

Introduction

Welcome to **Real Life Design**, a unit of five 15-minute programmes within The Technology Programme series.

Real Life Design deals with key aspects of design and technology for 11–14 year olds. The programmes link the work of leading designers in craft and industry to the projects students are undertaking in school.

The **first three programmes are pupil-focused** and concentrate on making things move, fashion design and taking control. The **last two programmes are teacher-focused** but can still be viewed by pupils. These two programmes look at issues surrounding food technology and they offer ideas on: starting a project, balancing design and make assignments with focused practical skills, continuity, progression and differentiation.

Within this Study Guide there are three photocopyable pupil sheets for each programme containing:

- ◆ a programme overview which can be used for class discussion and investigations before, during or after viewing the programme
- ◆ design-and-make projects with focused practical tasks

In addition to this book, The Royal College of Art Schools Technology Project has produced materials linked to **Real Life Design**. The content and approach of these printed materials and the television resources together offer a range of alternative strategies for planning a D & T 11–14 course. See pages 17–19 for tables showing the links between the **Real Life Design** programmes and the Royal College of Art Schools Technology Project materials (published by Hodder & Stoughton Educational).

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Making Things Move

Making Things Move overview

Automata (mechanical toys) provide a perfect introduction to mechanical principles and **making things move**. The cam is a fundamental component; an ideal first step to greater things.

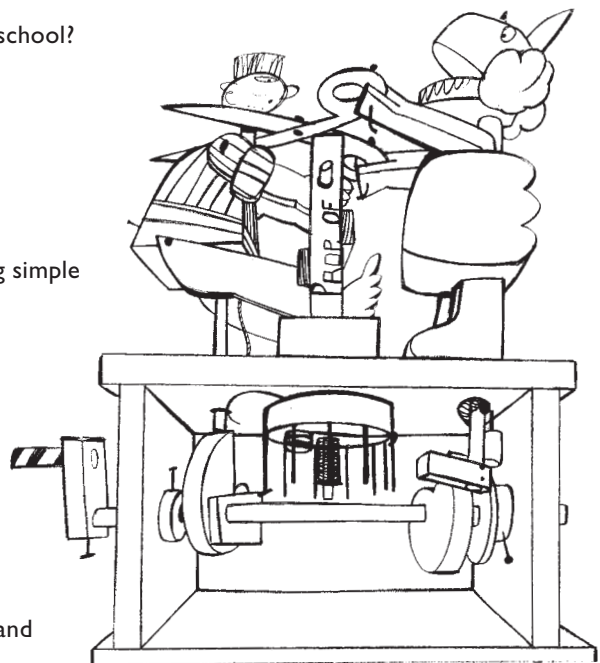
Creating the familiar, characteristic movement of animals or humans takes thought, care and skill. Man's fascination with mimicking human and animal behaviour goes back centuries. There are automata museums in both York and London which provide a great opportunity for school visits. Ron Fuller and Keith Newstead each have talent for combining artistic ideas with sound engineering principles when making their automata... an important quality for all students of Design & Technology. The programme focuses on translating movement from rotary to linear and providing some ingenious solutions. Prepare to be fascinated.

Before you watch, think...

- ◆ Many domestic and industrial machines work by translating rotary movement to movement in other directions. How do they do this?
- ◆ What mechanisms are used to do this: at home? at school?
- ◆ How do cams help in this translation?
- ◆ What other movements beside rotary are used?

Whilst you watch, note how...

- ◆ Automata make quite complicated movements using simple mechanical operations.
- ◆ The mechanisms used are borrowed from everyday mechanisms.
- ◆ Cams work and how useful they are.
- ◆ Many different types of material can be used to make automata models.
- ◆ Designing automata involves artistic as well as engineering skills combined with a dash of humour and originality.
- ◆ Each design is unique to the designer.



After watching, try tackling these challenges...

- 1 What makes some automata funnier than others?
- 2 Consider how the automata mechanisms resemble those used in everyday objects.
- 3 What are the three everyday machines which incorporate cams that were featured in the programme? What other examples can you find?
- 4 Inspiration for automata is all around us. Look around you and make a list of **four** different sources of inspiration.
- 5 What did Ron Fuller mean by **tweaking**?
- 6 Explain how cams are able to store information.
- 7 Cams are used to make objects rise and fall. A crank can also do this. Explain what a crank is and draw a sketch of a crank in use.
- 8 Whilst making his sheep-shearing man, Ron Fuller explained about making and drawing ... making and drawing. Why couldn't he have done all the drawings before he began?

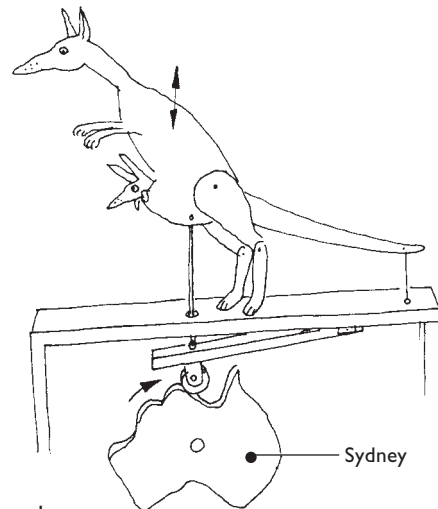
Design and make... an automaton

Design brief

Your challenge is to create an automaton which can be sold in an arts shop in your neighbourhood.

The automaton will be sold either assembled or in the form of a flat-pack kit. You will have to produce both a finished working model and a set of instructions on how to assemble the kit version.

The model can be of animal or human form but should reflect your town or city's culture or history.



first... Design

► Devise a funny caricature of a human or animal.

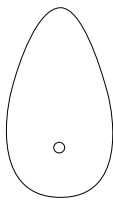
Try the idea out on potential customers. Do they find it funny?

Evaluate some old mechanical toys. Take them apart and see how they work.

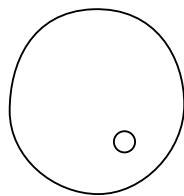
Make sure that a cam is important to your design.

A cam is a device used to turn rotary motion into an up and down movement.

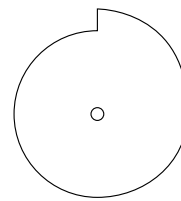
There are three common types of cam.



Pear Cam which gives a symmetrical rise and fall with a period of dwell (or pause)



Eccentric Cam which causes the movement to change all the time with a constantly moving follower



Snail Cam which gives a steady rise and instantaneous fall and rotates only in one direction

Which one(s) will you need? There is more information about cams on the **Cam design** sheet.

► Model your ideas in card first, using paper fasteners and drawing pins. Test the model.

then... Make

► Concentrate on refining your model and realising your ideas in resistant materials.

Will the parts break easily?

How might the design be changed to make it more sturdy?

An electric fret saw can be used to cut out the cams. How else could you produce cams?

How will you align the holes in opposite sides of the frame so that they are correct and accurate?

