

CAMBRIDGE

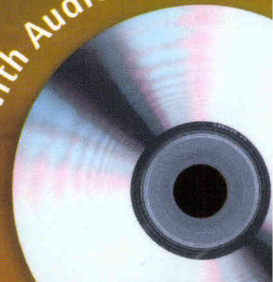
Professional English

Cambridge English for Engineering

Mark Ibbotson

Series Editor: Jeremy Day

With Audio CDs



	Skills	Language	Texts
UNIT 1	Describing technical functions and applications	Words stemming from <i>use allow, enable, permit, ensure, prevent</i>	Listening GPS applications Space elevators Advantages of a new pump A guided tour
Technology in use page 6	Explaining how technology works Emphasising technical advantages Simplifying and illustrating technical explanations	Verbs to describe movement Verbs and adjectives to describe advantages Adverbs for adding emphasis Phrases for simplifying and rephrasing	Reading Space elevators Otis lift technology Pile foundations
UNIT 2	Describing specific materials	Common materials Categories of materials	Listening An environmental audit Specialised tools High-performance watches
Materials technology page 14	Categorising materials Specifying and describing properties Discussing quality issues	<i>consist of, comprise, made of, made from, made out of</i> Properties of materials Phrases for describing requirements Compounds of <i>resistant</i> Adverbs of degree	Reading Materials recycling Regenerative brakes Kevlar
UNIT 3	Describing component shapes and features	Shapes and 3D features Words to describe machining	Listening A project briefing Electrical plugs and sockets Metal fabrication UHP waterjet cutting Options for fixing Cluster ballooning
Components and assemblies page 22	Explaining and assessing manufacturing techniques Explaining jointing and fixing techniques Describing positions of assembled components	Phrases for describing suitability Verbs and nouns to describe joints and fixings Prepositions of position	Reading Cutting operations Flow waterjet technology Joints and fixings The flying garden chair
UNIT 4	Working with drawings	Views on technical drawings	Listening A drawing query Scale
Engineering design page 30	Discussing dimensions and precision Describing design phases and procedures Resolving design problems	Phrases related to <i>scale</i> Phrases related to <i>tolerance length, width, thickness, etc.</i> Drawing types and versions Verbs for describing stages of a design process Verbs and nouns for describing design problems	A floor design Design procedures Revising a detail Reading Superflat floors Queries and instructions
UNIT 5	Describing types of technical problem	Verbs and adjectives for describing technical problems	Listening A racing car test session Test session problems Technical help-line Tyre pressure problems A maintenance check
Breaking point page 38	Assessing and interpreting faults Describing the causes of faults Discussing repairs and maintenance	Words for describing faults and their severity Phrases for describing certainty/uncertainty Adjectives with prefixes for describing technical problems Verbs for describing repairs and maintenance	Reading Air Transat Flight 236

	Skills	Language	Texts
UNIT 6	Discussing technical requirements	Phrases for referring to issues	Listening
Technical development page 46	Suggesting ideas and solutions	Phrases for referring to quantity and extent	Simulator requirements and effects
	Assessing feasibility	Phrases for suggesting solutions and alternatives	Lifting options
	Describing improvements and redesigns	Idioms to describe feasibility	Hole requirements and forming
		Verbs with <i>re...</i> to describe modifications	A project briefing
		Idioms to describe redesigning	Reading
			Mammoth problem
UNIT 7	Describing health and safety precautions	Types of industrial hazards	Listening
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	Discussing regulations and standards	Phrases for emphasising importance	Hazard analysis
	Working with written instructions and notices	Terms to describe regulations	Live line precautions
		Common language on safety notices	Safety training
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UNIT 8	Describing automated systems	Words to describe automated systems	Listening
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	Giving approximate figures	Words and phrases for approximating numbers	Electricity demand and supply problems
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			Internal reviews
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UNIT 9	Explaining tests and experiments	Words to describe test types	Listening
Theory and practice page 70	Exchanging views on predictions and theories	Words and phrases for stating assumptions	Vehicle design and testing
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	Describing capabilities and limitations	Words and phrases to describe degrees of difference	TGV world speed record
		Words to describe capabilities and limits	The story of John Paul Stapp
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			The rocket sled proposal

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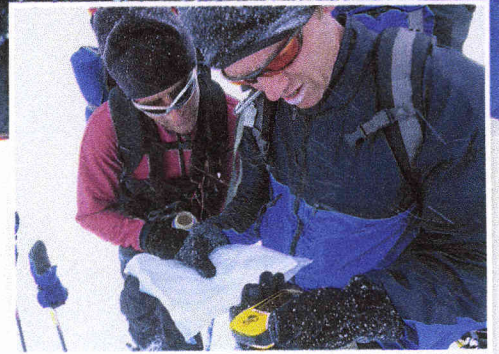
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UNIT 1

Technology in use

- Describing technical functions and applications
- Explaining how technology works
- Emphasising technical advantages
- Simplifying and illustrating technical explanations



Describing technical functions and applications

1 a In pairs, think about two or three products you use regularly and discuss the following questions.

