OCR
Oxford Cambridge and RSA

GCSE

Design and Technology: Industrial Technology

General Certificate of Secondary Education **J304**

OCR Report to Centres June 2015

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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.

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

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OCR REPORT TO CENTRES

A541 Introduction to designing and making

General Comments:

Several Centres submitted work early for Moderation this year, but Centres are reminded that marks must be submitted to OCR by May 15th. When marks are sent to OCR, an email will be generated automatically requesting the sample. There is no requirement to send work until this email is received, which will list the specific candidates whose work the Moderator wishes to see.

Entry numbers have remained reasonably stable compared with those of July 2014. No entries were made this year on the Repository, but there was an increase in Centres submitting their work electronically, either on CD or memory stick, which were sent directly to the Moderator.

Individual cover sheets can be sent electronically, but they are perfectly acceptable as hard copies, sent in the post, even if the associated candidate work is submitted in an electronic format.

Many Centres do not appear to be aware of the reasons for using cover sheets. They should be used by the person(s) marking the work to supply comments that support and justify the marks they are awarding. If there is doubt when the moderation process is taking place as to why a particular mark has been given, it is useful for the Moderator to look at the justification provided by the Centre. This is of course, only possible if the comments that are made are appropriate. Too many Centres are using just one word comments in the boxes, for example, 'good'. This is not helpful at all to the Examiner. If the mark awarded is in the high ability band then the work must be good. The centre should be providing a comment that justifies their awarding of the mark given in this strand.

It is preferable for Centres to use Microsoft PowerPoint when producing e-portfolios. These can then either be submitted in PowerPoint format or converted to PDF documents. Hard copies of candidate's work are still the preferred option for many submissions. If submitting work electronically, Centres are asked that one single file only is submitted for each candidate. This should include the images of the final piece of practical outcome. There were instances in this session where a Centre supplied multiple files for each candidate, in excess of sixteen files for certain individuals. Some of these files were already embedded in the main Power Point presentation file, but others were not. It is only fair to the candidate that the Moderator opens and checks all files submitted. With the Moderator is having to moderate possibly 15 candidates in a Centre, this clearly has the potential to be an extremely time consuming operation which would delay the moderation process considerably.

Centres that are preparing candidates for this examination must ensure that they read their Centre Report from the previous year, together with the report from the Principal Moderator. These reports highlight any problems with the Centre's submission, together with general problems encountered with the entry as a whole for this unit. It is apparent that some Centres are not reading these documents and acting on the guidance and comments made, as they are repeating the same errors year on year. This is not beneficial to their candidates.

There were more administrative errors this year. Some Centres did not include a CSF form with the mark breakdown for all candidates. Errors such as addition mistakes or missing marks were found in these. All boxes should be completed, even if this is with a zero. Mistakes were also found in the transfer of marks from the CSF form to the MS1 form or equivalent. Centres are asked to check all paperwork very carefully before sending to their Moderator.

It is also the responsibility of the Centre to check that all of a candidate's work is present, for example, that the candidate has supplied the requisite number of photographs of their completed practical work. If the Moderator has to contact the Centre to request missing work, then again, this seriously disrupts the moderation process.

When submitting work electronically, please ensure that the file is the most up to date. There were instances this session where the marks did not match the work supplied. This was because the file sent for moderation was not the candidate's latest version.

Many Centres continue to offer a very limited range of tasks for candidates to select from, for their Controlled Assessment task. The use of writing frames appears to be used by some centres still, despite advice from OCR to the contrary.

Centres are reminded that they should not be teaching for the Controlled Assessment Task, or marking and correcting work in progress, or offering feedback on how work can be improved.

Over marking the work of their candidates is still in evidence at some Centres. Care should be taken when marking. Close scrutiny and familiarity with the marking criteria should be established before marking the work.

Centres are reminded that this unit is an introduction to designing and making and the Controlled Assessment should represent 20 hours of work. Many candidates are clearly exceeding this and Centres should operate effective monitoring of the time spent on the Controlled Assessment task.

Creativity

This strand is still misunderstood by many candidates and Centres alike. Candidates are not being marked on the research directly, but how they analyse this and then use it to inform their designing. They should be aiming to identify common trends in what they research and then to reinterpret and apply this knowledge in their own designing. Candidates are spending far too much time including copious pages of what can only be described as 'theory notes' on such aspects as materials and processes. These may have some relevance in the planning or making section, but are superfluous in Creativity or Analysis. For the benefit of those Centres which did not see the report last year, I will repeat the list of what successful candidates demonstrated in each section.

