# BTEC Tech Award Engineering Level 2
# Curriculum Intent 2021-2022

## Core aims of the subject at Key Stage 4

Our curriculum at Brine Leas strives to present a range of opportunities for students to develop their breadth and depth of technical skills and knowledge for future preparation in the world of engineering in education and/or employment. The students can then apply these along with scientific principles and mathematical skills to project-based problems and theoretical scenarios, establishing good habits of learning which encourage life-long learning. The Pearson BTEC Level 1/Level 2 Tech Award in Engineering provides technical knowledge and technical skills through vocational contexts by studying mechanical and engineering design. Students develop practical and technical skills as they design and make prototypes and products that solve real life problems within a variety of contexts, considering both their own and others' needs, wants and values. The specification covers modern engineering technologies, materials and processes, and established engineering practices. The 'hands on' and project-based areas of this course provide challenging opportunities for personal development and opportunities for the academic learning to be seen and experienced as applied to a real situation. The qualification recognises the value of learning skills, knowledge and vocational attributes to complement GCSEs. The qualification will broaden the learner's experience and engineering concepts to aid their understanding of the real-world in order to develop informed opinions and varied progression options available to them. We deliver life skills, engineering skills, health and safety, teamwork, facilitated learning, confidence, workshop skills, Computer Aided Design and Computer Aided Manufacture, management skills, working independently. We have fantastic facilities with engineering machinery that mirrors industry. The core skills of English, Maths and Sciences are applied to engineering problem solving, designing and building.

The three components focus on the assessment of knowledge, skills and practices. These are all essential to developing a basis for progression and, therefore, learners need to achieve all components in order to achieve the qualification. The components are interrelated and they are best seen as part of an integrated course rather than as totally distinct study areas.

Students are given the opportunity to build their confidence in understanding the sector, vocational contexts and vocational attributes over a long period during the course of study before they are assessed. Students taking this course are exposed to a wide range of engineering processes including Computer Aided Design, machining, heat treatment, welding, Fabrication. Students will be inspired by these experiences and motivated to develop and apply their gained engineering knowledge during the project tasks. Most pupils experience a massive sense of achievement as they complete the tasks and look back at their journey over the making of a product and on their personal development.

Engineering is an essential key component of industry locally, nationally and globally. Students work on projects and gain community involvement through working with local engineering companies. With the delivery of our engineering course, the current Labour Market trends and the development of our careers provision, we are using engineering to help the students gain important skills and choose their desired pathway. The skills learned in engineering support many industry and employment types vocationally and academically.

Completing this BTEC Engineering course provides advantageous preparation for students wishing to undertake further Engineering or technology-based education at KS5 and provides experience and knowledge sought by employers in the industrial engineering community.

## Trips & visits

Not applicable

## Assessment

Internal assessment

Components 1 and 2 are assessed through internal assessment. This assessment is related to the achievement of knowledge and understanding through the application of practical and written tasks and activities. This style of assessment promotes deep learning through ensuring the connection between knowledge and practice.

The components focus on:

- the development of core knowledge and understanding of engineering sectors
- knowledge and skills of the stages involved in planning and implementing an engineering project
- the development and application of skills such as problem solving, design, creativity, communication and collaboration.

Internal assessment is through assignments that are subject to external standards verification. Please see website for internal assessment record.

External assessment

Component 3 is an external unit. It provides the main assessment for the qualification. Component 3 builds directly on Components 1 and 2, and enables learning to be brought together and related to a real-life situation. Students apply performances skills and techniques in response to a brief set by the exam board enabling the assessment of knowledge and understanding at the end of the learning period. The external assessment comprises 40 per cent of the qualification

## ovid 19 statement

Brine Leas is awaiting information and confirmation of adaptations to the course content and assessment methods for this course, from the examination board – Pearsons. We have no indication of the type of adaptations that will be announced. It would be risky to assume that the same adaptations will be adopted from the previous years proceedings. Until this happens, we are working on all units in order to cover the breadth of knowledge and skills intended by the entire course so that we are not caught short when the announcement of adaptations occurs.

