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Moderators' Report/ Principal Moderator Feedback

Summer 2013

GCSE Design & Technology

Electronic Products (5EP01)
Creative Design & Make Activities

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Introduction

Most centres ensured that students presented their folders in a structured manner with each assessment stage clearly indicated. However in some cases students did not number their pages and whilst folders were generally secured it is advisable for students to have their name and number on all sheets. CMRBs were well completed with the 'Assessor witness statement' being completed very well. Teachers should ensure that page numbers are given to indicate where the evidence can be found for each section. Comments may be given to help support the mark awarded but repeating the descriptors for each mark or set of marks is not required.
The front page should be completed to show whether the student has produced combined or separate design and make activities.

In all instances photographs should be shown in the CMRB for both sides of the PCB and of the finished product. Students are advised to produce a photo-diary in their folders that highlights the range of skills and processes used during the manufacture of their product.

Details for each stage are given below. Students would benefit by understanding how each stage feeds into the next and not treating them as separate entities.

Design Activity

Analysing the brief

Although some improvement was seen in the quality of students work this still remains a weak area with teachers' often being too lenient with their marking. Whilst most understand that this section relates to asking (but not answering at this stage) questions about their brief, in the main the questions are too general and could apply to virtually any brief. Many use spider diagrams and use one word statements which attract no marks. In order to score highly, and aid subsequent sections, students should ask a range of questions that are relevant to their brief together with others that will be of a more general nature. For example, a student with the brief of producing a 'Child's night light' would ask questions relating to how light levels can be sensed, what output(s) could be used and to what light level, if it should turn off after a given time and if so how long that time should be, the age group and/or gender of the target group and if a 'theme' is appropriate. These, as outlined about, should be augmented with general questions relating to type of battery, portability, casing materials and so on.

Research

The descriptor for the highest scoring box (5 to 6 marks) states "Research is selective and focuses on the design needs identified in the analysis" and this is key to success in this section. It was pleasing to see that more centres are taking this on board and that students are researching relevant topics. However, there is still a good deal of unfocused research presented that is doing little to help students to write a specification and subsequently help them when generating design ideas. Unstructured 'research' into materials and components should be avoided as should questionnaires with general questions that do little to progress the students understanding of the design needs. It was not uncommon to see students produced many more sheets for this section than they did for the initial design section which is worth twice as many marks.

Specification

Marking was generally accurate in this section with most centres understanding the requirements. Far more students are now justifying their specification points and this is to be encouraged for the vast majority of their points. In order to gain 'top box' marks students should ensure that some of their points are technical and measurable. Taking the 'Child's night light again as an example a low level specification point would state "it should be light- weight". At the other end of the spectrum the response may be "It should be portable and weigh no more than x grams as the child may have to carry it to the toilet during the night". For those who combine the design and make tasks this has the added benefit of giving students something tangible to test and evaluate at the end of their project.

Initial ideas

This section has the most marks allocated to it in the whole of the Creative Design activity and students should spend an appropriate amount of time on it. Often, as stated above, it comprised of very few sheets and students did not demonstrate a **detailed** understanding of electronic, material and process knowledge. What makes our subject so special is that we ask students to apply knowledge and not simply 'learn' it. In this section students should demonstrate their knowledge of Unit 2 through the generation of electronic and casing ideas.

Some centres take a 'systems' approach and this is fine as long as proposed circuits are included. Taking the 'Child's night light' as an example once again students could consider circuits based on the process devices listed in Unit 2. This could include transistor, thyristor, Op.Amp, 555 timer, logic and PIC circuits. As with all design and make sections the available marks are split approximately two-thirds for electronics and one-third for casings.

Circuits and casings should have brief annotations that help students to demonstrate their understanding. More able students should combine process devices in order to create more demanding circuits. A transistor light sensing circuit could be combined with a monostable timing circuit, logic gates could be combined and/or more involved PIC circuits could be shown that respond to varying input levels.

Credit is given when students use circuits not included in Unit 2 (a decade counter for example) but students should still demonstrate their understanding. It is not prudent to allow students to generate (obtain) overly complicated circuits where they show little or no understanding of its workings.

Review

Although most students reviewed their ideas against specification points there was a lack of user group feedback and issues of sustainability were only considered by the minority.

Communication

Centre marks were generally accurate and on occasions a little severe as a wide range of techniques were used with precision and accuracy.

Development

Generally students moved both their circuit and casing designs on and some good work was seen. The key in this section is to ensure that the initial ideas have been developed using modelling and with the help of feedback from a user group. Many different pathways were taken through this section and high marks can be achieved providing students develop both areas to a final proposal. Some spent time developing their circuit to a final proposal whilst others had arrived at that point in their initial ideas. Better students refined their PCB layout by moving components, changing track

widths, reducing links and decreasing the size. Others who did not score so highly accepted the programmes auto-route. A good number of students used bread boarding to test circuits and some made 2D card models of their casings. More able students should justify component values and include calculations if applicable. It is not feasible to expect all of the above to be completed but the final proposals for both the circuit and casing should be developed on from the initial ideas remembering the two- third, one-third guidelines.

Final Design

Students should be encouraged to produce this as a separate section although credit was given where evidence could be found during development. On the electronic side students should give details of all the components to be used and this should include values. The casing should included details of materials, sizes and processes.

Make activity

Production Plan

This section has continued to improve and generally marking was accurate. Most students produced a plan that considered the stages of manufacture in the correct sequence. Higher scoring students provided more detail relating to the processes but few gave specific forms of quality control. This should be an instruction and not a question. The moderating team see many examples asking “Is it OK?” Is it the correct size?” This is not specific and students should be encouraged to have a number of QC checks such as “Use a multimeter to check for continuity” and “Use a rule to check it is the correct size”.

Quality of manufacture

This section has the highest number of marks available (24) so it is imperative that good quality photographs of both sides of the PCB and the finished complete product are shown in the CMRB in order to provide evidence of the standard to the moderator. It is also recommended that students keep a photo-diary of their manufacturing. ‘Assessor witness statements’ are a very important part also in helping to evidence the levels of independence, range of skills and accuracy of students work. In most cases the above are completed well. However, many examples were seen where the marking was too lenient. This was due to the task not offering the level of challenge required to achieve ‘top box’ marks. Circuits should combine process devices and PIC’s should have a number of inputs and/or outputs with some challenge in their programming. Casings, worth approximately 8 marks, should involve a number of processes and be well made. Centres should ensure that if proprietary cases are used students use tools and process to enhance them in order to access all marks.

Quality of outcome

This section was generally well assessed by centres and those who produced good quality photographic evidence helped both their students and the moderators. Quality is the key word in this section. Students should be encouraged to use mounting techniques for inputs and outputs, heat shrink, effective cable management, battery and PCB holders and strain relief holes.

Health and safety

Teachers' award marks in this section based on their observations of students during the make activity and no formal evidence is required. It was good to see that in most cases photographs of students manufacturing showed them taking precautions to work safely.

Testing and evaluating

Marking was generally accurate in this section but a little lenient when students did not conduct meaningful tests. Teacher's whose students start on a separate making activity should ensure that they provide students with a specification that includes measurable points.

Referring to the example given in the specification section a student could conduct tests to ascertain just how portable the child's night light proved to be and indeed if it did weigh less than x grams. Two or three meaningful tests that include user group evaluation and sustainability issues can score full marks. Students do not need to evaluate their own performance, stages in the manufacture of the product or suggest improvements that could be made. Please note that this is the only section that assesses QWC and if no testing and evaluation has been completed then the mark should be zero.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwant to/Pages/grade-boundaries.aspx

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