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Moderators' Report/ Principal Moderator Feedback

Summer 2013

Principal Learning

Engineering
Level 1 Controlled Assessments

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Introduction

During this series, the centre/consortia marking for the internal units was generally in line with the national standard. It was clear that one person had completed the student assessment (for a given centre/consortia/unit) in virtually all cases, and hence internal standardisation was rarely an issue in this series; however, centres/consortia are advised that such a process is very important when multiple assessors mark the same unit.

'Annexe E' in the Principal Learning specification gives guidance as to how this should be carried out. Pleasingly, there was evidence from a number of centres/consortia that internal verification procedures had been used to check assignment briefs and assessor marks, and this is considered good practice.

In general, most aspects of administration for the internal units were good, with the correct samples being provided (including the work of those students with the highest score and lowest non-zero score for each unit), although several centre/consortia packages were sent to moderators after the submission deadline. Generally, a Candidate Record Sheet (CRS) was signed by each student and the teacher/tutor, and centre/consortia marks were recorded correctly, on the CRS; however, student and centre/consortia numbers were sometimes incorrect or missing, and centres/consortia are reminded that these are vital pieces of information if the moderation process is to operate smoothly. Further, centres/consortia should ensure that the marks for Learning Outcomes 2.1, 2.2, 2.3 and 2.4, for EG105, are noted separately on the CRS (each out of 7); in some instances, the marks for these Learning Outcomes were combined (to provide a mark out of 28), which presented moderation difficulties.

Most student work was organised in such a manner that it was straightforward for the moderator to locate the evidence for each Learning Outcome; however, centres/consortia should:

a) encourage students to number each page in their work;
b) note these page numbers, for each Learning Outcome, on the CRS;
c) send student folders, to the moderator, that are securely bound with a single treasury tag in the top left hand corner (not in plastic wallets, or other types of heavy folder).

Centres/consortia should recognise that if student evidence is provided in an organised fashion, by Learning Outcome, this greatly assists internal standardisation, as well as external moderation. Further, some centres/consortia sent a quantity of unnecessary student work to the moderator that was not associated with the summative assessment (i.e. course delivery materials), and others did not provide an EDI (Edexcel Online) print out of the centre/consortia marks for each student. Centres/consortia are reminded that marks on the EDI print out (via Edexcel Online) should match those on the CRS.

In this series, as in previous series, students were not given credit for implicit evidence. Students and/or centres/consortia must provide explicit evidence for each Learning Outcome, and hence centres/consortia should endeavour to assess each Learning Outcome in a similar manner. As a result, it would be advisable,

and very helpful, for all assessors to annotate student work, in order to clearly identify where marks have been awarded, linked to the appropriate Marking Grid (some good examples of this type of annotation were seen in this series), with page numbers noted on the CRS.

Centres/consortia are reminded that each unit specification has a section entitled 'Guidance for allocating marks', which should be referred to when designing/completing summative assessments. Further, centres/consortia 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 students have the opportunity to address all of the assessment requirements, in each of the three Marking Bands, for each Learning Outcome. This will often involve the use of annotated photographs and Student Observation Records (the latter completed by the teacher/tutor), especially for Marking Grid B and other practical evidence, which centres/consortia are actively encouraged to submit as supplementary evidence/assessment affirmation for the student in question.

Centres/consortia should also be aware that, at this level, the use of templates is actively encouraged when the summative assessment approach is improved by their use - please see the comments regarding Learning Outcome 5 for EG102, and the comments in the Principal Moderator reports for EG104, EG105 and EG106. Nevertheless, some centres/consortia again relied on the use of the Edexcel 'Activity Sheets' (from the Teacher Resource Disk) when asking students to generate summative assessment evidence for several units; this is not recommended, as these documents are designed as course delivery resources rather than assessment activities, and as a result restrict the level of attainment.

Centres/consortia were given individual feedback by a moderator, via an E9, with comments noting possible areas where the summative assessment approach could be improved.

