AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

Design and Technology: Product Design

Examiners' Report

2005 examination – June series

- Full Course (3544)

Contents

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Design and Technology: Product Design

Foundation Tier

General Comments

The format of the examination paper allowed candidates to demonstrate their knowledge in a wide variety of material areas and it was pleasing to note that the vast majority of candidates attempted most questions on the paper. A wide range of communication skills were shown by the candidates. Graphical communication skills were sometimes disappointing and there were a significant number of candidates who used no colour on the paper and did not appear to have a ruler which is a requirement of the paper. There is still a lack of technical vocabulary being used and far too many generic terms are evident in the answers.

Question 1

(a)   Very well answered in most cases. A significant number of candidates chose more than eight materials.

(b)   and (c) were very poorly answered. The majority of candidates had no clear understanding of renewable and non renewable materials.

Question 2

(a)   A wide range of products were selected from the given list.

(b)   Answers ranged from excellent to very superficial. A large number of candidates used only one geometric shape, for example a cylinder for the waste bin or cake. Candidates who used a wider range of shapes to produce an interesting design concept were awarded higher marks.

(c)   Very generic terms and inappropriate materials were often suggested in this section. Candidates who had chosen food often gave the best responses with lists of ingredients and methods for making cakes.

(d)   A very mixed response. Far too many scripts were seen with no colour used at all. There were very few good attempts at adding tone and texture.

Question 3

(a)   Generally well answered with typical acceptable responses of headphones, plays music and operating controls such as volume or on off switch.

(b) (i) Generally well answered with popular choices being mobile phones and televisions.

(ii) A number of centres had prepared the candidates well for this question and the candidates used the terms 'technology push' and 'market pull' with examples. This was given full credit. A lot of candidates repeated their answer and so could not gain full marks.

Question 4

(a)   On the whole this was well answered with many candidates gaining full marks. Typical acceptable responses were insulation, marketing, protection. Generic packaging criteria of preserve, protect, contain and inform were given appropriate credit.

(b)   This was usually well answered with popular correct responses being good insulator, low cost or rigid. An extended explanation using more than one criteria was expected for full marks.

(c) (i) Very poor response. Hardly any candidates understood the term 'composite material'.

     (ii) Again poor responses were in the majority. Some answers relating to keeping the food fresh were given appropriate credit.

(d)   There were some reasonable responses but the standard of sketching was poor.

(e) (i) A lot of candidates did score maximum marks for this section, however there were a lot of inaccurate boxes and far too many scripts where the candidates were not equipped with a ruler. Only a minority of candidates picked up on the fact that the image did not have to be in the centre. The ones who did sometimes answered part (e)(ii) more creatively as they had more space.

(ii)   There was a very mixed response from the entry. Some candidates produced very good elaborate lettering to very simple handwriting. Few candidates realised up that this was a single colour print and many used a lot of colours in the lettering.

(f) (i) Most candidates could name a suitable program such as Corel draw or Photoshop which was given full credit.

     (ii) This was well answered with most candidates referring to scanning. Very few gained full marks as they did not explain how the text would be added.

Question 5

(a) (i) Most candidates were able to choose a suitable material with acrylic being a very popular answer. There were far too many generic responses such as wood, plastic, metal which did not gain credit.

     (ii) This was fairly well answered but some answers did not tally with the material chosen. Far too many candidates gave simplistic answers such as cheap or strong with no depth of understanding.

(b) (i) Descriptions of a batch production set up to manufacture 50 leaves were in the minority. Many candidates referred to cutting the leaves out one by one using coping saws, Hegner saws, band saw etc. With the increasing use of CAD/CAM equipment candidates at a number of centres could describe the process of laser cutting which was given credit. There were few food examples seen in response to this question. Biscuit, pastry or cake could have made an excellent response.

     (ii) Far too many generic terms were used for tools so few candidates scored full marks.

     (iii) The quality of communication was very variable with far too many candidates drawing a simple leaf with just a few notes. A minority of candidates attempted a well annotated sequence of drawings which was given appropriate credit.

(c) The vast majority of candidates scored 1 mark for this question. They simply drew some form of decoration on the leaf with no consideration of how the process could be repeatable and accurate.

(d) Again most candidates only scored 1 mark for this question. Responses usually related to templates but there was no consideration of quality assurance throughout the process or a choice of process that would ensure consistency.

(e) Safety rules were generally well understood with the use of safety clothing and guards being popular responses. Simplistic responses such as 'do not run around' and 'be careful with tools' were too general to be given credit.

Question 6

(a) There were some good responses to this question, however too many scripts were labelled in a very untidy manner. Candidates could have answered this perfectly by drawing leader lines from the figure, drawing a dimension line and labelling it sensibly e.g. seat depth, seat width. There were very few scripts detailed in this way. A significant number of candidates drew a chair under the figure which did not gain credit.

(b) The correct answer of anthropometrics was seen on a significant number of scripts.

(c) (i) There were a lot of extremely poor drawings in response to this question. A neatly drawn improvement to grip with slimming of the pen body or improved texture was expected for high marks.

   (ii) Despite the poor drawings for part (c)(i) most candidates could explain the design improvements to the pen and many scored full marks.

(d) This was fairly well answered, with most candidates moving the equipment sensibly. Very few candidates included the working triangle asked for in the question which prevented them gaining maximum marks.

