OCR Cambridge Nationals in Engineering Design
Knowledge Organiser- Skills Builder

LO1

The Design Cycle

The design cycle is a recognised way to create an Engineered Product. It enables checking at every stage of the process

IDENTIFY

Checking what has been asked of you, what the client has asked for and researching around the problem to better understand the situation

Brief / Research / Process planning

DESIGN

The design phase involves creating a set of design rules based on the IDENTIFY section then creating designs (drawing or cad, 2d or 3d) and planning how it would be made

Specification / Design / Manufacturing Plans

OPTIMISE

The optimise stage is making models to ensure the plans and designs will work in making. Usually this involves prototyping a one off model and testing the making process you have come up with

Prototype / Error Proofing

VALIDATE

The validate phase is your evaluation stage, you have to test the product then comment on how effective it was

Iconic Products

INSPIRATIONAL / ICONIC PRODUCTS

ne products are so popular they set an expectation. E.g. the inimalist design and easy use of e Ipod influenced the design of nany other electronic gadgets.

Design cycle: The **design cycle** is a series of tools used by designers to help them create and evaluate solutions in response to **design** problems. The **design cycle** can have many sections, but in its simplest form it is – Investigate, Plan, **Design**, Create & Evaluate

User Needs: They are the things people **need** from a product or service to do something

Ergonomics and anthropometrics: Anthropometrics is the study of body measurements and statistical data concerning the sizes and shapes of the population. **Ergonomics** is the relationship between a product and its users. ... User group, posture, clearance, reach and strength are all important factors in **anthropometrics** and **ergonomics**

Product Safety: Product safety is the ability of a **product** to be **safe** for intended use, as determined when evaluated against a set of established rules.

Design briefs: A design brief is a document for a design project developed by a person or team in consultation with the client/customer. They outline the deliverables and scope of the project including any products or works, timing and budget

Manufacturing: Manufacturing is the production of products for use or sale, using labor and machines, tools, and chemical or biological processing or formulation.

Durability: Durability is the ability of a physical product to remain functional, without requiring excessive maintenance or repair, when faced with the challenges of normal operation over its design lifetime.

Tolerance: Engineering tolerance is the permissible limit or limits of variation in: a physical dimension; a measured value or physical property of a material, manufactured object, system, or service

Manufacturing considerations: In engineering design, selection of materials and processing of materials into finished components are closely related to one another. The major objective of DFM is to ensure that the product and the **manufacturing** processes are designed together .

standard and pre manufactured components

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Designing products.

Design Brief

Design brief
A short description of a problem and how it will be solved.
It is typically written in a few short paragraphs

Client needs/wants
You must consider the needs, wants, interests of the end users of the product

Situation
The situation normally identifies a need that requires a solution.
E.G Developing numeracy skills can equip young children well for school.

ACCESSFM

Aesthetics – How will the product look. E.g. Colour, texture, shape.
Client- Who is the product for? Gender and age of user.
Cost- How much will it cost to manufacture your product? How much will it cost consumer?
Environment- What impact will the product have on the environment? How can it be designed and be made to be more sustainable?
Safety- How will product be designed to be safe to use?
Size- What will the dimensions be in millimetres of the finished product? This should include Height, Length and Depth.
Function- What will the product do and how will it work?
Materials- What materials/components will be used to make the product

Design Specification

Definition/purpose:
A design specification is a list of measurable criteria that the product must meet. Each point must be concise and be justified.
It provides detail on the specific requirements of the product.
A good specification will include; aesthetics, function, ergonomics, components and materials, sustainable issues and social issues.

Design Specification	Justify my choice
1. I want my design to be simple so that it can be made very well and work well, but very good to look at as this will make my father happy to see a good and creative picture and cycles	Since the card is to make someone happy it should have a good and creative design but it also shouldn't be too complicated as this will mean that it will be difficult to make sure the circuit works well
2. My design must have an electrical circuit that works well.	The electrical circuit cannot have any gaps or parts that don't work as then the led lights will not work
3. My design must have a good battery holder	This is important so that the battery does not fall out and then the lights in the card will not work.
4. My design should be colourful and attractive	This is so that the person recieving this card will be pleased and think that it is a good design.
5. My design should be cost effective and not too expensive to make	It would be a good idea to keep the costs down wherever possible and avoid unnecessary spending so that the card is good value for money.
6. It should be made using the following materials: graphite pencil or copper tape, card, paint or colour pencils, a battery and led lights.	These are the materials I have chosen for my design because it is the simplest and most cost effective way to make a card with an electrical circuit (because graffite is conductive)
7. It should look neat, professional and well presented.	This is important because the card should appear like it has been carefully made and not messy or badly made.
8. My card should have a switch so that the light turns on when I its pressed	I think that this is important because it will make the card more fun and interactive

