Year 11 into 12 ‘Bridging the Gap’

PART 1: Bridging the Knowledge Gap

‘Bridging the Knowledge Gap’

Week 1: Social, Moral, Cultural, Ethical and Sustainability

Week 2: Materials

Week 3: Materials (cont.)

Week 4: Processes

WEEK 1:

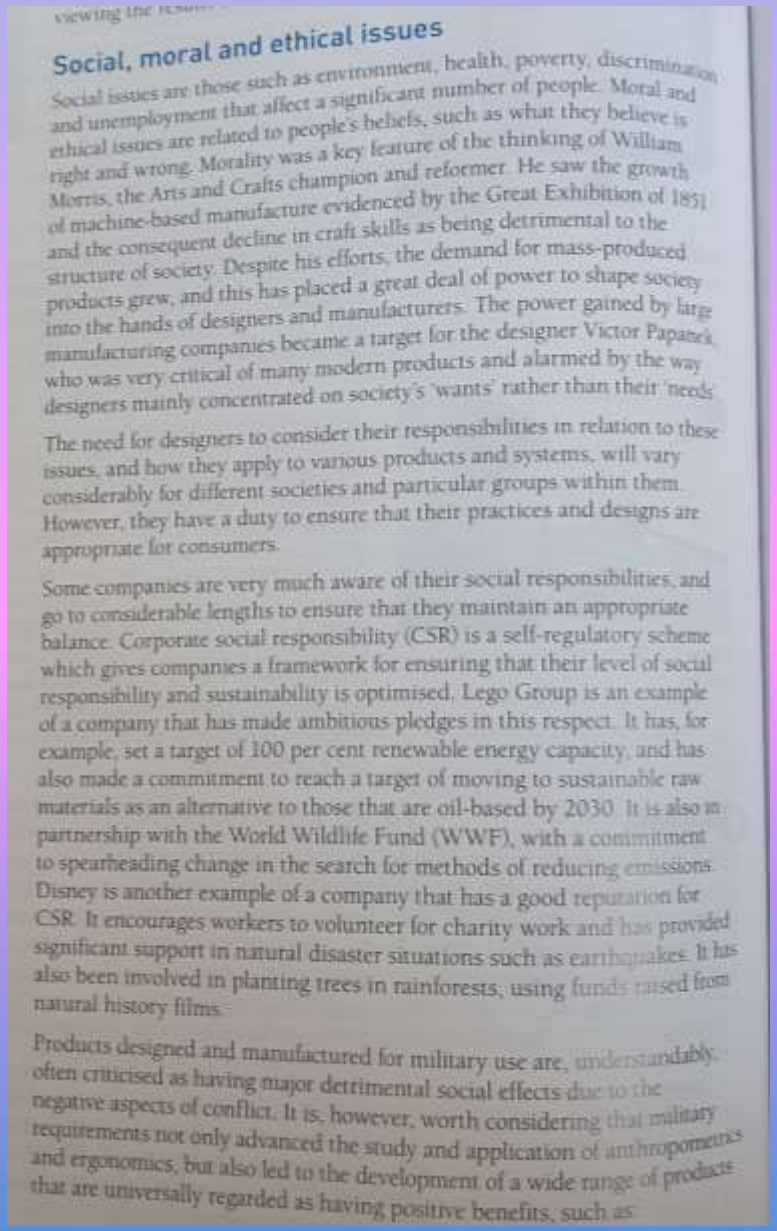
Design Considerations

(Social, Moral, Cultural, Ethical and Sustainability, Inclusivity)

Social, Moral, Cultural, Ethical, Sustainable & Inclusive aspects of Design

- S, M, C, E, S & I are the key factors that need to be explored when new products are being designed and developed. They are the fundamental things that designers must consider.
- You will have covered all of these things in Year 10 with a basic understanding, but it is now about applying the knowledge into real life design and products.

