



Report on the Examination

Design and Technology: *Product Design*

■ Full Course

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CONTENTS

Full Course

		Page No.
3544/F	Full Course Foundation	5
3544/H	Full Course Higher	9
Coursework		

Mark Ranges and Award	of Grades	22
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Design and Technology: Product Design

Foundation Tier

General

The format of this year's paper allowed for a truly Product Design approach to be taken throughout all questions. Candidates were given the opportunity to draw on their own personal experiences from the course, thus enabling them to demonstrate what they knew.

The paper was such that a very wide range of products was offered in answer to Question 2, ranging from a football stadium and a saloon car through to chocolate bars, packaging and prototype modelling of after-shave bottles – positive credit was given to all responses in answer to Question 3, recognising the fact that candidates were expected to describe, in detail, the making of their product having already chosen it in response to Question 2.

By the nature of the candidate entries for the Foundation Tier there was evidently a very wide range of abilities, with some encouragingly high scores awarded. However an alarming number of candidates failed to even attempt to answer whole questions throughout the paper. Graphical communication skills were once again, on the whole, limited, although there were some candidates who did demonstrate a good level of skill and application, but unfortunately they were often hampered by very poor annotation and written English. It was disappointing to evidence a complete lack of specific knowledge and understanding of 'Product Design' related matter, such as properties of materials, components or ingredients, nutritional values and Computer Integrated Manufacturing Systems. Too many responses still incorporated basic generic terms, poor technical nomenclature and a lack of understanding or sequencing of suitable manufacturing processes for a range of common products, including those covering 'paper and card' materials areas.

Question 1

- (a) Most candidates were able to give at least a partial response relating to litter, nonbiodegradable materials or harm to wildlife and animals but the majority of responses failed to expand their answers sufficiently to gain both marks available.
- (b) and (c) were not well understood by the vast majority of candidates. Answers, almost invariably, related to re-cycling and re-use of the packaging, and very few candidates were able to identify renewable material resources, such as timber and finite material resources.
- (d) This part of the question was generally well answered with a range of creditable responses accepted, including those of 'separating materials', 'the need to clean the materials', 'problems of encouraging consumers to collect and sort materials' and 'the cost factors associated with re-cycling'.

Question 2

(a) The majority of candidates were able to offer responses to this part of the question, but the standard of graphics and labelling varied enormously. Some products identified had clearly formed part of the candidate's course of study and they were familiar with all aspects, but others attempted to draw what was probably at hand in front of them, or a product that was too ambitious and complex and they were unable to present it graphically well or label it sufficiently.

- (b) (i) Very few candidates gained both marks for correct identification of specific materials, components or ingredients. Generic terms were given in most cases.
 - (ii) Very few candidates scored any marks here. Some gave lists of tools or processes, but few were able to identify or understood what was meant by properties or nutritional values.
 - (iii) Almost all candidates offering a response were given credit for an identifiable attractive feature of the product they had chosen.

Question 3

- (a) This question was not well answered. Positive marking was applied to all scripts, including those candidates who had obviously chosen an overly ambitious or complex product in response to Question 2 and had attempted to produce a response to describe its manufacture.
 - (i) Candidates did not achieve good marks for this part of the question. They generally failed to recognise the need to prepare materials, components or ingredients ready for the various stages of manufacture to produce a finished product. Often lists of tools and equipment, felling of trees for timber, collecting ingredients or designing the product were offered here, with little credit worthy information being included.
 - (ii) Varied responses were seen here from very good understanding, application and technical detail through to little knowledge or understanding of suitable processes or sequences, or the correct identification of tools and equipment. It was clearly evident that those candidates who had actually undertaken the design and manufacture of the product being described, during their course, gained high marks.
 - (iii) Most candidates offering responses here failed to gain high marks. Some vague reference to, or labelling of a finish was often the only evidence that this part of the manufacturing process was considered at all.

Many candidates did not make sufficient use of the sub-headings provided to structure their responses. The use of quality sketching and annotation was scarce throughout the range of responses.

- (b) Not generally well. Many candidates failed to relate this part of the question to part (a), when making the product. Responses were often too general and at times wholly inappropriate: 'goggles to be worn' 'wear gloves', 'do not go near the sharp blade' without reference to the particular process, equipment being used or need/appropriateness for such a safety precaution.
- (c) Many of the answers to this part of the question were weak and did not refer to suitable 'quality control' checks during making.

Question 4

- (a) (i) Disappointingly few candidates were able to recognise this as the British Standards Institute 'kite mark'. Many failed to give a full enough response, such as BSI or 'kite mark'. Credit was not given for stating 'British Standards' only.
 - (ii) Some understanding that a product had passed safety and quality tests was evident but many failed to gain the full marks for a full and correct explanation.

