

Unit 3

Application of technology

Summary

Technology has a major impact on the way that we design and manufacture an engineered product or deliver an engineering service and the use of technology—particularly new technology—is an exciting aspect of engineering. Technology provides us with new and more cost-effective solutions for problems that could not be easily solved using existing methods. In recent years the application of technology has revolutionised many traditional engineering processes, from cutting metal to manufacturing electronic circuit boards. At the same time, technology has given us the possibility of a whole range of new products from electric cars to consumer electronic equipment such as CD players and GPS receivers.

In this unit you will look at the application of technology in engineering through a series of case studies. To help you understand real-life examples of the development and application of technology, each case study incorporates one or more activities for you to complete. The case studies also provide you with opportunities to investigate products and to develop skills in gathering and using information. In order to complete the case study activities you will need to make use of your school or college library as well as other information sources such as CD-ROMs and the World Wide Web.

Unlike the earlier units that were assessed through your portfolio, your achievement of the learning outcomes for this unit will be assessed by means of a written examination.

3.1 Introduction

Imagine that you have the task of producing a printed circuit board that has to be drilled (using a small pillar drill) with 100, or so, 1 mm diameter holes through which component leads are to be inserted prior to soldering in place. In order that the component leads align with the copper pads on the track side of the circuit board, each of the holes has to be precisely positioned. Clearly, this task might take you some time but you would probably get there in the end!

Now imagine that you have to produce 1,000 similar boards. Not only will this task take you a very long time but it would be highly

likely that a significant number of boards would be rejected because the holes were not in the right place. What you need, of course, is to apply some technology to the solution and set up a machine to do the drilling for you!

At this point, it's worth stepping back a few years and considering how electronic circuits were manufactured 50 years ago and comparing this with the way they are manufactured today. Take a look at Figure 3.1 which shows the internal construction of a radio receiver designed and manufactured in the 1950s. Now look at Figure 3.2 which shows its modern equivalent. They don't seem to have a lot in common—even though both items of equipment essentially perform the same function. So, why the difference? The answer to this question is simply that advances in technology (both that associated with the engineered product itself as well as the technology associated with its manufacture) has moved on!