How could you use spraying masks or templates to assist in the finishing procedures?

Write your list of instructions on how to assemble the kit version of your model.

finally... Evaluate and display

► If you want an honest opinion, ask a fellow student.

Mount a display and invite local people to see it.

Is the movement of your model always reliable? If not, is this a design fault? Can you tweak it?

Can the design be simplified?

Will the parts wear out? How can you reduce wear?

How could you adapt the design so it can be driven by an electric motor?

Cam design

Cams play a crucial part in automata. How the different parts move in an automaton depends upon the shape of the cams. There are three sorts of cam: **Pear**, **Eccentric** and **Snail**. As the cam rotates the cam follower rises and falls. The dwell time is the length of time the cam follower pauses and the lift is the distance the cam follower rises.

Investigate how a pear cam works

► Look at the pear cam shown in the diagram.

The cam follower is resting at point X on the cam.

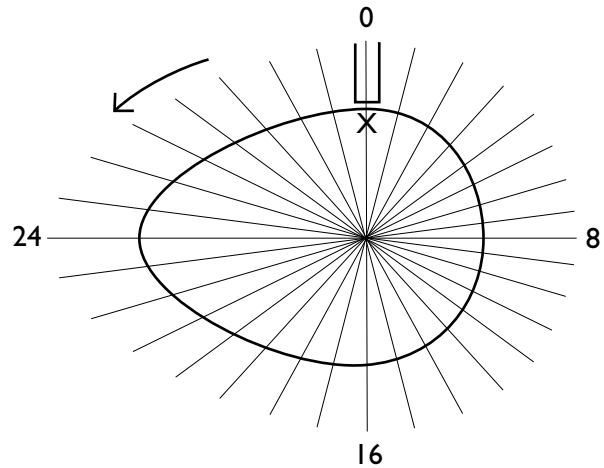
Imagine the cam then starts to rotate anticlockwise.

As the cam rotates for one revolution, the path traced by the end of the cam follower is drawn on the graph.

The distances on the graph are measured from the centre of the cam to the point on the edge by using the radial lines.

How do you think the graph finishes?

What will happen to the cam follower as the cam rotates?



Test your ideas

► Make a card pear cam the same size as the one shown, marking X in the same position.

Pierce a hole in the centre.

Use a paper fastener or drawing pin to attach the cam to this piece of paper in the same position as the one in the diagram.

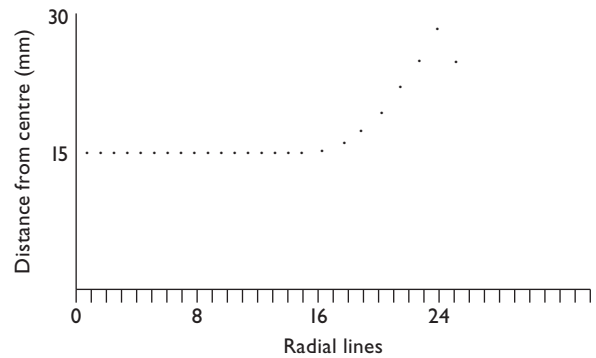
Make a follower similar to the one shown and place it touching the cam at point X.

Now turn the cam anticlockwise slowly.

Make appropriate measurements to finish the graph.

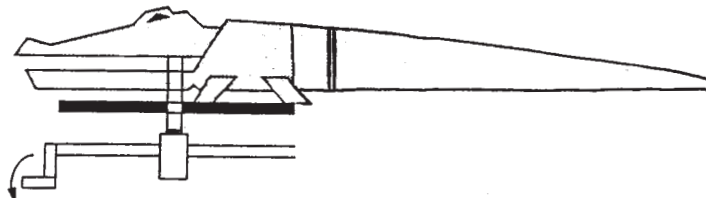
Note how the cam follower moves or pauses in the course of one cam revolution.

Try the same thing with an eccentric cam and a snail cam.



Further work

A new fast food centre called Snappy's is opening shortly in town. Its logo is a character of a crocodile. An automaton crocodile is to be given to the first 500 customers.



► Design a cam so that in one revolution, the crocodile's top jaw stays down for a time, then rises steadily and when it reaches a certain height falls instantly to its starting position.

What type of cam have you designed?

► Suggest uses for other shapes of cam.

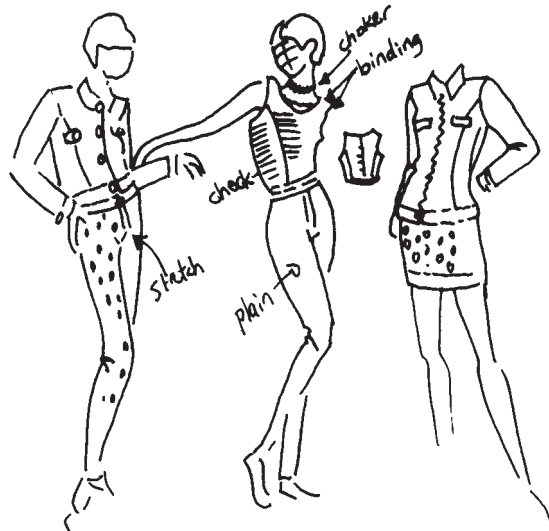
Looking for Ideas

Looking for Ideas overview

Fashion designers are always **looking for ideas**. Top fashion designers like 'Red or Dead' work at least one or two years ahead of the high street but occasionally there are special events such as the millennium which need careful, advanced planning. Fashion is not static, it is an ever-changing area which reflects the moods and trends of society. It is important that ideas are new and fresh but they also need to sell. Designing is not just about looks. Designers have to understand the technology of fabrics and their properties and manufacturing processes. They need to know at whom the product is aimed and what is its function. Looking for ideas is a complicated business.

Before you watch, think...

- ◆ How many reasons can you think of for wearing clothes?
- ◆ What fabrics are used to make clothes? How many are natural? How many synthetic? Why are they often mixed?
- ◆ What do you understand by fashion? What determines it?
- ◆ Is fashion design more important to girls than boys? Why?
- ◆ Why does fashion change every season?
- ◆ From where do fashion designers get their ideas?



Whilst you watch, note how...

- ◆ Professional designers draw their inspiration from many different areas.
- ◆ Designers use a range of skills when creating new ideas.
- ◆ Stories and moodboards form an important aspect of fashion designing.
- ◆ Aesthetic qualities look, colour, touch and feel are important to fashion success.

After watching, try tackling these challenges...

- 1 Many designers seek inspiration from nature. What else might inspire you?
- 2 What influences fashion designers? How do they go about designing a new garment?
- 3 Why are moodboards useful when fashion designing?
- 4 What would you include in a moodboard for **a** a waistcoat **b** clothes for a millennium party? Devise one.
- 5 How might the disassembly of garments help when designing clothes? Where can you easily get old clothes to take apart and examine?
- 6 Is fashion dictated by taste merchants, or can you create your own image?
- 7 How much control do you, the customer, have over what you buy?
- 8 Sketch a fashion portfolio for a teenager going on holiday to a hot country. Remember they have to stay within the baggage allowance!
- 9 Devise a total fantasy garment to catch the eye of fashion editors. It also has to be practical as well as achievable.
- 10 How could you use CAD (computer-aided design) embroidery to enhance clothing? Design a logo for a T-shirt to be applied using CAD.



