

# 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                     | a a plan                  |
| 2 a 2D view inside an object, as if it is cut through    | b a section               |
| 3 a 2D view, looking down on top of an object            | c an isometric projection |
| 4 a 3D view, showing an assembly taken to pieces         | d an oblique projection   |
| 5 a 3D view, with the 2D face of the object at the front | e an exploded view        |
| 6 a 3D view, with a corner of the object at the front    | 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?



- **Present time: present simple, present continuous, present perfect simple, present perfect continuous, stative verbs**

## Present simple

<b>Form</b>	statement: I/you/we/they <b>travel</b> ... negative: I/you/we/they <b>don't travel</b> ... question: <b>Do</b> I/you/we/they <b>travel</b> ...?	He/she/it <b>travels</b> ... He/she/it <b>doesn't travel</b> ... <b>Does</b> he/she/it <b>travel</b> ...?
<b>Use</b>	<b>Example</b>	
Current habits	Toby <b>walks</b> to work.	
To talk about how often things happen	Angela <b>doesn't visit</b> us very often.	
Permanent situations	Carlo <b>works</b> in a travel agent's.	
States	<b>Do you have</b> an up-to-date passport?	
General truths and facts	Poland <b>is</b> in the European Union.	



- We can also use *do/does* in present simple statements for emphasis.  
'You *don't* like going by bus, *do* you?' 'Actually, I **do like** going by bus for short distances.'  
The bus *isn't* quicker than the train but it **does stop** right outside the factory.

## Present continuous

<b>Form</b>	statement: I <b>am driving</b> ... You/we/they <b>are driving</b> ... He/she/it <b>is driving</b> ... negative: I' <b>m not driving</b> ... You/we/they <b>aren't driving</b> ... or You' <b>re/we're/they're not driving</b> ... He/she/it <b>isn't driving</b> ... or He's/she's/it's <b>not driving</b> ... question: <b>Am I driving</b> ...? <b>Are you/we/they driving</b> ...? <b>Is he/she/it driving</b> ...?
<b>Use</b>	<b>Example</b>
Actions happening now	Mike <b>is driving</b> to work at the moment.
Temporary series of actions	Taxi drivers <b>aren't stopping</b> at the train station because of the roadworks.
Temporary situations	<b>Are they staying</b> in a hotel near the Olympic stadium?
Changing and developing situations	Holidays abroad <b>are becoming</b> increasingly popular.
Annoying habits (usually with <i>always</i> )	Dad <b>is always cleaning</b> the car when I want to use it!

## Present perfect simple

<b>Form</b>	<i>have/has</i> + past participle statement: I/you/we/they <b>have flown</b> ... negative: I/you/we/they <b>haven't flown</b> ... question: <b>Have</b> I/you/we/they <b>flown</b> ...?	He/she/it <b>has flown</b> ... He/she/it <b>hasn't flown</b> ... <b>Has</b> he/she/it <b>flown</b> ...?
<b>Use</b>	<b>Example</b>	
Situations and states that started in the past and are still true	She's <b>had</b> her motorbike for over six years.	
A series of actions continuing up to now	We' <b>ve travelled</b> by taxi, bus, plane and train – all in the last twenty-four hours!	
Completed actions at a time in the past which is not mentioned	<b>Have you ever flown</b> in a helicopter?	
Completed actions where the important thing is the present result	I' <b>ve booked</b> the coach tickets.	





- Phrases such as *It's the first/second/etc time ...* are followed by the present perfect simple.  
✓ *It's the second time I've been on a plane.*



- Speakers of American English often use the past simple in situations where speakers of British English would use the present perfect simple.  
**US:** *We already saw the Sphinx.*  
**UK:** *We've already seen the Sphinx.*
- Speakers of American English use *gotten* as the past participle of the verb 'get', except when 'get' means 'have' or 'possess'. Speakers of British English only ever use *got*.  
**US:** *We've already gotten Dan a new backpack for his summer vacation.*  
**UK:** *We've already got Dan a new rucksack for his summer holiday.*

### Present perfect continuous

<b>Form</b>	statement: I/you/we/they <b>have been travelling</b> ...	He/she/it <b>has been travelling</b> ...
	negative: I/you/we/they <b>haven't been travelling</b> ...	He/she/it <b>hasn't been travelling</b> ...
	question: <b>Have</b> I/you/we/they <b>been travelling</b> ...?	<b>Has</b> he/she/it <b>been travelling</b> ...?

