



Australian Government

MEM09158 Perform mechatronics engineering design drafting

Release: 1

MEM09158 Perform mechatronics engineering design drafting

Modification History

Release 1. Supersedes and is equivalent to MEM09158A Perform mechatronics engineering design drafting.

Application

This unit of competency defines the skills and knowledge required to use computer-aided design (CAD) software and other drafting techniques to perform mechatronics engineering design drafting in the mechatronic engineering, manufacturing engineering and other industry sectors. It includes the application of conventions and graphical techniques to inform production of fully detailed drawings of mechatronic components and assemblies.

This unit is suitable for people working in design drafting and includes supervision of detailed drawing production and managing of requests for further information from detailed draftspersons.

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

Competency Field

Drawing, drafting and design

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 design drawing task	1.1 Determine the requirements of the design drawing brief received from the designer 1.2 Check and modify information to meet design criteria 1.3 Confirm accuracy of modified information with the designer 1.4 Confirm software and file formats to be used with designer and detail draftspersons 1.5 Confirm design drawing brief and provide preliminary advice on feasibility
2. Prepare for drawing production	2.1 Determine stakeholders to be consulted in design drawing process 2.2 Access required reference documents 2.3 Assess and determine work health and safety (WHS), regulatory and

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	sustainability issues relevant to design task 2.4 Determine range of engineering drawings required
3. Produce mechatronic related drawings	3.1 Produce orthogonal drafting of mechatronic components and assemblies to standards using computer graphical techniques 3.2 Produce 3D images of mechatronic components and assemblies to standards using computer graphical techniques 3.3 Determine and apply required dimensioning, symbols and other graphical convention information appropriate to mechatronic engineering applications 3.4 Produce graphical representations and circuit diagrams for fluid, electrical and electronic control systems in accordance with the design brief 3.5 Obtain required licensed, technical and professional assistance to clarify design information 3.6 Confirm final graphical representations with professional engineering staff and other stakeholders
4. Provide and supervise final documentation	4.1 Submit final design drawings for sign-off by specified authority 4.2 Prepare CAD files for export to detailer 4.3 Provide and store documentation and clearances according to job requirements and enterprise drawing management system and procedures 4.4 Follow organisational processes to supervise production of detail drawings

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.	
Stakeholders include one or more of the following:	• team members • cross-function support groups • experts • appropriate licensed technicians and professionals.
Designers include one or more of the following:	• professional engineer • scientist • engineering technologist • architect • person with appropriate skills and knowledge for the design task • team of designers.
Design drawing brief communicated to the design draftsman includes:	• major and critical engineering specifications (dimensions, limits, fits, tolerances and materials) • standards that must be adhered to Plus one or more of the following: • required features and performance of equipment (volume, temperature and flow) • control requirements and control methods • electrical and fluid power specifications • client requests • budget and project schedule • procedures to be followed for further clarifications.
Drawings include one or more of the following:	• sketches • application of national and international codes and drawing standards • 3D and 2D files • hard copies.
Design criteria for mechatronic designs includes:	• function • manufacturability and maintainability Plus one or more of the following: • aesthetics • marketability • sustainability: • social, economic and environmental • material and energy resources • cost constraints • ergonomics, anthropometrics and physiology • facilities, plant and skills available • automation safety and risk.

Graphical techniques include one or more of the Includes:	• orthogonal modelling • 2D modelling • 3D modelling • isometric perspective Plus one or more of the following: • mechanical perspective • schematics • dimensioning • limits and fits • welding symbols • other standard symbols.
Appropriate licensed technical and professional assistance include one or more of the following:	• technical support and advice relating to elements which have intrinsic dangers including: • high pressure • energised fluid vessels • high temperatures and heat energy capacity • wiring with high current control voltages above extra low voltage • professional support for technologies includes: • specialist electric motor drives and controllers • specialist materials, plastics, metal alloys and nano materials • special processes, foundry, alloy welding, heat treatment, sealing and fastening.
Mechatronic components and features represented by standard conventions and graphical techniques include one or more of the following:	• hole basis, shaft basis and keyway tolerances and fits • dimensioning, tolerancing for limits and fits • materials and surface finish • weld symbols • webs, cross-sections and cutting planes • chain drives, gear sets, pulley and belt drives • threads, fasteners and springs • shafts, keyways and splines • structural sections • surface finishes and welds • electric motors and fluid power actuators • electrical, electronic, electro fluid controls • electrical and electronic circuit components • other mechatronic components and features specified by the designer.
Mechatronic assemblies include one or more of the following:	• robots • automated mechanisms and machines • fan, ventilation, air conditioning service and ducting

	• manufacturing plant and process layouts • manufactured product with embedded controller • automated machines, drives and transmissions • handling equipment including belt conveyors, augers and pneumatic conveyors • guards, handrails and platforms for automated systems • automated fan, ventilation and air conditioning systems • automated manufacturing plant and process layouts • mechatronic devices and products and their component parts.
Documentation includes one or more of the following:	• computer library files • reference charts • catalogue information • drawings • orthogonal images • hard copies.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09158A Perform mechatronics engineering design drafting.

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MEM09158 Perform mechatronics engineering design drafting

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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:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- producing drawings that are consistent with design drawing brief information and relevant Australian and international standards, codes and conventions
- selecting and applying design criteria to meet requirements of the design brief and confirming software and file formats to be used for design drawings with designer, detail draftspersons and stakeholders on at least two occasions
- developing orthographic, isometric and other 3D graphical representations
- representing mechatronic components and assemblies using sketching and computer graphics on at least two occasions
- representing mechatronic components and features using of standard conventions and graphical techniques on at least two occasions
- representing mechatronic assemblies using standard graphical representations on at least two occasions
- consulting with other personnel and stakeholders
- recognising when to engage appropriate licensed technical and professional assistance for advice
- providing documentation.

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:

- safe work practices and procedures
- engineering designers
- types of engineering drawings
- design drawing brief requirements

- application of the role of engineering design, design drafting and detail drafting in mechatronic tasks and projects including:
 - design specifications
 - mechatronic manufacture and maintenance procedures
 - technical specifications and descriptions
 - physical arrangement of mechanical, fluid, electrical and control elements
 - diagrammatic layouts of control circuits and actuator sequence
 - logical signal diagrams
- drawing and graphical representation techniques
- stakeholders in the design drafting process
- WHS and regulatory requirements, codes of practice, risk assessment and registration requirements relevant to mechatronic applications
- design criteria for mechatronic designs
- mechatronic components and features
- mechatronic assemblies
- standards for mechatronic design
- drawing features requiring licensed, technical or professional assistance
- worksite procedures for the processing and filing of drafting, specifications and operating and maintenance instructions/manuals
- methods of representing mechatronic components and assemblies using sketching and computer graphics including all relevant symbols, conventions and abbreviations
- worksite procedures for the processing and filing of graphics, specifications and operating and maintenance instructions or manuals
- organisation processes relating to supervision responsibilities during the production of detail drawings.

Assessment Conditions

- Assessors must:
 - have vocational competency in performing mechatronics engineering design drafting 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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