Level 3 - Unit 10 – Computer Aided Design in Engineering

BTEC

# Knowledge Organiser

**Learners develop two-dimensional (2D) detailed drawings and three-dimensional (3D) models using a computer-aided design (CAD) system**

**Unit Overview**

Computer-aided design (CAD) spans most areas of engineering, as well as aspects of other disciplines such as construction and media. Engineering is a multi-disciplinary vocational subject that uses CAD as part of other processes to develop (design and manufacture), improve and maintain cutting edge products and systems. For example, Formula 1® racing teams test all their cars on bespoke CAD packages to analyse performance and stresses, and make modifications to the cars as a result. In this unit you will use CAD software and hardware to produce 2D and 3D drawings. You will acquire the skills to produce models of products, editing and modifying these, and exploring materials and their properties. You will output a portfolio of drawings, for example orthogonal, 3D shaded or solid model, and detail view drawings, to an international standard. As an engineer it is important to be able to interpret and produce engineering drawings that help individuals and organisations to communicate ideas, design and manufacture products and improve product performance. Studying this unit will help you to progress to employment as a draftsperson and gain other technician level roles in engineering. It also prepares you for an engineering-based apprenticeship, and for higher education.


**Learning Aim A**

learners will show Consistently accurate components with a material applied correctly to every component, for example, an engine/cylinder block Material could be made from either aluminium or cast iron. The Components should be assembled into a model, for example a model Formula 1® racing car or a model aircraft landing gear, with all the components orientated correctly. A drawing template should be created and used so that a professional portfolio of drawings can be output. The evidence should include orthogonal drawings, a 3D Shaded/solid model, and a detail view.

**Learning Aims:**

**A** Develop a three-dimensional computer-aided model of an engineered product that can be used as part of other engineering processes

**B** Develop two-dimensional detailed computer-aided drawings of an engineered product that can be used as part of other engineering processes

**C** Develop a three-dimensional computer-aided model for a thin walled product and a fabricated product that can be used as part of other engineering processes

**Learning Aim B**

Learners will show accurate components that form an assembly and all components should be orientated correctly. Layers should be used so that component attributes are grouped on one layer, for example, hatching is contained on a single layer and should be used to create different assemblies and/or components possessing similar attributes from the master layer. Another example would be a series of brackets with common attributes, such as a bar with a differing series of holes on a pitch circle diameter (PCD), which would be created from one master layer with the PCDs on separate layers to enable the output of several drawings

**Learning Aim C**

learners will show in their portfolios accurately modelled fabricated and thin walled components. The fabricated components together should contain a minimum of four folds, two bends and four slots. The components should be assembled into a model that contains a minimum of six components that are orientated correctly, containing a minimum of three fabricated components, plus rods, dowels and shafts may be included, for example a lever and linkage system or a scissor lifts. The thin walled components should be assembled together to create one assembly with no inaccuracies, for example a small hairdryer or a computer mouse. Both models should be rendered to show a realistic product. A drawing template should be created to output a professional portfolio of drawings, including orthogonal drawings, a 3D shaded/solid model, a sectional view of the thin walled components and a detail view of the fabrication. Overall, the portfolio should provide 3D models that fully meet their purpose, for example to display accurate visualisation to a potential customer, and are clear for a third party to understand.

**Key Vocabulary**

CAD, CAM, Datum, tolerances

**Work Related Learning:**

The packages used by the school are industry standards, which gives students a knowledge they can directly use in employment.

**Numeracy links:**

Mathematics based on accuracy, using measurements.

**SMSC and British Values**

Understanding the importance that good design can have to solve critical issues in the world.