

Examiners' Report June 2009

Principal Learning

Engineering
Levels 1 & 2

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Contents

1.	Level 1 Introduction	4
2.	Level 1 Unit 1 Report	5
3.	Level 1 Unit 2 Report	6
4.	Level 1 Unit 3 Report	9
5.	Level 1 Unit 4 Report	11
6.	Level 1 Unit 5 Report	12
7.	Level 1 Unit 6 Report	13
8.	Level 1 Unit 7 Report	15
9.	Statistics	16
10.	Level 2 Introduction	17
11.	Level 2 Unit 1 Report	18
12.	Level 2 Unit 2 Report	21
13.	Level 2 Unit 3 Report	23
14.	Level 2 Unit 4 Report	26
15.	Level 2 Unit 5 Report	28
16.	Level 2 Unit 6 Report	30
17.	Level 2 Unit 7 Report	32
18.	Level 2 Unit 8 Report	34
19.	Statistics	36

Principal Learning Engineering

Level 1 Introduction

This is the first moderation series where all the available units for the Level 1 Principal Learning in Engineering have been offered for moderation and awarded. This moderation series follows a limited window in January 2009 where Unit 1 was available for external assessment and Unit 3 and Unit 6 were offered for moderation. The specific reports for all units are under the appropriate heading, and broadly-speaking, learners performed well. General comments related to the external unit and the internal units are noted below.

Surprisingly, on the externally assessed unit, learners did not perform as well as in the January 2009 series. Learners must have a basic knowledge of engineering sectors, materials/processes (and their possible applications) and environmental factors/energy use, in order to gain a pass mark in this unit. Such knowledge is also fundamental to the Level 1 Principal Learning as a whole, hence centres must ensure learners have assimilated this information very early in the course.

On the internally assessed units, the centres' moderating was generally a little lenient in comparison to the Edexcel standard, but it was rare that a full sample had to be moderated due to inconsistency, and hence little adjustment took place. It was clear that one person had completed the learner assessment (for a given centres/unit) in most cases.

In general, most aspects of administration for the internal units were good, with the correct samples being provided, although many centres' packages were sent to the Moderators well after the submission deadline. Generally, a Candidate Record Sheet (CRS) was signed by each learner and the tutor, and centre marks were recorded correctly on the CRS. Furthermore, most learner work was organised in such a manner that it was straightforward for the Moderators to locate the evidence for each Learning Outcome. Some centres sent unnecessary learner work to the Moderators that was not associated with the summative assessment, and some did not provide an EDI print out of the centres marks for each learner. Some learners, from different centres, were taught as a single group, but still entered from their home centre; it may be appropriate to enter learners for each unit at the delivery centre in future series, in order to minimise the moderation process.

Considering this is a new specification, learners were given credit for implicit evidence they provided in their portfolios. Learners should provide explicit evidence wherever possible in future series, and hence centres should endeavour to assess each Learning Outcome in a similar manner. As a result, it would be helpful for assessors to annotate learner work to clearly identify where marks have been awarded, linked to the appropriate Marking Grid, with page numbers noted on the CRS. Centres are reminded that each unit specification has a section entitled 'guidance for allocating marks', which should be referred to when designing/completing summative assessments. Furthermore, centres may find it useful to refer to the Tutor Support Materials for this qualification when setting assignments that are to be internally assessed and externally moderated, in order to ensure that learners have the opportunity to address all of the assessment requirements in each of the three Mark Bands for each Learning Outcome. This will often involve the use of annotated photographs and/or witness statements/learner observation records (the later completed by the tutor), especially for Marking Grid B and other practical evidence, which centres are actively encouraged to submit as assessment affirmation for the learner in question. Centres were given individual feedback by a moderator, via an E9, with comments noting possible areas where the summative assessment approach could be improved.

Level 1 Unit 1 Introducing the Engineering World

General comments

In this series, learners around the pass boundary were expected to be able to answer questions 1, 2, 3, 5, 6, 8, 9(a), 12, 14, 15(a), 15(c), 15(d), 18(a), 18(c), 19(a), 19(b), 20(a), 23 and 29 correctly. As a result, learners around this boundary were not expected to be able to answer questions 4, 7, 9(b), 10, 11, 13, 15(b), 16(a), 16(b), 16(c), 17(a), 17(b), 18(b), 19(c), 19(d), 20(b), 20(c), 21(a), 21(b), 22, 24, 25, 26, 27, 28 and 30 correctly. The questions that learners around this boundary were expected to be able to answer centred on Learning Outcomes 1 and 3, and they mainly tested learners' knowledge of engineering sectors, materials, processes and environmental factors/energy use.

Learners around the A* boundary were expected to be able to answer all questions, except 15(b), 19(d), 26, 27 and 30, correctly. The aforementioned questions tested more specific knowledge for all three Learning Outcomes, and tended to be questions where at least 2 of the incorrect answers were strong distracters.

In future series, centres may wish to focus on the application, as well as the acquisition, of knowledge, when delivering the unit teaching and learning, in order to assist learners in attaining a higher grade. The more challenging questions on this paper require a competent understanding of the topic or area being addressed.

Level 1 Unit 2 Practical Engineering and Communication Skills

General comments

During this series, the internal marking for this unit was generally a little lenient, especially for Learning Outcomes 1 and 3, in comparison to the Edexcel standard. Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments.

Learning Outcome 1 (Marking Grid B)

In this series, the majority of learners provided evidence of being able to identify and apply the requirements of working safely with colleagues in a familiar and (to a lesser extent) unfamiliar context, explaining why key aspects of relevant health and safety legislation are necessary. This Learning Outcome was approached in a different manner across centres; nonetheless, it was pleasing to note that the vast majority of the summative assessments allowed learners to access Mark Band 3. For example, a number of learners were required to complete a health and safety worksheet and were then observed carrying out tasks in the workshop. Some were required to provide written responses in order to demonstrate that they understood the difference between their 'own responsibilities' and those of 'others' when considering health and safety legislation, in addition to identifying risks and citing some control measures. Others were required to complete written and practical health and safety tests, where, for the latter, the tutor wrote an observation record qualifying the ability of the learner to carry out a maintenance procedure safely.

In future series, centres may wish to combine aspects of the summative assessment for this Learning Outcome with those of Learning Outcome 3 in order to further contextualise the assessment approach. In addition, it was noticeable that few learners provided, in an explicit manner, evidence that they could identify and apply the requirements of working safely with colleagues in an unfamiliar context. As a result, centres may wish to ask learners what they would do to ensure safe working if they were going to perform a given task for the first time, and this could be captured using an observation record (see the 'approaches to assessment' section of the unit specification).

Learning Outcome 2 (Marking Grid A)

In this series, the majority of learners were clearly able to identify two cutting processes, two forming processes and a joining process (for Mark Band 1). A smaller number of learners described the aforesaid processes and fewer still compared the cutting and forming processes. However, a pleasing number attempted to relate each process to an industrial application.

Considering future series, it would be more appropriate for learners to state examples of cutting/forming/joining processes that are more akin to industrial manufacturing. Whilst 'sawing' is a cutting process, a better example would be to describe, for example, the use of a laser cutter. This comment is also applicable to the identification of a joining process, such as 'gluing', although this could still be used if the description was more elaborate. Some learners provided good sketches of the processes they identified/described and this is to be encouraged, as it provided a simple means of comparison. In some centres this Learning Outcome was evidenced by the use of a table, which required the learner to identify a specific process that may apply to a series a given tasks. This allowed the learner to show that they knew the difference between cutting, forming and joining processes. This was followed by a series of short questions requiring the student to describe the various processes and then compare two of them.

