



Australian Government

Department of Education, Employment and Workplace Relations

MEM09152A Apply computer aided modelling and data management techniques to mechatronic engineering designs

Release: 1

MEM09152A Apply computer aided modelling and data management techniques to mechatronic engineering designs

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers applying CAD modelling and data management techniques to the design of mechatronic and maintenance engineering products, processes, systems or services. Mechatronics is usually defined as the integration of mechanical, electronics, programming, electrical and fluid power in an automated engineering product.
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Application of the Unit

Application of the unit	Competency in this unit includes contribution to the full design process by the creation of models, graphics, documentation, and specifications representing mechatronic and maintenance engineering products, processes, systems or services in support of the planning and design processes. The data generated from the modelling process would be managed according to organisation procedures and contractual or agreed customer requirements. Work would typically be carried out as part of a design team. This unit only has application in qualifications that are not points based. Band: Unit Weight:
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM09142A	Represent mechatronic engineering designs
	MEM16008A	Interact with computing technology
	MEM30007A	Select common engineering materials
	MEM30012A	Apply mathematical techniques in manufacturing, engineering or related situations

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Clarify product, process, system or service design requirements	1.1. The design specification of the required product, process, system or service is discussed and clarified with the client and design team.
2. Produce the initial product, process, system or service CAD model	2.1. CAD modelling and data management techniques are applied to suit given task. 2.2. The initial CAD model and graphical representation satisfies the design specification, manufacturing and operational requirements, safety, environmental and related standards. 2.3. Engineering calculations are made and engineering references, standards and codes used appropriately to determine design parameters for the model. 2.4. Initial design model identifies materials, manufacturing methods and processes. 2.5. Initial design model provides for assembly and system form, fit, functional, load, service life and maintainability requirements. 2.6. Initial production graphics, specifications and instructions are prepared in accordance with the agreed design concept and organisational requirements using organisation standards. 2.7. The CAD software is appropriately customised to suit task requirements. 2.8. The CAD generated data is managed and distributed according to organisation protocols and access privileges, contractual or agreed client requirements.
3. Validate the product, process, system or service model	3.1. The suitability of the product, process, system or service design model and graphical representation is confirmed with the client, other team members and interested parties.
4. Develop, validate, implement and file model data, production graphics and specifications and procedural documentation	4.1. Production model and graphics, specifications and instructions for the product, process, system or service are prepared in accordance with the agreed design concept and organisational requirements and incorporate feedback on initial design graphics. 4.2. The production model or graphics, specifications and instructions for the product, process, system or service are checked with the client, design team and other affected persons for suitability prior to implementation. 4.3. Implementation installation and commissioning feedback is responded to in accordance with

ELEMENT	PERFORMANCE CRITERIA
	organisational requirements. 4.4. The validated production model or graphics, specifications and instructions for the product process, system or service are maintained throughout the implementation, installation and commissioning processes, processed and filed in accordance with organisational requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- using appropriate communication skills in contacting and confirming specifications with the client
- discussing the alternative options and their relative strengths and weaknesses with the client and selecting the most acceptable option
- addressing design specification, manufacturing and operational requirements, safety and related standards appropriately in the initial model, documents and multimedia presentations.
- presenting the graphical representations appropriately in terms of the dimensions, limits and fits, tolerances and surface textures, datum references and geometry tolerances as determined by design calculations and in accordance with engineering references, standards and codes.
- addressing materials, manufacturing methods, processes and design functional specification in initial model and documentation sufficient for client, design team and interested party consultation and validation.
- producing initial model, technical specifications and operational and maintenance instructions/manuals in accordance with design concept, work site procedures and client's s needs
- setting up the CAD system and data management system appropriately, customising according to organisational standards, contractual or agreed client requirements
- using library files
- setting up the CAD data management system with appropriate protocols and access privileges
- confirming that the design graphical representation meets the needs of the client and the expectations of other team members and interested parties

REQUIRED SKILLS AND KNOWLEDGE

- completing organisational procedures and "sign off" documentation
- preparing production graphics, specifications and instructions in accordance with the agreed design concept and organisational requirements and incorporating feedback on initial design graphics
- verifying production graphics, technical specifications and operational and maintenance instructions/manuals prior to implementation.
- incorporating feedback from the implementation, installation and commissioning phases into final graphics, specifications
- processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures

Required knowledge

Look for evidence that confirms knowledge of:

- the procedures for collaborating with the client and other staff in the selection of the preferred option
- features of the CAD model relevant to design requirements, manufacturing and operational requirements, safety, environmental and related standards
- functional operation of the component/assembly model
- surfaces that are to be in contact or separated
- the appropriate type of fit for contacting surfaces
- the reasons for selecting the chosen type of fit
- the effect of surface finish on the performance/operation of component/assembly
- appropriate datum points
- the procedures for determining tolerances
- design functional specification
- components, materials, methods and processes in terms of the range of options available and the manner in which the design specification is satisfied
- options for graphical methods of representation
- scientific principles and mathematical techniques underpinning design element choices and decisions
- graphical representation procedures for the preparation of production drawings, specifications and operating and maintenance instructions/manuals related to the original design brief
- procedures for setting customising CAD system
- use of standard library files
- management systems for CAD data including access privileges and protocols in terms of organisational procedures, contractual or agreed client requirements and project requirements for concurrent access to data
- clients and other people affected by the design
- organisational procedures and required communication techniques
- organisational requirements for the preparation of production drawings,

REQUIRED SKILLS AND KNOWLEDGE
specifications and operating and maintenance instructions/manuals for products and systems • persons to be consulted and procedures for verifying and implementing production graphics, technical specifications and operational and maintenance instructions/manuals • work site procedures for acting on implementation, installation and commissioning feedback • work site procedures for the processing and filing of production graphics, specifications and operating and maintenance instructions/manuals • use of file storage and archiving

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

A person who demonstrates competency in this unit must be able to apply computer aided modelling and data management techniques to a range of mechatronic engineering designs. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Context of and specific resources for assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying computer aided modelling and data management techniques to mechatronic engineering designs or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes,

EVIDENCE GUIDE	
	standards, manuals and reference materials.
Guidance information for assessment	

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Modelling and data management techniques	Selection of appropriate modelling software and technique, generating model and data, post processing, generation of annotated 2D images from model, customisation of user environment to organisational standards and customer requirements, incorporation of standard components and library files, use of programming and macros, setting up parametric models, presentation techniques including multimedia using CAD data, transfer and management of data
Graphical representation	Computer aided drafting, drawing and design techniques to relevant Australian and/or ISO standards or equivalent
Production graphics, specifications and instructions	May include those prescribed within the organisation's policies and procedures and those required by relevant statutory regulations and requirements

Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Drawing, drafting and design
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