

MODULE II

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CONVENTIONAL LATHE MACHINE OPERATIONS

UNIT CODE : 0715 351 03A

TVET CDACC UNIT CODE: ENG/CU/MMO/CR/03/4/MA

Relationship to Occupational Standards

This unit addresses the unit of competency: Operate Conventional Lathe Machine

Duration of Unit: 150 HRS

Unit Description

This unit covers the competencies required in operating a conventional lathe machine. It involves preparing working drawing, lathe operation plan and lathe cutting tools, setting up lathe machine, producing parts by lathe operations, inspecting finished work and maintaining lathe machine and tools.

Summary of Learning Outcomes

By the end of the unit the learner should be able to

S/NO	Learning Outcomes	Hours
1.	Interpret working drawings	20
2.	Set Work piece and tool(s) on lathe machine	20
3.	Setup lathe machine	20
4.	Produce parts by lathe machine operations	80
5.	Carry out Lathe maintenance	10
TOTAL		150 HRS

Learning Outcomes, Content and suggested assessment methods

Learning Outcome	content	Suggested assessment methods
1. Interpret Working drawings	1.1 Extraction of information 1.1.1 Dimensions 1.1.2 Tolerances 1.1.3 BS/ANSI drawing standards	• Written Tests • Practical tests • Project Work

	1.1.4 Geometric ISO symbols & abbreviations 1.2 Free hand sketching 1.3 Forms of supply of engineering materials 1.4 Definition of operation plan 1.4.1 Structure of an operation plan 1.5 Types of lathe machines 1.6 Parts of a lathe machine 1.7 Lathe machine operations 1.7.1 Knurling 1.7.2 reaming 1.7.3 Threading 1.7.4 Turning 1.7.5 Facing 1.7.6 Boring 1.7.7 Taper turning 1.7.8 Grooving 1.7.9 Parting off 1.7.10 Chamfering 1.7.11 Drilling 1.8 Machining parameters 1.8.1 Feed rate 1.8.2 Material removal rate 1.8.3 Spindle speed 1.8.4 Cutting speed 1.8.5 Depth of cut 1.8.6 Finishing allowance 1.9 Tools and accessories 1.9.1 Lathe Cutting tools 1.9.2 Measuring tools 1.9.3 Marking out tools 1.9.4 Lathe centres 1.9.5 Work holding devices 1.10 Workpiece materials	Portfolio of Evidence
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	1.10.1 Mild steel bars and shafts 1.10.2 Nylon and ptfe round bars 1.10.3 Stainless bars and shafts 1.10.4 Brass round bars	
2. set Work piece and tool(s) on lathe machine	2.1 Lathe cutting tools 2.1.1 Knurling tools 2.1.2 Reamer 2.1.3 Thread cutting tools 2.1.4 Turning tools 2.1.5 Boring tools 2.1.6 Parting off tools 2.1.7 Drilling bits 2.1.8 Chamfering tools 2.1.9 Facing tools 2.2 Tool sharpening by grinding 2.3 Selection and mounting of Tool inserts 2.3.1 Threading insert 2.3.2 Turning insert 2.3.3 Boring insert 2.3.4 Parting insert	• Written Tests • Practical tests • Project Work • Portfolio of Evidence
3 Setup lathe machine	3.1 Safety 3.1.1 PPE 3.1.2 Safe workplace 3.1.3 Machine safety 3.1.3.1 Machine Guard 3.1.3.2 Emergency buttons and foot brakes 3.1.3.3 Good Working condition 3.2 Workpiece preparation 3.2.1 Measuring and marking out 3.2.2 Cutting of work piece 3.3 Mounting of lathe machine accessories 3.3.1 Steady rest 3.3.2 Face plate	• Written Tests • Practical tests • Project Work • Portfolio of Evidence

	3.3.3 Travelling steady 3.3.4 Lathe dog 3.3.5 Mandrel 3.3.6 Chuck 3.3.7 Catch plate 3.4 Lathe machine attachments 3.4.1 Taper turning attachment 3.4.2 Grinding attachment 3.4.3 Copying attachment 3.4.4 Milling attachment 3.5 Mounting of workpiece 3.5.1 Truing 3.6 Tool setting on lathe machine 3.6.1 Tool centering 3.7 Coolants 3.7.1 Soluble oil 3.7.2 Importance 3.7.3 Composition	
4 Produce parts by lathe machine operations	4.1 Trial testing 4.1.1 For wobble 4.1.2 Centering 4.2 Lathe machine operations 4.2.1 Knurling 4.2.2 Reaming 4.2.3 Threading 4.2.4 Turning 4.2.5 Facing 4.2.6 Boring 4.2.7 Taper turning 4.2.8 Grooving 4.2.9 Parting off 4.2.10 Chamfering 4.2.11 Drilling	• Written Tests • Practical tests • Project Work • Portfolio of Evidence

