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UNIT 1: ENGINEERING -WHAT'S IT ALL ABOUT?

TT	Chuẩn đầu ra của chương	CĐR HP
1	Liệt kê được các ngành kỹ thuật bằng tiếng Anh.	1
2	Biết tra nghĩa của các từ chuyên ngành, sử dụng từ điển chuyên ngành hoặc internet	2

Vocabulary

New word	Pronunciation	Meaning
1. engineering (n)	/endʒɪ'nɪərɪŋ/	kỹ thuật, kỹ nghệ, công trình
2. branch (n)	/brɑːnt/	nhánh (sông), ngã (đường), chi nhánh (ngân hàng)
3. combine (v)	/kəm'baɪn/	kết hợp, phối hợp
4. activity (n)	/æk'tɪvɪti/	sự hoạt động, sự nhanh nhẹn
5. concerned (adj)	/kən'səːnd/	có liên quan, có dính líu
6. deal (v)	/diːl/	giải quyết, có liên quan đến
7. generation (n)	/dʒenə'reɪʃən/	sự sinh ra, sự phát điện
8. distribution (n)	/dɪstrɪ'bjuːʃn/	sự phân phối, sự phân phát
9. component (n)	/kəm'pəʊnənt/	thành phần, bộ phận, chi tiết
10. equipment (n)	/i'kwɪpmənt/	thiết bị, dụng cụ
11. communication (n)	/kə'mjuːnɪ'keɪʃn/	sự truyền đạt, thông tin liên lạc
12. marine (adj)	/mə'riːn/	(thuộc) biển, hàng hải
13. aeronautical, aeronautic (adj)	/ɛərə'noːtɪk/	(thuộc) hàng không

14. diagram (n)	/'daɪə,græm/	biểu đồ, sơ đồ
15. knowledge (n)	/'nɒlɪdʒ/	sự hiểu biết, kiến thức
16. guess (n)	/ges/	sự đoán, sự ước chừng
17. purpose (n)	/pɜ:pəs/	mục đích, ý định
18. illustration (n)	/ɪlə'streɪʃən/	sự minh họa
19. identify (v)	/aɪ'dentɪfaɪ/	nhận biết, nhận diện
20. match (v)	/mætʃ/	làm cho phù hợp
21. harbour (n)	/'hɑ:bə/	bến tàu, cảng
22. scanner (n)	/'skænə/	máy quét
23. provide (v)	/prə'vaɪd/	cung cấp, chu cấp
24. refrigeration	/rɪ,frɪdʒə'reɪʃən/	sự làm lạnh, kỹ thuật làm lạnh
25. mechanical (adj)	/mi'kænikəl/	(thuộc) máy móc, cơ khí
26. electrical (adj)	/ɪ'lektrɪkəl/	(thuộc) điện
27. lighting (n)	/'laɪtɪŋ/	sự thắp đèn, việc chiếu sáng
28. heating(n)	/'hi:tɪŋ/	sự đốt nóng, sự sấy
29. ventilation (n)	/ventl'eɪʃən/	sự thông gió, sự thông hơi
30. air-conditioning	/eə(r)-kən'dɪʃənɪŋ/	sự điều hòa không khí
31. lift	/lɪft/	thang máy

Grammar

- to deal with something/ somebody: Giải quyết vấn đề....

Example: *Mechanical engineering deals with machines.*

- be concerned with something/ somebody: quan tâm đến, dính líu đến....

Example: *Mechanical engineers are concerned with machines.*

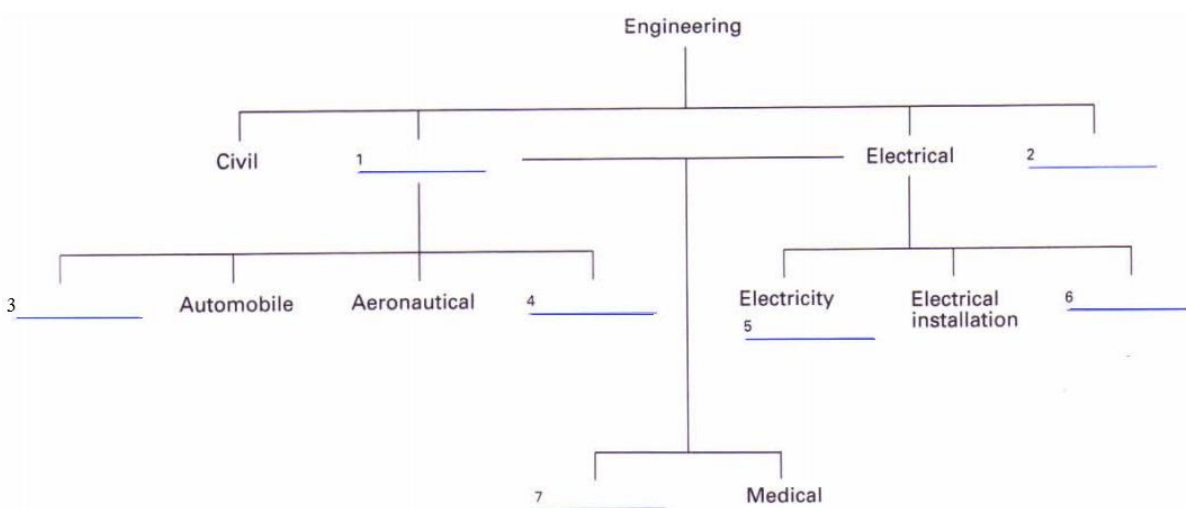
Tuning-in

Task 1 List the main branches of engineering. Combine your list with others in your group. Then read this text to find out how many of the branches listed are mentioned.

Engineering is largely a practical activity. It is about putting ideas into action. Civil engineering is concerned with making bridges, roads, airports, etc. Mechanical engineering deals with the design and manufacture of tools and machines. Electrical engineering is about the
5 generation and distribution of electricity and its many applications. Electronic engineering is concerned with developing components and equipment for communications, computing, and so on.

Mechanical engineering includes marine, automobile, aeronautical, heating and ventilating, and others. Electrical engineering includes
10 electricity generating, electrical installation, lighting, etc. Mining and medical engineering belong partly to mechanical and partly to electrical.

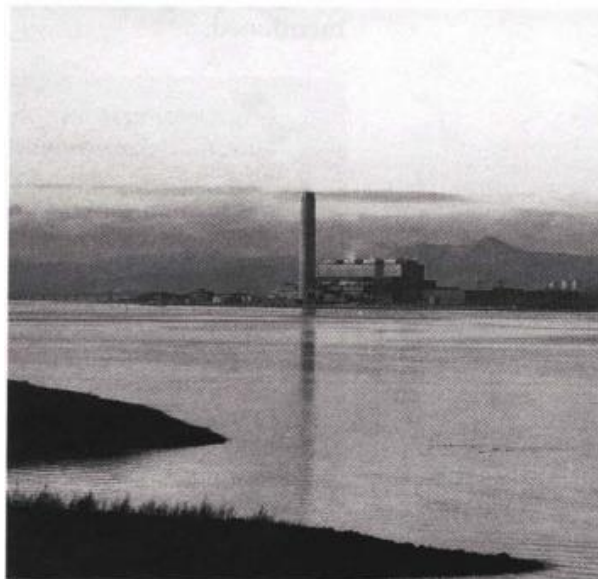
Task 2 Complete the blanks in this diagram using information from the text.



Reading Introduction

In your study and work, it is important to think about what you are going to read before you read. This helps you to link old and new knowledge and to make guesses about the meaning of the text. It is also important to have a clear purpose so that you choose the best way to read. In this book, you will find tasks to make you think before you read and tasks to help you to have a clear purpose when you read.

Task 3 Study these illustrations. They show some of the areas in which engineers work. Can you identify them? What kinds of engineers are concerned with these areas - electrical, mechanical, or both?





Task 4 Now read the following texts to check your answers to Task 3. Match each text to one of the illustrations above.

Transport: Cars, trains, ships, and planes are all products of mechanical engineering. Mechanical engineers are also involved in support services such as roads, rail track, harbours, and bridges.

Food processing: Mechanical engineers design, develop, and make the
5 machines and the processing equipment for harvesting, preparing and preserving the foods and drinks that fill the supermarkets.

Medical engineering: Body scanners, X-ray machines, life-support systems, and other high-tech equipment result from mechanical and electrical engineers combining with medical experts to convert ideas into
10 life-saving and preserving products.

Building services: Electrical engineers provide all the services we need in our homes and places of work, including lighting, heating, ventilation, air-conditioning, refrigeration, and lifts.

Energy and power: Electrical engineers are concerned with the production
15 and distribution of electricity to homes, offices, industry, hospitals,
colleges and schools, and the installation and maintenance of the
equipment involved in these processes.

Source: Adapted from Turning ideas in to action, Institution of Mechanical Engineers, and
Engineering a Career, Institution of Electronics and Electrical Incorporated Engineer.

Language study *deals/is concerned with*

What is the link between column A and column B?

A	B
mechanical	machines
electrical	electricity

Column A lists a branch of engineering or a type of engineer. Column B lists things they are concerned with. We can show the link between them in a number of ways:

- 1 *Mechanical engineering deals with machines.*
- 2 *Mechanical engineers deal with machines.*
- 3 *Mechanical engineering is concerned with machines.*
- 4 *Mechanical engineers are concerned with machines.*
- 5 *Machines are the concern of mechanical engineers.*

Task 5 Match each item in column A with an appropriate item from column B and link the two in a sentence.

A	B
1 marine	a air-conditioning
2 aeronautical	b roads and bridges

3	heating and ventilating	c	body scanners
4	electricity generating	d	cables and switchgear
5	automobile	e	communications and equipment
6	civil	f	ships
7	electronic	g	planes
8	electrical installation	h	cars and trucks
9	medical	i	power stations

Word study: *Word stress*

Words are divided into syllables. For example:

engine en.gine

engineer en.gin.eer

engineering en.gin.eer.ing

Each syllable is pronounced separately, but normally only one syllable is stressed. That means it is said more slowly and clearly than the other syllables. We say 'engine but engin'eer. A good dictionary will show the stressed syllables.

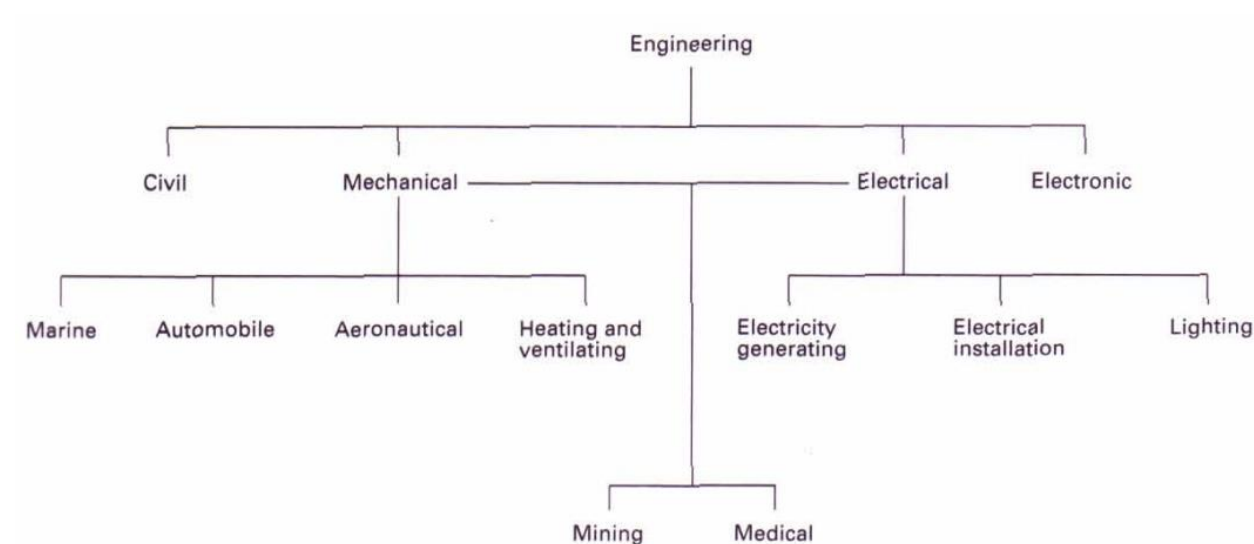
Task 6 Listen to these words. Try to mark the stressed syllables.

- 1** machinery
- 2** Mechanical
- 3** Machine
- 4** Install
- 5** Installation
- 6** Electricity
- 7** Electrical

- 8 Electronics
- 9 Aeronautical
- 10 ventilation

Writing

Task 7 Fill in the gaps in the following description of the different branches of engineering using information from this diagram and language you have studied in this unit.



The main branches of engineering are civil, ¹ _____, ² _____, and electronic. Mechanical engineering is ³ _____ ⁴ _____ machinery of all kinds. This branch of engineering includes ⁵ _____, automobile, ⁶ _____, and heating and ventilating. The first three are concerned with transport: ⁷ _____, cars and planes. The last ⁸ _____ with air-conditioning, refrigeration. etc.

Electrical engineering deals with ⁹ _____ from generation to use. Electricity generating is concerned with ¹⁰ _____ stations. Electrical installation deals ¹¹ _____ cables, switchgear, and connecting up electrical equipment.

Two branches of engineering include both ¹² _____ and ¹³ _____ engineers. These are mining and ¹⁴ _____ engineering. The former deals with mines and mining equipment, the latter with hospital ¹⁵ _____ of all kinds.

Listening

Task 8 Listen to these short extracts. To which branch of engineering do these engineers belong?

Task 9 Listen again. This time note the words which helped you decide on your answers.

UNIT 2: ELECTRONIC EQUIPMENT

TT	Chuẩn đầu ra của chương	CĐR HP
1	Thống kê được các thiết bị trong bản vẽ hoặc hồ sơ kỹ thuật.	4

Vocabulary

New word	Pronunciation	Meaning
1. electronic (adj)	/,ɪlek'trɒnɪk/	(thuộc) điện tử
2. appliance (n)	/ə'plaɪəns/	Thiết bị, dụng cụ trong nhà
3. Household (adj, n)	/haʊshəʊld/	Gia đình, nội trợ
4. motor (n)	/məʊtə/	Động cơ
5. washing machine	/wɒʃɪŋ mə'ʃi:n/	Máy giặt
6. machinery (n)	/mə'ʃi:nəri/	Máy móc, thiết bị
7. device (n)	/di'vaɪs/	Thiết bị, dụng cụ, máy móc
8. gadget (n)	/gædʒɪt/	(bộ phận cải tiến) trong máy móc, máy cải tiến
9. vacuum (n)	/vækjuəm/	Chân không
10. cleaner (n)	/kli:nə/	Máy quét, máy hút bụi
11. hairdryer (n)	/heədraɪə/	Máy sấy tóc
12. toothbrush (n)	/tu:θ ,brʌʃ/	Bàn chải đánh răng
13. shaver (n)	/ʃeɪvə/	Dao cạo
14. fan (n)	/fæn/	Cái quạt
15. sewing machine	/Souɪŋ mə'ʃi:n/	Máy may
16. battery (n)	/bætəri/	Pin

Giáo trình Anh văn Chuyên Ngành Điện

17. sensor (n)	/sensə/	Cảm biến
18. pump (n)	/pʌmp/	Máy bơm
19. temperature (n)	/temprətʃə/	Nhiệt độ
20. pressure (n)	/preʃə/	Sức ép, áp lực, áp suất
21. valve (n)	/vælv/	Cái van
22. shock absorber	/Sɒk , əb'sɔ:bə/	Bộ giảm sóc
23. thermometer (n)	/θə'mɒmitə/	Nhiệt kế
24. drum (n)	/drʌm/	Cái trống
25. measure (n)	/medʒə/	Sự đo lường, dụng cụ đo lường
26. function (n)	/'fʌŋkʃən/	Chức năng, nhiệm vụ
27. configuration (n)	/kən'fɪgə'reɪʃən/	Hình thể, hình dạng, cấu hình
28. digital signal	/dɪdʒɪtl signəl/	Tín hiệu số
29. analog signal	/ænələg signəl/	Tín hiệu tương tự
30. Push button	/puʃ bʌtn/	Nút nhấn
31. actuator (n)	/æk.tʃə/	Cơ cấu chấp hành, bộ truyền động, bộ kích thích
32. elevator (n)	/'eləveɪtə(r)/	Thang máy
33. bottling machine	/bɒtliŋ mə'ʃi:n/	Máy rót
34. packaging machine	/pækɪdʒɪ mə'ʃi:n/	Máy đóng gói
35. switch (n)	/swɪtʃ/	Công tắc

2.1. ELECTRONICS IN HOME

Tuning-in

Overview of electronics equipment

Appliances are all the electrical equipment you use to help you do jobs around the house. Most **household appliances** are powered by a **motor**. **Machine** is a general word for electrical equipment. It can be used in household appliances - for example, a washing machine.

Machinery is a general term, used to refer to large industrial machines.

A device is a small, useful machine.

A gadget is an informal word for a small, modern device.

Task 1 Complete the sentences below using these words:

motor device appliances machine

- a. The vacuum cleaner is not working. I think there's something wrong with the It keeps making a funny noise.
- b. It's surprising how much it costs to equip a modern kitchen. The electrical alone will cost at least two thousand pounds.
- c. Sorry, madam, I think this..... is beyond repair. Perhaps you should think of replacing it with a newer model.
- d. Most cars nowadays are fitted with a security of some kind.

