Long Term Mapping 2025 – 26

KS4 – Year 11 – OCR Engineering Manufacture

Subject Intent/ Aims:

This qualification will enable pupils to learn about the process of engineering manufacture and understand the different materials that can be used to manufacture products. Pupils will develop the ability to plan the production of a one-off product using a range of hand-held pieces of equipment and machining methods. You will also learn how to program CNC equipment to manufacture in quantity.

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Key Concepts - Advent	Key Concepts – Lent	Key Concepts - Pentecost
• Health and Safety Introduction- how to be safe in a workshop environment. • The Design Brief R015 OR R016– Introduction to the course and NEA. • Understand how to achieve and work to the required mark band for the 5 tasks required.	• Work on the required NEA R015/16 • Understand how to achieve and work to the required mark band for of the 5 tasks required.	• Work on the required NEA R015/16 • Understand how to achieve and work to the required mark band for of the 5 tasks required. • Upon completion of R015/16 focus on Y11 R014 context. • Revision and practical concepts explored to gain and understanding of R014.
National Curriculum Coverage	**National Curriculum Coverage**	**National Curriculum Coverage**
Cambridge National in Engineering Manufacture will encourage students to: • understand and apply the fundamental principles and concepts of Engineering Manufacture, including manufacturing processes, engineering materials, manufacturing requirements and developments in engineering manufacture • develop learning and practical skills that can be applied to real-life contexts and work situations • think creatively, innovatively, analytically, logically and critically.	Develop independence and confidence in using skills that would be relevant to the engineering, manufacturing, process and control sector and more widely: • Plan manufacturing production through practical experience of manufacturing for one-off products and manufacturing in quantity • Determine the sequence of operations required, recognising hazards and risks so that control measures can be implemented for safe working • Interpret engineering drawings to facilitate manufacture, using a range of tools and equipment, including Computer Numerical Control (CNC) machines.	Develop independence and confidence in using skills that would be relevant to the engineering, manufacturing, process and control sector and more widely: • Plan manufacturing production through practical experience of manufacturing for one-off products and manufacturing in quantity • Determine the sequence of operations required, recognising hazards and risks so that control measures can be implemented for safe working • Interpret engineering drawings to facilitate manufacture, using a range of tools and equipment, including Computer Numerical Control (CNC) machines. **Technical knowledge** • understand and use the properties of materials and the performance of structural elements to achieve functioning solutions.

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Components		Components		Components	
Term 1	*Term 2*	*Term 1*	*Term 2*	*Term 1*	*Term 2*
• Revision of Health and Safety- workshop, tools and materials. • Pupils will study the key aspects of engineering manufacture and have the opportunity to apply what they learn through a number of practical experiences. This will involve pupils studying three mandatory units: • R014 • R015 • R016	**R015:** Manufacturing a one-off product This is assessed by a set assignment. In this unit you will learn how to safely plan and produce a one-off product by using appropriate processes, tools and equipment. Topics include: • Planning the production of a one-off product • Measuring and marking out • Safely use processes, tools and equipment to make a product.	**R016:** Manufacturing in quantity In this unit you will learn how to manufacture using simple jigs and templates to support manufacturing in volume using Computer Aided Design (CAD) software and Computer Numerical Control (CNC) equipment. Topics include: • Preparing for manufacture • Develop programmes to operate CNC equipment • o Safely use processes and equipment to make products in quantity.	**R015:** Manufacturing a one-off product This is assessed by a set assignment. In this unit you will learn how to safely plan and produce a one-off product by using appropriate processes, tools and equipment. Topics include: • Planning the production of a one-off product • Measuring and marking out • Safely use processes, tools and equipment to make a product.	**R016:** Manufacturing in quantity In this unit you will learn how to manufacture using simple jigs and templates to support manufacturing in volume using Computer Aided Design (CAD) software and Computer Numerical Control (CNC) equipment. Topics include: • Preparing for manufacture • Develop programmes to operate CNC equipment • o Safely use processes and equipment to make products in quantity.	**R014:** Principles of engineering manufacture This is assessed by an exam. In this unit pupils will learn about the different types of manufacturing processes, and the different materials that can be used within manufacturing. Topics include: • Manufacturing processes • Engineering materials • Manufacturing requirements • Developments in engineering manufacture. •

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HO Knowledge		HO Knowledge		HO Knowledge	
Term 1	*Term 2*	*Term 1*	*Term 2*	*Term 1*	*Term 2*
❖ Can evaluate and interpret a design brief. ❖ Can interpret an engineering drawing and prepare a production plan. ❖ Can suggest a range of solutions to potential safety issues.	❖ Can identify the most important features of a product and prepare a risk assessment.	❖ Pupils are to select and use a range of measuring and marking out equipment. ❖ Can interpret an engineering drawing.	❖ Can interpret an engineering drawing and apply an understanding of how to manufacture a product. ❖ Can use a manually controlled machine and produce a product that is fit for purpose.	❖ Can effectively apply and demonstrate a good understanding of how to use a range of tools, equipment and joining techniques. This is to produce a result that would be fit for purpose.	❖ Can recognize previous learning to make their final product. ❖ Can carry out quality control when making. ❖ Can include numeracy when making. ❖ Can evaluate in detail and reflect on previous learning.