Design and make... a fantasy hat

Design brief

Fashion trends have not always changed as quickly as they do now. The top hat as worn by Hugh Grant in the film *Four Weddings and a Funeral* was considered vulgar when it was first designed two hundred years ago. This shows how fashion and our attitude to fashion changes with time. These days, however, we are more likely to see unusual hats worn by women at Ascot and on the catwalk than at a wedding or funeral.

Your challenge is to design and make a fantasy hat for a millennium party.

first... Design

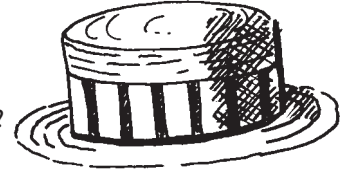


Explore your ideas by brainstorming:

Consider when and why people wear hats?

Where could you go to gain inspiration for your design?

In what context are you going to use your design?



How might the disassembly of ready-made hats help?

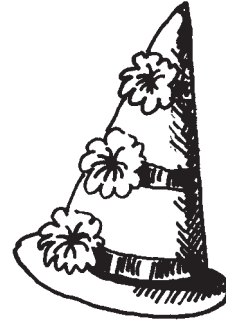
What fabric or materials will you need? Give reasons for your choice.

What measurements do you need to have?

What kind of pattern pieces will you need?

How are you going to join them to make your hat?

How are you going to decorate your hat?



► Draw an ideas diagram to illustrate all that you have thought of.

Create a moodboard.

Visit some museums and shops.

Collect hats to disassemble them.

Make sketches of the hat you will make.

Add any explanatory notes.

Make a list of all the materials, measurements and equipment you will need.



then... Make

► Make a prototype using newspaper, recycled materials and other materials.

As you progress, change the design as you go along.

If you want to colour and pattern your fabrics, tie-dyeing is one easy way of doing this. For some helpful hints on this technique see the **Tie-dyeing** sheet.

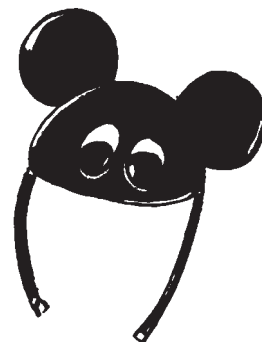
finally... Evaluate and display

► Organise a fashion parade to show how creative your class has been.

How successful are the hats in matching their original aims?

Do the hats fit in with the millennium theme?

How would you change your design?



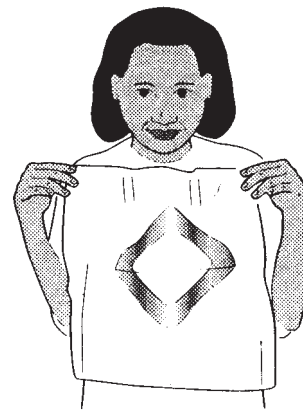
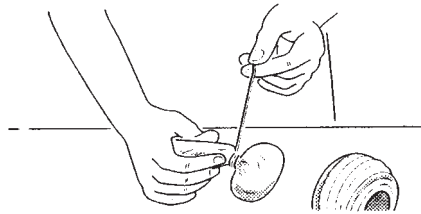
Tie-dyeing

Tie-and-dye is a very old method of making a pattern on fabric by resist dyeing. Parts of the fabric are bound together tightly with string, sometimes around hard objects like pebbles, beads or rice. The tied areas resist the penetration of the dye when the fabric is put into a bath of dye and so keep their original colour. Tie-dyeing is fun and easy, and gives unique results. So if you are 'dyeing' to be different, just follow these instructions and let your creativity run wild.

You will need:

fabric, dye, string, scissors,
pebbles, beans, stones, rice, etc
large, old plastic bowl
tablespoon, measuring jug
metal/plastic spoon or stick
apron or overall

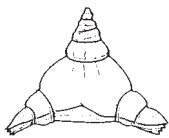
What to do



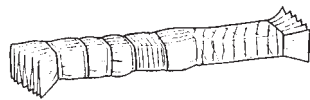
- 1 Decide on the type of pattern that you want to make.
- 2 Tie the fabric with string. Add pebbles, stones or similar materials. Remember, the tighter you tie the string, the more the fabric will resist the dye.
- 3 Fasten the string with a tight knot.
- 4 Dye, rinse and dry the fabric.
- 5 Untie the string and iron the fabric.

Tie-dyeing variations

These are some of the different ways of tying the fabric. Not all involve string!



tying



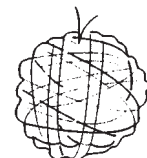
strips



knotting



swirling



marbling

Other ways include:

Ruching – take a piece of cord and tie the ends together. Lay the cord along the edge of the fabric and roll the fabric around it. Pass the knotted end through the looped end and pull tightly to ruche the fabric.

Sewing – use a strong thread to make a spiral pattern of small stitches. Pull the thread tightly to gather the fabric and then tie off the thread.

Pegging – fold the fabric into concertina pleats and use bulldog clips to peg the fabric.

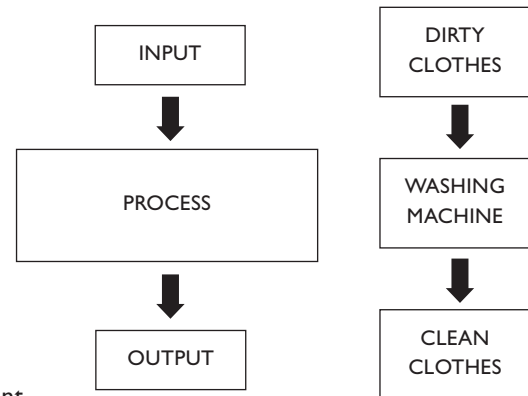
Take Control

Take Control overview

Human intelligence has enabled us to **take control** of our environment in a way no other creature can. Since the invention of the wheel we have sought ways to make life easier and better. To keep warm, human beings were able to harness the effects of friction on dry grass and wood. Today, however, many of us can switch on or off a central heating system in a matter of seconds. Such power at our disposal means that most people in the western world are able to live safer and more comfortable lives. Much of this success is through the application of systems and control.

Before you watch, think...

- ◆ How many examples of input/process/output control can you think of?
- ◆ What do we mean when we talk about systems?
- ◆ What systems do you know in school? at home?
- ◆ Why are systems important to us?
- ◆ How many of these systems depend upon electronics? Name their inputs and outputs.



Whilst you watch, note how...

