

## OCR Report to Centres

---

**June 2013**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, 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 2013

## CONTENTS

### Principal Learning

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

### OCR REPORT TO CENTRES

#### Contents

Overview	1
F548 The engineered world	2
F549 Engineering design	5
F550 Engineering application of computers	7
F551 Producing engineering solutions	9
F552 Construct electronic and electrical systems	11
F553 Manufacturing engineering	13
F554 Maintenance	15
F555 Innovation, enterprise and technological advance	16

## Overview

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

With moderated Units, Centres are reminded that it is essential that the Controlled Assessment Summary Form is accurately completed.

There is evidence that some centres are becoming too systematic in their approach to this qualification. 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 alongside real work commitments where they may bring with them a wealth of experience that could be utilised to maximum effect by presenters.

For most moderated units it is recommended that for some learners they might find it useful to divide their folders into sections that follow the assessment criteria. Detailed information can be found in the specification for each section. It also ensures that all sections are covered. In addition, the use of a treasurer tag is recommended.

A number of folders for various moderated units followed the same type of presentation with a similar use of some material. In general terms, centres should be empowering learners to take charge of their own learning and development.

In some cases, with moderated units, learners need to be shown how to interpret more carefully the evidence requirements for each mark band and presenters are reminded that progression across the bands is characterised by (i) increasing breadth and depth of understanding (ii) increasing coherence, evaluation and analysis (iii) increasing independence and originality.

When a disc is being submitted 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.

## F548 The engineered world

It was a pleasure to listen to and watch some well presented and clearly presented responses to the questions from learners who had clearly developed a sound understanding of the principles and techniques required for this novel type of assessment.

The following points need to be considered:

- In the information for presenters it clearly states that the digital video recorder in use must be able to store at least fifteen minutes of recording. The presenter must ensure that learners have access to all of the available time, even if the questions are repeated with appropriate prompts.
- When more than one presenter is being used to conduct the viva-voce, it is essential that internal standardisation takes place. • A number of centres did not provide a quiet enough room in which to conduct the viva-voce. There were instances of background noise on some recordings which meant that it was difficult to hear what the learner was saying. It is strongly recommended that a trial recording is undertaken prior to the first viva-voce and it is checked for quality and any necessary action taken.
- Centres are reminded that when a camera is in operation all other devices eg. mobile phones should be switched off and well away from the microphone. There have been instances where such devices have caused interference on the recording.
- In the notes for presenters it states "The profiles of the learner and presenter must be clearly visible on camera". In a number of cases this did not happen.
- The presenter may ask for further clarification if the learner's initial response to a question is ambiguous, incomplete or too inaccurate.
- If a learner is answering a question but the focus is wrong, a presenter is allowed to restate the question to guide the learner back towards the focus of the question. The presenter must not lead the learner but can refocus the answer and emphasise elements that are missing.
- The presenter must read out the exact question and not change any of the words or meanings because there must be consistency for every learner.
- For the viva-voce, learners may take into the preparation and examination rooms, a work book that has been compiled for use during the viva-voce. The learner can refer to the work book but must not be allowed to read out prepared material during the viva-voce. • A number of learners spent a lot of time flicking through their workbook. It is suggested that a contents page with page numbers is placed at the front of their booklet. This should assist learners in finding information that they want to use.
- In future it would be useful to the markers if all centres could have in view, for each learner, a card with their centre number, candidate number and name printed on it.
- Presenters are reminded that during the recording of the viva-voce it is in order for them to go back over questions. If there is time available, this opportunity should be offered to all learners.
- In question six, the workplace scenario, the question states 'Finally, I am going to give you a workplace scenario'. The presenter is then instructed to hand to the learner a printed copy of the scenario and read it out. In a number of cases the scenario was not handed out.
- There is a maximum of 15 minutes for the viva-voce. The presenter and/or invigilator are instructed to let the learner know when there are 2 minutes left. In a number of cases the presenter did not follow this instruction.
- 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.
- In addition, an indication of the contents of the CD/DVD must be written on the disc itself, self-adhesive notes are not sufficient for this purpose.

