

## TEACHERS EXHIBITION NOTES

## SUCCESS AND INNOVATION achieving for Australia

This exhibition is about people and products, issues, risks, trials and achievements. It celebrates Australians at work developing the products and processes that create jobs, money and national pride — but sometimes threaten our environment and existence.

Living in an industrial culture, we have learned to expect and even demand solutions to new and newly perceived problems, innovative ideas and changes to the products we use. Whether our desire is for more novelty, fashion, comfort, efficiency, economy, safety or environmental friendliness, a complex process of innovation has to be initiated and managed by an organisation (or collaborative group) to introduce this change.

Few individuals, companies or industries are willing or able to regularly invest the time, energy and resources required to guide an idea through the many pitfalls which lurk at each step along the way to success. These steps usually include research, development, design, patenting, manufacture, promotion, distribution, sales and servicing. Many of those who have done so in an innovative way are celebrated in this exhibition.

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There are any number of topics that can be investigated in the exhibition *Success and innovation*. For example: technological change, the role of design in product manufacture, technology and society, Australian social history, manufacturing, leisure and lifestyle, science and technology, environmental issues and others.

The exhibition has four main sections:

- Innovation in action: eight Australian case studies

- Reviewing the best
- Design
- Issues of innovation.

It also includes the *Know-how* CD-ROM, a 'Stop press' showcase and the *Simply the best* showcase which presents award winning engineering and design. A feature of the exhibition is the number of unique interactives and audiovisuals which highlight concepts and help make the ideas and issues more accessible.

Wherever possible the physical elements of the exhibition — finishes, lighting, showcases, audiovisual systems etc — are Australian. The mechanical and computer-based interactives and the database have been developed and produced by Powerhouse staff. Timbers used are all from managed forests or plantations.

### **Innovation in action: eight Australian case studies**

Eight major phases in the process of developing, producing and marketing a successful and innovative product are highlighted in this section of the exhibition. Each is represented by a case study, and each case study is itself an example of applied innovation.

### ***Owning innovation***

*Protecting intellectual property* is essential if your research and development is to remain yours. It may sometimes conflict with the scientific ideal of freedom of knowledge — the principle of publishing your findings for the intellectual community to admire and build upon — but where business is concerned,

protecting those ideas is essential. Intellectual property refers to those aspects of innovation which can be registered for set periods during which other individuals and companies are not free to copy them. These include:

- designs — the unique appearance or form
- trademarks — the brand name and logo
- patents — new materials, mechanisms or methods of operation
- copyright — any unique artwork or control program.

Should another company wish to make use of any of these aspects, that company would need to negotiate a licence.

One company that makes extensive and innovative use of the licence system is the engineering company **A E Bishop and Associates**. This case study features the extremely sophisticated variatronic power steering unit, introduced in 1991 after intensive development. The company designs and patents not only the steering system, but also the machinery needed to manufacture it. However it does not manufacture any products itself, but licenses car and component manufacturers around the world to make use of its patents.

### ***Design and innovation***

*Product design* relates to three quite different aspects of manufacture:

- ease of manufacture — especially minimising working parts and assembly steps
- ease of change — designing parts, moulds and tools which can allow future changes in style or function without the need for a complete redesign
- style — a sensitivity to styling which the buyer will find attractive and functional, and an awareness of fashion trends and cultural expectations.

Often commercial style reflects the innovations of art movements and

craftworkers. Designers, such as furniture designer **Marc Newson**, create unusual, handcrafted works for an elite market. These may then become commercially manufactured in limited editions, which in turn inspire a whole range of mass productions. Marc Newson's craft-made items of furniture have been featured in leading museums around the world and are recognised as incorporating many imaginative and novel shapes, materials and fabrication processes. The elegant aluminium Lockheed Lounge is now manufactured in limited numbers by Sydney specialist furniture company, Basecraft.

Newson's first foray into product design is the elegant and striking Orgone Lamp to be mass produced by Flos Italia in 1992. Newson has established leadership in design and has influenced the cultural reputation of Australia with this 'intellectual' export.

### ***Quality and innovation***

*Manufacture and quality control* — if a product, especially a complex and expensive item, can be guaranteed not to be a lemon, retailers will feel happier about stocking it. One quite extraordinary development in quality control has been the **Optical Surface Profiler** (OSP), produced by the CSIRO for the Royal Australian Mint.

A coin begins as a plaster design. This is used to make a die (this process involves several stages) which stamps out the coins. The equipment can show wear, or the process go slightly wrong, at any stage. Keeping track of the production process used to be slow and expensive until Dr Bob Oreb of the CSIRO invented a device which uses a computer to analyse the moire patterns reflected from moulds and dies. The OSP produces colour maps and graphs which identify flaws and wear, and can also be used to analyse and forestall production problems. Recently the OSP analysed the Arnott's Scotch Finger Biscuit master mould to allow the original design to be transferred to a computer that can replicate the mould on demand.

