



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MEM23072A Select and apply mechatronic engineering methods, processes and construction techniques**

Release: 1

## MEM23072A Select and apply mechatronic engineering methods, processes and construction techniques

### Modification History

Not Applicable

### Unit Descriptor

<b>Unit descriptor</b>	This unit covers the competences required to select appropriate methods, processes&construction techniques within mechatronic, maintenance, instrumentation and control engineering.
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### Application of the Unit

<b>Application of the unit</b>	Applications of this unit include identifying the range of mechatronic, maintenance, instrumentation and control engineering methods and processes required for mechatronic engineering applications; identifying sources of information on methods and processes; selecting methods and processes; specifying or implementing methods and processes for applications This unit only has application in qualifications that are not points based.  <b>Band: 0</b> <b>Unit Weight: 0</b>
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### Licensing/Regulatory Information

Not Applicable

### Pre-Requisites

<b>Prerequisite units</b>	

<b>Prerequisite units</b>		

## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1. Research and categorise methods, processes and construction techniques for engineering applications</p>	<p>1.1. Research and categorise methods, processes and construction techniques for mechatronic and maintenance engineering applications. Information sources to include equipment suppliers' printed data and websites.</p> <p>1.2. Identify methods, processes &amp; construction techniques to suit continuous production, mass, batch or jobbing shop production, prototype applications. Identify applications suitable for sequential or work cell manufacture or assembly.</p> <p>1.3. Identify manufacturing requirements of TQM, JIT and Competitive (lean manufacturing) environments.</p>
<p>2. Evaluate and select appropriate methods, processes &amp; construction techniques for particular mechanical engineering applications</p>	<p>2.1. Appropriate scientific principles have been considered or applied to enable methods, processes &amp; construction techniques choices.</p> <p>2.2. Appropriate materials properties knowledge has been provided for in methods, processes &amp; construction techniques choices.</p> <p>2.3. Appropriate materials handling procedures are implemented including compliance with OHS&amp;E requirements, legislative and regulatory requirements.</p> <p>2.4. Appropriate calculations and assumptions have been used to enable methods, processes &amp; construction techniques choices.</p> <p>2.5. Appropriate waste and pollution treatment and recycling techniques and policies have been applied to applications.</p> <p>2.6. Suitability of application to continuous production, mass, batch or jobbing shop production, prototyping sequential or work cell manufacture or assembly has been appropriately considered in choice of methods, processes and construction techniques.</p> <p>2.7. Manufacturing requirements of TQM, JIT and Competitive (lean manufacturing) environments have been researched and evaluated for a range of applications.</p> <p>2.8. Measurement and test methods for particular product or process outputs have been evaluated and selected.</p>
<p>3. Specify and implement methods, processes &amp; construction techniques for</p>	<p>3.1. Appropriate methods, processes &amp; construction techniques for particular applications have been specified and implemented.</p>

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
mechanical and manufacturing engineering applications	

ELEMENT	PERFORMANCE CRITERIA
4. Apply basic workshop knowledge and skills relevant to mechanical and manufacturing engineering applications	4.1. Identify the range and applications of basic workshop skills. 4.2. Relevant basic workshop skills can be demonstrated. 4.3. Appropriate basic workshop skills have been applied to particular engineering applications.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

#### Required skills

Look for evidence that confirms skills in:

- applying research and categorising methods, processes and construction techniques for engineering applications.
- using equipment suppliers' printed data and websites
- applications for methods, processes and construction techniques
- documenting applications suitable for continuous, mass, batch or jobbing shop production, work cell or sequential manufacture and assembly
- documenting applications suitable for a range of materials handling techniques
- researching and documenting manufacturing requirements of TQM, JIT and Competitive (lean manufacturing) environments
- selecting scientific principles in the choice of methods, processes and construction techniques
- identifying materials properties in the choice of methods, processes and construction techniques
- using appropriate materials handling techniques
- handling and storing materials and products in accordance with regulations, standard procedures and MSDS specifications
- applying waste and pollution treatment and recycling techniques and policies applications to meet code and regulatory requirements.
- selecting g methods, processes and construction techniques consistent with continuous, mass, batch, jobbing, prototype, sequential or cellular production process requirements.
- manufacturing requirements of TQM, JIT and competitive (lean manufacturing) environments
- evaluating measurement and test methods for product or process output

