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GCSE

Design & Technology (Industrial Technology)

General Certificate of Secondary Education **GCSE 1959**

Reports on the Components

June 2010

1959/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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General Certificate of Secondary Education

Design and Technology (Industrial Technology) (1959)

REPORTS ON THE COMPONENTS

Chief Examiner's Report

This has been the final occasion that candidates have been assessed on their work in this 'legacy' specification, and the number of entries for the subject was slightly down when compared with previous years.

Evidence from the written papers suggested that, on the whole, candidates had been entered for the tier most appropriate to their abilities, which has not always been the case in previous years.

Introduction to the written papers

Responses to questions on the written papers have again highlighted weaknesses in many candidates' knowledge and understanding of basic workshop tools and processes. It is expected that candidates will have had experience of a wide range of processes applied to both metals and plastics, particularly as the coursework project requires candidates to develop and produce a 'well engineered device'.

Whilst most candidates' work was clearly presented, a number of scripts were difficult for examiners to read or interpret because of poor handwriting in responses. On-screen marking allows examiners to magnify candidates' work, and this facility was used on a number of occasions in an attempt to read poorly presented work.

There was clear evidence that candidates often failed to read the questions fully before attempting an answer, and this included carefully studying illustrations. Exam technique is most important, particularly in the case of the lower achieving candidates, and time should be taken to read the paper fully and carefully at the start of the examination.

Many candidates gave simplistic one-word responses to questions where more detail was needed to qualify the answer. 'Quick' and 'Cheap' are not acceptable responses unless combined and/or qualified. e.g. 'Vacuum forming is cheap because the moulds do not cost much to make.'

The quality of sketching used in design responses again varied considerably. It is obviously important that examiners are able to interpret candidates' responses in order for marks to be awarded, and clear sketches that are suitably annotated need to be presented.

1959/01 Paper 1 (Foundation)

Comments on Individual Questions

1 **(a)** The vast majority of candidates were able to identify many of the correct materials and correctly used the material once only. A few candidates did not use the materials from the given list, but invented their own.

(b) Many candidates linked the word 'ferrous' with iron and therefore gave a correct response to this question. Some candidates, however, wrongly made reference to metals that do not corrode.

2 **(a)** Most candidates were clearly familiar with materials lists through their coursework, but there were some careless mistakes in the interpretation of the information.

(b) Most answers made reference to repetition of accuracy, but few mentioned speed of production.

(c) The common answer referred to the material being in keeping with the rest of the product. Some answers gave strength as an answer, but did not clearly compare the properties.

(d) There was a wide variety of answers to this question. Most answers picked up at least one mark by showing how the device could be held in an engineers' vice. Manufacturing details for the jig were often lacking, for example wood as a material description is not sufficient.

3 **(a)** Most candidates could see that leaflets are likely to slip down or off the sides, but not so many were able to articulate the issues with the single wall hanging point.

(b) **(i)** There was a range of descriptions presented, but most lacked the use of any engineering terminology.

(ii) The majority of candidates showed evidence of safety awareness, although it was apparent that some candidates were unfamiliar with the process or the machine.

(c) The majority of candidates were able to make reference to the repetition of accuracy resulting from using a former.

4 **(a-d)** The responses presented showed that candidates are more aware of some industrial processes than others, and in some cases candidates confused the process and the material. For example a number of answers for (a)(i) related to die casting when the product was made from plastic.

Few answers showed any indication of knowledge of a split mould and hence the flash lines. Most incorrectly described how two halves were glued together.

(e) Many candidates answered this question well, but failed to score full marks due to inadequate annotation of sketches.

5 **(a)** Most candidates were able to show some combination of slots in their drawings, although some did not show the slots in both the tube and the feet.

(b) It is matter of concern that, in an exam assessing knowledge and application of engineering processes, there appears to be a significant number of candidates that are not familiar with the brazing process. There were few fully correct answers for this part of the question.

