Examiners' Report Summer 2009

GCE

GCSE Engineering 2316

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Chief Examiner's Report

June 2009

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

- GCSE Engineering (Double Award) 2316
- GCSE Manufacturing (Double Award) 2351

Unit 3: Application of Technology (5318)

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

- 5318/01   Printing and Publishing Paper and Board

- 5318/02   Food & Drink, Biological & Chemical

- 5318/03   Textiles and Clothing

- 5318/04   Engineering and Fabrication

- 5318/05   Electrical and Electronic, Process Control, Computers, Telecommunications

- 5318/06   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 2008 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 widely available on the website as a 'stand alone document' and was also attached to the pre-release material so every centre had access to this. It was also attached to this report for last year. Candidates were able to take their own research notes into the examination, but this was not to be submitted with the examination paper for marking. The question paper within both sections was ramped in difficulty throughout.

All Principal Examiners' reports indicate that all the questions within the respective paper were accessible to their intended candidature, although all indicated that some lower achievers were able to access marks from the later questions in the paper. This was particularly the case for question 13 where in the second part it involved knowledge about the use of automation and the working environment.

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.

It was pleasing to note that most Principal Examiners reported a view that this year candidates performed better than previous years. This was confirmed by a general increase in the mean mark for all sectors except paper 02 Food and Drink where there was a very slight drop in the mean mark.

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 question 11. 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 a range of benefits of using ICT and communications technology. Their responses when describing an application of quality control and then explaining the benefits 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 application of technology. Many candidates were able to explain the benefits of the use of computer control. Often their evaluations on the use and impact of ICT were well presented.

All of these points were considered during the awarding of the results. Overall there was a decrease of around 23 % in candidature over that for June 2008 and a similar decline to the previous year.

Principal Moderator's Report Summer 2009
GCSE Engineering

Introduction
Presentation of Portfolios
Assessor annotation
Witness Testimony

Assessment of the Units
Unit 1: Design and Graphical Communication
Unit 2: Engineered Products

Introduction

A team of twenty seven moderators were involved in the moderation of portfolios from 199 centres covering the two internally assessed, externally moderated units. Moderators reported a general improvement in the standard of evidence produced by some of the candidates. However moderators also reported that there was a general tendency for assessors to be significantly lenient throughout. It was also disappointing to note that a significant number of centres continued to misinterpret the content of the specifications and failed to conform to the procedures laid down by the awarding body. Where ever possible moderators ensured that candidates were not unfairly disadvantaged by incorrect procedures, however where the specification was not interpreted correctly, as identified later in this report, candidates were inevitably disadvantaged.

This report highlights areas of good practice and also reiterates problems identified in previous reports. It is disappointing to report that a number of centres continued to repeat poor practice recognised in previous years.

Some centres have delivered a simple metalwork programme which failed to address several of the assessment criteria and moderators frequently reported that candidates have undertaken a worthwhile engineering activity that unfortunately did not address the assessment criteria and therefore did not provide evidence of achievement for this qualification.

The assessment of the internally assessed units should not be in the form of teacher lead coursework activities. It is essential that all teaching and learning activities should be completed before subjecting the candidates to assessment. The portfolios presented for moderation frequently demonstrated that the work had been undertaken as part of normal teaching activities and therefore failed to allow the candidates the opportunity to demonstrate independence.

There continues to be evidence that some centres used group discussion and statements provided by teachers in order to generate evidence for the portfolios. This resulted in severe loss of marks. It is essential that the candidate's portfolio records the individual's achievement during the assessment process. Assessors should refer to pages 9 and 10 of the specification for guidance on supervision of students, authentication of work submitted and application of the mark bands.

Some candidates produced clearly ordered portfolios which grouped evidence to meet individual assessment criteria simplifying the assessors task. However some centres failed to develop candidates portfolio building skills resulting in the presentation of ill-defined work which was frequently assessed incorrectly.

Candidates portfolios should be securely bound and include:

- a Candidate Authentication Sheet
- a title page with the relevant specification name and number, candidate name, candidate number, centre name, centre number, and date; The title page must be in addition to the Mark Record Sheet which does not form part of the portfolio and is removed when the work has been moderated. In many cases work did not carry any means of identification after the Mark Record Sheet had been removed.
- Mark Record Sheet for the unit to be moderated
- clear page numbering
- a contents list

It is disappointing to note that in many cases candidates portfolios did not conform to these simple standards.

A significant number of centres continued to use plastic wallets as binders for multiple sheets of evidence. The use of plastic wallets is not forbidden, but should be restricted to containing materials which can be read without removal. Moderators reported significant difficulties when portfolios were presented in this manner.

Although previous reports have highlighted the problems involved the use bulky folders, such as lever arch files, some centres continued to present portfolios in this manner. This frequently resulted in damage during transport and subsequent failure to bind sheets adequately. Moderators reassembled these portfolios in an appropriate order wherever possible. However this was not always possible and it is possible that some candidates may have been disadvantaged by this problem.

Some assessors continue to fail to provide indication of where achievement had been recognised. It is a regulatory body requirement that assessors provide page numbers to indicate where evidence had been recognised. In cases where page numbering was not provided the moderators applied individual judgement to identify where evidence was considered to have been recognised. However in these cases it was not possible to comment on assessment decisions with any certainty.

Some centres failed to provide any indication of where achievement had been recognised and moderators found it necessary to remark work instead of trying to agree assessment decisions. All portfolios should include an annotated Mark Record Sheet and the assessor should ensure that:

- All marks are recorded accurately and the arithmetic is correct
- The total mark is transferred correctly onto the OPTEMS or via EDI
- The candidate and the assessor, as appropriate, sign any required authentication.
- Consistent and accurate assessment usually occurred when assessors identified sections of portfolios which met the two different features of each assessment criterion.

It is disappointing to continue to report that some centres failed to record marks accurately, moderators noting that marks recorded on candidate work did not agree with those recorded on OPTEMS forms and also that some centres were not able to provide accurate totals for marks awarded. In these cases moderators sometimes were able to verify appropriate marks by communicating with the centre or assessor

individually. However in some cases it was necessary to use the marks recorded on the Awarding bodies system.

Some centres still did not provide any evidence of Candidate Authentication and moderators spent considerable amounts of time contacting centres in order to obtain the necessary authentication forms. In many cases these forms submitted were not correctly signed either by the candidate or the assessor/teacher. It is a JCQ requirement that all candidate work should be accompanied by a correctly completed Candidate Authentication Sheet.

Assessor Annotation

Assessor annotation continues to cause problems. The GCSE Code of Practice requires that assessors record full details of the nature of any assistance given to individual candidates that is beyond that of teaching the group as a whole. Many assessors did not record the degree of assistance provided to individual candidates and significantly similar pieces of evidence for different candidates were often awarded different grades without the assessor substantiating the decisions. This frequently resulted in moderators awarding substantially lower marks due to the lack of appropriate evidence. It was also noted that some centres failed to record marks accurately, moderators noting that marks recorded on candidate work did not agree with those recorded on OPTEMS forms and also that some centres were not able to provide accurate totals for marks awarded. This lack of attention to detail is unexplainable.

Assessor annotation to identify where achievement has been recognised is a mandatory requirement for internally assessed work. The minimum requirement for annotation is to complete the annotation column on the Mark Record Sheet by listing the portfolio page numbers where evidence can be found for each of the assessment criteria. A significant number of centres did not provide annotation and therefore moderators were not able to identify where assessors had recognised achievement. In these cases it was necessary for the moderator to remark the work in order to provide a reliable moderator mark for the available evidence.

Witness Testimony

The preparation and provision of Witness Testimony continued to cause major problems in assessment. Candidates should assemble their portfolio and include in it all relevant Witness Testimony. Assessors should then assess the evidence produced.

Assessors decisions frequently did not match the evidence provided by Witness Testimony. This was probably due to assessors awarding marks based on holistic decisions made during the delivery and assessment of the unit. It is important that assessors recognised that they should only make assessment decisions based on the content of the portfolio.

When assessing process skills it is vitally important that Witness Testimony is completed by assessors in order to authenticate Candidate work and provide evidence that Candidates have achieved the level of performance required in the assessment grid. This Witness Testimony must be detailed and state exactly what a Candidate has done and how this meets specified assessment criteria during assessment activities. Witness testimony should normally be supported by other

forms of evidence such as annotated photographs, records of measurements etc. For example, in some cases assessors provided statements that Candidates had met all required quality standards. In these instances the statements should be supported by records of measurements and comparison with the required standards. Similarly it is inappropriate for an assessor to record that a Candidate worked safely at all times. Witness testimony must state details of Candidate activity and equipment used accompanied by dates when observations were made. General 'all encompassing' statements are inadmissible.

Assessment of the Units

Overall there has been an improvement in the presentation of evidence. Many centres having benefited from the wealth of exemplar materials now available. This included the use of templates which greatly assisted the candidates in the documentation of suitable evidence. However a significant number of centres still do not appear to have availed them selves of this valuable material. This has inevitably disadvantaged some candidates.

This is a vocational qualification and centres need to provide candidates with access to up-to-date vocational resources. Where teachers do not have industrial knowledge it is important that centres generate good links with industry in order that candidates may understand industrial processes. Too often candidates demonstrate little understanding of engineering industrial practices other than those applicable to the school workshop. In order to meet the higher grades candidates must be able to show some application of industrial procedures.

