OCR
RECOGNISING ACHIEVEMENT

GCSE

Engineering (Double Award)

General Certificate of Secondary Education **J322**

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

OCR Report to Centres

June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this report.

CONTENTS

General Certificate of Secondary Education

Engineering (J322)

General Certificate of Secondary Education (Double Award)

Engineering (J344)

OCR REPORT TO CENTRES

Overview

General comments

Entries for all four units were submitted this session, and candidates had generally been well prepared for Controlled Assessment units and written examination papers.

Work presented in the Controlled Assessment units followed the requirements of the specification closely. Good practice was seen in a number of portfolios presented for moderation, and candidates made good use of computer generated work in many cases.

Candidate responses in the written examinations indicated that the specification content for these units had been generally well covered by centres. Candidates' knowledge and understanding was somewhat limited in certain areas, however, details of which are given later in this report.

Unit A621 - Controlled Assessment

General comments

When work is submitted for Unit A621, it would be helpful if it was securely bound, with individual pages clearly visible and not all inside a single plastic wallet. Good practice was evident in the use of numbered pages and division of work into sections following the assessment grid descriptors. Where this was done, page references could then be entered on the Unit Recording Sheet (URS).

It is essential that centres closely refer to the statements contained in the Unit Assessment grid (A621/URS) when allocating marks for a candidate's work. A best fit approach is recommended but, when awarding marks, evidence for the grade descriptors must be evident within the folder. In order to avoid confusion it would be beneficial if page references for the work were recorded in the appropriate section on the A621/URS form. It should be noted that although witness statements are valued, no marks are allocated to them in the Assessment Criteria. The requirements of the specification are that candidates should provide evidence of health & safety issues and quality control procedures. Photographic evidence of these aspects being carried out is an excellent way to record and show how they have been applied to the project.

When using the assessment grids, it is important that centres consider the introductory requirement at the beginning of each section. In the first column on the assessment grid there should be a basic description or explanation which may include brief notes or a list of key words. For candidates to progress to the second column they must describe and explain their work, and should use more text in order to present their findings and show their knowledge and understanding of the topic being covered. Candidates who are awarded marks from the third column of the assessment grid must add further detail to their descriptions and explanations as well as justifying the information provided.

Centres should note that the use of writing frames is not generally encouraged in this unit. It is felt that these inhibit middle to high ability candidates who may be restricted and unable to fully show their flair or understanding as they work through the required sections of the assessment grid. It may be beneficial to direct candidates towards areas that need to be covered, but it could be more appropriate to use page headers or prompts rather than grids as candidates then have unrestricted space to provide their responses, which could be developed over a number of pages.

Unit A621 1A Study of an Engineered Product

Candidates submitting work for this element must select a product from the list given by OCR. When analysing the product candidates should identify two, additional, similar products that have been subsequently developed using modern technology.

In general, work presented did follow the requirements of the specification, with a range of products being studied by the candidates. Good practice saw candidates studying the development of the three similar products at identified periods in time, maybe at ten year intervals or longer gaps depending upon which item was selected from the OCR list. By following this procedure it was easier for candidates to identify developments in materials, components and technology.

A621 1A Section 1

The product selected for study should be clearly presented and analysed in detail. It is important that work presented in this section is largely directed towards the products and not presented in generic terms. It is an opportunity for candidates to show their understanding of how technology has had an impact on society, as well as how components have developed/evolved over a period of time. This knowledge should be applied to the product studied and, as the candidates are presenting examples of the product that have developed over a period of time, this is an ideal opportunity to apply gained knowledge and understanding.

Candidates should analyse each of the products identified and give consideration to the impact of modern technologies, smart materials and components on their development. Modern materials, smart materials and components should be relevant to the products studied and should not be simply be presented in generic terms.

Candidates should provide written evidence to show that they have considered the advantages and disadvantages that the use of modern technology has brought to society. Once again this aspect should relate to the product being studied and how it has benefitted from advances in technological developments.

