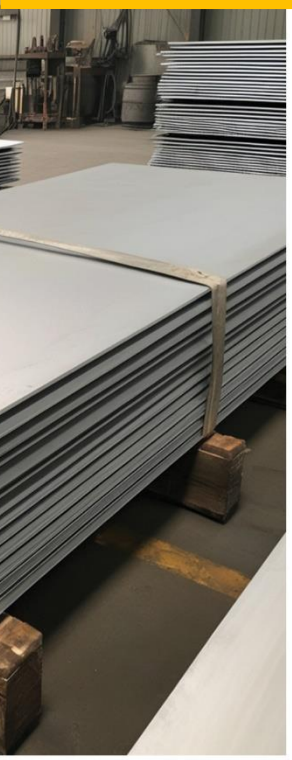
RQF LEVEL 3



MATDO301

MANUFACTURING TECHNOLOGY

Drilling Machine Operations

TRAINER'S MANUAL

October, 2024

DRILLING MACHINE OPERATIONS

KOICA Korea International Cooperation Agency

TQUM TVET Quality Management Project

2024

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ACRONYMS

CBT: Competency-Based Training

DO: Drilling Operation

IC: Indicative Content

LO: Learning Outcome

LTD: Limited

MAT: Manufacturing Technology

PC: Performance Criteria

PPE: Personal Protective Equipment

RQF: Rwanda Qualification Flame work

RTB: Rwanda TVET Board

TQUM Project: TVET Quality Management Project

TVET: Technical and Vocational education and training

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled **"Drilling Machine Operations."** Students 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.

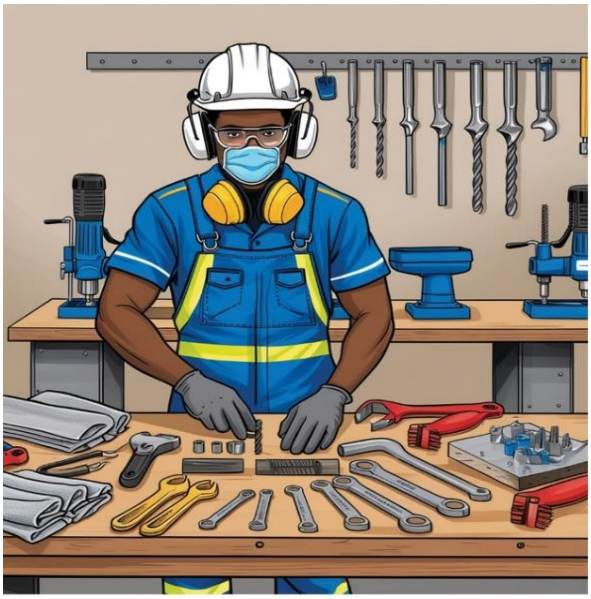
The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

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 students 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 students review the key reading and the points to remember section.

MODULE CODE AND TITLE: MATDO301 DRILLING MACHINE OPERATIONS

Learning Outcome 1: Prepare for drilling operations
Learning Outcome 2: Carry out drilling operations
Learning Outcome 3: Perform post operation activities



Indicative contents

1.1. Introduction to Drilling Operation

1.2. Identification of Safety Health, Environment and Security Measures at Work Place

1.3. Identification of Drilling Materials, Tools and Equipment

1.4. Pre-Operation Activities of Drilling Equipment

Key Competencies for Learning Outcome 1: Pre-operation activities of drilling Equipment

Knowledge	Skills	Attitudes
• Differentiation of drillingoperation • Description of advantages, disadvantages and application of drilling operation • Description of Safety andsecurity measures for drilling operation • Description of Material, tools and equipment for drilling operation • Description of Maintenance technics fordrilling equipment	• Applying Safety and security measures for drilling operation • Using PPE for drilling operation correctly • Selecting materials fordrilling operation • Using tools and equipment for drilling operation • Maintaining drilling equipment	• Being attentive while applying Safety and security measures for drilling operation • Being careful when selecting materials for drilling operation • Being Attentive Using tools and equipment fordrilling operation

Duration: 8 hrs.

Learning outcome 1 objectives:

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

1. Define properly the terms used in drilling operation.
2. Explain correctly the working principle of drilling operation
3. Identify correctly the types of hazards occur during drilling operation.
4. Identify effectively advantages and disadvantages of drilling operation
5. Identify effectively safety and security measures for drilling operation
6. Identify correctly tools, materials and equipment for drilling operation
7. Apply effectively safety and security measures for drilling operation at workplace
8. Select properly tools materials and equipment for drilling operation
9. Apply properly basic maintenance techniques on the drilling tools and equipment.

Resources

Equipment	Tools	Materials
• Drilling machine • Hand shear machine • Angle grinder • Work benches • Power hacksaw • Hand drill machine • Aircompressor	• Clamps • Mallet • Hack saw • Chisel • File • Marking gauge • Try square • Screw driver • Wire brush • Cloth rugs • Tape measures • Anvil • Center drill	• Sheet metal • Flat bar • Square bar • Angle iron • Iron tee • Pipe • Oil

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail a video and/or photos showing Drilled product and process.
- Avail PPEs and other safety equipment at workplace.
- Avail Drilled product with Drilling tools at workplace
- Have unarranged manufacturing workshop.
- Avail a well-set classroom

Indicative content 1.1: Introduction to drilling operation

Duration:2hrs

Theoretical Activity 1.1.1: Introduction to drilling operation

Notes to the trainer:

- While delivering this content, trainer may use small groups for describing drilling operation.
- Photos or videos related to drilling operation can be used as didactic materials

Key steps:

While delivering this activity, pass through the following steps:

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

i. Define the following Definition used in drilling operation:
   a. Drilling
   b. Counter bore
   c. Counter sink
   d. Reamer
   e. Center drill
   f. Drill bit
   g. Drill chuck key

ii. What are the advantages of Drilled product in manufacturing process?

iii. What are the disadvantages of Drilled product in manufacturing process?

iv. Identify the area of application for drilling machine operation.

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

Step 3: Engage trainees in presentation of their findings.

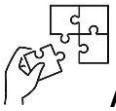
Step 4: Provide expert view and clarifies ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.1.1. In trainee manual

Points to Remember

- Drilling, Counter bore, Counter sink, Reamer, Center drill, Drill bit and Drill chuck are the important key terms used in drilling operation
- Drilling is a precise, versatile and efficiency operation
- Even though drilling operation is advantageous, it requires to replace frequently some tools and can cause material damage
- Drilling is widely used in various applications, including manufacturing, where it creates holes for fasteners in parts, construction, where it drills holes in different materials for fixtures, and the oil and gas industry, where it is essential for creating wells for extraction.



Application of learning 1.1.

After closing the trip of study in GDM company limited which is specialized for the drilling activity,ask trainees to make a short report of trip about the following aspect:

a) Working principle of drilling operation

b) Advantages and disadvantages of drilling

c) Application of drilling

Check list / solution of application

Sn	Criteria	Indicator	Yes	No
1	**Drilling operation is well introduced**	1.1. The working principles are demonstrated		
		1.2. Advantages are demonstrated		
		1.3. Disadvantages of drilling are demonstrated		
		1.4. Application of drilling are demonstrated		

Indicative content 1.2: Identification of safety health environment and Security measures at the workplace.

Duration: 1 hr

Theoretical Activity 1.2.1: Description of safety and security measures at workplace.

