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Moderators' Report/ Principal Moderator Feedback

June 2011

GCE Design and Technology: Resistant Materials Technology (6RM04) Paper 01 Commercial Design

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Principal Moderator's report on 6RM04 Resistant Materials Technology 2011

Moderators report that the quality of work seen this year showed some improvement on last year, but many students struggled to maximise their potential because of a lack of understanding of what is required in the detail of each assessment criterion.
At A2 level in order to reach the high level of achievement, candidates must display consideration of activities in their work that reflect how a designer would operate in a 'real world' commercial situation, dealing with constraints such as their own ideal solution to a problem, the influence of a client's needs and preferences and limitations of budget etc. and making appropriate compromises in order to produce the best possible solution to a problem. This means that consultation between designer and client should take place at key points in the design/make process, which amount to almost all assessment sections. Unfortunately, many students paid only cursory attention to this relationship seeing it as a necessary inconvenience that needed to be addressed to comply with the assessment criteria.

Research and analysis

Whilst a growing number of students sourced 'true' clients and user groups for their work, many more identified figures who had little influence or input beyond an initial interview, were superfluous to design decisions and were often not referred to until the summative evaluation of a product, if they were consulted at all. Despite no marks being awarded directly for the relationship between student and client, in the best work this relationship was firmly established during the research phase.
All students presented research materials, but many failed to be selective, focused and succinct in gathering information that was relevant and informative to the writing of a product specification and could be used when designing. Many students used the approach of 'the more the merrier', producing copious amounts of generic information, much of which was no more than padding. Research into materials at this stage is largely irrelevant as no design decisions have yet been made. It would be much more appropriate and useful to research materials and processes during initial designing, when such activity can be directed at a proposed design solution.

Product specification

In general, this criterion was fairly well tackled by the majority of students, but few achieved maximum marks because they were unable to write statements that were truly measurable, technical, justified, derived from research and developed in consultation with a client. In the best responses, students often produced specifications in tabular form using sub-headings such as purpose, user requirements, performance requirements etc. with adjacent columns explaining justification, how points could be tested and links to research and client needs.

Sustainability proved to be challenging to many students and centres are well advised to place greater emphasis in their teaching on this aspect of the course.

Design and development – Design

This assessment section was tackled reasonably well by most students and some outstanding work was seen that demonstrated true imagination and innovation but this was rare; most settled for more simplistic design ideas accompanied by little technical information, or client/user group input and at the lowest response level, work was seriously dull and often copied from existing design imagery. Communication skills in designing were generally good and in some instances flattered designs until on closer inspection it was seen that high quality presentation could not disguise a lack of accompanying technical information. In such cases, time spent on appropriate annotation would reap more reward than time spent making designs look slick. In the best examples of designing, students focused on no more than three or four initial ideas, but analysed these comprehensively through graphical cameos of sub-systems and construction details in consultation with clients/user groups to establish whether design needs were likely to be met. Client consultation should always be a feature of alternative design presentation.

Design and development – Review

Most students were able to score half mark in this section by making simple and generic comments against specification points. Some students managed to formatively evaluate their initial designs objectively, but client/user group involvement was often not as strong as it could have been and where feedback was recorded, it was rare to discern how students intended to use this information to influence the development of their continuing designing. Many students treated this section lightly, often failing to address specification points, or using tick boxes to evaluate progress.
Sustainability was often mentioned in the review, but hardly ever in any detail. Where students presented weak specifications, this section was inevitably weak too, as there was little guidance to evaluate designs formatively.

Design and development – Develop

Some excellent work was seen in this criterion from some students, but the vast majority struggled to understand what design development means. Many students made only cosmetic changes to initial designs which did not originate from any previous ideas and presented these as final design proposals, failing to explore issues regarding construction, materials and processes. There are ten marks for development, so it should be obvious that a significant amount of new work must be done to achieve these marks. In the best responses, students used information gathered in 'review' to drive the development of an initial idea and part-ideas through to a conclusive and refined final design proposal.
Development means 'change', and this should be shown in students' work through their ability to use the results of design review and bring together the best or most appropriate features of their design ideas into a coherent and refined final design proposal that meets all of the requirements of the

product specification and matches the client/user group needs. 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. Continuing design input should be a feature of the development section, along with detailed information on all aspects of the developed design as possible. Almost all students used modelling as part of their design development and there were some excellent examples of this, particularly where 3D CAD was used. Despite the expert use of CAD, not many students made statements to say why they were modelling. 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 always be a reason for modelling.