(e) There was some good evidence as to why the equipment had been moved but a clear understanding of working triangles was not usually evident.

Question 7

(a) This was very well answered. The least well understood sign was product suitable for freezing. A significant number of candidates thought that the handwash symbol meant wash your hands.

(b) This was very well answered with the vast majority of candidates explaining exactly what maintenance tasks were required.

Question 8

(a)   There was widespread misunderstanding of the term 'model'. Answers expected were sensible modelling techniques relating to the product chosen such as clay, paper, card models. The vast majority of answers related to a product evaluation.

(b)   A mixed response was seen. Many candidates gave simplistic answers with little explanation of how the test would be carried out.

(c)   Most candidates understood that the symbols related to approval and that they were safe. There was generally a lack of familiarity with the symbols.

Design and Technology: Product Design

Higher Tier

General Comments

The structure of the paper enabled students to access most of the questions, responses covering a wide range of materials and focus areas. Candidates of all abilities were encouraged to expand answers when appropriate. Indeed the mark scheme did provide flexibility to interpret the unexpected answer. Students had the opportunity to answer questions using a range of media, this did in fact help the flow of the examination. Students were able to move through a range of expected responses preventing them from becoming bogged down in any one area. As a result of this structure most papers were completed, usually all questions attempted with very few instances of inappropriate comments or graffiti on the papers themselves.

Question 1

(a) & (b) Many students did not complete this section well and a significant minority did get the renewable and non-renewable response in reverse.

(c)   Students did not understand that they only had to complete four of the sections on the materials grid. However many candidates did demonstrate a meaningful knowledge of these materials.

(d)   Many candidates did mix this process up with producing manmade boards in general and the production of veneer. Many answers consisted of a very basic statement.

(e)   Very limited answers were produced with only a minority including the expected content within the mark scheme. Indeed most only made some reference to improvements in overall quality.

Question 2

(a)   This was well answered and the fact that students had a realistic everyday experience of this product helped greatly. Responses were varied, logical and appropriate.

(b)   This part of the question was also well answered as a continuation in thinking from part (a). However, many candidates simply repeated answers in part (b).

(c)   This was poorly answered and in general most students showed nets and the use of CAM equipment. Very few responses had the full expected answer required by the marking scheme.

Question 3

(a)   Most candidates were able to achieve full marks for this part of the question and only a few very basic responses were observed.

(b) & (c) Responses to this part of the question tended to be in the midrange of the mark scheme.

(d)   Most candidates were able to approach this question with the appropriate terminology, however there was some duplication with answers produced in section (b).

(e)   Many candidates understood the purpose and explained them in a meaningful way although complete answers were limited.

(f)   Most candidates made reference to Dyson on this question. While a significant number did name a product, such as I-pod, the explanation of the success of the designer/product was basic and lacking in depth and understanding.

Question 4

(a)   Most candidates answered this part of the question well with only some generic responses.

(b)   Many candidates did understand the demands of producing a product in large numbers. They selected processes and materials that well suited the context of the question. However, a significant minority outlined a handcrafted outcome with little reference being made to a standardised product.

(c)   Most candidates produced some decoration to the surface of the product. In many cases it would not have been possible to produce it in the manner described in the earlier section.

(d)   The majority of students answered this question well and were able to relate it to the described task in producing the leaves.

(e)   This was well answered however many students did answer the question from the end users point of view rather than from the manufacturer's perspective.

Question 5

(a) & (b) Most candidates were able to attempt part (a) in an appropriate manner, although part (b) had a limited response which was, in the main poorly answered.

(c)   This was well understood by candidates and resulted in a wide range of responses, mainly dependent upon the quality of the communication used and the level of skill employed. A mix of simple drawing and/or annotation or just a written explanation.

(d)   This question was very well understood as a concept, and candidates selected a wide range of appropriate products to achieve a high level of marks. In some cases a basic product did result in limited annotations being produced.

(e)   A wide range of products were used to illustrate this question and candidates understood the objective of the question and generally answered it well.

(f)   Most candidates attempted the floor plan but not all understood that the main purpose of the question was to save time and energy, etc, as a consequence of the layout. This did impact on the quality of the descriptions produced and many were more concerned with individual practical tasks within the kitchen area.

Question 6

(a)   The responses for this question were midrange and most candidates responded to with one mark answers. A significant minority answered all the boxes whereas only four were required.

(b)   There were a narrow range of answers, with some including a finish to a product rather than a material. Most responses were paint or varnish applications and these were very often not explained.

(c)   In this section the bicycle was the option most candidates selected and it was very common to see simple one word statements, rather than annotations that explained why the maintenance was necessary. Many candidates only achieved midrange marks for this question.

Question 7

Whilst some candidates did not attempt this question, it was very well answered by a large number of candidates. Good responses included technical vocabulary and described very well CAD, CAM and the use of CNC. The use of e-mail between designers and manufacturers was also common.

Coursework

General Comments

The rapid expansion of centres entering candidates for this course means that moderators continue to report a wide range of standards and approaches. Paper/card, timber, plastic and metal products were most commonly seen this year. The use of textiles has continued to grow in popularity, especially where candidates are combining with other materials. There has also been a large increase in centres using control components (mainly some form of electronics/PIC control). A much smaller number of centres used food, and ceramic materials. Some centres used a single brief, whilst some offered a small choice of projects and some a provided a totally open brief. Centres which did give themes to candidates have in the main, got this approach well structured to the benefit of lower ability candidates. However, moderators have consistently reported that this approach has often prevented candidates accessing the higher grades and centres should be aware of this. By contrast some other centres have been too open-ended with candidates taking on tasks, which could never be completed in the 40 hours.

