

What are the Core Technical Principles?

1	New & Emerging Technologies	These include information technology, educational technology, nanotechnology, biotechnology, robotics, artificial intelligence.
2	Energy generation and Storage	Fossil fuels, nuclear power, renewable energy (hydroelectricity, solar power, wind power, wave power etc), batteries.
3	Developments in New Materials	Smart materials (eg Shape Memory Alloys), nanomaterials (eg graphene), metal foams, composites (eg GRP & CFRP).
4	Systems Approach to Designing	Inputs (eg sensors, switches), processes (eg timers, micro-controllers, counters) and outputs (eg buzzers, led's, lcd displays etc).
5	Mechanical Devices	Changing type and direction of motion using levers, linkages, gear trains, pulleys & belts, cams etc
6	Characteristics and Working Properties of Materials	Paper & card, wood (hard, soft, manufactured board) metals & alloys (ferrous & non-ferrous), polymers/plastics (thermoplastics & thermosets), composites (concrete, fibre-glass), textiles etc.



Electric cars are becoming more common as batteries have become smaller and lighter yet more powerful. Advances in robotics and artificial intelligence (AI) mean that driverless vehicles are no longer a distant dream.

More and more energy is being generated from renewables sources like the wind, the sun, rivers and the oceans.



Modern composites such as carbon fibre are extremely strong and very lightweight. They are increasingly being used to make products traditionally made from steel and aluminium.



Nanomaterials are so thin (just an atom or so thick) that they are considered two dimensional. They exhibit a range of unusual properties due to their huge surface area.

There is now more computer power in an average smartphone than there was in the first mission to the moon.



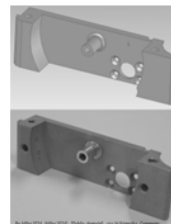
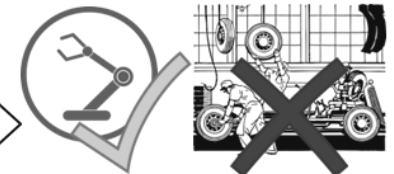
1 New & Emerging Technologies and their effects on;

Industry	Design & organisation of workplace, tools & equipment, automation, robotics
Enterprise	Crowd funding, virtual marketing & retailing, co-operatives, fair trade.
Sustainability	Finite & non-finite resources, waste disposal etc.
People	Changing job roles and the way we work, technology push & market pull.
Culture	Respect for people of other faiths & beliefs, changes in fashion trends etc.
Society	Designing products which have no negative impact on others, design for the elderly & disabled.
Environment	Continuous improvement, efficient working, pollution, global warming.
Production Techniques & Systems	Automation (CAD/CAM, robotics, AI), flexible & lean manufacturing systems, just in time (JIT)
How the critical evaluation of new and emerging technologies informs design decisions	Planned obsolescence, design for maintenance, ethics, environmental concerns.



Today, particularly in the developed world, more people are likely to work in office blocks than in factories

Robots have largely replaced humans in the manufacturing industry. With the advance of artificial intelligence (AI) robots can almost think like humans too!



Computer aided design and computer aided manufacturing (CAD/CAM) has been a major factor in the automation of the workplace. CAD/CAM allows products to be designed and modelled in 3D before final manufacture.



Today's designers are designing for increasingly diverse societies made up of different nationalities, cultures, beliefs, ages and abilities.

Greater awareness of environmental issues such as global warming has led to greater control over pollution and a continued drive toward more efficient ways of working. We have begun to appreciate many of the earth's resources are finite and that there is a need to reduce, re-use and recycle.



2 Energy Generation & Storage

Fossil Fuels	How is electricity generated from coal, oil, gas? Fossil fuels burnt to heat water, steam drives turbine which produces electricity, arguments for & against
Nuclear Power	How is electricity generated from nuclear power, nuclear reactors generate heat to heat water, steam drives turbines which produce electricity, arguments for & against
Hydroelectricity	How is hydroelectricity generated? Harnessing power of fast flowing rivers or potential energy stored in mountain lakes, arguments for & against
Solar Power	How is electricity generated from solar energy? Direct solar power using photovoltaic (PV) panels to convert sunlight into electricity or indirect using concentrated solar power to heat water, arguments for & against
Wind Energy	How is electricity generated from wind energy? Wind driven turbines, wind farms, arguments for & against
Wave Energy	How is electricity generated from wave energy? Waves movement forces air through turbines which then produce electricity, arguments for & against
Tide Energy	How is electricity generated from tides? Ebb and flow of tide harnessed in similar way to hydro-electricity, seawater passes through turbines which then produce electricity, arguments for & against
Energy Storage	Kinetic pumped water systems, batteries (eg alkaline, zinc carbon, lithium, rechargeable), choosing appropriate energy sources

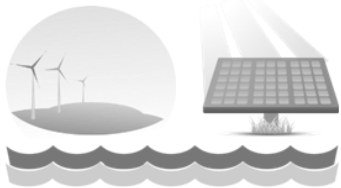


Fossil fuels still provide us with the bulk of our energy but there is increasing awareness that reserves of coal, oil and gas are running out.