(c) The clarity of sketches was an important factor in the awarding of marks for this question. In many cases, sketches presented did not clearly indicate the candidates' suggestions for the required jig.

1959/02 Paper 2 (Higher)

Comments on Individual Questions

1 **(a-d)** The responses presented showed that candidates are more aware of some industrial processes than others, and in some cases candidates confused the process and the material. For example a number of answers for (a)(i) related to die casting when the product was made from plastic.

Few answers showed any indication of knowledge of a split mould and hence the flash lines. Most incorrectly described how two halves were glued together.

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2 **(a)** Most candidates were able to show some combination of slots in their drawings, although some did not show the slots in both the tube and the feet.

(b) It is matter of concern that, in an exam assessing knowledge and application of engineering processes, there appears to be a significant number of candidates that are not familiar with the brazing process. There were few fully correct answers for this part of the question.

(c) The clarity of sketches was an important factor in the awarding of marks for this question. In many cases, sketches presented did not clearly indicate the candidates' suggestions for the required jig.

3 **(a)** Most candidates scored maximum marks in this question, but a few did not due to some careless annotation of sketches.

(b) Many good answers made reference to strength to weight ratios and appropriate materials. A number of candidates repeated answers in each section and therefore did not score full marks. Some responses suggested the dismantling of the bicycle rather than the use of twist and lock methods.

(c) Many candidates made reference to the International Systems Organisation but were then unable to articulate the quality assurance aspect of this for manufacturing. Some answers showed confusion with health and safety regulations.

4 **(a)** The poor quality of sketching and annotation let some candidates down, although there were some good answers with reference to leverage and 'spring back'. The manufacturing details presented often differentiated between the candidates.

(b) Many answers indicated that the material will try to return to its original shape, but lacked the depth indicating that the bend has to be made a few degrees past a right angle to achieve the required shape.

(c) To gain full marks at this level, candidates are expected to provide detailed annotations to sketches, perhaps with reference to sizes of tapping drill, bolt sizes and also full descriptions of fastenings and fittings.

5 **(a)** Many candidates were aware of the implications relating to risk assessment, but were unsuccessful in breaking down their answers into hazard determination, potential injury and control.

(b) Knowledge of the COSHH regulations was very limited, and few candidates gained any marks in this question.

(c) There was a significant number of ‘no responses’ for this question. A number of candidates wrongly made reference to fused systems in electrical goods. Little information presented by candidates related to build quality, maintenance or materials.

1959/03 Paper 3 (Foundation)

Comments on Individual Questions

1 **(a)** Responses to this question were very disappointing, with even some of the most basic components not being known by many candidates. Simplistic rather than specific responses were accepted at this stage of the question paper. A considerable number of candidates appeared to confuse ‘nuts’ with ‘bolts’.

(b) Surprisingly, most candidates gained full marks on this question, despite many not being able to name the components in part (a).

2 **(a)(i) & (ii)** Although many candidates were able to define the term ‘alloy’, few could correctly name another example, a number simply stating ‘aluminium’.

(b) Most responses to this question were in the form of simplistic statements relating to cutting and filing. Very few candidates earned all three marks by referring to the use of a finishing technique, such as draw-filing or linishing, in order to achieve the smooth curve required.

(c) The majority of candidates attempted this question, with the most commonly presented correct responses being the use of rivets or screws. A considerable number simply stated ‘welding’, which was not accepted as appropriate for the brass handle.

d) Very few candidates scored well on this question and knowledge of the application of jigs again proved to be limited. The most commonly omitted feature was a means of ensuring accurate positioning of the holes in the backplate.

3 **(a)** **(i)** Whilst all candidates answered this question, only a comparatively small number gave a suitable reason for the use of injection moulding for the removable top shown. Many candidates gave simplistic, one-word answers that did not contain the justification required to qualify for the mark.

(ii) Polishing was a fairly common inappropriate response to this question, while a number of candidates had failed to read the question carefully and suggested ‘painting’. Plastic coating and lacquering were the most popular correct responses, with galvanising appearing only very rarely.