Final, summative assessment should occur after all teaching and learning experiences have been undertaken in order that the candidate may demonstrate the highest achievable levels of understanding and independence and originality.

Where centres adopted a 'design and make' approach to the two units, candidates frequently were not able to present adequate evidence to meet some of the assessment criteria. Overall, candidates achieved most success when they were presented with completely unrelated assignments for each of units one and two.

There was evidence to suggest that some assessors failed to refer to the evidence requirements for the units and therefore failed to recognise that there are two aspects to each assessment criterion. Candidates must produce evidence to meet both of the bullet points identified in the specific criterion in the evidence requirements for that unit.

Unit 1: Design & Graphical Communication

Many candidates failed to include a copy of the client brief in the portfolio. This made it difficult to identify how the candidates had analysed this brief.

It is not appropriate to allow candidates to choose their own design topic. However it is acceptable to provide candidates with a number of different briefs from which they are required to select one most appropriate brief, since this approach helps to ensure candidates undertake individual, rather than group, design activities.

It is not appropriate to undertake the design activity as a group.

Some centres continued to use 'product design' activities which failed to recognise engineering principles necessary to ensure the successful operation of the product. Candidates frequently identified features of the product but failed to explain how these features would operate. For example where candidates identified features such as switches on general designs it was considered to be a low level response unless this identification was accompanied by details such as a circuit diagram which indicated the electrical source and how the circuit would be completed.

It continues to be disappointing to report that some candidates are still being severely disadvantaged by projects focussed on the design of items such as bottle openers, CD racks, shelves and stands and tool boxes. This type of focus usually triggers a simple 'product design' approach which mainly involves aesthetic appreciation. Also in these cases candidates were frequently not able to consider appropriate scientific principles. Candidates must consider engineering features in order to succeed in this unit. The engineering features relating to a 'cycle stand' would most probably include an appreciation of stability, centre of gravity, strength, maximum stress and possibly strain. Therefore they must be taught the appropriate scientific principles before undertaking the design activity. Similarly where candidates designed tool boxes there was a lack of understanding of either the desired strength or the manufacturing processes involved.

Many of the assignments failed to provide the candidates with an opportunity to use typical standard symbols. A good design brief would require a candidate to consider mechanical and either electrical/electronic or pneumatic/hydraulic features. A product or service that only includes mechanical features would limit candidates' ability to achieve some of the higher mark bands. Candidates should be able to recognise and use symbols for components and features such as:

- Electrical/electronic components such as: resistors, thermistors, LEDs, capacitors, bulbs, batteries, motors, buzzers, variable resistors, diodes
- Mechanical features such as: holes, screw threads (internal and external)
- Dimensions such as: dimensions, radii, centres, springs
- Pneumatic/hydraulic features such as: valves, cylinders, reservoirs, pipe-work, filters.

It is important that centres recognise that is not a 'design and make' activity, although the manufacture of a prototype could demonstrate that the product meets the clients brief, and could form a useful part of the presentation.

Some candidates work identified unfair leading by teachers. In order to meet the higher mark bands the majority of the work should be produced by the individual.

Unit 2: Engineered Products

The assessment requirements of this unit demand that the candidate produces one engineered product using engineering drawings and a product specification. Many centres failed to supply copies of the drawings and specification used to manufacture the product and therefore it was difficult to determine what information had been provided.

In some cases the drawings provide for the candidates failed to conform to appropriate vocational/industrial standards. Candidates should be provided with information such as:

- Orthographic projection which conforms to BS 8888 – the provision of perspective drawings reduces the candidates opportunity to demonstrate an ability to read and interpret industry standard drawings.
- Circuit diagrams which conform to an appropriate standard such as BS 3939 for electrical circuits. Many pieces of circuit design software do not generate circuits which conform to an appropriate standard, even though some small sections of industry may use similar software.

It is important that candidates can demonstrate an ability to read and interpret drawings which conform to the identified standards.

Some candidates made products which did not utilise the appropriate range of processes. It is suggested that during the teaching and learning activities candidates should make a range of products which use various processes. However the assessment activity should be related to one product which uses each of the following processes:

- Material removal, such as turning, drilling, etching , milling and grinding
- Shaping and manipulation, such as hammering, forming and bending
- Joining and assembly, such as crimping, soldering, adhesion, wiring, threaded fasteners, welding and brazing
- Heat and chemical treatment, such as annealing, tempering, hardening, etching, plating
- Surface finishing, such as polishing and coating.

The guidance for teachers explains that the product should endeavour to reflect the diverse realms of engineered products, for example by including mechanical and electrical components where feasible to do so.

It is disappointing to report that a number of centres continue to disadvantage candidates by undertaking simple handicrafts/metal-work activities which do not provide sufficient opportunity to meet many of the assessment criteria. The most successful products were those that incorporated mechanical and electrical/electronic features. However some centres concentrated on local skills and specialities such as hydraulics and pneumatics with equal success.

Witness testimony frequently lacked sufficient detail and was not supported by other forms of evidence.

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Principal Examiners Report, Summer 2009
GCSE Engineering and Manufacturing:
Printing and Publishing Paper and Board – 5318/01

General

Overall, the two sections within this paper produced a good range of responses.
Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions, especially at the end of Section B, were difficult for many candidates and consequently a large proportion gave inappropriate responses.

It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper. Most candidates would benefit from being taught examination skills and techniques, as often they did not read the questions properly, and 'describe', 'explain' or 'evaluate' questions were answered using bullet points as opposed to the 'state, describe, explain' method.

Written Test

SECTION A

Question 1

The majority of candidates correctly identified the products belonging to the Printing and Publishing sector in Part (a) and Paper and Board sector in Part (b). A small minority gave the response 'DVD' for Part (b), which was incorrect.

Question 2

The majority of candidates correctly identified one piece of equipment used when designing or making paper or board products, namely the 'craft knife' or 'Stanley knife'. Surprisingly few candidates identified the 'circle template' as the second piece of equipment. Further, many candidates could not describe the use of the 'flexi-curve', with many responses centred on 'measuring curves', thereby missing the repeatability/accuracy aspect of drawing complex curves.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa. The term 'Computer-aided design' was identified as belonging to the Control Key area, and 'Automation' to the ICT Key area, by a proportion of candidates, both of which are incorrect.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. A small minority of candidates insisted on using the excluded product, cereal packaging, as the subject for the question. In Part (b), candidates generally provided answers based upon processes used within the production stage for the given product. An explicit manufacturing stage was seen less than the aforementioned, but often resulted in a more detailed answer for (b) (ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for Part (b). Part (c) was well answered by the majority of candidates, with 'cardboard' or 'cartonboard' the most popular answer for (i) and 'improves the appearance/colour/durability of the product' type answers the most popular for (ii).

Question 5

The majority of candidates scored quite well for Part (a); however, a lot of repetition was seen in the answers to this question. Good responses gave 3 different benefits which were then explained, ie 'It's efficient, because once it's set up you only need to change the workpiece' or 'There are less injuries, as the cutting is behind a screen'; in contrast, poor responses were highly generic, ie 'it's quicker' or 'it's easier', which were often repeated later in Part (a). A small proportion of candidates read the question as CAD and answered accordingly, which was incorrect. Part (b) was not answered as well, as some candidate responses focused on the manufacturer, merely repeating responses from Part (a); the most popular responses for those who recognised the consumer angle were 'products are high quality which will encourage them to buy them again' or 'products are made more cheaply which means they can buy them more cheaply'.

Question6

Part (a) was a very well answered question. 'Mobile phone' or 'E-mail' were the most popular responses; however, a very small proportion of candidates stated computer software such as spreadsheets, which was incorrect. Many responses to the associated benefits were given in simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, ie 'easier, as you don't have to sit at a desk waiting for a call', and this explanation allowed access to the second mark. Candidates that answered Part (b)(i) well recognised that using modern communications technology to transfer sales information allows such information to be sent immediately, in order to respond to demand, with the use of online technologies to send 'real-time data' stated on numerous occasions. Less appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' etc.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able candidates. This question required an ability to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stage in a printing process scored well. Part (a) was generally a well answered question, although some candidates provided highly generic responses, such as 'it's faster' or 'you get less waste', without qualification, and some stated explicit financial benefits (these responses were not given credit due to the statement in the question); answers that scored full marks included 'as it's safer, because there will be guards and it won't get tired, meaning less accidents' or 'the time taken to set up the automation isn't a problem as when it's going it's cost effective and produces lots of prints consistently'. Part (b) was also a generally well answered question; again, some candidates provided generic responses, such as 'it might cost more' or 'humans might lose their jobs', without qualification, but there was a good proportion of sound responses, including 'the automation costs a lot to buy in the first place and will use a lot of electricity meaning it will cost a lot to run' or 'the automation will probably be quite complicated so it could go wrong and highly paid people would be needed to fix it'.

SECTION B – based upon the mass produced cereal packaging pre-release material

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the Inner bag and the Outer box. The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that provided incorrect responses described a manufacturing process for the component in question, rather than the function. However, it should be noted that full marks can only be attained with both notes and sketches; a significant number of candidates omitted one or the other.

