



REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

MECHANICAL PRODUCTION(LATHE AND FABRICATION) ARTISAN

LEVEL 4



TVET CDACC
P.O BOX 15745-00100
NAIROBI

First published 2020

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FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blue print and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted in the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in Curriculum Development to ensure the Curriculum addresses its competence needs. It is against this background that these Occupational Standards was developed for the purpose of developing a Competency-Based Curriculum form Mechanical Production (Lathe and Fabrication) Level 4. These Occupational Standards will also be the basis for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the Mechanical production sector's growth and sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION**

PREFACE

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Mechanical Sector Skills Advisory Committee (SSAC) have developed these Occupational Standards for a Mechanical Production (Lathe and fabrication) Artisan. These standards will be the basis for development of a competency-based curriculum Mechanical Production (Lathe and fabrication) Level 4. These Standards will also be the basis for assessment of an individual for competence certification.

The Occupational Standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to the Council Members, Council Secretariat, Mechanical Production SSAC, expert workers and all those who participated in the development of these National Occupational Standards.

CHAIRPERSON, TVET CDACC

ACKNOWLEDGMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am sincerely thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) for providing guidance on the development of these Standards. My gratitude goes to the Mechanical Production Engineering Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I thank all the individuals and organizations who participated in the validation of these Standards.

I acknowledge all other institutions which in one way or another contributed to the development of these Occupational Standards.

CHAIRPERSON MECHANICAL PRODUCTION ENGINEERING SECTOR SKILLS ADVISORY COMMITTEE

ABBREVIATIONS AND ACRONYMS

CDACC	Curriculum Development, Assessment and Certification Council
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
TVET	Technical and Vocational Education and Training
SOP	Standard operating procedure
WIBA	Work injury benefits Act
ENG	Engineering
OS	Occupational Standards
CU	Curriculum
ME	Mechanical Engineering
BC	Basic Competencies
CC	Common Competencies
CR	Core Competencies
B	Control Version

KEY TO UNIT CODE

ENG/OS/MLF/BC/01/4/B

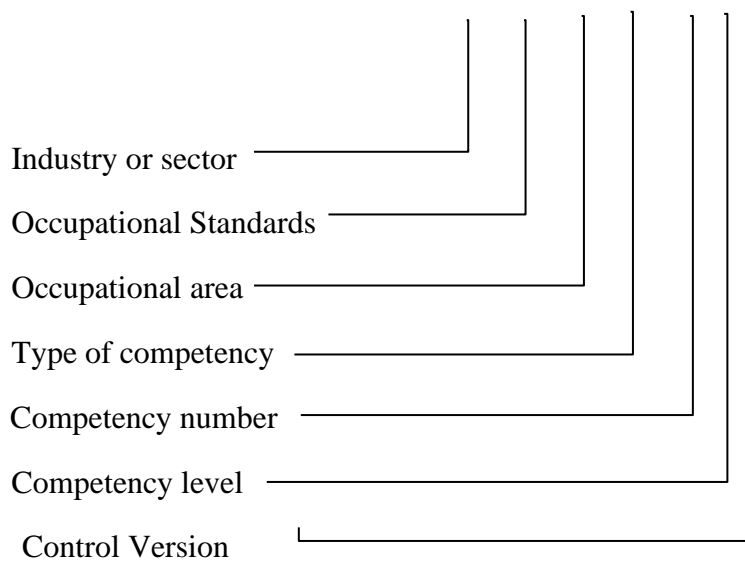


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OVERVIEW

Mechanical production (Lathe and fabrication) Level 4 qualification consists of competencies that a person must achieve to enable him/her to be certified as a lathe and fabrication artisan.

A Mechanical production (Lathe and fabrication) artisan is a person who will carry out Lathe and fabrication duties using a given design and customer's requirements. This work demands the artisan to read and interpret drawings in mechanical production sector so that he/she can fabricate and produce components on a lathe machine according to the national and international standards.

Thus, the units of competency comprising lathe and fabrication level 4 qualifications include the following basic, common and core competencies:

BASIC COMPETENCIES

Unit of Competency Code	Unit of Competency Title
ENG/OS/MLF/BC/01/4/B	Demonstrate communication skills
ENG/OS/MLF/BC/02/4/B	Demonstrate numeracy skills
ENG/OS/MLF/BC/03/4/B	Demonstrate digital literacy
ENG/OS/MLF/BC/04/4/B	Demonstrate employability skills
ENG/OS/MLF/BC/05/4/B	Demonstrate employability skills
ENG/OS/MLF/BC/06/4/B	Demonstrate environmental literacy
ENG/OS/MLF/BC/07/4/B	Demonstrate occupational safety and health practices

COMMON COMPETENCIES

Unit of Competency Code	Unit of Competency Title
ENG/OS/MLF/CC/01/4/B	Interpret basic technical drawing
ENG/OS/MLF/CC/02/4/B	Use common metallic and non- metallic materials
ENG/OS/MLF/CC/03/4/B	Perform bench work operations

CORE COMPETENCIES

Unit of Competency Code	Unit of Competency Title
ENG/OS/MLF/CR/01/4/B	Fabricate sheet metal parts
ENG/OS/MLF/CR/02/4/B	Produce components on the lathe

BASIC UNITS OF COMPETENCY

DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: ENG/OS/MLF/BC/01/4/B

UNIT DESCRIPTION

This unit covers the competencies required demonstrate communication skills. It involves obtaining and conveying workplace information, completing relevant work-related documents, communicating information about workplace processes, leading workplace discussion and communicating workplace issues.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from <i>appropriate sources</i> based on standard procedures 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information based on communication needs 1.3 Appropriate <i>medium</i> is used to transfer information and ideas in accordance with workplace guidelines 1.4 Appropriate non- verbal communication is used as per the communication needs 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed based on workplace requirements 1.6 Location and storage of information is undertaken according to workplace procedures 1.1 Personal interaction is carried out clearly and concisely according to workplace requirements
2. Complete relevant work-related documents	2.1 Range of forms relating to conditions of employment are completed according to workplace procedures 2.2 Workplace data is recorded based on workplace requirements 2.3 Errors in recording information are identified and acted upon in accordance with workplace policies 2.4 Reporting requirements are completed according to organizational guidelines
3. Communicate	3.1 Information sources are identified according to workplace

information about workplace processes	<p>procedures</p> <p>3.2 Methods of communication are selected based on workplace guidelines</p> <p>3.3 Multiple operations are communicated according to workplace structure</p> <p>3.4 Work-related questions are asked and responded based on set protocols</p> <p>3.5 Information is selected and organized according to workplace requirements</p> <p>3.1 Verbal and written reporting is undertaken as per workplace requirements</p> <p>3.2 Communication is maintained according to workplace standards</p>
4. Lead workplace discussions	<p>4.1 Response to workplace issues is sought and provided as per workplace protocol</p> <p>4.2 Constructive contributions are made based on workplace discussions</p> <p>4.3 Workplace objectives and action plan are communicated according to workplace requirements</p>
5. Identify and communicate issues arising in the workplace	<p>5.1 Issues and problems are identified as per workplace guidelines</p> <p>5.2 Problems and issues in the workplace are organized according to workplace operations</p> <p>5.3 Dialogue is initiated with appropriate personnel as per workplace structure</p> <p>5.4 Problems and issues raised are communicated as per the workplace reporting procedures</p>

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Methods of communication may include but not limited to:	<ul style="list-style-type: none"> • Non-verbal gestures • Verbal • Face to face • Two-way radio • Speaking to groups • Using telephone • Written • Internet

<p>2. Workplace discussion may include but not limited to:</p>	<ul style="list-style-type: none"> • Coordination meetings • Toolbox discussion • Peer-to-peer discussion
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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Active listening
- Interpretation
- Negotiation
- Writing

Required Knowledge

The individual needs to demonstrate knowledge of:

- Organization requirements for written and electronic communication methods
- Effective verbal communication methods
- Report writing
- Effective questioning techniques (clarifying and probing)
- Workplace etiquette

