

Subject Area: Design & Technology (Option 2 *Resistant Materials*)

Syllabus Code: 4120

Year 10

TOPIC	AREAS COVERED	SPECIFIC	TIMESCALE
Core knowledge and understanding	<ul style="list-style-type: none"> ● Design and technology and our world ● Smart materials ● Electronic systems and programmable components ● Mechanical components and devices ● Materials ● Papers & boards ● Natural & manufactured timber ● Ferrous & non-ferrous metals ● Thermoforming & thermosetting polymers ● Fibres and construction of specialist sports fabrics. 	<p>The impact of new and emerging technologies on industry, people, society, the environment, and systems.</p> <p>Developments in modern and smart materials, composite materials and technical fabrics.</p> <p>How energy is generated and stored in order to choose and use appropriate sources to make products and to power systems.</p> <p>How electronic systems provide functionality to products and processes, including sensors and control devices to respond to a variety of inputs, and devices to produce a range of outputs</p> <p>The use of programmable electronic components to embed functionality into products in order to enhance and customise their operation.</p> <p>The functions of mechanical devices, to produce different sorts of movement, changing the magnitude and direction of forces.</p> <p>The categorisation and study of the properties of plastics, woods and metals.</p> <p>A study of special fabrics and fibres such as Kevlar, Gore Tex and Polyester sportswear designed to quickly wick away moisture.</p> <p>The use of CAD/CAM production.</p>	Throughout Year 10
In-depth knowledge and understanding Option 2 Resistant Materials	<ul style="list-style-type: none"> ● The physical and working properties of Ferrous and nonferrous metals, and their ecological and social footprint. ● Specialist techniques and processes that can be used to shape, fabricate, construct and assemble a high quality prototype, including techniques 	<p>Students will complete a range of in-depth practical and theoretical investigations into; the working properties of ferrous metals, nonferrous metals and alloys.</p> <p>Properties of metals: hardness, elasticity, conductivity, toughness, ductility, tensile strength and malleability. Types of Ferrous metals, and Non-ferrous metals. An awareness that alloys of metals are a base metal mixed with other metals or non-metals to change their properties or appearance. The use and applications of</p>	Year 10 and Year 11

	<p>such as wastage, addition, deforming and reforming, as appropriate to the materials and/or components being used</p>	<p>finish to protect and improve the aesthetic appeal.</p> <p>Aesthetic and functional properties of the following: aluminium, duralumin, copper, brass, bronze, pewter, silver, cast iron, mild steel and medium carbon steel.</p> <p>Responsibilities of designers and manufacturers who design using metals with respect to: the environment; working conditions in third world countries, low labour costs and poverty; exploitation of employees; recyclability and waste. Biodiversity. Estimating the true costs of a prototype or product.</p> <p>Students will learn about techniques that include: Wastage/Addition; Cutting metals to the required shape or contour. Tools and equipment to mark out, hold, cut, shape, drill and form metals. The pillar drill to drill holes to various diameters. Jigs and formers to ensure accuracy as part of the process of drilling. Pilot, clearance, tapping, countersunk and counter bored holes. Deforming/Reforming; Metal joining can be permanent or temporary, by welding, soldering and the use of nuts, bolts, washers, screws, rivets, hinges, catches.</p> <p>Lathe to turn materials. Milling machine to create a slot or face edge. The main stages in the following joining processes: Permanent: riveting, welding, brazing, silver soldering and use of epoxy resins.</p>	
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Year 11

TOPIC	AREAS COVERED	SPECIFIC	TIMESCALE
<p>Non-Examined Assessment. (This is single coursework project)</p>	<ul style="list-style-type: none"> • Demonstration of knowledge of subject through the completion of a design and make task. • The non-examined assessment will be based on one of 	<p>Component 2: Design and make task</p> <p>Non-exam assessment: Design and manufacture of a fully functioning prototype, which focuses on an area of Resistant Materials The non-examined assessment will require students to undergo an iterative design process to develop a working</p>	<p>Year 11 18 - 20 Weeks</p>

	three themes chosen by the examination board.	prototype product. Students must demonstrate a range of skills within the non-examined assessment including the use of CAD & CAM. The Non-examined assessment is worth 50% of the overall GCSE qualification, approximately 35 hours	
Examination Preparation	All areas from the Core knowledge and the In-depth knowledge will be examined	Component 1: Design and Technology in the 21st Century Written examination: 2 hours 50% of overall GCSE qualification	Throughout Year 11