OCR
RECOGNISING ACHIEVEMENT

GCE

Design & Technology

Advanced GCE **A2 7822-3**

Advanced Subsidiary GCE **AS 3822-3**

Report on the Units

January 2008

3822-3/7822-3/MS/R/08J

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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 syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

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REPORT ON THE UNITS

Chief Examiner's Report

General comments

The number of candidates entered for assessment for AS and A2 components for the 2008 series was similar to previous January sessions.
Centres are to be congratulated on the efficient administration of examination and coursework submissions.
Many entries are re-submission of coursework or re-sits of examinations. There has been a small increase in the number of candidates taking units for the first time.
Whilst moderators reported very positively on the quality of work presented for Unit 2519: Product Study and Units 2522/2523: Coursework, there is a continued concern over the performance of candidates on written papers, particularly units 2520/02 and 2524/01.
It is recommended that you read the following reports with copies of appropriate assessment criteria and papers with mark schemes.

2519 Product Study (Coursework)

General Comments
Many Centres now have a clear understanding of the ethos of the Unit and Moderators report many more Centres where marking is accurate and falls within the OCR tolerance. Some Centres who have marked just within the accepted tolerance will have been informed with a comment on the Moderators report to Centres. To avoid any problems in the future it is advisable to concentrate attention with future candidates on the areas highlighted in the report. If no specific issues have been raised where a Centre is at 'the limit of tolerance' the problem was caused by a number of very small alterations, which compound to cause concern.

Centres who wish to resubmit the work of some or all of their candidates in the January session are asked to clearly identify additional work with annotated 'post it' stickers. These can be added to existing pages to identify additional work or to new pages, which have been inserted. In this January session some Centres resubmitted candidates work with mark alterations, which fell within the OCR tolerance, with little attempt to identify additional work. In these circumstances a considerable amount of candidate effort and Centre administration can lead to no mark alterations. Centres would be better advised in this instance to concentrate on preparing candidates for the examinations where the investment of time and effort and resources could result in a major improvement in overall marks. Resubmissions of coursework should be undertaken only for those candidates or Centres with quantifiable omissions, which can be remediated with clearly identifiable additional work, showing a demonstrable improvement over the previous submission.

Those Centres who use the January session as their main submission date and who wish to resubmit the work of some candidates in the June session are requested to clearly identify any additional work or new pages with annotated 'post it' stickers. Where little additional work can be identified the Centre should consider whether a resubmission is advisable.

A small number of Centres are still using the old specification and are advised to ensure that they use Version 3 of the Specification in future submissions. It is clear when Centres are using the old specification as old terminology is used, in particular in the section on moral implications.

The main changes in version 3 are:
- Candidates need to consider moral implications and in particular economic issues.
- Additional marks have been awarded to the creative ideas section.
- There is a greater emphasis on producing a range of 2D models and a range of 3D models.
- A test rig must be manufactured using workshop tools.

Administration:

Centres are to be congratulated on their efforts to complete documentation on time; in particular most Centres provided form CCS160 without further reminders being sent, this is the Centre Authentication sheet, which has to be signed by all teachers. No marks can now be entered on the system without this sheet. The Candidate Authentication Sheet which now has the Candidate name and number and the Centre name and number can be retained by the Centre for use in the event of a results enquiry. It is now being used in many cases to good effect as a title page.

All moderators check mark additions with calculators. Centres are urged to have their marks checked before they are transcribed to the MS1 form. This session there was a pleasing reduction in addition errors on form CSF 2519 and very few mark amendment forms were sent out to Centres. Few Centres use the spreadsheet provided by OCR for this purpose.

Many Centres now work within OCR recommended guidelines and produce work contained within 20 sheets of A3, which is securely bound down the left-hand side. This makes moderation, administration and logistics much easier. Some Centres are still providing work in heavy plastic binders. This is not necessary and causes many problems particularly with movement of samples. Please explain this to candidates. We only want to see the work clearly presented against the assessment criteria. Additional work on areas such as 'ergonomics' or 'manufacturing processes' should not be provided outside of the formal response to the assessment criteria. A thin card backing sheet and a clear front cover is all that is necessary if candidates wish to enhance their presentation. Work should not be placed in folders or plastic sleeves.

OCR recommends that the whole study can be completed in 20 sheets of A3. Centres should inform candidates that they should consider this as a maximum. In the detailed report which follows, a recommended page, allocation is given for each section with the mark allocation. Moderators report that 'the majority of folders were well organized and matched the layout of the mark scheme.'

SECTION A Analysis and design (60 marks)
SECTION A1 Analysis of Chosen product. (24 marks)

- **Examine the intended purpose of a product and identify the key criteria used in its design. (9) (2 x A3)**

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

- Detailed description of the intended purpose of **one** 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 and show quite clearly and categorically what **specific, single product** has been selected for analysis. Fewer candidates are now stating their product is ' toothbrushes ' 'torches' or 'handbags' where candidates insist on doing this they should be marked in the lower bands. Better candidates are now showing a clear photograph of the single selected product actually being used in context; this trend should be encouraged with candidates working within all assessment bands. Real time evidence is better than numerous photographs from catalogues.

- **Analyse the strengths and weaknesses of a product in comparison with similar products. (9) (2x A3)**

Advice on the finer points of interpretation of this section: The specification does not say 'analyse the strengths and weaknesses of similar products' (this is an A2 statement). Better candidates realise this and 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 product, marks at the top of the top band should be reserved for candidates who provide this. Poor responses often include charts and tables populated with Internet images with no identification of the strengths and weaknesses of the selected product. Better candidates are now showing clear photographic evidence of actually using a range of products, which are compared with the selected product. This feature needs to be encouraged with candidates working within all mark bands.

- **Identify and analyse the moral implications associated with environmental, social and economic issues in the design and use of the product. (6) (1 x A3)**

Moral implications should be considered in relation to the design and use of the product chosen for study. There is now a requirement to consider the moral implications associated with **economic issues**. Many candidates are now considering this topic and providing some good relevant information. A surprisingly large proportion of candidates are referring to this section as 'economical issues'. This is not the correct title and should be avoided as it leads candidates to consider general cost issues rather than the moral implications of the worldwide economy.

This section has a new direction and is being misinterpreted by many candidates. The clear emphasis 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 economics. This section is very poor in many cases and moderators are making large reductions. Some Centres that would otherwise be 'in tolerance' have a scaling applied due to overgenerous marking of this section.

Clear advice and structured teaching is required. Advice may be sought from the recently renamed' Practical Action'. Access to their resources is through their Sustainable Design Award Web site: (www.sda-uk.org). They provide helpful information and have structured their advice to mirror our assessment criteria. Their latest publication 'The Sustainability Handbook for D & T Teachers' includes advice on initiating discussions on sustainable topics. Some candidates had structured their work on relevant sections from this book dealing with economic, environmental and social responsibility. Candidates who use a good resource for this section are better prepared to access marks in the top band.

Better candidates have clearly shown evidence of addressing sustainable issues; an improvement is needed here by many candidates, which will only be achieved by accessing appropriate resources and engaging in the correct level of ethical debate.

SECTION A2 Initial Design of Improved Product. (36 marks)

- **Write a detailed design brief for improving the product in some way. (3) 1/3 x A3)**

The design brief presented should relate to improving the 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. Many reductions are being made here by moderators where the brief begins with statements similar to: 'I am going to design a hair brush'. Candidates should be informed that the correct approach is 'I am going to improve the design of hairbrush 'X' by…… Centres should consider awarding no marks whatsoever when an

improvement to a selected single product is not identified. Moderators report that many candidates are still trying to improve too many aspects of their selected product.

- **Develop and justify an objective design specification. (6) (2/3 x A3)**

Moderators reported an improvement in specifications this session with better candidates using 'specification categories'. 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. Many candidates are now identifying the justification for each specification point 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.

- **Use annotated sketching to generate a wide range of initial ideas, which explore possible improvements. (15) (5 x A3 max)**

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. Moderators report that there is an improvement in the sketching with many candidates now including initial 'thumb nail' sketches, which many might consider discarding. Simplistic sketches with little or no annotation should be awarded marks in the lower band as should presentations which rely exclusively on alternative shapes with little development or analytical content. All of the available additional marks gained by rewriting the specification have been awarded to this very important section. The expectation is that a specific improvement is developed, a few candidates try to re-design a whole product or 'almost every aspect of a product' and this is not the intention of this section. Candidates who choose to include 2D design models in this section need to be reminded that they will be acknowledged as design ideas in section A. 2D modelling is still a requirement in section B of the folder where a range of 2D models must be presented. No 3D material should be included in the folders sent for moderation.

- **Evaluate ideas against the specification and justify the choice of one idea worthy of being taken forward. (6) (1 x A3)**

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. Weaker candidates can benefit from a more structured response to this section in a table form; some more able candidates use this method to justify a design selection. Moderator's report that 'subjective marking ideas out of ten' is becoming a little too structured and is often a feature of weaker candidates work. Colour coding of evaluation points is being used to good effect in some Centres.