Manufacturing Specification

Definition/purpose:
A manufacturing Specification should contain information needed to make the design.
It should include the following information:
The scale of production to be used:. Is the product to be batch or mass produced or made as a one off item?
A drawing of the final design. This should include assembly and construction details.
Details of components and materials needed & any standard components. This could be a cutting list
Details of how quality will be ensured, such as quality control and quality assurance. This can be a flow diagram or visual making diary

Key Words
You must know the meanings of the key words below:
Design brief
Design specification
End user
Manufacturing specification
Key points
ACCESSFM is a tool used to help designers write a specification
You must be able to:
Explain what is a design brief
Explain what is a design specification?
Explain what should be included in a manufacturing specification
Write a design brief and design specification for a product
Modify a design brief as a result of user feedback
Produce a manufacturing specification for a product

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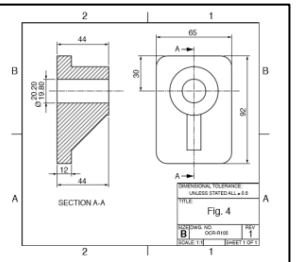
Communicating Design Ideas

Engineering drawings, are technical drawings, that show how to make a product. An engineering drawing will always contain specific measurements, detailed drawings and **tolerances.**



Tolerances are the allowances for products/parts/materials to not meet their exact sizing

E.g. If a product's diameter is 5mm, the tolerance might be 4.9mm – 5.1mm

Tolerances exist because it is extremely difficult to get the exact measurement every time, and not allowing any variation can result in a high amount of waste.
However, a product/part must still function within tolerance.

∅ = Diameter

± = Tolerance is (though doesn't appear on all drawings)

Example:

∅ 10mm ± 0.2mm = Would mean that the tolerance is: 9.8mm – 10.2mm

New Technologies

Market Pull – a need or gap needs filling – the customer wants something new e.g. longer battery life on mobile phones

Technological Push – new technologies allow new ways of doing something – e.g. facial recognition or AR

IMPROVEMENTS IN MATERIALS

Engineering often creates new materials that create opportunities for better products. E.g. Recently carbon fibre has offered better products in some areas.

NEW PRODUCTION PROCESSES

Engineering often creates new ways of making that allow a product to be better or made cheaper. E.g. Recently 3D printing has created new opportunities.

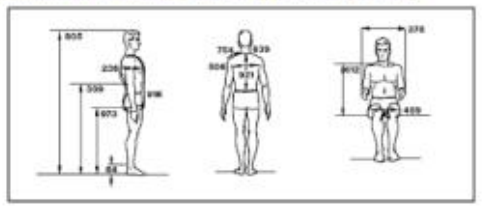
Specification Requirements

Lo2

– aesthetics – how they might require it to look

– ergonomics – suitability for human sizes e.g. hand size, height, weight, finger length

– anthropometrics – Physical sizes/ measurements recorded and used to deign ergonomic products



-Function – the purpose of a product e.g. a television displays programmes

-Features – the additions that make the product unique e.g. remote, controls,etc.

Disassembly: is to take something apart, like an old car motor

Regulations : On the other hand, **regulations** refer to the directives or statute enforced by law, in a particular country.

Copyright: The exclusive and assignable legal right, given to the originator for a fixed number of years, to print, publish, perform, film, or record literary, artistic, or musical material

Trademark:A trademark is a type of intellectual property consisting of a recognizable sign, design, or expression which identifies products or services of a particular source from those of others, although trademarks used to identify services are usually called service marks

CE : European conformity: CE marking is a certification mark that indicates **conformity** with health, safety, and environmental protection standards for products sold within the **European** Economic Area (EEA). ... The CE marking is the manufacturer's declaration that the product meets **EU** standards for health, safety, and environmental protection.

