

GCE

Design & Technology

Advanced GCE **A2 H453**

Advanced Subsidiary GCE **AS H053**

OCR Report to Centres June 2014

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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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 are not to write in it.

Answers must be completed in the booklets provided, 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. Additional supplementary sheets should be avoided if possible and additional paper of any kind should not be stuck into the challenge booklet. Where ‘non examination board’ paper is stuck into the challenge booklet it will not be marked. The front of the challenge paper indicates that additional paper will not be marked. It is expected that inspirational materials, e.g. photographs of existing products care stuck into the booklet to aid designing; this material is brought in as part of the job bag. Candidates are not allowed to 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, who is not the teacher, should be present. The teacher is there to read the instructions.

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 approached the challenge with pre-conceived ideas and failed to respond directly and creatively to the design challenges. A few candidates misinterpreted challenges, either because they did not read them with sufficient care or because they chose to base their work on practiced work to previous design challenges.

The themes for the examination deliberately give little opportunity to prepare specification points or ideas in advance of the examination to prevent over-preparation of candidates. Each challenge has **two specific key areas** that candidates will need to address fully with fresh innovative thinking to respond to the challenge.

It is the centres 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 will hamper design thinking. There is still evidence of candidates bringing in their own modelling materials despite this advice being published previously.

A ‘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 presenting candidates' work. These problems include; failing to focus on the object, photographs being printed at a size too large for the allocated positions within the workbook. Photographs must be stuck into the correct boxes in the booklet, a small number of candidates stuck photographs of existing products in place of where the pictures of the models should be. It is important that the Centre provides colour images of a good quality

Centres are reminded that three photographs is the minimum required, although 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 session 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 and the reflection paper continue to discriminate well between candidates. They are testing higher order thinking skills and these areas should be taught throughout the AS course.

Comments on Individual Questions:

The Challenge Assignment

Comments on Individual Challenges

Challenge 1

Security of personal belongings – this was a popular challenge and responses were generally creative. There were some predictable solutions e.g. locking briefcase or handbag. The 'easy access' element gave candidates an opportunity for innovative thinking, many candidate used new technology or smart materials.

Challenge 2

Exerciser. This was a reasonably popular challenge that produced some creative solutions, that were practical and used a variety of mechanisms.

Challenge 3

There were a number of candidates that chose to tackle the Food pack from a graphic products perspective. There were some creative solutions showing a good knowledge of nutrition. Most candidates also managed to produce a model of the packaging.

Challenge 4

Litter disposal, this was a popular challenge and was generally approached from a RM or textiles perspective. There was a variety of extremely innovative solutions with candidates having to

consider a range of issues including ergonomics, anthropometric, sustainability and hygiene. It seemed to give the most scope for creative thinking.

Challenge 5

Portable seating with additional function. This proved to be a popular challenge with some highly creative solutions. A number of candidates lost sight of the need for an additional feature or that the product needed to be portable. A significant minority of candidates lost marks by missing a key aspect of the challenge.

Challenge 6

Activity pack for Children – this was a reasonably popular challenge with students approaching the task from a variety of different approaches. Some creative solutions were seen that were suitable for use in a car or on a bus/train trip.

Comments on Challenge

Initial Thoughts

Candidates used a combination of text and drawings to explore the challenges and identified possible design areas/problems. Some candidates failed to think creatively about the challenge or context and suggested only very predictable responses. Many candidates explored ideas in depth; thinking creatively, whilst considering the indoor or outdoor environment, users and space they were designing for. A number of candidates did not fully engage with the challenges set, missing one or both of the two key points and so lost marks in this first section. Many candidates covered only one of the two key points in this section with candidates becoming focused very quickly on the one point. 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.

Specification

The more successful responses were where candidates concentrate on the functional and user needs of the product in the design situation and ensure that the relevance of all points are explained. Generic specification points cannot be awarded marks. Candidates should 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 lacking justification for the points given made it hard for candidates to access the top mark band.

Ideas

This section has seen an encouraging improvement and candidates are sketching a good range of ideas. The quality of annotation seen was generally very good, with relevant notes relating to the specification and construction & material details.

Initial ideas on the whole were creative, with some excellent examples of innovative thinking. Higher performing candidates produced a range of functionally different ideas that clearly related to their specification, situation and the potential users. It was encouraging that fewer candidates just presented one idea in this section compared to previous sessions.