Nuclear power can potentially provide almost limitless cheap energy but reactors are expensive to build and disposal of nuclear waste presents problems.

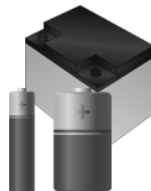


Hydroelectricity is a 'renewable' energy source. It is generated from the power of water falling from a height like from behind a dam to drive a turbine.



More and more of our energy is being generated from other 'renewables' such as the wind, the sun and the oceans. The technology behind harnessing energy from renewables is continuously improving.

One of the difficulties associated with renewables is how to store surplus energy for use later. Recent advances in 'battery technology' have largely addressed this issue and batteries continue to get better, last longer and for less money.



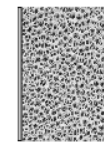
3 Developments in Modern Materials

Smart Materials	Materials that can have one or more properties changed by external stimuli such as stress/pressure, temperature, light. These include ; Shape Memory Alloys (SMA's), thermochromic & photochromic pigments , LCD's etc
Nanomaterials	Materials with at least one dimension less than 100 nanometres, where 1 nanometre is one millionth of a millimetre. Nanomaterials are just one atom or molecule thick and usually found as surface coatings applied to other materials. These include graphene, carbon nanotubes etc
Metal Foams	Metals with gas introduced in the molten stage then allowed to cool. These are strong, stiff yet extremely lightweight. Aluminium, copper and titanium are 'foamed' in this way. Titanium foam is used to replace bone.
Modern Composites	Glass Reinforced Plastic (GRP) and Carbon Fibre Reinforced Plastic (CFRP) use woven material (typically glass or carbon strands) as a reinforcement with polyester or epoxy resin matrix
Technical Textiles	Breathable waterproof fabrics, flame retardant/fire & heat resistant, conductive, synthetic & semi-synthetic (blended)
Properties & Characteristics	Classify a range of materials by type and properties. Extract information about materials from technical specification, select suitable materials. Properties; tensile & compressive strength, stiffness, hardness, ductility, conductive, semi-conductive, shape memory, heat resistant etc

Modern composites are used extensively in today's aircraft like this Airbus A380. They are even used in high stress areas and for structural components traditionally made from aluminium alloys.



Liquid crystals are 'smart materials' which change colour or opacity when an electric current is applied. Liquid Crystal Displays (LCD's) are now used in most electronic devices from watches to televisions.

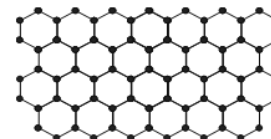


Technical textiles include breathable waterproof fabrics such as Goretex, flame resistant fabrics like Nomex as well as various geotextiles, agrotextiles etc




Metal foams are extremely lightweight whilst retaining many of the properties of the base metal.


Graphene is a nanomaterial. It is a hexagonal lattice of graphite (carbon) atoms just one atom thick. Like all nanomaterials it has unusual properties. Graphene is transparent, flexible, highly conductive and up to 200 times stronger than the strongest steel. It has found numerous applications, particularly in electronics (transistors, supercapacitors LED,s, touch screens etc).

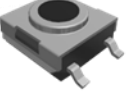


4 Systems Approach to Designing

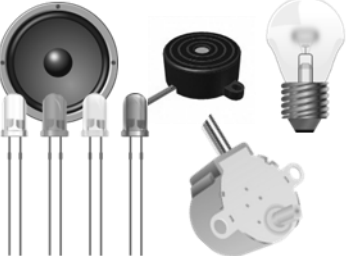
Inputs	Light sensors eg light dependent resistors (LDR's), photo diodes, temperature sensitive resistors (thermistors), infra red beam, push switch, tilt switch, reed switch, micro-switch etc. Name a range of input components, understand how they interact & operate. Select by extracting information from technical specification
Processes	Microcontrollers, programmable integrated circuits (PIC's), timers, amplifiers, counters and other 'decision making' components which process signals from inputs and send new signals to outputs. These provide functionality to products or parts of products. Name a range of process components, understand how they interact & operate. Select by extracting information from technical specification
Outputs	Light bulbs, LED's, buzzers, bells, speakers, LCD displays, motors etc. Outputs provide a visual, audible or other response to given inputs. Name a range of output components, understand how they interact & operate. Select components by extracting information from technical specification

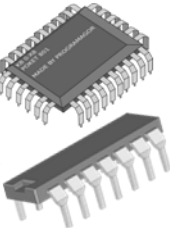
 A light dependent resistor (LDR) is an analogue sensor whose resistance changes in response to a change in the level of light.

