



Australian Government

MEM09220 Apply surface modelling techniques to 3D drawings

Release: 1

MEM09220 Apply surface modelling techniques to 3D drawings

Modification History

Release 1. Supersedes and is equivalent to MEM09220A Apply surface modelling techniques to 3-D drawings.

Application

This unit of competency defines the skills and knowledge required to apply surface modelling techniques to 3D drawings 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 surface 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 surface modelling task 1.3 Interpret available information relevant to project and work requirements, and identify and address further information needs 1.4 Identify and prepare equipment required to complete work 1.5 Identify and apply relevant codes, standards and symbols relevant to 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>
	1.6 Consult appropriate personnel to ensure the work is coordinated effectively with others involved in the project
2. Perform surface modelling	2.1 Prepare 3D environment for drawing work 2.2 Identify surface types, analyse surface data and prepare drawing for surface modelling 2.3 Determine key features of surface modelling software package and select methodology appropriate for task 2.4 Set up and apply wire frame and surface modelling techniques 2.5 Edit and manipulate surfaces and apply rendering techniques 2.6 Exploit surface modelling software to optimise productivity
3. Prepare views and annotations	3.1 Display isometric and orthographic perspectives 3.2 Extract properties from the surface model 3.3 Annotate drawing and complete required documentation
4. Complete CAD operations	4.1 Confirm drawing 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 Prepare drawings for presentation 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.	
Wire frame modelling techniques include one or more of the following:	• setting and using work planes • shifting and working with coordinate system • moving through 3D space • changing 'Z' depth • construction techniques • wire frame editing.
Surface modelling techniques include one or more of the following:	• use of surface primitives • editing surface primitives.
Surface types include one or more of the following:	• geometric • freeform surfaces • derived surfaces • draft • revolved • ruled • lofted • swept • coons • offset trimmed • fillet • blend • parametric • Non-uniform rational B-spline (NURBS) surfaces.
Rendering 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.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM09220A Apply surface modelling techniques to 3-D drawings.

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 MEM09220 Apply surface modelling techniques to 3D drawings

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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
- consulting appropriate personnel
- determining purpose and scope for surface modelling requirements relevant to the project utilising all available information
- performing wire frame modelling
- performing surface modelling on at least two occasions by selecting and using 3D computer-aided design (CAD) software, creating and manipulating surfaces in 3D space and applying rendering techniques
- applying rendering lighting techniques to views and scenes on at least two occasions to meet design specifications
- preparing views and annotations on at least two occasions, extracting the physical properties of shapes and surfaces created in 3D space
- performing required calculations to complete drawing to specifications
- confirming drawing accurately reflects specifications
- documenting and saving drawing files 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
- purpose for which the model is to be used
- appropriate personnel to consult
- resource requirements
- principle tools used in the creation and manipulation of model surfaces
- terminology associated with surface modelling

- features and uses of geometric, freeform and derived surfaces
- features and uses of wire frame and surface modelling techniques
- wire frame modelling techniques
- surface modelling techniques
- surface types and surface normal and reversing
- features and uses of rendering techniques
- features and uses of materials and surface finishing options
- number of views required
- CAD software features
- applications of ruled and revolved surfaces and procedures for creating them
- rendering types and preferences, render lighting techniques, views and scenes
- 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 shapes and surfaces created in 3D space
- terminology associated with surface modelling.

Assessment Conditions

- Assessors must:
 - have vocational competency in applying surface modelling techniques to 3D drawings 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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