RECOGNISING ACHIEVEMENT

Principal Learning

Engineering

OCR Level 2 Principal Learning **H810**

Examiners' Reports

June 2011

H810/R/11

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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Principal Learning

OCR Level 2 Principal Learning in Engineering (H810)

EXAMINERS' REPORTS

Chief Examiner's Report

General Introduction

This is the third year of assessment, with this being the fifth award for the Principal Learning units within the Diploma in Engineering. Here are eight units at level two and all have now been assessed.

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. Most 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.

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.

Unit 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 type of novel 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. In some cases, the presenter needs to ensure that the time is made available to learners for repeating questions with appropriate prompts.
- When one or more centre staff is being used to conduct the viva-voce it is essential that internal standardisation takes place so the experience for the learners is constant.
- A number of centres did not provide a quiet enough room in which to conduct the viva-voce.
- At one centre there was a lot of background noise on some recordings which meant that it was difficult to hear what the learner was saying. It is strongly recommended that after the first learners recording it is checked for quality and any necessary action taken.
- In the information for presenters it clearly states that the profiles of the learner and presenter must be clearly visible on camera.
- The presenter may ask for further clarification if the learner's initial utterance is ambiguous, incomplete or too inaccurate. However prompts that include statements that gave the learner clues to enable them to answer a question correctly is not permitted.
- The presenter must be careful that they do not give too much support when prompting. Being over enthusiastic can lead presenters to giving the answers to questions. The point is made again that It is important for presenters to watch other presenters so that consistency, reliability and validity is maintained.
- For the viva-voce learners may take into the preparation room and examination room 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 in order to answer a question.
- 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 and if the learner requests it.
- Part of question six 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 is 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 it-self, 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 back-up copy of the evidence until the results are published.

Question One

(a) Please identify an engineering achievement that you have researched.

(b) Explain any economic effects that have resulted from 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 the economic effects that had resulted from this chosen achievement others gave a limited explanation of a single economic effect.

During the delivery of this module, 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 Two

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

A number of learners could not talk about the social issues that had driven the development of the engineering achievement that they had chosen. It seemed that a number of learners did not appreciate that social issues means issues that involve people. 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 social 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 Three

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

Virtually all learners correctly identified a specific engineering professional body. Most learners gave an adequate explanation of the work it does and some merits of professional body membership with at least one relevant example. Learners are encouraged to consider the major institution in the UK which is the Institution of Engineering and Technology (IET). Learners can access a range of knowledge, services, events, profession support, news, views and topics from five sectors e.g. Built Environment, Design & Production, Energy, Information & Communications and Transport.

In a number of cases the learner identified a person rather than an organisation. 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 organisation not a person' would be in order.

Question Four

(a) Now, please tell me the two engineering sectors you have studied.

(b) Describe the job of a technical person within one of these engineering sectors.

Most learners correctly identified two engineering sectors they had studied. High marks were awarded to learners that gave a detailed explanation about the job role of a technical person. Learners are advised to concentrate on the tasks, qualifications, progression routes and responsibilities of a technical person rather than wider issues such as salary and holiday entitlement.

Question Five

(a) (i) Name the area with the most total incidents.

(a) (ii) What causes this area to have the most polluted incidents?

All learners correctly named the Midlands as the area with the most total incidents.

High marks were awarded to learners that gave a detailed response, which included reference to heavily populated industry, power stations, overuse of transport and a large population, all of which cause pollution in one form or another. Low marks were awarded when learners did not know very much about what caused the Midlands to have the most polluted incidents.

Question Six

What can you tell Derek about his responsibilities as a young person using chemicals and the responsibilities of his employer?

The good learners received marks for a detailed explanation of the responsibilities of a young person using chemicals. Other learners gave a basic answer which did not make reference to Derek seeking a further interview with the employer, visiting a Citizens Advice Bureau or similar organisation for advice or any reference to trade union support or seeking advice from an employment tribunal.