- ◆ Technology has enabled us to take control of our environment.
- ◆ Every system has an input, process and output.
- ◆ Systems are important in all aspects of Design & Technology work in schools.
- ◆ Electronic control systems depend upon switches and electronic sensors.
- ◆ A robot is a multi-system mechanism with a memory which can be programmed to perform a function.
- ◆ Robots have become essential for certain sorts of work.
- ◆ When designing robots, experts in electronics must work closely with experts in mechanisms.

After watching, try tackling these challenges...

1 What types of system are mentioned in the programme? What other types can you think of? For example, biological systems, etc.

2 List the inputs, processes and outputs in the following systems:

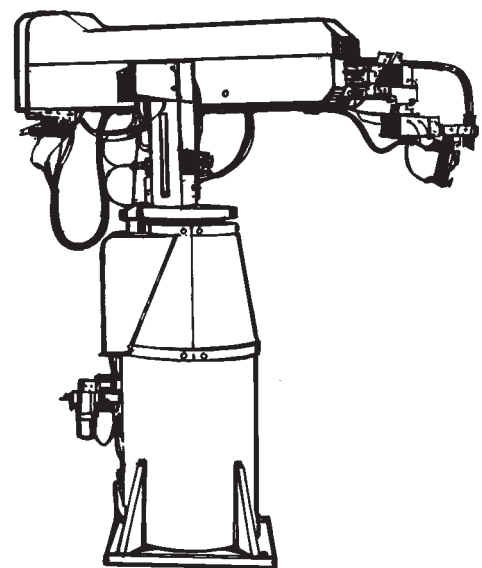
- a a baby's incubator
- b an automatic outside light
- c a microwave oven.

3 Sketch an automatic train crossing (i.e. an unstaffed level crossing) where the road crosses a busy rail track. List the inputs, processes and outputs. How will you protect against two trains following each other closely; and drivers crossing the track against the lights?

4 Robots are useful for performing unpleasant jobs, extremely accurate jobs, and repetitive jobs. List examples of these **three** types of job at home and in industry.

5 Taking control is about switching. Most switching is done using electricity. Switching can be done automatically either by counting periods of time or by detecting a change of situation through sensors or micro switches.

- a Name the different types of electronic sensor which were used in the programme.
- b Name the different types of electrical switch which can be found in your home.



Design and make... a Be-seen product

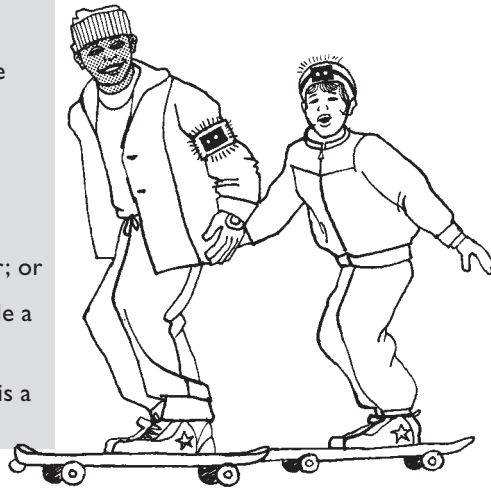
Design brief

The 'Be-seen project' is designed to introduce you to the importance of electronics in everyday life. Children going home from school in poor light face traffic danger. Being seen is a problem faced by other people as well.

Your challenge is to choose either:

- ◆ to design and make a flashing arm band for young children to wear; or
- ◆ to design and make a similar product for a specific use, for example a cyclist, a person in a wheel chair, or a horse rider.

The input is a low-light source; the process is electronic; the output is a warning signal.



first... Design



Explore your ideas by brainstorming:

- Do you know of any products similar to Be-seen that already exist?
- How do they work? Can you get one to disassemble?
- What are their main components?

What materials are used?

How many LEDs do they contain?

How are the components arranged on the circuit board?

How are the LEDs connected to the circuit board and supported?

How can their flashing be made clear and strong?

Is it important to have a pattern to the flashes?

At what speed do you think they should flash?

How could you discover the best speed?

Where should the Be-seen product be worn to be most effective?

How should the unit be attached to your person or a moving object?

► Draw an ideas diagram to illustrate all that you have thought of and found out.

You could examine or disassemble products similar to your Be-seen one.

Decide for whom you are making the product.

Make sketches of the product you will make.

Add explanatory notes.

Get organised and plan how you're going to tackle the project.

Make a list of all the materials and equipment you will need before you start.

then... Make

► Making the Be-seen product can be split into three main sections:

- ◆ the circuit board and components; for this you can use the circuit diagrams shown here and on the **Circuit board soldering** sheet; this extra sheet can be useful for soldering tips;
- ◆ the vacuum formed case to house the electronics and battery;
- ◆ the strap to attach everything to the user.

finally... Evaluate and display

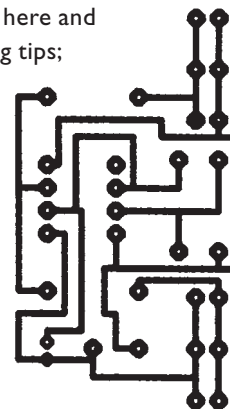
► Arrange a low-light environment at school.

Get someone else to try out your product.

How well do they think it works?

Change your design if you have to.

What would you do differently, if you had to tackle this project again?

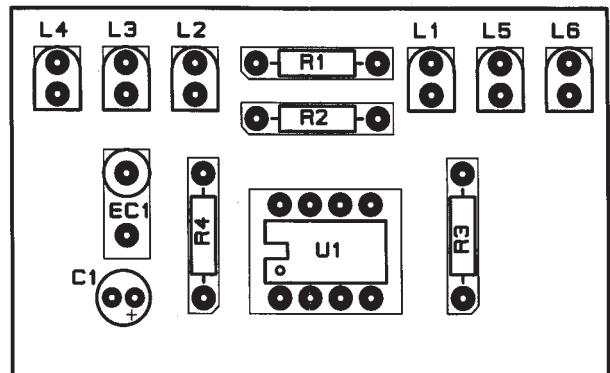


Circuit board soldering

- Why do we use solder and not glue to join electronic components together?

Be-seen circuit showing components from above

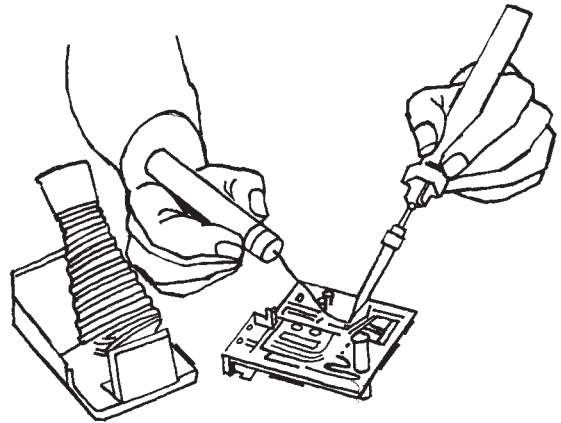
Key	
L	LEDs (up to 4 can be used in any position shown)
R	Resistors R1=47K, R2=47K R3 & R4 = 330K
CI	Capacitor 10UF
UI	Microchip (555) timer
EC1	A 9 volt (PP3) battery connector



- Before you start soldering on your actual circuit board it is advisable to practise first. Read the following tips before beginning. If you need to, write them out yourself to make sure you understand them clearly.

