

Year 10 and 11 Design Technology Curriculum Rationale

To provide students with experiences in a range of materials and with a range of processes making them aware of the practical life skills they can utilise in their own lives and gain an appreciation of how products are manufactured at scale in an industrial context. To develop a knowledge of materials, skills and processes combined with enriched communication skills to be creative in solving problems and developing a solution or product for a target market. To prepare students for their NEA by being able to identify and solve problems for a client's needs.

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
Term 1 and 2 (14 weeks) Project 1						
Measuring and marking out	How to use steel rules, tri-squares and marking gauges to accurately measure materials and mark out wood joints	Builds on skills taught in KS3.	Project 1 assessed in terms of practical quality only , using GCSE specification grade descriptors.	Correct use of subject specific terminology – ALL SECTIONS. Conversion of cm to mm.	REALISING – <i>Automaticity</i> <i>Speed and accuracy</i> for all practical tasks	
CAD	How to use 2D Design to produce flat drawings, isometric drawings and patterns for laser cutting. How to use Onshape to accurately produce 3D components and assemblies.	Builds on basic skills taught in KS3, but teaches students more advanced functions and draws links to the use of CAD/CAM in industry (orthographic projection and exploded diagrams)	1.8, 1.9. 1.10 and 1.12 assessed using low-stakes quizzes and summative exam questions.		REALISING <i>Automaticity</i> <i>Speed and accuracy</i> LINKING <i>Generalisation</i> <i>Abstraction</i>	HL – Onshape practice
1.12 – Natural and manufactured timbers	The types, properties, structure and uses of a range of woods and manufactured boards				ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – identifying timber-based products (followed by quiz)

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
						HL – Workbook completion
Cutting joints and joining	How to use tenon saws, vices, bench hooks, pillar drills, chisels and clamps to safely and accurately join materials	Builds on skills taught in KS3 but encourages further independence and confidence in the workshop. Emphasis on accuracy.			REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	
1.8 – Categorisation or ferrous and non-ferrous metals	The types, properties, structure and uses of some common metals	Taught to support the pewter casting section of project 1 at the end of the project.		SMSC - Impact of mining on communities and the environment	ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Identifying ferrous and non-ferrous metal items at home (followed by quiz) HL – Workbook completion
Finishing	How to use paints, dyes, stains and waxes to apply high quality finishes to materials				REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	
7.8 – Surface treatments and finishes for functional and aesthetic purposes		Taught to extend students' knowledge while applying finishes to their own projects.			ANALYSING <i>Critical thinking</i> LINKING <i>Connection finding</i> <i>Generalisation</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
1.10 – Thermoforming and thermosetting polymers	The types, properties, structure and uses of a range of polymers			SMSC - Impact of plastics on the environment	ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Identifying polymer items at home (followed by quiz) HL – Workbook completion
1.9 – Papers and boards	The types, properties, structure and uses of papers and boards			SMSC – how recycling is important for the environment	ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – packaging analysis task HL – Workbook completion
Pewter casting	How to construct moulds to make accurate pewter castings	Completely new skill for students.			CREATING <i>Fluent thinking to create quick ideas that could work with casting process</i> REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	
Terms 3 and 4 (12 weeks) Project 2						
1.16 – Use of different design strategies		Taught to illustrate to the students the importance of design strategies before they	Project 2 assessed in the following areas: 1. Research – client interview and analysis	SMSC – considering the user’s wants and needs when designing	META-THINKING ANALYSING <i>Critical thinking</i> <i>Complex problem solving</i> LINKING <i>Generalisation</i>	HL - Client survey/interview

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
		undertake designing of project 2.	2. Design ideas and development including physical and CAD modelling		<i>Connection finding</i> <i>Seeing alternative perspectives</i> EMPATHY	
Design strategies	How to use the work of past and present designers and a user focussed approach to ensure design solutions consider user wants and needs.	Students will use what they have learnt in 1.16 to improve the quality of their designs.	3. Quality of presentation 4. Making a quality product All areas assessed using the exam board specification.		LINKING <i>Generalisation</i> <i>Connection finding</i> <i>Seeing alternative perspectives</i> EMPATHY AGILE	
1.17 – Using communication techniques to present design ideas		Taught before students start their design ideas so that they can practice different presentation techniques.	1.1 assessed using low-stakes quizzes and summative exam questions.		CREATING REALISING <i>Automaticity</i> <i>Speed and accuracy</i> AGILE	
Drawing and sketching	Drawing straight lines, 1-point and 2-point perspective to improve sketching, and isometric drawing				CREATING REALISING <i>Automaticity</i> <i>Speed and accuracy</i> AGILE	HL - Orthographic drawing of your favourite possession.
1.1 – The impact of new and emerging technologies	Production systems and techniques	Taught before students make their lamination formers so they have an		SMSC and FBV – students consider the impact of new and	META-THINKING ANALYSING <i>Critical thinking</i> <i>Complex problem solving</i>	HL – waste analysis at home