Moderators reported that there was outstanding work seen in many centres, and particularly with those who have been following this course for a number of years. However, it was surprising how many new centres had not been to the Autumn Teachers' Meeting. These centres tended to have an unclear interpretation of some of the requirements of the specification and the assessment system.

As with last year, many centres had marked the design folders in accordance with the criteria. However, the assessment of the practical outcome was often over rewarded by more than a grade. It is important to stress that the expectation for this coursework is that about 13 hours are spent on the design folder and 27 hours on the manufacturing. Candidates who had an imbalance towards the design folder often did not access the higher grades.

There continues to be a misunderstanding in some centres that because Product Design requires a breadth of knowledge that this somehow means that the standard is lower. It is important to stress that this is not the case and a similar project should score a similar grade if entered for one of the focus material courses.

There appeared to be a reduction in the number of centres who had encouraged candidates to produce a range of products, such as band merchandising where there were a variety of products more appropriate to KS3. However, there was a growth in centres who believed they were encouraging "conceptual design" where the idea was more important than the prototype. Again, it is important to point out the weighting of making to designing and the clear expectation that candidates will develop a prototype to a point where the commercial viability can be tested.

Centres who had attended one of the Autumn Teachers' Meetings had often responded positively to the advice given and encouraged candidates to produce concise design folders. It is still disappointing to report that despite the support materials and meetings, there continues to be a significant number of centres who are producing work more appropriate to one of the focus material specifications. Architectural models such as night clubs, restaurants, football stadiums and shops are rarely appropriate projects for this age group or particularly for this specification and often prevented candidates accessing the higher grades. This was particularly the case when applying industrial understanding or demonstrating high level manufacturing skills. By contrast, producing a scale model of a large piece of play equipment could be seen as appropriate, particularly if the design was modular and exploited CAM.

It is worth reminding centres that the expectation for Product Design coursework is that the model or prototype produced should be:

- Designed to meet a commercial need
- Designed for commercial manufacture, in volume and not as a one-off

Designing for the candidate's own personal use without consideration for a wider commercial market is likely to restrict learning and access to the higher grades. Products are likely to involve some form of packaging, labelling or instructions. Although this is not a compulsory element as far as the assessment is concerned these areas are likely to feature in written papers. Combinations of materials are encouraged in the product or the manufacturing processes. Single material products are acceptable as far as the assessment criteria are concerned but ignore the distinct nature of this specification. It is clear that the Coursework Adviser service offered to all centres by AQA is seriously under-used and new centres in particular should seek advice before allowing candidates to start their coursework project.

Centres should also note that the assessment is holistic and the assessment criteria should be used as an indicator rather than a set of tick boxes. This is especially important with the making mark as there are only five sections. Centres might rely on experienced teachers to benchmark work they believe to be, for example, in the C grade band prior to looking at the specific assessment criteria and to use the criteria to refine the assessment to High Middle or Low.

Designing Skills

The quality of work submitted was very high from a significant number of centres and many candidates had submitted a combination of formal presentation sheets and freehand sketches. Centres had made a very real effort to encourage candidates to produce a concise design folder of around 20 sheets. It is pleasing to note that moderators reported a significant reduction in the number of folders which contained in excess of 30 sheets this year. There is still a tendency for some centres to encourage candidates to include large amounts of copied material and this is regarded as a serious waste of candidates' time and has no value.

The design folders of some candidates was not sorted and bound prior to marking and this made the process of assessing the relevant work harder for moderators. Some centres are encouraging the use of sketchbooks and/or notebooks as well as formal design sheets. This reflects good commercial practices and moderators reported that this often aided the assessment, particularly when teacher annotation was present.

Many candidates made effective use of ICT to present a lot of their design investigations in a concise manner. Digital photography was extensively used by candidates as both a research tool and for recording the various stages of their work. Where photographs of work in progress were provided the moderators found it to be of enormous benefit in deciding whether to accept the centre's marking. Some design folders were presented entirely using ICT.

It is important to note how few centres had adopted a design methodology which reflected current industrial design practices. The development stage of the process is generally where the bulk of the work takes place. Commercially, the use of CAD, modelling and sampling are used to a great extent and there is also a considerable amount of testing and evaluation taking place. It is important to recognise that the development stage should represent the most influential part of the assessment process

Design brief

Candidates were generally more focused this year. Most candidates were able to provide a clear statement of intent which was often supported with mood boards, user profiles etc. It is important to remind centres that commercial designers use mood boards or image boards often as a background to talking to the client. It should not represent a random selection of catalogue pictures. The best were often supported by a short statement explaining the relevance of the material. Where this approach was taken, full credit was given within the analysis section of the assessment criteria. Initial design criteria was sometimes found at this stage of the folder and often provided a focus for relevant research and the generation of initial ideas.

Research

Really good first hand research obviously drove the best projects with candidates using commercial products as a focus for their own designing. Some candidates had made excellent use of interviewing experts such as parents, teachers etc.