Learning Outcome 3 (Marking Grid B)

In this series, the majority of learners provided evidence of being able to use documentation to select equipment to dismantle a product, then clean and lay out the component parts and consequently reassemble the product. A smaller number of learners identified parts needing replacement and fewer still compiled a report including parts for replacement and reasons for replacing them. Several learners wrote a report, but in the main such reports were essentially a narrative of the process undertaken. Some centres made judicious use of annotated photographs and tutor observation records covering the strip, clean, layout, check and rebuild of various engineering devices, and this is to be encouraged for capturing the evidence of practical work. This type of evidence was clear, comprehensive and easy to follow, and it provided a means of detailing the level of assistance provided to each learner, thereby allowing the justification of marks. Such photographs would have also been appropriate as evidence for aspects of Learning Outcome 1 if the learner followed the appropriate health and safety procedures/precautions.

In future series, centres should provide learners with a product that does require replacement parts. Further, centres may wish to provide learners with documentation that includes an area for reflection/review after each stage of disassembly, with a further area for learners to note parts requiring replacement. This could then be used as a basis for compiling a reflective report that includes parts for replacement and reasons for replacing them.

Learning Outcome 4 (Marking Grid A)

In this series, the majority of learners produced sketches of an engineered product in both orthographic 1st and 3rd angle projection, and in isometric and oblique views, which were correctly dimensioned. Many of these could have been considered drawings as opposed to sketches, and several were quite complex. Most learners had clearly put a great deal of time and effort into their work for this Learning Outcome. However, it was very noticeable that centre lines and/or hatching were often missing from learner work, as was the use of common drawing conventions and layouts (for example, a title block) which prevented many learners from accessing Mark Band 3. Some learners provided projections and views using CAD; considering this is a new specification, and for this series only, learners were given credit for this, but it is expected that such projections and views will be hand drawn in future series, as the use of CAD is addressed in Level 1 Unit 3.

Considering future series, sketches of a simple engineered product, such as a turned bush with an internal bore, would allow all the requirements of Mark Band 3 to be met, and as a result centres may wish to ask learners to produce less complex projections and views, to ensure that time is available to attempt all the elements within the Marking Grid for this Learning Outcome.

Learning Outcome 5 (Marking Grid A)

In this series, most learners compiled a plan of operation to produce an engineered product. A smaller number of learners reviewed the success of the plan, and fewer still explained how changes to their plan would lead to improvements in planning or manufacture, which prevented many learners from accessing Mark Band 3. Surprisingly, many learners laid out their plan of operation as a series of written statements, rather than using a table format, and this often meant key elements of the plan, such as materials or tools required, were missing. Very few learners provided evidence of actually manufacturing the engineered product; however, considering this is a new specification, and for this series only, a review of the plan was taken as implicit proof that actual manufacture took place.

In future series, centres may wish to provide learners with a blank plan of operation table, with columns headed 'sequence of operations', 'materials', 'tools and equipment', 'health and safety' etc, perhaps with an area for reflection/review at

the end of each row. In some centres, learners were required to complete a reflective production diary as evidence of review, and this is considered to be good practice. Further, some centres also required learners to complete a dimension checking sheet, which again was used as a basis for reflective review. All of the above are appropriate in providing evidence that the learner actually undertook the manufacture of an engineered product; however, in future series, a tutor observation record and/or annotated photographs will also be required, to capture the practical evidence of manufacture, and consequently to allocate marks. Some centres used an external visit to support and consolidate learners' knowledge and understanding relating to this Learning Outcome; this clearly helped learners when undertaking their summative assessments and is to be commended.

Level 1 Unit 3 Introduction to Computer Aided Engineering

General comments

During this series, the internal marking for this unit was generally a little lenient, especially for Learning Outcomes 1 and 3, in comparison to the Edexcel standard. Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments. For Learning Outcomes 2 and 3, the majority of centres required learners to complete the summative assessment based on a simple engineered item, such as a stepped shaft or a drilled block. This was seen to work well with many learners able to access Mark Band 3 for both Learning Outcomes, despite the time constraint. However, centres may wish to concentrate on a single simple item for all three Learning Outcomes in future series as this would help to contextualise the assessment and allow learners to concentrate on producing 'process' type evidence, especially for Learning Outcome 1.

Learning Outcome 1

In this series, the majority of learners produced a dimensioned drawing of an engineered component in line with BS 8888 and a circuit diagram in line with BS 3939 complete with some annotation (for Mark Band 1). A smaller number of learners provided evidence of preparing a template for these drawings and fewer still provided evidence that they had used separate layers for the dimensioning, annotation etc. Further, learners that had produced a template for their drawings often missed important elements, for example the border or some necessary text. It was clear that many learners had put a great deal of time and effort into their work for this Learning Outcome; however, learners were sometimes required to produce drawings which were unrelated to the item to be manufactured for Learning Outcomes 2 and 3, and these drawings were quite complex at times, which was unnecessary (see below).

In future series, centres should ask learners to print a screen dump of their template prior to any drawings being added to it. Similarly, a screen dump would be appropriate to provide explicit evidence of their use of layers. Further, centres should ask learners to produce less complex drawings, to ensure that time is available to attempt all the elements within the Marking Grid for this Learning Outcome. It should be recognised that the summative assessment for this Learning Outcome is as much about the process of generating correct 2D CAD drawings as it is about the final outcome, and as a result, centres/consortia may also wish to provide tutor observation records to capture this procedural evidence.

Learning Outcome 2

In this series, the majority of learners were able to provide evidence that they had used CAM software and cutting information to convert CAD drawing geometry into a machine tool cutter path (including tool set-up); further, the majority of learners were able to provide evidence that they had the ability to process the cutter path data into a coded CNC operating program. It was pleasing to note that most centres then provided learners with the opportunity to identify and amend errors in program operation, through fault finding and rectification, often for a slightly different product, although a smaller number of learners provided evidence of rerunning the cutter path graphic simulation. Most learners used screen dumps with some annotation to provide evidence for this Learning Outcome, and this is to be commended, as such evidence was clear and easy to follow.

Considering future series, centres may wish to provide a guide for learners to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another screen dump with simple annotation would have sufficed to provide evidence of rerunning the cutter path graphic simulation, yet this was seen

very infrequently. Two to three pages of A4, with five to six screen dumps covering all elements of the Marking Grid, including associated annotation, would allow learners to access the top of Mark Band 3. Alternatively, tutor observation records could be used to provide (or support) evidence that learners undertook the necessary tasks to the required standard.

Learning Outcome 3

In this series, the majority of learners provided evidence of loading a CNC program into the controller, and of setting work datums and tool offset values. The majority of learners also provided evidence of safely executing the program to produce a first-off component. Very few learners provided evidence of using feed and speed override controls to gain optimum performance, or of editing the program to incorporate override values; however, a greater number of learners compiled a basic inspection report including reasons for non compliance and actions, which mainly resulted from centres requiring learners to complete, review and reflect upon an inspection sheet that recorded the dimensional accuracy of the item in question. The majority of centres required users to annotate images/photographs, or print screen dumps, when providing some of the evidence for this Learning Outcome, which again is to be commended; such evidence was clear and easy to follow. Some learners provided quite lengthy explanations of how they worked safely; this was unnecessary, as annotated images, perhaps showing the learner wearing PPE or traversing the workpiece away from the tool in order to unload, would have sufficed.

