

Design & Technology

Advanced GCE A2 H453

Advanced Subsidiary GCE AS H053

OCR Report to Centres

June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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CONTENTS

Advanced GCE Design and Technology: Product Design (H453)

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OCR REPORT TO CENTRES

Content	Page
Overview	1
F521 Advanced Innovation Challenge	2
F522 Product Study	8
F523 Design, Make and Evaluate	19
F524/01 Product Design Component 1	26
F524/02 Product Design Component 2	29

Overview

There were some outstanding examples of high quality performance this series. Inspirational, innovative and creative work is becoming more apparent across all of the units. Unit F521 Advanced Innovation Challenge is having an increasing impact on candidates with a wider range of interesting and exciting possibilities explored in Units F522 Product Study, F523 Design, Make and Evaluate and F524/02 Product Design.

There were a few problems relating to the administration of examinations and moderation documentation this series. Centres are reminded that the F521/01 and F521/02 examinations are not taken on the same day. Further information relating to administrative issues is given in the specific Unit sections of this report.

Marks awarded by some centres for the moderated units F522 Product Study and F523 Design, Make and Evaluate have been increasingly generous over the last few assessment series. This has resulted in an increasing number of adjustments to centre marks. Principal Moderators and their teams have worked exceptionally hard to ensure that a fair and consistent outcome relating to grades awarded is achieved. It is worth reiterating that in internally assessed units where the assessment contains many sections, erring on the side of generosity in the assessment of some areas can have a significant cumulative effect and result in overall marks which are over-assessed.

Many Projects submitted for F522 Product Studies and F523: Design, Make and Evaluate were of a very high standard. Increasing numbers of candidates are submitting work as e-portfolios. The majority of candidates make very effective use of digital technologies to record the development of their work in 'real-time' and show effective evidence of interactive dialogue.

A significant number of candidates produce e-portfolios for F522 and F523 that are excessively large, containing in some instances very large, high definition video files (sometimes not relevant) that take a long time to load for viewing. Centres are reminded that care should be taken to ensure that video files are appropriate in terms of value to the project and that they are tested to ensure that they are packaged correctly. In a number of cases the video files were not accessible. It would be helpful if candidates included a separate folder for video files so that if moderators cannot access the files through the presentation they would still be able to be viewed.

The majority of responses to F524/01 and F524/02 were for Resistant Materials with Manufacturing, Graphics Products and Textiles the other most popular options.

The overall standard on both papers was good, and it was pleasing to see an increasing number of successful attempts at Question 1 (Built Environment and Construction) and Question 3 (Food). More centres are preparing their students for these focus areas. A disappointing feature of this series was the drop in the number of candidates attempting Question 7 (Systems and Control).

The following reports contain detailed breakdowns of overall candidate performance in the June 2013 assessment series. They also include very valuable guidance on how to access the full range of marks.

Centres are advised to check the OCR website for specific GCE Product Design training materials and INSET opportunities.

It is helpful if the reports are read in conjunction with the full specification and appropriate mark schemes.

F521 Advanced Innovation Challenge

General Comments

Administration

It is important that both examination papers are dispatched to the appointed examiner in one package as soon as the reflection paper has been completed on the date set by OCR. Candidates will have access to their challenge work booklets during session 2; however, they should not write in it.

Answers must be completed in the booklets provided, and there is additional space in the challenge booklet should candidates require it; however, the use of this space should be labelled carefully with the box number that the work relates to so that it can be credited appropriately by the examiner when the script is marked.

The front of the paper clearly indicates that additional paper will not be marked; there are still a number of candidates submitting design work or written work on additional paper that is of a non-JCQ type. It is expected that inspirational material is stuck into the booklet to aid designing; this material is brought in as part of the job bag. Centres are also reminded that candidates should not access the internet during this examination.

All materials relating to examinations sent from OCR to centres will be dispatched to the examinations officer. Examination notices must be displayed in the area where the examination is to take place and an invigilator should be present.

Running the Challenge

Centres are reminded that the role of the teacher is that of a facilitator and not that of a normal classroom teacher. They are there to provide access to modelling materials, monitor health and safety issues and read the teacher script to candidates, elaborating and explaining where this is indicated.

Teachers must not:

- give advice to candidates about the design or manufacture of their product;
- cut materials to the correct shape or dimension for students.

It must be made clear to all candidates that this is an examination to assess the individual student's designing and modelling capability.

A number of candidates continue to approach the challenge with pre-conceived ideas rather than responding directly and creatively to the design challenges. A few candidates misinterpret challenges, either because they do not read them with sufficient care or because they choose to base their work on practiced work to a design challenge. Each challenge has specific key areas that candidates will need to address fully with fresh creative thinking to respond to the challenge effectively.

It is the centre's responsibility to provide a suitable range of modelling materials for candidates. It is not advisable for candidates to bring their own materials for modelling as this can hamper design thinking.

The 'job bag' should contain inspirational materials, images and information about materials, anthropometrics that could be useful when designing. Candidates must not share resources or job bags during this examination.

The quality of photographs is generally good but examiners have reported some problems with the photographs presented for assessment, particularly not focusing on the object. Photographs

must be stuck into the correct boxes in the booklet. It is important that the centre provides colour images of a good quality. A minimum of three photographs is required; however, additional photos can be added to the workbook. This is particularly important if it is necessary to show other parts or views of an artefact or mechanisms to fully illustrate the final outcome. Extra photographs can be included in the evaluation or progress report boxes.

It is recommended that if candidates wish to annotate photographs, that a second print is produced and stuck into either the appropriate section of the workbook or into the 'additional space' and clearly labelled and then annotated.

Security of Workbooks

Centres are reminded of the importance of appropriate security of all workbooks between the three sessions of the Innovation Challenge.

Work of Candidates

Again some highly creative work has been seen this series from candidates who have shown both design flair and sound technical knowledge. A significant part of the preparation for the exam should include techniques to allow the candidates to present ideas quickly and practice of workbook completion under timed conditions. Examiners are aware of the pressure on candidates in this examination and marks are awarded with this in mind.

Areas such as specification, evaluation of ideas and final products continue to discriminate well between candidates. They are testing higher order thinking skills and these areas should be taught throughout the AS course.

The Challenge Assignment

Initial Thoughts

Candidates used a combination of text and drawings to explore the challenges within the theme of 'retail' and identified possible design areas/problems. Some candidates did not think creatively about the challenge or context and suggested predictable or narrow responses. Many candidates explored ideas in depth thinking creatively, whilst considering the indoor or outdoor environment, users and space they were designing for. Those scoring highly explored the challenge widely expressing their thoughts and expanding further on them.

Design Brief

Candidates should be encouraged to write clear and precise design briefs that develop the design challenge further and offer scope for creativity. The majority of candidates identified the appropriate user groups for their products. The best design briefs expanded upon the design challenge clearly, adding users and extra market information in them.

Specification

The more successful responses are where candidates concentrate their thinking on the functional and user needs of the product in the design situation and ensure that the relevance of all points is explained. Candidates are advised to focus on functional aspects when writing a specification. Specific detail is required for high marks in this section, e.g. weight, size and material properties. Specifications made up of vague or generic points or which lack justification prohibit access to the top mark band.

A number of candidates did not fully engage with the challenges set, missing the key points and so lost marks in this first section. The use of CAFÉ QUES and ACCESS FM can often lead to generic specifications.

Ideas

This section continues to see an encouraging improvement and candidates are sketching a good range of ideas in most cases. The quality of annotation seen was very good, with relevant notes relating to the specification and construction & material details. The best responses also had integrated sources of influence in their ideas section.

Most candidates produce a good range of ideas and, on the whole, these were creative, with some excellent examples of innovative thinking and good use of annotation and sketching. Higher performing candidates produced a range of functionally different ideas that clearly related to their specification, situation and the potential users. Originality and creativity are key aspects of this criterion. There are still a small number of candidates presenting one idea in this section; it should be remembered a range of ideas is required.

Candidates used a combination of drawings, text, annotation and occasionally modelling/photographs to show their ideas. Higher performing candidates gave different views of objects or parts of objects and clearly communicated their creative design thinking and included specific detail of materials and manufacture/constructional techniques. This is an area that still needs developing, a significant number of candidates do not include details of specific and appropriate materials that could be used for the product.

An improvement was seen in this series for the evaluation section with good evaluative annotation in the designing section, where candidates had clearly detailed why they had chosen their idea but also why they had disregarded others. Where evaluations scored less well, candidates had not explained why they took the idea forward and why others were rejected.

Reference to source of inspiration/job bag was usually given although not always with pictures. The better examples of evidence from job bags were where candidates had collected a very broad range of items and took their inspiration from unrelated inspirational objects. Candidates should be advised against copying or presenting existing solutions as their own.

Many candidates had a clear structure to present their feedback in box 10 showing comments/response/modifications. Clearly, this is something that is influenced by good practice in coursework in individual centres.

Development of Ideas

There continues to be improvement in this section, and most candidates now use notes or annotations to show how they are developing and improving their design towards an optimum solution that satisfies the design brief, specification and needs of the user. Most candidates suggested specific materials but very few considered methods of manufacture for their developed idea. Materials were sometimes generic e.g. wood, plastic; or not appropriate for the design. It should be remembered that in this section the materials and construction are those that would be used for the product should it be manufactured commercially.

It is also expected in this section that the size of the product is considered. Dimensions of individual features, components and/or thicknesses of materials are considered in the best responses.