Written questionnaires and graphs were found in a large percentage of folders and it is important to report that this research rarely provided useful data to influence the candidates. Few candidates really conducted this activity in a manner which would provide valid data and it is strongly recommended that this activity is discouraged in favour of more product analysis.

Really good detailed product analysis and disassembly research was being encouraged by a wider number of centres this year. A good range was seen in some folders but the understanding of the relevance of it to the task was variable from centre to centre. A lot of materials research and research on industrial methods of manufacture was either not necessary at the initial stages or irrelevant.

Letters to companies rarely provided useful material. Centres need to understand the actual cost of providing such catalogues and advice for the large numbers of candidates undertaking coursework projects. It is suggested that centres build up a product library of catalogues and brochures for candidates to access in preference to the time taken in writing formal letters.

Some of the better design folders had summarised research findings in preference to including large amounts of copied material. This had been made relevant to the design focus. Far too many candidates still had large collections of irrelevant research such as photocopied data on materials and jointing methods from textbooks, CD ROMs and the Internet.

As with last year, some candidates were encouraged to include photographs and plans of the exact location of their final product. This is a concern as candidates should be designing for a commercial need and for commercial manufacture rather than a one-off product for their own bedroom.

Analysis of task and research material

The inclusion of a simple list of tasks to be undertaken was an aid to many candidates. The better candidates often explaining why, how and when the task would be completed in an action plan. Some centres had devised pro-formas to aid candidates with this potentially difficult area.

Research material was often described rather than analysed. The simple question "How is this relevant to my work and what can I learn from this?" applied to all research material would have aided many candidates.

Specification

There was an improvement in this area this year. The better candidates looked at essential, desirable and possible attributes for the product and focussed on consumer and manufacturer needs as well as social, moral and environmental issues.

The position that a specification is found in a design folder is a contentious one. Whilst the assessment criteria suggest that ideas must fit the specification, in practice this can stifle creativity. Some centres had encouraged candidates to devise initial design criteria and developed a full specification at a later stage of the process, such as prior to development. This allowed candidates to clarify their thinking and demonstrate their creativity and was seen by moderators as a more effective design strategy. Many candidates still presented a design proposal at this stage, rather than design criteria, listing the materials construction etc. before designing had commenced. This was clearly restricting the generation of ideas.

It is pleasing to report that many centres had directed candidates to cover general areas such as:

- Target market
- Function
- Size
- Weight
- Durability
- Aesthetics
- Materials
- Safety
- Cost
- Green issues
- Manufacture
- Packaging

These were suggested in last year's report and were seen in many folders. However, this list is not exhaustive and is also not relevant to every product and should only be used as a guide.

Some of the more able candidates produced more than one specification, including a manufacturing specification within the design proposal or as part of the evaluation. Again, full credit was given for this approach even though it is not a specific requirement.

Specifications, however written and presented do need to reflect the analysis previously undertaken. Moderators reported that many candidates at all levels were not making this connection obvious. Where candidates had summarised their research this link was often far easier to evidence.

Generation of ideas

Moderators were looking for quality rather than quantity. They reported seeing some really free flowing, creative thinking from a number of candidates; nearly always done in the form of quick, freehand sketches. Ideas need to be feasible and varied to gain the higher marks. This was, again, the strongest part of many folders with both creativity and originality evident. However, many candidates seemed to have produced four to six superficial ideas and had been over-rewarded this achievement. Candidates were also being over-rewarded for ideas which had been copied from existing products. Whilst it is expected that many candidates will draw ideas that closely resemble existing products it is vital that this is clearly indicated in the design folder or in the candidate declaration when it has been the case. Some candidates had stuck pictures of the source product onto the ideas sheet then continued with their own ideation. This was seen as an excellent strategy.

More able candidates had demonstrated a variety of approaches from freehand drawing, sketch modelling, word webs, test experiments etc. There were also some excellent design strategies used such as shape borrowing from other products, observations from nature, manipulation of geometry etc. to generate original design proposals.

One important issue for candidates is whether a third party can assess the feasibility of the ideas. Whilst the more able candidates had often thoroughly annotated the ideas, too often superficial single-view sketches were submitted with no indication of the materials and constructions that would be used. Neat drawings were more commonly seen rather than creative and efficient designing and many centres need to examine this. Whilst the complexity of the product will greatly affect the expectation for this part of the assessment, candidates who only suggested three or four very detailed ideas often gained the highest grades. Critical design thinking was highly rewarded.

Higher-level candidates summarised and evaluated their ideas giving clear information on why one or more might be further developed. Often more than one idea had been substantially developed and both the generation and development was one continual section within the folder. Once again, this is closer to commercial practice than the artificial divisions more often seen.

Development of a solution

This is regarded as the most important part of the design folder and a broad range of work was seen. Once again, far too few candidates are undertaking any real development of their ideas and simply redrawing one of their initial ideas as a design proposal. It is expected that alternatives are considered and design details explored in some depth. Some of the best examples were found in textile products where samples of stitch details, fastenings and decorative details were often explored through samples as well as trial mock-ups or toiles in cheaper fabrics. Card and block models were well used by some candidates but this was in a minority of cases. Pro DESKTOP was used for virtual modelling by an increasing number of candidates. In some cases this was a very superficial exploration of form whereas in the best examples sophisticated concepts were explored in detail.

