

# Examiners' Report/ Principal Examiner Feedback

June 2011

GCSE

Application of Technology in Engineering  
and Manufacturing

Unit 5EM03 Paper 3B

Food and Drink, Biological and Chemical

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## Chief Examiner's Report

There were two qualifications examined in this series at GCSE level.

GCSE Engineering (Double Award) 2EG02 and

GCSE Manufacturing (Double Award) 2MN02

Unit 3: Application of Technology in Engineering and Manufacturing (5EM03)

The award of this unit was split into six sectors with an individual paper for each;

5EM03/3A Printing and Publishing Paper and Board

5EM03/3B Food & Drink, Biological & Chemical

5EM03/3C Textiles and Clothing

5EM03/3D Engineering and Fabrication

5EM03/3E Electrical and Electronic, Process Control, Computers,  
Telecommunications

5EM03/3F Mechanical, Automotive

All six papers were harmonised for structure and difficulty.

Each paper had two sections. Questions in Section A related generally to information about the chosen sector. Section B illustrated a product from the chosen sector and questions were related to that product. The product was pre-released in September/October 2010 and acted as a focus for research in preparation for the exam. Again this year a Support Paper was available to help centres prepare for the exam. This paper was attached to the pre-release material so every centre had access to this. Candidates were able to take their own research notes into the examination, but these were not to be submitted with the examination paper for marking. A very few centres did submit this work which caused problems for the processing of their scripts. This action may cause a delay in the marking and therefore issuing of results so centres are strongly warned not to include the pre-release work when submitting scripts. The question paper within both sections was ramped in difficulty throughout although in some papers an unusual pattern emerged where higher achievers failed to gain "easy" marks.

All Principal Examiners' reports indicate that all the questions within the respective paper were accessible to their intended candidature, although all indicated that lower achievers often gave generic answers throughout the paper. A feature of this year, different to the predecessor qualification, was that some sector papers (mainly sectors 3B and 3E) had a significant number of blank spaces. Also most Principal Examiners' reports indicate that marks could be obtained from questions 13 but question 14 which involved assessment of Quality of Written Communication (QWC) was difficult for most.

Generally speaking those candidates who had had opportunities to study and research the target product answered well. It was clear in their responses that they understood the process of manufacturing/engineering when applied to their product and sector. Good candidates were also able to give variety in their responses across the range of questions. Some responses led the examining team to suspect that in some centres candidates were allowed to take in information from previous examination papers or mark schemes as often their answers were duplicates from these previous mark schemes. In these cases often the answer was not in the context of the question and the candidate was not able to score high marks and therefore were disadvantaged by having this information within their pre-release notes and sketches. Candidates are not allowed to have these documents in the examination room as part of their pre-release work.

In general terms a typical grade F candidate was able to identify products from a given sector, name and describe, with some exceptions in some sectors, the use of components/equipment etc and in nearly all cases link applications of technology to key areas of technology. In a range of other questions where explanations and descriptions were required often candidates were only able to give one word if not simple answers. Variations in answers throughout the paper were limited. Application of technology was also limited throughout their responses. Often no responses were suitable for the latter questions in the paper particularly when the question asked for explanations of a term such as 'systems and control' and 'automation'. They showed limited recall and application of knowledge and understanding.

In general terms a typical grade C candidate was able to gain a range of marks from the same areas and aspects of the paper as a grade F candidate, but with further detail in their responses to those questions demanding an explanation or description. They were able to explain benefits of using CAD and CAM. Their responses when explaining the implications of the use of information and data handling were limited. Good responses were given when explaining the aspects of the product through sketches and notes. Some were still unsure of the stages in manufacture, particularly what happens in some of the stages of manufacturing.

In general terms a typical grade A candidate was able to access marks for many aspects of the paper including most of those achieved by grade C candidates. Their explanations and descriptions were complete and had many references to the "real" manufacturing and application of technology of their product. Throughout the papers candidate responses evidenced a variety of applications of technology. Many candidates at this level understood what SMART materials are and knew all about the application of automation. Often their evaluations on the use and impact of modern materials and processes were well presented.

All of these points were considered during the awarding of the results.

## **Unit 5EM03\_3B**

### **Food & Drink, Biological & Chemical**

#### **General Comments**

The paper produced a wide range of responses in both Section 'A' and Section 'B'.

Average and lower ability candidates often gave generic responses that lacked real understanding or depth. Responses such as 'cheaper /quicker/faster /easier', sometimes with little or no explanation or development were often used, limiting the marks which could be awarded. A number of candidates based their responses on an incorrect context giving inappropriate answers and as a consequence did not gain marks. The more demanding questions at the end of each section proved difficult for a significant number of candidates, many giving inappropriate or low level responses.

In 'Section 'B' there was evidence that a significant number of candidates had not fully studied baking powder and how it is manufactured in sufficient depth, limiting the marks which could be awarded. Candidates who had studied and retained the information relating to baking powder and its manufacture and were able to link this to generic manufacturing gained marks.