Task 2 Match the words with the pictures

Hairdryer

Electric toothbrush

Electric shaver

Digital camera

Fan

Vacuum cleaner

Iron

Sewing machine

Washing machine



Making things work

Task 3 Use the correct form of these verbs below:

press work go run unplug

Q: Do you know how this machine?

A: All you do is just.....this button and it starts automatically.

Q: Where's the lead for this CD player?

A: It..... on batteries. There's no lead.

Q: Why isn't the video working?

A: I..... it earlier and didn't plug it in again.

Q: What's wrong with the lamp?

A: Oh, the bulb..... when I switched it on.

Phrasal verbs

Task 4 Add the correct preposition to the verbs below:

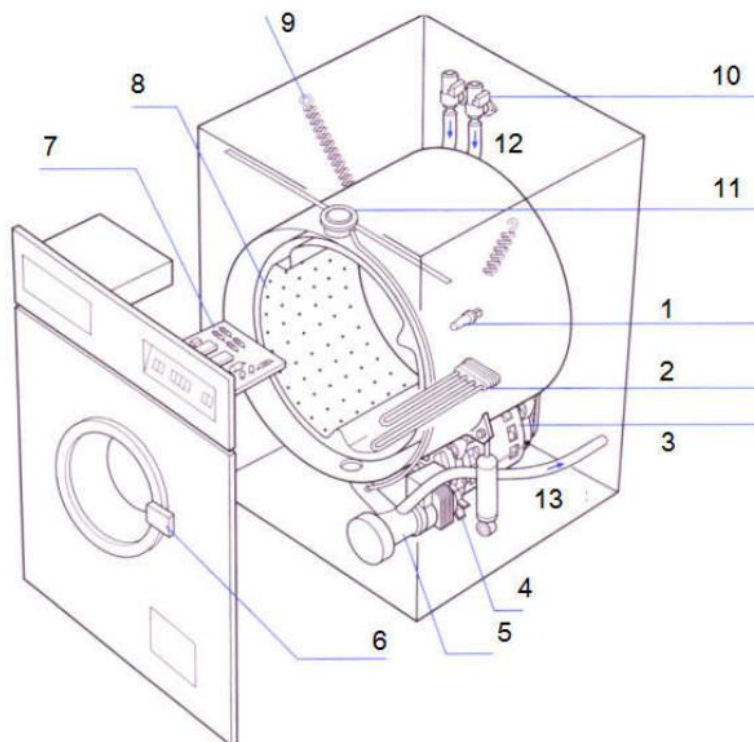
on out/off in up down

- a. Remember to put the lights..... when you go.
- b. Could you turn the volume.....? a bit? I can't hear anything.
- c. It's not surprising the toaster isn't working. You haven't plugged it.....!
- d. Can you turn the volume..... a bit, please? I'm trying to talk to somebody on the phone.

Central heating

Task 5 Fill in the blanks in the diagram using these words below:

*door lock and sensor pump fan motor heater temperature sensor
water out pressure sensor water in solenoid valve drum control unit
shock absorber*



Task 6 Read the following text to find the answers to these questions:

1. What device is used to lock the door?
2. What provides feedback to the control unit about the door position?

Door position

The machine will not start any program unless the door is fully closed and locked. When the door is closed, it completes an electrical circuit which heats up a heat-sensitive pellet. This expands as it gets hot, pushing a mechanical lock into place and closing a switch. The switch signals the control unit that the door is closed and locked. Only when it has received this signal will the control unit start the wash program.

Task 7 Read the following texts and complete the table below:

Control factor	Operating device	Feedback by
----------------	------------------	-------------

Door position	Heat-sensitive pellet	Switch
Water level		
Water temperature		
Wash and spin times		

Water level

When a wash program first starts it has to open the valve which allow the water in. There are usually two of these valves, one for hot water and one for cold. Each must be controlled separately depending on the water temperature needed for that program. The valves are solenoid operated, i.e. they are opened and closed electrically.

The rising water level is checked by the water level sensor. This is a pressure sensor. The pressure of the air in the plastic tube rises as it is compressed by the rising water. The pressure sensor keeps the control unit informed as to the pressure reached and the control unit uses the information to decide when to close the water inlet valves.

Water temperature

The temperature sensor, a type of thermometer which fits inside the washer drum, measures water temperature and signals it to the control unit. The control unit compares it with the temperature needed for the program being used. If the water temperature is too low, the control unit will switch on the heater. The temperature sensor continues to check the temperature and keep the control unit informed. Once the correct temperature is reached, the control unit switches off the heater and moves on to the next stage of the program.

Clock

The control unit includes a memory which tells it how long each stage of a program should last. The times may be different for each program. The electronic clock built into the control unit keeps the memory of the control unit informed so that each stage of each program is timed correctly.

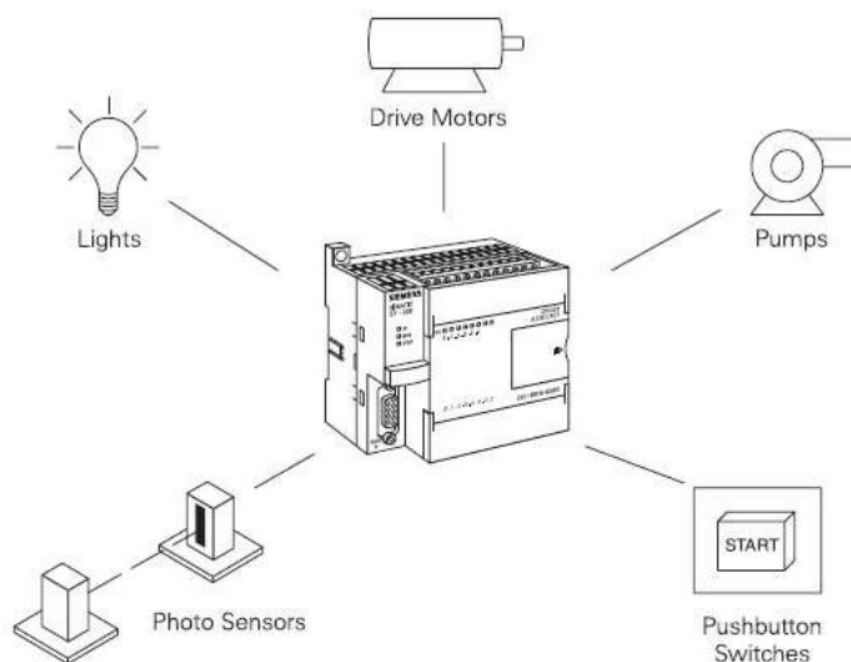
2.2. PLC'S OVERVIEW

Tuning-in

Task 1 Read the text and answer the questions below.

PLC

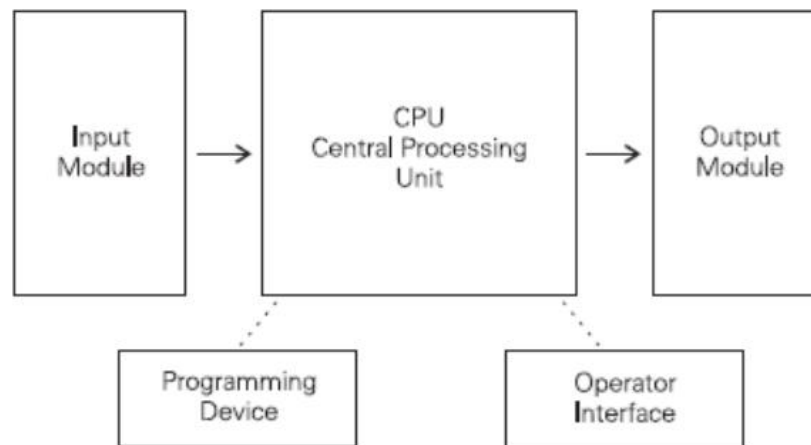
Programmable Logic Controllers (PLCs), also referred to as programmable controllers, are in the computer family. They are used in commercial and industrial applications. A PLC monitors inputs, makes decisions based on its program, and controls outputs to automate a process or machine. This course is meant to supply you with basic information on the functions and configurations of PLCs.



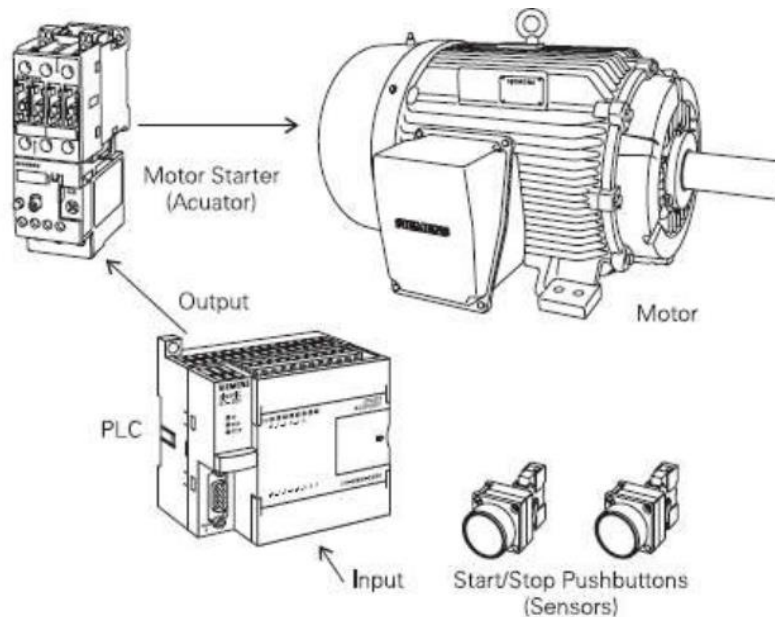
Basic PLC Operation

PLCs consist of input modules or points, a Central Processing Unit (CPU), and output modules or points. An input accepts a variety of digital or analog signals from various field devices (sensors) and converts them into a logic signal that

can be used by the CPU. The CPU makes decisions and executes control instructions based on program instructions in memory. Output modules convert control instructions from the CPU into a digital or analog signal that can be used to control various field devices (actuators). A programming device is used to input the desired instructions. These instructions determine what the PLC will do for a specific input. An operator interface device allows process information to be displayed and new control parameters to be entered.



Pushbuttons (sensors), in this simple example, connected to PLC inputs, can be used to start and stop a motor connected to a PLC through a motor starter (actuator).



Questions:

- 1 What is PLC?
- 2 What are PLCs used in?
- 3 How many parts are PLCs consist of? What are they? And what are the functions of them?
- 4 Give another example like the one in the text.

Work in groups and discuss about the manufacturer of PLCs, the PLC product lines.

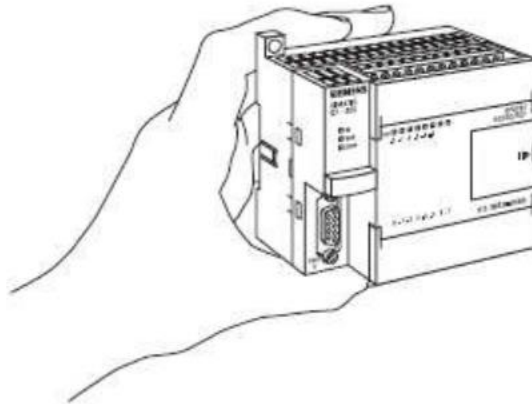
Task 2 Fill in the text in the following description of the product lines in the Simatic S7 family. Use the words below:

*S7-300 S7-400 I/O applications elevators referred PLCs
modules product*

Siemens PLCs: Siemens makes several PLC ...product... lines in the SIMATIC S7 family. They are: S7-200, ..., and S7-400.

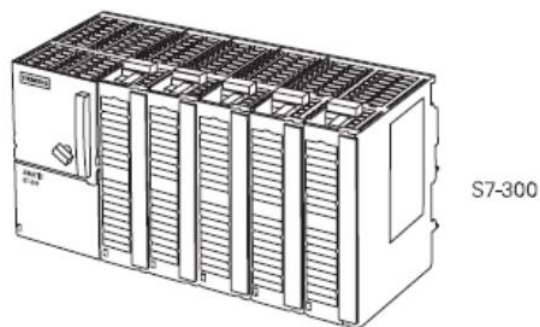
S7-200 The S7-200 is ...referred... to as a micro PLC because of its small size. The S7-200 has a brick design which means that the power

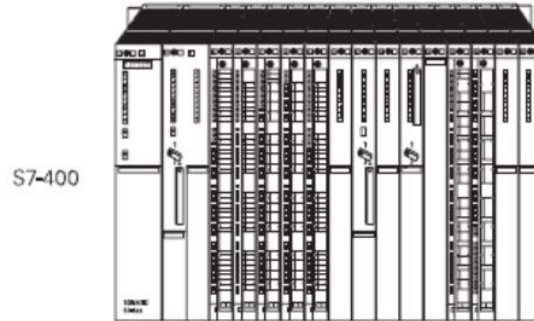
supply and I/O. are on-board. The S7-200 can be used on smaller, stand-alone applications such as elevators, car washes, or mixing machines. It can also be used on more complex industrial applications such as bottling and packaging machines.



S7-300 and S7-400

The S7-300 and S7-400 PLCs are used in more complex ...app. that support a greater number of I/O points. Both plcs are modular and expandable. The power supply and I/O consist of separate ...modules..connected to the CPU. Choosing either the S7-300 or ...S7-400. Depends on the complexity of the task and possible future expansion. Your Siemens sales representative can provide you with additional information on any of the Siemens PLCs.





Work in groups and discuss about the advantages of PLCs.

Here are some ideas about it.

The same, as well as more complex tasks, can be done with a PLC. Wiring between devices and relay contacts is done in the PLC program. Hard-wiring, though still required to connect field devices, is less intensive. Modifying the application and correcting errors are easier to handle. It is easier to create and change a program in a PLC than it is to wire and rewire a circuit.

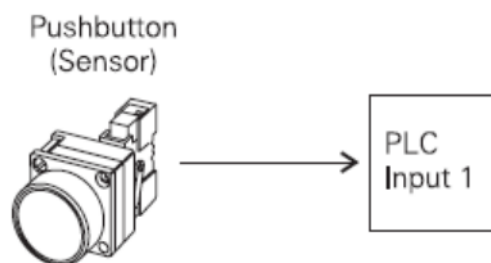
Following are just a few of the advantages of PLCs:

- Smaller physical size than hard-wire solutions.
- Easier and faster to make changes.
- PLCs have integrated diagnostics and override functions.
- Diagnostics are centrally available.
- Applications can be immediately documented.
- Applications can be duplicated faster and less expensively.

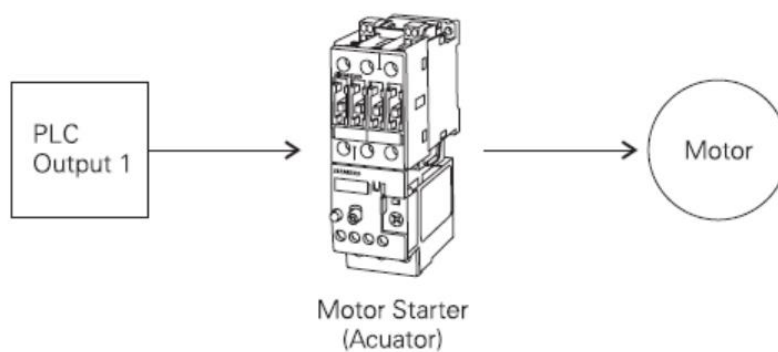
Discuss about the PLC in comparison with other control systems such as: Relay Control System, Electronic Continuous Control System, Computer Control System ...