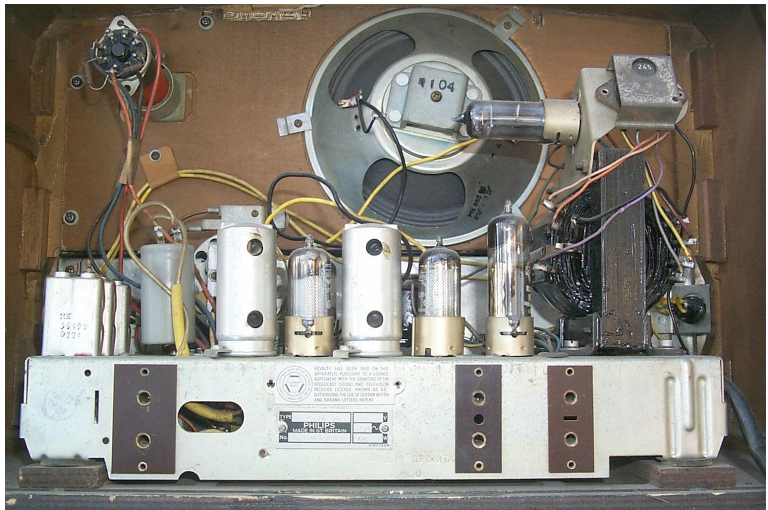


Figure 3.1 *Interior construction of a 1950's radio*

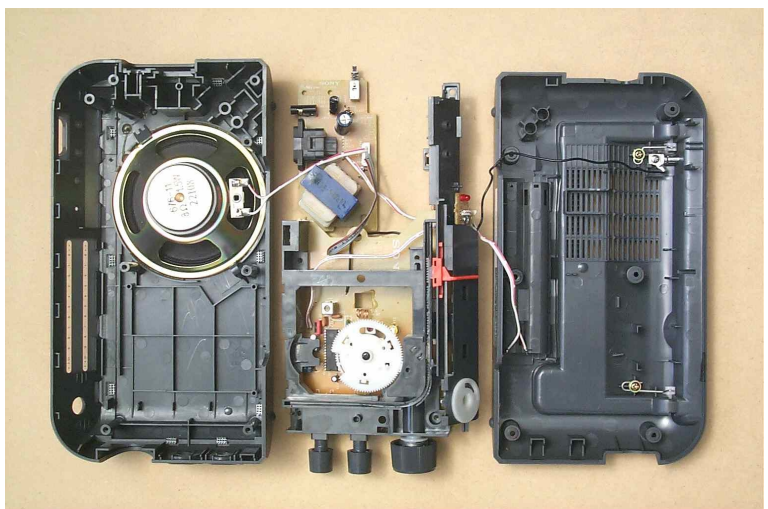


Figure 3.2 *Interior construction of a modern radio*

The important differences between the two radios shown in Figures 3.1 and 3.2 can be summarised in the following table:

Feature	1950's radio	Modern radio
Enclosure	Wooden case	Moulded plastic case
Components	Six thermionic valves	One integrated circuit and diodes
Construction	Metal chassis	Two printed circuits
Wiring	Point-to-point soldered wires	
Power consumption	30W	less than 3W

Table 3.1 Comparison of a 1950's radio with a current radio

Activity 3.1

Key point

Continuous improvements in technology (both that which is directly associated with a product as well as that which is used in its manufacture) allow engineers to use increasingly cost-effective solutions.

Consider the way the telephone has changed in the last hundred years. Use your school or college library or other source (such as a CD-ROM or the Web) to obtain information on the development of the telephone from around 1900 to the present day (including mobile phones). Write a brief report and include sketches and illustrations showing how technology has changed not only the way the 'phone works but also how it is made. Don't forget to mention materials and processes in your report!

3.2 Manufacturing sectors

Before we move on, it's important to think about the various sectors that exist in engineering and manufacturing. In particular, you need to be able to relate an engineered product or engineering service (as well as the technology that it uses) to a particular sector, as follows:

Engineering

- engineering fabrication
- mechanical/automotive engineering
- electrical and electronic engineering, process control and telecommunications

Manufacturing

- food and drink/biological and chemical
- printing and publishing/paper and board
- textiles and clothing.

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Test your knowledge 3.1

Which TWO of the following engineered products belong to the mechanical engineering sector?

- (a) Mobile phones
- (b) Ready-to-cook meals
- (c) CNC milling machines
- (d) Portable CD players
- (e) Lifting hoists
- (f) Light aircraft.

Test your knowledge 3.2

Which TWO of the following engineered products belong to the electrical engineering sector?

- (a) Metal cabinets
- (b) Generators
- (c) Gas welders
- (d) Mobile phones
- (e) Drinks cartons
- (f) Transformers.

Key point

Engineered products and services are often attributed to the sector from which they originate.

Key point

Engineering sectors include aerospace, electrical and electronic, mechanical, telecommunications, automotive, and manufacturing.

The engineering sectors, products and leading companies that you need to be particularly familiar with are as follows:

Aerospace

New passenger and military aircraft, satellites, space vehicles, missiles, etc from companies such as British Aerospace, Westland and Rolls-Royce.

Electrical and electronic

Electric generators and motors, consumer electronic equipment (radio, TV, audio and video) power cables, computers, etc produced by companies such as GEC, BICC and ICL.

Mechanical

Bearings, agricultural machinery, gas turbines, machine tools and the like from companies such as RHP, GKN and Rolls-Royce.

Telecommunications

Telephone, radio and data communications equipment, etc from companies like Nokia, GEC, Plessey and British Telecom.

Within the *manufacturing sector* you need to be able to identify and investigate a variety of products as well as the engineering technology used in their manufacture. An example of this is the use of engineering in the printing industry.

Activity 3.2

Investigate the engineering industry in your area. Name at least three engineering companies and identify the engineering sectors in which they are active. Give ONE example of how EACH of these companies is making use of technology. Present your findings in the form of a brief class presentation using appropriate visual aids.

