Moderators' Report/ Principal Moderator Feedback

Summer 2015

Pearson Edexcel GCE in Engineering
Unit 6936_01
Applied Design, Planning and Prototyping

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Summer 2015
Publications Code UA040784

6936 Report 2015

Applied Design, Planning and Prototyping

For this unit 'Applied Design, Planning and Prototyping' students are required to produce a single design and make task using titles from those published by Edexcel, or by generating their own. They must produce evidence of a solution to their selected problem in a design folder that contains evidence of researching the identified problem, writing a specification for the intended product, designing and developing a solution to the identified problem, holding discussions with peers/engineer regarding design progress, planning for production, considering relevant regulations and standards likely to influence product manufacture, product manufacture, and testing & evaluation.

A wide variety of projects were produced, most of which were complete, functioning and matched the final design proposal. Typical topic titles were trailers for bicycles, recumbent bikes, model engines, and models to demonstrate how scientific and engineering concepts work, e.g. turbines, solar power, hydraulics and many more mechanical projects. There were many electronic projects, such as speed measuring devices, automatic feeders for fish, cooling devices for laptop computers, but in such work where electronic circuitry was used it was rare to find true understanding. Some tasks were too ambitious and were either unfinished or did not operate. Where this poor topic choice was the case, students inevitably failed to reach their potential.

Assessment within centres was often consistent but lenient in some criteria. Teacher annotation sometimes credited evidence incorrectly, suggesting that some teachers did not fully understand the requirements of each separate assessment criterion.

As was the case in previous years, marks for designing (b) were generous where ideas were limited and students seemed to have decided what it was they were going to design and make before exploring possible alternatives. Knowledge and understanding of materials and processes was often poor and students made statements regarding design features that could not work.

In 'Making' (e) some marking was lenient where outcomes from tasks taken on by students were not complex or challenging enough to meet the rigours of this course. High marks were sometimes awarded for products that did

not function or match the final design proposal. When reading design briefs, in a significant number of cases it was obvious that students were setting themselves very difficult tasks that were unlikely to reach a satisfactory conclusion, but there was no teacher intervention to advise against being over-ambitious.

The requirements for 'Peer review' (c) were not well understood, and a lot of students presented subjective statements rather than the results of 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. research and specification or 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.

Assessment criterion (a)

All students produced research; some of which was relevant, but much that was generic and not focused closely on the design needs of the product to be designed and developed, or which could be used to underpin specification writing. Higher scoring students presented selective, relevant and realistic research, but often went far beyond what was needed to score all of the marks available, thus using up valuable time and effort that could have been channelled towards other aspects of the task.

Having gathered research, it was rare to see a summary of findings to determine what must be included as key points when producing the product specification.

Researching is a skill that includes an understanding of what relevant and succinct material should be gathered and when enough is enough. There are four marks available for research, so it is a pointless exercise to continue to collect information beyond what could reasonably be expected to earn the marks.

The quality of specification writing varied significantly. Some were well organised and included statements that were realistic, technical,

measurable, justified and linked to research information. However, quite a lot of students failed to use research to guide their specification writing and did not refer to it at all, which was disappointing and rendered their efforts in gathering relevant information pointless.

Two important specification 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 vague points that could not be used as a guide to design and development, or when evaluating a practical outcome.

Some students used the acronym ACCESSFM to supply sub-headings, but this does not focus strongly on user requirements or performance requirements.

Assessment criterion (b)

Comments on this assessment criterion seem not to change year on year. Despite some excellent work being produced by a minority of students, this remains the most problematic of assessment sections. 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 actually 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)

The requirements of this assessment section are not well understood. Some students recorded well organised, formalised meetings with peers and potential users where realistic and helpful feedback on design ideas was gathered and used to plan design developments that would improve the intended product. However, in other instances feedback was gathered through incidental and superficial comments that did not address measurable specification points, or result in any useful information to use in further design and development of the product. In some cases marks were awarded for subjective comments made as part of annotation on initial designs, which is inappropriate.

Assessment criterion (d)

As was the case last year, most students were able to produce relevant 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.

Assessment criterion (e)

In this section some work of high quality was seen and students were able to demonstrate precision and attention to detail in a range of challenging tasks.

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.

In a few cases CAM was in over-use, but in general, where CAM was used, this was appropriate within the recommended 50% in any product, leaving plenty of opportunity for students to show their competencies in using more traditional skills and processes.

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.

A few students took on tasks that were too challenging, resulting in either an unfinished product or one that had been significantly simplified and did not match the final design proposal. Where these situations were present, high marks could not be agreed, and effective testing against measurable and performance led points of specification could not be effectively carried out.

Although most students submitted a range of photographs in support of marks, these were sometimes of limited quality or small, failing to show the quality of outcome or the range of processes used during manufacture. A few 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 was 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 made.

Administration

As in previous years, most centres submitted work on time, but some failed to 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 marks 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.

A few teacher assessors included annotation to say that they could not find marks sheet templates to use when recording marks; these can be found in appendix G of the Teacher Guide for this course, which can be found under the heading ‘Coursework Materials’ on Edexcel’s A level Engineering webpage.

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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