

Product Design

Paper and Card *15 slides*

This presentation explains how paper is made, and also describes the different types of paper, card and board available. It also talks about modelling materials and finishes, and the results of combining paper with other materials.



Modelling materials

Match two properties to each modelling material

Corrugated plastic sheet	Foam board	Plaster bandage	Modelling foam
			
Rigid and strong	Comes in blocks	Easy to carve	Applied to a frame
Light weight	Sets in 30 mins	High shine finish	Bends easily along corrugation

solve

Timbers *20 slides*

This presentation looks at how woods are classified and explains the properties of each type of wood. It describes how manufactured boards are made and used, and talks about the different tools and techniques used when working with timber.



Inside a tree

medullary rays + soft tissue + carry water and nutrients from the centre to the sapwood

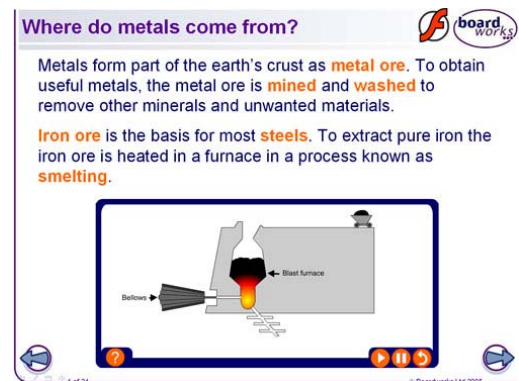
annual rings

bark

sapwood

Metals *24 slides*

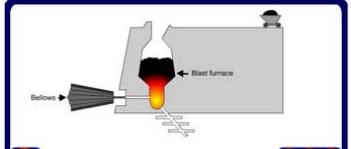
This presentation looks at where metals come from and how they are prepared for use. The students learn about ferrous metals, non-ferrous metals and alloys and how to alter the properties of each using heat treatment. Also included is information about hand tools and industrial techniques used on metals.



Where do metals come from?

Metals form part of the earth's crust as **metal ore**. To obtain useful metals, the metal ore is **mined** and **washed** to remove other minerals and unwanted materials.

Iron ore is the basis for most **steels**. To extract pure iron the iron ore is heated in a furnace in a process known as **smelting**.



Plastics

24 slides

This presentation looks at the differences between natural and synthetic, as well as thermoplastic and thermosetting plastics. It also explains how the properties of plastics can be altered and discusses recycling issues. It also goes into detail about the tools and processes involved in working with plastics.



Types of thermoplastics

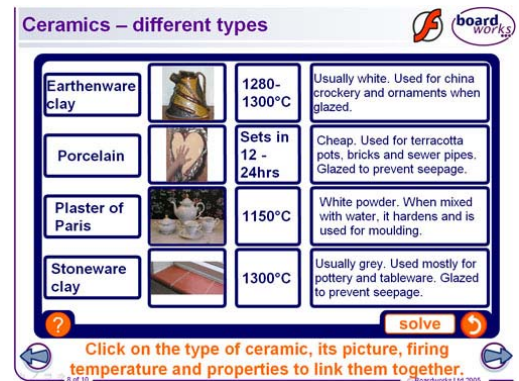
Click on each thermoplastic item to find out more.

Items shown: Rigid polystyrene, Expanded polystyrene, High impact polystyrene, Acrylic, High density polythene, Low density polythene, Polypropylene, ABS.





Ceramics

10 slides

This presentation covers the processes and ingredients involved in making ceramics from clay, as well as describing the properties of both. It talks about the relationship between ceramics and the electrics industry, and explains the different types available.



Ceramics – different types

Earthenware clay		1280-1300°C	Usually white. Used for china crockery and ornaments when glazed.
Porcelain		Sets in 12 - 24hrs	Cheap. Used for terracotta pots, bricks and sewer pipes. Glazed to prevent seepage.
Plaster of Paris		1150°C	White powder. When mixed with water, it hardens and is used for moulding.
Stoneware clay		1300°C	Usually grey. Used mostly for pottery and tableware. Glazed to prevent seepage.

Click on the type of ceramic, its picture, firing temperature and properties to link them together.

Textiles

19 slides

The presentation talks about how fibres become fabrics, and explains the properties of the different types. It describes the results of combining certain fabrics and gives details on components that can be used.



Fabrics

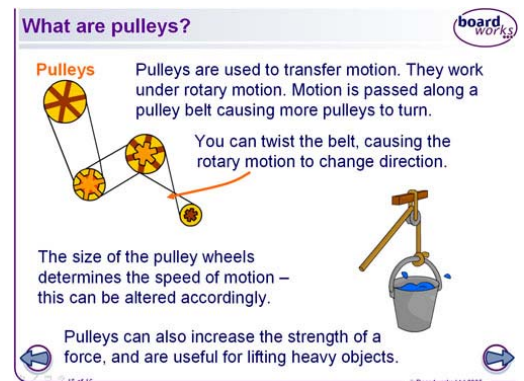
Look carefully at this picture, and click on all the different fabric uses you can spot.