- **Use a combination of text, graphical techniques and ICT, as appropriate to present information. (6) (All previous A3 sheets in section A)**

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. Centre marking of this section is usually accurate and consistent with many candidates producing excellent work. Candidates should be encouraged not to over enhance the background of their ideas sheets if this impairs the clarity of presentation. Some candidates spend a disproportionate amount of time in enhancing the appearance of their pages.
Many moderators still report that it is hard to read through some 'over decorative backgrounds.'

SECTION B Product Development, Modelling and testing. (60 marks)

- **Analyse the influence of relevant design constraints on the proposed idea. e.g. issues of materials choice, manufacturing issues, ergonomics, aesthetics, environment. etc. (6) (1 x A3)**

Candidates are required to show clear and careful consideration of the Design Constraints relevant to the product. For marks in the top band candidates should consider the following issues: materials choice, manufacturing, ergonomics, aesthetics, environment, etc. (other issues e.g. economics or sustainability could also be relevant). The best responses from candidates include an image of their selected idea for development; relevant constraints are often effectively presented by annotation. Section A often ends with a final image of the idea selected for development. Careful planning of the folder could present this information on an adjacent facing page

- **Make sufficient first generation 2D & 3D experimental prototype models to establish the validity of the proposed idea in terms of physical requirements e.g. construction, movement, stability, strength, etc.; aesthetic qualities; suitable manufacturing processes and issues, suitability of materials or components. (36) (3 x A3 drawings, images, photographs)**

This is the area where some Centres could make a major impact on the performance of candidates in relation to the assessment criteria.
The criteria state:

Top band- Makes a range of good quality first generation 2D and 3D prototype models…'
Middle Band - Makes a range of competent first generation 2D and 3D prototype models.'
Lower band - Makes a more limited range of moderate first generation 2D and 3D prototype models'

All three bands call for a range of 2D and 3D models.
Candidates should be advised to meet this requirement by completing a range of 2D models and a range of 3D models. It should be pointed out that the making of a single prototype does not satisfy the requirements of the assessment criteria for this section. One single prototype, however well made does not meet even the requirement for the lower band. Some Centres encourage candidates to produce a final redesigned product; this is acceptable with the provision that a range of 2D and a range of 3D models is provided during the development. The largest reductions made by moderators are for marks in the top band awarded to a single prototype.

The most common statement used in Moderators reports to Centres is:
'Candidates need to produce a range of both 2D and 3D models in this section, and marks in the highest band cannot be justified where no evidence of 2D modelling is presented.'
To award marks in the top band evidence of a good range of 2D modelling should be presented -Formal drawings, CAD, unfolded/uncut nets, flat paper and card models, croc-clip circuits, textile patterns and ProDesktop images can all support the 2D section.
Card, Calico/Toile, Plasticine, polymorph, clay, foam, and the use of breadboarding techniques can all precede the use of more resistant materials in the development of 3D models.

Moderators report that' better candidates tended to use a variety of materials/approaches to quickly validate their proposals.' Moderators need to judge the quality of models, this is difficult when photographs are too small or are of poor resolution.

- **Make, using workshop tools a self contained test rig to formally test an appropriate physical requirement e.g. construction, movement, stability, strength, etc. or the suitability of the proposed materials or components.**
  (12) (2x A3) - including test results from summary

There is now some very clear evidence of innovative test rigs manufactured within the required time scale. The best rigs show clear evidence of accurate measurement and calibration.

No marks can be awarded in this section unless a specially made **individua**l test rig is used, and it should be pointed out that an assembly of technical or scientific equipment does not meet the requirements of the assessment criteria. Questionnaires, surveys, or the use of a model or models does not meet the requirements of the assessment criteria.

It is expected that the test rig should take approximately three hours of workshop time to produce, and be capable of providing relevant and quantifiable results. Marks at the top end of the higher band should be reserved for those candidates who show clear evidence of calibration, accurate measurement or quantifying their results. Test rigs without this feature should be awarded marks in the lower bands. Moderators report that many candidates provide lengthy details of the construction method for their rigs- No marks are awarded for details of the design and construction of the test rig. Marks are awarded for the quality of the rig evidenced by clear photographs. One clear photograph of the rig in use can be supported by clear details of calibration or accurate measurement. Centres should only award marks in the top band where there is clear evidence provided of accurate calibration/ measurement.

Produce a summary of the results of this modelling which includes analysis of information gained from the models, details and analysis gained from the results of the testing with suggestions for further improvements to the proposed idea. (6) (2 x A3)

In addition to the presentation of test results, Candidates should summarise the results of their modelling and suggest 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.

Summary of some main points:

- Make sure Version 3 of the specification is being used.
- Clearly identify any resubmitted work for the June session - applied annotations are helpful.
- Choose one specific, single, selected product- use it and show it being used in real time.
- Show evidence of comparative products actually being used; write a conclusion or summary referring back to the original product.
- Emphasise the moral implications of economic issues- engage in an ethical debate.
- The brief should clearly identify one improvement to the single selected product.
- Make a range of both 2D & 3D models. Check 2D models are presented in section B.

- All candidates must construct a test rig using workshop tools. Don't share!
- To access marks at the top of the top band clear evidence of calibration/accurate measurement should be shown in the test rig section.
- Bind project securely down the left-hand side.
- Do not use plastic sleeves or folders of any description.
- Centres: Be rigorous and consistent in awarding no marks (0) where no work is presented against the assessment criteria.
- Please maintain the improvement in the quality of photographic evidence.

2520/01 Product Design1 and 2521/01 Product Systems & Control 1

General Comments

The overall standard was similar to January 2007, although there were a number of candidates who did not appear to be ready for the exam.
A significant number of candidates did not give justified design requirements in answer to part (a) of questions and many did not raise more than one issue in the discussion questions. Candidates offered generic statements for part (a) such as 'aesthetically pleasing' and 'value for money'. These statements will not gain a mark. The design requirement must focus on the product stated.
No credit is awarded for obvious statements such as 'The toothbrush must clean teeth.'

When preparing students for this paper, it is a good idea to ask the students if they can identify the specific product from the design requirements that they have given.
A significant number of candidates did not fully understand core design elements such as ergonomics and the use of tolerances.

A number of candidates answered more than the three questions required. Answers were mostly rushed and lacking detail. Candidates should be reminded to read through the paper carefully and select three questions to answer, making sure that all of the questions have been read, not just part (a).

A number of candidates rushed their answers, their writing was unclear and they did not use the full space allowed. This was particularly evident in question 2 (c), 4 (c), 5 (c) and the discuss questions. Candidates often gave very brief statements with limited explanation or detail.
Many candidates did not provide examples, which carry marks, when required to do so. This lead to lower marks achieved by some candidates in Question 1 (c), 2 (b), 3(c) and the discuss questions.
Questions 1,3 and 5 were the most popular with question 4 the least popular.

Comments on Individual Questions

1 (a) Most candidates gave at least 2 justified requirements for the hole punch such as ' it must have a guide to accurately position the paper for punching' and it must include a system to hold waste to avoid mess'

(b) Although most candidates gave good responses to part (b) a significant number focussed on features of the punch with no reference to the user.

(c) Many candidates did not achieve any marks for part (c). The best responses gave specific examples including dimensional detail eg. $\pm$ 0.05 mm on an engineered shaft.

(d) There were a number of outstanding responses to this part . Candidates focussed on the need to be aware of competitors, to respond to market demand and to ensure their products are well marketed and advertised.

2 (a) Generally very well answered, candidates had little difficulty in giving three benefits of CAD when designing products.

(b) Although most candidates explained the benefits of using CAM, very few gave an example.

(c) Very well answered, the most common drawbacks given were; initial set up costs, training issues and skill / job loss concerns.

(d) Very few candidates had an understanding of computer simulation. The best responses included issues such as testing structures using software to identify weaknesses, reducing lead-time for the introduction of new products, and architectural 'walk through' capabilities.

3 (a) Very well answered although a number of candidates gave generic or simplistic statements such as 'must clean teeth', which did not receive a mark.

(b) Generally well answered. A number of candidates gave brief statements such as ' contains fewer parts'. To access full marks it required '..fewer manufacturing processes therefore less energy used' or '..less material/s required'.

(c) Most candidates answered this part well, explaining the need for user feedback before production. Many gave appropriate examples.

(d) Although there were some excellent responses to this part, with candidates raising issues such as effective target marketing, ergonomic factors and style/fashion influences, many candidates referred to generic factors relating to product design and did not focus on the issues involved when designing for a specific group.

4 (a) Generally well answered with justified requirements relating to modesty, streamlining, and ease of putting on/taking off, being the most popular responses.