Moderators reported that many candidates simply moved from ideas into a making plan. Many candidates did not provide enough detail for third party manufacture to be attempted.

Testing is seen as an important part of the development section and, where relevant, should be encouraged and evidenced. This is by far the most appropriate time for candidates to undertake additional research into materials and constructions. A short investigation of relevant stock sizes and standard components was a useful addition for some candidates and full credit was given within the development section.

If sufficient development had taken place within the ideas section then credit was given. Sometimes additional evidence was also found in the evaluation report.

Planning of making

Flow charts were often used and this relates to industrial practices. More able candidates were able to indicate the quality assurance/quality control checks that would take place at various points and the action that would be taken. Pro-formas were put to good use by some centres. The use of patterns, templates and manufacturing aids were often missing completely from folders even though they formed an important part of the planning for many candidates. Cutting lists for materials was a surprising omission from many design folders where the assembly of a variety of components was a significant issue and few indicated the additional components that might need to be purchased, such as jewellery findings, zips, hinges etc.

Many candidates appear to have been simply supplied with materials or the construction predetermined through the project set by the centre and this gave little opportunity to gain marks.

The use of diaries to record the stages of the making was seen from a smaller number of candidates this year. Full credit was given to planning as long as there was sufficient evidence to support the judgment that planning had taken place. Where moulds, formers, jigs, manufacturing aids, CAD/CAM, patterns etc. had been used, some credit for planning was given even if there was no relevant written plan in the design folder.

Some of the more able candidates presented design proposals in sufficient detail that a separate planning document was not required. Again, credit was given when it was obvious that some planning had taken place.

A small number of candidates had used diagrams to explain basic making processes such as using a try square or applying spray paint. It should be stressed that this is not what is required. Candidates are encouraged to look at how industrial planning takes place and the use of simple pro formas and notes will often result in a more efficient use of their time.

Evaluation, testing and modification

This was once again a weak area for many candidates. Evaluation evidence should be found throughout the design folder in ongoing annotation. Some candidates drew attention to this by highlighting their evaluation comments wherever it appeared in the folder. This was often helpful to moderators.

Many candidates offered only a superficial final report of just a few sentences. Candidates often provided detailed evaluation of the process when it is the evaluation of the product which is the most important. Moderators do value the information contained in an evaluation of the process as candidates do include information that is not clear elsewhere, however, if the on-going annotation is clear throughout the folder then this approach is unnecessary. Generally, not enough time had been allowed for this part of the design component.

By contrast, it was clear that some centres had provided a great deal of guidance and support for this work. Pro-formas were occasionally used to good effect with checklists linked to the specification criteria found in the better examples. The use of real consumer trials were found in some folders with independent feedback provided by potential users. This is to be encouraged. Superficial comments from friends often produced unnecessary data but some surveys provided valid results, which were then commented on by the candidate. Moderators expressed some concerns over the limited number of candidates who detailed the modifications that would be needed to the prototype in order to commercially manufacture the product. This is a key expectation for this specification and candidates need to plan for this.

In a minority of cases, detailed midpoint evaluations had taken place prior to finalising every detail of the product. For example, childrens' furniture had been tested prior to painting to ensure that sizes were correct. This approach is to be encouraged where appropriate.

Some candidates structured the evaluations to include the products that were collected and analysed in the research section and made comparisons with their own design solutions. In the best examples, candidates were noting costs, marketability, improved features etc.

Use of communication, graphical and ICT skills

There is still a tendency for some centres to encourage use of over-elaborate titles and borders and to over-reward this section. However, this was a reduction on last year. There were numerous candidates who demonstrated a range of very high quality communication skills. Whilst the 40-hour requirement for the coursework does impose some challenges for centres, there is an expectation that candidates will demonstrate good communication skills at various points in their folders. Centres have generally discouraged time-wasting activities such as colouring the background of design sheets and using coloured mounts in favour of generally clear communication.

The most notable inclusion this year has been the use of Pro DESKTOP which was used very well by many centres. In general, whether they were informal folders or immaculately produced using ICT and A3 colour printers, the actual content of the communication has been better this year.

Higher-level skills should be found in some sections of the folder but it is not expected that every sheet is presented as a pristine end product. The folder should clearly and concisely demonstrate effective and efficient design skills. Some very good "rough work" was seen in the ideas and development sections and it was pleasing to note how many centres had responded to the advice of not re-presenting such work. Many candidates were able to sketch fluently and efficiently, using notes to clarify their thinking.

A wide variety of presentational drawings and working drawings were seen. Fashion drawings combined with patterns, engineering drawings, marker rendered 3D views and ProDESKTOP virtual modelling was seen in the folders of many of the better candidates. DTP was evident both for the presentation of the design folder pages as well as for the creation of related graphical components such as packaging, labelling and leaflets. It is pleasing to report that modelling was more apparent this year.

Many candidates used CAD effectively, prior to the use of CAM. Many centres still reported inadequate access to ICT facilities although it was obvious that many other centres had made a significant investment. It was clear that where effective use of ICT was used that this did have a positive effect on the motivation of candidates. Photographic evidence was often abundant in the better design folders.