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Dealt with a range of communication/information at one time 1.2 Made constructive contributions in workplace issues 1.3 Sought workplace issues effectively 1.4 Responded to workplace issues promptly 1.5 Presented information clearly and effectively in written form 1.6 Used appropriate sources of information 1.7 Asked appropriate questions
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	1.8 Provided accurate information
2. Resource Implications	<p>2. 1 Access to relevant workplace where assessment can take place</p> <p>2. 2 Appropriately simulated environment where assessment can take place</p> <p>2. 3 Materials relevant to the proposed activity or tasks</p>
3. Methods of Assessment	<p>3.1 Third-party reports</p> <p>3.2 Portfolio</p> <p>3.3 Interview</p> <p>3.4 Written tests</p> <p>3.5 Observation</p> <p>3.6 Oral questioning</p>
4. Context of Assessment	<p>Competency may be assessed</p> <p>4.1 On the job</p> <p>4.2 Off the job</p> <p>4.3 During industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

DEMONSTRATE NUMERACY SKILLS

UNIT CODE: ENG/OS/MLF/BC/02/4/B

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate numeracy skills. It involves identifying and using whole numbers and simple fractions, decimals and percentages for work, identifying, measuring and estimating familiar quantities for work, reading and using familiar maps, plans and diagrams for work, identifying and describing common 2D and some 3D shapes for work, constructing simple tables and graphs for work using familiar data and identifying and interpreting information in familiar tables, graphs and charts for work.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range.</i>
1. Identify and use whole numbers and simple fractions, decimals and percentages for work	1.1 Simple fractions, decimals and percentages identified and interpreted as per standard operating procedures. 1.2 Understanding of place value by organising numbers from smallest to largest demonstrated as SOPs 1.3 Required numerical information located and decision made on appropriate method to solve a problem as per SOPs 1.4 Limited range of calculations performed using the four operations using SOPs 1.5 Links between operations described as per SOPs 1.6 Estimations made to check reasonableness of results of problem-solving process as SOPs 1.7 Numerical information recorded, and the result of the task communicated using informal and some formal language and symbolism as per workplace procedures

<p>2. Identify, measure and estimate familiar quantities for work</p>	<p>2.1 Measurement information in workplace tasks and texts identified and interpreted as per workplace procedures.</p> <p>2.2 Familiar units of measurement needed for tasks is identified as per measurements manuals/charts</p> <p>2.3 Familiar and simple amounts estimated as per workplace procedures.</p> <p>2.4 Appropriate measuring equipment selected as per SOPs</p> <p>2.5 <i>Simple measuring equipment</i> graduated in familiar units to measure relevant quantities is used as per graduation manuals.</p> <p>2.6 Calculation done using familiar units of measurement as per SOPs</p> <p>2.7 Measurements and results checked against estimates as per job specifications.</p> <p>2.8 Results are recorded or reported as per workplace procedures</p> <p>2.9 Results relevant to the workplace task are communicated using informal and some formal mathematical and general language as per workplace procedures.</p>
<p>3. Read and use familiar maps, plans and diagrams for work</p>	<p>3.1 Items and places are in familiar maps, plans and diagrams as per SOPs</p> <p>3.2 Common symbols and keys recognised in familiar maps, plans and diagrams as per SOPs</p> <p>3.3 Understanding of direction and location demonstrated by describing the location of objects, or route to familiar places as per SOPs</p> <p>3.4 Instructions to locate familiar objects or places are given and followed as per SOPs</p> <p>3.5 Informal and some formal oral mathematical language and symbols are used as per SOPs</p>
<p>4. Identify and describe common 2D and some 3D shapes for work</p>	<p>4.1 <i>Common 2D shapes and some common 3D shapes</i> in familiar situations are identified and named as per job requirements</p> <p>4.2 Common 2D shapes and designs are compared and classified as per SOPs</p> <p>4.3 Informal and some formal language used to describe common two-dimensional shapes and some common three-dimensional shapes in accordance with workplace procedures.</p> <p>4.4 Simple items used to draw or construct common 2D shapes as per workplace procedures.</p> <p>4.5 Common 3D shapes matched to their 2D sketches or</p>

	nets as per SOPs
5. Construct simple tables and graphs for work using familiar data	<p>5.1 Common types of graphs are identified and named as per SOPs</p> <p>5.2 Familiar data to be collected is determined in accordance with job specifications.</p> <p>5.3 A method to collect data is selected in accordance with workplace procedures.</p> <p>5.4 A small amount of simple familiar data is collected as per workplace procedures</p> <p>5.5 One or two variables determined from the data collected as per SOPs.</p> <p>5.6 Data ordered and collated as per standard operating procedures.</p> <p>5.7 A table is constructed and data entered as per SOPs</p> <p>5.8 Graphs are constructed using data from table as per job specifications</p> <p>5.9 Results are promptly checked as per workplace procedures</p> <p>5.10 Graph information related to work is reported or discussed using informal and some formal mathematical and general language as per workplace procedures</p>
6. Identify and interpret information in familiar tables, graphs and charts for work	<p>6.1 Simple tables are identified in familiar texts and contexts in accordance with workplace procedures</p> <p>6.2 Title, headings, rows and columns located in familiar tables as per SOPs</p> <p>6.3 Information and data in simple tables identified and interpreted as per workplace procedures.</p> <p>6.4 Information is related in accordance with workplace tasks</p> <p>6.5 Familiar graphs and charts are identified in familiar texts and contexts as per SOPs</p> <p>6.6 Title, labels, axes, scale and key from familiar graphs and charts are located as per SOPs</p> <p>6.7 Information and data in familiar graphs and charts are identified and interpreted as per job requirements</p> <p>6.8 Information is related to relevant workplace tasks as per job requirements.</p>

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Simple measuring equipment may include but not limited to:	<ul style="list-style-type: none"> • Rulers • Watches/clocks • Scales • Thermometers • AVO meter
2. Common 2D shapes and common 3D shapes may include but not limited to:	<ul style="list-style-type: none"> • Round • Square • Rectangular • Triangle • Sphere • Cylinder • Cube • Polygons • Cuboids

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Measuring
- Logical thinking
- Computing
- Drawing of graphs
- Applying mathematical formulas
- Analytical

Required knowledge

The individual needs to demonstrate knowledge of:

- Types of common shapes
- Differentiation between two dimensional shapes / objects
- Formulae for calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations

- Fundamental operations (addition, subtraction, division, multiplication)
- Rounding techniques
- Types of fractions
- Different types of tables and graphs
- Meaning of graphs, such as increasing, decreasing, and constant value
- Preparation of basic data, tables & graphs

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Simple fractions, decimals and percentages are correctly identified and interpreted</p> <p>1.2 Performed a limited range of calculations using the 4 operations</p> <p>1.3 Performed calculations using familiar units of measurement</p> <p>1.4 Recognised common symbols and keys in familiar maps, plans and diagrams</p> <p>1.5 Constructed simple tables and graphs using familiar data</p> <p>1.6 Identified and interpret information in familiar tables, graphs and charts</p>
<p>2. Resource Implications</p>	<p>2.1 Access to relevant workplace where assessment can take place</p> <p>2.2 Appropriately simulated environment where assessment can take place</p> <p>2.3 Materials relevant to the proposed activity or tasks</p>
<p>3. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <p>3.1 Written Test</p> <p>3.2 Interview</p> <p>3.3 Oral Questioning</p>
<p>4. Context of Assessment</p>	<p>Competency may be assessed</p> <p>4.1 On the job</p> <p>4.2 Off the job</p> <p>4.3 During industrial attachment</p>
<p>5. Guidance information for assessment</p>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

DEMONSTRATE DIGITAL LITERACY

UNIT CODE: ENG/OS/MLF/BC/03/4/B

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving tasks and applying internet and email in communication at workplace.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify computer software and hardware	1.1 <i>Appropriate computer software</i> is identified according to manufacturer's specification 1.2 <i>Appropriate computer hardware</i> is identified according to manufacturer's specification
2. Apply security measures to data, hardware, software	2.1 <i>Data security and privacy are classified</i> in accordance with the technological situation 2.2 <i>Security and control measures</i> are applied in accordance with laws governing protection of ICT 2.3 Computer threats and crimes are detected as per information security management guidelines. 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT
3. Apply computer software in solving tasks	3.1 Basic word processing concepts are applied in resolving workplace tasks 3.2 Word processing utilities are applied in accordance with workplace procedures 3.3 Data is manipulated on worksheet in accordance with office procedures
4. Apply internet and email in communication at workplace	4.1 Electronic mail is applied in workplace communication in accordance with office procedures 4.2 Office internet functions are defined and executed in accordance with office procedures 4.3 Network configuration and uses are determined in accordance with office operations procedures

