GCE

Design & Technology

Advanced GCE **A2 H453**

Advanced Subsidiary GCE **AS H053**

OCR Report to Centres June 2015

CONTENTS

Advanced GCE Design and Technology: Product Design (H453)

Advanced Subsidiary GCE Design and Technology: Product Design (H053)

OCR REPORT TO CENTRES

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. The use of this additional 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, as stated on the front of the paper.

It is expected that inspirational materials, e.g. photographs of existing products are 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.

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 candidates.*

It must be made clear to all candidates that this is an examination to assess the individual candidate'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 in order to respond to the challenge.

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 will hamper design thinking.
A 'job bag' should contain inspirational materials, images and information about materials, and 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.
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 photographs can be added to the workbook. This is particularly important if it is necessary to show other parts or views of an artefact or mechanism to fully illustrate the final outcome. Extra photographs can be included in the evaluation or progress report boxes.

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.

In order to support centres further with their work on Advanced Innovation Challenge, further support materials have recently been added to the subject webpage.

http://www.ocr.org.uk/qualifications/as-a-level-gce-design-and-technology-product-design-h053-h453/

Comments on Individual Questions:

The Challenge Assignment
Comments on Individual Challenges

Challenge 1
Portable cooking area- this was a popular question. There was a variety of innovative solutions with candidates having to consider a range of issues including ergonomics and hygiene. It seemed to give good scope for creative thinking. Some materials suggested by candidates would be unsuitable for their designs because of their properties or cost.

Challenge 2
Portable product to provide family entertainment. This was a reasonably popular challenge that produced some creative and wide ranging solutions, that were practical and used a variety of mechanisms/ methods to collapse or fold. The majority of candidates created solutions that would encourage and promote physical activity, a key aspect of the challenge.

Challenge 3
Personal transportation and exercise. This was a reasonably popular challenge that produced some creative solutions, that were practical and used a variety of mechanisms and sustainable energy sources, from pedal to solar power. Some candidates focused on the exercise aspect of

the challenge and lost sight of the personal transportation key point.

Challenge 4
Carrying items for camping– this was a popular challenge and responses were generally creative. There were some predictable solutions e.g bags and trolleys. The 'secondary function' element gave candidates an opportunity for innovative thinking; many candidate used new technology or smart materials.

Challenge 5
Product to encourage relaxation. This proved to be a popular challenge with some highly creative solutions. A number of candidates lost sight of the council providing this. Most candidates considered all age ranges.

Challenge 6
There were a number of candidates that chose to tackle the meal pack from a graphic products perspective. However, there were some creative solutions showing some knowledge of nutrition. Most candidates also managed to produce a model of the packaging. A small number produced food, however a number of candidates missed the key point of the meal needing to be cooked outdoors.

Comments on Challenge

Initial Thoughts
Candidates used a combination of text and drawings to explore the challenges and identified possible design areas/problems. Many candidates explored ideas in depth; thinking creatively, whilst considering the outdoor environment, terrain, 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.

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 more successful specifications were where candidates concentrate on the functional and user needs of the product in the design situation/environment in which the product will be used and ensured that the relevance of all points were explained.

Specific detail is required for high marks, 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. Candidates should be advised to focus on functional aspects when writing a specification.

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

Initial ideas on the whole were creative, with some excellent examples of innovative thinking in line with the ethos of the challenge. 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. In many cases strengths of ideas are 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.

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 continues to be an 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 the 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 quick 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 skillfully; as does the use of existing products to form part of, or most of, their 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 many candidates responses, only the most able candidates evaluated their product while 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.

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. Both questions were accessible to the majority of candidates and produced some excellent responses.

Where candidates had written a short plan this seemed to help the structure of their responses to both questions.

Q1   Where the market was correctly identified, most candidates were able to provide a supporting explanation. Most candidates were able to suggest at least one suitable marketing method but often without being able to support their decision. Links to camping shops and seasonal marketing; made for some specific responses that scored highly. Few candidates were able to hold a discussion regarding a suitable time frame or meaningful cost implications. "Fairly expensive/cheap" was a common response that lacked the necessary detail.