(b) This question was very well answered and the majority of candidates were rewarded with full marks, although responses varied in the amount of detail given for explaining each symbol.

Question 5

- (a) Some very good answers were offered demonstrating a sound understanding of 'design requirements' in the context of the question.
- (b) This part of the question was not well understood at all. Many responses related to the 'aesthetics' of the product and very few full mark answers were seen.
- (c) It was encouraging to see some well thought through design improvements relating to both the visual appeal and physical use for children, by changing the shape of the container completely. There were some very clear sketches with some candidates effectively attempting 3D sketching and full use of colour showing intended improvements. The majority of candidates used colour effectively and those who worked only in one medium did attempt to indicate colour application through labelling and annotation.
- (d) Many candidates failed to gain full marks in response to this question because they did not describe suitable tests in enough detail.

Question 6

- (a) Generally well answered, the majority of candidates were able to state three or four suitable design specification points for the card
- (b) The quality of ideas and design presentation varied widely, from candidates offering only one simplistic idea through to a range of very creative and well presented ideas. Annotations and notes also varied dramatically from comprehensive, informative, analytical comments through to basic indications of the features of the design ideas.
- (c) The majority of candidates failed to demonstrate the full extent of their final design idea by not indicating the card as a complete product, with information relating to the front, inside and back of the card, although the design idea did score well. Some candidates failed to address the design specification points outlined in answer to part (a), in their final idea and accordingly lost valuable marks.
- (d) The commercial production processes involved in the manufacture of the card were not well understood generally. References to printing and cutting were the most common correct responses seen.
- (e) Very few candidates scored more than one or two marks for this question. The responses were often incorrect, too vague and lacking any significant information relating to appropriate production processes or stages.

Question 7

(a) Although most candidates answering this question were able to gain one or two marks, very few scored high marks. Responses were often too general and did not answer the specific question relating to the advantages of using CAD for designing. Single word responses were not credited e.g., 'faster' or 'easier'.

(b) Again, very few candidates gained high marks here. Answers were often a repeat of what was given in part (a) and many responses were too general or vague single word statements with no explanation given.

Question 8

The recognition of the systems involved in the operation of the vacuum cleaner was not well understood by the majority of candidates. Very few full mark responses were seen, with the most common creditable answers relating to the 'electrical input' and 'vacuum created' in the process.

Higher Tier

General comments

This year's examination encouraged candidates to use past experience to demonstrate their knowledge of products, materials and processes. The majority of candidates did this well showing an understanding of a wide range of material areas. The question requiring knowledge of the manufacturing processes used with paper and card was not answered well, suggesting that this was an area of expertise overlooked by some centres. Computer aided design and manufacture now seem fully absorbed into the product design curriculum with almost all candidates at this level having a good understanding of the capabilities of such technology.

Candidates appeared to be well prepared for this year's examination. Examiners however reported that some centres had entered candidates for an inappropriate tier, as these candidates were unable to show any understanding, or answer whole sections or complete questions.

Question 1

- (a) The majority of candidates answered this question well often gaining full marks. Standards of drawn and written communication were high.
- (b) Those candidates who had chosen an industrially produced product (e.g. car or laptop computer) struggled with this section as they often used generic rather than specific material names. Many candidates were confused when required to name the properties of materials, ingredients or components. Candidates who had chosen a product of which they had direct making experience, for part (a) achieved well.

Question 2

- (a) The majority of candidates had been prepared for this question and achieved well as a result. The most successful candidates combined written and drawn explanations showing correctly sequenced manufacturing processes that they appeared to have experienced or practised prior to this examination. Candidates who had chosen an industrially produced product again struggled to complete this question well being unable to name appropriate tools and equipment or preparation/finishing processes.
- (b) Very varied understanding of hazard analysis and risk control was shown in candidates' answers. Some candidates wrote a lot about safety equipment without mentioning specific risks, hazards or control procedures.

Question 3

Generally a well answered question, but few candidates showed understanding of the 'average system of weights and measures'. Many candidates confused weight and volume.

Question 4

- (a) Many candidates were unable to answer this from the manufacturer's view and were unable to state relevant criteria as a result.
- (b) The majority of candidates understood this question but referred to size which was inappropriate in the context given.