Candidates who did well in this section

- clearly identified the chosen problem;
- recorded their conclusions from investigations and research;
- thoroughly analysed two existing products;
- identified common good design features and explained the trends they had recognised in these products;
- used this work to produce a Design Brief that clearly indicated the problem, intended users and situation;
- indicated sources of information.

Designing

There were some excellent examples of high quality graphics in evidence again this year, but there were also many examples of poor quality designing that had been awarded very high marks. Centres must be realistic when marking and look carefully at the wording of the marking

criteria. Candidates should demonstrate the use of a range of creative ideas, well produced and using a variety of techniques if they are to be awarded a mark in the higher band. Their designing should cover ideas, development, modelling and CAD and culminate in a working drawing, produced in a recognised format. These are skills that will need to be taught to the majority of candidates.

Successful candidates started from a quality design specification that was realistic and objective. Other candidates were using a specification to design from that was unclear, subjective and sometimes unrealistic.

Candidates should be using a variety of graphic skills to produce a range of design ideas. Their ideas should be creative and flow from their research if high marks are awarded. They should use further graphic skills to develop their design.

An effective and correctly drawn working drawing should be included in their submission. Many candidates make good and relevant use of CAD. Often, candidates make good use of CAD software like Google SketchUp, as well as more established programmes like ProDesktop. If a candidate is using CAM, then screenshots of this process taking place should be included in the portfolio. Modelling should be used to help generate a final design.

There were many good examples of design development again this session. Candidates were clearly showing progression from an initial idea to a working drawing. This is essential in the process and effective development leads to a quality product during the making stages. Development of a design however, was completely absent in the work submitted by several Centres.

Many candidates continue to use modelling more frequently now and this is also supporting their progress into making. Models are occasionally 2D, which may show the effectiveness of a mechanism, but candidates are also more frequently using 3D modelling in resistant materials and using CAD software.

Design ideas again this year were not always well annotated or detailed sufficiently and often lacked the information required regarding construction, sizes or materials. Too many candidates are only producing design ideas using very limited methods, perhaps just computer-drawn images using graphics or drawing software. However, many excellent examples of working drawings are now being seen, mainly produced using CAD software.

Candidates who did well in this section:

- used their analysis of research to produce an effective, clear, objective design specification;
- then produced a range of well presented, annotated and evaluated ideas using a variety of techniques;
- developed a design effectively and used ICT where appropriate to aid their designing;
- used modelling to good effect to develop a design or aid design thinking;
- produced a good quality dimensioned working drawing in a recognised format.

Making

There was some excellent work submitted for moderation again this year. Many of the practical outcomes were of a very good standard and the digital images of the finished work were mostly adequate. These images are the only evidence the moderator has of the finished piece of work, so the images, a minimum of two, (but more are very welcome), should be of the highest quality. Sometimes images were supplied where the work was not well lit, was out of focus or had too

much light reflection from metal surfaces. The images should be embedded into the portfolio of the candidate. They should not be printed out or supplied digitally as separate images.

Work again ranged from MDF to fully engineered metal outcomes. Workplans were, on the whole, good, with sensible ordering of tasks and correct selection of tools and processes. The work of some candidates did not really cover a sufficient range of skills or complexity for the award of the highest marks.

If marks are awarded in any strand, there must be evidence in the portfolio to support the mark given. Some candidates lost marks because there was little or no evidence in their portfolios of problems that they had encountered and how these had been resolved in order to progress the work forward. There were examples this session of candidates describing procedures as problems that you would expect as a by product of certain processes. For example, the creation and removal of 'burrs' during manufacture in metal is not a problem that would warrant marks in this section. It is a normal practice when metalworking and you expect to have to deburr after certain processes. Candidates can successfully include the problems with the making as an additional column in a work plan. They plan what they are going to do, how it will be approached and the tools and equipment to use, but then include problems they encountered on those stages and how they modified and adapted their planning and making to overcome the problems encountered. It can also be successfully included as a separate section within the portfolio.

Many candidates are good at recording the progress of their work, using both notes and digital images to record the making sequence. What is required in this section is recording the making as it happened and *in situ*. It is not intended to be a simple photograph of a finished component and then an explanation of how that component was made. There were too many of the latter evident in this session.

Candidates who had used components produced by CAD/CAM software often had very little evidence in their portfolios of this process and they often showed a lack of knowledge of the designing and making process that had been used. If CAD/CAM is utilised, candidates should include screen shots to illustrate this and show ownership to the Moderator.

