

## Reports on the Units

---

**January 2010**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

© OCR 2010

Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

## CONTENTS

### Principal Learning

#### OCR Level 2 Principal Learning in Engineering H810

### REPORTS ON THE UNITS

<b>Unit/Content</b>	<b>Page</b>
Chief Examiner's Report	1
F548 The Engineered World	2
F549 Engineering Design	5
F550 Engineering Application of Computers	6
F551 Producing engineering solutions	8
F552 Design Challenge	10
F554 Maintenance	12
Grade Thresholds	14

# **Chief Examiner's Report**

## **Introduction:**

This is the second year of assessment for the Principal Learning units within the Diploma in Engineering. The opportunities for presenters to attend INSET, to use the excellent support materials provided and make their views known on the delivery and assessment of units has helped the development of many of the units within the scheme. All presenters are encouraged to attend one of a number of opportunities that are available for training.

Centres are to be congratulated on their efficient administration and prompt delivery of paperwork and compact discs. All centres submitted the Attendance Register, Centre Authentication Form CCS 160 and examination papers correctly filled in and on time.

There is evidence that some centres are becoming systematic in their approach to this diploma. With this systematic approach in mind centres should consider the learners' complete learning experience when designing learning programmes. This is particularly important in relation to learners studying part time alongside real work commitments where they may bring with them a wealth of experience that should be utilised to maximum effect by presenters.

With regard to the units that involved a viva-voce it was a pleasure to listen to and watch the oral solutions to the questions from learners who had demonstrated some understanding of the principles and techniques required for this type of novel assessment.

When there are a number of centres in a consortium it is essential that an internal standardisation system is implemented. This would ensure consistent assessment decisions and is a key to good practice. From a rank order point of view this internal standardisation is essential.

## F548 The Engineered World

### General Comments:

This unit was externally marked.

Every centre provided a separate room in which to conduct the viva-voce but in some cases there were minor disturbances caused by background noise but it did not appear to affect learner performance.

In future sessions, it would be useful to have a clear label with the centre number, candidate name and number printed on it visible to the camera.

Instruction 5.2 states 'The examination room - The learner and the presenter should be seated opposite each other across a table. The learner and presenter need ample table space to arrange their documents, but the learner should be close enough for a rapport to be established and for papers to be passed across the table without difficulty'. In a number of cases this did not happen.

Presenters were approachable and conducted the viva-voce in a friendly, relaxed, and flexible manner. In addition, they administered the viva-voce to an agreed standard which will have national validity and comparability. Learners treated the occasion with the thoroughness and seriousness it deserved.

The presenter may ask for further clarification if the learner's initial response is unclear, incomplete or inaccurate. Some prompting took place but in a number of cases more prompting could have been used to benefit the learner's response.

If time allows, it is advised that presenters return to questions that need more input. Not all presenters made use of this opportunity.

For the viva-voce, learners may take work into the preparation room and examination room that has been compiled for use during the viva-voce. The learner can refer to the work book but should not read out prepared material during the viva-voce. In a few cases reading from the work book did take place; this should be discouraged.

A number of learners spent a lot of time flicking forwards and backwards through their booklet. It is suggested that the use of labelled dividers would assist learners in finding information quickly and efficiently.

At the commencement of the viva-voce the presenter reads out to the learner that the viva-voce will last for 10 minutes. A warning will be given when there is two minutes of time left. In some cases this did not happen.

More attention needs to be paid to the labelling of files. In future each learners file must be named according to the following instructions:

**Centre number \_ Candidate number \_ Unit number \_ Series**

Centres are reminded that compact discs or digitally submitted evidence will not be returned. A copy of the evidence must be made and stored under secure conditions as a back up copy of the evidence until the results are published.

## **Individual Questions**

### **Question One**

- (a)** Please identify an engineering achievement that you have researched.
- (b)** Explain any economic effects which have resulted from this engineering achievement.

All learners correctly identified an engineering achievement that they had researched. Higher marks could have been obtained if learners had given a correct clear and logical example of the economic effects that had resulted from this chosen achievement. Weaker learners just identified an engineering achievement with virtually no comments about economic effects.

### **Question two**

Please tell me about any human issues which may have driven the development of the engineering achievement you have researched.