Good answers referred to employers carrying out a range of requirements governing such aspects as

(a) checking whether or not Derek could work with chemicals at the age of 16

(b) the training of Derek in all aspects of the job including health and safety issues

(c) providing safe machinery and equipment

(d) carrying out regular health and safety checks

(e) carrying out a risk assessment to assess the dangers of particular work activities

(f) checking and enforcing regulations about the way in which potentially harmful substances should be used and stored

(g) minimum temperature regulations in the workplace when dealing with chemicals

Presenters are encouraged to look at the reference www.direct.gov.uk

Unit 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.
- Most learners presented work in a neat and tidy fashion but the use of a contents list with page numbers is to be encouraged.
- A number of folders followed the same type of presentation with a similar use of some material. In general terms, the centre should be empowering learners to take charge of their own learning and development. There is scope within the tasks for centres/learners to chose their own product and devise their own design brief.
- It was encouraging to see learners presenting their work in clearly defined chapters/sections relating to assessment criteria.
- The model assignments chosen by the learners allowed for easy access to both disassemble and compare strengths and weaknesses.
- Developing their own design brief gave centres/learners the ability to tailor schemes of work to their particular resources and abilities.
- It was encouraging to see most learners choosing to improve the function rather than just the aesthetics of the chosen product.
- Choosing the more functional aspects of a product to study, allowed learners to investigate mechanisms, electrical/electronic circuits and/or structures. This gave 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.

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 Learners need to disassemble their chosen product in real time and support this with photographic evidence.

A number of learners need to describe, in detail, the manufacturing processes involved in making their chosen product, without this they cannot access the higher mark band.

In a number of cases more detail was needed when comparing the strengths and weaknesses of similar products. When making comparisons the use of a chart is often helpful. The comparison chart could consider aesthetics, ergonomics, safety, materials, fitness for purpose, sustainability.

Assessment Criteria 2

Most learners gave a limited response to legislation stating only the more obvious issues. Photographs 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. 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 and pinch points.

Assessment Criteria 3

Some design briefs were very simplistic with learners making statements such as "I am going to improve the lamp shade" and "I am going to add a component".

Design briefs should relate to an improvement which learners have identified in their disassembly of the product.

Specifications needed detailed and reasoned justification to access the higher mark band. Many 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. There must be evidence of this in their work and this could take the form of a chart of techniques giving uses and advantages.

A range of communication techniques was lacking in some learners work. For example the desk lamp chosen by many learners allows for circuit diagrams, exploded views as well as the more standard orthographic communication technique.

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.

Assessment Criteria 5

It is desirable that testing should be done in real time with photographic 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.

Unit F550 Engineering application of computers

The unit was marked by centres and moderated by OCR

The following points need to be considered:

- Centres are reminded that learners should choose a sensible modern domestic product from the approved list that they are interested in.
- Learners should be encouraged to 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. This point must be made very early on in this unit.
- From the previous point learners must be aware that an expert system is a computer programme that contains some of the subject-specific knowledge of one or more human experts. The most common form of expert systems is a programme made up of a set of rules that analyse information (usually supplied by the user of the system) about a specific class of problems, as well as providing mathematical analysis of the problem(s).
- Problems involving expert and control systems should be presented in real-life contexts with an emphasis on the application rather than systems theory.
- Learners must be able to recommend a course of user action in order to implement corrections.

Assessment Criteria 1

To gain marks in the higher band Learners must show, in more detail, how they independently investigated and thoroughly examined a modern domestic product.

More detail was needed from learners to demonstrate a deep 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. Evidence for this can come from screen shots, photographs and annotated control sheets.

Learners must also make thorough reference to the use of digital technologies.

Assessment Criteria 2

In a number of cases more evidence was needed that learners had developed a thorough understanding of simple computer control systems. In addition, learners must also show how they simulated complex control functions of the chosen modern domestic product to gain marks in the higher band. Evidence for this can come from photographs, screen shots, running simulation software, modelling circuits and/or systems.

Assessment Criteria 3

More detail was needed to show that learners had gained an understanding of simple expert systems for problem solving and maintenance operations for their chosen product. To gain higher marks, learners needed to give a more detailed explanation of the methods used to input appropriate data into an expert system. More detail was needed to show how learners had interpreted results and used them to modify engineering features.

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.

More evidence was needed to show the use of

(a) laptop computers to access and communicate information

(b) personal digital assistants to record digital images, annotations and dialogue in real time

(c) third generation mobile phones to record information in real time

(d) down-loading and transferring information from communications devices in a form that is usable and accessible for engineering reports and portfolios

(e) Bluetooth

(f) SMS multi- media messages.

Unit F551 Producing engineering solutions

The unit was marked by centres and moderated by OCR

The following points need to be considered:

- In some cases more care needs to be taken when the Unit Recording Sheet is filled in. Incorrect candidate numbers are being quoted and in some cases the candidate number was missing altogether.
- It is advised that this assignment should link directly with the sector in which the learner has most experience.
- 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.
- Learners must independently select suitable; materials, manufactured parts, components, tools, equipment and processes. This must be evidenced for learners to be awarded marks.
- 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 own progress, adapt to circumstances as they change and undertake appropriate quality checks and this must be evidenced
- 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 photographic evidence is a good way of evidencing much of the above.