- 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 backup copy of the evidence until the results are published.

### **Question 1**

- (a) Please tell me about an engineering achievement that you have researched.  
(b) Explain how people's lives have changed as a result of this engineering achievement.

All learners correctly identified an engineering achievement that they had researched. A number of learners wasted their time by giving times and dates of achievements which had no bearing on the answer to this part of the question. Learners included several correct clear and logical examples of how people's lives have changed as a result of this engineering achievement. High quality responses included comments about human, social, economic and political changes in their lives.

Learners should be encouraged during the study stage of the course, to select an engineering achievement that gives adequate scope for discussion in the viva-voce.

During the delivery of this unit, an appreciation of the typical questions should be included in the selection of an engineering achievement. Several inappropriate achievements were chosen making the answering of the questions very difficult.

### **Question 2**

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

The majority of learners could not talk in depth about any issues which may have driven the development of the engineering achievement they had chosen. The issues that could have been considered might involve human, social, economic and political ones. It seemed that a number of learners did not appreciate that some economic issues means issues that involve finance. It is suggested that centre's read the unit specification assessment criteria 1.4. This state's "Identify and assess the social, human, economic and political issues that drove the achievement".

To obtain high marks the learner needed to include logical and relevant supporting evidence that demonstrated depth and breadth of knowledge regarding issues.

It is suggested that the range of social, economic, political and human issues are considered when selecting engineering achievements and that learners are encouraged to study achievements where these issues can be demonstrated.

### **Question 3**

Please tell me what you have found out about an engineering professional body, for example, The Institution of Engineering and Technology (IET).

Most learners correctly identified a specific engineering professional body. A number of learners gave an in depth explanation of the purpose and function of an engineering professional body. It should be noted that an abundance of information is either available on the internet or directly from the organisations themselves.

In a number of cases the learner identified a person rather than a professional body. It is permitted to correct this assumption as long as the correction does not give an answer. So for example a prompt of 'you need to tell me about an engineering professional body not a person' would be in order.

It must be made clear to learners the difference between an engineering professional body and an engineering registration scheme.

#### **Question 4**

Describe the job role and responsibilities of a professional person within any engineering sector you have studied.

Most learners correctly identified an engineering sector they had studied. The good learners gave a detailed explanation about the job role of a professional person. There is still some confusion about the job role of a professional person as compared to the job role of a craft person or technical person. Learners are advised to concentrate on the tasks, qualifications, progression routes and responsibilities of a professional person rather than wider issues such as salary and holiday entitlement.

#### **Question 5**

Please explain, giving examples, how the engineering industry has improved the way materials are conserved.

Most learners gave an adequate explanation of how the engineering industry has improved the way materials are conserved. A number of learners included some examples of material conservation, such as, reduce the quantity used, recycle, reuse where possible, refuse - the consumer has the choice as to whether they buy materials or not, rethink the way in which materials are being used and repair where possible rather than discard.

High marks were awarded to learners who gave a response in breadth and depth and included logical and relevant supporting examples.

A number of students considered how fossil fuels could be conserved by the use of solar, wind, tidal and nuclear options. For cars, it was stated that hydrogen is an alternative as a suitable energy storage mechanism in the medium term together with batteries or hybrids.

#### **Question 6**

What can you tell Brian about his responsibilities as an employee using machines and the responsibilities of his employer.

Many responses included some or all of the following points:

Employers and employees have responsibilities to each other, they should also expect their rights to be upheld. These rights and responsibilities relate to areas such as Health and Safety, supervision and the provision of training.

The Health and Safety at Work Acts set out responsibilities and rights for both employees and employers. Employees are expected to carry out their work in a way that has regard to the safety of others.

Employers are expected to abide by a range of requirements governing such aspects as providing safe machinery and equipment, carrying out regular health and safety checks, ensuring the training of employees in health and safety issues, and carrying out a risk assessment to assess the dangers of particular work activities. There are also specific regulations about the way in which potentially harmful substances should be used and stored. There are a number of requirements about the minimum temperature at work, and other aspects of working conditions.