 A thermistor is an analogue sensor whose resistance changes with temperature.

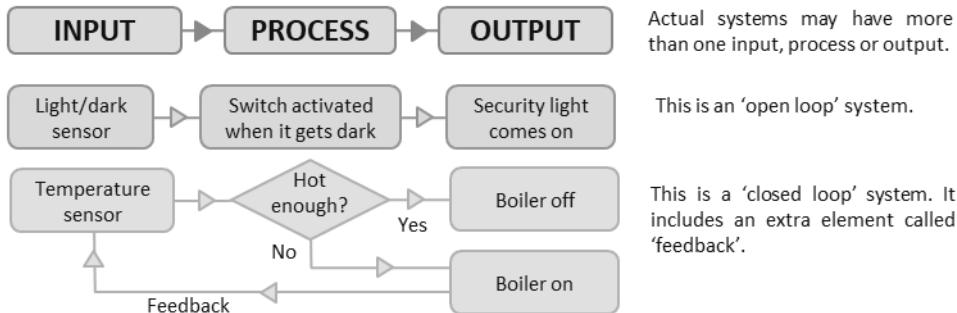
 A tactile switch is a digital sensor which detects a light touch

Analogue components recognise an infinite number of values within a particular range whereas digital components recognise only two values, 'high' and 'low' (or 'on' and 'off').

 Output devices include lamps, speakers, buzzers, light emitting diodes (LED's) and motors.

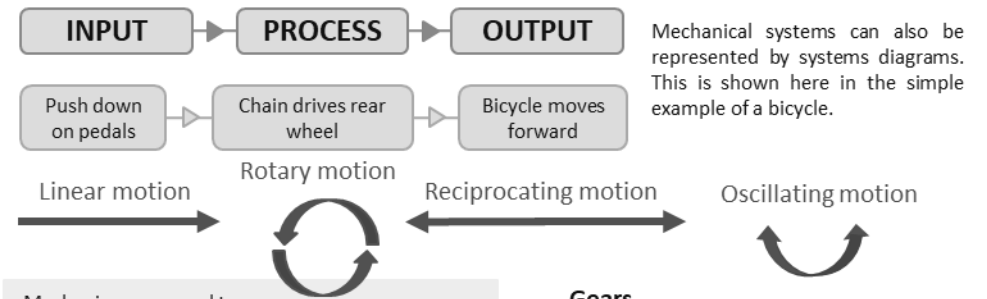
 Microcontrollers, logic gates, integrated circuits (IC's) and programmable integrated circuits (PIC's) give functionality to a circuit or product.

System diagrams are types of flow charts used by designers to plan out the stages of a system.

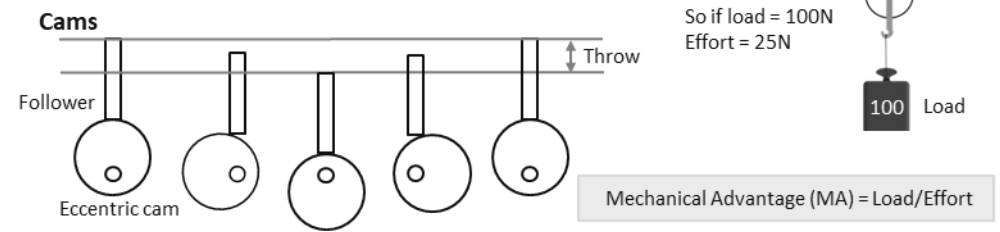
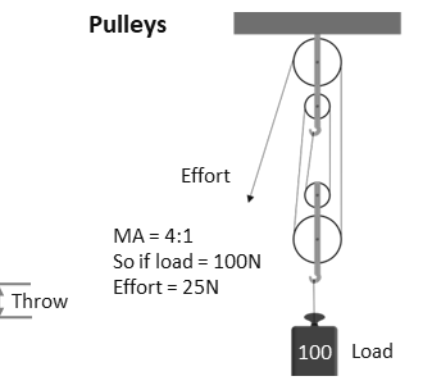
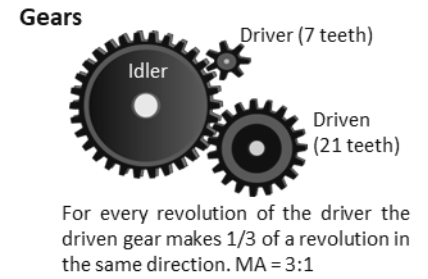
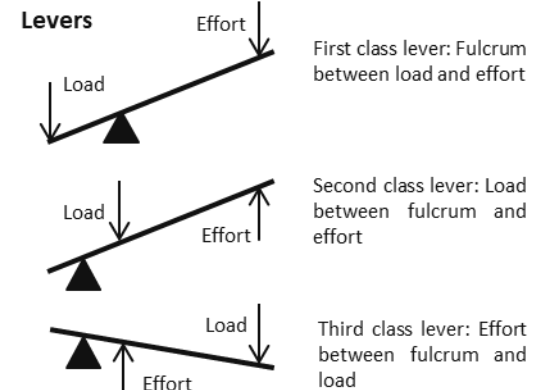


