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Moderators' Report/ Principal Moderator Feedback

June 2011

GCE Design and Technology: Resistant Materials Technology (6RM01) Paper 01 Portfolio of Creative

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Principal Moderator's Report on 6RM01 Resistant Materials Technology 2011

Overall, this year moderators reported improvements in student performance and greater accuracy of assessment by centres. Greater familiarity of course requirements and good quality support materials have combined to help raise standards in many centres. The efforts made by moderators to provide high quality feedback via their reports on student performance last year, and the Principal Moderator's report were also contributing factors to this year's success for many centres.

Product investigation

In general, most students achieved well in this assessment section, making good use of the clear mark scheme structure to target marks effectively.

A common failing throughout the product investigation however was that of many centres allowing students to investigate the same products, which led to very similar, even identical work being submitted. Problems also occurred where the selection of a similar product was so close as to make effective comparisons and contrasts impossible.

Criterion A - Performance analysis

Most students achieved more than half marks in this criterion, especially when using the recommended specification headings to structure and focus their responses. Many students provided appropriate statements under each specification heading that were justified and technical, but some simply offered descriptive text that could not be considered a product specification at all.

The choice of similar product is important in allowing students to compare and contrast one against the other effectively, and while the majority of students were successful at this, a significant number selected very similar products that limited their opportunities to make effective comments when comparing and contrasting.

Good examples of pairings were a penlight torch and an industrial hand lamp as used by police, a portable electric drill and a pedestal drill, a mountain bike and a road bike and a tenon saw and a circular saw. All of these examples are similar or linked in their use, but have distinctly different functions, user/performance requirements etc. and offer lots of opportunity to compare and contrast under the recommended specification headings.

Moderators reported that many centres were allowing or directing students to investigate the same product and this was leading to replication of information and difficulties in determining individuality of presentation. Investigating the same product is limiting and counter to the intended reasoning behind this element of the course. The intended action of each student, individually investigating different products was meant to develop discussion, interest and learning among peers who would experience different products manufactured using diverse materials and processes and this would add relevance and cohesion to their Unit 2 studies.

Criterion B – Materials and components

Most students had no difficulty in identifying two different materials that were used in the product under investigation and most were able to identify appropriate alternative materials, although as was the case last year, problems arose where students investigated products that were dominated by plastics, leaving little opportunity to identify suitable alternatives.

Many students presented comprehensive lists of materials properties, but failed to focus on ones that were pertinent to the product being investigated. There is no point or credit available in saying that a material is a good conductor of electricity when it is being used in a tin opener or that a material has good compressive strength when it is being used in a pair of garden shears where shear strength is required. Advantages of materials were usually given, but often disadvantages were ignored and these features were not always related to the needs of the product.

Some students looked at more than two materials in this section, which is fine if that is the intention, but it should be understood that considering two materials used in the product is the requirement to access the full range of marks available.

Consideration of the environmental impact of using the materials identified was a problem for many students whose responses were often generic, relating to recycling rather than extraction, processing and disposal.

Criterion C – Manufacture

Observations in this section reflect almost exactly those made last year. Almost all students were able to identify two appropriate processes used in the manufacture of the product, but often without justification. Students often presented detailed diagrams of injection moulding machines for example and described the process step by step. Many centres appear to have encouraged students to describe manufacturing processes in detail, and while this may be useful in

boosting Unit 2 teaching, it does not attract marks. Marks are gained for the justified selection of the processes identified for use when manufacturing the product.

When suggesting an alternative manufacturing process, many students described inappropriate processes in some detail and failed to realise that they could not have been used. A common example of this was where injection moulding had been used and students incorrectly suggested vacuum forming or blow moulding as an alternative. In this situation, it is acceptable for students to suggest a process that would be appropriate if a different material was used, as long as they name the material.

The environmental impact of using the processes identified was not well done. As with the previous assessment section much of the evidence seen was generic and failed to focus on the effects of using the identified manufacturing processes.

Criterion D – Quality

This was the most disappointing element of the product investigation section with few students managing to score full marks. Although they were able to identify quality control procedures, these tended to be generic and not focused specifically on the product under investigation. Reference to standards was often ignored and where standards were considered, there was hardly ever any explanation of how they influenced the manufacture of the product.

Many students were able to present quality assurance systems, but these did not usually focus on the product. What is required under 'Quality assurance' could be presented in the form of a flow chart for example, using such the sub headings as Preparation; Processing; Assembly; Finishing and After-sales. Many students failed to present a 'system' and described in general terms what QA was.

Product design

Criterion E - Design and development

In describing the performance of most students in this section, the term 'déjà vu' would be appropriate – we have been here before. Once again this was the most disappointing part of the portfolio of creative skills where a lot of poor and mediocre quality work was seen, with students not really designing and certainly not employing a range of design strategies.

Of course, some outstanding work was seen which exemplified exactly what this part of the course sets out to achieve, providing a platform for students to demonstrate their creativity, flair and knowledge and understanding of materials and processes but this was in the minority. Unfortunately, the majority of designing was weak and often limited to a series of shapes on a page accompanied by simplistic labelling and it seemed obvious that in many cases students had received little teaching input or guidance, being left to decide what to include in their work and how to address the assessment criteria.