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 included specific detail of materials and manufacture/constructional techniques. This is an area that still needs developing, many

candidates do not include details of specific materials and manufacturing techniques that could be used for the product.

An improvement was seen in the evaluation section this session with good evaluative annotation in the designing section. Where evaluations were weaker, candidates had not explained why they took the idea forward and why others were rejected. Sometimes strengths of ideas were discussed with no mention of disadvantages.

Reference to sources 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. In a few cases candidates had just collected modelling materials for their job bags, this can hamper design thinking and should be avoided.

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.

Development of Ideas

There has also been some improvement in this section, most candidates 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.

Again only the most able candidates suggested specific materials and very few considered methods of manufacture for their developed idea. Materials were often 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 by the more able candidates.

Candidates should be advised against modelling extensively at this stage of the challenge. Usually this is not successful because there is insufficient time in which to consider the practicalities of the real product.

Plan for Modelling

Action plans were mixed, often these were very general and referred to 'cutting out all pieces from the materials' and similar vague statements. The best candidates 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 – this is mainly due to two reasons; models that do not fully reflect the developed idea and poor reflection and recording sections.

Some candidates gave only brief statements in their progress reports with no real detail to show examiners what modifications/amendments or successes have been made. Candidates that 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.

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).

There were some excellent examples of models – however, some candidates are still using inappropriate materials, hindering the success of the final model. 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). The use of skills section cannot be highly marked if candidates have just stuck together collected items to form a model.

Evaluation

Some improvement was seen this session 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 fail to record further modifications in sufficient detail and some don't indicate any possible weaknesses of their product. A very small number of candidates talked about their model and not the product so failed to score any marks.

The best responses clearly evaluate against the specification, provide strengths and weaknesses and realistic improvements with sketches. This is still however one of the weaker areas in most candidates responses. Again, only the most able candidates evaluated their product most tended to purely describe rather than evaluate their product. There also 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 specification point.

Reflection Paper

It was pleasing to see more candidates producing more focused responses and addressing the bullet points; accessing the full mark range available. 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.

Question 1

Some candidates missed the key point of this question about on the 'product life' from its initial launch to decline and produced a 'Life Cycle Analysis' instead.

There was generally a good understanding of the meaning of USP and this section of the question was answered well. A few candidates used sketches or further explained the point to good effect to extend the points they were making and were able to access the full range of marks.

Question 2

Most candidates showed some understanding of the topic inclusive design. However a significant number showed no understanding at all.

A number of candidates struggled to score marks because their discussions did not accurately target the bullet points of the question – some candidates talked generically about inclusive design but many of them did not state specific examples of how they could improve the inclusivity of their product.

To achieve the 'S' marks candidates needed to support their points with sketches, examples or full justification of the improvements.

The cost implications of the modifications was the least well answered part of the questions. Answers tended to misunderstand the question and talk about processes rather than impact and its effect on cost. Simple comments such as 'would cost more/less/about the same' often seen 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;

"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 students should learn to apply knowledge to products when evaluating and analysing. Candidates should be familiar with technical terms related to these topics.

F522 Product Study

General Comments

Moderators found a significant amount of impressive/inspirational work contained within the Product Study coursework this series. This was seen in candidates submitting work with both e-portfolios and A3 paper portfolios. However, whilst it is possible to achieve higher mark band outcomes with both approaches, more and more are received via the e-portfolio route.

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 is fine 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 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.

Whilst interactive dialogue is a vital component there is **absolutely no requirement** for a presentation to have upwards of 15/20 videos embedded. We would not expect a centre to have more than ten and it can be counterproductive to have numerous videos on a single slide of a presentation.

- 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.

Centres should be aware that unless work is required for archiving or awarding purposes then it is our intention to return **all work** at the end of the moderation series. With this in mind USB memory sticks are far more **reliable** and significantly quicker to access, we urge centres to utilise these. Each candidate does not necessarily require a separate memory stick, a number can be added onto a single device if the file size is managed sensibly.

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.**

Key Points

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.

The MS1 form **MUST be sent to OCR and the named moderator by May 15th**, this form triggers the centre request for coursework.

Centres submitting e-portfolio work should send **ALL** candidates work to moderators at this point also. Centres submitting A3 folders with less than ten candidates should send all work to moderators at this point also.

