

**UTC Learning Cycles 2019 – Year 13 Product Design**

<b>Cycle 2.6</b>	<b>Cycle 2.7</b>	<b>Cycle 2.8</b>	<b>Cycle 2.9</b>	<b>Cycle 2.10</b>
<p align="center">Topics</p> <ul style="list-style-type: none"> <li>• Iterative Design</li> <li>• Design influences</li> <li>• Design styles and movements</li> <li>• Designers and their work</li> </ul>	<p align="center">Topics</p> <ul style="list-style-type: none"> <li>• Socio-economic influences</li> <li>• Major developments in technology</li> <li>• Social, moral, ethical issues</li> <li>• Product Lifecycle</li> </ul>	<p align="center">Topics</p> <ul style="list-style-type: none"> <li>• Environmental issues</li> <li>• Conservation of energy and resources</li> <li>• National and international standards</li> </ul>	<p align="center">Topics</p> <ul style="list-style-type: none"> <li>• Design for manufacturing, maintenance, repair and disposal</li> <li>• Health and Safety</li> </ul>	<p align="center">Topics</p> <ul style="list-style-type: none"> <li>• Materials, production processes and finishes</li> <li>• Enterprise and marketing in the development of products</li> </ul>
<b>Keywords</b>	<b>Keywords</b>	<b>Keywords</b>	<b>Keywords</b>	<b>Keywords</b>
<p align="center"><b>Topic Assessments Used</b></p> <p>The Design and Make Process Criterion 1</p>	<p align="center"><b>Topic Assessments Used</b></p> <p>The Design and Make Process Criterion 2</p>	<p align="center"><b>Topic Assessments Used</b></p> <p>The Design and Make Process Criterion 3</p>	<p align="center"><b>Topic Assessments Used</b></p> <p>The Design and Make Process Criterion 4</p>	<p align="center"><b>Topic Assessments Used</b></p> <p>The Design and Make Process Criterion 5</p>

<b>Cycle 2.6</b>	
<b>Topics</b>	
<p>designing to meet needs, wants or values</p> <ul style="list-style-type: none"> <li>• investigations to inform the use of primary and secondary data:</li> <li>• market research</li> <li>• interviews</li> <li>• human factors</li> <li>• focus groups</li> <li>• product analysis and evaluation</li> <li>• the use of anthropometric data and percentiles</li> <li>• the use of ergonomic data</li> <li>• the development of a design proposal</li> <li>• the planning and manufacture of a prototype solution</li> <li>• the evaluation of a prototype solution to inform further development.</li> </ul>	<p>Students should be aware of, and able to discuss, how key historical design styles, design movements and influential designers that have helped to shape product design and manufacture.</p> <p>Students should be aware of, and be able to discuss, key design styles and movements and their principles of design, including:</p> <ul style="list-style-type: none"> <li>• arts and craft movement</li> <li>• Art Deco</li> <li>• Modernism, eg Bauhaus</li> <li>• Post modernism, eg Memphis.</li> </ul>
<p>Students should be aware of, and be able to discuss, the work of influential designers and how their work represents the principles of different design movements, including:</p> <ul style="list-style-type: none"> <li>• Phillipe Starck</li> <li>• James Dyson</li> <li>Margaret Calvert</li> <li>• Dieter Rams</li> <li>• Charles and Ray Eames</li> <li>• Marianne Brandt.</li> </ul>	
<b>Keywords</b>	
<b><u>Student Review</u></b>	
What Went Well	
Even Better if	

