

Design and Technology: Industrial Technology

General Certificate of Secondary Education **J304**

General Certificate of Secondary Education (Short Course) **J044**

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

This report provides an overview of the work seen in the written examination Units 2 and 4 and the Controlled Assessment Units 1 and 3, for candidates who took the examination during this series. It precedes a more detailed report to centres from each subject area within the Innovator Suite and highlights general issues that have occurred across the suite of specifications.

This report has been prepared by the Chief Examiner, Assistant Chief Examiners, Principal Examiners and Principal Moderators and covers all specifications within the Innovator Suite. It should be read in conjunction with the examination papers, the mark schemes, and the marking criteria for assessment given in the specification booklets.

This is the first examination series in the fourth year for the Innovator Suite.

A reminder: An important point for teachers to note about the Terminal Rule in relation to this suite of specifications and re-sits: The terminal rule is an Ofqual requirement. Candidates must be entered for at least two units out of the four (full course) at the time that they certificate. i.e. the end of the course.

Please be aware that the Ofqual rule states that marks scored for terminal units will be the marks used in the calculation of candidate grades. Therefore, if one of the candidate's terminal units is a re-sit and the mark is poorer than the original mark, the poorer mark will be used to calculate the final grade for that candidate.

Obviously, the terminal unit marks are then added to the highest marks scored in the other units making up the certificate.

Centres need to remember the following change in the Innovator Suite: This is the last year of a January and June examination series. This specification will only examine in June from 2014 onwards.

Centres are reminded that it is also a requirement of Ofqual that candidates are now credited for their accurate use of spelling, punctuation and grammar across all four units.

It is obvious that centres have benefitted from previous reports and training sessions available for the qualifications.

Written Examination – Units 2 and 4

Unit 2 – For this examination series of the GCSE Innovator Suite entries were seen from all six subject specialisms.

The overall performance and range of results for Unit 2 was generally the same as seen in the last examination series – June 2012. There are variations within the subject specialisms and centres would benefit from reading the individual subject reports for this unit. It was pleasing to see that many candidates had been well prepared for the examination by centres and clearly had a sufficient knowledge base to answer the questions. It has been encouraging to see that candidates have been able to access the higher marks. There was also a significant improvement in the written response style question (*) this session, with candidates giving detailed answers combining good subject knowledge with an ability to produce a structured response.

In **Unit 2 – Section A** of the papers most candidates across the suite attempted to answer all questions, with few candidates giving no response (NR) answers.

Candidates generally demonstrated an improved understanding of sustainable design, but were still hampered by poor exam technique. Misunderstanding or misinterpreting the question, or not reading the question carefully enough was evident throughout the suite of papers. Candidates must be encouraged to take notice of the key word in the stem of the question to identify whether the question requires them to explain, describe, discuss, state, name or give.

There was less duplication of circling answers seen during this examination series.

Important: Centres need to be aware that where a candidate has provided multiple answers to a single response question, no marks will be awarded.

Unit 2 – Section B of the papers showed a greater mixture of responses and teachers need to ensure they read the subject specific reports for further detailed feedback on specific issues and individual question performance.

Important: Candidates need to be careful that they do not repeat the question in their answer or write the same answer for several questions. Similarly candidates must not use certain terms as 'stock' answers. Such answers included:

- 'Environmentally friendly' and 'better for the environment' or 'damages the environment'.
- To 'recycle' and 'recycling is good for the environment'.
- 'Cheaper', 'better' and 'stronger'.

The questions marked with an asterisk * provided candidates with an opportunity to give a detailed written answer combining good subject knowledge with an ability to produce a structured response. There has been a significant improvement in the written response style question this session, with candidates giving detailed answers combining good subject knowledge with a clear, structured response.

It was noticeable this series, that where extra paper was required to continue a question response, many candidates failed to reference the question number thus compromising marks. It is important therefore, that centres teach candidates how to highlight where they are continuing an answer on a different page in the examination document.

Centres need to be aware that questions may appear on the back page of the examination document and candidates should be encouraged to check carefully that they have completed ALL questions.