(iii) Most candidates were able to give at least one reason why cast iron was suitable for the display stand base, but marks were restricted in many cases by over-simplistic responses.

(b) It would seem that many candidates had no experience of cutting screw threads of relatively large size. Basic stages such as clamping and pilot drilling were often omitted, and in a number of cases a hole size equal to the thread diameter was drilled. The use of correct tool names and technical terminology was weak in the majority of responses.

4 **(a)** **(i)** Stainless steel was the most frequently seen correct response to this question, but many candidates appear to be unaware of the fact that aluminium is not a suitable metal for manufacturing unless used in the form of an alloy.

(ii) This question illustrated a weakness in candidates' knowledge of industrial applications, with only a very small number giving the correct response of presswork/stamping. In a number of cases, candidates offered no response at all.

(iii) Most candidates offered at least one acceptable reason for fitting the base to the toast rack, but few gave two reasoned answers worthy of full marks for this question.

(b) Confusion regarding the distinction between CAD and CAM was apparent in a number of responses to parts (i) and (iii) of this question and this caused some of the benefits given to be inappropriate for the question being asked. It was also rather disappointing to find that, in part (ii), a significant number of candidates were unable to identify a CNC machine suitable for cutting the slots in the acrylic prototype.

5 **(a)** Most candidates were able to give at least one benefit of using plastic for the remote control, but over-simplistic responses again restricted marks in a number of cases. Statements such as 'it's cheap' or 'it's easy to make', for instance, do not qualify for marks at this level unless justified in some way. 'It's easy to make awkward shapes by injection moulding plastics' would be a fully acceptable response to this question.

(b) This question was quite well answered, with many candidates recognising the shaping of the remote control case and the positioning of the buttons as examples of the application of ergonomics in design.

(c) Very few candidates correctly identified the three parts of the injection moulding machine in the diagram, but more were able to give an explanation of the injection moulding process in part (ii).

(d) A considerable number of candidates did not attempt this question but, where answers were given, vacuum forming was the most frequently mentioned plastics moulding process.

1959/04 Paper 4 (Higher)

Comments on Individual Questions

1 **(a)** **(i)** Stainless steel was the most frequently seen correct response to this question, but many candidates appear to be unaware of the fact that aluminium is not a suitable metal for manufacturing unless used in the form of an alloy.

(ii) This question illustrated a weakness in candidates' knowledge of industrial applications, with only a very small number giving the correct response of presswork/stamping. In a number of cases, candidates offered no response at all.

(iii) Most candidates offered at least one acceptable reason for fitting the base to the toast rack, but few gave two reasoned answers worthy of full marks for this question.

(b) Some confusion as to the distinction between CAD and CAM was apparent in a number of responses to parts (i) and (iii) of this question and this caused some of the benefits given to be inappropriate for the question being asked.

In part (ii), most candidates were able to correctly identify a CNC machine suitable for cutting the slots in the acrylic prototype, with 'milling machine' and 'router' being the most frequently presented responses.

2 **(a)** Most candidates were able to give at least one benefit of using plastic for the remote control, but over-simplistic responses again restricted marks in a number of cases. Statements such as 'it's cheap' or 'it's easy to make', for instance, do not qualify for marks at this level unless justified in some way. 'It's easy to make awkward shapes by injection moulding plastics' would be a fully acceptable response to this question.

(b) This question was quite well answered, with many candidates recognising the shaping of the remote control case and the positioning of the buttons as examples of the application of ergonomics in design.

(c) Very few candidates correctly identified the three parts of the injection moulding machine in the diagram, but more were able to give an explanation of the injection moulding process in part (ii).

(d) Most candidates attempted this question and vacuum forming was the most frequently mentioned plastics moulding process.

