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Examiners' Report Summer 2009

GCE

GCE Design & Technology – Product Design (8RM01)

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General

In this, the first year of this new course, almost all centres submitted candidate work that was conceptually and potentially suitable for course requirements. However, it is levels of response that determine whether outcomes are appropriate and these were very mixed. The best work came from centres that introduced elements of choice and diversity into their tasks encouraging individual work that fulfilled course requirements but allowed candidates to express their skills and talents. Many centres adopted a formulaic approach where all candidates investigated the same product, were given a very prescriptive design brief and all produced the same manufacturing task. This approach often resulted in almost exact replication of work from candidate to candidate and limited opportunities for individuals to express their competencies. The requirements of the Product Investigation element of the course were unfamiliar to centres, but the vast majority coped well with this change, producing commendable work.

Centres are comfortable with the familiarity of designing and making and standards were as always, mixed. There was some high quality design work seen, but not a great deal of the 'blue-sky' approach was in evidence, which was disappointing as this section was designed to allow creativity beyond the constraints of materials and processes found in centres.

Making was the most productive element for most candidates in eliciting marks and overall, some very good standards were presented, although a few centres allowed students to submit work that was barely of KS4 quality. Marking by teacher assessors was in the main acceptable, but generous. Most marks were supported by appropriate annotation and this helped moderators when writing E9 feedback to centres.

Moderators did not report any great administration problems coming from centres, beyond some addition errors, incorrect transfer of some marks to OPTEMS from CABs and some CABs not signed by teachers and candidates.
Of much greater concern was the number of centres who did not know that the 6141 D&T course had been superseded by 6RM01 and submitted work marked on the wrong CABs, to the old format of a single integrated coursework project. This caused difficulties in moderation and in dealing with such instances so as not to penalise candidates wrongly guided through no fault of their own.

Product investigation

There was a very wide spectrum of responses seen in this assessment section, ranging from excellent to very weak and success was largely dependent upon the products selected for investigation. Predictably, this element of assessment caused students most problems as might be expected considering that it was new to their experiences. The best work was seen where candidates had disassembled products in order to analyse the component parts in detail. A few candidates used only photographs of products to investigate, which severely limited their experience in this section. Other high quality work was achieved where centres had allowed candidates a choice in products to investigate. Where the same product was

investigated by all candidates in a cohort, there was replication of information and a lack of individuality when work was presented. If candidates are to be allowed to express their individual expertise and academic insight, centres need to be very cautious about only offering a single product for an entire cohort to investigate. Evidence from this year's submissions shows that such an approach leads to generic and formulaic responses that are of little benefit to candidates and are often no more than hoop-jumping exercises.

It was disappointing to observe the number of candidates who had blatantly plagiarised exemplar work which was placed on Edexcel's website to guide and help centres understand the requirements of this assessment section. In one instance, kettles were being investigated, but several candidates had used almost the entire example placed on the website and even left the title 'specification for a glue gun' on their work after slight adjustments to the content.
In future, exemplar materials are likely to be locked so that they cannot be treated in this way.

Criterion A

Most candidates were able to achieve fairly good marks in this criterion, particularly where they used the headings shown in the assessment criteria. Those students who were less well organised produced essay type responses which were often rambling, repetitive and difficult to follow.

The choice of a similar product to compare and contrast was central to reaching the higher marks and many candidates failed to consider this fully, selecting products that were too similar such as 3-pin plugs that differed only in the material used for the body, kettles both made from the same plastic, very similar IPods and almost identical hand-operated tin openers. Where candidates pursued these very similar products, opportunities to compare and contrast them were minimal.
As part of this criterion, candidates are expected to compare and contrast two similar products using the technical specification they have developed when putting themselves into the product designer's place. Some candidates did this very well, but many simply described the two products without comparing and contrasting them against points of specification.

Criterion B

Materials used in products were generally well identified and appropriate alternatives were usually offered. However, material properties were very often generic, taken from research sources without modification and did not focus on their usefulness in manufacturing the product under investigation. Advantages and disadvantages were not well identified or discussed and it was rare to find justified conclusions as to why one material was preferable to another.
When describing the environmental impact of using particular materials, the majority of responses were generic and superficial, usually mentioning energy use, depletion of resources and problems of disposal. A better focus would have been to consider extraction and processing of raw materials, processes when producing specific materials and disposal of specific products after their useful lifespan.