Social, Moral & Ethical Issues



viewing the results

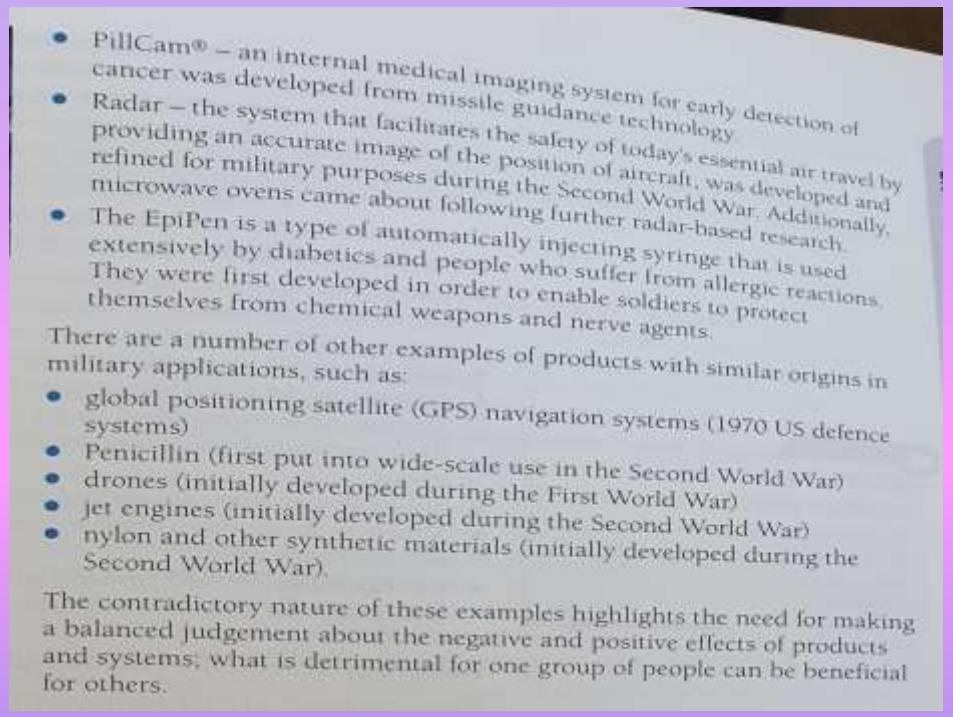
Social, moral and ethical issues

Social issues are those such as environment, health, poverty, discrimination and unemployment that affect a significant number of people. Moral and ethical issues are related to people's beliefs, such as what they believe is right and wrong. Morality was a key feature of the thinking of William Morris, the Arts and Crafts champion and reformer. He saw the growth of machine-based manufacture evidenced by the Great Exhibition of 1851 and the consequent decline in craft skills as being detrimental to the structure of society. Despite his efforts, the demand for mass-produced products grew, and this has placed a great deal of power to shape society into the hands of designers and manufacturers. The power gained by large manufacturing companies became a target for the designer Victor Papanek who was very critical of many modern products and alarmed by the way designers mainly concentrated on society's 'wants' rather than their 'needs'.

The need for designers to consider their responsibilities in relation to these issues, and how they apply to various products and systems, will vary considerably for different societies and particular groups within them. However, they have a duty to ensure that their practices and designs are appropriate for consumers.

Some companies are very much aware of their social responsibilities, and go to considerable lengths to ensure that they maintain an appropriate balance. Corporate social responsibility (CSR) is a self-regulatory scheme which gives companies a framework for ensuring that their level of social responsibility and sustainability is optimised. Lego Group is an example of a company that has made ambitious pledges in this respect. It has, for example, set a target of 100 per cent renewable energy capacity, and has also made a commitment to reach a target of moving to sustainable raw materials as an alternative to those that are oil-based by 2030. It is also in partnership with the World Wildlife Fund (WWF), with a commitment to spearheading change in the search for methods of reducing emissions. Disney is another example of a company that has a good reputation for CSR. It encourages workers to volunteer for charity work and has provided significant support in natural disaster situations such as earthquakes. It has also been involved in planting trees in rainforests, using funds raised from natural history films.

