Version V1

General Certificate of Education (A-level)
June 2011

Design and Technology: Systems and Control Technology SYST4

(Specification 2555)

Unit 4: Designing and Making Practice

Report on the Moderation

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Set and published by the Assessment and Qualifications Alliance.

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Registered address: AQA, Devas Street, Manchester M15 6EX.

General

Procedures and Administration

Most work arrived on or before the deadline; however, there are still a number of centres that send in coursework late making it difficult for moderators to plan for visits and unfair to other candidates whose work is in by the deadline. A number of centres are still not sending candidates work in rank order of marks, with the highest on top. The majority of paperwork was in order but some Candidate Record Forms had no annotation or no candidate number or lacked photo images. The presentation of candidates folder work had improved on last year.

Most centres that are submitting candidates work by e-folio is working well, however, there are one or two issues which still need addressing if this is to be successful; the CD should contain a single folder for each candidate; each candidate's folder should be labelled with their name, number and total mark; each candidate's folder should contain one single Power Point presentation, including imported images, text, charts, appendix material with any animation and movie images only at the end lasting a couple of minutes; each slide in the presentation is to have no links to other sheets or the internet etc. and each slide should be used like a traditional sheet of paper; The final CD produced should be tested on a Stand-alone computer running Power Point 2007 or 2010 and each folder opens successfully. All the above are problems, which have delayed moderators and should be addressed so that we can all benefit from this method of submission. There was an improvement on the use and quality of photographic images. Centres should remind candidates that their images should show the system i.e. mechanism, levers, electronic pcb and component assembly, or other system or the important aspects of containment to show quality and accuracy. Images of the 'stages of production' were also better but these should serve to highlight text or production charts such as Flow or MRPs.

Exam secretaries should not sign for the teacher where it states that 'the standardisation procedure has been followed' on the Centre Declaration Sheet. Key photographic images should be incorporated or attached to the Candidate Record Forms even if they are duplicates of what is in the candidate's folder.

Arrangements for visits were without exception exemplary.

Context and Objectives *5 marks*

A few centres had developed the candidates' ability in order to address this criterion correctly and it was pleasing to see how easily they provided the evidence and depth required to gain the higher mark bands. Most candidates made an attempt to address the assessment criteria but failed to go into the depth required to access the mid to higher-range of marks. The analysis of contexts was generally well done; however, few candidates were able to focus this analysis into clear statements of **Design** and **Manufacturing.** These objectives should read for example; My main **Design Objective** is to design a number of interconnected systems, which will detect, count, direct and organise entry / exit systems for cars at the new 6th form Car Park. Objectives like this can then be broken down into areas, which require information and knowledge in a Plan of Action so as to move the Solution to the problem forward.

Plan of Action and Clarification of Problem *8 marks*

Most candidates provided a plan of what to research, less knew exactly what sources of information to start looking at with typical statements as "to research the internet" or "to google it" being the norm of many. Fewer candidates, however, knew how to express themselves as to why they were looking at a particular area of research. The majority of candidates knew the difference between Primary and Secondary research techniques with many using appropriate tests and practical investigations to cover the primary sector. The most able candidates had made good use of various forms of Research Planning, Time Planning and Analysis Charts with the benefit of reduced word count, focussed analysis and succinct action planning. The more able could also analyse their strategy and cross-referenced research to prove fact or learn new knowledge, which enabled these candidates to focus on the **Design** and **Manufacturing** objectives. Candidates from a small number of centres had additionally related their planning to include how Industrial / Manufacturing / Commercial / Medical / Military or Scientific elements would be included in the knowledge base and presentation of their project. The weaker candidates failed to relate to any **Design** or **Manufacturing** objective or wider issues.