Criterion C

Almost all candidates were able to suggest appropriate methods of manufacture for their products and an alternative. Unfortunately there was little justification for the use of specific processes and most candidates used generic information and images taken directly from textbooks and websites without focusing on the product under investigation, especially where processes such as injection moulding and die casting were prominent.

As was the case in criterion B, the environmental impact of using named processes was generic and superficial in many cases. In this section particularly, there was well spread evidence of plagiarism, where candidates had copied and pasted exemplar material from Edexcel's website and claimed it as their own.

Criterion D

This was the least well done of the sections in product investigation, where many candidates struggled to understand what was required to achieve success. Although work submitted in this section related to quality control, much of it was very general and did not highlight specific checks or points at which they would be carried out during the manufacture of the product under investigation.
Not many canfdidates mentioned standards beyond very general ones such as BSI, ISO or health and safety and hardly any were able to say how specific standards influenced the manufacture of the product.
Not many candidates were able to describe a Quality Assurance system for their product. The QA system exemplified on Edexcel's website for a glue gun was commonly plagiarised in its entirety.

Product design

Criterion E

There were some excellent examples of creative design seen in this assessment section, particularly where candidates were not constrained by having to manufacture what they had designed. There were few risk taking 'blue sky' designs, with the vast majority of centres setting topics that stayed within the safety zone of what they have been comfortable with in the past.
Only a few centres adopted the approach of designing a product that would be manufactured later, which was pleasing and in line with the ethos of the course.
Most candidates were able to offer a range of alternative designs, but a significant number focused on a single design in detail, adding alternatives cosmetically and superficially.

The best all-round work came from candidates who added informed, succinct and useful annotation to designs, which demonstrated their understanding of materials and processes likely to be used in manufacture, and who presented summative evaluative statements focused on the set design criteria. Unfortunately, many more students failed to graphically analyse their design ideas and present information that could be used to make informed decisions about which designs to use in developing a final design proposal. Where this lack of accompanying information occurred, design ideas were no more than cosmetic styling exercises. Some centres produced mood

boards and questionnaires, which carried no currency value, were a waste of valuable time and were irrelevant as the design criteria had already been set by teachers, or agreed with candidates.

Development of a final design proposal varied from high quality to non-existent. Good levels of credit were achieved by candidates where they understood that development meant 'change', and that they should illustrate this by bringing together the best or most appropriate features of their design ideas into a coherent and refined final design proposal that met all of the design criteria.
For successful development there should be evidence of the final design proposal having moved on from an original idea through the results of graphical exploration and evaluation. It is not acceptable to simply take an initial idea and make superficial or cosmetic changes to it and then present it as a final developed proposal. Candidates should include as much detailed information on all aspects of their developed design as possible, as this is an opportunity to show knowledge and understanding of their design and make activities.

Modelling was well carried out by most candidates, but not many stated why or for what purpose modelling was being used. This important aspect of design development should be used to test features such as proportions, scale, mechanical details, sub-systems etc. At the end of the development section, most candidates were able to produce a clear and detailed final design proposal that included some technical details of materials, processes, techniques, fixtures and fittings that would be used during product manufacture, but not many objectively evaluated the proposal against the design criteria.

Criterion F

Most candidates achieved good marks in this assessment section although centres tended to award marks harshly. Credit in this section can be gained from communication evidence throughout the portfolio. The use of CAD was generally of high quality and the vast majority of students demonstrated expert skills in using CAD programs they were familiar with. There was good evidence of candidates producing drawings and enough information for a skilled third party to manufacture a designed product, but the quality and skills used varied greatly. A disappointing feature of this section was the widespread lack of basic drawing ability. It was obvious that some centres had spent time on developing skills in drawing and this was reflected in the work presented by their candidates, but in many other instances, drawing and sketching was weak and lacking in precision.

Product manufacture

Criterion G

Candidates from centres familiar with the 'old' AS course scored well in this section, as in fact did the majority of students. Marks were readily accessible for information that included a sequence of production stages in the correct order, consideration of time and scale of production. Many candidates included health and safety and quality control, features which were not necessary, but added to the detail of the plan.