Q2. Most candidates were able to suggest a suitable level of production, usually with a sound supporting statement. Only the very best candidates were able to suggest suitable materials and manufacturing methods in relation to the chosen level of production. Similarly, suggested modifications to the product were rarely in relation to the level of production. This question was generally not answered as well as Q1. A number of candidates were able to achieve 'p' marks but not the supporting information/evidence to get into top marks, mainly due to a lack of detail.

F522 Product Study

General Comments

As in the 2014 series Moderators found many examples of impressive work contained within the Product Study coursework. This was again seen in candidates submitting work with either e-portfolios or indeed A3 paper portfolios. However, whilst it is possible to achieve higher mark band outcomes with both approaches, most are received via the e-portfolio route due to the flexibility this affords students particularly in terms of **interactive dialogue**.

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 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.

Whist 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. They should always be compressed.

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 **backup** 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. It is worth noting that the use of **a USB drive** to send work is by far the preferred option, on behalf of the majority of Centres and our moderators. This is quite simply the most time efficient route as well as being far more **reliable**, 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.
Candidates submitting with paper folios also need to ensure that the **mandatory requirement for interactive dialogue is met.**

Several centres decided to print entire presentations that had obviously been compiled using PowerPoint; there is no need for this to happen as we are very happy having them sent via a USB drive.

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. With 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** (we urge **ALL** centres to utilise this form as it avoids clerical errors that take a great deal of time to correct) 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 – when there are transcription errors they 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. This is absolutely critical – **late moderation can lead to marks not being available for results to be published.**

Centres of **20 candidates** or less submitting e-portfolio work should send **ALL candidates** work to moderators at this point also.

Centres submitting A3 folders with less than **20 candidates** should send all work to moderators at this point also.

Submitting the MS1 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 candidate 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.

OCR recommended A3/PP allocations are indicated for each section - the total should not exceed 25 as a maximum.

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.
It is really pleasing to see that very few candidates are still considering generic groups of products. The first page of the candidate product study should state quite clearly what **specific, single named product** has been selected for analysis.
Candidates who do not present **real time evidence** 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.
• The section relating to manufacturers needs is still the weakest area in this section. Points raised are often very generic.
• Many Centres are showing the product in use with candidates clearly accessing the product first hand.

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 one is the best product.
• Limited conclusions drawn.
• There is good evidence of a 'hands on' approach to this section including the use of video.
• Candidates simply state the strengths and weaknesses of similar products with **no comparison** to the original.

- 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 has traditionally been poorly addressed in many cases and moderators often find this section to be over-assessed by Centres. **However,** we have seen a good number of exceptional approaches from Centres who have clearly used this section as a teaching opportunity to underpin the Core Knowledge taught component. 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'.
- Some candidates have undertaken research and as a result presented exceptionally well-informed work.
- 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 is generally well attempted with strong links to their product focus.
- 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 to 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. The 56 marks are broken down into three sections as identified below. Additional advice is also given on CSF F522 form to award marks in different bands within each section. This interactive mark sheet is available on the OCR web site. Please ensure this form is used 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.

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 moderatos 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.
- 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.
- ***CAD is making a significant contribution within this section and is very useful indeed. It is not a substitute for sketching – which remains part of the specification.***

  - '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'.
  - Many Centres clearly use this section to prepare candidates for the Innovation Challenge examination and we are seeing some excellent modelling as a result.
  - Some evidence of on-going evaluation through annotation, video and audio.
  - Good use of CAM modelling and 3D printing

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.

Ongoing comments from Moderators

- 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.

- Some excellent examples of testing by outside agencies related to the chosen product.

  - Videos used well by centres using PowerPoint in this section.
  - Testing is much improved with products often tested in their working environment by a third party.
  - 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.
  - 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/USB 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 USB drive.
- 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.
- 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.

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.
- This series the majority of presentations were through e-portfolios on USB drives.