Candidates who did well in this section:

- planned their making effectively recording process, resources, time and safety issues;
- had evidence of what problems had arisen during the making and how these had been overcome. Candidates sometimes combined this with forward planning to good effect;
- recorded the work in progress with annotated photographic images;
- produced an effective, feasible, good quality prototype.

Critical Evaluation

This section was again not well done by many candidates, possibly due to pressure of time, as it is the last task to be completed. Many comments were superficial and too brief and showed a lack of understanding of the requirements of the evaluation in this Unit.

Candidates should critically evaluate the processes involved in designing and making the prototype in this unit of work, as opposed to the product itself. With reference to their initial planning, and the record they produced of the stages in making their prototype product, they should be able to reflect and suggest modifications to improve the design, modelling and prototyping processes. They should use specialist terms, with a clear emphasis on the correct use of spelling, punctuation and grammar evident throughout the portfolio.

The correct use of specialist technical terms is still not well attempted by many candidates.

Candidates who did well in this section:

- effectively evaluated the designing and making process;
- in so doing, were able to identify how the designing, modelling and planning stages could have been improved;
- used correct specialist terms throughout their portfolio;
- throughout their portfolio, used spelling, punctuation and grammar correctly.

Many Centres have been entering candidates for this examination for many years and are very familiar with the demands of the specification and what is required. They are clearly able to guide their candidates effectively. Other Centres, both new ones, but also very established ones as well, are clearly not reading the guidance supplied in Centre Reports and the Principal Moderator Report. If they are, they are choosing to ignore the advice given in these reports, which would help their entries to be more successful in following years.

A543 Making quality products

General Comments:

Centres should ensure that they send the CCS160, MS1 or equivalent and a CSF form that includes the mark breakdown for all candidates, not just those selected for moderation. There was an increase in clerical errors this year and centres are asked to check addition and the transfer of marks very carefully before submission in future.

If submitting work electronically, please ensure that the work of each individual candidate is included in one single (usually a PowerPoint or PDF) file. Those submissions made in the more traditional A4 or A3 paper format should make sure that all the candidate's work is included, in order. There were some instances of work being totally disorganised and not in any logical order. This makes moderation difficult. If candidates are using clear wallets, pocketed portfolios or similar, then all the work should be visible without having to remove it from the portfolio. It is too time consuming to remove everything for moderation. If work is doubled up in a clear wallet, then things may be inadvertently missed.

Centres must ensure that they read their own Centre Report from the previous year on this unit, together with the Principal Moderator's Report for the June sitting, before commencing the Controlled Assessment with the candidates. These offer specific recommendations and observations to the Centre as well as general comments on how work can be improved, things to avoid and what evidence Examiners are looking for.

Digital images of the completed piece of work were not always of a high enough quality. Many images were far too small, particularly those embedded into A4 format paper portfolios. If using A4 format portfolios, it is recommended that the images are at least A5 in size, i.e. they take up half an A4 page. There should be a minimum of two, but more are welcome. As well as overall views, moderators are keen to receive good quality close-up views that illustrate significant detail on the practical outcome.

Candidates should be offered the full range of Controlled Assessment themes. Too many centres are clearly not doing this as all candidates are submitting the same theme. Also, centres must be aware of the pitfalls of showing candidates exemplar work too early in the process. The similarity in outcomes of many candidates at particular centres is too close to presume they have all arrived at the same outcome by chance. Candidates are either starting at a very similar point, for example a basic design which they are then modifying, (in which case this should be made clear at the start of their portfolio) or they are all being subjected to similar exemplar items at the commencement of the Controlled Assessment.

Designing:

Too many candidates are producing far too much research, not all relevant, for this unit. Research that is included should be relevant and then clear conclusions should be made as a result of what has been investigated. It should lead to a realistic specification. The inclusion of 'theory type' notes and work should be avoided

Centres are reminded that candidate work should include a variety of methods/media in conveying design information if high marks are to be awarded. The most successful candidates started from an effective and realistic Design Specification and produced a range of good quality ideas using a variety of media and strategies. They were annotated and evaluated and showed construction and material details.

After a good session in June 2014, the evidence of good quality development work this year was far less prolific. Many candidates appeared to have no evidence of development at all. The most successful candidates used drawing, modelling and CAD to good effect. CAD continues to be used to good effect by many candidates to develop and model their designs and to produce professional looking working drawings.

