



Australian Government

MEM09210 Create 3D solid models using computer-aided design (CAD) system

Release: 1

MEM09210 Create 3D solid models using computer-aided design (CAD) system

Modification History

Release 1. Supersedes and is equivalent to MEM09210A Create 3-D solid models using computer-aided design (CAD) system.

Application

This unit of competency defines the skills and knowledge required to create 3D solid models using a computer-aided design (CAD) system. It includes applications in CAD, computer graphics and animation, rapid prototyping, medical testing and visualisation of scientific research.

This unit covers the set up and manipulation of CAD software to produce 3D solid models and includes the use of region and solid modelling techniques, section views, and pre-drawn library files, extraction of properties and application of basic rendering techniques.

This unit is suitable for those working within a drafting work environment and can be applied across all engineering disciplines.

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 solid 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 modelling 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>
	1.3 Interpret available information relevant to job requirements, and identify and address further information needs 1.4 Identify and prepare resources required to complete work 1.5 Identify and consult with appropriate personnel
2. Prepare 3D environment	2.1 Apply workplace procedures to retrieve and manipulate required information and navigate computing technology 2.2 Set up a 3D environment to allow multiple viewing 2.3 Create 3D views on the screen by manipulating drawing planes and inserting 3D geometric shapes 2.4 Establish work planes and orientation according to job requirements 2.5 Determine and exploit key features of solid modelling software package
3. Produce output from 3D model	3.1 Perform drawing for solid modelling 3.2 Exploit features of modelling software to improve productivity 3.3 Extract physical properties to job requirements, including volume, mass and centre of gravity 3.4 Apply rendering techniques 3.5 Produce 3D drawings incorporating section views with all necessary annotation
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 according to organisational procedures 4.3 Evaluate work and identify areas for improvement 4.4 Close applications, perform CAD housekeeping and maintain organisational filing system 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.

Solid modelling includes one or more of the following:	• region modelling • solid modelling • parametric modelling • composite models • section models • 3D primitives • mass and area properties • rendering techniques • material finishes • production of hard copies • saving and retrieval of files of varying formats • consolidation.
Resource requirements include one or more of the following:	• computer software • stationery • software reference documentation • reference texts • consumables • computer • printing equipment.
Appropriate personnel include one or more of the following:	• supervisor • leading hand • foreman • manager • site engineer • mentor • other team members relevant to the project.
Rendering techniques include one or more of the following:	• rendering types and preferences • render lighting techniques • views and scenes.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09210A Create 3-D solid models 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 MEM09210 Create 3D solid models 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 purpose and scope for solid modelling task through consultation with appropriate personnel utilising all available information including industry codes and standards relevant to the requirements
- selecting and setting up 3D computer-aided design (CAD) software package including key features of solid modelling to create solid models that meet design specifications
- creating 3D models using CAD systems, incorporating section views and all necessary notation on at least two occasions
- confirming model accurately reflects specifications
- saving and filing drawing elements in accordance with SOPs.

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
- number of views required to establish the model
- procedures for:
 - creating and manipulating entities in 3D space
 - modifying existing 3D models
 - saving drawing files
 - extracting data with respect to the physical properties of models created in 3D space
- entities that can be created and/or manipulated in 3D space
- applications of swept, extruded and revolved solids and procedures for creating them
- rendering types and preferences, render lighting techniques, views and scenes
- formats in which drawing files can be saved and reasons for using different formats when saving drawing files

- physical properties of shapes created in 3D space that can be extracted from the drawing file
- solid modelling techniques including editing solid primitives, and conversion from region to solid models
- terminology associated with solid modelling, and wire frame, as opposed to solids
- personnel to be consulted.

Assessment Conditions

- Assessors must:
 - have vocational competency in creating 3D solid models using a 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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