Social issues, industrial practices and systems and controls

Moderators, once again, reported that the majority of candidates had not addressed this aspect of the coursework despite this being a significant expectation for this specification. Many candidates had approached this as a bolt-on at the end of the folder. Copied material on general issues related to the various scales of production was the most common evidence seen. It was also common to see material on injection moulding and similar processes even when these were irrelevant to the product.

Many centres still appeared to be providing handouts for candidates to put into their own words as every candidate had near identical evidence. Few candidates demonstrated any real understanding of how their prototype might be commercially manufactured and the cost implications of tooling. Fewer still had taken into account the impact their design might have on society, for example, through over-packaging. These are major areas for centres to address both to meet the coursework criteria as well as adequately

preparing candidates for the written paper. It is not expected that this evidence be found in a single isolated sheet titled "Social issues, industrial practices and systems and controls".

Where centres had thoroughly addressed this aspect, candidates provided a good understanding throughout their work. References were made to commercial production in the specification and throughout the designing.

The issue of whether candidates are modelling a design or designing a model is an important distinction. Many centres, once again, appeared to have encouraged candidates to design a model or prototype and ignore the final product. The complexity of some projects made this aspect of the work extremely difficult and especially so when candidates had tackled large-scale architectural problems.

It is not expected that candidates will fully understand all aspects of commercial production at this level. Some centres had directed candidates to consider one aspect, such as the packaging, and to deal with this in some detail. This is regarded as good practice and should also help with preparation for the written paper.

Making skills

As previously noted, the full spectrum of work was seen again this year. Whilst the majority of centres had produced work using resistant materials and paper/card, all materials listed in the specification were seen, with textile products greatly increased. Few centres offered food products or ceramics. A small number included control components.

The overall standard of making was disappointing in a significant number of centres, although moderators reported a general increase in standard from last year. Rather more centres had fully embraced the multi-material approach than was seen last year and this was a pleasing development. However, many new centres or centres who had not received a moderator visit the previous year were often severely limiting the candidates (sometimes because of resource implications) to a very narrow band of materials and manufacturing processes. There were many examples of materials and construction methods being so prescribed by the centres that it was difficult to separate candidates at the moderation stage.

It is important to point out the expectation for around 27 hours manufacturing (or two thirds of the 40 hours available) and the comparability with other specifications within the Design and Technology suite. Some centres had misunderstood the requirements for this specification believing that it was less rigorous than the others. This caused particular difficulties where centres had encouraged, for example, computer printing as the main manufacturing method or entirely CAM outcomes which might have been routered in Styrofoam or laser cut in acrylic in a matter of minutes. The use of CAM is greatly encouraged but centres do need to be aware of the need to demonstrate a range of making skills.

One pleasing development this year was the number of candidates who produced full scale product models which closely resembled the commercial product. This approach closely follows commercial practices for product designers.

Correction of working errors

There was often little evidence in the folder or through test pieces seen at the time of the visit to support this criteria and the moderation process often relied on teacher annotation. More able candidates had undertaken some testing as an integral part of the development before commencing the final product and had clear evidence of modifications. This is probably the most effective way of addressing this aspect of the criteria. If the candidate fails to record this work in the folder it is essential that it is retained and shown when the moderator visits. Where candidates had made no obvious errors in the manufacture of

their prototype or model but had described changes needed for commercial production full credit was given even though it is not strictly making criteria but knowledge of making.

It was a common strategy for candidates to prototype their product in less expensive modelling materials such as MDF or Styrofoam. It is important that candidates can explain the modifications needed when a more appropriate material would be used. Modifications due to poor crafts skills rather than as a result of testing and development did not receive high credit for this section of the assessment.

Use of appropriate equipment and processes (including the use of CAM)

Once again, moderators often needed assistance from teacher annotation to make a judgment in this area, as many candidates did not provide details of the equipment or processes used. It is an expectation that centres will give considerable guidance to individual candidates on the appropriate use of equipment and processes taking into account skill levels and the required standards. Moderators commented that it was often difficult to know whether to award the grade to the candidate or the technician, especially where CAM is being exploited. Candidates do need to record all aspects of this work.

Moderators, again, reported that candidates were often using unsuitable construction techniques although there has been a general improvement year on year. A disappointing number of candidates used construction techniques that were unsuitable both for commercial production. Knock-down fittings and the use of biscuit-jointing continues to grow in popularity where furniture projects had been undertaken. Timber materials were still being cut out by a teacher/technician and the candidate simply finishing and assembling the parts. It must be pointed out that candidates can only be credited for the work done entirely by themselves and centres do need to monitor and record this within the candidate record form. Some of the larger scale projects do restrict access to the higher grades mainly because of the amount of work done by staff. Centres who adopt this strategy do need to review the type of work undertaken.

More able candidates produced some very high level work which would compete well at Advanced Level. Where CAM was available this undoubtedly had a positive impact on the work seen in the majority of centres. In a small minority of centres the use of CAM was inappropriate and did not enhance the work.

Some centres have begun to exploit rapid prototyping systems to produce candidate outcomes. Laser-cutting had also increased dramatically this year. Whilst these do represent good commercial practices moderators often commented that the CAM had not been exploited to make the best use of the time available for manufacturing. It was difficult to compare a product manufactured at the touch of a button with one manufactured through the application of traditional craft skills. This specification does encourage and embrace the use of this type of technology but centres do need to be aware of both the benefits and the pitfalls. As a general guide, centres should ask themselves whether the work represents 27 hours worth of rigorous work for a 16 year old and demonstrates a range of skills. If the answer to ether question is no then they need to examine what the benefits might be in terms of freeing up time to undertake other work, such as packaging, exploiting the nature of quick and accurate manufacturing by producing a variety of outcomes or by comparing with other manufacturing methods. The latter is where developmental modelling can play a major part in supporting the grade.