BSI: British standard: A **British standard** is a minimum **standard** that a product must be manufactured in accordance with before it is recognised by the relevant authorities as a quality product. Insurance companies will specify for example that all external wooden doors on domestic properties are fitted with a **British Standard** deadlock.

Market pull and push: **Push marketing** means you are trying to promote a specific product to an audience you find relevant. **Pull marketing** implies that you implement a strategy that will draw consumers towards your products – often creating loyal customers or followers.

Cultural and fashion trends

Lion mark: The Lion Mark is a British consumer symbol developed in 1988 by British Toy & Hobby Association and used to identify toys denoted as safe and of high quality. It represents a red and white lion face in a triangle with a yellow background and green borders

Iconic Design: **Iconic design** is something recognisable and memorable, and comes in many forms. Just like the DeLorean, **iconic design** is something recognisable and memorable. It comes in many forms such as architecture, branding, typography, automobiles, industrial **design**, and popular culture

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Design Evaluation Modelling

Health and safety considerations are important, not just for consumers using products, but the manufacturers making them as well.
Often symbols are used around workshop areas, as well as being on products to ensure people are being safe in an area/ using equipment or a product

When manufacturing a product, there are several considerations that need to be planned for. There considerations often include:

- Standard Components
- Stock Forms
- Supply Chains
- Durability and Maintenance
- Product Safety
- Costs and Budget

A **standard component** is usually an individual part or component, manufactured in thousands or millions, to the same specification. These are often bought in bulk and saves companies money, rather than them trying to make their own.
The sizes of standard components are often internationally recognised, making manufacturing easier to communicate

Examples of standard components would be; nuts, bolts, hinges, panel pins and screws, etc

A **stock form** is when a raw material has ben machines/processed into a stock/standard size, shape or form. This can be easily used during manufacturing on a production line.
Like standard components, buying in these stock forms is often easier and cheaper that companies trying to create their own and are internationally recognised

One-off Production

This is the manufacture of **one item**

This item can be custom made/ designed (bespoke manufacture)

How can you tell it's one-off production?

- Specialised companies/ items
- Specialist materials
- High quality items
- Skilled workers
- Expensive

Batch Production

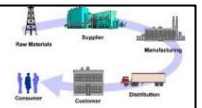
This is where small quantities of identical items are made (10s-1000s)

To ensure all items are identical, jigs, moulds and templates to aid workers

How can we tell it's batch production?

- Small quantities of products
- Mix of workers and automatic machinery
- "Stations" of workers, creating and assembling the products

Supply Chains are the process a product goes through, from sourcing the materials to being distributed to the consumer



Examples of stock forms would be; sheet of aluminum, acrylic rod, pine dowel, sheet of MDF, etc

Supply chains are effected by many things, including:

- Smaller/less equipped factories would impact the amount of products you could make
- Availability/ cost of materials
- Amount of warehouse storage/ budget to buy/rent warehouse space
- Size of distribution team would effect how many products and distance of product travel

Mass Production (High-Volume Production)

This is where large quantities of products are made (10,000s-100,000s)

There are often assembly lines (for the main product) and sub-assembly (for small pieces and components)

How can we tell when it's mass production?

- Heavily automated
- Large product output
- Standardised/ identical products

Continuous Production

This is when large quantities of products is produced (100,000s +)

However, unlike Mass Production this is **never ending** production e.g. power plants

How can we tell when it's continuous production?

- Heavily automated
- Large product output
- Standardised/ identical
- "Never ending" production

Just-in-time production (JIT)

This is when products made to order, but can be used in conjunction with any other scale of production

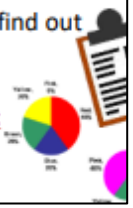
There is no need for warehouse space, as materials/ parts are ordered when needed.

However, if timings are wrong/ orders are delayed there is a big financial impact

Investigating the design context

There are areas that can be researched to find out more about the product requirements:

-Focus groups – talking to the likely customer
-Surveys – getting general information from the pubic
- Needs of target market – a product that fills a gap
-Changing consumer trends – a "must have" item



The 6 Rs

Word	Meaning
Reuse	Using a product again, for either the same or a different purpose
Reduce	Not using as much materials/ parts in products and packaging
Refuse	Not buying or using non-environmentally friendly products
Recycle	Reprocessing used materials to make new products
Rethink	Considering better materials, manufacturing processes and ways to make products, that make less of an environmental impact
Repair	Fixing a product rather than throwing it away

Designing for Disassembly is when products are made to be taken apart. This can be useful for repairing products, like cars, as the broken part can be taken out and replaced with a new one.
This is also useful for recycling products, as the different parts can be sent to specific recycling centres rather than being thrown away as a whole.