Composite Skills		Composite Skills		Composite Skills	
Term 1	*Term 2*	*Term 1*	*Term 2*	*Term 1*	*Term 2*
➢ The dangers of a DT workshop (recap). ➢ Methods to stay safe in the workshop(recap). • This qualification will enable pupils to learn about the • process of engineering manufacture, and understand • the different materials that can be used to manufacture • products	➢ Pupils will develop the ability to plan the production of a one-off product using a range of handheld pieces of equipment and machining methods. ➢ Cross curricular links with English, Math's and Science. This will be done by including sizes. Researching different materials (metals and polymers), research and analysis of products. Research different cultures from around the world. Designing using different graphics media.	➢ All of the potential hazards of the process are identified and the risk of occurrence for each is estimated. Appropriate control measures identified for all of the hazards. ➢ All measuring equipment is selected and used appropriately. Selects and safely uses appropriate marking out equipment for all of the features.	Able to accurately measure and mark out independently. Effectively applies understanding and skills to successfully to produce the intended result in a way that would be fit-for-purpose. ➢ Pupils will understand the use of conventional machines to produce a one off component. ➢ Pupils will also learn how to program CNC equipment to manufacture in quantity	Pupils are to reflect on their work. Emphasis on being a critical thinker as well as being positive. WWW & Presented in an extended writing task. This will include RRR all different aspects of the project from start to finish. Mnemonic – reference to design process. Dual coding technique linked to metacognition links to TLJ. Able to use machinery to successfully manufacture the required part independently.	These skills will help pupils progress onto further study in the engineering, manufacturing, process and control sector. This may be Level 3 vocational qualifications, such as the Cambridge Technical in Engineering, A-Levels, such as A-Level Design and Technology, or one of the number of Fabrication and Welding Operative/Technician or Manufacturing and Process Operative Apprenticeships.

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Final composition/ Deliberate Practice		Final composition/ Deliberate Practice		Final composition/ Deliberate Practice	
Term 1	*Term 2*	*Term 1*	*Term 2*	*Term 1*	*Term 2*
○ Written skills in analysis and product research. ○ Topic Areas 1.1 and 1.2: Interpret an engineering drawing and prepare a production plan ○ **Task 1** – Planning the manufacture ○ Topic Areas 1.1 and 1.2 are assessed in this task.	○ Discussion about product analysis. ○ **Task 2** – Risk assessment Topic Area 1.3 is assessed in this task.	**Task 3** – Measuring and marking out Topic Areas 2.1 and 2.2 are assessed in this task. Pupils need to measure and mark out the parts required.	○ **Task 4** – Machining Topic Area 3.1 is assessed in this task.	○ **Task 5** – Use tools and equipment Topic Areas 3.2 and 3.3 are assessed in this task.	○ Pupils will manufacture their product. ○ Pupils will evaluate their product. ○ Pupil will prepare and complete the end of project assessment
Assessment/s (Formative and Summative)		**Assessment/s (Formative and Summative)**		**Assessment/s (Formative and Summative)**	
• J823 OCR Level 1/Level 2 Cambridge National in Engineering Manufacture 120 GLH Made up of three mandatory units: Units R014, R015 and R016. *the GLH includes assessment time for each unit. Unit R015: Manufacturing a one-off product 36 GLH OCR-set assignment 60 marks (60 UMS) Centre-assessed and OCR moderated This set assignment contains 5 practical tasks. It should take approximately 10-12 GLH to complete. Unit R016: Manufacturing in quantity 36 GLH OCR-set assignment 60 marks (60 UMS) Centre-assessed and OCR moderated This set assignment contains 5 practical tasks. It should take approximately 10-12 GLH to complete. • Questioning • Base line skills assessment (y10) • Data Drop assessment		• J823 OCR Level 1/Level 2 Cambridge National in Engineering Manufacture 120 GLH Made up of three mandatory units: Units R014, R015 and R016. *the GLH includes assessment time for each unit. Unit R015: Manufacturing a one-off product 36 GLH OCR-set assignment 60 marks (60 UMS) Centre-assessed and OCR moderated This set assignment contains 5 practical tasks. It should take approximately 10-12 GLH to complete. Unit R016: Manufacturing in quantity 36 GLH OCR-set assignment 60 marks (60 UMS) Centre-assessed and OCR moderated This set assignment contains 5 practical tasks. It should take approximately 10-12 GLH to complete. • Key terms tests • Wordsearches RRR • Questioning • DD assessment		• J823 OCR Level 1/Level 2 Cambridge National in Engineering Manufacture 120 GLH Made up of three mandatory units: Units R014, R015 and R016. *the GLH includes assessment time for each unit. Unit R014: Principles of engineering manufacture 48 GLH 1 hour 15 minute written examination 70 marks (80 UMS) OCR-set and marked Calculators are allowed in this exam This question paper has two parts: x——————— Part A – includes 10 multiple choice questions (MCQs) x– Part B – includes short answer questions and extended response questions. One extended response question will be assessed using a levels of response mark scheme. • Wordsearches RRR • Multiple choice quizzes • Questioning • End of Year Exam/ DD assessment	