A minority of candidates presented no planning, which was a shame as the evidence required in this section was very straightforward to present.
Methods of presentation included flow charts, tables and Gantt charts, which were all acceptable planning tools as long as they contained the necessary information.

Criterion H

Without doubt, this assessment section elicited the highest percentage of marks for most candidates from those available in any section. Many centres opted to set only one manufacturing task, which is acceptable. However, a significant number of these tasks used only a single material, which does not match the criteria for the higher levels of response despite being generously rewarded by centres. The assessment criterion states that a 'range' of appropriate materials must be selected and that candidates should work with a 'variety' of materials, processes and techniques. In order to fulfil these requirements, the use of at least two materials and processes must be evidenced.

The majority of centres embraced the ethos of this section and set manufacturing tasks that allowed candidates to experience a range of materials, processes and techniques, planned to develop skills that candidates could call upon when designing and making their A2 project, and some high quality outcomes were seen. Most centres set two tasks and a few set three, which seemed to prove difficult to complete successfully in the time allowed.

Where very tight single tasks were set and all candidates in a cohort were given the same detailed working drawing, cutting list and materials, the outcomes were often difficult to differentiate between unless high quality photographs showing individual skill levels were provided. In much of the work presented, there were opportunities for candidates to make manufacturing decisions, such as choice of materials from those available in a centre, choice of joining techniques, use of certain processes, finishes etc, which would have given candidates more ownership of their work and helped in differentiation.

A problem with many of the manufacturing tasks set by centres was that they fell short of the AS standard. A significant number of tasks were simplistic and undemanding and did not have the scope to allow candidates to demonstrate high level skills. Balancing toys, flat faced acrylic clocks, key rings and simple cam operated moving toys are some of the inappropriate products presented and credited highly by centres. Where undemanding work is presented, no matter how well made it is, candidates cannot achieve high marks.

A few candidates presented a full research, design and development section as part of their 'making' activities, which is perplexing as criterion statements are clear and no marks are available in this section for design work. Teacher intervention is important in situations such as this, to ensure that candidates understand the requirements of each assessment criterion.

In general, marks awarded by centres in this assessment section were agreed during moderation, and where there were discrepancies between centre and moderator marks, this was often because candidates had not justified their selection of materials. Where students were given no choice of materials, for example when a task involved aluminium casting, they should still have an understanding of why that material was appropriate to the product under construction ie resistant to corrosion,

good strength to weight ratio, low melting point, good fluidity and so on and this information should be offered as justification. Where it was carried out successfully, justification of selection was evidenced through annotation of photographs of making or in the plan for production.

Criterion I

For many candidates, this criterion caused some problems of understanding. Tests were often superficial and subjective and were not based on the manufacturing criteria set at the beginning of a task. This section was often treated subjectively and superficially and only the most capable candidates were able to form objective conclusions from testing. Many candidates used third party commentary as evidence of testing, but this was often superficial, consisting of brief congratulatory statements unrelated to points of manufacturing criteria.
It was obvious from the evidence presented that in some centres, where identical tasks were set, teachers had provided templated sheets for testing, limiting individuality and forcing candidates to hoop-jump.

Principal Examiners Report, Summer 2009
GCE AS Design & Technology: Product Design
Resistant Materials Technology Unit 6RM02

General

The various command words used are published in the available support material. Understanding the command words will help candidates to structure their answers appropriately as many candidates strayed from the 'thrust' of the question. Candidates were better at keeping their responses within the allocated space on the Question paper, therefore reducing the 'excessive' answers seen in previous years.

Candidates must use more correct technical vocabulary in their answers as far too many answers are limited to 'general' descriptions of processes and procedures.
The structuring of answers is very important and candidates must plan, especially their longer, 'discuss/evaluate' answers before starting.
The quality of sketching was generally very poor for A-level candidates and centres should spend some time on improving it.

Question 1(a)

This question was reasonably well done by many candidates. However, a number did not focus their responses specifically enough on why rotational moulding was the best method. Too many candidates used examples like surface finish (which are not specific to rotational moulding).
Most candidates knew that the production of hollow shapes was a major advantage.

Question 1(b)

A significant number of candidates showed little or no knowledge of the rotational moulding process and many submitted confused answers describing an amalgam of injection and blow moulding. A common mistake was to suggest that molten plastic was injected into a rotating (cold) mould and allowed to cool. Others believed the mould was filled to capacity with melted plastic. Only a minority of candidates were able to sketch a reasonable schematic drawing depicting the stages in the process of Rotational Moulding.