5 Mechanical Devices

Types of Movement	Know the function/operation of mechanisms/mechanical devices to produce linear, rotary, reciprocating & oscillating motion/movement. Visualise and represent 2D & 3D mechanisms and mechanical movement
Changing size & direction of force	Levers (1 st , 2 nd , 3 rd order), linkages (cranks, push/pull), rotary systems (gears, pulleys & belts, cams & followers). Know the function/operation of mechanical devices to change magnitude & direction of forces. Visualise and represent 2D & 3D mechanisms and mechanical movement



- Mechanisms are used to;
- Change from one type of motion to another
 - Change the direction of motion
 - Change a force into a bigger or smaller force



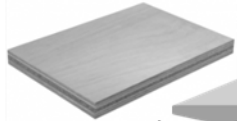
6 Materials & Properties

Paper & Card	Papers & it's properties/characteristics: Bleedproof, layout, cartridge, grid, layout, tracing, inkjet paper etc. Card & it's properties/characteristics: Corrugated cardboard, greyboard, duplex board, foamboard, solid white board, foil lined card, inkjet card. Graded by weight in grammes per square metre (gsm), surface texture.
Natural & Manufactured Timber	Hardwoods & their properties/characteristics: eg) Ash, beech, mahogany, oak, balsa. Softwoods & their properties/characteristics: eg) Larch, pine, spruce. Manufactured boards & their properties/characteristics: eg) Plywood, medium density fibreboard (MDF), chipboard, blockboard, oriented splinter board (OSB) etc.
Metals & Alloys	Ferrous metals & their properties/characteristics: eg) Cast iron, low carbon steel, high carbon steel. Non-ferrous metals & their properties/characteristics: eg) Aluminium, copper, tin, zinc. Alloys & their properties/characteristics: eg) Brass, bronze, stainless steel, high speed steel, solder.
Polymers (Plastics)	Thermoforming plastics (thermoplastics) & their properties/characteristics: eg) Acrylic (PMMA), polystyrene (PS), high impact polystyrene (HIPS), high density polythene (HDPE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET). Thermosetting plastics (thermosets) & their properties/characteristics: eg) Epoxy resin, polyester resin, melamine formaldehyde, urea formaldehyde.
Textiles	Natural fibres & their properties/characteristics: eg) cotton, wool, silk. Synthetic fibres & their properties/characteristics: eg) Polyester, polyamide (nylon), elastane (lycra). Blended/mixed fibres & their properties/characteristics: eg) cotton and polyester (polycotton). Fabrics & their properties/characteristics: eg) Woven (plain weave), non-woven (felt, bonded fabrics), knitted fabrics
Properties	Physical properties: eg) Density, absorbency, fusibility, conductivity. Durability. Working properties: eg) Strength (tensile, compressive), hardness, stiffness, ductility, malleability, toughness, machinability.



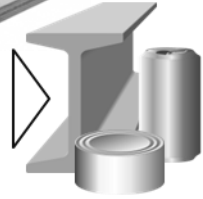
Hardwoods are generally heavier, harder, stronger & more durable than softwoods with the notable exception of balsa, which is softer and lighter than most softwoods.

Manufactured board has a more uniform, homogenous nature than natural wood and can be produced in larger pieces.



Cotton is often blended with polyester to make it harder wearing and quicker to dry.

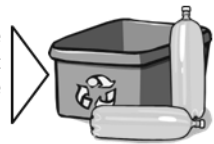
Most ferrous metals are magnetic while most non-ferrous metals are not. This is useful when it comes to recycling.



Thermoplastics can be heated and formed over and over again whereas thermosets can not.



Most plastics are still made from fossil fuels and are not biodegradable. They therefore need to be re-used or recycled.



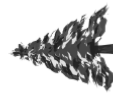
Softwoods.

Coniferous trees with needle like leaves and cones.



Hardwoods

Broad leaved trees that are usually slower growing



Seasoning Before we can use it we have to season timber to reduce the water content. If we don't it may warp, twist or bow.