Activity 3.3

In recent years, the application of technology in automotive engineering has led to a number of significant improvements in motor vehicle design. Obtain literature from a local car dealer and identify THREE improvements that are incorporated in modern production vehicles that were unavailable in vehicles produced 20 years ago. At least ONE of these improvements should contribute to the safety of the driver and passengers. Present your findings in the form of a brief class presentation using appropriate visual aids.

Test your knowledge 3.3

Figure 3.3 shows the exploded view of an electric saw.

- To which engineering sector does this product belong?
- Give the part numbers of THREE components that are electrical and have been developed from electrical technology.
- Give the part numbers of THREE components that are mechanical and have been developed from mechanical technology.
- Give the part numbers of THREE components that are polymers (plastic) and have been developed from materials technology.

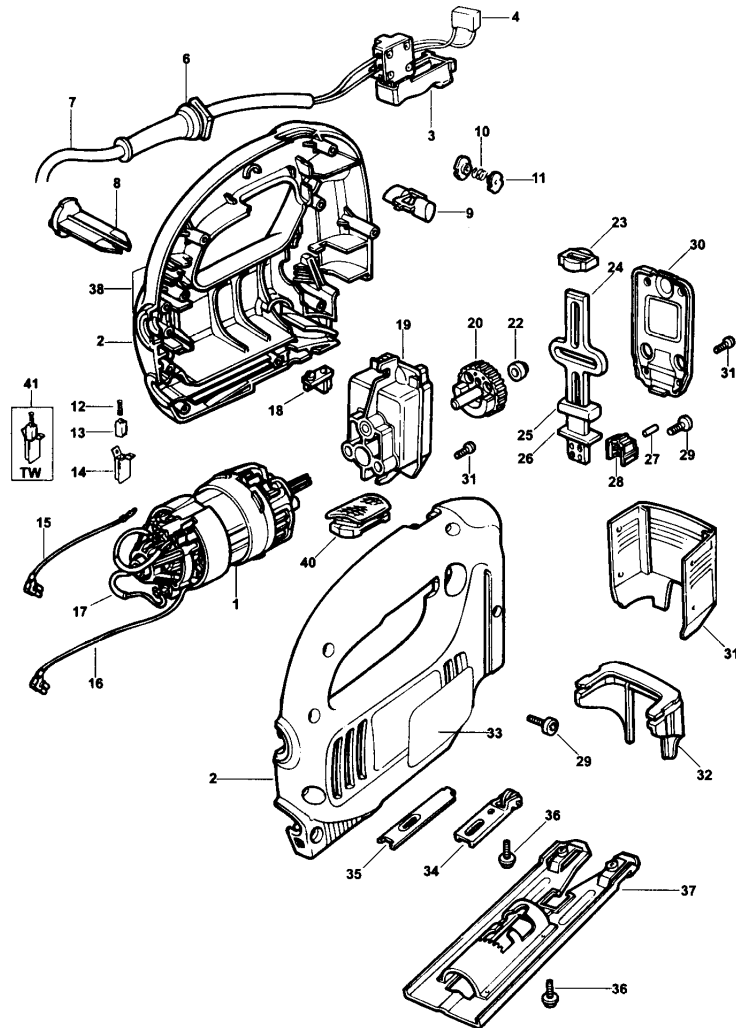


Figure 3.3 Exploded view of an electric saw

Test your knowledge 3.4

Figure 3.4 shows the exploded view of a VHF transceiver for use in a vehicle.

- To which engineering sector does this product belong?
- Give the part numbers of THREE components that are electrical and have been developed from electrical technology.
- Give the part numbers of THREE components that are mechanical and have been developed from mechanical technology.
- Give the part numbers of THREE components that are polymers (plastic) and have been developed from materials technology.

Activity 3.4

Several different types of computer printer (including ink jet and laser types) are currently available to home, small business and education users. Investigate one ink jet and one laser printer. Obtain a full specification and a user manual for each type (your tutor may be able to help you with this) and use this, together with other sources of information, to investigate the technology used for printing. Draw up a comparison chart which lists features such as; print technology, media requirements, cost (and cost of consumables), operating lifetime, colour print capability, reliability, etc. Also investigate the impact that the print technology has on the design of the printer. Present your result in the form of a single A4 page 'fact sheet' entitled 'Print Technology for Home and Small Business Users'.



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