Some less able candidates seemed to know what their solution would be before writing a Specification or designing a system. These low level Specifications were just lists of generic systems criteria and on occasions stated the parts to a system solution i.e. motor, chips, Led colours and placements etc. Most candidates, however, had summarised their findings and had produced a Specification, which had shown significant improvement from previous years. Candidates had justified their specification criteria and more were using measurable parameters in their stated criteria. A few of the most able were recording their return to the Specification and making changes, after modelling tests and systems ideas, as new and vital performance data became available during the design process.

Development of Design Proposal *26 marks*

Candidates performed better in this section but moderators still noted some disappointing weaknesses i.e. the annotation of design circuits were still reading like a textbook. A good proportion of candidates had moved into a more complex world of programmable chips and software with some outstanding results. This progression was matched by the use of commercial CAD software and high end programming giving the more able candidates access to industry standards. The outcomes were often designed with CAM in mind and most able candidates made excellent planning for such. It was pleasing to see candidates adapting industrial planning concepts for their own projects while making use of ICT i.e. scheduling charts, databases, critical path analysis etc.

The development of systems varied in quality and range of evidence. Some candidates, and not always the weaker ones, failed to record or save valuable evidence of the development phase. In particular failings in development included no final design test, although sub-systems were generally tested, the final outcome occasionally failed to function. Where PICs had been considered the opposite was usually the case that is sub-systems in programming were not tested but the final program usually was. Candidates who thought through their work and kept to a detailed plan and testing schedule were rewarded with more successful projects. Some of the more able candidates did not consider the range of response times between the various electronic or programming sub-systems with this leading to faults in their testing and time being wasted. Some less able candidates were still relying on computer simulations and auto routing for pcbs as proof that the system idea would work when manufactured.

Planning for manufacture varied from a list of main operations to a detailed plan that considered a Time Line, Process, Tools & Machines, Health & Safety, Material & Components, QA & QC with Quality Indicators, Sub-assembly and Teacher referral points. Candidates used a variety of methods to communicate their plans with many including centre requirements or other aspects to suit particular outcomes. It was pleasing to see a general improvement from last year, however, there was a proportion of candidates who tackled planning as an afterthought. There was an improvement on the previous year in relation to planning and stating specific aspects of Health & Safety. The majority of candidates still fail to communicate clear understanding of Quality Assurance and Quality Control, in particular specific indicators of quality. For example candidates used flow charts as part of their production planning, which had occasional decision symbols that simply stated “check it’s the right size”. The questions here are; what is the right size? How can this size be checked? How can this be guaranteed to be the right size? Candidates simply need to state using a rule and stating a tolerance or that the use of a jig may guarantee the correct size. There was little evidence of candidates understanding these concepts and this was carried through to Risk Analysis or Risk Assessment. This is a vitally important section for candidates to demonstrate their understanding of the above as in Industry / commerce or university candidates will struggle to progress. Centres should emphasise to candidates that planning is the biggest section where Safety and Quality can be demonstrated. Few candidates planned to test pcbs for functionality of chip pins or how to test quality of alignment in mechanisms. These finer points are essential if QC and QA are to be understood and carried forward in a career where Total Quality Management is the ethos of the day driving accountability and efficiency.

Too many candidates were content with large rectangular pcbs and simple cuboids for containers. Better candidates gave a little more thought to the professional presentation of their finished system as part of their consideration of a commercial environment. These better candidates tended to have containers being more ergonomic and therefore considered the effect upon the systems and components. The vast majority of candidates did not consider how the final system would interact with the target market, whether it was the industrial, public or scientific sectors. It was pleasing to note that a number of candidates from a few centres demonstrated the interlinked complexities of designing systems within a real context. These candidates tended to design more complex systems, which extended their abilities and took account of the manufacturing processes and the client market.

Photographic evidence within the design folder is now common with a significant number of candidates showing the making process, testing with breadboards or CAD screen dumps and of the final project. Candidates need to be reminded that the important images are the ones of the actual ‘system’. Short ‘movies’ were excellent at showing moving mechanisms, electro-mechanics or sound and light.

