



Australian Government

MEM14088 Apply maintenance engineering techniques to equipment and component repairs and modifications

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM14088A Apply maintenance engineering techniques to equipment and component repairs and modifications.

Application

This unit of competency defines the skills and knowledge required to apply maintenance engineering and design techniques to determine the repair, modification or replacement requirements of mechanical, fluid and electrical plant, and facilities. It is suitable for people working at a technician level in maintenance-related design drafting or in maintenance-related supervision or management and applies across all engineering disciplines. It should be selected in conjunction with appropriate technical units for the equipment or components being considered for maintenance and includes reviewing condition analysis and non-destructive test (NDT) reports.

The conduct of condition analysis and NDT tests is covered by the relevant specialist technical units.

Where an organisation or whole of plant maintenance management system is being reviewed or considered for change unit MEM23125 Evaluate maintenance systems should be selected.

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

Pre-requisite Unit

MEM14092 Integrate maintenance fundamentals into an engineering task

MEM23004 Apply technical mathematics

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. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify job requirements from specifications
2. Investigate requirements of maintenance tasks	2.1 Determine the context and parameters of the maintenance task in consultation with stakeholders 2.2 Establish equipment or component original design and any subsequent modifications and repairs 2.3 Obtain current performance specifications 2.4 Determine engineering scientific principles and design techniques required for equipment or component maintenance
3. Investigate alternatives of repair, replacement or modification	3.1 Analyse equipment or component condition analysis reports, including the results of any required NDT 3.2 Review maintenance repair techniques and processes, standard parts, labour and skill requirements 3.3 Determine life cycle design and sustainability implications of maintenance design and maintenance activities 3.4 Determine specification, documentation and graphical techniques required to define designs 3.5 Confirm WHS and regulatory requirements, codes of practice, standards, risk management and registration requirements relevant to repair and modification design projects 3.6 Assess the need for technical and professional assistance 3.7 Determine software requirements for repair and modification design 3.8 Decide if repair, replacement or modification is appropriate and seek any necessary approvals
4. Apply repair and modification design techniques	4.1 Plan, schedule and coordinate the repair or modification design task 4.2 Apply the design process and scientific principles to repair and modification design proposals 4.3 Determine materials, components, maintenance processes, equipment and tools required to implement design 4.4 Create adequate and accurate calculations, preliminary graphics and maintain design process records using appropriate software 4.5 Assess repair and modification designs against design criteria 4.6 Apply systems thinking to problem-solving and decision-making

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	techniques in dealing with contingencies and constraints for continuous improvement and development of design options 4.7 Incorporate required professional and technical assistance 4.8 Apply agreed techniques to define repair or modification
5. Report results	5.1 Record results of investigations, application and development of repair and modification design 5.2 Provide supporting documentation that includes accurate and comprehensive details about techniques 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.

Specifications include one or more of the following:	• drawings • job sheets • work instructions.
Maintenance repair and modification requirements include one or more of the following:	• scheduled maintenance required under the maintenance management system • unscheduled maintenance as a result of system or component failure • repairs to restore systems or components to operation • modifications to improve system or component reliability or maintainability • maintenance schedule change or equipment or component modification required because of a change in equipment performance requirements including changed production or product design

	• competitive market pressure and 'lean maintenance' • changes in available maintenance technology • resources supply including materials, labour and skills • introduction or changes to asset technologies including one or more of the following: • mechanical • fluid • electrical • electronic • system control • sustainability relevant to repair and modification design tasks • WHS, risk and applicable standards and code requirements.
Planning processes include one or more of the following:	• establishing maintenance parameters and design criteria • contributing to the negotiation and advice process • preliminary planning, investigations and costing • identifying design, development, prototyping activities and skills requirements • planning and scheduling design activities • improving, adjusting and rescheduling as required by emergency contingencies and constraints.
Design process includes one or more of the following:	• establishing design parameters and criteria • research, measurement, experimentation and investigation • generating ideas • synthesis, problem-solving and decision-making, and addressing constraints • techniques: • scientific principles • calculation and graphics • prototyping • mock-up • selecting components and hardware • evaluating solutions against design criteria • consultation, adjustments and agreement • finalising design and sign-off.
Design criteria includes one or more of the following:	• function and fit for purpose • aesthetics • manufacturability and maintainability • sustainability • cost constraints • ergonomics, anthropometrics and physiology • facilities, plant, services and skills available

	• WHS and risk.
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.
Life cycle analysis includes one or more of the following:	• improving sustainability of products and services • all aspects of manufacture of a single product • the entire operations of an organisation • a particular aspect of operations including environmental implications.
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.
Prototyping includes:	• mock-ups • physical and virtual modelling with post-processing for computer numeric control (CNC) and rapid prototyping.
Results to be reported and supporting information include one or more of the following:	• investigations • application of principles and techniques • calculations • specifications • diagrams • CAD files • mock-ups or prototypes of designs.

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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM14088A Apply maintenance engineering techniques to equipment and component repairs and modifications.

Links

Companion Volume implementation guides are found in VETNet -

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