THEORY types of production

Mass Production
Mass production involves the product going through many stages of a production line. There are workers and machines at certain stages along the line that are responsible for making certain parts of the product. This means the product is often made over days or even weeks depending how complicated it is. This product is often quite reasonably priced due to the large scale production techniques used. However if a problem occurs it will stop the whole line of production. A classic product could be a car.

www.tes.co.uk/teaching-resource/Mass-production-of-chocolate-

Batch Production
This is when a series of products which are all identical are made jointly in either large or small numbers. 2 – 100 is usually classed as batch. Once these have products have been made once more of the same products may be made using the same equipment. This equipment includes tools, moulds, machinery and labour. A classic product could be a chair, newspapers, books, electrical products, etc.

www.bbc.co.uk/learningzone/clips/production-on-mechanised-production-lines/8487.html

One off production
This is when only one product is made at a particular time. This one off product could be a prototype a one off object or a hand made object. Prototypes are made to see if a product works before it goes into large scale production. One off production takes a long time and often means it is expensive. A classic product could be a mobile phone prototype, a one off specialist product, handmade items, etc

THEORY types of production

Continuous production

This is where a product is continuously produced over a period of hours, days, weeks or even years. This kind of production means the product will often be quite reasonably priced. A classic product could be screws, bricks, food products, etc

http://www.youtube.com/watch?v=prHyUoKu3MI

Just in Time production

JIT is when a factory orders in and uses only the materials they need, when they need them. Stock is kept to a minimum with products being only produced when the demand is there for them, warehouse costs are therefore reduced. Bulk deals and reliance upon materials and deliveries.

Advantages
Reduced stock and therefore reduced warehouse and storage space needed – cheaper overheads. Less finance is tied up in stock as every product is already ordered by a customer and the suppliers provide materials and components when needed.

Disadvantages
Reliance on external suppliers.
Reliance on materials.
No available off the shelf stock.

http://www.bbc.co.uk/learningzone/clips/just-in-time-practice/368.html

THEORY modelling

What is modelling in Design and Manufacture?

Designers present their ideas to the user, client and manufacturer as models, mock-ups, prototypes and computer generated 3D models.

- Model - a scaled down graphic representation of a design.
- Prototype - a life size working model of a design used for testing development and evaluation.
- Mock-up - a model of a product built for study, testing and display
- Computer Generated 3d modelling – modelling software is used to create a realistic rendered model of the product.

Model making can be a very quick and cheap method of producing a prototype. Suitable materials include paper, card, foam board, styrofoam™, wire and 3mm MDF. Users, clients and manufacturers use models to evaluate ideas and decide how well they meet their needs and how best to make it.

Modelling - Styrofoam

There are many ways to build models. Some materials are more suited to making a certain type of model than others.

Styrofoam–This material is good for making block models as it is very easy to cut and form into thick 3D shapes. Styrofoam comes in large sheets, which commonly range from 25mm to 110mm thick and is usually coloured blue or pink. Styrofoam can be cut using a craft knife, fine bladed saw or hot wire cutter and shaped using sand paper, files or a surform. When cutting or sanding styrofoam, a dust mask and eye protection must be worn.

http://youtu.be/YlNmKrCynhU

Modelling – Clay

Clay–This material is good for making block models and more complicated mode ls as it is very easy to cut and form into thick 3D shapes. One mayor advantage of using clay is that if you make a mistake or change the design, this can be easily done by adding or taking more clay away.

http://youtu.be/eUz75_8gPs0

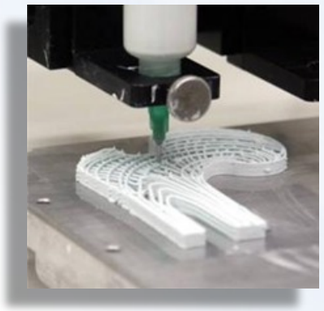
THEORY modelling

Modelling – Rapid Prototyping

What is Rapid Prototyping

Rapid prototyping is the name given to a number of processes used to turn CAD models into 3D objects very quickly. The process is normally carried out on a 3D printer which uses plastic such as ABS to construct the model. The printer melts the plastic through a nozzle onto a base board into the shape of the product. The printer does this a layer at a time building up into the completed model.