- What are the main functions of the products? (What do they do?)
- What are their different applications? (What are they used for?)

b What do you know about Global Positioning System (GPS) devices? In pairs, describe their main function, and give some examples of different applications of GPS devices.

2 a ▶ 1.1 Paula, a design engineer for a GPS manufacturer, is discussing product development with José, a senior manager new to the company. Listen to the conversation and complete the following notes.

- the primary application of GPS (1) _____
- associated applications Tracking systems for (2) _____
Tracking systems for (3) _____
- more creative features (4) _____ alarms
- not technical innovations (5) _____ buttons
(6) _____ the technology

b Complete the following extracts from the discussion with words that come from use.

- 1 *Then you've got associated applications, _____ that are related to navigating ...*
- 2 *... tracking systems you can _____ for monitoring delivery vehicles ...*
- 3 *... from the end-_____ point of view, accuracy is no longer the main selling point. Most devices are accurate enough. The key is to make them more _____ .*

3 a Match the GPS applications (1–6) to the descriptions (a–f).

1 topographical surveying	a navigation and safety at sea
2 geological exploration	b setting out positions and levels of new structures
3 civil engineering	c mapping surface features
4 avionics equipment	d applications in mining and the oil industry
5 maritime applications	e highway navigation and vehicle tracking
6 GPS in cars and trucks	f air traffic control, navigation and autopilot systems

b In pairs, practise explaining the applications of GPS in Exercise 3a to a colleague who has limited knowledge of the devices using the following phrases.

used for -ing used to useful for another / a similar use

4 a Complete the following extracts from the conversation by underlining the correct words.

- 1 ... there's a setting on the GPS that **allows/prevents** it to detect the movement ...
- 2 ... an alarm sounds to warn you, and **allows/prevents** the boat from drifting unnoticed.
- 3 ... and **enables/ensures** that you don't lose track of where you were, which then **enables/ensures** you to turn round and come back to the same point ...

b Match the words in Exercise 4a to the synonyms.

- 1 _____ = makes sure 2 _____ / _____ = permits 3 _____ = stops

c Complete the following extract from the user's manual of a GPS device using the verbs in Exercise 4a. Sometimes, more than one answer is possible.

INTRODUCTION

The core function of your GPS receiver is to (1) _____ you to locate your precise geographical position. To (2) _____ the device to function, it receives at least three signals simultaneously from the GPS constellation – 30 dedicated satellites which (3) _____ receivers can function anywhere on earth. To (4) _____ extremely precise positioning and (5) _____ errors from occurring due to external factors, this device is designed to receive four separate signals (see enhanced system accuracy on page 18).

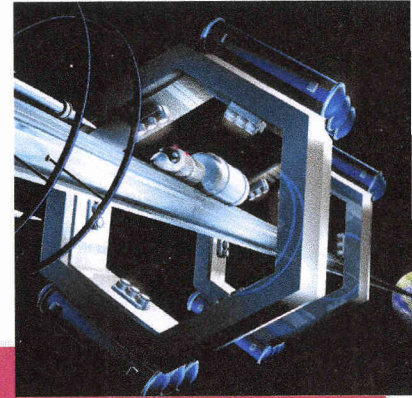
5 In pairs, explain the main functions and applications of a product made by your company or a product you know about. Student A, you are an engineering manager; Student B, you are a new employee. Use the language from this section and the phrases in the box. Swap roles and practise again.

I see. So ... OK. In other words ... So you mean ...

Explaining how technology works

6 a In pairs, look at the picture and discuss the following questions.

- How do you think a space elevator would work?
- What could it be used for?
- What technical challenges would it face?
- How seriously do you think the concept of space elevators is being taken at present?



b Read the following article and compare it to your answers in Exercise 6a.

Space elevators: preparing for takeoff

IN his 1979 novel, *The Fountains of Paradise*, Arthur C Clarke wrote about an elevator **connecting** the earth's surface to space. Three decades later, this science-fiction concept is preparing to take off in the real world. NASA has launched the Space Elevator Challenge, a competition with a generous prize fund, and several teams and companies are working on serious research projects aimed at winning it.

