



Australian Government

MEM234002 Integrate engineering technologies

Release: 1

MEM234002 Integrate engineering technologies

Modification History

Release 1. Supersedes and is equivalent to MEM234002A Integrate engineering technologies.

Application

This unit of competency defines the skills and knowledge required to integrate technologies, processes, components or equipment for engineering projects or operations. Apart from engineering considerations, the unit encompasses sustainability, work health and safety (WHS) and regulatory requirements and implications of the project.

This unit applies to individuals working as a Principal Technical Officer or in an equivalent engineering-related position who are required to integrate different technologies, processes, components or equipment.

Individuals completing this work either already have or are developing skills and experience in the application of scientific principles, mathematics, materials, manufacturing processes, computer software for computer-aided design (CAD), system analysis, modelling and simulation, project work and risk management, and experience in the technologies to be integrated.

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

Pre-requisite Unit

Nil

Competency Field

Engineering science

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. Clarify the scope of the integration design task and elaborate the specification	1.1 Identify processes, machine, equipment, components and technologies covered by the integration task 1.2 Determine other parameters to the integration task 1.3 Determine stakeholders to be consulted 1.4 Determine if and when input and advice should be obtained from

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	experts in other technical fields and disciplines 1.5 Assess WHS, regulatory, sustainability or environmental issues relevant to the integration task 1.6 Confirm brief, including budget and schedule, and provide preliminary advice on feasibility
2. Prepare integration analysis and concept proposal for designs or operational changes	2.1 Carry out initial investigations into technologies and equipment to be integrated 2.2 Identify any existing or predesigned integration 2.3 Determine any special features of machines, equipment or processes that need to be considered 2.4 Carry out required analysis, modelling and calculations using appropriate software and validation techniques 2.5 Obtain design or advice from experts in other technical fields and disciplines 2.6 Generate integration solutions that respond to the brief 2.7 Check feasibility and evaluate solutions against design criteria, project brief or operating specifications, ensuring conformity to technical, economic and WHS requirements 2.8 Determine social and sustainability implications of solutions 2.9 Present integration concept proposals to client or supervisors
3. Finalise integration strategy	3.1 Evaluate concept proposals with client and select preferred solution 3.2 Finalise selected integration strategy, including design elements or modifications and implementation strategy, ensuring preparation of all required documentation, drawings, specifications and instructions 3.3 Consult with client and stakeholders to obtain sign-off on integration strategy and documentation
4. Implement integrated engineering technologies strategy	4.1 Monitor and support prototyping or testing of machine, process or technology using selected integrated engineering strategy 4.2 Analyse performance against strategy and internal or external client specifications 4.3 Adjust strategy as required based on performance analysis 4.4 Obtain sign-off and oversight production of adjusted documentation, drawings, specifications and instructions 4.5 Communicate and negotiate with stakeholders to address issues

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	associated with design and resources adjustments 4.6 Ensure design and implementation documentation and records are maintained in accordance with organisational requirements

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.

Integration tasks include:	- the application of engineering skill and knowledge across engineering technologies and systems - partial or full design of the integration - integration across one or more processes, machines and sets of equipment - integration of mechanical, fluid power and electrical systems with control technologies, structural support, and other engineering-related systems as found in automated applications.
Parameters of the integration brief include:	- technology and process limits - capital and design budgets - product cost limits and budgets - anticipated post-integration performance specifications - equipment availability, capacities and restrictions - specified administrative, communication and approval procedures - other special features and limits in the integration brief.
Stakeholders include:	- clients - financier - project or operations team - support services including accounts and legal professionals, technical experts, suppliers and transporters

	those responsible for implementation plan activities including installation, commissioning and process improvement.
WHS, regulatory, sustainability and environmental issues include:	- WHS acts, regulations and relevant standards - industry codes of practice - risk assessments - registration requirements - safe work practices - state and territory regulatory requirements.
Software and validation techniques include:	- the use of failure effects analysis (FEA) and numerical methods within object-oriented modelling techniques - comparison of traditional solutions for simple design problems with software solutions to the same design problems - review of previously implemented design challenges which were completed using the software.
Sustainability includes:	- resources and energy: - sources, access, processing and consumption - food security and agriculture, health, education and shelter - land, energy and water - social and economic factors affecting design of machines and equipment - ecological and resources implications of activities - life cycle design of product (manufacture to re-manufacture or recycle) - raw material, solids and hazardous waste, and production by-products - contamination of land, air and stormwater pollutants, and discharge to sewerage - climate change.
Monitor and support the implementation includes:	- provision of assistance with hardware procurement and system assembly and arrangements to suit design - assisting installation and commissioning - provision of advice on adjustments, revisions and required documentation.
Systems thinking includes:	- process of developing solutions within the context of an entire system - recognising that an improvement in one subsystem can adversely affect another subsystem.
Planning and scheduling techniques include	- critical path or Pert network plans - Gantt charts.

Unit Mapping Information

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Links

Companion Volume Implementation Guides are available on VETNet -

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

Assessment Requirements for MEM234002 Integrate engineering technologies

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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:

- determining the scope and parameters of the integration task
- communicating and negotiating with client and stakeholders
- generating solutions in response to the brief, including the technical requirements of an implementation plan, using systems thinking, innovation and creativity
- applying design standards, performance analysis, modelling and simulation software
- validating software
- evaluating solutions for feasibility against brief criteria on at least two occasions
- developing and optimising the chosen solution and technical implementation plan and schedule on at least two occasions
- preparing proposals on at least two occasions, including the implementation plan, resource requirements, documents, specifications, graphics and instructions
- monitoring and supporting implementation
- commissioning the project or operation.

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:

- integration tasks and parameters
- design, implementation, commissioning and troubleshooting processes
- stakeholders in the integration task
- technology requirements for integration task
- holistic engineering principles including systems thinking, design, research and investigation methods
- modelling and calculation techniques
- current options and trends in design, performance analysis, and modelling and simulation software
- software validation techniques
- design and implementation criteria

- critical activities and resources as input to the planning process
- planning and scheduling techniques
- requirements for sign-off
- documentation, drawings, specifications and instructions required
- sustainability considerations
- WHS and regulatory requirements, codes of practice, standards and registration requirements.

Assessment Conditions

- Assessors must:
 - have vocational competency in integrating engineering technologies 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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