## ***Organising innovation***

*Obtaining and managing resources* can be one of the hardest stages to negotiate. The **Automated Wool Harvesting System** (the sheep shearing robot arm prototype is on display) represents an extraordinary saga of determined resource collection — people, knowledge, money, equipment — by a farmer, Lance Lines, determined to turn a space-age idea into a reality.

Thirteen years of development, involving shearers, engineers, laser technicians, scientists and managers, resulted in 1987 in a robot that could cut half the fleece from a sheep in 30 seconds. A feasibility study, market research program and business plan convinced Elders Pastoral to provide \$6.3 million for further development.

The innovation here lies in the evolution of a multiskilled team and of a comprehensive market and business plan to achieve the goal of a viable alternative to human shearers. Unfortunately this creative case study is also an example of the risks that lie in wait for all innovative manufacturers; the current economic climate has stalled the production process.

## ***Advertising and innovation***

*Promotion* is the means whereby potential buyers are made aware of a product and, hopefully, persuaded to purchase it. Promotion is as essential to success as research or quality control. At its most successful, promotion can actually act to define a product (Arnott's biscuits, Vegemite, Mortein, Cricket) as a recognisable part of a local culture.

One company that was outstandingly successful in this field was **Chiat Day Mojo**, the company responsible for such instantly recognisable products as Tooheys beers, Speedo swimming costumes, Pea Beu insecticide, Meadow Lea margarine and World Series Cricket. The company used the Australian vernacular, tied to jingles that were easy to recognise, remember and sing, and images that

presented quite outrageous stereotypes of 'Australianness'.

## ***Customers and innovation***

*Distribution, sales and services* — at the end of all the research, organising of resources, production and promotion, we find the target ... the customer. Companies which cultivate customers through market research, after-sales service and support networks create loyalty to their products and a sales-increasing reputation.

**Cochlear Pty Ltd**, the company responsible for the 'bionic ear' is an excellent example. The Nucleus 22 Cochlear Implant allows the profoundly deaf to receive auditory signals, but to do so they must learn to interpret signals from 22 implanted electrodes. To achieve this, the implant is distributed and sold only through clinics, where cochlear trained audiologists, psychologists, surgeons, engineers and teachers are available to provide the high standards of surgery, programming and teaching.

## ***Opportunity and innovation***

*Identifying a market opportunity* features the **Holeproof Computer Sock**. Development of this product began in 1969 in response to customer complaints about socks that habitually ended up around the ankles. It took several years of spare-moment research to develop a new method of knitting wool-Lycra blend socks, and a further three years to produce sock designs and a machine knitting program to manufacture them.

Detailed analysis of both the forces in socks and leg characteristics had to be carried out. The resultant sock worked, and a clever advertising campaign (featured in the exhibition) has brought Computer Sock sales to almost a million pairs per year. The essence of innovation in this process lies in recognising and exploiting an opportunity to create an entirely new version of an old product.

## ***Research and innovation***

*Research and development* has been a major factor in the ongoing development of the

**UNSW/BP Solar photovoltaic cell**, currently at the forefront of solar energy production. Early in 1992 the first batch of Green Cells, the world's most efficient silicon solar cells, were manufactured and sold after more than a decade of intensive research. The team at the University of New South Wales, led by Dr Martin Green, has worked closely with the company BP Solar Australia since 1977 and has grown from 3 to 53 employees.

Production of the solar cell has involved a fruitful combination of pure and applied research and practical technology development. Here innovation lies in the use and commercialisation of research to fund further work and create a new energy technology.

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**An overview** of the eight stages of production featured in the case studies can be obtained by playing the 'Cheryl's big break' computer interactive, housed opposite the Mojo case study. But as there is only one terminal, we would ask teachers to exercise some discretion in allowing students to monopolise the program.

### **Reviewing the best**

This section of the exhibition celebrates the breadth and variety of Australian innovation in manufacturing. Obviously not everything can be shown — Australian innovation has had 40 000 years to develop!

One very real problem, given the diversity of Australian innovation, was to decide on a means of presentation. A time-line was one possibility; division into like concepts — leisure, agriculture, built environment, food, etc — was another, and both these approaches can be found in the database. In the end we decided to look at some of the best in terms of originality of idea, quality of manufacture and effectiveness of sales. While all of the products meet all of the categories, there was usually some aspect that tipped the scales in favour of one of the three criteria.

**Bright ideas** includes pre-paid postage, the black box flight recorder, Louisa Lawson's mailbag buckle, the pop-top can, and the Glo sports night golf system.

**Well made** includes the Both artificial respirator, the Zip water heater, the Shepherd castor, Webster vaccines, the appropriate technology washing machine and the 'Perfect' Strachan teapot.

**Sold well** contains a wildly wonderful mix of everything from Splayds and Fred Burley's anthropometric survey of corsets to the Victa 'peach tin' lawnmower and good old Vegemite.

You will not always find the most familiar objects in this section — but if you're looking for the Hill's Hoist clothes line for instance, 'what about' labels will direct you to the CD ROM.