## Homework

Students are set home work to reinforce and practice the learning completed during lessons and to prepare for the internal and external units.

## Clubs and/or intervention

Students are welcome to attend extra curricular sessions, to make use of the workshop facilities, computers and CNC machines.

## Parental/Carer support

Monitor progress and encourage the completion of the unit portfolio. Encourage the watching of 'how it's made', 'Forged in Fire', 'Mega Engineering' type of programs.

## Helpful sources of information

The intranet contains various files and documents to assist with completion of this course and is available via the school computers and also from any internet linked home computers via the portal.
Useful websites:
https://www.heta.co.uk/
http://www.ceata.co.uk/
https://www.raf.mod.uk/
https://www.bbceng.info/
www.technologystudent.com

# Year 10 Overview
# BTEC Level 1/2 Tech Award Engineering.

| Term | Knowledge | Assessment | Connections to learning | Connections to future pathways |
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| Autumn 1 | **What is Engineering?**<br>It is vital for students to develop their knowledge of what engineering is about in order for them to make informed decisions for their future position within the national and global economy. The UK is aiming to develop a new smart style of engineering for which engineers are needed, and the country is short of engineers. Engineering covers a wide range of disciplines that will enable students to apply their mathematical, scientific and engineering skills to real-life problems. | | | |
| | Develop core knowledge of:<br>➢ Orthographic drawings, including engineering | ➢ Comparison of the application of knowledge to manufacture a soft jaw against their drawing. | Prior learning in D&T (Y7-9) | Careers<br>➢ Mechanical technician |

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| | conventions dimensions and tolerances.<br><br>➢ Marking out methods, datum lines, centrum lines, co-ordinates.<br><br>➢ Turning, using manual or CNC lathe.<br><br>➢ Cutting using hand tools.<br><br>➢ Joining of materials using a range of techniques<br><br>➢ Drilling, using both pillar drill and lathe, Using a jig.<br><br>➢ Applying surface finishes.<br><br>➢ Shaping and finishing, filing, milling, use of abrasives<br><br>➢ Following a provided production plan<br><br>➢ Awareness of health and safety. Using PPE and risk assessments<br><br>➢ Workshop safety. Procedure | ➢ Application of knowledge and skills: outcome compared to drawing standards for accuracy<br><br>➢ Application of knowledge and skills: both outcomes compared to drawing and product for accuracy.<br><br>➢ Test pieces of technique and actual product.<br><br>➢ Test pieces of technique and actual product.<br><br>➢ Application of knowledge through written questions, design challenges and production of technical drawings,<br><br>➢ Application of skills through completion of set practical tasks. | ➢ Templates and drawings to follow and create.<br>➢ Manufacture of products<br>➢ Evaluation of outcomes<br><br>Future learning in Engineering<br>➢ Read an engineering drawing when responding to an engineering brief (Y11) | ➢ Maintenance technician<br>➢ Mechanical engineer<br>➢ Production engineer<br>➢ Automotive engineer<br>➢ Maintenance engineer<br>➢ Design engineer<br>➢ Structural engineer<br><br>Future learning<br>➢ Level 3 BTEC National in Engineering<br>➢ Technical certificate in Engineering<br><br>Degrees, including<br>➢ Engineering<br>➢ Product Design<br>➢ Physics<br>➢ Maths |