Centres are reminded that candidates are assessed on spelling, punctuation and grammar on the banded mark scheme question.

It is also important to note that candidates need to ensure that they write legibly and within the areas set out on the papers.

Unit 4 – For this examination series of the Innovator Suite entries were seen from all six subject specialisms.

The overall performance of candidates was varied across the suite once again this series. Principal Examiners noted that candidates appeared to be better prepared for the written paper and there were several positive aspects evident in the January series:

- Candidates generally demonstrated sound knowledge of school-based processes and techniques;
- There were some very good answers to the Quality of Communication questions, where candidates combined their technical knowledge with an ability to present the information in a structured and coherent manner.

There were some very good answers to questions addressing specific areas across the Innovator Suite, including:

- *Modern Materials* [Textiles].
- Sound *nutritional knowledge* [Food].
- Good knowledge of the *benefits of CAD* [Industrial Technology].
- The techniques associated with *line bending* [Resistant Materials].

However, there are some areas which Principal Examiners have highlighted as being in need of improvement:

- Candidates should try to attempt every question.
- It is important that candidates read the questions carefully to determine exactly what is required before attempting an answer. It can be helpful for candidates to highlight what they consider to be the 'key' words or instructions.
- In those questions that require candidates to produce sketches and notes, it is essential that answers are made as clear, detailed and technically accurate as possible.
- Knowledge and understanding of industrial processes compared with school-based processes was considerably weak.
- There were many instances where examiners were unable to decipher illegible handwriting and poor quality sketches.

Controlled Assessment – Units 1 and 3

Most centres have been prompt in the dispatch of documentation to OCR and moderators, which is to be commended. **It is important that centres return the request for portfolios within three days.**

Centres are reminded to forward form CCS160 to moderators. It is helpful if centres also include a record of the marks allocated to each candidate, for each of the marking criteria sections.

Important Note: Candidates producing paper portfolios should be entered for postal (02) moderation. Candidates producing their portfolio on a CD or memory stick should also be entered for postal (02) moderation.

Centres must ensure that if candidates are entered through the repository (01), the portfolios must be uploaded via Interchange and **NOT** sent through to the moderator on a disc. The preferred format of files presented for this type of moderation needs to be PowerPoint, PDF or Word, with work saved in ONE file only and numbered, not as individual sheets saved in different files.

In general, centres have been successful in applying the marking criteria for both Units 1 and 3. Centres are reminded to apply the mark scheme on a 'best fit' basis which may mean allocating marks across the assessment grid. Marks should be positive, rewarding achievement rather than penalising failure or omissions.

It is important that centres encourage candidates to organise the portfolio according to the different marking criteria strands as it enables the candidates to produce work that clearly shows an understanding of the controlled assessment requirements. Portfolios should be clearly labelled with the candidate and centre name and number, with the unit code and title also evident. (*Specification – 5.3.5 Presentation of work*) This is particularly important when the centre submits work via the OCR Repository, where individual files are used to store portfolio work. Centres need to ensure that candidates clearly label each file using the marking criteria section headings; this facilitates a more effective completion of the moderation process.

Important: Centres are also reminded to ensure that the OCR cover sheet is included with each portfolio of work, **outlining the theme and the starting point chosen by the candidate.**

JCQ documentation on Controlled Assessment (September 2011 – August 2012) clearly states that any guidance given to candidates must be clearly recorded. 4.5.2 *When marking the work, teachers/assessors **must not** give credit in regard to any additional assistance given to candidates beyond that which is described in the specification and **must** give details of any additional assistance on the appropriate record form(s). **This includes providing writing frames specific to the task.** (e.g. outlines, paragraph headings or section headings).*

In light of the information given above, centres need to take care when using writing frames in the controlled assessment portfolios.

Many candidates included a bibliography or referenced their research sources, which was pleasing to see. **It is good practice to ensure that candidates acknowledge sources of information used for the development of their portfolio work.** 5.3.2 *Definitions of the Controls* section in the specification states: *“The teacher must be able to authenticate the work and insist on acknowledgement and referencing of any sources used”*.