(b) Many candidates gave correct responses relating to quality control in the production of swimwear such as; visual checks for colour fastness/pattern alignment and seam checks. Some gave general testing methods that would be carried out before or after production, only checks or tests carried out in the production of the swimwear would gain a mark.

(c) Most candidates identified methods of promoting swimwear products. Very few candidates evaluated their effectiveness.

(d) There were a number of excellent answers to this question. The best responses raised issues relating to cost implications, training requirements and brand reputation.

5 (a) Very well answered. The most common requirements focussed on: resisting damage; shape for display/transportation and ease of pouring.

(b) Although generally well answered, a significant number of candidates gave the same answer for each part, many stated that aesthetics would – attract attention, stand out, and look impressive. Only one mark out of three could be awarded.

(c) Many candidates were able to give two ways in which consumers are assured that they have purchased a quality product. The most common responses were: use of a symbol (Kite mark or CE to denote inspection by outside agency), brand reputation and independent reviews (Which Reports).

(d) This question was answered well by a significant number of candidates. Most were able to raise at least one issue, usually the large audience (TV). Few candidates achieved full marks. The best responses included other issues such as appropriate advertising (Alcohol, Cigarettes), effective images (electronic pitch/courtside advertising) and target market.

2520/02 Product Design 1

General comments

Despite the use of a different, printed answer booklet from the 2520/01 paper, a number of centres sent the 2520/02 scripts to the wrong examiner. This caused significant problems.
Many candidates do not use correct D&T terminology and fail to use the correct names of tools eg 'ban-saw'.
The response to part (c) of each question had improved over the past few years, this year it had regressed. Centres need to focus on clear points, qualified and supported by evidence if candidates are to gain full credit.
There was a tendency to give generic, superficial answers, which gave a very limited analysis of the demands of the specific question.

Comments on Individual Questions

Report arranged in order of questions 'popularity' with the candidates.

1 **(a)(i)** The majority of candidates answered correctly – oak, beech and teak being common responses.

(ii) 'Strong' and 'durable' being common responses with some referring to resistance to rotting, the oils contained in teak being given by some candidates.

(b) Some good answers but clearly some candidates had little understanding of the function of jigs. Few candidates identified correct tools and of those that did some incorrectly referred to technical name of tools, examples such as the 'ban' saw and hole drill were occasionally used.

However a number of candidates did describe the correct use of fences on the circular saw to reduce the raw material to the correct size. There were a significant number of candidates who incorrectly described vague systems of CAM and automated conveyor belts.

(c) Generally quite well attempted with type of wood, hard/soft, manufacturing costs: mass/bespoke and finishes being described. However a significant number focussed solely on environmental issues with little qualification or examples to complete their answers.

3 **(a)(i)** Generally sound reasons were given – typically self-coloured and toughness to protect glasses.

(ii) Many candidates identified the cost of extra components and assembly costs. However a significant number discussed the function of the glasses case and difficulty in opening a two-part case.

(b) The process was generally described but few discussed the design of the mould. Ejector pins were often described as injector pins. Few candidates gave details of the mould other than referring to it as two-part.

(c) The influence of fashion in the design of products generally revolved around: sales, colour and target audience (market).

4 **(a)(i)** Well answered with two properties well described.

(ii) Two advantages of laminating generally identified and described.

(b) The commercial process of laminating seemed unknown to all the candidates who attempted this question. Surprisingly, candidates were unaware of lamination using a pouch.

(c) This section was very poorly attempted. Material costs were identified but without qualification or example. 'Ink' was identified as expensive in quantity. Some candidates described no graphic examples e.g. car design.

2 **(a)(i)** Often only one legitimate reason was given – mainly strength or toughness.

(ii) Very few candidates described case hardening but many clearly had little or no understanding of the process.

(b) Many candidates described a process of blanking but I would suggest not from any previous knowledge. Some candidates likened it to pastry or cookie cutting but on a bigger scale! Many candidates did not understand the process of case hardening, a number of whom described electro-plating or casting.

(c) The implications of disposable tools revolved around the environment, recycling and landfill. Few qualified their answers and even fewer gave legitimate examples (with the exception of some candidates who mentioned flat pack furniture from IKEA). Many candidates attempted to consider the effects of disposable tools on the manufacturers their profit and loss.

6 **(a)** Generally candidates who attempted this question identified three of the four attributes of cotton for a Rugby shirt. The most common misconception was that cotton 'is a good insulator and will keep you warm on a Rugby field'.

(b) Poorly attempted – 'the generation of the design using CAD – linking to a CAM embroidering machine – machining the design and trimming off loose threads' was as the most common, if, superficial response.

(c) Very poorly attempted, 'loss of job due to computers' ,'loss of money because of frequent breakdowns' were frequently given generic responses. Better candidates referred to the large capital cost of installing CAD/CAM systems plus a subsequent loss of jobs!

5 **(a)(i)** Of the few candidates who attempted this question, most gained credit for two symbols. The age guide and recycling were the two most popular symbols given.

(ii) Generally well answered with candidates referring to re-use and allusions to standardisation of the DVD case.

(b) Knowledge of the flexography process was usually confined to – a tray of ink – transferred to a roller – ink dries. Very few candidates were able to give a detailed description.

(c) Very poorly attempted. However, a very few candidates did identify gravure as expensive and screen printing as cheap but without qualification or example to complete their answer.

7 **(a)(i)** Only attempted by a very small number of candidates who gave adequate responses. However most gave ‘Leather’ as a fabric.

(ii) Two chemical finishes correctly identified.

(b) Calendering was superficially understood and most candidates mentioned heat, pressure and ‘ironing’.

(c) Environmental issues were considered but not in sufficient breadth to gain full credit – typically the answers only considered the effect on watercourses of textile chemicals.

2521/02 Product Systems & Control 1

The January 2008 examination was answered well by most of the candidates. There were good approaches to the questions and well thought out answers to the 'discuss' section of each question. The improvement in the responses to the 'discuss' section seen over the last four examination sessions has been maintained with very few candidates failing to include a relevant specific example. There are still weaknesses in the knowledge of technical content seen from a number of candidates. The middle part of each question is designed to test the technical understanding of the candidate and whilst the best candidates produced very pleasing answers here, the majority lost marks by, either failing to read the question properly or making careless errors. However, many candidates produced interesting and pleasingly correct answers to the 'notes and sketches' parts to many of the questions. This shows that the questions were able to tease out the required technical knowledge from the best candidates. The questions with calculations in them again proved that there is a very mixed understanding of how to use formulae, given on the insert, along with the question paper. The questions are written to make the use of the formulae straightforward and it was still evident that candidates do not estimate an answer first, and then calculate out. The answers with the correct digits, but many decimal places out, bear this fact out.
Candidates attempted all the questions across the centres in the following preferences:
4 ; 3; 1; 2; 5; 6.

The mechanical questions were the most popular with more than half of the candidates. The Electronics questions were next with the Pneumatics questions some way behind. however there were some candidates who demonstrated an excellent knowledge of pneumatics.

1 **(a)(i)** Well answered

(ii) Mostly correct but some connected to Pin 3.

(iii) This was either correct or a long way out. Many candidates do not understand the capacitor units.

(iv) The question asked for the output but many candidates did not give this correctly.

(b) Surprisingly poorly answered with many inappropriate components put in.

(c) Answered well.

(d) Well answered when relevant points were made.

2 **(a)(i)** Well answered.

(ii) Well answered.

(iii) Fewer candidates than expected could suggest a de-bouncing circuit of any type here.

(b) (i) Calculation was not done well by the majority of candidates but the best ones found little difficulty with a simple division.

(ii) Very few candidates managed to draw a circuit that was anything like a standard relay circuit.

(c)(i) This was better with many candidates getting marks for part correct answers.

(ii) Well answered.

(iii) Well answered.

(d) Many candidates had a clear understanding of the issues here and answered well

3 **(a)(i)** Well answered.

(ii) Well answered. Some candidates incorrectly opted for the chain and sprocket but gave correct reasons why, thus gaining marks .

(b) Well answered with good solutions.

(c) (i) Well answered.

(ii) There were some good solutions seen here but often candidates who opted to use springs did not put any kind of damper mechanism in place. This made their answer impractical.

(d) Well answered and understood.

4 **(a) (i)** Well answered.

(ii) Many candidates inverted the ratio but were given the marks if ratio figures correct.

(iii) Well answered by the best candidates but many answers out by a surprising magnitude.

(b) (i) Reasonable understanding of steel types shown here.

(ii) Many candidates unsure as to the nature of rivets.

(c) Very interesting answers given here with good appreciation of the problem. The best candidates specified a full system with easy connections.

(d) Well answered.

5 **(a) (i)** Well answered.

(ii) Well answered.

(b) (i) Connections usually correct but some candidates got the flow through the unidirectional restrictors wrong.

(ii) Well answered.