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| **Autumn 2** | **Introduction to Component 1. Exploring Engineering Sectors and Design Applications**<br><br>Students will develop knowledge and understanding of the engineering industry, the links within engineering sectors, and how these are integrated to enable organisations to find solutions to real-life problems. The final of this unit will take place in term 2 of year 11 as this will be the content completion date.<br><br>Continuation of practical tasks from Autumn term | | | |
| | To broaden knowledge and understanding of:<br>➢ Engineering definition in context: the safe application of technical and practical knowledge to transform ideas and materials into products.<br><br>➢ The need for qualified people in an engineering discipline (e.g. electrical/electronics engineer), and can use their skills to help solve real-world problems.<br><br>➢ Develop an understanding of sectors Engineering, e.g. aerospace, automotive, communications, electrical/electronic, mechanical, environmental, transport, rail, marine.<br><br>➢ Understand Engineered products from different sectors and combinations of sectors, e.g. aerospace | ➢ Produce a presentation to discuss your prospects and the thoughts you have about a career choice in engineering.<br><br>➢ Evidence must fully meet the requirements of the assessment criteria and could include a portfolio of notes and images. It must include sections on:<br><br>➢ Describe engineering sectors and a engineered product they produce.<br><br>➢ Describe different sized engineering organisations and typical job roles.<br><br>➢ Explain how engineers from different sectors generate an engineered product, with reference to sizes of organisations and the job roles involved. | Prior learning in D&T (Y7-9)<br>➢ Templates and drawings to follow and create.<br>➢ Manufacture of products<br>➢ Evaluation of outcomes<br><br>Future learning in Engineering<br>➢ Read an engineering drawing when responding to an engineering brief (Y11) | Careers<br><br>➢ Mechanical engineer<br>➢ Production engineer<br>➢ Automotive engineer<br>➢ Maintenance engineer<br><br>Future learning<br>➢ General Engineering |

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| | (engines, wings, navigation systems),<br>(engines, suspension, braking system, fuel injection, engine management), (satellite dish, smartphone, wireless router) | ➢ Evaluate how engineers from different sectors cooperate to generate an engineered product, with reference to sizes of organisations and the job roles involved. | | |
| **Spring 1** | **Continuation of Exploring Engineering Sectors and Design Applications**<br><br>Students will develop knowledge and understanding of the engineering industry, the links within engineering sectors, and how these are integrated to enable organisations to find solutions to real-life problems. The final of this unit will take place in term 2 of year 11 as this will be the content completion date.<br><br>Continuation of practical tasks from Autumn term | | | |
| | ➢ The design process.<br><br>➢ Development of an engineering brief, e.g. physical requirements, aesthetics, size, function<br><br>➢ Performance requirements Producing initial design proposals, e.g. researching existing products, producing design sketches in 2D and 3D<br><br>➢ Create Computer-aided design (CAD) drawings using drawing, editing, modification designs to the appropriate standard. | ➢ Describe engineering sectors and an engineered product they produce.<br><br>➢ Describe different sized engineering organisations and typical job roles.<br><br>➢ Explain how engineers from different sectors generate an engineered products<br><br>➢ Evaluate how engineers from different sectors.<br><br>➢ Produce design proposals | ➢ Various aspects of the design process have been practiced during Y7,8 &9 D&T projects.<br>➢ The design process will be used in Product Design and Engineering courses at KS5<br>➢ Measuring simple items accurately using MM has been practiced during KS3<br>➢ | Careers<br><br>➢ Design engineer<br>➢ Ergonomics adviser<br>➢ Automotive engineer<br>➢ Test engineer<br><br>Future learning<br>➢ General Engineering<br>➢ Product Design |