http://youtu.be/1gzkCuLGzn0



Computer Generated 3D Modelling

Computer 3D Modelling - The development of 3D modelling software enables designers and engineers to create realistic 3D models of their designs. A 3D computer model is a virtual object which can be rotated on screen and viewed from any angle.

Advantages of computer 3D modelling

- Models can be produced very quickly.
- Models can be modified very easily.
- You can easily add colour & surface texture.
- You can test structural designs before building eg bridges & skyscrapers.
- Easily sent by email to remote locations throughout the world.
- Less storage space required than a 'real' model.
- Used to create realistic simulations.
- Clients can explore virtual 'walk through' of 3D model designs.

Disadvantage of Computer 3D modelling

- Computer generated models are virtual and can lack the feel of a traditional model which can be picked up and handled.

THEORY computer aided design

Computer Aided Design/ Draughting is the use of computer systems to assist the creation, modification, analysis, or optimisation of a design.
Computer-aided drafting describes the process of creating a technical drawing with the use of computer software. CAD software is used to increase the
productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. As in the manual drafting of technical and engineering drawings, the output of CAD could convey information, such as materials, processes, dimensions, and tolerances. CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, ar more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manu

Advantages of CADD
Drawing speed - Although it takes a considerable amount of time and financial investment by companies to train their CADD operators. It will save time in the long term as drawing production is more accurate much faster using CADD software opposed to traditional methods. Files can also be sent instantly through emails. In turn, this will help increase productivity generating more income for companies.

Ease of modification - Companies who use CADD systems have advantages over competitors who rely on more traditional methods of modifying drawings. The ease and speed with which modifications can be made reduce time and costs, which in turn increases productivity.

Drawing size and flexibility - Drawings can be enlarged or reduced with no loss of detail. Extremely fine, detailed work can be produced using commands such as ZOOM. Positive location tools such as GRID, GRID SNAP and ATTACH enable accuracy to be maintained even in the smallest details.

Repetitive elements (library) - Drawings can contain a number of repetitive elements such as doors, windows, kitchen fittings and appliances. It is useful to have these items stored in a CAD library file. CAD library files are available for mechanical engineering, architecture and electronics. Items that you design need only be drawn once, saved to a library file, then retrieved and positioned each time they are required on a drawing. This saves time and effort, which increases productivity.

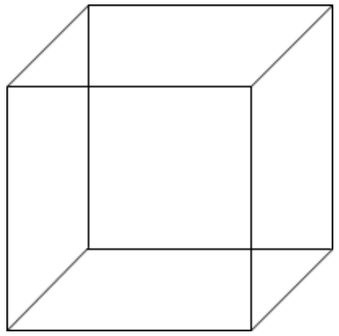
Storage and retrieval - A completed drawing or series of drawings can be stored on a hard drive, removable USB storage device or CD-R. These formats require less storage space than paper drawings. The drawings can then be printed as many times as required with no deterioration in quality.

Standardisation of drawings - Standardisation of drawings is often determined by drawing standards such as BS 8888. Standardisation of drawing layouts and styles can easily be created in the 'in-house' or corporate style adopted by the operator or the company.