In this work place scenario, some learners proceeded to discuss everything they knew about work place rights and responsibilities and therefore gave a lot of irrelevant information. Answers should be closely linked to the scenario i.e. Brian operating different types of machinery. For example, pay, holidays, paternity and maternity rights are not relevant to this scenario, but were often quoted.

Presenters and learners are encouraged to look at the reference [www.direct.gov.uk](http://www.direct.gov.uk)

# F549 Engineering design

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- More care needs to be taken when the Unit Recording Sheet is filled in. Some centres' need to provide more teacher comments in the panel provided. The specification states that all work must be annotated – in some cases nothing could be found that satisfied this condition.
- Most learners presented work in a neat and tidy fashion but the use of a contents list with page numbers is to be encouraged.
- It was encouraging to see learners presenting their work in clearly defined chapters/sections relating to assessment criteria.
- It is important that the model assignments chosen by learners should allow for easy access to both disassemble and compare strengths and weaknesses of the chosen product.
- It was encouraging to see that learners are no longer choosing to design a new product but to improve the function of a chosen product. As the assessment criteria clearly states learners should identify a possible improvement of the studied product.
- Choosing the more functional aspects of a product to study allowed learners to investigate mechanisms, electrical/electronic circuits and/or structures. This gives learners access to a much wider range of possible communication and modelling techniques such as circuit diagrams, flow diagrams, overlays, 2D/3D mechanical models and structural diagrams/models. It was encouraging to see learners presenting their work in clearly defined chapters/sections relating to assessment criteria.

## Assessment Criteria 1

It would be helpful if learners presented their key criteria in sections i.e. needs of the user, needs of the manufacturer, fitness for purpose.

It is important that learners disassemble their chosen product in real time and support this with image evidence.

It is important that learners describe in detail the manufacturing processes involved in making their chosen product, without this they cannot access the higher mark band.

Strengths and weaknesses comparison of similar products was not evident in much of the work and where it was more detail and products for comparison was needed.

A useful method of presenting analysis of strengths and weaknesses of a product and comparison to a range of similar products is in a chart.

Areas such as aesthetics, ergonomics, safety, materials, fitness for purpose, sustainability should be considered.

Meaningful and objective conclusions must be drawn from this comparison if the higher mark band is to be accessed.

## Assessment Criteria 2

Many learners only listed generic requirements of legislation and did not relate these to their chosen product. Images of labels showing CE and Kite Marks were as far as many learners went in showing an understanding of legislation.

To access the higher mark band learners must show a detailed understanding of the implications of the standards relevant to their selected product.

It would be useful if the chosen product was disassembled into its component form and standards and legislation addressed to all of these.

From this understanding learners should draw conclusions as to the implications for their chosen product. This could include reference to the risk from burning, earth points, toxic materials, pinch points and sustainability.

### **Assessment Criteria 3**

Most design briefs were very simplistic and general in nature. Design briefs should relate to an improvement which learners have identified in their disassembly of the product. From the design brief the specifications needed detailed with reasoned justification to access the higher mark band. A number of specifications were too generic and lacked meaningful justification.

### **Assessment Criteria 4**

To access the higher level mark band learners should independently select the most appropriate communication techniques for all aspects of their work. This could take the form of word processing to sketching, a chart of techniques giving uses and advantages and a range of CAD drawings.

Many learners showed a lack of ability in basic traditional drawing skills.

A wide range of presentation styles and techniques should include sketching, orthographic projections, isometric projections, exploded views, circuit diagrams, CAD and 2D/3D modelling. Modelling would be a good way of demonstrating structural issues and mechanisms.

In many cases drawings lacked clarity and accuracy which is essential for learners to gain the higher band marks.

Detailed annotation referring to the specification was not evident in some of the work.

### **Assessment Criteria 5**

Tests should be done in real time with image evidence supporting this.

Questionnaires and subjective surveys do not give learners the opportunity to do scientific tests and mathematical analysis. This denies them access to the higher level mark band.