	4.3 Surface Finishing 4.3.1 Chamfering 4.3.2 Knurling 4.3.3 Grooving 4.3.4 Polishing 4.4 Inspection 4.4.1 Tools and equipment 4.4.2 Dimensional tolerances 4.4.3 Surface finish 4.4.4 Discrepancies 4.4.4.1 Rough surface 4.4.4.2 Chatter marks 4.4.4.3 Tears and grooves 4.4.4.4 Out of roundness 4.4.4.5 Incorrect thread pitch 4.5 Functionality	
5 Carry out lathe maintenance	5.1 Types of maintenance 5.1.1 Preventive 5.1.2 Scheduled 5.1.3 Routine 5.2 Trouble shooting 5.2.1 Fault diagnosis 5.3 Servicing of lathe machine and accessories 5.3.1 Inspection 5.3.2 Storage 5.3.3 Lubrication 5.3.4 Alignment and adjustment 5.4 Maintenance report and logs 5.5 House keeping 5.5.1 Record keeping 5.5.2 Cleaning of work environment (waste sorting and disposal) 5.6 Cleaning and storage of finished work, tools and equipment	• Written Tests • Practical tests • Project Work • Portfolio of Evidence

Suggested Delivery Methods

- Demonstration by trainer
- Group discussions
- Practical work by trainee(s)
- Industrial visits
- YouTube for teaching/learning and inspiration
- Simulation

Recommended Resources for 25 trainees

S/No	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
1.	Textbooks	For reference purpose	1pc	
2.	Installation manuals	For reference purpose	1pc	1:25
3.	Charts	For illustration purpose	Adequate	
4.	Computer	Instruction	10	1:5
B	Learning Facilities & Infrastructure			
1.	Lecture/theory room	9 m × 12 m	1	1:25
	Workshop	20 m × 20 m	1	1:25
	Laboratory	9 m × 12 m	1	1:25
	Safety			
	Safety goggles	safety	25 pcs	1:1
	Leather glove	safety	25 pcs	1:1
	Helmet	safety	25 pcs	1:1

	Ear muffs	safety	25 pcs	1:1
	Overall	safety	25 pcs	1:1
	Safety boots	safety	25 pcs	1:1
	Dust mask	safety	25 pcs	1:1
	Face shield	safety	25 pcs	1:1
C	Consumable Materials			
1.	First aid kit	For first aid	1	1:25
2.	Fire extinguisher	Fire fighting	Adequate	
3.	Ream of Drawing papers	drawing	Adequate	
4.	Cleaning detergents	Cleaning	adequate	
5.	Cutting fluid	For cooling the cutting and drilling tool	adequate	
6.	Machine oil as per machine manual	For lubrication of the machine	adequate	
7.	Cotton wool waste	For cleaning	adequate	
8.	soft brush	For cleaning	25 pcs	1:1
	Raw material			
1.	Mild steel bar	Assorted	adequate	
2.	Round bar plastic	Assorted	adequate	
E	Tools and Equipment			
1	Measuring Tools			
3.	Steel rule	For short length measurement	25 pcs	1:1
4.	Micrometer screw gauge	For measuring external diameters	25 pcs	1:1
5.	Vanier callipers	For measuring internal and external diameters	25 pcs	1:1
6.	Combination set	For angle measurements	2pcs	2:25

7.	Dial gauge indicator	For measuring of internal diameters	3pcs	3:25
Marking Out Tools				
1.	Vanier height gauge	For measuring of height of short objects	2 pcs	2:25
2.	Surface plate	For marking out	2pcs	2:25
3.	Angle plate	For marking out	2pcs	2:25
4.	Scribers	For marking out	5 pcs	1:5
5.	Divider	For marking out	13pcs	1:2
6.	V block	For placing of work pieces during measurements	5 pcs	1:5
lathe Cutting Tools				
1.	Assorted Twist drills	For drilling	adequate	
2.	Turning tool	Turning operation	8	8:25
3.	Threading tool	Threading operation	8	8:25
4.	Facing tool	For work facing	8	8:25
5.	knurling	For knurling operation	8	8:25
6.	boring	For boring operation	8	8:25
7.	grooving	For grooving operation	8	8:25
8.	parting	For parting operation	8	8:25
9.	reaming	For reaming operation	8	8:25
10.	Centre drill	For drilling operation	8	8:25
Power cutting tools				

1.	Reciprocating saw	Cutting	1pc	1:25
2.	Band saw	cutting	1pc	1:25
3.	Hand grinder	grinding	2	2:25

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