Plan for Modelling

Action plans were mixed, often these were very general and referred to 'cutting out all pieces from the materials' and similar statements. The best responses produced detailed flow or block diagrams referring to individual parts of their model and the actions required / equipment needed to make them, some even allocating time to each action.

Recording Progress and Modelling

Many candidates are meeting the criteria in the middle band of marks and this is mainly due to two things - models that do not fully reflect the developed idea; and poor reflection and recording sections.

Some candidates give only brief statements in their progress reports with no real detail to show examiners what modifications/amendments or successes have been made. Those who have used extra photos or sketches of details of their models tend to complete these boxes more successfully. Candidates who provide little more than a cursory description of what they have done in the modelling are unable to reach the top band of marks for the progress report – reflection of modelling should illustrate with sketches/photos technical problems they have encountered and highlight how they have overcome these. The suggested timings for the progress reports should be followed as it forms part of the whole modelling mark.

Most centres have a better understanding of the type of models required although many candidates concentrate exclusively on the aesthetics of their design ignoring any functional detail (e.g. folding mechanisms). The main point here is for candidates to use appropriate modelling materials to enable them to fully reflect their design.

Candidates need to be able to develop their quicker modelling skills using a variety of materials. Creative use of common inexpensive materials is probably the easiest way for candidates to score well in this section. Kits should not be used for final models as it restricts the candidate's ability to model their design accurately and skilfully; as does the use of existing products to form part of, or most of their model. The use of collected materials should also be avoided (loo rolls, cereal boxes, plastic bottles etc). The skills section cannot be highly marked if candidates have just stuck together collected items to form a model.

Evaluation

Some improvement was seen this series for the evaluation section. Candidates who structure the section as 'Strengths and Weaknesses'; 'Evaluation' and 'Modifications', usually achieve success in this section. However, many candidates do not record their further modifications in sufficient detail and some do not indicate any possible weaknesses of their product. A very small number of candidates just talked about their model and not the product, and so could not score any marks.

The strongest responses clearly evaluate against the specification, provide strengths and weaknesses and realistic improvements with sketches. This is still one of the weaker areas in most candidates' responses. Where candidates did evaluate, they tended to focus on strengths with little mention of weaknesses in their product and, in doing so, restricted their marks. There can be a tendency to repeat the specification rather than evaluating their product against their specification and justifying how their product had met the relevant point.

Comments on Individual Challenges

Challenge One

Temporary changing area – a popular question, some highly innovative solutions were presented with the product coming up from the floor, down from the ceiling or folding out from walls, even some examples of portable devices that shoppers would carry around with them. Many candidates did not consider space implications, or how practical their idea would be to use in a busy shop.

Challenge Two

Pop-up shop – again a popular question, a small number of candidates did not seem to fully understand the concept of a pop-up shop but this did not compromise their thinking. Some good technical responses were seen. However some solutions presented would not be easy to disassemble, pack up or travel with and would be impossible to move without serious lifting equipment.

Challenge Three

Eco Promotional giveaway - this was a reasonably popular question. Some creative ideas at the start but candidates seemed to opt for the 'safer' options to realise.

Challenge Four

Fruit product – this was probably the least popular question; many candidates who attempted this challenge presented little detail of the food product itself. It exclusively became a packaging challenge. However, some creative responses were seen that explored a variety of ideas and included good detail of the food and nutrition.

Challenge Five

Charity collection – again a fairly popular question with some creative responses very rarely do candidates really consider the needs of the charity, mostly focussing on the interactivity of the product. Games of some kind were a popular solution. Many candidates needed to provide more detail of the money slot, the security of the money or how the money would be collected.

Challenge Six

Shopping centre focal point/bringing communities together – another popular question. Many candidates designed a seating area for a family or group of friends. Some candidates missed the focal point aspect of the challenge. However, many candidates who completed this challenge should be commended for their originality and creativity when developing a focal point for communities to use.

Reflection Paper

It was pleasing to see more candidates producing focused responses and addressing the bullet points thus accessing the full mark range. It is evident that the more successful candidates are planning their answers ensuring all bullet points are addressed in relation to the topic of the question. Not all candidates support the points fully with specific examples in reference to their product. Many candidates produced detailed answers for question 1 but seemed to rush question 2, perhaps due to time management during the examination.

Question 1

Almost all candidates understood the term ‘sustainability’ but some had trouble relating it in detail to their product. Most candidates identified a change of material in their design to one more able to be recycled or from a renewable resource, fewer of them can actually name specific materials and many used generic material names. Some changes were predictable, obvious material substitutions with little factual basis for claims of superior sustainable properties. The better responses included other improvements, such as reducing materials, manufacturing processes or weight and many responses covered environmental impact in use, life expectancy, disposal, carbon footprint etc. Many showed a good understanding of the use of recyclable components/materials, recycling issues and the six Rs – rethink, reuse, recycle, repair, reduce, refuse.

There was a good understanding of LCA cradle to grave - material selection, recyclable components/materials/environmental impact/attraction, obsolescence issues, recycling, energy used in production, energy during use, life expectancy - disposal/recycling issues. Some candidates did analyse their product, materials and components in depth and considered many of the phases of its life cycle. This bullet point was answered well.

Few made really meaningful points about the impact of changes on the cost of the product. Where implications of the cost of meeting legislation were discussed it was often linked to company image/customer perception. Some candidates discussed transportation costs, use of flat pack and benefits of sourcing materials locally.

Question 2

There was a broad interpretation of the terms ‘fashion’ and ‘trends’ by many candidates. Candidates made good links to the retail environment, where appropriate, making good use of company logos, branding, colour schemes etc. A few candidates cited sustainability as a ‘trend’ and repeated their answer to Q1. The trend of using new technology (or catering for users need for phones / tablets etc.) was frequently a basis for modifications – additional displays, access to

social media sites etc. A significant number discussed seasonal fashions (Christmas / Summer etc.) – most found some aspect of 'fashion' that could be related to their product. Many candidates showed a limited understanding of the processes required to achieve their desired outcome, for example manufacturing processes and systems, although strategies for repeated updating of the product were often discussed in good detail.

Many candidates did appreciate and give valid reasons for cost changes to their product in the light of the suggested improvements, but often did not get beyond simple comments such 'would cost more/less/about the same' with little justification. Common answers included 'cost would increase due to increased material', although not often explaining how or why. Many candidates did not mention the possibility of standard components and all seemed to assume they would have to start making the entire product again from scratch.

It should be noted that it is stated in the specification that candidates have the opportunity to reflect on the challenge by answering questions that require them to consider their product. These will be derived from a design, manufacturing or marketing perspective, including: sustainability and the environment; product life; social, moral and cultural issues; environmental issues; inclusive design; the human interface; aesthetics; scale of production; production technologies; fashion; marketing; commercial issues." These areas should be taught through the 'AS' course and candidates should learn to apply knowledge to products when evaluating and analysing and be familiar with technical terms related to these topics.

F522 Product Study

General Comments

Some inspirational work was again seen this series by candidates submitting work with both e-portfolios and A3 paper portfolios. The percentage balance for these two approaches is however changing dramatically. Initially candidates submitting e-portfolios were in the minority, once the specification had established numbers approached then exceeded 50/50. This series the majority of candidates submitted work via e-portfolios, it is difficult to give a precise figure but analysis of archive projects retained for Award purposes indicates between 80-90%. The percentage at the higher end of candidate performance is larger. Projects retained for archive purposes at the lower grade boundary indicate an approximate 50/50 split between the two approaches.

Although centres could be led to draw conclusions from the above analysis, there is no reason why the full range of marks cannot be accessed through each approach. There continues, however, to be a marked divergence of approach between the e-portfolio and A3 paper submissions.

E-portfolios- Good features/Issues to address

- 'Real time', 'hands on' approach usually evident in the 'product focus', 'strengths and weakness comparison' and 'testing sections'.
- This feature however makes the most impact in the 'development of improvement section' where it is a mandatory requirement and often used as a feature of 'ongoing evaluation'.
- Engaging presentations - in particular the 'interactive dialogue' - where candidates discuss and crucially respond to comments made by third parties.
- There is sometimes a lack of 'free-flowing' design sheets. Full scans of A3 ideas represent good practice - small text box scans of limited features often annotated with typed comments should be avoided.
- There is still a stated OCR requirement to submit files in PP 2003 or earlier. In practice 2007 gives us very few problems and runs efficiently on most systems with most videos working within embedded presentations. OCR has responded to enquiries on PP2010 by pointing out that we have a strategy to view these and moderators use file converters in some cases. This process does not work if the video files have not been embedded by the centre on to the candidates CD/DVD. Moderators (often with very sophisticated equipment) continue to report an inability to view some videos with the observation that they are probably still on the candidate's laptop and have not been transferred to the school system and on to the DVD. Nb. presentations prepared using PP 2010 can be saved using PP 2003/2007.
- Many centres provided a separate folder containing videos, enabling most moderators to view all video files. It is preferable however that this facility is used as a back up as viewing videos in context is a far more valuable exercise. In any event 'trial videos' should be deleted.

A3 paper portfolios- Good features/ Issues to address

- In particular, work in the 'creative and innovative ideas section' often provides free flowing, high quality annotated sketching which is sometimes not evident in e-portfolios.
- There was also evidence this series of small scanned images being included in A3 presentations. This is often a weak aspect of some e-portfolios and should not be replicated here with A3 folders.
- Candidates submitting using paper folios also need to ensure that the mandatory requirement for interactive dialogue is met.