Learners could use some of the tests outlined in Unit 545 Introduction to engineering materials. Few learners produced clear meaningful conclusions from their test results.

# F550 Engineering application of computers

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- Presenters and learners are reminded that an expert system is a computer program that contains some of the subject-specific knowledge of one or more human experts. The most common form of expert system is a program made up of a set of rules that analyse information about a specific class of problems, as well as providing mathematical analysis of the problems.
- Learners should be able to recommend a course of user action in order to implement corrections.
- Learners should also understand, why embedded systems are used in modern domestic products, how computer systems are used in maintenance operations and, have a knowledge and understanding of the way computer-based communication systems are used to exchange data.
- Problems involving expert and control systems should be presented in real-life contexts with an emphasis on the application rather than systems theory.
- It is recommended that learners set out their report in assessment criteria order to assist in marking and moderating the work. These could be presented in Assessment Criteria "chapter" form. This would avoid the work being credited twice.

## Assessment Criteria 1

Learners must show how they independently investigated and thoroughly examined a modern domestic product to gain marks in the higher band. The chosen product must contain an embedded computer control system.

Learners must also have demonstrated a thorough understanding of how computers are used in a work setting to design new parts, for production, for process control and for stock control, finance control and maintenance. These could be evidenced by screen shots, images and annotated control sheets.

## Assessment Criteria 2

Learners must show that they have developed a thorough understanding of simple computer control systems by providing evidence. Learners must show how they simulated complex control functions of the chosen modern domestic product to gain marks in the higher band.

Evidence for this could be with screen shots, running simulation software, modelling circuits/and or systems and images.

## Assessment Criteria 3

Learners must show that they understand what is meant by the term 'expert system'. Learners must demonstrate that they can input data into an expert system which can be evidenced by screen shots and print outs. Learners must also show how they selected suitable parameters for problem solving.

Learners should show how they interpreted results and used them to modify engineering features.

A deeper explanation was needed from learners when explaining how and why computers were used in the maintenance operations of their chosen domestic product.

**Assessment Criteria 4**

To gain marks in the higher band learners needed to demonstrate that they had independently identified and explained the use of computer-based communication systems used to exchange data during the design and manufacturing and maintenance of their chosen modern domestic product.

This can be evidenced by showing the use of a laptop computer to access and communicate information, personal digital assistants to record digital images, annotations and dialogue in real time, third generation mobile phones to record information in real time and downloading and transferring information from communications devices in a form that is usable and accessible for engineering reports and portfolios.

# F551 Producing engineering solutions

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- The purpose of this unit is to allow learners the opportunity to have the experience of producing practical solutions to simple engineering problems.
- The unit requires the learners to produce a comprehensive plan for the manufacture of an engineering solution from a set of engineering drawings and instructions which are provided by the centre. These must be detailed enough to allow the learners to work unaided.
- The chosen engineered product should include several components to allow the learners to demonstrate a range of engineering skills and processes.
- A product consisting of just two components and one material would not be suitable. Despite this advice being highlighted in previous reports some centres are disadvantaging their learners by allowing them to manufacture a simple one component product.
- Learners must independently select suitable; materials, manufactured parts, components, tools, equipment and processes. This must be evidenced for learners to be awarded marks. Witness statements are not an acceptable form of evidence.
- The learners must independently make a quality engineered solution using their own plan in a safe, effective and efficient manner.
- During production they will need to review their progress, adapt to circumstances as they change and undertake appropriate quality checks and these must be justified to gain marks in the higher band.
- Learners must be aware that these activities should be carried out in the context of production, maintenance, installation and commissioning.
- A diary of progress supported by image evidence is an appropriate method of collecting evidence.

## Assessment Criteria 1

Learners must produce a detailed plan for making, installing, commissioning and maintaining the selected product from the given engineering drawing and set of instructions.

In many cases commissioning and maintenance was not evident in the work.

Learners must also include details of how they selected suitable materials and how they used standard components and processes.

In much of the work more detail of how and why materials were selected was needed. This should include a reference to characteristics and properties. A list of generic properties for a range of materials that may or may not be suitable will not allow learners to access the higher mark bands.

