Moderators' Report/
Principal Moderator Feedback

Summer 2015

Pearson Edexcel GCE
AS Design and Technology
Resistant Materials Technology
Portfolio of Creative Skills (6RM01/01)

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Publications Code US041253

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 available to students. 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.

Some high quality work was seen by moderators, where students were able to target marks through excellent standards in each section of their portfolio, but as we near the end of this course before it is redeveloped, it is

quite disappointing to report that despite many years of feedback through Principal Moderator reports and moderator feedback to centres the same shortcomings were apparent again this year as those in evidence in previous years.

Assessment criterion (a)

In this section most students were able to achieve commendable marks, but the majority could have gained one or two more had they been more selective in their choice of 'similar product' and had justified statements of specification.

All students were able to write a specification for the product under investigation, but many did not qualify or justify statements. Saying that a handsaw needed to be balanced or that a drill must accommodate a range of drill sizes are appropriate statements, but there should be an explanation of how these requirements are achieved within the design of the product.

Many students simply described the products instead of justifying why specification points were relevant and the important areas of user requirements and performance requirements were often dealt with superficially.

Many students selected a 'similar product' that was so like the original that identifying differences to discuss was very difficult, resulting in the same things being said about both products

The choice of 'similar product' is important in enabling students to make effective comparisons under specification headings and if the similarity is too great, inevitably form, function, user requirements, performance requirements etc will be the same or very close for each product.

Product pairings such as similar sunglasses, ballpoint pens, clutch pencils, hairdryers, computer keyboards or headphone speakers offer little opportunity to compare and contrast under the recommended specification headings.

Much better choices included small domestic flip top waste bin and large wheelie bin, hand held tools such as a screwdriver and impact driver, tenon saw and electric saw, pocket torch and arc lamp and throwaway plastic stapler and electric office stapler. These pairings offered much more opportunity to identify and discuss differences and how the products met their differing design needs while still being similar products.

Where electronic devices such as mobile phones, iPads and tablets or cameras were investigated, students often focused on technical and electronic performance of Mega pixels, Gigabytes etc. instead of form, function user/performance requirements etc.

Some students used the acronym ACCESSFM as a structure for their specification, but this does not include important technical considerations such as 'performance requirements' or 'user requirements', where strong comparisons can be made.

Where a whole group of students analysed the same products many specification statements were the same or very close from student to student, defeating the purpose of this exercise.

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 appropriate materials and suggest viable alternatives. However, where plastics were involved, most suggestions were just another closely related plastic material.

A lot of students simply listed properties and cut and pasted generic information about materials without evaluating and justifying their suitability in meeting the design needs of the product. Some saw this as an opportunity to list everything they knew about materials without any selectivity.

A surprising number of incorrect statements were apparent and included examples such as “mining for brass” using mild steel for cutting blades and using gold as an alternative to aluminium because “it looks good” giving the impression that some students were not being taught effectively in this unit.

‘Environmental impact’ was addressed well by many students who discussed extraction, processing, refining, transportation, reuse and recycle. In a lot of instances however, students 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 manufacturing processes and suggest an alternative for one, but many simply described a process and produced a generic list of advantages and disadvantages and did not relate these to the product to say how or why they met its design/manufacturing needs.

Where a product consisted of several component parts it was sometimes difficult to determine which parts were meant to be made using what process as this was not made clear.

Some students presented information on how materials from the previous section were manufactured rather than focusing on the manufacture of the product under investigation.

Some alternative processes were inappropriate, such as vacuum forming and blow moulding as substitutes for injection moulding, and 3D printing appeared several times

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.

Environmental impact was often limited to energy use, or recycling of the product, rather than a discussion of the effects of using the process.

Assessment criterion (d)

Most students were able to identify some appropriate quality control procedures, but quality assurance was very generic and not often related to the product. Information about quality standards tended to just define the terms and not show how this was related to or influenced the manufacture of the product they were analysing. 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. 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.

Not many students were able 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)

In this section, as was the case last year, many students struggled to score high marks and this continues to be the area where, in many cases, teacher assessment levels could not be fully agreed by moderators.

A wide range of work was seen; at the highest levels of response work was outstanding, but at the lowest, the quality of work was not worthy of GCE AS 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 some did so for superficial or cosmetic reasons, rather than to test some aspects of design detail. Modelling is seen by many to be a hoop jumping exercise.

Final evaluation against design criteria was often simplistic, especially when no measurable criteria had been set at the beginning of the design task.

This section remains the least well done. Despite seeing some high quality work, most was uninspiring and in need of greater levels of creativity and knowledge of materials and processes.

Assessment criterion (f)

Some excellent standards of presentation were seen in this section, where almost all students are now expert users of 2D and 3D CAD. Many students still struggle with freehand sketching however and this was weak in many cases.

Modelling varied from precisely scaled replicas of the intended product to very loose 3D representations that could not be used in any constructive way to test aspects of designs. Many students still see modelling as an assessment necessity rather than a useful development tool.

Working drawings were included in almost all instances, but a large number were not detailed enough to enable 3rd party manufacture of the product. 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.

Assessment criterion (g)

This section was quite well done and students were able to produce an appropriate sequence of manufacturing operations, but in some cases tasks were not detailed enough to allow a third party to follow the plan. Planning statements should be detailed; the statement “cut rails to size” should include dimensions and quantities. Most students incorporated Gantt charts, flow charts or tables and details of tools/processes and materials. Timings were sometimes given in lessons, weeks or dates, but these terms need to be qualified to clarify how long each would be.

Assessment criterion (h)

Some excellent practical work was seen, but as always some work was too simplistic and undemanding to reach the higher mark ranges.

Many centres set the making task and where this was done well students were able to demonstrate their capabilities in a wide range of skills and processes. However, there were many centre generated tasks that did not offer the level of demand necessary to give students access to the full range of marks which is disappointing and limiting to capable students.

As was the case last year, some centres could be recognised from the same making task they have set and used over several years, which must be unexciting for students pressed into a formulaic routine.

Not many products were manufactured using an over-reliance on CAM equipment and the vast majority of centres understand the correct balance here.

A continuing problem is that 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.

Assessment criterion (i)

Many products lacked detailed testing against measurable manufacturing criteria, due often to limited criteria set at the beginning of manufacture, with some projects having no starting point.

Tests were not often carried out under realistic ‘field trials’ and third party testing often consisted of simplistic comments which did not evaluate the product and were not related to measurable performance criteria.

It is essential that three or four measurable performance criteria are set at the beginning of the making task, so that realistic and meaninful testing can be carried out on the finished product to test its fitness for purpose.

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