Moderators are aware of the development time needed to draw some of the products or components prior to outputting to CAM and try to be as flexible as possible in allocating some of this work to the making criteria as an alternative to, for example, marking out materials. However, the assessment criteria must be applied consistently across a whole range of approaches. Centres that have any doubt regarding this type of work should attend one of the Autumn Meetings or contact their Coursework Adviser.

Centres continued to use computer printouts of one form or another and claimed this as appropriate CAM. Whilst this is undoubtedly the case with many graphical products, moderators were looking for this used

with die cutting tools or other aids to access the higher marks. Some centres used this as part of a transfer printing system, for example on T shirts and similar commercially made products. This printing method and the use of sublimation printing can produce near commercial standards, however, unless there is a substantial range of manufacturing undertaken candidates are unlikely to achieve C grade or above.

Some centres are still totally reliant entirely on hand production techniques and the feature of traditional skills is still valued. In the better centres, the use of jigs and similar manufacturing aids gave candidates a good understanding of batch production systems even if they did not have access to CAM.

Moderators did report that with the growing interest in the use of electronics within products that they do need to be able to access any circuitry for which the centre is claiming manufacturing marks.

Production and effectiveness of outcome

Once again, higher-level candidates produced very effective products with commercial viability and this was particularly the case with many of the textile products. Some high-level craft skills were evident in all material areas. The criteria for this section of the assessment continues to be commonly misinterpreted by centres. It is crucial that the level of demand is taken into account when making judgments. A key fob might well be complete and of very high quality but is unlikely to be worth an A grade because of the level of demand. T shirt printing, simple graphical products such as CD covers or stationery, vinyl cutting applied to commercial products all fit into this category.

Electronic or mechanical products are expected to function to access the higher grades. It is essential, for example, to have a suitable power source to test electronic products. It should also be clear how the product functions and moderators commented that this was not always the case with this type of product. Lamps without the necessary fittings are another example of where higher level awards are restricted. It is worth mentioning at this point that any device which uses mains electricity should have been checked by a competent person and the necessary PAT label attached. The use of pre-wired 12 volt lamp units which come with a mains adaptor plug are highly recommended for candidates wishing to design lighting.

This is one of the more influential sections of the making assessment and one where moderator marks were often at variance with the centre's marks.

Level of accuracy and finish

Generally, this has continued a year on year improvement as fewer candidates undertook inappropriate projects given the time limitations and resource implications found in many centres. However, moderators continued to report that a surprising number of products were left unfinished by choice. This was particularly the case with Styrofoam models left unpainted and/or lacking the graphical details which form such an important part of the product styling.

Where candidates had access to CAM it was often easier to access the higher marks although this was not always the case. Spray painted models of the highest quality were seen when candidates had been modelling injection-moulded products. The use of vinyl cut lettering often provided additional detail to closely resemble the commercial product.

Timber products continue to be the least well finished and it is often the nature of the material combined with the time needed to seal and finish a porous fibrous material which had not been allowed for in the planning. In the best examples the products were of a saleable quality.

Textiles products were often finished to a commercial standard and displayed high levels of accuracy. The use of care labels and swing labels often replicated the product as it would be sold.

Moderators reported seeing some excellent examples of prototypes that were often packaged or labelled and appeared to be very similar to commercial examples. In these instances, candidates had generally undertaken more appropriate projects.

Board games were one example where moderators commented on the wide range of standards seen from crude to commercial. In the best examples they exploited the ability to manufacture in quantity and create a product complete with instructions and packaging. Where CAM was readily available some candidates had produced two variants of the product, one assembled and one packaged in self assembly form. This was particularly appropriate with some of the less demanding constructional products.

Use of Quality Assurance (QA) and Quality Control (QC)

Many candidates continue to provide no evidence of this either through the design folder or the manufactured product and moderators needed to rely on teacher annotation. Candidates who had utilised CAD/CAM, produced moulds, formers, templates or jigs were much more likely to gain credit for this criteria. Some centres had encouraged a theoretical approach to this with candidates writing an extensive section on QA/QC in very general terms, which gained little credit. Again, it is important to emphasise that this is part of the making assessment and is not regarded as a section within the design folder.

Some centres had simply asked candidates to list the quality assurance and quality control measures they would take throughout their work. This was often no more complicated than tacking parts together prior to machine stitching, checking angles in a construction using a try square etc. Moderators were looking for an application of QA/QC in the candidate's making rather than a design folder exercise and sought evidence in many areas, e.g. planning, evaluations etc.

Once again, it was pleasing to see how many centres had encouraged some degree of volume production. In some cases this was simply the production of identical components for a lamp or storage rack. Some centres had encouraged multiple production, with board games being a good example of a project that requires this. CAD/CAM, pewter casting, injection moulding, die-stamping, vacuum forming, printing and embossing were some of the processes which allowed QA/QC procedures to be fully utilised.