Considering future series, centres may again wish to provide a guide for learners to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another annotated photograph, providing evidence of learners experimenting with either physical or VDU-based feed and/or speed override controls, would have enabled many learners to gain access to the top of Mark Band 3, as opposed to Mark Band 2. Further, another screen dump with simple annotation would have sufficed to provide evidence of editing the CNC program to incorporate the optimum override values. Alternatively, tutor observation records could be used again to provide (or support) evidence that learners undertook the necessary tasks to the required standard.

Level 1 Unit 4 Developing Routine Maintenance Skills

General comments

The internal marking for this unit was in line with the expected standards of Edexcel. Candidate Record Sheets were present on all scripts, most had been signed by the learner, and the marks had been entered correctly. Useful annotation on most scripts assisted in the moderation process. Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments.

Learning Outcome 1 (Marking Grid A)

In this series most learners were able to describe three different types of maintenance procedures, where each could be used and how they are carried out. They were also able to give examples of maintenance documentation and what this documentation covered. Not all learners were able to state why different types of maintenance procedures were needed, and how to use maintenance documentation when planning and carrying out identified maintenance tasks.

It was pleasing to see that almost all centres used a practical approach to allow the learners to gather evidence relating to this Learning Outcome.

The vast majority of centres provided learners with the opportunity to access Mark Band 3, but are reminded that at Level 1 learners require clear and unambiguous guidance in order to understand the requirements of submitted evidence for this Learning Outcome. An example of this was noted during external moderation where clear defined tasks were created for the servicing of a braking system on a car vehicle. Very good use was made of the workshop manual as a source of documentation.

Learning Outcome 3 (Marking Grid A)

This Learning Outcome provided some challenges for learners in relation to evidence gathering in order to demonstrate knowledge and understanding of causes of failure of a product or a piece of equipment.

The majority of students were able to devise a simple plan to see if the product or piece of equipment or system might fail in service. They were also able to demonstrate the ability to use simple tools and equipment. Not all students recorded key measurements as part of this process. They also had difficulty in reviewing the plan in relation to its effectiveness and struggled to make improvements to it.

This situation could be improved if centres gave more thought to the task setting, and guidance given to students that would allow them to more easily provide evidence for Mark Band 3. Centres should consider allowing learners to discuss the possible reasons of failure, such as age, wear, corrosion, operating environment, lubrication failure, and inherent design faults.

Learning Outcome 2 (Marking Grid B)

This Learning Outcome centred around two key requirements:

- that learners were able to use tools safely
- that learners could carry out a routine maintenance task.

All centres used a practical setting to allow students to achieve this Learning Outcome. However the use of annotated photographs and witness testimony, which would have served to assist in the external moderation process, was not consistent across the centres. Centres should also consider how they can evidence guidance, limited guidance, and independence, which is an indicator for Mark Bands 1, 2, and 3 for this Learning Outcome. This could easily be referenced using a witness testimony.

Level 1 Unit 5 Introduction to Engineering Materials

General comments

The majority of the internal marking for this unit was in line with the expected standards of Edexcel, however there were several centres where the awarding of marks was lenient, with a number of further centres also applying the marks in an inconsistent manner.

Candidate Record Sheets were present and signed by the learner on the majority of scripts. In some instances there were several administrative errors including candidate/centre numbers being omitted from the CRS, and marks for Learning Outcomes being entered in the incorrect columns on the mark sheet. However, the majority of folders submitted were well presented and organised appropriately.

Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments.

Learning Outcome 1 (Marking Grid A)

In this series the majority of learners were able to investigate different material properties well, with many producing very good evidence in their coursework. In many cases this information was provided in tabular form, although alternative methods including spider diagrams were seen to be equally effective for providing suitable evidence. Many candidates achieved good marks for this Learning Outcome, with many displaying a clear link between the material properties, the definitions of these properties and how these properties affect the applications of materials.

In a number of cases learners submitted evidence which included more than the four required material properties, with some correct and some incorrect definitions being provided. In this series credit was given for the correct definitions even though the learners had submitted more than was required.

Learning Outcome 2 (Marking Grid A)

Overall learners performed well for these Learning Outcome. In some cases learners provided evidence in tabular form which gave a framework to the information required for each Mark Band. In some cases learners were either unable to justify the uses of the different forming techniques used for engineered items and considered the production methods for the materials, or they considered a range of different forming methods to those suggested in the 'what you need to cover' section of the unit specification, which limited their performance.

Learning Outcome 3 (Marking Grids A and B)

Where attempted, learners performed well for this Learning Outcome, although in some instances the evidence submitted for the forms of supply of materials was rather brief. Good practice included the use of delivery notes which learners interpreted to identify the form of supply of materials.

Evidence submitted by learners for Learning Outcome 3.2 ranged from being very comprehensive including annotated photographs, through witness statements to some candidates who offered no evidence at all. Annotated photographs showing the material tests being conducted is suggested to be a more satisfactory method of evidencing this Learning Outcome, with supporting witness statements/observation records.

There were several instances where learners did not submit work for Learning Outcome 3.3. In cases where work was submitted, learners who presented their findings in tabular form tended to achieve well, although criteria should be specific. In most cases, learners did not provide evidence of evaluation or comparisons of material properties.

Level 1 Unit 6 Electronic Circuit Construction and Testing

General comments

The internal marking for this unit was in line with the expected standards of Edexcel. Candidate Record Sheets were not present on all scripts, most had been signed by the learner, but some of the marks had not been entered correctly. Some scripts were not page numbered, which hindered the moderation process. Not all centres included EDI printouts. Useful annotation on most scripts assisted in the moderation process. Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments.

Learning Outcome 1 (Marking Grid A)

In this series, most learners were able to identify six components from a given circuit diagram, and a further four other components. Centres should note that the further four symbols should be identified from a selection of physical components. Most learners were able to research key features of components, but the various examples of what a key feature was varied across the centres. Key features such as tolerances, working voltages, power ratings, maximum current, and temperature ranges are typical key features that could be cited. In summary most learners were able to access Mark Band 3. This Learning Outcome was tackled well, yielding some high marks.

Learning Outcome 2 (Marking Grid A)

In this series, almost all learners were able to sketch an electronic circuit diagram to include six symbols. Some sketches were neater than others. Mark Band 2 called for learners to reproduce the sketch using a computer software package. This did not pose too many problems for the vast majority of learners. The issue that arose during the moderation process was the lack of evidence provided to enable confirmation that the drawing had been saved. This was also the case for Mark Band 3. It was difficult to confirm retrieval of the saved file, modification, and resave. Centres are advised to state file pathways and provide associated screen shots. In summary most learners were able to access Mark Band 3.

Learning Outcome 3 (Mark Grid A)

In this series, Learning Outcome 3 proved the most challenging for learners. Submitted evidence to justify planning was weak across the centres, as was evidence relating to working within a team. At Level 1 learners require more detailed guidance and direction from assessors that will enable them to fully understand the requirements of this Learning Outcome. Working within a team could be evidenced by a detailed set of minutes highlighting what planning was discussed and the contribution made by each member of the team. This was attempted by some centres. It was clear that learners had built the circuit, as most centres had provided photographs. However some showed more detail than others.

It is imperative in future series that centres provide clear evidence of the learner working safely. Suitable annotated photographs would suffice. Witness testimony could also be provided. In summary almost all students accessed Mark Band 2, and some were able to access Mark Band 3.