Most learners could not talk about the human issues that had driven the development of the engineering achievement that they had chosen. It is suggested that presenters and learners read the unit specification assessment criteria 1.4. This states "Identify and assess the social, human, economic and political issues that drove the achievement".

To obtain higher marks learners needed to include logical and relevant supporting evidence that demonstrated depth and breadth of knowledge regarding human issues.

### **Question three**

Please tell me what you have found out about a specific engineering professional body membership.

Weaker learners had shown little understanding of the membership merits of a professional body or its function. A popular response included information on 'Gas Safe'. In future years it would be appropriate if presenters and learners could consider the major professional body 'The Institution of Engineering Technology'. It is anticipated that a number of learners in a few years time will be seeking membership of such an organisation.

### **Question four**

- (a)** Now, please tell me which three engineering sectors you have studied.
- (b)** Describe the job role of a professional person.

All learners correctly identified a number of engineering sectors that they had studied. Higher marks could have been obtained by all learners if they had given a response that involved depth and breadth about a professional person including logical and relevant supporting evidence. It was obvious that the weaker learners did not explain the job role of a professional person when they started talking about craft person and technicians. Presenters and learners are urged to consider the difference between a craft person, a technician and a professional person.

**Question five**

Now, please choose a material that you have studied, and explain to me how engineering is important in conserving your chosen material.

This was a low scoring question. Not every learner chose a material that they had studied. The weaker learners did not understand the term conserving in the context of material conservation. Higher marks could have been obtained by learners if they had given a response that involved depth and breadth about conserving materials including logical and relevant supporting evidence.

**Question six (workplace scenario)**

A low scoring question. Most learners treated the question in two parts; they dealt with the responsibilities of the employee and the responsibilities of the employer as two separate responses. Few learners gave logical and relevant examples or made reference to the legal responsibilities of the employee and employer.

# F549 Engineering Design

## General Comments:

This unit was marked by centres and moderated by OCR.

All samples were well organised. A Unit Recording Sheet (URS) was completed for each candidate to a satisfactory standard giving some annotation but not page numbers for each Assessment Criteria. In most cases more annotation would have been useful.

When there are a number of centres in the consortium it is essential that an internal standardisation system is implemented. This would ensure consistent assessment decisions and is a key to good practice.

## Comments on Individual Questions

### Assessment Criteria 1

Most candidates selected a table lamp as their chosen product. In all cases, to obtain higher marks a more detailed description and a deeper analysis of the strengths and weaknesses of the lamp was needed. More information was needed regarding the key criteria used by the designers of the lamp.

The needs of the user were considered but more detail could have been provided on how the lamp was manufactured.

### Assessment Criteria 2

Much more detail was needed on standards and legislation for the lamp. Conclusions needed to be drawn on the implications of such standards. See the 'exemplification' column in the unit specification.

### Assessment Criteria 3

To obtain higher marks it is necessary to use the research on strengths and weaknesses of similar products to identify improvements for the chosen product. In all cases the justification of individual specification points was limited.

### Assessment Criteria 4

The range of techniques used in the design and development of the improvement was limited. The exemplification column in the unit specification lists 2D/3D modelling, orthographic, exploded views, pictorial drawings and digital images. Centres are encouraged to use this guidance.

### Assessment Criteria 5

More detail was needed when testing the design in the environment in which the lamp was to function. More evidence was needed regarding scientific, mathematical and material issues concerning the design. Learners needed to draw clear conclusions relating to their original criteria.

# **F550 Engineering Application of Computers**

## **General Comments:**

The work presented by learners was generally of a good to excellent standard and centres are to be congratulated on this.

All candidates chose a modern domestic product and used this chosen product throughout their report where appropriate.

The work in most examples was presented in tasks/chapters labelled both as a task and then sub-sections. This ensured that all assessment criteria were covered and work was not being credited twice.

Some of the work presented was sterile and textbook/internet sourced, however, some candidates linked their work to the 'real world' with visits and contact with outside agencies.

Centres are encouraged to include evidence of more interaction with maintenance engineers and retail outlets.

The marks awarded to the candidates in most cases reflected both their positive achievement and the deficiencies in their work.

With evidence of independent investigation more candidates were able to access the higher band of marks.

The use of video clips, simulation and interactive PowerPoint should be encouraged.