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:

16

- 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 USB to current OCR approved standard. (currently PP)

- 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 a USB on an independent stand-alone laptop.

- A candidate must submit either an A3 paper folder or an individual USB not both.

- A Centre can submit some candidates' work as A3 paper folders and some as USB.

- Centre and candidate name and number must be on all paper and individual USB.

- Work must be recorded in real time and digital technologies must be used.

- Centres and candidates should note that creative /innovative ideas should be presented through a wide range of high quality annotated sketching.

- 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 – 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 theCcentre to the file size of some presentations. Complex presentations, which take a long time to load, are counterproductive. The use of a USB key will save a great deal of time on the part of the Centre and our Moderator's.

F523 Design, Make and Evaluate

General Comments

There was a interesting range of project choices this year with candidates identifying genuine needs and opportunities for their coursework. An increased number of candidates made efforts to find real clients and real problems that helped to give a strong focus throughout the sections of the coursework. Regular and frequent contact with clients and potential users throughout the coursework, to obtain comments and feedback on the designing as it progressed, supported higher marks.

Coursework titles were appropriate to the requirements of the examination, and gave opportunities for candidates to be innovative and creative in the designing and making tasks. Projects were sensibly scaled on the whole. There were many 'simple and straightforward' projects which did not contain sufficient difficulty and complexity to support the marks submitted by Centres. Simpler projects need greater depth of approach to attain the same marks as those more sophisticated and intellectually challenging, particularly in key sections such as 4a: Design, Design Development and Making.

Some candidates tackled architectural projects where specialist technical knowledge and skills were required for them to tackle the challenges of ambitious building designs. Where the final outcome was solely a model rather than a working prototype product, significantly greater depth was required for candidates to show the higher level skills needed to access high marks in Sections 4a and 5.
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. Centres' assessments were often lenient in this respect, 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.

Candidates showed evidence of enthusiasm and imagination in their designing. Many candidates needed to move beyond outline and conceptual thinking to show detailed and rigorous design development after their analysis and synthesis of initial thoughts. A large jump from concept ideas to the final solution was often evident, and further stages of refinement were required to meet centres' marks. 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 construction details in increasing depth as the design work developed.

The use of 3D printing was more widely evident this session, and where used appropriately added enhancement to both designing and making processes. Several candidates had successfully used 3D printing to manufacture purpose-designed components such as furniture fittings or casings for electronic circuits, giving a valuable commercial perspective to the coursework. The 3D CAD designing usually accompanied this. It is important that candidates maintain and demonstrate a range and depth of skills and approaches appropriate to Advanced level coursework, and not to rely solely on methods such as 3D printing for the whole project unless accompanied by significant 'commercial level' depth and detail throughout the process.

Skills in a wide range of ICT and digital applications were seen in all sections of candidates' folios, with some candidates presenting a professional standard of work. Greater use of Photoshop was evident and this enhanced outcomes and clarity of presentation. Laser cutters and CNC routers were widely and effectively used by candidates during manufacturing, also in

modelling. The CAD work that formed part of the use of such equipment was often not evident in design folios.

CAD working drawings with details of the final design are not specifically mentioned in the Assessment Criteria, but they are expected if high marks are to be supported. 3D CAD images were sometimes included, but these mostly did not include the technical detail required for manufacture, and for higher marks to be supported.

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.

The vast majority of candidates submitted their coursework as e-portfolios which enabled candidates to include audio and video clips including CAD animations. These did have a positive impact on the folio as a whole. Generally e-portfolios worked very well although a large number had glitches such as videos that did not work, and some took considerable time to open. Centres are recommended to send a separate folder with video files and also to reduce the PowerPoint file size.

Most e-portfolios were in a single PowerPoint presentation, the preferred format. A small number of candidates submitted a PowerPoint presentation for each section, which made moderation very time consuming. A few centres used PDF files with links to external video content usually on YouTube. There were a significant number of PowerPoint and PDF e-portfolios where links to videos did not work. Centres are asked to include a folder of separate video files on the CD/DVD or memory stick as a backup for moderators to use when there is a problem. A common problem this year was the use of small font sizes or coloured text on a coloured background, making viewing of slides extremely difficult.

