

Moderator's Report

Principal Moderator Feedback

Summer 2017

Pearson Edexcel GCE
In Engineering (6936)
Paper 01: Applied Design, Planning
And Prototyping

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For this unit 'Applied Design, planning and Prototyping' candidates 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.

A wide variety of projects was seen this year, with only a few being selected from Edexcel's approved A2 list. There were many, more challenging tasks taken on by candidates who took risks in terms of not knowing whether they could achieve a successful outcome, which was pleasing to see. Challenging topic titles included rotational moulder, heat engine, thrust test rig for electric fans and electrical wire organiser. Other more straightforward topics were barbecue, air rifle target, bike trailer, bike repair stand, camera stabiliser, rugby-scrum machine and lifeguard spinal board. Almost all tasks taken on by candidates were appropriate to the requirements of the 6936 course and offered opportunities to access the full range of marks available.

Hardly any tasks were too ambitious, leading to them being unfinished or not operational, but where a poor topic choice was in evidence candidates inevitably failed to reach their potential.

There was an increase in electronic projects this year and PIC programming was a feature of some. Unfortunately, despite this increase it was rare to find true understanding or ownership of the electronic solutions presented. Many candidates described the hardware that housed electronic circuits, but could not explain how circuits operated beyond simplistic levels. The vast majority of manufacturing tasks were complete and functioning and only a few were too ambitious and were either unfinished or did not operate. Assessment within centres was usually consistent but lenient in some criteria, especially design ideas, peer feedback and testing. Teacher annotation was usually helpful, but there were many instances where no annotation appeared, or brief annotation did not include page numbers to identify where evidence had been credited.

There was a marked improvement from many candidates this year in designing (B) where more attention was paid to exploring and explaining design sub-systems and in a lot of cases it was obvious that candidates had a true understanding and ownership of their ideas and their development. Knowledge and understanding of materials and processes was often very good, but some candidates made statements regarding design features that could not work.

In 'Making' (E) most marking was accurate and candidates produced some excellent standards in their work, demonstrating a good balance between using CAM and hand processes. Some marking was lenient where outcomes

from tasks taken on by candidates 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. A few products placed a high reliance on CAM equipment during manufacture, leaving few opportunities for candidates to demonstrate other engineering competencies.

In 'Testing' (F) many candidates were over-rewarded where tests were superficial and not based on measurable, performance related criteria. There were few examples of realistic field-trials being carried out and centre assessors often awarded high marks for superficial work in this section.

Although this is improving, photographic evidence of product manufacture remains a problem for some candidates, where it is limited, unclear and fails to show the quality of manufacturing skills displayed or the range of processes used. In some instances the only images of the final product were shown in 'Testing & Evaluation', which made moderation of manufacture difficult.

Assessment criterion (a)

Almost all candidates were guilty of over-production of research materials, gathering far more information than necessary, much of which was often generic and not directly relevant to the problem in hand. In the best cases, research was selective and focused on the design problem identified. 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.

It was rare to see a summary of research 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, it was often difficult to determine a link between research and specification statements which was disappointing and rendered 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)

There was a distinct improvement in the approach to this section by many candidates, who were able to display high level design skills, accompanied by well informed, technical annotation. Ideas were often explained and explored to show how design sub-systems, such as mechanical details of drive, steering or braking systems might work, and more attention was paid to presenting realistic alternative ideas.

Idea development often included explanations of how 'peer review' of initial ideas and suggestions for improvement would be used in the development and refinement of a final design proposal through further design input. Unfortunately, not many candidates referred to their product specification to evaluate design proposals as they progressed and many appeared to treat research, specification writing and designing as completely separate and unlinked activities, when they underpin and support each other.

Despite an increase in risk taking when embarking on challenging design problems, some candidates were happy to settle for a single idea and add little or no development to it before presenting it as a final design proposal. In such cases there was little flair or attention to detail seen in designs, or exploration of sub-systems to explain graphically how design details could be achieved.

Presentation skills in this section varied greatly. Freehand sketching skills were limited for many candidates, but the vast majority were expert at using 2D and 3D CAD to present working drawings and final design proposals.

Assessment criterion (c)

This section was generally well done, where candidates recorded well organised, formalised meetings with peers and potential users eliciting realistic and helpful feedback on design ideas 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)

The vast majority of candidates 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 only a very few cases, planning using Gantt charts included the whole design and make process instead of focusing on manufacture only. Where flow charts were used, it was common to see quality control statements recorded as questions such as "Are the holes deep enough" or "Is it the right size" which are questions not checks.

A significant number of candidates 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 very high quality, demanding work was seen and candidates were able to demonstrate precision and attention to detail in a range of challenging tasks.

A few candidates produced well made products demonstrating good skills in making less demanding products, but did not meet the assessment criteria for higher marks because of the lack of challenge in the manufacturing task. There is a good understanding now that products should be manufactured using a range of skills and processes if marks are to be awarded in the high mark band.

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

Hardly any candidates appeared to take on tasks that were too challenging and it was pleasing to see such high numbers of finished and functioning products.

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

Assessment criterion (f)

Some testing was carried out by all candidates, 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 candidates 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 candidates often missed this important aspect of testing and evaluation; this was particularly noticeable where electronic products were produced.

Sadly, this is the final year of the 6936 course as new GCE A level specifications come into force. The course has developed well over its lifetime and centres have produced some excellent work and no doubt enthused students considering taking up some form of engineering as a career.

The moderation team have enjoyed looking at student projects over the years and would like to congratulate students and teachers on their efforts in making this a pleasurable process.