Ten tips for soldering

- 1 Practise soldering before working on the actual circuit board using pieces of vero-board and single strand wire.
- 2 Drill all the holes you need in one operation and insert the first component you intend to solder.
- 3 Warning! Too much heat may damage electronic components.
- 4 If the component is delicate and needs protecting from heat, use a heat sink.
- 5 Apply solder to the tip of a hot iron to tin it. Then wipe off the excess solder with a wet sponge.
- 6 Place the soldering iron on to the leg of the component touching the track on the board as well. Apply solder to the board and component.
- 7 Use only a small amount of solder.
- 8 The soldered joint will cool in three seconds.
- 9 Cut off the leg to about 1mm above the surface of the board using side cutters.
- 10 If the solder bridges across the tracks, run the soldering iron tip along the track and remove the excess solder, or you could use a de-soldering tool.



Further work

- Devise a method of holding the circuit board securely whilst soldering takes place.
- Design a poster to help anyone soldering for the first time. It might include this ten-point guide and any tips of your own, together with useful diagrams.

Why do you think manufacturers make integrated circuits larger than necessary with large connectors?

Why is it advisable to use a chip holder instead of soldering the chip directly to the track?

Mama Pasta

Mama Pasta overview

New products are essential to any business. For Pennine Foods Limited, this means developing new products and using packaging which attracts new customers, who are eager to buy, eat and enjoy the products. There are two major phases in developing the food product:

- developing the food itself
- developing the packaging, advertising and labelling that is needed to sell the food

The work of developing the food product is done by the food technologists. They decide how to make the food. This is known as **prototyping**. They determine the ingredients and their quantities, they list the nutritional information for labelling, they calculate the shelf life, and ensure that the quality of the batch is as good as the prototype. This whole process can take up to nine weeks or more, and will involve many different teams of people undertaking a wide range of duties.

Before you watch, think...

- ◆ How have eating habits changed and why?
- ◆ Why does food in Britain now not vary much according to season?
- ◆ Why do more people now eat fast food? Is this good?
- ◆ Why do people in Britain eat a lot more foreign food than they did 30 years ago?
- ◆ Why do different regions of the world have different foods?
- ◆ Are there variations of taste within this country? For example, the Cornish pasty?
- ◆ Have you ever thought about what's in a frozen meal and read the packet to examine the contents, their nutritional value and the cost?
- ◆ What would you say were typical ingredients of an Italian meal?



Whilst you watch, note how...

- ◆ Ideas for new dishes are thought of.
- ◆ Producing food in a small kitchen is different from producing it in a factory.
- ◆ Different methods are used for quality control in a factory.
- ◆ Production line techniques are used especially in batch production.

After watching, try tackling these challenges...

- 1 Which of our senses are used for sampling food?
- 2 What descriptive terms are used for the texture and taste of food?
- 3 The main stages in developing a new dish are:
idea generation, commercial considerations, food legislation and HACCP (Hazard analysis critical control points), **packaging, manufacturing processes & techniques** and **marketing, dispatch and retailing**.
Briefly explain what you think is involved at each stage.
- 4 How do Pennine Foods manage to ensure equal quantities in each dish?
- 5 What do you think quality assurance means in terms of equal quantities in each portion?
- 6 How can control technology be used to help in batch production?
- 7 What are the differences between how you cook food at home and batch production of food in a factory?
- 8 Explain the steps taken to ensure hygienic operating conditions at Pennine Foods.
- 9 Why do you think pasta is one of the main ingredients in Italian cooking? From what is it made and how do you store it? What shapes can you form with it? What colours are available?
- 10 Why is it important to have all pasta shapes the same size?

Design and make... a cook-chill pasta dish

Design brief

Italian food is well liked. Check out your supermarket and you'll find a wide range of ready-to-eat Italian dishes. Many of these dishes have pasta as a basic ingredient and have been chilled to keep well.

You are part of the product development team at the Mama Pasta company. Your task is to design and make a new cook-chill pasta dish suitable for batch production.

first... Design



Explore your ideas by brainstorming:

Analyse the ingredients of several Italian pasta dishes.

What is the balance between the amounts of protein and fat, carbohydrate and fibre? What is their energy equivalent?

Are these meals healthy or unhealthy?

How will you ensure that your new dish has good nutritional qualities?

What ingredients would you use?

For whom and why are you going to make your dish: people like you? your family? other people?

How would a survey or questionnaire help you to find out what the customers want?

What questions would you ask?

Would yes/no-type questions be adequate?

How would you use a tasting session to help you determine what appeals to your chosen target group?

► Show the results from your research using graphs and diagrams.

► You have to produce a dish on a large scale. What production line systems will you have to design?

How will the costs of labour, ingredients, packaging, etc. affect your new product?

How will you work as a team and share responsibilities?

► Once you know what exists already and what people want, write a specification for your product.

then... Make

► Plan how you will make some pasta dishes to meet your specification.

Decide what ingredients to use and what quantities.

List the steps necessary to make your dishes at school and include any hygiene precautions.

► Consider the differences if you were making it in a factory.

How would you scale-up your recipes to make larger quantities?

A food manufacturer has to follow strict quality procedures.

What quality controls would you set up on the production line so that all the dishes were good and came out the same?

There are a lot of regulations relating to food produced to ensure that it is hygienically made and all right for the consumer to eat and some regulations relating to the health and safety of the staff.

How would you identify areas of risk in all the manufacturing stages?

(**Hazard Analysis Critical Control Points** – HACCP – helps factories in this area. Find out more about this process.)

How will you control the hazards? prevent them? eliminate them?

► Draw a flow chart showing all the manufacturing processes involved as well as the various health and safety, hygiene and quality controls.

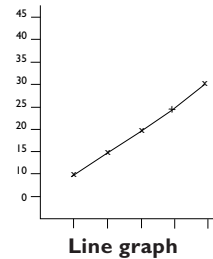
Keep an accurate record of each manufacturing stage in the form of a table. You could draw a diagram showing the whole process from start to finish. See the **Critical path network diagram** sheet for help. Carry out tasting sessions to see if your potential customers like your prototype dishes.

finally... Evaluate

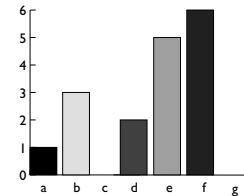
► From all your research, which dish is the preferred one?

How well does it match your design brief and specification?

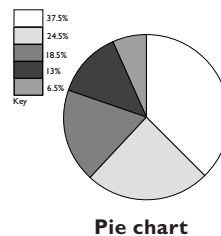
Are all the specification points covered?