Use	Example
Actions continuing up to the present moment	<i>We <b>have been driving</b> for hours. Can't we have a break soon?</i>
Actions stopping just before the present moment	<i>I'm out of breath because I've <b>been running</b> to get here in time.</i>



- The present perfect continuous is often used with words and phrases like *all day/week/year/etc, for, since, just, etc.*  
✓ *We've been walking for hours and I need a rest.*
- The present perfect continuous is **not** normally used with the words *ever* and *never*.  
✓ *Have you ever flown in a helicopter before?*  
X ~~*Have you ever been flying in a helicopter before?*~~
- Sometimes there is very little difference in meaning between the present perfect simple and the present perfect continuous and sometimes there is a difference in meaning.  
✓ *I have worked at the airport for four years. = I have been working at the airport for four years.*  
✓ *I have read that book about cruise ships. (I have finished it.) I have been reading that book about cruise ships. (I have not finished it.)*

### Stative verbs

Stative verbs are not normally used in continuous tenses because they don't describe actions.  
✓ *I see what you mean.*  
X ~~*I am seeing what you mean.*~~

Use	Example
Stative verbs often refer to:	
thinking	<i>believe, imagine, know, mean, think, understand</i>
existence	<i>be, exist</i>
emotions	<i>hate, like, love, need, prefer, satisfy, want</i>
the human senses	<i>hear, see, smell, sound, taste</i>
appearance	<i>appear, look, resemble, seem</i>
possession and relationships between things	<i>belong to, consist of, have, include, involve, own</i>



- Some verbs (such as *be, have, imagine, look, see, smell, taste, think*) are stative with one meaning and non-stative with another meaning.  
✓ *Do you have your plane ticket with you?* (state: possession)  
✓ *Are you having lunch at the moment?* (action: eating)

**A** Circle the correct word or phrase.

- 1 Elizabeth **usually goes / is usually going** to bed at around eleven o'clock.
- 2 Dan **talks / is talking** on the other phone right now.
- 3 We **don't eat / aren't eating** any meat at the moment as we're both on a diet.
- 4 **Does air travel get / Is air travel getting** increasingly safe?
- 5 My mum **calls / is calling** me every weekend without fail.
- 6 How much **do babysitters generally earn / are babysitters generally earning**?
- 7 **You always come / You're always coming** up with excuses for not having done your homework. It's so annoying!
- 8 **I don't go / I'm not going** out much during the week but **I always try / I'm always trying** to go out somewhere on Saturday night.
- 9 No, the train **does stop / is stopping** at Cirencester on Saturdays.
- 10 My mum **takes / is taking** part in ice-skating competitions almost every weekend.

**B** Rewrite correctly. Change the words or phrases in bold.

- 1 My dad **is often getting up** late on Saturday mornings.  
.....
- 2 **Are you speaking** any other languages apart from English?  
.....
- 3 **I already buy** all my Christmas presents and it's only October!  
.....
- 4 It's the first time **I'm ever having** a party at home.  
.....
- 5 Actually, I think Darren **does works** quite hard sometimes.  
.....
- 6 Carlo **is never eating** Chinese food before.  
.....
- 7 Sean **already books** a table for tonight.  
.....
- 8 **Needs Melanie** any help painting her new flat?  
.....

**C** Complete using the correct form of the verb in brackets.

- 1 It's the first time ..... (I / **ever** / **eat**) octopus!
- 2 Sandy ..... (**not** / **see**) his sister since she went to university.
- 3 They ..... (**go**) on holiday to Spain and won't be back until the end of the month.
- 4 Poor Tracy! She ..... (**write**) that essay for hours now and she still hasn't finished!
- 5 ..... (**you** / **ever** / **meet**) anyone famous?
- 6 ..... (**I** / **try**) to get in touch with Jenny all morning but I can't find her anywhere.
- 7 ..... (**I** / **not finish**) the book yet so I can't tell you what happens.
- 8 ..... (**you** / **already** / **decide**) where you're going this summer?
- 9 ..... (**We** / **live**) here for the last six years.
- 10 ..... (**I** / **never** / **hear**) such nonsense!

