

Unit 2: Investigating an Engineered Product

Scheme of work

Guided learning hours (GLH): 30 hours

Number of lessons: 13 lessons

Duration of lessons: one/two/three hours (as shown)

Learners should spend lesson time and non-supervised time working on assignments.

This scheme of work is provided to help you make the most of your planning time. Customise this by adding your own activities/lesson ideas to the 'Activities' column.

Lesson	Unit content*	Activities	Links to other units
		Tutor presentation (approx. 10 minutes) to introduce the unit: outline the nature of the learning aims and the number of assignments that learners will be expected to complete.	
Learning aim A: Understand the performance requirements of an engineered product			
1 (3 hours)	Topic A1 Technical specification Analysis of the chosen engineered product and production of technical specification criteria that covers the following key headings: <ul style="list-style-type: none"> • form • function • user requirements • performance requirements • material and component requirements • ease of manufacture • ease of maintenance • legal and safety requirements 	<ul style="list-style-type: none"> • Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials. • Paired activity: take it in turns to think of an engineered object that you use on a daily basis and describe it to your partner using the information you would get from its technical specification and see if they can guess what you are describing. 	<ul style="list-style-type: none"> • Unit 3: Health and Safety in Engineering • Unit 5: Engineering Materials • Unit 7: Machining Techniques • Unit 12: Engineering Design • Unit 13: Engineering Assembly
2	Assignment 1 Tasks for 2A.P1 and	Individual activity: learners to complete required tasks on assignment	

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(3 hours)	2A.M1 Centre devised assignment. Alternatively, use free Edexcel assignment on myBTEC.	sheet.	
Learning aim B Understand the selection of specific materials for use in the components that make up an engineered product			
3 (2 hours)	Topic B1 Selection of materials and components The materials used in the components of a chosen product and reasons for their selection for use, including: <ul style="list-style-type: none"> properties qualities 	<ul style="list-style-type: none"> Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials. Individual activity: learners work in the workshop to carry out some simple tests on a selection of materials (e.g. mild steel, brass, aluminium, plastic bar). Learners place each sample into a bench vice and gently strike with a hammer, recording the number of strikes required to break or fracture the material. This activity can be followed up with a group discussion about the results of the testing. 	<ul style="list-style-type: none"> Unit 5: Engineering Materials Unit 7: Machining Techniques Unit 17: Welding Unit 18: Computer Numerical Control Programming
4 (1 hour)	Topic B2 Environmental impact Sustainability issues of using the materials identified in the chosen product in relation to the following: <ul style="list-style-type: none"> extraction and processing of raw materials disposal of products after their useful lifespan 	<ul style="list-style-type: none"> Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials. Paired activity: learners are given a material, which has been either extracted as a raw material or recycled. Learners give a short presentation to the class on how the material has either been extracted or recycled. 	<ul style="list-style-type: none"> Unit 5: Engineering Materials Unit 15: Operating an Efficient Workplace
5 (1 hour)	Topic B3 Alternative materials Suitable alternative materials that could be used in the chosen product, including: <ul style="list-style-type: none"> advantages and disadvantages of alternatives comparison and contrast with the materials actually used. 	<ul style="list-style-type: none"> Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials, followed by group discussion. Group discussion: debate the advantages and disadvantages of using alternative materials. Split the group into two, with one side debating for the use of alternative materials, and the other holding the view that everything should be thrown away. 	<ul style="list-style-type: none"> Unit 5: Engineering Materials