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.

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.

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.
- There is a lot of 'condensed' focus and analysis sections with everything lumped in together and no real discrete criteria.

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.
- There is good evidence of a 'hands on' approach to this section beginning to come through.
- 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.

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.

A 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.

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.
- 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.

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.

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.

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. 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

- 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**.
- 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.
- There continues to be plenty of examples of ‘anonymous’ comments and questionnaires being given high marks. Blank questionnaires should be avoided!
- 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.

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.
- 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 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.
- 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.
- 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).

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/USB 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.
- 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/USB not both.
- A centre can submit some candidates' work as A3 paper folders and some as CD/USB.
- Centre and candidate name and number must be on all paper and individual CD/USB..
- 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

Coursework titles had been chosen from a range of topics that were appropriate to the requirements of the examination, and they gave opportunities for candidates to be innovative and creative in the designing and making tasks. There was wide variation in complexity and demand. Projects were sensibly scaled 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 was insufficient for candidates to attain the marks awarded by the centre. 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. Regular and frequent contact with clients and potential users throughout the coursework, to obtain comments and feedback on the designing as it progresses, is recommended.

Generic responses to the assessment criteria were common, where responses did not relate directly to the specific project and which 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.

Candidates are expected to make reference to the commercial and marketing aspects of design and manufacture throughout all sections of the project, and where this was the case candidates were able to score highly. The benefit of increased reference to the needs of a client or specific target audience was evident in many cases.

Section 4a was often the strongest section of the folder with candidates showing evidence of enthusiasm and creativity. Many did not get far beyond superficial thinking, showing little real evidence of design development after analysis and synthesis of initial thoughts. There was often quite a jump between concept ideas and the final solution. More able candidates showed a clear progression from concept to final idea using 3D and ICT modelling and the opinions of others to refine ideas and consider increasingly detailed construction as the work developed.

Sections 5, 6 and 7 are important sections following the making of the final working prototype. Candidates often allowed insufficient time to adequately address the requirements of these sections.

Skills in a wide range of ICT, CAD and CAM applications were seen, and some candidates presented a professional standard of work. Although CAD working drawings or details of the final design are not specifically mentioned in the Assessment Criteria, they are expected if high marks are to be supported. 3D CAD images were often included, but these mostly did not include the technical detail required for manufacture. Some candidates were able to model, develop and refine their designs effectively using 3D printing.

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 annotation difficult to read.

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. Videos can provide powerful evidence of user testing of candidates' working prototypes. 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 majority of centres sent their candidates work by the due date, enabling moderation to proceed promptly. The process of moderation was delayed in some cases due to incomplete or

incorrect documentation, late delivery of coursework, and damaged CD/DVD's. A large number of paper and electronic portfolios were not clearly identified with centre and candidate names and numbers.

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 with the OCR standard, where one or more of the key elements had not been targeted.

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.

Candidates who established specific clients and experts relating to their chosen product were more able to gather person to person information in Section 2, receive on-going feedback throughout the designing and development stages, and receive appropriate testing and evaluative feedback on the final prototype product.

Design briefs were often too broad, for example 'A Storage Unit'. 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 could not be supported where there was no primary research or 'personal-contact' investigation, and little inspiration derived from the evidence.

Quantity is not a substitute for quality. Candidates often included large amounts of 'generic' or 'standard' research (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 unable to earn credit.

For marks to enter the top mark band (7-9 marks) in this section, 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.)

Candidates who included relevant quantitative and technical data such as measurements, capacities, weights, and timings provided important data for future sections, and were able to score well.

3 DESIGN SPECIFICATION 3 marks **Produce a design specification for the product**

Centres' assessments in this section tended to be lenient when compared with the OCR standard.

Design Specifications were usually well structured with appropriate headings. A lengthy list of generic points that were vague and based on candidate's own thoughts and feelings rather than the analysis of research were unable to score highly

Specific performance targets that would be useful when evaluating and testing designs and products were included in good responses. Unsupported and generic statements such as 'must be safe', 'must last a long time', 'must be easy to use', 'must be aesthetically pleasing' were 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 that this must be reflected in the marks awarded. Centres' marking was often lenient where there was insufficient depth, difficulty and sophistication involved to meet the marks awarded when compared with OCR benchmarking and standardising examples. A simpler project will need to be carried out in considerably greater depth to achieve the same marks as a more complex project.

