	Yes	No
1	Tools, materials and equipment are properly selected	Materials are selected		
		Tools are selected		
		Equipment is selected		



Learning outcome 1 end assessment

Written assessment

Q1. Answer the following statements by TRUE if the statement is correct, or by FALSE if the statement is incorrect:

- a) Aluminium is a highly corrosion-resistant metal
- b) Aluminium has a density lower than that of steel

Q2. Circle the letter corresponding with the correct answer:

i. A method which is generally used when a strong and permanent bond without additional fasteners is required is:

- a) Riveting
- b) Fastening
- c) Clamping
- d) Adhesive bonding

Answer: d) Adhesive bonding

ii. A tool which is used to ensure accurate measurements of aluminium profiles is:

- a. Clamps
- b. Drill
- c. Measuring tape
- d. Mitre saw.

Answer: c) Measuring tape

Q3. Match personal protective equipment in (column A) with their corresponding purpose in (column B). Write answers in the provided blank space.

Answers	Column A	Column B
1 E	1) Safety glasses	A. Prevents hearing damage from loud machinery
2 C	2) Gloves	B. Protect head from falling object
3 A	3) Earmuff	C. Protects hands from sharp edges
4 B	4) Helmets	D. Protects feet
		E. Protects eyes from debris

Q4. Match safety signs in (column A) with their corresponding meaning in (column B) by writing the answer in the provided blank space:

Answer	Column A	Column B
1 A	1) 	A) Acute toxicity
2 D	 2.)	B) Explosion hazard
3 F	 3)	C) Gas under pressure
4 B	4) 	D) highly flammable
5 C	5) 	E) environmentally hazardous
6 G	6) 	F) Corrosive or irritant effect on skin or severe eye irritation
7 F	 7)	E) Air under pressure
		F) Acute toxicity, skin corrosion/ specific target organ toxicity

5. Complete the table below in (column A) by using (chisel, hammer, side cutter plier, wrench, steel rule, try-square, Vernier calliper) with their corresponding statement in (column B)

Column A	Column B
1. Steel ruler	1) basic measuring tool with straight edges and marked units, typically in inches or

	centimetres, used for measuring length or distance
2. Vernier calliper	2) Precision instruments used to measure the internal and external dimensions of objects with high accuracy
3. Try square	3) Tools with a right-angle shape used for checking or marking right angles and for measuring or marking perpendicularly.
4. None	4) It is a head tool with blunt edge metal blade
5. 5. Chisel	5) A hand tool with a sharp-edged metal blade used for cutting, shaping, or splitting metal workpieces.

Practical assessment

Suppose that TREBLE XXX is a workshop located in your home district that has won a tender of fabricating aluminium doors and windows using aluminium profiles. Ask your trainees to apply safety and security measures and select materials, tools and equipment at TREBLE XXX workshop. (Allocated time: 2 hours).

Checklist

Assessment criteria	Indicator	Score		Comments
		Yes	No	
1. Safety and security measures are effectively applied as per Aluminium handling procedures.	PPE are well worn			
	Hazardous materials are appropriately removed			
2. Equipment and tools are properly selected according to the required operations	Cutting tool are correctly selected			
	Drilling tool is selected			
	Drilling equipment is selected			
	Riveting gun is selected			

	Glue guns is selected			
	Nail Hit gun is selected			
	Bolts and nuts are selected			
	Screws are selected			
	Rubbers are selected			
	Glasses are selected			
3. The selection of Aluminium profiles is properly done according to the drawing.	The selection of aluminium profiles is properly selected			
Total marks				13
Passing line: 70%				
Decision:				



Further information to the trainer

1. American Society for Testing and Materials. (2020). *ASTM B221-20: Standard specification for aluminum and aluminum-alloy extruded bars, rods, wire, profiles, and tubes*. ASTM International.
2. Callister, W. D., & Rethwisch, D. G. (2018). *Materials science and engineering: An introduction* (10th ed.). Wiley.
3. Houghton, L. (2019). *Introduction to aluminum extrusion*. In *Aluminum profiles and their applications* (pp. 1-15). Springer.
4. International Organization for Standardization. (2017). *ISO 7010:2017 - Graphical symbols - Safety colours and safety signs - Registered safety signs*. International Organization for Standardization
5. <https://shorturl.at/2lqjO>
6. <https://shorturl.at/adpzg>
7. <https://shorturl.at/POMkf>

