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Moderators' Report/ Principal Moderator Feedback

Summer 2014

Pearson Edexcel GCE Engineering Unit 6936_01

Applied Design, Planning and Prototyping

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Summer 2014
Publications Code UA038003

Unit 6936

Applied Design, Planning and Prototyping

General

In this unit the vast majority of coursework seen was appropriate to requirements, allowing students access to the full range of marks.

There was a wide variety of projects presented, most of which were complete and a match for the final design proposal. Tasks included recumbent bikes, barbecues, hydraulic log splitter, automated toothpaste dispenser, lost key finder, airfield signalling system, maintenance equipment for bikes/motorbikes, robotic devices and many more.

Tasks were interesting and diverse for the most part, but a few were inappropriate or too simplistic to meet the expected levels of response for this course. Simple wooden mobiles, wooden chairs or completely laser-cut table lamps are not appropriate to the engineering requirements at A2 level.

Where electronic projects were undertaken, it was unusual to see these fully functioning in testing and evaluation and there was often little evidence that students understood or had true ownership of such projects. Some students used PICs, which is fine, but simply programmed commercial test boards and included these in their final product, removing all 'making' challenge.

Assessment within centres was generally close to the national standard. Where marking was inaccurate it was usually consistent, although there were some quite extreme cases of over-marking.

Many students appear to have a weak understanding of what is required in criterion (b) where design and development of ideas takes place. Assessment criterion statements are clear on what evidence is required, but it was rare to see good work, matching assessment statements being produced by more than a handful of students.

There is not a good understanding of what is required in (c) 'Peer review', where some students relied on subjective statements rather than shared discussion.

It was common to see more than half marks, and sometimes full marks awarded in sections where evidence of two elements is required e.g. planning and regulations & standards, but where students had presented no evidence for one element.

Photographic evidence remains a problem for some students, where it is limited, unclear and fails to show the quality of manufacturing skills displayed and the range of processes used. In a significant number of instances the only images of the final product were shown in 'Testing & Evaluation', which made moderation of 'Making' difficult.

Administration

As in previous years, most centres submitted work on time, but some did not include authentication sheets. Most centres submitted marks appropriately, but some used copies of the assessment criteria photocopied from the subject specification and wrote marks on these, neglecting to include annotation. A few mark totals were incorrectly added up and a few were not transferred accurately from mark sheets to OPTEMS. A minority of centre assessors did not annotate mark sheets to identify where evidence to support marks could be found, but overall administration tasks were carried out effectively with attention to detail.

Assessment criterion (a)

All students were able to produce research that was relevant to their chosen task and many gathered focused, succinct and selective information that was useful when writing a product specification. However, there were a significant number who included research that was generic and superficial and was no more than padding. The copious amounts of research gathered by some students must have taken up much valuable time that could have been better used elsewhere in this unit. Researching is a skill that includes an understanding of what relevant and succinct material should be gathered.

Specification writing was generally good and most students were able to write well organised statements that were realistic, technical, measurable and justified. A significant numbers of students failed to use research to guide their specification writing and did not refer to it at all, which was perplexing to see, after the efforts made in gathering it.
Two important sub-headings are ‘performance requirements’ and ‘user requirements’ as this is where the technical aspects of an intended product are specified, so it is appropriate to list several points under these headings. Weaker specifications contained superficial, non-technical, unjustified and general points that could not be used as a guide to design and development, or when evaluating a practical outcome.

Assessment criterion (b)

Despite some excellent work being produced by a minority of students, this appears to remain the most problematic of assessment sections for students. It was the exception to see high level design skills being displayed that explored a range of alternative ideas before developing one through continued design input and refinement of details. Most students were happy to settle for a single idea and add little or no development to it before presenting it as a final design proposal. There was little flair or attention to detail seen in most designs, or willingness to explore sub systems to explain graphically how design details that swivelled, slid, moved or converted rotary to linear motion could be achieved.

Not many students referred to their product specification to evaluate design proposals and many appear to treat research, specification writing and

designing as completely separate and unlinked activities, when they underpin and support each other.

There was evidence of some good modelling, but there was usually little design development beyond specifying materials and processes. Development means 'change', and this should be illustrated by students through their ability to bring together the best or most appropriate features of their design ideas into a coherent and refined final design proposal that meets all of the requirements of the product specification. There should be evidence of the developed design having moved on from an original idea through the results of evaluation against measurable specification points and peer feedback.

Assessment criterion (c)

Quality of work seen in this section was mixed. In some cases, meetings held with peers/engineers focused on progress to date and information gathered was recorded and acted upon to improve final design proposals, which is very good practice. Other evidence presented however, described brief meetings and general discussions being held in an ad hoc manner with no formality or recording of outcomes. Some teacher assessors were lenient in this section, crediting any meetings between students and peer group as appropriate evidence for marks. In a few cases marks were awarded for subjective comments made as part of annotating initial designs, which is inappropriate.

Assessment criterion (d)

As was the case last year, most students were able to produce good quality production plans detailing a sequence of manufacturing tasks in an appropriate order, mentioning materials, processes and equipment used. Good plans included reference to quality control and health and safety issues.

In a few cases, planning using Gantt charts included the whole design and make process instead of focusing on manufacture only. It was common to see quality control statements recorded as questions such as "is it a right angle", which is not a check.

A significant number of students ignored the requirement in this section to identify and explain relevant standards and regulations and where there was evidence, this was often superficial and did not consider how standards might influence production of the product. It is surprising that so many students struggle with this area of assessment as it links to Unit 5 studies.

Assessment criterion (e)

As has been the case in preceding years, the majority of students were able to demonstrate good manufacturing skills to make products that functioned and matched their final design proposal. Some excellent work was seen in this section, where students used high level skills to produce work that

highlighted precision and attention to detail in making complex and challenging products.

Some students produced well made products demonstrating good skills to make less demanding products, but did not meet the assessment criteria for higher marks because of the lack of challenge in the manufacturing task.

There were few instances of students over-using CAM and in general there was a good balance between this and more traditional skills and competencies.

In order to achieve the high mark band in this section, students must show demanding and high-level making skills so it is essential that the product under construction offers enough complexity to allow access to high marks. The level of complexity will already have been established at the design development stage, so it is important that students who have high potential are guided towards appropriate levels of response at an early stage in their work to ensure their success.

Although most students submitted a range of photographs in support of the marks these were sometimes of limited quality or small, failing to show the quality of outcome or the range of processes used during manufacture. Some students presented no photographic evidence of practical outcomes at all and where this was the case, no marks were awarded. In order to achieve marks in this assessment section, there must be explicit evidence of product manufacture.

Assessment criterion (f)

Some testing was carried out by most students, some of which was appropriately focused on the performance of the final product, set against technical and measurable specification points. Realistic field trials were a feature of the best efforts in this section, where annotated photographs illustrated tests. A significant number of students presented superficial and simplistic testing and evaluation which was not referenced to specification points and were not accompanied by any realistic evidence. It was not clear in some instances whether products functioned as intended and students often missed this important aspect of testing and evaluation; this was particularly prevalent where electronic products were manufactured.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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