Question 9

For Part (a), a number of candidates were unable to correctly identify the missing stages in the list. Many tried to give 'Quality Control' as a stage, and 'processing' or 'production' were popular, but incorrect responses. The correct sequence of stages is clearly outlined in the specification and centres should refer to it. Typically, such candidates were unable to correctly identify the stage where the images are produced for the outer box, and again 'processing' or 'production' were popular, but incorrect responses. Part (b)(i) was generally well answered; responses centred on market research, advertisement/promotion activities or 'trying to get orders', and many candidates gained at least 2 marks. Part (b)(ii) was again generally well answered, with many candidates gaining at least 2 marks; most correct responses focused on getting materials, equipment and people to the right place at the right time, with some very good answers seen on occasions, mainly associated with planning critical paths/quality control points and scheduling. Poor responses often stated activities with a design bias, such as planning the layout of the cereal package or creating the final design using CAD. It was rare that a fully developed answer, and hence a score of 3 marks, was seen for either Part of (b), as most of the descriptive responses were very brief.

Question 10

Part (a)(i) was well answered, with 'cartonboard' the most popular (correct) answer. Popular responses for (a)(ii) included 'polythene', 'PE', and 'LDPE', although 'plastic' was still seen on numerous occasions and was not awarded a mark, as the question asked for a specific material. Part (b)(i) elicited a mixed response, which was surprising; answers that gained the full 3 marks were few, with many candidates stating other printing processes, such as lithography, or other manufacturing stages/aspects of manufacturing, such as health and safety. 'Die cutting' was the most popular correct response, with 'heat sealing' seen very rarely. For Part (b)(ii), those candidates that had studied the pre-release material were able to offer detailed responses in relation to why flexography is a suitable process for printing onto the surface of the outer box. The most popular answers centred on the advantages of using ready mixed, fast drying inks and/or the ability to print directly onto the surface of the substrate. Some candidates only gained 1 mark for generic responses such as 'fast and automatic', and others gained a single mark as there was no explanation or second reason given. Poor answers explained how the flexography process operates or the suitability of the material. Some excellent responses were seen for Part (c), many of which centred on materials technology that has enabled manufacturers to develop new products that are environmentally sustainable or more hygienic, for example 'inner bags can now be biodegradable meaning they will eventually rot away in a landfill' or 'modern inner bags can be anti-bacterial so the cereal doesn't get contaminated' . Other good responses focused on the use of modern boards/inks allowing for high quality imagery on the outer box. Poor responses were again very generic, with responses mentioning, for example, less waste material or the advantages of the processes used (as opposed to the material).

Question 11

For Part (a), simple responses were still evident, ie 'measure sizes' [for (i)] then 'with a ruler' [for (ii)], but generally this aspect of the question elicited far better responses than in previous series; many candidates had clearly researched how printing quality can be checked (the use of colour bars etc.) and how positional checks can be undertaken (crop marks, registration marks etc.). Few candidates gained all 3 marks for (a)(iii), as most focused on product reliability/consistency or safety (due to the use of quality control) without qualifying their answers. Further, many candidates gave responses that were incorrect as the answers were benefits for the manufacturer, as opposed to the user, for example 'it shows them their mistakes and the changes they should make'. Many candidates gave correct answers to (b)(i), although a significant proportion stated a printing process or a type of computer software. Those who gave a correct answer to (i) generally scored better on Part (ii), although this part of the question was not answered well, as many responses related to benefits, and were not descriptions of a type of computer control. Responses that were popular and correct centred on a description of how the production process could be quickly modified or how the computer control could link the different stages of manufacture together. For Part (c) the responses scored better, as candidates are generally very aware of the benefits of computer control. Popular and correct responses included 'it means problems will be shown up before you make too many that are wrong' or 'it will take less time to change production from making one thing to another'.

Question 12

Part (a) and (b) were generally answered well by the majority of candidates. For Part (a)(i), a large range of answers were identified on the mark scheme, and hence a variety of responses were seen from 'drawing using CAD' to 'researching where to get materials'. For Part (a)(ii), 'using bar codes to monitor the amount of packaging going to the cereal maker' was a popular (and correct) answer, as were responses associated with generating/printing labelling. For Part (b), many correct responses were associated with monitoring sales, the ease of ordering, or re-ordering, the benefits of this for matching stock to demand, and how this could improve the reputation of the retailer. Unfortunately, a significant proportion of the candidate responses to Part (c) repeated some of the answers to Question 5(a) or 6(b), and as a result the question elicited a mixed response, with most candidates gaining only one or two marks. The majority of good responses centred on modifying ideas and the speed at which such ideas can then be produced. Poor responses were too generic for a higher ramped question, for example 'ICT makes for a better quality design'. Few candidates gained 3 or 4 marks for Part (c) as a result of not expanding their answer into a fully developed explanation/s.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good examination technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess. For Part (a) and Part (b) some good answers were seen across the ability spectrum, with less generic responses than seen in previous years. For Part (a) the majority of candidates focused their response exclusively on the 'product cost' part of the question, which prevented them from gaining the full 4 marks. Responses such as 'automation reduces lead times meaning the product cost will be lower' were popular. Further, automation was seen by the majority of candidates in a positive light, whereas those who gained better marks also noted the disadvantages, such as 'automation can mean it can take a long time to set up the machines to work at full speed so you can't change designs quickly, and if they go wrong it could mean you are making nothing, which will mean you have to charge more in the long run'. For Part (b) candidates generally responded to both elements of the question, but a significant proportion gave responses associated with the global environment as opposed to the working environment. Popular responses to this question focused around employment issues, such as 'using automation will probably mean workers losing their jobs', whereas those who gained better marks considered more specific effects, such as 'automation might mean workers will have to retrain to look after the machines rather than work them, so this should be a bit safer but it could be a lot more noisy'. In both parts of the question few candidates were able to provide responses that generated full marks, and a proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain' / 'evaluate' question, is unlikely to generate full marks. Again, centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates.

Principal Examiners Report, Summer 2009
GCSE Engineering and Manufacturing:
Food & Drink, Biological & Chemical – 5318/02

General

Both sections of the paper produced a wide range of responses.
Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap/easier', without sufficient explanation or clarification, limiting the marks which could be awarded. Some candidates based their responses on an incorrect context and consequently gave inappropriate answers and therefore did not gain marks. The more demanding questions at the end of each section, especially 'B', proved difficult for a significant number of candidates and consequently many gave inappropriate or low level responses.

There was evidence that a significant number of candidates had not studied the product comprehensively reducing the marks which could be awarded.
The majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper. Most candidates would benefit from being taught examination skills and techniques, as often they did not read and understand the questions properly and link answers to the maximum number of marks that could be awarded. The 'describe', 'explain' questions, and those requiring an 'evaluation', were often answered using single words/bullet points, similar to those questions asking the candidate to 'name', 'state', and were not fully developed.

Specific Comments

SECTION A

Question 1

The majority of candidates correctly identified the products belonging to the Food and Drink sector (Part (a)).
A minority gave the response vegetable oil in the Biological and Chemical sector (Part (b)) which was incorrect.

Question 2

Table1; The majority of candidates correctly named the 'cutter'.
However 'brush' only was named by a minority and not 'glazing brush or similar' as was required.
Table 2; The use of the 'weighing scales' was generally well answered; responses often included references to 'accuracy', maximising the marks given.
The use of the 'rolling pin' proved more difficult for some candidates to expand, ie to roll out pastry or similar was a common response but without expansion, ie to the correct thickness/shape/size etc. resulting in reduced marks being given.

Question 3

Generally well answered, the majority of candidates gained maximum marks and very few less than four marks. A significant minority confused CONTROL TERMS with ICT TERMS and vice versa, which were incorrect. CAD was sometimes linked to CONTROL TECHNOLOGY and AUTOMATION linked to ICT, again were incorrect. The MODERN MATERIALS element was generally linked correctly.

Question 4

Part (a) provided good responses to (a)(i) and the follow - on (a)(ii), for the majority of candidates gaining them maximum marks. Product examples from previous pre-release and examination papers were often used to good effect.
Part (b) responses were generally good, ICT being linked to the chosen 'manufacturing stage' and the 'advantage' explanation relevant to the stage, generic responses ie quicker, easier, were often incorporated into the answer.
Part (c) was generally well answered by the majority of candidates, who displayed a good knowledge and understanding of modern materials and what they are used for, their functions and how they can improve a product ie shelf life, texture, flavour. stability etc.

Question 5

Part (a) provided the more able candidates to gain high marks, although the majority of candidates scored quite well. The 'benefits' given were frequently clear and relevant to the question ie 'more reliable than humans with less chance of human error', 'helps production match consumer demand' and similar references to safety, handling large amounts of data, etc.

Part (b) provided the more able candidates with opportunity to achieve high marks, however, many candidates were unable to link CAM and 'encouraging the consumer to buy' except in a generic way, repeating responses from Part (a) was popular, especially for those who recognised the consumer angle and then re-worded the manufacturing angle accordingly ie 'products are high quality which will encourage them to buy them again', or 'products are made more cheaply which means they can buy them more cheaply' etc. Some candidate responses focused on the manufacturer rather than the consumer. The information available to assist candidates with regard to preparing for Part (b) appears to be very limited.

Question 6

Part (a) (i) was very well answered by the majority of candidates. 'Mobile phone' or 'E-mail' being the most frequent responses. A very small proportion of candidates stated computer software such as spreadsheets, which was incorrect.
Part (a) (ii) responses relating to the associated benefits were given in simple terms such as 'quicker' or 'easier', however, a significant proportion of these answers were qualified, ie 'easier, as you don't have to sit at a desk waiting for a call' etc ., these explanations allowed access to the second mark.