(c) (i) This part of the question was a good example of candidates not taking enough care with reading the table information and making careless errors.

(ii) Very few candidates knew any thing about solenoid valves and sensors here.

(d) Many candidates did very well here but marks were lost by candidates who wandered off the points they had identified and did not qualify them.

6 (a) (i) Surprisingly few candidates got this right. Many thought they were the numbers 12 and 14.

(ii) Usually correct but errors in flow direction were made.

(b) (i) Correctly answered by the best candidates but most others avoided this calculation or made a weak attempt to use the formula and units.

(ii) Choice of cylinder here was correct if (i) was understood.

(iii) Very poorly answered. Little understanding of cylinder performance shown.

(c) Not much knowledge of industrial settings shown, rather only generic points made.

2522: Designing and Unit 2523 Making and Evaluating

General Comments

Centres submitted their marks to the Moderator using the correct CSF2522 and CSF2523 forms, although Moderators needed to contact several Centres after the due date in order to obtain MS1 forms, CCS 160 Centre Authentication forms, or the coursework itself.

There was only a small entry for this coursework component, the vast majority for Unit 2522. A small number of candidates resubmitted coursework folders from the June 2007 session.

A range of project titles had been chosen by candidates that were appropriate to the requirements of the examination. There was considerable variation in terms of complexity and demand, both for designing and making. Some large and complex projects resulted in superficial design work and expensive practical outcomes. A2 coursework needs to be substantial and rigorous, but it can easily be unrealistic and unmanageable. High marks were achieved in some cases from relatively straightforward problems addressed thoroughly with attention to detail.

A high standard of design and making work was again presented by many candidates, and this is an inspiration to Moderators. A number of projects were innovative in concept and outcome, and creative work of this nature was appropriately rewarded by Centres.

In some cases the overall complexity of the projects as executed and the range and/or depth of skills involved in the designing and making was insufficient for candidates to attain the marks awarded by the Centre when compared with the OCR standard. The guidance of the teacher is crucial at the start of the project and during the design development to ensure that the project work contains and retains significant skills appropriate to Advanced Level that will enable the candidate to demonstrate his or her ability in every section of the assessment criteria.

Centres' assessments for both 2522 and 2523 were mostly in line with the OCR standard this session. A few Centres' marks were lenient and just outside the tolerance permitted. Centres are reminded that although marks for individual sections may be one mark lenient, if this applies to several sections there will be a cumulative effect which will necessitate adjustments.

Most candidates used the assessment criteria headings to give structure to their folders. In general, folders were concise and well laid out, following the recommended number of A3 sheets for each Unit.

Reference to industrial and commercial issues was generally weak, with few candidates exploring the commercial aspects of manufacture and the implications for design in significant detail. However, candidates did reflect commercial practice by further developing and using ICT and CAD CAM in their coursework, and high level skills were evident in many cases.

An increasing number of candidates are using PowerPoint software to present their coursework, submitting A3 colour print-outs for assessment. This is a beneficial development as Centres prepare for the new OCR GCE DT Product Design specification. The backgrounds used by some candidates made it very difficult to read the text or to decipher the sketches and drawings.

The preferred method for binding the folders is to hole-punch (ideally using a 4-hole punch) along the left hand edge and secure together with treasury tags. Individual plastic sleeves, folders with multi-plastic sleeves and/or ring binders should not be used. 2522 and 2523 should each be presented in a separate folder. Sample materials should not appear in the folders.

Photographs, diagrams, and written details of samples obtained are sufficient evidence for assessment.

Comments on Individual Sections

Unit 2522: Designing

1 RECOGNITION, INVESTIGATION AND SYNTHESIS OF DESIGN OPPORTUNITIES (33 MARKS)

SELECT and INTRODUCE. Select and introduce a design opportunity, suitable for developing within the recommended time allocation of the unit, explaining in detail the reasons for choice; present an initial design brief and identify important, relevant issues for investigation (6 marks)

The choice of an appropriate project is crucial to success in both Unit 2522 and Unit 2523 and this should arise from discussion between the candidate and teacher to ensure that, within the time available, the proposal will give access to all of the assessment criteria at a level to match the ability of the candidate. To gain high marks for this section there should be a detailed introduction which explains thoroughly the background and reasons for choice. A clear design brief and the issues likely to be involved throughout the project should be identified.

Design briefs were clear, but mostly 'candidate-focused' rather than 'market-focused'. Most candidates did not consider and state the potential benefits of the product in a broader, more commercial, context. It is important for the candidate to look beyond their personal needs to the needs of a specific client or user group, and beyond this to the appropriate issues relating to commercial production and the marketing of their product.

Centres assessments in this section tended to be slightly lenient.

TIME PLAN. Produce a realistic time plan for the unit, from initial investigation through to the working drawings, which includes as much detail as can be projected at this stage, together with evidence of adapting the plan to changing circumstances (3 marks)

In almost all cases, Centres' assessments were generous in this section. Several Centres awarded marks in the middle and higher mark bands where the time plan was generic and could have been placed in any A2 project folder. In such cases a mark of zero should be awarded. Key stages, tasks, and timings for the particular project should be identified, and evidence of the plan being used as an ongoing stage-by-stage guide through the project is required. Project planning and management is crucial in an industrial context and candidates are expected to apply similar principles and practices to their coursework projects at A2 level.

SOURCES of INFORMATION. Identify primary and secondary sources of information relevant to the problem (3 marks)

By this stage, candidates should have a clear idea of the direction of their project, and should in this section include named specific sources of information (e.g. named people, organisations, websites and books) and specific techniques (e.g. interview or survey to be conducted in a particular way at a given location and time). Potential users of the product should be included. Specific relevance to the needs of the individual product and its target market is important for the highest marks to be achieved.
Candidates' work in this section was usually accurately assessed by Centres.

STRENGTHS and WEAKNESSES in EXISTING PRODUCTS. Present and analyse edited research to identify strengths and weaknesses in existing products to provide information for later use (6 marks)

Many candidates are still simply copying and pasting images and product specifications from the Internet. This does not satisfy the assessment criteria for high marks, and candidates' work in this section was therefore often over-rewarded by Centres.

Images obtained from the Internet are of limited value and do not provide the specific and detailed information needed by candidates to guide their designing. Whilst aesthetic aspects can be reasonably judged through a series of images, the functional suitability of existing products cannot be analysed and assessed without direct and personal contact with the product.

The best work in this section included diagrams and sketches of existing products and their features alongside close-up photographs taken by the candidate. Looking closely in person at a small number of items is of higher value than studying a large number of items at a distance, both in terms of the useful information which will be gained and the marks that can be awarded.

IDENTIFY and ANALYSE CONSTRAINTS. Present and analyse edited research to identify the constraints caused by environmental factors, moral issues, social issues, cost factors and market opportunities, to provide information for use in the development of a design specification (9 marks)

Too much work in this section was generic and not specifically related to the project being designed. For this reason the Moderators were unable to confirm the high marks awarded by Centres in many cases.

The main purpose of research is to identify specific data relating to user/target market needs and functional aspects of the product that is essential if the design is to do the job for which it is intended. Many candidates failed to show evidence of having obtained key information such as the details and dimensions of items to be stored or fitted into the product, or details relating to the intended location for the product. In many cases there were massive gaps in the information which would be needed to be able to design a functioning product.

The 'constraints' are the restrictions, limitations, and boundaries imposed on the product by various issues. If a product is to be used by a certain group of people, be stored in a certain location, or contain certain items, the details of the constraints arising from these factors (obtained by interviewing users, by measurement, or by consulting relevant documentation) should be identified, analysed and presented by candidates in this section.

DESIGN SPECIFICATION. Produce a detailed and justified design specification from the objective analysis of research data (6 marks)

In general, the Design Specifications contained many generic points which were insufficient to guide and influence the design work. Specific requirements in terms of sizes, capacities, features, performance, ergonomics, and cost were often omitted.

Those candidates who had thoroughly analysed the design need and carried out effective product and user research were able to present sound criteria that the product should meet. The design specifications produced by those having carried out limited research and investigation were not specific or detailed enough and were unsuitable as a basis for evaluation.

For high marks to be awarded, candidates must state requirements by reference to specific aspects of the product, including measurable targets wherever possible.

Centres' assessments in this section tended to be lenient.

GENERATION, MODELLING and DEVELOPMENT of IDEAS (57 MARKS)

IDEAS with DEVELOPMENT to a PROPOSAL. Generate and modify a range of innovative ideas using annotated sketching and modelling, leading to a final justified proposal which takes into account aesthetics, suitability of materials, manufacturing processes and fitness for purpose (18 marks)

There was a wide variation in the standard of work in this section, but Centres were reasonably accurate in their marking. In a small number of cases some highly innovative and inspirational design work was under-rewarded by Centres.

