Australian Government

Department of Education, Employment and Workplace Relations

MEM23092A Apply automated systems principles and techniques in engineering situations

Release: 1

MEM23092A Apply automated systems principles and techniques in engineering situations

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers applying scientific principles and techniques to automated systems.

Application of the Unit

| Application of the unit | This unit applies to selecting and applying automated systems principles and techniques. It includes identifying characteristics of automated systems and related principles and techniques, selecting principles and techniques for particular automated systems, applying principles and techniques to automated systems, quoting results. This unit only has application in qualifications that are not points based.

Band: **0** **Unit Weight**: **0** |
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM23041A	Apply basic scientific principles and techniques in mechanical engineering situations
	MEM23051A	Apply basic electro and control scientific principles and techniques

Prerequisite units		
		in mechanical and manufacturing engineering situations

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify the range of principles and techniques relevant to automated systems	1.1. Research and report on automated systems engineering techniques using appropriate sources of information. 1.2. The techniques and associated technologies, software and hardware associated with implementing scientific principles relating to automated systems applications. Research and report on using appropriate sources of information.
2. Select principles and techniques relevant to automated systems applications	2.1. For particular automated systems situations the relevant principles can be selected. 2.2. For particular automated systems situations, the relevant techniques and associated technologies, software and hardware can be selected.
3. Apply the relevant automated systems principles and techniques appropriately	3.1. The principles are applied in a consistent and appropriate manner to obtain any required solution. 3.2. Appropriate calculations and correct units are used to establish quantities. Coherent units are used in equations in a systematic manner to ensure meaningful solutions. 3.3. Significant figures are used in engineering calculations. 3.4. The techniques and associated technologies, software and hardware are applied in a consistent and appropriate manner to obtain required solutions.
4. Quote the results of the application of automated systems principles and techniques correctly	4.1. For applications involving engineering calculations the solution is quoted in an appropriate style. 4.2. For applications not involving engineering calculations the solution is quoted in an appropriate style.

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 automated systems principles relevant to engineering

REQUIRED SKILLS AND KNOWLEDGE

- analysing the given situation to determine what is required in the manner of a solution
- analysing the given situation to determine which automated systems principles are selected
- selecting appropriate automated systems techniques and associated technologies, software and hardware to suit the application/s
- applying appropriate automated systems principles in determining the required solution
- applying and manipulating formulas and calculations for engineering applications
- using the correct units to solve engineering calculations
- checking the validity of equations using a systematic method for ensuring coherent units
- applying automated systems techniques and associated technologies, software and hardware in a manner appropriate to the application and identified scientific principles
- referring solutions to the original aim of the application
- quoting solutions in appropriate units and using appropriate significant figures
- presenting solutions referring to the original aim of the application

Required knowledge

Look for evidence that confirms knowledge of:

- automated systems techniques and related technologies, software and hardware associated with implementing scientific principles in engineering solutions and related to appropriate engineering applications
- the limitations of automated systems techniques and associated technologies, software and hardware
- the relevance of scientific principles to automated systems engineering
- the applicability and limitations of an extensive range of automated systems techniques and associated technologies, software and hardware
- the choice of automated systems scientific principles for particular applications
- the applicability of particular automated systems techniques and associated technologies, software and hardware to specific applications
- the choice of automated systems techniques and associated technologies, software and hardware for particular applications
- the method of application of the scientific principles
- fundamental and derived quantities and explained
- common systems of units
- the procedure for converting between systems of units
- common prefixes used with units and their values
- the procedure for ensuring coherent units for meaningful solutions to equations
- the concept of significant figures
- the uncertainty of computations based on experimental data

REQUIRED SKILLS AND KNOWLEDGE

- the procedures for determining the significance of figures in calculations
- the procedures for estimating errors in derived quantities
- the method of application of the automated systems techniques and associated technologies, software and hardware
- the significance of the calculation solution style in relation to the original task
- the significance of the non calculation solution style in relation to the original task

Evidence Guide

EVIDENCE GUIDE	
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.	
Overview of assessment	A person who demonstrates competency in this unit must be able to apply automated systems principles and techniques in engineering situations. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	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.
Context of and specific resources for assessment	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. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying automated systems principles and techniques in engineering situations or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	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,

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EVIDENCE GUIDE	
	standards, manuals and reference materials.

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EVIDENCE GUIDE	
Guidance information for assessment	

Range Statement

RANGE STATEMENT	
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.	
Automated systems	• The engineering discipline concerned with the conceptual development, research, design, manufacture and/or implementation and/or installation, commissioning and maintenance of automated 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. • Automated systems may incorporate mechanical, electronics, programming, electrical and fluid power elements in a system designed to achieve a desired output in response to a variety of inputs, disturbances and variables. The principles and techniques underpinning mechatronics are largely common with those underpinning automated systems. Mechatronics is usually confined to automation associated with a product.
Automated systems engineering techniques	Automated systems engineering techniques includes the use of system analysis, mechanical and electro, programming and software skills for design, installation, commissioning, troubleshooting and maintenance of systems, processes and services. Automated systems technique may be enhanced by the development of basic capabilities with hand and power tools,

RANGE STATEMENT	
	experience of processes and materials properties.
Automated systems applications	• In general, principles and techniques for automated systems will include mechanical, structural, hydraulic, pneumatic, fluid pumping, electrical and electronic control principles and techniques. The control systems will typically include sensory elements such as position, level, pressure, temperature, flowrate, pH sensors, computer, PLC or dedicated microprocessor control together with appropriate signal conditioning and actuator interfacing. Emergency stop and failsafe design should be incorporated as required. Communications may be hard-wired, telemetric, radio or phone linked. • The principles and techniques for automated systems have much in common with those for mechatronics. Where mechatronics focuses on a product, automated systems focuses on processes, systems and services automation
Sources of information	Includes reference texts, manufacturer's catalogues and industrial magazines, websites, use of phone, email and fax information gathering.

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Engineering science