Evidence must be provided by learners that relate to health and safety issues, including a risk assessment of procedures for processing the materials and components. Many learners considered their production plan alongside risk assessment and health and safety issues which proved a successful way of achieving this.

## Assessment Criteria 2

Learners need to produce a high-quality and accurate outcome that is detailed enough to allow them to demonstrate their use of a range of production and process skills.

Learners must produce a detailed record of their progress during making, showing how they adapted ideas as circumstances changed. This could be done using real time image evidence together with a diary of progress.

There must be evidence of any alterations to the production plan to gain marks in the higher band.

Annotated images are an appropriate method of providing evidence of the outcome which should include close-ups of individual components.

Learners must also produce evidence to show how they checked the performance of their risk assessment and make any necessary modifications.

### **Assessment Criteria 3**

Learners must produce evidence that they used quality control checks in the making, installation, commissioning and maintenance of their product.

Again in much of the work there was little evidence of this being done in regards to installation, commissioning and maintenance.

There must be evidence of quality control checks throughout the production of the product.

Learners should be encouraged to use a range of quality control checks. There was little evidence in much of the work of jigs and formers being used. There must also be evidence of a review of progress with changes made. This is best done with real time images evidence together with a diary of progress.

Witness statements are not an acceptable method of evidencing this.

There was little evidence of learners testing their outcomes in a "real" situation. This is an important part of product quality control and evaluation.

# F552 Construct electronic and electrical systems

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- The workbook format continues to help learners structure their ideas in a more logical way.
- Learners must use only the pages in the workbook to present their work with space provided at the back of the workbook for additional images and extra supporting material.
- It was evident that learners were able to complete all sections of the Design Challenge within the time allowed.
- Centres are reminded that they need to enter the mark in the boxes at the end of each task. These marks must be entered in ink not pencil. Some centres are failing to comply with this requirement.
- From the work submitted it was evident that learners had undertaken a number of teaching and learning 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.
- Image evidence varied in quality. Centres must ensure that the images are clear enough for all the detail in the circuits to be seen and that they are securely glued into the workbooks.
- Annotating their image evidence would allow learners to gain access to the full mark range. There was little or no annotation in some of the work presented.
- 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.

## Assessment Criteria 1

In response to the Design Challenge all 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 should be reminded that they need to identify safe working procedures for tools, equipment and manufacturing processes; these should be appropriate to their selected proposed circuit and the design room or workshop used.

Most learners were able to describe generic safe working procedures but to gain marks in the higher band also needed to consider the needs of others and give specific details of this in their workbook.

## Assessment Criteria 2

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

It is important that learners justify their selection based upon component properties, principles and values if they are gain marks in the higher band.

They also need to justify their selection of component values and component types.

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

## Assessment Criteria 3

It was disappointing to see some learners only using CAD prototyping systems to develop their final solution. It is clearly stated in the workbook that at least two different prototyping systems are required.

It was evident that centres supplied their learners with a full range of tools, components and equipment to allow them successfully to complete this task.

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

Centres are reminded of the importance of taking good quality images throughout both these tasks. This is important as it allows for accurate assessment of the learners work. Learners are permitted to glue extra images to support these tasks at the back of the workbook.

#### **Assessment Criteria 4**

Most learners were able to devise simple tests to confirm correct operation of their device. This often involved physically testing the device in a test rig to see how it performed. Whilst this is an important part of testing their device they also need to use test equipment to verify the performance of different parts of their circuit. It was also evident that some learners were not familiar with electronic bench testing methods.

Learner's performance would have been improved if they had used calculations to predict circuit test data and the possible use of alternative components. Learners should be guided to use their test results to identify circuit modifications.

## F553 Manufacturing engineering

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- It is anticipated that learners will have undertaken directed activity with a degree of autonomy to achieve their outcomes and accept responsibility in a team context. This was not evident in some of the learners work.
- The use of screen shots would have been useful where CAD and CAM was used. These could have been developed with detailed supporting notes and annotation.
- The use of annotated real time image evidence could be used in providing evidence in all of the assessment criteria.

