

GCSE

**Design & Technology: Systems
& Control Technology**

45652

Report on the Examination

4565
2014

Version: 0.1

Further copies of this Report are available from aqa.org.uk

Copyright © 2014 AQA and its licensors. All rights reserved.

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

General Information

This is now the fourth year of submission of controlled assessment work for Systems and Control Technology and once again, it was pleasing to see the variety of ways in which candidates responded to the tasks. All 12 design tasks were attempted and candidates produced a wide range of largely successful outcomes. There were very few requests to contextualise the tasks; a couple of these requests were granted where the context did not affect the nature of the system required.

Some centres offered a limited choice of tasks but it was pleasing to see that the majority of centres offered a choice of several tasks to candidates, allowing a much greater range of outcomes than seen with the previous specification. Where only one task was undertaken by all the candidates from a centre, there were generally still opportunities for creativity and individuality.

For Criterion 3, the vast majority of candidates completed functioning products or systems which combined technologies; it was extremely pleasing to see that teaching staff had managed the time and resources available to candidates very successfully. Design work was submitted in either paper-based folders or electronically as PowerPoint/ P.D.F. files; all candidates were able to respond to all the tasks undertaken at a level appropriate to their ability.

It is evident that exemplar work produced by AQA had been used to assist assessments by the vast majority of centres and most were within tolerance with their marking. Where centre assessments were inaccurate, it was usually most apparent in Assessment Criterion 2 (Development of Design Proposals including modelling) and Assessment Criterion 4 (Testing and Evaluation).

It should be noted that for projects to receive full marks, or very close to the maximum, they must meet **all** of the top band criteria. The criteria are precise and if they are not met in full, then a maximum mark is not appropriate.

Administration

Design work should be submitted either as paper based folders or electronically as PowerPoint or PDF files. Please do not use any other format or moderators may not be able to access the work. There were many excellent design folios which were focused and concise with all the relevant areas covered. Photographic evidence was being used in virtually all instances but please remember that with Systems and Control it is very important to show photographic evidence of **all** aspects of the system. Annotation on the Candidate Record Forms (CRF's) is important and helpful in aiding a moderator to support the centre's judgement. Teachers should use the CRF positively by explaining particular circumstances and considerations which have arisen and affected the assessment of a candidate which may not be apparent to the moderator. Most centres were prompt with the dispatch of marks and sample folders.

Criterion 1 - Investigating the Design Context.

This criterion is worth a maximum of eight marks but if used purposefully sets the agenda for a successful piece of project work. Candidates who wrote down the selected controlled assessment task and context, and then investigated it tended to be more successful with their project as it gave them an opportunity to analyse and research with a more open mind, rather than stating what was going to be manufactured. When analysing relevant existing products or systems, the best candidates analysed the systems in terms of 'Input', 'Process', and 'Output'. Where the target market was profiled well, it often helped the candidate to focus the designing and evaluation, including seeking client opinion as the design progressed. Some candidates however lost sight of the context. It is important this is referred to throughout the project. Initial specifications which reflected the analysis and research undertaken put candidates in the top mark band.

Research is starting to become more concise, well-presented and relevant in the majority of centres. There was good consideration in the initial breakdown of the task as to what research was required. Some primary research was evident e.g. visiting and photographing areas where there was a rodent problem for a mouse trap project. There was more evidence this year that the research had led to the design criteria. Analysis of the research is essential; this is a high level skill and needs to be taught to candidates. The use of text book and internet research was widely used, but often did not relate to the task. The information was usually just copied from a book or other source. Discrimination needs to be shown when selecting the research material to use. Several centres did **too much** research and this impinged upon the 45 hour time limit. Candidates would benefit from knowing how to link their research to their chosen task. The design criteria must result from the research analysis. The linkage was not always evident. When a design criterion is not produced, it affects candidates' performance for criteria 2 and 4.

The quality of work seen identifying a target market and producing a customer/user profile was varied. When a customer profile had been produced it helped candidates to focus their thinking. Most candidates had identified a target group, and improvements were seen in the quality of customer/user profiles overall. Some candidates had developed these well but then failed to use the profile throughout the project.

A target market needs to be identified. To achieve the 7-8 mark band, a customer/user profile is required. This profile should be used when testing and evaluating and then this should provide the basis for evaluation. This was a weak area again and needs to be developed in many centres.