For this Unit, e-portfolios may be submitted on memory stick, and centres are permitted to submit all e-portfolios to one USB Memory Stick, 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 portfolios were not clearly identified with Centre and candidate names and numbers. The mark bands and descriptors for Section 4a were revised in 2014, and the new mark grid should now be used.

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 / named client, the specific users, situation, the problems, the need……

- A clear and precise BRIEF - what the candidate will be designed and made.

- Clear reference to MARKETING - the important aspects of design and manufacture if the product is to be marketable. Why people will want to buy it.

- Reference to KEY ISSUES – the crucial / critical parts of the designing.

The marking of this section tended to be lenient when compared with the nationally agreed standard, where one or more of the key elements had not been targeted.

In general, responses had improved in this section, with many candidates showing evidence of close contact with clients and target users at this crucial initial stage. This in turn enabled them to receive on-going feedback throughout the designing and development stages, and obtain evaluative comments on the final prototype product. The 'marketing' aspect was commonly misunderstood, where candidates described 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 sometimes too broad, for example 'A Child's 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
Most candidates researched existing products and produced 'mood boards' showing sources of inspiration, and these pages were well presented. In some cases these were of little value where specific influences and technical details were not included in the annotation.

In general, responses in this section were often too long and lacked focus and direct relevance. There was a strong overreliance on secondary sources of information. Candidates should be encouraged to be very clear about the information that they will need to design their products. This will ensure that relevant and key data is gained and appropriate influences identified which will ultimately contribute to a fit-for-purpose marketable product in the designing section.

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.

There were some excellent responses in this section 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.

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, were able to score well.

In general, Centres' assessments were lenient when compared with the nationally agreed standard.

3   DESIGN SPECIFICATION   (3 marks)

Produce a design specification for the product

Design Specifications were usually well structured and presented clearly with appropriate headings. Specific performance targets that would be useful when evaluating and testing designs and products were included in good responses. Unsupported and generic statements that could be placed in any folio such as *'must be light in weight, 'must last a long time', 'must be easy to use',* and *'must be aesthetically pleasing'* were of little value.

The involvement of a client or representative of the target market by some candidates had a noticeable affect in improving the quality and value of their responses. Some candidates had obtained the signature of their client (with their comments in a few cases) as formal approval of the list of design requirements.

For maximum marks to be awarded in this section, the Specification should include a range of relevant numerical / technical requirements, such as life span, capacities, weights, sizes (max / min / range of adjustments, positions), quantities, costs/budgets….. Measurable targets are crucial to provide a framework for on-going evaluation during the design development, and also in the testing and evaluation of the final product. Where the Design Specification did not include an appropriate level of specific detail, this had a clear impact on the marks possible in Section 5.

Centres' assessments in this section tended to be lenient when compared with the nationally agreed standard. For marks in the middle and higher mark bands to be supported, specification points must be specifically related to the specific product being designed.

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 of the candidates' work in this section should include evidence against all five key strands listed above.

There was some high quality work from many candidates with fluent design sheets showing an integrated approach and clear progression through the use of sketching, CAD and modelling with evaluation by a target user to a justified final design. The positive influence of the 'Advanced Innovation Challenge' at AS level was evident. A formulaic approach was evident with lower ability candidates, addressing the five strands in a more segregated way.

The level of 'intellectual challenge' and 'design thinking' involved in the designing and making varied considerably, and this should be reflected in Centres' assessments. Centres' marking was often lenient where there was insufficient depth, difficulty and complexity to meet the marks awarded when compared with OCR's benchmarking and standardising examples. In a number of cases this session, further stages of development

and refinement to the final design or manufactured outcome would have helped the quality of response to meet the high marks submitted by centres.