Unit EG102_1A
Practical Engineering and Communication Skills

During this series, the internal centre/consortia marking for this unit was generally in line with the national standard.

Learning Outcome 1 (Marking Grid B)
In this series, the majority of students provided evidence of being able to identify and apply the requirements of working safely with colleagues in a familiar and unfamiliar context (to a lesser extent – see below), explaining why key aspects of relevant health and safety legislation are necessary. This Learning Outcome was approached in a different manner across centres/consortia; nonetheless, it was pleasing to note that the vast majority of assignment briefs allowed students to access Mark Band 3. For example, a number of students 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 later, the tutor wrote a Student Observation Record qualifying the ability of the student to carry out a different types of engineering procedure safely etc.

In future series, centres/consortia may wish to combine aspects of the controlled assessment for this Learning Outcome with LO.3 (see below), in order to further contextualise the assessment approach (i.e. students could demonstrate they are working safely [LO.1] when dismantling an engineered product [LO.3]). In addition, it was noticeable that fewer students 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/consortia may wish to ask students what they would do to ensure safe working if they were going to perform a given task for the first time, and this evidence could be captured using a Student Observation Record.

Learning Outcome 2 (Marking Grid A)
In this series, the majority of students were clearly able to describe two cutting processes, two forming processes and a joining process (for Mark Band 2). A smaller number of students just identified the aforesaid processes (Mark Band 1) and fewer still compared the cutting and forming processes (Mark Band 3). However, a pleasing number attempted to relate each process to an industrial application.

Considering future series, it would be more appropriate for students to state examples of cutting/forming/joining processes that are more akin to industrial manufacturing (although better examples were seen in this series as compared to earlier series). Whilst 'sawing' is a cutting process, a better example would be to describe, for example, the use of a laser or water jet 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. Further, the two cutting and forming processes identified/described should be sufficiently

different, i.e. ‘turning a shaft’ and ‘milling a block’, rather than ‘cutting with a hack saw’ and ‘cutting with a power saw’.

Some students provided good sketches/imagery of the processes they identified/described and this is to be encouraged, as it provided a simple means of comparison. In some centres/consortia this Learning Outcome was evidenced by the use of a table, which required the student to identify a specific process that may apply to a series a given tasks. This allowed the student to show that they knew the difference between cutting, forming and joining processes, and this was followed by a series of short questions requiring the student to describe the various processes and then compare two of them. Centres/consortia should also note that good descriptions of, for example, numerous joining processes, will still only generate the marks allocated to this particular piece of student evidence. Students need to provide evidence that they can identify/describe/compare cutting, forming and joining processes, not just one of the aforementioned.

Learning Outcome 3 (Marking Grid B)
In this series, as in earlier series, the majority of students provided evidence of being able dismantle a product, clean and lay out the component parts and consequently reassemble the product. A smaller, but still sizeable, number of students provided evidence of using documentation to select equipment when dismantling the product. A minority of students identified parts needing replacement and fewer still compiled a report including parts for replacement and reasons for replacing them.

Several students wrote a report, but generally such reports were a retrospective narrative of the procedure carried out. Some centres/consortia made good use of annotated photographs and Student Observation Records covering the strip, clean, layout, check and rebuild of various engineering devices, and this is to be encouraged/commended for capturing evidence of the practical activities. 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 student, thereby justifying the allocation of marks. Such photographs would have also been appropriate as evidence for aspects of LO.1 (see above), if the student followed the appropriate health and safety procedures/precautions.

In future series, centres/consortia should provide students with a product that does require replacement parts. Further, centres/consortia may wish to provide students with documentation (possibly in the form of a template) that includes an area for reflection/review after each stage of disassembly, with a further area for students to note parts requiring replacement. The aforementioned 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 students produced sketches of an engineered product in orthographic 1st and 3rd angle projections. Most students also produced an isometric view of the same product, and all of these sketches were, in the main, correctly dimensioned.