Centres are to be reminded that the *‘controlled assessment task must NOT be used as practice material and then as the actual live assessment material. Centres should devise their own practice material using the OCR specimen controlled assessment task as guidance.’* Specification - Section 5.2.2 *Using Controlled Assessment Tasks.*

Resits – Centres must remember that the theme, starting point and research aspects of the portfolio can be maintained. However, the remaining portfolio and final prototype should be redeveloped for submission.

Important: It is a requirement in the Making criteria that candidates *“demonstrate an understanding and ability in solving technical problems”*. **Centres must therefore ensure that problems encountered are written into the record of making, for the higher marks.** Marks were compromised here this examination session.

4.1 ‘Schemes of Assessment’ clearly states that *“A Minimum of two digital images/photographs of the final product showing front and back views”* should be evident in the candidate portfolio. **It is the centre’s responsibility to ensure that photographs are evident, are of a good quality and are of the candidate’s own work.**

A542 Sustainable design

General Comments

There was a very small entry for this exam as compared to previous January series'. Nevertheless, most performed quite well on Section A, and candidates were able to access the majority of Section B questions. A few candidates exhibited a good knowledge across the whole range of questions, demonstrating a sound understanding of sustainable issues.

Question 16(c) provided candidates with an opportunity to give a detailed response, combining good subject knowledge with an ability to produce structured and coherent responses. However, most candidates failed to gain the higher level marks.

Candidates need to work on their examination technique and respond to the command word given in the questions, as this provides an indication of the depth of response required.

Section A

Questions 1–5 required candidates to select the correct answer from four possible answers. One mark was available for each question.

- 1 Most candidates gave the correct answer as – product disassembly
- 2 Most candidates gave the correct answer as – not using unnecessary materials and parts.
- 3 Most candidates gave the correct answer as – taken from managed forest.
- 4 Most candidates gave the correct answer as – a combination of electricity and fossil fuels.
- 5 Virtually all candidates gave the correct answer as – risk assessment.

Questions 6-10 required candidates to respond with very short answers of a single word or sentence. One mark was available for each.

- 6 No correct answers were given regarding the meaning of COSHH.
- 7 A well answered question regarding the carbon footprint symbol.
- 8 Only the more able candidates could name a non-sustainable method of product disposal.
- 9 Candidates found this question challenging and only a small number of candidates responded with an answer related to obsolescence.
- 10 Only the more able candidates stated smart materials.

Questions 11–15 required candidates to respond with true or false. One mark was available for each question.

- 11 This question was very well answered with a majority of candidates realising that lead based paints are not safe for children's toys.
- 12 This question was quite well answered with a majority of candidates realising that ethical companies are sweatshop free.

- 13** This question was quite well answered with most realising that disposable products do not benefit the environment.
- 14** This question was well answered with most candidates realising that reforestation does not harm the environment.
- 15** This question was well answered and many candidates realised that good design can improve the quality of life of the user.

Section B

Questions 16–18 required candidates to respond with more extended writing, drawings or notes. 15 marks were available for each full question.

- 16** (a) Candidates had trouble in identifying that waste materials recycled in to different products was secondary recycling.
- (b) Candidates showed little awareness of the basic terms – refuse (many seemed to misread as reuse), and sustainability.
- (c*) Generally this question was not very well answered, with Level 3 proving difficult for candidates to achieve. Candidates also did not consider recycling across the life cycle of a product.
- (d) Many candidates answered generally about recycling and disposal, failing to connect with the question and identify how manufacturers could encourage consumers to recycle their products.
- 17** (a) All candidates were able to provide some correct answers regarding the environmental benefits of rechargeable batteries.
- (b) Only the more able candidates responded with a definition of product analysis.
- (c) A number of candidates confused the technical aspects of the laptop, as being ergonomics. This suggests a lack of awareness of ergonomic concepts.
- (d) In general candidates failed to justify their answers providing very short phrases regarding injection moulding.
- 18** (a) Most candidates answered correctly – wind farm.
- (b) Candidates often failed to pick up all the marks as they did not justify their responses regarding the benefits of wind turbines.
- (c) Candidates scored well on this question about the negative impact of wind turbines.
- (d) Generally this question was well answered but several candidates responded with water, failing to identify if this was hydro electric, tidal, wave etc.
- (e) (i) Only a few candidates were able to associate the pylon of a wind turbine, as being made of steel.
- (ii) Very few candidates showed an awareness of the environmental issues concerning Industrial Technology and manufacture.
- (f) The majority of candidates recognised reasons for increasing sustainable energy sources.