**Teacher Feedback**

<b>Cycle 2.7</b>	
<b>Topics</b>	
<p>Students should be aware of, and able to discuss, how socio economic influences have helped to shape product design and manufacture, including:</p> <ul style="list-style-type: none"> <li>• post WW1: the Bauhaus and development of furniture for mass production</li> <li>• WW2: rationing, the development of 'utility' products</li> <li>• contemporary times:</li> <li>• fashion and demand for mass produced furniture</li> <li>• decorative design.</li> </ul>	<p>Students should be aware of, and able to discuss, how major developments in technology are shaping product design and manufacture, including:</p> <ul style="list-style-type: none"> <li>• micro electronics</li> <li>• new materials</li> <li>• new methods of manufacture</li> <li>• advancements in CAD/CAM. Students should be aware of, and able to discuss, the responsibilities of designers and manufacturers, including:</li> <li>• products are made using sustainable materials and ethical production methods</li> <li>• the development of products that are:</li> <li>• culturally acceptable</li> <li>• not offensive to people of different race, gender or religious belief</li> <li>• the development of products that are inclusive</li> <li>• the design and manufacture of products that could assist with social problems, eg poverty, health and wellbeing, migration and housing</li> <li>• the impact of Fairtrade on design and consumer demand</li> <li>• designing products to consider the six Rs of sustainability.</li> </ul>
<p>Design introduction, evolution, growth, maturity, decline and replacement.</p> <p>Students should be familiar with examples of how designers refine and re-develop products in the lifecycle of specific products</p>	
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Cycle 2.8	
Topics	
<p>Students should be aware of, and able to discuss, the importance environmental issues in design and manufacture, including:</p> <ul style="list-style-type: none"> <li>the responsibilities of designers and manufacturers in ensuring products are made from sustainable materials and components</li> <li>the environmental impact of packaging of products, eg the use of excessive packaging and plastics.</li> </ul>	<p>Students should be aware of, and able to discuss, the concept of a circular economy, including:</p> <ul style="list-style-type: none"> <li>how products are designed to conserve energy, materials and components</li> <li>the design of products for minimum impact on the environment including raw material extraction, consumption, ease of repair, maintenance and end of life</li> <li>sustainable manufacturing including the use of alternative energy and methods to minimise waste</li> <li>the impact of waste, surplus and by-products created in the process of manufacture including reuse of material off-cuts, chemicals, heat and water</li> <li>cost implications of dealing with waste</li> <li>the impact of global manufacturing on product miles.</li> </ul>
<p>Students should be aware of, and able to discuss, the importance of national and international standards in product design, including:</p> <ul style="list-style-type: none"> <li>British Standards Institute (BSI)</li> <li>International Organisation for Standardisation (ISO)</li> <li>Restriction of Hazardous Substances (ROHS) directive</li> <li>battery directive</li> <li>polymer codes for identification and recycling</li> </ul>	<ul style="list-style-type: none"> <li>packaging directives</li> <li>WEEE directives</li> <li>energy ratings of products</li> <li>eco-labelling: <ul style="list-style-type: none"> <li>the Mobius Loop</li> <li>the European Eco-label</li> <li>NAPM recycled mark</li> <li>the EC energy label</li> <li>the Energy Efficient label and logo</li> <li>Forest Stewardship Council (FSA)</li> <li>EPA energy star.</li> </ul> </li> </ul>
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Cycle 2.9	
Topics	
<ul style="list-style-type: none"> <li>reducing the number of manufacturing processes</li> <li>how the choice of materials affects the use, care and disposal of products:</li> <li>labelling of materials to aid separation for recycling</li> <li>making products easy to disassemble or separate</li> <li>application of the six Rs of sustainability:</li> <li>reduce the quantity of materials, of toxic materials, of damaging materials and associated energy use</li> <li>reuse components and parts</li> <li>rethink by using eco friendly alternative materials</li> <li>recycle materials and/or components into new products</li> <li>maintenance: <ul style="list-style-type: none"> <li>temporary and integral fixings</li> <li>use of standardised parts</li> </ul> </li> <li>allowing for service and repair/ replacement of parts</li> <li>ability to upgrade</li> </ul>	<p>knowledge of the Health and Safety at Work Act (1974), and how it influences the safe manufacture of products</p> <ul style="list-style-type: none"> <li>control of Substances Hazardous to Health (COSHH) and safety precautions that should be taken with relevant materials</li> <li>safe working practices and identifying potential hazards for the school or college workshop and industrial contexts</li> <li>safety precautions that should be taken with specific manufacturing processes</li> <li>the concept of risk assessment and its application to given manufacturing processes.