Most students had clearly put some time and effort into their work for this Learning Outcome. Fewer students produced a correct oblique view; however, it was pleasing to note that many students were able to provide evidence of centre lines and/or hatching and/or common drawing conventions and layouts (eg a title block, border etc). The majority of centre/consortia assignment briefs are now a better interpretation of the Marking Grid for this Learning Outcome, which allows more credit for the scope/accuracy of the drawings rather than the detail required.

Considering future series, centres/consortia must note that the product/s to be sketched should allow students the opportunity to generate all 3 elevations (side, front and plan), when considering the orthographic projections; a single view is not acceptable.

Learning Outcome 5 (Marking Grid A)

In this series, most students compiled a plan of operation to produce an engineered product. A small number of students reviewed the success of the plan, and fewer still explained how changes to their plan would lead to improvements in planning or manufacture; as a result, this prevented many students from accessing Mark Band 3. Some students still provided their plan of operation as a written narrative, rather than using a table format, and this often meant key elements of the plan, such as materials or tools required, were missing. The majority of students subsequently provided evidence of manufacturing the engineered product, through the use of annotated photographs and Student Observation Records. A notable number of students had again written the plan retrospectively; centres/consortia are again advised that no credit can be awarded for this.

Considering future series, centres/consortia are advised to provide students with a blank plan of operation table/template, 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/consortia, students were required to complete a reflective production diary, including suggestions for improvements, as evidence of reviewing their plan (not their product), and this is considered to be good practice. A reflective diary is also appropriate confirmation that the student actually undertook the manufacture of an engineered product, if supplemented with a Student Observation Record and/or annotated photographs to capture the practical evidence of manufacture. Centres/consortia are advised that students cannot access MB2 or MB3 marks unless a review of the plan of operation (not the product) is evident.

Unit EG103_01
Introduction to Computer Aided Engineering

During this series, the internal centre/consortia marking for this unit was generally a little lenient when compared to the national standard. However, it was pleasing to note that many centres/consortia required students to complete a single controlled assignment based upon a simple engineered item (such as a turned/tapered shaft or a milled/routed block) for this unit, and this is good practice, as students were able to access Mark Band 3 for all Learning Outcomes. Concentrating on a single, simple item, for all 3 Learning Outcomes, helps to contextualise the assessment and allows students to focus on producing the necessary evidence as stated in the Marking Grid.
Centres/consortia should note that Student Observation Records alone are not sufficient evidence for any of the Learning Outcomes for this unit.

Learning Outcome 1 (Marking Grid A)
In this series, the majority of students 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 significant number of students provided evidence of preparing a template for these drawings, but some still failed to include important elements, such as a title block and/or the truncated cone symbol. Many students did not provide explicit evidence that they had used separate layers for the dimensioning, annotation etc (via a colour print out), but often a Student Observation Record was provided by the assessor to confirm they were utilised. It was again clear that many students had put time and effort into their work for this Learning Outcome; however, students were still sometimes required to produce a drawing (BS:8888) that was unrelated to the engineered item to be manufactured for Learning Outcomes 2 and 3, and both drawings (BS:8888 and BS:3939) were still somewhat complex at times, which was unnecessary (see below).

In future series, centres/consortia should ask students to print out their template (and/or a screen shot) prior to any drawings being added to it. Similarly, screen shots and/or print outs, that show, for example, the dimensioning in a different colour, would be appropriate to provide explicit evidence of the use of layers. Further, some centres/consortia should ask students 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 CAD drawings as it is about the final outcome, and as a result, centres/consortia may also wish to provide supplementary procedural evidence in the form of Student Observation Records; however, centres/consortia are advised that Student Observation Records alone are not sufficient evidence for this Learning Outcome.