## REQUIRED SKILLS AND KNOWLEDGE

- specifying and implementing methods, processes and construction techniques in an efficient and optimal manner for manufacturing requirements
- applying workshop skills for a range of applications
- applying occupational health and safety practices
- selecting appropriate workshop skills for particular engineering applications

### Required knowledge

Look for evidence that confirms knowledge of:

- methods and results of research and categorising of methods, processes and construction techniques for engineering applications.
- Methods of accessing and using alternative information sources
- applications for methods, processes & construction techniques
- applications suitable for continuous, mass, batch or jobbing shop production, work cell or sequential manufacture and assembly
- applications suitable for range of materials handling techniques
- manufacturing requirements of TQM, JIT and Competitive (lean manufacturing) environments
- the reasons for considering or using particular scientific principles
- the provision for particular materials properties in the choice of methods, processes and construction techniques
- the use of particular materials handling procedures . The reasons for compliance with regulations, standard procedures and MSDS specifications
- the reasons for using particular calculations and assumptions
- effects of waste and pollution from the application on the environment
- options for treatment and recycling as well as future developments that might be incorporated at a later date
- the suitability of application to particular continuous, mass, batch, jobbing shop, sequential or cellular manufacture and assembly
- manufacturing requirements of TQM, JIT and competitive (lean manufacturing) environments
- measurement and test methods for product or process output
- specification and implementation process for methods, processes and construction techniques in particular applications in the context of manufacturing requirements
- manufacturing requirements include volume considerations, TQM, JIT, competitive (lean) manufacturing
- applications for particular basic workshop skills
- procedures used in the application of skills
- OH&S procedures for basic workshop skills

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<b>Overview of assessment</b>	<p>A person who demonstrates competency in this unit must be able to apply calculus in engineering situations.</p>
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p>
<b>Context of and specific resources for assessment</b>	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying calculus in engineering situations or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
<b>Method of assessment</b>	<p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>
<b>Guidance information for assessment</b>	



## Range Statement

<b>RANGE STATEMENT</b>	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<b>Mechatronic engineering</b>	<p>Mechatronics is usually defined as the integration of mechanical, electronics, programming, electrical and fluid power in an engineering product. The skills and underpinning knowledge of Mechatronics are common with general automation of processes, systems and services. The definition of Mechatronics is here broadened to include general automation.</p>
<b>Maintenance engineering</b>	<p>The engineering discipline concerned with the conceptual development, research, design, and implementation of maintenance systems for product manufacture, processes, systems or services for converting energy into power and motion, materials into product and components into machines and systems for domestic, commercial, industrial, civil, entertainment, medical or military applications. Product manufacturing, processes, systems or services may be automated.</p>
<b>Total Quality Management (TQM)</b>	<p>A customer driven amalgamation of quality assurance, quality control and quality improvement.</p> <p>Tools of TQM include flow charts, pareto, ishikawa (cause&amp;effect), process capability analysis, sampling and control charting, run charts, correlation analysis.</p>
<b>JIT</b>	<p>Just In Time is a system of ordering, manufacturing and supply of raw material, component parts and product at the point in time required by the process system or service. The objective is to minimize buffer stocks and</p>

<b>RANGE STATEMENT</b>	
	inventory and the associated costs of buffer stocks and inventory.
<b>Competitive (lean) manufacturing principles and techniques</b>	An integrated approach to manufacturing aimed at competing for market share by maximizing efficiency and minimizing cost by comparison with alternative manufacturers. Techniques used include sequential and cellular manufacture and assembly with multi-skilling of work-teams, work-place improvement (incl. Kaizen, a gradual and continual improvement to products, processes, systems and services.), Total Quality Management including use of TQM tools, Just In Time (JIT), quick change-over, process and productivity improvement, cost reduction, supply and demand chain management, quality optimisation, design for reliability, optimum maintenance, computer managed maintenance.
<b>Information sources</b>	Includes reference texts, manufacturer's catalogues and industrial magazines, websites, use of phone, email and fax information gathering.

**Unit Sector(s)**

<b>Unit sector</b>	
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**Co-requisite units**

<b>Co-requisite units</b>	

## Competency field

Competency field	Engineering science
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