Part (b) (i) and (b) (ii) were attempted by the majority of candidates although some were unable to clearly understand the differences between part(a) and (b) of the question.

Candidates that answered Part (b)(i) recognised that using modern communications technology to transfer sales information allows such information to be sent immediately eg EPOS. In order to respond to sales demand/ordering, the use of online systems etc. were also appropriately referred to by some. Less appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' and also references to quicker, easier etc.

Question 7

A number of candidates gave responses relating to a 'product' rather than 'production' as stated in the question.
Part (a) responses sometimes related to 'financial benefits' although the question was very specific by stating 'other than a financial benefit'. However, Part (a) was generally well answered, although some candidates gave generic responses, such as it's faster, it's quicker, it's more reliable,it doesn't get tired, it's safer, you get less waste etc. but without explanatory detail or links ie ' it is more reliable because it doesn't get tired'.

Part (b) was also a generally well answered question; again, some candidates provided generic responses, such as 'it might cost more' or 'humans might lose their jobs', without qualification or expansion, but there was a good proportion of sound responses, including 'costs a lot to buy in the first place and will use a lot of electricity meaning it will cost a lot to run' , 'will cost a lot to repair if it breaks down and might take a long time to repair loosing production'.

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able and well prepared candidates. This question required an ability to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stages of a food and drink product scored well.

SECTION B – based upon the mass produced pots of virtually fat free fruit yoghurt pre-release material

Question 8

A well answered question for both parts 'a' and 'b'.
A number of candidates gave the same responses in both parts of the question, eg texture, flavour, healthy, colour etc, and although correct, showed a shallow understanding and lack of research. Some candidates did not seem to understand the meaning of 'function' in the context of the question and gave answers relating to processing or characteristics.
Part 'a' was the better answered section with many candidates achieving full marks.
Part 'b' proved more difficult for a significant number of candidates because they did not fully understand the main functions of the milk in relation to the yoghurt and sometimes were not able to give three responses.

Question 9

For Part (a) (i) and (ii), although generally well answered with many achieving full marks, a number of candidates were unable to correctly identify the missing stages in the list or give them in the correct order or 'state the stage' correctly.

Part (b)(i) was generally well answered. Responses centred on market research, advertisement/promotion activities, or 'trying to get orders', and many candidates gained at least two marks.

Part (b)(ii) was again generally well answered, with many candidates gaining at least two marks, most correct responses focused on getting materials, equipment and specific production activities eg mixing, homogenization, fermentation etc. It was evident from the well developed answers given by some candidates that they had researched the production of the yoghurt thoroughly, and thus gained three marks.

Question 10

Part (a)(i) was generally well answered, with 'plastic', 'PS' and Pvc being the most frequently stated correct answers for the 'pot', and various descriptions of 'foil' being the most frequently stated correct answers for the 'lids'.

Part (b) clearly separated those candidates who had researched the product and those who had not. Some candidates were able to give a correct list of the processes including homogenization, pasteurisation, inoculation with culture and why fermentation was used, eg acid taste, set the yoghurt, allowing cultures to convert milk to yoghurt gaining full marks. Others either gave largely generic responses, ie weighing, mixing etc. and whilst correct, showed evidence of little research or retention of the research.

Part (c), many responses centred on materials and ingredients such as preservatives, stabilisers, emulsifiers, flavours etc. that have enabled manufacturers to develop new products that last longer, alter texture, stability, taste etc. Many answers that had the potential to achieve maximum marks lacked sufficient breadth to achieve this, ie hitting only two of the three possible marks. Poor responses were again very generic, ie taste better, look better.

Question 11

Part (a) (i) and (ii) were generally answered but often with simple/basic responses, ie weighing the pots, temperature checks etc., followed by a very scant description, often not mentioning either technique or equipment used. Those candidates who had researched the product were able to give good relevant answers and gained full marks.

Part (b)(i) and (ii), although a significant proportion of responses stated a generic process or production stage, descriptions of the type of computer control were often generic and not related directly to the production of the yoghurt.

Many candidates referred to QC despite being asked not to in the question.

Part (c) was generally well answered with many candidates gaining two or three marks with good explanations of the benefits, ie lower costs, less waste, production control better, consistent products being made. Other popular responses that were correct centred on descriptions of how the production process could be quickly modified or changed.

Question 12

Part (a) (i) was generally answered well by the majority of candidates who gave a wide variety of appropriate responses including references to the internet, advertising, communication with customers and potential customers.

Part (a) (ii) was generally answered well by the majority of candidates who gave a wide range of responses including references to the production and application of labels, use of bar codes, date coding, best- before codes, product information, monitoring dispatch of orders, stock control.

Part (b), many correct responses included references benefiting; monitoring of sales, ease of ordering, ease of re-ordering, matching stock to demand, sales, profits, customer satisfaction and how this could generally improve the reputation of the retailer.

Part (c), many candidates had some difficulties in framing answers which addressed each of the three areas stated in the question; design, development and production, often focussing on one and not always achieving full marks because of this. Many candidates gained only one or two marks. Responses were sometimes low level or generic (faster, easier, quicker) and were not expanded/developed sufficiently to gain near or full marks.
Some candidates gave answers similar to those given in earlier questions 5(a) or 6(b).

Question 13

The majority of candidates attempted this question.
Part (a), many candidates centred on reduced labour costs with few making reference to the 'introduction of new product design' aspects. This often prevented candidates from gaining full marks. Other responses made reference to faster or more production lowering costs, higher maintenance costs, costs relating to breakdowns, expensive specialists to fix, less waste products keeping costs down etc. There were many references to 'improved quality' without explanation as to its impact on product cost.

Part (b), many candidates responded to both parts of the question (workforce and work environment), but a significant proportion gave responses which focussed on the workforce, responses included issues around employment, ie less jobs, fewer employees needed, eg 'automation will probably mean people being made redundant/losing their jobs'.
Some candidates made reference to the 'global environment and environmental issues such as pollution', rather than 'the work environment' as stated in the question. Where there were clear rational links and explanations, marks were given. Many responses made reference to safer, cleaner, more hygienic, and healthier.

In both parts of the question few candidates were able to provide responses that generated full marks, and a proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain'/'evaluate' question, is unlikely to generate full marks.

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates.

Principal Examiners Report, Summer 2009
GCSE Engineering and Manufacturing:
Textiles and Clothing – 5318/03

General

Overall, the two sections within this paper produced a good range of responses. Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions, especially at the end of Section B, were difficult for many candidates and consequently a large proportion gave inappropriate responses. It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Most candidates would benefit from being taught examination skills and techniques, as often they did not read the questions properly, and 'describe', 'explain' or 'evaluate' questions were answered using bullet points as opposed to the 'state, describe, explain' method.

Specific Comments

Written Test

SECTION A

Question 1

The majority of candidates correctly identified the products belonging to the Textiles sector in Part (a) and Clothing sector in Part (b). A small minority gave the response 'Embroided Cushion' for Part (b), which was incorrect.

Question 2

The majority of candidates correctly identified one piece of equipment used when manufacturing textiles and clothing products, namely the 'iron' or 'pressing station'. Surprisingly few candidates identified the 'spool case' as the second piece of equipment often stating 'spool' or 'bobbin'. However, many candidates could describe the use of the 'quick unpick' and the 'embroidery ring'.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa. The term 'Computer aided design' was identified as belonging to the Control Key area, and 'Automation' to the ICT Key area, by a proportion of candidates, both of which are incorrect.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. In Part (b), candidates generally provided answers based upon processes used within the production stage for the given product. An explicit manufacturing stage was seen less than the aforementioned, but often resulted in a more detailed answer for (b) (ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for Part (b). Part (c) was well answered by the majority of candidates, with 'Gortex' or 'Teflon coating' the most popular answer for (i) and 'improves the appearance/durability of the product' type answers the most popular for (ii).

Question 5

The majority of candidates scored quite well for Part (a), however, a lot of repetition was seen in the answers to this question. Good responses gave three different benefits which were then explained, ie 'Higher production rates, this means lower workforce is required', or 'Processes are easily repeated, quickly and precisely as data is stored and can be easily re-loaded'; in contrast, poor responses were highly generic, ie 'it's quicker' or 'it's easier', which were often repeated later in Part (a). A small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Part (b) was not answered as well, as some candidate responses focused on the manufacturer, merely repeating responses from Part (a); the most popular responses for those who recognised the consumer angle were 'products are high quality which will encourage them to buy them again' or 'products are made more cheaply which means they can buy them more cheaply'.

Question 6

Part (a) was a very well answered question. 'Mobile phone' or 'E-mail' were the most popular responses; however, a very small proportion of candidates stated computer software such as spreadsheets, which was incorrect. Many responses to the associated benefits were given in simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, ie 'easier, as you don't have to sit at a desk waiting for a call', and this explanation allowed access to the second mark. Candidates that answered Part (b)(i) well, recognised that using modern communications technology to transfer sales information allows such information to be sent immediately, in order to respond to demand, with the use of online technologies to send 'real-time data' stated on numerous occasions. Less appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' etc.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able candidates. This question required an ability to provide specific responses, by drawing upon specialist knowledge.

Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stage in clothing manufacture scored well. Part (a) was generally a well answered question, although some candidates provided highly generic responses, such as 'it's faster' or 'you get less waste', without qualification, and some stated explicit financial benefits (these responses were not given credit due to the statement in the question); answers that scored full marks included 'automation is a process that works without the need for manual control which means things are done more efficiently'.

Part (b) was also a generally well answered question; again, some candidates provided generic responses, which included a significant amount referring to 'humans might lose their jobs', where answers relating to employment are incorrect. But there was a good proportion of sound responses, including 'the automation costs a lot to buy in the first place and will use a lot of electricity meaning it will cost a lot to run' or 'the automation will probably be quite complicated so it could go wrong and highly paid people would be needed to fix it'.

SECTION B – based upon the mass produced children's dungarees' pre-release material

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the Bib and brace clips and the Poppers. The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that provided incorrect responses described a manufacturing process for the component in question, rather than the function. However, it should be noted that full marks can only be attained with both notes and sketches; a significant number of candidates omitted one or the other.

Question 9

For Part (a), many candidates were able to identify the missing stages correctly. Part (b)(i) was generally well answered; responses centred on 'putting together the dungarees', or 'building of the product', and many candidates gained at least 2 marks. Part (b)(ii) was again well answered, more so than part (b) (i), with many candidates gaining at least 2 marks; most correct responses focused on creating labels, bagging up the product, putting into boxes and sending to customers. It was rare that a fully developed answer, and hence a score of 3 marks, was seen for either Part of (b), as most of the descriptive responses were very brief.

Question 10

Part (a)(i) was well answered, with 'cotton' the most popular (correct) answer. Popular responses for (a)(ii) included 'polyester' and 'cotton' appeared here also. The most popular, and correct answer for (a)(iii) was 'denim'. Part (b)(i) elicited incorrect responses, which was surprising, with many candidates stating a stage ie. 'production-planning' or 'processing- production' which was incorrect. Many candidates gained the two marks with responses such as 'heat seal printing' and 'overlocking'.

For Part (b)(ii), those candidates that had studied the pre-release material were able to offer detailed responses in relation to why machine embroidery is a suitable process for decoration onto the surface of the dungarees. Most candidates only gained 1 mark for generic responses such as 'fast', 'quicker'. Some excellent responses were seen for Part (c), many of which centred on materials technology that has enabled manufacturers to develop new products that are environmentally sustainable and durable. Poor responses were very generic, with responses mentioning, for example, less waste material or the advantages of the processes used (as opposed to the material).

Question 11

For Part (a) there was a very disappointing amount of incorrect answers. Candidates vary rarely gave a specific application of quality control, most responses gave a vague overview for example 'check garment thoroughly' or 'making sure body is sewn together properly'. Few candidates gained all 3 marks for (a)(iii), as most focused on product reliability/consistency or safety (due to the use of quality control) without qualifying their answers. Further, many candidates gave responses that were incorrect as the answers were benefits for the manufacturer, as opposed to the user, for example 'it shows them their mistakes and the changes they should make'.

Many candidates left (b)(i) blank (unanswered) and where answers were given they were done so incorrectly with responses relating to CAD or CAD/CAM. For Part (c) the responses scored better, as candidates are generally very aware of the benefits of computer control. Popular and correct responses included 'it means problems will be shown up before you make too many that are wrong', or 'it will take less time to change production from making one thing to another'.

Question 12

Part (a) and (b) were generally answered well by the majority of candidates. For Part (a)(i), a large range of answers were identified on the mark scheme, and hence a variety of responses were seen from 'drawing using CAD' to 'researching where to get materials'. For Part (a)(ii), 'using bar codes to monitor the amount of packaging going to the retailer' was a popular (and correct) answer, as were responses associated with generating/printing labelling.

For Part (b), many correct responses were associated with monitoring sales, the ease of ordering, or re-ordering, the benefits of this for matching stock to demand, and how this could improve the reputation of the retailer. Unfortunately, a significant proportion of the candidate responses to Part (c) repeated some of the answers to Question 5(a) or 6(b), and as a result the question elicited a mixed response, with most candidates gaining only one or two marks. The majority of good responses

centred on modifying ideas and the speed at which such ideas can then be produced. Poor responses were too generic for a higher ramped question, for example 'ICT makes for a better quality design'. Few candidates gained 3 or 4 marks for Part (c) as a result of not expanding their answer into a fully developed explanation/s.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good examination technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess. For Part (a) and Part (b) some good answers were seen across the ability spectrum, with less generic responses than seen in previous years.

For Part (a) the majority of candidates focused their response exclusively on the 'product cost' part of the question, which prevented them from gaining the full 4 marks. Responses such as 'automation reduces lead times meaning the product cost will be lower' were popular. Further, automation was seen by the majority of candidates in a positive light, whereas those who gained better marks also noted the disadvantages, such as 'automation can mean it can take a long time to set up the machines to work at full speed so you can't change designs quickly, and if they go wrong it could mean you are making nothing, which will mean you have to charge more in the long run'.

For Part (b) candidates generally responded to both elements of the question, but a significant proportion gave responses associated with the global environment as opposed to the working environment. Popular responses to this question focused around employment issues, such as 'using automation will probably mean workers losing their jobs', whereas those who gained better marks considered more specific effects, such as 'automation might mean workers will have to retrain to look after the machines rather than work them, so this should be a bit safer but it could be a lot more noisy'. In both parts of the question few candidates were able to provide responses that generated full marks, and a proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain'/'evaluate' question, is unlikely to generate full marks. Again, centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates.

Principal Examiners Report, Summer 2009
GCSE Engineering and Manufacturing:
Engineering and Fabrication – 5318/04

General

Overall, the two sections within this paper produced a good range of responses. Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions, especially at the end of Section B, were difficult for many candidates and consequently a large proportion gave inappropriate responses. It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Most candidates would benefit from being taught examination skills and techniques, as often they did not read the questions properly, and 'describe', 'explain' or 'evaluate' questions were answered using bullet points as opposed to the 'state, describe, explain' method.

Written Test

SECTION A

Question 1

The majority of candidates correctly identified the products belonging to the Engineering Fabrication sector in Part (a) However a significant number of candidates failed to get both answers correct with the 'Brake Disc' causing problems for candidates in the Engineering Fabrication sector.

Question 2

The majority of candidates correctly identified one component used in the manufacture of Engineering Fabrication products, namely the 'rivet'. Very few candidates identified the 'key' as the second component. However, many candidates were able to describe the use of the 'bearing', with many responses centred on 'reducing friction' and/or 'helping rotation'. Similarly, the 'Hexagonal headed bolt' generated a good range of responses such as 'used with a nut to hold parts together' and 'a temporary fastener to join components'.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa. The term 'Computer-aided design' was identified as belonging to the Control Key area, and 'Automation' to the ICT Key area, by a proportion of candidates, both of which are incorrect.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. A small minority of candidates insisted on using the excluded product, mechanics vice, as the subject for the question. In Part (b), candidates generally provided answers based upon processes used within the production stage for the given product. However, there was a significant increase in candidates giving an explicit manufacturing stage that was very pleasing to see. This often resulted in a more detailed answer for (b) (ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for Part (b). Part (c) was well answered by the majority of candidates, with 'aluminium alloy' or 'carbon fibre' the most popular answer for (i) and 'makes the product light but strong' type answers the most popular for (ii).

Question 5

The majority of candidates scored quite well for Part (a); however, a lot of repetition was seen in the answers to this question. Good responses gave 3 different benefits which were then explained, ie 'It's efficient, because once it's set up you only need to change the workpiece' or 'There are less injuries, as the cutting is behind a screen'; in contrast, poor responses were highly generic, ie 'it's quicker' or 'it's easier', which were often repeated later in Part (a). A small proportion of candidates read the question as CAD and answered accordingly, which was incorrect. Part (b) was not answered as well, as some candidate responses focused on the manufacturer, merely repeating responses from Part (a); the most popular responses for those who recognised the consumer angle were 'products are high quality which will encourage them to buy them again', or 'products are made more cheaply which means they can buy them more cheaply'.

Question 6

Part (a) was a very well answered question. 'Mobile phone' or 'E-mail' were the most popular responses; however, a very small proportion of candidates stated computer software such as databases, which was incorrect. Many responses to the associated benefits were given in simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, ie 'emails sent instantly and to multiple user at one time' or 'mobile phones are portable which means you can always keep in contact with someone'. Both these explanations allowed access to the second mark.

Candidates that answered Part (b)(i) well recognised that using modern communications technology to transfer sales information allows such information to be sent immediately, in order to respond to demand, with the use of online technologies to send 'real-time data' stated on numerous occasions. Less appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' etc.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able candidates. This question required an ability to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stage in a engineering manufacture scored well.

Part (a) was generally a well answered question, although some candidates provided highly generic responses, such as 'it's faster' or 'you get less waste', without qualification, and some stated explicit financial benefits (these responses were not given credit due to the statement in the question); answers that scored full marks included 'as it's safer, because there will be guards and it won't get tired, meaning less accidents' or 'the time taken to set up the automation isn't a problem as when it's going it's cost effective and produces lots of parts consistently'.