As its name suggests, a space elevator is designed to **raise** things into space. Satellites, components for space ships, supplies for astronauts in space stations, and even astronauts themselves are examples of payloads that could be **transported** into orbit without the need

for explosive and environmentally unfriendly rockets. However, the altitude of orbital space – a colossal 35,790 km above the earth – is a measure of the challenge facing engineers. How could such a height be reached?

The answer is by using an incredibly strong and lightweight cable, strong enough to **support** its own weight and a heavy load. The design of such a cable is still largely theoretical. This would be **attached** to a base station on earth at one end and a satellite in geostationary orbit (fixed above a point on the equator) at the other. Lift vehicles would then **ascend** and **descend** the cable, **powered** by electromagnetic force and **controlled** remotely.

c Match the verbs (1–9) from the text in Exercise 6b to the definitions (a–i).

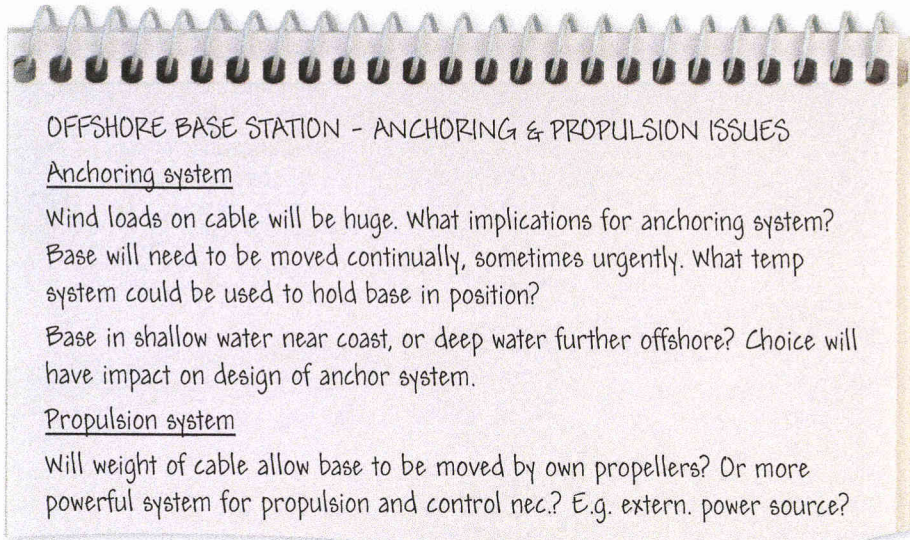
1 connecting	a carried (objects, over a distance)
2 raise	b hold something firmly / bear its weight
3 transported	c climb down
4 support	d provided with energy / moved by a force
5 attached	e joining
6 ascend	f driven / have movement directed
7 descend	g fixed
8 powered	h climb up
9 controlled	i lift / make something go up

7 a James, an engineer, is giving a talk on space elevators. Complete his notes using the correct form of the verbs (1–9) in Exercise 6c.

Space Elevators

- Challenge of (1) connecting a satellite to earth by cable is significant.
- To (2) _____ its own weight, and be securely (3) _____ at each end, cable would need phenomenal strength-to-weight ratio.
- How could vehicles be (4) _____ into space, up cable?
- Self-contained energy source problematic, due to weight (heavy fuel or batteries required to (5) _____ vehicle).
- Two possible ways round problem:
 - 1 Transmit electricity wirelessly. But technique only at research stage.
 - 2 Solar power. But would only allow vehicle to (6) _____ slowly. Not necessarily a problem, as car could be controlled remotely, allowing it to (7) _____ payloads unmanned.

- b** ▶ 1.2 Listen to part of James' talk and check your answers in Exercise 7a.
- c** What kinds of word are missing from the notes? In pairs, compare the audioscript on page 86 with the notes in Exercise 7a.
- 8 a** Some space elevator designs propose an offshore base station. In pairs, discuss how such a system might work using words in Exercise 6c. What advantages might an offshore base have compared with a land base?
- b** ▶ 1.3 James goes on to discuss offshore base stations. Listen to the talk and answer the following questions.
- 1 How would an offshore base station be supported?
 - 2 What would the function of its anchors be?
 - 3 How would payloads reach the base station?
 - 4 What problem would a mobile base station help to prevent?
 - 5 What would the procedure be if there was an alert?
- 9 a** You are members of a space elevator research team designing a concept for offshore base stations. In pairs, analyse the notes below, which were made during a briefing given by your manager. Imagine you are giving a presentation. Begin by reading out the abbreviated notes in full.