Learning Outcome 2: Carry Out Aluminium Assembling Operation



Indicative contents

2.1 Interpretation of drawing

2.2 Aluminium joining techniques

2.3 Verification of aluminium product

Key Competencies for Learning Outcome 2: Carry Out Aluminium Assembling Operation

Knowledge	Skills	Attitudes
<ul style="list-style-type: none">● Description of drawing elements for aluminium profiles assembling● Identification of cutting list of aluminium profiles● Description of joining techniques for aluminium profiles● Description of verification procedures of aluminium products	<ul style="list-style-type: none">● Interpreting drawings related to aluminium profiles.● Applying aluminium joining techniques● Verifying aluminium products	<ul style="list-style-type: none">● Paying attention to details while assembling and verifying aluminium profiles to ensure the final product is of high quality and meets specifications● Being patient as interpreting drawings of aluminium profiles requires careful and methodical work, which can be time consuming● Having problem solving skills to address and resolve issues that arise during the application of aluminium joining techniques



Duration: 25 hrs

Learning outcome 2 objectives:



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

1. Describe properly drawing elements as used in aluminium profile assembling.
2. Interpret appropriately the drawing as used in aluminium profile assembling.
3. Differentiate correctly joining techniques applied for assembling aluminium profiles.
4. Apply correctly joining techniques as required in assembling aluminium profiles.
5. Describe properly verification elements of product required in aluminium profile assembling.
6. Verify correctly aluminium profile products according to the drawing applications.



Resources

Equipment	Tools	Materials
<ul style="list-style-type: none"> ● PPE (safety glasses, gloves, ear muff, face mask, helmets, safety shoes, overall) ● Riveting gun tighteners ● Glue gun ● Nail hit gun ● Drilling machine ● Fire extinguishers ● First aid kit 	<ul style="list-style-type: none"> ● Measuring tape ● Rules ● T square ● Marking pen ● Scribers ● Dividers ● Vernier calliper ● Micrometre ● Beam clamp ● Bench clamp ● Bench vice ● Hand screw clamps ● Picture frame clamp ● Hand files ● Hand hacksaw 	<ul style="list-style-type: none"> ● Aluminium profiles ● Rivet ● Bolts and nuts ● Screws ● Nail ● Glues ● Rubbers ● Glasses

- | | | |
|--|--------------------------------------------------------------------------------|--|
| | <ul style="list-style-type: none">● Twist drill● Chisel | |
|--|--------------------------------------------------------------------------------|--|



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail prepared aluminium work pieces to be assembled.
- Avail materials, tools and equipment required in aluminium profile assembling.
- Have videos illustrating the process of assembling aluminium profiles.
- Have a well-organised workshop.



Indicative content 2.1: Interpretation of Drawing



Duration:4 hrs



Theoretical Activity 2.1.1: Description of dimensions, symbols and cutting list



Notes to the trainer:

- While delivering this content, short questions can be used to describe dimensions, symbols and cutting list.
- Images and videos illustrating dimensions, symbols and cutting list elements can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the session, engage trainees in groups and ask them to answer the following questions:
- Describe the following drawing elements:
 - Dimension
 - Symbols
 - Cutting list
 - Describe the elements of the cutting list as used in the aluminium profile assembling process.
- Step 2:** Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.
- Step 3:** Engage trainees in presentation of their findings
- Step 4:** Provide an expert view on presentations of the groups.
- Step 5:** Address any questions or concerns from the trainees
- Step 6:** Ask trainees to read the key readings 2.1.1, in the trainee manual



Points to Remember

- Dimensions, symbols and cutting list should be used while describing interpretation of drawings used in aluminium profile assembling.
- Item description and quantity are key elements to consider in a cutting list.



Practical Activity 2.1.2: Interpretation of drawing



Notes to the trainer

- This activity should take place in a workshop/workplace where you are supposed to demonstrate to the trainees how to interpret drawing used for assembling aluminium profiles. Refer your trainees to the previous theoretical activity 2.1.1.
- Avail drawing materials and tools
- Avail images and videos about interpretation of drawings



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

As an aluminium worker, you are requested to go to the workshop/workplace to interpret drawings used in assembling aluminium profiles based on the interpretation process.

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

Step 3: Demonstrate how to interpret drawings used in assembling aluminium profiles and explain the interpretation process.

Step 4: Ask trainees to interpret the drawings used in assembling aluminium profiles and monitor the interpretation process.

Step 5: Verify whether drawings used in assembling aluminium profiles are correctly interpreted and provide support where necessary.