There was a considerable difference in intellectual demand from one project to another. Candidates choosing very simple products with little complexity must be aware that considerable detail will be needed if their work is going to achieve high marks. Most candidates showed a reasonable range of initial, concept ideas but relatively few of them showed a true progression of ideas explaining and justifying a final proposal. Often there was a totally unexplained jump from concept ideas to the final idea which usually lacked much of the technical information (such as dimensions and constructional details) that was needed before manufacture could begin.

The majority of candidates followed guidance from previous Moderators' Reports and integrated the presentation of sections 2.1, 2.2 and 2.3. This made it easier to follow the development of the design idea.

In addition to the use of CAD to produce working drawings, several candidates used CAD effectively in this section to show variations in shape and form, colour and texture, and to model ideas and possible solutions. This approach is encouraged, and is a good use of ICT to develop and refine ideas.

Development using MODELS. Produce first generation 2D and 3D models to aid the development of ideas and to establish the validity of their chosen solution (9 marks)

There was some high quality modelling, with a widely variable standard of analysis. Clear and detailed annotation of photographs and diagrams is crucial to support the decisions made. Where candidates integrated sketching and modelling, the progression of ideas was more fluent.

Models that focused on specific details of the solution were generally found to be more useful than models of the final idea. Centres and candidates are encouraged to use 2D and 3D modelling as a means of testing out the viability of aspects of the design while the design sheets are being produced.

A variety of modelling materials were used appropriately, and laser cutting and engraving CAM equipment was again commonly used to produce a range of models, including card cut and scored ready for folding, and thin MDF cut and then joined.

Photographic evidence was of variable quality, with a number of blurred images in some folders.

Some candidates presented rendered images created in CAD packages to give 3D visualisations of the proposed solution, although in some cases these were of limited value beyond the sketched ideas in establishing the validity of possible solutions.

In general, Centres' assessments in this section were accurate.

EVALUATION of IDEAS and MODELS. Evaluate ideas and models against the design specification and justify decisions for choice or rejection (6 marks)

Centres' marks in this section were broadly in line with the OCR standard.

A variety of different formats was used, but intellectual rigour in the analysis of the ideas was often missing. For many candidates the evaluation was hampered by a weak specification in section 1.6. This meant that candidates did not have a sensible set of objective criteria by which to judge their ideas, so that comments could only be subjective personal opinion.

Annotation of sketched ideas tended to be descriptive. The real time evaluation of ideas, modelling, and design development should be given a higher priority. This must be clearly evident to be of benefit to the candidate in the process of choosing the most suitable design idea to be developed.

ADDITIONAL RESEARCH. Undertake and record the edited results of relevant additional research into information needed for further development of ideas including as appropriate, available materials, types and properties of materials appropriate to specific needs, suitable components, costings, ergonomics and manufacturing processes (3 marks)

Centres' assessments tended to be lenient in this section, where work was often superficial. There was often limited evidence of the application of the information gathered to inform the development of ideas or the final solution.

Care should be taken to include an appropriate level of detail. To be of real benefit in the design development, for example, the research into a range of fittings should include technical information such as dimensions, specific materials, finishes, and method of fixing, as well as costs.

Influence of DESIGN CONSTRAINTS. For the chosen solution, consider the influence of relevant design constraints, including environmental factors, moral issues, social issues, cost factors, ergonomics, market opportunities and user and manufacturer needs (6 marks)

The requirements of this section are not understood by many candidates. Assessments by Centres tended to be lenient when compared with the OCR standard.

The influence of the design constraints (identified in Section 1.5) on the chosen solution should be clearly shown. Reasons should be given for the design choices and decisions that have been made, such as the sizes and proportions, the components and features, the materials and finishes, the overall form and visual aspects. The recommended means of presentation is an image of the final design with surrounding annotation to indicate and justify the various features and aspects of the design.

Produce CAD WORKING DRAWINGS. Produce high quality working drawings using CAD, in a format appropriate to the type of product and which could be used by a third party with no further guidance (9 marks)

Work presented by candidates in this section continues to improve. Some responses were to a high standard of detail and complexity, showing an high level of skill. A variety of CAD software was used by candidates.

Whilst an increasing number of candidates added the necessary information about component detail and materials, the majority of candidates did not include sufficient detail for third party manufacture. Drawings often lacked detailed dimensions, materials, and constructional details. For maximum marks, it is expected that the working drawings will include full details of the product – an assembly drawing with named component parts (with separate drawings of each part where necessary) and their materials and details for assembly. Candidates should be encouraged to add parts lists and notes to their working drawings to ensure all information is incorporated.

A small number of candidates presented only hand drawn working drawings which could only earn marks within the bottom mark band. In a number of cases CAD drawings were annotated / dimensioned by hand and the notes added in pen or pencil.

A number of candidates presented CAD 'virtual' 3D / pictorial images in this section when these form part of ideas and modelling. Some candidates presented high quality 3D images but had not converted these to 2D line drawings using the tools in the CAD software, usually involving just a few mouse clicks. The use of the dimensioning tools is equally straightforward.

Centres' marks in this section were generally in line with the OCR standard.

Produce DESIGN FOLIO. Produce a fluent, well presented and informative design folio, using a combination of text, graphical techniques and ICT (6 marks)

A range of hand techniques, ICT applications and CAD were evident in most folders.

Digital photography featured strongly, although the quality of the images, especially where 'camera-phones' were used, was poor in some cases. In a small number of cases, handwriting and written annotation were almost illegible.

Coherence and fluency are key factors for success, and candidates who clearly communicated their process of designing through the various sections scored high marks.

Overall this section was accurately assessed by Centres. Many candidates were awarded maximum marks, and deservedly so. Most candidates earned marks in the middle or higher mark bands.

Unit 2523: Making and Evaluating

1 PLANNING and MAKING (69 MARKS)

1.1 PLAN for MAKING. Produce a thorough plan for making which includes details of materials and processes to be used, health and safety issues, including a risk assessment of procedures and materials involved and quality control measures (9 marks)

This section requires a stage-by-stage plan of action for the making of the final outcome defined in the CAD Working Drawings presented in Unit 2522. Centres' assessments were generally in line with the OCR standard.

Plans were generally presented in a 'standard' table format with appropriate headings for Materials, Processes, Health and Safety, Risk Assessment, and Quality Control.

1.2 QUALITY of OUTCOME. Produce a high quality outcome that demonstrates substantial making skills and innovation

There was variety in the quality and scope of products. Centres' marking was broadly in line with the OCR Standard.

Some candidates had used high level skills to produce exceptional outcomes that were fully working prototypes of an extremely high standard. In some cases the project required more complex means of making for the candidate to be able to access the higher mark bands for A2 level coursework.

Marks allocated to practical work should reflect the overall level of demand, the level of skill demonstrated by the candidate, the quality of the making of the product outcome, and evidence of innovation. Evidence in the form of clear photographs of the whole and parts of the outcome, and an accurate record of progress, is crucial to support Centres' assessments. The total marks available in this section are **51 MARKS**, awarded in three sub sections as follows:

1.2a SKILL LEVEL. Demonstrate substantial making skills (15 marks)

It is important that the level of making skills shown by the candidate is consistent with the demands of Advanced Level coursework. More important than the size of the outcome is the overall complexity, the breadth and/or depth of making skills involved. A limited range and depth of basic hand skills was demonstrated in some cases, and it was not possible to confirm marks in the higher bands awarded by Centres. Projects involving challenging making skills and detailing, which clearly stretched the candidates, gave access to higher marks.

The use of CAD and CAM, and their integration and inclusion in various aspects of the projects beyond the CAD working drawings, is to the benefit of candidates. Full evidence in the form of stage-by-stage 'Print Screens' is required to support the Centre marks.

1.2b PRODUCT. Produce a high quality outcome (24 marks)

There was wide variation in product quality, including some truly outstanding and expertly produced prototypes.

'Quality' is an all-embracing word, and characteristics of a high quality product include: fitness for purpose, suitability for the intended market, appropriate and high quality finish, appropriate and accurate construction and assembly, economical use of materials, value for money,

attention to detail, safety and ease of use, durability, ease of maintenance, visually attractive, together with evidence of a consideration of commercial issues such as manufacturing, packaging and marketing.

Photographic evidence was generally acceptable, but close-up photographs need to be clearer to support the Centre's assessments.

Centres' marks in this section were generally in line with the OCR standard.

1.2c INNOVATION. Demonstrate innovation (12 marks)

In the majority of cases, the Moderator was in broad agreement with the Centre's assessments.

The marks available for innovation in this section and in Designing section 2.1 have encouraged candidates to be more explorative, to extend the boundaries of their thinking, and to introduce innovative elements into the designing and making. Through modelling and trials candidates are refining their creative designs and features, and an increasing number of outcomes are distinctive and unique.