Some terminology. Make sure you understand the meaning of these words

Sensor

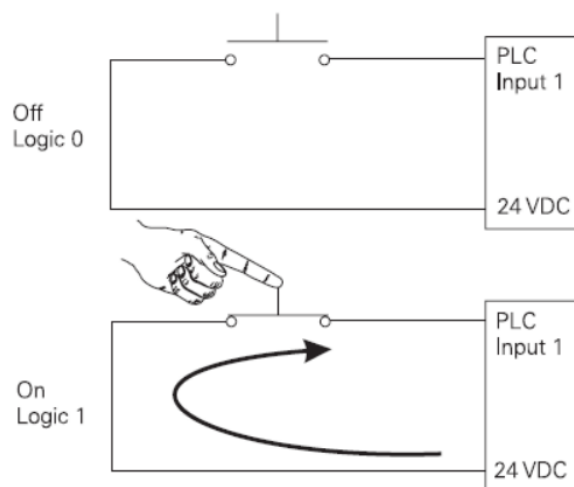
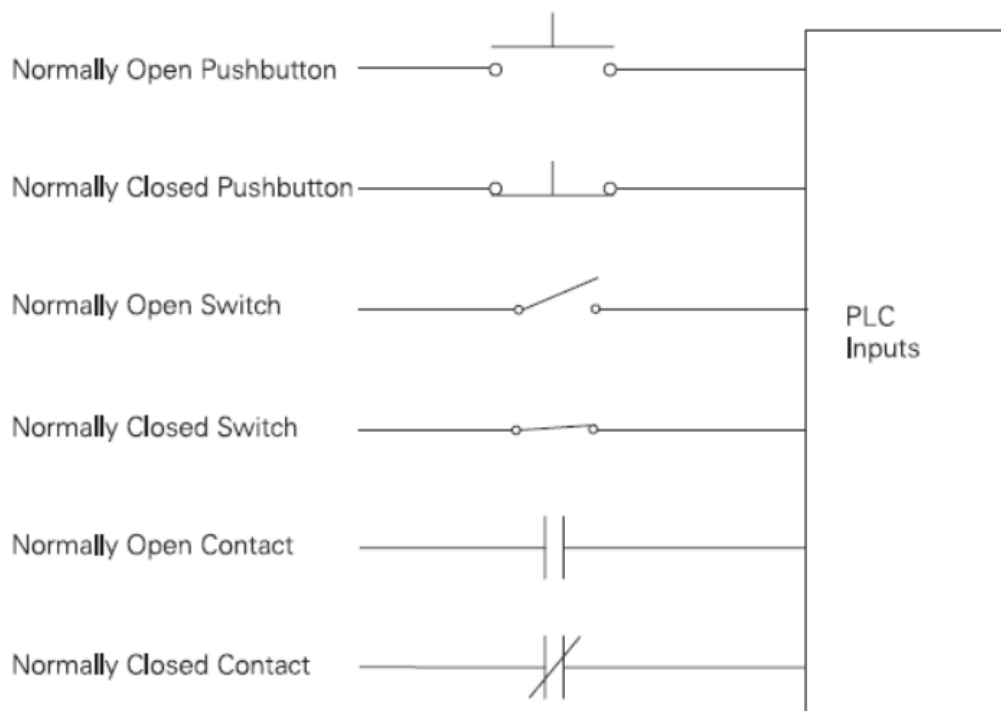


Actuators

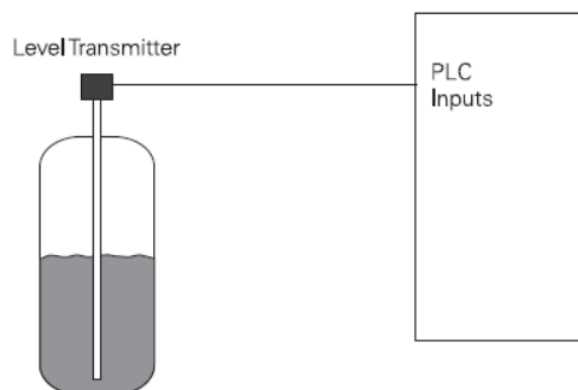


Discrete Input

Digital input

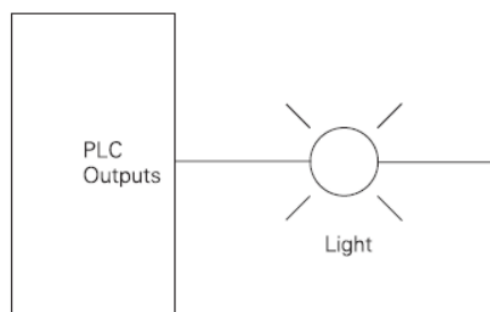


Analog Inputs

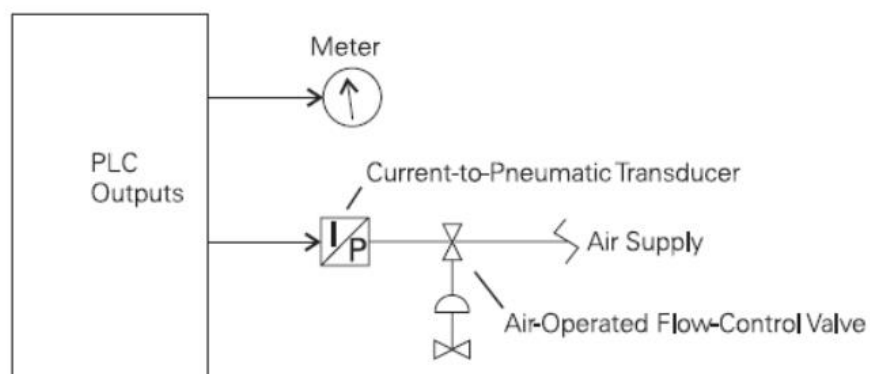


Discrete Outputs

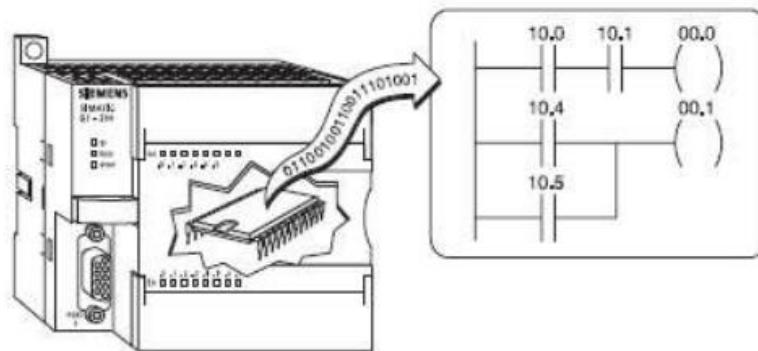
Digital outputs



Analog Outputs



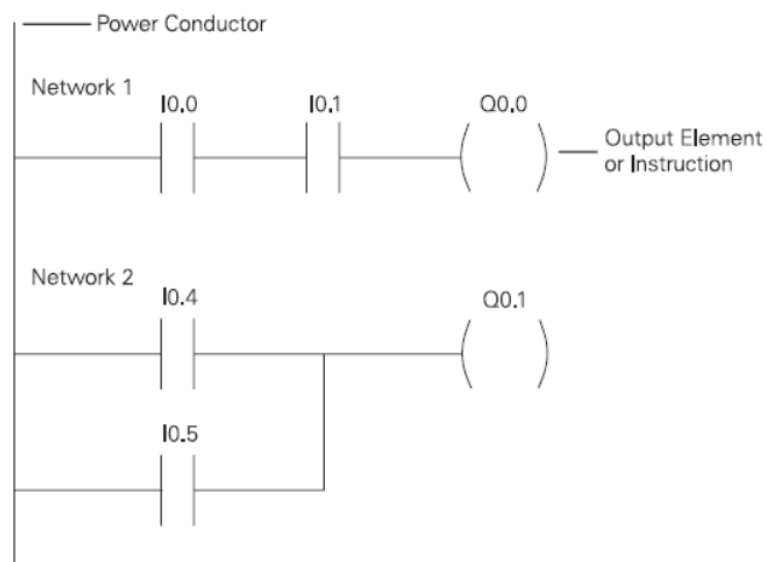
CPU



Programming

Ladder Logic

Ladder Logic Diagram



Statement list

```
NETWORK 1
LD    I0.0
A      I0.1
=      Q0.0

NETWORK 2
LD    I0.4
O      I0.5
=      Q0.1
```

Function Block Diagrams

NETWORK 1



NETWORK 2



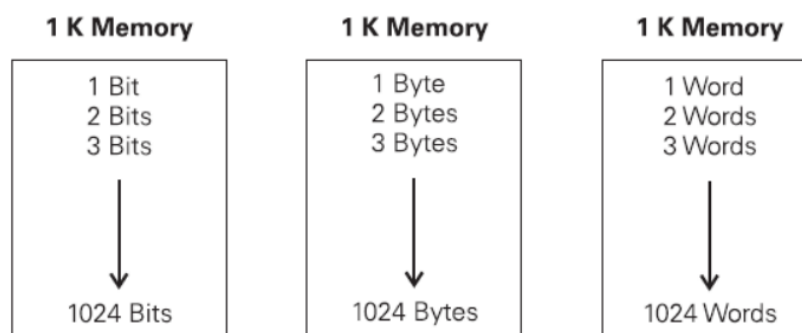
PLC Scan



Software

Hardware

Memory Size



RAM

ROM

EPROM

Firmware

Cable

Task 3 Fill in the sentences with these word above

- 1 A switch or a pushbutton is a input.
- 2 A lamp or a solenoid is an example of a output.
- 3 The makes decisions and executes control instructions based on the input signals.
- 4 is a PLC programming language that uses components resembling elements used in line diagram.
- 5 A.....consists of one or more instructions that accomplish a task.
- 6 When talking about computer or PLC memory, 1K refers to bits, bytes, or words.
- 7 Software that is placed in hardware is called
- 8 Which of the following is not required when creating or changing a PLC program?
 - a PLC
 - b Programming Device
 - c Programming Software
 - d Connector Cable
 - e Printer
- 9 A special cable, referred to as a PC/PPI, is needed when a personal computer is used as a programming device.

Read the manual of product line in the S7-1200 CPU 1214C family. Check the meaning in dictionary.

Table A- 44 General

Technical data	CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/Relay	CPU 1214C DC/DC/DC
Order number	6ES7 214-1BG31-0XB0	6ES7 214-1HG31-0XB0	6ES7 214-1AG31-0XB0
Dimensions W x H x D (mm)	110 x 100 x 75	110 x 100 x 75	110 x 100 x 75
Shipping weight	475 grams	435 grams	415 grams
Power dissipation	14 W	12 W	12 W
Current available (SM and CM bus)	1600 mA max. (5 VDC)	1600 mA max. (5 VDC)	1600 mA max. (5 VDC)
Current available (24 VDC)	400 mA max. (sensor power)	400 mA max. (sensor power)	400 mA max. (sensor power)
Digital input current consumption (24VDC)	4 mA/input used	4 mA/input used	4 mA/input used

Table A- 45 CPU features

Technical data	Description
User memory ¹	
Work	75 Kbytes
Load	4 Mbytes internal, expandable up to SD card size
Retentive	10 Kbytes
On-board digital I/O	14 inputs/10 outputs
On-board analog I/O	2 inputs
Process image size	1024 bytes of inputs (I)/1024 bytes of outputs (Q)
Bit memory (M)	8192 bytes

Table A- 47 Blocks, timers and counters supported by CPU 1214C

Element	Description
Blocks	
Type	OB, FB, FC, DB
Size	64 Kbytes
Quantity	Up to 1024 blocks total (OBs + FBs + FCs + DBs)
Address range for FBs, FCs, and DBs	1 to 65535 (such as FB 1 to FB 65535)
Nesting depth	16 from the program cycle or start up OB; 4 from the time delay interrupt, time-of-day interrupt, cyclic interrupt, hardware interrupt, time error interrupt, or diagnostic error interrupt OB

Element	Description
OBs	Monitoring Status of 2 code blocks can be monitored simultaneously
	Program cycle Multiple: OB 1, OB 200 to OB 65535
	Startup Multiple: OB 100, OB 200 to OB 65535
	Time-delay interrupts and cyclic interrupts 4 ¹ (1 per event): OB 200 to OB 65535
	Hardware interrupts (edges and HSC) 50 (1 per event): OB 200 to OB 65535
	Time error interrupts 1: OB 80
	Diagnostic error interrupts 1: OB 82
Timers	Type IEC
	Quantity Limited only by memory size
	Storage Structure in DB, 16 bytes per timer
Counters	Type IEC
	Quantity Limited only by memory size
	Storage Structure in DB, size dependent upon count type • SInt, USInt: 3 bytes • Int, UInt: 6 bytes • DInt, UDInt: 12 bytes

Table A- 49 Power supply

Technical data		CPU 1214C AC/DC/Relay	CPU 1214C DC/DC/Relay	CPU 1214C DC/DC/DC
Voltage range		85 to 264 VAC	20.4 VDC to 28.8 VDC 22.0 VDC to 28.8 VDC for ambient temperature -20° C to 0° C	
Line frequency		47 to 63 Hz	--	
Input current (max. load)	CPU only	100 mA at 120 VAC 50 mA at 240 VAC	500 mA at 24 VDC	
	CPU with all expansion accessories	300 mA at 120 VAC 150 mA at 240 VAC	1500 mA at 24 VDC	
Inrush current (max.)		20 A at 264 VAC	12 A at 28.8 VDC	
Isolation (input power to logic)		1500 VAC	Not isolated	
Ground leakage, AC line to functional earth		0.5 mA max.	-	
Hold up time (loss of power)		20 ms at 120 VAC 80 ms at 240 VAC	10 ms at 24 VDC	
Internal fuse, not user replaceable		3 A, 250 V, slow blow		

Answer the question about PLC S7-1200 CPU 1214C

- 1 What is the dimension of PLC S7-1200 CPU 1214C?
- 2 How many inputs does it have?
- 3 How many timers does it have?

- 4 What is the power supply for CPU 1214C AC/DC/Relay and CPU 1214C DC/DC/DC?
- 5 What is the meaning of the signal 'DC/DC/DC or AC/DC/Relay

2.3. SENSOR SPECIFICATION

Optical sensors:

Optical Sensors are electronic detectors that convert light, or a change in light into an electronic signal. They are used in many industrial and consumer applications.

For example: detect the distance, absence or presence of an object.

Function An optical sensor converts light rays into electronic signals. It measures the physical quantity of light and then translates it into a form that is readable by an instrument. An optical sensor is generally part of a larger system that integrates a source of light, a measuring device and the optical sensor. This is often connected to an electrical trigger. The trigger reacts to a change in the signal within the light sensor. An optical sensor can measure the changes from one or several light beams. When a change occurs, the light sensor operates as a photoelectric trigger and therefore either increases or decreases the electrical output. An optical switch enables signals in optical fibers or integrated optical circuits to be switched selectively from one circuit to another. An optical switch can operate by mechanical means or by electro-optic effects, magneto-optic effects as well as by other methods. Optical switches are optoelectronic devices which can be integrated with integrated or discrete microelectronic circuits.

Proximity sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.

A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive proximity sensor or photoelectric sensor

might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

The maximum distance that this sensor can detect is defined "nominal range". Some sensors have adjustments of the nominal range or means to report a graduated detection distance. Some know these processes as "thermos sensation". Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.

Pressure sensor

A pressure sensor is a device for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical.

Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators, piezometers and manometers, among other names.

UNIT 3: ELECTRICAL EQUIPMENT

TT	Chuẩn đầu ra của chương	CĐR HP
1	Thống kê được các thiết bị trong bản vẽ hoặc hồ sơ kỹ thuật.	1
2	Trình bày nguyên lý làm việc của động cơ điện	4

Vocabulary

New word	Pronunciation	Meaning
1. Electric (adj)	/ɪˈlektrɪk/	(Thuộc) điện, có điện, phát điện
2. Motor (n)	/ˈmɒtə/	Động cơ
3. Specific (adj)	/spəˈsɪf.ɪk/	Rành mạch, rõ ràng; cụ thể Đặc trưng, riêng biệt
4. Information (n)	/ˌɪnfəˈmeɪʃn/	Thông tin, tin tức
5. Quickly (adv)	/ˈkwɪkli/	Nhanh, nhanh chóng
6. Useful (adj)	/ˈjuːsfʊl/	Hữu ích, có ích, giúp ích; có thể được dùng cho một mục đích thực tế nào đó
7. Strategy (n)	/ˈstrætədʒi/	Chiến lược
8. General (adj)	/ˈdʒenərə(ə)/	Chung, chung chung
9. Idea (n)	/aɪˈdiː.ə/	Quan niệm, tư tưởng, ý tưởng, ý nghĩ, ý kiến
10. Contain (v)	/kənˈteɪn/	Chứa đựng, bao hàm, gồm có, bao gồm
11. Decide (v)	/dɪˈsaɪd/	Quyết định

		Lựa chọn, quyết định chọn
12. Worth (adj)	/wɜːrθ/	Đáng giá, có một giá trị nào đó
13. Detail (n)	/diˈteɪl/	Chi tiết, tiểu tiết; điều tỉ mỉ, điều vụn vặt
14. Purpose (n)	/'pɜːpəs/	Mục đích, ý định
15. Identify (v)	/ai'dentɪfaɪ/	Nhận ra, nhận biết, nhận diện, nhận dạng
16. Armature (n)	/'ɑːmətʃə/	Phần ứng
17. Turn (v)	/tɜːn/	Quay, xoay, vặn
18. Electromagnet (n)	/iˌlektroʊ'mæɡnɪt/	Nam châm điện
19. Effect (n)	/i'fekt/	Kết quả, hiệu quả, tác dụng Tác động, ảnh hưởng; ấn tượng
20. Magnetic field (n)		Từ trường
21. Produce (v)	/prə'djuːs/	Làm, sản xuất, chế tạo
22. Movement (n)	/'muːvmənt/	Sự chuyển động, sự vận động, sự cử động, sự hoạt động
23. Turning movement		Chuyển động quay
24. Washing machine		Máy giặt
25. North (n)	/nɔːθ/	Hướng bắc, phương bắc, phía bắc
26. South (n)	/'sauθ/	Hướng nam, phương nam, phía nam

27. Pole (n)	/pəʊl/	Cực
28. Loop (n)	/lu:p/	Vòng
29. Attract (v)	/ə'trækt/	Hút, thu hút, hấp dẫn, lôi cuốn
30. Simple (n)	/'simpl/	Đơn giản, dễ làm, dễ hiểu, không gây khó khăn
31. Attraction (n)	/ə'trækʃn/	Lực hút
32. Repulsion (n)	/ri'pʌlʃn/	Lực đẩy
33. Magnet (n)	/'mæɡnit/	Nam châm
34. Direction (v)	/di'rekʃn/	Phương hướng, chiều, phía, ngã
35. Current (n)	/'kʌrənt/	Dòng điện
36. Reverse (v)	/ri've:s/	Đảo ngược
37. Diagram (n)	/'daɪə,ɡræm/	Biểu đồ, sơ đồ
38. Description (n)	/di'skripʃən/	Sự tả, sự diễn tả, sự mô tả
39. Function (n)	/'fʌŋkʃən/	Chức năng
40. Describe (v)	/di'skraɪb/	Diễn tả, mô tả

3.1. THE ELECTRIC MOTOR

Tuning-in

Task 1 Working in your group, list as many items as you can in the home which use electric motors. Which room has the most items?