- This can be achieved by real time –first hand comments either added directly to design sheets or on ‘overlay sheets’: There was some good evidence of this practice.
- Retrospective or ‘typed up’ comments reformatted after discussions should not be encouraged and often have a negative effect on outcomes. Actual comment by those making them and the responses of the candidate are required in ‘real time’ as they actually happen and not later.

In essence, CD presentations often have outstanding use of real time interactive dialogue but sometimes tend not to develop the freedom of design ideas expected through high quality annotated sketching (scanning in whole design sheets would be an advantage). A3 folders are generally stronger on the quality of detailed annotated sketching in the development of ideas section but sometimes lean too heavily on retrospective comments, which are often typed. This does not meet the requirement for ‘real time interactive dialogue’. Centres however should note that submitting A3 and CD content for one individual candidate is not allowed.

The purpose of the moderation process is to ensure that centre assessments are in line with a common national standard. This is achieved by adjusting any centre assessment where the moderation process indicates that this is necessary based on the sample of work viewed. Centres receive a detailed report following moderation which identifies specific areas of the assessment criteria which need attention, where applicable. In internally assessed units where the assessment contains many sections as in F522, erring on the side of generosity in the assessment of some areas can have a significant cumulative effect and result in overall marks which are over-assessed. Centres need to remain objective in their internal assessment and assess candidate work against the published criteria, awarding marks as appropriate.

Most centres are now using the interactive CSF form which correctly totals candidate marks and together with meeting the requirement to send the Centre Authentication form (CSS160) and the MS1. OCR has a responsibility to check names, candidate numbers and marks entered against those on the computer system entries - there are occasional transcription errors and these are impossible to check without the MS1 forms. Submitting this form electronically is efficient but does not remove the necessity for sending a copy of this form to the moderator. There are various versions of electronic MS1 forms used by centres.

Essential information should include:

- Centre name and number
- Candidates full name
- Candidate number
- Raw centre mark

If transcription or arithmetical errors are reported to the centre these cannot be corrected by the moderator on screen and it is very important that Examination Officers are positively involved with changing the centre entries on the system. This has been a problem in previous series and centres are thanked for their interaction with this process which has run efficiently again this summer. This situation is also relevant to ‘withdrawn candidates’ where this involves the whole sample. These entries must also be removed from the system by the centre. Centre co-operation in this respect is essential as the centre will remain as a live entry and subject to a monitoring process for incomplete marks.

Section by section guidance on Product Study requirements for Unit F522

These comments are common to most series and are added to when moderators raise additional issues for attention.

Moderator's comments for both 2013 sessions have been added in italics.

**This product study should take candidates 30 hours to earn up to 120 marks.
(1 hour's work should notionally equate to 4 marks)**

OCR recommended A3/PP allocations are indicated for each section - the total should not exceed 20

Product focus and analysis (8) (2 x A3/PP)

Products can be selected from any of 8 different focus areas:

- Built Environment and construction, Engineering, Food, Graphic Products, Manufacturing, Resistant Materials, Systems and Control, Textiles.

For marks in the top band all of the following should be addressed:

- Detailed description of the intended purpose of one single selected named product (not a range).
- Key Criteria used in the design of the product.
- The needs of the manufacturer.
- The needs of the consumer.

Where all four of the above have not been covered the centre should consider awarding marks in the lower bands. Moderators report that the 'needs of the manufacturer' section is not covered to sufficient depth in many cases.

Some candidates and some whole centre groups are still considering generic groups of products. The first page of the candidate product study should state quite clearly and categorically what **specific, single named product** has been selected for analysis.

Candidates who do not present real time evidence and interactive dialogue should not be marked in the top band.

Ongoing comments from Moderators:

- A wide range of interesting products was chosen.
- Many centres are now showing the chosen product actually being used with the use of video.
- Some centres are not encouraging the candidates to show an image of the product in this section.
- The section relating to manufacturers needs is still the weakest area in this section. Points raised are often very generic.
- Some centres are allowing candidates to pick generic product areas like 'toothbrushes' but on the whole this section is very good. Many centres are showing the product in use.
- Analysing products that students had made, as part of GCSE coursework requirements, is not appropriate and should be discouraged.
- *Good range of products selected on the whole - still quite a few game controllers though!*
- *There is a lot of 'condensed' focus and analysis sections with everything lumped in together and no real discrete criteria.*
- *The application of 'product in use' videos has greatly improved the overall standard of work in this section.*

Strengths and weaknesses comparison (12) (2x A3/PP)

Candidates should be encouraged to analyse the strengths and weaknesses of a *product in comparison* with similar products. Good responses often include a conclusion or summary, which relates similar products back to the single selected named product. Weaker responses often include charts and tables populated with internet images with no identification of the strengths and weaknesses of the selected product. Candidates should be encouraged to show evidence of actually using a range of products, which are compared with the selected product. For marks in the top band the following should be addressed: function, suitability of materials and manufacturing processes, ergonomics, aesthetics and cost.

Ongoing comments from Moderators:

- Candidates are not comparing a range of products against the original. It is not obvious which is the better product.
- Limited conclusions drawn.
- Little evidence of the candidates actually experiencing the products.
- A 'hands on' approach to this section is required!
- (There is now good evidence that this is being adopted)
- Some centres introducing video to this section, which enhances the work.
- 'Old table' format still being used by some centres. Some candidates however had made these interactive by the embedding of videos in the charts. This is an excellent feature to be encouraged.
- Lower achieving candidates are still relying on internet images/information.
- *Answered well in most cases. Nice evidence of some candidates being more 'hands on' with their analysis of similar products using video clips.*
- *Many candidates not identifying S and W of chosen product before the standard 'comparison table'. Conclusions and relevant summaries are quite rare.*

Moral Implications (8) (1 x A3/PP)

Identify and analyse the moral implications associated with environmental, social and economic issues in the design and use of the product.

Moral implications should be considered in relation to the design and use of the product chosen for study:

The clear emphasis of this section is now on the moral implications associated with three specific issues. Centres need to prepare candidates for this by organising and structuring ethical debates about the environment, social cultures and economic issues. The term 'economical issues' should be avoided as it encourages a discussion of general cost issues, which is not what is intended. A far wider debate about the effects of the global economy and exploitation of workers is required. This section is poorly addressed in many cases and moderators often find this section to be over-assessed by centres. Marks in the top band are not awarded in many cases. Centres may wish to consider inviting staff from 'critical thinking' or business departments to facilitate discussions, or inviting in visiting speakers.

Ongoing comments from Moderators:

- Many centres are not presenting a good response to this section and are content to award marks in the middle band for average responses.
- There are still cases where centres award top band marks for 'middle band thinking'.
- It is the perception of many moderators that some centres are not actually targeting the top band.
- In some cases where top band marks are inappropriately awarded it can result in an adjustment to centres marks for the whole cohort for the unit.
- The ethical consideration of moral implications needs to be integrated into the AS course – it contributes to other areas of study.

- *Much improved – lots more detail in comments.*
- *Some centres using sustainability tools from ‘The Practical Action Green Book.’*
- *One centre used a video of a debate – candidates ‘reading from a script’ did not enhance this process.*
- *Evidence from one centre of interaction with their school business studies department, enhanced the ethical debate relating to the wider implications of the global economy.*
- *This section improves steadily, but still some centres not addressing the ‘economic issues’ which some still refer to as ‘economical’.*

Brief and specification for improving the product (8) (1 x A3/PP)

The design brief presented should relate to improving the single selected chosen product in some way. Centres should award marks in the lower bands where an improvement is not identified, or where the proposal is to redesign a complete product. Moderators still report that many candidates are still trying to improve too many aspects of their selected product.

- Proposals to redesign a complete new product should always be marked in the lower bands

Specifications need to be detailed and justified, resulting from the objective analysis of the original product. Where there is little or no justification centres should award marks in the lower bands. It can help if the justification for each specification point is clearly identified by using a different font size, style or colour- better candidates often use this technique, and it would help candidates in the middle and lower bands.

Ongoing comments from Moderators:

- The majority of candidates identified an improvement or in many cases a number of improvements (one will do).
- The specification was not drawn from the analysis of the original product.
- Many focused on ergonomic improvements.
- Colour code, italics and tables were used to good effect.
- This section, is generally marked accurately by centres.
- Still some instances of lower achieving candidates trying to redesign the whole product.
- *Most centres scored highly – nice to see detailed briefs again.*
- *Nb. Specifications tend to be detailed but ‘Briefs’ are invariably anything but brief, being very wordy and often imprecise.*

Development of improvement (56) (10 x A3/PP)

This section relies on the integration of three separate requirements for successful completion. There is a very large allocation of marks for this assessment criterion; this is deliberate as it was considered during the development of this unit that this is where the majority of candidates would choose to spend their time and energies. As there will be many different approaches to this section appropriate to different focus areas, it might be helpful to consider that the expectation in relation the notional guideline of 4 marks per hour means that candidates should devote 14 hours to this section.

56 marks is a very large allocation to accurately apportion in three mark bands and in the past many centres found this difficult. For the last three series OCR has provided a new CSF F522 form to make this task easier. The 56 marks have now been broken down into three sections as identified below. Additional advice is also given on the new CSF F522 form to award marks in different bands within each section. The new interactive mark sheet is available on the OCR web site. Please make sure this new form is used in the future as it enables marks to be appropriately awarded and cuts down clerical and addition errors. Please note that only the interactive form automatically adds up candidate marks.

