Examiners' Report/
Lead Examiner Feedback

January 2017

NQF BTEC Level 1/Level 2 Firsts in Engineering

Unit 38: Materials Used In Engineered Products (20573G)

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Introduction

This report has been written by the Lead Examiner for BTEC Engineering Unit 38 – Materials Used In Engineered Products. It is designed to help you understand how learners performed overall in the exam. For each question, there is a brief analysis of learner responses. You will also find some example learner responses for some questions. We hope this will help you to prepare your learners for future examination series.

Grade Boundaries

Introducing external assessment

The new suite of 'next generation' NQF BTECs now include an element of external assessment. The external assessments for NQF BTEC Construction are timetabled paper-based examinations.

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade (Distinction, Merit, Pass and Level 1 fallback).

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark should be for a particular grade.
When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each test we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each test, because then it wouldn't take into account that a test might be slightly easier or more difficult than any other.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Grade	Unclassified	Level 1 Pass	Level 2		
			Pass	Merit	Distinction
Boundary Mark	0	12	21	30	40

General Comments on Exam

As with previous series, the entry of learners was low, there are no realistic comparisons which can be made to previous series. The format of the paper is however similar to other traditional examinations in the BTEC Level 2 Engineering programme, namely Unit 9, therefore some comparisons to the approach taken by learners for that paper can also be made.
This paper forms part of the core of the BTEC Level 1/Level 2 First Award in Engineering Materials and Manufacturing alongside Unit 4.

Question 1

This question concerns materials and material properties and was in the format of multiple choice questions and short answer questions, mostly directly based on content in the specification. Considering the individual part questions, candidate achievement was variable across the responses seen.

Targeted Specification Area: Learning Aim B.2

Q1(a) – This question was generally well answered, with many learners correctly able to identify an appropriate composite material. Common responses included carbon fibre, GRP and Kevlar; these being examples listed in the unit content.

Targeted Specification Area: Learning Aim B.1

Q1(b) – Learners responded well to this question, with a large proportion of learners correctly identifying carbon steel and cast iron as examples of ferrous metals.

Q1(c) – In this question, learners were asked to identify two examples of alloys. The majority of learners were able to identify at least one, with brass and bronze being common responses. Some learners included examples of non-ferrous metals or composites in error. The majority of correct responses were however directly from the list given in the unit specification.

Targeted Specification Area: Learning Aim A.1

Q1(d) – Unlike Q1b, this question was less well answered, with only a small proportion of learners correctly identifying that mass and opacity are examples of physical material propertie. Topic A1 in the specification states clearly how material properties are classified for the purposes of this Unit.

Q1(e) – As with Q1d above, this question focussed on the material properties which are stated in the unit content in Topic A1. Only a small proportion of leaners were able to identify the definition as being for stiffness or rigidity. The specification indicates that learners should know the definitions of material properties, which was lacking in this cohort of learners.

Question 2

This question concerns a range of areas of the specification, including life cycle, sectors and forms of supply. As with Q1, a range of question types were used; again candidate achievement was variable.

Targeted Specification Area: Learning Aim C.1

Q2(a) – In this question learners were asked to identify the activity where ore is mined from the ground. A large proportion of learners were able to correctly identify this as mining.

Targeted Specification Area: Learning Aim D.1

Q2(b) – This question draws from two aspects of the specification, asking learners to identify the sector which is associated with the manufacture of one of the named products in Topic D1. Whilst most learners were able to correctly identify both sectors in question, a common error was to state that rotor blades are produced by the marine sector. Centres are reminded that it is important that learners have a familiarity with the named sectors and the products which they manufacture as listed in Topic D1.

Targeted Specification Area: Learning Aim C.2

Q2(c) – Learners achieved limited success with this question, with only a small proportion being able to identify an advantage of polymers being supplied in granule form; the majority of learners who achieved marks tended to focus on the reduced energy needs for moulding.

Question 3

This question followed a similar format to Question 2, with a number of areas of the specification being assessed through short answer and multiple choice questions.

Targeted Specification Area: Learning Aim A.2

Q3(a) – Learners tended to have an awareness of the characteristics of materials and were able to correctly identify crystal growth as being associated with metals.

Targeted Specification Area: Learning Aim A.1

Q3(b) - As with Q1d above, this question focussed on the material properties which are stated in the unit content in Topic A1. Only a small proportion of leaners were able to identify that solvent resistance is an example of a chemical and durability property. Common incorrect answers included corrosion resistance.

Targeted Specification Area: Learning Aim C.2

Q3(c) – This question was generally well answered, with many candidates giving two appropriate examples of the use of composites in tube form. Typical answers included fuel pipes and pipes within heating systems. Where learners did not achieve marks, responses tended to be inaccurate or not relate to tube or pipe form.