Learning Outcome 2 (Marking Grid A)
In this series, as in earlier series, the majority of students 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, most students were able to provide evidence that they had the ability to process the cutter path data into a coded CNC operating program (for Mark Band

1). It was again pleasing to note that most centres/consortia then provided students with the opportunity to identify and amend errors in program operation (often by modifying the original item), and a good percentage of students evidenced their fault finding and rectification, although a much smaller number of students provided evidence of rerunning the cutter path graphic simulation. Most students used screen shots with some annotation (and program code print outs) when providing evidence for this Learning Outcome, and this is to be commended, as such evidence was clear and easy to follow.

Considering future series, centres/consortia may wish to provide a guide for students to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another screen shot with simple annotation would suffice to provide evidence of using cutter path graphic simulation, yet this was still seen infrequently. Further, centres/consortia could provide students with a template or framework into which they could note details relating to the introduced error/s (i.e. a description of the problem). A further screen shot/s showing the cutter path graphic simulation being rerun, following amendments by the student, with brief annotation noting how effective the changes were, would allow students to access the top of Mark Band 3. Three pages of A4, with five to six large screen shots covering all elements of the Marking Grid, including associated annotation/details, would suffice for this Learning Outcome. Student Observation Records could also be used to support evidence of students undertaking the necessary tasks to the required standard; however, centres/consortia are advised that Student Observation Records alone are not sufficient evidence for this Learning Outcome.

Learning Outcome 3 (Marking Grid A)

In this series, the majority of students provided evidence of loading a CNC program into the controller, and of setting work data and tool offset values. The majority of students also provided evidence of executing the program to produce a first-off component, safely (often via annotated images, perhaps showing the student wearing PPE or traversing the work piece away from the tool in order to unload). Fewer students 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 students compiled a basic inspection report including reasons for non compliance and actions, which mainly resulted from centres/consortia requiring students to complete, review and reflect upon an inspection sheet that recorded the dimensional accuracy of the item in question. The majority of centres/consortia required students to annotate images/photographs, or print screen shots, when providing evidence for this Learning Outcome, which again is to be commended; such evidence was clear and easy to follow.

Considering future series, centres/consortia may again wish to provide a guide for students to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another annotated photograph, providing evidence of students experimenting with either physical or VDU-based feed and/or speed override controls, would have enabled many students to gain access to Mark Band 3, as opposed to Mark Band 2. Further, another screen shot with simple annotation would have sufficed to provide evidence of editing the CNC program to incorporate the optimum override values. Student Observation Records could again be used to support evidence of students undertaking the

necessary tasks to the required standard; however, centres/consortia are advised that Student Observation Records alone are not sufficient evidence for this Learning Outcome.

Unit EG104_1A

Developing Routine Maintenance Skills

During this series, the internal centre/consortia marking for this unit was generally in line with the national standard.

Learning Outcome 1.1 (Marking Grid A)
In this series, most students were able to state three types of maintenance procedures carried out in industry. Further, most students were able to state why the procedures are used, but some struggled to submit sufficient evidence in relation to how the procedures are carried out.

In future series, centres/consortia should ensure that they require students to link the three types of procedure to an industrial application, so they are able to attain full marks from Mark Band 1.

Learning Outcome 1.2 (Marking Grid A)
In this series, almost all students were able to state two types of documentation that can be used, and most were able to cite a maintenance task that can be carried out. However, the majority of students did not submit sufficient evidence associated with what the documentation covers and where/how it would be used.

In future series, centres/consortia should consider using a framed template for both parts of Learning Outcome 1; this will assist students to present the full range of appropriate evidence. Centres/consortia should also note the natural link between Learning Outcomes 1.1 and 1.2, and could consider combining the two when writing an appropriate assignment brief for this unit.

Learning Outcome 3 (Marking Grid A)
As in previous series, this Learning Outcome proved the most challenging for the majority of students.

