OCR
RECOGNISING ACHIEVEMENT

GCSE

# Design & Technology (Industrial Technology)

General Certificate of Secondary Education **GCSE 1959**

## Report on the Components

## June 2007

**1959/MS/R/07**

Oxford Cambridge and RSA Examinations

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

The reports on the Examinations provide 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 syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

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## General Certificate of Secondary Education Industrial Technology (1959)

## REPORTS ON THE COMPONENTS

# 1959/05 Report on Coursework Moderation

## General Comments

This year has seen a marked increase in the use of writing frames for work in the coursework portfolio. Whilst this approach can be helpful, particularly for less able candidates, it can be somewhat restrictive for candidates of higher ability and often limits their potential for success. Where the writing frame approach is used, it is essential that the independent work of the candidate is easily distinguished, and that sources of any information given are properly acknowledged.

Work from candidates across the full range of abilities was seen by moderators this year and there were examples of some very well engineered devices from a number of Centres. A limiting factor for less able candidates again proved to be the satisfactory completion of the device and often little more than a selection of part-finished components was presented for assessment.

The quantity production requirement continued to present problems for some candidates and was often ignored completely, resulting in a reduced performance across the objectives. A number of candidates wrongly assumed that the device itself had to be made in quantity whereas the requirement is for the device to be capable of producing batches of its product with repeatable accuracy. This should be considered throughout the project and evidence of the device's ability to fulfil the requirement should form a major part of Objective 6 (Evaluation & Testing).

Centres wishing to devise a different capability task to those detailed in the Course Specification must submit a formal proposal to the Board for approval in order to ensure that work done by candidates in the project meets the requirements of the assessment criteria. The proposal should be submitted prior to commencement of the project and a copy of the approved proposal must be made available for the moderator at the time of the visit.

## Comments on Specific Objectives

### Objective 1 – Identification of a need or opportunity leading to a design brief

Most candidates scored well in this objective, although in a number of cases the design brief did not take into account the quantity production requirement of the device. It is important that this aspect is considered from the very outset of the project as this will enable candidates to perform better in the objectives that follow.
For the maximum mark in this objective, the candidate is required to enlarge upon the information given for the chosen capability task by clearly showing consideration of the users and the design needs of the device.

### Objective 2 – Research into the design brief which results in a specification

This objective continues to differentiate well across the ability range with only the higher achieving candidates carrying out relevant research into the design and use of the chosen device. A number of candidates continue to fill this objective with pages of theory notes on materials and processes that are largely irrelevant at this stage of the project. This would be of more benefit to candidates in Objective 4, where the information could be used to inform decisions made about the construction of the final device. Many candidates produced questionnaires to collect data, but the information collected was generally of no specific relevance to the design need of the device and results were generally presented without analysis.

Where candidates use the Internet to collect information for research they should make reference to this and acknowledge the sources of information. It is important that they then show how they have analysed and made use of the information, as simply printing out pages from a website cannot be accepted as evidence of research.

Most candidates were able to identify existing products, in many cases these being examples that had been presented to them. It is important that candidates evaluate these products against the needs of the users, as merely describing their operation is of little or no benefit. 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

The importance of a detailed specification cannot be over-emphasised, as it should be referred to throughout the project and also used to test and evaluate the finished device. Most candidates produced a specification of some sort, but often this lacked the required detail and made no reference to the need for quantity production.

**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 were too “guided”, with all candidates presenting identical design ideas. There is a tendency for some candidates to supplement the ideas section by adding details of sizes, materials, construction techniques and standard components to their design sketches. If this is done, the information will also be required in Objective 4, where marks are specifically available for such details.

Evaluation of design ideas continues to be rather weak and often candidates use annotation merely to describe the design, with no reference to the specification or reasons for choice of ideas to develop. Only the more able candidates used the specification to evaluate ideas objectively and in many cases reference to the specification took the form of a tick box or a “mark out of 10”, with no detail as to how or why a particular idea had been chosen.

