GCSE
ENGINEERING

8852/C Practical engineering
Report on the Examination

8852/C
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General

This year saw the GCSE Engineering NEA marked without COVID adaptations, the second time since the beginning of this specification.

It was pleasing to see the Non-Examined Assessment (NEA) tackled with enthusiasm and creativity by many students, displaying a wide range of interesting and with diverse solutions proposed to the set task.

Projects were generally well organised, and in the most effective examples students presented their work in sections under headings of the design criteria or were colour coded. The number of sheets or slides that students completed often exceeded the AQA recommendation.

The majority of centres have been accurate in their assessments of the students' work. Centres, staff and students are to be congratulated for this.

Teachers are advised to make use of the Teacher Online materials (TOLs) available on AQA centre services and make contact with their NEA adviser to support future assessments. As moderators do not visit, centres should present good quality photographs and annotation to justify marks awarded. It is also useful if moderators are provided with photographic evidence of the prototype being made.

An increasing number of centres submitted work electronically, in some cases they included videos of work being evaluated. Please ensure that the electronic work is either in a PowerPoint or PDF format and sent to the moderator on a memory stick.

Teacher Annotation Teacher comments are very useful. They are used by the moderator to confirm why a particular mark was awarded. It is most useful when teacher annotation details and states exactly what a student has done and how this meets specified assessment criteria. General statements or comments copied straight form the assessment criteria are not as helpful.

Administration

The moderation period is limited, and centres are thanked for their cooperation in completing administrative tasks promptly.

It is worth noting:

• with the online mark submission system, the sample of folders to be sent to the moderator is generated automatically. These folders should be sent to the moderator once the sample has been identified.
• centres must complete a Centre Declaration Sheet and enclose this with the sample.
• each student requires a completed Candidate Record Form (CRF); these should be secured to the front of each portfolio or be included with the folders or memory stick when the sample is sent to the moderator . Teachers should be aware that the CRF is removed from folders in order to read the comments and cross check the marks with those recorded on the system. It is therefore vital that the work is labelled with candidate name and number as once the CRF is removed there is no other form of identification.

• portfolios should be individually fastened together in a logical order, to assist the moderation process. It is the centre's responsibility to present students' work in the best possible manner for moderation to ensure their potential is achieved.
• when assessing students' work, reference should be made at all times to the Assessment Criteria.

Problem solving

This section gives students an opportunity to demonstrate their ability to analyse a given problem, imagine solutions to that problem, use a range of modelling techniques, produce a prototype and communicate their ideas clearly.

Problem solving occurs throughout the NEA with marks awarded for work that appears across the whole project; problem analysis, problem solving, modelling, communicating and the design for a final prototype.

Students achieving the highest marks for Problem Analysis showed discrimination when selecting material to include, while some students presented material that was purely factual which they did not link to the relevance of the products or systems they were designing. This is worthy of little or no mark recognition.

Students achieving the highest marks for Problem Solving produced a range of ideas that gave alternative solutions and explained the reasons behind their choice of solution. They explained their ideas in terms of Input, Process and Output.

Students tended to show the weakest performance in this section where the work was highly structured and formulaic in its approach. Centres are reminded that templates and writing frames are specifically forbidden in the NEA. Students also did not score well when they appeared to complete initial investigation for the sake of it, and then completely ignore their findings as they moved forward.

A range of modelling techniques was used by many students with the most able students modelling both mechanical and electronic solutions. This was done in card, electronic breadboarding and using modelling software. It was noted that this year, as in previous years, very little mathematical modelling was evident.

In the main, decisions were explained and well communicated by the most able students. However, many students failed to explain the choices they considered and failed to justify the decisions they made.

Many final prototypes were worthy of good marks where evidence suggested they were fully functioning and manufactured to a high quality.

Drawing and conventions

This section gives students an opportunity to demonstrate their ability to develop illustrated design ideas that conform to sector-specific conventions, use CAD effectively and clearly annotate their drawings.