Learning Outcome 4 (Mark Grid B)

In this series most learners were able to use a software simulation package to undertake basic tests. The requirement to undertake six measurements did challenge some learners. Centres are advised that the six measurements do not ALL have to be waveform outputs. Voltage tests will also suffice.

Evidence of setting up physical test equipment was sketchy. Some centres did provide witness testimony, but again the detail was a little brief. The use of annotated photographs is recommended.

Some learners provided very basic statements about the advantages/disadvantages of using physical test equipment. In general the requirement to compare results and advantages/disadvantages of computer based tests versus physical tests was not answered well. In summary most learners accessed Mark Band 2; very few accessed Mark Band 3.

Level 1 Unit 7 Engineering the Future

General comments

The internal marking for this unit was in line with the expected standards of Edexcel. Candidate Record Sheets were present and signed by the learner on all scripts. The majority of folders submitted were well presented and organised appropriately. Centres are reminded that the unit specification has a section entitled 'guidance for allocating marks' which should be referred to when designing and completing summative assessments.

Learning Outcome 1

In this series, most learners were able to identify and name three new smart engineering materials and also three new engineering technologies for Learning Outcome 1.2. A significant number of learners were also able to describe and explain the properties of these materials and technologies and explore appropriate applications for them.

The vast majority of learners responded well to the tasks set to fulfil this Learning Outcome. In many cases there was scope for the learners to access Mark Band 3 through their assignments.

Learning Outcome 2

In general, learners were able to provide more detail in their responses for the recycling of materials and the reasons for doing so. It was notable that in many cases the same learners were not able to provide the same depth of response for the reasons why other materials cannot be recycled and must be disposed of using other safe methods, although there were examples where this aspect had also been well answered.

Learning Outcome 3

In many cases learners were able to access Mark Band 2 and Mark Band 3 for this Learning Outcome. Learners were able to identify and review how energy is generated from two different renewable sources. In many cases they could also identify the environmental impact of using renewable sources of energy and state the benefits and disadvantages of storage of energy.

Statistics

Level 1 Unit 1 Introducing the Engineering World

	Max. Mark	A*	A	B
Raw boundary mark	45	40	29	19
Points Score	4	3	2	1

Level 1 Unit 2 Practical Engineering and Communication Skills

	Max. Mark	A*	A	B
Raw boundary mark	60	52	38	24
Points Score	8	6	4	2

Level 1 Unit 3 Introduction to Computer Aided Engineering

	Max. Mark	A*	A	B
Raw boundary mark	60	52	37	23
Points Score	4	3	2	1

Level 1 Unit 4 Developing Routine Maintenance Skills

	Max. Mark	A*	A	B
Raw boundary mark	60	52	38	25
Points Score	4	3	2	1

Level 1 Unit 5 Introduction to Engineering Materials

	Max. Mark	A*	A	B
Raw boundary mark	60	52	38	24
Points Score	4	3	2	1

Level 1 Unit 6 Electronic Circuit Construction and Testing

	Max. Mark	A*	A	B
Raw boundary mark	60	54	39	24
Points Score	4	3	2	1

Level 1 Unit 7 Engineering the Future

	Max. Mark	A*	A	B
Raw boundary mark	60	53	38	24
Points Score	4	3	2	1

Notes

Centres are reminded that this is the first summer examination for this new specification and that boundaries may change in the following series

Maximum Mark (raw): the mark corresponding to the sum total of the marks shown on the Mark Scheme or Marking Grids.

Raw boundary mark: the minimum mark required by a learner to qualify for a given grade.

Principal Learning Engineering

Level 2 Introduction

June 2009 has been the first summer series of the Engineering Principal Learning and as such some issues have arisen. In general much of the work submitted has been of a good standard and has been graded correctly by centres. The work submitted by these centres usually followed a logical format with a well developed and prepared 'brief' which was clear to learners and allowed them to access marks across all Mark Bands.

Some aspects of centre administration were not properly addressed. OPTEMS/EDI must be included with samples. Front sheets should be correctly filled in with centre number, candidate number, candidate signatures etc.

When centres submit the required sample they must also include the highest and lowest achieving candidate. When submitting samples the candidate work should be annotated by the assessor to highlight where marks have been awarded.

Generally marking was lenient across all units. Centres must ensure they allocate marks in accordance with the Marking Grid and gain further clarification of mark allocation from the 'guidance for allocating marks' section of the unit specification.

In future, when centres are designing the unit assignment brief they would benefit by referring to the published Tutor Support Material as this gives them clear guidance on how to present tasks so that learners are able to focus on what evidence should be presented, particularly with reference to gaining scores in Mark Bands 2 and 3.

The degree of support given to learners does not appear to be uniform and some have been allowed too free a hand, making it harder for them to meet the requirements of the Marking Grid. Candidates will benefit from well-designed assessment briefs and clear guidance which will allow them to access Mark Band 2 and 3. A reminder to centres about fully understanding what is written in the unit delivery, assessment and allocation of marks guidance will benefit learners in the future.

Level 2 Unit 1 Exploring the Engineering World

General comments

Centres need to look more carefully at the 'guidance for allocating marks' section of the unit specification and to pick up on the fine detail in the Marking Grid e.g. the reference to engineering in Mark Band 2 and Mark Band 3 of Learning Outcome 4.

Standard of assessment

The standard of assessment was good in only a few cases. In some cases it was very disappointing. Some assessors seemed to be unaware of the marking guidance. Generally marking was very lenient and the assessor gave the total marks for a band when they were not justified.

Assessors in general seemed unaware of the increasing requirements on the answer as the Mark Bands increased. In some cases they gave full marks for an answer given in Mark Band 2 that they had awarded full marks for in Mark Band 1.

Evidence of marking practice was variable, with the better centres providing fully annotated work, and the weaker centres with no marking on the scripts at all. There was also variability in terms of the comments entered onto the Candidate Record Sheets. One centre also marked in half-marks, which is not required.

Administration

OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from and the reference numbers had to be obtained from Edexcel Gateway. Some centres responded very well to being sent an E6. Others were very slow and held up the moderation process.

It was evident that a number of centres, especially where they were part of a cluster, were not ready for assessment.

It was also apparent that centres were not entirely familiar with the administrative procedures and the requirements to enter marks onto the Edexcel Gateway and print and sign mark return sheets. This might be a requirement for further training or education for centres.

Most centres did, however, send the correct samples including the work of the highest and lowest learners.

Not all centres returned signed CRS and a few errors in marks entered online were found and reported to Edexcel for correction.

Learning Outcome 1

Sectors were generally well described and learners were able to access Mark Bands 1 and 2 without too much difficulty. Some learners included a lot of irrelevant detail about manufacturing processes carried out within the sectors. They put too much effort into presenting detailed information about companies within the sectors e.g. history, size and the manufacturing processes undertaken. It would have been much more useful to have concentrated on just one or two specific products from each sector with full explanations of their function and operation. For example, one learner chose the mechanical sector and focussed in on Rolls-Royce Motor Cars. They then explained how the cars are welded, painted and assembled instead of describing/explaining the function of a car/motor vehicle i.e. getting someone from A to B in comfort, providing passenger safety in the event of an accident, economic mass transportation of people by bus.

Some learners showed difficulty in understanding what is meant by the term 'function of a product' and as a result presented weak evidence.

