

PRODUCTS
MILLENNIUM

Investigating Innovation

teacher handbook

for product profiles

Dr David Barlex
Director Nuffield Design and Technology
Senior Lecturer Brunel University

product profile authors

Alison Hardy	Caistor Yarborough School
Julie Messenger	Sawtry Community College
Jon Parker	Northamptonshire Inspection and Advisory Service
James Pitt	York University
John Sutcliffe	Hasland Hall Community School
Ruth Wright	Engineering Council
Editor	
Dr David Barlex	Director Nuffield Design and Technology Senior Lecturer Brunel University

product profile researchers

Sue Byrne	Nuffield Curriculum Projects Centre
Gwen Singer	Nuffield Curriculum Projects Centre


© Design Council 2000

All rights reserved.

This work is copyright but copies of the accompanying Product Profiles may be made without fee or prior permission provided that these copies are used solely within an educational institution.

First published 2000

The Design Council is a registered charity, number 272099, incorporated by Royal Charter.



sharing innovation

At the end of the last millennium, Prime Minister Tony Blair launched a Design Council initiative to identify the most creative, most innovative, best-designed products and services in the UK. Over a three-year period, 1,012 innovations were selected and declared, in a rolling programme of announcements, as 'Millennium Products'.

From the stories behind these products and services, a whole new campaign has been launched to explore, analyse and understand the drivers, the pitfalls and the benefits of innovative success. This new programme is called Sharing Innovation. It is at the heart of what the Design Council does today and is behind the content included in this publication.



Visit www.sharinginnovation.org.uk.

millennium product companies

These Product Profiles would not have been possible without the considerable help and co-operation received from the following Millennium Product companies.

Accuhaler
Glaxo Wellcome plc
Glaxo Wellcome House
Berkeley Avenue
Greenford Middx UB6 0NN

Anywayup Cup
V and A Ltd
Charlesworth House Andrews Road
Llandaff North Cardiff
South Glam CF14 2JP

Bridge Electric Violins
Bridge Musical Instruments Ltd
The Hoplands Boston Road
Sleaford Lincs NG34 7LZ

Divine Chocolate
The Day Chocolate Company Ltd
10 Northburgh Street
London EC1V 0AH

Freeplay Lantern
Freeplay Energy Europe Ltd
Cirencester Business Park Love Lane
Cirencester Glos GL7 1XD

Heathrow Express
Cardinal Point
Newall Road Hounslow
Middlesex TW6 2QS

Lantau Link Bridge
Mott MacDonald Group
St Annes House
20-26 Wellesley Road
Croydon Surrey CR9 2UL

Neotrend
Diametrics Medical Ltd
5 Manor Court Yard
Hughenden Avenue
High Wycombe HP13 5RE

OptiMusic
OptiMusic Ltd
8 Deane House
27 Greenwood Place
London NW5 1LB

Skystreme
Skystreme UK Ltd
367 High Street
Brentford Middx TW8 0BD

Wilkinson Sword Protector 3D
Wilkinson Sword Ltd
Sword House Totteridge Road
High Wycombe Bucks HP13 6EJ



contents

Introduction	7
The Products	8
Product Profile Design	10
What Will Students Learn?	12
Product Profiles in the Classroom	13
Writing Your Own Product Profiles	21
Product Profiles and the Design and Technology National Curriculum in England	24

PRODUCTS
MILLENNIUM
PRODUCTS
MILLENNIUM



1 introduction

Millennium Products are special. They are innovative and forward looking. They solve problems and are pioneering. They are things we can be proud of and inspired by. These products and those who designed them have fascinating stories to tell; stories that can be used to enhance young peoples' understanding of the made world and how it comes into being. It would be easy for this learning legacy to become lost. The aim of these Product Profiles is to ensure that this does not happen.

Learning through these Product Profiles is not seen as an alternative to handling a product. Some of the products described are also present in the Millennium Products Handling Collection being developed by the Design Museum. There are, however, features that cannot be derived from handling a product, for example, the thinking of the designers and the way the product is traded, although inferences may be made. By combining the written study approach with learning through a handling collection a more rounded treatment can be obtained.

The written studies have been produced to be used primarily with pupils at KS3 whilst the handling collection has been chosen with KS4 pupils in mind. However, it is expected that both the case studies and the handling collection will be used across both key stages.