Most 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**

Innovative and creative thinking from a broad perspective was evident from a good number of candidates, with fluent and open-minded approaches able to access high marks. Some responses showed little innovation or meaningful exploration of alternatives and were based on standard readily available designs. Poor quality sketching and untidy presentation was sometimes over-rewarded.

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 - 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 reflected 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, ease of use, maintenance, and standardisation of components. Both the product designs and 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 the 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. There was excellent use of CAD programs such as SolidWorks, and SketchUp and similar CAD software was used as a development tool in addition to being used to visualise a final idea.

- **experimenting and modelling**

It was clear when modelling had been an integrated and valuable part of the design process. For some candidates it was a highly 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 modelling to determine ergonomic suitability.

To raise attainment, candidates are encouraged to further expand their design development through modelling and experimenting. The benefits of using modelling and trials as a means to explore and develop ideas, and to obtain helpful client feedback, cannot be overstated. The development of design thinking is clearly evident from stronger candidates who use information from modelling and comments from third parties to refine their ideas leading to a fully developed solution.

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

Centres' assessments in this strand of Section 4a were lenient when compared with the OCR standard. Greater attention to technical aspects in the refining and defining stage of design development was needed to support the centres' marks. Details of dimensions, materials, construction, ingredients, components, and fittings, were 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 expected at this level as a clear and necessary mirror of industrial practice. Hand drawn working drawings were more common this session, and in these cases candidates were able to score low marks only.

The quality of ongoing evaluation varied considerably. Some candidates made 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 limited material of 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, centres' marking tended to be lenient when compared with the OCR Standard.

Along with clear photographs of modelling 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 most cases. Many candidates embraced this aspect and explored a broad and creative range of alternative designs and manufacturing options, and awarded marks accordingly. 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.

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. Moderators were able to confirm high marks awarded by the centre where candidates had clearly addressed all three requirements.

Centres' assessments in this section tended to be lenient when compared with the OCR standard, with the most common shortcomings being:

- Evaluation against the Specification conducted subjectively by the candidate, sometimes in the school workshop, 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 supporting highly optimistic comments recorded by candidates, clients or 'independent' assessors.

Aspects completed successfully this session 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

It was evident that the teaching of the principles of marketing had been 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.

Many candidates spent time on a 'worked through example' but gave insufficient attention to the analytical and strategic planning requirement for the marketing of their product. The choice of media for the advertisement was sometimes inappropriate for the product, and in these cases it was not possible 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.

Candidates who gave a presentation to groups of students and staff found this 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. Moderators were able to confirm high marks awarded by the centre where candidates had clearly addressed all three requirements. Centres' assessments in this section tended to be lenient when compared with the OCR standard.

The 'review and reflection' aspect was usually well done. Responses to the 'wider impact' aspect improved this year with more candidates using a Life-Cycle Analysis (LCA) approach to their analysis. 'Future developments' tended to lack the detail and depth required with responses often focusing on improvements to the prototype rather than looking forward to the next stage of the design and manufacturing process as the product enters the industrial and commercial world.

Specific considerations in this section include:

- An insight into the process of designing and making
- Honest comments about the learning that has taken place.
- Moral, ethical, and sustainability issues, together with economic and manufacturing issues.
- The likely success of the product in the market-place.
- Future developments including quality improvement or design variations (with diagrams).

F524/01 Product Design Written Paper

General Comments:

The most popular question this session was Question 6: Resistant Materials followed by Question 4: Graphic Products and Q5: Manufacturing. Whilst there was a slight increase in the number of candidates attempting Question 1: Built Environment and Construction and Question 3: Food, there was a drop in the number of candidates attempting Question 7: Systems and Control.

The vast majority of candidates fully complied with the rubric with very few attempting more than one question.

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. Marks were not awarded for generic or brief, unjustified responses.

Part (b) Most candidates were able to describe at least one benefit of computerised stock control in industry. The most common correct responses referenced increases in efficiency in terms of time, accuracy and cost. Some candidates gave very brief answers; detailed responses were required to access full marks

Part (c) The best responses demonstrated a very good understanding of COSHH Regulations focussing mostly on the storage and safe handling of substances hazardous to health. Candidates also referred to the use of PPE. Many candidates were not aware of COSHH and a significant number made no response.

