TAC – Engineering Manufacture						
Technical Award Specification Statement	Year 9		Year 10		Year 11	
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills
Unit R109: Engineering materials, processes and production						
Learning Outcome 1: Know about properties and uses of engineering materials	Students will learn about different types of Engineering Materials including Ferrous and no-Ferrous metals, thermos and Thermo-Setting Plastics. ***This LO will be assessed at the end of each half term.*** Stu	Learn to identify the different materials from inspection and testing	Students will learn about different types of Engineering Materials including Ferrous and no-Ferrous metals, thermos and Thermo-Setting Plastics. ***This LO will be assessed at the end of the spring term.***	Investigating material testing processes	Learn about new and emerging materials (e.g. nanotechnology; advanced metal alloys) ***This LO will be assessed at the end of the spring term.***	Identifying suitable materials for specific applications based on their properties and suitability.
Learning Outcome 2: Understand engineering processes and their application	Students will develop knowledge of production methods for polymers and metals ***This LO will be assessed at the end of the Autumn term.***	Use CAD/CAM to produce a mould and cast metal in it. Explore a range of basic cutting, drilling and shaping techniques	Students will learn about different types of Engineering Materials including Ferrous and no-Ferrous metals, thermos and Thermo-Setting Plastics. ***This LO will be assessed at the end of each half term.***	Use the Metal Lathe, Taps and Dies, Pillar drill. Hand tools.	Students will learn about Forming, Moulding, Joining and Finishing ***This LO will be assessed at the end of the Autumn term.***	Production of test pieces to demonstrate skills.
Learning Outcome 3: Know about developments in engineering processes	Learn about applications of computer controlled production processes. ***This LO will be assessed at the end of each half term.***	Design and 3D print a Spinning Top. Further Laser cutting applications investigated and utilised.	Learn about applications of computer controlled production processes, ***This LO will be assessed at the end of the Autumn term.***	Using Computer Numerical Control (CNC), machining processes	Learn about applications of computer controlled production processes.	CNC milling techniques.
Learning Outcome 4: Understand the impact of modern technologies on engineering production	Learn about digital communications of engineering drawings, Internet research and CAD applications	Effective use of CAD/CAM in the workshop and exporting files.	Learn about global manufacturing. Investigate workforce, output and quality.	Identifying factors that affect engineering manufacture.	Learn about standardisation of processes and procedures	Demonstrate an understanding of the requirements for engineering manufacture to be successful.

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	This LO will be assessed at the end of each half term.		***This LO will be assessed at the end of the G-M Unit***		***This LO will be assessed half termly.***	
Unit R110: Preparing and planning for manufacture						
Learning Outcome 1: Be able to plan for the making of a pre-production product	Learn about 2D and 3D engineering drawing techniques and understand conventions on engineering drawings. ***This LO will be assessed at the end of the Spring term***	Demonstrate the ability to represent engineering components in a range of drawing conventions.	**Learn about 2D and 3D engineering drawing techniques and understand conventions on engineering drawings.** ***This LO will be assessed at the end of the Autumn term***	Be able to successfully produce plans for the making of a pre-production product.	Learn about H&S and quality control checks. ***This LO will be assessed at the end of the Autumn term***	Incorporate relevant QC and H&S into production plans
Learning Outcome 2: Be able to use processes, tools and equipment safely to make a pre-production product	Learn how to use appropriate use Personal Protective Equipment (PPE) appropriately. Learn about Marking-out, Bench work and hand-held tools. ***This LO will be assessed at the end of the Autumn term***	Use appropriate processes for making pre-production products.	**Further develop knowledge of a wider range of hand and manually controlled equipment.** ***This LO will be assessed at the end of each half term***	Demonstrate making skills through practical work.	Further develop knowledge of a wider range of hand and manually controlled equipment. ***This LO will be assessed at the end of the Spring term***	Demonstrate making skills through practical work.
Learning Outcome 3: Be able to modify a production plan for different scales of production	N/A	N/A	Learn about of scales of manufacture. ***This LO will be assessed at the end of the G-M Unit***	Identifying the production type for a range of products and appreciate the reasons why this is the case	Learning about the impact of quantities of production on production plans. ***This LO will be assessed at the end of the Autumn term***	Identifying sequence operations, economy of scale, H&S and QC
Unit R111: Computer aided manufacturing						
Learning Outcome 1: Be able to plan the production of components on Computer Numerical Control (CNC) machines	Learn how to design products in 2D and 3D on CAD taking into account the sequence of operations and the type of machine being used. ***This LO will be assessed at the end of the Autumn term***	Demonstrate skills in designing in 3D. Design and 3D print a Spinning Top.	Learn about types of CNC machines and their applications. ***This LO will be assessed at the end of the Summer term***	Investigate the applications of CNC milling, Laser cutting and	Learn about the correct tooling for different types of materials as well as the importance of “speed and Feed” considerations.	Demonstrate correct setup for different materials and operations.
Learning Outcome 2: Be able to interpret information from	Learn to use 2D and 3D Computer Aided Design (CAD) packages.	Demonstrate an understanding of Exporting files and the use of digital	Develop the use of 2D and 3D Computer Aided Design	Produce suitable files to produce 3D products using CNC machines	Develop the use of 2D and 3D Computer Aided Design (CAD)	Produce suitable files to produce 3D products using CNC machines. Demonstrate

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Computer Aided Design (CAD) to manufacture components on CNC equipment	***This LO will be assessed at the end of the Autumn term***	communication in CNC applications.	(CAD) packages to include "Assembly" techniques.		packages to include simulation and rendering.	an understanding of tool offsets' tool change-over Language, (e.g. G-codes).
Learning Outcome 3: Be able to set-up and use CNC equipment to manufacture components	Learn about the importance of procedures for setting up CNC equipment. ***This LO will be assessed at the end of the Summer term***	Setup and use the laser cutter and 3D printer for the production of components.	Learn about factors to consider when performing CNC machine programming operations ***This LO will be assessed at the end of the Spring term***	Demonstrate the use of setting datum points, co-ordinates (absolute and incremental).	Learn about factors to consider when performing CNC machine programming operations ***This LO will be assessed at the end of the Autumn term***	Demonstrate the use of setting datum points, co-ordinates (absolute and incremental).
Learning Outcome 4: Know about applications of computer control processes used to manufacture products	Learn about Rapid Prototyping ***This LO will be assessed at the end of the Autumn term***	Demonstrate skills in 3D design and printing	Learn about the importance of CNC manufacturing processes and Robotics ***This LO will be assessed at the end of the summer term***	N/A	Learn about the different processes associated with different scales of production ***This LO will be assessed at the end of the Spring term***	N/A