1.3 RECORD of PROGRESS. Record and evaluate progress during making, incorporating changes to the plan or the intended outcome if necessary; show evidence of the use of well planned quality control processes in the making of their product and the use of a variety of appropriate materials, tools and equipment in a safe and efficient manner (9 marks)

A record of progress was mostly well presented and communicated in terms of a diary of production, although the requirement to evaluate was not properly addressed. The intention is not to simply record progress but to assess each stage of the making in terms of the time taken, the level of difficulty, the appropriateness and effectiveness of the equipment used, the quality and accuracy of the results, and how that part of the process might be improved or translated into commercial terms.

The requirements for this section are clear. Although it was completed reasonably well by the majority of candidates, few attained maximum marks because some of the detailed aspects of the criteria were omitted. Many candidates failed to record problems, changes and adjustments to the original plan or the intended outcome, and overall evidence of the use of quality control was often missing. There was little reference back to Section 1.1 Plan for Making, which is a clear requirement if proper evaluation is to occur.

There is no substitute for real-time recording. The need for candidates to be organised and to keep a careful and detailed record as work progresses cannot be over-emphasised. Centres' assessments were broadly in line with the OCR standard.

2 TESTING and EVALUATION (21 MARKS)

2.1 User TESTING against Specification. Show evidence of user testing of their final solution against the specification to objectively identify strengths and weaknesses (6 marks)

In most cases, moderators were able to confirm the Centres' assessments in this section. Candidates who had produced a detailed Design Specification in Unit 2522 had the benefit of a clear framework for the evaluation and testing in this section. Some candidates simply reported their personal observations and thoughts against the specification points but did not provide first hand evidence of testing the product in use. Candidates who had centred their project on the

needs of a client or specific users from the outset of the project were able to obtain valuable and detailed feedback from testing carried out by those individuals or representative groups in the intended environment for the product.

At this level it is expected that evaluation and testing will subject the product prototype to scrutiny regarding all aspects and phases of its life, including its suitability in all places and situations it may be used, situated, stored, packaged, or transported.

Candidates are reminded that the conclusion to this section should be a summary of the strengths and weaknesses of the final solution. Not all candidates presented such a summary.

2.2 Response to EXTERNAL EVALUATION. Show a positive and responsive attitude in the face of first hand external evaluation (3 marks)

Most candidates provided some evidence of comment by a third party and, in general, Centres' marking in this section was accurate.

Some external evaluations were reported by the candidate with no evidence that any external person had actually been in contact with the product. In some cases emails were included with comments on the product where it was clear from those comments that the writer had not had direct in-person contact with the product. Often the candidate did not respond to the comments made.

The intention is that thorough testing and objective evaluation will inform modifications and improvements to the product prototype and, for the candidate, provide material for the sections of the folder that follow.

2.3 MODIFICATIONS to one-off prototype. Present detailed drawn modifications to improve the identified weaknesses in their one-off prototype (3 marks)

In general, candidates' work was accurately assessed by Centres.

The assessment criteria specifically require drawn modifications, and the best work included well presented and detailed annotated sketches and diagrams of improvements to the prototype, relating to the candidate's own and third party appraisal of the prototype product.
Weaker work consisted of what appeared to be rushed last-minute generic statements lacking specific detail.

2.4 COST ANALYSIS and comparison. Prepare a full cost analysis and compare this with previously conducted market research (3 marks)

Centres' marks were usually accurate in this section.

The need to consider costs for the one-off prototype, the likely commercial manufacturing costs, and the likely selling price for their product, relating them back to their own research prior to the designing, are emphasised as important.

Few responses achieved full marks because candidates did not thoroughly analyse and interpret the information presented. To compare the information on the production cost of the prototype with previously conducted research requires the candidate to consider the totality of the costs involved in their own product prototype including time and resources. Detailed records kept by the candidate during the project are a great help here (see comments on 2523 Section 1.3).

The costs that would be involved on a commercial basis such as research, development, fixed and variable costs should be analysed, along with related issues such as economies of scale, and comparison with similar products already on the market.

2.5 POTENTIAL and MODIFICATIONS for commercial manufacture. Show a good understanding of the potential of the product for industrial production and present drawn details of the modifications necessary to make the prototype suitable for commercial manufacture (6 marks)

Responses were marked accurately by Centres in the majority of cases, although there was a tendency to be lenient.

Candidates are required to give an honest appraisal of the commercial potential for their product, to show a clear understanding of the commercial issues involved, the likely scales of production, and to explain, justify, and show using annotated drawings the modifications needed to their prototype and appropriate processes for industrial production.

Good work in this section included an explanation of the changes which would enable the product to be marketed as a self assembly product and included a breakdown of parts and components.

Section 2524 – Product Design Section A
General Comments

All questions were attempted with numbers 1 and 3 being the most popular. There was little variation in the number of candidates answering question 2 and 4. However, very few candidates attempted to answer questions 5, 6 and 7. It was noted by the examiners that a large number of candidates failed to correctly address the actual discussion points being asked in part (c). Centres are again recommended to instruct their candidates to read through the whole question paper before selecting the questions they attempt. Centres are also encouraged to prompt their candidates to underline the central points on the question paper. This action will help the candidates to focus on the important key words of the question and not put their own interpretation on the question.

The centres that performed well in this examination had covered, in depth, the process of working in selected materials and their candidates were able to enhance their answers with clear and well labelled sketches.

Comments on individual questions:

1 (a) (i) A significant number of candidates appeared not to understand the term 'physical properties' asked for in the question. Better candidates gave tensile and compressive properties in their answers.

(ii) Most candidates were able to gain two marks for this part of the question with candidates considering the consumer in their answers.

(iii) Most candidates scored at least two marks for this part of the question. Better candidates did not just rely on anthropometric data responses and expanded their responses to fully consider a wide range of ergonomic factors.

(b) (i) Many candidates were able to give a brief description of steam bending. Better candidates augmented their answers with detailed sketches of a steam bending chamber.

(ii) A significant number of candidates relied on a very brief answer of simply putting a wooden blank on a CNC machine without explaining how the machine might be set up and run. Better candidates were able to describe a CNC set up in some detail whilst others described how the legs might be turned with the aid of copy templates.

(c) This section was generally poorly answered as many candidates failed to address the implications of the processing of raw timber. The weaker candidates wrongly centred their responses to sustainable forests, a topic that may have been previously asked in mock examinations. The better candidates discussed the environmental implications and addressed such points as energy use and pollution factors that occur during the processing stages of timber production.

2 (a) (i) Most candidates were able to give two reasons why mild steel is a suitable material for the base of the trimmer.

(ii) Most candidates were able to identify at least one suitable finish, with many gaining both marks in this part.

(iii) The majority of candidates were able to fully describe at least one

safety feature and included sketches to enhance their responses. Better candidates correctly identified several potential finger traps or gave full explanations as to why rounded edges are incorporated into certain parts of the design.

(b) (i) Most candidates were able to give an outline description of press forming. However the detail given in the labelled sketches was disappointing in the majority of answers with candidates relying totally on written descriptions.

(ii) Most candidates were able to score at least two marks in this section. Better candidates described the process of hardening and tempering referring to appropriate colour changes that would be observed.

(c) This section was generally poorly answered as many candidates failed to address the 'form and function' implications of office equipment design. The better candidates considered points such as aesthetics versus cost and how these had been taken into account.

3 (a) (i) Most candidates were able to correctly identify two reasons why PVC was a suitable material for the side moulding.

(ii) Most candidates correctly named two other suitable plastics used in car production.

(iii) Whilst most candidates scored well in this question a significant number of candidates centred their responses on the moulding rather than considering other components that are attached to cars as referred to in the question. Although this was not wrong, it did limit the responses the candidate could have opted for.

(b) Most candidates were able to describe the production cycle for extrusions in some detail. It was pleasing to see a large number of very well labelled sketches used to enhance candidates' answers.

(c) This section was generally well answered. Most candidates were able to identify that manufacturers would have to consider alternative fuels and to improve the efficiency of current engines. The better candidates centred their answers on clearly defined examples that enabled them to quantify the points they were raising.

4 (a) (i) Most candidates were able to identify two reasons why concept drawings would be produced.

(ii) Most candidates correctly stated two methods of hand rendering drawings.

(iii) Many candidates were able to score at least two marks for this section although many of the responses lacked the detail required to score maximum marks. The better candidates described how a mask would be prepared using card or film.

(b) (i) There were a significant number of candidates who had difficulty answering this part of the question. The better candidates described in detail how images would be imported and manipulated prior to printing.

(ii) Few candidates had difficulty answering this part of the question with most giving very detailed responses.

(c) There were some good answers to this part of the question, but few candidates made references to examples in their responses.

5 (a) (i) Most candidates were able to name two suitable materials for the production of children's books.

(ii) Most candidates were able to give two reasons why varnished surfaces are used in children's books.