Part (d) was generally well answered. Most candidates explained the benefits of their selected energy production system. The majority selected Hydro-electric. Some candidates did not achieve full marks by not describing their chosen system in detail. The best responses included simple annotated sketches to help describe the system and clear explanations focussing mostly on specific environmental benefits.

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.

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

There were a number of outstanding, fully detailed responses to this part. In the best responses, candidates described a correct sequence of stages, using 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 including very limited detail to describe the given process, and consequently did not achieve the middle or higher mark range.

There was 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 parts for Question 6: Resistant Materials which required a batch size of 50. Some candidates answering Question 8: Textiles, incorrectly described the manufacture of the pyjamas; the question asked for a description of how the fabric would be transfer printed.

Part (f) is a 'discuss' question. Candidates were well prepared to raise and explain a range of issues and include supporting evidence or examples.

There was a wide range of responses to part (f), with a significant number of candidates achieving very high marks.

Most candidates presented well-structured discussions; raising two or three issues relating to the impact of modern media on the advertising of products.

Many candidates made reference to their F523 Marketing section to provide examples of modern media advertising. A number of candidates missed out on achieving full marks by not including specific 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.

2. Comments on Individual Questions:

Question 1 Built Environment and Construction

Relatively few candidates attempted this question. Some responses were fully detailed, demonstrating a sound understanding of flat roof structure. A number of candidates attempted this question with very little knowledge of construction and consequently did not access the full mark range. Very few candidates were able to produce details of how fall can be provided to take rainwater away off of a flat roof for part (e) (ii)

Question 2 Engineering

Few candidates attempted this question. Responses were mostly detailed with candidates identifying appropriate materials and clearly describing the stages of manufacture of the seat rail of the metal bench.

Some candidates did not consider the requirement for a batch of 5000 and subsequently did not access the full mark range.

Question 3 Food

A number of candidates made successful attempts at this question. Most candidates stated at least two reasons why we are encouraged to include fish in our diet for part (e) (i). Part (e) (ii) was generally well answered with candidates producing a flowchart to clearly describe how to manufacture flaky/rough puff pastry for the ready cooked meal.

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 point of sale display stand. The most common responses were corrugated card and Corriflute.

There were a number of very good answers to (e) (ii), most candidates correctly described the stages of manufacture of the point of sale display including details of the cutting dies and folding jigs.

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

Question 5 Manufacturing

This was a popular question with a wide range of responses. For part (e) (i), almost all identified a suitable specific plastic material with appropriate properties for the hollow body shell. There were some very detailed and full responses to (e) (ii). Candidates produced flow charts (including appropriate sketches) of the sequence of manufacture of the hollow body shell. Most correctly described rotational or blow moulding.

Question 6 Resistant Materials

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

Most candidates selected the part C: seat but there was an even amount of responses for part A: forks and part B: frame.

For (e) (i), most candidates proposed aluminium or mild steel giving valid reasons for selection. Beech and birch were the most common acceptable responses for the frame. A number of candidates proposed acrylic for the seat which would have been inappropriate.

ABS, and plywood (birch laminate) were the most common acceptable materials for the seat. For (e) (ii), most candidates correctly described appropriate shaping and bending for the forks, some candidates lost marks by not including the drilled holes.

Many candidates achieved high marks by fully describing a steam bending or laminating process for the frame.

A range of appropriate manufacturing methods were given for the seat. Many fully described a steam bending or laminating process, giving full details of formers and jigs required.

Many candidates selected an appropriate plastic material such as ABS for the seat and fully described the process of shape and thermo-forming. A number of candidates demonstrated a good understanding of the laser cutting process. Those candidates, who included details such as production of CAD file, setting up the laser through auto-focus or other appropriate method, accessed the full mark range.

Question 7 Systems and Control

Very few candidates attempted this question. Most candidates gave four justified design requirements for the electric kettle. A thermistor was the most common correct response for a sensor to be used in the kettle to measure water temperature for part (e) (i). Not all candidates drew a circuit to show how the sensor is used to produce a voltage signal, which changes with temperature.

Answers to (e) (ii) were generally detailed. Candidates produced an appropriate labelled circuit diagram to show how the signal from the sensor could be used to switch off the kettle when the kettle reached boiling point.