Reading Skimming

In Unit 3 you studied scanning-locating specific information quickly. Another useful strategy is reading a text quickly to get a general idea of the kind of information it contains. You can then decide which parts of the text are worth reading in more detail later, depending on your reading purpose. This strategy is called *skimming*.

Task 2 Skim this text and identify the paragraphs which contain information on each of these topics. The first one has been done for you.

- | | |
|---|-------------|
| a What electric motors are used for | paragraph 1 |
| b The commutator | _____ |
| c Why the armature turns | _____ |
| d Electromagnets | _____ |
| e Effect of putting magnets together | _____ |
| f The armature | _____ |

para

In an electric motor an electric current and magnetic field produce a turning movement. This can drive all sorts of machines, from wrist- 1

watches to trains. The motor shown in Fig. 1 is for a washing machine. It is a universal motor, which can run on direct current or
5 alternating current.

An electric current running through a wire produces a magnetic Field 2
around the wire. If an electric current flows around a loop of wire
with a bar of iron through it, the iron becomes magnetized. It is called
an electromagnet; one end becomes a north pole and the other a south
10 pole, depending on which way the current is flowing around the loop.

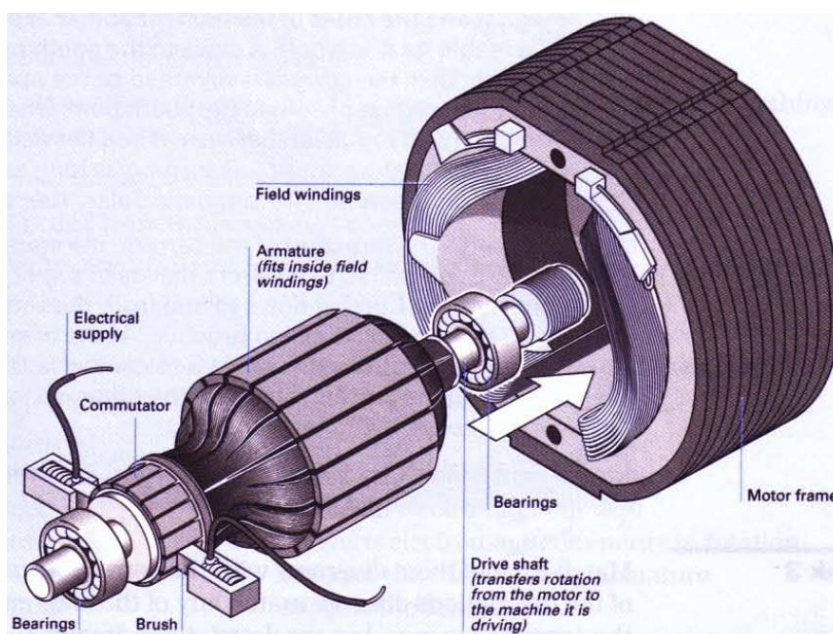


Fig. 1

If you put two magnets close together, like poles-for example, two
3 north poles-repel each other, and unlike poles attract each other.

In a simple electric motor, like the one shown in Fig. 2, a piece of 4
15 iron with loops of wire round it, called an armature, is placed between
the north and south poles of a stationary magnet, known as the field

magnet. When electricity flows around the armature wire, the iron becomes an electromagnet.

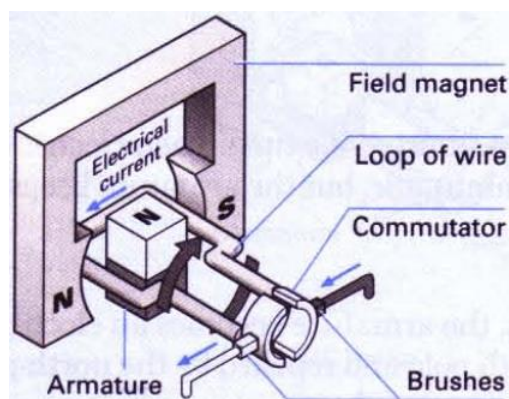


Fig. 2

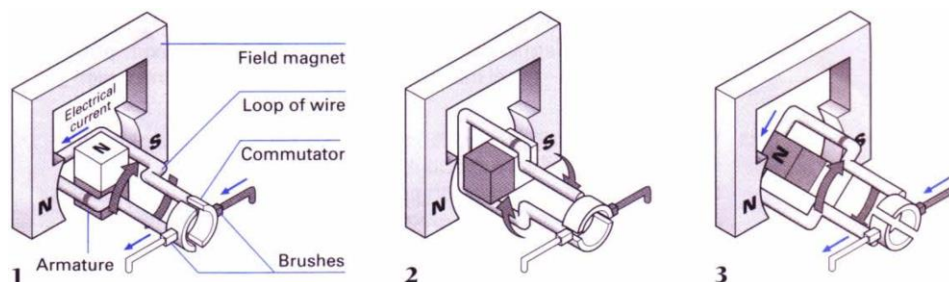
The attraction and repulsion between the poles of this armature magnet and the poles of the field magnet make the armature turn. As a result, its north pole is close to the south pole of the field magnet. Then the current is reversed so the north pole of the armature magnet becomes the south pole. Once again, the attraction and repulsion between it and the field magnet make it turn. The armature continues turning as long as the direction of the current, and therefore its magnetic poles, keeps being reversed.

To reverse the direction of the current, the ends of the armature wire are connected to different halves of a split ring called a commutator. Current flows to and from the commutator through small carbon blocks called brushes. As the armature turns, first one half of the commutator comes into contact with the brush delivering the current, and then the other, so the direction of the current keeps being reversed.

Source: Adapted from 'Inside out: Electric Motor', *Education Guardian*

Task 3 Match each of these diagrams with the correct description, **A**, **B**, **C**, or **D**. One of the descriptions does *not* match any of the diagrams. (The diagrams are in the correct sequence, but the descriptions are not.)

Motor run on direct current:



A

The armature turns a quarter of a turn. Then electric contact is broken because of the gap in the commutator, but the armature keeps turning because there is nothing to stop it.

B

When current flows, the armature becomes an electromagnet. Its north pole is attracted by the south pole and repelled by the north pole of the field magnet.

C

When a universal motor is run on direct current, the magnetic poles in the armature change while those of the field magnet remain constant.

D

When the commutator comes back into contact with the brushes, current flows through the armature in the opposite direction. Its poles are reversed and the turn continues.

Language study *Describing function*

Try to answer this question:

What does an electric motor do?

When we answer a question like this, we describe the function of something.

We can describe the function of an electric motor in this way:

An electric motor converts electrical energy to mechanical energy.

We can emphasize the function like this:

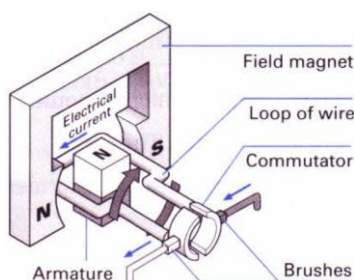
The function of an electric motor is to convert electrical energy to mechanical energy.

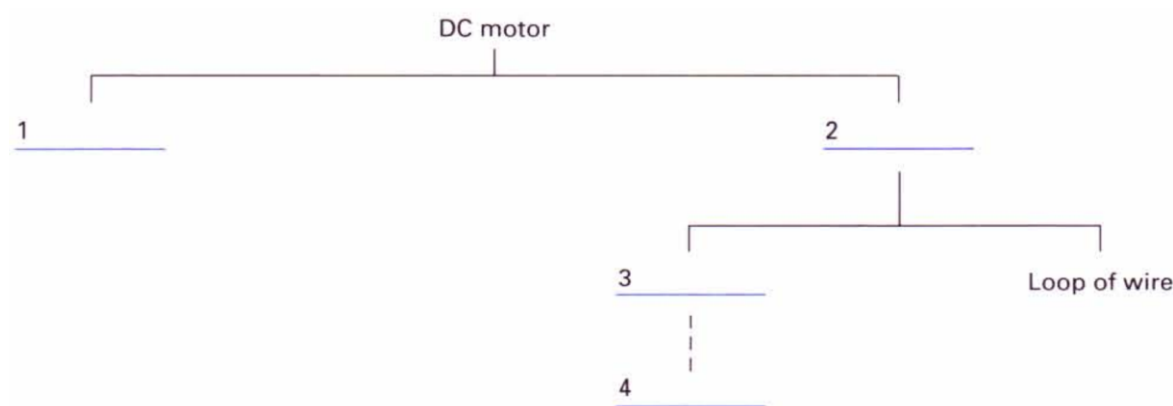
Task 4 Match each of these motor components to its function, and then describe its function in a sentence.

Component	Function
1 armature	a transfers rotation from the motor
2 bearings	b create an electromagnetic field
3 brushes	c converts electromagnetic energy to rotation
4 commutator	d reverses the current to the armature
5 drive shaft	e support the drive shaft
6 field windings	f supply current to the armature

Writing *Describing components*

Task 5 Dismantle this simple dc motor into its components by completing the labelling of the chart below





Now study this description of the motor.

A simple dc motor *consists of* a field magnet and an armature. The armature is placed between the poles of the magnet. The armature is *made up of* a loop of wire and a split ring *known as* a commutator. The loop is *connected to* the commutator. Current is supplied to the motor through carbon blocks *called* brushes.

To write a description, you need to use language to:

- 1 dismantle a piece of equipment into its main parts. These expressions will help

		<i>consists of</i>		X
A	A	<i>is made up of</i>	X and Y	
		<i>is composed of</i>		Y

- 2 name components:

Carbon	<i>known as</i>	
blocks	<i>called</i>	brushes

- 3 locate components:

The armature *is placed between* the poles.

- 4 connect components:

The loop *is connected to* the commutator.

Task 6 Complete the text with the help of the diagram on the next page. Use the following words:

are made up

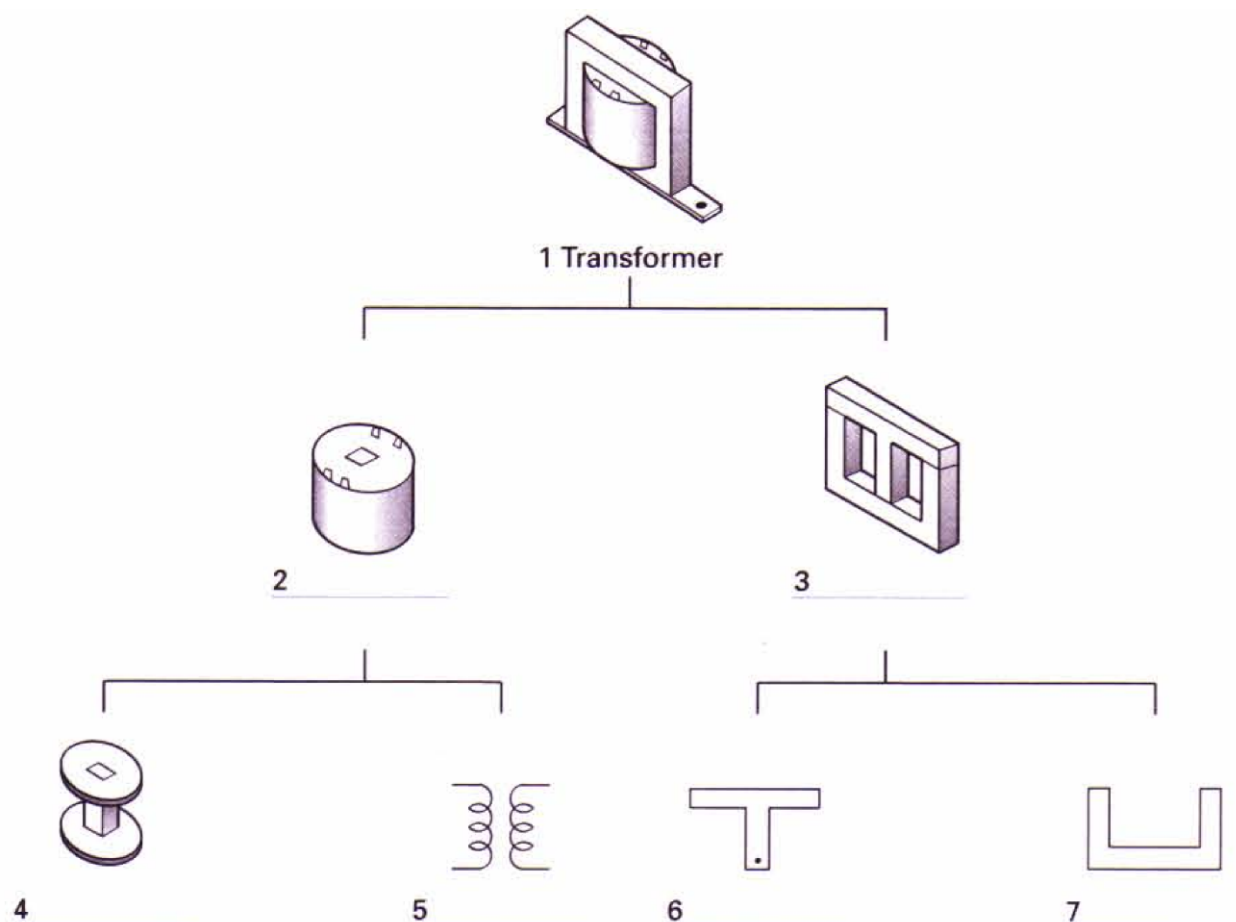
is placed

is composed

consists

A transformer _____ of two coils, a primary and a secondary. The coils are wound on a former which is mounted on a core. The coils _____ of a number of loops of wire. The core _____ of thin pieces of soft iron. U and T-shaped pieces are used. The former _____ on the leg of the T.

Now label the diagram opposite using the completed text.



Word study

Study these expressions for describing how components are connected to each other.

A is bolted to B. = A is connected to B with bolts.

A is welded to B. = A is connected to B by welding.

A is fixed to B. = no specific method given

Task 7 Explain each of these methods of connection.

- 1** screwed
- 2** soldered
- 3** attached
- 4** wired
- 5** bonded
- 6** glued
- 7** riveted
- 8** welded
- 9** brazed
- 10** nailed

3.2. PORTABLE GENERATOR

Tuning-in

Task 1 List the different ways in which electricity can be generated.

Reading *Reading diagrams*

Task 2 Study the diagram below of a portable generator. Answer these questions using the diagram and your own knowledge of engineering.

- 1 What are its main parts?
- 2 What does the engine run on?
- 3 What are the four strokes called?
- 4 What is the function of the crankshaft?
- 5 What do both stator and rotor have?
- 6 What is the difference between stator and rotor?

A portable generator can provide electricity to power lights and other appliances no matter how far you are from the mains. It works by turning the movement of a piston into electrical energy.

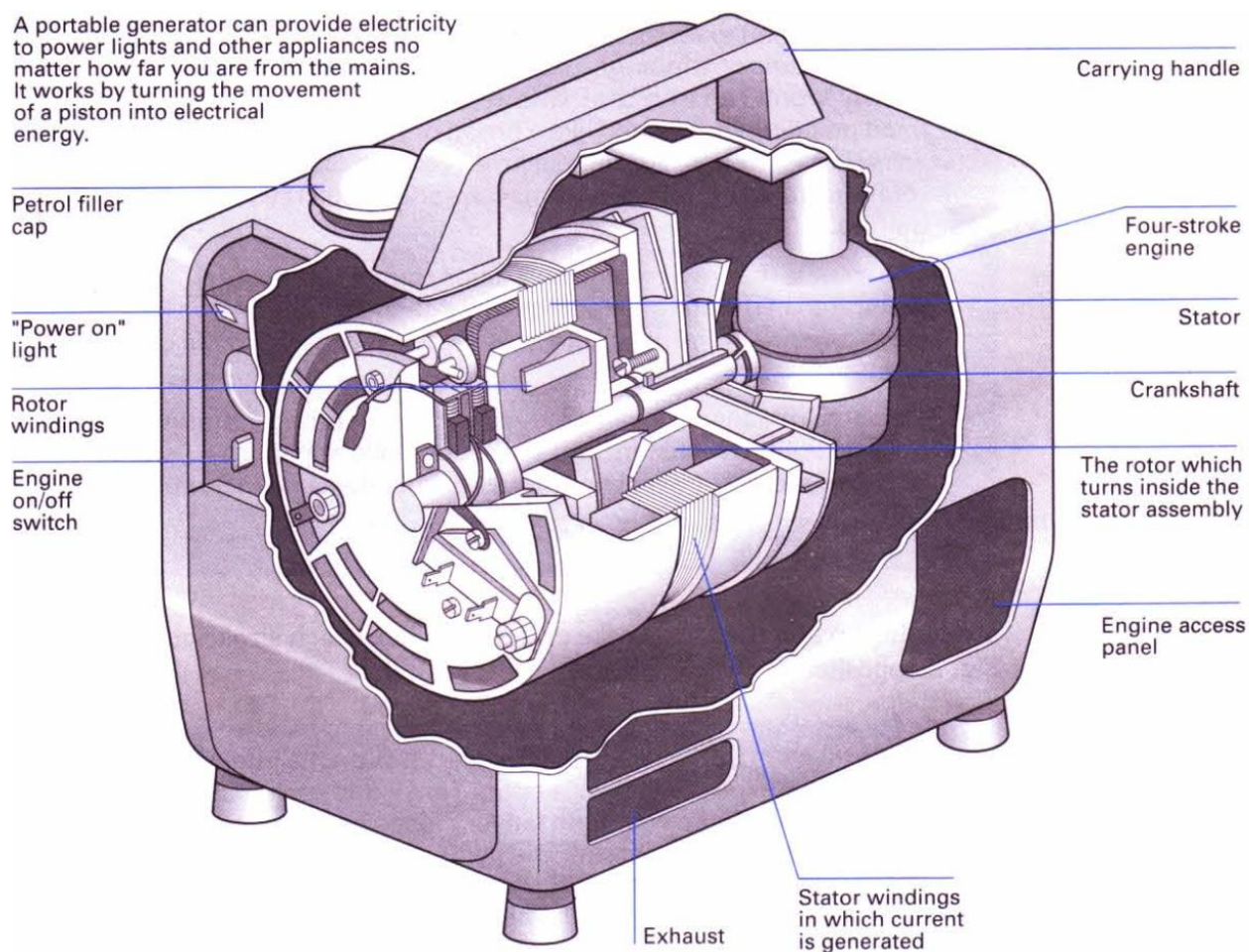


Fig. 1

Task 3 Read this text to check as many of the answers as you can. You will not find complete answers to all of the questions.