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6 (4 hours)	<p>Assignment 2 Tasks for 2B.P2, 2B.M2 and 2B.D1</p> <p>Centre devised assignment. Alternatively, use free Edexcel assignment on myBTEC.</p>	<p>Individual activity: learners to complete required tasks on assignment sheet.</p>	<ul style="list-style-type: none"> • Unit 5: Engineering Materials • Unit 7: Machining Techniques • Unit 17: Welding • Unit 18: Computer Numerical Control Programming
<p>Learning aim C: Understand the selection and use of manufacturing processes in an engineered product</p>			
7 (1 hour)	<p>Topic C1 Selection of production processes</p> <p>The production processes involved in the manufacture of components in a chosen product, including:</p> <ul style="list-style-type: none"> • processes in reference to the manufacturing needs of the product • how each process meets the manufacturing need. 	<ul style="list-style-type: none"> • Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials. • Paired activity: pairs are given a manufactured product (e.g. plastic drink bottle, disposable pen, model car). Pairs investigate how the product has been manufactured and create a poster or information leaflet that can be shared with the group. 	<ul style="list-style-type: none"> • Unit 7: Machining Techniques • Unit 17: Welding • Unit 18: Computer Numerical Control Programming
8 (2 hours)	<p>Topic C2 Environmental impact</p> <p>The impact on the environment of the production processes used in the manufacture of components in the product including:</p> <ul style="list-style-type: none"> • energy and resources used during production • waste production and pollution as a result of production. 	<ul style="list-style-type: none"> • Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials. • Group research and presentation: on using different energy sources and recycling waste products. It may be possible to arrange a visit to the local recycling centre to see how materials are sorted when they have been collected from homes. 	<ul style="list-style-type: none"> • Unit 15: Operating an Efficient Workplace
9	<p>Topic C3 Comparing production</p>	<ul style="list-style-type: none"> • Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials, followed by a group discussion on the 	<ul style="list-style-type: none"> • Unit 7: Machining

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Lesson	Unit content*	Activities	Links to other units
(2 hours)	<p>processes</p> <p>Comparison between two processes used in the manufacture of components in the product including:</p> <ul style="list-style-type: none"> advantages and disadvantages of each process. 	<p>advantages and disadvantages of different production processes.</p> <ul style="list-style-type: none"> Paired activity: show learners a glass bottle and a plastic bottle, asking them to think about how they would have been processed. Ask learners to compare the processes, decide which one is more efficient, and present their choice and reasons to the rest of the group. 	<p>Techniques</p> <ul style="list-style-type: none"> Unit 13: Engineering Assembly Unit 17: Welding Unit 18: Computer Numerical Control Programming
10 (4 hours)	<p>Assignment 3 Tasks for 2C.P3, 2C.M3 and 2C.D2</p> <p>Centre devised assignment. Alternatively, use free Edexcel assignment on myBTEC.</p>	<p>Individual activity: learners to complete required tasks on assignment sheet.</p>	
Learning aim D: Understand the quality issues related to an engineered product			
11 (2 hours)	<p>Topic D1 Quality control (QC)</p> <p>The specific quality-control checks that could have been used on an engineered product to ensure its quality and performance at one or more of the following stages:</p> <ul style="list-style-type: none"> materials supply production assembly 	<p>Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials, followed by practical activity using different products to investigate the quality of each one. Learners are given a range of components, which can be measured using a range of measuring equipment, e.g. steel rules, micrometers, digital callipers. Learners measure the same feature on each component, and compare the different readings.</p>	<ul style="list-style-type: none"> Unit 9: Interpreting and Using Engineering Information Unit 13: Engineering Assembly
12 (2 hours)	<p>Topic D2 Quality assurance (QA)</p> <p>The quality assurance system that could have been used on an engineered product including:</p> <ul style="list-style-type: none"> when and where quality-control checks take place what the checks consist of 	<ul style="list-style-type: none"> Teacher/tutor presentation, e.g. using PowerPoint or other presentation materials, followed by a group discussion on the importance of products coming with a quality assurance mark. Individual activity: learners identify as many products as they can that have passed a quality test. This can be a competition to see who can identify the most products. 	<ul style="list-style-type: none"> Unit 9: Interpreting and Using Engineering Information

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	<ul style="list-style-type: none"> • how they form part of the overall quality-assurance system • fitness for purpose in terms of the product meeting the specification criteria. 		
13 (3 hours)	<p>Assignment 4 Tasks for 2D.P4, 2D.P5, 2D.M4 and 2D.D3</p> <p>Centre devised assignment. Alternatively, use free Edexcel assignment on myBTEC.</p>	<p>Individual activity: learners to complete required tasks on assignment sheet.</p>	<ul style="list-style-type: none"> • Unit 9: Interpreting and Using Engineering Information • Unit 13: Engineering Assembly
TOTAL: 30 hours			

*See the specification for full details of unit content.