Good practice was evident when candidates had broken down each of the requirements of this section and had addressed them as separate topics, presenting the information in written format or as a table. Images were provided of the selected products in order to support the information given.

A621 1A Section 2

In this section candidates need to select appropriate materials and components to analyse. They should consider carefully the product selected, and list materials and components that are used in its manufacture. Once materials and components have been identified, candidates should explain their use, including reference to properties, characteristics, performance and cost. With components, an explanation of how they work and their application may also be appropriate.

When attempting this piece of work, it may be to the candidate’s advantage to address materials and components in two separate parts. Part one might cover the analysis of appropriate materials and their relevant properties, characteristics, performance and cost, with part two following a similar approach but with reference to components.

Good practice for this section saw candidates identifying, explaining and justifying a range of different materials and components that had developed over a period of time. Information was presented in the form of a table that identified materials and components that could be used for

the construction of the product studied and explained their properties, characteristics, performance and cost. Other candidates commenced this section by presenting photographs of disassembled products, labelling and explaining the function of components.

A621 1A Section 3

In this section, candidates are expected to identify, explain and justify engineering processes that could be used in the production of their selected products. It is important that candidates do identify and explain a range of processes. In the samples moderated, far too many candidates had been awarded high marks for this section but had only identified, and briefly explained, two or three processes. It is important that a range of relevant processes is included and that an explanation is given as to how each process is carried out stage by stage. The presentation of images to support this information can often be beneficial.

Good practice was shown by candidates who identified and explained a range of different engineering processes. Information and images were used to help explain a variety of engineering processes that had been used over a period of time as the selected product had evolved.

A621 1A Section 4

Candidates are expected to suggest modifications that could be carried out on the selected product so that the needs of present and future users are met. The use of modern technology in the development of the selected product should be considered. The information in this section could allow candidates to do some 'crystal ball' thinking and give their opinions of how the product studied may develop in the future. Reference to design concept ideas may be a good starting point for this element.

Sustainability issues should be explained and evaluated. When carrying out work on this topic, issues such as recycling, selection of materials and resources, and other green issues should be considered, with information recorded and presented. This is not an opportunity to talk purely about the benefits of sustainability and "green issues", as the information presented must relate to the product studied.

Good practice in this section saw candidates dividing their work into two parts, one addressing modifications to the design solution and the other dealing with sustainability, in each case using images to support written explanations.

Unit A621 1B Engineering a Product.

Candidates submitting work for this element must select a client design brief from the list given by OCR as a starting point for the project.

The outcome of this part of the unit should be a high-quality prototype of the design solution.

Unit A621 1B Section 1

Once a design brief has been selected, it should be analysed and researched, and a specification produced which identifies the key points of the product. The specification should be more than a simple list of keywords or bullet points, and each point should be explained and justified. The specification should be referred to and comments recorded during the design stage, as this supports the statement on the assessment grid "produces and applies a specification".

A number of the coursework folders presented for moderation did not contain any input from a client or, in some cases, the input had been limited. The lack of client input can limit a candidate's ability to access the higher marks in later sections of the project.

Good practice saw candidates analysing a design brief, carrying out relevant research on the topic, analysing existing items, and then presenting a revised specification. The specification was then used and referred to in the following section, where the candidate presented a range of ideas that met the client's requirements.

Unit A621 1B Section 2

Candidates are expected to present a range of different ideas that will answer the client brief and meet the requirements of the specification. Ideas should be presented using a range of techniques, including annotated sketches, 3D views and engineering drawings that meet current industry standards.

Once suitable solutions have been developed, a final product should be selected and the reasons for its choice explained and justified. The final idea should be presented to the client and feedback sought. The candidate should present evidence of their response to the clients feedback with any changes made explained and justified. It is important that reference is made to client feedback here as without it candidates are unable to gain higher marks having failed to meet one of the sections descriptors.