Question 5

- (a) Most candidates were able to give three specification points but a minority were unable to justify each point.
- (b) Some candidates did not use colour and stated that they did not have access to colours during the examination. The majority of answers were flat 2D drawings concentrating on the front of the card or badge. Only the best candidates considered all aspects of the card and badge.
- (c) Many candidates produced a simple 2D drawing of the front of the card showing little quality and no explanation. The best answers fully illustrated and explained all aspects of the inside and outside of the card, including the badge and envelope and were well drawn in full colour.
- (d) In evaluation of their designs most candidates simply praised their designs with very few suggesting any improvements.
- (e) Some candidates named design rather than production stages.
- (f) Very few candidates were able to accurately describe or illustrate a production stage. The best candidates were well prepared and could accurately illustrate and explain die cutting and printing techniques.

Question 6

- (a) Computer aided design was well understood and answered by the majority of candidates.
- (b) Fewer candidates seemed to fully understand computer aided manufacture. Many answers stated it was cheap, quick and easy, suggesting that they had little understanding of the complexity of using the machinery.

Question 7

Not a well answered question with the majority of answers referring to clothes being ironed rather than the control system involved in the iron itself. Very few candidates understood or made reference to feedback in the system diagram and even fewer added arrows to the diagram.

Question 8

Those candidates from centres who had considered market pull and technological push answered this question well. Some candidates seemed to use guesswork with varying amounts of success.

Coursework

General

A wide and varied range of work was encountered across the centres. Paper/card, timber, plastic and metal products were most commonly seen. Textile products have grown in popularity and were often the most creative projects seen. A smaller number of centres had used food, control components and ceramic materials. Some centres used a single brief, some a small choice of projects and some a totally open brief. Centres, which did give themes to candidates in the main, have got this approach well structured to the benefit of candidates. Others have been too open ended with candidates taking on tasks, which could never be completed in the 40 hours.

Moderators reported that there was a general improvement in standards as centres have begun to settle into this new specification. However, it was surprising how many centres (even 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.

As with last year, many centres had marked the design folders well within the AQA tolerance. However, the assessment of the practical outcome was often out of line, requiring some adjustment to be made. Many new centres had used inappropriate tasks or ones that restricted access to the higher marks. Typical examples of this would be band merchandising where transfer printed T shirts and graphical outcomes of low demand, in terms of making skills, were over rewarded. Corporate identity projects were common where the scope of the products such as key rings, mugs, packaged glasses etc. were more appropriate to KS3.

Centres who had attended on of the Autumn Teachers' Meeting had often responded positively to the advice given and encouraged candidates to produce concise design folders. As last year, many new centres had not achieved a satisfactory balance between the designing and making components, giving too much importance to the creation of a design folder at the expense of the higher weighted making component.

It is still disappointing to report that despite the support materials and meetings there were still a significant number of centres who appeared to have chosen the specification on the basis of the written paper alone. A large number of centres produced traditional resistant material type projects which lacked a commercial product focus. Some centres also had products that were better suited to the graphic products specification, for example café models.

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

Designing for the candidate's own personal use without consideration for a wider commercial market is likely to restrict learning. 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 likely to be used 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 also worth reminding centres 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. Each of the sections in the assessment criteria are not regarded as carrying equal importance, therefore centres who had devised spreadsheets or a form of aggregation were often less accurate with their judgments.

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 candidate's time and has no value.

Many centres are not insisting on candidates sorting out and securely binding design folders prior to marking and this makes the process of assessing the relevant work harder for moderators. 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.

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. Many candidates are being encouraged to "hoop-jump" the assessment criteria in a linear manner. It is important to recognise that the development stage should represent an influential part of the assessment process.

Design brief

Candidates were generally more focused this year. Centres were less often encouraging candidates to explore several potential design briefs before selecting the most appropriate one to continue with. 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. They should not represent a random selection of catalogue pictures. The best were often supported by a short statement explaining 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.

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, varied 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 wasting time writing formal letters.

Some of the better design folders had summarised research findings in preference to 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 centres were encouraging candidates to include photographs and plans of the exact location of their final product. This is a major concern, as clearly, these centres have not understood the nature of this Product Design specification. 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 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

This section was greatly improved by many centres this year. The better candidates looked at essential, desirable and possible attributes for the product and focused 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 areas 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. Centres should use this as a guide only.

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 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 centres – 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, numerous centres appeared to have directed candidates to produce four to six superficial ideas and had over-rewarded this achievement. Candidates were also being over-rewarded for ideas which had been copied form 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. In several instances centres were over-rewarding work that was blatantly copied from other sources. Some candidates had stuck pictures of the source product onto the ideas sheet then continued with their own ideas. 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 singleview 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 developed further. 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 a very 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 are 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 centres but this was in a minority of cases. Pro DESKTOP was used for virtual modelling by an increasing number of centres. 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 anywhere near 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 in a smaller number of centres this year. Full credit was given to planning as long as there was sufficient evidence to support the judgement 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 minority of centres had encouraged the use of diagrams to explain basic making processes such as using a try square or applying spray paint. It cannot be stressed enough that this is not what is required. Centres 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 candidates' 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. Centres often appeared to be encouraging a detailed evaluation of the process when it is the evaluation of the product, which is the most important. 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. Superficial comments from friends often produced worthless 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 centres need to plan for this.