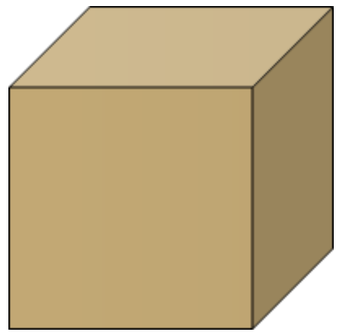
THEORY computer modelling

Types of Models

Wire Frame



Solid



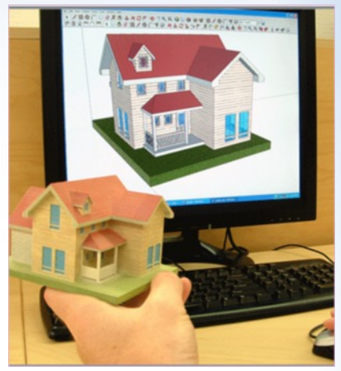
Real Time

These are the main types of computer models used by designers of animation or simulation.
Models start off as 'wire frame' then are made 'solid' and finally given the image of being 'real time' as in a movie production or a training simulation environment.

Animation is where computer models perform as in entertainment e.g. films. Simulation is where models create a virtual reality where humans can interact with events and change the outcome e.g. aircraft pilot training etc.

Computer Models Vs Hand/Machine Made Models
The development in 3D modeling techniques enables designers in different industries to create 3 dimensional models of their concepts quickly and easily.

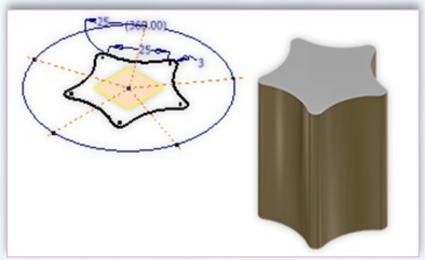
Hand/Machine Made Models
These models are very useful for designers when determining how a design may look or feel before moving to the next stage of design. Previously, 3D models had to be built manually from materials such as card, clay and polystyrene blocks. Nowadays, advances in technology have enabled 3D printers to become a reality, allowing the user to produce accurate real life models. Although this gives the benefit of being able to touch and hold the model it means another model would need to be created to take into consideration any changes or modifications that may need to be made. It can also be quite time consuming to produce these models.



Computer Generated Models
These models are much quicker and easier to create and edit. Modifications can be done at the click of a button, eg . Shape, colour, texture, scale, degree of accuracy. They can also be seen to function in any given environment. They obviously take up less physical space as they are stored electronically and designs can be sent instantly over the internet to clients and other designers. Unfortunately they cannot be physically touched for feel of comfort or control.

THEORY modelling tools

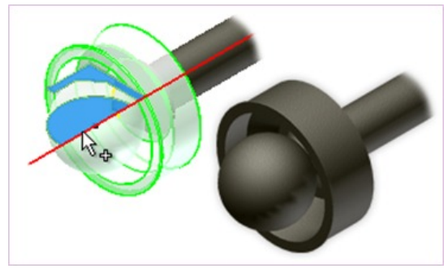
Extrude

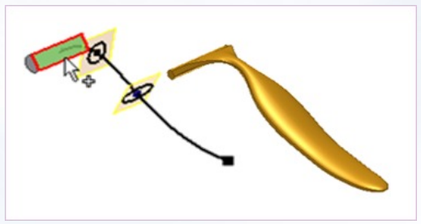


The extrusion tool is used to add depth to a sketch to transform it into a 3D model

Revolve

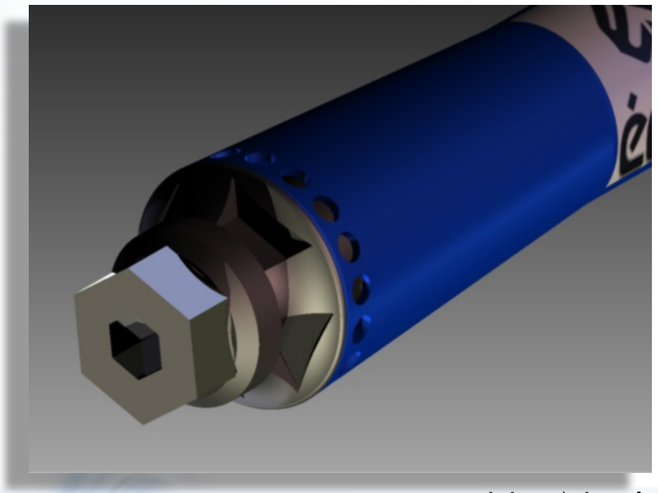
Creates a 3d model or feature by revolving one or more sketched profiles around an axis.