Notes to the trainer:

- Trainer may deliver these contents by using small groups to describe safety and security measures at workplace.
- Photos or videos related to workplace safety can be used as didactic materials

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session and request trainees to respond to the following questions.

i. What are the various types of workplace hazards?

ii. What safety measures should be implemented to ensure safety and security duringoperations?

iii. Describe the personal protective equipment used in drilling operation.

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

Step 3: Facilitate trainees to present their findings.

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 1.2.1. in the trainee manual

Points to Remember

- Remember that hazards are potential sources of harm, which can manifest in various forms such as physical, chemical, biological, ergonomic, and psychosocial. These hazards impact not only people but also property and the environment.
- Remember that different types of hazards related to drilling include chemical hazards (causing health effects like respiratory issues), physical hazards (such as noise or radiation), ergonomic hazards (leading to musculoskeletal injuries), psychosocial hazards (affecting mental health), and electrical hazards (arising from improper electrical contact).
- Remember that Personal Protective Equipment (PPE) includes items like helmets, goggles, and protective clothing designed to safeguard the wearer from injury or infection by minimizing exposure to workplace and environmental hazards.

Practical Activity 1.2.2: Applying safety and security measures in drilling

Notes to the trainer

- Facilitation of this activity can be individual based; you are supposed to demonstratehow to apply safety equipment for the effective delivery; it is recommended to:
  - Avail a manufacturing workshop which is not arranged
  - Avail PPEs and safety equipment.

Key steps

While delivering this content, pass through the following steps:

Step 1: Introduce the topic and ask trainees to go at workplace and apply safety precautions by wearing PPE, using fire extinguishers as required in drilling machine operation.

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

Step 3: Demonstrate how to wear PPE and how to use fire extinguisher

Step 4: Ask trainees to wear PPE and how to use fire extinguisher and monitor the procedures.

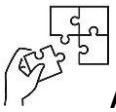
Step 5: Check whether safety equipment is applied and provide clarifications if any.

Step 6: Ask trainees to read key reading 1.2.1 and 1.2.2. in trainee manual.

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

Points to Remember

- When working in a workshop environment, it is necessary to conduct a comprehensive risk assessment. This involves evaluating potential hazards, assessing the associated risks, and prioritizing them to implement effective safety, health, and security measures. By identifying and addressing these risks, workers can prevent accidents and ensure a safer working environment.
- It is essential to know how to properly use a fire extinguisher. The correct technique can be remembered with the acronym "PASS":
  i. P: Pull the Pin
  ii. A: Aim the Nozzle
  iii. S: Squeeze the Handle
  iv. S: Sweep Side to Side



Application of learning 1.2.

Organize a trip of study in your local manufacturing workshop and ask trainees to apply safety precaution by:

1. Wearing PPEs
2. Using fire extinguishers
3. Preparing for emergence rescue

Check list:

SN	Criteria	Indicator	Yes	No
1	**Firefighting equipment are properly selected**	1.1 work place is well cleaned		
		1.2. procedure of using fire extinguisher isclear		
		1.3. extinguishers are available		
2	**First aid tool kit is properly selected**	2.1. Adhesive Bandages are available		
		2.2. Sterile Gauze Pads are selected		
		2.3. Adhesive Tape are selected		
		2.4. Antibiotic Ointment: are selected		

		2.5. Scissors are well selected.		
		2.6. Tweezers: are selected		
		2.7. Elastic Bandag are selected		
		2.8. Antibiotic Ointment: For applying on cuts to prevent infection. are selected		
		2.9. Thermometer are selected		
		2.10. Burn Cream or Ointment are selected		
		2.11. Medical Face Mask are selected		
3	**Personal protective equipment correctlyused**	3.1. Welding Helmet. are selected		
		3.2. Safety Glasses are selected		
		3.3. Welding Gloves are selected		
		3.4. Flame-Resistant Clothing **a**re selected		
		3.5. Respiratory Protection are selected		
		3.6. Welding Boots are selected		
		3.7. Hearing Protection. are selected		
		3.8. Welding Sleeves are selected		
		3.9. Face Shields are selected		
		3.10. Welding Helmet are selected		
		3.11. Welding Caps or Skull Caps are selected		

Indicative content 1.3. Identification of drilling Materials, tools and equipment

Duration:2hrs

Theoretical Activity 1.3.1: Identifying of drilling materials, tools and equipment

Notes to the trainer:

- Trainer may deliver this content in classroom or other learning place, use small groupsto discuss about tools materials and equipment used in drilling machine operation.
- Use pictures or photo of different types of tools, materials and equipment to providemore understanding

Key steps:

While delivering this activity, pass through the following steps:

Step1: Introduce the session and ask trainees to provide the answers of below questions reflecting on tools materials and equipment used in drilling machine operation.

i. What are the types of materials used in drilling operation?
ii. What are the types and uses of tools used in drilling operation?
iii. What are the types and uses of equipment used in drilling operation works?

Step 2: Asks any trainee to write answers provided on flipchart/paper.
Step 3: Facilitate trainees to present their findings.
Step 4: Provides 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 1.3.1. in the trainee manual.

Points to Remember

- In drilling machine operations, various materials are used, including metals, polymers,ceramics, and composites. These materials possess distinct properties mechanical, physical, and chemical which are critical to the drilling process.
- The tools utilized in drilling are categorized into several types, including measuring tools, cutting tools, marking tools, clamping tools, and miscellaneous tools. Additionally,
- Different types of equipment are employed in drilling operations, such as hand drillingmachines, drill press machines, bench drilling machines, angle grinders, and shear machines.

Practical Activity 1.3.2: selecting tools, materials and equipment used in drilling

Notes to the trainer

- The trainer may facilitate individual trainee to go to the workplace and demonstrate trainees to select tools, material and equipment to be used in drilling machine operation.
- It is recommended to:
  - Avail all tools, materials and equipment
  - Have a well-organized workshop and store

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to go to the workshop and store to select tools,material and equipment to be used in drilling machine operation based on selection criteria.

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 drilling machineoperation and explain selection criteria.

Step 4: Ask trainees to select tools, materials and equipment used in drilling machine operation and monitor the procedures.

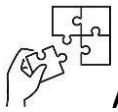
Step 5: Verify whether tools, materials and equipment used in drilling machine operation arecorrectly selected and provide support where necessary.

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

When selecting tools for drilling, consider the following factors: type of drill bit, material, size, and diameter. For materials used in drilling operations, keep in mindthe material type, hardness, and thermal conductivity. When choosing drilling equipment, focus on the type of drilling machine, its capacity, and safety features.



Application of learning 1.3.

GWD offers an internship in home land work shop, ask trainees as one given that opportunity to select the necessary materials, tools, and equipment required for the bending operation involved in the fabrication a newly designed metallic chair, this activity must be referring to the previous activity 1.3.2

Check list:

Sn	Criteria	Indicator	**Yes**	**No**
1	**Materials are properly selected**	1.1 Pipe or tube are selected		
		1.2. Rivet is selected		
		1.3. Cutting disc are selected		

Duration: .3hrs

Theoretical Activity 1.4.1: Description of pre-operation activities for Drilling

Notes to the trainer:

- During delivering these contents, small groups can be used to discuss on pre-operation activities for drilling equipment.
- You can use some videos or pictures related to working principle and maintenance for drilling equipment.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and request trainees to respond to the following questions:

i. Explain working principle of drilling equipment

ii. Explain maintenance activities such as Lubrication, Cleaning, Tightening

Step 2: Ask trainees to discuss the provided answers on flipchart/paper

Step 3: Facilitate trainee to present their findings

Step 4: Provide expert view on the group presentations.