They have been written by experienced teachers and the classroom observations of the studies in use by an evaluation team from the Open University led by Patricia Murphy has provided clear guidance on how best to teach with them.

2 the products

These products cover a wide range. There are small domestic items like the Anywayup cup and the Protector 3D Razor. There are large scale engineering projects such as the Heathrow Express and the Lantau Link Bridge. Neotrend and the Accuhaler are medical products. Bridge Instruments and OptiMusic enable people to make music in very different ways. Skystreme saves lives by providing an emergency beacon while Divine Chocolate improves lives by ensuring cocoa farmers get a fair deal. The Freeplay Lantern is one of a growing number of wind-up energy products.

Each of the design and technology focus areas is represented in the set but there are lessons to be learned from each study that are applicable to all focus areas.



Accuhaler

An easy to use dry powder inhaler for treating asthma, using a new drug formulation.

Anywayup Cup

Toddler's training cup incorporating patented unique valve which only allows liquid through when the child sucks the spout.

Bridge Electric violins

String instruments made from kevlar and carbon fibre, featuring unique active pickup system, producing unrivalled sound and power.

Divine Chocolate

Milk chocolate moulded bar; the first mainstream, high quality product on sale nationally which is fairly traded ensuring African farmers benefit.

Freeplay Lantern

Fail-safe illumination device; it has wind-up and mains charging units to provide light wherever you are.

Heathrow Express

High-speed new rail link between London Heathrow airport and central London taking 15 minutes, every 15 minutes.

Lantau Link Bridge

A six lane, covered railway and emergency bridge which joins Hong Kong island to the new airport.

Neotrend

A device to continually monitor the temperature and oxygen, carbon dioxide and pH levels in a premature baby's blood.

OptiMusic

A unique control system 'played' by interacting with light beams, creating an exciting interactive musical environment accessible to all - so useful for rehabilitation, education, leisure and entertainment.

Skystreme

An inflatable, radar-effective, visual location marker for outdoor pursuits.

Wilkinson Protector 3D

An innovative razor from Wilkinson incorporating a moveable cartridge head for a closer shave.

3 product profile design

Each Product Profile is in two parts; a case study dealing with the product, and a design study describing how the designers worked to develop the product.

Both parts are in the form of a single double-sided A4 sheet. Each should be used to produce a double-sided copy which folds as shown to produce the complete case study or design study.



A relevant image showing the product, the product in use or associated products

Evidence from the trial indicates that it is essential for students to be given the Product Profiles ready folded or shown how to fold them.

A title with the coding cs for a case study and ds for a design study

The Millennium Products logo with the words CASE STUDY or DESIGNING



cs 1 freeplay self-powered lantern

MILLENNIUM
PRODUCTS
CASE STUDY



This is a hand-held torch with a rechargeable battery and a wind-up, spring-driven generator.

You can use the wind-up generator to recharge the battery. If the battery fails you can use the wind-up generator to light the bulb. 55 turns stores enough energy in the spring to give light for up to 4 minutes.

The torch is manufactured in Cape Town, South Africa - mainly by disabled or disadvantaged workers.

A short piece of introductory text - no more than 100 words

The centre pages of the study are laid out to have instant visual appeal with a range of devices to help the reader understand the content.

Numbered headings to help the reader follow the text in the correct order and indicate what the text will be about.

The final page continues to use these devices. The address of the Design Council Sharing Innovation website (www.sharinginnovation.org.uk) is given on this page.



Illustrations in the form of explanatory diagrams and high contrast photographs suitable for photocopying. These are captioned and sometimes labelled with number keys to aid comprehension

Explanatory text that is limited to 200 words per page

Evidence from the trials indicates that it is essential for each of these features to be identified and carefully explained to the students before they begin to read the studies.

Only when they understand the way the design of the studies works will they be able to use them effectively.

1 how it works

The 2.4 volt rechargeable battery lights the bulb when you push the switch from off, past charge to normal. If you push the switch to maximum the bulb shines more brightly. A fully charged battery gives a 'white time' of up to two hours. When the battery runs out you can recharge it by switching to charge and using mains electricity and an adaptor that converts the high voltage alternating current from the mains to low voltage direct current. Or you can use the handle to wind up the spring with the switch in the off position  and then switch to charge  and let the spring unwind. This will increase the level of charge in the battery.