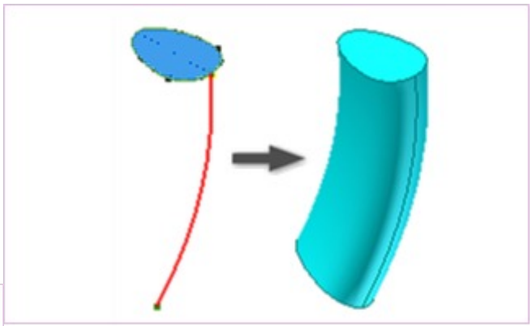
Loft

Creates a model or feature by blending multiple profiles (sketches) called sections, and transitioning them intmooth shapes between the profiles or part faces.



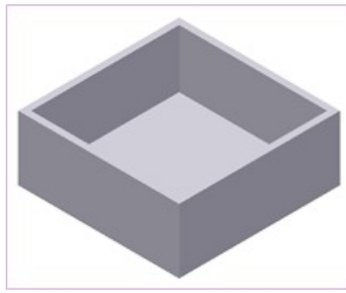
Sweep

Sweep models or features are created by moving or sweeping one or more profiles (sketches) along a path. If using multiple profiles, they must exist in the same sketch. The path can be an open or closed loop, but must pierce the profile plane.



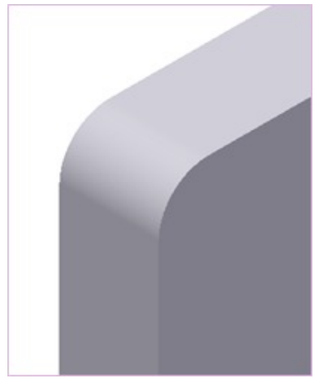
THEORY modelling tools

Shell



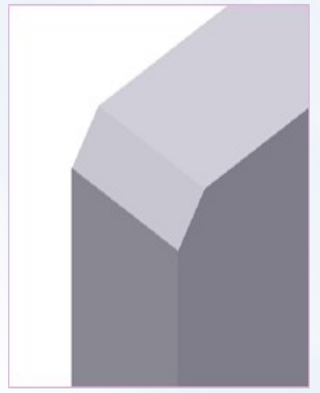
The shell tool allows you to remove surfaces and hollow out any shape or feature. The wall thickness can also be edited .

Fillet



The fillet tool allows you to round any selected corner or edge on a model. Multiple edges and corners can be filleted at any one time and the size of the fillet can be easily edited

Chamfer

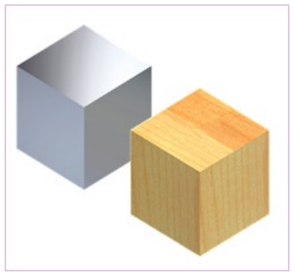


The chamfer tool allows you to remove an angular section along any selected corner or edge. Again, multiple edges/corners can be chamfered at any one time and the size can be easily edited

Inventor Studio

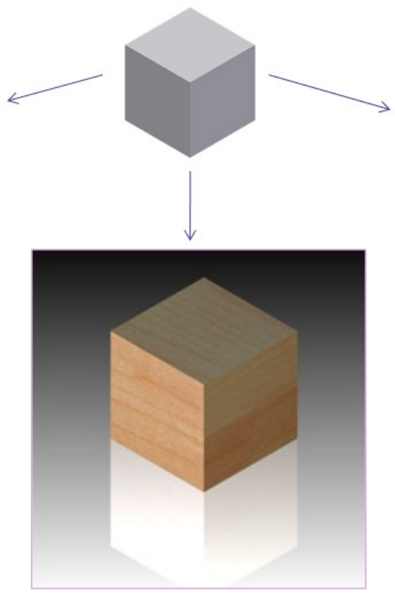
Within Inventor, you will find 'Inventor Studios' in the 'Environments' tab.
This part of the software, allows you to create a more realistic image of your work through the use of materials, scenes and light sources.