Products designed and manufactured for military use are, understandably, often criticised as having major detrimental social effects due to the negative aspects of conflict. It is, however, worth considering that military requirements not only advanced the study and application of anthropometrics and ergonomics, but also led to the development of a wide range of products that are universally regarded as having positive benefits, such as:



- PillCam® – an internal medical imaging system for early detection of cancer was developed from missile guidance technology.
- Radar – the system that facilitates the safety of today's essential air travel by providing an accurate image of the position of aircraft, was developed and refined for military purposes during the Second World War. Additionally, microwave ovens came about following further radar-based research.
- The EpiPen is a type of automatically injecting syringe that is used extensively by diabetics and people who suffer from allergic reactions. They were first developed in order to enable soldiers to protect themselves from chemical weapons and nerve agents.

There are a number of other examples of products with similar origins in military applications, such as:

- global positioning satellite (GPS) navigation systems (1970 US defence systems)
- Penicillin (first put into wide-scale use in the Second World War)
- drones (initially developed during the First World War)
- jet engines (initially developed during the Second World War)
- nylon and other synthetic materials (initially developed during the Second World War).

The contradictory nature of these examples highlights the need for making a balanced judgement about the negative and positive effects of products and systems; what is detrimental for one group of people can be beneficial for others.

Sustainability, Ethics & Cultural

Sustainable materials and ethical production methods

Our standard of living is currently dependent on the ready availability of a wide range of materials, many of which are obtained from finite sources. As we have seen, companies are looking towards sustainable materials that can be substituted for the oil-based polymers currently being used. Starch-based materials such as PLA are growing in popularity, and have the additional advantage of being biodegradable. Timber is another example of a sustainable material, which is protected by schemes such as the one operated by the Forest Stewardship Council (FSC).

Metal production relies on the extraction and processing of ores, and this can be very damaging to the environment due to the large scale of mining and quarrying operations. The work involved in obtaining these ores can be very dangerous, and some companies have been accused of having a disregard for their workers' and local people's welfare. An example of this occurred in the Minas Gerais region of Brazil in 2015, when a dam burst in an iron ore mine, killing several workers and local people as well as engulfing the nearby town in mud. Accusations have been made that the appropriate safety standards had not been implemented.

Another disaster, on a far larger scale, occurred in connection with the processing of chemicals for pesticide manufacture. In 1984, the Union Carbide plant in Bhopal, India suffered a leak of methyl isocyanate, which resulted in the death of thousands of people in the plant and local towns, as well as serious health effects for thousands more. The cause of this disaster has been subject to much controversy and argument, but the siting of such a plant near to a large centre of population clearly exacerbated the problem, and health and safety standards were subject to much criticism.

In the last two examples, we have considered methods of extraction and preparation of materials that could be regarded as being questionable, but conditions for workers manufacturing and assembling products can also be subject to criticism. An example of this is the Foxconn iPhone factory in China, where several workers committed suicide. The cause was allegedly the pressures of working in a stressful environment.

How can companies avoid these pitfalls and work towards an **ethical** approach? Here are some examples of strategies that they might adopt:

- Carry out a sustainability review prior to starting a project.
- Check that materials are being sourced as locally as possible along the lines of the 'Grown in Britain' campaign.
- Use responsibly managed resources overseen by schemes such as the FSC.
- Ensure that the workforce operates fairly and safely under the Ethical Trading Initiative promoted by the International Labour Organisation (ILO), particularly in connection with issues such as child and slave labour.
- Ensure that products are labelled and marketed honestly to aid consumers.
- Adhere to appropriate compliance schemes such as BS EN 60335 for electrical appliances.
- Use **Fairtrade** certified products whenever possible, and seek certification for their own practices.