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
		understanding of the importance of designing for quantity production.		emerging technologies on individuals, communities, society and different social groups. Students consider the ethical factors of new and emerging technologies.	LINKING <i>Generalisation</i> <i>Connection finding</i> <i>Imagination</i> <i>Seeing alternative perspectives</i> EMPATHY	HL – Workbook completion
Designing formers and laminating	Practical lessons	Reminds students of what they have learnt about quantity production. Practical task will be used to remind students about the lamination process when studying timbers in Year 11.			REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	
Term 5 (6 weeks) Core theory remainder						
Term 6 (7 weeks) Non-examined assessment (NEA) begins						
1.2 – Evaluating new and emerging technologies to	Group and individual analysis of products			Literacy – extended analysis and writing tasks	META-THINKING ANALYSING <i>Critical thinking</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
inform design decisions	using critical evaluation questions				LINKING <i>Generalisation</i> <i>Imagination</i>	
1.3 – Energy: generation, storage and choosing appropriate sources	Methods of generating energy, how energy is stored and made available for use, factors to be considered when choosing power sources and how to discriminate between them			SMSC – environmental and social concerns	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i> EMPATHY	HL – Workbook completion
1.4 – Smart and composite materials, and technical textiles	Modern and smart materials, composite materials, technical textiles				META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion
1.5 – Mechanical devices used to control movement	Performance, principles, application and influence of mechanical devices on product design; how mechanisms change movement and increase mechanical advantage; how different components			Numeracy – various formulae and simple equations used to calculate mechanical advantage, velocity ratios and efficiency	META-THINKING ANALYSING <i>Critical thinking</i> <i>Complex problem solving</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	can be used within a mechanism.					
1.6 – Electronic systems	How an electronic system can make a product function; the role of devices and components; input devices and output devices			Numeracy	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion
1.7 – Programmable components	How flowcharts can be used to create a program; how to switch outputs on and off in relation to inputs and decisions; how analogue inputs can be used; how delays and loops can be used in a circuit.			Numeracy – how to design logical systems	META-THINKING ANALYSING <i>Critical thinking</i> <i>Complex problem solving</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Workbook completion
1.11 – Fibres and textiles	The types, properties, structure and uses of different fibres and textiles				META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion
1.13 – All design and technological practice takes place within	Performance requirements of a wide range of materials, components, and	Should be taught parallel to relevant NEA section			META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
contexts which inform outcomes	manufacturing processes; how to discriminate between them and select appropriately				AGILE	
1.14 – Challenges that influence the processes of designing and making	Environmental challenges; social challenges; economic challenges; that designers have to take into consideration in the design and development of new products			SMSC, FBV – environmental, social and economic challenges affecting designers	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i> <i>Imagination</i> EMPATHY	HL – Workbook completion
1.15 – Investigate and analyse the work of professionals and companies to inform design	Strategies, techniques and approaches for investigating and analysing the work of others; how to analyse existing products to help you establish specification criteria; the influence if leading design companies and professionals			SMSC – looking at designers from different parts of the world and different genders	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Seeing alternative perspectives</i>	HL – Workbook completion

Timbers

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
7.1 – Design contexts	Brief history of the use of wood for making objects and products		All areas are assessed formatively and frequently using low-stakes quizzes, and using summative exam questions after each section is complete	Correct use of subject-specific terminology in ALL AREAS	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	
7.2 – Sources of timber	Some of the different hardwoods, softwoods and manufactured boards available; the advantages, disadvantages of some timbers, and their applications; some of the physical characteristics of timber; some of the social issues raised by the use of timber			SMSC – Social and environmental factors involved in the growing and felling of trees.	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Workbook completion
7.3 – Selection of timber	The aesthetic, cultural and social factors involved in the use of timber; the environmental factors involved in the use of timber; how cost and availability affect product design; how to use this			SMSC – environmental factors concerning the choosing of sources of timber	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> <i>Connection finding</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	information to select appropriate materials					
7.4 – Strengthening timber	The types of forces that can act on timber; some ways to strengthen timber beams and frames				META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion
7.5 – Stock forms and sizes	The stock shapes and forms timber comes in; standard stock sizes; how to use this to select appropriate timber			Numeracy – standard sizes and measurements	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i>	HL – Workbook completion
7.6 – Manufacturing processes	Some of the machinery used to process timber; the different scales of production in manufacturing; how manufacturing aids can be used in manufacturing				META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	HL – Workbook completion
7.7 – Equipment and processes used to make prototypes	The purpose of a range of hand tools used for working wood; the purpose of some of the machinery that can be used to work				META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> REALISING <i>Automaticity</i>	HL – Workbook completion

Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	wood; fixtures and fittings that can be used to join wood				<i>Speed and accuracy</i>	
7.8 – Surface treatments and finishes for functional and aesthetic purposes	The advantages and disadvantages of a range of surface finishes that can be applied to timber			SMSC – the importance of applying finishes to keep timber in good condition for longer, reducing the necessity of sourcing additional materials	META-THINKING ANALYSING <i>Critical thinking</i> LINKING <i>Generalisation</i> REALISING <i>Automaticity</i> <i>Speed and accuracy</i>	HL – Workbook completion
Non-examined assessment 01/06 Year 10 – 30/04 Year 11)						
1 – Investigating design possibilities						
2 – Design ideas						
3 – Developing ideas						
4 – Practical						
5 – Evaluation						

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Unit:	Core knowledge/skill development:	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
Exam preparation						