Students achieving the highest marks for development drawings developed engineering drawings of their solution that contained detailed annotation and evaluated their solution.

Good use of Computer Aided Design was evident in many folders, with students producing accurate rendered drawings that in some cases showed complex parts. However, title blocks were generally not used to identify parts by many students or were incomplete if using certain pieces of software.

Students achieving the highest marks for the use of drawing conventions produced drawings that conformed to sector specific standards. It was disappointing to see that many still lacked specific conventions, and a great many did not include tolerances.

Production planning

This section gives students an opportunity to demonstrate their ability to produce and follow a production plan and explain the stages of production.

Students achieving the highest marks produced and followed detailed plans that gave information about:

- materials, parts and components to be used.
- processes to be used.
- use of jigs/or fixtures and/or CNC programming.
- tools, equipment and machinery to be used.
- the sequence of production, including critical production and quality control points.
- how quality will be checked and inspected.
- health and safety factors.

Many students, however, gave the use of jigs little or no mention; some missed opportunities by not mentioning the use of CAD drawings to reference or create templates and repeatability. The only quality control technique mentioned by many was its use to check fit and function after making rather than using specific measurement and inspection techniques.

Where Health and Safety was mentioned by some students it was merely to watch for sharp edges and wear goggles and an apron with no other hazards or risks identified.

A comprehensive production plan is at the heart of a well-planned and produced engineered solution and time spent on the production of a detailed plan is generally well rewarded.

Engineering skills used

This section gives students an opportunity to demonstrate their ability to use safely a range of materials and equipment and explain their choices, consider quality control and work to tolerances. A wide range of skills were used by students and were generally specific to the equipment available to the centre. The most able students outlined the quality control methods used. Many less able students inferred methods but did not evidence them.

Many students missed opportunities by not referencing any planned quality control and not mentioning working within the tolerances stated in production plans.

Photos in manufacturing diaries showing how jigs, fixtures and gauges had been used to check components were used by some and were good evidence of the higher marks awarded, however, as previously mentioned, many only concentrated on fit and function when referencing tolerances.

Many students only described one method of production rather than an alternative and in so doing limited the marks they could be awarded. For example, a student would mention the use of the laser cutter but would not mention an alternative CNC/CAM device or technique such as Waterjet, router or by hand. Students achieving the highest marks did give clear and detailed explanations of which alternative processes were considered and explained why particular methods were chosen.

Applying systems technology

This section gives students an opportunity to demonstrate their ability to identify and explain the systems they have used and produce block diagrams to represent them.

A number of centres have continued to award marks to students for producing a flow diagram for constructing their product. In this section students should produce a systems block diagram to help describe the engineering principles which have been used, Input, Process, and Output blocks should be used to describe the systems or engineering principles students use.

Students achieving the highest marks in this section produced system block diagrams for the systems used in their specific projects which included the sub systems used. They also produced detailed explanations of these systems which outlined how they controlled the function of the product.

Many students however, only gave the Input, Process and Output for the electronic element of their project and missed opportunities by not considering the mechanical or hydraulic/pneumatic options used. Little mention was given to feedback loops or sub systems.

Many students gave a general description of how the circuit worked but did not explain the rationale for its selection.

Testing and evaluating

This section gives students an opportunity to demonstrate their ability to undertake testing of their product and evaluate its effectiveness. They should also provide an honest evaluation of the product and make recommendations for improvements.

Students achieving the highest marks provided evidence of how they tested their prototypes; they explained what tests they used and outlined quality issues and they evaluated their completed product in terms of both systems and operation. There was also analysis and evaluation evident throughout the design process.

Many students' only mention of testing referred to simple visual checks or to simple checks of function and did not check back to drawings or part specifications. Many students had little or no evidence of checking back to tolerances.

Students need to use these methods to analyse their work and suggest future improvements. Improvements suggested often only referred to taking more time during making or stated they could be more careful during the manufacturing process. The most effective suggestions for improvements talked about how systems operation and/or the manufacturing process could be improved.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.