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Range	Variable
1. Appropriate computer software may include but not limited to:	<ul style="list-style-type: none"> • Operating system • MS office • Web browser • Media players
2. Appropriate computer hardware may include but not limited to:	<ul style="list-style-type: none"> • Computer Case • Monitor • Keyboard • Mouse • Hard Disk Drive • Motherboard • Video Card
3. Data security and privacy may include but not limited to:	<ul style="list-style-type: none"> • Confidentiality • Cloud computing • Confidentiality • Cyber terrorism • Integrity -but-curious data serving
4. Security and control measures may include but not limited to:	<ul style="list-style-type: none"> • Countermeasures and risk reduction • Cyber threat issues • Risk management

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical
- Interpretation
- Typing
- Communication
- Computing

Required Knowledge

The individual needs to demonstrate knowledge of:

- Input and output devices

- Central processing Unit (CPU)
- Peripherals
- Storage Media
- Software concept
- Types of concept
- Function of computer software
- Data security and privacy
- Security threats and control measures
- Computer crimes
- Detection and protection of computer crimes
- Laws governing protection of ICT
- Word processing;
 - ✓ Functions and concepts of word processing.
 - ✓ Documents and tables creation and manipulations
 - ✓ Mail merging
 - ✓ Word processing utilities
- Spread sheet;
 - ✓ Meaning, formulae, function and charts, uses, layout, data manipulation and application to cell
- Networking and Internet;
 - ✓ Meaning, functions and uses of networking and internet.
 - ✓ Electronic mail and world wide web
- Emerging trends and issues in ICT;
 - ✓ Identify and apply emerging trends and issues in ICT
 - ✓ Challenges posed by emerging trends and issues

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Identified input, output, CPU and storage media devices of computers in accordance to computer specification</p> <p>1.2 Identified concepts, types and functions of computer software according to operation manual</p> <p>1.3 Identified and controlled security threats</p> <p>1.4 Detected and protected computer crimes</p> <p>1.5 Applied word processing in office tasks</p> <p>1.6 Prepared work sheet and applied data to the cells in accordance to workplace procedures</p> <p>1.7 Used Electronic Mail for office communication as per workplace procedure</p>
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	<p>1.8 Applied internet and World Wide Web for office tasks in accordance with office procedures</p> <p>1.9 Applied laws governing protection of ICT</p>
2. Resource Implications	<p>2.1 Access to relevant workplace where assessment can take place</p> <p>2.2 Appropriately simulated environment where assessment can take place</p> <p>2.3 Materials relevant to the proposed activity or tasks</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Written tests</p> <p>3.2 Practical assignment</p> <p>3.3 Interview</p> <p>3.4 Oral Questioning</p> <p>3.5 Observation</p>
4. Context of Assessment	<p>Competency may be assessed</p> <p>4.1 On the job</p> <p>4.2 Off the job</p> <p>4.3 During industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

DEMONSTRATE ENTREPRENEURIAL SKILLS

UNIT CODE: ENG/OS/MLF/BC/04/4/B

UNIT DESCRIPTION

This unit covers the competencies required demonstrate entrepreneurial skills. It involves creating and maintaining small scale business, establishing small scale business customer base, managing small scale business and growing/ expanding small scale business.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Create and maintain small scale business	1.1 Generation and evaluation of business ideas is undertaken in accordance with the existing procedure 1.2 Competencies are matched with business opportunities in accordance with business practices. 1.3 Procedure for starting a small business is identified as per the legal requirements 1.4 SWOT/ PESTEL analysis and or industrial survey is carried out according to office procedures 1.5 <i>Business operations</i> are monitored and controlled following established procedures. 1.6 Quality assurance measures are implemented in accordance with the business practices. 1.7 Good relations are maintained with staff/workers as per the workplace policies. 1.8 Policies and procedures on occupational safety and health and environmental concerns are constantly observed as per the workplace policies
2. Establish small scale business customer base	2.1 Good customer relations are maintained in accordance with office procedures 2.2 New customers and markets are identified, explored and reached out to according to the marketing plan 2.3 Promotions/Incentives are offered to loyal customers in accordance with office procedures 2.4 Additional products and services are evaluated and tried in accordance with marketing strategy 2.5 Customer record is maintained in accordance with office procedures

<p>3. Manage small scale business</p>	<p>3.1 Enterprise is built up and sustained in line with judicious control of cash flows.</p> <p>3.2 Profitability of enterprise is ensured as per the internal controls.</p> <p>3.3 Unnecessary or lower-priority expenses and purchases are avoided as per the marketing strategy</p> <p>3.4 Basic cost-benefit analysis are undertaken in accordance with office procedures</p> <p>3.5 Basic financial management are undertaken in accordance with office procedures</p> <p>3.6 Basic financial accounting in undertaken in accordance with office procedures</p> <p>3.7 Business <i>internal controls</i> are implemented in accordance with office procedure</p> <p>3.8 Setting business priorities and strategies is carried out according to office procedures</p> <p>3.9 Preparation and interpretation of basic financial statements is undertaken in accordance with set procedures</p> <p>3.10 Preparation of business plans for small business is undertaken in accordance with <i>business strategy</i></p> <p>3.11 Business Social Responsibility is maintained in accordance with Standard Operations Procedures (SOP)</p>
<p>4. Grow/ expand small scale business</p>	<p>4.1 Prepared business growth strategy for small sale business in accordance with office procedures</p> <p>4.2 Incorporated technology in small scale business growth in accordance with technological trends</p> <p>4.3 Emerging issues and trends are considered in accordance with business growth strategy</p> <p>4.4 Built audience interest in product/service according to growth strategy</p> <p>4.5 Boosted cooperate communication according to business <i>communication strategy</i></p>

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Business	<ul style="list-style-type: none"> • Purchasing

operations may include but not limited to:	<ul style="list-style-type: none"> • Accounting/administrative • Work production/operations/sales • Marketing
2. Internal control may include but not limited to:	<ul style="list-style-type: none"> • Accounting systems • Financial statements/reports • Cash management • Human resource management
3. Business Strategy may include but not limited to:	<ul style="list-style-type: none"> • Management of wastages • Environmental Conservation
4. Communication strategy may include but not limited to:	<ul style="list-style-type: none"> • Blue print of exchange of information • Technology and exchange of information

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Marketing
- Advertising
- Basic bookkeeping
- Accounting
- Communication

Required Knowledge

The individual needs to demonstrate knowledge of:

- Generation and evaluation of business ideas
- Legal requirements for starting a small business
- SWOT/ PESTEL analysis
- Occupational Safety and Health
- Public relations concepts
- Business plan
- Business financing
- Marketing strategies
- Business management and control
- Production/ operation process
- Product promotion strategies

- Market and feasibility studies
- Business ethics
- Building customer relations
- Business models and strategies
- Types and categories of businesses
- Business internal controls
- Relevant national and local legislation and regulations
- Basic quality control and assurance concepts
- Building relations with customer and employees
- Building competitive advantage of the enterprise
- Business growth strategies

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Demonstrated entrepreneurial skills 1.2 Demonstrate competencies to create a small-scale business 1.3 Demonstrated ability to conceptualize and plan a micro/small business 1.4 Grew customer base for the small-scale business 1.5 Demonstrated ability to manage/operate a micro/small-scale business 1.6 Demonstrated competencies to grow a micro/small-scale business
2. Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Assessment location 2.2 Case studies on micro/small-scale enterprises 2.3 Assessment materials
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Written tests 3.2 Observation 3.3 Oral questioning 3.4 Portfolio 3.5 Projects
4. Context of Assessment	<p>Competency may be assessed</p> <ul style="list-style-type: none"> 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
5. Guidance	<p>Holistic assessment with other units relevant to the industry</p>

information for assessment	sector, workplace and job role is recommended.
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DEMONSTRATE EMPLOYABILITY SKILLS