In this series, 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 their ability to use simple tools and equipment. Most students recorded key measurements as part of this process. However, the majority of students had difficulty reviewing the plan in relation to its effectiveness, and struggled to make improvements to it.
This situation could be improved if centres/consortia revisited and gave more thought to the assignment task setting and subsequent guidance given to students, as this could enable access to Mark Band 3. Centres/consortia should consider allowing students 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)
All centres/consortia used a practical setting to allow students to provide evidence for this Learning Outcome. A range of tasks were seen, which was pleasing; however, the use of annotated photographs and Student Observation Records was not consistent across centres/consortia. Centres/consortia should

consider how they can evidence whether each student has been provided with guidance, limited guidance etc, which is a key indicator that restricts access to the higher Mark Bands for this Learning Outcome. This ‘process type’ evidence can be appropriately referenced using the aforementioned Student Observation Record.

Unit EG105_1A
Introduction to Engineering Materials

During this series, the internal centre/consortia marking for this unit was generally in line with the national standard.

Learning Outcome 1 (Marking Grid A)
This Learning Outcome was evidenced to a good standard by the majority of students. In most cases, material properties were stated and definitions were given. It was apparent that a large proportion of students had a good understanding of the link between material properties and applications.

In most centres/consortia the assessment was in line with the national standard for this Learning Outcome. Centres/consortia are reminded that in order to gain full marks a student needs to state four material properties, define three of them, and then explain how the applications of two materials are influenced by the properties of these materials.

Learning Outcome 2.1 (Marking Grid A)
This Learning Outcome was generally tackled well by students, with many producing some appropriate evidence. Most students were able to: a) identify three ferrous metals; b) state an appropriate forming process and an engineering application for the identified ferrous metals; and c) describe the properties of two of the identified ferrous metals. However, few students justified the use of the stated forming processes for two of the identified ferrous metals. Further, it is not appropriate to consider three steels with different levels of carbon content; centres/consortia should require students to consider a wider range of materials, such as cast iron, stainless steel and high speed steel. It is also not appropriate to state casting as a forming process for all of the ferrous metals indicated.

In some instances, students did not provide either a suitable forming process and/or an appropriate application for each material; this prevented them from accessing both Mark Band 1 and Mark Band 3 marks (where applications and forming processes are justified in relation to material properties).

Some centres/consortia made good use of writing frames and tables for this Learning Outcome, in order to encourage students to generate Mark Band 3 evidence.

Learning Outcome 2.2 (Marking Grid A)
As with Learning Outcome 2.1, this Learning Outcome was generally tackled well by students, with many producing some appropriate evidence. Most students were able to: a) identify three non-ferrous metals; b) state an appropriate forming process and an engineering application for the identified non-ferrous metals; and c) describe the properties of two of the identified non-ferrous metals. However, few students justified the use of the stated forming processes for two of the identified non-ferrous metals.
Again, in some instances, students did not provide either a suitable forming process and/or an appropriate application for each material; this prevented them from accessing both Mark Band 1 and Mark Band 3 marks (where applications and forming processes are justified in relation to material properties).

Again, some centres/consortia made good use of writing frames and tables for this Learning Outcome, in order to encourage students to generate Mark Band 3 evidence.

Learning Outcome 2.3 (Marking Grid A)
The majority of students provided some appropriate evidence for this Learning Outcome. Pleasingly, almost all students considered an elastomer and therefore provided information associated with two, rather than three, thermoplastics (as has been the case in previous series). It is a requirement of all three mark bands that two thermoplastics and one elastomer are considered, and this improvement in the provision of student evidence is welcomed. Nevertheless, few students attempted to justify the use of the stated forming processes for a thermoplastic/elastomer (Mark Band 3).

Again, in some instances, students did not provide either a suitable forming process and/or an appropriate application for each material; this prevented them from accessing both Mark Band 1 and Mark Band 3 marks (where applications and forming processes are justified in relation to material properties).

