1 Drawings

A Drawing types and scales

In engineering, most design information is shown on **drawings**. Today, drawings are generally not drawn by hand. They are produced on computer, using **CAD** (**computer-aided design**) systems.

A key factor on a drawing is the **scale** – that is, the size of items on the drawing in relation to their real size. When all the items on a drawing are shown relative to their real size, the drawing is **drawn to scale**, and can be called a **scale drawing**. An example of a scale is 1:10 (**one to ten**). **At 1:10**, an object with a length of 100 mm in real life would measure 10 mm on the drawing.

Most engineering designs consist of **a set of drawings** (a number of related drawings):

- **General arrangement** (**GA**) drawings show whole devices or structures, using a **small scale**. This means objects on the drawing are small, relative to their real size (for example, **a 1:100 drawing** of an entire building).
- **Detail** drawings show parts in detail, using a **large scale**, such as 1:5 or 1:2. Small parts are sometimes shown in a **detail** as **actual size** (1:1), or can be **enlarged** to bigger than actual size (for example, 2:1).

For electrical circuits, and pipe and duct networks, it is helpful to show designs in a simplified form. In this case, **schematic drawings** (often referred to as **schematics**) are used. An everyday example is the map of a train network.

Notes: When written, **drawing** is often abbreviated to **dwg**.
CAD is pronounced as a word: /kæd/.

B Types of views used on drawings

Technicians are discussing different **views** shown on drawings (looking at components from above, from the side, etc.), as they search for the information they require.

We need a view from above showing the **general arrangement** of all of the roof panels - a **plan** of the whole area.

According to this list, there are **elevations** of all four sides of the machine on drawing 28. So one of those should show the front of the machine.

There should be a **section** through the pipe, showing the valve inside, on drawing 36.

We need an **exploded view** of the mechanism, showing the components spaced out.

It's hard to visualize this assembly, based on **two-dimensional** elevations and sections. It would be clearer if we had a **three-dimensional** view, as either an **oblique projection** or an **isometric projection**.

Notes: See Appendix I on page 98 for examples of three-dimensional drawings.

In non-technical, everyday English, engineering **drawings** are often called **plans**.
Section is the short form of **cross-section**, and is commonly used in technical contexts.
Two-dimensional and **three-dimensional** are often shortened to **2D** and **3D**.

1.1 Complete the sentences. Look at A opposite to help you.

1 Enlarged drawings show components larger than their ....
2 For engineering drawings, 1:5 is a commonly used ..... .
3 Whole machines or structures are shown on .... drawings.
4 Electrical drawings don't usually show sizes. They're shown as ..... .
5 A ..... of drawings for a large project can consist of hundreds of pages.
6 Most drawings are produced on computers, using ..... software.

1.2 Match the descriptions (1–6) with the names of views used on drawings (a–f). Look at B opposite and Appendix I on page 98 to help you.

1 a 2D view of the side of an object
2 a 2D view inside an object, as if it is cut through
3 a 2D view, looking down on top of an object
4 a 3D view, showing an assembly taken to pieces
5 a 3D view, with the 2D face of the object at the front
6 a 3D view, with a corner of the object at the front

a a plan
b a section
c an isometric projection
d an oblique projection
e an exploded view
f an elevation

1.3 Write the full forms, in words, of the abbreviations and shortened terms below. Look at A and B opposite and Appendix I on page 98 to help you.

1 GA ....
2 CAD .....-..... ....
3 dwg .....
4 3D .....-.....
5 section .....-.....
6 1:50 ....

1.4 Complete the sentences, taken from conversations about drawings, using the words and abbreviations in the box. Look at A and B opposite and Appendix I on page 98 to help you.

3D	detail	elevation	GA	plan	scale	schematic	section

1 We need a ..... through the bridge, showing the profile of the deck.
2 The only drawing we have is the ..... , which is 1:100, so it obviously doesn't show things in detail.
3 On drawing 12, there's a large ..... of the entire top deck of the ship.
4 This is the ..... showing the front face of the tower.
5 Modern CAD systems can produce ..... drawings that look almost as realistic as photographs.
6 We don't need dimensions and positions at this stage. We just need a ..... showing how many branches come off the main supply pipe.
7 We don't have a proper drawing. We've just got a rough sketch, which is not to ..... .
8 The fixings aren't shown on the 1:50 general arrangement. But there's a ..... , at 1:5, on drawing 42.

Over to you

Imagine you are in a meeting at the start of a project. You and your colleagues are about to begin work on the design of a device, installation or structure you're familiar with. What types of drawing will be needed to communicate the design?