Engineering KS4

	Composite 1: Exploring Engineering Sectors and Design Applications	Composite 2: Investigating an Engineering Project	Composite 3: Responding to an Engineering Brief

Curriculum Content	**Component A**
	Understand Engineering Sectors, engineered products and interconnections
	
	Component A1:
	• Engineering sectors, engineered products and interconnections
	  ○ Define different engineering sectors
	  ○ Explore products from each sector and combinations of sectors
	
	Component A2:
	• Engineering organisations, functions, job roles and career progression
	
	Component B
	Explore engineering skills through the design process
	
	Component B1:
	• The design process
	  ○ Define
	  ○ Develop
	  ○ Choose
	  ○ Design
	  ○ Evaluate
		Component A
		Understand materials, components and processes for a given engineered product
		
		Component A1:
		• Materials
		  ○ Engineering material categories
		  ○ Properties of engineering materials
		  ○ Characteristics of engineering materials
		
		Component A2:
		• Components
		  ○ Types of components
		  ○ Characteristics of components.
		
		Component A3:
		• Processes
		  ○ Types of engineering processes (cutting, shaping, forming and joining)
		
		Component B
		Investigate a given engineered product using disassembly techniques
		
		Component B1:
		• Practical engineering skills
		  ○ Observing and recording skills
		  ○ Measurement skills
		
		Component B2:
		• Disassembly techniques
		  ○ Safe use of disassembly techniques
		  ○ Safe use of tools and equipment
		
		Component B3:
		• Product Design Specification (PDS)
		  ○ Key information in a PDS
		
		Component C
		Plan the manufacture of and safely reproduce/inspect/test a given engineered component
		
		Component C1:
		• Apply Engineering make process
		  ○ Defining the problem
		  ○ Developing possible solutions
		  ○ Choosing a solution
		  ○ Making using engineering processes
		  ○ Inspecting and testing chosen solution
		  ○ Evaluating outcome of project
		
		Component C2:
			Component 3 consolidates the skills and knowledge acquired in Composites 1 and 2 and is synoptic.
			
			The composite will give students engineering briefs with problems they need to respond to.
			
			Students will carry out tests, collect and analyse data, reflect on their findings, consider any issues and suggest solutions
			
			Component A
			Carry out a process to meet the needs of an engineering brief
			
			Component A1:
			• Carry out a process
			  ○ Following planned procedures
			  ○ Using and testing a prototype/model
			  ○ Assembling, handling and using material, equipment and machinery
			
			Component A2:
			• Recording the process
			  ○ Measuring and recording data
			  ○ Tabulating data
			  ○ Displaying appropriate data graphically
			  ○ Observation skills
			
			Component A3:
			• Interpretation of data
			  ○ Identify anomalous results
			  ○ Comparison of trends/patterns in data
			  ○ Evaluating the process
			  ○ Drawing valid conclusions
			  ○ Making recommendations related to engineering briefs
			
			Component B
			Provide a design solution for an engineered product against the needs of an engineering brief
			
			Component B1:
			• Interpretation of a given brief for an engineered product
			  ○ Analysing the existing product
			  ○ Assessing dimensions and tolerances
			  ○ Evaluating material and processes used
			
			Component B2:
			• Redesign
			  ○ Identify relevant issues with the existing design
			  ○ Design sketched
			  ○ Redesign ideas
			
			Component B3:

		• Develop a production plan including:
		  ○ Planning operations and processes
		  ○ Awareness of risks and hazards
		  ○ Safe preparation
		  ○ Good housekeeping
		  ○ Apply making skills
		  ○ Apply skills in observing and recording techniques
			• Evaluation
			  ○ Review the credibility of design ideas
			  ○ Selecting the most appropriate design
			  ○ Justification of the design solution
			  ○ Justification of the processes used.
			