Quality of written communication

It appeared that many centres had responded to advice regarding the importance of this assessment which can provide a mark to the value of almost a full grade on top of the matrix mark. Where centres had encouraged extended writing, for instance, as part of the analysis or as a formal evaluation report, moderators reported the ease at which candidates could gain a valuable number of additional marks. Word processed reports were found in many of the best examples.

Basic technological vocabulary was still a major omission for many candidates and this is surprising considering the emphasis on literacy across the curriculum in recent years. The spelling of subject specific words often prevented access to the higher marks.

The advice given at teachers' meetings was that the over use of pro-formas sometimes prevented candidates gaining the higher marks as they were encouraged to use simple bullet points or notes rather than complete sentences. It is pleasing to report how few examples there were of this strategy this year.
A structured approach to extended writing had been adopted by many centres this year. Moderators also reported that the majority of centres had applied the assessment criteria for QWC fairly and consistently.

Moderator visits

Moderators continued to report that they were made welcome by centres which had usually gone to some length to provide a suitable location with the work laid out well for inspection. There were far less cases reported that inappropriate rooms had been used this year. The length of the moderator visit can vary enormously with two/three hours being common. Centres do need to be aware that the room may be out of action for a large proportion of the day. In a very small minority of cases a second visit by a senior moderator may be necessary to ensure the AQA standard is maintained.

Whilst the letter to centres required the sample to be laid out in total mark rank order some moderators commented that it was easier if the rank order for just the making component was used. This would certainly have been helpful when work was from different teaching groups, as internal standardisation continues to be an issue in some centres and is addressed in more detail later in the report.

Some centres had included all of the development work, models, test pieces etc. and this was found to be very helpful for moderators who could re-check, for example, the development mark. Where centres had disposed of such material the assessment often relied entirely on the candidate to record such details in their folder. As previously mentioned, this is very often a crucial part of both the designing and making process and work at this stage can often be credited in more than one area of the assessment.

It is a concern to note how many centres needed to substitute work that had gone missing or had been badly damaged. Whilst storage is a major problem for many centres, it is vital that work submitted for assessment is available to the moderator. In some centres the work of every candidate was clearly labelled and stored for easy retrieval. This was often easier if the physical size of projects had been restricted.

Internal standardisation

Internal standardisation continues to be a major issue and there is an expectation that where a number of teachers have been involved in the assessment that rigorous standardisation has taken place. This is a time-consuming issue, especially in large centres, but the moderation process involves sampling a maximum of 20 projects and the moderator will choose the sample based upon a spread of marks. The impact of a single teacher marking at a different standard can have a dramatic effect upon any adjustments to the centre marks.

It is a requirement that where more than one teacher is involved in the assessment of work that internal standardisation is carried out. This needs to be rigorous and ensure that all material areas and teachers are involved. Sampling work in isolation is not regarded as an effective method of undertaking standardisation. This specification has attracted some very large centres where it would be impractical to assemble all of the work in rank order within a single room. If that is the case, it is recommended that a range of work is marked and agreed by all teachers involved and that this becomes the standard to check against.

Moderators reported that matrix errors were commonly found within the samples and again, this can affect a lot of candidates if unchecked. It is strongly recommended that the checking and recording of the matrix mark is a two person operation to avoid mistakes. Where adjustments have been made as a result of internal standardisation it is essential that these alterations are clearly recorded on the candidate record form to avoid any later confusion. A significant number of centres show differences between the marks recorded on the candidate record form and the centre mark sheet.

Whilst the report outlines a great deal of minor problems encountered by moderators centres do need to be congratulated on the way they have embraced this new specification and established it as a viable alternative to focus material courses.

Mark Range and Award of Grades

Full Course

Foundation tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	74.8	17.0
Coursework	95	210	109. 3	39.5
Foundation tier overall 3544/F	--	350	184.1	48.2

		Max. mark	C	D	E	F	G
Paper boundary mark	raw	125	80	70	60	50	40
	scaled	140	90	78	67	56	45
Coursework boundary mark	raw	95	60	47	35	23	11
	scaled	210	133	104	77	51	24
Foundation tier scaled boundary mark		350	218	181	144	107	70

Higher tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	80.2	15..5
Coursework	95	210	165.9	30.7
Higher tier overall 3544/H	--	350	246.1	39.5

		Max. mark	A*	A	B	C	D	allowed E
Paper boundary mark	raw	125	89	82	75	68	53	-
	scaled	140	100	92	84	76	59	-
Coursework boundary mark	raw	95	95	83	71	60	47	-
	scaled	210	210	183	157	133	104	-
Higher tier scaled boundary mark		350	306	270	239	209	163	140

Provisional statistics for the award

Foundation tier (7980 candidates)

	C	D	E	F	G
Cumulative %	25.4	55.1	75.9	88.2	95.6

Higher tier (8791 candidates)

	A*	A	B	C	D	allowed E
Cumulative %	4.4	30.1	60.2	83.6	97.0	98.6

Overall (16771 candidates)

	A*	A	B	C	D	E	F	G
Cumulative %	2.3	15.8	31.6	55.9	77.1	87.8	93.7	97.2

Definitions

Boundary Mark: the minimum (scaled) mark required by a candidate to qualify for a given grade. Although component grade boundaries are provided, these are advisory. Candidates' final grades depend only on their total marks for the subject.

Mean Mark: is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

Standard Deviation: a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).