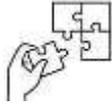
Step 6: Ask trainees to read the key readings 2.1.2.

Step 7: Ask trainees to perform the task provided in application of learning 2.1.



Points to Remember

- To enhance the aluminium profile assembly process, it is important to interpret dimensions, annotations, and symbols during the drawing interpretation process.



Application of learning 2.1.

Organise a study visit to any aluminium profile assembly workplace located in your surrounding areas. Suppose that workers in that workplace are conducting an activity of interpreting drawings of cooking wares, doors, windows, and chairs. Referring to the activity 2.1.2, request your trainees to:

- a) Interpret dimensions
- b) Interpret symbols
- c) Provide the cutting list elements

Checklist:

SN	Criteria	Indicators	Yes	No
1	Drawing is correctly interpreted	Dimensions are identified		
		Symbols are identified		
		Cutting list is done		



Indicative content 2.2: Aluminium Joining Techniques



Duration: .16 hrs



Theoretical Activity 2.2.1: Explanation of aluminium joining techniques



Notes to the trainer:

- While delivering this content, short questions can be used to explain joining techniques used in assembling aluminium profiles.
- The use of images and videos about aluminium joining techniques can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session and ask trainees to answer the following question.

- Describe the following joining techniques used in aluminium profile assembling:
 - Screwing
 - Riveting
 - Bolting
 - Stapling
 - Adhesive bonding

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings

Step 4: Provide an expert view on presentations of the groups.

Step 5: Address any questions or concerns from the trainees

Step 6: Ask trainees to read the key readings 2.2.1, in the trainee manual



Points to Remember

- For best practices, apply these aluminium joining techniques which include: screwing, riveting, bolting, stapling, adhesive bonding and fastening.



Practical Activity 2.2.2: Applying aluminium joining techniques



Notes to the trainer

- Facilitation of this activity can be individual based. You are supposed to demonstrate how to apply joining techniques in aluminium profiles assembling.
- Avail prepared aluminium profiles to be assembled.
- Have materials, tools and equipment to be used in assembling aluminium profiles.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

As an aluminium worker, you are requested to go to the workshop/workplace to assemble the prepared aluminium profiles by using different joining techniques.

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

Step 3: Demonstrate how to assemble aluminium profiles using different joining techniques. While demonstrating, explain the assembling procedures.

Step 4: Ask trainees to assemble the prepared profiles using different techniques and monitor the procedures.

Step 5: Verify whether the profiles are properly assembled and provide support.

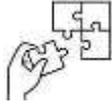
Step 6: Ask trainees to read the key readings 2.2.1.

Step 7: Ask trainees to perform the task provided in application of learning 2.2.



Points to Remember

- While assembling aluminium profiles, follow these three crucial steps which include: (1) preparation, (2) joining, and (3) inspection of the assembled product. This will help you get high-quality standards of the product.



Application of learning 1.3.

Organise a study visit to any aluminium profiles assembling workshop/workplace located in your surrounding areas. By referring to the previous activities 2.2.1 and 2.2.2, Ask your trainees to assist its aluminium workers to apply joining techniques by:

- a) Preparing edges of profiles
- b) Joining edges of profiles

Checklist:

SN	Criteria	Indicators	Yes	No
1	Aluminium profile joining techniques are properly applied	Edges of profiles are prepared		
		Joints are produced		



Indicative content 2.3: Verification of Aluminium Product



Duration: .5 hrs



Theoretical Activity 2.3.1: Explanation of verification measurement, opening system, sealing and screening on assembled aluminium profile product.



Notes to the trainer:

- While delivering this content, short questions can be used to explain verification of measurement and opening system, sealing and screening of aluminium profile products.
- The use of images and videos illustrating verification measurement, opening system, sealing and screening on assembled aluminium profiles can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the session, engage trainees in groups and ask them to answer the following questions:
- i. What are the kinds of measurements to be checked for verifying aluminium products?
 - ii. What are the points to be verified in the opening system of aluminium profiles product?
 - iii. Differentiate sealing from screening in aluminium product verification.
- Step 2:** Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.
- Step 3:** Engage trainees in presentation of their findings.
- Step 4:** Provide an expert view on presentations of the groups.
- Step 5:** Address any questions or concerns from the trainees.
- Step 6:** Ask trainees to read the key readings 2.3.1, in the trainee manual.



