Cambridge NATIONALS

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CAMBRIDGE NATIONALS IN ENGINEERING

R102 - THE ENGINEERED BUSINESS WORLD

DELIVERY GUIDE

VERSION 1

OCR
Oxford Cambridge and RSA

CONTENTS

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INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning objective so you can see how each activity helps you cover the specification.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resourcesfeedback@ocr.org.uk.

PLEASE NOTE

The activities suggested in this Delivery Guide MUST NOT be used for assessment purposes. (This includes the Consolidation suggested activities).

The timings for the suggested activities in this Delivery Guide DO NOT relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk.

The latest version of this Delivery Guide can be downloaded from the OCR website

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

KEY

English

Maths

UNIT R102 - THE ENGINEERED BUSINESS WORLD

Guided learning hours : 30

PURPOSE OF THE UNIT

This unit will develop knowledge and understanding of the breadth and diversity of the world of engineering. Learners will study products and services of different sectors of engineering and consider how large and small engineering companies operate in local and global market. The content of this unit covers competitive factors within business and how new and emerging technologies influence engineering developments.

Learners will consider job roles, career options and employment available to them in the engineering sector. Learners will develop knowledge of the recent engineering innovations and technical advances that have influenced and changed the world in which we live.

On completion of this unit, learners will understand the breadth and diversity of the world of engineering and will know job roles and career options available to them in the engineering sector.

Learners studying for the certificate will be able to apply knowledge and understanding gained in this unit to help develop their skills further during the completion of units R103 and R104.

Learning Outcome — The learner will:
LO1: Know about engineering sectors, their products and services
LO2: Understand how engineering companies operate
LO3: Know about employment in engineering
LO4: Understand innovation and technical advances in engineering

LO1 - KNOW ABOUT ENGINEERING SECTORS, THEIR PRODUCTS AND SERVICES

Learning Outcome — The learner will:
LO1: Know about engineering sectors, their products and services

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Services and products of differing sectors within engineering 	Learners could be introduced to the services and products of different sectors within engineering.	30 minutes	
	Learners could be introduced to the services and products of different sectors within engineering by the teacher. Ideally learners should cover a range of sectors, eg at least 7 sectors and their associated products and services. Learners could be asked to work in groups using 3 different engineering sectors per group. Learners could discuss examples of the range of products and services related to each of the 3 given sectors. Learners could carry out online research to identify products and services and identify 2 engineering manufacturers or service provider companies for each of the sectors. Learners could feed back to the wider class to complete the exercise.	2 hours	
	The teacher could ask the learners to consider the role of sectors such as chemical, process, metals, electronics and utilities have with other sectors products and services, such as aerospace, automotive, marine, rail and medical. Working in groups, teachers could ask learners to identify examples of products and services provided by one sector that provide services to each other. eg electronics and automotive, metals with rail, chemical with medical, or other combinations of products and services.	1 hour	

LO2 - UNDERSTAND HOW ENGINEERING COMPANIES OPERATE

Learning Outcome — The learner will:
LO2: Understand how engineering companies operate

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Characteristics of engineering companies	Learners will need to be taught the definitions of micro, SME and large companies. Learners could be introduced to the characteristics of engineering companies by teachers giving learners a range of companies across the sectors to consider, and the learners identify which category of size each company falls within. Teachers could use their knowledge of local companies to give examples in some cases for micro businesses and SMEs.	1 hour	
	Teachers could introduce learners to company structures diagrammatically explaining the different types of structure and characteristics of each.	1 hour	
	Teachers could show learners an example of a large company structure and the diverse range of engineering products and services, and roles such as that from the following web link: http://www.aet-ps.com/img_custom/organizational_chart.jpg	30 minutes	
	Learners could split into 3 groups and asked to form a fictitious company. Each group could be given a different size of company and asked to draw an organisational chart for their company or department within a larger company. Working in their groups, learners as group members could each assume a role with the structure and agree their reporting lines within the structure. Learners could feedback to the wider class to complete the exercise.	1 hour	
	Learners could be asked to research a company from one engineering sector and discuss in small groups how the activities of one department impacts on another. Learners could be given a scenario of the sales department promising delivery of an order to a customer without checking production schedules. Working in small groups, learners could be asked to discuss the impact to; the company – reputation, production, workforce, quality, income, future sales, and the customer. Learners could use an organisational structure chart to discuss reporting responsibilities in this example.	1 hour	