UNIT CODE: ENG/OS/MLF/BC/05/4/B

UNIT DESCRIPTION

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Conduct self-management	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives 1.2 Emotional intelligence is demonstrated as per workplace requirements. 1.3 Individual performance is evaluated and monitored according to the agreed targets. 1.4 Assertiveness is developed and maintained based on the requirements of the job. 1.5 Accountability and responsibility for own actions are demonstrated based on workplace instructions. 1.6 Self-esteem and a positive self-image are developed and maintained based on values. 1.7 Time management, attendance and punctuality are observed as per the organization policy. 1.8 Goals are managed as per the organization's objective 1.9 Self-strengths and weaknesses are identified based on personal objectives
2. Demonstrate critical safe work habits	2.1. Stress is managed in accordance with workplace policy. 2.2. Punctuality and time consciousness is demonstrated in line with workplace policy. 2.3. Personal objectives are integrated with organization goals based on organization's strategic plan. 2.4. <i>Resources</i> are utilized in accordance with workplace policy.

	<p>2.5. Work priorities are set in accordance to workplace goals and objectives.</p> <p>2.6. Leisure time is recognized and utilized in line with personal objectives.</p> <p>2.7. Drugs and substances of abuse are identified and avoided based on workplace policy.</p> <p>2.8. HIV and AIDS prevention awareness is demonstrated in line with workplace policy.</p> <p>2.9. Safety consciousness is demonstrated in the workplace based on organization safety policy.</p> <p>2.10. Emerging issues are identified and dealt with in accordance with organization policy.</p>
3. Demonstrate workplace learning	<p>3.1 Learning opportunities are sought and managed based on job requirement and organization policy.</p> <p>3.2 Improvement in performance is demonstrated based on courses attended.</p> <p>3.3 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job</p> <p>3.4 Time and effort is invested in learning new skills based on job requirements</p> <p>3.5 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy.</p> <p>3.6 New systems are developed and maintained in accordance with the requirements of the job.</p> <p>3.7 Awareness of personal role in workplace innovation is demonstrated based on requirements of the job.</p>
4. Demonstrate workplace ethics	<p>4.1 Policies and guidelines are observed as per the workplace requirements</p> <p>4.2 Self-worth and professionalism is exercised in line with personal goals and organizational policies</p> <p>4.3 Code of conduct is observed as per the workplace requirements</p> <p>4.4 Integrity is demonstrated as per legal requirement</p>

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Range	Variable
1. Personal objectives may include but not	<ul style="list-style-type: none"> • Long term • Short term

limited to:	<ul style="list-style-type: none"> • Broad • Specific
2. Feedback may include but not limited to:	<ul style="list-style-type: none"> • Verbal • Written • Informal • Formal
3. Team may include but not limited to:	<ul style="list-style-type: none"> • Small work group • Staff in a section/department • Inter-agency group
4. Drug and substance abuse may include but not limited to:	<ul style="list-style-type: none"> • Alcohol • Tobacco • Miraa • Over-the-counter drugs • Cocaine • Bhang • Glue
5. Emerging issues may include but not limited to:	<ul style="list-style-type: none"> • Terrorism • Social media • National cohesion • Open offices
6. Range of media for learning may include but not limited to:	<ul style="list-style-type: none"> • Mentoring • peer support and networking • IT and courses
7. Innovation may include but not limited to:	<ul style="list-style-type: none"> • New ideas • Original ideas • Different ideas • Methods/procedures • Processes • New tools

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Interpersonal
- Critical thinking
- Observation
- Organizing
- Record keeping

- Problem solving
- Decision Making
- Resource utilization

Required Knowledge

The individual needs to demonstrate knowledge of:

- Work values and ethics
- Company policies
- Company operations, procedures and standards
- Occupational Health and safety procedures
- Fundamental rights at work
- Personal hygiene practices
- Workplace communication
- Concept of time
- Time management
- Decision making
- Types of resources
- Work planning
- Record keeping
- Workplace problems and how to deal with them
- Assertiveness
- Team work
- HIV and AIDS
- Drug and substance abuse
- Safe work habits
- Professional growth and development
- Technology in the workplace
- Emerging issues
 - Social media
 - Terrorism
 - National cohesion

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Conducted self-management
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	<p>1.2 Demonstrated critical safe work habits</p> <p>1.3 Demonstrated workplace learning</p> <p>1.4 Demonstrated workplace ethics</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>2.1. Access to relevant workplace where assessment can take place</p> <p>2.2. Appropriately simulated environment where assessment can take place</p>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1 Oral questioning</p> <p>3.2 Portfolio of evidence</p> <p>3.3 Third Party Reports</p> <p>3.4 Written tests</p>
4. Context of Assessment	<p>Competency may be assessed:</p> <p>4.1 On-the-job</p> <p>4.2 Off-the –job</p> <p>4.3 During Industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

DEMONSTRATE ENVIRONMENTAL LITERACY

UNIT CODE: ENG/OS/MLF/BC/06/4/B

UNIT DESCRIPTION

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, demonstrating sustainable resource use and evaluating current practices in relation to resource usage.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Control environmental hazard	1.1 Storage methods for environmentally hazardous materials are followed according to environmental regulations and OSHS. 1.2 Disposal methods of hazardous wastes are followed according to environmental regulations and OSHS. 1.3 <i>PPE</i> is used according to OSHS.
2. Control environmental pollution	2.1 <i>Environmental pollution control measures</i> are compiled following standard protocol. 2.2 Procedures for solid waste management are observed according Environmental Management and Coordination Act 1999 2.3 Methods for minimizing noise pollution complied following environmental regulations.
3. Demonstrate sustainable use of resource s	3.1 Methods for minimizing wastage are complied with. 3.2 <i>Waste management procedures</i> are employed following principles of 3Rs (Reduce, Reuse, Recycle) 3.3 Methods for economizing or reducing resource consumption are practiced.
4. Evaluate current practices in relation to resource usage	4.1 Information on resource efficiency <i>systems and procedures</i> are collected and provided as per work groups/sector 4.2 <i>Current resource usage</i> is measured and recorded as per work group/sector 4.3 Current purchasing strategies are analyzed and recorded according to industry procedures.

	4.4 Current work processes to access information and data is analyzed following enterprise protocol.
5. Identify environmental legislations/conventions for environmental concerns	5.1 Environmental legislations/conventions and local ordinances are identified according to the different environmental aspects/impact 5.2 Industrial standard/environmental practices are described according to the different environmental concerns

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. PPE may include but are not limited to:	<ul style="list-style-type: none"> • Masks • Gloves • Goggles • Safety hat • Overall • Hearing protector • Safety boots
2. Environmental pollution control measures may include but are not limited to:	<ul style="list-style-type: none"> • Methods for minimizing or stopping spread and ingestion of airborne particles • Methods for minimizing or stopping spread and inhaling gases and fumes • Methods for minimizing or stopping spread and ingestion of liquid wastes
3. Waste management procedures may include but are not limited to:	<ul style="list-style-type: none"> • Sorting • Storing of items • Recycling of items • Disposal of items • Handling • Transport
4. Current resources usage may include but are not limited to:	<ul style="list-style-type: none"> • Electric • Water • Fuel • Telecommunications • Supplies • Materials

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Measuring
- Recording
- Analytical
- Monitoring
- Writing
- Communication

Required Knowledge

The individual needs to demonstrate knowledge of:

- Storage methods of environmentally hazardous materials
- Disposal methods of hazardous wastes
- Usage of PPE Environmental regulations
- OSHS
- Types of pollution
- Environmental pollution control measures
- Different solid wastes
- Solid waste management
- Different noise pollution
- Methods of minimizing noise pollution
- Solid Waste Act
- Methods of minimizing wastage
- Waste management procedures
- Economizing of resource consumption
- Principle of 3Rs
- Types of resources
- Techniques in measuring current usage of resources
- Calculating current usage of resources
- Types of workplace environmental hazards
- Environmental regulations
- Environmental regulations applying to the enterprise.
- Procedures for assessing compliance with environmental regulations.
- Collection of information on environmental and resource efficiency systems and procedures,
- Measurement and recording of current resource usage
- Analysis and recording of current purchasing strategies.