Portable generator

Although most electricity comes from power stations, power can also be generated by far smaller means. Nowadays, electricity generators can be small enough to hold in the hand.

Portable generators are made up of two main parts: an engine, which powers the equipment, and an alternator, which converts motion into electricity.

The engine shown (Fig. 1) runs on petrol. It is started by pulling a cord. This creates a spark inside which ignites the fuel mixture.

In a typical four-stroke engine, when the piston descends, the air inlet valve opens and a mixture of air and petrol is sucked in through a carburettor.

The valve closes, the piston rises on the compression stroke and a spark within the upper chamber ignites the mixture. This mini-explosion pushes the piston back down, and as it rises again the fumes formed by the ignition are forced out through the exhaust valve.

This cycle is repeated many times per second. The moving piston makes the crankshaft rotate at great speed.

The crankshaft extends directly to an alternator, which consists of two main sets of windings -coils of insulated copper wire wound closely around an iron core. One set, called stator windings, is in fixed position and shaped like a broad ring. The other set, the armature windings, is wound on the rotor which is fixed to the rotating crankshaft. The rotor makes about 3,000 revolutions per minute.

The rotor is magnetized and as it spins round, electricity is generated in the stator windings through the process of electromagnetic induction. The electric current is fed to the output terminals or sockets.

This type of generator can produce a 700watt output, enough to operate lights, television, and some domestic appliances. Larger versions provide emergency power to hospitals and factories.

Source: Adapted from 'Inside out: Portable Generator', *Education Guardian*

Task 4 Study this text on the four-stroke cycle. Then label each stroke correctly in Fig. 2 opposite.

In the four-stroke cycle, the piston descends on the intake stroke, during which the inlet valve is open. The piston ascends on the compression stroke with both valves closed and ignition takes place at the top of the stroke. The power or expansion stroke follows. The gas generated by the burning fuel expands rapidly, driving the piston down, both valves remaining closed. The cycle is completed by the exhaust stroke, as the piston ascends once more, forcing the products of combustion out through the exhaust valve. The cycle then repeats itself.

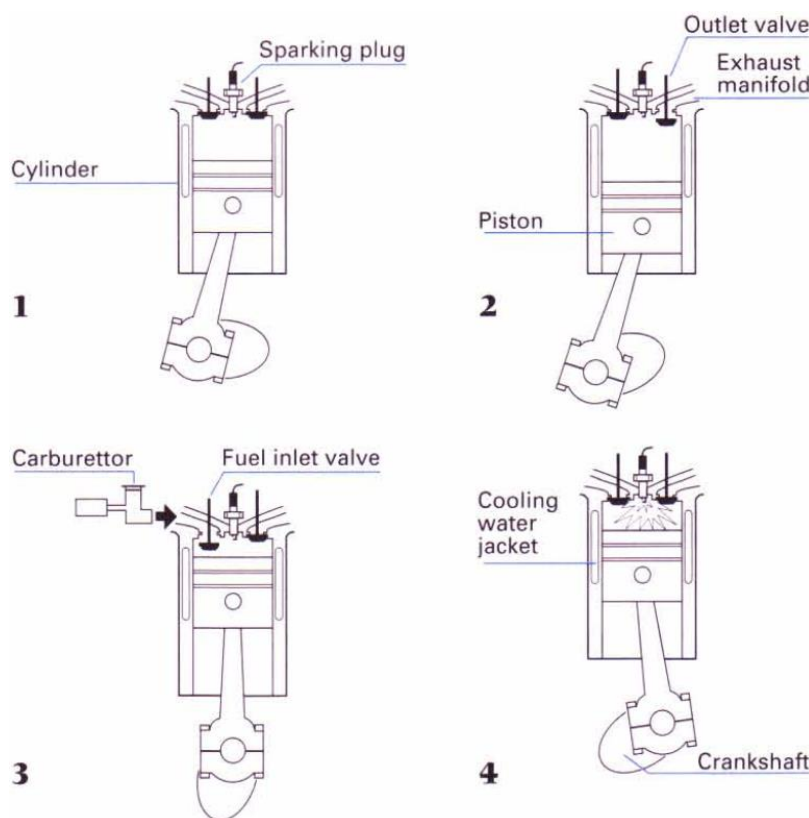


Fig. 2

Language study *Cause and effect, 2*

Study these pairs of actions. What is the link between each pair?

- 1 The gas expands.

- 2 This drives the piston down.
- 3 The piston ascends.
- 4 This forces the products of combustion out.

There are two links between the actions:

They happen at the same time. We can show this using *As* (see Unit 8)

1+2 *As the gas expands, it drives the piston down.*

3+4 *As the piston ascends, it forces the products of combustion out.*

One is a cause and the other an effect.

- | | |
|-----------|---|
| 1 Cause: | The gas expands. |
| 2 Effect: | This drives the piston down. |
| 3 Cause: | The piston ascends. |
| 4 Effect: | This forces the products of combustion out. |

We can show both the time link and the cause and effect link like this:

1+2 *The gas expands, **driving** the piston down.*

3+4 *The piston ascends, **forcing** the products of combustion out*

Task 5 Link these actions in the same way.

Cause	Effect
1 The piston moves down the cylinder.	This creates a partial vacuum.
2 The piston creates a vacuum.	This draws in fuel from the carburettor.
3 The piston moves up the cylinder.	This compresses the mixture.
4 The gas expands quickly.	This pushes the piston down.

- | | | |
|---|---|--|
| 5 | The piston moves up and down. | This rotates the crankshaft. |
| 6 | The crankshaft spins round. | This turns the rotor at 3,000rpm. |
| 7 | The armature of the alternator rotates. | This induces a current in the stator windings. |
| 8 | The alternator runs at a steady 3.000rpm. | This generates around 700 watts. |

Word study *Verbs with -ize/-ise*

Study this statement:

*The rotor is **magnetized**.*

What does it mean? Can you say it another way? We can rewrite this statement as:

*The rotor is **made magnetic**.*

Verbs ending in *-ize/-ise* have a range of meanings with the general sense of *make* + adjective.

Task 6 Rewrite these sentences replacing the phrases in italics with appropriate *-ize/-ise* verbs.

- 1 Some cars are fitted with a security device which *makes* the engine *immobile*.
- 2 In areas where the power supply fluctuates, for sensitive equipment a device to *make* the voltage *stable* is required.
- 3 Manufacturers seek to *keep* costs to a *minimum* and profits to a *maximum*.
- 4 Most companies have *installed computers to control* their production line.
- 5 Companies may make their operation more rational by reducing the variety of products they make?

Writing *Describing a process, 3: sequence and location*

Task 7 Fig. 3 opposite shows the distribution of power from power station to consumer. The statements which follow describe the distribution. Put the statements in the correct order with the help of the diagram. The first one has been done for you.

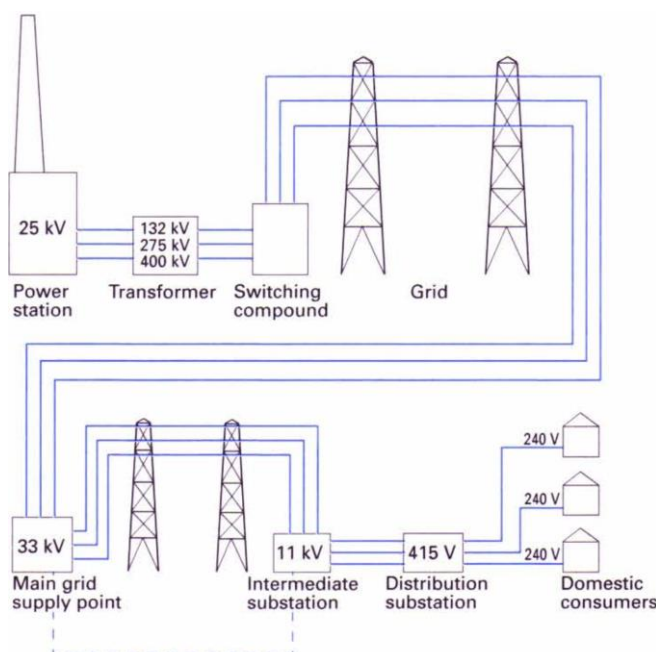


Fig. 3

- a. It is fed to substations. _____
- b. It is stepped up by a transformer to high voltages for long-distance distribution. _____
- c. It is distributed via the grid to supply points. _____
- d. It is distributed to the domestic consumer. _____
- e. Electricity is generated at the power station at 25 kV. 1
- f. It passes via the switching compound to the grid. _____
- g. It is distributed via overhead or underground cables to intermediate substations. _____

Task 8 Mark the sequence of stages using appropriate sequence words where you think this is helpful. Add the following information to your statements and make them into a text.

- 1 At the main grid supply points, power is stepped down to 33kV for distribution to heavy industry.
- 2 At intermediate substations, power is reduced to 11kV for light industry.
- 3 At the distribution substations, power is stepped down to 415 V. 3-phase, and 240 V, 1-phase.

Technical reading *Wave power*

Task 9 The two texts which follow describe two plants for generating electricity from wave power. Note the similarities and differences between the plants.

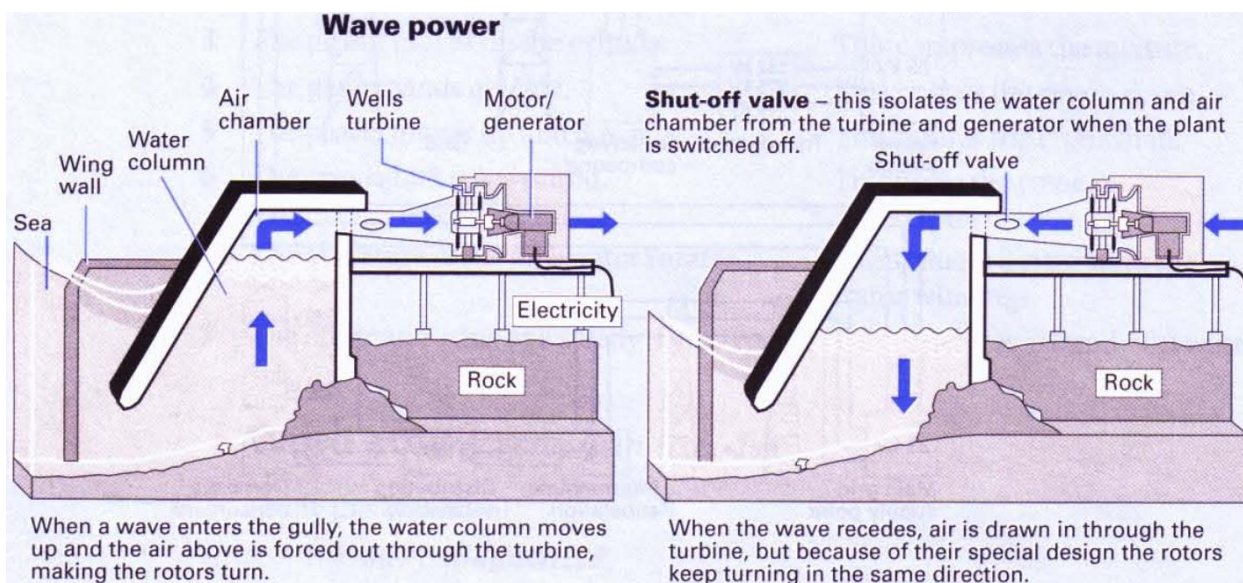


Fig. 4

This prototype wave power plant on the Scottish island of Islay was constructed by building a concrete water column across a natural gully on the shoreline. Waves flowing in and out of the gully cause water in the column to move up and down. As the water moves up it compresses the

- 5 air above and forces it through a wide tube at the back of the water column.
As the water moves down, air is drawn into the water column.

The moving air passes through a turbine coupled to a generator. Both the turbine and generator are unusual. The turbine is a Wells turbine (named after its inventor) which keeps turning in one direction even though the air
10 flow is constantly changing direction. It has two rotors, each with four blades.

The generator is a wound rotor induction motor, which acts as a generator when it is turning at speeds greater than 1,500 rpm. Below that speed it operates as a motor and takes power from the grid. This motor/generator
15 is used because the turbine takes some time to build up to a speed where it can generate electricity. When the turbine slows down due to a lull in wave activity, the generator becomes an electric motor and keeps the turbine running at a minimum speed so that it is ready to accept the power from the next batch of waves.

- 20 The plant is controlled by a computer. It includes a PLC (programmable logic controller), which monitors the operation of the motor/generator and the amount of electricity going to or being taken from the grid. There is also testing equipment to monitor how much electricity the plant is producing and the efficiency of the water column, turbine, and generator.
- 25 This experimental plant generates 150kW. Plans have been approved for the construction of a 1MW scheme.

Source: Adapted from 'Inside out: Wave power', *Education Guardian*

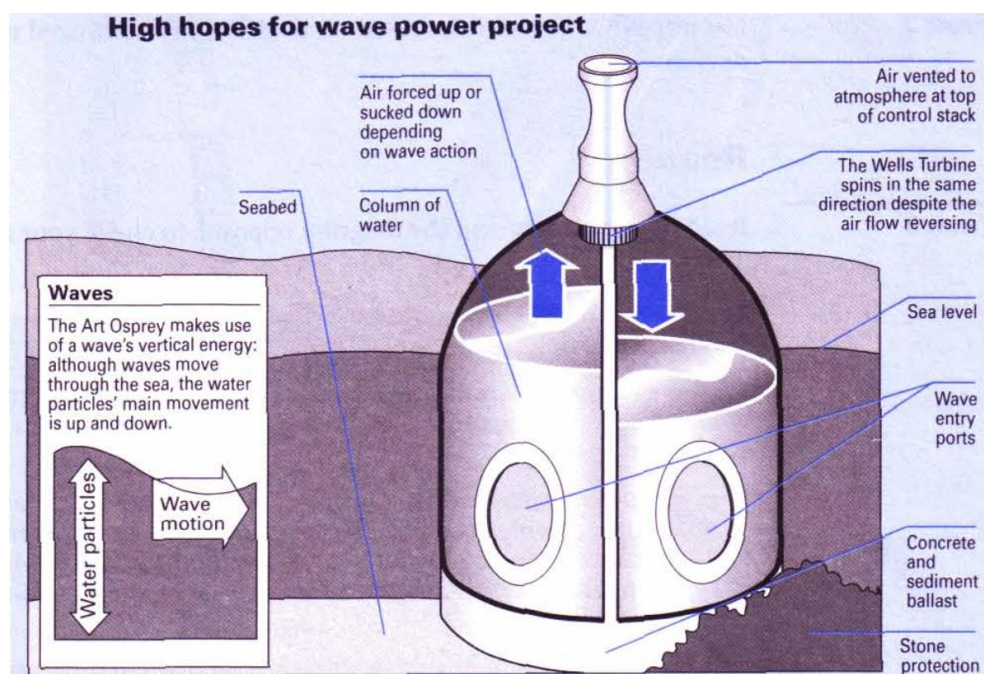


Fig. 5

The world's first power station in the open sea is to be stationed off Dounreay in Scotland. The machine, called Osprey (Ocean Swell Powered Renewable Energy), will stand in 18 meters of water a kilometer out and not only harvest the larger waves, which produce higher outputs, but also gain power with waves from any direction.

The device is known as an oscillating water column. As a wave rises, air is pushed through an air turbine and sucked back again as the wave falls. The turbine has been designed by Professor Alan Wells, of Queen's University, Belfast. It will generate 2 megawatts.

15 There is potential for 300 Ospreys in Scottish waters which could provide 10 percent of the country's peak electricity demand.