Many folders presented for moderation provided only a limited range of ideas, with many ideas being similar to each other with limited development. Design ideas should be cross-referenced to the points made in the specification. This can be achieved by the annotation of drawings or a table where drawings are numbered and given a rating against key points from the specification. Some candidates failed to feature a presentation of the final idea or, when it was included, it lacked feedback from a client regarding its suitability and how it met initial needs.

An expectation of this section is that a range of ideas will progress from annotated sketches into a final idea that is presented in an isometric or perspective format (with assembled and exploded views) and then as a working orthographic drawing including the main dimensions.

Good practice showed a wide range of ideas, normally five or more, being presented with annotation referring to key points from the specification. Such ideas were developed to include notes on materials, construction details and components. A final idea was selected, drawn using a variety of techniques including CAD and then evaluated. The final design was then presented to a client using a PowerPoint presentation. Comments from the client were recorded and considered with modifications to the design carried out, presented and justified.

Unit A621 1B Section 3

In this section, candidates are required to produce a high-quality prototype of the final idea and provide photographic evidence of its completion.

The majority of candidates did include a photograph of their product, but it would be beneficial if several photographs of the product were included in the folder to show different views, different angles and close-ups. In the sample of folders seen during the moderation process, it was difficult in some cases to judge the quality of candidates' work, as single photographs were presented or the quality of the photographs was poor.

The expectation in this section is that a quality/high quality product is produced for the mid to high range marks to be awarded. Centres should carefully consider the quality and level of completion of work when awarding marks as incomplete models or simplistic products that have only used one or two processes do not necessarily constitute quality or high quality prototypes.

Unit A621 1B Section 4

Candidates working on this section should show evidence that they have selected and used a wide range of appropriate materials, components, processes, tools and equipment. They should also appropriately apply and explain a range of quality control techniques.

Centres should note that witness statements are not acceptable for health and safety issues or quality control procedures. Candidates should provide their own evidence for these aspects through the use of text, photographs or a log of events.

Good practice in the folders moderated saw candidates using production plans that identified health and safety issues and quality control checks. Such information was not generic but was related to the product being produced and detail was given as to what the checks would be, how they would be carried out and why they were necessary. Evidence was presented showing that candidates had carried out or applied risk assessments on equipment to be used. Good use was made of photographic evidence to support safe practice and to highlight quality control checks. It must be noted, however, that when photographs are used to support health and safety issues, the candidate must follow the required procedures. A number of the photographs seen in folders showed candidates using machines without goggles, apron or appropriate holding devices.

Unit A621 1B Section 5

This section is an opportunity for candidates to reflect on what they have done and what could be changed if they were to attempt the project again. It is also a place where they should consider how modern materials, processes and technologies could have been used if they had been available. In order to gain mid to high marks in this section, candidates should present evidence considering these aspects. It is not enough for them to carry out a basic product evaluation.

Good practice was carried out by candidates who used diagrams and modelling to suggest and explain modifications to their final product. Such modifications not only suggested how the design of the product could be modified, but also considered alternative production methods, the use of 21st century equipment and smart materials.

Unit A622 Engineering Processes

General comments

Most candidates attempted all of the questions on the paper but, in a number of cases, there was some evidence of candidates not having read questions carefully before answering. It is most important that candidates take the time to read through the question paper before attempting to answer questions, as this can help to ensure that basic errors are avoided.

Questions relating to the recognition of basic engineering materials were generally quite well answered, but detailed knowledge of specific materials was less common. Answers to questions about engineering processes were also rather disappointing.

Detailed knowledge of engineering components remains limited in many cases, as does a clear understanding of the application of information, communication and digital technologies in engineering manufacture.

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, it appeared that candidates could have completed some of the links by guesswork.

1(b) The majority of candidates were able to name two engineering sectors different to those given in part (a) and, in most cases, quoted the examples of products detailed in the specification.

2(a) This question was generally well answered, with most candidates gaining good marks for it. It was, however, disappointing to see that there was confusion between ferrous and non–ferrous metals in some cases, and this most basic of errors was frequently the reason for loss of marks on the question.

2(b) Only a limited number of candidates scored full marks on this question by giving explanations that referenced the joining of chains of molecules. By far the most common response simply referred to ‘plastics’.