The three sections:

Present a wide range of innovative/creative initial ideas, which demonstrate a high level of development using high quality annotated sketching, real time digital images and interactive dialogue. (14 marks)

The expectation here, for marks in the top band, is that a wide range of innovative/creative initial ideas are presented which demonstrate a high level of development using high quality annotated sketching. Simplistic sketches with little or no annotation should be awarded marks in the lower band. The expectation is that a specific improvement is developed; a few candidates try to re-design a whole product, and this is not the intention of this section.

Integrate this with real time evidence of a wide range of appropriate prototype models. (36 marks)

Moderators again reported some very high quality models were presented using a range of modelling materials. Many moderators however pointed out that some centres were concentrating on producing one high quality single prototype. This may produce a high quality outcome but will not access the full range of marks available for the development of a wide range of appropriate prototypes.

Evaluate ideas against the specification in real time and justify the choice of one idea worthy of being taken forward. (6 marks)

It is important that Candidates evaluate their ideas against the specification and clearly justify decisions made. Where little reference is made to the specification, centres should award marks in the lower band. No marks at all should be awarded where there is no reference to the specification. Centres should note that it is impossible for candidates to access these marks if the original specification is missing. Zero for the specification automatically results in zero for the evaluation against it.

Where candidates choose to annotate their ideas sheets, they must make it clear which specification points are being cross-referenced. Colour highlighting can help in this respect. Better candidates clearly rationalise the choice of one idea to be further developed. Interactive dialogue is mandatory in the development section, and this can be best addressed by ongoing evaluation, which seeks the views of others and then provides evidence of responding to points raised.

Ongoing comments from Moderators:

- For this specification, for all focus areas, there is a need for presenting innovative and creative ideas, which are annotated. This is required for an e-portfolio as well as A3 portfolios - many candidates re-submitting again this January did not provide sufficient well-annotated design sheets.
- In a small but significant number of submissions there was no evidence at all of any annotated design sketches; where no work is being presented, no marks should be awarded.
- The use of 'interactive dialogue' is mandatory in the development section – real time comments from third parties should be an essential feature.
- For this specification centres should encourage the use of ongoing evaluation on the candidate ideas sheets.
- Previous practice of tabulating responses to this section could still be relevant to the justification of an idea to be taken forward but should not be encouraged as the main mechanism for ongoing evaluation which is best provided in real time as ideas develop.
- 'We still need to see developed annotated sketching' – 'marking of this is too high.' 'Often marks are awarded in the top band for work of limited quality'.
- General standard of sketching is quite poor.
- A great deal of 2D sketching.
- Some evidence of on-going evaluation through annotation, video and audio.
- Good use of CAM modelling.

- Range of modelling materials used.
- Some good instances of centres integrating the modelling more and using it to develop the idea.
- Some very high quality models which enabled realistic testing to take place.
- Good quality photographic evidence in most centres.
- Table approach to evaluation used less and candidates are using other pupils to evaluate with the use of video.
- Significant number of good quality but single products produced, not a wide range.
- Centres scored better when candidates developed through their sketches.
- There should be a more exploratory route throughout this section - pretty sketching is one thing – proper development and experimentation is another.
- Still some centres awarding high marks for few models but more instances of integrated modelling/development from the better candidates.
- Many centres are still awarding high marks for terminal evaluation rather than ongoing. Students who constantly referenced their spec deserve the higher marks.
- *Still a limited use of interactive dialogue in many cases.*
- *Not many examples of high quality sketching.*
- *Still too many centres relying on a page or two of nice drawings – ‘then into models’. A backward step.*
- *Still need to focus on a more exploratory route throughout this section. Good sketches need to be combined with decent exploratory work.*
- *One centre made good use of CAM to produce final developments.*
- *Little evidence of terminal evaluation this time round but overall quality of ongoing evaluation was disappointing, with hardly any reference to the spec during development.*
- *Still a considerable number of presentations, which show little or no development from GCSE standard in design idea sketches.*
- *There is a tendency for candidates to use CAD drawings for this section, possibly masking the fact that the ability to sketch is underdeveloped.*
- *Some really good examples of modelling/prototyping using a variety of materials and techniques. It was good to see centres not entirely dependent on 3D printing, but using it as well as more traditional methods-current cycle times for 3D printing make it less than perfect for a quick model for development, and only really suitable for a final prototype.*
- *Ongoing evaluation is improving, but rarely includes third party comments, and often has no interactive dialogue - this is often a major reason for mark adjustments in this section.*
- *Where interactive dialogue is used there is a significant increase in the number of ‘other pupils’ being used to evaluate ideas.*

Testing of final developed idea (12) (2 x A3/PP)

There is no requirement to make a test rig, though candidates can if they want to (many candidates again produced test rigs in this series). Any appropriate method or system to formally test and evaluate the final developed idea will meet this requirement. Testing must be formally planned and implemented. Appropriate tests might include using a product or getting others to use it, wearing it or getting others to wear it or eating it or getting others to eat it. A scientific or technical test could also be appropriate for some focus areas. Whichever method is thought by the candidate to be appropriate, there must be formally presented results. The results should be presented in real time, clearly and concisely. Many candidates are still using customer surveys; some of these produced low level numerical data, which was of little value. Candidates should be encouraged to deepen the level of their analysis. It is worth emphasising again that real time evidence is required. Copying out neatly the responses of others is counter-productive - it could actually result in reduced marks if there was no real evidence of real people being involved. Presenting blank questionnaires in this section should be discouraged.

Ongoing comments from Moderators

Test rigs are still being produced rather than testing the final design. (These are still acceptable but should not be contrived)

- Testing of the product often involved a customer survey or a questionnaire, which produced low-level numeric data.
- Some excellent examples of testing by outside agencies related to the chosen product.
- Videos used well by centres using PowerPoint in this section.
- Centres should make candidates aware of the need to plan as well as carry out testing; this feature is often omitted and leads to moderation adjustments. In general if no planning is evident marks should not be awarded in the top band.
- Appropriate testing is open to interpretation but many centres are awarding marks for limited testing – a questionnaire to friends seems to be the order of the day for many. PM note – this is a growing and worrying trend where there is lack of formal planning and superficial data.
- *This section has a relatively high proportion of the total marks 10%, nearly equating to the whole of the marks for the creative ideas.*
- *Appropriate testing is open to interpretation and many centres are awarding high marks for what moderators consider to be inappropriate (very limited) testing.*
- *A questionnaire to friends seems to be the order of the day for many.*
- *A few more centres made use of video feedback from peers.*
- *Centres need to critically analyse what is appropriate for candidates working at this level - if simplistic questionnaires are rewarded with high marks, mark reductions are likely.*
- *Note from PM – there is only one thing worse than a simplistic questionnaire response – and that is a blank one. (Many candidates provide these).*
- *The ‘testing section’ can be a difficult one for candidates as some of the techniques used (videos and user testing), do not lend themselves to ‘formal’ presentation of results.*
- *There continues to be plenty of examples of ‘anonymous’ comments and questionnaires being given high marks.*
- *Testing should be ‘rigorous and objective’. This is particularly relevant to marks awarded in the high band. Many centres were informed of this again in this series.*
- *There is more evidence of testing being planned.*
- *Some centres are now moving away from more subjective testing with questionnaires to a more formal test using ‘test rigs’.*

Produce a summary of the results of the product development with detailed analysis of how the prototypes and final tests contributed to establishing the validity of the chosen idea.

Present one further improvement in detail. (8) (2 x A3/PP)

In addition to the presentation of the final test results, candidates should summarise the results of their prototyping and suggest one further possible improvement to the product. There are three distinct sections to this assessment criterion. For marks in the top band, all three areas need to be considered. Better candidates show a clear annotated sketch of a further improvement. Analysis of results is also a more complex matter than simply stating results in a table.

Ongoing comments from Moderators:

- Some candidates completed a separate section as a conclusion; others relied on the summary produced during the development section.
- Centres are awarding high marks in this section without candidates addressing all three aspects.
- Many centres are awarding marks just for the analysis of the testing - this section requires a broad look back at the whole process of development.
- *Evidence of the ‘summary of results’ section is often spread over the final 4-5 sheets/slides, making the actual ‘summary’ appear limited and not worthy of marks awarded. In some cases this section appeared to consist only of suggested improvements.*
- *This section has three distinct requirements which should all be present in a discrete summary section.*

Communication (8 marks)

Use a wide range of high quality text, graphical techniques, digital technology, and interactive dialogue as appropriate to present information. (8 marks All 20 A3 sheets/PP slides)

The use of ICT must be included in the range of communication techniques used in the presentation of the folder; an over-dependence on the use of ICT/CAD should however be avoided. A combination of different approaches is to be encouraged. Candidates should not over enhance the background of their ideas sheets if this impairs the clarity of presentation. Many moderators reported again that it is hard to read through some 'over decorative backgrounds'. Some candidates spend a disproportionate amount of time in enhancing the appearance of their pages, often at the expense of clarity. Candidates presenting on CD still need to provide evidence of annotated sketching. This assessment requirement is not met by scanning in a few small images amongst other computer-generated designs. Many candidates try to avoid this issue.

