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Moderators' Report/ Principal Moderator Feedback

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Pearson Edexcel GCE in

Engineering (6936)

Unit 6: Applied Design, Planning and Prototyping

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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 regulation and standards likely to influence product manufacture, product manufacture and testing & evaluation.

As was the case last year, a wide variety of projects was seen, with most students developing their own design briefs. Some students selected tasks from the AS recommended list, which is quite acceptable.

Some excellent standards of work were seen from students who took on challenging tasks that required high levels of design thinking and manufacturing skill. The majority of work was completed and fully functioning which was good to see.

Some successful topic titles were bicycle and car trailers, nut cracking machine, automated toothpaste dispenser, garden and household waste compactors, iPod docking and amplifier station, and various buggies which were pedal or hand-lever operated.

There were quite a few electronic projects such as greenhouse ventilation system, laptop cooling system speed measuring device, automatic animal feeder, remote controlled buggies and alarms, 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 poor topic choice was the case students inevitably failed to reach their potential.

Marks awarded within centres were often consistent but lenient in some criteria. Teacher annotation sometimes credited evidence incorrectly, suggesting that not all assessment criteria were fully understood.

The biggest discrepancy between centre awarded marks and moderated marks was in (B) designing, where ideas were often 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) most marking was accurate, but some was lenient 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 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 better understood this year and many students scored well in this section. However, marks were sometimes awarded for annotated comments in the design section, which is inappropriate as peer review must be an organised discussion of design ideas and how they might be improved going into design development.

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 and in the best cases, this was relevant selective and focused on the design problem identified. In quite a lot of cases however, research was generic and not focused closely on the design needs of the product to be designed and developed, or which could be used to develop a technical specification. Many students were over-zealous in their efforts in this section, gathering copious amounts of research data that was unnecessary. 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.

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

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.

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, refinement and as a result of peer review. Many 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.

Almost all students modelled their final design proposal; many did not use modelling to test aspects of design, but merely to 'see what it would look like'. Design development for many consisted of redrawing an initial idea without change and specifying materials, processes and manufacturing details.

Assessment criterion (c)

This section was generally well done, where students recorded well organised, formalised meetings with peers and potential users eliciting realistic and helpful feedback on design ideas to use to use to plan design developments that would improve the intended product. In a minority of work, 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.

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.

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.