


1 Year 8 Design Technology Education

Industry & Enterprise

Fairtrade is about better prices, decent working conditions and fair terms of trade for farmers and workers in less economically developed countries.


- Bananas
- Cocoa beans (chocolate)

Crowd funding is a way for designers to gain investment to help develop a product. It is usually internet based on websites such as Kickstarter.com. People who think the idea is good invest in the product which can help the product make it to market



2 People & Culture

We must take responsibility for how we dispose of our products. They could be recycled or end up in landfill.



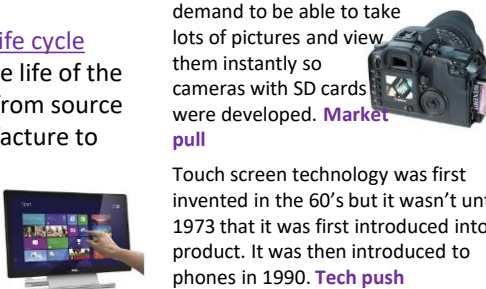
Technological push is when a new technology is developed and then pushed into market creating new products.

Market Pull is when there is a problem identified by a consumer group driving new technology to be used to solve with a product.

There was a consumer demand to be able to take lots of pictures and view them instantly so cameras with SD cards were developed. **Market pull**

Touch screen technology was first invented in the 60's but it wasn't until 1973 that it was first introduced into product. It was then introduced to phones in 1990. **Tech push**


Product life cycle covers the life of the product from source to manufacture to disposal.



3 Culture & Society

Products **evolve** over time due to:

- New technology
- Fashion/style
- Consumer need
- New materials
- New manufacturing



Anthropometrics is the measurements and limitations of the body such as:

- Hand sizes
- Reach

Ergonomics is about how a product or environment interacts with a user.


Physical/mental/cognitive

When designing for children a product should be:

- Safe
- Robust
- Non toxic
- Fit their measurements/size

Mobile phones have changed drastically over time including:

- Features
- Internet access
- Colour screen
- Touch screen
- Battery size




4 Environment, Production Techniques & Systems, Analysis

Designers and manufacturers must ensure they try to reduce the amount of **pollution** they produce by making products. Creating CO2, methane and other greenhouse gasses contributes towards **global warming** which raises the earths average temperature

CAD – Computer Aided Design

CAM – Computer Aided Manufacture



Just in time production Manufacturers respond to customer demands, an order triggers the production process and the manufacturer makes the product specifically to meet the order

Continuous improvement is the process of improving products, services and processes. It is often viewed as a circular process of planning, implementation, measuring results and taking corrective actions if results don't represent an improvement.

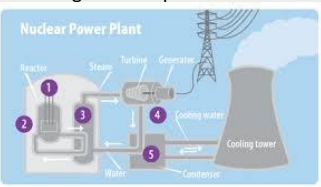
Flexible manufacturing is using automated robots and machines on production lines The machines can be reprogrammed to perform different tasks or the same repetitive task

5 Fossil Fuels & Nuclear Power

Fossil fuels are resources that cannot be replaced after we convert them into energy for fuel. They include:

- Gas
- Oil
- Coal

Nuclear power is a method of producing energy where a nuclear reaction is created inside a controlled vessel to produce vast amount of heat which generates power



Nuclear power positives:

- Clean
- Efficient
- Quick


Nuclear power negatives:

- Expensive
- Radioactive
- Dangerous to all life if radiation leaks
- Waste stays active for a long time
- Almost impossible to dispose waste

Fracking is the process of extracting **shale gas** that is trapped within areas of the earths crust.


6 Renewable Energy & Energy Storage Systems inc Batteries

Wind is a renewable source of energy that we can harvest by using the wind to rotate a turbine which converts this energy into power through a generator.



Kinetic energy is the energy involved in motion. Any object in motion has kinetic energy – a ball thrown, a person walking an object falling.

Electrical power can be stored in **batteries**. Batteries contain electrochemicals that react with each other to produce electricity



Solar energy is where energy from the sun's rays are converted into electrical energy.

7 Modern Materials & Smart Materials

Modern materials are new materials or new ways of working with a material.

Smart materials change their properties to react to a stimulus such as heat

Corn starch polymers are biodegradable plastics made from corn or potato starch. Uses: Disposable cutlery, food packaging, pens, 3d printing

Thermochromic inks change colour with a change of temperature. Uses: Baby products, novelty mugs, packaging, strip thermometers



Titanium is a modern material that is usually mixed with other metals to form an alloy. Pure titanium does not react with the human body and so is used by the medical industry for artificial joints e.g hips



Polymorph is a smart material that softens and becomes mouldable at 70 degrees C. When it cools, it hardens and can be used to test ergonomic grips or components.

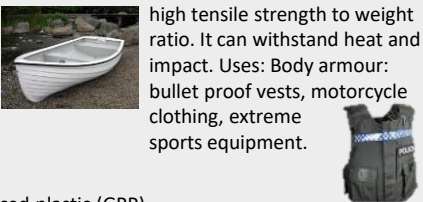


8 Composite Materials & Technical Textiles

Composite materials are a combination of materials to improve properties

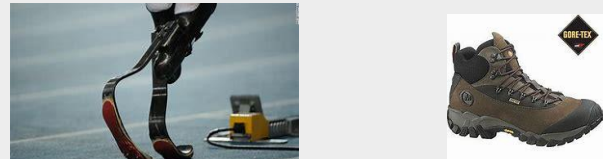
Technical textiles are fabrics that have enhanced properties to withstand specific uses.