Targeted Specification Area: Learning Aim B.6

Q3(d) – Learners generally performed poorly on this question. In many cases they identified the incorrect materials for the component parts given, with common responses being cast iron for the landing gear strut and medium carbon steel for the compressor casing.

Question 4

This was the first question in the paper to introduce a scenario; learners are expected to be able to apply knowledge of materials in familiar contexts. As such, a scenario allows learners to demonstrate deeper understanding of materials and their uses in an engineering context.

Targeted Specification Area: Learning Aim B.6

Q4(a) – This question was answered well by the majority of learners, who were able to identify correctly that cars are manufactured by the automotive sector.

Targeted Specification Area: Learning Aim B.5

Q4(b) – As Q4a, many learners correctly named an appropriate surface treatment, with typical responses including painting and plating. Some learners made reference to surface nanotechnologies which was an appropriate response.

Targeted Specification Area: Learning Aim C.2

Q4(c) – Learners performed poorly on this question. Only a small proportion of candidates were able to explain an advantage of the form of supply of the low carbon steel. Where learners did gain marks, this was as a result of the same materials being able to be used for different sizes of wheel or the ability to use a range of processes. Incorrect responses tended to focus on delivery or storage of the material.

Targeted Specification Area: Learning Aim B.1

Q4(d) – The focus of this question was on the properties of the material with regards to manufacturing, rather than end use. Those learners who achieved marks tended to make reference to being able to shape/form low carbon steel with relative ease.

Question 5

This was another example of a scenario based question, in this case related to smart materials as listed in Topic B4 of the specification.

Targeted Specification Area: Learning Aim B.4

Q5(a) – The performance of learners with regard to this question was very good, with the majority of learners being able to correctly identify the stimulus for shape memory polymers as being heat.

Q5(b) – Knowledge of the uses of shape memory polymers was variable, with a large proportion of learners identifying their use in medical stents. A common incorrect answer was to state glasses frames which are manufactured from a similar smart material, namely shape memory alloy.

Targeted Specification Area: Learning Aim C.1

Q5(c) – Only a small proportion of learners were able to identify disadvantages of the company extracting metallic materials from ore. In a number of cases where learners achieved marks, they made reference to the quality or quanity of material that is available. In instances where learners did not achieve marks, this tended to be as a result of answers considering the primary extraction of ore from the ground as opposed to the materials from the ore.

Targeted Specification Area: Learning Aim B.4

Q5(d) – Learners performed better on this question in comparison to Q5c, with many identifying at least one advantage to the end user of using thermochromic materials in the glass panel. Common responses included increasing the safety of the kitchen because the panel changes colour when hot. A large proportion of learners were able to provide at least one linked response.

Question 6

The focus of question 6 was on the marine sector, with a range of different question types being used to test knowledge and understanding.

Targeted Specification Area: Learning Aim C.2

Q6(a)(i) – There was a significant amount of confusion amongst learners who provided responses such as mass and batch production rather than the form of supply used to manufacture chains. Only a small proportion of learners were able to identify bar stock, or similar, to achieve the mark.

Targeted Specification Area: Learning Aim B.5

Q6(a)(ii) – This was an example of a question where learners were required to link the heat treatment of a materials to changes in properties. Many learners were able to state that annealing made the chains less brittle or more able to withstand impacts, however these were often not linked and resulted in learners achieving only 1 of the 2 marks available.
Q6b – Learners performed comparably on this question to Q6aii. Learners tended to be able to identify an advantages of additional fibre reinforcement, such as being able to provide strength where needed or to increase stiffness of the masts. Where candidates achieved higher marks, they provided linked responses that justified advantages, such as reducing the likelihood of masts snapping or breaking.

Targeted Specification Area: Learning Aim A.2

Q6(b) - Learners tended to be able to identify an advantages of using additional fibre reinforcement, such as being able to provide strength where needed or to increase stiffness of the masts. Where candidates achieved higher marks, they provided linked responses that justified advantages, such as reducing the likelihood of masts snapping or breaking.

Question 7

Targeted Specification Area: Learning Aim D.1

Learners tended to achieve in the middle mark band for this question as they had some familiarity with the concepts relating to mobile phones and the various factors that need to be considered on disposal. Some lowerscoring responses were generic and tended to focus on the need to disassemble the phones and sort materials. The higher scoring learners considered the different materials used in the phones, how the recycling needs are different for them, and the possibility of reusing some of the components, for example batteries. Those learners who performed well tended to consider all of the factors included in the question, with a balanced consideration being presented.

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