- For this specification the use of 'real time digital images ' is mandatory - they have to be used to record evidence of work as it actually happens.
- OCR is encouraging the use of short video clips, with sound bites (interactive dialogue) recorded as part of an e-portfolio on a CD.
- If the preferred option is to continue to use a paper portfolio, digital photographs must be used and interactive dialogue must be presented in alternative forms which show a positive response to the first-hand opinions of others. Overlay sheets could provide an opportunity for comment without affecting the quality of candidate presentation. Comments should not be retrospective and re-typing should be avoided.
- Communication in this specification relates to the whole product study.
- Candidates should not over-enhance the background of design sheets.
- The use of Arial 10 pt (min) should be encouraged for PowerPoint presentations – this is widely available and does not corrupt.
- Many whole centres submit the work of all of their candidates in a form, which cannot be accessed with the equipment, which most moderators use. It is absolutely essential that all individual CD's are trialled on an independent XP laptop to ensure that all video clips and sound files have been correctly transferred to the folder. Candidates should be discouraged from using files from IPod's, iTunes, and mobile phones if they are not compatible with a standard PP presentation. If candidates work will not run on a moderators computer many hours of effort could be completely wasted as the work might not be seen.
- OCR has measures in place to try to view non-standard files – this does however take up a disproportionate amount of time and success is not guaranteed.
- Additional steps should be taken for the next series to ensure that files produced by candidates using PP2010 can be viewed fully on a standard pre 2010 XP laptop.
- The overall ethos for this specification is based on 'real time recording 'of events as they actually happen. The expectation was that the majority of centres would submit projects as e-portfolios - this remains the preferred option. Many centres have retained an A3 format.

Ongoing comments from Moderators

- The vast majority of folders were well organised and matched the layout of the mark scheme.
- Many cases of imaginative use of digital technology and some interactive dialogue. Centres should be encouraged to use digital technology to enhance the quality of the candidates work.
- Centres should be encouraged to develop e-portfolios at the earliest opportunity.
- Candidates using PowerPoint are advised not to over-enhance their presentations as dynamic effects can detract from academic content.

- Some candidates are still spending a considerable amount of time detailing the manufacture of models- there are no marks for this.
- Many centres still appear to be using A3 paper folders.
- More accurately marked this year –centres are slowly appreciating the importance of interactive dialogue.
- *This series the majority of presentations were through e-portfolios.*
- *Marked fairly accurately again this year. Centres are slowly realising the importance of interactive dialogue, but only a few candidates go out of their way to highlight it in their folios.*
- *Some very large e-portfolios this series: 7-8 at 1.5 GB. Ridiculously huge file size meant waiting a considerable amount of time for certain folders to load (even on a Mac).*
- *One centre submitted 'Publisher files' – this is not the OCR preferred format.*
- *Communication was quite good in general with rather less of the ' PowerPoint' animation being seen.*
- *The standard of computer-generated portfolios was sometimes used to disguise weak content.*

Summary of Main features for Unit F522

- The ethos of the unit remains - A single specific named product is selected and shown in use - a detailed description of the product is given together with needs of manufacturer and consumer. Key criteria are identified. Throughout the study an identified improvement is developed, tested and evaluated.
- A 'real time' digital image of the selected product in use will be an essential feature.
- Products for analysis can be selected from any of 8 different focus areas:
- Built Environment and construction, Engineering, Food, Graphic Products, Manufacturing, Resistant Materials, Systems and Control, Textiles.
- Work can be presented on 20 sheets of A3 paper or CD ROM equivalent to current OCR approved standard. (currently PP)
- Please consult the OCR guidance notice to centres for submitting e-portfolios. In particular guidance on 'Pack and Go' or 'Package for CD' facility for PowerPoint. Videos will not work without this facility being used. This booklet stipulates acceptable formats and should be strictly observed.
- For the Product Study please do not over enhance backgrounds.
- Please use Arial font at least 10pt- this is widely available -can be read easily -does not corrupt.
- If video clips are used, 3-5 of no more than 20 seconds each would be appropriate. Make sure they work from an individual CD on an independent stand-alone laptop.
- A candidate must submit either an A3 paper folder **or** an individual CD **not** both.
- A centre can submit some candidates' work as A3 paper folders and some as CDs.
- Centre and candidate name and number must be on all paper and individual CDs.
- CD's must have full details on both the outside cover and written on the actual CD.
- Work must be recorded in real time and digital technologies must be used.
- The ideas section and modelling are linked in a section called 'Design Development'. The approach to this section will differ depending on the focus area studied by the candidate. The key thing is that the development is appropriate to the product and the focus area.
- For this specification prototype modelling should be fully integrated into the development of creative ideas and ongoing evaluation. Different focus areas should respond with an appropriate balance of prototyping, which suits the development of improvement for their selected product.
- Centres and candidates should note that creative /innovative ideas should be presented through a wide range of high quality annotated sketching. It is essential that this is represented in both A3 and CD based projects.
- It is important that all focus areas are responded to with presentation of an appropriate range of prototyped developments.
- One single 'final prototype' is not within the overall ethos of the specification.

- The requirement to make a test rig is no longer necessary. This has been replaced with the need to plan and implement an appropriate test on the final developed idea. It is, however, still possible to submit one if it is considered an appropriate test.
- Communication skills should include the use of digital technology. Interactive dialogue candidates who fail to use these techniques should be marked in the lower bands.
- Interactive dialogue involves discussing the selected product/comparative products/prototype development/ongoing evaluation and testing with others and responding to suggestions made. It could be used in other sections – many candidates use this feature to advantage in the moral implications section. In all cases, evidence of interaction should be recorded in real time with the active comments of those involved recorded first hand and not retrospectively. Re-typing of genuine first hand comments is totally counterproductive and should be avoided.
- For future series, it is absolutely essential that centres take steps to ensure that work produced by candidates using PP2010 can be viewed on a stand-alone XP laptop. *This cannot be assumed to be the case and should be actually checked for each candidate. (Saving using the 'Package for CD option' in PP2003 or 2007 should achieve a satisfactory result)*
- *As a backup only an additional folder can be submitted containing all videos used in the presentation (only one final copy of each)*
- *Serious consideration should be given by the centre to the file size of some presentations. Complex presentations, which take a long time to load, are counterproductive.*

F523 Design, Make and Evaluate

General Comments

A wide variety of coursework titles had been chosen that were appropriate to the requirements of the examination, giving opportunity for innovative and creative design solutions. There was considerable variation in complexity and demand, in terms of both designing and making. Whilst it was pleasing to see sensibly scaled projects on the whole, in some cases the overall complexity and sophistication of the projects as executed and the range and/or depth of skills involved in the design development, making and evaluating was insufficient for candidates to attain the marks awarded by the centre. In these cases, adjustments were necessary to bring the centre's assessments into line with the National standard. Projects that were simpler and more straightforward in nature were generally more successful when tackled from a commercial standpoint. Candidates with genuine clients or named contacts within their target market, and those with topics outside their own interests, tended to adopt a focused approach throughout and were able to access high marks.

A number of candidates had attempted 'architectural design' projects this series, and in many cases the work had been over-rewarded where candidates had not adequately satisfied sections of the Assessment Criteria when compared with standardising examples. If candidates choose to undertake projects of this nature, they should understand the difficulties and complexities involved, especially where a model is the final prototype product outcome. A guidance document for projects of this type is available on request from OCR.

Generic responses to the assessment criteria were common, where responses did not relate directly to the specific project and lacked the focus and relevant detail required at A2 level. Such work was often over-rewarded by centres, where marks in the lower bands were more appropriate.

In most cases there was limited reference to the commercial and marketing aspects of design and manufacture throughout the project, although it was pleasing to see the benefit of greater reference to the needs of a client or specific target audience.

In many cases it was evident that candidates allowed insufficient time to address the requirements of sections 5, 6 and 7 effectively. Responses often appeared rushed and were incomplete.

Skills in a wide range of ICT, CAD and CAM applications were seen, and some candidates presented a professional standard of work. A surprising number of candidates did not provide evidence of CAD, and centres should note that although this is no longer a specific named requirement in the Assessment Criteria, it often provides crucial evidence to support the award of higher marks. In some cases random 3D CAD images were included, but with little commentary to explain their value and how they had informed the design process. Some candidates relied heavily on CAM, including some 3D printing, and in some cases limited practical skills were evident beyond this.

The number of candidates submitting PowerPoint e-portfolios continues to increase. Some file sizes were excessive, and moderators frequently had to wait a considerable time for files to open. Scanned images were often too faint, and annotations difficult to read. In a minority of cases, very small font sizes made text in 'Slide Show' mode completely illegible, requiring moderators to zoom in to view the work in 'Normal View'.

A single PowerPoint file is OCR's approved format, although other files, including video clips, may be embedded or hyperlinked. Most candidates submitting e-portfolios took advantage of the opportunity to include short video clips and this did have a positive impact on the folder as a whole. It is important that centres check that the PowerPoint plus videos and linked files operate

on a stand-alone computer before sending e-portfolios to the moderator. For this unit, e-portfolios may be submitted on memory stick, and centres are permitted to burn all e-portfolios to one CD or DVD for moderation.

The process of moderation was often delayed due to late, incomplete or incorrect documentation, missing coursework, and damaged CD/DVDs. There were fewer addition errors where centres had utilised the interactive CSF form, although errors were found in the transcription of marks to the MS1. A large number of portfolios lacked clear identification.

