ks4 Engineering Design

Knowledge:

- Be able to identify or recognise a given item, for example on a diagram
- Use direct recall to answer a question, for example the definition of a term.

Understanding:

• To assess and evidence the perceived meaning of something in greater depth than straight identification or recall.

Understanding will be expressed and presented using terms such as: how; why; when; reasons for; benefits and drawbacks of; advantages and disadvantages of; purpose of; suitability of; recommendations for improvement; pros and cons; appropriateness of something to/in different contexts.

	Acquire	Exam component R038	Coursework 1 R039 Desk tidy	Coursework 2 R040 Speaker project

- Understand the stages involved in design strategies
- The context in which each strategy might be applied
- Stages of the iterative design process, and the activities carried out within each stage of this cyclic approach.
- Principles of engineering design Make and evaluate:
- Types of criteria included in an engineering design specification
- How manufacturing
- Scale of manufacture
- Types of manufacturing processes
- considerations affect design
- Influences on engineering product design
- Design for the circular economy
- Types of drawing used in engineering
- Working drawings
- Standard conventions for dimensions
- Principles of engineering design
- Representations of mechanical
- Using CAD drawing software
- Methods of evaluating design ideas
- Methods of evaluating a design outcome
- Understand the difference between need and want
- Know the difference between qualitative and quantitative data.
- Know the difference between market pull and technology push.
- Understand different types of legislations.

- Principles of engineering design Make and evaluate:
- Types of criteria included in an engineering design specification.
- How manufacturing considerations affect design
- Influences on engineering product design
- Types of drawing used in engineering
- Working drawings
- Principles of engineering design
- Using CAD drawing software
- Methods of evaluating design ideas
- Modelling methods
- Methods of evaluating a design outcome
- ACCESS FM and their reference to products
- How to create a basic specification with some justification
- Understanding of the 6Rs and links to a product
- Batch production and its link to scale of manufacture.
- Knowledge of types of manufacturing processes and its application.
- Some understanding of how to analyse an existing product.
- Primary and secondary research.
- Understand how to analyse a design brief.
- Develop a customer profile to identify needs and wants for the TMG.

- The stages involved in design strategies
- Stages of the iterative design process, and the activities carried out within each stage of this cyclic approach.
- Using CAD drawing software
- Methods of evaluating design ideas
- Modelling methods
- Methods of evaluating a design outcome
- ACCESS FM and their reference to products
- How to create a basic specification with some justification
- Understanding of the 6Rs and links to a product
- Batch production and its link to scale of manufacture.
- Knowledge of types of manufacturing processes and its application.
- Some understanding of how to analyse an existing product.
- Primary and secondary research.
- Understand how to analyse a design brief.
- Understand quantitative and qualitative data

.

Apply

- Demonstrate the following knowledge through mind mapping, discussion, investigating the following;
- o Linear design
- Iterative design
- Inclusive design
- User-centred design
- Sustainable design
- o Ergonomic design
- Be able to apply advantages and disadvantages of each design strategy.
- Be able to mind map the brief.
- Conduct primary research and secondary
- Investigate existing products and provide a comparison.
- Create tables, charts and collect anthropometric data.
- Use ACCESS FM to analyse existing products.
- Create an engineering design using a specification
- Sketch and model ideas
- Discuss needs and wants of a target market group
- When comparing products, create ranking matrices.
- Apply quantitative and qualitative data to a product
- Apply the 6Rs to a design idea and annotate potential developments and improvements.
- Make accurate inferences
- Research and analysis
- Disassembly of a product
- Developing questionnaires and surveys

- Researching primary and secondary information with strong links to ACCESS FM when investigating a product or TMG.
- Justify key points to make strong links to coursework.
- Practical application
- Independently carry out practical activity in a safe working environment.
- Evaluate key findings and provide opportunity to understand future modifications and developments.
- Ally knowledge of British Standards, United Kingdom Conformity Assessed (UKCA).
- Identify legislation related to health and safety regulation and risk assessment
- List the advantages and disadvantages of a range of drawing techniques.
- Be able to design a 2D drawing as well as a 3D drawing using CAD and CAM with independence.
- Apply drawing conventions to drawings and product parts and materials lists.
- Be able to apply a range of finishes to drawings and line types.
- Model ideas in a range of materials safely and material that is appropriate.
- Be able to list the advantages and limitations of each technique.

- Create a picture flow chart from start to finish of the modelling process.
- Create a quantitative comparison with the design brief and the specification.
- List the potential modifications and improvements of the final idea.
 - Create graphs and pie charts to show analysis on a visual platform.
 - Develop designs and showcase in a range of formats with confidence and accurately.
- Assess the advantages and disadvantages
- Understand and apply the knowledge of strengths and weaknesses
- Create a ranking matrix and evaluate findings
- Create a product that is made to a high quality standard
- Use knowledge of types of production to link to batch production
- Disassemble a product and annotate the manufacturing process, materials and the link to industry for each component
- Analyse a product against ACCESS FM
- Use Autodesk or shpr.3D to create a replica of the image provided
- Create an exploded image of the final product
- Work with a 3D printer and associated software to create a final product

Vocab	 Threads holes chamfers countersinks knurls Production of models Qualitative comparison with the design brief & spec. Ranking matrices Quality Function Deployment (QFD) Types of production Coping saw Fret saw Bench hook Sharp pencil Steel rule Try square Pine Plywood Panel pins Centre punch Softwoods Hardwoods Manufacture boards Template 	 Bench vice Hazard Prevention Belt sander designing drawing two point perspective isometric 3D 2D CAD CAM across flats centre line diameter drawing material square Freehand sketching Isometric Oblique Orthographic drawings Exploded views Assembly drawings Block diagrams Flowcharts 	 diameter surface finish Meaning of line types: outlines hidden detail centre line projection dimension leader line Circuit diagrams Wiring diagrams title block metric units of measurement scale tolerance Standard conventions; linear measurements radius
V 00 00000 0 12 1	Pin hammer From questions at the start of lessons	Course work deadline Catalans 2004	Coursework deadline February 2005
Assessment	Exam questions at the start of lessons Questioning, Self and Peer assessment FAR Marking – theory and practical tasks December Mock 1 March Mock 2 End of year assessment (covering theory and coursework application)	Coursework deadline October 2024 Questioning, Self and Peer assessment FAR Marking – theory and practical tasks	Coursework deadline February 2025 Questioning, Self and Peer assessment FAR Marking – theory and practical tasks