Points to Remember

- When it comes to verifying products made of aluminium profiles, remember to use measurement, opening system, sealing and screening as proper systems to get the right results of the assembled products.



Practical Activity 2.3.2: Verifying measurement, opening system, sealing and screening on assembled aluminium profile product.



Notes to the trainer

- Facilitation of this activity can be individual based. You are supposed to demonstrate to your trainees how to verify measurement, opening system, sealing and screening on assembled aluminium profiles.
- Avail required product to be verified.
- Avail tools and equipment to be used in verifying measurement, opening system, sealing and screening on assembled aluminium profile products.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

As an aluminium worker, you are requested to go to the workshop/workplace and verify measurement, opening system, sealing and screening on assembled aluminium profile products by using different techniques.

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

Step 3: Demonstrate how to verify measurement, opening system, sealing and screening on assembled aluminium profile product, explain the verification procedures.

Step 4: Asks trainees to verify measurement, opening system, sealing and screening on assembled aluminium profile products and monitor the procedures.

Step 5: Inspect whether the product is properly verified and provide support if necessary.

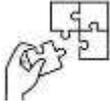
Step 6: Ask trainees to read the key readings 2.3.2.

Step 7: Ask trainees to perform the task provided in application of learning 2.3.



Points to Remember

- Ensure that the final product meets quality standards, and it is free from any defects that could affect its function and/or aesthetics.



Application of learning 1.3.

Organise a study visit to any aluminium profiles assembling workshop/workplace located in your surrounding areas. By referring to the previous activities 2.3.1 and 2.3.2., Ask your trainees to conduct a final verification of aluminium products (doors, windows, chairs) available in that visited area. Indeed, you are requested to verify the following elements:

- a) Measurement
- b) Opening system
- c) Sealing
- d) Screening

Checklist:

Criteria	Indicators	Yes	No
Final aluminium products are correctly verified	Measurements are checked		
	Opening system is verified		
	Sealing is verified		
	Screening is verified		



Learning outcome 2 end assessment

Written assessment

Q1. Circle the letter corresponding with the correct answer:

- i. The primary purpose of fabrication drawings is:
 - a. To communicate design ideas
 - b. To guide assembly procedures
 - c. To specify material costs
 - d. To interpret legal regulations

Answer: a) To communicate design ideas

- ii. The difference between dimensions and symbols in engineering drawings is:
 - a) Dimensions are graphical representations; symbols are numerical values.
 - b) Dimensions specify size attributes; symbols convey specific meanings.
 - c) Dimensions are used for surface finishes, symbols for material properties.
 - d) Dimensions are only used for 2D drawings, symbols for 3D models.

Answer: b) Dimensions specify size attributes, symbols convey specific meanings.

- iii. The type of caulk recommended for sealing aluminium windows is:
 - a) Acrylic caulk
 - b) Silicone caulk
 - c) Polyurethane caulk
 - d) Butyl rubber caulk

Answer: b) Silicone caulk

Q2. Answer by TRUE if the statement is correct or by FALSE if the statement is incorrect:

- i. Fabrication drawings are prepared by the fabrication department to finalise designs. **Answer: FALSE**
- ii. Symbols on engineering drawings include graphical representations such as circles, squares, and triangles. **Answer: TRUE**

Q3. Match the following joining techniques in (column A) with their corresponding description in (column B). Then write the answers in the provided blank spaces.

Answers	Column A	Column B
1 B	1. Screwing	A. Uses rivets to join work pieces
2 E	2. Bolting	B. Joins materials with adhesive
3 C	3. Stapling	C. Fastens materials with metal staples
4 A	4. Adhesive bonding	D. Joins materials with ropes
		E. Connects components using screws or bolts

Practical assessment

Suppose that ABG workshop located in Niboyi sector, Kicukiro district has won a tender for fabricating two aluminium windows and two aluminium doors for KDG bank ltd. The manager of ABG workshop wants an aluminium worker for assembling those windows and doors. Request your trainees to assemble those aluminium profiles and verify the final products. (Allocated time 8 hours)

Checklist

Element	Indicator	Score	
		Yes	No
1. Technical drawing is correctly interpreted according to the work specifications	Ind.1. Dimensions are respected		
	Ind. 2. Symbols are interpreted		
	Ind. 3. Cutting list is respected		
2. Aluminium joining techniques are properly applied according to the required operations.	Ind. 1. Screwing is done		
	Ind. 2. Riveting is done		
	Ind. 3. Bolting is done		
	Ind. 4. Stapling is done		
3. Final aluminium product is correctly verified as per product specification.	Ind. 1. Diagonals are checked		
	Ind. 2. Height is verified		