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| | ➢ Generating final design solution using 2D drawing techniques and 3D models<br><br>➢ Making final design solution decisions, e.g. selection of materials, selection of making techniques, considering quality requirements<br><br>➢ How employees work in a team and peer review during the engineering design and make process with the customer as a focus | ➢ Describe successful features of the design process<br><br>➢ Justify the development of an improved final solution and evaluate | | |
| **Spring 2** | Completion of practical tasks from Autumn term | | | |
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| **Summer 1** | **Responding to an Engineering Brief in preparation for mock exams**<br><br>Students will be given engineering briefs with problems you need to respond to. Your response will include possible solutions that you will test against the brief.<br>You will be given the opportunity to carry out tests, collect and analyse data, reflect on your findings, consider any issues, and suggest solutions.<br>This will not cover the unit in depth as this will be reviewed in term of year 11 just before the task is released | | | |
| | ➢ To broaden knowledge and understanding of:<br><br>**Carry out a process**<br>➢ Understand planning of activities.<br>➢ Knowledge to test prototype<br>➢ Apply knowledge of materials and equipment<br><br>**Recording the process**<br>➢ Ability to use a range of measuring equipment<br>➢ Ability to record data by producing chart/graph, line/curve of best fit, axis, scaling labelling<br>➢ Ability to observe, noting problems with practical activities.<br>**Interpretation of data**<br>➢ Identifying anomalous results or sources of error.<br>➢ Identify comparison of trends/patterns in data, to include tables, charts and graphs.<br>➢ Evaluate a process | Following planned procedures.<br>➢ Using and testing a prototype/model.<br><br>➢ Assembling, handling and using materials, equipment and machinery.<br><br>➢ Measuring and recording data with accuracy and precision, using appropriate units<br><br>➢ Tabulating appropriate data in the correct format accurately and to a suitable degree of precision.<br><br>➢ Displaying appropriate data graphically with accuracy:<br><br>➢ Suggest reasons for anomalous results<br><br>➢ Evaluating the process, to include testing process used, recording/processing results.<br><br>➢ Drawing valid conclusions.<br><br>➢ Making recommendations | ➢ Producing and or following a making plan and making diary have been experienced during KS3 projects.<br>➢ Producing charts and graphs have been studied in Maths and other KS3 subjects.<br><br>➢ Sketching in orthographic format | ➢ Production planner<br>➢ Quality Inspector<br><br>➢ Quality engineer<br>➢ Crash test investigator |

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| | ➢ Make recommendations in a given context<br><br>**Interpretation of a given brief for an engineered product**<br>➢ Ability to analyse text<br>➢ Ability to apply standard drawing conventions<br><br>**Redesign**<br>➢ Ability to identify issues with given designs<br>➢ Demonstrate good sketching<br>➢ Knowledge of a range of manufacturing techniques<br><br>**Evaluation**<br>Ability to evaluate a given design, suggest improvements to materials, processes | ➢ Analysing the existing product with reference to the brief.<br><br>➢ Dimensions and tolerances, to include linear, radial, surface finish.<br><br>➢ Identifying relevant issues with existing design<br><br>➢ Design sketching, to include 2D, 3D, exploded diagrams<br><br>➢ Design for manufacture, e.g. fabricate, forge, cast, machined.<br><br>➢ Reviewing the credibility of the design ideas given the needs of the brief.<br><br>➢ Selecting the most appropriate design solution.<br><br>➢ Justification of the design solution.<br><br>➢ Justification of the processes to be used. | has been practiced at KS3<br><br>➢ Evaluation is a fundamental part of the design process practiced in KS3 KS5 and beyond. | |
| **Summer 2** | **Introduction to Component 2: Investigating an Engineering Project**<br><br>This component will give you an understanding of the types and properties of metallic and polymeric materials, and proprietary components commonly used in engineered products. You will acquire an understanding of the selection of materials, proprietary components, making processes and disassembly of a given engineered product. You will then plan, reproduce, inspect and test a single component. | | | |