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Term Dates	Sept/Oct	Nov/Dec
Curriculum content (Ongoing formative assessments. WWW EBI)	Week starting 23-9-24 Week starting 21-10-24	Week starting 18-11-24 Week starting 16-12-24
Assessment (Summative assessment. Synoptic Quiz)	Week starting 14-10-24	Week starting 25-11-24
Feedback	Week starting 14-10-24	Week starting 9-12-24

**Dates are to be amended for future/new academic years.*

Term Dates	Jan/Feb	Feb/Mar/Apr
Curriculum content (Ongoing formative assessments)	Week starting 13-1-25 Week starting 10-2-25	Week starting 3-3-25 Week starting 31-3-25
Assessment (Summative assessment. Synoptic Quiz)	Week starting 20-1-25	Week starting 10-3-25
Feedback	Week starting 3-2-25	Week starting 24-3-25

Term Dates	Apr/May	June/July
Curriculum content (Ongoing formative assessments)	Week starting 28-4-25 Week starting 12-5-25	Week starting 16-6-25 Week starting 14-7-25
Assessment (Summative assessment. Synoptic Quiz)	Week starting 5-5-25	Week starting 30-6-25 (End of year assessment)
Feedback	Week starting 19-5-25	Week starting 7-7-25

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Key Terms				Key Terms			Key Terms		
Term 1		*Term 2*		*Term 1*	*Term 2*		*Term 1*		*Term 2*
□ Forging □ Press forming metal □ Strip heating of polymers □ Vacuum forming □ Moulding of composite materials	□ Wasting □ Shaping □ Forming □ Additive processes □ Joining □ Finishing	□ Sawing □ Shearing □ Drilling □ Filing □ Threading □ Routing □ Laser-cutting □ Turning □ Milling	□ Strength □ yield/tensile □ compressive □ Elasticity □ Ductility □ Hardness	□ Malleability □ Machinability □ Cost □ material □ manufacturing □ Sustainability	□ Brazing □ MIG/MAG welding □ Riveting □ hammered rivets □ pop rivets □ Mechanical fastening □ nuts and bolts □ self-tapping screws	□ Types of thermoplastic polymer □ Acrylonitrile-Butadiene-Styrene (ABS) □ High Impact Polystyrene (HIPS) □ Polymethylmethacrylate (PMMA/Acrylic) □ Polycarbonate □ Polylactic acid (PLA) □ Types of thermosetting polymer: □ urea formaldehyde □ melamine formaldehyde □ epoxy resin □ polyester	□ Types of ferrous metal □ cast iron □ low carbon steel □ high carbon steel □ stainless steel □ Types of non-ferrous metal □ aluminium and alloys □ copper, brass and bronze	Analytical Feature Critical Advantage Disadvantage Explain Describe □ Types of engineering ceramic □ silicon carbide □ tungsten carbide □ silicate glass	Dimensions Final Ergonomics Environmental Materials Quality checks Evaluative