3 **(a)** Most candidates gave at least one reason for using aluminium alloy for the column of the display stand, but few gave sufficiently detailed responses to qualify for full marks. It should be noted that, at this level, one-word answers are not an appropriate form of response.

(b) A significant number of candidates did not attempt this question on lathework and the correct response of 'knurling' was quite rare.

(c) Very few candidates were able to name two forming process for metal. A number of candidates misread the question completely and gave two types of casting.

(d) All candidates attempted this question and the quality of responses was varied. A number of very well presented sketches were seen, but some sketches were poor and difficult to interpret. Few candidates fully addressed the requirements of the question, with the prevention of loosening in use being frequently ignored.

4 **(a)** **(i)** A number of candidates did not even attempt this question and, in many cases candidates failed to take into account that fact that the base was made from cast iron. The most appropriate response of sand casting was only infrequently seen.

(ii) Correct answers to this question were rare. Many candidates simply stated 'aluminium' which is unsuitable unless used in the form of an alloy.

(b) Although most candidates attempted this question, few gained both marks available. The majority of responses included clamping methods that would cause damage to the plastic lens frame.

(c) Some interesting solutions to this design question were seen, with much use being made of rack and pinion systems and keyways. In most cases the requirement for fine adjustment had not been addressed, and only a small number of candidates gained full marks on the question.

5 **(a)** It was clear from responses to this question that knowledge of JIT and other manufacturing systems was very limited. Very few candidates scored marks in parts (i) and (ii) by addressing the main issues relating to the JIT system. In part (iii), the most common responses referred to manufacturing methods, such as batch production and mass production, rather than manufacturing systems.

(b) Questions relating to environmental issues are normally well answered at this level and many candidates scored quite good marks here. The majority of responses described two benefits to the environment of recycling, but some repetition of points in the two parts caused a number of candidates to receive less than full marks for the question.

1959/05 Coursework

General Comments

Coursework projects this year represented the full range of abilities, and examples of very well engineered devices were seen in some centres. Allocation of time to the individual Assessment Objectives proved to be a limiting factor in a number of cases, particularly for lower ability candidates. Although there were less partially completed outcomes seen than has been the case in previous years, a significant number of candidates had obviously not allowed sufficient time to make their devices, and produced work of rather poor quality.

The quantity production requirement continued to present problems for some candidates and was all too often ignored completely. It should be pointed out that the device made by a candidate was to be capable of producing batches of it's product with repeatable accuracy. This needed consideration throughout the project, up to and including the evaluation and testing in the final objective.

Presentation of portfolios was disappointing on the whole, with many candidates submitting their work as a few loose sheets of paper rather than a coursework folder. A structured portfolio is important for presenting the candidate's work effectively and also helps make the moderation process more straightforward.

Comments on Specific Objectives

Objective 1 – 'Identification of a Need or Opportunity leading to a Design Brief'

Sufficient information to justify full marks in this objective was adequately presented on a single sheet by the majority of candidates, and most scored well here.

Candidates were required to enlarge upon the information given for the chosen capability task by showing consideration of the users and the design needs of the device, and in some cases specific scenarios were presented relating to a design need.

The most common cause of lower marks in this objective was the design brief being unclear and not taking into account the quantity production requirement of the device.

Objective 2 – 'Research into the Design Brief which results in a Specification'

This objective differentiated well across the ability range with only a minority of candidates carrying out detailed research relating to the design and use of the chosen device. Many candidates produced questionnaires to collect data and, whilst this can sometimes be of use, it is essential that the information collected is relevant and is properly analysed. The time spent in preparing questionnaires would normally be better used in gathering data that has direct relevance to the design and use of the chosen device.

Most candidates were able to identify existing products, but these were often simply described rather than evaluated, and in some cases only photographs of the products were presented with no annotation. The more able candidates used their analysis of these products to gain information about the principles involved in their design and use, enabling them to relate this information to the design needs of their chosen device.