Some centres did not seem to be giving enough guidance on how to access the higher marks and there was also confusion about what is meant by a commercially available product. To achieve Mark Band 3 it should be commercially available products which

are considered. Some learners chose the RNAE, Nasa, the Apollo programme and Concorde, none of which are commercially available products. The robotic sector was chosen by a number of learners with the product being Asimo. Again, this prevented access to Mark Band 3 because it is not a commercially available product or service. One learner chose the Eiffel tower as an example of a product from the civil sector but did not explain its function. A model roller coaster built by the learners was given as an example of a Civil Engineering sector product but again this not a commercially available product.

Learning Outcome 2

Many learners would have benefited by having been given more guidance on what to present as evidence. As a result of not being given clear guidance they fell into the trap of downloading/copying job advertisements. Learners also presented evidence in the form of detailed CVs. While this approach does show career development, it does not really address the issue of job and overall career opportunities within engineering. The range of jobs within engineering was generally well considered although these were sometimes job adverts, rather than job descriptions, and training opportunities were often not considered.

All learners identified four job opportunities, although this was sometimes four different opportunities within the same profession (e.g. the RAF).

The description of the Engineering Council was on the whole good, albeit not quite correct in a few cases. There was also evidence of some commentary on progression opportunities and evaluation of the reasons for professional registration.

Most learners were not able to access Mark Band 3 because evaluations were weak/missing, particularly with reference to the reasons for professional engineering registration at national and international level.

Learning Outcome 3

Many learners seemed not to have been given enough guidance on what evidence to present and some presented unedited material sourced from the web. Social impact of products was generally very weak.

Most learners covered three centuries but fell into the trap of describing several products from each rather than homing in on one key achievement for each century. Most learners had covered developments from all three centuries and, although some were a little incorrect, were able to describe the socio-economic impacts of what they had selected and so were able to access Mark Band 2. Some presented too much evidence on how the product works/is manufactured rather than focusing on the impact that the product has on society.

Evidence for Mark Band 3 was mainly weak with insufficient explanation about the social and economic impact of the key engineering achievements identified.

Learning Outcome 4

The quality of learner evidence was very variable and seemed linked to the engineering expertise of the centre e.g. good from FE colleges, not so good from schools.

The generic aspects of legislation have been identified by all learners but many did not make the link to engineering. Discrimination, equal opportunities, family/parenting, dismissal, health and safety were all covered, but in a general way. For one centre it was apparent that this topic had been delivered by someone with no knowledge of engineering, disadvantaging the learners and restricting them to Mark Band 1.

To access Mark Band 2 learners must comment on the rights and responsibilities of employers and employees within engineering. Explanations of how to encourage employees to meet their responsibilities in accordance with employment legislation were generally weak and few learners achieved Mark Band 3.

Some learners produced a tabulated list of legislation with the briefest of description presented as bullet points, others presented the evidence as short paragraphs stating the legislation but not focusing in on rights and responsibilities.

Level 2 Unit 2 Investigating Engineering Design

General comments

The provision of witness evidence, in any form, was in a number of cases very poor, making it difficult to moderate Learning Outcome 1. In some cases there was a box on a task sheet that should have been signed by the assessor but this was not always done. The assessment decisions could have been supported with greater annotation within the scripts to identify where marks had been awarded to the individual learners. Often it was difficult to identify where the assessors had awarded individual marks, this resulted in many scripts being re-marked rather than moderated. Very little verification of the initial assessor's decision could be found.

With regard to the awarding of marks for the delivery of a presentation (Learning Outcome 4), the supporting evidence required within a portfolio should be a model (CAD), PowerPoint, or simulation utilising software (as indicated in the guidance section of the unit specification). This should be supplied together with a witness statement that would generally reflect the effectiveness of the presentation. Learners lost marks because this evidence was not present.

Some learners obtained material from the internet, often assessors picked this up and commented, but very little material was referenced and sources acknowledged.

Standard of assessment

The standard of assessment was good in only a few cases. In some cases it was very disappointing. In about half the cases the assessor seemed to be unaware of the marking guidance. Generally marking was very lenient with the assessor giving the total marks for a band when they were not justified. Many assessors seemed unaware of the increasing requirements across the Mark Bands. Many learners started well, with good scores obtained for Learning Outcomes 1 and 2. Perhaps due to shortage of time or loss of interest they then produced weak evidence for Learning Outcomes 3 and 4. Some learners did not attempt all Learning Outcomes.

Administration

Some centres failed to send the correct sample. OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6 requests, others were very slow and held up the moderation process.

Learning Outcome 1

This was generally well done but it would have helped to have had a witness statement that covered the dismantling and reassembly, though this was covered in most cases to a lesser degree by photographs. There were some cases of particularly good evidence being presented.

All learners dismantled engineered products but a number failed to present evidence of reassembly. Some included information about tools and equipment not related to dismantling/ assembly e.g. taps and dies. Learners who achieved higher marks seem to have benefited from being given a structure to work to and guidance on how to evaluate range of performance and fitness for purpose.

Learning Outcome 2

Both strands of this Learning Outcome were covered reasonably well. Design constraints were generally well identified and the specifications well detailed.

Learning Outcome 3

Generally it was difficult to see clearly what the designs were. The addition of text helped but more annotation of the design features would also have been useful.

Learners generally did not consider others' ideas and so lost marks from Mark Band 1. However, this did not prevent them from accessing the higher Mark Bands if their comparisons and justifications were valid.

Some learners identified three alternative design proposals from the internet but did not interpret them so that they could use them as a basis on which to develop their own design ideas. Some learners produced excellent technical drawings whilst others produced sketches with limited clarity.

Many learners did not refer back to the product design specification when evaluating for Mark Band 3 and were unable to pick up marks.

Learning Outcome 4

The final designs were generally drawn in CAD. This seemed to limit how much information about the design and essential components of the product could be presented in order to understand the operating principles of the product. Using CAD is not ideal because it is dependent on the learner's CAD skills whereas the aim of this unit is to develop design skills. It would be better to draw the designs clearly by freehand and to provide additional drawings of the detail.

Some centres recorded marks for the presentation in the Marking Grid B part of the CRS. Evidence was generally weak for the presentation.

Level 2 Unit 3 Engineering Applications of Computers

General comments

Witness statements were generally poor or missing and this issue needs to be addressed in the future. In some cases there was a box in the task sheet that should have been signed by the assessor but this was not always done.

For the future it will be beneficial to look very carefully at the 'guidance for allocating marks' section of the unit specification and to pick up on the finer details in the Marking Grids.

Standard of assessment

The standard of assessment was good in only a few cases. Generally it was very disappointing

In many cases the assessors seemed to be unaware of the marking guidance. Generally marking was very lenient with total marks for a band being awarded when they were not justified.

Many assessors seemed unaware of the increasing requirements on the answer as the Mark Bands increased. In some cases they gave full marks for an answer given in Mark Band 2 that they had given full marks for in Mark Band 1.

All samples moderated for a number of centres fell outside the tolerance bands and so required the full sample moderated.

Evidence of marking practice was variable, with the better centres providing fully annotated work, and the weaker centres with no marking on the scripts at all. There was also variability in terms of the comments entered onto the CRS sheets. One centre also marked in half-marks, which is not required.

Administration

OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6 requests others were very slow and held up the moderation process.

Most centres sent samples of coursework after the deadline date of 5 June 2009, with many being between one and two weeks late. A number of centres withdrew from this assessment round. It was evident that a number of them, especially where they were part of a cluster, were not ready for assessment.