Assessment Criteria 1

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

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

Learners must relate the plan to health and safety issues, including a risk assessment of procedures for processing the materials and components. This must be evidenced.
This could have been done by learners considering the production plan alongside risk assessment and health and safety issues.

Also far more detail of material, component and processes selection was needed if learners were to get marks in the higher band.

Assessment Criteria 2

Learners need to produce a high-quality and accurate outcome that is detailed enough to allow them to demonstrates their use of a range of making 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 photographic evidence and/or a diary of progress. There must be evidence of any alterations to the production plan. There needs to be clear evidence of the outcomes. This is best done by using annotated photographs. These 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 to this process of risk assessment.

Assessment Criteria 3

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

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

There must also be evidence of a review of progress with changes made.

This is best done with real time photographic evidence and/or a diary of progress.

Witness statements are not an acceptable method of evidencing this.

Unit F552 Construct electronic and electrical systems

The unit was marked by centres and moderated by OCR

It was evident that learners found navigation through the workbook straight forward. All learners were able to complete all sections of the Design Challenge within the time allowed. 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.
Photographic evidence was of good quality in all cases.

The following points need to be considered:

- Marks should be entered in the mark boxes at the end of each task in ink and not in pencil.
- Photographs must be annotated to allow learners to gain full credit and centres must ensure they are securely glued into their workbooks.
- There is the provision for learners to add extra photographs to support tasks at the back of the workbook.
- Annotating their photographic evidence would allow learners to gain access to the full mark range.
- Centres are reminded that they are permitted to devise their own Design Challenge, or present more than one Design Challenge. These should be submitted for approval to OCR.
- 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.

Some learners were able to describe generic safe working procedures but also need to consider the needs of others and give specific details of this in their workbook.

Learners are expected to include, in their workbook the safe use of manually operated tools.

Assessment Criteria 2

It was encouraging to read that learners are able to describe the properties of at least three components. However, a description of a larger range of components is required to gain access to the higher band marks.

Learners need to justify their selection of component values and component types based upon component properties and including a statement as to why calculations are important in this selection process.

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

Assessment Criteria 3

It was encouraging to see learners using a range of prototyping systems to develop their final solution. 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. The use of circuit design software was evident in many learners work and this should be encouraged. 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 both these tasks. Learners are permitted to glue extra photographs to support these tasks at the back of the workbook, these should also be annotated.

Assessment Criteria 4

Learners were supplied with a suitable range of test equipment which they used with varying degrees of success. Most were able to devise a simple test to confirm the device measured showed tilt. The use of complex calculations to predict circuit test data was lacking in the majority of learners work. Most learners were unable to use their test results to identify circuit modifications to enable correct operation. Most were also unable to use complex calculations to prove the use of alternative components. The majority also failed to suggest circuit changes based on their data findings.

Unit F553 Manufacturing engineering

Most Centres submitted the Attendance Register and the Centre Authentication Form correctly filled in and on time.

The following points need to be considered:

- Most learners presented work in a neat and tidy fashion but the use of a contents list with page numbers is to be encouraged.
- Some use was made of photographs; this and the use of other similar types of media are to be encouraged.
- It is recommended that learners should divide their folders into sections that follow the assessment criteria. Detailed information can then be found in the specification for each section. It also ensures that all sections are covered.
- A number of folders showed the same type of presentation with use of material common to the centre. In general terms, the centre should be empowering individual learners to take charge of their own learning and development.
- In some cases, learners need to be shown how to interpret more carefully the evidence requirements for each mark band. Presenters and markers 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.

Assessment Criteria 1.1

To access the higher mark bands learners needed to explain in depth:

- how they had made a significant contribution to the detailed plan of manufacture of the product.
- how the team had made a significant contribution to a detailed plan of manufacture by including in the plan;
  - 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.

In addition learners should have provided much more evidence concerning additional and/or alternative methods of manufacture and fully justified the correct procedures to be adopted. A high proportion of learners used the same descriptions, same flow charts and the same images for this area of work.

Assessment Criteria 1.2

In some cases it was not clear how the individual learner had been instrumental in ensuring the success of the team.