'Full marks' can only be awarded if all top band criteria are met; for example, 'relevant research that will promote originality in designing' must be evident in a candidate's folder. Too often a folder is full of generic research which has no bearing on the development of the design proposals.

Research should be an aid to design decision making. If it is not, it has no value. All candidates need to keep their research brief and focussed but use it to directly influence their design ideas. This section attracts 8 marks out of 90; a number of candidates spent a disproportionate amount of time on this aspect of the task. There was very good evidence of design criteria reflecting the research analysis.

Criterion 2 - Development of Design proposals (including modelling)

Imaginative and creative design ideas were generated by many candidates and there were some excellent examples of annotated sketches and images. Several centres however failed to produce any system design block diagrams before moving on to developing a solution. Imaginative and creative ideas need to be produced.

The more successful candidates had PCB's which showed development; for example, if auto-routed, the tracks were made thicker, re-aligned, pads made bigger, component location identified. Where PIC programming was used, this often appeared in completed form with little or no explanation, with generally only the very best candidates explaining and showing how programs were developed.

There was some outstanding development work including experimental modelling and investigative tasks which is to be commended. Where centres had a clear understanding of development some superb work was seen. Development should be taught throughout the specification and applied to the controlled assessment project. When candidates thoroughly understood how to develop, some creative final products were produced. It was encouraging to see development work throughout the ability range; there were some excellent development activities produced by lower ability candidates. It is expected that lower ability candidates will modify, rather than develop and this should be reflected in the mark bands.

When recording the development work, candidates should be encouraged to include photographic evidence and explain reasons and decisions. When an adjustment of marks was required, it was often due to Criterion 2 being over rewarded, particularly the development of a solution.

Moderators were pleased to see photographs used to evidence modelling with many candidates modelling the shape and size of final outcomes in card. For the manufacturing specification, moderators are looking for candidates to try to provide enough information for a competent third party to be able make the product. This could be conveyed successfully through some sort of formal drawing/sketch/CAD with measurements, a cutting list and a plan of making. Other approaches can also convey the same information.

Criterion 3 - Making

At the top end of the mark range candidates produced high quality systems that generally used appropriate CAD/CAM in the manufacturing process. In the middle and lower order, the concept of commercial viability and suitability for the target market was often lacking.

The amount of making was correct in the majority of centres and it was pleasing to see lower ability students often scoring proportionately more marks in this section. It was encouraging to see that an appropriate amount of time had been spent on making by the majority of centres. There was evidence of lots of making work which was generally supported with excellent photographic evidence. Where centres scored highly, it was due to a wide variety of skills being shown and the production of creative final products. There was evidence of good quality finish and a high standard of presentation. Candidates really did take pride in their completed practical work. Many candidates presented work worthy of being in the top mark band; this work was often demanding and of an excellent quality. Candidates obviously put a great deal of time and effort into this criterion and to be successful, they have to manage their time very well.

In some cases however, candidates were awarded marks from the top mark band where the outcome was not overly demanding or rigorous, and or where they had not taken time to hold down circuits and battery packs appropriately, had not fixed or mounted switches appropriately, had not dressed wires neatly or had not made or attached mechanisms appropriately. Excessive use of glue gun was also visible in some cases.

Centres must also provide moderators with detailed photographs of all aspects of the making, including photos to show the quality of soldering if PCBs are made by candidates. It was very pleasing to see the number of outcomes that had the potential to be commercially viable with further detailed development. There were again a number of candidates producing creative products. This is generally in centres where the candidates have been offered a choice from a large number of the set tasks. Candidates who achieved top band marks showed a high level of making / modelling / finishing skills and accuracy.

However the lack of finesse demonstrated in some of the practical outcomes meant that, in some cases, the marks awarded by some centres were unjustified. For candidates to be awarded marks from the top band, there should be evidence of a number of the following quality standards:

- PCB and battery secure in the product or system
- Circuit assembly and soldering completed to a high standard
- Exposed wires insulated by use of heat shrink.

For a Systems and Control project to have commercial viability and suitability for the target market, it must be complete so that the customer/client can see how it would work and understands it's commercial appeal. If this is not the situation with a piece of practical work, its 'best fit' is under the descriptor of "viable with further development".