HARDWOODS

Oak	Strong, durable attractive grain Expensive	Garden furniture, gateposts
Mahogany	A stable timber. Polishes well. Strong and fairly durable	High quality furniture
Beech	Tough and hard Not suitable outdoors	Work benches, toys
Balsa	Very lightweight and easy to cut Very soft	Model making
Jelutong	Light colour and straight grain	Model making and moulds for casting
Birch	Straight grain, easy to work	Used as a veneer for plywood
Ash	Open to insect attack Strong, tough, flexible Used as a veneer	Tool handles, sport equipment

Properties of timber

Hardness	Timber is generally softer than other resistant materials
Toughness	Timber is generally tough. When hit it will dent but not easily break
Durability	Properly seasoned timber lasts a long time. Some timber has natural oils
Elasticity	Timber is not generally elastic and will splinter when thin
Strength	Timber is stronger when pulled. Some timbers are denser so withstand crushing

Stock forms

PAR—Planned all round

PSE—Planned square edge

Mouldings

Dowel

Sheets:

2440x1200



Sources of timber

Cold climate: **Alpine**, softwoods

Temperate climate: **European**, soft & temperate hardwood

Tropical climate: **Tropical** hardwood



SOFTWOODS

Larch	Tough, durable and resists water	Cladding, yachts
Cedar	Very durable and easy to work	Fences, sheds
Pine	Contains natural oils Lightweight and easy to work but splinters	House construction, indoor furniture

Manufactured boards

Plywood	Veneers of timber glued together with the grain running at 90 degrees to the last Very structurally strong.	Laminate floors, furniture panels
MDF	Wood fibres compressed with glue to give large, smooth, flat sheets	Flat pack, curved furniture, building construction
Chipboard	Wood chippings compressed with glue into sheets Uses waste material	Kitchen and bedroom furniture. Shelving

Questions

- State 2 stock forms of timber
- Give 2 reasons why oak is suitable for outdoor use
- I want to make a rounders bat, what timber could I use? Why?
- Discuss the advantages and disadvantages of making a log store from pine

Find the meaning of: Veneer, grain, evergreen, warp, deciduous. Also revise the meanings of: Hardness, toughness, durability, elasticity, tensile and compressive strength.

Selection of materials or components		Forces and Stresses		Sources and Origins	
Students should be able to select materials and components considering following factors:		Materials and objects can be manipulated to resist and work with forces and stresses		Students should know the sources and main processes of converting at least one materials into its workable form:	
A Aesthetics	C Cost	E Environmental	S Society		
C Cultural	A Availability	F Functionality	E Ethical		
		Materials can be enhanced to resist and work with forces and stresses to improve functionality through reinforcing, stiffening or being made more flexible.			

Part 2: Specialist Technical Principles

Ecological and social footprint		Using and working with materials		Stock forms, types and sizes							
Ecological issues in the design and manufacture of products		Properties of materials: must know and understand how different properties of materials and components are used in commercial products and how these affect use and performance.		Commercially available types and sizes of materials and components							
		The modification of properties for specific purposes including additives, seasoning, annealing, stabilisers, flame retardants, photosensitive PCB and anodizing.		<table border="1"> <tr> <td>Papers and Boards: Sheet, roll and ply</td> <td>Timber: Planks, boards, and standard mouldings.</td> </tr> <tr> <td>Textiles: Yarns and Fabrics</td> <td>Polymers: sheet, rod, powder, granules, foam and films</td> </tr> <tr> <td>Electrical and mechanical components: sold by quantity, volt and current rating.</td> <td>Metal: sheet, rod, bar and tube</td> </tr> </table>		Papers and Boards: Sheet, roll and ply	Timber: Planks, boards, and standard mouldings.	Textiles: Yarns and Fabrics	Polymers: sheet, rod, powder, granules, foam and films	Electrical and mechanical components: sold by quantity, volt and current rating.	Metal: sheet, rod, bar and tube
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The Six Rs <ul style="list-style-type: none"> Reduce Reuse Recycle Refuse Repair Rethink 		How to shape and form using cutting, abrasion and addition: 		Surface treatments and finishes Preparation and application of treatments and finishes to enhance functional and aesthetic properties							
Social issues in the design and manufacture of products		Tools, equipment and processes: Wastage, Addition, Deforming and Reforming		Papers and Boards- Printing, embossing, UV Varnishing							
Scales of Production The reasons and methods used for manufacturing products in different volumes:		Specialist techniques and processes Use of production aids: measuring, reference points, templates, jigs and patterns.		Timber- painting, varnishing and tantalising							
Prototype	Batch	How materials are cut, shaped and formed to a tolerance-manufacturing to minimum and maximum measurements.		Metal- dip coating, powder coating, and galvanising							
		Commercial processes		Polymers- polishing, printing and vinyl decals							
Mass	Continuous	The application and use of Quality Control to include measurable an quantitative systems used during manufacture.		Textiles- printing, dyes and stain protection							
				Electronic and mechanical systems- PCB lacquering, and lubrication							