Questions such as the following should be considered when making assessments in this section:

- Is the work demanding enough at A2 level? (A step above GCSE and AS level)?
- How much thought has been needed with the designing?
- How long has the making taken, and what level of skill has been required?

For high marks to be supported, projects must involve sophistication in the designing and making, e.g. through articulation or movement ('static' items do not require the same level of skill in designing and making), flat-pack, adjustment, folding mechanisms, interchangeable parts, complex assemblies / manufacturing techniques, stacking facility, or opening / closing / sliding features.

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

Innovative and creative thinking from a broad perspective was evident from a good number of candidates, with open-minded approaches using appropriate design methodology able to access high marks.

For many candidates the weakness was lack of exploration. There were usually enough simple concepts and initial ideas presented but frequently these were not pursued to sufficient depth. The words 'exploration', 'experimenting', and 'refining' in the criteria clearly imply that a good number of alternatives, options, and choices will need to be considered and/or developed if high marks are to be attained. Almost all candidates would benefit from greater consideration of the technical and constructional aspects of their designs to meet the Centres' assessments.

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. This approach is entirely correct and is encouraged - both the final product designs and the marks that could be confirmed were improved by such approaches.

- **the use of digital technologies**

Digital technology, such as photography, scanning, CAD, and videos, was widely used. Various forms of CAM were often used in the modelling and making processes, with candidates usually presenting appropriate evidence to support the Centre assessments. There was a noticeable increase in the use of image manipulation software (such as Photoshop) and animations (as specifically included in the assessment criteria and mark descriptors) and these helped to support high marks in some cases.

The overall use of digital technology by some candidates was of a professional standard, but the quality of digital photographic and video images was less creditable in some cases, in terms of their sharpness and clarity. There was excellent use of CAD programs such as SolidWorks, Creo and SketchUp which were effectively used as a development and design refinement tool in addition to being used to visualise a final idea.

Centres are reminded that there is a difference in complexity between 2D CAD and 3D CAD and this should be reflected in the marks submitted in this section. Similarly, there is a difference in the level of skill involved in designing and making using a 2D laser cutter or vinyl cutter and designing and making using a 3 or 4 axis CNC router. The marks submitted by centres should reflect this difference in complexity.

- **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 where models, trials, experiments and test had led to further development and refinements, often to a number of further models with incremental changes. This was particularly so when input of the client was also obtained. Many candidates benefitted from the use of full scale modelling to determine ergonomic, dimensional and functional suitability.

To raise attainment, candidates are encouraged to further expand their design development and refinement through modelling and experimenting. Following on from the AS 'Advanced Innovation Challenge' many candidates used 'interactive dialogue' with peers. Although this is not as valuable as feedback on designs gained from target users or a client, this can be extremely beneficial and effective - and should be kept in mind when making assessments.

Key questions to ask when making assessments are
- Is there a purpose to the modelling and experiments?
- Do the models contribute to the suitability and quality of the final design and outcome?
- the refining and defining of a final design through ongoing evaluation.

This was one of the weakest strands in Section 4a for most candidates. Centres' assessments were lenient when compared with the nationally agreed standard. Greater attention to technical aspects and details 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.

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.

Many candidates had only their own evaluative comments, perhaps with fellow student views in some cases. Some Centres used peer assessment / feedback as a learning strategy in place of on-going client feedback. Evidence of structured and thorough client / target market input was invariably valuable when taken seriously.

Many candidates started to make the final product prototype without fully defining the final design. This was particularly evident in Textiles projects and some Graphic Products (architectural) projects.

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 common this session, and in these cases candidates were able to only score low marks.

As a constructive guide to Centres when making future assessments in this strand - the evidence of competence of candidates should be considered against the three key requirements:

- **Refining**

  - By evaluating, by obtaining feedback and advice from users / clients?

  - By testing possible modifications?

  - By incorporating additional features?

  - By changing aspects of the design?

  - What is the overall level of detail?

  - Is there evidence of in-depth consideration of the various components of the design, such as the ranges, types, and sizes of fittings and fastenings?