UNIT 4: SAFETY AT WORK

TT	Chuẩn đầu ra của chương	CĐR HP
1	Liệt kê các trang thiết bị bảo hộ lao động bằng tiếng Anh.	1
2	Đọc hiểu các biển báo, ghi chú và báo cáo tai nạn trong môi trường làm việc.	5

Vocabulary

New word	Pronunciation	Meaning
1. Safety (n)	/ˈseɪfti/	Sự an toàn, sự chắc chắn
2. Warning (n)	/ˈwɔːniŋ/	Lời cảnh cáo, lời răn
3. Label (n)	/ˈleɪbl/	Nhãn, nhãn hiệu
4. Chemical (n)	/ˈkɛmɪkəl/	Chất hoá học; hoá chất
5. Correct (adj)	/kəˈrekt/	Đúng, chính xác
6. Flammable (adj)	/ˈflæməbl/	dễ cháy
7. Harmful (adj)	/ˈhɑːmful/	Gây tai hại, có hại
8. Explosive (adj)	/ɪkˈsplɒsɪv/	Nổ; gây nổ, dễ nổ, dễ bùng nổ
9. Corrosive (n)	/kəˈrɒsɪv/	Chất ăn mòn
10. Oxidizing		có tính ôxi hóa
11. Toxic (adj)	/ˈtɒksɪk/	Độc
12. Potential (adj)	/pəˈtenʃl/	Tiềm năng; tiềm tàng
13. Danger (n)	/ˈdeɪndʒə(r)/	Sự nguy hiểm
14. Laboratory (n)	/ˈlæbrəˌtɔːri /	Phòng thí nghiệm; phòng pha chế

15. Workshop (n)	/ˈwə:kʃɒp/	Phân xưởng (sửa chữa, chế tạo máy móc...) Hội thảo
16. Hazard (n)	/ˈhæzəd/	Mối nguy
17. Instruction (n)	/ɪnˈstrʌkʃn/	Lời chỉ dẫn
18. Wear (v)	/weə/	Mang, đeo; mặc
19. Protective (adj)	/prəˈtektɪv/	Bảo vệ, bảo hộ, che chở
20. Lathe (n)	/leɪð/	Máy tiện
21. Operate (v)	/ˈɒpəreɪt/	Vận hành
22. Cutter (n)	/ˈkʌtə/	Máy cắt, máy băm
23. Grinder (n)	/ˈgraɪndə/	Máy mài
24. Workplace (n)	/ˈwə:kˌpleɪs/	Chỗ làm
25. Tidy (adj)	/ˈtaɪdi/	Sạch sẽ, ngăn nắp, gọn gàng, có trật tự
26. Tool (n)	/tu:l/	Dụng cụ, đồ dùng
27. Intend (v)	/ɪnˈtend/	Định, có ý định, có ý muốn
28. Encourage (v)	/ɪnˈkʌrɪdʒ/	Khuyến khích, cổ vũ, động viên
29. Employee (n)	/ˌemˈplɔɪˈi:/	Người lao động, người làm công
30. Conscious (adj)	/ˈkɒnʃəs/	Biết rõ, thấy rõ, tỉnh, tỉnh táo, có ý thức
31. Reduce (v)	/rɪˈdju:s/	Giảm, giảm bớt, hạ
32. Risk (n)	/rɪsk/	Sự rủi ro, sự nguy hiểm
33. Accident (n)	/ˈæksɪdənt/	Sự rủi ro, tai nạn, tai biến

34. Supervisor (n)	/ˈsu:pə,vaizə/	Người giám sát; người giám thị
35. Document (n)	/ˈdɒkjʊmənt/	Văn kiện; tài liệu, tư liệu
36. Technician (n)	/tekˈniʃən/	Nhà kỹ thuật, nhà chuyên môn, kỹ thuật viên
37. Manager (n)	/ˈmænədʒər/	Người quản lý; giám đốc
38. Intention (n)	/inˈtenʃn/	Ý định, mục đích
39. Protect (v)	/prəˈtekt/	Bảo vệ, bảo hộ, che chở
40. Investigation (n)	/in,vestiˈgeɪʃən/	sự nghiên cứu; điều tra

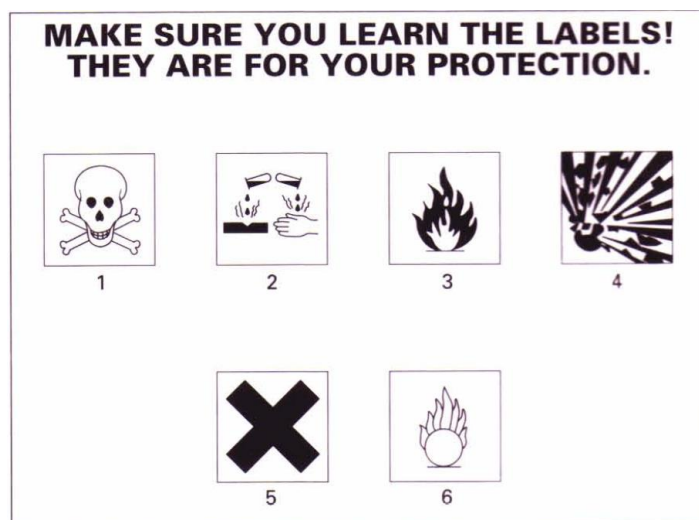
4.1. SAFETY AT WORK



Tuning-in

Task 1 What do these warning labels on chemicals mean? Match each label to the correct warning.

- a** Highly flammable
- b** Harmful
- c** Explosive
- d** Corrosive
- e** Oxidizing
- f** Toxic



Task 2 List some of the potential dangers in your laboratory, workshop, or place of work. How is the risk of these hazards reduced?

Task 3 Study the safety instructions from a workshop below, and then answer these questions.

- a Who are the instructions for?
- b Who wrote them?
- c What was the writer's purpose?

- 1 Wear protective clothing at all times.
- 2 Always wear eye protection when operating lathes, cutters, and grinders and ensure the guard is in place.
- 3 Keep your workplace tidy.
- 4 The must areas between benches and around machines must be kept clear.
- 5 Tools should be put away when not in use and any breakages and losses reported.

Reading *Understanding the writer's purpose*

- 6 Machines should be cleaned after use.

Knowing what the writer's purpose is, who the writer is, and who the intended readers are can help us to understand a text. The safety instructions in Task 3 are clearly intended to encourage employees to be safety conscious and reduce the risk of accidents. The writer is perhaps a supervisor or the company safety officer, and the intended readers are machine operatives. Knowing these things can help us to work out the meaning of any part of the text we may not understand.

Task 4 Study the company document on safety on the next page, and then answer these questions.

- 1 Who is this document for?
 - a. machine operatives
 - b. managers
 - c. all employees
 - d. injured employees
- 2 Who wrote this document?
 - a. trade union representative
 - b. technician
 - c. manager
 - d. medical staff
- 3 What is the writer's intention?
 - a. to prevent accidents
 - b. to ensure speedy help for injured employees
 - c. to protect the company
 - d. to warn about dangers

Accident investigation

Whenever an accident occurs that results in an injury (medical case), damage of equipment and material, or both, prompt accident investigation by the immediate manager is required. A written preliminary investigation will be completed by the end of the particular shift or business day on which the accident occurred.

In no event should there be a delay of more than 24hours. Failure to comply with this requirement may subject the immediate manager to disciplinary action up to and including discharge.

Without adequate accident investigation data, the Company may be subjected to costs, claims, and legal action for which it has no defence.

As a minimum, the preliminary accident investigation report will include the following:

- 1 Name, occupation, and sex of injured worker.
- 2 Place and date/time of accident.
- 3 Description of how the accident happened.
- 4 Immediate causes of the accident-unsafe acts and unsafe conditions.
- 5 Contributing causes-manager safety performance, level of worker training, inadequate job procedure, poor protective maintenance, etc.
- 6 Witness(es)-name and department.
- 7 Corrective action taken- when.

The employee who was injured and any employee(s) who witnessed the incident should be separately interviewed as soon as possible. A copy of the report must be submitted to the Manager-Human Resources for review. Another copy of the

Task 5 Study this brief report of an accident. In which points does it not meet company policy on reporting accidents:

To:	Name	Department & Location	Date
	Manager	Human Resources	17 May
From:	Name	Department & Location	Tel.
	D. Taylor	Mech. Eng. Workshop	6200
Subject	Preliminary Report, Accident, 12 May		
	While turning a brass component on Tuesday, last week, Kenneth Oliver, machinist, received an injury to his eye. He was taken to the Eye Hospital where I understand he was operated on. I believe the accident was due to carelessness.		

Language study *Making safety rules*

What are the differences in meaning, if any, between these statements?

- 1 Wear protective clothing.
- 2 Always wear protective clothing.
- 3 Protective clothing must be worn.

We can make safety rules in these ways:

- 1 Using an imperative.
***Wear** protective clothing.*
***Do not wear** loose-fitting clothing.*
- 2 *Always/never* are used to emphasize that the rule holds in all cases.
***Always** wear protective clothing.*
***Never** wear loose-fitting clothing.*
- 3 We can use a modal verb for emphasis
*Protective clothing **must** be worn.*
***Protective** clothing **should** be worn.*

Task 6 Study this list of unsafe environmental conditions (hazards). Write safety rules to limit these hazards using the methods given above. For example:

inadequate lighting

Lighting must be adequate. or

Lighting should be adequate.

- 1 uneven floors
- 2 unguarded machinery
- 3 untidy workbenches
- 4 untidy workplaces
- 5 badly maintained machinery
- 6 carelessly stored dangerous materials
- 7 inadequate ventilation
- 8 damaged tools and equipment
- 9 machinery in poor condition
- 10 equipment used improperly
- 11 equipment operated by untrained personnel
- 12 apprentices working without supervision

Writing *Ways of linking ideas, 2*

In Unit 4 we learnt that to make our writing effective, we have to make sure our readers can follow our ideas. We learnt how to mark reasons, results, and contrasts in our writing.

What are the links between these ideas? What words can we use to mark the links?

- 1 The accident happened.
- 2 The operator's carelessness.
- 3 The supervisor was not present.

Sentence 2 is a reason for sentence 1. Sentence 3 is an additional reason. We can mark the links between them like this:

*The accident happened **because of** the operator's carelessness. **In addition/moreover**, the supervisor was not present.*

We use *because of* to introduce a reason which is a noun or noun phrase. We use *in addition* and *moreover* to introduce an additional reason.

What are the links between these ideas? What words can we use to mark the links?

- 4 Suitable protection should be worn.
- 5 Safety helmets should be used where there is a danger of falling objects.

Sentence 5 is an example to illustrate sentence 4. We can mark this in this way:

Suitable *protection should be worn. **For example/For instance**, safety helmets should be used where there is a danger of falling objects.*

Task 7 Show the links between these sets of ideas using appropriate linking words from this unit and from Unit 4.

- 1 Many accidents happen.
Workers' carelessness.
- 2 Education can reduce accidents.
It is important that all workers receive training in basic safety.
- 3 Eye injuries can be serious.
Goggles must be worn for grinding and cutting.
- 4 Safety gloves provide protection for the hands.
They prevent burns.
They reduce the danger of cuts.
- 5 Safety shoes protect the feet against falling objects.
They prevent the feet getting caught in machinery.
- 6 Respirators should be worn in dusty conditions.
Dust can damage the lungs.
- 7 Safety gear exists for every danger.
Each year people are injured.
They refuse or forget to wear the right gear.

4.2. AN ENGINEERING STUDENT

Tuning-in

Task 1 List some of the subjects studied by engineering students. Share your List with others in your group.

Task 2 Find out what these terms mean in education. Use a dictionary if necessary.

7 pass

8 resit

9 assessment

10 fail

11 drop out

12 period

13 full-time

14 module

Listening

When listening, it is important to have a clear purpose so that you can concentrate on the parts of the message which best meet your needs. It also helps to think about what you will hear before you listen. The next two tasks will help you to prepare for listening and to have a clear purpose.

Task 3 You are going to hear an interview with David, a student of electrical engineering at a Scottish college of further education. He is a mature student with previous service in the Navy.

Here is David's weekly timetable. Some of the information is missing. Before you listen, try to answer these questions about the timetable.

1 What time does David start each day?

- 2 When does he finish?
- 3 How long is a class?
- 4 How many classes does he have each week?
- 5 What do the numbers mean after each class, e.g. 150?
- 6 How often does he have breaks?

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8.45-10.15	Design and make 150	_____	_____	Technology 138	Technology 051
B r e a k					
10.30-12.00	Design and make 150	_____	Tutorial 063	_____	_____
L U N C H B R E A K					
13.00-14.30	_____	Maths 510	Communications 606	_____	Maths 510
B r e a k					
14.45-16.15	Technology 053	Principles 138	Technology 039	Principles 051	Self-study

Task 4 Listen to Parts 1 and 2 of the interview in turn. Answer these questions.

Compare your answers with a partner.

Part 1

- 5 What is the name of David's course?
- 6 How long is the course?
- 7 How old is David?
- 8 How long was he in the Navy?
- 9 How many types of submarines are there?

Part 2

10 How many weeks of teaching does he have left?

11 How is the course assessed?

12 What happens if you fail the tests once?

13 How many are in his class?

14 What kind of problems has he had?

Task 5 Listen to Part 3 of the interview. Try to complete the information missing from the timetable. Compare your answers with a partner.

Task 6 Listen to the last part of the interview. Answer these questions.

Part 4

15 When does he practice sport?

16 Where can you go for sport

17 What kind of sports can you practise there?

18 What is he going to do after the Certificate?

19 What does he want to be?

Task 7 Now listen to the whole tape. Answer these more difficult questions.

1 Why did David leave the Navy?

2 Why did students drop out of the class?

3 Why did he dislike school?

4 Why do most students find PSD a bit of a nuisance?

5 Why does he want to know when it's raining?

6 Why does he not have to use the library?

7 Why does he enjoy technology most?

Writing *Comparing and contrasting*

Task 8 Write your own timetable in English

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY

Task 9 Now complete this table. Note any similarities and differences between David's week and your own.

David's subjects	Hours per week	Your subjects	Hours per week

Task 10 Write a short comparison and contrast of your timetable and David's. These expressions may be useful:

more time/hours/classes/maths than

less time/maths/physics than

fewer hours/classes than

not as much time/maths/physics as

not as many hours/classes as

start/finish earlier /later than

Note that *less* and *much* are used for things which cannot be counted.

UNIT 5: CAREERS IN ENGINEERING

TT	Chuẩn đầu ra của chương	CĐR HP
1	Đọc hiểu và viết báo cáo bằng tiếng Anh.	6

Vocabulary

New word	Pronunciation	Meaning
1. Career (n)	/kə'riə/	Nghề, nghề nghiệp, Sự nghiệp (của một người)
2. Job (n)	/dʒɒb/	Việc, việc làm, công việc; việc làm thuê, việc làm khoán
3. Combine (v)	/kəm'beɪn/	kết hợp, phối hợp
4. List (n)	/lɪst/	Danh sách, sổ, bản kê khai
5. Group (n)	/gru:p/	Nhóm
6. Work (n)	/wɜ:k/	Sự làm việc; việc, công việc, công tác
7. Work (v)		Làm việc
8. Scan (v)	/skæn/	Nhìn lướt, đọc lướt
9. Section (n)	/'sekʃn/	Phần cắt ra; đoạn, khúc, phần
10. Mention (n)	/'menʃn/	Sự kể ra, sự nói đến, sự đề cập
11. Mention (v)		Kể ra, nói đến, đề cập
12. Professional (adj)	/prə'feʃənl/	(thuộc) nghề, (thuộc) nghề nghiệp; có tay nghề
13. Design (n)	/di'zain/	Đề cương, bản phác thảo, phác hoạ, đồ án

14. Design (v)		Phác hoạ, vẽ phác (tranh...), thiết kế, làm đồ án (nhà cửa), làm đề cương,
15. Product (n)	/ˈprɒdʌkt/	Sản vật, sản phẩm
16. Extend (v)	/iks'tend/	Kéo dài (thời hạn...), gia hạn, mở rộng
17. Application (n)	/æplɪ'keɪʃn/	Ứng dụng Lời xin, lời thỉnh cầu; đơn xin
18. Aim (n)	/eɪm/	Mục đích, mục tiêu, ý định
19. Quality (n)	/'kwɒləti/	Chất lượng, phẩm chất, tính chất;
20. Reliability (n)	/rɪˌlaɪə'bɪləti/	Sự đáng tin cậy; tính đáng tin cậy
21. Introduce (v)	/'ɪntrədʒu:s/	Giới thiệu
22. Component (n)	/kəm'pəʊnənt/	Thành phần, phần hợp thành
23. Material (n)	/mə'tɪəriəl/	Nguyên liệu, vật liệu
24. Installation (n)	/ɪnstə'leɪʃn/	Sự đặt (hệ thống máy móc, hệ thống sưởi...); sự đặt (ai) vào (nơi nào, tình trạng nào...)
25. Customer (n)	/'kʌstəmə/	Khách hàng
26. Premises (n)	/'premɪs/	Dinh cơ Cơ sở (kinh doanh...)
27. Equipment (n)	/'kwɪpmənt/	Đồ trang bị, thiết bị, dụng cụ, đồ dùng cần thiết
28. Production (n)	/prə'dʌkʃən/	Sự sản xuất, sự chế tạo

29. Ensure (v)	/ɛn'ʃʊər , ɛn'ʃɜr/ /ɪn'ʃuə/	Bảo đảm
30. Process (n)	/'prouses/	Quy trình, sự tiến hành
31. Efficient (n)	/'i'fɪʃənt/	Có năng suất cao, có hiệu suất cao (máy...)
32. Safely	/seifli/	An toàn, chắc chắn
33. Correctly	/kə'rektli/	Đúng cách thức, phù hợp
34. Occur (v)	/ə'kɔ:/	Xảy ra, xảy đến, xuất hiện, tìm thấy
35. Department (n)	/di'pɑ:tmənt/	Cục; sở; ty; ban; khoa
36. Consult (v)	/kən'sʌlt/	Hỏi ý kiến, thỉnh thị, thăm dò
37. Innovation (n)	/ɪnə'veɪʃən/	Sự đổi mới, sự cách tân
38. Propose (v)	/prə'pəʊz/	Đề nghị, đề xuất, đưa ra
39. Practicable (adj)	/'præktikəbl/	Khả thi, có thể thực hiện được, có thể thực hành được
40. Knowledge (n)	/'nɒlɪdʒ/	Sự hiểu biết, tri thức, kiến thức; học thức



Tuning-in

- Task 1** List some of the jobs in engineering. Combine your list with others in your group.
- Task 2** Work in groups of three, A, B. and C. Scan your section of this text. A, B. or C. How many of the jobs in the combined list you made in Task 1 are mentioned in your section?