Materials



Your model can be quickly and easily enhanced by Selecting appropriate materials for different parts of your inventor model. Each material choice can be edited to make it more unique and even more realistic.

Lights



Adding lighting allows your rendered image to take on shadows and reflections. You can choose from preset styles or make your own to produce a high quality effect.

Scene

Adding a scene allows you to incorporate a background colour or image to enhance your presentation. Scenes are only visible during editing and the rendering process.

THEORY animation & simulation

The development of technology and computer software has changed the way in which graphics can be produced. Recent advances have enabled designers to create complex and realistic graphic images quickly and easily. Two examples of this are animation and simulation.

Computer Animation

Animation allows a designer to create on-screen movement of graphic images along a set path (to form a video clip). It is quick and easy to produce a realistic impression and is used to increase visual impact of graphics on the viewer. A product with moving parts can be animated to demonstrate how it fits together and operates.

Computer Simulation

Computer simulation is used to imitate or predict behaviour in a real life or hypothetical situation. This provides a virtually realistic experience for the user within a safe simulated environment. By changing the variables within the software, predictions can be made about the behaviour of a System. Computer simulation is beneficial for training purposes, eg, 3D simulators are commonly used to train pilots how
To manoeuvre their planes in dangerous conditions.

http://www.youtube.com/watch?v=P_6xsA0gZE4 - Medical Uses

http://www.youtube.com/watch?v=BUHKMIr5E1E - Geographical Uses

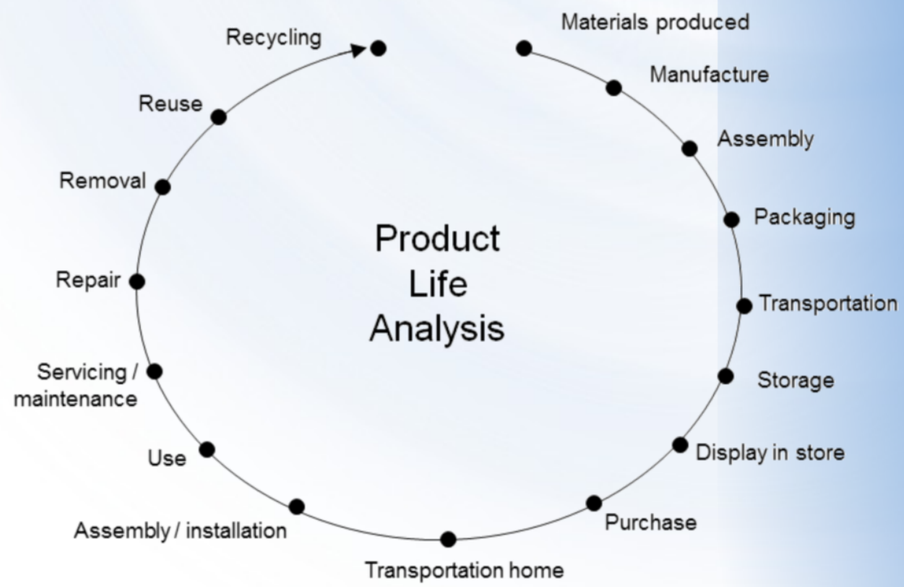
http://www.youtube.com/watch?v=orUsJV31H3o - Industrial Uses

http://www.youtube.com/watch?v=i92aQVW0mC0 - Training Uses

THEORY environmental considerations

Three key considerations of the environment should be kept in mind: Pollution, Aesthetics, Sociology
Environment and pollution
Pollution is created by the manufacturer – during the making of the product, its use and/or its disposal at the end of its life. Designers have a large responsibility to the environment and must try to keep pollution to a minimum in their designs.