Image shows a house with various fabric uses: tent, car, sofa, rug, curtains, carpet, bedding, etc.

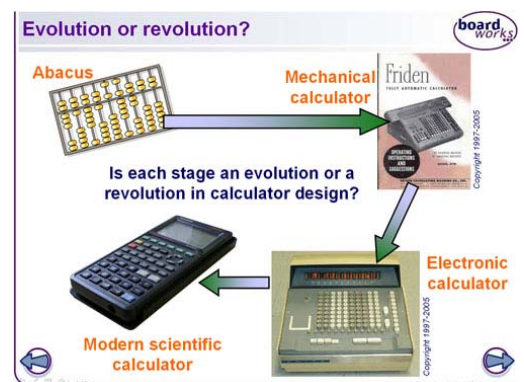
Food 26 slides
Students look at the physical and chemical properties of Starch, sugar, protein and fat. They also learn the Importance of raising agents in food production.



Control Components 19 slides
In this presentation, students learn how to identify common electronic and mechanical components. They are also taught their functions and uses.



Evolution of Product Design 19 slides
This presentation covers the role of product designers and how product design evolves over time in response to market trends and technological developments. It shows how manufacturing processes have developed over time and explains how society and design are related.




Product Analysis 19 slides

In this presentation, students learn why product analysis is important, especially when designing your own product. It also goes into detail about the main areas and key criteria to investigate, and explains what sorts of questions to ask when analysing a product. It also demonstrates how to use an analysis chart.

Product analysis

To establish objective information and offer a fair comparison, it is important to use the same criteria.



What is the target market? What manufacturing processes have been used?
 How does it look? (aesthetics) What are the key criteria?
 Where will it be used? How well does it perform its purpose?
 What are the primary and secondary functions? How is it assembled?
 What materials is it manufactured from? Is it environmentally friendly?

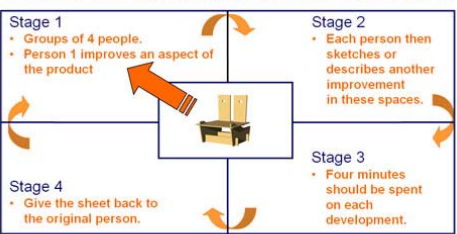
Answer the questions with regard to the joystick pictured, and think of any other questions that could be asked.

Developing your Portfolio 57 slides

This presentation looks at how to investigate the problem and develop design proposals. It also talks about product synthesis, production planning, manufacturing, testing and evaluation. All of these areas are discussed in detail.

Developing ideas – 4 x 4 activity

The 4 x 4 activity uses other people's ideas to develop your own ideas. Your original idea is in the centre of an A3 sheet.



Stage 1
 • Groups of 4 people.
 • Person 1 improves an aspect of the product

Stage 2
 • Each person then sketches or describes another improvement in these spaces.

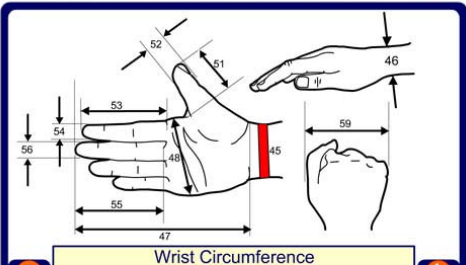
Stage 3
 • Four minutes should be spent on each development.

Stage 4
 • Give the sheet back to the original person.

Anthropometrics and Ergonomics 25 slides

This presentation looks at the importance of considering the anthropometrics of potential end users when designing a product, as well as making sure that the product is ergonomically suitable for a range of user groups. The students will become familiar with anthropometric terminology.

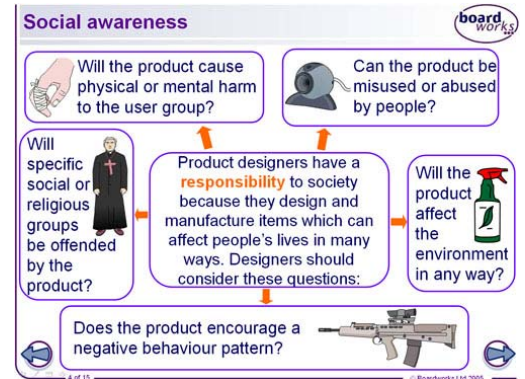
Anthropometrics of the hands



Wrist Circumference

Designing for Different Needs 15 slides

This presentation aims to make the students aware of a product designer's role in health and safety, as well as the responsibility he or she has to be environmentally friendly. The students also learn about product obsolescence and its implications.



Social awareness

Will the product cause physical or mental harm to the user group?