- **Defining**

  - The use of appropriate CAD software to produce 'working drawings' is expected for all material focus areas. (Print-ready images in Graphic Products and Lay Plans in Textiles)

  - Final designs should be sufficiently detailed for third party manufacture without further guidance (i.e. fully dimensioned and cutting lists).

  - Do the drawings or manufacturing specification include technical details and sizes of all components and of all joining methods?

  - If the solution is not defined clearly using CAD software (i.e. pencil/pen drawings are presented), a mark in the lower bands is appropriate.

- **Ongoing evaluation**

  - Is the annotation descriptive or evaluative?

  - Progression is a key word here - has the design benefitted (changed and developed) as a result of ongoing evaluation?

  - Regular consultations (in person, authentic) with the client, target market, or potential users is important, against the Design Specification. Personal, direct contact with the client / target market / potential users is required for marks to be supported in the highest bands.

  - Reference to the Design Specification is required (specific performance, functional and measured).

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

Most folios 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 had already happened. Responses were often superficial, including limited points of real value. The identification of the major stages of the making to show that a logical process and priorities have been established in advance is the requirement, including key stages to ensure a fit-for purpose outcome.

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

nationally agreed standard. Where a narrow range / depth of skills has been involved, or if the outcome is largely 'static', marks in the lower bands should be given for this strand.

In some cases, a further stage or stages of design refinement or the practical modification of one or more aspects of the final outcome by the candidate would have potentially enabled the Centres' marks to be confirmed.

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 many cases. Many candidates embraced this aspect and explored a broad and creative range of alternative designs and manufacturing options, and Centres allocated marks accordingly. In a few cases, Centres had submitted 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. 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 nationally agreed standard.

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.

Key elements to be included for high marks are:

- Systematic and rigorous testing (qualitative and quantitative test results with technical and numerical data) of the various aspects of the product to the specification – numerical and measurable requirements in Section 3 will give potential for higher attainment in this section.

- Testing in the intended location by the intended user.

- A list clearly stating strengths and weaknesses, with modifications to the product identified and described with sketches/diagrams.

- Authentic and formally recorded comments from an '*independent*' expert person or user group (to be 'independent' this person or group should not be associated with the candidate, school or project).

6 MARKETING PRESENTATION (15 marks)

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

There was a large variation in the standard of responses. A good number of candidates gave a thorough, insightful analysis of how the marketing of their product might be structured from a strategic point of view, with thought through and well-prepared examples of promotional materials. It was evident that time management was a problem for some and as a result this section was often very rushed. Many candidates presented generic 'marketing theory' with little clear and specific relevance to the product they had designed.

The development of company or product logos and brand identities was common, with some creative and innovative designs and suggestions for these important marketing elements. Details for packaging and instructions were included less often. Many worked-through examples consisted of an image of a well known website copied and pasted from the internet with an image of the candidate's product copied and pasted onto it, then details of the product added with a selling price. Higher ability candidates had developed aspects of a real-life / working website with various web pages and links.

The suggestion of bus-shelter or bus-side advertising was widespread, with candidates copying and pasting an image of their product onto a downloaded image. These 'public' sites for advertising were often inappropriate for specialist products not normally marketed to the general public. To support marks in the higher band, part of the strategic marketing analysis should include the placement and justification of suitable promotional materials,

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 of marketing 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.

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. 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.

The 'review and reflection' aspect was usually well done with candidates evaluating the design **process** they had followed. This aspect was often confused with the evaluation of the **product**, which is Section 5.

Responses to the 'wider impact' aspect mostly and appropriately included a Life-Cycle Analysis (LCA) approach to their analysis. In some cases this was not focused directly enough to their product to meet the marks submitted.

'Future developments' tended to lack the detail and depth required with responses often focusing on improvements to the prototype product rather than looking forward to the next stage of the design and manufacturing process as the product enters the industrial and commercial world. Best responses here included quality improvement or design variations with diagrams.

This section was often rushed and incomplete. A few Centres clearly gave templates or prompt questions to assist candidates in targetting the key points. Centres' assessments in this section tended to be lenient when compared with the nationally agreed standard.