### Assessment Criteria 1.1

Some learners did not present enough evidence of how they had made a significant contribution to the detailed plan of manufacture of the product. The implication of this was that they could not achieve marks in the top band.

Learners needed to explain, in depth, how they had made a significant contribution to a detailed plan of manufacture.

This should include:

- all preparation, processing and assembly stages
- the sequence and timing of stages
- critical production and quality control points
- production and quality control procedures
- allocation of roles and responsibilities

Learners should have also provided some evidence of how they suggested additional and alternative methods of manufacture based on their own knowledge and experience.

This was not evident in some of the work. Some of the learners used the same descriptions, flow charts and images in their work as others which then did not allow access to the higher mark band.

### Assessment Criteria 1.2

Some learners did not evidence how they as individuals had been instrumental in ensuring the success of the team.

Some learners needed to show how they co-operated with others in reaching agreement in order to achieve the desired outcome. There must be unique evidence of learner's individual contribution to the planning process. There was little evidence of justification of the chosen processes and of alternative processes in much of the work. This is essential for learners to gain marks in the higher band.

This should include evidence of:

- allocating roles and responsibilities, based on the strengths and weaknesses of each team member
- setting and agreeing individual and team targets
- ensuring good communication between team members
- ensuring that team members were motivated
- creating an appropriate working environment
- considering health and safety issues in relation to the practical activities to be undertaken

The evidence could include minutes of meetings, a diary of events, written notes and a video of team meetings.

Witness statements are not acceptable.

### **Assessment Criteria 2.1**

Learners needed to design, describe, select and use quality control checks for the manufacture of the component. They also needed to show how they used actual and statistical testing methods. This was not evident in much of the work.

To gain marks in the higher band learners needed to describe, in depth, how they:

- selected and used six different quality checks for the product that was manufactured with a CNC machine
- inspected and compared samples of the product materials at the critical control points specified in the plan
- had used fully detailed appropriate quality control checks using actual and statistical testing methods
- produced a detailed justification of alternative methods using the gathered statistical data.

### **Assessment Criteria 3.1/2/4/5**

Learners needed to fully explain procedures and detailed sequences of setting up a complex machining operation. There was not enough detail in some of the work.

To gain marks in the higher band learners needed to explain, in depth, how they:

- step by step, programmed and set up the CNC machining operation.
- reviewed the machining process on screen and how they acted on the outcomes
- manufactured five identical components.
- planned a safe procedure and confidently employed that procedure.
- produced a detailed set of instructions for a third party to undertake the same operations

It would have been beneficial if some of the above had been supported by annotated screen shots.

There was little evidence in some of the work that five identical components had been produced.

### **Assessment Criteria 2.1 and 3.3**

Some learners at best produced a set of limited data with only a basic analysis of the quality tests undertaken.

To gain marks in the higher band learners needed to produce a detailed report on the data findings of the quality tests. They also needed to show how they interpreted the data in order to analyse the performance of the machining operations they undertook.

## F554 Maintenance

The unit was marked by centres and moderated by OCR

Most learners chose to use the Model Assignment based on the maintenance of bicycles.

One centre chose an automotive engine for the assignment.

The choice of a bicycle gave the learners easy access to a product that they were familiar with. It also allowed the tasks to be undertaken in the centre workshop.

The centre that chose the automotive engine had access to industry standard facilities.

The following points need to be considered:

- Learners must undertake their maintenance tasks independently.
- Centres are reminded that they can use more than one product for their learners to maintain, which could be useful where centres have a wide range of abilities.
- For example some learners could maintain a child's single speed bicycle and some could maintain a sophisticated mountain bike with multiple gears and suspension.
- In some cases the nature of failure and failure trends was very centre lead which did not allow learners to work independently and gain access to the higher mark band.

### Assessment Criteria 1

To gain marks in the higher band learners must independently select information from manufacturers and prioritise what is needed.

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

There should be evidence of learners using tools and equipment safely; the most effective way of achieving this is with annotated real time image evidence and not a witness statement.