Some examples of making a product suitable for disassembly, would be to use temporary fixings (screws, etc), using components that can be removed using common tools and keeping materials separate so they can be easily recycled.

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Design Evaluation Modelling

Thermoplastics: Plastics that can be reheated and reshaped an infinite amount of times

Thermosetting plastics: Plastics that once heated and shaped can't be remoulded. They are permanently shaped and are incredibly heat resistant.

Thermoplastics

Common Name	Properties	Common Uses
ABS	High impact strength, lightweight and durable	Phone cases, helmets and toys
Acrylic	Food-safe, tough and durable	Car lights and illuminated signs
PP	Lightweight, food-safe and good chemical resistance	Food containers and medical equipment
HIPS (High Impact Polystyrene)	Good impact resistance, lightweight and stiff	Toys and fridge linings
LDPE (Low density Polyethylene)	Lightweight, low rigidity and good chemical resistance	Carrier bags, detergent bottles and toys
HDPE (High density Polyethylene)	Stiff and good chemical resistance	Crates, buckets and bowls

Thermosetting Plastics

Common Name	Properties	Common Uses
Epoxy Resin	High strength and good chemical and wear resistance	Adhesives and surface coatings
Urea Formaldehyde	Rigid, hard, brittle and good insulator	Electrical fittings and adhesives
Melamine Formaldehyde	Rigid, strong and scratch resistant	Tableware and decorative laminates for work surfaces

Natural Timber: Woods that are naturally grown i.e. from trees

Softwoods: Woods that have come from a Coniferous Trees. These trees are Evergreen and don't loose their leaves/ keep growing in Winter.

Hardwoods: Woods that come from Deciduous Trees. Loose their leaves and stop growing in winter. Start growing and produce fruit/flowers in Spring.

Man-Made Boards: Manufactured using woods and adhesives. They are not natural.

Manufactured Boards

Common Name	Properties	Common Uses
Plywood	Very strong, durable and won't warp	Furniture
MDF (Medium Density Fibreboard)	Smooth and even surface, easy to machine and often veneered	Patterns for Casting and furniture
Chipboard	Available in a range of densities and has a relatively even surface	Furniture and flooring

Hardwoods

Common Name	Properties	Common Uses
Oak	Strong, hard but easy to work with	High quality furniture, veneers and roof beams
Mahogany	Strong, durable and hard. Very aesthetically pleasing	Indoor furniture, Veneers, Worktops and flooring
Teak	Durable, oily and resistant to moisture	Outdoor furniture and boats

Softwoods

Common Name	Properties	Common Uses
Pine	Light in colour, inexpensive, often contains knots and easy to machine	DIY, school projects and simple joinery
Spruce	Soft texture and fairly lightweight	Musical instruments

Sustainability: meeting our own needs without compromising the ability of future generations to meet their own needs. In addition to natural resources, we also need social and economic resources

Renewable Energy: Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

non renewable energy: A non-renewable resource is a natural resource that cannot be readily replaced by natural means at a quick enough pace to keep up with consumption. An example is carbon-based fossil fuel. The original organic matter, with the aid of heat and pressure, becomes a fuel such as oil or gas.

End of life: In the context of manufacturing and product lifecycles, is the final stages of a product's existence. The particular **concerns** of **end-of-life** depend on the product in question and whether the perspective is that of the manufacturer or the user

Environmental pressures: Indicators of **environmental pressure** reflect the impact of human activities on the **environment, environmental pressure**; **environmental** impact) that leads to the appearance of **environmental** problems.

DFMA: DFMA stands for Design for Manufacture and Assembly. DFMA is the combination of two methodologies; Design for Manufacture, which means the design for ease of manufacture of the parts that will form a product, and Design for Assembly, which means the design of the product for ease of assembly.