	Ind. 3. Width is verified		
	Ind.4. Opening system is verified		
	Ind. 5. Sealing is verified		
	Ind. 6. Glass fixing is verified		
	Ind. 7. Net fixing is verified		
Total marks:		/15	
Passing line:		70%	
Decision:			

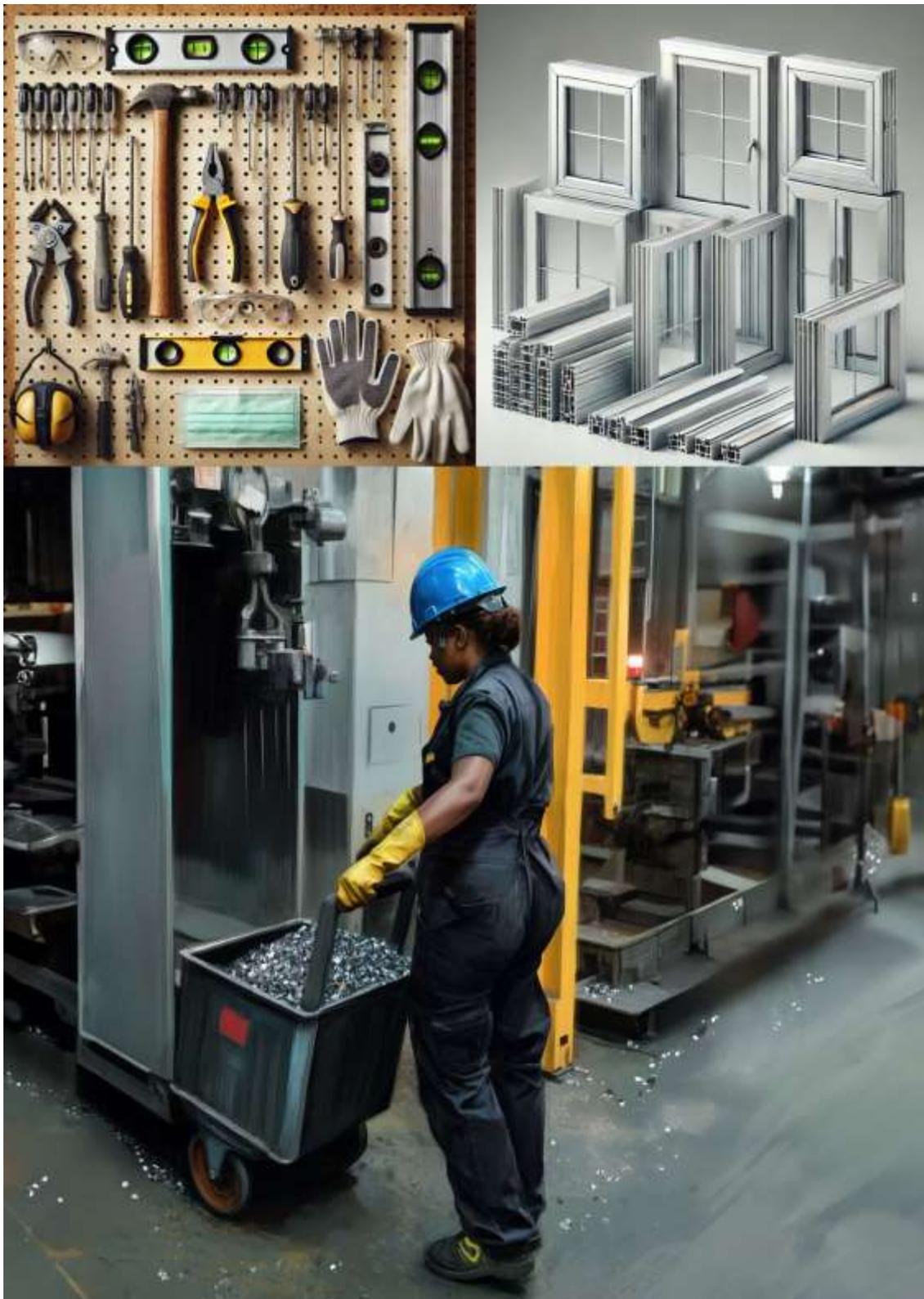
END



Further information to the trainer

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2. Smith, J. (2022). *Understanding fabrication drawings: A guide for designers and fabricators*. Engineering Press
3. Wilson, R. (2021). *Symbols and conventions in engineering drawings*. Technical Publications
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5. <https://shorturl.at/OFcrT>