Students can discover a great deal about the history and diversity of Australian manufacturing from both this section of the exhibition and the *Know-how* CD ROM, an interactive database of stories, case studies and games profiling about 350 products. The CD ROM can be accessed through product name, time-line, context, or simply at random, and gives details of a product's development, production and sales.

The 'Stop press' in the 'Issues' section focuses on products which are either relatively new, or which have recently expanded their overseas market.

### **Design**

The process of product evolution is considered in the section on design. This section looks at the transformation of shapes and improvement in performance that adds value and international marketability to Australian products. Through a series of examples such as Fitpak, the Café Bar, the ABC's station identification and the Eveready Dolphin, the processes through which idea becomes reality and (sometimes) transforms again to match a changing market, are documented through models, prototypes and recorded interviews with some of the designers.

## Simply the best

*Simply the best*, sponsored by the Institution of Engineers Australia (Sydney Division) displays award-winning products and processes from Australian engineers and designers. Updated twice a year, this showcase presents subjects as diverse as medical and construction technologies and mining and ergonomic tools.

At the far end of the gallery, a separate showcase outlines the history of the development of the Australian totalisator industry from George Julius' original model of the electro-mechanical automatic odds and dividends calculator (1913) to the latest on-line pub betting systems. This case study shows how Australia established industrial leadership in this field based on a single invention and continued innovation.

## FOCUS QUESTIONS

### Innovation in action

1. What's so innovative about a sock? Discuss how people feel about buying and wearing socks. What are some of the problems you experience with them?
2. Even an invention that is of great benefit to a special section of the community, for example the cochlear implant ('bionic ear'), is still a commercial undertaking. The cochlear implant is one of Australia's top ten manufactured exports, sold in 35 countries. How is it marketed?
3. Some profoundly deaf people are against the idea of a cochlear implant. Why would this be so? What problems might there be in using an implant? Listen to the video of Sue Walters talking about the issues and discuss them with your group.
4. Of all the companies represented in the case studies, Arthur Bishop's 'ideas factory' takes most care to protect its ideas from theft. What is 'intellectual property' and how can you protect it from thieves?

5. Advertisements often work by linking a product to a particular section of the community, for example young men who like playing football. In doing this they can also create a false image of the 'average Australian and the average family'. Do you think that you and your family are fairly represented in ads? Discuss who turns up in ads and who doesn't, and how members of the class feel about it.
6. Discuss the job of shearing sheep, try the sheep-shearing interactive, then work out why both the sheep and the Australian Workers' Union (which includes the shearers) prefer the robot.
7. Universities are increasingly being asked to put their research time into potentially practical developments. Should there be equal time for pure research? What good is it?

### Reviewing the best

8. 'Bright ideas' includes all kinds of products from genetic engineering to children's films. Some, such as Synroc, raise ethical issues. Others, such as the Night Golf System, are frivolous in the extreme. Choose any 'bright idea' and discuss its value and implications.
9. 'Well made' includes a number of products designed to improve the quality of life and/or to be environmentally friendly. Choose one and discuss how well it has achieved this aim.
10. Discuss why women are so under-represented in the design and manufacturing sectors?
11. Success often comes from innovation in new production processes and technologies, better design, quality management or reliability. But being well made is not always a recipe for success. In the 1970s the Leyland P76 was launched with considerable fanfare. It was one of the all-time great flops. Think

about what might have gone wrong. Some ideas to consider: becoming aware of environmental issues. 'Family' car not as important as it once was. More women buying cars. Design problems. Advertising directed at the wrong market.

12. 'Sold well' celebrates products that used innovative design, sales techniques or advertising in their marketing. Choose an early product and discuss if the sales techniques would work as well today.

### **Design**

13. Design involves making an object that looks 'right' to a certain 'target' group of people, eg girls aged seven to ten, men buying gadgets for Mothers Day, home do-it-yourselfers. Pick a product from the exhibition and discuss who you think was the designers target audience.

14. Before industrialisation, all products were made by individual craftspeople or small teams, and it was possible for each item to be tailored to the individual consumer. Quality could also vary considerably. How have modern production methods changed the relationship between producer/designer and consumer?

15. The Café Bar was first introduced in 1965 and has changed greatly since the first model was released. What factors do you think have influenced those changes?

For details of other exhibitions and ways that students can visit the Powerhouse Museum, consult the current *Powerhouse teachers guide* or **call** (02) 9217 0222 or **fax** (02) 9217 0441 or **email** edserv@phm.gov.au

#### **Available from the Powerhouse Museum**

*Making it: innovation and success in Australia's industries* by Robert Renew.

A full-colour illustrated reference book on industrial design and technology in Australia. ISBN 1 86317 030 8, 112 pp, paperback \$24.95.

*Know-how: the guide to innovation in Australia*. CD-ROM. The perfect companion to the *Making it* book. Dual platform version for Macintosh and Windows. ISBN 1 86317 0537, \$99.95.

#### • *Ideas in Action* •

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# EXHIBITION FLOORPLAN

## Success and innovation, level 4

