



**Australian Government**

# **Assessment Requirements for MEM234014**

## **Design a robotic system**

**Release: 1**

# Assessment Requirements for MEM234014 Design a robotic system

## Modification History

Release 1. Supersedes and is equivalent to MEM234014A Design a robotic system.

## 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:

- consulting and negotiating throughout the design process
- establishing required features of the robotic system
- confirming parameters of the brief or contract and providing initial advice based on discipline knowledge, standards, work health and safety (WHS), regulatory and risk assessment requirements
- researching sustainability and current and emerging trends in applications of robots and robot functions, programming options and reverse engineering
- investigating and reviewing robotic concept proposals and performance parameters and options
- investigating faults in existing designs and proposing solutions
- measuring, modelling and calculating using appropriate techniques, software and validation techniques
- applying innovation and creativity to generate solutions
- evaluating solutions against design criteria, ensuring conformity to WHS requirements
- preparing robotic system proposal
- designing a robotic system on at least two occasions
- communicating, negotiating and reviewing with stakeholders and client throughout the process to obtain agreement on proposal and sign-off on design
- documenting design with required drawings, specifications and instructions.

*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:

- contemporary engineering for robot and robotic application design methods
- design brief parameters
- robotic fundamentals including:
  - mechanical

- electrical
- fluid
- electronic and information technologies
- sensors and transducers
- controllers
- interfacing and signal conditioning
- networking
- software
- data sharing
- control functions
- techniques for:
  - continuous improvement
  - problem-solving and decision-making
  - root cause analysis (RCA) or failure mode and effects analysis (FMEA) or design review based on failure mode (DRBFM), and Pareto analysis
- WHS and regulatory requirements, codes of practice, standards, risk management and registration requirements
- processes for:
  - investigation
  - developing options
  - modelling and calculating
  - generating solutions
  - completing feasibility and evaluation studies
  - preparing proposals
  - designing
- software modelling techniques to analyse robot capability including motions, loads, accuracy, precision and repeatability, kinematics, kinetics and dynamic stability
- validation techniques including use of simple case traditional methods and calculations:
  - robot drive systems
  - manipulators and end effector options
- fundamentals of locomotion for mobile robots including wheels, legs, combined leg and wheels and tracks:
  - object detection and sensor options
- program techniques for robot functions including:
  - pick and place
  - proximity detection (presence and distance)
  - motion control algorithms
- supervisory control and data acquisition (SCADA) or distributed control systems (DCS), communications methods and protocols, and networking requirements
- programs and programming techniques for robot functions, communications and networking as required by design

- documentation, drawings, specifications, programs and instructions.

## Assessment Conditions

- Assessors must:
  - have vocational competency in designing a robotic system 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 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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## Links

Companion Volume Implementation Guides are available on VETNet -  
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>