Question 8 Textiles

Most candidates gave at least three acceptable justified design requirements for the pyjamas. Almost all candidates stated a suitable fabric for part (e) (i). Cotton and polyester were the most common correct responses.

There was a range of responses to part (e) (ii). Most candidates used well-annotated diagrams to correctly describe how the fabric for the pyjamas would be transfer printed. A significant number of candidates misread the question and described the manufacture of the pyjamas and did not access the full mark range.

F524/02 Product Design Written Paper

General Comments:

The format of the paper and generic mark scheme were unchanged from previous sessions of the examination. Many centres had prepared candidates well for the paper and this allowed them to show creativity, technical knowledge and an ability to effectively communicate their design thinking.

Candidates from some other centres were less well prepared; struggled to write specification points and did not give technical details of materials and construction.

Specification points

Some candidates continue to find the requirement to write three relevant specification points extremely difficult. Many repeat information from the question or make generic statements about, for example, cost, aesthetics or sustainability. Such specification points show a total lack of engagement with the brief they are working on and are given no credit.

The majority of relevant specification points cover essential, and usually obvious requirements (for example 'must be waterproof because the product will be used outdoors') which are valid but show a disappointing level of design thinking.

Candidates who show a degree of empathy with the end user of the product, reflecting their needs in specification point are relatively rare. They do, however, give themselves a great advantage in subsequent sections of the paper because are more likely to show evidence of their design thinking in their ideas, and to carry out thoughtful evaluation of their initial ideas.

Overall, this section of the paper is rather disappointing with very few candidates scoring full marks

There is very strong evidence that writing specification points is a skill that can be taught with marks awarded following a definite trend from centre to centre.

Range of ideas (R)

To achieve high marks in this section there are two complementary demands: firstly to produce a number of different concept solutions to the design brief set in the question, secondly to develop each concept to show details of possible alternatives and to consider how modifications could better suit the needs of user and manufacturer.

Although many candidates performed well in the first of these demands many failed to 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 present.

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 of examination 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 apply 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.

Dimensional detail was often lacking. In many cases the size and scale of the product could only be estimated by comparison to human figures or reference to known items (for example the tablet computer which was the item to be held in question 4). It was rare to find sketches which included information about component sizes, thicknesses of materials and so on.

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 their value judgements.

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 sessions with most candidates showing a complete final idea with specific features identified. There is evidence that some candidates spend far too long on this final section which must be to the detriment of earlier sheets, where more marks are available.

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.

Many examiners commented on the 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 more able candidates 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:

Question No. 1 Built Environment and Construction

As in previous sessions the majority of responses to this built environment and construction question seem to be from candidates who have not prepared for this focus area. Answers tend to lack understanding of suitable materials and construction.

Question No. 2 Engineering

This question, about portable lighting for construction sites, produced a wide range of responses. Some candidates showed good knowledge of materials, mechanisms and construction.

Question No. 3 Food

Insufficient responses to this food focus question were seen to be able to make a general comment.

Question No. 4 Graphic Products

This was a popular question, asking students to design packaging for a tablet computer. This was well answered by many candidates who incorporated stands, accessory storage or other additional functions into their ideas. Some candidates put considerable effort into designing surface decoration and/or logos that might be applied to the package. This is time that would be better spent on more functional aspects of the design.

Question No. 5 Manufacturing

This question asked candidates to consider the problem of separating household waste for recycling. Understandably, most designed a bin, or system of bins with varying degrees of innovation, imagination and practicality.

Question No. 6 Resistant materials

This was the most popular question, producing a wide range of responses. Some candidates lost marks because they failed to address key information in the question, such as the need to accommodate three students. Most responses showed awareness of the need to fold, stack or disassemble for storage but many struggled with the technical details of mechanisms and construction.

Question No. 7 Systems and Control

Insufficient responses to this systems and control focus question were seen to be able to make a general comment.

Question No. 8 Textiles

This question, to design a textiles product to store items in a child's bedroom, produced some imaginative responses. All candidates picked up the requirement to be based on a theme of nature and used this as the basis for their ideas. Many candidates indicated the need to include some elements of resistant materials in their solutions (e.g. a framework to support the textile product) and in some cases this was done well. In general the level of technical detail was slightly disappointing with relatively few showing the construction details we often see from students from this focus area.

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