The starting point in this section must be a design brief that contains some measurable design criteria that can be used to evaluate designs against as they progress. In reality, many students included no design criteria at all as a starting point which meant that evaluation of the final design proposal could not be carried out appropriately and where this was the case, moderators struggled to determine exactly what students were setting out to design.

Probably because of a lack of teaching input, many students appeared not to understand that a range of alternative design ideas is required in this section that are explored in detail graphically and annotated to communicate details of sub-systems, materials and processes that might be used during manufacture. At this stage too, design criteria should be referenced to review designs and check their potential in meeting design requirements.

Fewer ‘blue-sky’ designs were seen this year as students returned to more traditional design briefs, but where this approach was in evidence it was pleasing to see some interesting and forward thinking solutions. In a few cases, students following this approach excused themselves from specifying materials and processes that could be used in manufacture by stating that because their designs were not yet in existence, neither were appropriate materials or processes.

In developing ideas to produce a final design proposal, some excellent work was seen, but it was obvious that many students, and indeed centres still do not understand what design development should entail.

Development means ‘change’, and this should be illustrated by students through their ability to bring together the best and most appropriate features of their design ideas into a coherent and refined final design proposal that meets the requirements of the design criteria.

There should be evidence of the developed design having moved on from an original idea through the results of 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. Students should also 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.

Almost all students used some form of modelling as part of design development and good use of CAD was in evidence, but equally, physical modelling was often too weak to enhance development at all. The use of card that sagged and plasticine to model furniture are inappropriate materials to use at AS level.

Modelling is an important aspect of design development and should be used to test features such as proportions, scale, mechanical details, sub-systems etc. There should be a reason for modelling and should not be carried out as a hoop-jumping exercise. Modelling can be done through the use of traditional materials, or through the use of 3D CAD. Evidence of 'real-world' modelling should be presented through clear, well-annotated photographs.

Development should produce a clear and detailed final design proposal that includes technical details of materials, processes, techniques, fixtures and fittings that will be used during product manufacture. There should be enough information present to enable a skilled third party to manufacture the product. The final developed design proposal should be evaluated objectively against the design criteria to justify the design decisions taken.

As a result of development, most students were able to produce a 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.

As was the case last year, the most disappointing aspect of the design and development section was the generosity of some centres in awarding marks where there was little evidence to support the credit given.

If student performance is to improve in this section, more 'design teaching' needs to be employed and a closer focus placed on addressing the requirements of the assessment criteria.

Criterion F – Communicate

Most students achieved significant marks in this section and some displayed excellent standards of all-round communication skills. The use of CAD was generally of high quality, but dimensioning of CAD drawing tended to be problematic. Where this aspect was generated

within the CAD software many dimensions were inappropriate, extending to three decimal places and of no practical value to a third party intending to manufacture the design proposal.
While many students received good credit for using a range of communication techniques with some skill, the level of free-hand sketching was generally poor and often consisted of no more than simplistic images that conveyed little detail. A common failing in this section was the lack of detailed information offered to enable third party construction of the intended product. The production of a detailed and dimensioned working drawing of some kind, a cutting list and suggested processes would help many students to achieve higher levels of response in this assessment section.

Product manufacture

Criterion G – Production plan

Many students managed to score full marks in this section, which only requires a logical and well organised approach and knowledge of assessment requirements in order to achieve well. Common failings in some cases were that students simply listed processes and did not explain them in any detail, while others used units such as weeks, lessons, days and dates to convey time which provided no 'real-time' information.
Where students had been presented with the same practical task, in some cases almost identical and identical planning was in evidence, which defeats the purpose of this section, which is to test students' individual competencies in planning for production. It should be realised that it is highly unlikely that students will make all component parts in exactly the same order and estimate the same amount of time for each task if they are working independently. Very disappointingly, a few centres produced templated planning sheets for students that listed manufacturing activities and all they had to do was enter timings. It must be realised that exercises such as planning for production are designed to 'teach' students skills that can be used at A2 level and should never be treat as an opportunity to minimise student effort and input.

Only a few students presented retrospective plans this year, which in fact were not plans but diaries of events.

Many students included health and safety, a feature not necessary in planning, but a requirement of 'making' which can be evidenced here.

Criterion H – Making

This assessment section provided the vast majority of students with their best achievement within the Portfolio of Creative Skills. Most centres have the measure of product manufacture and high quality skills and expertise was in evidence from many students. Having said this however, many centres are setting tasks of limited potential which do not allow students to demonstrate precision and accuracy in their work; it can also be extraordinarily dull for students, which is disappointing as it is hoped that 'making' experiences will be enjoyable and used to take students out of the comfort zone of familiar skills and processes.

Where very prescriptive 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 students more independence in their work.

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 students to demonstrate high level skills.

Many students failed to justify the choice of materials used in their making tasks which meant that they were unable to achieve full marks despite demonstrating skills worthy of this level.

A few centres treated this section as a complete design and make task, where students included research and design/development in their work, wasting time and effort producing unnecessary evidence.

Criterion I – Testing

A wide range of responses to testing were seen with many students failing to gain what should be straightforward marks. In many instances it appeared that testing was tackled when students had run out of time, leading to superficial and limited tests that were written about poorly and were unsupported by photographic evidence. Testing was particularly superficial where no manufacturing criteria had been set, so no testing against known measurable manufacturing needs could be shown.

Third party testing often consisted of simplistic congratulatory comments that were not set against manufacturing criteria and it was obvious that some such comments were written by students about their own work.

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