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Characteristics of engineering companies continued 	Learners could complete Lesson Element Engineering Companies to develop further understanding of how engineering companies operate.	2 hours	
	Teachers may choose to give learners examples of companies to research online to save research time in deciding which company examples may be appropriate.	30 minutes	
	Teachers could arrange an industrial visit to a local company for learners to gain knowledge of the functions and scope of operation of the company.	3 hours	
2 Relationships within the engineering marketplace	Learners could be introduced to relationships within the engineering marketplace by the teacher giving examples of engineering companies. Learners could be asked to identify or research a competitor in the same marketplace. Learners could study a particular engineering company that is part of a network or group with differing products and suppliers.	1 hour	
	Learners could be shown the examples from the following web link and asked to identify a range of different functions and the scope of operation from the information shown in the video. http://www.aesseal.com/journey-of-a-seal.aspx	30 minutes	R109 (LO4)
	Teachers could explain the term 'supply chain' using examples of engineered components or supplies produced for assembly in products by other manufactures. Examples include fixing and fastener suppliers and automotive examples. Learners could be shown examples from the following web links and asked to consider how the supplies of materials can impact on production, operation, quality, cost, competition: http://www.kostal.com/english/3-02-01-01.html http://www.kostal.com/english/2-00-00-01.html http://fixfirmlincoln.com/	1 hour	

LO3 - KNOW ABOUT EMPLOYMENT IN ENGINEERING

Learning Outcome — The learner will:
LO3: Know about employment in engineering

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Sources of careers information available to young people	Teachers could introduce learners to sources of careers information by demonstrating relevant internet sources at the following web links: https://nationalcareersservice.direct.gov.uk/Pages/Home.aspx www.apprenticeshipsguide.co.uk	1 hour	
	Learners could search local 14-19 prospectus websites or similar for full and part-time courses in engineering.	30 minutes	
	Teachers could signpost learners to forthcoming careers events such as careers fairs and careers evenings at the current or other learning institution.	30 minutes	
	Teachers could support learners to prepare for attending careers fairs and events with CV preparation, and speculative letter writing to hand out to employers and learning providers.	1 hour	
	Teachers could support learners to prepare for attending careers events by setting learners tasks to independently complete during their attendance at the event such as; identify 3 learning providers that provide engineering courses full-time and part-time. Learners could collect information of what types/ disciplines of engineering the learning provider offer courses in, and which learning providers at the event offer Apprenticeships in Engineering including the frameworks and levels offered.	1 hour	
	Learners could complete the Lesson Element Careers in the Rail Engineering Sector to learn more about different entry routes into an engineering sector and the role of professional body organisations.	2 hours	R115 (LO2)
2 Career opportunities within engineering business functions	Learners could be introduced to the range of sectors within engineering and career options at the following web links: www.careersworld.co.uk http://www.careersworld.co.uk/west-midlands/careers-training/manufacturing	30 minutes	
	Teachers could ask learners to research different business function roles. Learners could research the differences between maintenance engineers and manufacturing/production engineers, identifying different skills sets required for each.	1 hour	