3(a) Although all candidates attempted this question, responses were very mixed. A number of candidates failed to recognise the client brief as the starting point of the design process and, in some cases, it appeared that candidates had entered the design stages entirely at random.

3(b) This question was quite well answered, with most candidates scoring two or more of the three marks available. The use of email for sending designs to clients electronically was often mentioned in responses, as was the use of PowerPoint presentations. In a number of high scoring responses, candidates had also made reference to the ability to produce ‘rapid prototypes’ for client approval.

4(a) The full range of marks was covered by responses to this question, but over half of the candidates scored three marks or less out of the six marks available for it. Only a small number of candidates showed good knowledge and understanding of engineering processes and, in many cases, tools and equipment were not well known at all. Marks were not awarded where materials and consumables were given as ‘tools and equipment’.

4(b) All candidates attempted this question, and many scored full marks on it. The majority gave items of PPE for each response, and this was perfectly acceptable provided that specific items were given. In a number of cases, candidates made mention of the need for the secure clamping of the workpiece and, occasionally, the need to keep the workspace clear.

5(a) This question was well answered in most cases, with factors such as cost and availability appearing in many responses. A significant number of candidates did lose marks, however, by listing individual material properties that would only be relevant for specific products.

5(b) Although able to give appropriate factors in part (a), very few candidates were able to explain the importance of one of them, and the majority of candidates scored one mark or even less out of the three marks available.

5(c) Most candidates were able to identify one benefit of using plastics materials, this generally being the fact that they can be readily moulded into complex shapes. Only a small number of candidates scored full marks, however, and simplistic responses such as ‘cheaper’ and ‘lighter’ were all too often seen.

6 The two parts of this question were generally not well answered and only a limited number of candidates scored two marks or more for either of them. Marks were awarded for identifying a modern technology and then describing its application and use in the specific stage of manufacture. Whilst the technologies were readily identified by most candidates, descriptions of use were mostly very vague, and marks gained on the question were quite low overall.

7(a) Many candidates scored quite well on this question, but a surprisingly large number were unable to name the cam or the fuse. The single-acting cylinder was recognized as a pneumatic/hydraulic component in most cases, but it was often referred to as a ‘piston’ or a ‘valve’. The fuse was frequently mistaken for a resistor, despite having a value of 5 amps marked on it.

7(b) A number of candidates did not attempt this question, but many chose the fuse and gave an adequate description of its function in electrical plugs. A smaller number of candidates chose to describe the function of the cam, and related this to the camshaft in a car engine.

8* Almost all candidates attempted this question, but a considerable number did not gain many marks, as the responses they presented were too vague.

Candidates were required to discuss the effects on the workforce of introducing modern technologies when making engineered products, but most responses were limited to rather simplistic references to the potential loss of jobs. Only the higher achieving candidates recognised the benefits brought about by robots carrying out heavy or dangerous work, and references to a cleaner and safer working environment were not often seen.

The candidate’s Quality of Written Communication (QWC) was assessed in this question, and marks were awarded for well written answers, despite technical content often being limited.

Unit A623 - Controlled Assessment

When work is submitted for Unit A623, it would be helpful if it was securely bound, with individual pages clearly visible and not all inside a single plastic wallet. Good practice was evident in the use of numbered pages and division of work into sections following the assessment grid descriptors. Where this was done, page references could then be entered on the Unit Recording Sheet (URS).

It is essential that centres closely refer to the statements contained in the Unit Assessment grid (A621/URS) when allocating marks for a candidate's work. A best fit approach is recommended but, when awarding marks, evidence for the grade descriptors must be evident within the folder. In order to avoid confusion it would be beneficial if page references for the work were recorded in the appropriate section on the A621/URS form. It should be noted that although witness statements are valued, no marks are allocated to them in the Assessment Criteria. The requirements of the specification are that candidates should provide evidence of health & safety issues and quality control procedures. Photographic evidence of these aspects being carried out is an excellent way to record and show how they have been applied to the project.