Investigation, primary and secondary data		The work of others		Design Strategies	
Use primary and secondary data to understand client and/or user needs: market research, interviews and human factors; focus groups, product analysis and evaluation; anthropometric data and percentiles.		Investigate the work of a minimum of two designers and two companies including: Marcel Breuer, Coco Chanel, Foster, Philippe Starck, Issigonis, Macintosh, Apple, Gap, Alessi		Generate imaginative and creative design ideas using a range of different design strategies, including:	
How to write a design brief and produce a design and manufacturing specification: should consider own and other's needs, wants and interests				<ul style="list-style-type: none"> Collaboration User centred design A systems approach Iterative Design Avoiding Design Fixation 	
Carry out investigations in order to identify problems and needs- why we consider alterations and modifications to a design brief.				Explore and develop their own ideas: Sketching, Modelling, Testing, Evaluation	
Environmental, social and economic challenge:		<h2 style="font-size: 2em;">Part 3: Designing and Making Principles</h2>		Communication of design ideas	
Deforestation: Between 1990 and 2015, the world lost 129 million ha of forest. 				Develop, communicate, record and justify ideas including: Freehand sketching, 2D and 3D drawings, System and schematic diagrams, Annotated drawings, Exploded diagrams, Working drawings, Audio and visual recordings, Mathematical modelling, Computer based tools, Modelling	
Increase in carbon dioxide levels: The need for fair trade: 		Prototype development		Tolerances	
Design and develop prototypes in response to client wants and needs 		Selection of materials and components Appropriate materials and components to make a prototype considering: Functional Need, Cost, Availability 		Work accurately using tolerances; How a range of materials are cut, shaped and formed to designated tolerances; why tolerances are applied during making activities. 	
Material Management		Specialist tools and equipment		Specialist techniques and processes	
Cut materials efficiently and minimise waste		How to select and use specialist tools and equipment including hand tools, machinery, digital design and manufacture		How to select and use specialist techniques and processes appropriate for the material and/or task and use them to the required level of accuracy in order to complete quality outcomes.	
				Surface treatments and finishes 	
Use appropriate marking out methods, data points and coordinates:					

GCSE Design & Technology

Key Terms/ Words

A-Z

Acrylic

A type of plastic commonly used in DT projects. It belongs to the thermoplastic family and its full name is Polymethyl methacrylate.

Aesthetics

An appreciation of whether an object is pleasing or not. This is usually about how good the object looks but it can also be related to its smell, texture, taste of an object etc

Annotated sketches

These are design drawings that include written explanations or notes to help the designer to communicate his/ her ideas to the client. These notes can include a range of information such as, colour, size, shape or the type material (s) from which the product will be made.

Appearance

How it looks, the finishes that you apply, colour, size, weight etc.

Anthropometrics

This relates to detailed dimensions or measurements of the human body. Designers must think carefully about this when designing and making a product for example, what the most suitable height for a classroom chair is for a primary school child in year 3 or what the best height is for a dining room table.

Blow Moulding

Blow moulding is a manufacturing process by which hollow plastic parts are formed

B.S.I. (The British Standards Institute)

The British Standards Institute is an organisation that produces guidelines or minimum standards which many materials and products must reach. All standards are given a number that helps you to identify them, rather like a registration number on a car. For example, BS4163 relates to safety guidelines for design and technology departments in schools.

C.A.D 'Computer Aided Design'

A programme on a computer used for design work. The CAD programme we use is called '2D Design'.

C.A.M 'Computer Aided Manufacture'

A method of making a product using a machine controlled by a computer.

CNC 'Computer Numerically Controlled'

The machines used in CAM are CNC. Data is sent to the machine in the form of numbers

Consumer group

These are the different types of people who buy the product such as parents buying toys for children.

Consumer

The intended user or buyer of a product. We are all consumers. However, we have different factors which influence our choice. These include cost and the different requirements/ needs we have for the product.

Consumer Association

This is an independent association that produces reports on products and services.. They produce a magazine every month e.g. *Which?* Magazine. They report on the best and worst products on the market.

Components

The individual parts that make up a product.

Consumer or End User

This is the person(s) who will ultimately decide if the product is what they needed, without their needs the designer (you and me) would not have to make the product; therefore they are very important people

Die Cutting

Metal, paper, or other material shaping process in which a metal die with sharp edges is pressed into the material to cut it. The metal die is the cutter which will be specifically designed for the net it is cutting out.