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

Step 6: Ask trainees to read the key reading 1.4.1. in trainee's manual

Points to Remember

- Working principle of drilling machine: A drilling machine operates by rotating a drill bitand applying a downward force to create a hole in a material.
- Choosing and Applying the Right Lubricant: Select the appropriate lubricant for equipment needs and apply it properly to reduce friction and wear, enhancing machinery efficiency and lifespan.
- Ongoing Monitoring and Maintenance: Regularly check lubricant levels and followa maintenance schedule to avoid issues like contamination and depletion, ensuring optimal performance and extending equipment life.
- Regular Cleaning Establishing a routine for cleaning prevents build-up of contaminants and maintains equipment efficiency.
- Effective Methods and Inspection Using the right cleaning techniques and tools, along with inspecting equipment during cleaning, helps identify potential issues early andensures reliable operation.

Practical Activity 1.4.2: Perform pre-operation activities for drilling equipment

Notes to the trainer

- Individually, referring to the previous activity 1.4.1, you are requested to go in manufacturing workshop and lubricate, cleaning and tighten the drilling equipment asmaintenance activities with respect to trainer's instructions.
- It is recommended to:
    - Avail all lubricant, cleaning and tighten materials and equipment
    - Have a well-organized workshop and store

Key steps:

While delivering this activity, pass through the following steps:

Step 1: trainer Give instructions to the trainees before starting the work

Step 2: Guide trainees to apply lubrication, cleaning and tightening technics on drilling equipment

Step3: Ask trainees individually to repeat second step

Step 4: Observe whether lubrication technic is correctly applied

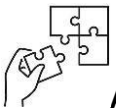
Step5: Give clarification on what trainees have done and ask failed leaners to repeat the work

Step 6: Ask trainees to read key reading 1.4.2

Step 7: Ask trainees to perform the task provided in application of learning 1.4

Points to Remember

- Before applying new grease, thoroughly clean grease points and remove any old grease to prevent compatibility issues and contamination, ensuring effective lubrication and optimal performance of the equipment.
- Safety and Thorough Cleaning: Always disconnect equipment, use appropriate PPE, and thoroughly clean all surfaces with proper tools and agents. Ensure equipment isdry and reassembled correctly before use.
- Correct Tightening Practices: Adhere to the manufacturer's torque specifications, use a uniform tightening pattern, and regularly check for signs of corrosion to maintain equipment integrity and performance



Application of learning 1.4.

After completing this session, you are assigned to go in assistance of JNB company for making the observation on how the maintenance of drilling machine must be done after making this observation a trainer ask you to make what you observe on the drilling machineused on the school this must be done, Referring to previous activity 1.4.

Check list:

Sn	Criteria	Indicator	Yes	No
1	**Lubrication are well applied**	1.1. Reduction of friction are well performed		
		1.2. Cooling are well performed		
		1.3. Cleaning are well performed		
		1.4. Protection for moving parts are well performed		
2	**Cleaning are well applied**	2.1. Dusting are well performed		
		2.2. Remove of dirt are well performed		
		2.3. Chemical spraying are well used		
3	**Tightening are well applied**	3.1. Drill bit are well fixed		
		3.2. Work piece are well fixed		
		3.3. Cutting machine are well fixed		

Learning outcome 1 end assessment

Written assessment

Q1. Read careful the following statement and choose the letter corresponding to the correct definition of drilling operation

a) Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials.
b) Drilling is a cylindrical flat-bottomed hole that enlarges another coaxial hole, or the tool used to create that feature.
c) Drilling is a conical hole cut into a manufactured object, or the cutter used to cut such a hole. A common use is to allow the head of a countersunk bolt or screw, when placed in the hole, to sit flush with or below the surface of the surrounding material. This process is often used to remove the burr left from drilling or tapping operations.
d) Drilling is cutting tool used in metalworking to slightly enlarge or improve the finish of an existing hole. It is designed to remove a small amount of material to create a precise hole diameter with a smooth surface finish.

Answer: a) Drilling is a cutting process that uses a drill bit to cut or enlarge a holeof circular cross-section in solid materials.

Q2. The following are the advantages of drilling except:

a) It requires less labour and easy to operate
b) Rough hole: as it makes rough holes during the drilling operation. Therefore, a medium surface finish can be expected but not a high surface finish.
c) High precision and accuracy will be maintained by the operator in Bench Drilling Machine whereas, in the case of Automatic drilling machine, high accuracy is maintained by the machine itself.
d) Limited size work piece: a small size work piece that can fit on the worktable is machined whereas large size components cannot be machined.

Answer: a) It requires less labour and easy to operate

High precision and accuracy will be maintained by the operator in Bench Drilling Machine whereas, in the case of Automatic drilling machine, high accuracy is maintained by the machine itself.

Q3. Match the concepts in column A to their meaning in column B, Write the answers in Column of Answers

Answers	Column A	Column B
1……..B…	**1. Chemical hazard**	**A)** Are environmental factors that can harm an employee without necessarily touching them, including heights, noise,radiation and pressure
2……..A…	**2. Physical hazard**	**B**) Are hazardous substances that can cause harm. These hazards can result in both health and physical impacts, suchas skin irritation, respiratory system irritation, blindness, corrosion and explosions
2……..D…	**3. Ergonomic**	**C).** Include those that can have an adverse effect on an employee's mental health or wellbeing. For example, sexual harassment, victimisation, stress and workplace violence.
3……..C…	**4. Psychosocial**	**D)** Are a result of physical factors that can result in musculoskeletal injuries. For example, a poor workstation setup in an office, poor posture and manual handling.

Q4. Which of the following list are the materials tools and equipment used in drillingoperation?

1. Drilling machine
2. Power hacksaw
3. Steel bar
4. Plate metals
5. Vernier caliper
6. Center punch
7. Angle grinder
8. Shearing machine
9. Tubes
10. Hs profiles

11.Scriber

12.12.Vice

Answer:

1. **Tools:** Vernier caliper, Center punch, scriber, vice
2. **Materials:** Steel bar, Plate metals Tubes, Hs profiles
3. **Equipment:** Drilling machine, Power hacksaw, Angle Grinder, Shearing machine

Q5. Identify which metals from the following list are ferrous and which are non-ferrous.

1. Stainless steel
2. Cast iron
3. Bronze
4. Brass
5. Alloy steel
6. Mild steel
7. Aluminium
8. Copper

Answer:

Ferrous metals are:

1. Stainless steel
2. Cast iron
3. Alloy steel
4. Mild steel

Nonferrous metals are:

1. Bronze
2. Brass
3. Aluminium
4. Copper

Q6. Among the following list some are the technics used to cleaning the work place afterfinishing the work, Answer by true for the correct or false for the incorrect?

