

Engineering (Double Award)

General Certificate of Secondary Education **J322**

General Certificate of Secondary Education (Double Award) **J344**

OCR Report to Centres

January 2013

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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Overview

General comments

Only the two externally assessed units (Units A622 and A624) were taken this session, and responses to the questions on the examination papers indicated that the specification content had been generally well covered by centres. Candidates' knowledge and understanding was somewhat limited in certain areas - details of which are given later in this report.

In many cases, candidates tend to struggle with the Quality of Written Communication (QWC) questions, where discussion of a particular issue is required in an extended writing response. Some candidates would certainly benefit from practicing this type of question, as the questions carry a relatively high mark compared to others on the paper.

A622B Engineering Processes

Most candidates attempted all of the questions on the paper, and some good responses were seen in a number of cases. Gaps in candidates' knowledge of some areas of the specification were evident where questions were not attempted, and marks were occasionally lost where candidates had not read questions carefully before answering. It is most important that candidates take time to read through the question paper thoroughly before attempting to answer questions. This is particularly important where questions have a very specific focus and require extended writing in the response, as is the case in Quality of Written Communication (QWC) questions.

Knowledge of basic engineering materials was reasonably sound in most cases, but this was not the case with the more modern materials, such as composites. Detailed knowledge of the function of engineering components remains limited in many cases, as does a clear understanding of the different types of engineering process

Comments on individual questions

- 1(a)** Candidates are familiar with this style of question, and all but a very small number gained full marks on it. In the few cases where marks were lost, this was generally due to confusion between the Rail and Marine and Automotive sectors.
- 1(b)** Most candidates were able to give two different examples of products made in the engineering sectors from part (a). Where marks were lost, this was usually as a result of using different sectors, or repeating a product from part (a) as one of the examples.
- 1(c)** This question was answered well by the majority of candidates, with only a limited number being unable to name two different sectors.
- 2(a)** Responses to this question were very varied, with marks awarded ranging from one to four. Most candidates correctly gave Vacuum forming and Welding as examples of 'Shaping and manipulation' and 'Joining and assembly', but there was often confusion between 'Heat and chemical treatment' and 'Surface finishing' processes.
- 2(b)** All candidates managed to score full marks on this question by naming appropriate items of PPE for heat and chemical treatment processes.
- 3(a)** Although most parts of this question were answered correctly, a significant number of candidates gave incorrect responses for the composite material. In a small number of cases, it appeared that candidates had limited real knowledge of materials, and had answered these questions by guesswork.
- 3(b)** The majority of candidates answered this question correctly by referring to the absence of iron in non-ferrous metals. In some cases, however, candidates had gone on to give an example that was not correct, such as Stainless Steel. Whilst candidates were not penalized for this error, it is always best to give an example only where the question specifically asks for one.
- 3(c)** In this question an example was asked for and full marks were only possible if a suitable example was provided. In the majority of cases the example given was brass, but often the constituent parts of this were incorrectly identified as Copper and Tin, again without penalty

- 4(a)** Responses to this question were mixed and a few candidates did not even attempt it. A significant number of candidates gave the name of the self-locking nut as a 'bolt', and the descriptions given of the function of components were generally quite weak.
- 4(b)** Most candidates scored well on this question, with responses generally relating to the cost of manufacturing components 'in-house'. In a number of cases, it was pleasing to see candidates' awareness of other benefits, such as ready availability and consistency of quality in the 'pre-manufactured standard components'.
- 5(a)(i)** Responses to this question were varied, and a small number of candidates did not offer a response at all. Marks were quite frequently lost where candidates gave process types, such as material removal, as their answer, rather than a specific example of a process. Processes given were dependent on the product the candidate had chosen, and drilling, vacuum forming, milling and soldering were popular examples.
- 5(a)(ii)** Again the responses given were dependent on the product chosen, and most of the candidates that attempted the question gained full marks by naming two appropriate tools used when making the product.
- 5(b)** Responses to this question were quite disappointing, with more than half of the candidates scoring two marks or less out of the three marks available. The question asked for detail of a quality control check to be given, but some responses contained only vague references to 'measuring', with no detail of the features measured or tools used.
- 6(a)** This question was well answered by almost all candidates, with only a small number entering stages in the wrong order.
- 6(b)** Responses to this question seemed to indicate that few candidates had any real knowledge and understanding of 'monitoring quality'. Most responses made brief mention of quality control checks, but only the higher achieving candidates gave any detail of what might happen and how. A few candidates gave details of such things as sampling, use of scanners, and automatic rejection of faulty products, and these responses gained full marks.
- 7(a)(i)** This question was quite poorly answered and, in some cases, candidates offered no response at all. Marks were often lost where the benefit of using modern technologies was related to the manufacturer rather than the workforce.
- 7(a)(ii)** Some interesting responses to this question were seen, and most candidates scored two marks or more. Many responses concentrated on the use of 'clean energy' and the reduction in the amount of waste produced when using modern technologies, and understanding of environmental issues was generally good.
- 7(b)** This question was well answered, and many candidates gained good marks on it by describing two distinctly different cost factors to consider before introducing modern technologies. Where marks were lost, this was normally due to repetition within the two responses, or a lack of direct reference to cost.
- 8*** A number of candidates did not attempt this question and where responses were presented they were often of quite poor quality.