It was apparent that many centres were not entirely familiar with the administrative procedures and the requirements to enter marks onto the Edexcel Gateway and print and sign mark return sheets. This might be a requirement for further training or education for centres.

Most centres did, however, send the correct samples including the work of the highest and lowest learners.

Not all centres returned signed the CRS and a few errors in marks entered online were found and reported to Edexcel for correction.

Learning Outcome 1

Most learners gave a description of two industrial applications, however in some cases this was lacking in detail and the contribution of computers to process control was not always clear. There was limited or no comparison between the two areas, and limited evaluation (both being required to access the higher Mark Bands).

One learner presented flow carts - getting showered and dressed; manufacturing and filling bottles with mascara on a production line - but with no reference to computer systems.

Generally the evidence presented was weak. Learners who tried to evaluate the processes/systems did not do this well and were not able to access Mark Band 3.

Learning Outcome 2

Few learners made a choice as to which equipment to use - this seems to be because centres are very limited in the amount of computer-based equipment that they have available. Some were provided with the same hardware and then used their choice of software/programme as evidence for gaining the two marks designated for choosing appropriate equipment in Mark Band 1.

This Learning Outcome requires a witness statement in respect of the correct setting up of the equipment, the correct use of the equipment, the safe use of the equipment and the final solution. In many cases this statement was not presented. Moderators, for this session only, have had to assume correct setting up based on learners' descriptions and photographs.

One centre presented evidence of a product (a key ring) being designed using computer controlled equipment. It was not clear how well this method worked to solve the problem (produce the key ring), and there was limited justification and evaluation of the solution. There was also limited detail of any safety requirements when using a laser engraver. Clear articulation of the design of the key ring and its production, with justification and evaluation would give access to the higher Mark Bands. The centre might consider the use of signed witness statements in order to document that the task was actually undertaken and executed practically.

It has been noted for this series that one assessor annotated learner scripts with a numerical score for safe working e.g. 2/2. For future series, it will strengthen the evidence if a witness statement/observation record confirming safe working is included for each learner. These statements should be signed by the assessor. Evidence of setting up was generally weak - the inclusion of observation records and photographs would overcome this problem in the future.

Learning Outcome 3

Most learners were able to describe two systems. The description of the component parts of the system (e.g. input/output devices, sensors, actuators) was invariably a little weak. Some of the systems described did not appear to be consumer products. There was little or no discussion of how the systems being described might be transferred to a similar product and consequently many learners were not able to gain access to the higher Mark Bands.

Learning Outcome 4

Most learners identified and described two different diagnostic systems but in limited detail. It was not always clear what data could be derived from these systems and how this data could be used in fault diagnosis. Things that might be obtained would be diagnostic codes for analysis. Some learners presented a screw selection activity but it was not clear how this related to computer-based fault diagnostics. Analysis of fault data with suggestions for an appropriate course of action would give access to the higher Mark Bands.

Unfortunately all learners at one centre seem to have been poorly advised about their choice of maintenance operation - all chose to research the same systems: a car diagnostic system (which is a suitable system) and maintaining stock levels in a

warehouse (which is not a suitable system). Learners referred to the use of hand held scanners to record stock levels and may have confused this with using scanners to read the bar codes of replacement parts as suggested in the 'what you need to cover' section of the unit specification. They also considered a vision system to check whether a cap is fitted correctly to a bottle (the Cognex system used by the Original Juice Company was given as an example) which is also not a maintenance operation. Sadly, learners from this centre also wasted time and effort looking at three applications, two of which were invalid.

Level 2 Unit 4 Producing Engineering Solutions

General comments

Generally the provision of witness evidence, in any form, was very variable and it seems that many centres do not appreciate the value of providing them. In some cases there was a box in the task sheet that should have been signed by the assessor but sometimes this was not filled in.

Standard of assessment

The standard of assessment was very variable and only good in only a few cases. In general it was very disappointing.

In a number of centres assessors seemed to be unaware of the marking guidance. Generally marking was very lenient with the assessor giving the total marks for a band when they were not justified. Assessors in general seemed unaware of the increasing requirements on the answer as the Mark Bands progressed.

For several centres all samples moderated fell outside the tolerance bands, and so required the full sample to be moderated.

Evidence of marking practice was variable, with the better centres providing fully annotated work, and the weaker centres with no annotation on the scripts at all. There was also variability in terms of the comments entered onto the CRS sheets. One centre also marked in half-marks, which is not required.

Administration

OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6 requests. Others were very slow and held up the moderation process.

Many samples of coursework were received after the deadline date of 5 June 2009, with most being between one and two weeks late. A number of centres subsequently withdrew from this assessment round. It was evident that a number of centres, especially where they were part of a cluster, were not ready for assessment.

It was apparent that centres were not entirely familiar with the administrative procedures and the requirements to enter marks onto the Edexcel Gateway and print and sign mark return sheets. This might be a requirement for further training or education for centres.

Most centres did, however, send the correct samples including the work of the highest and lowest learners.

Not all centres returned signed CRS and a few errors in marks entered online were found and reported to Edexcel for correction.

Learning Outcome 1

Learners at some centres would have benefited from better guidance on what evidence should be presented when describing health and safety procedures. Most learners identified basic PPE (such as boots, overalls and goggles). Access to the higher Mark Bands was limited in many cases because there was little evidence presented about describing the responsibilities of self and others, and the carrying out and analysing of risk assessments.

Learning Outcome 2

Most learners produced a basic plan and then applied it to the manufacture of their item. There was little evidence of justification of the plan, or suggestions for improvement. This restricted access to the higher Mark Bands. A number of learners presented the plan in the form of a diary which described what they had done but which would be of no use to a third party carrying out a similar manufacturing process or service. Many learners did not properly see the link between tools, materials, process and sequence of events.

Learning Outcome 3

Generally the evidence to support material identification was brief, although there were some reasons given as to why they were chosen. More evidence of preparation of materials would have been useful. It would also have benefited learners if assessors had provided witness statements to support the selection of materials and components within the tasks.

Most learners were able to demonstrate the selection of materials and perform a number of preparations techniques. There was limited evidence of justification of the materials selected or the techniques used so restricting access to the higher Mark Bands.

Learning Outcome 5

Some inspection and testing techniques were carried out by most learners. There were some reviews evident, although some learners simply provided measurements against specifications, limiting marks to Mark Band 1.

Some learners demonstrated a number of inspection techniques, although there was a lack of evidence of the actual measurements taken. Assessment of compliance of these measurements with the original plan, and an evaluation of the actual inspection techniques used was not well done so limiting access to the higher Mark Bands.

Learning Outcome 4 (Marking Grid B)

It is noted that some centres provided witness statements to support the evidence, which included photographs.

Level 2 Unit 5 Electrical and Electronic Circuits and Systems

General comments

The provision of witness evidence, in any form, was very poor from some centres, making it very difficult to give learners proper credit when moderating. For some centres there was a statement for Marking Grid B that covered some of the learners, but not all. In some cases there was a box in the task sheet that should have been signed by the assessor - this was not always done.

Standard of assessment

Evidence of marking practice was variable, with the better centres providing fully annotated work, and the weaker centres with no marking on the scripts at all. There was also variability in terms of the comments entered onto the CRS sheets. One centre also marked in half-marks, which is not required. The standard of assessment was good in only a few cases. In some cases it was very disappointing. In a number of cases the assessor seemed to be unaware of the marking guidance. Generally marking was very lenient with the assessor giving the total marks for a Band when they were not justified. Many assessors seemed unaware of the increasing requirements on the answer as the Mark Bands progressed.

