

# **Engineering (Double Award)**

General Certificate of Secondary Education **J322**

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

## **Report on the Units**

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**June 2010**

**J322/J344/R/10**

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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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# Chief Examiner's Report

## General Comments

The examinations for both the A622 and the A624 indicate that centres have a general understanding of most aspects of the specifications, but there are a few areas which resulted in very weak responses or no response at all.

For the controlled assessment elements, the centres appear to have a good understanding of what is required and followed the guidance and suggestions provided by OCR in most cases.

## 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 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 studied by the candidates. Good practice saw candidates studying the development of three similar products at identified periods in time, maybe at ten year intervals or longer gaps depending upon the product selected from the OCR list. By following such a procedure it was easier for candidates to identify developments in materials, components and technology.

## 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.

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 through the use of numbering pages and dividing work into sections following the assessment grid descriptors.

## A622B Engineering Processes

The performance of the candidates resulted in a full range of scores from single figure scores to approaching full marks.

Some responses, as detailed later, suggested a general misunderstanding of some of the terms and terminology used in engineering, although these were typically in the minority.

It is recommended that candidates are made aware of the importance of writing in the correct boxes, and for using additional pages, if the need arises.

## A624B Impact of modern technologies on engineering

The performance of the candidates resulted in a full range of scores from single figure scores to approaching full marks.

Some responses, as detailed later, suggested a general misunderstanding of some of the terms and terminology used in engineering, although these were typically in the minority.

It is recommended that candidates are made aware of the importance of writing in the correct boxes, and for using additional pages, if the need arises.

## **A621 1A/1B Engineering Product**

### **Unit A621 1A Study of an Engineered Product**

Candidates must identify a product to study from the list published by OCR. Once they have identified the product they should analyse it and two other similar products. Good practice saw candidates comparing three products that had evolved over a period of time.

When using the assessment grid it is important that centres consider the introductory requirement at the beginning of each section. It was through the application of such statements where disagreements occurred during the moderation process, with some candidates being marked leniently or harshly by centres. In the first column on the assessment grid a basic description or a basic explanation 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 present more text in order to present their findings and to show their knowledge and understanding of the topic being covered. Candidates who are awarded marks from the third column of the assessment grid must provide detail to their descriptions and explanations as well as justifying the information provided.

#### **A621 1A Section 1**

It is important that candidates analyse each of the products identified and give consideration to the following areas; the impact of modern technologies, smart materials and components on their development.

Candidates should also present evidence to show they have considered the advantages and disadvantages that the use of modern technology has brought to society.

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**

For their selected products candidates should explain the use of materials and components. This should include reference to properties, characteristics, performance and cost.

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 each of the products and their properties, characteristics, performance and cost.

#### **A621 1A Section 3**

Candidates are expected to identify, explain and justify a range of engineering processes that are used in the production of their selected products.

Good practice was evident 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.

#### **A261 1A Section 4**

Candidates are expected to suggest modifications that can be carried out on the selected product so that the needs of present and future users are met. The use of modern technology should be considered in the development of the selected product.

Sustainability issues should be explained and evaluated. When carrying out work on this topic issues such as recycling, other green issues, selection of materials and resources should be considered and information recorded and presented.

Good practice in this section saw candidates dividing their work into two sub sections, one addressing modifications to the design solution and the other dealing with sustainability.

#### **Unit A621 1B Engineering a Product**

When using the assessment grid it is important that centres consider the introductory requirement at the beginning of each section. It was through the application of such statements where disagreements occurred during the moderation process, with some candidates being marked leniently or harshly by centres. In the first column on the assessment grid a basic analysis or a basic explanation may include brief notes or a list of key words. For candidates to progress to the second column they must give detail by describing and explaining their work in order to present their findings and to show their knowledge and understanding of the topic being covered. Candidates who are awarded marks from the third column of the assessment grid must fully explain their work as well as justifying the information presented.

#### **Unit A621 1B Section 1**

Candidates working on this section must select a client design brief from the list given by OCR. Once a design brief has been selected it should be analysed and a specification produced which highlights the key points. Many of the coursework folders presented for moderation had not featured any input from a client or in some cases the input had been limited.

Good practice saw candidates analysing a design brief, carrying out relevant research on the topic and then presenting a revised specification. The specification was then used, and referred to, in the following section when the candidate went on to present a range of ideas that met the candidates specification.

#### **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 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 with feedback sought. The candidate should give evidence of responding to the feedback with any changes made explained and justified.

Folders presented for moderation did not provide a wide range of different ideas, many candidates only showed one or two ideas with limited development evident. Candidates also failed to feature a presentation of the final idea or when it was included lacked feedback from a client.

Good practice showed a wide range of ideas, normally five or more, being presented and 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 then selected, drawn using a variety of techniques including CAD and evaluated. It was then presented to a client using power point. Comments were recorded from the client with modifications carried out and justified.

### **Unit A621 1B Section 3**

Candidates are expected to complete a high quality prototype of the final idea.