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Literacy/ Numeracy/ Cross-Curricular Links		Literacy/ Numeracy/ Cross-Curricular Links		Literacy/ Numeracy/ Cross-Curricular Links	
Term 1	*Term 2*	*Term 1*	*Term 2*	*Term 1*	*Term 2*
Literacy Opportunity for literacy – written analysis of tasks 1-5. Students will be required to answer questions and be successful metacognitive learners. **Numeracy** There is a strong need for numeracy ; there is a need for students understand dimensions and sizes on engineering drawings. **Cross-Curricular** English and math. Literacy tasks in line with the learning journey. Numeracy tasks in line with the learning journey. Research – Literacy task different cultures and products. Cross-Curricular – English (literacy – write up tasks) Math (measuring and application of sizes and dimensions) Science (knowledge of materials such as wood, metals and polymers) Computer Science (use of computers and different programs eg Techsoft)	**Literacy** Opportunity to write up research and product analysis. Peer assess and self-reflection task. **Literacy** Opportunity for literacy – written analysis of tasks 1-5. Students will be required to answer questions and be successful metacognitive learners. **Numeracy** Numeracy use. Research and explain size of existing products. **Cross-Curricular** English and math. Literacy tasks in line with the learning journey. Numeracy tasks in line with the learning journey. Reference made to materials needed for NEA.	**Literacy** links with English, Maths, Science, Computer Science. The main literacy element will come from the students learning new terms within the NEA assignment. Key terms test will help with development of understanding. **Numeracy** – size and dimensions associated to engineering drawing. **Cross curricular** This will be done by including sizes to drawings, researching different materials (metals and polymers), the use of different software (Techsoft and PowerPoint), research and analysis of products and different cultures from around the world.	**Literacy** The main literacy element will come from the students learning new terms within the topic. Key terms test will help with this. **Literacy** Opportunity for literacy – written analysis of tasks 1-5. Students will be required to answer questions and be successful metacognitive learners. **Numeracy** Pupils should now have developed a detailed understanding if the engineering drawing. **Cross-Curricular** Math's as numeracy will be used.	**Literacy** Evaluation – Literacy task Cross-Curricular – English (literacy – write up tasks) **Literacy** Opportunity for literacy – written analysis of tasks 1-5. Students will be required to answer questions and be successful metacognitive learners. **Numeracy** size and dimensions associated to project. Math (measuring and application of sizes and dimensions) Science (knowledge of materials such as wood, metals and polymers) **Cross-Curricular** Computer Science (use of computers and different programs eg Techsoft)	**Literacy** Opportunity for literacy – written analysis of tasks 1-5. Students will be required to answer questions and be successful metacognitive learners. **Literacy** Evaluation task Reflection task linked to metacognition. Summary of written tasks 1-5. **Numeracy** Checking sizes QA and QC **Cross-Curricular** All revisited through revision sessions. Engineering QA and QC references.

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SMSC	British Value	RSHE
✓ *There will be multiple opportunities for students develop spiritually; being creative in their learning with the different ways in which they create a range of research and analysis.* ✓ *The high expectations placed on the student from the school and department mean that pupils will regularly be made aware of the right and wrong morally; especially through the use of Q and A in the classroom in line with the learning journey .* ✓ *Pupils are expected to share the views morally on the different topics but also show respect and appreciate others in the classroom.* ✓ *The majority of topics will give the students an opportunity to develop their social skills, from peer assessment opportunities to working in group tasks.* ✓ *When researching products from around the world pupils will understand and appreciation of different cultures.*	✓ *Students will be taught the legal implications of using the internet and social media.* ✓ *Students will be taught to fully appreciate other students' viewpoints and the importance of being respectful when researching on a computer.* ✓ *Students will be taught the importance of selecting valid information from reliable sources for any presentation tasks that they do.* ✓ *Students are taught how to contribute to life in modern Britain by learning about the history of products.* ✓ *Students will be learning how to display British Values to use the internet and social media positively. The rule of law associated to products that are imported into the country.*	✓ *The students will be taught about how to be safe online and the dangers.* ✓ *The students will be made aware of online relationships and the sexual issues that may arise.* ✓ *The students will be regularly conversed on their physical and mental health when overusing computers.* ✓ *Working collaboratively in the classroom. Peer assessing and buddy up low ability with higher ability.*

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Adaptive Curriculum Content	Adaptive Curriculum Content	Adaptive Curriculum Content
• Clear instructions on PowerPoint • Adapted handouts • Demo of practical tasks • Extra time given during RRR and mid-term assessments • Homework adapted • The end of topic assessment modified to reflect the topics covered by certain classes and ability levels.	• Clear instructions on PowerPoint • Adapted handouts • Demo of practical tasks • Extra time given during RRR and mid-term assessments • Homework adapted • The end of topic assessment modified to reflect the topics covered by certain classes and ability levels.	• Clear instructions on PowerPoint • Adapted handouts • Demo of practical tasks • Extra time given during RRR and mid-term assessments • Homework adapted • The end of topic assessment modified to reflect the topics covered by certain classes and ability levels.

Adaptive Implementation Practices

Practices used during each unit of work

Adaptive Instruction: *Class instructions adapted to meet the needs of students by providing varied materials, activities, and assessments.*	***Scaffolded Instruction:*** *Break down complex concepts into smaller, more manageable steps, providing additional support and guidance as students' progress through the material.*	***Formative Assessment:*** *Use ongoing assessments, such as quizzes, discussions, and peer reviews, to continuously monitor student progress and provide timely feedback.*	***Pace:*** *Time given to students to organise equipment and resources at their own pace.*