

## PERFORM WORKSHOP PROCESSES AND PRACTICES

**UNIT CODE: ENG/OS/MC/CC/03/6/A**

### Unit description

This unit describes the competencies required by a mechatronic technician in order to apply a wide range of workshop processes and practice skills in their work. It involves use of different methods to produce work pieces using basic tools while observing occupational safety and health legislations, regulations and safe working practices, interpret working drawings, select appropriate techniques for a given task to achieve specified results, assemble of metal parts and sub-assemblies as well as perform housekeeping.

### ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b> These describe the key outcomes which make up workplace function	<b>PERFORMANCE CRITERIA</b> These are assessable statements which specify the required level of performance for each of the elements. <i><b>Bold and italicized terms are elaborated in the Range</b></i>
1. Use technical drawing to plan work operations	1.1 Technical drawings are produced <i>as per drawing standards</i> 1.2 Technical drawings and geometric symbols are read and interpreted as per drawing standards. 1.3 <i>Operation plan</i> is produced as per the technical drawings.
2. Measure and mark out dimensions on work pieces	2.1 Measuring tools suitable for the work are selected according to task description 2.2 Measuring tools are inspected and calibrated as per requirements 2.3 Dimensions are marked on the work piece as per the working drawing.
3. Use hand tools to cut and file parts	3.1 <i>Hand tools</i> are selected based on operation plan 3.2 Work piece is cut to specification based on job requirement 3.3 Work piece is filed to specification based on job requirement 3.4 Part are produced to <i>specifications</i> based on work requirement
4. Use drills to make holes	4.1 Hole centers are marked and center-punched as per operation plan.

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	<p>4.2 Drill bits are selected and mounted according to work requirements</p> <p>4.3 Work piece is mounted and clamped according to workshop regulations</p> <p>4.4 Hole is drilled to specification according to work requirements</p> <p>4.5 Holes inspected to specification according to work requirements</p>
<p>5. Thread using taps and dies</p>	<p>5.1 Taps and dies selected based on operation plan.</p> <p>5.2 Taps and dies are set up on the work piece according to work specifications</p> <p>5.3 Work piece is clamped according to work requirements</p> <p>5.4 <i><b>Threads</b></i> are cut according to work specifications</p>
<p>6. Produce components using a lathe and milling machine</p>	<p>6.1 Work piece is faced according to work specifications</p> <p>6.2 Work pieces are turned according to work requirements</p> <p>6.3 Work piece is threaded according to work requirements</p> <p>6.4 Work piece is drilled according to work requirements</p> <p>6.5 Work piece is bored according to work requirements</p> <p>6.6 Work piece is milled according to specified milling operation</p>
<p>7. Assemble metal parts and sub-assemblies</p>	<p>7.1 <i><b>Joining and assembly method</b></i> is selected according to work requirements</p> <p>7.2 Parts joined, fitted and assembled according to the specified assembly and joinery methods</p> <p>7.3 Final assembly is inspected as per specification</p>
<p>8. Perform surface finish</p>	<p>8.1 <i><b>Surface finishing method</b></i> is selected according to work requirements</p>

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	8.2 Surface finishing materials are selected according to work requirements 8.3 Work piece is surface finished according to work requirements
9. Perform housekeeping	9.1 Waste is segregated and disposed as per disposal guidelines. 9.2 Housekeeping is carried out as per workplace requirement 9.3 Tools and equipment are stored in accordance to manufacturer requirement
10. Inspect finished work for accuracy and quality	10.1 Inspection tools and methods are selected as per operation plan 10.2 Finished work is inspected as per specification 10.3 Adjustments are made based on inspections results
11. Maintenance of tools and equipment	11.1 Machines and tools are inspected in accordance to manufacturer specifications 11.2 Machines and tools are lubricated according to manufacturer manual 11.3 Tools are ground to manufacturer specification 11.4 Faults on machines and tools are identified and reported according to maintenance manual