## **Individual Questions:**

### **Task 1 Use of Computers**

- Stock Control and Financial Control were covered to a good standard in most of the work.
- In some of the work more evidence was needed of candidates demonstrating how computers are used to design new parts and in maintenance.
- Some of the work was textbook/internet sourced and would benefit from visiting 'real time' situations.
- Textbook and internet sourced information was not always referenced. Information should be used and manipulated by learners to demonstrate a point they wish to make if it is to be given credit. Annotated screen shots are a good way of doing this.

### **Task 2 Simple Control Systems**

Some good work in this section with the majority of the students being able to simulate complicated control functions and showing a good understanding of computer control systems. It would be good practice if learners used a domestic product to simulate control functions.

### **Task 3 Simple Expert Systems**

Some of the candidates work could still benefit from the input from an expert such as a service engineer who could demonstrate in 'real time' how to data input, problem solve and interpret results to allow fault finding and maintenance.

Visits to a service centre such as a car dealership or domestic goods repair centre would be useful.

### **Task 4 Computer Communication Systems**

Some very good and thorough work demonstrated in this task. Most candidates were able to independently identify and explain computer-based communication systems.

A few learners showed that they had independently used and understood how to exchange data during the design and manufacture of a product.

Most learners need to develop their understanding of how to exchange data during the maintenance of the product.

# F551 Producing engineering solutions

## General Comments:

This unit was marked by centres and moderated by OCR.

All samples were well organised. A number of centres need to take more care when completing the Centre Authentication Form CCS 160, the mark sheet MS1 and the Unit Recording Sheet (URS). All relevant blocks must be completed. When a candidate is absent an 'A' must be recorded in the appropriate place.

At the beginning of the report it would have been appropriate to give some explanation as to what the engineering problem was and how it was going to be solved.

Detailed annotated photographic evidence was required to enable learners to access higher marks.

Witness statements must only be used to support detailed evidence provided by the learner and are not acceptable as the only source of evidence for a specific criterion. Any unendorsed witness statements will not be considered as evidence.

## Individual Questions:

### Assessment Criteria 1

Learners could have achieved higher marks by:

- (a) Giving more details on the production plan, such as tolerances and quality control measures
- (b) Explaining in detail about which component was a standard part and which was not
- (c) Giving precise information about processes
- (d) Demonstrating a greater understanding of health and safety issues

### Assessment Criteria 2

Without the use of photographic evidence it was difficult to find evidence that demonstrated skills in the production of a solution. Annotated photographic images should be used to provide evidence that a solution, fit for purpose, has been produced to a high level using accurate making skills.

### Assessment Criteria 3

Much more evidence was needed on how a review took place and how procedures were adapted in the light of this evidence.

**Assessment Criteria 4**

It is highly recommended that annotated photographic evidence is used to show how tools and equipment are being used in a safe manner. Likewise annotated photographic evidence can be used to show quality control checks being made.

## **F552 Design Challenge**

### **General Comments:**

All candidates were able to complete all sections of the Design Challenge within the time allowed and it was evident they found navigating through the workbook straightforward.

Presenters need to ensure that marks are being correctly entered into the mark boxes at the end of each task and are entered in ink.

From the work submitted, it was evident that learners had undertaken a number of activities to develop their knowledge and understanding of electronic and electrical systems prior to undertaking the Design Challenge: centres are to be congratulated on this.

Photographic evidence was adequate in most cases; however annotated photographs would be an advantage.

Based on the evidence of the prototypes and final solutions all centres were able to provide learners with access to a full range of components and equipment.

### **Individual Questions:**

#### **Assessment Criteria 1 – Electronic and electrical principles.**

In response to the 'Design Challenge' learners were able to apply their knowledge of electronic and electrical principles to propose possible Input, Control and Output components for the design of their circuit to varying degrees of sophistication.

Learners are reminded that they need to identify safe working procedures for tools, equipment and manufacturing processes. These should be appropriate to their selected proposed circuit. Most learners were able to describe generic safe working procedures but some failed to consider the needs of others and of giving specific details in their workbook.

#### **Assessment Criteria 2 – Operating principles.**

All learners were able to describe the properties of at least three components but a larger range is required to gain access to the higher band marks.

More able learners were able to justify their selection based upon their properties and to independently identify and select component values. Learners need to justify their selection of component values and component types.

Learners were able to produce an initial circuit diagram to varying levels of sophistication.