A543 Making quality products

Introduction

January 2013 saw a very small entry for this Specification and centres must therefore appreciate that these comments are made on a range of work that is perhaps not representational of the much larger entry usually moderated in the June session.

The work seen thoroughly covered the assessment objectives, paperwork was submitted correctly and work samples and marks were submitted in plenty of time for the deadline date.

Candidates presented work effectively; folders were well organised and labelled clearly. Work was ordered logically within the folders presented for moderation.

Designing

Candidates should be working from a Design Brief, and their recording of evidence in response to this brief forms the first strand in this objective. Research that was seen was not always particularly relevant to the candidate's line of enquiry. Candidates should not burden themselves with quantities of research into existing products. What is attempted should be objective, relevant and should provide a focus for the following designing stages. Candidates still do not show effectively within their folders how research and their findings inform their design thinking.

More examples are being seen of computer aided drawing software, like Google SketchUp, for producing design ideas. This is acceptable, but it is preferred if this is part of a range of communication skills that the candidate demonstrates. Good use of conventional working drawings in Orthographic Projection was in evidence.

What is still often not in evidence is any development of a design. Many candidates still go from rough preliminary sketches, lacking any indications of dimensions or construction information, into a working drawing. This intermediate stage, showing clearly how candidates have developed their idea and worked out detail and construction issues, is often missing.

Making

The work seen showed that candidates were carefully planning and using appropriate materials and outcomes for this specification. Most work seen involved a **good range of skills and processes**. The quality of the making was high in many cases and this is often the result of candidates taking on realistic designs to make within the recommended time scale. Ideas must be for achievable outcomes within this time frame.

Candidates are improving at recording their making processes using clear digital images of the making as it takes place. Centres are reminded that this is how it should be recorded. It should not be a photograph of a finished component with an explanation of how it was made afterwards.

The most successful way of showing evidence for recognition in this strand of the marking is to incorporate it into the 'planning for making', together with the recording of any problems encountered during the making stages and how these were overcome. These are all interlinked in the making process and it is good to see them recorded together in the form of a table where it can be seen in a linear fashion how a component has been planned, manufactured and modified.

Centres are reminded that there **must be evidence** in the folder in order for marks to be awarded for solving technical problems.

Critical Evaluation

Evaluations are improving generally and candidates are recording trialling and testing regimes more effectively. Testing is a crucial part of an evaluation and there must be evidence of it in the evaluation if the higher marks are awarded. Candidates are good at evaluating against their design specification. There is sometimes a lack of the use of correct technical terms when describing their work and making processes.

Centres are reminded that candidates can be given credit for the 'Quality of Written Communication' throughout the folder under this mark strand.

A544 Technical aspects of design and making

General comments

Generally, candidates had been well prepared for the examination and some very good responses to questions were seen. In a limited number of cases, however, it appeared that candidates had not always read questions carefully and therefore gave inappropriate responses. 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.

Knowledge and understanding of processes used in industry was again quite limited in some cases, but questions relating to school workshop processes were quite well answered. Candidates showed good knowledge of computer applications relating to CAD, but applications relating to the industrial use of computer control were less well known.

Sketches used in the design questions were of variable quality, in some cases making interpretation quite difficult for examiners. In questions such as these it is important that sketches are clear and suitably annotated, however simplistic they may be.

