

Moderators' Report/
Principal Moderator Feedback

Summer 2012

GCE Engineering
Unit 6933_01

Principles of Design, Planning and
Prototyping

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Publications Code UA031649

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Unit 6933_01

Principles of Design, Planning and Prototyping

General comments

A wide range of coursework projects was undertaken by candidates and Edexcel approved titles such as PCB holder, mini-drill holder, can-crusher, spray-can shaker and TV adjustable support were popular choices. An increasing number of centres are encouraging candidates to personalise their choice of tasks. Examples of good projects seen this year included mechanical oscillating fan, proximity alarm, full size house gates, tool box, pedal driven buggy and many more.

There were a few examples of poor project choices which limited opportunities for good quality and challenging 'engineering' work to be pursued by candidates. Woodwork projects that limit skills to gluing and screwing and plastics projects that require simple shaping, bending and cementing are inappropriate and do not allow candidates scope to demonstrate a range of high level engineering skills.

As was the case last year, all work seen was potentially appropriate to the demands of this unit and provided opportunities to access the full range of marks. However, some candidates failed to achieve the quality and skill levels necessary to gain high marks. There were a few instances of over-reliance on CAM, where candidates had little practical input beyond the assembly of CNC machined parts.

Assessment criterion (a)

In this assessment section most candidates were able to achieve credit worthy of mark band 2 or higher. CAD continues to feature highly, which is fine, but it is concerning that more and more candidates are not using 2D CAD packages to develop their skills and knowledge and understanding of engineering drawing, but are relying on computer software to generate drawings automatically from 3D CAD sketches. In this section, candidates are expected to produce engineering drawings using 2D CAD or by hand, so that they learn and understand concepts of formal drawing and do not rely on a computer program feature to do this for them.

Many candidates produced several high quality engineering drawings, but failed to include enough information to enable the successful manufacture of the designed prototype. Some candidates presented dimensioned freehand sketches that did not conform to engineering drawing standards and conventions, but worryingly were well rewarded by centre assessors.

Assessment criterion (b)

In this assessment criterion most candidates were able to achieve medium levels of success, but not many reached mark band 3.

The vast majority of candidates were able to present a sequence of manufacturing tasks in some form, referring to projected times and deadlines, but these were not always realistic and time was often given in days, dates or lessons, with no indication of how long these units of time were. Surprisingly, after regular mention of this in E9 feedback to centres and Principal Moderator reports each year, a significant number of candidates presented Gantt charts which considered the whole design and make task, instead of focusing in detail on product manufacture only. Where this occurred, necessary details of manufacturing were not recorded, but some centre assessors awarded higher marks even though the evidence presented bore little resemblance to assessment criteria statements. The best work seen in this section detailed tasks and sub-tasks and gave projected timings. It is not expected that candidates 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 candidates included quality control checks and consideration of safety issues, which is good practice in preparation for the requirements of the A2 6936 unit.

There were some very good product specifications written, but overall this assessment element was disappointing. Most candidates were able to identify some relevant points, but these were not always measurable or justified. Many specification statements were superficial and generic and lacked technical information that could have been used to evaluate design ideas and their development, and to test and evaluate the final outcome. When presenting their product specification, most candidates used sub-headings, but often did not consider 'user requirements' and 'performance requirements', which are important in considering the projected technical performance of the product and in guiding design ideas.

Assessment criterion (c)

Once again this year, it appears that many candidates were unable to achieve higher mark levels in this assessment section. There was of course some excellent work presented that matched the assessment requirements, and most candidates were able to offer a range of design ideas relating to their intended product. However, the majority of candidates failed to produce alternative ideas that were detailed with technical information or reviewed against measurable specification points. Development of designs was generally weak and candidates failed to illustrate how initial designs had been refined and developed into a final design proposal. It was obvious too that many candidates had already decided on their final design idea and all other design ideas were presented to match an assessment requirement. There was often little or no mention of specification points, which in many cases rendered specification writing pointless.

More electronic projects were presented this year, but there was little evidence of circuit design taking place. Many candidates used 'found' circuits in their work, without making any attempt to modify these. It is not expected that candidates 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. This assessment section represents a significant number of marks that many candidates are failing to access through a lack of understanding of what is required to match the assessment criterion statements.

Assessment criterion (d)

Most candidates succeeded in producing a practical outcome to their chosen problem that reflected their final design proposal and it was very pleasing to see that almost all practical work was complete and functioning. Where skills were modest, this was usually recognised by the teacher assessor and rewarded appropriately. The rise in the use of CNC equipment and laser cutting continued this year, but some centres allowed an over-reliance on such equipment in candidates work. In order to achieve high marks candidates 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 suitably limited during product manufacture.

Where electronic project work was submitted for moderation, there was usually 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 issue regarding the quality of photographic evidence presented by some centres is ongoing. 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 supplied, otherwise no marks can be awarded in this assessment section. Despite submitting photographic images of practical work, a significant number lacked the detail necessary to illustrate the complexity of task and the higher-level 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.

Photographic evidence can also be employed to support a candidate's awareness of health and safety issues when working.

Assessment criterion (e)

Most candidates provided appropriate evidence of oral presentations, which included hard copies of PowerPoint slides, and teacher witness statements, which were generally informative and provided useful annotation regarding individual

candidate performances. Where centre assessors award marks in the higher regions for criterion (e), it is essential that evidence beyond simple witness statements is supplied in support of the credit given.

Administration

As was the case last year most centres submitted samples of 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. Where this occurred, there was no accompanying annotation to point out where evidence could be found, which hindered moderation.

A few centre assessors made addition errors when totalling candidate marks and errors in transferring marks from mark sheets to OPTEMS.

Overall however, teacher assessment continues to improve in terms of accuracy and consistency and centres are congratulated on the care taken in this regard.

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