1. Dusting **Answer: True**
2. Polishing **Answer: False**
3. Removal of dirt. **Answer: True**
4. Grinding. **Answer: False**
5. Painting. **Answer: False**
6. Mopping. **Answer: True**
7. Chemical spraying. **Answer: True**
8. Brushing. **Answer: False**

Practical assessment

B&L is a manufacturing company located near the school; the company has various machines used in manufacturing including drilling machines and their accessories. Ask trainees to perform the following tasks:

i. Prepare the work place for drilling
ii. Select tools perform pre-operation maintenance based on drilling equipment requested all tools and equipment needed in order to perform this work.
iii. Perform the proper maintenance before starting the work

Checklist:

SN	criteria	Indicator	Score	
			Yes	No
1	Safety and security measures are effectively applied as per workplace policy	1.1 PPE are worn		
		1.2 Finishing operations and storage conditions are well performed		
		1.3 drilling equipment safety tips are applied		
2	Equipment, tools and materials are properly selected according the shape ofproduct	2.1 Equipment areselected		
		2.2. Tools are selected		
		2.3 Materials areselected		
3	Pre-operation maintenance of drilling machine is correctly conducted refer to the maintenance guide	3.1 Working principles of drilling machine are conducted		
		3.2. Pre-operation maintenance of drilling machine is conducted		

Further information to the trainer

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Indicative contents
2.1. Interpretation of drawing
2.2. Identification of drilling machine
2.3. Preparation of the work piece
2.4. Setting up the drilling machine
2.5. Drilling the work piece

Key Competencies for Learning Outcome 2: Carry out of drilling operation

Knowledge	Skills	Attitudes
• Identification of Cutting list elements • Identification of correctly Criteria of drill bit positioning • Description of steps for drilling tool fixing • Description of Drilling method • Identification of Drill bit fixing Techniques correctly.	• Interpreting ofdrawing • Setting up drilling equipment • Drilling work piece	• Be Obedience • Have Attentive • Have Team work • Have Self-evaluation • Having Selfconfidence

Duration: 15hrs

Learning outcome 2 objectives:

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

1. Identify effectively cutting list elements as used in drilling operation
2. Identify correctly Criteria of drill bit positioning in drilling works
3. Describe correctly of steps for fixing tool in drilling operation
4. Apply correctly Drill bit fixing Techniques as applied in machine set up.
5. Fixing firmly work piece on the working table in drilling operation
6. Apply correctly of Drilling method as required in drilling operation
7. Perform correctly Bench drilling machine operations on workpiece.

Resources

Equipment	Equipment	Equipment
• PPE • Drilling machine • Hand shear machine • Angle grinder • Work benches • Anvil • Lifting machine • Power hacksaw • Hand drill machine • Projector • Computer	• Clamps • Mallet • hack saw • chisel • File • Pencil • Marking gauge • Try square • Scales hummer • Screw driver • Wire brush • Cloth rugs Tape measures	• Sheet metal • Flat bar • Square bar • Angle iron • Iron tee • Pipe • Oil

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail required PPEs ready to be used for safety.
- Avail prepared work pieces to be drilled.
- Avail drilling machine, spanner for tightening
- Prepare the video illustrating the process of drilling the work piece aided by drilling Machine
- Have a well-organized workshop, store and other necessary workplaces.

Indicative content 2.1: Interpretation of drawing

Duration: 2hrs

Theoretical Activity 2.2.1: Description of drilling machines

Notes to the trainer:

- Trainer may deliver this content, use small groups to discuss on hand drilling and bench-drilling machine.
- Use some videos or pictures to explain more about hand drilling and bench drilling machine.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session, engage trainees in groups forming and ask them to answer thefollowing question.

i. What do you understand by drilling machine?
ii. What could be the difference between hand drilling and bench drilling machine?
iii. What should be the criteria for identifying drilling machine to be used?
iv. What are the advantages and disadvantages of drilling machines?
v. What is the application of drilling machines?

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

Step 3: Ask trainees to discuss the provided answer and choose correct answers.

Step 4: Provides 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 2.2.1. in trainee manual and address any questions or concerns.

Points to Remember

- Hand drills are portable and ideal for use in areas without electricity or where mobility is needed. They offer precision and control, especially in light tasks like jewellery making and model building, though they are slower than powered drills.
- Bench drilling machines provide exceptional precision and stability, making them perfect for detailed and repetitive tasks in small workshops, while occupying minimal space.
- Bench drilling machines are best suited for lighter, precision tasks and smallerprojects due to their limited capacity in terms of material size and power.
- Despite their limitations, bench-drilling machines are versatile and valuable for precise drilling across various materials, such as wood, metal, and plastic, makingthem ideal for small-scale projects and educational use.

Practical Activity 2.1.1: Interpretating workpiece drawing to be drilled

Notes to the trainer

- The trainer may facilitate the trainees to go in the workshop and interpret drawing to be drilled
- It recommended to Avail all materials used for cutting list preparation

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to go to the workshop and store to interpret drawing by preparing of cutting list based on technical specification and size of materials for drilling operation

Step 2: Explain the task and provide clear work instruction

Step 3: Demonstrate how to interpret drawing based on cutting list element

Step 4: Asks trainees to interpret drawing and monitor the procedures.

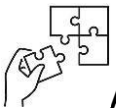
Step 5: Verify whether the interpretation of drawing is correctly and provide support where necessary.

Step 6: Ask trainees to read key reading 2.1.1

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

Points to Remember

- When creating a cutting list, make sure each element is clearly identified with a unique serial number, accurately describe the material properties, provide exact specifications and dimensions, and specify the precise quantity required. This thorough detail ensures accurate cutting, proper material use, and effective tracking and management of parts.
- Clearly define the colour in terms of hue, lightness, and saturation to ensure consistency and precision in the final appearance of the object or material
- Provide comprehensive information about the material's properties, including
- hardness, strength, and thermal characteristics, to ensure the appropriate material selection and performance
- **Remember that Accurate Review of Design and Specifications is Crucial**.Begin by thoroughly reviewing the design or blueprint and Focus on components that require cutting and drilling, ensuring all dimensions andspecifications are correct.
- **Remember that Detailed Listing of Components and Dimensions is Essential**. Itemize all materials involved, specifying type, grade, thickness, and required quantities and clearly outline dimensions such as length, width, and thickness, along with drilled hole details including size, position, and depth.
- **Remember to Incorporate Cutting and Drilling Tolerances**. Account for tolerances, material waste, and kerf (cutting blade width) to ensure precisionand organize the cutting list effectively, verify it with the production team, and make necessary adjustments before finalizing.



Application of learning 2.1.

At the end of trip on how we prepare a cutting list, ask trainees to prepare the cutting list of the door which is damaged by focusing on this point

i. Serial number
ii. Specification
iii. Quantity
iv. Size

This activity must be done by referring the activity 1.3

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	workpiece drawing to be drilled are properly interpreted	1.1 serial number are defined		
		1.2. materials are defined		
		1.3. specification of materials is defined		
		1.4. Quantity is defined		
		1.5. Dimensions are defined		

Indicative content 2.2: Identification of drilling machine

Duration: 2hrs

Theoretical Activity 2.2.1: Description of drilling machines

Notes to the trainer:

- Trainer may deliver this content, use small groups to discuss on hand drilling and bench-drilling machine.
- Use some videos or pictures to explain more about hand drilling and bench drilling machine.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session, engage trainees in groups forming and ask them to answer thefollowing question.

vi. What do you understand by drilling machine?

vii. What could be the difference between hand drilling and bench drilling machine?

viii. What should be the criteria for identifying drilling machine to be used?

ix. What are the advantages and disadvantages of drilling machines?

x. What is the application of drilling machines?

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

Step 3: Ask trainees to discuss the provided answer and choose correct answers.

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 2.2.1. in trainee manual and address any questions or concerns.