It is important that learners do not complete this task as part of a team. It must be undertaken independently

Some learners chose to produce a maintenance manual and others a flow diagram as evidence of how they devised procedures for an engineered product. This proved a very effective method of demonstrating this requirement.

Many learners failed to address the requirement to modify and re-test where necessary.

### Assessment Criteria 2

It is a requirement for learners to choose a different product from the same company to study for this assessment criteria. It was evident that some centres failed to adhere to this requirement allowing learners to use the same product.

Some learners referred to a robot arm that could have been used in the manufacture of the product.. Other learners used data generated by the centre, both of which are acceptable.

Most learners were able to give detailed information on the nature and cause of failure.

However, to gain marks in the higher band they also need to consider the implications and impact of this on both user and manufacturer.

### Assessment Criteria 3

Some centres found it difficult to access suitable data for their learners to use when analysing failure trends. To overcome this problem centres devised their own statistics and data for learners to use; this was quite acceptable.

One centre used motor and plant manufacturers as a source for this information which proved successful.

Some learners chose to present their findings as a simple statement. Some used graphs and charts; this proved a very effective method of presenting this information.

Only a few learners went on to include a planned maintenance schedule in their report for the associated engineered product or system.

# **F555 Innovation, enterprise and technological advance**

The unit was marked by centres and moderated by OCR.

The following points need to be considered:

- Assessment of this unit requires that learners experience real events and work alongside people in a 'sector' context.
- Learners need access to specialist equipment to allow them to demonstrate their skills and to apply their knowledge. This was not evident in much of the work presented.
- Learners are required to complete this research assignment based on a chosen product. It is important that care is taken in choosing this product to allow learners full access to all the requirements for assessment.
- Learners should record all their research, findings, observations, analysis and individual conclusions in a workbook. It is important that learners have the workbook available for the duration of the unit as they are permitted to return to and add information to earlier sections in the light of any new discoveries.
- During their research and investigations the use of images, sketches, drawings and other presentation methods should be encouraged.
- It was evident that in some cases the work was undertaken as a classroom internet research exercise and the opportunity for real time sector experience was denied to the learners.

## **Assessment Criteria 1**

It was encouraging to see that learners used a wide range of information sources to investigate their chosen product with regard to innovation and creativity. To gain marks in the higher band they must also fully justify their use of information. It is also important that learners acknowledge reference sources.

## **Assessment Criteria 2**

Learners must use a wide range of sources of information to investigate the chosen product with regard to the protection of the design. Too many of these sources were generic in nature and did not relate directly to the chosen product.

To gain marks in the higher band they must relate to the chosen product and fully justify their use of this information.

The report must also detail how protection of the product has been achieved and what this means in real terms, e.g. illegal downloads, costs.

Details of these costs both in implementation and ongoing protection should be included. The implications of these must be considered to gain marks in the higher band.

## **Assessment Criteria 3**

Learners must outline research activities and developmental work in detail. To gain marks in the higher band they must fully justify the financial decisions which have been made in relation to the product. They must also refer to specific details of the research, development and securing of finance when developing new products. It is important that learners use and reference the sources of information obtained in Assessment Criteria 1 for this.

In some of the work presented it was clear that some learners had presented downloads with no attempt to analyse the information. This approach is of little value for assessment.

#### **Assessment Criteria 4**

It was encouraging to see learners disassembling their chosen product to allow them access to the various materials and components used in its manufacture and to allow them to identify processes.

Most learners explained and justified materials and processes used in their chosen product but much more detail should be provided when learners are considering the use of alternative materials and processes. The consideration of the implications of environmental and sustainability issues should be encouraged.

It is important that learners explain and evaluate the cause and effects of engineering technologies in the home, the workplace and the built environment.

#### **Assessment Criteria 5**

Most learners were able to explain the environmental and social impacts of engineering and the importance of the sustainability of resources.

To gain marks in the higher band all explanations must relate to the chosen product i.e. processes, materials, parts, components.

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

**OCR Customer Contact Centre**

**Education and Learning**

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**

© OCR 2013

