

# OPERATE MECHATRONIC SYSTEMS

**UNIT CODE: ENG/OS/MC/CR/06/6/A**

## Unit description

This unit covers the competencies required to operate mechatronic systems. It involves observing occupational health and safety, interpreting installation manuals, installing mechatronic systems, integrating mechatronic systems, testing and commissioning mechatronic system and servicing and maintaining mechatronic system faults

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
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. <b><i>Bold and italicized terms are elaborated in the Range.</i></b>
1. Observe occupational health and safety	1.1 <b><i>Personal protective equipment</i></b> (PPE) are used according to OSHA 2007 1.2 <b><i>Tools and equipment</i></b> are stored and maintained correctly according to manufacturer's specifications 1.3 Tools and equipment are used correctly according to designated purpose 1.4 Workspace housekeeping is maintained according to Standard operating procedures (SOPs) 1.5 Workplace is planned according to design specifications.
2. Interpret installation manuals	2.1 <b><i>Installation manuals</i></b> are obtained from the user according to equipment specifications 2.2 Manuals are studied and analysed according to the components functionality 2.3 Manuals are stored for future use and references
3. Install mechatronic systems	3.1 <b><i>Mechatronic systems</i></b> components are identified according to the installation manuals and user specifications 3.2 Components are inspected according to the prescribed systems specifications 3.3 <b><i>Tools and equipment</i></b> are selected according to the installation manuals 3.4 Mechatronic system components are assembled together according to installation manuals 3.5 Mechatronic systems are connected to the required power supply according the component power specifications and manuals

	<p>3.6 Control systems are interfaced to the system according to user specifications and installation manuals</p> <p>3.7 System programming is done according to functionality of the system</p> <p>3.8 Program is uploaded to the mechatronic system according to prescribed functionality</p> <p>3.9 Inspection of the assembled system is done as per installation manuals and system functionality</p> <p>3.10 Assembled components are tested according to the system specifications</p> <p>3.11 Documentation is done according to the obtained end results</p> <p>3.12 Program is debugged and tested according to the system functionality</p> <p>3.13 Mechatronic system is operationalized according to the user specification</p>
<p>4. Integrate mechatronic systems</p>	<p>4.1 Manuals for the existing system are obtained from the user</p> <p>4.2 Safety and precaution measures are observed according OSHA</p> <p>4.3 Existing system is studied and analysed according to its prescribed functionality</p> <p>4.4 Appropriate tools and equipment are selected according to the installation manuals</p> <p>4.5 Existing and the new system are tested for compatibility according to the user specification</p> <p>4.6 New system and the existing system are interfaced together according to the user specification and system functionality</p> <p>4.7 Interfaced system is calibrated according to the system functionality</p> <p>4.8 Documentation of the results is done for future reference</p>
<p>5. Test and Commission mechatronic system</p>	<p>5.1 Interfaced system is tested for functionality according to system specifications</p> <p>5.2 Monitoring, evaluation and assessment of the system performance is done according to the system functionality</p> <p>5.3 System commissioning is done according to the prescribed user specifications</p>

<p>6. Service and maintain mechatronic system faults</p>	<p>6.1 Safety and precaution measures are observed according OSHA.</p> <p>6.2 Installation manuals are obtained from the user and analysed for functionality of the system</p> <p>6.3 Tools and equipment are obtained according the manual specifications</p> <p>6.4 System testing is done for comparison with the manufacturer’s specifications and system functionality.</p> <p>6.5 Fault diagnosis is done according to service manuals instructions</p> <p>6.6 Faulty units removed and replaced with new ones considering their compatibility with the system</p> <p>6.7 System is tested against the required specifications</p> <p>6.8 Documentation is done for future use according to user specifications</p>
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**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
Tools and equipment may include but is not limited to:	<ul style="list-style-type: none"> <li>• Hand tools</li> <li>• Power tools</li> <li>• Machines</li> </ul>
Mechatronic systems may include but is not limited to:	<ul style="list-style-type: none"> <li>• Robots</li> <li>• Pneumatics systems</li> <li>• Hydraulic systems</li> <li>• Generators</li> <li>• Safety equipment</li> </ul>
Installation manuals may include but is not limited to:	<ul style="list-style-type: none"> <li>• Electrical and electronic components manuals</li> <li>• Mechanical components manuals</li> <li>• Pneumatics manuals</li> <li>• Hydraulic manuals</li> <li>• Programming manuals</li> <li>• Servicing and troubleshooting manuals</li> </ul>

**REQUIRED KNOWLEDGE**

*The individual needs to demonstrate knowledge of:*

- Electrical circuit design
- Mechanical structural design

- Computer Aided Design
- Mechatronic programming
- Technical report writing
- Data analysis and interpretation
- Interpretation of technical drawings
- Documentation
- Types of tools and equipment
- Properties of materials
- Electrical and mechanical machine drives
- Testing and inspection
- Sensors and transducers
- Robotics and automated processes
- Hydraulics and pneumatics systems
- Service and maintenance of mechatronics processes
- Control and instrumentation
- Interfacing of mechatronics components
- Integration of mechatronics components

## REQUIRED SKILLS

*The individual needs to demonstrate skills in:*

- Communication skills
- Problem solving
- Creativity and innovation
- Data collection and analysis
- Use of tools and equipment
- Technical presentation
- Technical drawing
- Installation and fabrication
- Interpretation of installation manuals
- Integration of robotics and automated processes
- Service and maintenance

## EVIDENCE GUIDE

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

1 Critical Aspects of Competency.	1.1 Observed occupational health and safety 1.2 Interpreted installation manuals 1.3 Installed mechatronic systems 1.4 Integrated mechatronic systems 1.5 Tested and Commissioned mechatronic system 1.6 Serviced and maintained mechatronic system faults
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2 Resource Implications.	<ul style="list-style-type: none"> <li>2.1 Computers</li> <li>2.2 Software</li> <li>2.3 Projectors</li> <li>2.4 Markers</li> <li>2.5 Whiteboards</li> <li>2.6 Tools and equipment</li> <li>2.7 Whiteboard markers</li> </ul>
3 Methods of Assessment.	<p><b><i>Competency may be assessed through:</i></b></p> <ul style="list-style-type: none"> <li>3.1 Practical</li> <li>3.2 Observation</li> <li>3.3 Questionnaire</li> <li>3.4 Case studies</li> <li>3.5 Written examinations</li> <li>3.6 Oral presentation</li> </ul>
4 Context of Assessment.	4.1 Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions.
5 Guidance information for assessment.	5.1 This unit may be assessed on an integrated basis with others within this occupational sector.

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