The majority of more able candidates attempted all questions and the better candidates gained high marks. Lower ability candidates often left empty spaces throughout the question paper. The questions requiring an 'explanation' or requiring an 'evaluation' were often answered using single words or other low level responses and were often not fully developed again reducing the marks which could be awarded to lower ability candidates.

Most candidates would benefit from practicing examination skills and techniques. It appeared that a number of candidates did not read the questions carefully and as a consequence did not fully understand, or misinterpreted what was required of them, therefore reducing the marks that could be awarded.

In addition developing skills relating to discussing topics (ref.Q14) would assist most candidates.

#### **Section A**

##### **Question 1**

Q1(a) - The majority of candidates correctly identified products belonging to the Food and Drink sector.

Q1(b) - A few candidates gave an incorrect response eg pastry cutter in the Biological and Chemical sector.

## **Question 2**

Q2(a) -Table1; The majority of candidates correctly named the thermometer and oven.

Q2(b) -Table 2; The meanings of the symbols were generally well understood by the majority of candidates but often answers were not expanded enough by lower and average ability candidates to gain maximum marks eg 'it will burn', 'it will cause itching', those candidates referring to warning it is 'harmful', 'poisonous' etc were awarded additional marks.

## **Question 3**

Well answered by the majority of candidates, many gaining full marks. Incorrect responses usually centred on links with ICT and Control Technology.

## **Question 4**

Q4(a) - A number of lower ability candidates were unable to differentiate between a product and a modern material and many were relying on basic or standard materials ingredients such as 'flour'. However, generally well answered and products from previous question papers were often used.

Q4(b)(i) - Again lower ability candidates were only able to identify basic or standard materials, a few identifying 'starch' but not 'modified starch'. A significant number of candidates correctly stated preservatives and emulsifiers.

Q4(b)(ii) - Answered well by the average and more able candidates, often with references to shelf life and efficiency benefits. Lower ability candidates gave scant responses that lacked depth, others referred to equipment.

Q4(c)(i) - A significant number of candidates confused modern and smart materials. Lower ability candidates often referred to basic or generic materials such as cornstarch, flour etc., others listed equipment, CAD and CAM.

Q4(c)(ii) - Descriptions of the characteristics given by more able candidates were mostly satisfactory often underpinned with appropriate references to the functions.

## **Question 5**

Q5(a) - Answered well by the majority of candidates with many gaining full marks. Responses such as more accurate, quicker development time, easier to make changes etc were frequently used.

Q5(b)(i) - Attempted by the majority of candidates, many were awarded full marks. There were a low number of responses referring to CAD by lower level candidates.

Q5(b)(ii) - Attempted by the majority of candidates. A significant number made responses linked to the manufacturers benefit rather than the retailers. This

resulted in no marks being awarded. There were numerous references to manufacturing costs being lower due to less labour, but these did not always extend to lower prices to retailer. Few candidates referred to reduced ordering times, focussing largely on customer satisfaction due to consistent or cheaper products. A small number answered the points about CAD and CAM separately.

### **Question 6**

Q6(a) - Lower ability candidates were unable to explain fully systems and control technology or identify technology or computers to control machinery. There were a number of references to Quality Control and benefits of large scale manufacturing. Some candidates merely identified the stages of manufacture. Others gave explanation referring to how it is used rather than what it is.

Q6(b)(i) - Most candidates attempted this part of the question and many giving appropriate examples.

Q6(b)(ii) - A significant number of candidates responded with references to CAD or stock control including JIT. Many responses related to manual methods.

Q6(b)(iii) - Most candidates attempted this part of the question and gave detailed well developed responses. In addition to safer, fewer injuries, does not tire type responses, references to better hygiene conditions with minimal human input were made.

### **Question 7**

Q7(a) - Attempted by the majority of candidates. A wide range of responses including references to sales data, customer information, advertising information, posters, flyers. Some responses referred to stock control and supplies of materials instead of those relating to marketing. Lower ability candidates gave brief, generic responses, higher level candidates gave well developed and detailed responses.

Q7(b) - This was attempted by the majority of candidates, many gaining 2 or 3 marks through well developed and detailed responses. However, a number of candidates gave responses that were more appropriate to part Q7(a) marketing. Other candidates identified negative implications, identifying the implications of systems failure and loss of data.

## **SECTION B – based upon the mass produced boxes baking powder pre-release material**

### **Question 8**

Q8(a) - The functions were generally not well understood by low and some average ability candidates. The more able candidates were able to state sufficient functions including neutralises the acid, influences pH etc and gained full marks. Lower and average candidates were often able only to state one or two of the more common functions such as produces carbon dioxide gas, makes product bigger. The term 'react' without explanation, references to taste were sometimes made again without explanation, limiting the marks given.

Q8(b) - The functions were generally not well understood by low and some average ability candidates. Low level responses were often single words such as heat/water, size, bigger etc. without sufficient explanation being given by low and average ability candidates. More able candidates were able to state sufficient functions to gain full marks.