When using the assessment grids, it is important that centres consider the introductory requirement at the beginning of each section. In the first column on the assessment grid there should be a basic description or a basic explanation which may include brief notes or a list of key words. For candidates to progress to the second column they must describe and explain their work and should use more text in order to present their findings and show their knowledge and understanding of the topic being covered. Candidates who are awarded marks from the third column of the assessment grid must add further detail to their descriptions and explanations as well as justifying the information provided.

Centres should note that the use of writing frames is not generally encouraged in this unit. It is felt that these inhibit middle to high ability candidates who may be restricted and unable to fully show their flair or understanding as they work through the required sections of the assessment grid. It may be beneficial to direct candidates towards areas that need to be covered, but it could be more appropriate to use page headers or prompts rather than grids as candidates then have unrestricted space to provide their responses, which could be developed over a number of pages.

Unit A623 3A Real World Engineering

Candidates submitting work for this element must select a product from the list given by OCR.

A623 3A Section 1

In this section candidates should present and analyse their selected product for study. They should identify and explain the stages that are carried out in the production of the product.

Good practice was evident where candidates had broken down the production process, listing the various stages and then explaining, each in turn with information provided in a written format or as a table. Images were provided of the selected stages in order to support the information given.

A623 3A Section 2

In this section, candidates are required to identify, explain and justify a range of engineering processes and quality control techniques that are used in the production of their selected product. A range of processes that could be used in the manufacture of the product should be identified with the stages of carrying out the process explained. A wide range of processes should be covered, the number depending upon the complexity of the product studied, and all the processes should be relevant to the product selected. It is important that candidates consider and explain quality control procedures that may be carried out with each process.

Good practice saw candidates identify and explain a range of different engineering processes. Written information and images were provided to help explain a variety of engineering processes and quality control checks that had been used.

A623 3A Section 3

Candidates should provide details of the materials and components used in the production of their selected product. For candidates to perform well in this section they should provide a detailed explanation of the information and not simply a list of key words. Appropriate materials that may be used in the production of the product should be identified and then, for each material, their functions, properties and characteristics should be explained. A similar procedure should be carried out for components, with appropriate items listed and/or images presented, and their characteristics, function and application explained.

Good practice saw candidates dividing this section into two parts - one part dealing with appropriate materials and the second part with relevant components. Candidates then explained, analysed and justified materials and components identified in Sections 1 and 2, using a table with column headings of function, property and characteristics. Some candidates presented images of products that had been disassembled in order to identify and explain components.

It should be noted that mid to high marks cannot be gained in this section unless materials and components are considered.

A623 3A Section 4

In this section, candidates should identify and explain systems and control technology that is used to organise, monitor and control the production of the selected product. Systems and control technology identified in this section must not be explained purely in generic terms, but must be related to the product studied and to the methods of production used.

Good practice saw candidates identifying a list of stages to highlight key systems and various stages of production that used control technology in engineering the product studied. Images were used to support written text, helping candidates to fully explain how the product evolved.

A623 3A Section 5

Candidates are expected to identify and explain the impact of modern technologies when engineering their chosen product. The work presented must relate mainly to the product studied and not be explained in generic terms.

When carrying out work on this topic, candidates should identify and explain a range of modern technologies. They should explain how the use of the modern technologies has changed the production of their selected product and evaluate if such changes are good or bad. In doing this, candidates should consider the effects on production times, workforce, quality, value for money and resources.

Unit A623 3B Making an Engineered Product

Candidates submitting work for this element must select a product from the list given by OCR as a starting point for the project.

All evidence for assessment must be contained within the candidates portfolio, and should include photographic evidence of the product produced. It would assist the moderation process if the final product was photographed from a variety of angles, and that the size and quality of photographs was sufficient to allow the moderator to clearly see the detail and standard of the work produced.

Unit A623 3B Section 1

Candidates working on this section must select a design situation from the list given by OCR. Once a design situation has been selected it should be analysed and a production plan produced.