Criterion 4 - Testing and Evaluation

More candidates are evaluating their projects through the Design Specification and using third party feedback. The less able candidates evaluated their projects through their own observations and were historic in nature. Generally candidates did not detail sufficiently the improvements that could be made.

The most successful candidates used a variety of testing/evaluation techniques which incorporated points from the criteria/specification. Candidates explained their methodologies, referred to the product specification, fully discussed the results and used these to inform the next steps. Scaffolds and writing frames, used to support less able candidates to organise their thoughts, were well used by many centres. In some centres, there was limited evidence of linking the generation of ideas to the design criteria and referring back to it as part of evaluation. The target group must be referred to throughout the design and make process. Many centres missed out the review of development and final testing against specification when producing the final solution. This is essential to achieve marks in the higher bands.

Successful candidates in this section honestly appraised their work and told the moderator whether it worked or not, what they had found difficult and what was successful, and said how they might improve their product taking into account feedback from their client/target market. They also referred back to their initial design criteria statements and specification, produced formative as well

as summative evaluation and tested the practical work on a regular basis during its manufacture and at completion seeking third party opinions of their designs.

Candidates who did not score highly on this section missed many aspects of the above, possibly through poor time management and not finishing the outcome in the time period available. All candidates should realise that, at 12 marks out of 90, this is a significant element of the controlled assessment work.

Criterion 5 - Communication

Candidates achieved good marks when the design folders reflected the product development story. The majority of folders were concise and focused. Some good use of technical language relating to the working properties of components was seen, however this is an area that could be developed further. To access higher marks candidates must record their decisions throughout the folder to provide a link and coherence that will tell the 'product and system development story' clearly.

The majority of centres were accurate in their assessment for this criterion however there were a significant number of candidates awarded marks in the top band where this was not justified. To achieve this candidates should:

- have a narrative which explains and justifies their decisions and processes
- have an organized, concise, focussed and legible design folder, including name, cover, contents, page numbers, page titles, acknowledgements
- used technical language
- have appropriately produced design work by hand and by use of ICT.

A few reminders

- Please use your Controlled Assessment Adviser. They are appointed to help and guide you with your candidates' choice of projects - especially if you want to try something that is unusual and you need reassurance.
- Photographs – as many as possible of 3-D modelling and the practical work so that the moderator is in no doubt why marks have been awarded.
- If a moderator wishes to visit your centre, it would be appreciated if centres could provide batteries, screwdrivers and written instructions describing how the projects work.
- Moderators would be helped if projects were left with screws removed from cases or loosened ready for examination;
- Ensure all documentation is sent to your centre's examination officer and please check regularly for AQA correspondence

Conducting controlled assessment tasks.

Centres are reminded of the need to restrict feedback to candidates to generic feedback, i.e. feedback given to the whole group. Detailed guidance on conducting the controlled assessment can be downloaded from e-AQA on the secure area of the AQA website. This information is included in the Controlled assessment tasks document, following the tasks themselves. If you don't have access to e-AQA, register on the AQA website or speak to your examinations officer. Whilst logged onto the site, you will also be able to access the very useful enhanced results analysis service (E.R.A.) enabling you to analyse the performance of your candidates once results are published.

The exemplar materials produced for Teacher On-Line Standardisation over the last few years have been used in many centres to allow pupils to self-assess their work as it progresses.

Some centres have made use of scaffolding, frameworks, templates, etc to assist pupils in the production of their controlled assessment work. Whilst these prove useful in ensuring all candidates have some response to all assessment objectives, they can stifle the creativity of middle and higher ability candidates.

Administration of assessments

It is evident that exemplar work produced by AQA has been used to assist assessments; the majority of centres were within tolerance with their marks. Where centre assessment was inaccurate, it was usually most apparent in criteria 1, 2 and 4.

The candidate record form was well used by many centres to explain the marks awarded. It was particularly useful to clarify if any help had been given to candidates e.g. where PCB designs were given to the candidate.

Most centres were prompt in the dispatch of marks and requested folders. A few centres did not realise that they needed to send all folders where there were 20 candidates or fewer.

Many centres were very helpful in providing clear photos of outcomes, thus avoiding the need for moderator visits (where the assessments were accurate!).

Centres producing electronic portfolios could consider short video clips of outcomes and systems functioning, although care must be taken so as not to make file sizes too large and cumbersome whilst in a standard format that moderators can access.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator www.aqa.org.uk/umsconversion