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| | ➢ Investigate the materials, components and processes used in the production of engineered products:<br><br>➢ Engineering material categories<br><br>➢ Types of components, such as: proprietary<br><br>➢ Characteristics of components, e.g. permanent/semi-permanent<br><br>➢ Types of engineering processes: e.g. cutting, drilling, sawing, filing, shearing<br><br>➢ shaping, e.g. turning<br><br>➢ forming, e.g. forging, casting<br><br>➢ joining, e.g. soldering, brazing.<br><br>➢ Investigate engineered products by using practical engineering skills and techniques, such as disassembly and assembly, observation and measurement.<br><br>➢ Observing and recording skills<br>➢ Measurement skills<br>➢ Appraisal/interpretation skills<br>➢ Safe use of disassembly techniques<br>➢ Requirements in terms e.g mass and size | ➢ Students will produce solutions to problems using different combinations of practical engineering<br><br>➢ Skill and produce a portfolio and practical outcome. Evidence must fully meet the requirements of the assessment criteria and could include a portfolio of notes and images.<br><br>➢ From the given assembly and detail drawing, identify all the components.<br><br>➢ For each component, consider whether it is a proprietary component, such as a mechanical fixing, or if it has been processed from raw material, e.g. a turned shaft or a folded bracket<br><br>➢ Investigate the properties of the materials that have been used to make the components.<br><br>➢ Investigate the making processes used to make the components.<br><br>From the selected product:<br>➢ investigate its purpose/function.<br>➢ Use hand tools and work safely to dismantle the product.<br>➢ Lay out the parts, label them and identify the function of each one.<br>➢ For parts that have been machined/formed, measure their | ➢ Knowledge of different processes and their capabilities is invaluable in designing products in D&T KS5 studies. | ➢ Production engineer<br>➢ Product Designer<br>➢ Design Engineer<br>➢ Industrial Designer<br>➢ Materials laboratory Technic<br><br>➢ Welding and fabrication technician<br>➢ Mechanical Technician<br>➢ CNC Operative |

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| | | dimensions and record on simple sketches.<br>➢ For the product, write a product design specification (PDS). | | |

## Year 11 Overview
## BTEC Level 1/2 Tech Award Engineering

| Term | Knowledge | Assessment | Connections to learning | Connections to future pathways |
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| | **Investigating an Engineering Project-continuation**<br><br>This component will give you an understanding of the types and properties of metallic and polymeric materials, and proprietary components commonly used in engineered products. You will acquire an understanding of the selection of materials, proprietary components, making processes and disassembly of a given engineered product. You will then plan, reproduce, inspect and test a single component | | | |
| **Autumn 1** | ➢ Defining the problem.<br><br>➢ Developing possible solutions.<br><br>➢ Choosing a solution.<br><br>➢ Application of skills to making using engineering processes.<br><br>➢ Inspecting and testing chosen solution.<br><br>➢ Evaluating outcome of project.<br><br>➢ Developing a production plan, | ➢ Inspecting and testing chosen solution.<br><br>➢ Evaluating outcome of project.<br><br>➢ Developing a production plan, to include: health and safety, operations/processes, inspection, testing and quality standards, equipment/tools, materials and components, quantity, | ➢ Material properties is part of the KS5 curriculum for product design and engineering. | Careers<br><br>➢ Mechanical engineer<br>➢ Production engineer<br>➢ Automotive engineer<br>➢ Maintenance engineer<br><br>Future learning<br>➢ General Engineering |

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| | | e.g. one-off, batch, mass production.<br><br>➢ Awareness of risks and hazards for making processes.<br><br>➢ Safe preparation, good housekeeping and close down of the work area.<br><br>➢ Making skills associated with the product to be produced, e.g. choosing suitable tools,<br><br>➢ appropriate set up of the work area/machine, adaptation according to inspected outcomes.<br><br>➢ Skills in observing and recording techniques, e.g. in process measurement and comparison. | | |
| **Autumn 2** | **Investigating an Engineering Project-completion**<br><br>This component will give you an understanding of the types and properties of metallic and polymeric materials, and proprietary components commonly used in engineered products. You will acquire an understanding of the selection of materials, proprietary components, making processes and disassembly of a given engineered product. You will then plan, reproduce, inspect and test a single component | | | |
| | | ➢ Using the information gathered, prepare a plan for | | Careers |

