Australian Government

MEM14085 Apply mechanical engineering analysis techniques

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM14085A Apply mechanical engineering analysis techniques.

Application

This unit of competency defines the skills and knowledge required to undertake a range of mechanical engineering-related analyses that relate to design, fitness for purpose evaluations, installation and commissioning, and other mechanical engineering-related tasks, including documentation of the design process. Documentation may include calculations, specifications, computer-aided design (CAD) files, risk analysis, sustainability and life cycle assessments. It is suitable for people working at a technician level in a mechanical engineering work environment and applies to people working individually or as part of a team.

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

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23109 Apply engineering mechanics principles

Competency Field

Planning

Elements and Performance Criteria

Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify job requirements from specifications
2. Investigate mechanical analysis context and need	2.1 Negotiate parameters of the mechanical design or task in consultation with stakeholders 2.2 Identify relevant engineering scientific principles and required

Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	analysis techniques 2.3 Investigate life cycle design and sustainability implications of mechanical design, existing plant or equipment 2.4 Determine specification, documentation and graphical techniques required for analysis 2.5 Confirm WHS and regulatory requirements, codes of practice, standards and risk management relevant to mechanical analysis task 2.6 Determine available sources for any required technical and professional assistance
3. Apply mechanical analysis techniques	3.1 Plan, schedule and coordinate the analysis task 3.2 Create adequate and accurate calculations and preliminary graphics, and maintain analysis process records 3.3 Evaluate multiple solutions against analysis criteria 3.4 Apply systems thinking to problem-solving and decision-making 3.5 Incorporate required professional and technical assistance 3.6 Apply agreed techniques to achieve or test solution
4. Report results	4.1 Record results of analysis 4.2 Provide supporting documentation that includes accurate and comprehensive details about analysis 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.
Mechanical engineering analysis reasons include one or more of the following:	• design of mechanical devices and plant • design or evaluation of significant modifications, process changes or improvements • sustainability issues relevant to plant, equipment or processes • static and dynamic analysis of loads, including the resulting stresses and deformations • fitness for purpose evaluation • installation and commissioning of plant and equipment.
Planning processes include one or more of the following:	• establishing analysis parameters and criteria • contributing to the negotiation and advice process • preliminary planning, analysis investigations and costing • identifying analysis, development, prototyping activities and skills requirements • planning and scheduling analysis activities • improving, adjusting and rescheduling as required by emergency contingencies and constraints.

Analysis process includes one or more or the following:	• establishing analysis 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
	• evaluating solutions against analysis criteria
	• consultation, adjustments and agreement
	• finalising analysis and sign-off.

Analysis criteria includes one or more of the following:	• function • manufacturability and maintainability • marketability • sustainability • cost constraints • ergonomics, anthropometrics and physiology • facilities, plant and skills available • contingencies and constraints minimisation • safety 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.
Prototyping includes:	• mock-ups • physical and virtual modelling with post-processing for computer numeric control (CNC) and rapid prototyping.
Appropriate licensed technical and professional assistance includes one or more of the following:	• technical support and advice relating to elements which have intrinsic danger • 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.
Results to be reported and supporting documentation include one or more of the following:	• investigations • application of principles and techniques • calculations • specifications • diagrams • CAD files • mock-ups • prototypes.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM14085A Apply mechanical engineering analysis techniques.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2