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Moderators' Report/ Principal Moderator Feedback

Summer 2014

Pearson Edexcel GCE in Design & Technology (6RM01) Paper 01 Portfolio of Creative Skills

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Unit 6RM01
Portfolio of Creative Skills

Much of the observations and comments in this report reflect those made in previous years. Despite detailed feedback from moderators to centres and Principal Moderator reports advising on assessment requirements and how to target marks effectively, the same strengths and weaknesses are apparent in much of the work submitted for moderation this year.

As a reminder of requirements in the 6RM01 course; students must produce a Portfolio of Creative Skills which is divided into three distinct sections, Product Investigation, Product Design and Product Manufacture.

In Product Investigation, they must select a product that contains at least two materials and is manufactured using more than one process. They are required to investigate the selected product under the headings performance analysis, materials and components, manufacture, and quality. Students, under teacher guidance have complete choice in selecting appropriate products for investigation. Work can be presented in either A4 or A3 format.

In Product Design, students are required to submit at least one design task appropriate to AS levels of response that demonstrates their design competencies. They are encouraged to be as creative as possible and to support this there is no requirement for the designed product to be manufactured, which means there are no constraints placed on designs through the limitations of resources. Students have the option in Product Manufacture of making what they design.

In the course of designing, students are expected to produce a range of initial design ideas accompanied by technical annotation, a review of design ideas based on product specification requirements and development of designs into a final design proposal that includes details that would allow a skilled third party to manufacture the intended product.

Students, under teacher guidance have complete choice in selecting appropriate design briefs. Work should be presented in A3 format.

In Product Manufacture students are required to plan, make and test one or more products that match the manufacturing criteria of the task. If a single product is made, it must be manufactured using more than one material and process and if more than one product is produced, the collective group must contain more than a single material and process. In this section of the portfolio, it is strongly recommended that teachers set the manufacturing tasks in order to ensure that students improve competencies and learn new skills in preparation for A2 tasks. It is a rule that where CAM is used, it must not exceed 50% of product manufacture.
Where more than one product is made, planning and testing should only be evidenced once.
It is a requirement that clear photographic evidence is submitted that shows the quality and complexity of challenge relating to all manufacturing tasks.
Work in this section should be presented in A3 format.

It is expected that the complete Portfolio of Creative Skills will be presented using 25 – 30 sheets of A3 paper. There is no penalty for exceeding these guidelines.

Assessment criterion (a)

This section is improving overall and most students were able to score four or five marks for analysing appropriate product pairings. However, there were still a significant number of students who chose to compare and contrast products that were too similar, such as two electric drills, two electric kettles or electric screwdrivers, products that could have had better alternatives such as hand drill, camping kettle and hand held screwdriver. Quite a lot of students chose high-tech cameras, phones iPads/tablets etc, where comparisons were focused on electronic performance and discussion of Mega pixels, Gigabytes etc. instead of form, function user/performance requirements etc. Students who used the suggested headings of form, function user requirements etc. tended to score better marks than those who used their own sub-headings, or ACCESSFM, which does not include important technical considerations such as 'performance requirements' or 'user requirements', where strong comparisons can be made.

A minority of centres allowed all students in a group to analyse the same product pairing and where this was the case, many statements were inevitably similar from student to student. The object of this section is to assist teachers in their teaching by encouraging a group of students to look at different products individually so that the information gathered through several analyses can be used in relevant and cohesive teaching, avoiding dry theory lessons.

Assessment criterion (b)

In this section students are required to investigate two materials used in the manufacture of the product under investigation and suggest one appropriate alternative for each.

Almost all students were able to identify two materials used in the product under investigation and were able to suggest an appropriate alternative for each, but some alternatives were very close, especially where plastics were concerned. As has been the case in previous years, many students saw this section as an opportunity to list everything they knew about a material and its properties but failed to relate these to the needs of the product.

There were examples of students including large amounts of generic, cut and pasted technical information, listing alloy content of metals, carbon percentages of steels, information on copolymers, electrical resistivity, coefficient of friction and so on, when what is required is that students have an understanding of why particular materials were used in the product and what advantages and disadvantages are associated with them. Properties should be mentioned, but only those that are appropriate to the needs of the product; it is irrelevant to mention 'good electrical insulation' or 'high tensile 'strength, if these are not properties that would be of use.

'Environmental impact' was addressed well by many students who discussed extraction, processing, refining, transportation, reuse and recycle. In a lot

of instances however, student presented a list of generic statements that had little consideration of the product.

Assessment criterion (c)

In this section students are required to identify and investigate two processes used in the manufacture of the product under investigation and to suggest one appropriate alternative for one of the identified processes.

Most students were able to identify two appropriate processes and suggest an alternative for one, but as in previous years, in the majority of cases this section was answered using generic descriptions of processes rather than justifying their use in manufacturing the product.

Again, there were lots of cut and pasted diagrams of processes, with generic descriptions of how they worked, rather than a justification of their use in manufacturing the product. The better achieving students discussed, for example, the finer points of the casing of a drill, and how injection moulding would allow the creation of “click-together” joints, which need high tolerances or that the cases needed to be thin walled with integrated bosses for receiving machine screws.