#### **Assessment Criteria 3 – Circuit Construction.**

It was encouraging to see learners using a range of prototyping techniques to develop their final solution.

It was evident that learners had access to a full range of circuit design hardware.

### *Report on the Units taken in January 2010*

Producing the PCB between tasks did not seem to cause any problems for centres.

Centres are reminded of the importance of taking good quality photographs throughout all the tasks.

Centres are reminded that learners can attach extra photographs in the back of the workbook. All learners were able to produce a working circuit of varying degrees of sophistication.

#### **Assessment Criteria 4 – Testing and fault finding.**

Learners used a range of test equipment with varying degrees of success.

Most learners were able to devise a simple test to confirm that their completed device was fit for purpose.

The use of complex calculations to predict circuit test data was lacking in the majority of learners' work. Few learners used their test results to identify circuit modifications and were able to use complex calculations to prove the use of alternative components.

The majority did not suggest circuit change based on their data findings.

## **F554 Maintenance**

### **General Comments:**

Most learners entered for this module chose to use the Model Assignment based on the maintenance of bicycles.

This choice gave the learners easy access to a product they were familiar with and one which allowed for them to undertake the task in their centre.

There were a variety of presentations with some on PowerPoint and others as a written report. Learners can choose their own product to maintain but this option was not taken up by any centres.

Centres are reminded that they can use more than one product for their learners to maintain, which could be useful where centres/consortia have wide ability ranges.

For example, some learners could maintain a child's single gear cycle and some could maintain a sophisticated mountain bike with multiple gears and suspension.

Not all learners chose a different product to examine for task two as required.

Some centres found it difficult to find suitable data for their learners to use in task two. To overcome this they devised their own product data for their learners to use which is quite acceptable.

### **Comments on Individual Questions**

#### **Assessment Criteria 1 – Maintenance Procedures.**

Few learners were able to independently select information from manufacturers and prioritise what was needed.

Learners must undertake complex routine maintenance procedures such as on bearings, cranks and gear systems to gain marks in the higher band.

Annotated photographs and a written statement is essential evidence to show learners using tools and equipment safely.

There should be clear evidence of learners using appropriate tools and equipment effectively. Annotated photographic evidence again is a good way of showing this.

The majority of learners chose to produce a maintenance manual as evidence of how they devised procedures for an engineered product. This proved a very effective method of demonstrating this requirement.

An area that should be addressed by learners is the requirement to modify and re-test where necessary.

**Assessment Criteria 2 – Nature of Failure.**

Centres are still finding it difficult to identify a suitable product to use to investigate the nature of failure that is different from that selected for Task 1. In some cases this requirement was ignored which is against guidelines and those learners concerned were penalised.

This was overcome by some learners choosing a product from the automotive field which is a logical step from cycles. This was quite acceptable.

Most learners were able to give detailed information on the nature of failure and what caused it. However to gain marks in the higher band they also needed to consider both the implications and impact of this on both the user and manufacturer.

**Assessment Criteria 3 – Failure Trends.**

Some centres found it difficult to access suitable data for their learners in order to analyse failure trends. To overcome this centres devised their own data for learners to use.

Motor and plant manufacturers could be a good source of this information.

The use of graphs and charts would be an appropriate method of presenting this information rather than in written report form, a method chosen by most learners.

Few learners went on to include a planned maintenance schedule in their findings.

# Grade Thresholds

OCR Level 2 Principal Learning in Engineering H810  
January 2010 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	U
F548	Raw	60	48	36	24	12	0
	Points	10	8	6	4	2	0
F549	Raw	60	48	36	24	12	0
	Points	10	8	6	4	2	0
F550	Raw	60	48	36	24	12	0
	Points	10	8	6	4	2	0
F551	Raw	60	48	36	24	12	0
	Points	10	8	6	4	2	0
F552	Raw	30	24	18	12	6	0
	Points	5	4	3	2	1	0
F554	Raw	30	24	18	12	6	0
	Points	5	4	3	2	1	0

## Specification Aggregation Results

No learners aggregated this series. Aggregation is not available for this specification until June 2010.

For additional guidance on the points awarding system, please refer to the Admin Guide for Diplomas at:

<http://www.ocr.org.uk/administration/documents.html?section=general>

Statistics are correct at the time of publication.

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**14 – 19 Qualifications (General)**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity



**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553