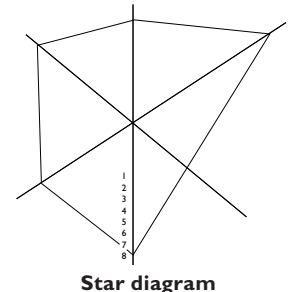
Line graph



Bar graph



Pie chart



Star diagram



Critical path network diagram

After completing this sheet, you will understand what happens when Pennine Foods develop a new dish.

At Pennine Foods the whole schedule usually takes 45 working days (9 weeks) but this varies considerably according to the specification. It is divided into the following stages and approximate timings – they are not in the right order!

Launch	1 or 2 days
Product development	15 days
Packaging design	20 days
Product testing	5 days
Analysing tests	10 days
Producing on-pack information	35 days
Producing advertising material	25 days
First production run	up to 5 days

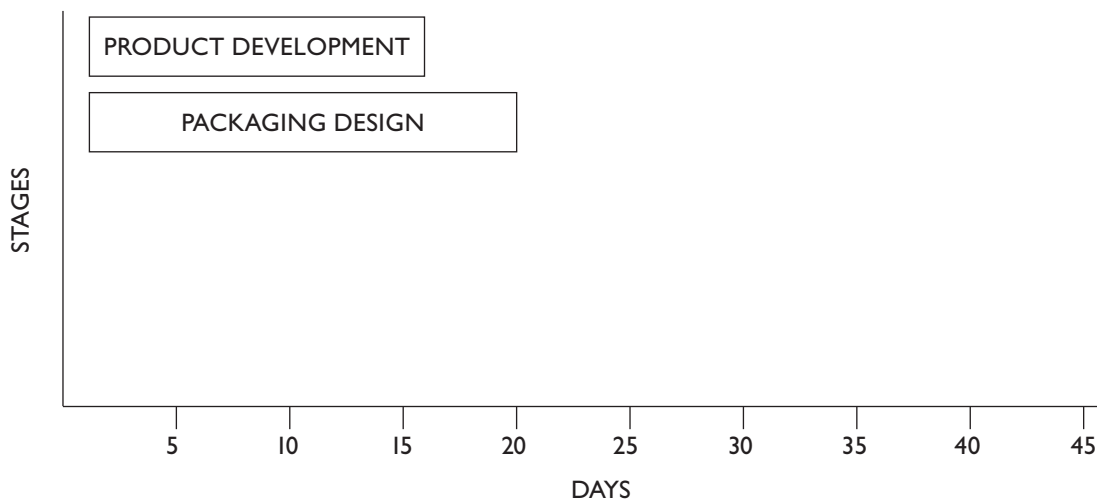
- ▶ Read the list of all the stages involved and check you understand what each means.
- ▶ Look at the diagram below. You are going to use your knowledge of industrial processes to position the boxes within the grid at appropriate times.

Remember: not all processes begin during week one and you cannot **analyse the tests** until **product testing** is complete. Also you cannot **launch the product** until it has been **developed!**

- ▶ The diagram has already been started for you.

Complete the diagram, using the information given above.

Adjust the length of each box to represent the time taken for that process. In some cases you may have to write very small or use a shortened name.



Further work

- ▶ Draw a similar diagram for your new cook-chill pasta dish. You should have approximate timings for each manufacturing stage.

Use a suitable scale (for the length of the boxes as well) and a similar grid.

Change the length of the boxes and their position to represent the correct amount of time that was needed for each stage of your new dish.

- Having made the dish how could you improve the production process?
- What about the times involved? Are they flexible? Could you produce your product faster?

Inside Out

Inside Out overview

Designers gain their inspiration from various sources but base most of their work on what has gone before. In a sense nothing is new, only a variation with improvements. Generally there is a sequence to work through when designing (see **Design Me** sheet). However, you need not always start at the beginning. You could begin with an evaluation. This is how many industrial designers work; at Rover, 'tear down' is used to evaluate other companies' products.

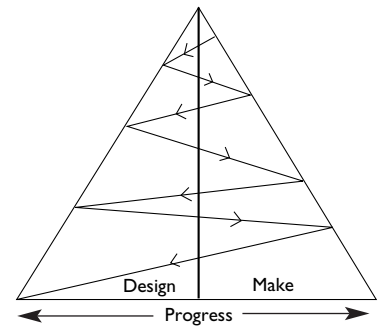
Designers rarely follow a simple list of procedures. They move erratically from idea to drawing or model and then back to drawing in a **zig-zag** path. They have their own vocabulary to describe their work and we need to try and understand their words and appreciate good design. As the programme says: as consumers of the future we need to reduce waste and contribute to a better world.

Before you watch, think...

- ◆ Why do some designs succeed whilst others fail? Think of some examples of each.
- ◆ If design is a process, what do you understand by this?
- ◆ Is the design process the same no matter what you are making? Give some examples.
- ◆ What are the similarities between designing a celebration cake and designing a chair? What are the differences?
- ◆ How can evaluating the designs of others help you with your own designs?

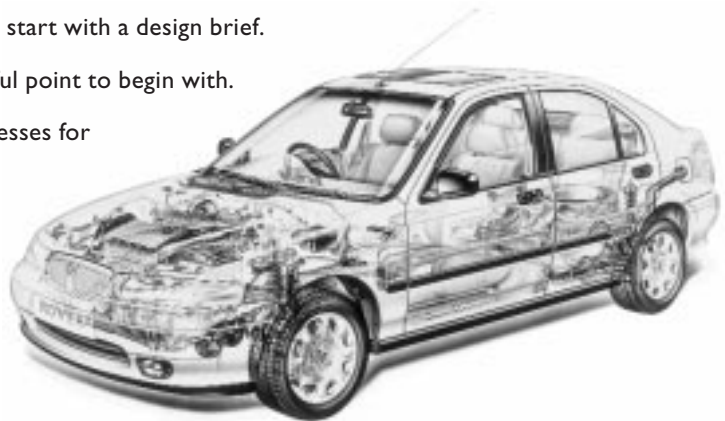
'Designers move from design ideas to making, and then return to the drawing board for design improvements. This zig-zag path results in increasing progress.'

Richard Kimbell, Goldsmiths College, London.



Whilst you watch, note how...

- ◆ A design and make project does not always start with a design brief.
- ◆ Evaluating an existing product is also a useful point to begin with.
- ◆ There are similarities between design processes for different projects in all areas of D & T.
- ◆ 'Tear down' takes place in most industries that employ a designer.
- ◆ A 'good design' means the design fulfils a specific need or use.

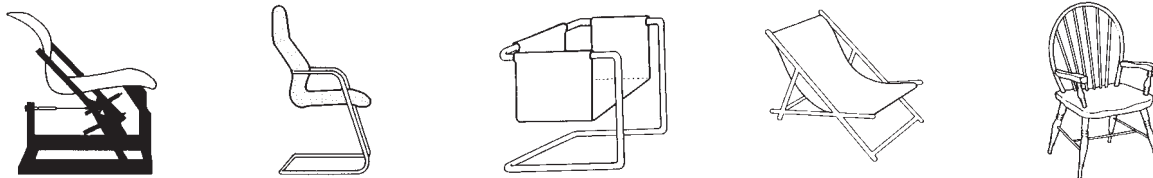


After watching, try tackling these challenges...

