



Australian Government

MEM09221 Create 3D model assemblies using computer-aided design (CAD) system

Release: 1

MEM09221 Create 3D model assemblies using computer-aided design (CAD) system

Modification History

Release 1. Supersedes and is equivalent to MEM09221A Create 3-D model assemblies using computer-aided design (CAD) system.

Application

This unit of competency defines the skills and knowledge required to create 3-D model assemblies using computer-aided design (CAD) and is primarily suitable for those performing a drafting role.

It can be applied across a range of engineering disciplines including applications in CAD, computer graphics and animation, rapid prototyping, medical testing and visualisation of scientific research.

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

Pre-requisite Unit

MEM09229 Read and interpret technical engineering drawings

MEM30031 Operate computer-aided design (CAD) system to produce basic drawing elements

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. Determine assembly modelling requirements	1.1 Follow standard operating procedures (SOPs) and comply with work health and safety (WHS) requirements at all times 1.2 Check purpose, scope and information requirements for assembly modelling task 1.3 Interpret available information relevant to work requirements, and identify and address further information needs 1.4 Identify and prepare equipment required to complete work

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. Prepare 3D environment	2.1 Create 3D views on the screen by manipulating drawing planes and inserting 3D geometric shapes 2.2 Establish work planes and orientation according to job requirements 2.3 Determine key features of assembly modelling software package 2.4 Select methodology appropriate for assembly task 2.5 Create individual components within the assembly using adaptive technology 2.6 Access required library items to create assemblies
3. Produce output from 3D assembly model	3.1 Perform drawing for assembly modelling 3.2 Exploit features of assembly modelling software to improve productivity 3.3 Extract physical properties to job requirements, including volume, mass and centre of gravity 3.4 Edit solid models of components and assemblies 3.5 Apply visual style techniques
4. Complete CAD operations	4.1 Confirm model accurately reflects specifications, is presented according to work requirements and contains all relevant information 4.2 Save and file drawing elements in accordance with SOPs 4.3 Produce 2D drawings from the assembly models incorporating section views with all necessary annotation 4.4 Evaluate work and identify areas for improvement 4.5 Close applications, perform CAD housekeeping and maintain organisational filing system

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.

Solid modelling assembly includes one or more of the following:	• economic impact of design upon manufacturing • principles of design • engineering components and standard parts • edit solid models and assemblies • 2D manufacturing drawings and annotation • 3D printing of components and assemblies • rendering and use of colour on 3D models and assemblies • production of hard copies of drawings for solid models, assemblies and orthogonal drawings • saving files for later retrieval • parametric modelling • composite models • section models • 3D primitives • production of 3D models • 3D printing of components and assemblies.
Visual style techniques include one or more of the following:	• rendering types and preferences • render lighting techniques • views and scenes.
Appropriate personnel include one or more of the following:	• supervisor • leading hand • foreman • manager • site engineer • trainer • mentor • teacher • team member.
Resource requirements include one or more of the following:	• computer software • stationery • software reference documentation • reference texts • consumables • computer • printing equipment.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09221A Create 3-D model assemblies using computer-aided design (CAD) system.

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 MEM09221 Create 3D model assemblies using computer-aided design (CAD) system

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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 scope for creating model assemblies utilising all available information and consulting appropriate personnel
- selecting a 3D computer-aided design (CAD) software to create solid model assemblies that meet design specifications
- creating 3D model assemblies on at least two occasions, including manipulating the entities in 3D space, and creating intelligent models using parametric modelling to meet design requirements
- producing output from 3D assembly model on at least two occasions including extracting mass and area properties from solid model and applying rendering techniques to meet design specifications
- performing required calculations to complete model to specifications
- confirming model accurately reflects specifications
- producing 2D drawings from the assembly model on at least two occasions
- documenting and saving drawing elements in the appropriate format
- complying with organisational policies and procedures, 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
- principle tools used in the creation and manipulation of assembly models
- solid modelling rendering task
- appropriate personnel to consult
- resource requirements
- orientation of the model with respect to the plane system

- number of views required to establish the model
- top down and bottom up modelling techniques
- procedures for creating and manipulating entities and components in 3D space
- rendering types, preferences, views and scenes
- procedures for modifying existing 3D assembly models
- procedures for saving drawing files
- various formats in which drawing files can be saved and reasons for using different formats when saving drawing files
- procedures for extracting data with respect to the physical properties of models created in 3D space
- terminology associated with solid assembly modelling.

Assessment Conditions

- Assessors must:
 - have vocational competency to create 3D model assemblies using computer-aided design (CAD) system 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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