Points to Remember

- Hand drills are portable and ideal for use in areas without electricity or where mobility is needed. They offer precision and control, especially in light tasks like jewellery making and model building, though they are slower than powered drills.
- Bench drilling machines provide exceptional precision and stability, making them perfect for detailed and repetitive tasks in small workshops, while occupying minimal space.
- Bench drilling machines are best suited for lighter, precision tasks and smallerprojects due to their limited capacity in terms of material size and power.
- Despite their limitations, bench-drilling machines are versatile and valuable for precise drilling across various materials, such as wood, metal, and plastic, makingthem ideal for small-scale projects and educational use.

Practical Activity 2.2.2: Selection of drilling machine

Notes to the trainer

- The trainer may facilitate the trainees to go in the workshop and select different drilling machine individual.
- It recommended to avail all kind of drilling machine in the workshop

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to go to the workshop and select different drilling machine used in drilling operation

Step 2: Explain the task and provide clear work instruction

Step 3: Demonstrate the criteria of selecting of drilling machine

Step 4: Ask trainees to select drilling machine and monitor the procedures.

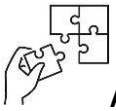
Step 5: Verify whether the identification of drilling machine is correctly and provide support where necessary.

Step 6: Ask trainees to read key reading 2.2.2

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

Points to Remember

- When identifying drilling machine, consider the following factors: type of drill bit, material, size, and diameter. For materials used in drilling operations, keep in mind the material type, hardness, and thermal conductivity. When choosing drilling equipment, focus on the type of drilling machine, its capacity, and safety features.



Application of learning 2.2.

By referring the activity 2.1 prepare a visit of workshop where there are different drilling machine and ask trainees to identify each type of drilling machine and their performance.

Check list:

Sn	Criteria	Indicator	Yes	No
1	**Different drilling machine are well identified**	1.1 hand drilling machine are identified		
		1.2. drills are well identified		
		1.3. manual drill is well identified		
		1.4. brace drill is well identified		
		1.5. bench drilling machine are well identified		

Indicative content 2.3: Preparation of the wok piece

Duration: .3hrs

Practical Activity 2.3.1: Preparing work pieces for drilling

Notes to the trainer

- The trainer may deliver these contents which must be done in workshop.
- Guide trainees in workshop/workplace to perform the preparation of the work pieces.
- You are recommended to Avail of work pieces to be drilled.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to prepare work pieces by measuring, marking and cutting.

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

Step 3: Demonstrate how to prepare the work pieces by measuring, marking andcutting. While demonstrating, explain the preparation procedures.

Step 4: Ask trainees to prepare the work pieces and monitor the procedures.

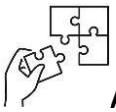
Step 5: Verify whether the work pieces are clearly prepared.

Step 6: Ask trainees to read key reading 2.3.1.

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

Points to Remember

- Remember that always calibrate measuring instruments like vernier callipers and micrometres before use, and regularly check their zero settings to ensure precise measurements.
- When you are going to Use tools remember to use according to their specific procedures and apply consistent pressure to avoid measurement errors. Align and read measurements accurately for reliable results.
- To ensure efficiency and accuracy. Select the appropriate tool for the job—steel rulers for linear measurements, micrometres for precision, and protractors for angles
- Maintain Proper Cutting Technique: Start with light strokes and then use full, steady strokes while cutting. Apply pressure on the forward stroke to avoid bending the blade and achieve a clean cut.
- Maintenance and Storage: Clean and store tools properly to prevent damage and maintain accuracy. Keep them in protective cases and avoid exposure to harsh conditions.
- Follow a systematic approach to using measuring tools, starting with selecting the right tool and familiarizing yourself with it, then ensuring proper setup and alignment, and concluding with accurate measurement, recording, and maintenance.
- When using marking tools, choose the right tool for the material, prepare the workpiece, and make clear, visible marks by stabilizing the workpiece and verifying alignment. Adjust as needed, communicate marking information effectively, protect marks if necessary, and clean up properly. Lastly, store and maintain your tools for future use.
- When using cutting tools and equipment, select the right tool for the material and task, inspect and maintain the tool in good condition, and secure the workpiece firmly. Wear appropriate PPE and set up the equipment correctly. Align the tool accurately, perform a test cut, and follow safe cutting techniques. Monitor the process closely, clear debris regularly, inspect the cut, and clean and store equipment properly.



Application of learning 2.3.

At the end of this session a trainer prepares a workshop trip near at you school to see how we utilize the tools and equipment in preparation the work piece, after reaching there you are the one who assigned to make the assistance in the use of tools, and equipment in the work piece preparation.

Checklist:

Sn	Criteria	Indicator	Yes	No
1	**Workpiece is correctly prepared**	1.1. selection of piece of metal are well done		
		1.2. marking tools are well used		
		1.3. measuring tools are well used		
		1.4. clamping tools are well used		
		1.5. cutting tools are well used		
		1.6. drilling machine are well prepared		

Indicative content 2.4: Setting up the drill machine

Duration: 3hrs

Practical Activity 2.4.1: Setting up the drill machine

Notes to the trainer

- Trainer may demonstrate this activity in workshop, by guiding trainees to perform setting up of drill machine.
- You are recommended to:
  - ✓ Avail drill tools
  - ✓ Avail Prepared work pieces
  - ✓ Have clamps

Key steps:

While delivering this content, pass through the following steps:

Step 1: Introduce the topic and ask trainees to setting up drill machine by fixing drill tool,fixing work piece and use of clamps based on trainer's instruction.

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

Step3: Demonstrate how to set drill machine by fix drill tool, fix work pieces and use of clamps based on trainer's instruction. While demonstrating, explain the procedures.

Step 4: Ask trainees to prepare the set up on drill machine, fix drill tool, fix work pieces anduse of clamps based on trainer's instruction and monitor the procedures.

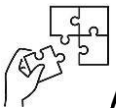
Step 5: Verify whether the parts to be setting up are clearly prepared.

Step 6: Ask trainees to read key reading 2.4.1 in trainee manual

Step 7: Ask trainees to perform the task provided in application of learning 2.4

Points to Remember

- Remember that when you Fix the Drill Bit, Clean the spindle socket and drill shank, align the drill properly, and secure it by tightening with a key or tapping lightly.
- Remember this For Proper Clamping: Secure the workpiece by positioning the vice to resist cutting forces, directing them into the solid jaw and vice body for stability and accuracy.
- Effective Work Holding: Use appropriate devices like machine table vises and geared drill chucks to securely position the workpiece and ensure accuracy during drilling
- Ensure Proper Alignment and Secure Mounting: Always verify that the tool is correctly aligned and securely fastened to the machine, following the manufacturer's specifications, to ensure safe and effective operation.
- Ensure Secure and Proper Alignment: Always securely clamp the work piece and align it precisely with the drill bit to prevent movement and ensure accurate drilling.
- Ensure the Work piece is Firmly Secured and Properly Aligned: Always tighten the clamps to securely hold the work piece and align it accurately with the drill bit to prevent movement and ensure precise drilling.
- Ensure the Work piece is Firmly Secured and Properly Aligned: Always tighten the clamps to securely hold the work piece and align it accurately with the drill bit to prevent movement and ensure precise drilling.



Application of learning 2.4.