The battery is supplied with the RBC® (Rechargeable Battery Recycling Corporation) seal to indicate that when the useful life of the battery is over you should dispose of it in an environmentally friendly way.

You can remove the lens and reflector by holding anti clockwise. This reveals the battery, the bulb, a spare bulb and a slide switch. You can use the slide switch to set the torch to flash to attract attention in the case of an emergency.

The bulb is filled with neon gas which is inert and does not react with the white hot filaments. There are two filaments, one is used on normal and both on maximum brightness.

You can use the energy stored in the spring to drive other electrical devices, providing they do not require more than 2V and 300mA (the equivalent of using 2 AA batteries). You just wind up the torch, connect the device to the 2V output socket at the back of the torch and switch to charge. The spring unwinds, turning the generator which supplies the electrical current.

research

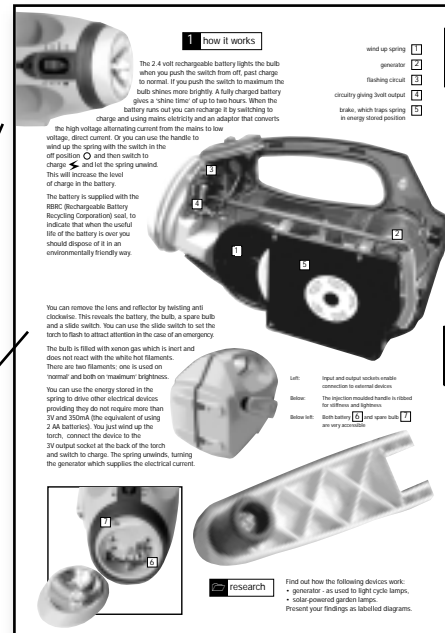
Find out how the following devices work:

- generator - as used to light cycle lamps,
- solar-powered garden lamps.

Present your findings as labelled diagrams.

wind up spring **1**
 generator **2**
 flashing circuit **3**
 circuitry giving 3vvt output **4**
 brake, which traps spring in energy stored position **5**

Left: Input and output sockets enable connection to external devices
 Below: The injector moulded handle is robust for off-road and off-highway
 Below left: Both battery **6** and spare bulb **7** are very well secured



? question

Questions that can be used for either written work or discussion

research

Research activities that encourage students to use the internet and can be used for homework

4 what will students learn?

The aim of Product Profiles is twofold:

- to give pupils insight into products from a variety of perspectives;
- to give pupils an appreciation of how those responsible for developing products work.

To meet these aims through studies on such different products it was essential to develop a framework which authors could use in writing the studies. These are summarised below.

A framework for reading the product

- Needs and wants
- The user
- Production
- Performance
- Trade
- Use
- Disposal



A framework for questioning for the designers

- Background
- Issues and constraints
- Creative thinking
- Logistics
- Evaluation

Clearly not every case study will deal with every part of the framework and some parts are more easily dealt with through some products than through others. Over the entire set of studies pupils will be exposed to a consideration of all the parts. So the expectation is that by using the studies on a regular basis across a Key Stage students will, by the end of that time, have a considerably enhanced ability to evaluate products from different perspectives and a more sophisticated view of the way in which designers work. These are both new and important areas in the Revised National Curriculum for design and technology in England.

5 product profiles in the classroom

Some of the many ways to use Product Profiles are described in this section. You will almost certainly find other ways to use them as well.

As a teacher resource

Evidence from the trials indicated that teachers found much of the information in the Product Profiles to be new to them and, as such, they provided useful inset in terms of subject knowledge. Some of the teachers in the trials used the information and images in the Product Profiles as the basis for a lesson in which they told the story of the product, or the way it was designed 'from the front', without giving the students the printed material. They produced a series of overhead projector transparencies from the printed materials and used these to construct a question - answer based lesson which moved the class through the exposition. This has the advantage of providing a completely customised approach although it might be difficult to keep the concentration of a wide range of ability throughout the lesson with this approach. It also has the disadvantage that it requires a lot of preparation time.



Introducing the Product Profiles to a class
Evidence from the trials indicates that it is essential to describe the design of the Product Profiles to a class if the students are to be able to use them effectively.

Start by showing the class the case with the studies inside and describe how they are taken out, laid flat and photocopied for them to use. Explain that it is important that they fold the flat copy in half if the material is to be read in the correct order. Tell them that there are two sorts of study for each product; a case study, dealing with the product, and a design study describing how the designers worked to develop the product.