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 points of specification and the client/user group needs to justify the design decisions taken and recorded in detail by students. Client feedback should be referenced in detail at this point in order to justify and clarify final design details that may be compromises between the student's ideals and the client's preferences.

Design and development – Communicate

As was the case last year, 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 cause problems. Where drawings were generated from 3D CAD sketches some dimensions were labelled to three significant figures and some drawings were populated with endless dimensions that were of no value and did not inform the manufacturing process.

Despite the general high level of CAD skills seen, many drawings fell short of providing enough information to allow third party manufacture of the designed product. Students are willing to generate copious amounts of component drawings, but these are rarely coupled to data on assembly or general arrangement drawings and as such are of little value.

Planning

Students tackled this section well and most achieved good levels of success. Almost all were able to produce an appropriate work order and this was usually done in the form of a flow chart or table and included the order of assembly of parts or components, tools, equipment and processes to be used during manufacture. Gantt charts were also in evidence but some included the whole design and make process instead of focusing only on product manufacture. Only a minority of students failed to consider quality and safety checks, but statements such as 'check dimensions are correct' or 'is the bend at the right angle' are worthless as quality checks as they convey no information regarding how checks would be carried out. When recording realistic times for stages of manufacture, a significant number of students used units of weeks or lessons, which does not convey real-time

i.e. hours/minutes. A few students presented retrospective planning describing how processes 'were' carried out instead of how they 'would' be carried out and this changes a plan for production into a diary of events.

Making – Use of tools and equipment

Marks awarded by centres in this section were generally accurate and some high quality skills and competencies were in evidence. However, despite demonstrating good skill levels, some students produced undemanding work that could not support the marks awarded by centres. Simplistic and undemanding work, no matter how well made using appropriate tools, equipment and processes, that is unchallenging, cannot elicit high levels of credit here, so centres must ensure that the work students embark upon is appropriate to the capabilities of individuals and will allow them to achieve their potential.

In this section marks are awarded for the skills used by students in manipulating tools and equipment. High level skills will demonstrate precision and accuracy. Consideration of safety awareness should be credited here, but any risk assessment illustrated in planning can be used as evidence.

Making – Quality

In general this assessment section was marked fairly by centres. Marks are gained here for the quality of the completed work and its component parts, whether it functions as it is meant to, whether it matches the final design proposal and whether it is appropriate to expected A2 levels of response. Some excellent work was produced but some tasks lacked the scope and potential to allow students to demonstrate their abilities. More ambition and risk taking would be of benefit to students at the outset.

Not many students justified their choice of materials for manufacture, which could be done easily through simple annotation of photographs or in planning.

The key to supporting teacher marks is for students to present a photographic manufacturing diary to illustrate skills and processes. A series of photographs taken over a period of time during manufacture is the ideal way to highlight skills and processes used and to provide examples of precision and attention to detail that may not be readily noticeable in an image of the finished product.

Most students presented a good range of clear images to support their practical work, but some photos were too small to illustrate technical details and some did not convey any useful information. It is better to have fewer, larger and more detailed images than many thumbnail size ones that are difficult to see.

Making – Complexity/level of demand

As was the case last year, some high level work was seen which was generally well marked by centres, but conversely some work was of mediocre quality which was rewarded generously, where students had produced well made products which demanded relatively low level and

repetitive skills. Where it was in evidence, it was pleasing to note that most centres had restricted the use of CAM to the recommended 50% or less, allowing students to demonstrate their personal manufacturing skills. Only a few centres allowed an over-reliance on CAM in their students work.

Testing and evaluation

Only the best students scored well in this section, which is surprising as the requirements are very straightforward and focus on testing the performance and quality of the completed product. Judging by its brevity, it appears that this section is not being given enough time by some students, whose work in the rest of design folders is significantly better than in this section. A significant number of students wrote about testing but did not include any evidence of actual testing taking place. Many tests tended to be simplistic and subjective and lacked the objectivity of placing the product into real-life situations to test performance

Client/user group evaluation, when it was used, was often no more than a series of congratulatory statements and it was rare to see perceptive comments made against points of specification.

Life cycle assessment was only tackled by a minority of students and in the best instances students used a detailed ‘cradle to the grave’ analysis.

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