DISASSEMBLY

This is a form of research where you take a product apart to find out how it is made and how it works

The design process in 12 stages

- 1) **Idea** - all new products start with an idea.
- 2) **Design Brief** – what it is, who needs it, why they need it and how they will use it.
- 3) **Research** = e.g. talk to people who might use your product or study existing products on sale in the shops
- 4) **Design Specification** - A detailed list of things that the product must achieve if it is to be successful. An "it must" list.
- 5) **Proposals** - A collection of ideas and designs for your product

- 6) **Development** - Includes modelling, building prototypes and making modifications
- 7) **Evaluation** To check whether the product meets the design specification
- 8) **Manufacturer's Specification**
Precise construction details, quality control procedures, costings
- 9) **Plan the Production Process** Plan the order work will happen in, make a timeline for production.
- 10) **Manufacture** – Make it
- 11) **Final Testing and Evaluation** - Check the product works and meets the specifications
- 12) **Marketing** - Since it works, you can start selling it

Design brief

A concise written statement, which sets out the task, the problem to be solved. It should explain clearly what you are going to design.

Design specification

A detailed list of things, which the product must achieve if it is to be successful. Example
1) My product must have no sharp edges, Cost, appearance, manufacture, maintenance, size, materials, tools, equipment, finish, user, time plan, tolerances, ergonomics, environment and safety.

Design

The process of designing and making something is called the design process

Designers

Designers communicate their ideas through drawings. The drawings include annotated sketches to explain details. These drawings are used in meetings with clients to explain concepts and ideas.

Electrical resistance

The ability of a material to prevent the flow of electricity. `Wood resists electricity much more than metal. Resistance is measured in 'Ohms'. This is the Ohms symbol Ω

Enhancement rendering

This is when you add shading or colour and texture to make a drawing look 3-dimensional

Finishes – for protection and appearance/ looks.

Types of finishes are painting, plastic coating, polishing and lacquering. In food it may include icing, cream, fruit or glazing. In textiles it may include over-locking, hemming, water-proofing or fire-proofing.

Form

An object which is three-dimensional as opposed to a shape which is two-dimensional. For example, a cube is a form; a square is a shape

Function

The purpose and use of a product

Health & Safety

Safety is very important for the person making the product and the person using the product. How you use tools etc. the clothes you wear while working, the working environment and risk assessments are all to be considered.

ICT = Information Communication Technology

Using the computer, the internet, 2-d design, CD-ROM's, etc.

Isometric

A method of producing a 3D drawing using 30 degree angles.

Materials

These can be classified into plastics, metals, wood, paper, boards, composites and smart materials, ceramics in resistant materials. In food you can classify materials into proteins, fats, carbohydrates, vitamins and minerals. In textiles materials/ fabrics can be classified into either, woven, knitted or bonded fabrics.

Physical property or properties of materials:

The properties of materials are the way they look, feel and behave.

Market research

We do market research to find out about a product (s) that is similar to the one we intend to design and make. This helps you to get ideas about what the end user likes, dislikes, needs and or prefers about a particular product.

Marketing

This is the process of promoting/ trying to sell goods through advertising and packaging .

Modelling

We use modelling as a way of trying to decide, or make up our minds about our different ideas, as they progress. Making a range of drawings to solve a problem is a form of two-dimensional modelling. Making models or prototypes out of card or foam is a form of three-dimensional modelling.

Manufacturer

A person or company that makes products to sell.

MDF 'Medium Density Fibreboard'

A material made from wood pulp mixed with resin. This is pressed into large sheets.

Nets

A flat development which when cut out and scored forms a net. Nets are used for the packaging of most products. Nets are manufactured using a printer and a die cutter. They can be manufactured by hand using a solid line for cutting and a dashed line for scoring.

Pressure Group

A group that applies political pressure to companies and governments when they disagree with them.

Perspective

This is a way of showing distance in a drawing or painting. When drawing perspective we are creating an illusion of distance. When you look up a street and see the path and lamp posts getting smaller as they get further away you are seeing distance. To draw them you use perspective.

Production schedule

Time plan and order of how you will produce your product. This can be produced as a flow chart and you must show in sequence the order of each task and how long it will take. This is especially important with mass production

Product Analysis

Analysing different aspects of a product, e.g. aesthetics, function, and environmental impact, to find out it's good and bad points.

1. Function- what it is used for, disassembling or taking apart to see how it works
2. Form- the shape and look of the product
3. Ergonomics- is about how easy the product is to use-safe, comfortable, fit well
4. Cost-is it value for money, how the cost compares to similar existing products
5. Competition-how a product performs compared with similar existing products
6. Environment-if the design and manufacture are environmentally friendly
7. Materials- what materials have been used

Prototype

This is a product that has been modelled from one of your design ideas. You make prototypes as part of the development stage of your project. This helps you to test whether your product will be successful or whether it needs further modification or changes to improve it.

Scales of Production

One-off

Also known as job production. This involves designing and making single products usually for a special order (commission).

Batch production

Also known as small scale or low volume production . This is where small amounts/ quantities of the same product are made in groups.

Mass production

Also known as repetitive flow or volume production . This involves producing large amounts of the same/ identical products.