Next you need to explain each of the features in the design of the Product Profiles that will help them read and understand the content of the study.

continued overleaf

On the first page there is:

- a title with the coding cs for a case study and ds for a design study;
- a relevant image showing the product, the product in use or associated products;
- a short piece of introductory text - no more than 100 words;
- the Millennium Products logo with the words CASE STUDY or DESIGNING.

Explain that reading this short piece sets the scene for what follows and that if there is anything they aren't sure about they will be able to ask about it and the class will discuss their questions so that everyone can understand.

On the centre pages there are:

- numbered headings to help them follow the text in the correct order and indicate what the text will be about;
- illustrations; some are self explanatory others have captions and some are labelled with number keys to help them understand;

- explanatory text that is limited to 200 words per page;
- questions which they can use to help them understand the study, (usually they will need to discuss the questions with a partner and sometimes they will need to write things down);
- research activities that they can do for homework and often ask them to use the internet.

Explain that using a Product Profile is not like doing a worksheet. It treats them much more like 'grown ups' reading an article in a magazine or a professional journal, expecting them to read carefully and use the questions and research sections to develop their understanding.

Tell them that it is quite alright to underline new words they don't understand yet or draw circles around text they find difficult. The aim of reading the study is to increase their understanding and if they understood it all to begin with then reading the study wouldn't be achieving that.

You might find it useful to make a transparency of a product profile and use an overhead projector to show it.

Using product profiles with the design museum millennium products collection

There are three Product Profiles that also feature in the Design Museum Millennium Products Collection and for students who might find the written studies inaccessible using the actual product with the study is an important stepping stone in enabling such students to become more confident at accessing information from printed material. The products that occur in both the handling collection and the Product Profiles are the Divine chocolate bar (present as the wrapper only), Skystreme (an inflatable, radar-effective, visual location marker for outdoor pursuits) and the Anywayup Cup (toddler's training cup incorporating a patented unique valve which only allows liquid through when the child sucks the spout.)



Here is one way that you can use the product with the written material.

Show the class the product and discuss it with them before you give out the case study. Ask the class questions about the purpose of the product, who it's for, the materials used and how it's made. Write suggestions on the board and then use reading the case study to check their correctness and to find answers for areas of uncertainty. In this way you can establish the importance of the case study material in finding out about products.

You can extend this further if in the next lesson you ask the class questions about the designing of the product: Where did the original idea come from? How were these ideas developed? How was the product evaluated? These questions are almost impossible to answer from a consideration of the product alone. Students should then see reading the designing study as a useful way of increasing their understanding.

Using a product profile without the product

There are good reasons why some products cannot be brought into the classroom. They are too expensive, they are too large, they are a scarce resource. It is important that students' experience of design and technology is not limited to that which they can handle in the classroom. This is where the Product Profiles can be used to extend student's understanding into the world well beyond the classroom through effective and active reading of the studies. There is, of course, lots that you can do to help make these studies accessible. Here are some examples.

Similar products

In the case of the Accuhaler there will almost certainly be students in the class who use inhalers. If it is appropriate you can ask them to show them and demonstrate how they use them.

Cheaper but related products

In the case of the Protector 3D you could have some cheap disposable razors to hand; for the Freeplay Lantern you could provide some conventional torches.

Additional visual aids

In the case of Neotrend you could have a measuring cylinder, syringe, and a beaker of red coloured water (all readily available from the Science Department) and use these to show how much blood is in a premature baby and how much might need to be taken out for conventional testing.

Additional information

All the products are contemporary and there is often new information about similar products or recent work of the designers. In the case of Freeplay Products, Trevor Bayliss is developing a battery charging system that is housed in the heel of a trainer. Large consulting engineers like Mott MacDonald will be taking on new projects in different parts of the world and details can be found on their website.

Supporting worksheet

You can, if you think it is appropriate, write worksheets which help to guide students through the written material. If possible it is best to avoid this approach as one of the aims of the Product Profiles is to increase student's ability to access information from written material independently.

By using these strategies you can customise the Product Profiles so that they are best fitted for use with your students.

However you choose to teach with the Product Profiles there are several considerations which are fundamental to the success of the endeavour.