</li> </ul> <p>Impact on product design, eg Consumer Rights Act (2015), Sales of Goods Act (1979) • the British Standards Institute (BSI), and how specific products might be tested to meet safety standards</p> <ul style="list-style-type: none"> <li>measures to ensure the safety of toys, eg Lion Mark</li> <li>advice to consumers: <ul style="list-style-type: none"> <li>manufacturer's instructions</li> <li>safety warnings</li> <li>aftercare advice.</li> </ul> </li> </ul>
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Cycle 2.10	
Topics	
<p>physical and mechanical properties and working characteristics</p> <ul style="list-style-type: none"> <li>• product function</li> <li>• aesthetics</li> <li>• cost</li> <li>• manufacture and disposal.</li> </ul> <p>metals (ferrous, non-ferrous, alloys)</p> <ul style="list-style-type: none"> <li>• woods (hardwoods, softwoods, manufactured boards)</li> <li>• polymers (thermoplastics, thermoset polymers, elastomers)</li> <li>• papers and boards</li> <li>• composites</li> <li>• smart materials</li> <li>• modern materials</li> <li>• Metals, ferrous, non ferrous, alloys</li> </ul>	<p>hardness</p> <ul style="list-style-type: none"> <li>• toughness</li> <li>• malleability</li> <li>• elasticity</li> <li>• tensile strength</li> <li>• density</li> <li>• resistance to corrosion</li> <li>• thermal conductivity</li> <li>• electrical conductivity</li> <li>• melting points</li> <li>• ability to be alloyed</li> <li>• ability to be joined with heat processes</li> <li>• ability to take applied coatings and finishes</li> </ul>
<p>kevlar</p> <ul style="list-style-type: none"> <li>• precious metal clay (PMC)</li> <li>• high density modelling foam</li> <li>• polymorph.</li> </ul> <p>shape memory alloys (SMA), eg Nitinol</p> <ul style="list-style-type: none"> <li>• thermochromatic pigment</li> <li>• phosphorescent pigment</li> <li>• photocromic pigment</li> <li>• electroluminescent wire</li> <li>• piezo electric material.</li> </ul> <p>Production processes related to woods, polymers, composites, metals and smart and modern materials</p>	<p>Enterprise and marketing in the development of products</p> <ul style="list-style-type: none"> <li>• customer identification</li> <li>• labelling</li> <li>• packaging</li> <li>• corporate identification</li> <li>• concept of global marketing:</li> <li>• the promotion and advertisement of products including the use of new technologies, eg social media, viral marketing</li> <li>• product costing and profit</li> <li>• awareness of the role of entrepreneurs.</li> </ul> <p>Students should be aware of, and able to explain, the collaborative working of designers in the development of new and innovative products, including virtual and face-to-face collaborative working systems.</p>
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Major project - NEA (non examined assessment)	
Topics	
<p>Students should be aware of, and able to discuss and implement, the stages of a range of design processes in order to apply personal judgement and relevant criteria in the appraisal of products and systems, including:</p> <ul style="list-style-type: none"> <li>• those used in the NEA</li> <li>• investigations and analysis</li> <li>• use of inspiration materials, eg mood boards</li> <li>• ideas generation</li> <li>• illustration</li> <li>• development of a design specification</li> <li>• modelling</li> <li>• planning</li> <li>• evaluating and testing.</li> </ul>	<p>Students should be aware of, and able to discuss and demonstrate, the development of a prototype from design proposals.</p> <p>This knowledge should influence the development of design ideas for the NEA so that students may make high quality products that meet the needs of identified users.</p> <p>Students should be aware of, and able to discuss, how different design methodologies are used by designers in the corporate world when designing products including collaborative working and the cyclic nature of commercial design and manufacture.</p>
<p>Students should be aware of, and able to discuss, their own and commercial products leading to possible improvements/modifications of the original idea.</p> <p>Students should be aware of, and able to discuss, how products are required to undergo rigorous testing, and the testing methods used, before they become commercially available for sale.</p> <p>Students should be aware of, and able to discuss, how the use of feedback and testing informs the evaluation process, including:</p> <ul style="list-style-type: none"> <li>• informing future modification and development</li> <li>• the importance of ensuring the views of other interested parties in order to have objective and unbiased feedback.</li> </ul>	
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