Manufacture / Modelling *26 marks*

The range of quality and complexity of systems produced varied from a simple project with basic systems and manufactured poorly, to high quality interactive working robots or gadgets for the disabled that had a number of interconnecting systems / technologies of a complex nature. At this the 2nd year of 'A' level it was unfortunate to observe a proportion of candidates that had attempted too ambitious a project and failed on a number of levels. Centre's should consult their AQA Coursework Adviser and discuss any projects, which may stretch candidates or projects, which may be out of the ordinary. Most work was well executed, included at least an element of quality, involved CAD/CAM, tackled a real problem and worked, some 'after a bit of tweaking'. Moderators reported a number of projects that looked professionally presented and were complex in nature, which would compare easily with degree level programmes.

Most projects undertaken were of electronic, electro-mechanical or programmable chip based technologies, however, there were also examples of infra-red, Ultra-Sonics, pneumatics and QT based technology outcomes across the subject.

A number of areas can be addressed for candidates to improve their marks:

Lower ability: a working outcome is essential, one that utilises a number of systems and one where there are opportunities to show quality manufacturing.

Mid-range ability: improve accuracy of manufactured systems and evidence of industrial practice.

High ability: Not to over complicate systems at the expense of finishing a fully functioning outcome and complete all aspects to the highest quality of manufacture and finish. Ensure time is realistically planned for.

Conclusions, Evaluations and Recommendations *12 marks*

Candidates appeared to be better prepared for this Assessment Criteria who generally evaluated their work well against an original Specification, with some appraisal coming from third parties. The more able candidates also evaluated their own learning and knowledge findings. These more able candidates looked back at their time management and commented how they performed against set target dates and made alterations to their original time plan demonstrating how time problems were overcome. In addition analysis often referred to new skills developed and key findings that were surprising or interesting. Candidates who had genuine clients to report to, were often far more informed and produced superior reports for this section. Only a small proportion of candidates made a detailed analysis of changes that could be made for improvement or for scaled production. A handful of candidates produced new designs that were more suited to an industrial or more commonly a commercial context. Candidates in general failed to understand production management and commercial strategies used in the Engineering and Manufacturing Sectors.

Communication and Presentation *8 marks*

Most candidates performed well in this section owing to the nature of the subject and its reliance on the use of ICT. The weaker candidates generally failed to provide sufficient evidence of their work producing sparse images, charts or circuits throughout their folders. The weaker candidates made few comments about their systems only describing what the image or drawing was.

The use of CAD, CAM and ICT was prolific and this has enabled the mid to top ability candidates to enhance the complexity of systems designed and the quality of presentation. The less able candidates have used ICT well but only in parts and with much less analysis. Candidates generally don't use diagrams enough to help explain complex ideas and systems. There was an improvement in the quality of sketching and in most cases these were scanned to enter an e-folio.

The quality of communication and presentation by many was akin to a professionally produced book, with layout, graphics and the use of technical language being of the highest order. The range of software and hardware used by candidates is too numerous to note, however, they are a testament to the complexity of the subject.

Total for A2 Coursework *85 marks*

Centre Assessments

85 % of all centres were accurate with their assessment of the candidates' evidence, however, please note the moderators remarks on Feedback Forms, particularly regarding which of the assessment criteria's need addressing for the future. Moderators found that centres were generally inaccurate in their assessment of Criteria 1, 2 and 5 compared to their generally accurate assessment of Criteria 3 and 4. The weakness in assessing the candidates work in the criteria mentioned is probably a lack of understanding by the centre on what evidence is required. The Autumn Standardisation Meetings are a key venue where questions can be asked in addition to reviewing coursework for standardising with guidance. Coursework Advisers are available to e-mail and phone for additional help and guidance on any issue of project work.

Mark Ranges and Award of Grades

Please see the following link:

http://www.aqa.org.uk/over/stat.html

UMS Conversion Calculator

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