- Ensure that all students have a copy of the Product Profile, printed on both sides and folded in the correct way.
- Remind the class how to use the layout features to help them read the Product Profile.
- Ensure that the lesson has pace and that there are opportunities for the students to interact with the text through individual work, group work and whole class work.

A sequence of activities within a lesson might look like this:

Teacher introduction Class to ask questions about page 1 of the study	10 minutes
Quiet independent reading of the rest of the study Each student to underline words and phrases that are new	10 minutes
Working in pairs students try to explain new words and phrases	10 minutes
Whole class question - answer session on new words and phrases	10 minutes
Quiet independent re-reading of the study Independent answering of the question section	10 minutes
Whole class question - answer session on question sections	10 minutes
Quiet independent re-working of questions in the light of question - answer session	5 minutes
Class discussion of Research section Setting Research section for homework	5 minutes

Using a product profile about a large-scale product

There are two Product Profiles that fit into this category - Heathrow Express and Lantau Link Bridge. In both cases, it will be important to set the scene with the class so that they can get to grips with the studies at two levels. Firstly, at the individual level - the difference that these endeavours have made to people who travel, and secondly, on the grand scale where the sheer size of the endeavours and the logistics involved almost defeat the imagination. At the individual level you may well be able to elicit travelling stories from members of the class or tell stories of your own travelling experiences. On the grand scale, it is important to enable and encourage the class to be impressed both at the necessary attention to detail and the vision necessary for such projects to succeed. The opportunity for students to discuss in groups and report back on what their group thought was the most significant factor in such projects is important.



Using several product profiles with a class

This is a more complex way of using the printed materials and should only be used once students have become familiar with and successful at using the Product Profiles.

- Organise the students into groups
 - five groups of four for example.
- Give each group a different Product Profile case study.
- Ask each group to read the study and prepare a short oral report on, for example, the properties of the materials used in the product. Give the groups a time limit for this task, 15 minutes maximum.
- Each group then reports back to the whole class (2 minutes maximum for each feedback) and you note key points on the board.

You then use a whole class question - answer session based on the key points to develop the class's understanding of the properties of materials and the relationship between the properties of a material and the uses to which it is put.

You can use this approach to develop understanding about a range of issues.



Using product profiles during a design and making assignment

At the beginning of a design and making assignment (dma) you can use a Product Profile to establish some of the important considerations that will be useful in making the design decisions likely to be encountered in the dma. For example, if you are designing and making products with electrical or mechanical features the Freeplay Lantern studies would provide useful background. If you were designing an electronic product using sensors then Neotrend would be useful. If you were designing textile products where the physical properties of the fabrics were important then Skystreme would be relevant. The significance of the study may not necessarily be that explicit; the aim is to encourage students to develop a more holistic view across their design and technology experiences so that work in product evaluation and thinking about the activities of professional designers naturally informs their own designer - maker practice.

During a dma you can use Product Profiles to focus student's attention on areas that need serious consideration. For example you could use Anywayup cup, Electric Violins or OptiMusic to focus attention on meeting user's needs. You could use Heathrow Express to consider environmental impact issues. You could use Divine chocolate to consider sources of raw materials.

At the end of a dma you could use almost any of the Product Profiles to focus attention on evaluation.



6 writing your own product profiles

You can use the framework developed for writing the studies about Millennium Products as the basis for writing your own Product Profiles. The two panels on pages 22 and 23 show the questions underpinning the framework for 'reading' a product.

For any given product you can try to find out answers to these questions. Some you can answer simply by looking at and handling the product. Others will require research and you may need to contact the manufacturer and the distributor.

This can seem a daunting task but it is quite possible to use and develop the research skills of your students and involve them in the process. Organise the class into four or five groups and give each group a section to research.



You can help students use the Internet successfully for research by explaining the use of bookmarking, search engines and reading URL's carefully so that they don't waste time. This activity can be the basis for an ongoing homework over six weeks with each group having to report progress every two weeks. You can report on your findings as well. The results of this progress can be posted on a class Product Profile notice board and at the end of the six weeks each group has to use the findings of the class to produce a Product Profile. If during this research you have managed to build a good relationship with the manufacturer or the distributor it is possible to invite them to view the results of the work and pass comments.

Questions for reading a product - Part one

Thinking about needs and wants

- What needs and wants are met by the product?
- What's it for?