It is important that design ideas are clearly communicated, and pencil sketching remains the most appropriate and most widely used method of presenting initial ideas. The standard of sketching seen this year has been rather variable, and weaker candidates should be encouraged to make use of grid paper backing sheets in order to improve the quality of their sketches. Candidates that are proficient in the use of CAD packages can make good use of computer generated drawings to present the chosen design idea at the end of the objective. This also extends the range of communication techniques used by the candidate.

**Objective 4 – Product development**

Almost without exception, this objective is the least well done of them all. Candidates are required to develop their chosen idea into a final design and to give all details needed to produce the device. The objective differentiates well across the ability range with only the more able candidates providing sufficient details of sizes, materials, processes and components to be used. In many cases the less able candidates do not even attempt the objective or, at most, simply present another sketch of their chosen idea.

Most candidates produced a model of some description, but many failed to show how the model had helped in the development of the final design. A number of Centres now use software packages such as ProDesktop to produce 2D models and candidates used this to good effect. The modelling section can also be used to trial and test construction techniques and processes to be used in the final design, and this would be of more use than a simple model that is not evaluated. Whatever form the modelling takes, it is important that evidence is available at

moderation, particularly as models are often lost or broken. This evidence could be presented in the candidates folder in the form of photographs that are clearly labelled with the candidates name.

It should be possible to make the final device from the information given in this objective, but few candidates gave sufficient detail to allow this. Cutting lists and working drawings are a particularly appropriate way to present details of final device, but often the only drawing presented was a general sketch with few, or no, dimensions. This is another area where CAD packages can be used to very good effect and the higher achieving candidates produced computer generated detail drawings of the component parts of the final design. In many cases there was no reference made at all to the vital control system for batch production that the final device needs to have.

**Objective 5 – Product planning and realisation**

Candidates' approach to the planning element of this objective has shown some improvement, with only the weaker candidates presenting no evidence at all. Fewer candidates are now producing "making diaries" as evidence of planning and most candidates do present a plan of sorts, albeit often lacking in detail. A detailed plan should take account of materials, processes, health and safety requirements and time, and the most able candidates produced some good examples of this.

Much good quality work was seen in finished devices, particularly where castings or appropriate fabrication techniques had been used. A significant number of candidates had used arc welding to assemble the parts of the device, perhaps to speed up the making, and this generally had a detrimental effect on the finished quality. It is important that candidates plan their work carefully and allow sufficient time for the device to be completed to the best possible standard. Completion of the device was again a problem for the weaker candidates, many of whom could present only a collection of parts for assessment and, therefore, were unable to demonstrate a suitable range of skills.

**Objective 6 – Evaluation and testing**

Most candidates who produced a completed device in Objective 5 attempted an evaluation, but few achieved high marks. In the first strand of the objective the device should be evaluated against the specification and this was done quite well by many candidates, with reference made to specification points and the use of resources. The testing element, however, continues to be rather weak in most cases, as often no evidence of testing is provided.

Testing should take account of the batch production requirement of the device and clear evidence of this testing must be presented where marks have been awarded. This evidence could either be in the form of photographs in the folder of the device being used or physical examples attached to the completed device.

**Presentation**

Most Centres now present candidates' work in A4 format, but it should be pointed out that this is not a specific requirement in this subject. Some Centres have a preference for A3 format for design folders and this is a perfectly acceptable way for work to be presented. The choice of format is entirely at the Centre staffs' discretion and will be dependent on candidature, resources and personal preference.

**Papers 1 and 2**

**General** Comments

It is pleasing to note the continued improvement in candidates' responses to some areas of the assessments; for example the quality of sketching and annotation required by the design questions. It continues to be equally disappointing that candidates' responses to technical questions requiring a basic knowledge of workshop practice and processes are poor; for example, brazing, riveting and lathe work.

**Comments on Individual Questions**

**Foundation Tier 1959/1**

1 (a) Most responses identified the correct file. Some candidates used descriptions not in the list e.g rat tailed file, but were still awarded the mark.

(b) Again most candidates were able to identify the correct file.

(c ) A poorly answered question. A few responses made reference to the cut or the shape of the file.