In internship activity, the trainer instructed the trainees to request assistance on manufacturing workshop to show how to apply correctly set up the drilling machine, install the drill tools, securely fix the work piece, and properly use clamps to complete the requiredtasks this it can be done by Referring to the previous activity 2.3

Check list:

SN	Criteria	Indicator	Yes	No
1	Set up drilling machineoperation	1.1 Drilling machine are well fixed		
		1.2 The regulation and calibration of drillingmachine are well done		
		1.3 Cleaning drilling machine are well done		
2	Set drilling tools operation	2.1 Drill tools are well selected		
		2.2 Drill bit are well fixed		
3	Fix the workpiece operation	3.1 Work piece are well prepared		
		3.2 The work piece are well fixed		

Indicative content 2.5: Drilling the work piece.

Duration: 5hrs

Practical Activity 2.5.1: Perform drilling Operations on the work piece

Notes to the trainer

- Facilitation of this activity can be individual based; you are supposed to demonstratehow to perform drilling operation effective delivery.
- It is recommended to:
  - Avail all materials to drill
  - Prepare all materials, tools and equipment to be used in drilling operation.

Key steps:

While delivering this content, pass through the following steps:

Step 1: Introduce the topic and ask trainees to drill the work pieces using different drilling operation based on trainer's instruction.

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

Step 3: Demonstrate how to drill the work pieces using different drilling operation.

Step 4: Ask trainees to drill the work pieces using different drilling operation and monitor the procedures.

Step 5: Verify whether the work pieces to be drill are properly drilled and provide support.

Step 6: Ask trainees to read key reading 2.5.1.

Step 7: Ask trainees to perform the task provided in application of learning 2.5.

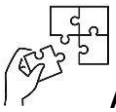
Points to Remember

- Remember that choosing the right tool for the job, For precise enlargements, reamers are used to fine-tune hole sizes, while boring tools adjust hole diameters using a single cutting edge.
- Proper setup is critical. Ensure that the drill is correctly installed in the machine spindle and that the speed and feed rates are adjusted appropriately for the material and type of cut.

- The final result must meet the required specifications within prescribed tolerances. This means carefully controlling the drilling process to avoid deviations that could affect the fit and function of the finished part. Proper alignment, speed, feed, and secure mounting of the work piece are key to achieving accurate results.

- Remember that when you are going to Choose the Right Drill Bit, select a high-speedsteel (HSS) drill bit for the metal type and apply cutting oil to the indentation to minimize heat and friction.

- Remember that to make accurate Setup and Adjustment, properly secure the workpiece, select the correct drill bit, and adjust the machine settings for speed andfeed to achieve precise holes that meet the specified dimensions and tolerances



Application of learning 2.5.

After completing this session, you are assigned to go in the internship in manufacturing workshop which designed to perform different drilling operation. referring to the previous activity 2.4 you are hired to ask a supervisor to show howwe practice the following drilling operation:

1. Reaming
2. Counter bore
3. Counter sinking
4. Boring
5. Spot facing

Checklist:

SN	Criteria	Indicator	Yes	No
1	**Drilling operation are correctly set**	1.1. Reaming is done		
		1.2. Boring is done		
		1.3. Counter boring is done		
		1.4. counter sinking is done		
		1.5. Spot facing is done		

Learning outcome 2 end assessment

Written assessment

Q1. Match the following tools and equipment in column A with their respective function in column B, write the answer in column Answers

Answers	Column A	Column B
1…C….	**1.** Steel rule	A. It is used for rough or rough-machined steel parts and leaves a fine notch. Widely used scribing tool with hardened or carbide points which are straight or angular
2…D……	**2.** Vernier caliper	B. is a handheld power tool that can be used for a variety of metal fabrication jobs that include cutting, grinding, deburring, finishing and polishing
3…A…	**3.** Scriber	C. Is a measuring tool used to measure length and straightness
4…E……	**4.** Divider	D. Is one of the most popular and widely used linear measurement tools for collecting external, internal, and depth dimensions.
5…B…….	**5.** Angle grinder	E. Are circular arcs and curvatures. The use of dividers always necessitates a punch mark for the guiding point. It leaves a fine notch

Q2. Answer by "True" if the statement is correct or "False" if the statement is wrong
The following are the tips that must be followed during drilling the work piece

1. Selecting the drill bits **Answer: True**
2. Grinding the work piece. **Answer: false**
3. Storing the work piece. **Answer: false**
4. Put on work gloves and safety glasses. **Answer: true**
5. Measuring the position of the hole. **Answer: true**
6. Polishing the work piece. **Answer: false**
7. Clamp the metal to your workstation. **Answer: true**

Q3. Match the concepts in column A which is the cutting list elements to their meaning in column B

Answers	**Column A**	**Column B**
1. **C** ……	1. Specification	**A.** The elements, constituents, or substances of which something is composed or can be made, also Material is the matter, an object is made up of. It is a relatively broad term to be defined. Theyare classified based upon their properties
2. … **A** …	2. Material	**B.** is a measurement such as length, width, or height. If you talk about the *dimensions* of an object or place, you are referring to its *size*
3. … **B** ….	3. Dimension	**C.** Define exactly how each standard will be measured or give information about items

Q4. Which of the following are the key criteria of drill bit positioning?

1. Proper alignment with the work piece,
2. Ensuring correct depth and angle,
3. Maintaining consistent pressure to avoid drill bit wear or breakage.
4. Diameter of drill bit
5. Materials of drill bit

Answer: the key criteria of drill bit positioning

1. Proper alignment with the work piece,
2. Ensuring correct depth and angle,
3. Maintaining consistent pressure to avoid drill bit wear or breakage.

Q5. Which of the following are the drilling methods that must be performed on metals or wood?

1. Reaming
2. Grooving
3. Boring
4. Tacking
5. Countersinking
6. Beveling

Answer: the drilling methods that must be performed on metals or wood

1. Reaming
2. Boring
3. Countersinking

Practical assessment

GITEGA company ltd won the tender to make office table. The top part will be fixed to the flame. Unfortunately, the company does not have an experienced manufacturer to drill the required holes. You are asked by Head of manufacturing to perform that activity of drilling sixholes with in 40min.
All necessary resources are available in the company store.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cutting list of drillingwork is properly produced based on technical drawing	1.1 Drawing are well interpreted		
		1.2 Cutting list are well prepared		
2	drilling machine is correctly selected according to the work specifications	2.1 Drilling machine are well identified		
		2.2 Drilling machine are well fixed		
		2.3 Drilling machine are well started		
3	Drilling machine is accurately set according the size of dill bits and machine positions	3.1 Drilling machine are well set		
		3.2 Drill bit size are respected		
4	Work piece are properly fixed according to the work piece dimensions and shape	Work piece are wellfixed		

5	Work piece is drilled according to the hole required	5.1 A work piece are well drilled		
		5.2 Dimension of hole are respected		