- Analysis current work processes to access information and data Analysis of data and information

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Controlled environmental hazards 1.2 Controlled environmental pollution 1.3 Demonstrated sustainable resource use 1.4 Evaluated current practices in relation to resource usage
2. Resource Implications	The following resources should be provided: 2.1 Workplace with storage facilities 2.2 Tools, materials and equipment relevant to the tasks (e.g. cleaning tools, cleaning materials, trash bags, etc.) 2.3 PPEs 2.4 Manuals and references 2.5 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.6 Case studies/scenarios relating to environmental Protection
3 Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written tests 3.4 Third party reports 3.5 Portfolio
4 Context of Assessment	Competency may be assessed: 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
5 Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE OCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: ENG/OS/MLF/BC/07/4/B

UNIT DESCRIPTION

This unit specifies the competencies required to practice safety and health and comply with OSH requirements relevant to work. It involves observing workplace procedures for hazards and risk prevention and participating in arrangements for workplace safety and health maintenance.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Adhere to workplace procedures for hazards and risk prevention	1.1 Arrangement of work area and items in accordance with workplace procedures requirements 1.2 Work standards and procedures are followed based on instructions 1.3 <i>Prevention and control measures</i> are applied based on instructions
2. Participate in arrangements for workplace safety and health maintenance	2.1 Orientations on <i>OSH requirements and regulations</i> is undertaken in line with policy. 2.2 Feedback on occupational health and safety are provided as per workplace instructions. 2.3 Workplace procedures for reporting hazards, incidents, injuries and sickness are adhered to as per workplace policy. 2.4 <i>OSH-related training needs</i> are identified and proposed as per workplace policy.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Prevention and control measures may include but are not limited to:	<ul style="list-style-type: none"> • Eliminate the hazard • Isolate the hazard • Substitute the hazard with a safer alternative • Use administrative controls to reduce the risk • Use engineering controls to reduce the risk • Use personal protective equipment • Safety, Health and Work Environment Evaluation • Periodic and/or special medical examinations of workers
2. Safety gears /PPE (Personal Protective Equipment's) may include but are not limited to:	<ul style="list-style-type: none"> • Arm/Hand guard, gloves • Eye protection (goggles, shield) • Hearing protection (ear muffs, ear plugs) • Hair Net/cap/bonnet • Hard hat • Face protection (mask, shield) • Apron/Gown/coverall/jump suit • Anti-static suits • High-visibility reflective vest
3. Incidents and emergencies may include but are not limited to:	<ul style="list-style-type: none"> • Chemical spills • Equipment/vehicle accidents • Explosion • Fire • Gas leak • Injury to personnel • Structural collapse • Toxic and/or flammable vapors emission.
4. OSH requirements / regulations may include but are not limited to:	<ul style="list-style-type: none"> • Building code • Permit to Operate
5. OSH-related trainings may include but are not limited to:	<ul style="list-style-type: none"> • Safety Orientations relevant to tasks • Safe and Correct Operation of Tools and Equipment • Health Orientations/trainings • Prevention and Control of OSH Hazards in the workplace • Chemical Handling • Safety Trainings • Prevention and Control of Work-related Injuries and Illness • Basic First-aid Trainings • Emergency Response Trainings • Trainings on use of fire-extinguisher

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Knowledge management
- Collaborating
- Interpersonal
- Troubleshooting
- Critical thinking
- Observation

Required Knowledge

The individual needs to demonstrate knowledge of:

- General OSH principles and legislations
- Principles of good housekeeping (5S)
- Company/workplace policies/ guidelines
- Standards and safety requirements of work process and procedures
- Standard Workplace emergency plan and procedures
- Safety and health requirements of tasks
- Workplace guidelines on providing feedback on OSH and security concerns
- OSH regulations
- Hazard control procedures
- OSH trainings relevant to work

EVIDENCE GUIDE

<p>1. This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1. Arranged work area and items in accordance with 1.2. workplace procedures requirements 1.3. Followed work standards and procedures based on instructions 1.4. Applied <i>Prevention and control measures</i> based on instructions 1.5. Undertook orientations on <i>OSH requirements and regulations</i> in line with policy. 1.6. Provided feedback on occupational health and safety as per workplace instructions. 1.7. Adhered to workplace procedures for reporting hazards, incidents, injuries and sickness to as per workplace policy. 1.8. Identified and proposed <i>OSH-related training needs</i> as per workplace policy.
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Oral questioning 3.2 Portfolio of evidence 3.3 Third Party Reports 3.4 Written tests
<p>4. Context of Assessment</p>	<p>Competency may be assessed:</p> <ul style="list-style-type: none"> 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
<p>5. Guidance information for assessment</p>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

COMMON UNITS OF COMPETENCIES

INTERPRET BASIC TECHNICAL DRAWINGS

UNIT CODE: ENG/OS/MLF/CC/01/4/B

UNIT DESCRIPTION

This unit covers the competencies required by a mechanical production artisan to interpret basic technical drawings. It involves competencies to: select and use drawing instruments and materials, interpret plain geometry drawings, solid geometry drawings, pictorial and orthographic drawings and mechanical drawings to help in fabrication and machining of components on the lathe.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
<p>These describe the key outcomes which make up workplace function.</p>	<p>These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicised terms are elaborated in the Range)</i></p>
<p>1. Use drawing instruments and materials</p>	<p>1.1 <i>Personal Protective Equipment</i> is used according to occupational safety and health regulations</p> <p>1.2 <i>Drawing instruments</i> are identified and gathered according to task requirements</p> <p>1.3 <i>Drawing materials</i> are identified and gathered according to task requirements</p> <p>1.4 Drawing instruments are used as per the task specification</p> <p>1.5 Drawing instruments are maintained as per manufacturer's instructions</p> <p>1.6 Drawing materials are used as per workplace procedures</p> <p>1.7 Waste materials are disposed in accordance with workplace procedures and <i>environmental legislations</i></p>
<p>2. Interpret plane geometry drawings</p>	<p>2.1 Different lines used in drawing are identified according to standard drawing conventions</p> <p>2.2 Different <i>geometric forms</i> are constructed according to standard conventions</p> <p>2.3 Different angles are measured using appropriate measuring tools</p> <p>2.4 Angles are bisected according to standard conventions</p> <p>2.5 Freehand sketching of different geometric forms, tools, equipment, diagrams is conducted</p>

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicised terms are elaborated in the Range)</i>
3. Interpret solid geometry drawings	3.1 Drawings of patterns are interpreted according to standard conventions 3.2 Patterns are developed in accordance with drawing specification
4. Interpret orthographic and pictorial drawings	4.1 Drawing symbols, abbreviations are interpreted according to standard drawing conventions 4.2 First and third angle orthographic drawings produced in accordance with the standard conventions 4.3 Orthographic elevations are dimensioned in accordance with standard conventions 4.4 Isometric drawings are produced in accordance with standard conventions
5. Interpret mechanical drawings	5.1 Mechanical symbols and abbreviations are interpreted according to BS 3939 5.2 Mechanical drawings are interpreted in accordance with BS 3939

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
Personal Protective Equipment includes but not limited to:	Dust coats, closed leather shoes
Drawing instrument includes but not limited to:	Drawing boards, T and set squares, drawing sets, curves, protractor, ruler, computers with CAD packages
Drawing materials includes but not limited to:	Drawing papers, pencils, erasers, masking tapes, paper clips
Environmental legislations include but not limited to:	EMCA 1999
Geometric forms include but not limited to:	Circles, triangles, rectangles, parallelogram, polygons, pyramids, conic sections, prisms, loci
Standard conventions	<ul style="list-style-type: none"> Anatomy of engineering drawing (title block,

include but not limited to:	coordinate grid system, revision block, notes and legends) <ul style="list-style-type: none"> • Drawing scale (paper size and drawing symbols) • International drawing standards
Mechanical drawings include but not limited to:	Block, schematic and line diagrams