To obtain higher marks learners needed to explain in depth, how an effective team can be built by:

- allocating roles and responsibilities, based on the strengths and weaknesses of team members
- setting and agreeing individual and team targets
- ensuring good communication between team members
- ensuring team members are motivated

- creating an appropriate working environment
- considering health and safety in relation to the practical activity.

Learners could have provided more detailed visual evidence to support this activity.

Assessment Criteria 2.1

To obtain higher marks learners needed to:

- show fully detailed appropriate quality control checks using actual and statistical testing methods
- describe, in depth how they selected and used six different quality checks for the manufacture of the product using a CNC machine; many learners, only used the measurement of length and diameter. It is also customary to state a tolerance as a ± value, not just a numerical value
- state how they inspected and compared samples of the product materials at the critical control points specified in the plan
- show how they intended to use statistical testing methods. Very little evidence, if any could be found concerning this matter. There did not seem to be any awareness of statistical testing
- Learners could have provided more detailed visual evidence to support this activity.

Assessment Criteria 3.1/2/4/5

To obtain higher marks learners needed to:

- fully explain procedures and detailed sequences of setting up a complex machining operation;
- more digital evidence would have been useful
- explain how they reviewed the machining process on screen and how they acted on the outcomes
- show how they recorded details of the machining process; again digital evidence would have been useful
- show how they considered health and safety in the planning and execution of the machining procedures; again digital evidence needed to be provided.

Most learners produced a very limited risk assessment document. To gain higher marks much more detail and analysis was needed. Learners need to understand that risk is defined as the probability of an event occurring and its consequences. From this, the learner could consider that risk management is the practice of using processes, methods and tools for managing these risks.

Most learners missed the opportunity to demonstrate that they had independently produced five components; much more digital evidence would have been useful.

Assessment Criteria 2.1 and 3.3

Most reports needed greater detail for both the findings from the quality tests and analysis/ interpretation of the data. Few learners made use of the simplest statistics such as a mean, mode or median value for the data gained. Any interpretation or analysis of the data was at a low level and did not give learners the opportunity to comment upon the performance of the machining operation.

Unit F554 Maintenance

The unit was marked by centres and moderated by OCR

All learners chose to use the Model Assignment based on the maintenance of "off road" cycles. This choice gave the learners easy access to a product that they were all familiar with and one which allowed for the tasks to be undertaken in the centre workshop.

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 mixed ability range.
- Some learners could maintain a child's single speed cycle and some could maintain a sophisticated mountain bike with multiple gears and suspension.
- Learners must choose a different product to examine for task two.
- 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 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 photographic evidence rather than 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 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

As all model assignment focussed on cycles it was difficult for learners to choose a different product from the same company to study. It was evident that some centres failed to adhere to this requirement allowing learners to use cycles in this section.

A number of learners overcame this by choosing a robot arm that could be used to in the manufacturing of the cycle.

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

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. Motor and plant manufacturers could be a good source for this information. A number of learners chose to present their findings as a simple statement, others used graphs and charts, which proved to be a very effective method of presenting information. Not many learners went on to include a planned maintenance schedule in their report.

Unit F555 Innovation, enterprise and technological advance

The following points need to be considered:

- Assessment of this unit should be in the context of the engineering industry and requires that learners experience real events and work alongside people in a 'sector' context.
- Learners needed access to specialist equipment to demonstrate their skills and extended periods of time to apply their knowledge. This was not evident in much of the work presented.
- Learners are required to complete a research assignment based on a specific product which must be carefully chosen to allow the learner to achieve maximum marks available.
- The learners should record all their research, findings, observations, analysis and individual conclusions in a workbook. Learners should have the workbook available for the duration of the unit and are permitted to return to and add information to earlier sections in the light of any new discoveries.
- When there is a need to illustrate a particular point, photographs, sketches, drawings and other presentation methods may be used.
- Presenters should note that the assessment criteria are accessed solely by the learner's completion of their individual workbook, which should be fully evidenced for all assessment criteria.
- It was evident that in most 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 innovation and creativity. To gain marks in the higher band they must fully justify their use of information. The report must also detail how protection of the product has been achieved and what this means in real terms. The implications of this should also be considered.
More detail was needed from a number of learners when explaining why the relevant protection was selected for the chosen product including a breakdown of the costs involved.

Assessment Criteria 3

Learners must outline research activities and developmental work in more detail. To gain marks in the higher band they must fully justify the financial decisions which have been made in relation to the product. More information was needed about research, development and raising finance when developing new products.

Assessment Criteria 4

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.

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