Jobs in engineering

A

Professional engineers may work as:

Design engineers: They work as part of a team to create new products and extend the life of old products by updating them and finding new applications for them. Their aim is to build quality and reliability into the design and to introduce new components and materials to make the product cheaper, lighter, or stronger.

5

Installation engineers: They work on the customer's premises to install equipment produced by their company.

10 *Production engineers:* They ensure that the production process is efficient, that materials are handled safely and correctly, and that faults which occur in production are corrected. The design and development departments consult with them to ensure that any innovations proposed are practicable and cost-effective.

B

15 Just below the professional engineers are the *technician engineers*. They require a detailed knowledge of a particular technology - electrical, mechanical, electronic, etc. They may lead teams of engineering technicians. Technician engineers and engineering technicians may work as:

Test/Laboratory technicians: They test samples of the materials and of the product to ensure quality is maintained.

20 *Installation and service technicians:* They ensure that equipment sold by the company is installed correctly and carry out preventative maintenance and essential repairs.

25 *Production planning and control technicians:* They produce the manufacturing instructions and organize the work of production so that it can be done as quickly, cheaply, and efficiently as possible.

Inspection technicians: They check and ensure that incoming and outgoing components and products meet specifications.

Debug technicians: They fault find, repair, and test equipment and 30 products down to component level.

- 30 *Draughtsman/ women and designers:* They produce the drawings and design documents from which the product is manufactured.

C

The next grade are *craftsmen/women*. Their work is highly skilled and practical. Craftsmen and women may work as:

- 35 *Toolmakers:* They make dies and moulding tools which are used to punch and form metal components and produce plastic components such as car bumpers.

Fitters: They assemble components into larger products.

Maintenance fitters: They repair machinery.

Welders: They do specialized joining, fabricating, and repair work.

- 40 *Electricians:* They wire and install electrical equipment.

Operators require fewer skills. Many operator jobs consist mainly of minding a machine, especially now that more and more processes are automated. However, some operators may have to check components produced by their machines to ensure they are accurate. They may require
45 training in the use of instruments such as micrometers, verniers, or simple 'go/no go' gauges

Source: Adapted from S. Moss&A.S. Watts, *CareersinEngineering*, 3rdedition

Task 3 Combine answers with the others in your group. How many of the jobs listed in Task 1 are mentioned in the whole text?

Task 4 Who would be employed to:

- 11 test completed motors from a production line?
- 12 find out why a new electronics assembly does not work?
- 13 produce a mould for a car body part?
- 14 see that the correct test equipment is available on a production line?
- 15 find a cheaper way of manufacturing a crankshaft?
- 16 repair heating systems installed by their company?
- 17 see that a new product is safe to use?
- 18 commission a turbine in a power station?

Reading *Inferring from samples*

In Task 5 below and in the Listening (Task 7), you are asked to infer from a small sample of text information which is not clearly stated. Use the clues in the samples and the knowledge you have gained from the text *Jobs in engineering*.

Task 5 As a group, try to identify the jobs of these workers from their statements.

- 1 We perform standard chemical and physical tests on samples, usually as a result of a complaint from inspectors on the production line. We are an important part of production. We have the authority to stop the line if we find something seriously wrong. It's interesting work, and
5 we're able to move around from test to test and chat. Sometimes, admittedly, the work gets a bit repetitive.
- 2 All machinists can be difficult. The older blokes especially don't like me telling them their work isn't good enough and instructing them to

do it again. One or two of them seem to think the inspector is always out to get them. I'm constantly having to calm things down.

- 3 We measure up the components to see that they are the right size and shape, and we make any minor adjustments ourselves with hand tools or power tools. All along, parts will need adjusting slightly and you have to check things at each stage with measuring instruments and
15 gauges. You have to get a feel for it—clearances have to be just right. Otherwise things won't fit together.

- 4 I find my job a very satisfying one. It's never easy to say exactly why one likes a job. I think the basic thing I get out of my profession at the moment is the creativity that is involved in design work. You start from
20 square one with a plain sheet of paper. You draw a component. You design something and perhaps a few months later you can see the end product. And you get told whether or not your design works! I think it's that aspect that I find most satisfying

- 5 I enjoy my job. I really like doing the same thing every day— exactly
25 the same job. You know what to look for and how things should be. You know how the machine—or the machines — run, when a machine is working properly and when there is something wrong with it. I really like the routine. I don't have dreams of becoming a supervisor or anything like that. I'm just content running my machines

- 6 30 My company makes desalination equipment. It takes the salt out of sea water so it can be used for drinking and irrigation. A lot of our customers are in the Middle East. I have to go there whenever new equipment is being set up to make sure it's properly installed and everything is running OK

Source (quotations 1- 5): T. May, People at Work: Working a light engineering plant

Speaking practice *Role play*

Task 6 Work in pairs, A and B. Each of you has profiles of three workers in a light engineering plant which supplies car electrical components such as starter motors, fuel pumps, and alternators.

Play the part of one of these workers and be prepared to answer questions from your partner about your work. Your partner must try to identify your job from your replies.

In turn, find out about your partner.

Do not give your partner your job title until he or she has found out as much information as possible and has made a guess at your occupation. Try to find out:

- 1 Age
- 2 Education
- 3 Qualifications
- 4 Nature of work
- 5 Who he/she is responsible to
- 6 What he/she feels about his/her work

Before you start, work out with your partner useful questions to obtain this information.

Student A: Your profile is on pages 179/80.

Student B: Your profile is on page 183.

Listening *Inferring from samples*

Task 7 Listen to these workers talking about their jobs. Try to match each extract to one of these jobs.

- a** Methods engineer
- b** Systems analyst
- c** Toolmaker
- d** Machine tool development fitter
- e** Foreman/woman
- f** Applications engineer

UNIT 6: APPLYING FOR JOB

TT	Chuẩn đầu ra của chương	CĐR HP
1	Viết CV và e-mail đúng các mẫu phổ biến trong tiếng Anh	7

Vocabulary

New word	Pronunciation	Meaning
1. Apply (v)	/ə'plai/	Ứng dụng, áp dụng Xin, thỉnh cầu
2. Sort (n)	/sɔ:t/	Thứ, loại, hạng
3. Present (v)	/pri'zent/	Đưa ra, bày ra, lộ ra, giờ ra, phô ra
4. Present (n)	/'prezənt/	Hiện tại, hiện thời, hiện giờ, hiện nay, lúc này, bây giờ
5. Future (n)	/'fju:tʃə/	Tương lai
6. Attraction (n)	/ə'trækʃn/	Sự thu hút, sự hấp dẫn, sự lôi cuốn; sức hấp dẫn, sức lôi cuốn
7. Compare (v)	/kəm'peə(r)/	so, đối chiếu
8. Answer (n)	/'ɑ:nsə/	Sự trả lời; câu trả lời; thư trả lời; lời đối đáp
9. Question (n)	/'kwɛstʃən/	Câu hỏi
10. Group (n)	/gru:p/	Nhóm
11. Understanding (n)	/,ʌndər'stændɪŋ/	Trí tuệ, sự hiểu biết, óc thông minh, sự am hiểu

12. Advertisement (n)	/æd'və:tismənt, ,ædvə'taizmənt/	Sự quảng cáo; bài quảng cáo (trên báo, trên đài...) Tờ quảng cáo; tờ yết thị; tờ thông báo (dán trên tường...)
13. Below	/bi'lou/	Ở dưới, ở bên dưới, ở dưới thấp, ở phía dưới
14. Airport (n)	/ˈɛə,pɔ:t/	Sân bay, phi trường
15. Highly (adv)	/ˈhaili/	Rất, lắm, hết sức, ở mức độ cao
16. Successful (adj)	/sək'sesfəl/	Có kết quả, thành công, thắng lợi, thành đạt
17. Part (n)	/pa:t/	Phần, bộ phận, tập (sách)
18. Approximately	/ə'prɒk.sɪ.mət.li/	Khoảng chừng, độ chừng
19. Expansion (n)	/ɪk'spænjən/	Sự mở rộng, sự bành trướng, sự phát triển, sự phồng ra; phần mở rộng
20. Opportunity (n)	/ˌɒpər'tuniti , ˌɒpər'tyuniti/	Cơ hội, thời cơ, dịp may
21. Corrective (adj)	/kə'rektiv/	Để sửa chữa, để hiệu chỉnh
22. Preventative (adj)	/pri'ventətiv/	Ngăn ngừa, phòng ngừa; thận trọng với
23. Maintenance (n)	/ˈmeɪn.tən.əns/	Sự giữ gìn, sự duy trì; sự bảo vệ, Sự bảo dưỡng
24. Variety (n)	/və'raɪəti/	Sự đa dạng, tính chất không như nhau; trạng thái khác nhau, trạng thái muôn màu muôn vẻ; tính chất bất đồng

25. Monitoring (n)	/ˈmɒnɪtərɪŋ/	Sự giám sát Sự kiểm tra
26. System (n)	/ˈsɪstəm/	Hệ thống; chế độ
27. Effective (adj)	/ɪfektɪv/	Có hiệu lực, có kết quả
28. Control (n)	/kənˈtrɒl/	Sự điều khiển, sự lái, sự cầm lái
29. Diagnose (n)	/ˈdaɪəɡˌnoʊz/	Chẩn đoán
30. Operation (n)	/ˌɒpəˈreɪʃn/	Sự hoạt động; quá trình hoạt động
31. Plant (n)	/plænt , plant/	Máy móc, thiết bị (dùng trong quy trình sản xuất..)
32. Equipment (n)	/ɪˈkwɪpmənt/	Đồ trang bị, thiết bị, dụng cụ, đồ dùng cần thiết
33. Applicant (n)	/ˈæplɪkənt/	Người xin việc; người thỉnh cầu
34. Recognized (adj)	/ˈrekəɡnaɪzd/	Được công nhận, được thừa nhận, được chấp nhận
35. National (adj)	/ˈnæʃnəl/	(thuộc) dân tộc (thuộc) quốc gia
36. Experience (n)	/ɪksˈpiəriəns/	Kinh nghiệm Điều đã trải qua
37. Experience (v)		Trải qua, kinh qua, nếm mùi, chịu đựng
38. Position (n)	/pəˈzɪʃən/	Vị trí, chỗ (của một vật gì)

Tuning-in

Task 1 What sort of engineering job do you do at present or would you like to do in the future? What are the attractions of the job? Compare answers with others in your group.

Reading *Understanding job advertisements*

Task 2 Answer the questions below about this job advertisement.

AAA * Castleton Airport

As a highly successful part of AAA plc, we handled approximately 5 million passengers last year. Further expansion of the airport facilities has created a career opportunity for the following:

Engineering Technicians

£13,000

In this multi-skilled role you will carry out corrective and preventative maintenance on a variety of electrical, electronic, and mechanical plant. You will use computer-based monitoring systems for effective control, fault diagnosis, and operation of plant and equipment.

Applicants should have a recognized HNC or National Certificate in Electrical/ Electronic Engineering and have served a recognized apprenticeship. Experience in the operation and maintenance of electromechanical plant utilizing electronic system control including experience of HVAC plant and systems, electronic PLC systems, boiler control systems, positional and electronic speed control systems including hydraulics, pumps, and heat exchangers would be desirable.

This demanding position requires effective communication skills together with a flexible attitude.

A clean current driving license is essential.

In return you can expect an attractive salary and benefits package.

Please forward a comprehensive CV to Denise Dickens, Personnel Department, Administrative Block A, Castleton Airport, Castleton CS213SL. Closing date for receipt of completed applications is 31 December.

- 19 Which company is advertising?
- 20 Where are the jobs based?
- 21 At what professional level are the jobs available?
- 22 Applicants from which branch of engineering are eligible?
- 23 What qualifications are required?
- 24 In addition to qualifications, what must the applicants have completed?
- 25 List some of the areas in which experience is sought.
- 26 Might you be considered for the job without this experience?
- 27 In addition to qualifications and experience, what characteristics should applicants have?
- 28 Which non-professional qualification is essential?
- 29 What might a benefits package include?
- 30 What are PLC systems?
- 31 What does HVAC mean?
- 32 What is a CV?

Task 3 Fiona Weaver decides to apply for one of the posts. Study her CV below.
Answer these questions.

- 1 What is her highest educational qualification?
- 2 Why do you think the education and experience sections of her CV start with the most recent events?
- 3 Why does she give two references?
- 4 Why has she chosen these people to be her referees?
- 5 Why does she include interests and activities?

CURRICULUM VITAE

Personal details

Name: Fiona Weaver
Date of birth: 7 April 1974
Address: 6 Haymarket, Newcastle, NC1 4YU
Marital status: Single

Education and qualifications

1991-1995 Faraday College of Further Education, Newcastle
- National Certificate in Electrical and Electronic Engineering
(day release from S & T (UK) Ltd)
1985-1990 George Stephenson Secondary School, Newcastle

I hold a clean driving licence. I have been driving for three years.

Work experience

1995 to present Inspection Technician
Sturner & Thomson (UK) Ltd
- Responsible for checking incoming components and completed products using a wide range of test equipment including computer-based record systems.
1991-1995 Apprentice electrical technician
Sturner & Thomson (UK) Ltd
1990-1991 Office junior
Brent & Wicker, Solicitors
- Basic secretarial duties-filing, word-processing, telephone receptionist, in a busy lawyers' office

Interests and activities

Travel, modern dance, swimming

References

College:

Work:

Mr Andrew Wood
Head of Department
Electrical Engineering
Faraday College
Cornwallis Road
NEWCASTLE NC2 3PL

Mrs Joy Milne
Personnel Officer
S & T (UK) Ltd
North Street
NEWCASTLE NC14 7TL

Task 4 Study this letter of application which accompanied the CV. What information does it add to the CV?

6 Haymarket
Newcastle
NC1 4YU

15 December 19-

Ms Denise Dickens
Personnel Department
Administrative Block A
Castleton Airport
Castleton CS21 3S

Dear Ms Dickens,

Re: Engineering Technicians

I would like to apply for the post of Engineering Technician as advertised in today's issue of the Tribune. I enclose my CV with the names of two referees.

You will note from my CV that I have a National Certificate in Electrical and Electronic Engineering and considerable experience. My work at S & T (UK) means that I am

familiar with HVAC plant and systems including electronic system control. As an inspection technician, I have experience of a wide range of systems for product testing and component evaluation.

I enjoy my work at S & T but would like now to broaden my experience, especially in the area of maintenance. I feel that I can bring considerable skill to the post together with the ability to work well in a team. I am also interested in further improving my qualifications by studying for an HNC, part-time.

I look forward to hearing from you.

Yours sincerely

Fiona Weaver

Speaking practice *Role play*

Task 5 Imagine you are Ms Dickens of Castleton Airport. List Fiona's strong points and weak points. Plan questions to ask her at her interview.

Task 6 Now divide into pairs so that you are working with another student. Act out the interview with one being the applicant and the other the personnel officer. You can change Ms Dickens to Mr Dickens and Fiona Weaver to Michael Weaver if you wish.

Writing *Writing a CV and letter of application*

Task 7 Study the advertisements on the following pages. Select suitable jobs for which these applicants could apply.

- 1 Technician engineer. 27. HNC in Electrical Engineering, with two years' sales experience.
- 2 Professional engineer. 35, with five years' experience in the automotive – industry.

- 3 Design engineer, 42. BSc in Mechanical Engineering, with experience in managing projects both in-house and subcontracted.
- 4 Technician, 24. National Certificate in Mechanical Engineering, two years' shop floor experience.
- 5 Electrical engineer, 50. HNC, long experience in maintenance of high voltage plant.
- 6 Mechanical engineer, 46, HND, experience in maintenance.
- 7 Yourself.

SALES ENGINEER

Sinclair is one of the UK's largest private engineering groups, with an international reputation. The sealing systems operation requires a Technical Sales Engineer to sell the world-renowned Chesterfield range of products throughout the Midlands.

You should have previous sales and mechanical engineering experience with a bias to maintenance products and mechanical engineering. The successful candidate will ideally be between 30 and 45 years of age living in the Midlands with a mechanical engineering background. The company offer a good basic salary, commission and company car. Apply in writing, with full cv to: J. FORD

SINCLAIR SEALING SYSTEMS LTD.
16 CANYON ROAD, NETHERTON INDUSTRIAL ESTATE,
BIRMINGHAM B2 0ER Closing date 17 December 19—

SINCLAIR

a

PROJECT/DESIGN ENGINEER

We are a long established medium/ heavy engineering company (Liverpool area) specializing in mechanical handling equipment and require to appoint a project/ design engineer for our busy drawing office.

The applicant should be aged between 28 and 40 and must have a sound and practical engineering background. Ideally he/ she should be a time served draughtsperson, capable of running projects from initial concept, through design and detail including to final installation. He/She should have experience in fork truck attachments, lifting beams, and conveyor systems; must be able to work on his/ her own initiative and liaise with customers. This is an extremely responsible position with good prospects for further advancement.

Please reply in writing with full cv in the first instance to Box 1383, The Herald, Liverpool L1 1QP.

b

SUBCONTRACT MANAGEMENT

INTERNATIONAL MECHANICAL/ELECTRICAL PROJECTS £NEG AND GENEROUS BENEFITS

John Blair Engineering, part of the Nelson House Group, is a UK and International leader in power and process engineering. Continuing success in gaining new contracts world-wide has resulted in the ongoing growth of our Operations Division. This has created opportunities for additional Senior Subcontract Personnel.