Ferrous

Common Name	Properties	Common Uses
Mild Steel	Ductile, malleable and rusts quickly when exposed to moisture	Nuts, Bolts and car bodies
Tool Steel	Strong and hard	Hand Tools and springs
Stainless Steel	An alloy with chromium and nickel, doesn't rust and easy to sterilise	Kitchen utensils, surgical instruments and teapots

Non-Ferrous Metals

Common Name	Properties	Common Uses
Aluminium	Lightweight, can be polished and malleable	Cooking foil, saucepans and chocolate wrappers
Copper	Can turn green after being exposed to moisture, good conductor and malleable	Plumbing and electrical components
Tin	Ductile and malleable and resistant to corrosion	Coating on food cans and packaging

Modelling Materials are ones that are commonly used to model and make prototypes with. Common modelling materials include:

- **Paper**
- **Card**
- **Blue Foam**
- **Clay**
- **Polystyrene**
- **MDF**
- **Polymorph**

New/ modern materials are materials that **have been recently developed.**

Examples of Modern Materials include:

- **Titanium –** Good strength to weight ratio, non-corrosive and can be mixed with other metals to gain further properties. Applications include; medical prostheses, aircraft and dental implants.
- **Kevlar** – Good strength to weight ration, withstand high-impacts, and can be woven into clothing. Applications include; body amour, racing sails and tyres
- **Carbon Fibre –** Very high strength to weight ratio, and can be moulded into a variety of shapes. Applications include; bicycle frames, F1 cars, and sporting equipment

Smart Materials are materials that **change in reaction to the environment**. They may react to moisture, heat and UV rays, for example.

Examples of Smart Materials include:

- **Thermochromic Pigments –** This is when the pigments change colour in reaction to heat. Applications of this include; baby bottles, hair dye and mugs
- **Photochromic Pigments** – This is when the pigments change colour and/or opacity in reaction to light. Applications of this include; Signage and smart glass
- **Shape Memory Alloys** – This is when alloys, no matter how they are bent and manipulated, return to their original shape. They are also non-corrosive and are resistant to moisture. Applications include braces and glasses

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Design Evaluation Modelling

Tools Equipment & processes Pages

Manufacturing Processes: Polymers

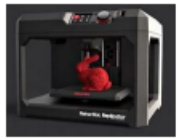
Wasting Processes:
Thin sheets of Polymers can be sawn using coping saws , fret saws and band saws.

Holes can be drilled using power drills or pillar(pedestal) drills

Addition processes:
Solvent cement is an adhesive. It can bond (join polymers). It dissolves the surface to mix/join them so they solidify together.

Thermoplastics can be welded . The faces can be heated using an electrical welding gun or hot plate. On melting of the surfaces they are pushed together forming a joint as they cool.

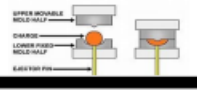
3d printing involves printing out a CAD(computer aided design model). A complex Shape can be made in a single operation. Instead of using numerous machines. The 3d printer deposits material one layer at a time until the item is finished.



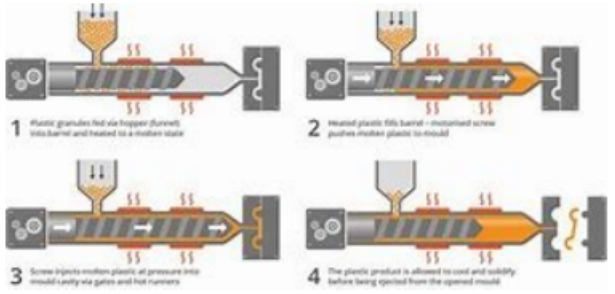
Deforming and Reforming:
Bends can be made in thermo plastics using a line bender. This heats just the area where the plastic is needed to be bent. The plastic once hot can be bent against a former or jig until it cools and goes rigid.

3D products can be made using a vacuum former where the plastic is heated around a mould and then the air around the mould is sucked out of the former.

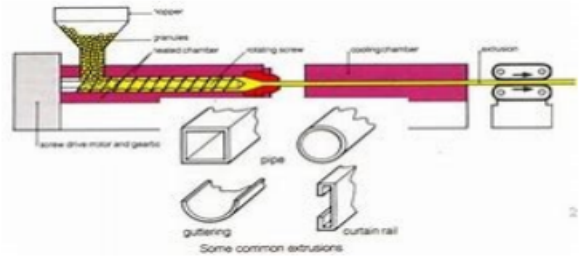
Yoke/Press moulding heats plastic sheet until it is flexible. It is then pressed between a mould and yoke. Once cool it retains the shape of the mould.