			<u>Component C</u>
			Provide solutions to meet the needs of an engineering brief
			
			Component C1:
			• Analysing engineering information associated with the problem
			  ○ Types of engineering information
			  ○ Interpreting patterns and trends related to the engineering information
			  ○ Identifying issues and causes associated with the problem
			
			Component C2:
			• Selecting a solution
			  ○ Potential solutions for current and/or potential issues
			  ○ Any wider factors
			  ○ Ways in which the solution may be improved
			  ○ Identifying advantages and disadvantages/limitations/constraints
			  ○ Justifying the best solution
			  ○ Reflecting on processes and making recommendations
			
			Component C3:
			• Problem Solution
			  ○ Resources required and their use
			  ○ Design of solution
			  ○ Make processes
			  ○ Manufacturing processes
			  ○ Data collecton
			  ○ Data analysis and quality
			  ○ Safety considerations
			  ○ Considering timescales

Prior knowledge and skills (from previous year / key stage)	Some students will have covered basic material testing in KS2 Science. There is the possibility that some students have experienced some Design and Technology work in Primary school, however this is likely to be a very small percentage of the cohort. Most students should have experienced Design and Technology as a KS3 rotation subject in year 7. Some students will also have had experience in year 8, but due to covid related disruption this will not apply to all students. Due to the mixed previous experiences of students, no prior knowledge will be assumed.	Component 1 will have opened up some opportunities for discussion of materials and their properties.	Component 3 consolidates and assesses learning from Components 1 and 2.
Assessment Objectives			**AO1** Understand how to respond to an engineering brief **AO2** Select skills and techniques in response to an engineering brief **AO3** Apply skills and techniques in response to an engineering brief **AO4** Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief
Vocabulary / Key Subject Terminology	Sector / Discipline Product Pulley Gear Lever	Forming Joining Durable Ductile Malleable Tensile Torsion Caliper Risk Hazard CAD Line Type Radius Scale	

		Compression Aesthetic photosensitive Component Dissassembly Tolerance Marking out Accuracy Precision Anomaly	
Assessment 1	Knowledge retrieval questions	Knowledge retrieval questions	Knowledge retrieval questions
Assessment 2	Mastery Tasks	Mastery Tasks	Mastery Tasks
Assessment 3	Internal Asessment Component 1A	Internal Asessment Component 2A	External Assessment
Assessment 4	Internal Asessment Component 1B	Internal Asessment Component 2B	
Assessment 5	Internal Asessment Component 1B	Internal Asessment Component 2C	
Cross Curricular Links with other Faculties	• Science: Moments, levers and gears, fluid pressure. • Literacy: Articles related to engineering sectors, products, companies and job roles.	• Numeracy: Measuring and marking out • Science: use of keywords • Literacy: articles about materials and their application, interpreting engineering briefs	• Numeracy: Measuring and marking out. • Science: application of scientific principles • Literacy: interpreting engineering briefs
Knowledge Organiser content	• Engineering Sectors and Products • Engineering Companies, job roles and career progression	• Material types • Material Properties – Physical / Aesthetic • Manufacturing Tools • Manufacturing Techniques	• Electronic components and circuit symbols • Components of technical drawings
British Values	• ‘Rule of Law’ and why we have rules and regulations in the Engineering Workshop. • ‘Mutual Respect’ and ‘Tolerance’ will be taught through component 1 as students learn about engineering sectors and job roles. Special attention will be made to promote career opportunities for female and ethnic minority students in engineering. • These British Values will be referenced whenever possible in each of the composite 1 lessons.	• ‘Rule of Law’ and why we have rules and regulations in the Engineering Workshop. • ‘Mutual Respect’ and ‘Tolerance’ will be encouraged throughout all discussions. • ‘Mutual Respect’ and ‘Tolerance’ will also be referred to during all knowledge organiser quizzes referencing Composite 1 content.	• ‘Rule of Law’ and why we have rules and regulations in the Engineering Workshop. • ‘Mutual Respect’ and ‘Tolerance’ will be encouraged throughout all discussions. • ‘Mutual Respect’ and ‘Tolerance’ will also be referred to during all knowledge organiser quizzes referencing Composite 1 content.
Extra-Curricular Offer			

THE OLDHAM ACADEMY NORTH