Moderators' Report/ Principal Moderator Feedback

Summer 2014

Pearson Edexcel GCE Engineering
Unit 6933_01
Principles of Design, Planning and Prototyping

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General comments

This year saw a wide range of projects undertaken. Pearson Edexcel's published tasks remain popular with lots of PCB holders, can crushers, can shakers and TV swivel stands in evidence. Other choices included soccer/sports targets, household waste compactors, tennis/table tennis ball launchers, indoor plant growing systems and many more. Many tasks were carried out with high levels of skill, producing fully functioning products that met final design proposals.

The vast majority of tasks undertaken were appropriate to the requirements of this course, offering students potential access to the full range of marks available.

There are still a few centres allowing students to demonstrate an over-reliance on CAM equipment such as laser cutters and 3D printers, limiting opportunities for students to demonstrate a range of high level 'personal' skills.

Where electronic project work was submitted for moderation, this was usually simplistic and not challenging in terms of AS work. Tasks involving sensing temperature or moisture were seen, but students settled for simplistic electronic solutions that were no more than average GCSE standard. Some work was more sophisticated, but it was obvious from design sections that students had little understanding of how circuitry operated and usually only a single circuit was considered with no alternatives or development offered.

The majority of centres awarded marks in line with the national standard, but as usual, criterion 'C' appeared to be problematic for students as they failed to present alternative ideas that were detailed with technical information or reviewed against measurable specification points. Few students seemed prepared to explore alternative designs, preferring to settle on a single idea and cosmetically adding to it. Some high marks were awarded by teacher assessors in instances where students should have been given much less credit based on the evidence available.

Administration

Administration tasks were generally well carried out and accurate. A few teacher assessors failed to include annotation or page numbers to guide the moderator to assessment evidence, and a minimal number of addition errors were discovered.

Some design folders were difficult to follow because they were disorganised and not assembled under section headings and some were not identified beyond the mark sheets, which when removed made it difficult to re-identify work if necessary.

Assessment criterion (a)

An increasing number of students were over-rewarded in assessment criterion 'a' where engineering drawings were generated automatically from 3D CAD sketches, which is not acceptable. Students are rewarded for their understanding of drawing standards and conventions and for being able to create engineering drawings independently. In this criterion there are eight marks to be gained for a student's understanding and skill in producing engineering drawings. It is expected that students will produce engineering drawings either by hand, or through the use of a 2D drawing package in order to develop formal drawing skills and an understanding of what an engineering drawing is. It is not acceptable to simply generate orthographic views from 3D CAD sketches. Where hand produced engineering drawings were submitted, the quality and precision shown was somewhat disappointing.

Assessment criterion (b)

Planning for production was generally well done and centres appear to understand what is required in this section. Almost all students were able to present a sequence of manufacturing tasks in some form, referring to projected times and deadlines, only a few students recorded units of time in days, weeks or lessons without qualifying how long these units of time were. A few students presented Gantt charts which considered the whole design and make task, instead of focusing in detail on product manufacture only. As always, the best work seen in this section detailed tasks and sub-tasks and gave projected timings in hours and/or minutes. It is not expected that students should be able to predict accurately how long a task will take, but they should be aware that some processes and tasks will take longer than others to carry out. Although not a requirement in this section, some students included quality control checks and consideration of safety issues, which is good practice in preparation for the requirements of the A2 6936 unit.

Some students presented excellent product specifications which contained statements that were technical, measurable and justified. However, a significant number produced superficial, vague and non-specific statements that lacked technical information that could have been used to evaluate design ideas and their development, and to test and evaluate the final outcome. User requirements and performance requirements are important sub-sections of a product specification, as this is where technical and measurable statements are made, but unfortunately on many occasions these areas were either ignored or covered very briefly.

Assessment criterion (c)

As has been the case in previous years, many students did not achieve higher mark levels in this assessment section. Some excellent work was seen, but this was rare rather than the norm. The majority of students did not produce alternative ideas that were detailed with technical information or reviewed against measurable specification points and there were very few links to research information gathered previously. It appeared that

many students had already decided on their final design idea and included other design ideas which were superficial and lacking in development.

Development of designs was generally weak and students failed to illustrate how initial designs had been refined and developed into a final design proposal. There was often little or no evaluation of the final proposed design to check its viability or fitness for purpose.

Numerous electronic projects were presented, but there was little evidence of circuit design taking place. Most students used 'found' circuits in their work, without making any attempt at modification and it was clear that most had little understanding of how circuitry worked. It is not expected that students should design circuits from first principles, but what they should do is use established electronic building blocks in creative ways to explore alternative ways of producing the desired electronic performance for their intended product.

There are sixteen marks available in this section and it appears that the majority of students are failing to access the full range because of not fully understanding what is required, or not paying enough attention to assessment statements.

Assessment criterion (d)

The vast majority of students presented practical outcomes that were complete and functioning. Some very high quality outcomes were seen, demonstrating a range of challenging processes and high level skills, but there were also instances of over-rewarding poor quality work that was of low demand. A minority of work was inappropriate to the expectations of an AS level 'engineering' outcome.

In this section, most marks awarded by centre assessors were agreed, but sometimes high marks were awarded where there was an over-reliance on CAM. In order to achieve high marks students must demonstrate high-level manufacturing skills, attention to detail and precision in their work, which cannot be done if their skills input is limited to the simple assembly of component parts that have been manufactured by computer controlled machinery. Whilst it is important to embrace new technologies, the use of CNC equipment should be limited to no more than 50% during product manufacture.

Where electronic project work was submitted for moderation, there was often little evidence of the quality of making linked to the electronic circuitry. Credit can be gained for evidence of soldering neatly, dealing with flying leads, anchoring circuit boards inside cases etc, which are all creditworthy activities.

The quality of photographic evidence presented by some centres remains problematic. The practical outcome is worth one third of the marks available, so it is essential that clear and detailed photographic evidence of manufacturing and processes used is provided to the moderator for this

section. Marks cannot be awarded for witness statements without explicit photographic evidence.

Despite submitting photographic images of practical work, a significant number lacked the detail necessary to illustrate the complexity of task and the higher-order skills necessary to gain higher marks. A series of photographs taken over a period of time during manufacture is the ideal way of highlighting processes used and providing examples of precision and attention to detail that may not be readily noticeable in an image of the finished product.

A significant number of students did not include images of their completed work, which made moderation difficult.

Assessment criterion (e)

The vast majority of students provided appropriate evidence of their oral presentations, which included hard copies of PowerPoint slides, and teacher witness statements, providing useful guidance to student performances. A minority of students provided little or no evidence of having carried out a presentation and in some cases high marks awarded were suspect, particularly where the rest of a student's folder was of limited quality. In such cases, marks could not be fully accepted.

Grade Boundaries

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