During each stage of a product's life, its human, environmental and economic needs should be considered and investigated. This is often referred to as the cradle to the grave approach which examines the environmental impact from the production of the raw materials all the way through to the disposal of the products at the end of its life.



Some products are advertised as being 'environmentally friendly'.
For this to be true these conditions must apply:

- The use of finite resources must be avoided
- Most materials should be recyclable (>90%)
- The processes used in manufacture should not pollute the environment
- The waste products produced during manufacture should not cause pollution
- The operation and maintenance of the product should not pollute the environment
- The disposal of the product at the end of its useful life should not pollute the environment

At all stages in the development, manufacture, use, and disposal of a product, environmental issues have to be considered:

Can the product be made from renewable materials?
Are the proposed materials recyclable?
Is the product and manufacturing processes energy-efficient?
Can natural power sources be used?
How will the product be packaged?
Can the product be easily repaired?
Are the materials biodegradable?
How will it be manufactured?
Is it made using local skills and materials?
Are the power sources used rechargeable?
How will the product be transported to the market place?
Have waste and by-products been kept to a minimum?

Have all the types of pollution (noise, smell, chemical and air) been kept to a minimum?
It is clear then that these limits will have major implications for the design and cost of the product?

THEORY environmental considerations

Environment and aesthetics

The designer has the ability to create products in any style he/she chooses. It is possible to design products that merge well with their environment or alternatively those that contrast with their surroundings. Products which harmonise well with their surroundings are pleasing to the eye but might be considered boring by some. A bus shelter May be designed in mock Georgian style to blend in with the surrounding architecture. However, this "safe" approach can create an environment which could be described by some as monotonous.

Alternatively the designer might choose a modern design to contrast with the existing buildings. She/ he might use modern materials such as steel and plastic and incorporate features such as integrated lighting so that the shelter stands out day and night. This concept can be seen in the glass pyramid metro entrance at the Louvre in Paris. This bold approach to design can be shocking and often attracts controversy, particularly in relation to architecture. Such an approach can be interesting and exciting to some people and yet offensive to others. The designer then has to come to a decision regarding the impact the design will have and then decide if it is acceptable.

Environment and sociology

Studies show that if we simply alter the lighting from day to day in a factory, it will improve the output of the workforce. It is not the quality of the light but rather that there has been a change that causes this. A changing environment is more stimulating and therefore more motivating than a static one. Products such as computers or even hair dryers all have a bearing on our general state of mind, particularly in a society where people lead very busy lives. The feelings of frustration we feel when a product fails to function are commonplace. Well designed products should be pleasing to use, reliable and do the job they were designed to do. In catering for the needs of the individual the designer must consider age, culture and physical ability/disability. They all have an effect on a user's reaction to the product.

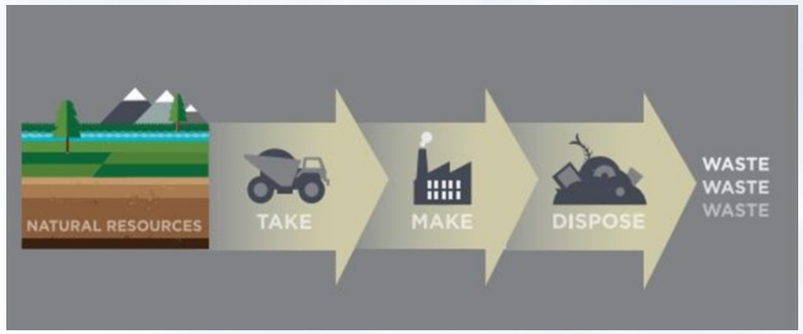
A designer must try to make new technology as user friendly as possible; for example 'high tech' products can be threatening to older people because they do not understand how they work, which makes them feel insecure. Care must be taken that a design does not cause offence to a particular race or culture. Many products do not take into account the problems of the elderly, disabled or very young. In particular handles and switches are often too small or difficult to operate. With some thought many of these problems could have been avoided. Good design will take account of as many users as possible.