Can the product be misused or abused by people?

Will specific social or religious groups be offended by the product?

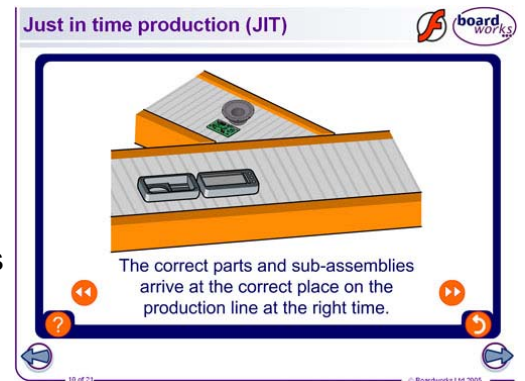
Product designers have a **responsibility** to society because they design and manufacture items which can affect people's lives in many ways. Designers should consider these questions:

Will the product affect the environment in any way?

Does the product encourage a negative behaviour pattern?

Scales of Production and Manufacturing Systems 21 slides

This presentation talks about the importance of considering the manufacturing process when designing a product. It also highlights the different scales of production and explains the idea of economy of scale, as well as asserting the significance of quality assurance and control.

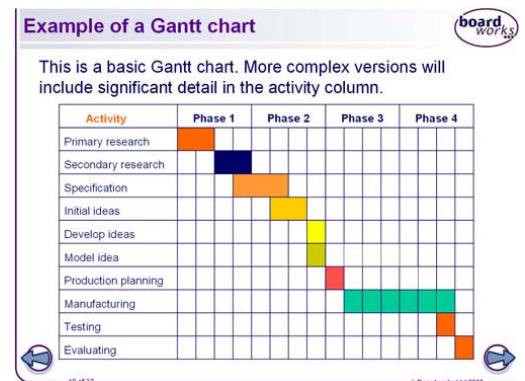


Just in time production (JIT)

The correct parts and sub-assemblies arrive at the correct place on the production line at the right time.

Quality Control 32 slides

This presentation is about the importance of products being manufactured according to a specific standard. It discusses the ideas of quality assurance and quality control and highlights methods employed to improve them. It also mentions agencies set up to ensure that both are of a high standard.



Example of a Gantt chart

This is a basic Gantt chart. More complex versions will include significant detail in the activity column.

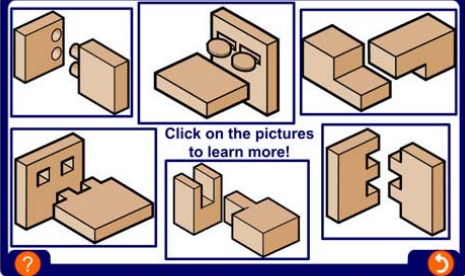
Activity	Phase 1	Phase 2	Phase 3	Phase 4
Primary research	█			
Secondary research		█		
Specification		█		
Initial ideas			█	
Develop ideas			█	
Model idea			█	
Production planning			█	
Manufacturing			█	█
Testing				█
Evaluating				█

Product Manufacture

30 slides

In this presentation, students will become familiar with the different forms of commercial production (primary and secondary). They will also learn about wasting, deforming, reforming, fabricating and finishing processes and know the tools that are involved in each.

Fabricating processes – wood joints



Click on the pictures to learn more!

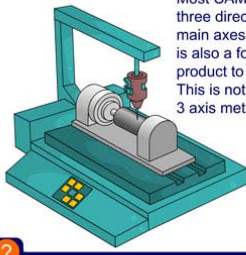
Why do you think that these joints have the names that they do?

CAD/CAM

29 slides

This presentation explains the role that computers now play in developing and testing new products. It also talks about how CAD software creates 2D and 3D designs, and the advantages and disadvantages of using both CAD and CAM. The students will also learn about CNC machines.

Computer aided manufacturing



Most CAM machines move in at least three directions called axes. The three main axes are called X, Y and Z. There is also a fourth axis which enables a product to be made using 360° rotation. This is not possible using conventional 3 axis methods of manufacturing.

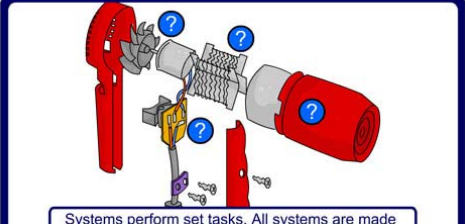
+Z	+Y	
+X		-X
	-Y	-Z

Systems and Control

18 slides

This presentation covers inputs, processes, outputs, feedback, sub-systems and flow charts. It also talks about different communication systems and how working practices are changing as a result.

Sub-systems



Systems perform set tasks. All systems are made up from connected parts. These are called sub-systems. Click on the question marks to find out about the different sub-systems in a hairdryer.