Some students presented information on how the materials from the previous section were manufactured; discussing how mild steel or plastics were manufactured, instead of focusing on manufacture of the product under investigation.

Some alternative processes were inappropriate, such as injection moulding and vacuum forming and this problem occurred mostly where plastics were involved. Where there is no real alternative to a process such as injection moulding it is acceptable for students to suggest a process that would be appropriate if a different material were used, as long as they name the material; for example aluminium alloy and pressure die casting.

The environmental impact of using the processes identified was not well addressed. 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.
Many students gave the same information as that presented in the previous section.

Assessment criterion (d)

Quality Control was well addressed by many students who were able to identify and describe appropriate QC checks and the more able students explained in detail how a test would be carried out, for example using go/no-go gauges for checking sizes of a component. However, many students identified quality checks, which were generic and did not focus on the product or component parts of the product under investigation. Some students simply described what QC was without specifying checks linked to their product.

The understanding of quality assurance is improving but there are still a significant number of students unaware of requirements, resulting in general explanations of QA and confusion with QC. 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 sub headings as Preparation; Processing; Assembly; Finishing and After-sales.

The majority of students ignored the requirement to identify and explain appropriate quality standards and where standards were identified there was often no explanation to say how they would influence the manufacture of the product.

Assessment criterion (e)

A very wide range of work was seen and it is difficult to believe that it was produced by the same age range following the same course. At the highest levels of response work was outstanding, but at its lowest, the quality of work seen failed to reach good GCSE standard.
A lot of work was simply concept sketches or body styling, with little or no exploration of design details. Many students annotated to describe design features or details, but failed to illustrate how they might work. Technical annotation was often weak and did not reflect a good knowledge and understanding of materials and processes.
Most students produced a range of ideas, but often the first idea related to the task in hand while others bore little relevance to it and were included to make up the 'range' of ideas . Reference to design criteria was not often in evidence and in many instances students presented no design criteria, or it was so superficial as to be useless in reviewing designs as they progressed. It is essential, if students are to target high marks, that the Product design section begins with a design brief that contains measurable design criteria that can be used to review design ideas against and to evaluate the final design proposal.

Design development was excellent in some cases, but often limited to presenting construction details without any further design input taking place. Development means 'change', and this should involve the bringing together of the best and most appropriate features of design ideas into a final refined design proposal that meets the requirements of the design criteria. There should be evidence of further design input into the developed design through the results of evaluation against design criteria.
Almost all students modelled their final design proposal, but many did so for superficial or cosmetic reasons, rather than to test some aspects of design detail.
Final evaluation against design criteria was often simplistic, especially when no measurable criteria had been set at the beginning of the design task.
Overall, this section was not done particularly well, perhaps because of a lack of teacher intervention and guidance. Allowing students to design spectacles that are very similar, or other narrow ranging products such as trainers or snowboards is limiting and cannot achieve high marks. It is likely that more teacher input in design teaching and in ensuring students

are familiar with assessment requirements would result in significant improvements in this section.

Assessment criterion (f)

In this section, drawing and sketching work varied from the outstanding to very weak and the quality of annotation ranged from very well informed to simplistic labelling.

The use of 3D CAD was extensive and expertly carried out, but where orthographic working drawings were generated automatically from 3D CAD sketches dimensions were often recorded to two or three decimal places, making them unrealistic. It is expected that when this short-cut to a working drawing is used, students will edit and modify dimensions appropriately.

An important aspect of this section is to include enough information to allow a skilled third party to manufacture the designed product and a lot of students failed to do this to a level where it was genuinely possible to make the product by working solely from the working drawings; very few produced a cutting list that was of realistic use.

Assessment criterion (g)

This section was reasonably well done, but many students did not provide a great deal of detail and merely listed a number of task stages.
Most students incorporated Gantt charts, flow charts or tables and details of tools/processes and materials. Timings were sometimes unrealistic, particularly where students were working on small components and suggesting short times for sometimes complex processes.
Where Quality Control was included it was common to see statements such as ‘is it the right size’ or ‘is it a right angle’, which are questions not checks. Checks should be described to say what they are and how they might be carried out. QC is not currently required as part of planning, but its inclusion is good practice for this section at A2 level.

Assessment criterion (h)

In this section, marks awarded by teacher assessors were largely accurate and some excellent work was seen which was challenging and was used to introduce students to new skills and processes, or to reinforce existing skills and competencies. It was noticeable that a significant number of centres set tasks of limited potential which limited students in demonstrating precision and accuracy in their work.

Fewer products were manufactured using an over-reliance on CAM equipment and the vast majority of centres understand the correct balance here.

A continuing problem was that many students did not 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 small number of 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.

Assessment criterion (i)

A minority of students were able to score maximum marks in this section, where tests were based on measurable manufacturing criteria produced at the outset of manufacture, but many projects lacked detailed testing against measurable criteria, due often to limited criteria set at the beginning, with some projects having no starting point.
Much testing was superficial, focusing on aesthetics for example instead of performance. Not many realistic 'field-trials' were used to test a product under realistic conditions and third party testing was generally congratulatory and not focused on measurable manufacturing criteria.

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