- 1 Where does the design process begin?
- 2 What are the various stages involved in the design process?
- 3 Compare these stages with the ones identified in the **Design Me** sheet. Modify the sheet for your own use when undertaking future design and make projects.
- 4 Explain why understanding the design process enables you to be a better consumer.
- 5 Why does disassembly of products help us understand the designs of others and become better designers?
- 6 At Rover they use 'tear down'. List all the reasons why this can help in new designs.

Design and make... a chair

On the face of it, a chair might seem the simplest of objects. But chair design is not as straightforward as it looks! There are many factors to be taken into consideration. A chair can be designed for symbolic purposes, for example a throne; or for practical purposes, for example a deck chair. You might think that every possibility for the design of a chair has been tried. However, as new materials and processes are invented and human values, trends and society change, so will the chair.



Design brief

Your challenge is to look at chairs in greater detail, by first starting with a full product evaluation. Then design and make a model chair for a specific purpose of your choice making sure to identify the potential market.

You may find the **Design Me** sheet useful throughout your work.

But remember you have four sources of help – the four 'B's':

first... Design



Explore your ideas by brainstorming:

List as many different types of chair as you can.

Identify the purpose of each type.

Can you modify any of these to create a new improved product?

Alternatively, can you think of a new situation where a chair would be useful?

Can you modify an existing type of chair to fit the situation?

Or do you need to find a radically different design?

What materials would you use in your design? Why?

What type of drawings would you have to do?

What measurements would you have to make?

► Now evaluate some existing chairs of the type you feel is appropriate.

When doing this you may find it helpful to use the **Product evaluation** sheet and consider the following questions:

How would you describe its style?

Why is it constructed in the way it is?

How well does it meet its need?

What makes it different, attractive and comfortable? Plus points?

Minus points?

What materials are used and will it last? How much do they cost?

Does the chair include any mechanisms? How do they work?

How much does it cost and is it value for money?

How well is it finished? Is it good to look at and to use?

Does the chair conform to British Standards? Has it a kite mark?

How is it marketed? Who buys it?

► After this, write a design brief starting with: 'Design and make a chair suitable for...'

Include at least six specifications for your chair.

then... Make

► Produce a model of your chair, using the most appropriate materials for its function.

finally... Evaluate and display

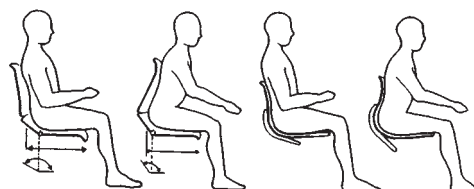
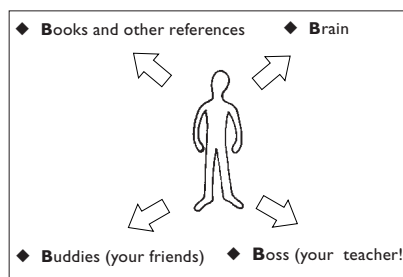
► Let your classmates evaluate your model chair.

Would it be comfortable? Does it look good and feel okay?

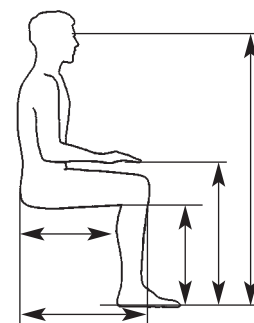
How well is it made and is it nicely finished?

Will it sell well? Who would buy it?

Does it satisfy your design brief and specifications? How could you improve your chair design?



Ergonomic considerations



Anthropometric measurements

Product evaluation

Product type Product number

Name Date

Drawing of product with approximate measurements, showing any mechanisms/structures

Materials used to make the product

Any special parts/components?

Who would use the product?

Where is it used or found? Why?

What is the cost of the materials used to make the product?

What would be the cost of the labour to make, package, transport and market it?

What would people pay for it?

Are there any special safety features?

Comments from the users of the product

Important/unusual features of the product (e.g. on the design, colour, comfort of use, etc)

**Links between Real Life Design programmes and
The Royal College of Art Schools Technology Project (Red Book and Teacher's Resource 1)**

Real Life Design Programme	Red Book: Challenge (pages)	Red Book: Focused Practical Task (pages)	Teacher's Resource 1 Photocopiable Worksheet (pages)
1 Making Things Move	Puppets (Bring a character to life 12–15)	3–D modelling ideas for your puzzle (48) Designing the puzzle using computer-aided design (CAD) (50) Investigating levers (63) Working with design briefs (87) Using fantasy to generate ideas (92–3) Developing ideas – modelling (96–7, 105–7)	Rod puppets (26) Shadow puppets (27) Marionettes (28) Making heads and faces (29) Making the box (67) Cutting your box open (68) Marking out (81) Cutting materials (82–3) Joining materials (84–5)
2 Looking for Ideas	Wall hanging Team textiles (16–23)	Choosing and using machines (37) Personalising the outside of your disc case (39) Generating and developing ideas for your puzzle (48) Evaluating yourself (51, 122) Thinking about aesthetics (112–14)	Try spinning for yourself (34) Have a go at weaving (35) Using DTP, paint or draw software for graphic design (43) Testing fabrics (48–9) Data capture sheet – sewing machines (50)
3 Take Control	Door buzzer Private lives (24–31)	Controlling your buggy (70) Personalising your buggy (71) Developing an idea from a picture (75–6) Vacuum-forming (108, 110)	Electricity refresher sheet (11) Vacuum-forming (18) Identifying switches (42)
4 Mama Pasta – INSET	Pasty product development All wrapped up (52–9)	Case study – Marks & Spencer ribbon vegetables (43) Understanding about healthy eating (45) Modelling food ideas (104)	Health of the nation (56) Food tests (58–9) What do customers want? (75) Taste panels (76) What is a portion? (102) Food hygiene (105)
5 Inside Out – INSET	Novelty chocolates Chocoholics (6–11) Event kits Festive food (78–84)	Evaluation – comparative testing (65) Product evaluation: testing chocolate novelties (8) What sort of event? What sort of people? (80) Presenting for maximum impact (83) Looking at existing products (94–5) Thinking about the environment (114–16) Communicating ideas (117) Evaluating (119–22)	Chocolate product evaluation (190) Group planner (36) Ways of recording information (77) Mounting a display (97) Designing a checklist (111) Examining products and their applications/evaluating products (notes 110) Examining products (112) Evaluating (115–18)

Links between Real Life Design programmes and
The Royal College of Art Schools Technology Project (Green Book and Teacher's Resource 2)