Polystyrene

A type of thermoplastic. We use it in the vacuum forming machine. 'Expanded polystyrene' is another version of this plastic and is used in packaging materials.

Packaging

Packaging protects, preserves(keeps fresh) and promotes (advertises) the product it contains. These are called the 3 P's by people in the packaging industry.

- Protection – when a product is being transported from the factory to the shops

- Preservation – especially for food as all foods begin to go off when they are exposed to oxygen/ air

- Promotion – designers and manufacturers use striking colours, catchy slogans, prize offers and exciting images or pictures to attract you to buy the product

Quality Control (QC)

The checks a manufacturer does to make sure that his products are made to a good and safe standard.

Quality assurance (QA)

The guarantee, given by manufacturers, that products meet standards of quality

Recycle or Recycling

Materials such as glass, plastic, metal or card that can be re-used again to make the same or different products

Resources

The materials, time, equipment and skills needed for making a product

Renewable

Materials that that can be replaced naturally or the use of sources like sunlight or wind power.

Research

This is finding out about, or gathering information to help you design and make your project.

Market Pull Vs Technology Push

Designers identify the opportunity to develop new products based on technology push or market pull.

Technology push

Technology push is when products are re-designed because of changes in materials or manufacturing methods. This might mean that new materials have become available, with improved properties; or that improvements in manufacturing processes mean a manufacturer can make the product cheaper or more effectively, which reduces manufacturing costs.

Market pull

Market pull is when product ideas are produced in response to market forces. Examples of market influences include;

- A demand from consumers for new or improved products.
- A competing product is launched by another manufacturer.
- A manufacturer wants to increase their share of the market.

Consumer choice

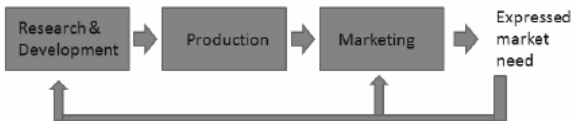
Once a designer has identified an opportunity for a product, the next step is to identify the detail of what consumers want. To do this they need to identify who the different customers are and what they are looking for, e.g. a choice of different styles, performances and process.

For example, car manufacturers design slightly different versions of the same car model to suit individual driver's different tastes. Market research is carried out to identify consumer wants and desires.

Technology push



Market pull



Consumer Rights

The Consumer Protection Act:1987

This protect the public by:

Prohibiting the manufacture and supply of unsafe goods.

Making the manufacturer or seller of a defective product responsible for damage it causes.

Allowing local councils to seize unsafe goods and suspend the sale of suspected unsafe goods.

Prohibiting misleading price indications

The trade Descriptions Act: 1968

This protect s the public by:

Making it an offence for a trader to make false or misleading statements about goods or services.

Making it an offence for a trader to:

Apply a false trade description to any goods.

Sustainability

Ways to be more sustainable:

Use less material: *can you make things smaller, thinner lighter or with less parts?*

Use renewable material/energy: *materials that can be regrown or recycled easily like wool or steel. Solar or wind power, no batteries.*

Be more eco-friendly: *Reuse old materials, recycle waste, and refuse polluting materials.*



REPAIR, REUSE, REFUSE, REDUCE, RETHINK, RECYCLE

Global production and its effects on culture and people

Designers have to be very aware of what is acceptable and what is not acceptable in society.

Issues with making products: Most people would prefer the products they want to be low cost and good quality.

One way of reducing the manufacturing costs is using computer controlled machines or robots to make the products.

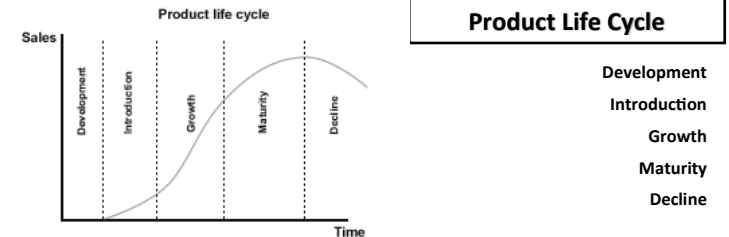
Negative effect – fewer people are employed.

Positive effect – computer controlled systems create jobs for highly skilled workers to develop, program and maintain these systems.

Another way of reducing costs is to make products in countries where labour costs are low. Sometimes the conditions for workers in those countries are far below UK standards.

Negative effect – pollution may also be higher. Environmental cost in transporting good all over the world.

Positive effect – create jobs and opportunities for people.



Legislation

Products have to meet certain standards before they are allowed to be sold to a consumer. In the UK, standards are regulated by the British Standards Institution (BSI). Products which meet these standards can be marked with the KiteMark.

The marks show government officials that the product conforms to a standard, which enables it to be legally placed on the market within their country.



ISO – International Standards Organisation

BSI – British Standards Institution