A small number of centres structured the evaluations to include the products that were collected and analysed in the research section and made comparisons with their candidate's 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 & 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. 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 centres 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 manufactured commercially 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

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 many centres, although moderators reported a general increase in standard from last year. Rather more centres had fully embraced the multimaterial 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 one third of the 40 hours available) and the comparability of this Specification 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 to support this criteria and the moderation process 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. 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.

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 reported that candidates were often using unsuitable construction techniques although there was a general improvement on last year. A disappointing number of candidates used construction techniques that were unsuitable both for commercial production. Indeed, one centre had used polyurethane foam as the adhesive/filler within the construction for almost all of the work in the sample.

Some knock-down fittings were seen and the use of biscuit-jointing had increased in popularity this year. Timber materials were often cut out by a teacher/technician and the candidate simply finished and assembled 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.

More able candidates produced some very high level work. 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. It appeared that the centres had insisted that CAM be a feature of the work regardless of the product, e.g. the candidate's name engraved on a "makers nameplate" and decoration engraved onto the outer surface of the product were two examples of where the use of CAM was questionable. Many candidates used 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.

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 were 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.

This is one of the more influential sections of the making assessment and one where moderators often adjusted the centre's mark.

Level of accuracy and finish

This was a major improvement on last year as fewer candidates undertook inappropriate projects given the time limitations and resource implications found in many centres. However, moderators reported 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. 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 such as furniture were often poorly varnished or painted and moderators commented that this was partially due to the large scale of some of the projects attempted. Candidates appeared to have simply run out of time. In the best examples the products were of a saleable quality.

Some textiles products were 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 a particularly good example, as were some of the food products seen. Where CAM was readily available, some candidates had produced two variants of the product, one assembled and one packaged in self assembly form.

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

Many candidates provided 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. It was obvious where this had been taught and monitored by the centre and 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.

Moderator visits

Moderators were very well received, and centres had usually gone to some length to provide a suitable location and laid the work out well for moderators. In a few cases inappropriate rooms had been used. Whilst the moderators accept the pressure on rooms in most, centres it is not essential to have the work displayed within a DT room. Some moderators reported that they felt under pressure to vacate the room due to timetabling needs.

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.

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. This is very often a crucial part of the designing and making process and work at this stage can often be credited in more than one area of the assessment.

It continues to be disconcerting 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 the better-organised 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

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.

It was a concern that many centres reported that they had been given inadequate time to undertake this work and were relying on after-school sessions to agree the assessment. By its very nature, moderation is only a sampling process and any adjustments made may impact on many other candidates in the cohort.

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.

Mark Ranges and Award of Grades

Full Course

Foundation tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	63.3	17.6
Coursework	95	210	105.9	40.1
Foundation tier overall 3544/F		350	169.2	49.6

		Max. mark	С	D	Е	F	G
Paper boundary mark	raw	125	76	64	52	41	30
	scaled	140	85	72	58	46	34
Coursework boundary mark	raw	95	60	47	35	23	11
	scaled	210	133	104	77	51	24
Foundation tier scaled boundary mark		350	211	173	135	97	59

Higher tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)	
Paper	125	140	82.1	15.7	
Coursework	95	210	164.56	31.6	
Higher tier overall 3544/H		350	246.6	40.7	

		Max. mark	A*	А	В	С	D	allowed E
Paper boundary mark	raw	125	96	88	80	73	59	-
	scaled	140	108	99	90	82	66	-
Coursework boundary mark	raw	95	95	83	71	60	47	-
	scaled	210	210	183	157	133	104	-
Higher tier scaled boundary mark		350	309	277	245	214	170	148

Provisional statistics for the award

Foundation tier (6272 candidates)

	С	D	E	F	G
Cumulative %	21.2	49.9	73.3	87.0	95.5

Higher tier (7929 candidates)

	A*	А	В	С	D	allowed E	2	
Cumulative %	3.7	25.3	55.0	80.1	95.8	98.1		
Overall (14201 co	andidates)							
	A*	А	В	С	D	E	F	G
Cumulative %	2.1	14.1	30.7	54.1	75.6	87.2	93.2	97.0

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).