Curriculum Map: ENGINEERING DESIGN

Subject sentence – What do we do?
The Engineering Design curriculum provides students with a comprehensive engineering specific knowledge base, of which will be applied in a wide range of practical contexts, situations and scenarios.

How does Engineering equip students with powerful knowledge?
Students will design and make products that solve real and relevant problems, within a variety of contexts, while considering their own needs and those of others, external influences, and the application of theoretical understanding of processes and techniques. Students will develop a deep understanding of the Engineering design process, which includes; design strategies, forms of research, generation of design solutions, use of Computer aided design to produce 2d and 3d engineering models and materials theory.

What skills and cultural capital do students gain in Engineering?
The Engineering curriculum exposes students to a wide and diverse range of contemporary and historical engineering trends. Students will also develop a detailed understanding of ethics and sustainability in relation to sourcing and processing materials, labour law, fair trade and product miles.

How do we support literacy in Engineering?
Within all aspects of Engineering, literacy is essential. In particular, the correct use of technical language. In order to equip all students with the correct and extensive range of technical vocabulary, tier two and tier three language is delivered through modelling tasks and skills. Teachers will demonstrate how to apply key vocabulary in a variety of contexts.

How is the Engineering curriculum designed?
The Engineering curriculum is highly ambitious, academically challenging and relevant to real world situations and scenarios. Students learn the key concepts, skills and processes identified in the national curriculum from Year 7 and then engage with them at a deeper level of understanding as they progress into Year 9. In Year 7 and 8, breadth is delivered through a rotation across the Creative Technologies subject areas. In Years 9 to 11 the curriculum is focused specifically on developing engineering knowledge and the application of it through a series of design and make projects.

How do you use spaced practice / retrieval practice?
Retrieval practice is a feature of every lesson. Our 'Do Now' tasks are designed to interleave retrieval from previous topics, as well as offer the 'hinge' point for understanding of the current lesson. The curriculum design is such that the core knowledge taught underpins the next cycle and body of work, meaning that all students are constantly building on prior knowledge in new and challenging contexts. Knowledge organisers provide the foundations for this on a weekly basis.

What content do you cover and how is this delivered over time?
In Year 7 and 8 the Creative Technologies foundation curriculum introduces and develops the essential skills such as, researching, problem solving, planning, generating ideas, developing ideas, using CAD and evaluating, all of which students will need to thrive and succeed in all areas of Creative Technologies, should they choose to study these at greater depth through Year 9 - 11. At greater depth, in Engineering design students are introduced to all material areas, the working properties of these materials, manufacturing processes and their wider implications on the world around us. Over time the work of others is considered in terms of how this may influence design thinking. Building on this, students are introduced to computer aided design and technical drawing requirements in order to bring their thinking through the development phase and into production.

How do you sequence the curriculum so that new knowledge and skills build on what has been taught before?
The curriculum has been carefully and thoughtfully sequenced to ensure that firstly through Year 7 and 8 all students development the essential practical skills they will need, should they choose to study a Creative Technology subject at greater depth in Year 9-11. The Engineering curriculum delivers knowledge and builds on this through a series of design and make tasks, in order to allow students to develop an understanding of knowledge application in a wide range of contexts. The culmination of the five year journey will require all students to draw upon the extensive range of knowledge and skills to independently engineer a fully functioning product.

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CYCLE 2
R040: Design, evaluation and modelling: Undertake a practical risk assessment, write a detailed plan of making and use this to manufacture a working prototype.

CYCLE 3
Completion of R040: Design, evaluation and modelling, revision and examination.

CYCLE 1
R040: Research, product analysis and generation of CAD models: Research and evaluate existing products. Generate a 3D CAD model of your final design.

CYCLE 3
Principles of Engineering Design
Needs and wants, quantitative and qualitative data analysis.

CYCLE 2
R039: Communicating Designs: Production of industry standard engineering drawings and 3d CAD models.

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CYCLE 2
Principles of Engineering design: Design strategies, research techniques and the design process.

CYCLE 3
Presentation techniques: Drawing/sketching in 3d, rendering and annotating designs.

CYCLE 1
R039: Communicating Designs: Production of freehand sketches; perspective and isometric rendering.

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CYCLE 1
CAD & manufacturing: Industry standard orthographic drawing and 3d modelling.

CYCLE 3
Engineering: Block Bot; planning manufacture, CAD modelling and manufacturing a prototype.

CYCLE 2
Design Technology: Biomimicry: the use of structures and forms in nature to inspire design ideas.

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CYCLE 2
Design Technology: Design and make it; Morag Myerscough inspired picture frame.

CYCLE 3
Engineering: Block Bot; planning manufacture, CAD modelling and manufacturing a prototype.

CYCLE 1
Design Technology: Glasses holder; research, design and make task.

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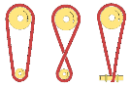
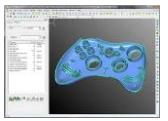
CYCLE 1
Digital Literacy: eSafety, cyber security, apps, cloud computing and file structures.

Potential future careers in Engineering

CAD engineer.
Aeronautical engineer.
Civil engineer.
Structural engineer.
Design and development technician.

Ted Wragg Trust

Key concepts

- Sustainability
- Diversity in design
- Creative problem solving
- Retrieval and recall
- Materials and their working properties
- Designers, design movements and influences
- Time management

Understand and apply the fundamental principles of engineering design to create solutions to design problems.