(iii) Most candidates were able to identify two suitable binding methods. However, the descriptions given by candidates were a bit variable with the weaker candidates describing a form of loose binding. Better candidates gave full descriptions of methods such as gluing and stitching.

(b) This part of the question was generally well answered with some very detailed responses being given in well presented sketches.

(c) Most candidates gave very superficial answers to this part of the question. Whilst the majority of candidates correctly identified some of the implications for graphic designers there was very little reference as to why these issues are important and very few examples were given in support of the discussion. The better candidates considered issues such as simple language and they gave supporting evidence as to why this would be important to a young audience.

6 This question was one of the least popular questions on the paper.

(a) (i) Most candidates were able give four reasons why a woven cotton fabric would be used to make the shirt.

(ii) Most candidates correctly identified four pieces of information given to the consumer about the shirt.

(b) This part was generally poorly answered with candidates giving only vague descriptions of the printing process. The better candidates were able to give full details of the process describing how the image would be transferred using engraved rollers, a blanket and transfer rollers.

(c) This section was generally poorly answered as many candidates gave very generic ICT responses and failed to expand on the issues they raised. The better candidates considered points such as costing issues and the benefits that ICT has brought to the textiles industry.

7 (a) (i) Most candidates were able to give two explanations and gain both marks.

(ii) Most candidates were able to give two reasons of why overlocked seams were suitable for the bedding set.

(b) (i) This part was generally well answered with most candidates correctly identifying two advantages for the manufacturer.

(ii) This part was generally well answered with most candidates correctly identifying two disadvantages for the consumer.

(c) (i) A significant number of candidates only gave superficial descriptions of the process and restricted their opportunity of accessing all of the marks available for this section. The better candidates were able to give several stages of how the button holes would be worked and the buttons attached.

(ii) Generally well answered with most candidates correctly giving details of two quality control checks.

(d) A significant number of candidates gave very superficial answers to this part of the question. Again, whilst the majority of candidates correctly identified some of the implications for marketing there was very little reference as to why these issues are important and very few examples were given in support of the discussion. The better candidates made references to such points as target markets, advertising and how the promotion of products can lead to adverse pressures on consumers.

General Comments

(Centres should refer to the published generic mark scheme for this unit when reading this report.)

Administration

There were few problems this session.

It would be helpful if all Centres would ensure the following points are carried out at the end of the examination before despatch to examiners.

- Candidates should circle the question they have answered on the first answer sheet and write their name and candidate number on all four answer sheets.
- Loosely enclose the four answer sheets in the headed folded A2 sheet provided without any further method of securing answer sheets.
- Remove the question sheets.

Work of Candidates

In general examiners were pleased with the quality of work seen this session with exceptionally good work from some candidates. However, there are many candidates whose handwriting and use of English has been so poor that it is difficult to understand and/or interpret.

For some candidates, poor time management is a major handicap, with clear evidence that the final sections are either rushed or unfinished. Examiners are aware of the pressure on candidates in this examination and marks are awarded with this in mind. It is recommended that a significant part of the preparation for the exam should include techniques to allow the candidates to present ideas quickly and clearly.

The way in which Centres use the pre-release materials can have a significant impact on the results. The themes for the examination deliberately attempt to give little opportunity to prepare specification points or ideas in advance of the examination to prevent over-preparation of candidates. Centres are reminded of the specification content:

> *'The preparation for the examination should be carried out by the candidate. It is not intended that the preparatory work should be formally taught.'*

Comments on each of the marking criteria:

Specification Points (SP):

This continues to be an area that discriminates clearly between more and less able students.

To earn full marks a specification point must be both relevant to the set question and justified or explained. It is important that candidates respond to the question set and many find this difficult, tending to rely on largely generic statements (which get no mark) or statements pre-prepared from the published themes (these seldom receive full marks).

Candidates are becoming better at ensuring that specification points are justified and there were a significantly smaller number of candidates this year who produced a set of unjustified points. It is helpful when candidates actually include words such as "because", "so that" or "in order to" when writing their statements, as it explains to the examiner their justification.

Initial Ideas (ID):

The pre-printing of answer sheets has certainly helped candidates to focus more effectively on the marking criteria. There is a growing, and welcome, trend among candidates to utilise some form of coding (often using colour) to distinguish types of annotation relating to the mark criteria set out for them.

Range of Ideas (R):

Most candidates produced a suitable range of ideas although for some it seemed difficult to move away from one basic concept such that all ideas presented were essentially the same. To be awarded high marks the ideas must be *functionally different* rather than relatively superficial changes in shape or configuration. Credit is given for sketches which explore and develop possible variations within a concept and this is often an indication of the work of more able candidates.

Design Ideas relating to the functional aspect of the Specification (S):

Most candidates scored well in this section. More candidates are producing annotation which refers explicitly to the specification points of the previous section; this helps the candidate to earn high marks, by focussing their attention on the function of the product.

Quality of design thinking relating to volume production and wider market issues (V):

Although work in this section improves session on session, it remains a weak area with most annotation superficial (eg 'suitable for mass production') often unsupported by evidence in the sketches. Very few candidates address the wider market issues in any meaningful way; candidates should be encouraged to think about how their designs can meet the needs of diverse groups of consumers.

Detail consideration of Construction (C):

This section differentiates clearly between able and less able candidates. In many cases there is little or no evidence that candidates have any understanding of how their designs could be manufactured, and in many more suggestions are clearly based on school workshop practice rather than commercial volume production.

A few candidates produced quite detailed sketches and explanations of manufacturing processes (such as injection moulding or extrusion) as construction methods used to produce *components* rather than information about how the *product* would be constructed. This should be discouraged as it does not meet the needs of the mark scheme.

Consideration of specific Materials and Components (M):

As above, the technical knowledge required for this section often differentiates between able and less able candidates. Most candidates now remember to suggest materials for construction and very few continue to use generic terms such as ‘wood’, ‘plastic’, ‘card’ and so on. Unfortunately, in too many cases, the materials are unsuitable for the product and its application, and rarely is the choice of material justified by explaining a property that is relevant to the product and its application.

Consideration of Dimensional detail (D):

As in previous sessions there was much evidence of candidates simply taking dimensions given in the question (for example the dimensions of menus in question 1, or anthropometric data from question 4) and applying these to their sketches. Whilst this is a reasonable starting point for indicating the scale of a product it is important that candidates understand that much more detail than this is required for full marks. Dimensions of individual features, components and/or thicknesses of materials are needed to score well in this section.

Evaluation of the suitability of the ideas with reference to the specification (E):

A lot of annotation for this section was purely descriptive and showed no real evaluation at all. Some only focussed on the positive aspects of their ideas, with no reference to possible problems or improvements. Candidates can use an “evaluation of ideas table” with evaluative comments and this can be a good method for candidates to score highly. However, candidates should not use such a table with simple ticks, crosses or numbers which do not really show the depth of thought required at this level. More able candidates were able to offer objective evaluation against all of their specification points.

Features suitable for development (FD):

This section was completed well by many candidates although a significant number appeared to have run out of time before it was started or completed.

Appropriate features identified and clearly described (F):

A wide range of techniques is acceptable for this section, and most candidates responded in an appropriate way. The majority used sketches (although text alone is acceptable) to identify a number of features from their initial ideas. Some feel the need to make changes or to develop the features from the ideas section although this is not expected and is certainly not necessary to gain full marks.

Appropriate Justification of the choices made (J):

Several candidates went into a lot of detail in this section. This detail would have been better suited to the previous two pages of ideas instead. It was clear from looking at this section that candidates did have the relevant knowledge and understanding that they were required to demonstrate in their initial ideas. Unfortunately by placing this information (and sometimes very detailed evaluative commentary), in the wrong section they gained nothing.

CS Communication skills and techniques:

Examiners are mindful of the time available to complete this paper and the quality of work produced by the better candidates in this area is truly impressive. An extremely wide range of work is seen; in terms of graphical techniques better examples include different drawing styles (such as sections, cut-aways and hidden detail to show construction and functionality) as well as the more obvious 3D sketches. In terms of annotation; logical layout, clear reference to the marking criteria, detail and legibility are all evident.

Comments on Individual questions:

The number of candidates answering questions one – four was fairly even. Question five was less popular.

Question One: Take-away Menu Storage:

This question created a lot of generic specification points such as ‘must be aesthetically pleasing to fit in the home’ or ‘must be light so that it can be easily moved’. Greater focus on the specific requirements of the project would have been helpful in these cases. Many candidates produced a good range of ideas: inevitably most were based on existing products, such as paper filing systems or storage boxes, but by careful use of detailed features and annotation it was possible for candidates to relate the sketched products to the specific problem set.

Question Two: Storage of Materials for Recycling

Possibly because of the clearly functional nature of the required product, most candidates produced several good specification points. Ideas tended to be variations on one or two concepts with little evidence of innovation, but with good consideration of the technical details of construction and materials.