Making:

Again this year, many examples of good quality work were in evidence. It showed a variety of high quality making skills using appropriate materials. An area that gives cause for concern is that many candidates had a quality practical outcome, but not the matching design evidence in the portfolio. It must be asked how they get from a few basic sketches, without construction detail or dimensions, to a completed outcome of quality. All candidates had some level of practical outcome to moderate.

Planning was often competently completed and levels of terminology were at higher level in this unit compared to A541. This section of the work for some candidates, however, highlighted their lack of knowledge and terminology.

Candidates must identify problems that occurred during the manufacturing stage and explain in their portfolio how these were overcome in order to complete the making. Marks cannot be awarded if this evidence is not included. As in A541 however, Centres were awarding marks for solving technical problems when there was a lack of or no evidence in the portfolio.

Many candidates recorded the making effectively as it progressed, using both written and photographic evidence to show the stages, tools and processes that they used. There was however, a marked tendency to photograph just a completed component and then briefly explain its production. This is not what is required. Evidence should be of live work with the digital images being captured at the production stage.

Digital images of the completed practical work are improving, but there are still too many instances of small, poor quality pictures, often printed at low resolutions. It must be pointed out that if using an A4 format portfolio, small images on one part of the page are insufficient to convey the information required and to do the work justice. There were some instances where there was no image at all of the completed work included in the portfolio. This delays the moderation process if Centres have to be contacted to supply missing images, especially as this may come at a time when the candidates are not in regular attendance at the Centre.

Critical Evaluation:

Candidates are far more comfortable, and therefore more successful, in evaluating the final product rather than the designing and making processes as in A541.

The most successful candidates evaluated their completed project against their own criteria as set out in their Design Specifications. There was less evidence in this session of candidates including a detailed testing process of their work and showing evidence of the testing outcomes. Depending on which project they are attempting, it may be possible to include physical evidence of the testing results in the portfolio, for example, pieces of embossed card or punched metal. For other tasks, clear photographic evidence should be supplied showing the results of the testing.

The appropriate quality of written communication, particularly punctuation and grammar, is still an issue for some candidates. The correct use of technical terms highlights a lack of knowledge and understanding for many.

Candidates were usually competent at identifying weaknesses in their product and suggesting design developments/modifications that would improve their product.

A545 Sustainability and technical aspects of designing and making

General Comments:

The majority of candidates attempted all of the questions on the examination paper and a number of very good responses were presented. It was evident, however, that candidates had not always read questions carefully, resulting in inaccurate or inappropriate responses. It is most important that candidates take time to read through the question paper thoroughly before attempting to answer questions, in order to avoid such basic errors.

Section A was generally well answered by most candidates, and sound knowledge of general sustainability issues was demonstrated in many of the responses seen. This was not the case in questions relating to recycling, however, where there seemed to be some confusion over what can and cannot be recycled, and also a certain amount of uncertainty regarding primary recycling.

In Section B, candidates' knowledge of the use of basic hand tools showed some improvement over previous sessions, and materials were quite well known, with the exception of 'smart' materials. Knowledge and understanding of processes used in the school workshop was generally quite limited, but the application of health and safety precautions appeared to be well understood.

Sketches produced for responses to the design questions were generally of rather poor quality. It is most important that sketches are clear and suitably annotated, as Examiners must be able to readily interpret a candidate's design ideas in order to award marks appropriately.

Comments on Individual Questions:

Section A

Question Nos 1 - 15.

These one-mark questions were mostly answered correctly, with the following notable exceptions:-

4 Whilst the correct response of Polystyrene was given by many candidates, a number of incorrect choices were made in answering this question, with some appearing to have been made by guesswork.

5 A significant number of candidates took the reference to temperature change as a suggestion of heat treatment, and gave 'Case harden' as their response.

7 The correct name of PVC was not well known, the 'chloride' element being the one causing most problems.

8 Many candidates had difficulty with this question, with a variety of terms being put forward rather than the correct response of sweatshop or unethical.

16(a) This question was generally quite well answered, with most candidates scoring two marks or more on it. Wood being a sustainable resource and also biodegradable appeared in many responses, as did the lack of environmental disturbance of mining for ore. Where marks were lost; this was normally as a result of one or more of the suggested benefits being inaccurate or too simplistically presented.

16(b) Responses to this question were quite varied. Most candidates made reference to the fair treatment of workers, but only the higher achievers mentioned the environmental awareness of ethical companies.