2 (a) Most candidates could identify the correct information and draw on their experience of the coursework requirements.

(b) (i) Too few candidates took note of the requirements to dimension using British standards.

(ii) A significant number of candidates did not answer this section.

3 (a) (i)(ii) This question was designed to assess a candidates knowledge of setting up a lathe and establishing the correct tool height. A disappointing number of correct answers were recorded.

(b) (i) Examiners were looking for responses that indicated a candidates knowledge of how to set up a brazing hearth and an explanation of the process in their annotations using appropriate technical language. The responses were very poor.

(ii) The poor response to this method of construction, as with brazing in part (i) reflects the diminishing evidence of these processes used in practical coursework or indicated as a possible method of construction in the design folios.

4 (a) (i) A significant number of answers wrongly made reference to Vacuum Forming.

(ii) A significant number of answers wrongly made reference to Die Casting.

(b) Most answers referred to painting.

(c ) The key emphasis in this question was on the benefit to the manufacturer which some Candidates' did not respond to.

(d) (i) It is important that candidates clarify their answers e.g light weight therefore makes it easy to move.

(ii) Many answers referred to durability.

(e) The standard of response to this question was good, with detailed annotation indicating construction methods and materials.

5 (a)(b) Few candidates had difficulty identifying the correct sequence to gain eight marks, but few scored full marks due to carelessness.

**Higher Tier 1959/2**

For questions 1 and 2 refer to the comments relating to questions 4 and 5 on the Foundation tier.

**Comments on individual questions.**

3 (a) Most responses were correct although some wrongly made reference to injection moulding.

(b) Few candidates appreciated the need for a draft angle.

(c ) Few candidates made reference to rigidity.

(d) Most candidates responded well by making reference to grip or relating to heat.

(e) Many candidates wrongly made reference to the point of injection rather than ejection.

(f) Many candidates scored one mark by referring to recycling, but not so many were able to explain the number indicating the plastic type.

(g) Few candidates referred to 'webs' or the improvement requiring modification to the mould.

4 (a) Most candidates scored some marks by indicating a draft angle. Some did not appear to be aware of the term 'cross section' in the stem of the question.

(b) At this level it is important candidates are clear in the presentation of their answer to gain full marks.

(c ) A variety of responses. Many answers did not recognise that the holes in the body of the design were clearance holes and therefore dimensioned their pin design at diameter 8.5. A significant number did not indicate a head design for the pin.

5 (a) Surprisingly few candidates scored both marks.

(b) Many candidates appreciated that the process demanded heating the metal to a high temperature, but many provided an answer for hardening and tempering tool steel rather than case hardening.

## 1959 Papers 3 and 4

### General Comments

More than 55% of the total entry had been entered for the Higher Tier and it was again evident that in a significant number of cases tier entry was inappropriate in relation to candidates' abilities.

It was obvious that questions had not always been read correctly by candidates and this was the case in both Foundation and Higher Tier papers. The importance of examination technique cannot be over emphasised and this includes the careful reading of each question prior to answering.

There has been an increase this year in the number of scripts being difficult for examiners to read. Whilst correct spelling is not a particular issue, it is obvious that a candidate's response must be clear to an examiner if marks are to be awarded.

Responses to questions requiring the use of annotated sketches were disappointing this year and many sketches lacked both detail and quality of communication. The use of jigs to perform operations with repeated accuracy remains an area of weakness, this being particularly disappointing as it is also an important element in the coursework project.

## Foundation Tier 1959/3

### Comments on Individual Questions

1 (a) Disappointingly few candidates scored high marks on this question, with the odd-legged calipers being the least well known of the tools shown. Many candidates identified the micrometer (tool 4) as a precision measuring device, but most mistakenly called it a vernier caliper.

2 (a) This part of the question was generally well answered, but only a minority of candidates gave six appropriate stages to gain full marks. A significant number of candidates omitted the stage of centre punching before drilling the holes.

(b) Responses given generally indicated some limited knowledge of the use of jigs, but most candidates were only able to give one advantage of their use.