Learning Outcome 3: Conduct Aluminium Post Assembling Activities



Indicative contents

- 3.1. Protection of the product**
- 3.2. Cleaning of tools, equipment and workplace**
- 3.3. Storing of tools and equipment**

Key Competencies for Learning Outcome 3: Conduct Aluminium Post Assembling Activities

Knowledge	Skills	Attitudes
<ul style="list-style-type: none"> ● Identification of packaging methods of aluminium products ● Description of cleaning techniques of aluminium tools, equipment and workplace ● Description of aluminium waste disposal methods ● Identification of methods of storing aluminium tools and equipment 	<ul style="list-style-type: none"> ● Packaging aluminium products ● Cleaning aluminium tools, equipment and workplace ● Disposing of aluminium wastes ● Storing aluminium tools and equipment 	<ul style="list-style-type: none"> ● Being adaptable to new techniques of packaging aluminium products. ● Having safety consciousness by following protocols while cleaning aluminium tools and equipment ● Being careful while disposing of aluminium wastes. Otherwise, they can intoxicate the users and the community at large. ● Respecting storing techniques as it helps effective store management



Duration: 5hrs

Learning outcome 3 objectives:



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

1. Describe properly the product protection in aluminium profile assembling
2. Apply appropriate protection to the aluminium assembled products according to the product specification.
3. Describe properly cleaning methods of tools, equipment and workplace in aluminium profile assembling.
4. Apply effectively cleaning methods required of tools, equipment and workplace in aluminium assembling process.
5. Differentiate correctly storing methods required for tools and equipment in the aluminium profile assembling process.
6. Store appropriately tools and equipment used in aluminium assembled products according to the product specification.



Resources

Equipment	Tools	Materials
<ul style="list-style-type: none"> ● PPE (safety glasses, gloves, ear muff, face mask, helmets, safety shoes, overall) ● Wheelbarrows ● First aid kit ● Air compressor ● Forklift ● Hand trucks ● Pallet jacks 	<ul style="list-style-type: none"> ● Soft brush ● Wire brush ● Mop ● Air blower ● Tool box ● Storage bin ● Pegboards ● Shelves 	<ul style="list-style-type: none"> ● Aluminium profiles ● Rivet ● Bolts and nuts ● Screws ● Nail ● Glues ● Rubbers ● Glasses



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail aluminium products
- Have videos and/or pictures about aluminium post assembling activities.
- Avail materials, tools and equipment required for aluminium post assembling activities



Indicative content 3.1: Protection of the Product



Duration: 2hrs



Theoretical Activity 3.1.1: Explanation of packaging methods



Notes to the trainer:

- While delivering this content, short questions can be used to explain packaging methods of aluminium products.
- The use of images and videos illustrating packaging methods of aluminium products can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the session, engage trainees in groups by asking them to answer the following questions:
- What do you understand about the term “packaging”?
 - Differentiate the following packaging methods.
 - PVC covering
 - Paper covering
 - Wood covering
- Step 2:** Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.
- Step 3:** Engage trainees in presentation of their findings
- Step 4:** Provide an expert view on presentations of the groups.
- Step 5:** Address any questions or concerns from the trainees
- Step 6:** Ask trainees to read the key readings 3.1.1, in the trainee manual



Points to Remember

While packaging, use proper packaging materials which include PVC covering, paper covering, wood covering as these will increase shelf life of the packaged product



Practical Activity 3.1.2: Packing the assembled product



Notes to the trainer

- Facilitation of this activity can be individual based. You are supposed to demonstrate to your trainees how to package assembled aluminium products.
- Avail required products to be packed.
- Prepare tools and equipment to be used in packaging.



Key steps:

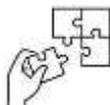
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the topic and ask trainees to do the task described below:
- As an aluminium worker. You are requested to pack the assembled product by using different techniques based on the trainer's instructions.
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate how to pack the assembled product of an aluminium profile product and explain the packaging procedures.
- Step 4:** Ask trainees to pack the assembled product of an aluminium profile product and monitor the procedures.
- Step 5:** Verify whether the product is properly packed and provide support if necessary.
- Step 6:** Ask trainees to read the key readings 2.3.2.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.3.