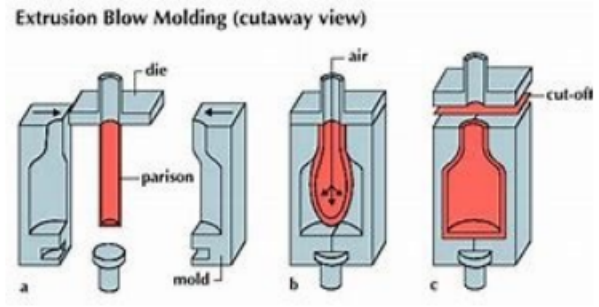
Injection moulding:
Plastic powder/granules are fed into a hopper. Heaters melt the plastic as a screw moves it towards a mould. This is forced into the mould and pressure maintained until cooled.



Extrusion:
Similar to injection moulding without using a mould. The plastic is forced through a die in a continuous stream to create long tubes/sections.



Blow moulding:
Similar to extrusion. An air supply and split mould are used to make hollow products such as bottles.



Key Words
You must know the meanings of the key words below:
Line bending
Moulding
Vacuum forming
Injection moulding
Extrusion
Blow moulding

Key points
Most industrial polymer moulding processes use reusable metal moulds and are designed to make large quantities

You must be able to:
Identify the processes and equipment used to manufacture products from polymers
Select an appropriate tool to carry out a process needed on a polymer and justify your choice

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Design Evaluation Modelling

DFMA

DFMA: Design for Manufacture and Assembly

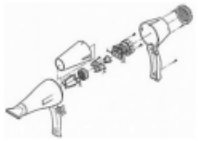
Is a design approach that focuses on ease of manufacture and efficiency of assembly. By simplifying the design of a product it is possible to manufacture and assemble it more efficiently, in the minimum time and at a lower cost.

CONCEPTULIZATION STAGE
"The act or process of forming an idea". In this stage we review user requirements of product.

E.G **What are the user requirements of the hairdryer**

Blows hot air over damp hair to **speed the evaporation of water to dry the hair**.
Enable control over the shape and style of hair, by accelerating and controlling the formation of temporary hydrogen bonds within each strand.
Affordable
Looks good

ANALYSIS STAGE
A paper assembly diagram is completed to check if there are there are excess **components & processes** in use. The analysis stage consists of 5 parts.



SUB ASSEMBLY
2 or more components, treatments or processes that must happen before being assembled in main assembly

COMBINED COMPONENT
Consists of several components and **cannot be easily dismantled!**

PROCESS STAGE?
Checks are made to see if there are excess processes in the assembly diagram?

Checks are made to see if processes can be removed or altered to make manufacture more stream lined?

DFMA REPORT
Details of participants
Date of location
Key user requirements
Outcome of analysis
Alternative designs
Evaluation of key issues and action points

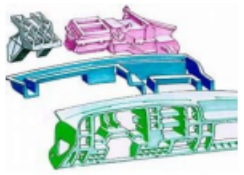
REDESIGN
This could happen by elimination and removal of a component or process?

Finding another way of making it?

Finding a solution where things can be combined together?

Key Words
You must know the meanings of the key words below:
DFMA, components, analysis, main assembly, sub assemblies, redesign, conceptualization stage
Key points
There are 5 stages in the analysis stage
DFMA focuses on simplifying a product for manufacture.
The use of elimination questions helps decide the need for a redesign of a component
You must be able to:
Describe the concept of DFMA
Consider how a design can be adapted to make it easier and manufacture

MAIN ASSEMBLY
Product for which the assembly diagram is made.
Consists of components, combined components and sub assemblies



1) Should the component move or be able to move in relation to the preceding component in the assembly diagram ?

3 Elimination Questions

3) Should the component be fitted or removed separately because otherwise assembly or disassembly of other theoretically essential components would be impossible ?

2) Are there fundamental reasons for the component being made of a different material which does not otherwise occur in the product ?