Most responses simply made reference to customer complaints and loss of a company's reputation, and only very rarely were issues such as the cost of making and disposing of scrap taken into account.

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Where detail was limited, marks were awarded for the quality of written communication in the candidate's response.

Marks for this question were generally quite low, with three marks or less being the norm for a response.

A624B Impact of modern technologies on engineering

Most candidates attempted all of the questions on the paper but, in some cases, responses seemed to have been hurried and did not always address the questions fully. The importance of effective examination technique cannot be over-emphasized, as there was some evidence of candidates not having read questions carefully before answering. It is most important that candidates take time to read through the question paper thoroughly before attempting to answer questions. This is particularly important where questions have a very specific focus and require extended writing in the response, as is the case in the Quality of Written Communication (QWC) questions.

Questions relating to the application of modern technologies were generally not well answered, with many responses referring simply to CAD or CNC machines. Candidates' knowledge of engineering components and their function was quite limited in many cases, and answers to questions relating to applications of engineering materials were also quite disappointing.

Comments on individual questions

- 1(a)** All candidates attempted this question, but a surprising number failed to score full marks on it. In a number of cases, it appeared that the links had been made by guesswork, rather than simple confusion between the sectors.
- 1(b)** Very few candidates did well on this question, with a significant number offering no response at all. Where responses had been made, examples of appropriate modern technologies were very rarely given.
- 1(c)** This question was generally well answered, with most candidates able to give the names of two sectors not mentioned in part (a).
- 2(a)(i)** Most candidates were able to recognize two alloys from the list given, but where marks were lost, this was often due to the candidate giving aluminium as one of the answers, suggesting that their understanding of the term 'alloy' was somewhat limited.
- 2(a)(ii)** This question was better answered, with all candidates being able to recognize at least one example of a polymer in the list of materials given.
- 2(b)** Reasons for preferring a plastics material to metal were often too simplistic to gain more than one mark, with unqualified statements such as 'easy to form' being given. Marks were also lost where candidates had not given the example that was asked for in the question.
- 3(a)** Responses to this question were generally very good, with the majority of candidates scoring at least five of the six marks available. The most common error was in the 'Material removal' section, where extrusion was seen in a number of cases.
- 3(b)** This question required the candidate to give two safety precautions that were directly relevant to the process chosen from the list. The two precautions given invariably related to PPE, and most candidates scored full marks on the question.

- 4a** Parts (i) and (ii) were answered correctly by most candidates, but few were able to explain a possible reason for the large amount of energy used in the distribution stage. Most responses were rather generic, referring simply to fuel used by lorries and ships, without relating this to any possible features of the product, such as its physical size or weight, or the distances involved in the distribution. Only a limited number of candidates scored full marks by giving a relevant and justified response.
- 4(b)** Responses to this question were very varied, and a significant number of candidates did not give any response at all. The most frequently referred to effects of end-of-life disposal of products related to the filling of land-fill sites and fumes given off by incinerating. Most responses were limited by a lack of detail, however, and only a small number of candidates scored full marks on the question.
- 5(a)** Many candidates were unable to name the illustrated components correctly, and some did not even attempt to do so. Despite this, most did identify the type of component shown, often gaining half of the available marks as a result.
- 5(b)** Most candidates gave component B (the LDR) as a sensor, it having been correctly identified as an electrical/electronic component in part (a).
- 5(c)** Responses to this question were generally rather weak, with descriptions of a component's function being quite vague. In some cases, marks were lost where an example of use had not been given.
- 6(a)** Most candidates were able to give at least one benefit of using CAD to produce engineering drawings. Where marks were lost, this was generally due to simplistic or inappropriate responses such as 'quicker' or 'easier to do'.
- 6(b)** With so many examples of computer controlled machines in common use, it was rather disappointing that most candidates were unable to name more than one. Marks were only awarded where specific machines were named, and generic references such as 'rapid prototyping' were not accepted.
- 6(c)** Responses to this question were rather mixed and, in some cases, did not relate to the use of CAD/CAM in the development of a new product, which was the focus of the question. Marks were again lost where answers were too simplistic to be called an explanation, and only the more able candidates correctly referenced the link between CAD and CAM that was required for full marks.
- 7** Marks gained in this question covered the whole range from zero to six, with few fully explained responses to both parts. Whilst most candidates attempted to give an explanation relating to one manufacturing stage, a significant number did not attempt a second, and overall marks were generally rather low.
- 8*** Although the average mark scored for this question was less than 3 out of the six available, a number of very good responses were seen, and a significant number of candidates scored well. Discussions normally centred around the effects of pollution from factories and the damage caused when sourcing and transporting raw materials, with clear understanding shown in a number of cases.

Where detail was limited, marks were awarded for the quality of written communication in the candidate's response.

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