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ASSESSMENT and QUALIFICATIONS ALLIANCE

## General Certificate of Education

# Design and Technology (Systems and Control Technology) SYST 2

# Coursework

# Report on the Examination

*2009 examination – June series*

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**Criterion 1: Investigation and Clarification of Problems**

Generally candidates provided routine and sometimes irrelevant research e.g. basic electronic components, wood, metal and plastics. Average and lower ability candidates simply presented research facts and pictures, which were only analysed with basic and obvious statements. The more able candidates analysed their research as the material was presented, which included more subtle assertions while providing justification. However, all candidates of all ability levels provided too much factual information directly from sources. On numerous occasions there were folders of 70 pages with more than half for research. Centres are reminded that this section is worth 8 marks.

Candidates should provide succinct statements of a nature which helps clarify the problems, and an analysis of the way forward based on sited evidence. They should not simply regurgitate the sources of data.

Specifications were too often basic lists of points, which did not reflect the research or its analysis. These points were often not justified and few had any measurable aspects. At the lower end of the ability range, it was obvious that candidates were just going through the motions in a mechanistic way with little thought or understanding. Candidates of all abilities need to consider in more depth the purpose of *specifications* and the part it plays in the designing, testing, manufacturing and evaluation aspects of the whole design process.

**Criterion 2: Development of Design Proposal**

Centres had prepared candidates well and in the main, candidates focussed on providing relevant evidence. A few candidates at the top end exceeded the criteria and were producing quality work at degree level in systems design. The weaker candidates, at times, would struggle to gain GCSE grades. These less able candidates produced design ideas limited to the general container for the systems with a single system idea (electronic circuit, mechanism or program) just appearing.

There was greater use and credit given for photographic evidence, which showed testing and modelling to support design ideas i.e. use of breadboards, screen dumps of CAD software or mechanisms. Photographs within candidates' work were generally relevant, clear and in-focus!

The main aspect of the criteria is to provide evidence of *systems design and development*. As mentioned above, the weaker candidates struggled to provide evidence of the development aspect. For example a mechanism and linkage would be shown through a line drawing and titled 'Design Ideas'. The final outcome may include a motor controlled by a simple PIC circuit and the mechanism, however, there would be no evidence in the folder of programming and its development in order to gain marks.

Most candidates did provide varying degrees of *systems design and development* with the top candidates providing excellent examples of good practice. These candidates gave numerous ideas for electronic circuits, PCBs, programs, mechanisms and methods of customising the system in order to contain it in a suitable shell. The evidence was supported by practical investigations and tests with the results being analysed to show how the candidate moved forward in the development of the system and the final system design. Most centres are providing candidates with a variety of up to date CAD software and CAM hardware. Candidates generally provided good evidence of the use of ICT in their design development section.

Moderators noted that most candidates had planned their research, manufacturing and testing

activities well and many had produced various charts and tables reflecting good industrial practice. These charts included work method studies, field tests, expediting, scheduling, Critical Path Analysis, Health and Safety, hazard analysis, material and process analysis, all of which providing candidates with excellent experience in preparation for A2.

**Criterion 3: Making / Modelling**

Centres had a range of approaches to the course, for example; a Portfolio approach of three or four distinct practical outcomes; a two-project approach; and a single project. Candidates had made use of a range of technologies, some outside of the exam specification e.g. Ultra Sonics, Infra Red, Lasers and Pneumatics. The range of quality and complexity of systems produced varied from a single project with a very simple process and poorly executed, to a superbly manufactured working machine with a number of interconnecting systems of a complex nature.

Some centres relied upon the use of PIC chips for their control system with candidates providing programming evidence for the systems development. This led, in some cases, to candidates providing minimal making and modelling skills. At the higher level, programming will use a range of concepts to control a number of systems, these systems of sensors, transducers and outputs should provide a sufficient range of making skills to gain access to the higher level of marks. Across the mid-range of ability, there were three main areas for improvement:

- accuracy in manufacturing linkages, cams and methods of joining mechanisms to shafts,
- care and quality of PCBs and soldering,
- general quality of finishing materials and in particular edges.

At the lower ability level all too often candidates failed to provide making evidence within a systems context, and relied upon their skills in the general manufacturing of the ‘container’ to gain marks for Making / Modelling.

**Criterion 4: Evaluation and Testing**

Moderators noted that candidates generally had performed well in this assessment criterion. The use of testing was well established among centres with candidates at the top end using results and strategies to draw conclusions for future performance and manufacturing. Within their strategies, top end candidates had included ‘Expert appraisal’, third party evaluation and various tests against the specification. Most candidates evaluated against the specification and drew some conclusions from their tests and looked for ways to improve. However, too many candidates relied on their own experiences and failed to quote evidence or make use of third party appraisal. The weakest candidates evaluated some of the specification points, gave historic statements about tests and generally drew no conclusions.

**Criterion 5: Communication and Presentation**

Most candidates picked up half marks in this section owing to the nature of the subject and vast range of ICT used. The better candidates made consistent use of Desk Top Publishing, use of graphics such as ‘Pro Desktop’, PCB Wizard, Croc Clips, 2D Design Tools, Live Wire, screen dumps, image imports with labelling, text features and spell checkers. This ICT coupled with good use of language, folder layout and the ability to communicate complex concepts clearly, achieved full marks for the better candidates.