Suggested content	Suggested activities	Suggested timings	Possible relevance to
3 Entry routes for employment in engineering	Teachers could ask learners to carry out research on entry routes into engineering. Learners could independently research Traineeships and Apprenticeships, and be asked to identify the types of Apprenticeship framework they may be interested in. Learners could look at current Traineeship and Apprenticeship vacancies being advertised and the types of employers recruiting, and how to apply at the web link: https://apprenticeshipvacancymatchingservice.lsc.gov.uk/navms/Forms/Candidate/Apprenticeships.aspx	1 hour	
	Learners could independently research companies offering graduate placements and forthcoming graduate fairs to identify employers attending and the format of these events.	1 hour	
	Learners could look at examples of existing graduate programmes in the web link: http://www.tatasteeleurope.com/en/careers/graduate/	30 minutes	
4 Employee rights and responsibilities	The teacher could give a brief overview of the main Acts relating to employment. Learners could get learners to work in small groups to identify employer responsibilities and their own responsibilities as an employee including the use of personal protection equipment.	1 hour	
	Learners could be asked to identify common hazards of working in a production workshop and hazards when working on/with machinery and equipment.	30 minutes	R109 (LO2)
	Learners could be asked to identify hazards associated with coming into contact with vehicles and driving of any type of vehicle on the workplace premises.	30 minutes	
	Learners could be introduced to the role of the Health & Safety Executive and how this relates to the engineering sector by following the web link: http://www.hse.gov.uk/engineering/index.htm http://www.hse.gov.uk/workers/index.htm	30 minutes	
	Teachers could get learners to work in small groups and research one news story from the HSE site to feedback to the wider group. Learners could discuss precautions related to the news story to avoid similar occurrences.	1 hour	
	Teachers could get learners to research the trade unions relative to a chosen sector and ask learners to identify 3 roles of unions by following the web link: http://www.tuc.org.uk/about-tuc/union-issues/union-advantage	30 minutes	

Suggested content	Suggested activities	Suggested timings	Possible relevance to
5 The role of the Engineering Council and its member institutions	Teachers could ask learners to research the role of the Engineering Council and its member institutions.	1 hour	
	Learners could be directed to the following web link: http://www.engc.org.uk/ and its partner institutions such as the Institute of Engineering Technology http://www.theiet.org/	30 minutes	
	Learners could research the role of the Royal Academy of Engineering: http://raeng.org.uk/ and a range of other key sector bodies including the Institute of Mechanical Engineers http://www.imeche.org/	30 minutes	
	Learners could be asked to research five activities of the Engineering Council, five different member institutions and review one case study. Learners could feedback to the wider class on their findings.	1 hour	
	Learners could be shown a video about the benefits of registration from the following web link: http://www.engc.org.uk/professional-registration/video-what's-in-it-for-me	30 minutes	
	Learners could each choose a member institution to research; the sector covered by the institution, and two different levels of membership grade.	1 hour	

LO4 - UNDERSTAND INNOVATION AND TECHNICAL ADVANCES IN ENGINEERING

Learning Outcome — The learner will:
LO4: Understand innovation and technical advances in engineering

Suggested content	Suggested activities	Suggested timings	Possible relevance to
1 Applications of recent of engineering innovation and technical advances	Teachers could ask learners to consider the applications of technical advances used in the home and industry such as fibre optics used in communication, and how communication signals are transmitted.	30 minutes	
	Teachers could introduce learners to innovation and technical advances using examples of the uses of microprocessor applications in everyday applications and products, and the advantages of these advances.	30 minutes	
	Teachers could get learners to carry out research on advances in orthopaedic implants and joints such as those found by following the web link: http://www.jri-ltd.co.uk/healthcare-professionals/furlong/hac-femoral-stem.aspx	30 minutes	
	Learners could complete Lesson Element Innovations in Engineering.	1 hour	
2 Impact of innovation and technical advances	Teachers could introduce learners to the impact of innovation and technical advances with particular materials and exploring the advantages of use and impact on design and production methods. Learners could be given the example of the use of composites. Teachers could use examples of how the use of materials impacts on fuel efficiency of the product. Teachers could ask learners to identify examples of the impact of innovation using materials, design and production methods, and product efficiency are achieved using the web link: http://www.boeing.com/boeing/commercial/787family/background.page	1 hour	R109 (LO1)
	Learners could be asked to identify how technical advances have impacted on design and production methods, costs, sustainability of processes, material and labour usage in the example contained in the web link: http://www.hitachi-rail.com/products/rolling_stock/a_train/index.html	2 hours	R109 (LO1, LO2, LO3)
	Learners could read the content and watch the range of videos available and identify the technology used, benefits to the company and product by accessing the web link: http://www.gestamp.com/what-we-do/technologies/welding/laser-welded-blanks	2 hours	R109 (LO2, LO4)

Contact us

Staff at the OCR Customer Contact Centre are available to take your call between 8am and 5.30pm, Monday to Friday.

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