Further information to the trainer

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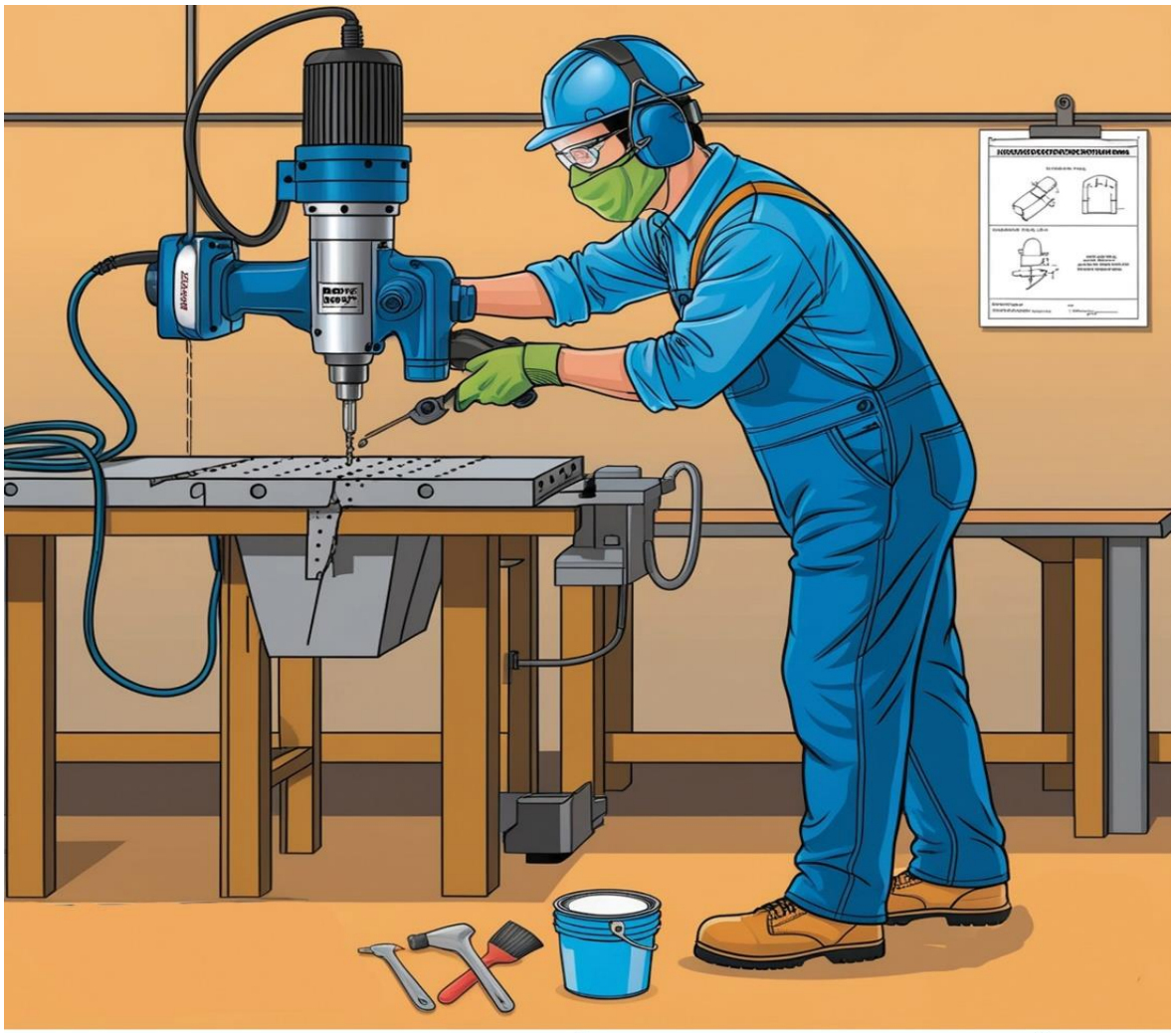



CLEANING TOOLS

Indicative contents
3.1: Finishing drilled product
3.2: Reporting
3.3: Work place arrangement

Key Competencies for Learning Outcome 3: Post-Operation Activities

Knowledge	Skills	Attitudes
• Identification of finishingtechniques • Description of procedures of writing technical reportof work done • Description of factors to consider while making • arrange the work place	• Finishing drilled product • Reporting the work done • Arranging the workplace	• Be Attentive while finishing the workpiece • Having attention to details in reporting • Being careful when arranging the workplace

Duration: 7 hrs

Learning outcome 3 objectives:

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

1. Identify correctly surface to be finished on the product
2. Apply correctly methods of finishing drilled product
3. Identify effectively storing procedures materials, tools and equipment for drilling
4. Store properly materials, tools and equipment for drilling operation
5. Apply correctly reporting methods applied while writing the report of work done

Resources

Equipment	Tools	Materials
• Hand shear machine, • angle grinder • work benches, • anvil, • lifting machine, • power hacksaw	• Clamps, • Mallet • hack saw, • chisel, • file, • pencil, • marking gauge, • try square • screwdriver, • wire brush, • cloth rugs, • tape measures	• Mark pen, • Chalk • flipchart, • oil

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail the drilled product
- Prepare the video illustrating the steps of finish drilled product
- Avail a sample of report for the work done

Indicative content 3.1: Finishing Drilled product

Duration: 3hrs

Practical Activity 3.1.1: Applying finishing techniques on drilled products

Notes to the trainer

- The trainer may facilitate individual based activity by demonstrating learner how toapply finishing technique on drilled products.
- For the effective delivery, it is recommended to:
    - ✓ Avail all required resources for finishing techniques
    - ✓ Have well drilled product
    - ✓ Have well organized workshop

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Gives instruction related to the work and select tools, materials and equipment

Step 2: Present new materials by demonstrating how to apply finishing techniques to thedrilled products.

Step3: Asks trainee to repeat the procedures according to the demonstration of trainer

Step4: Ask trainees to read key reading 3.1.1 in trainee manual

Step5: Ask trainees to perform the task provided in application of learning 3.1

Points to Remember

- Remember that edge finishing in manufacturing and metalworking is crucial for improving the safety, functionality, and aesthetics of metal products by removing sharpness and imperfections through techniques like grinding, polishing, filing, sanding, and painting.
- Remember that when grinding, you must carefully plan your workspace to avoid over-reaching, maintain firm footing and balance, and always use both hands to securely hold the grinder.
- Remember that painting serves multiple purposes: it protects surfaces from environmental damage, enhances aesthetic appeal through decoration, and can offerspecialized functionality like heat resistance or anti-slip properties.
- Remember that procedures for grinding, sanding, and polishing all require careful preparation, including inspecting and securely attaching the appropriate disc or pad,wearing safety gear, and adhering to correct techniques to ensure a high-quality finish and safety
- Always wear safety gear and inspect the grinding disc for damage before use to ensure a safe and effective grinding process.
- Remember that for filing, sanding, and polishing processes, always inspect and prepare your tools and materials carefully before starting to ensure safety and achievethe best finish.
- Remember that when painting a metal surface; ensure proper surface preparation byremoving dust, sanding, and applying a suitable metal primer to achieve the best adhesion and finish

Application of learning 3.1.

While making a trip of study you pass through a workshop, which has a project of fabricate aTV stand made in tubes, and you saw how the finishing must be done well when you reach at school trainer asked you to perform what you observe in the field study? This activity must be done referring the previous activity 2.5.

Check list:

Sn	Criteria	Indicator	Yes	No
1	**Drilled product are perfectly finished**	1.1. Grinding are well performed		
		1.2. filler paste are well applied		
		1.3. Filler paste are well sanded		

Indicative content 3.2: Reporting the work done

Duration: .30hrs

Theoretical Activity 3.2.1: Description of report of the work done

Notes to the trainer:

- Trainer may use small group to discuss about technical report of the work done after drill work pieces.
- You can use some videos or picture to explain those operations and forming terms

Key steps:

While delivering this activity, pass through the following steps:

Step1: Introduce the activity and request trainees to respond to the following questions:

i. What do you understand by the term report?
ii. What is the purpose of work report?
iii. What should do be the types of report?
iv. What should do be the advantages of reporting

Step 2: Ask trainees to discuss the provided answers on flipchart/paper

Step 3: Facilitate trainee to present their findings

Step 4: Provide expert view on the group presentations.