(c) This part of the question was well answered by the majority of candidates, showing good understanding of the safety precautions needed for drilling machine use.

3 (a) The majority of candidates were able to identify three design faults with the hanger and most of them suggested improvements that were valid, if not well described.

(b) Solutions for this part of the question were weak and very few candidates managed to score more than half marks. In most cases the missing elements were a method of holding the strip firmly for sawing and a means of ensuring that the ends were cut square to the edges. Design sketches were generally of poor quality and often difficult to interpret.

4 (a) Very few candidates gained full marks on this part of the question and many confused CAD with CAM, giving responses that related to manufacturing rather than design.

(b) A significant number of candidates did not take account of the workforce in their responses and gave effects that were directly related to the manufacturing aspect only.

Where candidates had read the question carefully enough, most were able to give at least one suitable response, normally that of job losses.

(c)(i) This part of the question was quite well answered generally, but some candidates did not relate their answer to the making of a prototype toy and named inappropriate machines such as lathes and injection moulding machines.

(ii) Only a very small number of candidates answered this part of the question correctly and several very inventive suggestions were made as to what CNC stands for.

(d) Most candidates scored quite well here but some complicated the chart by adding unnecessary extra boxes. Charts were often left incomplete by failing to join the final link appropriately.

5 (a) Few candidates correctly identified pressing/stamping as the process used to produce the mild steel casing. A number of candidates misread the question and gave responses relating to plastics production.

(b)(i) Most candidates were able to identify a suitable thermoplastic for the handles, credit being given for answers that were incorrectly spelt provided they were understandable.

(ii) This part of the question was quite poorly answered by most candidates, many responses being over simplistic with one word answers and no justification. Few candidates managed to score more than one of the two marks available.

(c) Some good solutions to the stability problem were presented but the standard of sketching was very varied. Most candidates gained full marks for an annotated sketch of their design modification.

(d) Many responses were restricted by poor quality sketches that were difficult to interpret and the majority of candidates scored half marks for this part of the question. The design requirement least often met was that of securely supporting the heater, but most solutions spaced the heater from the wall and allowed easy removal.

## Higher Tier 1959/4

### Comments on Individual Questions

1 (a) Some candidates gained full marks on this part of the question, but others confused CAD with CAM, giving responses that related to manufacturing rather than design.

(b) A significant number of candidates did not take account of the workforce in their responses and gave effects that were directly related to the manufacturing aspect only. Where candidates had read the question carefully enough, most were able to give at least one suitable response, normally that of job losses.

(c)(i) This part of the question was well answered by the majority of candidates and several different machines were suggested as being appropriate.

(ii) After answering part (i) correctly, disappointingly few candidates were able to state what the letters C.N.C stand for.

(d) Most candidates scored quite well here but some complicated the chart by adding unnecessary extra boxes. Charts were often left incomplete by failing to join the final link appropriately.

2 (a) Few candidates correctly identified pressing/stamping as the process used to produce the mild steel casing. A number of candidates misread the question and gave responses relating to plastics production.

(b)(i) Most candidates were able to identify a suitable thermoplastic for the handles, credit being given for answers that were incorrectly spelt provided they were understandable.

(ii) This part of the question was quite poorly answered by many candidates, with responses that were over simplistic and lacking justification. Few candidates managed to score more than one of the two marks available.

(c) Some good solutions to the stability problem were presented but the standard of sketching was very varied. Most candidates gained full marks for an annotated sketch of their design modification.

(d) Many responses were restricted by poor quality sketches that were difficult to interpret and the majority of candidates scored half marks for this part of the question. The design requirement least often met was that of securely supporting the heater, but most solutions spaced the heater from the wall and allowed easy removal.

3 (a) Only a very small number of candidates were able to identify bevel/mitre gears as being suitable for the application given. There was clear indication that mechanical systems were not well known, the most common response being “cogs”.

(b)(i) Responses to this part of the question were varied, with some candidates merely sketching a plan view of the chassis complete with motors and wheels. Of the candidates that did draw a net, many did not use the full size of the blank given, but were awarded one mark subject to the shape and proportion being suitable.