COMBINED COMPONENT
Consists of several components and **cannot be easily dismantled!**

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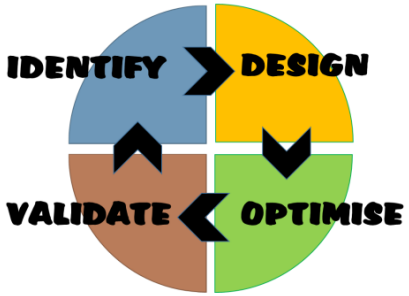
Examination Unit

The Design Cycle



Identify	Brief	Research	Process Planning
Design	Specification	Design	Manufacturing Plan
Optimise	Prototyping	Error proofing	
Validate	Test	Evaluate	

Human Factors

Anthropometrics is the ***study of measurements of the human body***

Ergonomics is the ***application of anthropometrics in order to make products and places efficient, comfortable and safe to use***

Anthropometric Data will be used for different genders, ages and even nationalities. This is applied to products in order to make them suitable to use.

Ergonomics is the application of that data, and often products are **adjustable** in order to be **inclusive.** A car interior is a prefect example of adjustability to suit a variety of people.

Product Requirements

Product requirements are what a product has to meet/ must do.
Common requirements are:

- Function – *what a product's purpose/ job is*
- Features – *what makes a product unique and sellable*
- Performance – *how well it completes its function*
- Target Market – *how it appeals to its customers*
- Working Environment – *how it is suitable for where it will be used*
- Constraints – *what is must do or must not do*
- Aesthetics – *what it will look like*
- Ergonomics – *how its comfortable and safe to use*
- Lifecycle – *what environmental impact it makes (and how that can be reduced)*

Regulations and Standards

Standards are often set by countries, to ensure all products are safe to use. The most common are:

British Standards Kitemark shows that a product has consistently met the requirements of the British Standards Institute. These regulations are of a higher standards than European ones

European Conformity Symbol shows that a product has consistently met the minimum requirements of the EU

Sustainable resources are ones that can be maintained over time e.g. trees can be re-planted and re-grown after being cut down

Sustainable resources are meant to have as little impact on the environment as possible
Designers can ensure their designs are sustainable by:

- Choosing sustainable materials
- Giving appropriate disposal (recycling) instructions
- Manufacturing products in less of an impactful way

Resource Depletion is when resources are being used at a faster pace than they can be replaced
This then means there is no more of that natural resource left
Resource depletion can happen to both renewable and non-renewable resources

Product Lifecycle is what environmental impact a product makes over its life time. Including:

- Impact of materials
- Impact of processes
- Product Miles (how far a product has to travel to get from factory to consumer)
- Impact while in use
- Impact when disposed of (6Rs)

A Lifecycle Analysis is when a designer looks at a product's impact and considers what can be improved to minimise it's impact

Symbol	Name of Symbol	Purpose of Symbol
	Recycling Symbol	The product/ materials the product is made from can be recycled
FSC	Forest Stewardship Council Symbol	The materials used for aren't harming the world's rainforests. They are meeting high environmental and social standards.
	The Green Dot	Used in Europe to show the manufacturer has made a financial contribution to recycling packaging in Europe
	Tidyman Symbol	Encourages users to dispose of waste correctly
6 PS 7 OTHER	Recycling Code	To indicate the material used can be recycled
	EU Directive	This helps show consumers how energy efficient a product is
	Encouraging Electronics Recycling	Shows some products/ chemicals can't be put in the bin and need to be disposed of a certain way

ACCESSFM

Aesthetics – How will the product look. E.g. Colour, texture, shape.
Client- Who is the product for? Gender and age of user.
Cost- How much will it cost to manufacture your product? How much will it cost consumer?
Environment- What impact will the product have on the environment? How can it be designed and be made to be more sustainable?
Safety- How will product be designed to be safe to use?
Size- What will the dimensions be in millimetres of the finished product? This should include Height, Length and Depth.
Function- What will the product do and how will it work?
Materials- What materials/components will be used to make the product

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Intellectual Property

INTELLECTUAL PROPERTY
Typically the rights will be sold or licensed to others
The Patent Office is responsible for granting patents, registered designs and registered trade marks
The Rights are effective in UK only

COPYRIGHT
Issued on musical work, artists, literature, films, ensures that the artist can gain financially.
Can be drawn on paper, filmed or sound recorded on tape disc or electronic file.
Happens automatically when you compose a piece of work, essay, book or music.
Lasts for the life of the creator + **70 years** after his death
Sound recordings are protected for 50 years