Question 2(a)

Well answered by most candidates but a small proportion of candidates tried to answer for all 3 marks with individual PPE answers and not necessarily for the pillar drill.

Question 2(b)

Many candidates clearly did not have much knowledge about CNC machines and fewer still were able to relate it solely to safety aspects. When they did know and understand it, candidates clearly knew a great deal and mentioned many of the points available. Some candidates only gave the reason – not the explanation as well which was where the better candidates were able to extend their answers.

Question 3(a)

Candidates mostly answered this question well, although too large a number still did not know what quarter sawn would look like and simply quartered the entire log, drawing just four pieces.

Question 3(b)

This was another question in which the candidates scored quite well by being able to list multiple advantages and disadvantages. Several candidates referred to just cutting the log in to four and subsequently gained no marks for saying it was quicker, easier, cheaper etc. Some candidates mixed the two cutting systems up and reversed the qualities. Far too many candidates put together a poorly structured answer, which 'jumped' from one method to another and from advantages to disadvantages. This often resulted in repeat answers, especially giving the advantage of one method as the disadvantage of the other method.

Question 4(a)

Many candidates did not explain the reasoning fully but managed to pick marks up in a variety of ways. Most got the corrosion resistant properties of stainless steel with application to the outdoors and weather. Very few referred to finishes available in a range or to maintenance of the product. Aesthetics was often covered just with the 'looking nice' style of answer with a limited range of correct technical terminology.

Question 4(b)

A significant number of candidates did not **discuss** the use of PVC, but offered personal preferences. Significantly recurring answers which caused concern included:

- PVC described as being malleable
- generalised descriptions such as PVC being 'strong'
- contradictory statements such as describing PVC as 'tough' and also 'brittle'
- repeated use of the phrase 'doesn't rust' when describing the weather resistance of PVC
- a significant number of students stated that stainless steel is prone to corrosion.

Question 5(a

Quality Control was frequently confused with Quality Assurance in answers. Critical control points were rarely referred to.
There were few references to the importance of quality control results being **fed back** into the quality assurance system.
Most answers were limited to the basic concept of 'testing during manufacture'.

Question 5(b)

Many candidates referred to the CE mark and the Lion Mark. Most recognised this as a standard mark of quality – many thought it referred only to quality control as applied in

the factory without stressing the fact of independent testing and meeting outside quality regulations. Marks were often picked up for referring to the safety and reliability points without any real demonstration of better understanding of the awarding of the Kitemark.

Question 5(c)

There were significant numbers of candidates who just re-iterated their answers to Q5(a). Few picked up on the involvement of ALL members of production units being vital links in the TQM chain from design to consumer. There were many references to Health and Safety of employees, which is not a feature unique to TQM.

Question 6(a)

This question was often poorly read. Many candidates described the rotation of the cam rather than the motion (or otherwise) of the follower. Candidates frequently failed to describe the dwell of the pear shaped cam.

Question 6(b)i

Answers rarely recognised that the idler gear 'linked' the two main gears but gained marks by knowing the direction. Too often speed was not mentioned.

Question 6(b)ii

When candidates knew new how to draw the gears they often produced them meshing correctly and turning in the correct directions. But, too often when answers were given that did not show the gears correctly, they also did not show meshing or direction correctly. There were a significant number of blank or almost blank answers to this question.

Question 7(a)

A reasonable number of the required answers were given in the majority of cases although there was some rambling and repetition of answers. Mostly 'high initial cost' was the only disadvantage given. The advantages formed the bulk of the answer and 'renewable, sustainable and emissions and pollutions' being the most common advantages given.

Question 7(b)

A very poorly answered question, possibly due to the 'new', 'smart' nature of QTC's. There was significant evidence of not reading the question carefully, as many candidates gave three 'USES' of QTC's rather than 'advantages'

Statistics

			Grade Boundaries				
			A	B	C	D	E
Unit 6RM01	Raw Marks	90	73	64	56	48	40
	UMS	120	96	84	72	60	48

			Grade Boundaries				
			A	B	C	D	E
Unit 6RM02	Raw Marks	70	46	41	36	32	28
	UMS	80	64	56	48	40	32

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