Table 2.3.3 Examples of different connotations of colours

	Black	White	Red
UK/USA	Death, mourning, funerals	Bride, wedding, purity	Energy, warning, love
Eastern	Wealth, health, prosperity	Death, mourning	Bride, wedding, prosperity
China	Colour for young boys	Death, mourning	Good luck

Figure 2.3.41 White funeral flowers in Hong Kong

An example of a company using an inappropriate colour is United Airlines' decision to hand out white carnations to passengers when it started a new first class route serving Hong Kong. They had not considered that white symbolises misfortune and death in that part of the world, and once they realised their mistake, they changed to red flowers.

The traditional, three-stone cooking stove used by millions of people in rural African communities are only about 10 per cent efficient. Unfortunately, efforts made by well-meaning designers to improve the design of these stoves and reduce the vast amount of effort and time that goes into collecting firewood, as well as reducing the danger to health caused by smoke inhalation, have often been unsuccessful. The reason for this is the long-standing cultural tradition of using the version incorporating three stones, since the stones can have a symbolic meaning.

When a toothpaste company tried to market its product in some areas of southeast Asia with a slogan emphasising that it 'whitens your teeth', their

Inclusive & Social Design Considerations

advertising campaign was not successful. This was due to the local custom in some communities of blackening their teeth to make them more attractive, as they believe that only demons and wild animals have white teeth.

Designers need to undertake thorough research to ensure that these situations do not occur, in order to avoid alienating potential consumers and wasting money.

Products that are inclusive

The British standards Institution's (BSI) definition of **inclusive** design is 'the design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design', as set out in their BS 700 Part 6, 'Managing inclusive design' standards document. One of the key aspects of the approach to design that they promote is to ensure that the needs of a diverse range of people can be accommodated without them being stigmatised or limited in some way. The goal of designing products for the widest possible range of people has led to the term 'universal design' being used.

Figure 2.2.42 Specialist clothes store catering for a wider anthropometric range of customers.

The term 'accessible to, and usable by, as many people as reasonably possible' has obvious links with the dimensions of people, since there is a wide range of sizes of people who need to be able to use products. Anthropometric data gives designers a useful picture of the size, shape and strength of the population, and the 5th to 95th percentile is often used as a basis for deciding on the size and range of adjustability of products. The extremes are sometimes more difficult to cater for, and the fact that there are fewer people in these categories means that there is less profit to be made, so they are often regarded as a niche market.

Figure 2.2.43 Bright yellow handrails on a Nottingham tram.

Assumptions are often made that the number of people in society who require particular consideration in the design of products is relatively small. Research shows, however, that there is a much more complex picture, with a large proportion of the population sometimes finding that their requirements are not met. Therefore, designers need to bear this in mind when designing products. Examples of this already happening include:

- the adoption of updated standards for wider doors for wheelchairs in the design of new houses
- the production of a highly successful, attractive range of 'good grips' kitchen utensils, by Oxo, that can be used by a wide range of people and have won a number of design awards
- many accessibility improvements on public transport, including buses with floors that lower for pushchair and wheelchair users, and the incorporation of bright yellow handrails that are more easily seen by people with a visual impairment
- measures to enable people with a range of disabilities to safely negotiate pedestrian road crossings, such as raised pavement bumps, ramps and visual, audible and tactile feedback
- the installation of hearing induction loops in theatres for hearing impaired members of the audience
- a range of products such as kettle pourers, simplified remote controls with larger buttons, key and door handle adapters and modified gardening tools that can be purchased from a growing number of specialist retail outlets.

Although the Disability Discrimination Act (DDA) of 1995 does not specifically dictate requirements for product design, it was instrumental in bringing about many of the accessibility improvements that we have seen, and has strongly influenced design in areas such as public transport.

It can sometimes be a problem that designers are unaware of the difficulties encountered by disabled consumers of their products. For this reason, it is common practice for 'empathic research' to be carried out to give them an idea of what it might be like for the disabled to use their products. Examples of this include the simulation of arthritis using specially adapted gloves, and wearing obscured goggles to replicate levels of sight loss.

The growth in participation and interest in the Paralympic Games has resulted in a wide range of specialised equipment for disabled athletes, and has also been effective in raising awareness of the potential that inclusive design has for improving the lives of the broader population.