For a number of centres all samples moderated fell outside the tolerance bands, and so required the full sample moderated.

Administration

One centre submitted all the learner evidence as PowerPoint presentations in electronic format with nothing paper-based apart from the CRS. For this session only it has been accepted as valid evidence but for the future it should be supported by witness statements. For Learning Outcome 2 the assessor for one centre made reference to a test when learners were identifying components - there was a statement in the CRS but no proper record of how they achieved their score.

OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6. Others were very slow and held up the moderation process.

The majority of samples of coursework were received after the deadline date of 5 June 2009, with most being between one and two weeks late. A number of centres subsequently withdrew from this assessment round. It was evident that a number of centres, especially where they were part of a cluster, were not ready for assessment. It was apparent that centres were not entirely familiar with the administrative procedures and the requirements to enter marks onto the Edexcel Gateway and print and sign mark return sheets. This might be a requirement for further training or education for centres.

Most centres did, however, send the correct sample including the work of the highest and lowest learners.

Not all centres returned signed CRS and a few errors in marks entered on-line were found and reported to Edexcel for correction.

Learning Outcome 1

There was a big variation between centres. Some had learners who presented no evidence of working safely and seemed to be carrying out tasks only partially aligned to the marking guidelines. Others provided the correct evidence to prove safe working. One trap that many learners fell into was identifying/demonstrating safe working practices not specific to working with electronic circuits e.g. wearing eye protection when working on a lathe or using correct procedures when lifting heavy objects.

The same variation occurred with the calculation part of this Learning Outcome. In many cases full working out was not shown and one centre incorrectly gave learners a list of fuses to guess/choose from. Several learners were not able to access full marks for Mark Band 3 because they forgot to include a statement about assumptions made.

Most learners identified a useful range of health and safety precautions and many were able to score in Mark Bands 2 and 3.

Learning Outcome 2

A variation between centres was noticed. One centre restricted learners to identifying six components and also awarded from Mark Band 3 without there being a second circuit in evidence. Other centres ensured that learners were able to identify at least 12 electronic components and to then go on to select components for two different applications. Where it appeared that learners had been well supported by the centre very good evidence for Mark Bands 2 and 3 was presented.

Quite a few learners tended to identify rather than select components when gathering evidence for the higher Mark Bands. Catalogue part numbers or references were not always presented.

Learning Outcome 3

There was a big variation between centres. Some centres gave marks too leniently in respect of the description of the overall function of the circuit constructed. In many cases there was no evidence presented to support Mark Band 3. Other centres gave learners tasks which allowed them to fully access all three Mark Bands.

Function of components usually covered with some circuit descriptions but more detail would have helped learners here. Other learners were able to explain the overall operation of a given circuit and its individual component so producing a well answered question.

Learning Outcomes 3 and 4 (Marking Grid B)

It is noted that some centres provided witness statements to support the evidence, which included photographs. It appears that many statements did not properly support evidence being presented for the higher Mark Bands and would have been an issue if Marking Grid B evidence were subject to moderation.

Level 2 Unit 6 Application of Manufacturing Techniques in Engineering

General comments

The provision of witness evidence, in any form, was generally poor making it difficult to moderate learner work. For some centres there was a statement for Marking Grid B that covered some of the students, but not all. In some cases there was a box in the task sheet that should have been signed by the assessor - this was not always done.

Standard of assessment

The standard of assessment was good in only a few cases. In some cases it was very disappointing. In many cases the assessor seemed to be unaware of the marking guidance and gave the total marks for a Band when they were not justified.

Assessors in general seemed unaware of the increasing requirements on the answer as the Mark Bands progressed.

All samples for one centre moderated fell outside the tolerance bands, and so required the full sample to be moderated.

Evidence of marking practice was variable, with the better centres providing fully annotated work, and the weaker centres with no marking on the scripts at all. There was also variability in terms of the comments entered onto the CRS sheets. One centre also marked in half-marks, which is not required.

Administration

OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also candidate numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6 requests. Others were very slow and held up the moderation process.

All samples of coursework were received after the deadline date of 5 June 2009, with most being between one and two weeks late. A number of centres subsequently withdrew from this assessment round. It was evident that a number of centres, especially where they were part of a cluster, were not ready for assessment.

It was apparent that centres were not entirely familiar with the administrative procedures and the requirements to enter marks onto the Edexcel Gateway and print and sign mark return sheets. This might be a requirement for further training or education for centres.

Most centres did, however, send the correct sample including the work of the highest and lowest learners.

Not all centres returned signed CRS and a few errors in marks entered online were found and reported to Edexcel for correction.

Learning Outcome 1

Most learners identified their own role or roles as part of the team, but this was not described in detail. There was some evidence of reflection on own strengths and weaknesses, and suggestions on how their performance could be improved. This is required for access to the higher Mark Bands.

One centre wrongly awarded marks for evidence relating to team strengths and weaknesses whereas the Learning Outcome was about the learner specifically. This has been consistently too generously marked by the centre - few witness statements or proper indication of strengths and weaknesses were provided.

One centre submitted a DVD to prove evidence of team working - good in principle but not useful as it turned out to be a long Q&A session led by the teacher. Apart from proving that the learners sat round a table it did little to support evidence of effective team working.

Learning Outcome 2.1

Generally the evidence presented for this Learning Outcome was poor with learners not being properly directed about what to look for in product drawings.

In most cases a CAD drawing had been presented, and in some cases annotated although this was very basic. There was little evidence of written interpretation from the drawing about how the item might be produced, including interpretation of dimensions, materials or techniques to be used. A written critique of the information presented on the drawing would have been useful.

At one centre the learners do not appear to have been given product drawings or specifications from which to identify and describe product information. Irrelevant information was also presented about types of drawing projection e.g. oblique, isometric etc clipped from an unspecified source.

Learning Outcome 2.2

Production plans were mainly very brief one line lists and no schedule being presented. Many learners tried to present their plan in the form of a log book but this did not work properly, reading more like a diary of what had been done. Some log books were presented in tabular form and listed what happened during the delivery of the unit i.e. what was taught to them. Many production plans looked as though they were put together as an after-thought when the product had already been manufactured.

A Gantt chart had been produced in many cases. The sequence of events was not realistic in some cases for the manufacture of a quantity of the item (with the Gantt chart showing time in weeks or days). In many cases the sequence of events was not justified so limiting access to Mark Band 3.

Learning Outcome 4

Generally the evidence presented was very poor with no reference to or use of three different quality control techniques as required in the assessment guidance for Mark Band 1. Techniques were not correctly identified. The equipment for making measurement was usually only vaguely mentioned. Many learners were not able to specify the criteria against which the item was being checked and presented no statistics.

Learners at one centre presented a quality assurance chart which showed the dimensions and tolerances but there was no evidence to indicate what inspection techniques were actually used (e.g. rule, callipers, vernier, micrometer).

There was no analysis of the reasons for the success or failure of production and no suggestions for improving the manufacturing processes. There was also very little statistical data presented or analysed so limiting access to Mark Band 3.

Level 2 Unit 7 Applications of Maintenance Techniques in Engineering

General comments

For some centres the provision of witness evidence was very poor, making moderation difficult. For some centres there was a statement for Marking Grid B that covered some of the learners but which should have been a Marking Grid A statement. In some cases there was a box in the task sheet that should have been signed by the assessor - this was not always done.