Part (b) was also a generally well answered question; again, some candidates provided generic responses, such as 'it might cost more' or 'humans might lose their jobs', without qualification, but there was a good proportion of sound responses, including 'the automation costs a lot to buy in the first place and if it breaks down it costs a lot to repair' or 'the automation will probably be quite complicated so it could go wrong and highly paid people would be needed to fix it'.

SECTION B – based upon the mass produced mechanics vices pre-release material

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the Tommy Bar and the Vice Jaws. The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that provided incorrect responses described a material used to manufacture the component in question, rather than the function. However, it should be noted that full marks can only be attained with both notes and sketches; a significant number of candidates omitted one or the other.

Question 9

For Part (a), a number of candidates were unable to correctly identify the missing stages in the list. Many tried to give 'research' or 'advertising' as a stage, and 'manufacturing' were popular, but incorrect responses. The correct sequence of stages is clearly outlined in the specification and centres should refer to it. However, such candidates were able to correctly identify the stage where the machining of the mainscrew would be carried out. Part (b)(i) was generally well answered; responses centred on 'putting the parts of the vice together' or 'adding the finishing touches such as painting' and many candidates gained at least 2 marks. Many very good responses specifically mentioned the assembly of certain parts, ie 'securing the vice jaws to the main body of the vice'. Part (b)(ii) was again generally well answered, with many candidates gaining at least 2 marks; most correct responses focused on packing the mechanics vices securely and sending them to distributors. Poor responses often stated activities related to the manufacture of the mechanics vices.

It was rare that a fully developed answer, and hence a score of 3 marks, was seen for either Part of (b), as most of the descriptive responses were very brief.

Question 10

Part (a)(i) was well answered, with 'mild steel' or 'steel' the most popular (correct) answers. Popular responses for (a)(ii) included 'cast iron' and 'grey cast iron'. 'Mild Steel' and 'Iron' was seen on numerous occasions and was not awarded a mark. Part (b)(i) elicited a mixed response, which was surprising; answers that gained the full 3 marks were few, with many candidates stating manufacturing processes such as milling, turning or drilling. Some candidates misread the question and simply named another manufacturing stage.

For Part (b)(ii), those candidates that had studied the pre-release material were able to offer detailed responses in relation to why sand casting is a suitable process used during the manufacture of mechanics vices. The most popular answers centred on the advantages of using producing moulds with intricate shapes or that the mould can be re-used. Some candidates only gained 1 mark for generic responses such as 'quick and easy to do', and others gained a single mark as there was no explanation or second reason given. Poor answers explained how the process of sand casting was undertaken.

For Part (c), many responses focused around materials being developed that make the mechanics lightweight with increased strength. Poor responses were again very generic, with responses mentioning, for example, less waste material or the advantages of the processes used (as opposed to the material).

Question 11

For Part (a), simple responses were still evident, ie 'inspection' [for (i)] then 'visually checking the product for defects' [for (ii)], but generally this aspect of the question elicited far better responses than in previous series; many candidates had clearly researched how manufacturing quality can be checked (checking the diameter of the tommy bar) and how the main body could be checked for casting imperfections.

Few candidates gained all 3 marks for (a)(iii), as most focused on product reliability/consistency or safety (due to the use of quality control) without qualifying their answers. Further, many candidates gave responses that were incorrect as the answers were benefits for the manufacturer, as opposed to the user, for example 'it shows them their mistakes and the changes they should make'.

Many candidates gave correct answers to (b)(i) and this meant they generally scored better on Part (ii), although this part of the question was not answered well, as many responses related to benefits, and were not descriptions of a type of computer control. Responses that were popular and correct centred on a description of how the production process could be quickly modified or how the computer control could link the different stages of manufacture together. For Part (c) the responses scored better, as candidates are generally very aware of the benefits of computer control. Popular and correct responses included 'less waste produced due to the efficiency of the machining process', or 'customers have confidence in the product therefore less returns'.

Question 12

Part (a) and (b) were generally answered well by the majority of candidates. For Part (a)(i), a large range of answers were identified on the mark scheme, and hence a variety of responses were seen from 'creating an advert' to 'carrying out market research'. For Part (a)(ii), 'using databases/spreadsheets to record the amount of products being dispatched' was a popular (and correct) answer, as were responses associated with generating/printing labelling.

For Part (b), many correct responses were associated with monitoring sales, the ease of ordering, or re-ordering, the benefits of this for matching stock to demand, and how this could improve the reputation of the retailer. Unfortunately, a significant proportion of the candidate responses to Part (c) repeated some of the answers to Question 5(a) or 6(b), and as a result the question elicited a mixed response, with most candidates gaining only one or two marks. The majority of good responses centred the use of CAD and the ability to modify ideas easily and the speed at which such ideas can then be produced. Poor responses were too generic for a higher ramped question, for example 'ICT makes for a better quality design'. Few candidates gained 3 or 4 marks for Part (c) as a result of not expanding their answer into a fully developed explanation/s.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good examination technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess. For Part (a) and Part (b) some good answers were seen across the ability spectrum, with less generic responses than seen in previous years.

For Part (a) the majority of candidates generally responded to both the 'product cost' and 'new product designs', this allowed many candidates to gain the full 4 marks. Responses such as 'automation reduces lead times meaning the product cost will be lower' and 'reduced labour costs with one worker overseeing a number of automated machines' were popular. Further, automation was seen by the majority of candidates in a positive light, whereas those who gained better marks also noted the disadvantages, such as 'automation can mean it can take a long time to set up the machines to work at full speed so you can't change designs quickly, and if they go wrong it could mean you are making nothing, which will mean you have to charge more in the long run'.

For Part (b) candidates generally responded to both elements of the question, but a small proportion gave responses associated with the global environment as opposed to the working environment. Popular responses to this question focused around employment issues, such as 'using automation will probably mean workers losing their jobs', whereas those who gained better marks considered more specific effects, such as 'automation might mean workers will have to retrain to look after the machines rather than work them, so this should be a bit safer/cleaner but it could be a lot more noisy'. A proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain'/'evaluate' question, is unlikely to generate full marks. Again, centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates.

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GCSE Engineering and Manufacturing:
Electrical and Electronic, Process Control,
Computers, Telecommunications – 5318/05

General

Overall, this paper produced a good range of responses, the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. The more demanding questions, especially at the end of Section B, were difficult for many candidates and consequently a proportion gave poor responses.

Most candidates would benefit from being taught examination skills and techniques, as often they did not read the questions properly, and 'describe', 'explain' or 'evaluate' questions were answered using bullet points as opposed to the 'state, describe, explain' method.

Written Test

SECTION - A

Question 1

The majority of candidates correctly identified the products belonging to the Electrical and Electronics sector in Part (a) and the Computers sector in Part (b).

Question 2

The majority of candidates correctly identified one component used in the manufacture of products, namely the motor. Surprisingly many candidates incorrectly identified the diode as a resistor. Part b) was well attempted with the majority of candidates gaining some marks.

Question 3

A straightforward and generally well answered question with a high proportion of candidates gaining full marks.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. In Part (b), candidates generally provided answers based upon processes used within the production stage for the given product. Responses were of a very varied standard with many low order responses Part (c) was well answered by the majority of candidates, with 'polymer' or 'ABS'

the most popular answer for (i) and 'improves the appearance/colour/durability' of the product type answers the most popular for (ii).

Question 5

The majority of candidates scored quite well for Part (a); however, a lot of repetition was seen in the answers to this question. Good responses gave 3 different benefits which were then explained, ie 'Large scale production and improved control will give consistent quality of product ' or 'Reduced workers because of an automated process which provides a safer environment'; in contrast, poor responses were highly generic, ie 'it's quicker' or 'it's easier. Part (b) was not answered as well, the most popular responses for those who recognised the consumer angle were 'products are high quality/consistent which will appeal to the consumer'.

Question 6

Part (a) was a very well answered question. 'Mobile phone' or 'E-mail' were the most popular responses. Many responses to the associated benefits were given in simple terms such as 'quicker' or 'easier' or 'cheaper', but a good proportion of these answers were qualified, ie 'messages can be sent quickly, to more than one person, notifying them of production problems', and this explanation allowed access to the second mark. Candidates that answered Part (b)(i) well recognised that using modern communications technology to transfer sales information allows such information to be sent immediately, in order to respond to demand. Less appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' etc.

Question 7

This question required an ability to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stage in a printing process scored well. Part (a) was generally a well answered question, although some candidates provided highly generic responses, such as, 'it's faster' or 'you get less waste', without qualification, and some stated explicit financial benefits. Responses that scored full marks had an explanation or were qualified such as 'Because of automation there is less human intervention making the process safer for operators'.

Part (b) was also a generally well answered question; again, some candidates provided generic responses, such as 'it might cost more' or 'workers might lose their jobs', without qualification, but there was a good proportion of good responses, such as, 'staff need to be retrained on how to maintain new machines'.

SECTION B – based upon the mass produced LCD Alarm Clock pre-release material

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the Liquid Crystal display and the outer casing. The vast majority of candidates had clearly undertaken research based upon the pre-release material.

However, it should be noted that full marks can only be attained with both notes and sketches; a significant number of candidates omitted one or the other.

Question 9

For Part (a), the correct sequence of stages is clearly outlined in the specification and centres should refer to it. Part (b)(i) was generally well answered; responses centred on market research, advertisement/promotion activities or 'trying to get orders', and many candidates gained at least 2 marks. Part (b)(ii) was again generally well answered, with many candidates gaining at least 2 marks.

