Engineering Curriculum Intent

The Engineering curriculum at Trinity High School has been carefully designed so that students' **knowledge** – both substantive and disciplinary – becomes more broad and more sophisticated as they progress through year 10 and year 11. We have used the strong **subject expertise** within our department to ensure **inclusivity -** that all students are able to access and understand even the most complex of concepts.

For example, in Year 10 pupils are first introduced to the key materials used withing engineering: Metals, Alloys and Polymers. We then focus on specific functional areas as our students progress enabling them to form links between the different areas within engineering and develop a clearer understanding of how the concepts link together to form a final solution.

Our curriculum also ensures that students' disciplinary knowledge develops in an equally advanced way. For example, students will take the knowledge of the keys areas and develop skills that allow them to make informed engineering decisions, with the understanding of how these decisions may differ based upon different contexts.

We use the principles of **cognitive science** in the planning of our curriculum, to ensure that students develop bodies of knowledge through revisiting key concepts in different contexts. Each element of the curriculum has been **carefully sequenced** to aid the **acquisition and remembering** of this content and through this, students will be enabled in their learning - to think **metacognitively**.

Finally, although outcomes are very important, we know that teaching to the test is counterproductive in developing knowledge and understanding. Our curriculum is therefore enriched by a wealth of **cultural capital** – the glue which helps the core content to stick. Throughout the course theory is linked to real life engineering examples, giving students a clear insight into how the studying of the subject will develop their understanding in future pathways. An example of this would be a look into how the emerging technologies and science play an impact on the world and its engineering developments.

"As engineers, we were going to be in a position to change the world – not just study it." Henry Petroski

The document below details the core substantive and disciplinary knowledge and how these build over time in our subject.

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	Subject: Engineering Curriculum Intent Year 10		
Term	**Core Propositional Knowledge (The What)**	**Procedural Knowledge (The How)**	**Hinterland**
Autumn	**3.1 Engineering materials** Students will learn and understanding of the following groups/classifications of engineering materials. • Metals and alloys • Polymers • Composites • Other matierials **3.2 Engineering manufacturing processes** Students will learn and understanding of the following manufacturing processes and techniques. • Additive manufacturing • Material removal • Shaping • Casting and moulding • Joining and assembly • Heat and chemical treatment • Surface finishing Students will learn: • which process is appropriate for specific materials • how these processes would be carried out.	• AO1: Demonstrate knowledge and understanding of engineering principles and processes. • AO2: Apply knowledge, understanding and skills in different contexts, including through the use of a range of tools, equipment, materials, components and manufacturing processes. • AO3: Analyse and evaluate evidence in relation to a range of engineering context	• Weekly discussions with a relevant topic taken from current affairs within the engineering industry. Students should be able to link lesson theory work to the real world. • Investigation into materials. • Investigation into manufacturing processes. • Links to materials and manufacturers used within the school, home and the wider world environments. • Exploration of entrepreneurs.
Spring	**3.3 Systems** Students will learn and understanding of the use and role of the following systems within engineering settings. • Mechanical Systems • Electrical Systems • Electronic Systems • Structural Systems • Pneumatic Systems Students will be: • familiar with the function of the system building blocks specified in 'systems' below • able to describe the way in which parts of a system can be divided into sub-systems		• Weekly discussions with a relevant topic taken from current affairs within the engineering industry. Students should be able to link lesson theory work to the real world. • Investigation into systems. • Links to systems used within the school, home and the wider world environments. • Exploration of entrepreneurs.

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Summer	**3.4 Testing and investigation** Students will learn and understanding of a range of testing and investigation methods. They should be able to apply relevant mathematical calculations when engineering a solution. • Modelling and calculating • Testing • Aerodynamics **3.5 The impact of modern technologies** Students will learn and understand the following and provide and discuss examples for each. • The use of new and emerging technologies • The impact of engineering industries		• Weekly discussions with a relevant topic taken from current affairs within the engineering industry. Students should be able to link lesson theory work to the real world. • Investigations and testing scenarios • Investigations into modern technology • Links to investigation and testing used within the school, home and the wider world environments. • Exploration of entrepreneurs.
Year 10 End Point	By the end of Year 10, students will have a clear understanding of the topic areas: 3.1, 3.2, 3.3, 3.4 and 3.5. Students will be aware of the impact of the different topic areas on the final solution and be able to analyse the impact. They will also be confident at producing suitable solutions to support solving engineering problems.		

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	Subject: Engineering Curriculum Intent Year 11		
Term	**Core Propositional Knowledge (The What)**	**Procedural Knowledge (The How)**	**Hinterland**
Autumn Spring Summer	**3.6 Practical engineering skills** Students will learn to draw on their knowledge and understanding of engineering to apply the following practical skills to a problem. • Solve problems through a logical, systematic approach. Analyse and evaluate existing solutions to problems. • Produce and work to a series of engineering drawings or schematics • Use CAD to assist in the creation of a solution. Use Computer Numerical Control (CNC)/Computer Aided Manufacture (CAM) in the manufacture of a solution. • Test materials and their structural behaviour under load in order to ascertain suitable material(s) for a chosen component. • Produce and follow a production plan taking into account: materials, processes, time and safety. • Predict performance using calculations and modelling. • Select and safely use a range of appropriate: • materials • parts • components • tools • equipment. In order to manufacture a working solution. • Select and use appropriate processes in order to manufacture a working solution. • Apply quality control methods and techniques during the manufacture of the solution. • Design a range of tests to assess the fitness for purpose and performance of a completed product. **Revision** Structured revision and exam practice of all content will take place leading up to the final GCSE exams.	• AO1: Demonstrate knowledge and understanding of engineering principles and processes. • AO2: Apply knowledge, understanding and skills in different contexts, including through the use of a range of tools, equipment, materials, components and manufacturing processes. • AO3: Analyse and evaluate evidence in relation to a range of engineering context	• Visits to local engineering industry. • Workshop demonstrations
Year 11 End Point	By the end of Year 11, pupils will draw together their knowledge, skills and understanding from across the full course of study to analyse engineering aspects from each topic area. They will be able to analyse the impact on the environment and make informed judgements on how specific engineering approaches can solve these problems. Finally, they will develop their ability to identify solutions by critically and reflectively evaluating again criteria, which in turn will benefit them in their future working lives.		