Standard of assessment

For a number of centres the assessor seemed to be unaware of the marking guidance. Generally marking was very lenient. Many assessors seemed unaware of the increasing requirements as you move across the Mark Bands.

Administration

A number of centres failed to send the correct sample. OPTEM/EDI printouts were often not included and front sheets were missing from some centres. Also learner numbers were not shown on sheets. Consortia sent work with no indication of which centre it was from. The numbers had to be obtained from Edexcel Gateway. Some centres responded very well to E6 requests. Others were very slow and held up the moderation process.

Learning Outcome 1.1

Generally too many marks were given. Marks were given at Mark Band 2 and 3 without reference to the marking guidelines. Most learners described two types of maintenance but the evidence lacked detail about the appropriateness for each of these.

Learning Outcome 1.2

Again too many marks were given because the Marking Grid was not accurately applied. There was some evidence of using statistical data but most learners only achieved Mark Band 1 because calculations and description were weak.

Learning Outcome 2.2

Most learners were not able to devise an effective maintenance procedure. Maintenance procedures lacked any detail about resources, tooling and safety. Most learners provided lists that could be developed further with additional detail, sufficient for a third party to perform the procedure. Many learners did not seem have been properly briefed on how to approach this task because when devising a new maintenance procedure they took no account of experience gained from following a previous one. Some learners fell into the trap of downloading standard procedures from the web or lifting them from reference documentation such as a Haynes manual.

Learning Outcome 3.1

A variation between centres was noticed. In some cases too many marks were awarded and again without the correct application of the marking guidelines. Some implications were described by learners with some indication of how these could be reduced by maintenance. Where learners justified the maintenance against the implications, higher marks were achieved.

Learning Outcome 3.2

The Learning Outcome requires the learner to identify spares or replacement parts for a given maintenance task, but not many were able to do this. One centre set a task which did not offer learners the opportunity to meet this focus (a stock tracking task was given). Learners need to identify spare or replacement parts for a given maintenance task and, for the higher Mark Bands, describe the consequences of not maintaining adequate spares levels.

Learning Outcome 4

A variation between centres was identified particularly in the approach to risk assessment. Many used a proforma technique, not linked to a maintenance procedure but containing generic statements about health and safety. A good number of learners wasted time and effort producing hand drawn pictures of Health & Safety warning signs found in workshop areas. This was particularly noticeable for learners based in schools. References to the storage of PPE were generally weak.

Where centres had obviously provided good guidance, learners presented evidence suitable for Mark Bands 2 and 3. Learners achieving higher marks were those who included detailed assessor witness statements in their portfolios.

Level 2 Unit 8 Exploring Engineering Innovation, Enterprise and Technological Advancements

General Comments

Overall, the paper produced a good range of responses. Lower ability learners often gave generic responses to questions, such as 'test/stronger/lighter/get a loan' that gained limited marks. Some learners often repeated answers or phrases which limited their access to some marks. The more demanding questions at the end of the paper provided learners with an opportunity to expand and apply their knowledge and it was pleasing to see some good responses.

Learners would benefit from being taught examination skills and techniques as often they did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Question 1 is aimed at (a) identifying types of intellectual property, (b) identifying a specific intellectual property and explaining why it is used (c) understanding why a given intellectual property is used, (d) explaining the advantages of registering intellectual property.

Part (a): the majority of learners correctly associated the different types of intellectual property with their descriptors.

Part (b): many learners incorrectly identified which intellectual property should be chosen based on information in the pre-release but were able to correctly explain its use.

Part (c): many learners were able to give valid advantages for registering intellectual property. Typical responses included 'stop it being stolen' and 'stop the product being copied'.

Question 2 is aimed at (a) raising finance, (b) testing the product, fit-for-purpose, (c) market research.

Part (a): this question was answered well with most learners scoring high.

Part (b): a significant percentage of learners could not adequately describe industrial testing techniques. Testing methods such as pressure tests, reliability tests, soak tests etc. were given by some learners. Answers such as 'produce a working model' or 'prototyping' were also typical.

Part (c): most learners were able to give explanations of why market research is needed.

Question 3 is aimed at testing knowledge of materials and their properties. The questions were set in the context of the pre-release, in particular, the pole. The question also required knowledge of an appropriate mass production process.

For part (a) and (b) most learners stated a suitable material and matched its properties.

Part(c): most learners were able to list at least one benefit to the manufacturer of choosing their stated material with the better learners being able to identify three.

Part (d): a reasonable proportion of learners were able to give a response to this question. However, knowledge of a typical mass production process was patchy. The majority of answers were focused on injection molding but few learners gained full marks.

Question 4 is aimed at alternative energy sources and their impact on the environment.

Part (a): answers were very generic such as 'cheap', 'sustainable' and 'wont work if not windy/sunny'. Marks were lost by some learners for repetition.

Part (b): many learners had a good understanding of the positive impact alternative energy sources have on the environment and accessed high marks.

Question 5 is aimed at (a) environmental issues with the production of a new product, (b) an explanation of the social impact of using the new product. Part (a) was generally well answered with most learners attracting some marks; very high and low responses were limited in number. Some responses were generic and limited to a narrow range of questions. Part (b) had a similar result with many learners attaining mid-range marks, explanations were generally limited.

Question 6 is aimed at explaining the impact on the environment of (a) protective packaging and assembly documentation and (b) distribution of the product to the end user and how it can be reduced.

The majority of learners sitting the examination paper attempted the final questions. This is pleasing as it is good exam technique for learners to attempt all questions. Many learners were able to gain good marks for this question with responses which showed a good level of general knowledge about environmental issues.

Statistics

Level 2 Unit 1 Exploring the Engineering World

	Max. Mark	A*	A	B	C
Raw boundary mark	60	53	43	33	24
Points Score	10	8	6	4	2

Level 2 Unit 2 Investigating Engineering Design

	Max. Mark	A*	A	B	C
Raw boundary mark	60	53	43	33	23
Points Score	10	8	6	4	2

Level 2 Unit 3 Engineering Applications of Computers

	Max. Mark	A*	A	B	C
Raw boundary mark	60	52	42	33	24
Points Score	10	8	6	4	2

Level 2 Unit 4 Producing Engineering Solutions

	Max. Mark	A*	A	B	C
Raw boundary mark	60	54	44	34	25
Points Score	10	8	6	4	2

Level 2 Unit 5 Electrical and Electronic Circuits and Systems

	Max. Mark	A*	A	B	C
Raw boundary mark	60	54	44	34	25
Points Score	5	4	3	2	1

Level 2 Unit 6 Application of Manufacturing Techniques in Engineering

	Max. Mark	A*	A	B	C
Raw boundary mark	60	53	43	33	24
Points Score	10	8	6	4	2

Level 2 Unit 7 Applications of Maintenance Techniques in Engineering

	Max. Mark	A*	A	B	C
Raw boundary mark	60	53	43	33	24
Points Score	5	4	3	2	1

Level 2 Unit 8 Exploring Engineering Innovation, Enterprise and Technological Advancements

	Max. Mark	A*	A	B	C
Raw boundary mark	60	53	44	35	26
Points Score	10	8	6	4	2

Notes

Centres are reminded that this is the first summer examination for this new specification and that boundaries may change in the following series

Maximum Mark (raw): the mark corresponding to the sum total of the marks shown on the Mark Scheme or Marking Grids.

Raw boundary mark: the minimum mark required by a learner to qualify for a given grade.

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