Many candidates did include a photograph of their product. However it would be beneficial if several photographs of the product were included in the folder showing different views, different angles and close ups. In the folders observed during the moderation process it was difficult to judge the quality of candidates work as single photographs were presented or the quality of the photograph was poor.

### **Unit 621 1B Section 4**

Candidates working on this section should show evidence that they have selected and used a wide range of appropriate materials, parts and components, processes, tools and equipment.

They should also appropriately apply and explain a range of quality control techniques.

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. However it must be noted that when photographs are used to support health and safety issues that the candidate does follow the required procedures as some of the photographs inserted showed candidates using machines without goggles, apron or appropriate holding devices.

### **Unit 621 1B Section 5**

Candidates should detail and justify modifications that can be made to the design solution. They should include consideration to the use of modern materials, processes and technologies.

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 production methods, the use of 21st century equipment and smart materials.

## A622B Engineering Processes

- 1a** The majority of candidates achieved full marks for this starter question, matching engineering sectors with example products.
- 1b** Some candidates did not understand the requirements of this question and selected two sectors from the 5 listed in the table above.  
A small number of candidates scored all 4 marks for this question.
- 2a** Many candidates gained full marks for this question, some selected more than 2 responses. Poor responses suggested little knowledge of health and safety.
- 2b** Again, although the majority of responses provided two different safety precautions, a small, but significant number had not read the question - and took the two items from 2a and described why they were important. Where the response was sensible and extended beyond the answer for 2a, credit was given.
- 2c** Many answers related to finished product quality checks, which were given credit where appropriate. Whilst using the milling machine, quality checks could include the use of dial test indicators, surface comparison, visual check and surface texture gauge. Ensuring the correct tools, speed and operation was also accepted - as were other suggestions which indicated some knowledge about how to make a good finish on a milling machine.

Tolerance was misunderstood by some candidates, many believed that it meant pressure or load capabilities of equipment, those who answered this correctly did it by mentioning the limits of accuracy of size or weight, or by giving an example, such as +/-1mm.  
Many candidates knew how to check that a product was within tolerance, by using test gauges, micrometers and vernier gauges, - but some described load testing until it broke, being confused by thinking of how much load the material could tolerate.

- 3a** Identifying the engineering materials proved reasonably straightforward for most candidates. Many showed little knowledge of ferrous and non-ferrous metals, or composites
- 3b** Alloys are mixtures of metals, but some candidates wrongly described them as being car wheels. The best answers mentioned more than one metal, mixed to benefit from certain properties of each in combination.
- 4** This question was not generally well answered. The majority of candidates stated that CAD or CAM had made the development of specifications better and easier, when it is, in fact, communication and research which has made this possible.
- 5a** This was not generally well answered. Few candidates provided examples of the required processes with clear descriptions. Some gave only one word answers, such as drilling, sanding, painting.
- 5b** Candidates generally failed to understand the term 'advantages to the workforce.' Many gave answers which indicated advantages to the employer, and some gave disadvantages such as cost of investment, redundancies.
- 6a** Machine screws were incorrectly interpreted as electric screw drivers and Cam was taken, almost unanimously, to mean CAM. Only a handful correctly described it in relation to its action in a car engine. Other options were answered correctly by most candidates.



*Report on the Units taken in June 2010*

- 7a** Most candidates chose the correct response, F, but some had interpreted the question incorrectly and selected 'D' because it had the lowest score.
- 7b** This question was generally well answered.
- 7c** This question was generally well answered.
- 8** The majority of candidates attempted this question. The best responses included thorough discussions about many aspects of the introduction of control technology into the workplace, including electrical/electronic sensors, monitoring and planning ordering of spares, reduction of risks by using machines in hazardous areas.

## **A624B Impact of modern technologies on engineering**

- 1a** All candidates scored full marks on this question by correctly identifying which products were produced by each engineering sector.
- 1b** Some candidates misunderstood what was meant by the term 'technologies,' and gave items of equipment, tools, in answer to the question.
- 2a** The majority of candidates answered this question correctly.
- 2b** The majority of candidates answered this question correctly.
- 2c** The majority of candidates answered this question correctly. Credit was given for comments which implied basic knowledge.
- 2d** The majority of candidates mentioned re-cycling or re-using as a valid response and gained credit for their answers.
- 3** This question was not particularly well answered. Most candidates did not appreciate the need for quality control measures at each stage of production of engineered products.
- 4a** The majority of candidates answered this question correctly.
- 4b** A range of responses were given in answer to this question. Some comments were not related to CAM, and some thought that CAM (rather than CAD), showed an engineer what a product would look like before being made.
- 5** A range of responses were given in answer to this question. There was some misunderstanding of the terms 'recyclable' and 'reusable.'
- 6** A variety of answers were given by candidates in relation to environmental considerations during the manufacture of engineered products.
- 7a** The majority of candidates answered this question correctly.
- 7b** Again, the majority of candidates answered this question correctly.
- 7c** This question was not particularly well answered. Most candidates did not show a suitable understanding of 'manufacturing engineered products without producing some hazardous waste.'
- 8** This question was not particularly well answered, with most candidates failing to fully understand the implications of using modern technology for material supply and control.

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