Your prime responsibilities will involve:

- *the award and management of subcontractors working on major turnkey projects;*
- *the administration of change control procedures;*
- *identification of liabilities and risk assessment;*
- *cost forecasting;*
- *variation management.*

To be successful in this challenging position you will be qualified to degree level in a Mechanical, Electrical, or Quantity Surveying discipline and have 10 years experience at a Senior level preferably with a large, successful organization. Good communication and interpersonal skills are an essential requirement.

Salary is negotiable at a level attractive to high calibre individuals and in addition to the career prospects you would expect from a Company of our stature, we offer an attractive range of benefits, substantial pension provision, free life assurance, permanent health insurance, and generous relocation expenses where appropriate.

To apply please send a full cv stating current salary to: Planning and Development Manager, John Blair Engineering Limited, Dumbarton Road, Clydeside, Dumbartonshire G52 1YA, quoting reference number: 86/46/12.

JOHN BLAIR

ENTERPRISE THROUGH ENGINEERING

c

Senior Electrical Engineer

A MAJOR ROLE FOR A DEDICATED PROFESSIONAL

The Semiconductor UK plant at Knutsford covers over 300,000 square feet, over 100,000 square feet of which is devoted to clean rooms. We are currently investing some \$90 million in new equipment and buildings and the upgrading of plant and facilities.

In this high tech environment devoted to the design and manufacture of semiconductors, efficient and effective electrical supply and distribution systems are essential. We now have an opening for a Senior Electrical Engineer to take full responsibility for the management, use and engineering of the electrical supply and distribution on the site. Your expertise will be called upon during electrical enhancement, upgrades, and maintenance work. You will also have a responsibility for electrical safety and energy management conservation.

Qualified to degree level and preferably holding professional status you will have excellent knowledge of and expertise in the design of HV and LV distribution and control systems, gained ideally during your time in a manufacturing and operational/maintenance environment.

This important role carries an excellent salary and generous benefits including free private health care, life assurance, contributory pension scheme, and a progressive relocation package if necessary.

To apply, please write with full C.V. to:
Brian Williamson, Human Resources
Department, Semiconductor UK plc, Larkspur
Industrial Estate, Knutsford WA16 8QT.

 **Semiconductor UK**

d


A Division of
N & S plc

Part of the N & S Group, one of the world's major suppliers of automotive components, PREMIER VANDERBILT LTD is a market leader in the manufacture of plain bearings for automotive and general engineering applications.

QUALITY ENGINEER – c.£16k

Our manufacturing facility at Wycliffe Valley, Bathgate, commenced production in early 1992 and the workforce has expanded rapidly. We now require a Quality Engineer to join us.

Reporting to the Quality Assurance Manager, you will be responsible for ensuring quality related activities are implemented in line with company policies and objectives.

Educated to at least HNC level in mechanical engineering, experience in quality improvement in the automotive industry would be a distinct advantage. A working knowledge of SPC, FMEA, DOE, and problem solving techniques is essential.

Together with an attractive salary the benefits are those which can be expected from a progressive organization. There will be excellent opportunities for career development as the company continues to grow.

To apply, please send a cv stating current salary, to, **Stuart P. Alexander, Human Resources Manager, Premier Vanderbilt Ltd, 10 Stonehouse Road, Wycliffe Valley Industrial Estate, Bathgate, Berks RG20 2EW.**

Closing date for applications is Wednesday 5 January 19— and interviews will be held during January 19—.

e

MECHANICAL FITTER and PROJECT ENGINEER FOR MECHANICAL HANDLING

We require young, enthusiastic people in the maintenance department to work in conveying and specialist machinery for the Glass Container Industry. Applicants should have previous experience working on a shop floor with minimum supervision and be willing to work shifts with overtime. Annual salary will be not less than £13,500.

Please apply in own handwriting enclosing CV to:

**Mrs M Ramsay
GLACIER GLASS
PACKAGING LTD
1 Grayshill Road,
Westfield Industrial Estate
Bristol BS68 9HQ.**

(Only applicants selected for interview will receive an acknowledgement within the next 3 weeks.)

f

ENGINEERS FOR SALES

c£16,500k + CAR



NEWCASTLE

Whether customers are looking for induction motors or datacomms technology, the engineers who make up our sales team can be confident that the solution is in our catalogue. As the country's leading distributor of electronic, electrical, and mechanical engineering products, we can supply customers with some 40,000 different items—all within 24 hours of an order being placed.

If anything we have even more to offer engineers who would like to build on their expertise in sales. If you hit your targets—and we'll give you all the training you need to ensure that you do—you can look forward to high earnings and opportunities to develop your career further.

You'll visit customers in your area, selling them SB products and services, then feeding the information back via written reports, so you'll need to be able to impress decision makers with your technical ability, deciding priorities and motivating yourself to succeed.

This is a role that calls for proven sales experience and a background in electronic/electrical engineering (HNC essential). Bring us that and we can offer you the environment and scope to achieve your ambitions

All in all, there have never been better reasons to breakout (with or without the box). For more information and an application form, please send your full CV quoting ref E530H to Julia Beckett, Personnel Officer, SB Components Ltd, PO Box 26, Retford, Northants NN32 9RS.

SB Components Limited

g

Task 8 Write your CV and a letter of application for one of the posts advertised in Task 7. You may invent suitable qualifications and experience if you are still a student.

Technical Reading *Company structure*

Task 9

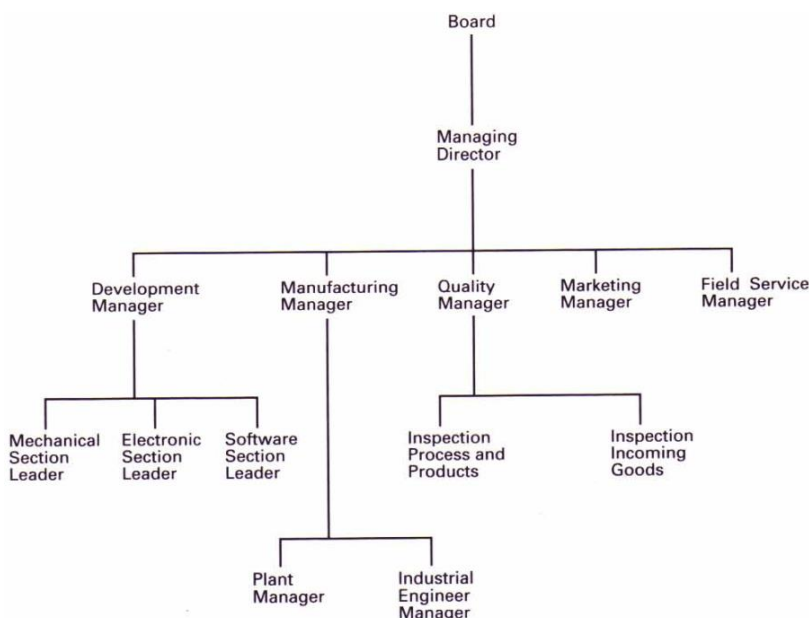


Fig. 1

Complete the blanks in this text using information from Fig. 1.

The head of an engineering company in the UK is the⁽¹⁾..... or the Chief Executive Officer (CEO). If it is an American subsidiary, the head may be known as the Vice President. Unless the person at the top is the Chairman of the company, or the owner, he or she will be responsible to a⁽²⁾..... or, in the case of a US subsidiary, the President. In turn, the Chairman or President is responsible to the company shareholders.

The managers of the various departments which are vital to a company report directly to the Managing Director. These managers may be referred to as the Management Team. They are required to advise the Director on the

consequences of any decision made by the Board in terms of costs, personnel, materials, tie, plant, etc. They also have to brief the Director on any matters which should be taken to the Board for decision.

The ⁽³⁾....., with the support of the Mechanical, Electronic, and ⁽⁴⁾..... Sections, is responsible for the introduction of new products. The ⁽⁵⁾.....decides how the new products will be produced. The ⁽⁶⁾ and Industrial Engineer Manager report to this member of the Management Team.

The⁽⁷⁾.....ensures that the products are fault-free and that the components and materials used in their manufacture meet company standards. The ⁽⁸⁾.....handles market research, promotion, and sales. The Field Service Manager is responsible for the installation and maintenance of the company's products wherever required.

The structure shown in Fig. 1 is common to most engineering companies but there can be differences in reporting channels. For example, in some companies the Field Service Department may report through Marketing, through Quality, or even through a separate Product Assurance and Support Group.

Although the company structure shows managers for each separate department, departments are interdependent. For example, the Development Manager would not start the design of a new product without first discussing the project with other managers. The design would not be completed without regular meetings with other departments to ensure that it fitted the customers' requirements, that cost targets would be met without adversely affecting quality, manufacturability, and serviceability. These meetings would ensure that trained manpower, tooling, documentation, etc.. were in place at the correct time for each stage of the product's launch.

Task 10 Read the text again to find the answers to these questions.

- 1 What is the US equivalent of the Managing Director?

- 2 Who is the Chairman of a company responsible to?
- 3 Who comprise the Management Team?
- 4 In what way might companies differ in structure from the example given?
- 5 Which department would advise on whether a new product would meet customers' requirements?

TỔNG HỢP TỪ TIẾNG ANH NGÀNH ĐIỆN

Electric power system:	Hệ thống điện (HTĐ)
Electric network/grid:	Mạng (lưới) điện
- Low voltage grid: lưới hạ thế - Medium voltage grid: lưới trung thế - High voltage grid: lưới cao thế - Extra high voltage grid: lưới siêu cao thế - Extremely high voltage grid: lưới cực cao thế	
Electricity generation:	Phát điện
Power plant:	Nhà máy điện
- Thermal power plant: nhà máy nhiệt điện - Hydroelectric power plant: nhà máy điện - Wind power plant: nhà máy điện gió - Tidal power plant: nhà máy điện thủy triều	
Electricity transmission:	Truyền tải điện
- Transmission lines: đường dây truyền tải	
Electricity distribution:	Phân phối điện
Consumption:	Tiêu thụ
- Consumer: hộ tiêu thụ	
Load:	Phụ tải điện
- Load curve: biểu đồ phụ tải - Load shedding: sa thải phụ tải - Unbalanced load: phụ tải không cân bằng - Peak load: phụ tải đỉnh, cực đại - Symmetrical load: phụ tải đối xứng	
Power:	Công suất
- Power factor: hệ số công suất - Reactive power: công suất phản kháng - Apparent power: công suất biểu kiến	
Frequency:	Tần số
- Frequency range: Dải tần số	
System diagram	Sơ đồ hệ thống điện
System operational diagram	Sơ đồ vận hành hệ thống điện
Power system planning	Quy hoạch hệ thống điện
Interconnection of power systems	Liên kết hệ thống điện
Connection point	Điểm đấu nối
National load dispatch center	Trung tâm điều độ hệ thống điện Quốc gia
Steady state of a power system	Chế độ xác lập của hệ thống điện
Transient state of a power system	Chế độ quá độ của hệ thống điện
Operation regulation	Tiêu chuẩn vận hành

Synchronous operation of a system	Vận hành đồng bộ hệ thống điện
Power system stability	Độ ổn định của hệ thống điện
Steady state stability of a power system	Ổn định tĩnh của hệ thống điện
Conditional stability of a power system	Ổn định có điều kiện của hệ thống điện
System diagram	Sơ đồ hệ thống điện
System operational diagram	Sơ đồ vận hành hệ thống điện
Power system planning	Quy hoạch hệ thống điện
Interconnection of power systems	Liên kết hệ thống điện
Connection point	Điểm đầu nối
National load dispatch center	Trung tâm điều độ hệ thống điện Quốc gia
Steady state of a power system	Chế độ xác lập của hệ thống điện
Transient state of a power system	Chế độ quá độ của hệ thống điện
Operation regulation	Tiêu chuẩn vận hành
Synchronous operation of a system	Vận hành đồng bộ hệ thống điện
Power system stability	Độ ổn định của hệ thống điện
Steady state stability of a power system	Ổn định tĩnh của hệ thống điện
Conditional stability of a power system	Ổn định có điều kiện của hệ thống điện
Service reliability	Độ tin cậy cung cấp điện
Service security	Độ an toàn cung cấp điện
Economic loading schedule	Phân phối kinh tế phụ tải
Balancing of a distribution network	Sự cân bằng của lưới phân phối
Load stability	Độ ổn định của tải
Overload capacity	Khả năng quá tải
Load forecast	Dự báo phụ tải
System demand control	Kiểm soát nhu cầu hệ thống
Management forecast of a system	Dự báo quản lý của hệ thống điện
Reinforcement of a system	Tăng cường hệ thống điện
Two-winding transformer	Máy biến áp 2 cuộn dây
Three-winding transformer	Máy biến áp 3 cuộn dây
Auto transformer	Máy biến áp tự ngẫu
Primary voltage	Điện áp sơ cấp
Secondary voltage	Điện áp thứ cấp
Step-up transformer	MBA tăng áp
Step-down transformer	MBA giảm áp
Tap changer	Bộ chuyển nấc (MBA)
OLTC – on load tap changer	Bộ chuyển nấc dưới tải (MBA)
Punching	Lá thép đã được dập định hình.
Winding.....	Dây quấn (trong máy điện).
Wiring	Công việc đi dây.
Bushing	Sứ xuyên.

Differential amplifier	Mạch khuếch đại vi sai.
Differential relay	Rơ le so lệch.
Different gear box	Trong xe ô tô, nó là cầu vi sai.
Autotransformer	Hông phải biến áp tự động, mà là biến áp tự ngẫu.
Fault	Sự cố, thường dùng để chỉ sự cố ngắn mạch.
Earth fault.....	Sự cố chạm đất.
Trip.....	Máy bị ngưng hoạt động do sự cố.
Loss of field	Mất kích từ.
Ammeter	Ampe kế
Busbar	Thanh dẫn
Cast-Resin dry transformer	Máy biến áp khô
Circuit Breake	Aptomat hoặc máy cắt
Compact fluorescent lamp	Đèn huỳnh quang
Contactor	Công tắc tơ
Current carrying capacity	Khả năng mang tải
Dielectric insulation	Điện môi cách điện
Distribution Board	Tủ/bảng phân phối điện
Earth conductor	Dây nối đất
Earthing system	Hệ thống nối đất
Equipotential bonding	Liên kết đẳng thế
Fire retardant	Chất cản cháy
Impedance Earth	Điện trở kháng đất
Instantaneous current	Dòng điện tức thời
Light emitting diode	Điốt phát sáng
Oil-immersed transformer	Máy biến áp dầu
Outer Sheath	Vỏ bọc dây điện
Relay	Rơ le
Sensor / Detector	Thiết bị cảm biến, thiết bị dò tìm
Switching Panel	Bảng đóng ngắt mạch
Tubular fluorescent lamp	Đèn ống huỳnh quang
Upstream circuit breaker	Bộ ngắt điện đầu nguồn
Voltage drop	Sụt áp
Cable	Cáp điện
Electrical appliance	Thiết bị điện gia dụng
Electrical insulating material	Vật liệu cách điện
High voltage	Cao thế
Jack	Đầu cắm
Lamp	đèn
Leakage current	Dòng rò
Low voltage	Hạ thế

Neutral wire:	Dây nguội
Photoelectric cell	Tế bào quang điện
Relay	Rơ-le
Wire	Dây điện
Capacitor	Tụ điện
Compensate capacitor	Tụ bù
Cooling fan	Quạt làm mát
Copper equipotential bonding bar	Tấm nối đẳng thế bằng đồng
Current transformer	Máy biến dòng
Disruptive discharge	Sự phóng điện đánh thủng
Disruptive discharge switch	Bộ kích môi
Earthing leads	Dây tiếp địa
Magnetic Brake	Bộ hãm từ
Phase reversal	Độ lệch pha
Rated current	Dòng định mức
Selector switch	Công tắc chuyển mạch
Starting current	Dòng khởi động
Disconnecting switch	Dao cách ly.
Circuit breaker	Máy cắt.
Power transformer	Biến áp lực.
Bushing type CT	Biến dòng chân sứ.
Winding type CT	Biến dòng kiểu dây quấn.
Auxiliary contact, auxiliary switch	Tiếp điểm phụ.
Thermometer	Đồng hồ nhiệt độ.
Pressure gauge	Đồng hồ áp suất.
Position switch	Tiếp điểm vị trí.
Control board	bảng điều khiển.
Rotary switch	Bộ tiếp điểm xoay.
Control switch	Cần điều khiển.
Selector switch	Cần lựa chọn.
Synchro switch.....	Cần cho phép hòa đồng bộ.
Synchro scope	Đồng bộ kế, đồng hồ đo góc pha khi hòa điện.
Alarm	Cảnh báo, báo động.
Time relay	Rơ le thời gian.
Phase shifting transformer	Biến thể dời pha.
Điện áp danh định của hệ thống điện.....	Nominal voltage of a system.
Air circuit breakers (ACB).....	Máy cắt không khí.
Automatic circuit recloser (ACR)	Máy cắt tự đóng lại.
Area control error (ACE)	Khu vực kiểm soát lỗi.
Analog digital converter (ADC)	Bộ biến đổi tương tự số.

REFERENCES

Eric H. Glendinning and Norman Glendinning, *Oxford English for Electrical and Mechanical Engineering*, Oxford Oxford University Press 2001.