Products that could assist with social problems

Social problems cover a wide range of issues, from what might seem relatively trivial, to difficulties that seriously affect the lives and wellbeing of significant numbers of people.

An example of a social problem that does not affect lives seriously but does create ill feeling is litter. The problem of changing attitudes to dropping litter is a difficult one to deal with, but there is awareness that attitudes can be formed at a young age. A number of innovative designs for litterbins have therefore been conceived to encourage children to adopt good habits.

A significant social issue is the large number of accidents involving young drivers and, as a result of this, insurance companies are actively seeking ways of reducing the high number of casualties in that group of motorists. The increasingly ubiquitous nature of satellite navigation and vehicle tracking has facilitated the development and use of 'black box' devices that actively monitor driving data such as location, time, speed, acceleration and braking. This enables a constant check to be made on the standard of driving and thus reduce risk.

Another example of a product responding to a significant social problem is the 'itemiser' scanning device being used by police to check for illegal drugs being taken into pubs and clubs or being used by motorists. This device simply needs a swab from the suspect's hand to check for recent interaction with illicit substances. Versions of this device are also employed in the detection of explosives at airports and other locations, to counter potential security threats.

Week 1: Tasks

- Read through the textbook pages, making notes of the different key terms. (Highlighting keywords):
  - Social
  - Moral
  - Social
  - Sustainability
  - Inclusivity

  (include examples for each one)

WEEKS 2-4:

Materials & Processes

(Paper & Boards, Timbers, Polymers, Metals, Composites, Smart Materials and Modern Materials)

Materials & Processes

- In order for you to be able to design successfully, you need to understand about materials and processes, so that you can select the best and most appropriate options
- You will cover this in more depth in the Autumn Term, but the following work will set you thinking about what you can produce using different materials and processes.

Materials

- **Paper & Boards** (e.g. corrugated card, cartridge paper, duplex, foam board)
- **Timbers** (Pine, Oak, Mahogany, beech, birch, Cedar, plywood, MDF)
- **Polymers** (ABS, Acrylic, urea formaldehyde, nylon, HIPS, epoxy resin, cornstarch, potatopak)
- **Metals** (low carbon steel, high carbon sttel, pewter, silver, titanium, alloys)
- **Composites** (GRP, CFRP, concrete, tungsten carbide)
- **Smart Materials** (SMAs, thermochromics pigments, phosphorescent/photochromic pigment, piezoelectric material)
- **Modern Materials** (Kevlar, polymorph, precious metal clay)

Processes

- **Paper & Boards** (Die cutting, creasing, bending, laser cutting)
- **Timbers** (wood joining-joints, lamination, milling machine, steam bending)
- **Polymers** (calendering, lamination (lay-up of polymers), injection moulding, blow moulding, rotational moulding, extrusion, compression moulding)
- **Metals** (Press forming, Spinning, cupping and deep drawing, sand casting)

Week 2&3: Materials - Tasks

MATERIALS

- Pick **ONE** type from **EACH** of the different materials (see examples on previous slide), find out about the material and write the:
  - Properties and characteristics
  - Uses and Products (could be images of the products)
- Use SENECA, www.technologystudent.com or BBCBitesize for information
- It may help to put the information in a table, or written as a paragraph with sub-headings

Week 4: Processes - Tasks

Processes

- Pick **ONE** type from **EACH** of the different materials (see examples on previous slide), find out about the process and write the:
    - Name of the process and material that is normally used
    - Simple steps of the process
    - Diagrams of the steps
    - Images of products made using the process
- Use SENECA, www.technologystudent.com or BBCBitesize for information
- It may help to put the information in a table, or written as a paragraph with sub-headings

Submission of Work

Please look for weekly/regular update of work on Google Classroom - 116FGr1 [9194013][2019]

You will be expected to submit work, either uploading documents, or taking photos of work and uploading them to Google Classroom

You can also email me on:

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