

Overview

This standard identifies the competences you need to set up and operate a computer aided modelling system to produce detailed three-dimensional models for engineering activities, in accordance with approved procedures. The CAD models produced will be relatively straightforward and uncomplicated, and are likely to be based on existing models but will require some changes (such as changes to shape/profile, additional features, dimensional differences) and will include surface modelling, solid modelling and wire frame modelling.

You will be given a detailed 'model' brief or a request for change/modification order, and you will be required to access these requirements and to extract all necessary information in order to carry out the modelling operations. You will be expected to produce models in a 3D modelling environment and to produce 2D and 3D prints or plots. You will be expected to use current British, European and company standards to produce the drawing template and to carry out the drawing activities.

Your responsibilities will require you to comply with organisational policy and procedures for working in the drawing office or CAD suite. You will be required to report any problems with the computer hardware, software or modelling procedures that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions, either alone or in conjunction with others, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying the appropriate computer aided drawing procedures and techniques for 3D modelling for producing or modifying engineering drawings. You will understand the CAD system and software used, and its application, and will know about the various tools and techniques used to produce the models and drawings, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when working with the computer modelling/drawing system. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

- P1 prepare the CAD system for operation
- P2 produce/modify drawings to defined requirements
- P3 produce/modify drawings in the required formats
- P4 use codes and other references that follow the required conventions
- P5 deal with problems within your control and report those that cannot be solved
- P6 ensure that drawings are registered, saved and stored in line with organisational procedures
- P7 ensure that changes are completed as required by organisational procedures

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the correct start up and shutdown procedures to be used for the computer systems
- K3 how to identify and select the correct 3D drawing software package from the on-screen menu or graphical equivalent
- K4 the various techniques that are available to access and use the CAD software
- K5 how to deal with system issues
- K6 the importance of protecting the computer system from viruses, and the implications if the correct procedure is not followed
- K7 the sources and methods for obtaining any required technical information relevant to the drawing being produced
- K8 types of drawing that may be produced by the modelling software
- K9 how to set up the viewing screen to show multiple views of the component to help with drawing creation
- K10 the national, international and organisational standards and conventions that are used for the models/drawings
- K11 the application and use of modelling tools
- K12 how to add dimensions and text to drawings
- K13 how to access, recognise and use a wide range of standard component and symbol libraries from the CAD equipment
- K14 the applications of different 3D modelling programs
- K15 the need for document control

K16 the need to create backup copies and to file them in a separate and safe location, filing and storing hard copies for use in production

K17 the extent of your own responsibility, and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Prepare the CAD system for operation by carrying out all of the following:
 - 1.1 power up the equipment and activate the appropriate modelling software
 - 1.2 set up the modelling environment and select a suitable template/folder
 - 1.3 set up and check that all peripheral devices are connected and correctly operating (such as keyboard, mouse, light pen, digitiser/tablet, scanner, printer, plotter)
 - 1.4 set the drawing datum at a convenient point (where applicable)
 - 1.5 create a modelling template to the required standards, to include all necessary detail (such as title, file/drawing number, material, date)
2. Use three of the following to obtain the necessary data to produce the required model:
 - 2.1 model brief/request
 - 2.2 specifications
 - 2.3 change order/modification request
 - 2.4 sample component
 - 2.5 manuals
 - 2.6 previous models/designs
 - 2.7 sketches
 - 2.8 standards reference documents (such as limits and fits, tapping drill charts)
 - 2.9 notes from meetings/discussions
 - 2.10 other available data
- 3.3 Take into account three of the following, as appropriate to the model being produced:
 - 3.1 function
 - 3.2 cost
 - 3.3 physical space
 - 3.4 quality
 - 3.5 lifetime of the product
 - 3.6 operating environment
 - 3.7 manufacturing method
 - 3.8 tolerances
 - 3.9 interfaces
 - 3.10 ergonomics
 - 3.11 clearance
 - 3.12 safety
 - 3.13 materials
 - 3.14 aesthetics
4. Carry out all of the following before producing the engineering model:
 - 4.1 obtain all the required data and information you need to produce the required model
 - 4.2 review the data and information to identify the model requirements
 - 4.3 recognise and deal with issues (such as lack of, or incorrect, information and technical issues)
5. Use one of the following modelling tools:

- 5.1 surface modelling
- 5.2 solid modelling
- 5.3 wire frame modelling
6. Use all of the following CAD operations to highlight design areas in the modelling environment:
 - 6.1 pan
 - 6.2 isometric
 - 6.3 zoom
7. Produce models which include the use of eight of the following from the part feature menu:
 - 7.1 constrained parts
 - 7.2 solid model
 - 7.3 mirror
 - 7.4 extrude
 - 7.5 wire frame
 - 7.6 radius
 - 7.7 revolve
 - 7.8 rib
 - 7.9 rectangular pattern
 - 7.10 hide
 - 7.11 cut/remove
 - 7.12 circular pattern
 - 7.13 fillet
 - 7.14 shell
8. Modify parts in the assembly environment, using eight of the following features:
 - 8.1 constrained parts and assemblies
 - 8.2 insertion of standard components
 - 8.3 hidden detail
 - 8.4 straight lines
 - 8.5 symbols and abbreviations
 - 8.6 hatching and shading
 - 8.7 dimensions
 - 8.8 curved surfaces
 - 8.9 surface texture
 - 8.10 angular surfaces
 - 8.11 circles or ellipses
 - 8.12 parts lists
 - 8.13 text
 - 8.14 material colour
 - 8.15 other specific detail
9. Produce the following drawings, to provide sufficient detail for manufacture:
 - 9.1 3D isometric or model view to provide a pictorial view
10. Plus, one more from the following:
 - 10.1 first angle 2D drawings (2 or 3 views) with dimensions
 - 10.2 third angle 2D drawings (2 or 3 views) with dimensions

10.3 the most informative model that could be dimensioned

11. Save and store models in appropriate locations, to include carrying out all of the following:

11.1 ensure that your model has been checked and approved by the appropriate person/s

11.2 check that the model is correctly titled, referenced and annotated

11.3 save the model to an appropriate storage medium (such as hard drive, disc, external storage device)

11.4 create a separate backup copy and place it in safe storage

11.5 produce a hard copy printout of the model for file purposes (where required)

11.6 register and store the models in the designated company information system (where appropriate)

11.7 record and store any changes to the models, and reasons for the changes in the designated company information system (where appropriate)

12. Produce models which comply with one of the following:

12.1 organisational guidelines

12.2 statutory regulations and codes of practice

12.3 CAD software standards

12.4 BS and ISO standards

12.5 other international standard

SEMTS207

Producing/modifying engineering CAD models (drawings) using a CAD system



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