Good practice saw candidates analysing a design situation and producing a production plan that identified an appropriate sequence of making, suggesting time estimates for each stage. Materials, tools, equipment and processes to be used were highlighted in the production plan. Health and safety aspects and quality control checks to be carried out were also included.

Unit A623 3B Section 2

Candidates are expected to produce a prototype which will answer the design situation identified from OCR lists.

It is important that a solution is presented in this section and that it is evidenced in the portfolio, as without such evidence the moderator cannot approve any marks awarded by the Centre.

The prototype should be produced using appropriate materials and should be able to function as required in order to fulfil the requirements of the design situation. As this product can only be moderated through the use of photographs, it is important that candidates present a range of images. Although the majority of candidates did include a photograph of their product, it would be beneficial if several photographs of the product were included in the folder to show different views, different angles and close-ups. In the folders observed during the moderation process it was sometimes difficult to judge the quality of candidates work as photographs included were too small due to them being a part of a diary of making.

Unit A623 3B Section 3

In this section, candidates are expected to show, explain and justify the use of a wide range of appropriate processes, materials, parts, components, tools and equipment. It is important that evidence is presented in the folder of the candidate's use of tools, equipment and processes, as marks cannot be approved for witness statements covering this work.

The information can be presented in a variety of formats, and good practice saw candidates presenting this information as a log or diary of making. This record was often presented in table form, and included photographs for each stage and details of the tools, materials and equipment used. Further columns gave explanations of why the items used were appropriate, and references to the production plan, identifying and justifying changes that had been made, often with sketches added to justify a point.

Unit A623 3B Section 4

In this section, candidates are expected to show evidence that they have applied appropriate health and safety procedures. They should also appropriately apply, explain and justify a range of quality control checks that have been carried out during the production of their product. Health and safety procedures and quality control checks should be relevant and related to the product being made, and not be presented as generic procedures.

Good practice observed in the folders moderated saw candidates using images that supported health and safety issues and quality control checks. Detail was given as to what the quality control checks would be, how they would be carried out and why they were necessary. Health and safety issues were identified and explanations given as to how the user would be protected. Evidence was presented showing that candidates had carried out, or applied risk assessments on equipment to be used, with explanations given as to why such procedures were necessary.

Unit A623 3B Section 5

Candidates should detail and justify modifications that could made to the design solution. Sketches of a modified and potentially more appropriate solution could be incorporated, with an explanation given as to why this would be so. Consideration could also be given as to why the use of modern materials, processes and technologies would be beneficial to the product and its production.

Good practice was seen from candidates who evaluated their final product and went on to use diagrams and modelling in order to suggest and explain modifications that could be made. Such modifications not only considered how the design of the product could be improved, but also considered alternative production methods and materials plus the use of 21st century equipment and smart materials.

Unit A624B Impact of modern technologies on engineering

Most candidates attempted all of the questions on the paper but, in some cases, there was 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 that dealt with environmental issues and recycling were generally well answered, but responses to questions relating to engineering materials were quite disappointing. Candidates' knowledge and understanding of quality control procedures was generally quite limited.

Comments on individual questions

1(a) All candidates attempted this question, and the majority scored full marks on it. Where marks were lost, this was invariably as a result of confusing the 'electrical and electronics' and the 'computers, communication and 'IT' sectors.

1(b) Most candidates answered this question correctly by giving another example of a product made in sectors from part(a). In most cases, candidates quoted products directly from the specification in their responses.

1(c) Most candidates attempted this question, but a significant number scored no marks on it. Where the use of a modern technology was not adequately described, one mark was awarded for simply naming the technology, provided it was relevant to the product stated.

2(a) Responses to this question were a little disappointing, with a number of candidates scoring two marks or less on it. Aluminium was quite commonly referred to as an 'alloy', and there was also some confusion between ferrous and non-ferrous metals. Most candidates were able to give an appropriate example of a 'polymer', and concrete was generally recognized as a 'composite' material.