Comments on Individual Sections

1 DESIGN BRIEF 3 marks

Present a design brief for a marketable product

Four key areas need to be addressed in this section for maximum marks to be possible:

- Details of the CLIENT and the CONTEXT – the target market / client, the situation, the problems, the need...
- A clear and precise BRIEF - what the candidate will be designing, making and evaluating.
- Clear reference to MARKETING - the important aspects of design and manufacture if the product is to be marketable.
- Reference to KEY ISSUES that will be important during the designing.

The marking of this section tended to be lenient when compared to the assessment criteria, where one or more of the key elements had not been targeted. The majority of candidates attained the middle mark band.

Overall, responses had improved in this section, with a common shortcoming being the misunderstanding of the 'marketing' aspect. Many candidates explained how the product would be marketed rather than explaining the features and qualities the product would need to ensure that it was an item people would want to purchase.

Design briefs were often too broad, for example 'An Educational Toy'. Candidates with a specific brief and a clear direction from direct contact with their client or target market were usually able to proceed positively and conduct relevant, detailed and focussed research in Section 2.

2 INFORMATION, INSPIRATION and INFLUENCES 9 marks

Obtain information relevant to the design of the product

Present a range of evidence to show the sources of inspiration and influences on the designing

The best responses in this section consisted of focused, detailed, and relevant research that included plenty of first hand information and experiences. High marks were frequently given when there was no primary research or 'personal-contact' investigation, and little inspiration derived from the evidence.

Quantity is not a substitute for quality. Large amounts of 'generic' or 'standard' research were presented by many candidates (for example 'anthropometric data', materials information) without any analysis that related it to the project. Mood boards with no annotation or text showing the relevance and benefit gained from the images selected were common.

These factors resulted in centres' marks being lenient in many cases in this section. For marks to enter the top mark band (7-9 marks) there must be clear evidence of:

- personal contact (person to person, not via email or letter etc.) with a client or representation of the target market

AND/OR

- personal contact with existing / similar products (the actual products - not internet images, photograph, etc.).

Similarly, relevant quantitative and technical data such as measurements, capacities, weights, and timings, are necessary if high marks are to be awarded.

3 DESIGN SPECIFICATION 3 marks

Produce a design specification for the product

Candidates' responses in this section mostly fitted the descriptor for the middle assessment box, with few candidates scoring full marks. Centres assessments in this section tended to be lenient when compared to the assessment criteria.

Design Specifications were usually well-structured with appropriate headings. However, many candidates tended to produce a lengthy list of generic points that were vague and based on their own thoughts and feelings rather than the analysis of their research.

A minority included specific performance targets that would be useful when evaluating and testing their designs and products. Unsupported and generic statements such as 'must be safe', 'must last a long time', 'must be easy to use', 'must be aesthetically pleasing' were widely included, but of little value.

For the highest mark to be awarded in this section, candidates must state detailed requirements by reference to specific aspects of the product, including technical, numerical, measurable targets. This should include sizes (e.g. maximum or minimum / range of adjustments, positions), capacities, weights, quantities, nutritional values, costs/budgets, performance, life span, and features required, wherever possible.

4a DESIGN, DESIGN DEVELOPMENT and MAKING 57 marks

Demonstrate competence in the design, design development and making of the product, to include the following package of evidence:

- **the generation and exploration of design possibilities**
- **the use of digital technologies**
- **experimenting and modelling**
- **the refining and defining of a final design through ongoing evaluation, and**
- **the planning and making of the product**

The package of evidence presented by candidates in this section should include all five key areas listed above.

The level of 'intellectual demand' and 'design thinking' involved in the designing and making varied considerably, and centres are reminded that this must be reflected in the marks awarded. Centre marking was often lenient where there was insufficient depth, difficulty and sophistication involved to warrant the marks awarded. A simpler project will need to be carried out in considerably greater depth to achieve the same marks as a more complex project.

In general, candidates displayed an integrated approach to designing, with freehand sketches, 2D and 3D modelling including computer modelling and evaluative commentary used to communicate design thinking and a progression of design.

- **the generation and exploration of design possibilities**

Most candidates were able to produce a range of initial design possibilities and concept ideas. Innovative and creative thinking from a broad perspective was evident from a good number of candidates, with a good number of fluent and open-minded approaches which were a pleasure to moderate. Some responses, however, showed little innovation or meaningful exploration of alternatives and were based on standard, readily available designs. Moderators reported poor quality sketching and untidy presentation being awarded very high marks by centres in some cases.

Candidates would benefit from greater consideration of the technical aspects of their designs. It is important that candidates show genuine progression from initial concepts through to final solution - in a significant number of cases a more thorough development phase (to expand and confirm design detailing) was needed rather than a huge jump from a chosen design concept to final chosen product.

An increasing number of candidates are reflecting commercial practice by including marketing aspects in their design thinking from the start, incorporating features relating to lifestyle and fashion, product identity and branding, styling and logos. Also a consideration of aspects such as adaptability, compactness, eases of use, maintenance, and standardisation of components. Both the product designs and, consequently, the marks that could be awarded were enhanced by such approaches.

- **the use of digital technologies**

Digital technology such as photography, scanning, CAD, and videos were widely used. CAM was often used in the modelling and making processes, with candidates usually presenting appropriate evidence to support centre assessments. The use of digital technology by some candidates was of a professional standard, but the quality of photographic images was less creditable in some cases. Moderators reported excellent use of CAD programs such as SolidWorks, and it was also pleasing to see SketchUp and similar CAD software being used as a development tool in addition to being used to visualise a final idea.

- **experimenting and modeling**

It was always very clear when modeling had been an integrated and valuable part of the design process. For some candidates, it was clearly an enjoyable and informative part of their designing.

Candidates used experiments, trials, visualisations and simulations to test design possibilities, to explore different concepts and design details, and to aid the development and refinement of their designs. A strong influence from the Advanced Innovation Challenge Unit at AS level was evident in some cases. An increasing number of centres had made use of full-scale modeling to determine ergonomic suitability.

To raise attainment, candidates are encouraged to further expand their design development through modelling and experimenting. The benefits of using modeling and trials as a means to explore and develop ideas, and to obtain helpful client feedback, cannot be overstated.

- **the refining and defining of a final design through ongoing evaluation**

In general, centres' assessments in this strand of Section 4a were lenient compared to the assessment criteria. Greater attention to technical aspects in the refining and defining stage of design development is needed to support centres' marks. Details of dimensions,

materials, construction, ingredients, components, and fittings, are crucial to access higher marks.

The majority of candidates did not fully define their final solution before making their final prototype. The use of suitable CAD software to produce a clear definition of the final design solution is a reasonable expectation at this level. A surprising number of candidates produced hand-drawn working drawings, and in most cases this led to a mark that was lower than would have been the case if produced using CAD.

The quality of ongoing evaluation varied considerably. Some candidates make good use of 'target market' contacts to obtain ongoing feedback whilst designing. This was most often at the end of 'initial ideas' but was relatively unusual during the further development, thus the 'refining' stage lacked the input from potential users that would be considered essential by professional designers.

Annotation of design possibilities was often descriptive, with features being labelled rather than being evaluated against the key requirements in the Design Specification. Formal charts entitled 'Evaluation of ideas against the Specification' were common, and these were less effective than spontaneous annotation added in 'real time' around design sketches, CAD images, and photographs of models.

- **the planning and making of the product**

Most candidates included some evidence of 'planning' but this was often more of a retrospective log or diary of making where the 'planning' was a record of what happened. Responses were sometimes very superficial, including material of limited value, and elements such as: 'Mark the material using a pencil and ruler', 'Go to the machine', and 'Use the knife carefully to cut the material'. The identification of the major stages of the making, to show that a logical process and priorities have been established in advance, is the key requirement.

There was a large variation in the level of demand of the making tasks involved in the production of the final outcome, with an increasing number of candidates including CAM, including 3D printing.

It is crucial that the level of difficulty and complexity involved is reflected in the award of marks for this strand. High marks were often awarded to well-finished but undemanding products, and in general, centre marking tended to be lenient for this aspect.

Along with clear photographs of modeling and experimentation, and evidence to authenticate contact with the client and target market throughout the project, centres are requested to ensure that clear overall and close-up photographs of key aspects of the making and the final outcome are provided.

4b INNOVATION 15 marks

Show innovation

Moderators were able to support centres' assessments in the majority of cases. In a few cases, centres had awarded a mark in the top mark band, alongside marks in lower bands in most other sections of this unit. Although this is not an impossible scenario, only in rare cases might high marks be justified in this section alongside much lower marks in other sections. Marks are normally expected to be '*proportionate*' to marks in other sections. An assessment of the innovation shown will be influenced by the overall complexity, challenge, and level of difficulty involved in the project as a whole.

A few centres had prompted candidates to produce specific information about how and where they had shown innovation, and to point specifically to evidence in the folder. This

approach is encouraged as a positive means of supporting the centre's mark in this section rather than assuming that the innovation is implicit.

5 TESTING and INDEPENDENT EVALUATION of the FINAL PRODUCT 9 marks

Show evidence of the testing of the final product against the specification

Identify and state strengths and weaknesses in the product

Respond to independent evaluation

There are three clear requirements for candidates' responses if they are to satisfy the assessment objective:

- TESTING to the Specification
- STRENGTHS and WEAKNESSES
- INDEPENDENT EVALUATION

For the highest mark to be awarded, all three elements need to be covered thoroughly and in depth. In many cases the moderator was unable to confirm high marks awarded by the centre where candidates had not clearly addressed all three requirements.