Real Life Design Programme	Green Book: Challenge (pages)	Green Book: Focused Practical Task (pages)	Teacher's Resource 2 Photocopiable Worksheet (pages)
1 Making Things Move	Moving display Windows on the world (64–9)	Clarifying the task (21) Developing a specification (21) Thumb-nail 3–D modelling (22) CAD/CAM (88) Modelling your design ideas (108)	Getting your display moving (74–5) Controlling your display (73) Modelling the gearbox (58–9)
2 Looking for Ideas	Colouring textiles Dipping, dyeing, dribbling (70–7)	Finding out more about teenagers (20) Case study – Dixon's client profiling (20) Patterns (61) Joining and finishing (61–2)	Tie and dye (80) Batik (81) Block printing (82) Dyeing fabric (83) Mordants (84) Design ideas (85) Using three different sewing machines for embroidery (99–101)
3 Take Control	Electronic textiles Flashing lights (56–63)	Manufacturing on a larger scale (29–30) For whom are you designing? (40) Designing to suit your client (41)	Making an electronic noise (40–1) Controlling the weight (31) Controlling the raw ingredients (30) Production teams for making the circuit (66) Fact sheet – circuit components (67)
4 Mama Pasta – INSET	Pasta production Eat Italian (24–31)	Writing a specification for your design (81) Designing a complementary package (82–3) Thinking about ingredients (106–7) Finding out about Italian food (26) Product evaluation – examining and testing desserts (80)	Making pasta (28) Testing sauces (29) Eating less sugar (90) Understanding fruits (91) Thickening (94–5) Controlling the raw ingredients (30)
5 Inside Out – INSET a) Using Existing Products to Generate Ideas	Torch modelling Shining bright (38–43) Musical instruments Making music (32–7)	Designing and Making: Identifying needs (90) Ideas from existing designs (94–5) Things to think about when designing – function/safety/cost/materials/production (97–104) Evaluating your project (49) Quality in food production (125–6)	Generating proposals – developing ideas (notes 105) Ideas from existing products (106) Evaluating a set of products (110) Consumer testing (110) Working in teams (113–15) Product analysis (45)
b) The Design Environment	Promotional products Remember us (84–8)	Presenting design ideas (111) Creating lettering (68) Communicating your design (35)	Presenting your ideas (notes 116) Mounting a display (notes 117)

Links between Real Life Design programmes and
The Royal College of Art Schools Technology Project (Blue Book and Teacher's Resource 3)

Real Life Design Programme	Blue Book: Challenge (pages)	Blue Book: Focused Practical Task (pages)	Teacher's Resource 3 Photocopiable Worksheet (pages)
1 Making Things Move	Keeping it under control A moving experience (46–55)	Using a specification (30) How to plan your project (91)	Driving mechanical subsystems (51) Investigating friction (26) Achieving a good painted finish (60) Testing and evaluating structures (66)
2 Looking for Ideas	Manufacturing with textiles Outdoor pursuits (76–83)	Presenting a company profile (31) Using computers (33) Post modernist style (58) Embroidery (119)	Modelling and pattern pieces (47) Technical textiles (80) How does it perform? (81) Finding out about new fabrics and fibres (82) How smart fabrics are used (83)
3 Take Control	Keeping it under control A moving experience (46–55)	Manufacturing methods used in school (25) Using different materials (27) Using systems and control in manufacturing (27) Vacuum-forming (117)	Driving mechanical sub-systems (51) Analysing systems (52) Useful sub-systems (53–4) Could you use a computer in your control system? (55)
4 Mama Pasta – INSET	Creative food Born again products (34–9)	Understanding the market for bread and bread products (8) Finding out about ingredients (9) What's so special about dietary needs? (70)	Traditional products (39) Describing texture and appearance (40) Marketing your product (41) Crops for life (13) The Food Safety Act (73) Process control HACCP (75)
5 Inside Out – INSET	Collapsible structures Temporary furniture (62–7) Children's books Stories for children (14–21) Manufacturing to sell Be enterprising (84–9)	Investigating fasteners (24) Looking at existing products (31) Evaluation (92–3) Designing for users, clients and manufacturers (93–4) Things to think about when designing (95–102) Graphics in designing (103–7) Evaluating products and applications (107–12) Well-made products (114)	Producing a rough or a mock-up (19) Properties and characteristics of materials (27) Roles of the managers (87) Who does what? (88) Enterprise Action Plan (89–90) Enterprise targets (91) Systems and control (notes 126)

Design Me

This is a new approach to designing and making in Design & Technology.

The design process often seems complicated so usually the first thing to do is have a ...

D Design brief	This should be just one or two sentences about a problem that you have been given by your teacher. It should explain what the project is all about.
E Extra information	You should do some research and find different ideas to solve the given problem. This could include going to a library, reading the newspapers, using the Internet/CD-ROM, conducting a survey or using a questionnaire.
S Specification	This should include an explanation of your designs and for whom they are produced. This could be done just as a list of sentences.
I Ideas	Use diagrams or sketches to show at least four different ideas which solve your problem and how they will look and work in practice. Add notes if necessary.
G Gather more information	This extra information should support and convince others that your ideas are good. You could use IT to present information in an attractive way. By now you should know which is your best solution.
N Name your solution	Now that your best solution is more than an idea in your head, give it a name. Produce detailed drawings with notes to explain how your solution will look when finished and list your materials and equipment.
M Make	Make your solution using the most suitable processes and equipment. Consider health and safety requirements as well as manufacturing and production processes.
E Evaluate	Consider your solution using the following questions:

- 1 Does the named solution match the specification points?
- 2 Was the work well-planned and completed?
- 3 Did any problems arise during the process and, if so, were changes made?
- 4 What improvements could be made in the future?
- 5 What have you learnt from doing this work?
- 6 Have you thought about the environmental, social and moral considerations of what you produced?

This is a guide to help you understand the stages in the design process. You could begin your project at any one of the stages shown.

Credits

Production Company **Poseidon Pictures Ltd**

Producer and Director **Andy Walker**

Executive Producer **Frixos Constantine**

Production Manager **Sabrina Paik**

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Diane Hodge – fashion designer

Ron Fuller – toy maker and designer

Peter Judd – Lecturer in Department of Electronic
Engineering, University of Sheffield

Useful Resources and Addresses

Making Things Move

York Automata Museum and Covent Garden

Automata Exhibition

Looking for Ideas

Tie-dye Techniques and Colour with Confidence leaflets
from Dylon International Ltd, Lower Sydenham,
London SE26 5HD

The resource sheet on page 7 of this guide is based
on the Tie and Dye worksheet from the Teachers'
Resource 2, Green Book, which is part of The Royal
College of Art Schools Technology Project, published
by Hodder & Stoughton Educational (1996)

Take Control

An Introduction to Soldering from Antex (electronics)
Ltd, 2 Westbridge Industrial Estate, Tavistock,
Devon PL19 8DE

Mama Pasta

Risk Assessment video from The Food Hygiene Bureau,
Long Hanborough, Oxon OX8 8LH

Inside Out

Designing by John Cave, published by Nelson