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Critical thinking
- Basic numeracy
- Drawing skills
- Interpretation
- Drawing equipment handling
- Analysis and synthesis
- Communication skills
- Inter personal skills

Required knowledge

The individual needs to demonstrate knowledge of:

- Drawing equipment and materials
- Freehand sketching
- Lettering
- Geometrical constructions
- Types of drawings
- Types of lines
- Isometric drawing conventions, features, characteristics, components
- Orthographic drawing conventions, features, characteristics, components
- Sketches and drawings of simple patterns

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Used <i>Personal Protective Equipment</i> according to
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	<p>occupational safety and health regulations</p> <p>1.2 Used drawing instruments as per the task specification</p> <p>1.3 Used drawing materials as per workplace procedures</p> <p>1.4 Identified different lines used in drawing according to standard drawing conventions</p> <p>1.5 Conducted freehand sketching of different geometric forms, tools, equipment and diagrams</p> <p>1.6 Developed patterns in accordance with drawing specification</p> <p>1.7 Produced first and third angle orthographic drawings in accordance with the standard conventions</p> <p>1.8 Produced isometric drawings in accordance with standard conventions</p> <p>1.9 Produced mechanical drawings in accordance with BS 3939</p>
2. Resource Implications	<p>Resources the same as that of workplace are advised to be applied.</p> <p>2.1 Drawing room</p> <p>2.2 Drawing instruments and materials</p> <p>2.3 Teaching models</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Practical assessment</p> <p>3.2 Observation</p> <p>3.3 Oral assessment</p>
4. Context of Assessment	<p>Competency may be assessed:</p> <p>4.1 On the job</p> <p>4.2 Off the job</p> <p>4.3 During industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

USE COMMON METALLIC AND NON-METALLIC MATERIALS

UNIT CODE: ENG/OS/MLF/CC/02/4/B

UNIT DESCRIPTION:

This unit covers the unit of competency required by a mechanical production artisan to use common metallic and non-metallic materials. It involves competencies required to: identify properties of engineering materials, identify ore extraction processes, identify methods of producing engineering materials, perform heat treatment and prevent material corrosion.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements (<i>Bold and italicized terms are elaborated in the Range</i>)
1. Identify properties of engineering materials	1.1 Engineering materials type is identified as per the application 1.2 <i>Physical properties</i> of engineering material are determined 1.3 <i>Mechanical properties</i> of engineering materials are tested 1.4 Crystal structure of materials are identified
2. Identify ore extraction processes of metallic materials	2.1 Safety procedures to be observed are identified according to OSHA 2.2 Method of extraction is outlined as per <i>metal classification</i> 2.3 Procedure in extraction process is outlined as per extraction method 2.4 Extraction by- products are identified as per material extraction method
3. Identify methods of producing engineering materials	3.1 Method of producing different <i>non-metallic materials</i> are identified according to the type of material 3.2 Forms of supply of engineering materials are identified according to their application 3.3 <i>Finishing and Refinement</i> processes are identified based on material required.
4. Perform heat treatment	4.1 Safety requirements associated with heat treatment are observed in accordance to OSHA 2007 4.2 Tools, equipment and materials used for heat treatment are selected according to manufacturer's

	<p>specification and workplace procedures</p> <p>4.3 Heat treatment processes are identified as per the job specification and workplace procedures</p> <p>4.4 Heat treatment of metals is performed as per the job specification and workplace procedures</p>
5. Prevent material corrosion	<p>5.1 Safety rules and regulations are observed during corrosion prevention in material in accordance to OSHA 2007 act.</p> <p>5.2 <i>Types of corrosion</i> are identified as per the application of the material</p> <p>5.3 Agents of corrosion are identified as per the corrosion type</p> <p>5.4 <i>Methods of corrosion prevention</i> are identified as per the application of the material</p> <p>5.5 Corrosion prevention is performed as per the job specification and application area.</p>

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
Physical properties include but not limited to:	<ul style="list-style-type: none"> • Density • Color • Texture • Melting point • Thermo conductivity • Electrical resistivity
Mechanical properties include but not limited:	<ul style="list-style-type: none"> • Ductility • Malleability • Elasticity • Toughness • Hardness • Brittleness • Plasticity • Strength
Metal classification includes:	<ul style="list-style-type: none"> • Ferrous metals • Non-ferrous metals
Different non-metallic materials include but not limited to:	<ul style="list-style-type: none"> • Rubber • Plastics • Wood

VARIABLE	RANGE
	<ul style="list-style-type: none"> • ceramics • Glass
Finishing processes includes but not limited to:	<ul style="list-style-type: none"> • Lapping • Fine grinding • Polishing
Heat treatment processes includes but not limited to:	<ul style="list-style-type: none"> • Annealing • Tempering • Normalizing • Hardening • Case hardening
Corrosion type includes but not limited to:	<ul style="list-style-type: none"> • Galvanic • Stress corrosion cracking
Methods of corrosion prevention includes but not limited to:	<ul style="list-style-type: none"> • Painting • Electroplating • Galvanizing • Cathodic • Chromizing

REQUIRED KNOWLEDGE AND SKILLS

The individual needs to demonstrate the following skills

Required Skills

- Measuring and marking
- Material inspection and testing
- Analytical skills
- Communication skills
- Occupational health and safety regulations
- Heat treatment skills
- Corrosion prevention
- Problem solving skills
- Use of hand tools

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

- Occupational Health and Safety Act of Kenya laws 2007 with focus on personal safety, machine safety and workplace
- National Environment Management Authority Act, Kenya 2004
- OSH ACT 2007

- Forms of material supply
- Heat treatment processes
- Corrosion formation and prevention
- Equipment manuals
- Metallurgy and materials
- Inspection and testing
- WIBA ACT
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the learner</p> <p>1.1 Identified safety procedures to be observed according to OSHA</p> <p>1.2 Determined physical properties of engineering material as per the workplace requirements</p> <p>1.3 Tested mechanical properties of engineering materials as per the workplace requirements</p> <p>1.4 Outlined procedure in extraction process as per extraction method</p> <p>1.5 Identified forms of supply of engineering materials according to their application</p> <p>1.6 Performed heat treatment of metals as per the job specification and workplace procedures</p> <p>1.7 Identified agents of corrosion as per the corrosion type</p> <p>1.8 Performed corrosion prevention as per the job specification and application area</p>
<p>2. Resource Implications</p>	<p>Resources the same as that of workplace are advised to be applied.</p> <p>2.1 Testing materials</p> <p>2.2 Measuring instruments</p> <p>2.3 Heat treatment equipment (furnaces, oxy-fuel gas system etc)</p> <p>2.4 Inspection tools</p>
<p>3. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <p>3.1 Oral questioning</p> <p>3.2 Written test</p> <p>3.3 Practical assessment</p>

4. Context of Assessment	Competency may be assessed: 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
5. Guidance information for assessment	Holistic assessment of other units relevant to the industry sector, workplace and job role is recommended.