Centres assessments in this section tended to be lenient when compared with the National standard moderators are working to, with the most common shortcomings being:

- Evaluation against the specification conducted subjectively by the candidate without meaningful and rigorous testing in the intended situation or context.
- Client feedback not arranged
- Technical and numerical detail missing from the identified strengths and weaknesses.
- Independent evaluation arranged with the candidate's peers or teachers rather than genuinely independent representatives of the target market or experts in the relevant field.
- Lack of clear authenticity / direct contact with independent others
- Photographic and video evidence not corroborating highly optimistic comments recorded by candidates, clients or 'independent' assessors.

Aspects completed successfully this series included suggested modifications to the prototype product as a response to testing and evaluation. Responses included some excellent drawings and CAD images of proposed improvements. These were sometimes misplaced in Section 7, which refers to the future developments of the product in a wider more commercial market.

6 MARKETING PRESENTATION 15 marks

Using appropriate techniques create a marketing presentation suitable for the final product

Many candidates were unable to spend sufficient time on the analytical and strategic planning requirement for the marketing of their product and spent their time on a 'worked through example'. In some cases, the choice of media for the advertisement was inappropriate for the product, and this made it difficult for moderators to support the marks awarded by the centre. Simply pasting an image of a prototype product to fit onto a screen-shot of a website or image of a bus shelter or shop display is of limited value unless supported by further details of the placement.

It was evident that the teaching of the principles of marketing is being given a higher priority in centres. However, in many cases candidates did not show consideration of the basic aspects of product distribution, selling, and promotion.

A few candidates included videos of themselves giving a presentation to groups of students and staff, and this proved effective as part of their consideration of the many and varied aspects of marketing.

The majority of responses warranted marks in the middle assessment band. For marks in the highest mark band to be awarded, a thorough, in depth coverage of all key aspects is needed, including designs for promotional materials such as posters, leaflets, advertisements, presentations, and websites. Responses covering a more limited range of aspects in depth, or a wider range in less depth, should be given marks in the middle mark band.

Specific marketing aspects needing consideration in this section include:

- The 'Unique Selling Proposition' (USP)
- The '4 P's of Marketing' – Product, Price, Place, and Promotion
- Suitable media for the promotion of the product
- Product identity and branding
- A product 'logo' or trademark
- Packaging - the presentation and protection of the product.

7 REVIEW and REFLECTION 9 marks

Review and reflect on the effectiveness of the designing and making process that led to the final product

Consider the possible wider implications and impact of the product, including possible future developments

There are three clear requirements for candidates' responses if they are to satisfy the assessment objective:

- REVIEW and REFLECT
- WIDER IMPACT
- FUTURE DEVELOPMENTS

For the highest mark to be awarded, all three elements need to be covered thoroughly and in depth. In many cases the moderator was unable to confirm high marks awarded by the centre where candidates had not clearly addressed all three requirements. Centre assessments in this section tended to be too lenient.

Consideration of the wider implications and impact of the product was often generalised rather than specific to include how the product would be manufactured if commercially available at an appropriate scale of production. Few candidates mentioned aspects such as energy and consumption of resources such as water in sufficient relevant and specific detail to support high marks.

Specific considerations in this section include:

- An insight into the process of designing and making
- Honest comments about the learning that has taken place.
- Use of Life-Cycle Analysis (LCA) to evaluate the wider impact of the product.
- Moral, ethical, and sustainability issues, together with economic and manufacturing issues.
- The likely success of the product in the market-place.
- Developments relating to potential industrial and commercial production (diagrams).
- Future developments including quality improvement or design variations (diagrams).

An original idea seen in a few candidates' 'future developments' section was the possibility of 'Apps' for use on smart phones, enabling items such as recipe cards or additional features for teaching aids to be downloaded.

F524/01 Product Design Component 1

General Comments

The most popular question was Question 6: Resistant Materials followed by Question 4: Graphic Products. There were equal numbers of candidates attempting Q5: Manufacturing and Question 8: Textiles. Whilst there was an increase in the number of candidates attempting Question 1: Built Environment and Construction and Question 3: Food, there was a significant drop in the number of candidates attempting Question 2: Engineering and Question 7: Systems and Control.

Whilst the vast majority of candidates fully complied with the rubric, a small number attempted more than one question. This should be discouraged as the quality and detail of the response for this paper would be limited and it would restrict the amount of time that they spend on the F524/02 paper. This consequently impacts upon the overall mark.

Parts (a), (b), (c), (d) and (f) are common across all questions.

Part (a) was generally answered well with most candidates giving at least two design requirements for the given product. Candidates achieving full marks proposed appropriate design requirements, fully justifying each one.

Part (b) Many candidates were able to describe two appropriate quality control checks for the stated product. Many correctly described visual checks although a clear description of the check was required to access full marks. A significant number of candidates incorrectly referred to checks such as material testing, that would be carried out prior to manufacture.

Part (c) was answered particularly well. Candidates demonstrated a very good understanding of sustainability issues and responses were varied. Many responses concentrated on recycling; using recycled materials or ensuring that the product had an extended life cycle and would be easily recycled at the end of its useful life.

Part (d) was well answered. Candidates demonstrated a clear understanding of JIT manufacture and most were able to explain two valid benefits. Storage issues and the reduction of waste through manufacturing to order were the most common correct responses. A number of general responses relating to 'quicker' and 'better quality' with no reference to JIT were seen and did not access the full mark range.

Part (e) assesses specific material content from the focus area.

Most candidates answered (e) (i) well, stating an appropriate specific material example with appropriate properties or performance characteristics given. A number of candidates however proposed unsuitable materials for the stated product/part. This was particularly evident in Question 6: Resistant Materials.

For part (e) (ii), most questions include the instruction for candidates to 'Use a flowchart and/or annotated diagrams to support your answer'.

In most cases, candidates made the decision to use annotated diagrams to ensure that they include sufficient detail to access higher marks. Some candidates produced very detailed and full flowcharts, which included the same level of technical detail. A significant number of candidates however produced a flowchart with very limited detail to describe the given process, and consequently did not access the higher mark range.

There were a wide and varied range of appropriate and feasible manufacturing methods proposed for part (e) (ii). For all questions, there are a number of acceptable methods of manufacture, taking into account factors such as the function of the product and batch size. Whilst most candidates responded with appropriate methods of manufacture, a significant number described processes that were only remotely feasible and were awarded some credit, such as injection moulding the sides of the truck in Question 6: Resistant Materials. Some candidates answering Question 8: Textiles, incorrectly described the manufacture of the shirt, not how the linen fabric would be manufactured from raw materials.

Part (f) is a 'discuss' question. Candidates were generally well-prepared to raise and explain a range of issues and include supporting evidence or examples. There were a wide range of responses to part (f), with a number of candidates achieving very high marks.

Most candidates presented well-constructed discussions, raising two or three issues relating to the implications to the manufacturer of ensuring that products are safe to use. Many included details of the cost implications of introducing quality control and testing systems and the implications of legal claims and damage to reputation.

Whilst many candidates presented clear, cogent and well-structured responses, some candidates produced a list of bullet points that could not access the higher mark ranges.

A number of candidates missed out on achieving full marks by not including additional evidence or specific detail/examples to support their answer.

Further comments related to parts (e) and (f) are referred to in the Comments on Individual Questions section of this report.

Comments on Individual Questions

Question 1 Built Environment and Construction

A few candidates attempted this question. Some responses were fully detailed, demonstrating a sound understanding of external wall construction. A number of candidates attempted this question with very little knowledge of construction materials and methods and consequently did not access the full mark range.

Question 2 Engineering

Few candidates attempted this question. Responses were mostly very detailed with candidates identifying appropriate materials and clearly describing the stages of manufacture of the mounting bracket.

Question 3 Food

A number of candidates made successful attempts at this question. Most candidates stated an appropriate ingredient of the sponge cake layer and gave appropriate properties. Part (e) (ii) was generally well-answered, although some did not take into account the scale of production.

Question 4 Graphic Products

This was the second most popular question. For (e) (i) a number of candidates correctly provided specific details of the material to be used for the sign. The most common responses were Corriflute or Correx.

Whilst there were a number of very good answers to (e) (ii), a significant number proposed inappropriate printing methods for a batch of 150 signs. Most candidates correctly described screen-printing; credit was awarded to candidates who described knowledge of other printing techniques that were remotely feasible.

The best responses made good use of annotated diagrams, in some cases as part of a flow chart, to describe fully the printing process.

Question 5 Manufacturing

A number of candidates attempted this question. For part (e) (i), almost all identified a suitable material with appropriate properties for the support rail.

There were some very detailed responses to (e) (ii). Candidates produced flow charts (including appropriate sketches) of the sequence of manufacture of the support rail. Most correctly described extrusion, cropping to length, slot punching and finishing.

Question 6 Resistant Materials

This was the most popular question with a very wide range of responses.

Most candidates selected the 18mm thick side or the 1mm thick grill. A few candidates selected the wheel.

For (e) (i), most candidates proposed MDF or plywood for the 18mm thick side, giving valid reasons for selection.

Aluminium, acrylic and HIPS were the most common acceptable responses for the grill. ABS, Nylon and MDF were the most common acceptable materials for the wheel.