- b** In pairs, discuss the questions raised in the notes and think of some suitable solutions for the anchoring system and the propulsion system. At this stage, these should be overall concepts, not detailed designs. Remember to make notes.
- c** In small groups, take turns to give a short talk using your notes to explain how the systems work, in general terms. Imagine you are speaking to a small group of colleagues, including your manager.
- d** Write two or three paragraphs to summarise your talk. These will be included in your manager's longer report on offshore base stations.

Emphasising technical advantages

10 In pairs, discuss the term *technical advantage*. Give some examples of technology you are familiar with.

11 a Read the first paragraph of some promotional literature from Otis, a leading elevator company. What is the Gen2™ system?

b Match the words (1–6) from the text in Exercise 11a to the synonyms (a–f).

1 conventional	a decreases
2 eliminates	b better / the best
3 superior	c improved
4 energy-efficient	d standard, usual
5 enhanced	e gets rid of
6 reduces	f has low energy consumption

c Complete the following text using the correct form of the words (1–6) in Exercise 11b. You will need to use some words more than once.

OTIS Unique Flat Belt

The key to Otis's patented drive technology

At the heart of the Gen2™ elevator system is a flat belt (developed by and unique to Otis). It is just 3mm thick. Yet it is stronger than **conventional** steel cables. It lasts up to three times longer. And it has enabled Otis to completely re-invent the elevator. The flat, coated-steel belt totally **eliminates** the metal-to-metal effect of conventional systems. Coupled with a smooth-surface crowned machine sheave, the result is exceptionally quiet operation and **superior** ride comfort. Furthermore, the flexible flat belt enables a more compact, **energy-efficient** machine, which can be contained in the hoistway. This **enhanced** technology **reduces** building and system operating costs, and frees up valuable space.



Protecting the environment

Neither the belt nor the gearless machine, with its permanently sealed bearings, requires any lubrication so the Gen2™ system is cleaner for the environment. The highly (1) **energy-efficient** gearless machine, with its permanent-magnet synchronous motor, (2) _____ power consumption by as much as 50 percent over (3) _____ geared machines and 15 percent over other machines with permanent-magnet motors of axial construction.



Reliable by design

Long-lasting flat belts, smooth, crowned sheaves and minimal moving parts in the gearless machine dramatically (4) _____ wear and increase durability and efficiency. To further (5) _____ reliability and safety, Otis developed the Pulse™ system, which continually monitors the status of the belts' steel cords. Unlike visual inspections of (6) _____ steel ropes, the Pulse™ system automatically detects and reports belt faults to maintenance personnel for rapid response, providing owners with greater peace of mind. With flat belt technology, Otis has created a (7) _____ system that (8) _____ the need for a machine room, is quiet, clean, reliable and economical, and easy to install and maintain.

d In pairs, summarise the advantages of the flat belt system. Discuss durability, wear, noise, space, cleanliness, efficiency, automation, maintenance and cost.

12 a Complete the following tips on emphasising technical advantages using the words in the box.

conventional eliminated enhanced reduced superior

When describing technical advantages, it's useful to emphasise ...

- (1) _____ performance, compared with the older model of the same product.
- negative issues that have been (2) _____, or completely (3) _____.
- special features that differentiate the technology from (4) _____ systems.
- performance levels that make the technology (5) _____ to the competition.

b ▶ 1.4 Stefan, an engineer, is briefing some sales colleagues on the advantages of a new pump design. Listen to the briefing and match the tips (a–d) in Exercise 12a to the extracts (1–4).

Extract 1 _____ Extract 2 _____ Extract 3 _____ Extract 4 _____

c Complete the following sentences from the briefing by underlining the correct emphasising word.

- We've come up with a completely/significantly unique profile.
- It completely/dramatically reduces vibration.
- Machines like these can never be entirely/highly free from vibration.
- The new design runs dramatically/extremely smoothly.
- Another advantage of the new profile is that it's considerably/entirely lighter.
- So compared with our previous range, it's highly/totally efficient.
- Trials so far suggest the design is completely/exceptionally durable.
- We expect it to be entirely/significantly more reliable than rival units.

d Match the words in Exercise 12c to the synonyms.