PERFORM BENCH WORK OPERATIONS

UNIT CODE: ENG/OS/MLF/CC/3/04/B

UNIT DESCRIPTION

The Mechanical production artisan will be able to perform bench work operations using basic hand tools while observing occupational safety and health legislations, regulations and safe working practices. In the context of the standards, the learner is to plan work operations, mark out work pieces, set up work pieces on holding devices, assemble metal parts and their sub-assemblies, inspect the work, perform maintenance and perform housekeeping.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements (<i>Bold and italicized terms are elaborated in the Range</i>)
1. Observe safety rules and regulations	1.1 Prescribed personal safety gear is worn as per work place procedure. 1.2 Prescribed safety measures for the operation of hand tools and bench drilling machines adhered to as per safety rules and regulations (OSHA) 1.3 Prescribed safe work environment is observed as per rules and regulations
2. Plan work operations	2.1 Working drawing are interpreted as per <i>drawing standards.</i> 2.2 Operation Plan is produced as per the working drawings. 2.3 Tools and equipment are selected as per the operation plan.
3. Mark out dimensions on work pieces	3.4 <i>Measuring tools</i> suitable for the work are selected 3.5 Measuring tools are inspected and calibrated as per the workplace procedures 3.6 Marking out tools are selected as per the operation plan 3.7 Dimensions are marked on the work piece as per the working drawing specifications
4. Set up work pieces on holding devices	4.1 Work piece is mounted on work holding devices 4.2 Work piece is clamped securely on <i>work holding devices</i>
5. Use hand tools	5.1 <i>Hand tools</i> are selected based on operation plan 5.2 Hand tool used as per the operation plan
6. Use bench drill	6.1 Hole centers are marked and center punched as

	<p>per specifications</p> <p>6.2 Drill bits are selected and mounted on the machine spindle</p> <p>6.3 Work piece is mounted on holding device and clamped as per the work place procedures</p> <p>6.4 Hole is drilled to specification</p> <p>6.5 Hole is inspected to specification</p>
7. Assemble metal parts and sub-assemblies	<p>7.1 Fitted parts are joined and assembled as per the working drawing specifications</p> <p>7.2 Final assembly inspected as per specification</p>
8. Inspect finished work	<p>8.1 Inspection tools and methods selected as per operation plan</p> <p>8.2 Finished work is inspected as per specification</p> <p>8.3 Adjustments are made based on inspection results</p>
9. Perform maintenance	<p>9.1 Tools and equipment are inspected as per the work place procedures</p> <p>9.2 Faults on tools and equipment identified and reported as per the work place procedures</p> <p>9.3 Tools and equipment are lubricated as per the workplace procedures</p>
10. Perform house keeping	<p>10.1 Work environment is cleaned as per the workplace procedures</p> <p>10.2 Waste is segregated and disposed as the workplace environmental regulations</p> <p>10.3 Tools and equipment are stored as per the workplace procedures</p>

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
1. Measuring tools may include but not limited to:	<ul style="list-style-type: none"> • Steel rule • Vernier caliper • Micrometer screw gauge • Vernier height gauge
2. Drawing Standards may include but not limited to:	<ul style="list-style-type: none"> • ISO • BS • ANSI

3. Marking out tools may include but not limited to:	<ul style="list-style-type: none"> • Scribes • Dividers • Dot punch • Centre punch • Engineer's square • Straight edge • Surface plate
4. Work holding devices may include but not limited to:	<ul style="list-style-type: none"> • Bench vice • V-Block • Angle plate • G-clamp • Jigs and fixtures • Hand vice
5. Hand tools may include but not limited to:	<ul style="list-style-type: none"> • Files • Saws • Hammers • Chisels • Taps and dies
6. Hole drilled may include but not limited to:	<ul style="list-style-type: none"> • Location • Counter sinking • Counter boring • Reaming • Boring
7. Joining may include but not limited to:	<ul style="list-style-type: none"> • Riveting • Use of mechanical fasteners
8.	<ul style="list-style-type: none"> • Use of adhesives • Soldering • Brazing • Welding (gas/arc)
9. Specifications may include but not limited to:	<ul style="list-style-type: none"> • Dimensions • Tolerances • Geometry • Surface finish • Functionality

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Interpreting Technical drawing
- Using measuring and inspection tools
- Using hand tools
- Using portable and bench drilling machines
- Soldering and brazing
- Riveting and fastening
- House keeping
- Observing safety rules and regulation
- Work planning
- Time management
- Problem solving
- Communication skills

Required Knowledge

The individual needs to demonstrate knowledge and understanding of:

- Occupational Health and Safety Act of Kenya laws 2007 with focus on personal safety, machine safety and workplace
- National Environment Management Authority Act, Kenya 2004
- OSH act
- Equipment manuals
- Basic technical drawing complying to ISO, ANSI & BS standards
- ISO 1101 Geometrical tolerance and where to use the norm
- Work Planning and documentation
- Measuring tools
- Hand tools
- Bench work
- Portable and bench drilling machines
- Metal joining methods
- Housekeeping procedures
- Inspection and quality control
- Preventive maintenance of machine tools
- Metal cutting technology
- Materials and metallurgy
- WIBA act (2007)
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the learner:</p> <ul style="list-style-type: none"> 1.1 Adhered to prescribed safety measures for the operation of hand tools and bench drilling machines as per safety rules and regulations standards (OSHA) 1.2 Produced Operation Plan as per the working drawings 1.3 Marked dimensions on the work piece as per the working drawing specification 1.4 Clamped work piece securely on work holding devices as per the work place procedures 1.5 Cut work piece to specification 1.6 Drilled hole to specification 1.7 Joined and assembled the fitted parts as per the working drawing specifications 1.8 Inspected finished work as per the specification 1.9 Cleaned work environment as per the workplace procedures 1.10 Stored tools and equipment as per the workplace procedures
<p>1. Resource Implications</p>	<p>Resources the same as that of workplace are advised to be applied.</p> <ul style="list-style-type: none"> 1.1 Hand measuring tools 1.2 Hand marking tools 1.3 Hand tools 1.4 Inspection tools and equipment 1.5 Hand drilling machine 1.6 Bench Drilling machine 1.7 1.7 Work benches 1.8 1.8 Bench vices 1.9 ISO, BS and ANSI standards 1.10 Rules and procedures 1.11 Resource materials, manuals for bench, tools and equipment 1.12 Materials 1.13 Cutting tools
<p>2. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 2.1 Observing the behavior of the learner 2.2 Oral presentations 2.3 Inspection of written operation procedures 2.4 Inspection of finished product 2.5 Observing housekeeping of the work area and/or machine tool

3. Context of Assessment	Competency may be assessed: 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
4. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

CORE UNITS OF COMPETENCY

FABRICATE SHEET METAL PARTS

UNIT CODE: ENG/OS/MLF/CR/01/04/B

UNIT DESCRIPTION

This unit covers the competencies required by a Mechanical production (Lathe and Fabrication) artisan to fabricate sheet metal parts. It includes competencies that ensure the learner will: observe safety rules and regulations, identify sheet metal tools & Equipment, read and interpret working drawing, mark out, set up sheet metal fabrication machines and equipment, fabricate sheet metal components, assess quality of components, maintain sheet metal fabrication tools, machine and equipment and perform housekeeping

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Observe safety rules and regulations	1.1 Prescribed personal safety gear is worn as per work place procedure. 1.2 Prescribed safe work environment is observed as per rules and regulations. 1.3 Prescribed workplace procedures are adhered to.
2. Use sheet metal machines, tools & equipment.	2.1 Types of <i>sheet metal machine tools</i> /equipment identified as per the manufacturer's manual 2.2 Parts of sheet metal machine/equipment identified as per manufactures manual 2.3 Functions of the parts of a sheet metal machine identified as the manufacturers manual 2.4 Sheet metal machines, tools and equipment selected as per the operation plan 2.5 Sheet metal machine, tools and equipment used as per manufacturer's specification manual.
3. Plan work operation	3.1 Technical drawings and geometric symbols are read and interpreted as per <i>drawing standards</i> . 3.2 <i>Operation Plan</i> is prepared as per the working drawings. 3.3 Pattern development layout is sketched as per the work specification
4. Mark out work pieces	4.1 Marking and measuring tools selected as per specifications 4.2 Work piece dimensions are measured as per the specifications

	4.3 Dimensions are marked on work piece as per the <i>drawing specifications</i>
5. Set- up sheet metal machine and equipment	5.1 Machine, tools and equipment are selected as per operation plan 5.2 Attachments are mounted as per machine operational manual
6. Fabricate sheet metal component (s)	6.1 Accessories mounted as per machine manual 6.2 Sheet metal work pieces produced as per operation plan 6.3 Sheet metal parts joined as per the specifications
7. Assess Quality of the fabricated component(s)	7.1 Finished work is cleaned according to work place procedures 7.2 Finished work is inspected to specification 7.3 Finished work is tested for function ability as per the Specifications
8. Maintain sheet metal machines, tools and equipment	8.1 Machines, tools and equipment cleaned as per the work place procedures 8.2 Machines and tools are inspected as per the work place procedures 8.3 Faults on machines and tools are identified and reported as per the workplace procedures 8.4 Machines and equipment are lubricated as per the manufacturers manual
9. Perform housekeeping	9.1 Work environment cleaned in accordance with work place procedures 9.2 Waste is segregated and disposed as per the work place environmental procedures 9.3 Tools and equipment are stored as per the workplace Procedures