For (e) (ii), most candidates correctly described CNC routing for the 18mm thick side. A number of candidates incorrectly proposed injection-moulded acrylic for the side. The wheel was the most obvious part for injection moulding as a batch of 2500 because of the simplicity of the mould required, however, most candidates described turning on a CNC lathe as a method of manufacturing the wheel, which was awarded full credit.

Most candidates correctly described laser cutting as a method of manufacturing the 1mm thick grill. Candidates demonstrated a broad understanding of the laser cutting process. Those candidates, who included details such as the tessellation of shapes using CAD to maximize production setting up the laser through auto-focus or other appropriate method, accessed the full mark range.

Question 7 Systems and Control

There was a very limited response to this question. Most candidates gave four justified design requirements for the scales. A strain gauge and variable resistor were the most common correct response for a sensor to be used in the scales to measure weight for part (e) (i).

Answers to (e) (ii) were generally detailed. Candidates produced appropriate labelled circuit diagrams to show how the signal from the sensor could be displayed on the scales.

Question 8 Textiles

Most candidates gave at least two acceptable justified design requirements for the shirt. Some responses were too generic and did not receive credit. Almost all candidates gave three appropriate performance characteristics of linen fibres that made it suitable fabric for the shirt for part (e) (i). There was a range of responses to part (e) (ii). Some candidates used well-annotated diagrams to correctly describe the stages of the manufacture of linen fabric from raw material. A significant number of candidates misread the question and described the manufacture of the shirt and did not access the full mark range.

F524/02 Product Design Component 2

Reference should be made to the published generic mark scheme for this unit when reading this report.

It would help examiners if centres encouraged candidates to circle the question number attempted on the first answer sheet and to write their name and candidate number on each answer sheet.

Comments on each of the marking criteria:

Specification Points (S):

Candidates are asked to write three specification points. To be awarded full marks each point must be directly relevant to the brief and justified in relation to the function of the product, the potential user or the manufacturer of the product. It is disappointing that many candidates continue to find this very difficult as all prior units in the qualification will have provided experience of writing detailed specification points.

The best responses reflect on how the product will be used by the target market and what specific functions will be necessary to make the product fit for purpose.

Many candidates continue to miss out on marks in this section by failing to show empathy with the needs of the user and simply repeat information given in the question or make generic points relating to issues such as the need to be cost effective, aesthetically appealing or ergonomically suitable. Factors such as these are relevant to *all* products, so to be given credit in this section they must be carefully justified indicating more specifically how each would influence the design of the product.

It is essential that key functional aspects of the product are identified when writing specification points and all points should be over and above the basic outline for the product set out in the question.

The remaining assessment headings draw on the experiences from units F521, F522 and F523 to generate and present a range of design ideas and to consider practical details of material choice and construction techniques. Examiners understand that the limited amount of time available for candidates to complete the paper will not allow them to include the same level of detail seen in the coursework units, nevertheless we do expect to see evidence of design thinking; the balancing of creative and functional demands, and consideration of the wide range of factors which may affect the success of the product in a commercial market.

Range of Ideas (R):

To achieve high marks in this section there are two complementary demands: first, to produce a number of **different** concept solutions to the design brief set in the question; second, to develop each concept to show details of possible alternatives and to consider how modifications could better suit the needs of user and manufacturer. Particular credit is given for innovative ideas which show an original approach to the design brief.

The majority of candidates performed quite well in the first of these demands but many did not reach the higher marks because they showed little if any evidence of development beyond the initial concept. In a few cases ideas presented were unrealistic with little prospect of fulfilling the design brief. High marks cannot be awarded for ideas which are completely unsuitable, with little or no prospect of satisfying the set brief even if a suitable number of different ideas are provided.

Technical Detail (D):

Assessment of this criterion was based on three strands:

- consideration of methods of construction, assembly or manufacture
- understanding of suitable materials, components, or ingredients
- details of dimensions or quantities.

At this level candidates are expected to have detailed knowledge of materials and components, and how these are used to construct, assemble and manufacture commercial products from their focus area. In this unit they are expected to be able to relate this knowledge to their own design proposals.

The more successful candidates showed good subject knowledge by offering realistic options for construction and justified choices of materials by reference to their properties and performance. In some cases, suggestions for construction and materials were inappropriate whilst a significant number of candidates made no reference to specific materials or construction details at all. No credit can be given for generic terms such as 'wood', 'metal', 'plastic' or 'card'. A significant number of candidates drew detailed diagrams of manufacturing processes. This is unnecessary and no additional credit can be given for these diagrams.

In most cases, dimensional detail was somewhat lacking with only overall sizes given. For full credit in this area at least some more detailed dimensions must be given, for example thicknesses of material or sizes of standard components which would be used to produce the product.

Evaluation of ideas with reference to specification and volume production (E):

This was done well by some candidates who considered how the product would be used and manufactured and drew attention to both positive and negative aspects of their designs.

Unfortunately, in many cases comments were summative rather than evaluative becoming simple statements that did not show any evidence of balance in value judgement.

A few candidates used summary tables to evaluate their ideas, often with simple ticks or crosses, or scores out of ten to show success or failure. This should be discouraged because it does not allow the candidate to show the depth of thought necessary for high marks at this level.

Final Developed Outcome (F):

This section has improved significantly over the last few series with most candidates showing a complete final idea with specific features identified. A significant number of candidates produce detailed final evaluations, sometimes with a summary of strengths and weaknesses for the product. This is not necessary to achieve high marks and it is clear that some candidates must spend a considerable amount of time on this final sheet.

Communication (C):

The mark awarded for communication is based on a combination of factors:

- The overall clarity of presentation evident in the layout of the three design sheets of the paper.
- The range and quality of graphical skills evident.
- The use of clear annotation which communicates the quality of the candidate's design thinking.

There seems to be a growing trend for candidates to use lengthy descriptive text throughout the paper. This is often very difficult to decipher and is not an effective way to communicate design thinking. When preparing for this unit it is important that candidates practice the use of a range

of graphical techniques (for example 2D, 3D sketching, cross sections, exploded views) and the appropriate use of these to show construction and assembly detail.

Techniques of annotation (for example using arrows to connect comments to specific points) avoiding long passages of text would also help candidates communicate speedily and effectively.

The best responses show impressive skill, managing to communicate broad concepts whilst also including useful detailed sketches and informative notes on clear, attractive sheets.

Comments on individual questions:

Candidates are free to choose from any of the set questions regardless of the focus area they have studied or the question answered in part one of the unit. It is clear that many candidates take advantage of this freedom but in some cases, where the question answered requires knowledge of specialist materials and construction, the outcome is less than satisfactory.

Question One: Built environment and construction focus

This question asked candidates to design a porch for a modern house. Relatively few attempts were seen and all were by candidates who appeared to be working outside their focus area with, consequently, little understanding of appropriate materials and construction techniques.

Question Two: Engineering focus

This question asked candidates to design a folding workbench to be located in a household garage and was generally answered well. Candidates engaged with the needs of the client, clearly understanding the practical requirements of the product and bringing prior knowledge of existing products which fold and/or collapse to kick start their designs. A good understanding of materials and construction was shown by most candidates.

Question Three: Food focus

There were relatively few attempts at this question, which asked for a design for a dish to be served as part of a celebratory meal. Each year candidates, who appear to have no experience of food as their focus area, attempt to answer the food focus question. This is always ill advised because they do not have sufficient understanding of the technical issues of nutrition and food preparation necessary to be successful at this level.

Question Four: Graphic products focus

This was a popular question. It asked candidates to design a product to contain a packed lunch for hotel guests. A requirement specified in the question was that the container must be flat pack, with the expectation that candidates who have studied graphic products would be familiar with typical constructions to achieve this common function. Candidates were free to decide whether the pack would be disposable or re-useable. Candidates who scored high marks considered the need to separate different types of food and drinks and the needs of the customer when eating on the move. Some candidates struggled to show any originality in the designs with many offering minimal variations on simple boxes and / or bags with a hotel logo.

Question Five: Manufacturing focus

This was a popular question asking candidates to design an activity table for children aged 2-5 which included suitable games or activities. Good solutions considered practical requirements, such as storage of game pieces, and more educational requirements such as the need for youngsters to develop social skills at this stage in their development. Some candidates limited the marks they could achieve by focussing entirely on the design of the games and activities without any consideration of the design of the table.

Question Six: Resistant materials focus

This was a popular question in which candidates were asked to design an item for a music garden for a secondary school. Some interesting solutions were proposed, mostly based on

percussion, stringed or wind instruments, although many candidates limited their range of ideas to just one of these concepts. The best solutions showed innovative thinking to incorporate one or more principles of music making in a form that would readily engage secondary pupils. Some candidates struggled with the concept of a 'music garden' and produced designs which were either a conventional instrument made immobile in some way, or a natural form found in a garden (usually a tree) with some element of a conventional instrument attached. A significant number of students confined their thinking to electronic devices based on mp3 players with aesthetic excitement provided by LED displays.

Question Seven: Systems and control focus

Relatively few responses were seen to this question which asked candidates to design an innovative kitchen timer. Most solutions focussed on the overall concept and form of the product with very few showing details of the technology which would be required to implement the functionality. In some cases there was sufficient detail in the work presented in terms of range of ideas, materials and construction to award high marks despite the clear gaps in the full definition of the design of the product.

Question Eight: Textiles focus

This was a popular question, asking candidates to design a bag for picnics and outings for families. Candidates clearly related to the focus of the question and most considered the practical requirements of the product in suitable depth. Better responses showed impressive knowledge of materials and construction detail.

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