F524/01 Product Design Written Paper

General Comments:

The majority of candidates answered Question 6 Resistant Materials with a fairly even spread of candidates attempting Question 8 Textiles, Question 4 Graphic Products and Question 5 Manufacturing.
Whilst there were a number of very good responses to Question 1 Built Environment and Construction, Question 2 Engineering and Question 3 Food, there was a significant drop in the number of candidates attempting Question 7 Systems and Control.

Whilst most candidates fully complied with the rubric, some candidates attempted more than one question. A number of candidates made attempts at question 1, crossed out their answers and made fuller attempts at another question. Candidates must be made familiar with the requirements of the question paper and take care in selecting a question that they have been prepared for to ensure that they can answer all parts of the question.

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

Part **(a)** was answered well with most candidates giving two or more fully justified design requirements for the given product. A few candidates gave generic responses such as 'must be value for money' which was not awarded a mark.

Part **(b)** was answered generally well. Most candidates were able to describe at least one way that ergonomics would have been considered in the design of the given product. Some candidates gave functional requirements with no reference to the user and did not access marks.

Relatively few candidates achieved full marks for part **(c).** 3D printing, Stereo Lithography and Laser sintering were the most popular methods given. Many candidates stated a rapid prototyping method without providing a description and did not access the full mark range.

Most candidates explained at least one key feature of batch production for part **(d).** This was generally well answered with reaction to market demand, description of batch sizes of specific products and workforce skills the most popular features given. Some candidates gave very brief responses lacking any explanatory detail and did not access the higher mark ranges.

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

Candidates generally answered part **(e) (i)** well, stating an appropriate specific material example and giving appropriate properties or performance characteristics. Some candidates proposed a generic material group or suggested unsuitable materials for the stated product/part and did not gain a mark.

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

Many responses were fully detailed, in a correct sequence and had all major stages clearly described. The very best responses made excellent use of annotated sketches in a basic flow chart configuration.
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 lamp base for Question 6: Resistant Materials which required a batch size of 250.

Part **(f)** is a 'discuss' question. Candidates were generally well prepared and raised and explain a range of issues and included supporting evidence or examples.
There was a wide range of responses to part **(f),** with a number of candidates achieving full marks.
Most candidates presented well-structured discussions; raising at least two issues relating to the importance and effectiveness of legislation in protecting the consumer and using appropriate examples to support their answer. A number of candidates referred only to safety issues, focussing on the work of regulatory bodies and did not make reference to any specific legislation, consequently they did not access the full mark range. Some candidates focussed on design rights and intellectual property legislation rather than the requirement to protect the consumer, and also did not access the full mark range.

Further comments related to parts **(e)** and **(f)** are referred to in the Comments on Individual Questions.

Comments on Individual Questions:

Question 1 Built Environment and Construction

There were a number of good responses to this questions. Candidates generally had a good understanding of lintels and of semi-circular brick arch construction. Some of the responses to **(e) (ii)** were particularly good, fully detailed descriptions using well annotated sketches to show the sequence of stages of construction.
A number of candidates attempted question 1 with very little knowledge of construction and the built environment.

Question 2 Engineering

There were a number of very good responses to this question. Candidates proposed a wide range of materials and manufacturing methods for the main body of the litter bin. Casting the base from cast iron, and rotational moulding the base using a thermoplastic such as HDPE or Polypropylene were the most popular methods described.

Question 3 Food

Relatively few candidates attempted this question but responses were generally good. Most candidates described at least two appropriate functions of vitamin C and many candidates produced a clear full and detailed flow chart to show the sequence of operations to describe the batch production of jam.

Question 4 Graphic Products

There was a wide range of responses to this question. Some candidates had a very sound understanding of embossing and foil blocking and produced excellent, fully detailed descriptions of the process. The best responses were basic flow charts showing the sequence of stages of the applied decoration techniques. Most candidates clearly described the process of embossing, relatively few gave a full description of the process of foil blocking. A small number of candidates misread part **(e)(ii)** and produced descriptions of the manufacture of a gift bag restricting access to the full mark range.