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
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1. Sheet metal machine tools include but not limited to:	<ul style="list-style-type: none"> • Rolling Machine • Bending machine • Punching machine • Shearing machine
2. Drawing Standards includes but not limited to:	<ul style="list-style-type: none"> • ISO • BS • ANSI
3. Operation Plan includes but not limited to:	<ul style="list-style-type: none"> • Sequence of operations • Measuring tools • Hand tools • Cutting tools • Inspection tools
4. Drawing specifications includes but not limited to:	<ul style="list-style-type: none"> • Dimensions • Tolerances • Geometry • Surface finishing • Functionality • Visual inspection

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Technical drawing
- Sheet metal development
- Soldering
- Welding
- Seaming
- Riveting
- Bolting
- brazing
- Use of the Guillotine, bending and rolling machines
- Use of hand tools to cut, fold and form sheet metal
- Production of holes in sheet metal
- Measuring and marking out

Required Knowledge

The individual needs to demonstrate knowledge of:

- Occupational Health and Safety Act of Kenya laws 2007 with focus on personal safety, machine safety and workplace
- National Environment Management Authority Act, Kenya 2004
- OSH act
- Equipment manuals
- Technical drawing complying to ISO, ANSI & BS standards
- ISO 1101 Geometrical tolerance and where to use the norm
- Measuring tools
- Hand tools
- Sheet metal development
- Joining methods (bolts, screws, rivets, seams, soldering, brazing and welding)
- Cutting, bending, and rolling machines
- Drilling, and punching machines, drills and punches
- WIBA act (2007)
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the learner:</p> <ul style="list-style-type: none"> 1.1 Observed prescribed safety rules and procedures in sheet metal work as per the OSHA standards 1.2 Used sheet metal machine, tools and equipment as per manufacturers manual 1.3 Prepared operation Plan as per the working drawings 1.4 Sketched Pattern development layout as per the work specification 1.5 Marked dimensions on work piece as per the specifications 1.6 Selected machine, tools and equipment as per operation plan 1.7 Produced sheet metal work pieces as per operation plan 1.8 Joined sheet metal parts as per the specifications 1.9 Inspected finished work to specification 1.10 Cleaned machines, tools and equipment as per the work place procedures 1.11 Cleaned work environment in accordance with work place procedures
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2. Resource Implications	<p>Resources the same as that of workplace are advised to be applied.</p> <p>2.1 Cutting Machine 2.2 Rolling Machine 2.3 Bending machine 2.4 Punching machine 2.5 Drilling machine 2.6 Hand shearing machine 2.7 Hand tool and measuring instruments 2.8 Inspection tools 2.9 Gas welding set 2.10 Sheet metal materials 2.11 Resource materials, manuals for cutting tools and machine tools 2.12 Material safety data sheets 2.13 Occupational and safety act Kenya 2007</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Observation 3.2 Written Tests 3.3 Oral Questioning</p>
4. Context of Assessment	<p>Competency may be assessed:</p> <p>4.1 On the job 4.2 Off the job 4.3 During industrial attachment</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

PRODUCE COMPONENTS ON THE LATHE

UNIT CODE: ENG/OS/MLF/CR/02/4/B

UNIT DESCRIPTION

This unit specifies the competencies required to identify lathe machine parts accessories and their functions, prepare operation procedure sheet, mount work pieces, perform lathe machine operations, assess quality of finished work, organize work area and maintain machine tool and accessories and observe safety rules and regulations.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Observe safety rules and regulations	1.1 Prescribed personal safety gear is worn as per work place procedure. 1.2 Prescribed safety measures for the operation of hand tools and drilling machines adhered to as per rules and regulations 1.3 Prescribed safe work environment is observed as per rules and regulations 1.4 Prescribed workplace procedures are adhered to
2. Identify machine parts, tools, accessories and their functions	2.1 A lathe is defined as per the manufacturers manual 2.2 Types of lathe are identified as per the manufacturers manual 2.3 Parts of a lathe are identified according to manufactures manual 2.4 Functions of the parts of a lathe are defined as per manufacturers operation manual 2.5 Lathe <i>cutting tools</i> and accessories are identified as per manufacturers manual and work specifications

3. Prepare operation plan	3.1 Working drawing is read and <i>interpreted as per the technical drawing Standards</i> 3.2 <i>Operation plan</i> is prepared as per the standard operations procedure
4. Mount work piece	4.1 Work piece is mounted on the chuck or other accessories according to machining operation procedures 4.2 Work piece is supported by tail stock as per the SOPs 4.3 True running of the work piece is observed as per the work place procedures
5. Perform machining to specifications	5.1 Work piece machined to specified dimensions 5.2 Work piece machined to specified surface roughness
6. Assess quality of finished work	6.1 Inspection tools and methods selected as per operation plan 6.2 Finished work is inspected as per specifications 6.3 Adjustments are made according to inspection Results
7. Maintain machine tool and accessories	7.1 Machine and accessories are inspected as per the work places procedures 7.2 Faults on machines and accessories are identified according to standard operation procedures 7.3 Machine parts oiled and lubricated as per the manufacturer's manual
8. Perform house keeping	8.1 Tools, equipment and accessories are cleaned and stored as per the work organization policy. 8.2 Housekeeping is carried out as per the work place requirements 8.3 Waste is segregated and disposed as per the disposal guidelines

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1 Technical drawing Standards includes but not limited to;	<ul style="list-style-type: none"> • ISO • BS • ANSI

<p>2 Cutting tools and accessories includes but not limited to;</p>	<ul style="list-style-type: none"> • Knurling tools • Threading • Turning • Boring • Parting • Drilling bits • Lathe dog • Face plate • Lathe steadies and centers
<p>3 Specifications includes but not limited to;</p>	<ul style="list-style-type: none"> • Dimensions • Geometry • Surface finishing • Functionality • Sequence of operations
<p>4 Operation plan includes but not limited to;</p>	<ul style="list-style-type: none"> • Measuring tool • Cutting tool including cutting data • Production time • Speed and feed rate • Cutting angles

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Work piece material preparation
- Measuring and marking
- Technical drawing
- Work mounting
- Tool setting and tool grinding
- Use of lathe accessories and attachments
- Performing various lathe operations
- Inspecting finished work
- Maintaining machine tool
- Organizing work area

Required knowledge

The individual needs to demonstrate knowledge of:

- Occupational Health and Safety Act of Kenya laws 2007 with focus on personal safety, machine safety and workplace
- National Environment Management Authority Act, Kenya 2004
- OSH act
- Equipment manuals
- Technical drawing complying to ISO, ANSI & BS standards
- Geometrical tolerance
- Metal cutting processes using HM & HSS cutting tools
- Measuring tools
- Preventive maintenance
- Inspection and quality control
- Lathe operations
- Taper turning
- WIBA act
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	<p>Assessment requires evidence that the learner:</p> <ul style="list-style-type: none"> 1.1 observed safety as per work place procedures 1.2 Developed operation plan as per the specifications 1.3 Calculated speed and feed rate as per the specifications 1.4 Selected cutting tools, speed & feed rates as per the working drawing 1.5 Performed machining operations as per the work place procedures 1.6 Inspected finished product as per the specifications 1.7 Set up machine tools as per the work place procedures 1.8 Mounted work piece as per the work place procedures 1.9 Performed machine, tool and equipment maintenance as per the work place procedures
2. Resource Implications	<ul style="list-style-type: none"> 2.1 Lathe 2.2 Cutting tools 2.3 Measuring tools 2.4 Material 2.5 Resource materials, manuals for cutting tools & lathe 2.6 Work place procedures

3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral Questioning 3.3 Written Tests
4. Context of Assessment	Competency may be assessed: 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
5. Guidance information for assessment	Holistic assessment of other units relevant to the industry sector, workplace and job role is recommended.