(ii) Most candidates gained one mark here, but very few were able to name two tools suitable for cutting out the chassis. A significant number gave answers that were completely inappropriate, a particularly common response being “tenon saw”.

(iii) Whilst a number of candidates were able to describe the process of annealing reasonably well, very few could give the name of the process. Responses such as “heat treatment” and “hardening and tempering” indicated only limited knowledge of heat treatment processes and their application.

(c) This part of the question was generally not well answered, with very few candidates scoring more than half marks. Most solutions involved merely giving minimal extra support to the chassis, whilst not taking account of the need to support the axle. A number of unsuitable solutions included full width axles or enclosures that would impede the operation of the gear system.

4 (a) Very few candidates were able to demonstrate an understanding of the term fabricating. This was most disappointing to see, particularly as most candidates would have used fabrication in the making of their coursework project outcome.

(b) This part of the question was generally not well answered, with many of the proposed solutions being unsuitable. The majority of candidates gained some marks by the simple use of circlips or split pins, but fully appropriate methods were seldom seen and it is clear that most candidates' knowledge of the workings of mechanical systems is somewhat limited.

(c) Most candidates were able to name a workshop machine suitable to make the bracket from the solid. In a number of cases, however, candidates had not related the choice of machine to the bracket in Fig. 4 and gave an incorrect response such as "lathe".

(d) This part of the question was generally well answered, but far too many candidates gave over simplistic one word answers such as "quick" or "easy". Candidates at this level should be able to give clear descriptions of the benefits, and each response should be properly justified. eg "less material is wasted because the bracket will not need as much machining".

5 (a)(i)&(ii) Few candidates were able to demonstrate either knowledge or understanding of the Just In Time system and consequently scoring on these parts of the question was generally low. Where candidates showed an awareness of the system, their descriptions were often disjointed and lacking in the clarity and detail required of a response at this level.

(b) Many candidates did not relate their responses to the manufacturing industry and gave very general examples of computer technology applications. Despite the wording of the question, a number of candidates gave examples that referred to the application of CAD or CAM and these responses were not awarded any marks.

**General Certificate of Secondary Education**

**Design & Technology (Industrial Technology) (1959)**

**June 2007 Assessment Series**

## Component Threshold Marks

| Component | Max Mark | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| 1 | 50 | n/a | n/a | 30 | 28 | 26 | 24 | 22 |
| 2 | 50 | 27 | 23 | 20 | 16 | n/a | n/a | n/a |
| 3 | 50 | n/a | n/a | 30 | 26 | 22 | 19 | 16 |
| 4 | 50 | 28 | 22 | 17 | 11 | n/a | n/a | n/a |
| 5 | 105 | 79 | 69 | 59 | 47 | 36 | 25 | 14 |

## Specification Options

### Foundation Tier

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 175 | n/a | n/a | n/a | 97 | 83 | 69 | 55 | 41 |
| Percentage in Grade | 175 | n/a | n/a | n/a | 23.64 | 23.17 | 22.22 | 14.42 | 8.27 |
| Cumulative Percentage in Grade | 175 | n/a | n/a | n/a | 23.64 | 46.81 | 69.03 | 83.45 | 91.73 |

The total entry for the examination was 461

### Higher Tier

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 175 | 127 | 113 | 99 | 85 | 66 | 56 | n/a | n/a |
| Percentage in Grade | 175 | 7.62 | 17.84 | 26.77 | 23.79 | 16.73 | 4.65 | n/a | n/a |
| Cumulative Percentage in Grade | 175 | 7.62 | 25.47 | 52.23 | 76.02 | 92.75 | 97.40 | n/a | n/a |

The total entry for the examination was 549

### Overall

| | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| Percentage in Grade | 4.27 | 9.99 | 14.98 | 23.73 | 19.56 | 12.38 | 6.35 | 3.64 |
| Cumulative Percentage in Grade | 4.27 | 14.26 | 29.24 | 52.97 | 72.53 | 84.91 | 91.26 | 94.90 |

The total entry for the examination was 1010

Statistics are correct at the time of publication.

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