Question 5 Manufacturing

A popular question with a wide range of responses. There were some outstanding responses to part **(e)(ii)** the manufacture of a large batch of the door knocker back plate. The most common processes were metal casting (sand and die casting) in aluminium alloy. The level of technical detail demonstrated by many candidates was most impressive. A small number of candidates produced a method of creating the flat shape without including details of the two lugs require to hinge the knocker and consequently did not access the full mark range.

Question 6 Resistant Materials

The most popular question, generally answered well. The majority of candidates produced well annotated sketches to show the sequence of operations in the production of the base. Most candidates described a method of shaping and thermoforming acrylic into the required form using a variety of jigs and formers to ensure regularity in the production of a batch of 250 products.

Many produce excellent fully detailed descriptions of forming mild steel or aluminium and there were some outstanding examples of the use of lamination to create the shape.
Some candidates produced very brief and limited flow charts, lacking and technical detail and consequently did not access the middle or higher mark ranges.
The key elements to a successful response on this part are:
- the appropriate production method for the batch required;
- the correct sequence of all stages;
- appropriate annotated sketches of key stages.

Question 7 Systems and Control

There were very few attempts at this question

Question 8 Textiles

A popular question with some outstanding responses. Most candidates gave at least two fully justified design requirements for a set of bedding. Whilst a blend of polyester and cotton fibres was a popular correct answer for an appropriate fabric for the pleated valance, a wide range of appropriate fabrics was accepted. For part **(e)(ii),** many candidates fully described how the pleated valance would be produced and accessed the full mark range, a number of candidates ignored the technical aspects such as types of stitch and the forming of pleats, restricting opportunities to 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

Writing a design specification being a common requirement across all units of the qualification yet some candidates find it difficult to write three relevant and justified points. 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.

Many candidates jot down mnemonics such as CAFEQUES or ACCESSFM before writing their specification points; almost invariably the points that follow are too generic to be awarded marks.

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 explore 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 is 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. 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 only descriptive 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 is done well by many candidates showing a complete final idea with specific features identified. There is evidence that some candidates spend far too long on this final section, usually to carry out unnecessary evaluation 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.

Evidence of candidates using lengthy descriptive text, which was commented on in last year's report seems to be increasing. 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 tended to focus on elaborate mechanical systems for lifting and organising cycles rather than the building/structure that would contain them. There was, in general, a lack of understanding of suitable materials and construction.

Question No. 2 Engineering

This question, about a support for a digital projector, was quite popular and produced some good responses. In most cases the design concepts were somewhat similar to existing products but with sufficient innovation in the detail to deserve high marks.

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 reasonably popular question, asking students to design a product to encourage creative play for 5 - 7 year old children. Unfortunately many candidates did not respond to the key word **creative** and produced ideas to teach specific factual knowledge such as 'times tables' or spelling. This was rather disappointing because such a prescriptive interpretation of education excluded many opportunities for many more exciting design ideas.

Question No. 5 Manufacturing

This popular question asked candidates to consider the problem of drying laundry in student accommodation. In most cases the relatively focussed nature of the question allowed candidates to produce good specification points and practical, workable design ideas.

Question No. 6 Resistant materials

This was the most popular question, producing a wide range of responses. Many based their design thinking on existing exercise equipment, whilst others concentrated on the need to engage 7 - 12 year olds with equipment that encouraged energetic game play. Both were acceptable approaches and resulted in some good responses. Less successful were those who based their thinking on hi-tech monitoring of movement or high-tech scoring systems because the candidates understanding of the way the product would function was, invariably lacking.

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 asked candidates to design a textiles product to help a child make the transition from cot to bed. Many responses were based on traditional 'bed time' products such as teddy bears or novelty quilt covers. Others suggested innovative use of smart materials such as photo chromic pigments or interactive led lighting to encourage a child to look forward to bed time.

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