Thinking about the user

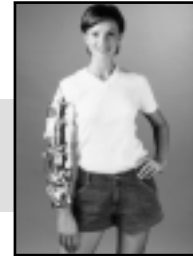
- Who is likely to use the product?
- What effect will it have on their lives and relationships?

Thinking about production

- What materials are used and why?
- Is the product one-off/batch/mass produced? Why?
- What manufacturing processes are used ? Why?
- What skills are needed?
- Where do the materials and other resources needed for production come from? Are they likely to run out?
- Is there a problem with side effects - e.g. waste disposal or pollution?
- What are the social and economic effects of manufacturing the product?

Thinking about performance

- How does it work?
- How easy is it to use?
- What manufacturer's information is supplied with the product?
- Does the user require written/graphical information?
- Are there any risk assessment issues in relation to the use of the product?



Questions for reading a product - Part two

Thinking about trade

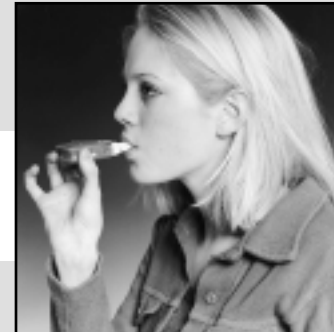
- How is the product promoted?
- Does it have an identity or image?
- How has this been achieved?
- Does the promotion target a particular age group or sector of people?
- Does the promotion target potential buyers and/or users?
- What assumptions have been made about the potential buyers/users?
- How is it sold?
- Where is it sold?
- What is the importance of the packaging in selling the product?
- What is the product's cost in relation to the income of potential buyers/users?

Thinking about use

- How will it be used?
- What effects will using it have, including those beyond intended use and user?

Thinking about disposal

- How is any packaging disposed of?
- What happens to the product after use?
- How long will it last?
- What factors limit/lengthen its life span?
- Can it be repaired? Can parts be replaced?
- How easily can it be recycled?
- Who would pay for the cost of recycling?



7 product profiles and the design & technology national curriculum in england

Product Profiles will be useful in meeting the requirements of the new design and technology National Curriculum in England as these extracts indicate.

From the opening statement on the importance of design and technology . .

‘As they do this, they reflect on and evaluate present and past design and technology, its uses and effects.’

From the opening statement of the Key Stage 3 Programme of Study . .

‘They develop their understanding of designing and making by investigating products and finding out about the work of professional designers and manufacturing industry.’

Within the Key Stage 3 Programme of Study Evaluating Processes and Products . .

‘ . . identify and use criteria to judge the quality of other people’s products, including the extent to which they meet clear need, their fitness for purpose, whether the resources have been used appropriately and their impact beyond the purpose for which they were designed.’

Within the Breadth of Study statement in both Key Stage 3 and Key Stage 4 Programmes of Study . .

‘During the key stage, pupils should be taught the knowledge, skills and understanding through . . product analysis’

Within the Key Stage 4 Programme of Study Evaluating Processes and Products . .

‘ . . recognise the difference between the quality of design and quality of manufacture, and use essential criteria to judge the quality of other people’s products.’

Product Profiles have been developed to provide you with the resources to meet these demands in ways that are flexible and can be adapted to meet the unique characteristics of your situation and the needs of your students.



The Millennium Products Profiles and Millennium Products Collection are available through in-service training sessions organised by the Design Museum and the Nuffield Design and Technology Project. The providers of this training are Education Business Partnerships and Nuffield Area Field Officers. The training will be through short twilight sessions and free of charge. It will take place from April 2000 onwards at different venues around the country.

If you are interested in taking part in this training contact Nina Towndrow at the Nuffield Curriculum Projects Centre

email ntowndrow@nuffieldfoundation.org
telephone 020 7436 4412

or the Education Department at the Design Museum

telephone 020 7698 4777

The Millennium Products Profiles and Millennium Products Collection are derived from the Design Council's Sharing Innovation Initiative. They are a joint venture between the Design Council, the Nuffield Design and Technology Project and the Design Museum.

The Design Council

34 Bow Street London WC2E 7DL
www.design-council.org.uk

The Nuffield Design and Technology Project

Nuffield Curriculum Project Centre
28 Bedford Square London WC1B 3EG

The Design Museum

Shad Thames
London SE1 2YD

8 notes

PRODUCTS
MILLENNIUM





This project received funding from the Design Council on behalf of the Department of Trade and Industry