Points to Remember

- To ensure that your product made of aluminium is well protected, choose proper packaging techniques, proper sealing and an ideal verification processes.



Application of learning 3.1.

Organise a study visit to any aluminium profiles assembling workshop/workplace located in your surrounding areas. By referring to the previous activities 3.1.1. and 3.1.2, Request your trainees to help aluminium workers in that area to:

- a) Choose appropriate packaging materials, tools, and equipment
- b) Apply effective packaging techniques
- c) Inspect the packaged items (aluminium products)

Checklist:

SN	Criteria	Indicators	Yes	No
1	Final aluminium product is appropriately protected	Packaging materials, tools, and equipment are selected		
		Packaging techniques are applied		
		Packaged products are inspected		



Indicative content 3.2: Cleaning of Tools, Equipment and Workplace



Duration: 2.hrs



Theoretical Activity 3.2.1: Explanation of cleaning techniques of tools, equipment and workplace



Notes to the trainer:

- While delivering this content, short questions may be used to explain cleaning techniques of tools, equipment and workplace.
- The use of images and videos illustrating cleaning techniques can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session by asking trainees to answer the of following questions:

- What do you understand by the term “cleaning” in aluminium profile assembling?
- Describe the following cleaning technique used in aluminium profiles assembling:
 - Chemical cleaning
 - Dusting
 - Sweeping
 - Compressed air cleaning

Explain the waste disposal methods in aluminium profile assembling

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings

Step 4: Provide an expert view on presentations of the groups.

Step 5: Address any questions or concerns from the trainees

Step 6: Ask trainees to read the key readings 3.2.1, in the trainee manual



Points to Remember

- When describing cleaning techniques, key factors to consider are the type of surface, the nature of the contaminants, and the effectiveness of each method.



Practical Activity 3.2.2: Cleaning of tools, equipment, workplace and apply waste disposal methods



Notes to the trainer

- Facilitation of this activity can be individual based. You are supposed to guide your trainees how to clean tools, equipment, workplace and apply waste disposal methods.
- You are recommended to avail materials tools, equipment used in cleaning



Key steps:

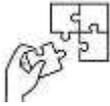
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the topic and ask trainees to do the task described below:
As an aluminium worker. You are requested to go to the manufacturing workshop/workplace and clean used tools, equipment, workplace and dispose of aluminium wastes.
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate how to clean used tools, equipment, and the workplace. Explain the cleaning procedures of aluminium waste disposal.
- Step 4:** Ask trainees to clean used tools, equipment, workplace and dispose of wastes in assemble aluminium profile products and monitor the procedures.
- Step 5:** Verify whether the tools, equipment and workplace are properly cleaned and if wastes are properly disposed of.
- Step 6:** Ask trainees to read the key readings 3.2.1.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.



Points to Remember

- While cleaning aluminium materials, tools, equipment as well as the workshop/workplace, you should consider waste disposal methods which include recycling, composting and sanitary landfill.



Application of learning 3.2

Organise a study visit to any aluminium profiles assembling workshop/workplace located in your surrounding areas. By referring to the previous activities 3.2.1. and 3.2.2, Request your trainees to:

- i. Apply cleaning techniques of:
 - a. Materials, tools and equipment
 - b. The workshop/workplace
- ii. Dispose of aluminium wastes

Checklist:

SN	Criteria	Indicators	Yes	No
1	Tools, equipment and workplace are properly cleaned	Materials are cleaned		
		Tools are cleaned		
		Equipment is cleaned		
		Workshop/workplace is cleaned		
2	Waste disposal methods are effectively applied	Aluminium wastes are disposed off		



Indicative content 3.3: Storing of Tools and Equipment



Duration: 1 hrs



Theoretical Activity 3.3.1: Description of tools and equipment storing methods



Notes to the trainer:

- While delivering this content, small groups can be used to describe methods of storing tools and equipment used in aluminium profiles assembling.
- The use of images and videos and illustrating storing methods can be used as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Engage trainees in group forming and ask them to answer the following question:

- Describe the following tools and equipment storing methods
 - Re-arranging
 - Shelving
 - Hanging

Step 2: Ask trainees to write their findings on papers, flipcharts, blackboard or whiteboard.

Step 3: Engage trainees in presentation of their findings.

Step 4: Provide an expert view on presentations of the groups.

Step 5: Address any questions or concerns from the trainees.