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

Step6: Ask trainees to read key reading 3.2.1 in trainee manual

Points to Remember

The purpose of a work report is to explain a certain topic based on a specific aspect ofone's job. It also illustrates the growth and work accomplishments of an employee through indicating certain tasks, activities, and other project completions in a given timeperiod, as well as measuring the overall work performance in the business firm or organization.

Practical Activity 3.2.2: Reporting the work done

Notes to the trainer

- Referring to the activity 3.2.1, as a trainer may facilitate trainees to prepare the report of drilled product

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and request trainees to report the work done

Step 2: Gives instruction related to the reporting work

Step3: Present new materials by demonstrating how to write a technical report.

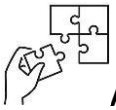
Step4: Ask trainee to write report according to the demonstration of trainer

Step5: Ask trainees to read key reading 3.2.2 in trainee manual

Step6: Ask trainees to perform the task provided in application of learning 3.2

Points to Remember

- Remember that planning the structure of the report helps ensure clarity and coherence, making it easier to write with conciseness and accuracy.



Application of learning 3.2.

Manufacturing supplier has assigned to bring the different materials used in the workshop during the final practical exam and you are the one who assigned to receive those materials based on what you study prepare the technical report of those materials.

Checklist:

Sn	Criteria	Indicator	Yes	No
1	**Reporting the work done are well done**	1.1. Writing report are well selected		
		1.2. Form of report are well respected		
		1.3. Element of form report are well respected		

Indicative content 3.3: Work place arrangement

Duration: 3hrs

Theoretical Activity 3.3.1: Description of work place arrangement

Notes to the trainer:

Trainer ask to the trainees to discuss on work place arrangement such as Housekeeping and cleaning required on drilled products by answering the following questions:

Key steps:

While delivering this activity, pass through the following steps:

Step1: Introduce the activity and request trainees to respond to the following questions:

i. Definition of house keeping
ii. What is the benefit of housekeeping how can you Care and storage procedures of tools, equipment and materials?
iii. What is Storage condition of tools, Equipment and materials?

Step 2: Ask trainees to discuss the provided answers on flipchart/paper
Step 3: Facilitate trainee to present their findings
Step 4: Provide expert view on the group presentations.
Step 5: Address any questions or concerns from the trainees.
Step6: Ask trainees to read key reading 3.3.1 in trainee manual

Points to Remember

- **Effective housekeeping maximizes efficiency and safety:** Maintaining a clean, organized, and hazard-free environment not only helps in better space utilizationand inventory control but also enhances workplace hygiene and overall safety.
- **Housekeeping functions are diverse and essential for meeting guest demands:** From cleaning and maintenance to managing inventories and waste, housekeepingplays a crucial role in the overall operational efficiency of an organization.

Practical Activity 3.3.2: Arranging work place

Notes to the trainer

Referring to the activity 3.3.1: A trainer ask to the trainees to go in the work place and perform work place arrangement by cleaning with different tools with respect totrainer's instruction.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and request trainees to arrange the workplace

Step 2: Give instruction related to the work

Step3: Present new materials by demonstrating how to arrange workplace

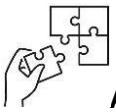
Step4: Ask trainee to arrange workplace according to the demonstration of trainer

Step5: Ask trainees to read key reading 3.3.2 in trainee manual

Step6: Ask trainees to perform the task provided in application of learning 3.3

Points to Remember

- Cleaning is essential for maintaining hygiene and preventing the spread of illnesses byremoving dirt, dust, stains, and contaminants from surfaces and environments.
- Always start dusting from the top of surfaces and work your way down to ensure dustand debris are effectively captured without resettling on already cleaned areas .



Application of learning 3.3.

Prepare a field trip on manufacturing workshop located near of school to see how the work place must be arranged well. After reaching there, you saw some technicians who do it, so a trainer asks you to go for assisting him for mastering the session.

Check list:

Sn	Criteria	Indicator	Yes	No
1	**Work place are well arranged**	1.1. All types of tools are well arranged accordingto their types		
		1.2. All materials are well arranged according totheir types and size		
		1.3. The equipment are well arranged according tothe size and their types		
		1.4. The work place are well cleaned		

Learning outcome 3 end assessment

Written assessment

Q1. In the following definition, which defines edge preparation?

a) Edge finishing involves smoothing or polishing the edges of metal parts to remove sharpness, burrs, or imperfections, making them safer to handle and more aesthetically pleasing
b) Is an abrasive machining process that uses a grinding wheel or grinder as the cutting tool.
c) Is a material removal process in manufacturing? Similar, depending on use, to both sawing and grinding in effect, it is functionally versatile, but used mostly for finishingoperations, namely in deburring operations
d) This is a tricky technique that involves mounting your workpiece in a lathe, which willrotate it when activated.

Answer: edge finishing involves smoothing or polishing the edges of metal parts toremove sharpness, burrs, or imperfections, making them safer to handle and moreaesthetically pleasing

Q2. Which of the following are the technics used for finishing the workpiece

a) Grinding
b) Soldering
c) Filling
d) Sanding
e) Polishing
f) Painting

Answer a) grinding b) filling c) sanding e) polishing

Q3. Which of the following are the advantages of galvanisation?

a) Zinc oxide coating is highly stable and adheres tightly to the metal substrate;
b) It is high cost.
c) It is very durable and does not flake off easily.
d) While hot-dip galvanizing (HDG) may be cheaper for coating large steel structures, it can beless cost-effective for smaller pieces such as nuts and fasten.

Answer: Zinc oxide coating is highly stable and adheres tightly to the metal substrate;It is very durable and does not flake off easily.

Q4. Housekeeping may be defined as activities undertaken to create or maintain an orderly, clean, tidy and safe working environment which of the result of good house keeping

1. More effective use of space;
2. Better inventory control of tools and equipment
3. Cleaning and Maintenance
4. Safety and Security

Answer

- ✓ **More effective use of space;**
- ✓ **Better inventory control of tools and equipment**

Q5. Read the following statement and answer by true or false.

A work report may have defined as:

a) A work report is a simple and cohesive document that outlines the fundamental activities and tasks conducted by an employee throughout the day, week, month, quarter, year, or any timeperiod mandated by the management of the company or organization

b) A work report it provide data, facts, or findings without offering recommendations orconclusions.

c) A work report may have defined as to analyze information, draw conclusions, and provide recommendations based on the analysis

d) A work report is to explain a certain topic based on a specific aspect of one's job. It also illustrates the growth and work accomplishments of an employee through indicating certain tasks, activities, and other project completions in a given time period, as well as measuring the overall work performance in the business firm or organization.

Answer a) true b) false c) false c) false

Q6. What are the 4 main factors to be considered while storing tools materials and equipment

Answer:

1. According to the same types.
2. According to the same size
3. According to the same shape
4. According to the same properties.

Practical assessment

You are a technician tasked with completing the finishing process on a TV stand fabricated from 1.5mm thick tube and sheet metal. The stand has drilled holes, and the edges require cleaning. Additionally, you are responsible for ensuring the cleanliness and organization of the workplace aftercompleting the task. You have been allocated 2 hours to perform this work.

Check list:

SN	Criteria	Indicator	Yes	No
1	Perform finishing and clean the work place	1.1 Drilled product isfinished		
		1.2 Drilled product isfinished		
		1.3 Product is painted		
		1.4 Drilling machine is maintained		
		1.5 Work is reported		
		1.6 Working area arecleaned		

Further information to the trainer

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