2(b) Although a number of candidates did not attempt this question, responses to it were generally quite good. The higher scoring candidates gave complete and reasoned explanations of the term composite, not only referencing the mixing of different materials, but also mentioning the improvements gained by combining material properties.

3(a)(i) All candidates answered this question correctly by simply interpreting the information given on the bar chart.

3(a)(ii) This question was attempted by most candidates, but in many cases the responses were too simplistic. In a number of cases, candidates only suggested manufacturing products locally, but the higher achieving candidates considered the matter more carefully and suggested 'flat-packing' the product to take up less space in delivery trucks, or using more fuel-efficient methods of transportation.

3(b) The majority of candidates were able to give at least two examples of renewable energy sources, most commonly giving wind and solar power in their responses. In a very small number of cases, however, candidates suggested that fossil fuels were renewable sources.

4(a) All candidates attempted this question, and the full range of marks was seen for responses presented. Most candidates chose the pop-rivet and the cable tie to name and describe the use of, and a number of responses gained full marks. Some candidates recognised the rack and pinion as being used to convert rotary motion to linear motion, and a small number were able to describe the application of the ratchet and pawl. Where a candidate had named a component incorrectly, marks were awarded for an appropriate description of the component's use.

4(b) Most candidates scored marks on this question but, in a number of cases, responses consisted of rather simplistic references to 'cheapness'. Where a question asks for a reason to be given, that reason must be justified to qualify for full marks.

5(a) The majority of candidates recognised the fact that injection moulding would be used to make the ABS body of the electric drill, but a significant number gave inappropriate responses.

5(b) This question was poorly answered, with no candidates scoring more than half marks on it. The only acceptable response seen related to the use of re-chargeable batteries, but no references to other uses of modern technologies, such as electronic speed control or multi-material moulding, were seen.

5(c) Most responses to this question were rather generic, being related to safety features of drills in general rather than the one shown in the question. Where responses were appropriate, the lack of a cable was most frequently mentioned, and a small number of candidates gained full marks by also referring to the more secure grip provided by the 'soft-grip' handle.

6(a) Responses to this question were rather mixed and, in some cases, lacked any real detail relating to sampling in quality control. Most candidates referred to the checking of samples during the manufacturing process, but only a limited number related this to the frequency of sample taking or the reasoning behind it.

6(b) A small number of candidates did not attempt this question but, on the whole, it was well answered. A range of tools or items of equipment used for quality control checks was seen, the most popular being verniers, rules, micrometers, digital scales and ultrasound.

6(c) Responses to this question were rather mixed and only a limited number of candidates scored high marks on it. The effects of poor quality products on the safety of consumers were often mentioned, but only the higher achieving candidates made reference to factors such as damage to a manufacturer's reputation, or the cost of making and disposing of scrap.

7(a) This question was well answered, with most candidates scoring full marks on it by giving two appropriate benefits of using computer controlled machines. The ability of machines to work without breaks was frequently quoted, as were increased production and more consistent accuracy of products. Only where responses were too simplistic, such as 'quicker' or 'cheaper', were marks lost on this question.

7(b) A small number of candidates did not attempt his question, but most scored at least one mark out of the two available. The most popular example of the use of robotics was in the welding of car bodies, but a number of candidates lost marks by relating their response to a finishing process rather than the assembly asked for in the question.

7(c) A number of candidates did not offer any response to this question, but some good answers were seen from the higher scoring candidates. A number of responses made reference to the recycling of materials after disposal, and the ease of replacing faulty/broken parts was also quite frequently mentioned.

8* Many candidates did not score any marks at all on this question, and this was largely due to the fact that their responses did not relate to the specific focus of the question. Many responses were related to the effects of modern technologies on production rather than the development of new products and, consequently, references to 24/7 working and loss of jobs were often seen. Only a limited number of candidates offered relevant responses containing reference to the use of CAD, electronic communication and rapid prototyping. The candidate's Quality of Written Communication (QWC) was assessed in this question, and marks were awarded for well written answers where technical content was limited but relevant.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553