PATENTS
Patents are for new inventions. A new invention is a product or process that can be used or made.
Patents are concerned with how things work

To be patented idea must:-
· Be new and have an inventive step that is not obvious to someone with knowledge and experience in the subject
· Be capable of being made or used in some kind of industry.
· Can sell the invention and all the intellectual property (IP) rights
· Can license the invention to someone else but retain all the IP rights

DESIGN RIGHTS
Protects the appearance of a product. In particular shape, lines and forms, colour, texture or material of the product.
A registered design can last for 25 years, and in that time can be bought, sold or licensed. You can license your design to other manufacturers so that they can manufacture your product.[the designer would be paid for this]
You can also stop others from manufacturing your product.

•Lasts for an initial period of 5 years.
•Can be extended in four 5-year terms to give protection for a maximum of 25 years.
•Becomes a property which can be bought, sold, hired or licensed.

REGISTERED TRADE MARKS

Trade marks are used for brand recognition. Badge, Name or Logo, Words picture or a combination. Eg. Nike, Macdonalds,
Unauthorised use of a company trade mark means the rightful owner may lose business and the trust of their customers.

A sign which may be represented graphically.
•Distinguishes the goods or services of one company from another.
•May include words, designs, letters and the shape of goods or their packaging.
•Provides legal protection.
•Application fee of £200 and a further £50 for each other class.
•Lasts indefinitely, lasts 10 years and can be renewed every 10 years.

Key Words
You must know the meanings of the key words below:
Patent
Design Right
Copyright
Registered trade mark
Key points
Registered designs which give stronger protection but require registration at the Patent Office

Design right gives weaker, but automatic protection without the need for registration

Intellectual property rights are effective in UK only

It offers protection to the designer so people do not make money out of your idea
You must be able to:
Explain what intellectual property is?
Explain the difference between the 4 types of intellectual property?
Explain the length of time each intellectual property lasts
Be able to give examples of each type of intellectual property.

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Standards

STANDARDS
A Standard is a guide that companies, that design and make things, need to follow.
They tell manufacturers how their products and services can be safe and of a certain quality.
Standards may state:

maximum sizes . thicknesses of certain parts of an object.
certain colours that need to be used for things to be safe and ensure that they are seen at night.
a specific way of making a product well in the factory.

Standards affect our daily lives in many ways, making life easier, safer and healthier.
Without Standards for people to follow, then all our products would behave slightly differently, making them hard to operate, to fix or to programme.

BRITISH STANDARDS

The British Standards Institution (BSI) brings together experts from across the designing and manufacturing industries to help devise Standards by which products are measured.

They were the first Standards organisation in the world with its history dating back to 1901.

It is independent from government and trade and industry associations and is a non-profit distributing organisation. This means that all the profit it makes goes back into the service it provides.

BRITISH STANDARDS

BSI has thousands of current standards; this equals one for every 59 businesses in the UK.

BSI standards cover everything from accounting to zoom lenses. There are approximately 6,000 standards in development at any one time.

Over 130,000 BSI standards are sold each year in hard copy alone. Standards contribute £2.5bn to the UK economy -

BSI's oldest standard still in use today is from 1927 - BS 275 Dimensions of rivets - while some of its most recent are for biometrics and business continuity.

STANDARDC MARKS
A product passes all of the specified independent tests that make up a particular Standard, manufacturers can indicate this by displaying a certification mark on its surface. Products that have not undergone the standardization process are not allowed to do so.

When you see a product with a Kitemark this means BSI has independently tested it and has confirmed that the product conforms to the relevant British Standard, and has issued a BSI license to the company to use the Kitemark

Many products such as new toys must meet legal requirements before they can be sold within the European Community, and must carry CE marking. CE marking attached to a product is a manufacturer's claim that it meets all the requirements of the European legislation.

Key Words
You must know the meanings of the key words below:
Standard
Kitemark
British Standard

Key points
Standards make life safer and easier
Kite marks, The CE mark and Lion mark show that the product has been thoroughly tested
Over 130,000 standards are sold each year

You must be able to:
Explain why people use standards?

What a standard is?

The purpose of symbols on products

Recognise and identify different symbols

Be able to discuss the benefits to the consumer of having Standards on products

Explain why product regulations and safeguards are important