



Australian Government

MEM09157 Perform mechanical engineering design drafting

Release: 1

MEM09157 Perform mechanical engineering design drafting

Modification History

Release 1. Supersedes and is equivalent to MEM09157A Perform mechanical 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 prepare design drawings and graphics used in mechanical engineering, manufacturing engineering and related industry sectors. It includes the application of conventions and graphical techniques to inform production of fully detailed drawings of mechanical components and assemblies.

This unit is suitable for people working in design drafting and includes managing of requests for further information from those responsible for detailed drafting.

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 1.2 Check and modify information to meet design criteria 1.3 Confirm accuracy of modified information with relevant stakeholders 1.4 Confirm software and file formats to be used with relevant stakeholders 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 sustainability issues relevant to design task

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	2.4 Determine range of engineering drawings required
3. Produce mechanical or maintenance engineering-related drawings	3.1 Produce orthogonal drawings of mechanical components and assemblies to standards using computer graphical techniques 3.2 Produce 3D images of mechanical components and assemblies to standards using computer graphical techniques 3.3 Determine and apply dimensioning, symbols and other graphical convention information appropriate to mechanical or maintenance engineering applications 3.4 Obtain required technical and professional assistance to clarify design information 3.5 Confirm final range of design drawings to be produced with relevant 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 drafting

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.

Designer includes one or more of the following:	- professional engineer - scientist
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	• engineering technologist • architect • person with appropriate skills and knowledge for the design task • team of designers.
Design drawing brief 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) • 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 files • 2D files • hard copies.
Criteria for mechanical 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 • safety and risk.
Graphical techniques include:	• orthogonal modelling • 3D modelling • isometric perspective Plus one or more of the following: • 2D modelling • mechanical perspective • schematics • dimensioning • limits and fits

	- welding symbols - other standard symbols.
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.
Mechanical assemblies include one or more of the following:	- machines, drives and transmissions - materials handling equipment (belt conveyors, augers, pneumatic conveyors) - guards, handrails and platforms - structures, vessels and tanks - fan, ventilation, air conditioning service and ducting - manufacturing plant and process layouts - manufactured products and their component parts.
Mechanical components and features include one or more of the following:	- hole basis, shaft basis and keyway tolerances and fits - dimensions, tolerances 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 - other mechanical components and features specified by the designer.
Documentation includes one or more of the following:	- computer library files - reference charts - catalogue information - drawings - orthogonal images - data files - hard copies.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09157A Perform mechanical 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 MEM09157 Perform mechanical 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 information and all 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 with stakeholders on at least two occasions
- developing orthographic, isometric and other 3D graphical representations
- representing mechanical components and assemblies using sketching and computer graphics on at least two occasions
- representing mechanical components and features using standard conventions and graphical techniques on at least two occasions
- representing mechanical assemblies using standard graphical representations on at least two occasions
- consulting with other personnel and stakeholders
- 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
- types of engineering drawings
- application of the role of engineering design, design drawing and detail drawing in mechanical and maintenance engineering tasks including:
 - design specifications
 - mechanical and maintenance procedures
 - technical specifications and descriptions

- content in design drawing briefs
- design criteria for mechanical designs
- graphical techniques
- types of mechanical assemblies, components and features
- availability and features of standards related to mechanical plant and devices, design, maintenance and alteration
- key requirements of AS 1100.101 Technical drawing – General principles, and means of locating and referencing other relevant standards
- methods of representing mechanical components and assemblies using sketching and computer graphics
- methods of documentation generation and control
- worksite procedures for the processing and filing of graphics, specifications and operating and maintenance instructions or manuals
- WHS and regulatory requirements, codes of practice, risk assessment and registration requirements relevant to mechanical and maintenance applications
- software options and developments in graphics and related engineering software
- documentation used in mechanical engineering design drafting
- current graphical methods compared with traditional methods.

Assessment Conditions

- Assessors must:
 - have vocational competency in performing mechanical 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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