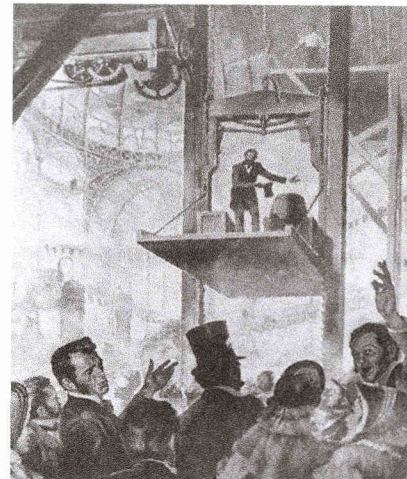
considerably dramatically entirely exceptionally highly totally

- _____ / _____ = completely
- _____ / _____ = significantly
- _____ / _____ = extremely

13 You are Otis engineers back in the 1850s, when elevators were new. In pairs, prepare a short talk to brief your sales colleagues on the advantages of elevators for lifting people and goods. Emphasise the points below, using the phrases and techniques from this section. Remember that people at this time are sceptical about the technology.

Elevators are ...

- safe – a reliable braking system eliminates the danger of a car falling if a cable fails
- simple – they're controlled from the car and are very easy to operate
- convenient – they're easier on the legs than the conventional alternative (stairs)
- valuable – they enhance the value of land by allowing taller buildings on smaller areas



Simplifying and illustrating technical explanations

14 a ▶ 1.5 Richard, a structural engineer, often takes clients on guided tours of their new buildings during construction. He is talking about explaining technical concepts to non-specialists. Listen and answer the following questions.

- 1 What does Richard say about explaining technical concepts?
- 2 What does he mean by *dull* explanations?
- 3 What is *being patronising*?

b In pairs, think of some tips on how to solve the following problems.

- | | |
|---------------------------------|---------------------|
| 1 not being understood | 2 being patronising |
| 3 explaining difficult concepts | 4 sounding dull |

c ▶ 1.6 Richard is giving some advice about the problems in Exercise 14b. Listen and summarise his ideas. Compare his tips with your suggestions.

15 a Richard has made notes for a guided tour of a site. The project is a skyscraper in the early stages of construction. During the tour he explains the technical terms to the non-specialist group. In pairs, discuss the following terms and try to interpret them using everyday language to rephrase them.



SUBSTRUCTURE

- Pile foundations (in general)
- Bored in situ concrete piles
- Pre-cast driven concrete piles
- Pile driver
- Pile auger
- Bentonite

b ▶ 1.7 Richard is giving a tour of a construction site. Listen and make notes of his explanations of the following technical terms. Compare your ideas with his.

- | | | | |
|---------------------|--|------------------------|-------|
| 1 the substructure | the part of the structure below ground | 5 pre-cast piles | |
| 2 a pile foundation | | 6 to drive in (a pile) | |
| 3 to bore (a pile) | | 7 a pile driver | |
| 4 in situ concrete | | 8 a pile auger | |
| | | 9 bentonite | |

c ▶ 1.7 Listen again and compare Richard's explanations with the tips in Exercise 14c. Which techniques did he use? Were they successful?

d Complete the following table using the words in the box.

basically (x2) call effectively essentially imagine other
picture refer **simple** simply

Function	Words / Phrases
1 Simplifying the language	in <u>simple</u> terms / put _____ / in _____ words / _____
2 Simplifying the concept	_____ / _____ / _____
3 Focusing on technical terms	what we _____ / what we _____ to as
4 Illustrating with images	if you _____ / if you _____

e In pairs, practise explaining the technical terms in Exercise 15a using the simplified words and phrases in Exercise 15d.

16

Read the textbook description of two types of pile foundation. Use the words and phrases in Exercise 15d and the following notes to rephrase it.

From a structural perspective, pile foundations can be divided into two categories: end-bearing piles and friction piles.

Like standing on stilts in water

End-bearing piles are driven or bored through soft ground in order to attain firm substrata below. The pile then transmits load vertically to firm subsoil or bedrock. The soft ground surrounding the sides of the pile is structurally redundant.

Imagine water and the seabed

Imagine a leg and a foot

Friction piles counteract downward loads from the structure through frictional resistance between the sides of the pile and the surrounding ground, and do not therefore rely on firm substrata. In some cases, the diameter of the concrete at the pile's base is widened by compaction, allowing the increased area to give the friction pile a certain degree of end-bearing resistance.

Like a nail in wood

17

You are showing a non-specialist visitor around your company and explaining technical concepts using simplified language. In pairs, practise explaining a product or type of technology that you are familiar with.