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| | | the safe making of a reproduction of a component from the product previously dismantled.<br><br>➢ Prepare a list of the tools and materials to make the component.<br><br>➢ Risk assess the processes to be used.<br><br>➢ Make the component.<br><br>➢ Quality inspect the component.<br><br>➢ Awareness of risks and hazards for making processes.<br><br>➢ Safe preparation, good housekeeping and close down of the work area.<br><br>➢ Making skills associated with the product to be produced, e.g. choosing suitable tools appropriate set up of the work area/machine, adaptation according to inspected outcomes.<br><br>➢ Skills in observing and recording techniques, e.g. in | | ➢ Production engineer<br>➢ Maintenance engineer<br>➢ Health and safety officer<br><br>Future learning<br>➢ General Engineering<br>Automotive Studies |

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| | | process measurement and comparison. | | |
| **Spring 1** | **Review of Responding to an Engineering Brief** in preparation for set task from the board | | | |
| | To broaden knowledge and understanding of:<br><br>**Carry out a process**<br>➢ Understand planning of activities.<br>➢ Knowledge to test prototype<br>➢ Apply knowledge of materials and equipment<br><br>**Recording the process**<br>➢ Ability to use a range of measuring equipment<br>➢ Ability to record data by producing chart/graph, line/curve of best fit, axis, scaling labelling<br>➢ Ability to observe, noting problems with practical activities.<br><br>**Interpretation of data**<br>➢ Identifying anomalous results or sources of error.<br>➢ Identify comparison of trends/patterns in data, to include tables, charts and graphs.<br>➢ Evaluate a process<br>➢ Make recommendations in a given context<br><br>**Interpretation of a given brief for an engineered product** | Following planned procedures.<br>➢ Using and testing a prototype/model.<br><br>➢ Assembling, handling and using materials, equipment and machinery.<br><br>➢ Measuring and recording data with accuracy and precision, using appropriate units<br><br>➢ Tabulating appropriate data in the correct format accurately and to a suitable degree of precision.<br><br>➢ Displaying appropriate data graphically with accuracy:<br><br>➢ Suggest reasons for anomalous results<br><br>➢ Evaluating the process, to include testing process | ➢ Material properties is part of the KS5 curriculum for product design and engineering.<br><br>➢ Safe and skilful making ability is part of the KS5 curriculum for | Careers<br><br>➢ Quality engineer<br>➢ Production engineer<br><br>Future learning<br>➢ General Engineering |

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| | ➢ Ability to analyse text<br>➢ Ability to apply standard drawing conventions<br><br>**Redesign**<br>➢ Ability to identify issues with given designs<br>➢ Demonstrate good sketching<br>➢ Knowledge of a range of manufacturing techniques<br><br>**Evaluation**<br>Ability to evaluate a given design, suggest improvements to materials, processes | used, recording/processing results.<br><br>➢ Drawing valid conclusions.<br><br>➢ Making recommendations<br><br>➢ Analysing the existing product with reference to the brief.<br><br>➢ Dimensions and tolerances, to include linear, radial, surface finish.<br><br>➢ Identifying relevant issues with existing design<br><br>➢ Design sketching, to include 2D, 3D, exploded diagrams<br><br>➢ Design for manufacture, e.g. fabricate, forge, cast, machined.<br><br>➢ Reviewing the credibility of the design ideas given the needs of the brief.<br><br>➢ Selecting the most appropriate design solution.<br><br>➢ Justification of the design solution. | Product Design and Engineering. | |

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| | | ➢ Justification of the processes to be used. | | |
| **Spring 2** | **Review of Responding to an Engineering Brief** in preparation for set task from the board | | | |
| | ➢ Review knowledge by applying to exemplar and past tasks | ➢ Marked against set answers and feedback given | | |
| **Summer 1** | **Responding to an Engineering Brief**<br>**Respond to brief set by exam board**<br><br>Students will be given engineering briefs with problems you need to respond to. Your response will include possible solutions that you will test against the brief. You will be given the opportunity to carry out tests, collect and analyse data, reflect on your findings, consider any issues, and suggest solutions. | | | |
| | ➢ Apply knowledge to the set task under examination conditions | | | |
| **Summer 2** | **Complete Responding to an Engineering Brief**<br>**Date set by exam board (TBC)** | | | |
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