SEMTS204

Producing/modifying mechanical or fabrication engineering drawings using a CAD system

Overview

This standard identifies the competences you need to set up and operate a computer aided drawing (CAD) system to produce or modify fully detailed drawings for mechanical or fabrication engineering activities, in accordance with approved procedures.

The drawings produced will be relatively straightforward and uncomplicated, and are likely to be based on existing drawings, but will require some changes (such as additional features, change in profile, dimensional differences), and will include detail component drawings for manufacturing, assembly, sub-assembly drawings and installation drawings.

You will be given a detailed drawing 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 drawing operations. 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 drawing 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 for producing or modifying mechanical or fabrication 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 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 CAD 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 startup and shutdown procedures to be used for the computer systems

K3 how to identify and select the correct 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 software

K9 how to set up the viewing screen to show multiple views of the pattern to help with drawing creation

K10 the national, international and organisational standards and conventions that are used for the drawings

K11 how to set up the drawing template parameters

K12 the application and use of drawing tools

K13 how to create hatching and shading on drawings

K14 how to add dimensions and text to drawings, producing layers of drawings

K15 how to access, recognise and use a wide range of standard component and symbol libraries from the CAD equipment

K16 the need for document control

K17 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

K18 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 drawing software
   1.2 set up the drawing system to be able to produce the drawing to the appropriate scale
   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 set up drawing parameters (to include layers, line types, colour, text styles) to company procedures or to suit the drawing produced (where applicable)
   1.6 create a drawing template to the required standards, to include all necessary detail (such as title, drawing number, scale, material, date,)
2. Produce/modify drawings for one of the following activities:
   2.1 mechanical engineering
   2.2 fabrication/structural engineering
3. Use one of the following to obtain the necessary data to produce the required drawings:
   3.1 drawing brief/request
   3.2 specifications
   3.3 change order/modification request
   3.4 regulations
   3.5 manuals
   3.6 sample component
   3.7 calculations
   3.8 previous drawings/designs
   3.9 sketches
   3.10 standards reference documents (such as limits and fits, tapping drill charts)
   3.11 notes from meetings/discussions
   3.12 other available data
4. Take into account four of the following design features, as appropriate to the drawing being produced:
   4.1 function
   4.2 materials
   4.3 clearance
   4.4 operating environment
   4.5 quality
   4.6 cost
   4.7 aesthetics
   4.8 standard parts/components
   4.9 manufacturing method
   4.10 lifetime of the product
   4.11 physical space
   4.12 safety

4.13 ergonomics
4.14 tolerances
4.15 interfaces
4.16 other design features

5. Carry out all of the following before producing/modifying the engineering drawing:
5.1 obtain all the required data and information you need to produce the required drawing
5.2 review the data and information to identify the drawing requirements
5.3 recognise and deal with issues (information-based and technical)

6. Interpret and produce drawings using one of the following methods of projection:
6.1 first angle orthographic projections
6.2 third angle orthographic projections
6.3 isometric/oblique projections

7. Produce one of the following types of drawing:
7.1 detail drawing
7.2 sub-assembly drawing
7.3 general arrangement drawing
7.4 installation drawing
7.5 assembly drawings

8. Produce/modify drawings which include seven of the following:
8.1 straight lines
8.2 symbols and abbreviations
8.3 hidden detail
8.4 dimensions
8.5 curved/contour lines
8.6 sectional detail
8.7 angled lines
8.8 circles or ellipses
8.9 parts lists
8.10 text
8.11 geometrical tolerancing
8.12 insertion of standard components
8.13 other specific detail

9. Save and store drawings in the appropriate locations, to include carrying out all of the following:
9.1 ensure that your drawing has been checked and approved by the appropriate person/s
9.2 check that the drawing is correctly titled, referenced and annotated
9.3 save the drawing to an appropriate storage medium (such as hard drive, disc, external storage device)
9.4 create a separate backup copy and place it in safe storage
9.5 produce a hard copy printout of the drawing for file purposes (where required)
9.6 register and store the drawings in the designated company information

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

10. Produce/modify drawings which comply with one of the following:
    10.1 organisational guidelines
    10.2 statutory regulations and codes of practice
    10.3 CAD software standards
    10.4 BS and ISO standards
    10.5 other international standard

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