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**Knowledge Rich Curriculum Plan**

GCSE Design Core

Core Technical Principles - 1.3 Developments in new materials



| **GCSE Design Core** | **Core Technical Principles**  **1.3 Developments in new materials** |  |  |  |
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| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* | **Assessment** |
| **Lesson:**  **Smart materials** | * Students will know the term smart materials * Smart materials: materials that change their properties due to changes in the environment * Students will know the types of smart materials * Smart materials: Thermochromic, Photochromic, Shape memory alloy * Students will know how different smart materials are used * Students will know that thermochromic changes colour due to temperature change * Students will know that Photochromic darkens colour due to UV light change * Students will know that Shape memory alloy changes shape due to temperature change | Smart material: are designed materials that have one or more properties that can be significantly changed  Thermochromic: undergoing a reversible change of colour when heated or cooled.  Photochromic: undergoing a reversible change in colour or shade when exposed to light of a particular frequency or intensity.  Shape memory alloy: an alloy that can be deformed when cold but returns to its pre-deformed ("remembered") shape when heated. | * ***Students need to already know the term ‘properties’*** * ***Students need to already know the term environment can mean surroundings as well as global environment*** | How can the use of the new material help develop a product?  Are there any advantages or disadvantages from the use of these smart materials? |
| **Lesson:**  **Modern materials** | * Students will know the term modern material * Students will know modern materials that have been discovered over the past 50 years * Students will know the types of modern materials * Metal foam * Nanomaterials * Liquid crystal display * Students will know how each modern material is used * Students will know metal foam is a sponge like metal, which is used for cars and planes * Students will know nanomaterials is an Atom by atom materials used to create protective covers * Students will know liquid crystal display is used display for TVs that use LCD technology | Modern material: a material that has been engineered to have improved properties  Metal Foam: a cellular structure consisting of a solid metal (frequently aluminium) with gas-filled pores comprising a large portion of the volume.  Nanomaterial: a material having particles or constituents of nanoscale dimensions, or one that is produced by nanotechnology.  LCD: a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid. | * ***Students need to already know the term industry*** * ***Students need to already know how products are made in industry*** | Compare the differences between smart and modern materials. Which one would be more suitable to different product?  How can the use of modern materials aid a product? |
| **Lesson:**  **Composite materials** | * Students will know the term composite material * Students will know that Composite materials are materials that are created by combining two or more materials * Students will know the types of composite materials * Glass reinforced plastic * Carbon fibre * Manufactured boards * Students will know how each composite material is used * Students will know that glass reinforced plastic is composed of small strands of glass * Students will know that carbon fibre is a woven textiles material * Manufactured boards: man made board used as a natural alternative | Composite material: formed by combining two or more materials with different properties, without dissolving or blending them into each other.  Glass reinforced plastic: a composite material made of a polymer matrix reinforced with fibres.  Carbon fibre: a material consisting of thin, strong crystalline filaments of carbon, used as a strengthening material, especially in resins and ceramics.  Manufactured Board: comprise a range of sheet materials produced by pressing and bonding together. | * ***Students need to already know the term manufactured board*** * ***Students need to already know the term properties `*** | How is the combination of different materials help strengthening the properties?  Why is it important to understand material property? |