Comments on specific questions

- 1
 - (a) Most candidates scored very well on this question, with a significant number gaining full marks. Where marks were lost, this was normally as a result of confusing the use of dividers with odd-leg calipers, or failing to recognize the importance of the 90° angle on the try square.
 - (b) Few candidates gave the correct response of a template as the device that could help in the marking out of the link, with many suggesting a jig. In a few cases, candidates offered no response at all.
 - (c) It was pleasing to see all candidates attempting this safety question and gaining good marks for it. The most popular responses centred around the use of PPE and some candidates also made reference to work holding and machine guards.
- 2
 - (a) Most candidates were able to give at least one reason why acrylic was a suitable material for the clock body. The most frequently seen responses related to the ease of forming the bend and the fact that the material is available in a range of colours. Simplistic responses such as 'cheap' and 'strong' were not rewarded, as such statements need to be justified to be worthy of marks.
 - (b) Some candidates did not attempt this question and, of those that did, very few scored more than one mark out of the three available. All the responses showed some attempt to hold the acrylic securely for drilling, but the need to support the acrylic to prevent splintering was rarely taken into account.
 - (c) Outcomes for this question were rather disappointing and no fully correct responses were seen. Most responses gave the stages needing to be carried out, but very few correctly identified the tools or equipment used. The most significant omissions were a strip heater to soften the acrylic and a suitably shaped former to produce the bend. The need to hold the acrylic in position whilst it cooled was not recognized at all.

- (d)** Most candidates were able to give a suitable method for producing the markings on the clock face. Laser etching was suggested in a number of cases and the use of transfers and permanent markers also appeared.
- 3 (a)** Almost all candidates gave a suitable finish for the aluminium alloy handle, although anodising was very rarely seen. Most responses suggested painting, plastic coating, or galvanizing for the finish which, although suitable, would be unlikely to be used.
- (b)** This question was quite well answered with most candidates showing some understanding of the principles of ergonomics. Where marks were lost, this was normally because responses were too simplistic or repetitive.
- (c)** Most candidates correctly identified die casting as the most suitable industrial process for the large scale manufacture of the aluminium alloy handle.
- (d)*** Some good responses to this question were seen, but some candidates offered no response at all. References to the fact that aluminium alloys are light and easy to form were common, but it was disappointing to see so many candidates suggesting that aluminium alloys are 'cheap'. Marks were awarded for well written answers, despite technical content often being weak (QWC).
- 4 (a)** All candidates attempted this question, but responses were generally quite disappointing, particularly when some candidates suggested that mild steel does not rust. The most frequently seen correct responses related to the ease of cutting and forming mild steel and its cost compared with other metals. Statements such as 'cheap' and 'strong' were only rewarded if qualified.
- (b) (i)** Most candidates were able to give two ways of fixing the legs permanently to the drum of the barbeque, with welding and brazing being the most popular methods. Riveting and pop-riveting were also seen in a number of responses, but soldering was not accepted as an appropriate method.
- (ii)** Almost all candidates correctly identified nuts and bolts as being the most suitable way of temporarily fixing the legs to the drum.
- (c)** This question was attempted by all candidates, but with varying success. Most made the legs adjustable in length to aid stability, but often not on an individual basis, and rarely infinitely adjustable. The majority of designs did meet the requirement for adjustments to be made without tools, but in many cases marks were lost for failing to give any details of components or processes used.
- 5 (a)** This question was generally well answered, with most candidates giving two or more benefits of using CAD when designing products. The ease of making changes to designs, the ability to produce 3D images, and the ease of sharing designs electronically were all frequently seen responses, but occasionally marks were lost where the candidate made direct reference to manufacturing using CAM.
- (b) (i)** A surprisingly large number of candidates failed to score on this question and a few did not offer a response at all. Where an appropriate response was given, this normally related to the use of robots for welding and paint spraying in car manufacture.
- (ii)** The majority of candidates scored full marks on this question, but again, a few offered no response. The names of specific computer controlled machines were required here and, in a small number of cases, marks were lost by giving generic terms, such as CAM and prototyping.

- (c)*** Of those candidates who attempted this question, over half gained three marks or more out of the six marks available. The majority of responses concentrated on the cost of purchasing computer controlled machines, the loss of employee jobs and the ability to make the machines work 24/7. Only a limited number of candidates made reference to the more technical aspects, such as the improved safety for workers, the consistent accuracy of products made, and the increase in output. Marks were awarded for well written answers, despite technical content occasionally being weak (QWC).

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