Kelvar is a material that has a high tensile strength to weight ratio. It can withstand heat and impact. Uses: Body armour: bullet proof vests, motorcycle clothing, extreme sports equipment.



Carbon fibre reinforced plastic (GRP) consists of carbon fibres woven into cloth and set with a resin. It has a high strength to weight ratio. Uses: Sports cars, f1 cars, sports equipment, boats, prosthetics

Gore-tex is a very thin fabric that is waterproof, wind proof and breathable. Uses: outdoor clothing, skiwear, walking boots, gloves.



9 Year 8 Design Technology Need to Know

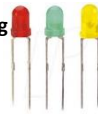
Inputs, Processes & Outputs

For a system to be controlled it needs an **input**, this could be manually controlled or to sense an environment change such as light. Examples – toggle **switch**, push to make switch, push to break switch



Output components are used to give off a stimulus such as heat, light sound

Light emitting diode (LED)



Light dependent resistors are used to switch on a light when the lighting in the room or environment falls below a certain level. Uses: street lights, security light, night light, solar garden light.

Buzzers create a mid to high pitched buzz when switched on. Uses: Alarm systems, door entry system, children's toy.

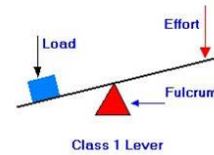


10 Types of Movement & Changing Magnitude and direction of Force

Linear motion is movement in one direction along a straight line. For example a train or a 100m sprint runner



A **lever** is a simple mechanism to gain mechanical advantage to help lift or move things easily.



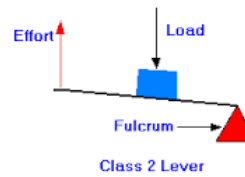
Reciprocating motion is a repetitive up and down or back and forth movement along a straight line. Example – sewing machine needle moving up and down.



Oscillating motion is similar to reciprocating but this is along a curved line. Example – Windscreen wipers



Second order lever



11 Paper and Board & Natural and Manufactured Timbers

Bleed proof paper

Used for sketching and using marker pens



Corrugated cardboard

Used for packaging electronic or heavy items. Impact protection



Duplex board

Used for packaging and drinks cartons. Often foil lined



Foam core board

Used for modelling, mounting and framing.



Timer is available in 3 categories

- Hardwood (oak)
- Softwood (pine)
- Manufactured board (plywood)

Hardwood: beech



Softwood – Spruce



Manufactured board - MDF



12 Metals and Alloys, Polymers & Textiles

Ferrous metals contain iron.



Low carbon steel

Thermoplastics can be reshaped with heat



Polypropylene (PP)



Cotton

Plant based fabrics are made from plant fibres spun into yarn



High impact polystyrene (HIPS)

Non Ferrous metals do not contain iron.



Aluminium



Polyester

Synthetic fabrics are man made fabrics

13 Material Properties

Physical properties

Absorbency – the tendency to attract or take an element, usually liquid but could include light or heat

Density – the mass of a material per unit of volume; how compact a material is

Fusibility – the ability of a material to be converted through heat into a liquid state and combined with another material (usually the same) before cooling as one

Mechanical properties

Strength – the ability of a material to withstand a force such as pressure or tension

Hardness – the ability to resist abrasive wear and indentation through impact

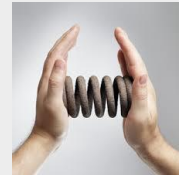
Toughness – The ability to absorb energy through shock without fracturing

Malleability – the ability to deform under compression without cracking, splitting or tearing.

14 Selection of Materials and Components, Forces and Stresses & Ecological and Social Footprint

Compression

occurs when a pushing force is applied to either end of a material



Tension occurs when pulling force is applied to either end of a material.



Carbon footprint refers to the amount of Co2 produced by a product, person or a company



Social footprint is a measure of the impact that a company's social policies have on its employees, partners, subcontractors and society. It covers things such as:

- Flexible working hours
- Health and safety
- Fair pay
- Training
- Sponsorship
- Contribution to community

15 Sources and Origins, Using and working with Materials & Stock Forms, types and sizes



Forest stewardship council is a mark that means wood/paper has come from a sustainably harvested source

Felling is the term used for cutting down a tree. Machines are available that can fell a tree. De-branch it and cut it into equal-length logs in one action

Paper comes in the following available **stock forms**:

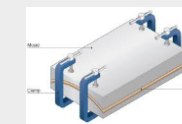
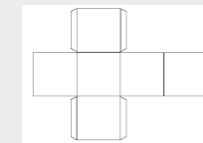
- A0/A1/A2/A3/A4/A5 etc.
- Gsm weight
- Microns (thickness)
- Colours
- Ply (layers)

After a tree is cut down into manageable lengths it is then converted into planks. Timber is supplied in two main types of finish:

- **Rough sawn**
- **Planed all round (PAR)**

16 Scales of Production, Specialist Techniques and Processes & Surface Treatments and Finishes

Die cutting is a process where paper or card is cut into a shape or net. This can cut and score to fold the card into the desired shape such as a packaging net



Wood lamination is where thin strips of wood, usually plywood, are glued together in a mould to create the desired shape/curve.

Batch production

is a scale of manufacturing where a certain number of identical products are required. This could be small or large numbers.

Mass Production

involves the product going through various stages on a production line where the workers at a particular stage are responsible for a different part of the product. (High volume)