Q8(c) A small number of candidates did not attempt this question, however those who did often gained full marks. Many of the responses although correct were often generically based including references to labelling, display, protecting, date coding etc. Some lower ability candidates simply referred to different pack/weight sizes.

### **Question 9**

Q9(a) (i) and Q9(a) (ii) - Correctly answered by majority of the candidates.

Q9(b) (i) - This question produced a wide range of responses. Many lower and average ability candidates were unable to describe the production planning stage for baking powder in detail and often relied on minimal or generic responses without linking them directly to the product. More able candidates, who had researched and studied the product in detail and retained the information, often gained full marks.

Q9(b) (ii) - Again this question produced a wide range of responses. Many lower and average ability candidates were unable to describe the packaging and dispatch stage for baking powder in detail and often relied on minimal generic responses without linking them to the product or going well into the distribution stage. More able candidates, who had researched and studied the product in detail and retained the information, often gained full marks.

### **Question 10**

Q10(a) - Very well answered by those candidates who had researched and studied the product. Lower ability candidates often stated sodium bicarbonate or an acid as the filler.

Q10(b) (i) - This question produced a wide variety of responses. Many lower ability candidates gave inappropriate or generic responses, often a single word without explanation or reference to the production process eg hoppers, vacuum

tubing, etc. More able candidates, who had researched and studied manufacturing the product in detail and retained the information, often gained full marks.

Q10(b)(ii) - Most candidates attempted this part of the question. Low level responses included to mix well, to mix thoroughly etc. without any further explanation or development. More able candidates expanded similar responses with more consistent product, more efficient, faster production etc. and gained marks for this.

Q10(c) – This question was attempted by most candidates, however many of the responses were not well developed or did focus on increasing sales. The knowledge of modern materials and their applications was generally not well understood by lower and average ability candidates. A number also responded with references to modern materials used in packaging citing them for being strong lightweight and easier to print on therefore making them attractive to customers these were awarded marks. Some more able candidates grasped the concept well, giving well developed responses gaining full marks.

### **Question 11**

Q11(a) - Attempted by most candidates and produced a wide variety of explanations, some with specific examples, often gaining 2 marks. Lower ability candidates often gave simplistic answers such as “by itself”. Few references to control were made.

Q11(b)(i) Many candidates were unable to provide coherent examples of automation used in the production of baking powder or gave low level /generic type responses. More able candidates, who had researched and studied how baking powder is manufactured in detail and then retained the information, often gained full marks.

Q11 (b)(ii) and Q11(b)(iii) - Some very full answers from the more able candidates, who were often able to give more than two benefits for each of the manufacturer and the consumer. Lower ability candidates often did not give appropriate answers because they did not answer Q11(b)(i) correctly or not at all. Many responses lacked depth in relation to benefits. Others did not attempt any part of the question. A small number failed to differentiate between the manufacturer and consumer or answered both parts from the manufacturer's perspective.

Q11(c) A significant number of candidates failed to provide a response to this question. Those that did were often only able to achieve 1 mark indicating that there was little real understanding of the terms “automation” and “mechanisation” and how they differ.

### **Question 12**

Q12(a)(i) and Q12(a)(ii) - Well answered by most candidates, although some lower level candidates gave responses including databases, CAD, computers etc. Where the examples in Q12(a)(i) were appropriate the follow through into Q12(a)(ii) was generally good with appropriate examples of benefits given.

Q12(b)(i) and Q12(b)(ii) - Most candidates were able to identify some form of quality check including references to weights, contamination, or similar, although its relevance to baking powder was sometimes overlooked, indicating insufficient research. Lower ability candidates often had little knowledge of how the checks were carried out.

Q12(b)(iii) - Most candidates were able to identify two of the three required benefits to the end user including safer to use, consistent product, better quality etc. A small number did not attempt the question and a few candidates failed to relate the Quality Control to the end user. Lower ability candidates tended to state what was being checked rather than the benefits or provided low level responses referring to 'looks' or 'appearance'.

### **Question 13**

Most answers related to the 'workforce'. Responses relating to the workforce were usually comprehensive and often included references to less staff, new/different skills, safer.

A significant number of candidates failed to recognise that the second part of the question related to the working environment. Those that did were able to pick up marks easily. Candidates occasionally referenced advantages and disadvantages of modern technologies and focussed on these in relation to the manufacturer rather than the workforce. Additionally there were candidates that referenced the global environment rather than the working environment. In a few instances higher ability candidates produced well developed points which unfortunately referred to the global environment and use of resources.

### **Question 14**

This question produced a wide range of responses, many were unable to provide a real discussion and it would appear that most did not fully understand the concept of sustainability. Few candidates really got to grips with the notion of 'sustainable manufacture' and increased consumerism, a significant number gave repeated statements often relating to the workforce or increased use of machinery / technology. In some instances these were awarded a higher mark because of the way the argument / discussion had been presented or because of the number of issues raised. Sometimes relevant statements were made, issues identified but often they lacked real development. Some candidates also answered the question with reference only to modern materials rather than technologies. A significant number omitted any reference to baking powder but referred to other food products.

## **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>

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