Question 10

Part (a)(i) was well answered with mainly specific and appropriate materials being stated. Part (b)(i) elicited a varied response; answers that gained the full 2 marks were few, with many candidates only correctly stating one other process, such as 'pick and place'. For Part (b)(ii), those candidates that had studied the pre-release material were able to offer detailed responses in relation to why injection moulding is a suitable process for the manufacture of LCD Alarm Clocks. Some excellent responses were seen for Part (c), with a high proportion of candidates gaining 3 marks with answers that matched the typical mark scheme answers.

Question 11

For Part (a), simple responses were still evident, ie 'measure sizes' then 'with a ruler', but generally this aspect of the question elicited far better responses than in previous series; many candidates had clearly researched how quality control can be checked. Few candidates gained all 3 marks for (a)(iii), as most focused on product reliability/consistency or safety (due to the use of quality control) without qualifying their answers.

Many candidates gave correct answers to (b)(i). Those who gave a correct answer to (i) generally scored better on Part (ii), although this part of the question was not answered well, as many responses related to benefits, and were not descriptions of a type of computer control. Responses that were popular and correct centred on a description of how the production process could be quickly modified or how the computer control could link the different stages of manufacture together.
For Part (c) the responses scored better, as candidates are generally very aware of the benefits of computer control. Popular and correct responses included 'it means problems will be shown up before you make too many that are wrong' or 'work out what is going wrong quickly and stop the process'.

Question 12

Part (a) and (b) were generally answered well by the majority of candidates. For Part (a)(ii), 'using databases/electronic monitoring to store packaging information ' is an example of a typical correct answer, as were responses associated with generating/printing labelling.

For Part (b), many correct responses centred on the creation of databases which can be used to share information with distributors etc. In part (c) the majority of good responses centred on modifying ideas and the speed at which such ideas can then be produced. Poor responses were too generic for a higher ramped question.

Questions 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good examination technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess. For Part (a) and Part (b) some good answers were seen across the ability spectrum, with less generic responses than seen in previous years. For Part (a) the majority of candidates looked at both featured aspects of 'product cost' and 'new design' and some good answers were seen.

For Part (b) candidates generally responded to both elements of the question, but a significant proportion gave responses associated with the global environment as opposed to the working environment. Popular responses to this question focused around employment issues, such as 'using automation will probably mean workers losing their jobs', whereas those who gained better marks considered more specific effects, such as 'specialist workers required with retraining for new roles and changed work patterns'. In both parts of the question few candidates were able to provide responses that generated full marks. Again, centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates.

Principal Examiners Report, Summer 2009
GCSE Engineering and Manufacturing:
Mechanical, Automotive – 5318/06

General

Overall this paper produced a good range of responses across the whole paper and the two sections within it. There was evidence that candidates were not able to identify the key in question 2. The more demanding questions at the end of Section B were difficult for most candidates and many gave inappropriate responses. Some candidates gave general responses or based their responses on incorrect contexts and did not gain marks. It was extremely pleasing, however, to evidence that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Lower ability candidates often gave generic responses to questions, such as 'quick, fast, cheap', which gained them limited marks. Most candidates would benefit from being taught exam skills as often they did not read the questions properly.

Written Test

SECTION A

Question 1

The majority of candidates correctly identified the products belonging to the Mechanical and Automotive sectors respectively. However a significant number of candidates failed to get both answers correct in part (a) with many offering the 'flat screen TV' as a product belonging to the Mechanical sector.

Question 2

The majority of candidates correctly identified one component used in the manufacture of products, namely the 'rivet'. Very few candidates identified the 'key' as the second component. However, many candidates were able to describe the use of the 'bearing', with many responses centred on 'reducing friction' and/or 'helping rotation'. Similarly the 'Hexagonal headed bolt' generated a good range of responses such as 'used with a nut to hold parts together' and 'a temporary fastener to join components'.

Question 3

A straightforward and generally well answered question. However, some confused ICT terms with Control terms and vice versa. The term 'Computer-aided design' was identified as belonging to the Control Key area, and 'Automation' to the ICT key

area, by a proportion of candidates, both of which are incorrect. The links between these terms and key areas can be found in the unit specification.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. A wide range of appropriate products were evidenced some from previous year's pneumatic cylinder or a foot pump or the trolley jack to the simple holistic products such as a car or a milling machine. Explanations were generally sufficient to be awarded a range of marks. Centres are reminded that products from this sector are wide and varied so candidates should always be able to gain some marks from these types of questions.

Whilst many were very able to state a stage where ICT would be used for part (b) and state a suitable material for part (c) often they failed to maximise their marks when explaining the advantage or describing how the material improves the design respectively. Candidates should, in part (c), concentrate on the product stated in part (a) and not the pre-release product.

Question 5

The majority of candidates scored quite well for Part (a); however, a lot of repetition was seen in the answers to this question. Good responses gave 3 different benefits which were then explained, ie 'It's efficient, because once it's set up you only need to change the workpiece', or 'there are less injuries, as the cutting is behind a screen'; in contrast, poor responses were highly generic, ie 'it's quicker' or 'it's easier', which were often repeated later.

A small proportion of candidates read the question as CAD and answered accordingly, which was incorrect hence part (b) was not answered as well, as some candidate responses focused on the manufacturer, merely repeating responses from part (a); the most popular responses for those who recognised the consumer angle were 'products are high quality which will encourage them to buy them again', or 'products are made more cheaply which means they can buy them more cheaply'.

Question 6

Part (a) was a very well answered question. 'Mobile phone' or 'E-mail' were the most popular responses; however, a very small proportion of candidates stated computer software such as databases or computer, which is incorrect. Many responses to the associated benefits were given in simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, ie 'emails sent instantly and to multiple user at one time', or 'mobile phones are portable which means you can always keep in contact with someone'. Both these explanations allowed access to the second mark.

Simple and appropriate (but still acceptable) responses focused on sending spreadsheet or database attachments on e-mails. The standard of the response to 6 (b)(i) had a large impact on the answers for 6 (b)(ii); popular responses to the benefits of using the communications technology included 'accurate information', 'low cost', 'easy to update', 'Just-In-Time orders' etc. These tended to be low level responses attracting minimum marks.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter question in each section are aimed at the more able candidates. This question required an opportunity to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the advantages/disadvantages of introducing automation to the production stage in a engineering manufacture scored well. Part (a) was generally a well answered question, although some candidates provided highly generic responses, such as 'it's faster' or 'you get less waste', without qualification; answers that scored full marks included 'as it's safer, because there will be guards and it won't get tired, meaning less accidents' or 'although it takes a lot to set up once it is set up correctly it produces good quality products time and time again'.

Part (b) needed answers that focussed on the production stage; again, some candidates provided generic responses, such as 'it might cost more' or 'less jobs', without qualification. Loosing your job was not accepted as this only related to the individuals concerned and in fact having less employees to pay would be an advantage in the production stage. There was, however, a good proportion of sound responses, including 'the automation costs a lot to buy in the first place and if it breaks down everything stops', or 'the automation will probably be quite complicated so it could go wrong and people will need maintenance skills to fix it'.

SECTION B – based upon the mass produced bench pillar drills pre-release material

Question 8

A simple question well answered with many candidates able to gain all marks by using notes and sketches to explain the functions of the pulley guard and the work table. Marks were awarded for what the candidates communicated and not how they communicated, although those who either only gave notes or only gave sketches were unable to gain maximum marks. Those that provided incorrect responses described the features of the pulley guard or the work table, or how it was made and what it was made from, rather than the function. It should be noted that full marks can only be attained when both notes and sketches are included; a significant number of candidates omitted one or the other.

Question 9

For part (a), a number of candidates were unable to correctly identify the missing stages in the list. Many seemed to guess. It is very disappointing that many candidates still get this wrong when the correct sequence of stages is clearly outlined in the specification. Centres are advised to refer their candidates to the list. However, such candidates were able to correctly identify the stage where the moulding of the pulley guard would be carried out.
Part (b)(i) was generally answered in such a way that many candidates gained at least 2 marks. Many very good responses specifically mentioned the assembly of certain parts ie 'fitting the pulleys to the spindles and the motor'. Part (b)(ii) was again generally well answered, with many candidates gaining at least 2 marks; most correct responses focused on secure packaging and sending to the customer. It was rare that a fully developed answer, and hence a score of 3 marks, was seen for either

part of (b), as most of the descriptive responses were very brief and lacked a full range of detail about the stage.

Question 10

Part (a)(i) was not as well answered as expected. Many candidates gave generic material family types when a specific material was requested. Many were unable to link a material that was transparent and yet difficult to break for part (a)(iii). Again, some of the responses in part (b) were limited and seemed to be similar to injection moulding such as vacuum forming. Whilst many gained full marks for part (b)(ii) the responses were often very limited and general. For Part (c), many responses focused around materials being developed that make reference to the mechanical side of the bench pillar drill such as weight or strength. Poor responses were again very generic, with responses mentioning, for example, less waste material. Many failed to give a detailed description.

Question 11

For Part (a) there was a very disappointing amount of incorrect answers and simple responses were still evident such as 'inspection' then 'visually checking the product for defects'. Candidates very rarely gave a specific application of quality control, most responses gave a vague overview. Few candidates gained all 3 marks for (a)(iii), as most focused on product reliability/consistency or safety (due to the use of quality control) without qualifying their answers. Furthermore many candidates gave responses that were incorrect as the answers were benefits for the manufacturer, as opposed to the user.