### **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.

<b>VARIABLE</b>	<b>RANGE</b>
Measuring tools may include but is not limited to:	<ul style="list-style-type: none"> <li>• Steel rule</li> <li>• Vernier calliper</li> <li>• Micrometre screw gauge</li> </ul>

<b>VARIABLE</b>	<b>RANGE</b>
	<ul style="list-style-type: none"> <li>• Vernier height gauge</li> <li>• Combination set</li> <li>• Bevels</li> </ul>
Drawing Standards may include but is not limited to:	<ul style="list-style-type: none"> <li>• ISO</li> <li>• BS</li> <li>• ANSI</li> </ul>
Operation Plan may include but is not limited to:	<ul style="list-style-type: none"> <li>• Sequence of operations</li> <li>• Measuring tools</li> <li>• Hand tools</li> <li>• Cutting tools</li> <li>• Inspection tools</li> </ul>
Marking out tools may include but is not limited to:	<ul style="list-style-type: none"> <li>• Scribes</li> <li>• Dividers</li> <li>• Dot punch</li> <li>• Centre punch</li> <li>• Engineers square</li> <li>• Straight edge</li> <li>• Surface plate</li> </ul>
Work holding devices may include but is not limited to:	<ul style="list-style-type: none"> <li>• Bench vice</li> <li>• V-Block</li> <li>• Angle plate</li> <li>• G-clamp</li> <li>• Jigs and fixtures</li> <li>• Hand vice</li> </ul>
Hand tools may include but is not limited to:	<ul style="list-style-type: none"> <li>• Files</li> <li>• Saws</li> <li>• Hammers</li> <li>• Chisels</li> <li>• Taps and dies</li> </ul>
Threads may include but is not limited to:	<ul style="list-style-type: none"> <li>• Internal and external threads</li> <li>• V-profile threads</li> </ul>
Surface finishing methods may include but is not limited to:	<ul style="list-style-type: none"> <li>• Filing/deburring</li> <li>• Tumbling</li> <li>• Plating</li> <li>• Painting</li> </ul>
Joining and assembly	<ul style="list-style-type: none"> <li>• Riveting</li> </ul>

<b>VARIABLE</b>	<b>RANGE</b>
method may include but is not limited to:	<ul style="list-style-type: none"> <li>• Fastening</li> <li>• Soldering</li> <li>• Brazing</li> <li>• Welding</li> </ul>
Specifications may include but is not limited to:	<ul style="list-style-type: none"> <li>• Dimensions</li> <li>• Tolerances</li> <li>• Geometry</li> <li>• Surface finish</li> <li>• Functionality</li> </ul>

### **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
- Using measuring and inspection tools
- Using hand tools
- Using portable and bench drilling machines
- Soldering and brazing
- Riveting and fastening
- Use of the lathe machine
- Use of milling machine
- Using grinding machine

#### **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
- Lathe machine
- Grinding machine

- 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.

1. Critical Aspects of Competency	Assessment requires evidence that the learner: 1.1 Observed rules and procedures in the workshop 1.2 Interpreted technical drawing 1.3 Produced operation plan 1.4 Produced holes on a work piece 1.5 Threaded using taps and dies 1.6 Assembled metal parts 1.7 Surface finished work piece 1.8 Maintained tools and equipment 1.9 Did housekeeping before, during and after operations
2. Resource Implications	2.1 Hand measuring tools 2.2 Hand marking tools 2.3 Hand tools 2.4 Inspection tools and equipment 2.5 Hand drilling machine 2.6 Bench Drilling machine 2.7 Lathe machine 2.8 Grinding machine 2.9 Milling machines 2.10 Punching tools 2.11 Work benches
3. Methods of Assessment	Competency may be assessed through: 1.1 Observing the behaviour of the learner 1.2 Oral presentations 1.3 Inspection of written operation procedures 1.4 Inspection of finished product 1.5 Observing housekeeping of the work area and/or machine tool
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

for assessment	
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