16(c)* Only the higher achieving candidates scored well on this question, with most responses being rather limited in detail. The design and manufacture of products was considered by most candidates, but reference to product life-cycle was less common.

Quality of Written Communication (QWC) marks were awarded for responses that were presented well despite technical content being rather limited.

16(d) The whole range of marks was seen on this question, with some candidates making no attempt at all and only a small number scoring full marks. Most candidates gained a mark by giving a recyclable material used in the design and / or a method of removing the assembly quickly, but clearly annotated complete design solutions were very rare. The quality of sketches seen in these responses was generally quite poor and they were often too small to show detail.

16(e) Most candidates were able to give at least one eco-friendly feature of the dynamo compared with battery power, and many higher achieving candidates gave two well-reasoned answers to gain full marks on the question. The most popular responses were based around the removal of the need to dispose of spent batteries, and the fact that the power supply is both sustainable and renewable was also mentioned.

16(f) This question was well answered, with most candidates recognising the need to separate different materials for recycling or safe disposal. The best responses also made it quite clear how the ease of disassembly helps in this process.

Section B

17(a) Most candidates were able to name two ferrous metals, although a number showed that they were unsure of the difference between ferrous and non-ferrous by giving one example of each type.

17(b) Most candidates scored at least two marks on this question, invariably by naming the scriber and giving its use. The dividers were often described as odd-legged callipers, and only the higher achieving candidates recognised the scribing block / surface gauge.

17(c) This question was generally well answered, with the majority of the candidates giving detailed responses to it and scoring full marks. It was rather surprising to see that not all candidates described the simple method of joining the diagonals to find the centre, but marks were also awarded for measuring the half-way point of the sides and then using a try square and scriber.

17(d)(i) Although candidates might be expected to have used the vice shown when using a drilling machine, few gave the correct response of ‘machine vice’. Most incorrect responses suggested that it was a hand vice, and some even thought it was a bench vice, although this response could have been the result of guesswork.

17(d)(ii) Most candidates were able to explain two relevant safety precautions that should be taken when using a drilling machine. Where marks were lost on this question, it was normally due to the candidate not giving sufficient detail or justification in one or both responses.

18(a) Responses to this question were very disappointing, and a significant number of candidates did not even attempt it. Marks were awarded where relevant stages were given, but very few candidates provided an accurate and workable description of the brazing process.

18(b)(i) Most candidates understood that a 'tapping size' hole needs to be smaller than the thread diameter, and gave the correct response of 5mm. Where an incorrect response was given, this was normally the thread size of 6mm, although 7mm was also seen on occasions.

18(b)(ii) This question was quite poorly answered, with a significant number of candidates not scoring any marks on it at all. Many candidates gave both tap and die as their answers, ensuring that one of the two marks would be gained, but even hacksaws and files were mentioned in some responses.

18(c)(i) Only the higher scoring candidates scored well on this question, with some offering no response at all. Facing off was recognised by most candidates, and knurling by many, but few could name plain turning or parting-off.

18(c)(ii) This question was not well answered, with many candidates suggesting that cast iron, mild steel and even aluminium were suitable for making lathe cutting tools. Tool steel was the most frequently seen correct response, but high speed steel (HSS) appeared less often than might have been expected.

18(d) Responses to this question were generally good, with most candidates being able to name two CNC machines. The most popular example given was the milling machine, and 3D printers were also mentioned in a number of responses.

19(a) This question was generally quite well answered, with most candidates scoring at least one mark on it. In a number of cases, two simplistic or one-word responses that could not be described as 'reasons' were given, in which case the two were combined for one mark only.

19(b) Most candidates were able to name at least two thermoplastics, the most popular examples being ABS and HIPS.

19(c) This design question was quite well attempted, but only a limited number of candidates scored full marks on it. Strengthening the rack was normally achieved by adding corner braces, but the issue of the files being difficult to remove was less well addressed, with most candidates simply enlarging the holes. In a number of cases, marks were lost where candidates had used metal for the bracing, rather than the same thickness acrylic asked for in the question. The quality of sketches seen was again quite poor, as was the standard of any annotation provided.

19(d)* Responses to this question were very varied, and marks across the whole range were seen. In many cases, candidates had failed to address the focus of the question and related their response to more general applications of CAD/CAM, rather than design and development of products. Only the higher scoring candidates presented responses that included reference to the benefits of using CAD packages in designing and CAM applications, such as CNC machining and 3D printing, when making prototypes. Quality of Written Communication (QWC) marks were awarded for responses that were presented well despite technical content being rather limited.

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