Step 6: Ask trainees to read the key readings 3.3.1, in the trainee manual



Points to Remember

- For proper maintenance of aluminium materials, tools and equipment, hanging, shelving and rearranging are important storing methods.



Practical Activity 3.3.2: Storing of tools and equipment



Notes to the trainer

- Facilitation of this activity can be individual based. You are supposed to demonstrate to your trainees how to store tools and equipment.
- You are recommended to have materials, tools and equipment to be used in the storing process.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to do the task described below:

As an aluminium worker, you are requested to go to the manufacturing workshop/workplace to store materials, tools and equipment.

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

Step 3: Demonstrate trainees how to store materials, tools and equipment. Explain storing procedures.

Step 4: Ask trainees to store materials, tools and equipment of aluminium profiles. Monitor the procedures.

Step 5: Check whether materials, tools and equipment are properly stored and provide support if necessary.

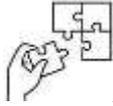
Step 6: Ask trainees to read the key readings 3.3.1

Step 7: Ask trainees to perform the task provided in application of learning 3.3.



Points to Remember

- For best inventory and proper management of aluminium tools, materials and equipment, you are highly recommended to store them in respect with their types, sizes, and uses.



Application of learning3.3.

Organise a study visit to any aluminium profiles assembling workshop/workplace located in your surrounding areas. By referring to the previous activities 3.3.1. and 3.3.2, request your trainees to apply the following storing methods:

- a) Re-arranging
- b) Shelving
- c) Hanging

Checklist:

SN	Criteria	Indicators	Yes	No
1	Methods of storing materials, tools, and equipment are effectively applied	Rearranging is applied		
		Shelving is applied		
		Hanging is applied		



Learning outcome 3 end assessment

Written assessment

Q1. Answer the following statements by TRUE if the statement is correct or by FALSE if the statement is incorrect:

- i. PVC covering is used to protect furniture from dust and scratches and allows the furniture to remain visible.

Answer: TRUE

- ii. PVC covering is used to protect furniture from dust and scratches and allows the furniture to remain visible.

Answer: FALSE

- iii. Organizing tools by function and using color coordination can improve workspace efficiency.

Answer: TRUE

- iv. Shelving units are available in metal, wood, and plastic, and can be custom built to fit specific needs.

Answer: TRUE

- v. Hanging tools are less space-efficient than using shelves because it takes up more floor space.

Answer: FALSE

Q2. Circle the letter corresponding with the correct answer:

- i. The final step in the packaging process before the product is shipped is:

- a) Securing assembled components
- b) Inner packaging
- c) Quality control checks
- d) Surface protection

Answer: c) Quality control checks

- ii. One of the following is an advantage of hanging tools in a workspace:

- a. Tools are less visible and harder to access.
- b. It takes up more floor space than shelving.
- c. Tools are more prone to damage and misplacement.
- d. Tools are easily visible and within arm's reach, and space is optimized.

Answer: d) Tools are easily visible and within arm's reach, and space is optimised.

Q3. Match cleaning techniques in (column A) with their corresponding descriptions in (column B) by writing the answers in the provided blank space.

Answers	Column A	Column B
1.F	1) Chemical Cleaning	a. Using a damp cloth to remove dust and dirt, primarily on floors
2) B	2) Dusting	b. Removing dust using a dry cloth
3) A	3) Mopping	c. Using a muddy soil with a soap
4) G	4) Washing	d. Applying compressed air to remove dust from equipment.
5) D	5) Air pressure Cleaning	e. Using a brush to clean surfaces, especially before welding.
6) E	6) Wire brush cleaning	f. Using chemical solutions to clean equipment without dismantling it.
		g. Scrubbing surfaces with water and detergent to remove tough dirt.

Practical assessment

Suppose that ABC metal fabrication workshop located in your home district has fabricated ten (10) sliding windows made with glasses. Request your trainees to protect those windows, clean used tools, equipment, and the workplace. Then store them after work. (Allocated time: 4 hours).

Checklist

Elements to be checked	Indicators	Score	
		YES	No (0)
1. Materials, tools and equipment are appropriately cleaned according to well-known cleaning techniques	The tools and equipment are well cleaned		
	Chemical cleaning is done		
	Dusting is done		
	Sweeping is done		
	Compressed air cleaning is done		
	Wastes are disposed		
2. Materials, tool, and equipment are properly stored according to safety rules	Tools are stored		
	Equipment are stored		
Total marks		8	
Passing line:		70%	
Decision:			



Further information to the trainer

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