Learning Outcome 2.4 (Marking Grid A)
The majority of students produced some appropriate evidence for this Learning Outcome, with work across Mark Bands 1 and 2 evident. However, students should be required to provide a range of appropriate processes in relation to the three identified thermosetting plastic materials; it is not appropriate to state 'lay-up' or 'injection moulding' for two or more materials. Centres/consortia should note that it is advisable to provide students with a selection of materials from which to choose, which would allow for a range of forming methods to be identified. As with Learning Outcome 2.3, there was little evidence of students attempting to justify the use of the stated forming processes for two thermosetting plastics (Mark Band 3).

Again, in some instances, students did not provide either a suitable forming process and/or an appropriate application for each material; this prevented them from accessing both Mark Band 1 and Mark Band 3 marks (where applications and forming processes are justified in relation to material properties).

Learning Outcome 3.1 (Marking Grid A)
In this series, most students could describe what three different material abbreviations meant (Mark Band 1). Further, some centres/consortia provided suitable documentation, such as parts lists or drawings, from which most students could identify two further materials (Mark Band 2). However, in some instances these materials were the same as those provided for the Mark Band 1 assessment task, which is not appropriate. Mark Band 3 work was also evident; nonetheless, some students were still not able to identify forms of raw material and their dimensional requirements (as was the case in previous series).

Learning Outcome 3.2 (Marking Grid B)
In most cases, the evidence for this Learning Outcome consisted of reports, tables of results and Student Observation Records, which were appropriate and generally supported the marks awarded. Some centres/consortia provided very good photographic evidence for this outcome, which was commendable. It is

again suggested to centres/consortia that a comprehensive Student Observation Record is useful supplementary evidence to support the marks awarded for Marking Grid B work.

Learning Outcome 3.3 (Marking Grid A)
Most students presented material testing reports for this Learning Outcome. In general, students carried out two tests on two different materials, but there was little evidence that they had selected appropriate tests (Mark Band 3). However, many students made a good attempt at comparing their results/outcomes from the material tests; importantly, this comparison was linked to mechanical properties in some cases.

Invariably, the evidence for this Learning Outcome could have been enhanced by the use of annotated photographs, although in some cases the centre/consortia use of a Student Observation Record supported the marks which had been awarded. Often, the said Student Observation Record supplemented the written work submitted by the students themselves, and this is considered to be good practice.

Unit EG106_1A

Electronic Circuit Construction and Testing

During this series, the internal centre/consortia marking for this unit was generally in line with the national standard.

Learning Outcome 1 (Marking Grid A)
In this series, most students were able to identify six components from a given circuit diagram, and a further four other components. Centres/consortia should note that the further four symbols should be identified from a selection of physical components (for Mark Band 2). Most students were able to state some key features of components, but examples of what a key feature was varied across centres/consortia. Tolerances, working voltages, power ratings, maximum current and temperature ranges are typical key features that could be cited by students.

In summary, most students were able to access Mark Bands 2 and 3 due to appropriate assessment tasks. This Learning Outcome was tackled well, yielding some high marks.

Learning Outcome 2 (Marking Grid A)
In this series, almost all students were able to sketch an electronic circuit diagram, including six symbols. Some sketches were neater than others. Mark Band 2 calls for students to reproduce the sketch using a computer software package. This did not pose too many problems for the vast majority of students. 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/consortia are advised to state file pathways, and provide associated screen shots.
In summary, most students were able to access Mark Band 3.

Learning Outcome 3 (Marking Grid A)
In this series, this Learning Outcome proved the most challenging. Evidence to justify planning, or working within a team, was not consistent across centres/consortia. At Level 1, students require more detailed guidance and direction from tutors that will enable them to fully understand the requirements of this Learning Outcome. A detailed set of meeting minutes could highlight what planning was discussed, and the contribution made by each member of the team. A meeting template proforma could be given to each student. Some centres did attempt to adopt this approach, but they were in the minority.
It was clear that students had built the circuit, in its various forms, as most centres/consortia provided photographs; however, some of these showed far more detail than others.

