



Australian Government

MEM14090 Integrate mechatronic fundamentals into an engineering task

Release: 1

MEM14090 Integrate mechatronic fundamentals into an engineering task

Modification History

Release 1. Supersedes and is equivalent to MEM14090A Integrate mechatronic fundamentals into an engineering task.

Application

This unit defines the skills and knowledge required to identify, apply and integrate mechatronic fundamentals to achieve an engineering or related task and includes identifying task parameters, personal and team functions, chain of responsibility and work health and safety (WHS) guidelines. It is suitable for people working as mechatronic or automation technicians and draftspersons and those pursuing careers and qualifications in mechatronic engineering.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23111 Select electrical equipment and components for engineering applications

MEM23112 Investigate electrical and electronic controllers in engineering applications

Competency Field

Planning

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Investigate scope of engineering task	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with WHS requirements at all times 1.3 Identify mechatronic and related fundamentals to be integrated into engineering task 1.4 Identify stakeholders to be consulted 1.5 Review functions and features of programmable machines,

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	controllers, devices and automated systems requiring mechatronics 1.6 Review software techniques required for task analysis and graphics
2. Integrate mechatronic fundamentals	2.1 Use systems thinking to address contingencies and constraints, problem-solving and decision-making, and continuous improvement to achieve integration task 2.2 Integrate mechatronic fundamentals to achieve task objectives 2.3 Identify and seek required technical and professional assistance or clarification of design information
3. Report results	3.1 Record results of investigation, evaluation and integration 3.2 Provide supporting documentation that includes accurate and comprehensive details about mechatronic fundamentals used

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Appropriate licensed technical and professional assistance includes one or more of the following:	- technical support and advice relating to elements which have intrinsic dangers - professional support for technologies.
WHS, regulatory requirements and enterprise procedures include:	- WHS acts, regulations and relevant standards - codes of practice from Australian and overseas engineering and technical associations and societies - risk assessments - registration requirements

	• safe work practices • state and territory regulatory requirements applying to electrical work.
Continuous improvement implementation includes one or more of the following:	• balanced scorecard • current and future state mapping • measuring performance against benchmarks • process improvement, problem-solving and decision-making • data management, generation, recording, analysing, storing and use of software • training for improvement systems participation • technical training.
Constraints and contingencies include:	• financial • organisation procedural or culture • physical constraints including limits to resources, limits to site access or logistical limitations.
Sustainability includes:	• meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer.
Results to be reported and supporting documentation include one or more of the following:	• investigations • evaluation and integration • calculations • diagrams • programs • files.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM14090A Integrate mechatronic fundamentals into an engineering task.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM14090 Integrate mechatronic fundamentals into an engineering task

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- communicating, cooperating and negotiating with stakeholders to achieve integration task
- determining task parameters and context and work health and safety (WHS) regulatory and risk management requirements
- identifying and investigating required mechatronic fundamentals
- evaluating task requirements, principles, techniques, typical applications and software
- selecting and using software and graphics for required analysis and graphics
- planning the task
- integrating mechatronic fundamentals to achieve task objectives on at least two occasions
- reviewing sustainability implications, functions and features for the engineering task
- reporting and documenting results on at least two occasions.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures
- WHS and regulatory requirements, codes of practice, and risk minimisation and registration requirements
- programmable machines, controllers and mechatronic devices
- automated systems
- mechatronic fundamentals, includes:
 - mathematics
 - material properties
 - mechanics
 - electrical and electronic fundamentals

- fundamentals of controller programming, interfacing and signal conditioning, and which depending on the application also include the following:
 - chemistry
 - light, sound and electromagnetic effects
 - thermodynamics and heating, ventilation and air conditioning
 - fluid mechanics
 - fluid power
 - supervisory control and data acquisition systems (SCADA) and distributed control systems (DCS)
 - computing
 - graphics, including computer-aided design (CAD) and drafting systems
- sources of professional and technical assistance
- methods and processes for shaping, cutting, joining and coating of metal and other materials
- functions and features of machines, controllers and mechatronic devices and automated systems
- current options and trends in software including circuit and system layout and simulation
- continuous improvement processes and procedures
- constraints on the integration of mechatronic fundamentals into an engineering task
- sustainability considerations
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Assessment Conditions

- Assessors must:
 - have vocational competency in integrating mechatronic fundamentals into an engineering task at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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