It is important that candidates show how they have analysed and made use of research information, particularly where websites or pre-prepared sheets have been used. Simply printing out pages directly from a website, or presenting copies of worksheets, cannot be accepted as evidence of research, as the candidate needs to show how the information has been analysed and used.

The majority of candidates produced a specification at the end of this objective, but often this tended to be rather simplistic and did not obviously result from analysis of research information. The importance of a detailed specification cannot be over-emphasised as it should be used throughout the project, up to and including the evaluation of the finished device in Objective 6.

Objective 3 – 'Generation of Design Proposals'

Most candidates were able to present a range of initial ideas for their chosen device, but in a number of cases these lacked originality, with all candidates in a group presenting identical ideas. Pencil sketches were used to communicate ideas in most cases, but the standard of these was often poor, making them quite difficult to understand.

Use of the specification to evaluate design ideas was rather weak, with only the more able candidates evaluating ideas objectively. To qualify for the higher marks in this section, a range of ideas should be evaluated against the specification and 'tick boxes' or unqualified 'marks out of 10' are not appropriate ways to present an evaluation. In many cases the choice of a design idea to develop was not clearly stated or justified.

There was rather less use of CAD than has been the case in previous years, but those candidates that used it did so to good effect in presenting their chosen design idea.

Objective 4 – 'Product Development'

This objective again differentiated well across the ability range and most candidates presented only limited evidence of any development. A considerable number of the lower achieving candidates missed the objective out altogether and went straight on to the making of the device. Only the more able candidates provided detailed drawings and information regarding materials and processes to be used in the making of the final device. Where candidates present sheets of detailed information about materials and processes, it is important that they show how this information is used in making decisions regarding their use in the final design.

Most candidates produced a model of some description and in some cases computer modelling was used to good effect. It should be pointed out, however, that candidates need to show how any models produced have helped in the development of the final design. It is important that evidence of modelling is presented at moderation, particularly as models are often lost or broken, and this should preferably be in the form of photographs in the candidate's folder. Candidates need to fully develop their chosen idea in this objective and all details required to make the final design should be clearly presented. It should be possible to make the final device from the information given, but few candidates gave sufficient detail to allow this and in the majority of cases there was no reference made at all to the control system for batch production. Cutting lists and working drawings are a particularly appropriate way to present details for making the final device and this is an area where CAD packages can be used to very good effect.

Objective 5 – 'Product Planning and Realisation'

Examples of retrospective planning were still seen in this objective, as were diaries of making, neither of which can be accepted as an effective work plan. In some cases there was no evidence of planning presented in the folder at all, and it should be pointed out that all planning, however basic, should be included. A fully detailed plan will take account of materials, techniques, time, and health and safety issues in addition to specifying an appropriate sequence of operations.

Making skills across the whole ability range were seen again this year with examples of excellent work produced in some centres. Examples of poorly finished work were also seen however, often having been given a thick coat of paint in an attempt to enhance the finish. The higher marks in the making strand of the assessment criteria were only justified where a well engineered device capable of repeated use and accuracy had been completed to a high standard.

Objective 6 – 'Evaluation and Testing'

Few candidates scored high marks in this objective, and in many cases no evaluation was carried out even when the device had been completed satisfactorily. Only the more able candidates produced detailed and objective evaluations, relating their comments to the original specification. The weaker candidates made simple, unsupported comments relating to the specification, or a description of their performance in the project.

High achievement in this objective was, in most cases, limited by a lack of evidence of testing. It is important that evidence of testing is provided if marks have been awarded. A written suggestion that testing had been carried out did not satisfy the requirements of the assessment criteria for the objective.

Presentation

The quality of portfolio presentation was very varied, ranging from well ordered design folders with each objective clearly defined, to a few loose sheets of paper in a plastic pocket. Cover sheets giving centre and candidate details were provided on the front of the portfolio in some cases, as were breakdowns of marks awarded for the Assessment Objectives. Particularly well presented folders often included a cover sheet with a photograph of the completed device and division sheets for each individual objective.

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