It is imperative in future series that centres/consortia provide clear evidence of the student working safely. Suitable annotated photographs would suffice, and/or a Student Observation Record could be provided.

In summary, almost all students accessed Mark Band 2, and some were able to access Mark Band 3.

Learning Outcome 4 (Marking Grid B)
In this series, most students were able to use a software simulation package to undertake basic tests. The requirement to undertake six measurements did challenge some students. Centres/consortia are advised that the six measurements do not all have to be waveform outputs. Voltage tests will also suffice.

Evidence of the use of physical test equipment to take measurements was apparent during this series, although not from every centre/consortia. Some centres/consortia generated Student Observation Records, and the use of annotated photographs was also more prevalent. Providing both of the aforementioned forms of evidence is considered to be good practice.

Some students 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 evidenced well.

In summary, most students accessed Mark Band 2; very few accessed Mark Band 3.

Unit EG107_01
Engineering the Future

During this series, the internal centre/consortia marking for this unit was generally closer to the national standard than in the previous series, but still a little severe. Numerous students were not awarded suitable marks for evidence that was creditable. Centres/consortia are reminded that the unit specification has a section entitled 'Guidance for allocating marks', which should be referred to when assessing student evidence.

Learning Outcome 1 (Marking Grid A)
Students were able to state appropriate materials in most cases; polymorph, shape memory alloys, phosphorescent pigments and carbon fibre composites were amongst the most prevalent. However, there was a tendency to describe the properties and applications of the said materials in a very limited manner, and hence Mark Band 3 scores were rare for this Learning Outcome.

Centres/consortia are reminded that marks should be awarded for the identification of materials by the student; hence, the provision of these in the assignment brief will have the effect of restricting the attainment of students, as a maximum of three marks will be available from MB1.

Learning Outcome 1.2 (Marking Grid A)
In this series, most students identified three new engineering technologies, and were then able to state brief examples of how they are used. However, the majority of students didn't give enough information about the application of each technology, or they did not credit their sources (from the internet), and lost marks as a result. Nonetheless, it was noted that technologies such as smart windows and self healing polymers added variety to assignments and were of interest to the students. As in previous series, there was little consideration of social and environmental issues associated with the technologies, which is why many students failed to attain a Mark Band 3 score.

Learning Outcome 2 (Marking Grid A)
In this series, most students were able to give examples of appropriate recyclable and non recyclable materials/products and how they can be disposed of. Typically, students were able to demonstrate an understanding of a range of recycling processes, with glass, paper, aluminium cans and related products being considered. Some of the higher scoring student samples were in the form of information leaflets or presentations, aimed at the general public or peers. Similarly, students provided solid evidence in relation to materials/products that cannot be recycled. In the majority of cases this evidence included a sound commentary associated with methods of safe disposal.
The benefits of recycling were identified in most cases; however, many students could have gained more marks if their evidence had included a more in-depth explanation of why some products are recycled whilst others are not.

Learning Outcome 3 (Marking Grid A)
In general, students were able to identify two sources of renewable energy. Typically, these were solar or wind sources; however, a substantial number of students considered HEP, geothermal or tidal energy. In most instances students

were able to state, in a basic fashion, the environmental impact of using the sources/how the energy can be stored. Descriptions of how energy is generated (from the identified sources) were poor during this series, although an increasing number of centres/consortia encouraged students to include diagrams to exemplify their descriptions, which is to be commended. Students who attained a score from Mark Band 2/3 tended to do so by producing a presentation that included most of the necessary information. Compared to previous series, students provided some good evidence of appropriate storage methods for energy, such as batteries, reservoirs and fly wheels.

As with previous series, there were once again omissions in the student evidence seen for this Learning Outcome. Few students compared the positive and negative environmental impacts of the identified renewable energies, and fewer still gave an indication of the benefits and disadvantages of storing the said energies. These are areas which centres/consortia should consider addressing in more detail, at the unit delivery stage, in order to promote the provision of Mark Band 3 evidence.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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