Many candidates gave correct answers to (b)(i) and this meant they generally scored better on part (ii), although this part of the question was not answered well, as many responses related to benefits, and were not descriptions of a type of computer control. Responses that were popular and correct centred on a description of how the production process could be quickly modified or where automation would be used. For part (c) the responses scored better, as candidates are generally very aware of the benefits of computer control.

Popular and correct responses included 'customers have confidence in the product therefore less returns'. Some candidates did miss the point here especially if they gave benefits in part (b)(ii) instead of a description.

Question 12

Part (a) and (b) were generally answered well by the majority of candidates. For part (a)(i), a large range of answers were found on the mark scheme, and hence a variety of responses were seen from 'advertising' to 'carrying out market research'. Some lower level responses involved the use of databases. For part (a)(ii), 'using databases/spreadsheets to record the amount of products being dispatched' was the most popular (and correct) answer, it was disappointing that only a few answers referenced labelling and the use of bar codes.

For part (b), many correct responses were associated with monitoring sales, the ease of ordering, or re-ordering, the benefits of this for matching stock to demand, and

how this could improve the reputation of the distributor. Few responses linked the information gained with the manufacturer. The majority of good responses in part (c) centred the use of CAD and the ability to modify ideas easily and the speed at which such ideas can then be produced. Poor responses were too generic for a higher ramped question, for example 'ICT makes for a better quality design'. Few candidates gained 3 or 4 marks for this part as a result of not expanding their answer into a fully developed explanation/s.

Question 13

It was pleasing to note that the majority of candidates attempted this final question. Centres should continue to encourage candidates to do this as it is good examination technique for them to attempt all questions, even if the response is an informed or 'educated' guess. For part (a) and part (b) some good answers were seen across the ability spectrum, with less generic responses than seen in previous years. However, some candidates failed to respond to both the 'product cost' and 'new product designs', this restricted them from gaining the full 4 marks. Responses such as 'automation reduces lead times meaning the product cost will be lower' and 'reduced labour costs with one worker overseeing a number of automated machines' were popular good answers. Further, automation was seen by the majority of candidates in a positive light, whereas those who gained a fuller range of marks also noted the disadvantages, such as 'automation can mean it can take a long time to set up the machines to work at full speed', or 'if they go wrong it could mean the whole plant may stop'.

For part (b) candidates generally responded to both elements of the question, but didn't always give the correct responses associated with the working environment. Popular responses to this question focused around employment issues, such as 'using automation will probably mean workers losing their jobs', whereas those who gained better marks considered more specific effects, such as 'automation might mean workers will have to retrain to look after the machines rather than work them', or 'it should be a bit safer/cleaner but it could be a lot more noisy'. A proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain' / 'evaluate' question, is unlikely to generate full marks.

Again, centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at more able candidates. Centres should therefore encourage candidates to give a fuller written response for the questions such as this and near the end of the paper. When the new 2009 GCSE Engineering/Manufacturing qualification is examined candidates will also be reward for the 'quality of their written response'.

Statistics

Coursework

Unit 1: 5316 – Designing and Graphical Communication

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	42	39	34	29	24	20	16	12	8
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

Unit 5317 – Engineered Products

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	42	39	34	29	25	20	16	12	8
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

Unit 3 – 5318 External examination with pre-release

5318/01 – Printing and Publishing, Paper and Board

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	99	81	73	66	59	52	45	38
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

5318/02 – Food & Drink, Biological & Chemical

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	99	81	73	66	59	50	43	36
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

5318/03 – Textiles and Clothing

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	86	77	69	60	54	48	43	38
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

5318/04 – Engineering Fabrication

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	91	83	75	68	60	52	45	38
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

5318/05 – Electrical and Electronic, Process Control, Computers, Telecommunications

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	90	84	79	72	64	57	50	43
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

5318/06 – Mechanical, Automotive

Grade	Max mark	A*	A	B	C	D	E	F	G
Raw Boundary Mark	100	89	82	75	69	62	56	50	44
Uniform Boundary Mark	100	90	80	70	60	50	40	30	20

APPENDIX 1

Support Paper for Teachers of GCSE Engineering/Manufacturing
Use of Pre-release for the External Examination Unit 5318

The examination for Unit 3 is offered as six different sector pathways. Centres are free to select which sector paper they wish to enter their candidates for. The deadline for entries to be received by Edexcel is 21st March of each year. The pre release material is posted on the website by the end of September for the examination in June the following year. Where centres have estimated entries for the Engineering or Manufacturing qualification, a complete copy of the pre-release material can be downloaded from the Edexcel website. This pre-release will be in the form of a booklet and will cover all six sectors.
Teachers at new centres should ensure that their Examinations Officer has informed the ECC (Entries Department) at Edexcel of their intention to enter candidates.

The pre-release consists of guidance for the candidates and notes to the centre. Staff at the centre should therefore open this material as soon as it arrives in the centre and read the information for all six sectors before deciding which sector is most suitable for them to support the needs of their candidates.
Generally speaking, Engineering is split into three sectors, Engineering Fabrication, Mechanical/Automotive, and Electrical and Electronic/Computer/Process Control/Telecommunications. Manufacturing is split into three sectors, Food and Drink/Biological and Chemical, Printing and Publishing/Paper and Board, and Textiles and Clothing.

Regardless of the route the centre is planning for the other two units in the qualification, the sector for this unit can be chosen to suit the best support a centre can offer rather than being defined by any preconceived ideas.
The product selected by Edexcel for each of the sectors is a product that is in general use, easy to recognise and easy to obtain. Most of these products would be of a reasonable price to purchase, such as the Cordless Electric Drill, or are already available or owned by centres or candidates, such as the Mountain Bike.
Whilst the internet is a valuable source of information researching for this product, centres should not rely totally on this and may need to be diligent in their own research before deciding which sector is best for their candidates. For some sector products there may be a wealth of materials on the internet, such as food industry information. However, searching for manufacturers of traditional engineering type products may prove more difficult. Often adding the word "manufacturer" when carrying out searches using 'advanced search tools' on search engines supplies better results than not entering or using this word alongside the product name.
After defining the sector specific paper, centres need to develop a support strategy for their students.

They need to consider the local support that can be gained from either industry, colleges or even universities, together with the information known to be available from the teacher's initial search and investigation to decide which sector paper to use.

In an area where manufacturer support for the exact product may be difficult to come by, such as the Trolley Jack in the 2005 pre-release, the centre needs to source local engineering support that uses similar processes and techniques to that found in almost any engineering manufacture. A typical way to support the

candidates, in this case, would be to visit the local company before the planned visit, establish what the company can show/offer, and then match or simulate this to the manufacturing process in e.g., the Trolley Jack.
Different groups of candidates could be asked to get information on a particular aspect on application of technology from the company visit and briefed to give feedback to the rest of the group on return back to the centre. The teacher's role would be to draw out the similarities between the technology seen and that of the Trolley Jack. Back at the centre the product, in this case, the Trolley Jack, should be made available and dismantled. Again the teacher should be able to relate what is required for the manufacture and application of technology from that seen on any visits to local companies.

The delivery of the vocational curriculum requires that centres support candidates in the context of their course by applying work-related learning techniques to their area of study. Engineering and Manufacturing has the support of SEMTA and local SET Points, as well as all other local support mechanisms such as the Education Business Links Organisations (EBLO) and Work Related Learning Officers, either in schools or LEA. Food manufacturing, for example, has the support of appropriate trade associations and professional bodies such as, for the mass-produced sliced and wrapped loaves of bread in the 2004 pre-release, the Federation of Bakers, and similar baking industry associations may be useful sources. Often Vocational Learning Support Networks 14–16 are available and supported by the Learning & Skills Development Agency (LSDA).

Once the centre has facilitated the research required by the pre-release material and instructions, the teachers should encourage the candidates to consider the usefulness of any materials gained. Often materials will be found on websites; centres need to ensure that the candidates print/copy only pages that are relevant to that required and defined by the pre-release. They should not print masses of web pages. If studied closely the pre-release highlights the areas of knowledge required for the examination and can become the focus for collecting information. Just like an internally assessed unit, the candidates should be encouraged to produce a portfolio of their research. This can then be taken into the examination and used by the candidates when answering the questions in the paper. The research notes and sketches therefore need to be well organised, or they may be more of a hindrance than help. After studying the application of technology associated with the manufacture of the Trolley Jack candidates in 2005 were asked, for instance, to answer questions about coatings used. Therefore this was listed in the pre-release instructions as an important aspect to research for Section B of that paper.

The experience of reviewing responses in previous examinations indicates that centres may be allowing candidates to take into the examination more than their own research notes and sketches, such as practice or previous examination papers, or materials from the Candidate Kit supplied by Edexcel as support materials. This can damage candidate opportunities when they give a very detailed answer, obviously taken from the practice papers or Candidate Kit, but fail to put their answer into the context of the question being asked. Centres should think about their responsibility in this matter, as candidates may be disadvantaged and not be awarded marks to match their potential. In short, staff in centres should prepare themselves to prepare the candidates to achieve their full potential in the examination without employing strategies that will disadvantage them.