Question Three: Novelty Stackable Seating for a Nursery

This question produced many weak, almost generic, specification points such as ‘No sharp edges because the product is for children’, or ‘Must be colourful to be attractive to children’. Few candidates took up the novelty theme from the stem of the question and whilst this was not penalised directly it was an opportunity to increase the range of ideas missed by all but these few. Many candidates paid lip service to the need for the chairs to be stackable with little evidence of how their ideas could actually achieve this key design requirement.

Question Four: Toy Storage

This question gave candidates good opportunities for functional specification points and creative and innovative ideas. In general it was answered well with most candidates producing a reasonable range of specification points and a variety of initial ideas. The majority of responses were based on resistant material solutions but more innovative work was produced by those using a wider variety of materials for their ideas.

Question Five: Paper Towel Dispenser.

Relatively few candidates answered this question and those that did so found it difficult to produce a range of significantly different ideas. Understandably most ideas were based on existing units but few indicated a real understanding of how these existing products attempt to control the dispensing of single paper towels, as required by the question.

2525/01 Systems & Control Technology

General Comments

The majority of candidates who sat this paper opted to do questions 3 and 4. Only 7% of candidates attempted the pneumatics questions and of 29% that attempted the electronic questions very few were suitably equipped for the task.

Once again it was found that many candidates had problems with questions containing calculations. Using the calculator does not seem to be a problem, but understanding how to tackle the problem at all or simple errors like using the diameter instead of the radius, causes so many lost marks. At this level and with a formula sheet candidates should be able to tackle the simple calculations required of them.

The 'discuss' part of each question was answered a lot more fully than previously. 'Selecting suitable packaging' was generally well answered.

Comments on Individual Questions

1 (a) (i) Most candidates who answered this question had little difficulty offering two reasons.

(ii) Most candidates could not answer this correctly. A matrix keypad is not well known or understood.

(b) (i) This question was badly answered by most. A simple logic circuit like this should not cause any difficulty.

(ii) This was better understood but still many left a NOT gate in the line from B.

(c) (i) Generally well answered.

(ii) Few candidates could offer any suitable advantage.

(iii) No candidate correctly answered this question.

(d) Reponses to this question were varied but generally candidates referred to packing density, smaller PCBs and so smaller products.

2 (a) (i) Most candidates answered this correctly.

(ii) Most candidates answered this correctly.

(b) (i) Answers varied wildly. Most showed a square wave but few could label the axes.

(ii) Only a few candidates could answer this correctly.

(iii) Candidates had difficulty achieving full marks.

(iv) Some candidates probably understood but failed to explain themselves well.

(c) Candidates do not have much of an idea of commercial methods.

(d) Surface mount technology was well understood by a few and misunderstood by many.

3 (a) (i) Strangely, candidates failed to notice the reference to the user and offered advantages for the manufacturer.

(ii) Candidates tended to read into the question what they wanted to answer not what the question required. Often answers were broad statements relating to injection moulding and not specifically the plastic components of the tripod.

(iii) Anodising is not well understood by candidates.

(b) (i) Candidates usually answered this question well.

(ii) This was well understood by all candidates.

(c) (i) Far too many candidates do not understand the difference between permanent and non-permanent. Much latitude was given but a self-tapping screw is not a permanent fixing method.

(ii) Most candidates went for a hinge or a ball and socket.

(d) Generally well answered by candidates. A few got themselves bogged down with examples rather than discussion, but generally candidates picked up the issues of the size of the product, cost and materials.

4 (a) (i) Easily answered by most candidates.

(ii) Few candidates had any idea of hardening and tempering.

(b) Easily answered by most candidates.

(c) (i) Most candidates knew it was a Nylock nut but failed to go on and fully explain why it was chosen.

(ii) Aesthetics and area of usage was most quoted here.

(d) (i) Generally well answered by most. A few had trouble with the calculations, but otherwise many correct answers.

(ii) Most candidates understood what would happen if handles were over one metre.

(e) Responses were very patchy. Quality control, JIT and storage were most quoted here.

5 (a) (i) Generally well understood by candidates.

(ii) Candidates quickly realised it was a simple time delay.

(iii) Candidates were generally vague about the movement of the barrier and the cylinder.

(b) A fairly complex question requiring candidates to answer four specific parts. Not well done.

(c) A straightforward calculation provided it was realised that it was to raise the barrier therefore the piston rod area had to be taken into account.

(d) Of the few candidates that attempted question 5 none fully attempted this question. Plenty of scope here for such things as easy to update and change, can be seen in 3D without need for model, information can be shared around factory / world by internet and link with CAM.

6 (a) (i) Well understood.

(ii) Well understood.

(iii) Candidates all offered the correct sequence.

(b) A straightforward question that was usually well answered.

(c) Generally well done by candidates.

(d) (i) Not really understood by candidates.

(ii) A straightforward calculation question all too easily avoided or calculated wrongly.

(e) This discuss question was not well done by candidates. Quite often the question was left incomplete. Candidates did not appear to have the breadth of knowledge to give a full and coherent answer.

2525/02 Systems & Control Technology

General Comments

Overall candidates responded a lot better in this section of the examination. There was significant indication that candidates received a lot of teacher input. While this is to be applauded we must not stifle a candidate's flair and innovation.

A little over half of candidates elected to tackle question two and most of the remainder attempted question one.

It was pleasing to note that candidates whose theoretical knowledge may not be all it should be for part one were still able to gain a reasonable overall mark because they had developed their designing skills and used them for this part of the paper.

Candidates and invigilation staff are reminded that extra pages are not available for this examination. All pages are pre-printed with information and instructions and all work should be contained only on these FOUR pages.

Once again Centres are asked to help stop the small but significant number of candidates who are not circling the question number they are answering or putting their name at the bottom of each sheet.

Specification

Candidates must ensure that the points offered do 'directly relate to the given situation'. All too often candidates fail to gain marks in this section because comments are generic or a statement is not fully justified. However, a significant number of candidates did access most of the marks for this section.

Once again It is suggested that candidates avoid points related to cheapness / price, aesthetics and green issues because some of the situations posed will make these points difficult to relate directly to the given situation and even more difficult to justify.

Initial Ideas

It was pleasing to see candidates offering a reasonable range of alternative ideas and, more significantly, these ideas further developed with circuit diagrams, flow charts, exploded views and detail drawings. This approach allows candidates to access the full range of marks provided their sketches are suitably annotated. One centre in particular had taught candidates to use coloured markers to highlight each area of the marking scheme they had covered in their annotations. This helped with the marking, provided the highlighting was accurate, and must have helped candidates during the examination.

When evaluating their ideas candidates must ensure it is referenced to the specification and that the evaluation and the specification must agree. Putting specification points as numbers in circles, underlining specification statements or using a highlighter are just three ways to ensure evaluation statements and the specification points are linked.

If candidates practise doing this section of the paper they will develop their own style of presentation that suits them but still allows them to access the full range of marks. This section contains 66% of the marks so it is worth the effort.

Features suitable for development

Most candidates offered something in this section. Those who performed well offered a range of features from their initial ideas, that were suitable for development and justified them all against the specification. The features selected by candidates should cover the majority of the design, be realistic and have sufficient detail drawn or explained.

Candidates need to remember that repeating the specification is not what is required but rather an intellectual justification of the points chosen.

Efficient Communication

To gain the highest marks in this area candidates are expected to show fluent design thinking through a **range** of graphical presentation techniques so that it can easily be followed and understood by a third party. Those candidates who offered a small, single overall diagram for each of two or three ideas did not score highly in this section. A glance at the mark scheme before taking the paper would have enlightened them.

Grade Threshold

Advanced GCE GCE Design and Technology (7822, 7823)
Advanced Subsidiary GCE Design and Technology (3822, 3823)
January 2008 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2519	Raw	120	96	84	72	60	48	0
	UMS	120	96	84	72	60	48	0
2520	Raw	90	54	48	43	38	33	0
	UMS	90	72	63	54	45	36	0
2521	Raw	90	60	54	48	42	37	0
	UMS	90	72	63	54	45	36	0
2522	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	0
2523	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	0
2524	Raw	120	77	69	61	53	45	0
	UMS	120	96	84	72	60	48	0
2525	Raw	120	81	73	65	57	49	0
	UMS	120	96	84	72	60	48	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3822, 3823	300	240	210	180	150	120	0
7822, 7823	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3822	9.6	26.6	50.00	78.7	100	100	100
3823	0.0	11.1	44.4	88.9	100	100	10

3822: 3389 candidates aggregated this series

3823: 167 candidates aggregated this series

	A	B	C	D	E	U	Total Number of Candidates
7822	16.7	25.00	83.3	91.7	91.7	100	13
7823	0	0	0	0	0	100	0

7822: 2969 candidates aggregated this series

7823: 0 candidates aggregated this series

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/examsystem/understand_ums.html

Statistics are correct at the time of publication

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