People's lifestyles have changed over the years and these sociological factors have an effect on Product Design. Today leisure time is seen to be very important. Factors that would have been important even thirty years ago are seen as unimportant today. Tasks such as cooking and cleaning have to be quicker and easier to do, hence the increase in the use of things like precooked foods, microwave ovens and dishwashers. People therefore now have more leisure time and this has increased demand for items like stereo systems, video and more recently home cinema. Linked to this has been the increase in the use of sports / leisure equipment such as exercise bikes, jogging machines and sun beds.

THEORY circular economy

The circular economy is a new way of thinking about how we manufacture, use and then discard the products we use.

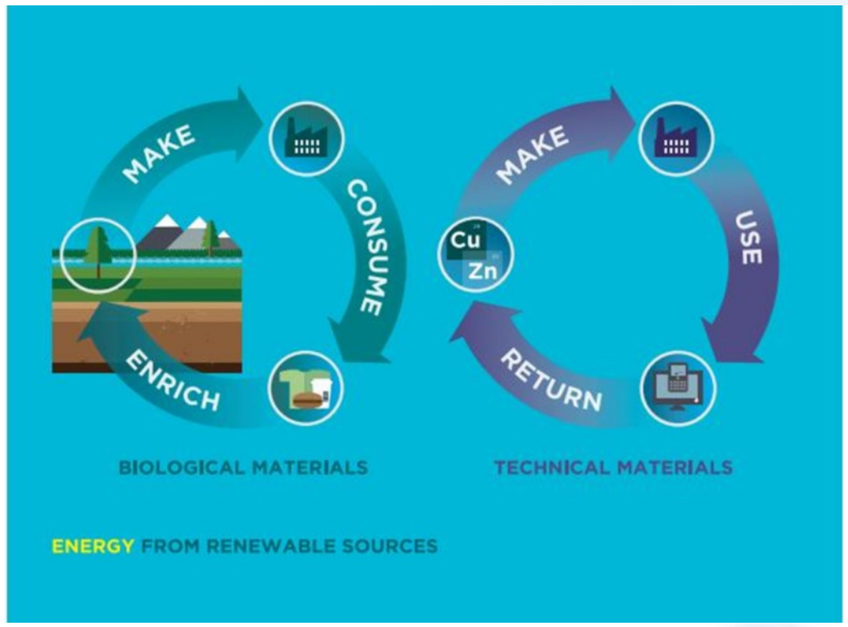
This is what usually happens with products - they have a linear life cycle. We take away natural resources to make them. We make them using energy and then we dispose of them - usually in Landfill. This is damaging our environment



Sometimes we reduce the amount of goods we use, or reuse it (eg charity shops) or we recycle them. But sometimes this is not enough. Often we we recycle products the new product that can be made from the materials is not of a very good quality or it has been 'downcycled' into a product such as bin bags.

A new way of thinking is the Circular Economy. - The circular economy promotes products that have A much longer life cycle, that can be reproduced into a better (upcycled) or equivalent product. The Key is that there will be less waste needing to be put to landfill

http://www.youtube.com/watch?v=zCRKvDyyHml



THEORY circular economy

Here are a selection of short videos to get you thinking about approaching design differently. Some companies have come up with creative ways to help the environment. - And do be more aware of the circular economy

The Clever Little Shopper

http://www.youtube.com/watch?v=ZH2Z16t13Yw

Replenish

Cleaning products

http://vimeo.com/48159392

PHONEBLOKS
A PHONE WORTH KEEPING

SmartPhone

http://www.youtube.com/watch?v=oDAw7vW7H0c