



Australian Government

MEM09214 Perform advanced engineering detail drafting

Release: 1

MEM09214 Perform advanced engineering detail drafting

Modification History

Release 1. Supersedes and is equivalent to MEM09214A Perform advanced engineering detail drafting.

Application

This unit of competency defines the skills and knowledge required to perform advanced engineering detail drafting to Australian Standard (AS) 1100.101 Technical drawing - General principles or equivalent and has been developed for an engineering detail draftsman. It can be applied individually or in a team environment where comprehensive responsibility for the production of the drawing is exercised.

Critical dimensions and associated tolerances are determined where required and drawings can be created with or without the use of computer-aided design (CAD) systems.

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

Pre-requisite Unit

MEM09204 Produce basic engineering detail drawings

MEM09229 Read and interpret technical engineering drawings

MEM30012 Apply mathematical techniques in a manufacturing engineering or related environment

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. Prepare for drawing work	1.1 Follow standard operating procedures (SOPs) and comply with work health and safety (WHS) requirements at all times 1.2 Determine purpose, scope and presentation requirements for drawing task 1.3 Determine the information requirements for the finished part or item and its interaction with the next level of assembly or process

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.4 Submit requests for further information (RFI) to designer where information cannot be obtained or calculated 1.5 Identify relevant standards and terminology, symbols and notation required to comply with standard and design 1.6 Prepare equipment and set up software for drawing work
2. Identify and apply dimensions and tolerances for drawing	2.1 Determine methods of general dimensioning and tolerancing, classes of fit and forms of geometric shapes, from engineer, sketches or specifications 2.2 Select dimensioning and tolerancing scheme and symbols consistent with standards and design requirements 2.3 Identify and confirm datum points 2.4 Apply the principles of general dimensioning to engineering drawing 2.5 Apply the principles of general tolerancing to engineering drawing 2.6 Check that each dimension and tolerance symbol can be clearly interpreted for application 2.7 Re-dimension tolerance drawing with new datum positions if required 2.8 Extract information from dimensioned drawing
3. Prepare assembly, layout and detail drawings	3.1 Produce sectioned third angle orthogonal assembly drawings 3.2 Project a primary auxiliary view 3.3 Produce finished assembly drawings complete with required material, part and cutting lists, cross-referencing and any required dimensions, both overall and centre-to-centre 3.4 Produce all drawings to AS 1100.101 Technical drawing - General principles or equivalent, and organisational presentation standards 3.5 Check that all required tolerances and dimensions are on the drawing
4. Select material, components and assemblies	4.1 Interpret specifications to determine material requirements 4.2 Select components, material and assemblies from data sheets or manufacturer catalogues to meet specifications 4.3 Produce bill of materials to specifications
5. Complete drawing	5.1 Verify drawing compliance with specifications

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
work	5.2 Check drawings to ensure that assembly or fabrication is possible 5.3 Document and save drawings in accordance with SOPs

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.

Dimensioning includes one or more of the following:	• symbols • lines • numerical value • linear • angular • diameter • radius • not to scale (NTS) • auxiliary • reference • common feature • tabular presentation • squares • holes • screw heads • tapers/slope • profiles • notes.
Tolerancing includes one or more of the following:	• basic dimension • bilateral • unilateral

	• zone • datum • tolerance grade • datum feature.
Symbols used for tolerancing include one or more of the following:	• datum identification • form • location • profile • runout • modifiers.
Symbols used for dimensioning include one or more of the following:	• diameter • square • counterbore • countersink • depth • dimension origin • reference value • slope • taper • radius • spherical radius.
Condition includes one or more of the following:	• fit • limits of size • fundamental deviation • allowance • maximum material condition • least material condition.
Geometry tolerancing includes one or more of the following:	• virtual condition and size • geometric reference frame • principle of independency • tolerance (form, profile, orientation and position) • characteristics, including: • straightness • flatness • circularity • cylindricity • profile • squareness • parallelism • angularity • runout

	• tolerance indication method • projected tolerances • statistical value tolerances.
Assembly drawing types includes one or more of the following:	• general assembly • detailed assembly • layout drawings • installation drawings • erection diagrams • shop and field assemblies • pictorial exploded drawings.
Information from dimensioned drawing includes one or more of the following:	• limits of size • fundamental deviation • allowance • tolerance, including: • maximum material condition • least material condition • fit.
Drawings include one or more of the following:	• accurate representation, including any necessary hidden detail of the specific assembly • border, title block and projection symbols • accurate line work • appropriately positioned views • hatching to AS 1100.101 Technical drawing - General principles specifications (sectioned third angle orthogonal assembly drawings) • correct use of terminology and abbreviations.
Auxiliary projection includes one or more of the following:	• purpose for auxiliary projection • planes of projection • projection involving circular components • border, title block and projection symbols.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09214A Perform advanced engineering detail 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 MEM09214 Perform advanced engineering detail 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
- determining purpose and scope for drawing requirements including software relevant to the project, utilising all available information and requesting further information from designer as required
- calculating required limits, fits, datum references and geometric tolerances where not supplied from designer or reference material to meet design requirements
- producing assembly and sectioned drawings, with all components identified, including specialised dimensioning and auxiliary views, to AS 1100.101 Technical drawing – General principles, or equivalent, on at least two occasions
- producing a bill of materials on at least two occasions including part quantities and material lengths
- confirming drawings accurately reflect specifications
- documenting and storing drawings in accordance with SOPs
- complying with standard operating procedures (SOPs) including quality requirements.

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
- specifications and requirements of the component, assembly or layout to be drawn
- types of assembly drawings
- functional operation of the component or assembly to be drawn
- surfaces which are to be in contact or separated
- appropriate type of fit for contacting surfaces and reasons for selection
- calculation methods for determining limits, fits, datum references and geometric tolerances

- effect of surface finish on the performance or operation of surfaces
- lineal, diametric and geometric tolerances and procedures for determining tolerances
- requirements of AS 1100.101 Technical drawing - General principles, or equivalent for drawings to be produced
- appropriate components and materials from supplier or manufacturer catalogues and reasons for selection
- procedures for checking and approving drawings and reasons for checking the drawings to ensure that manufacturing or assembly is possible, efficient and cost-effective
- drawing specifications
- methods of manufacture, assembly and/or fabrication from drawings
- unnecessary or inappropriate tolerances
- engineering features, terminology and abbreviations
- hatching techniques including large sections, small sections, thin sections and designation of materials
- sectioning systems including revolved section, removed section, local or part section, offset section, aligned section and interposed section
- types of bearings
- sectioning conventions including screw threads, shafts and rods, webs and thin sections
- awareness of copyright and intellectual property issues and legislation in relation to drawing
- role of datum points in dimensioning and tolerancing a detail engineering drawing
- RFI process for project or organisation
- symbols used for dimensioning and tolerancing.
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Assessment Conditions

- Assessors must:
 - have vocational competency to perform advanced engineering detail 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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