November 2013 subject reports

Design Technology

Overall grade boundaries

Higher level

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 14	15 - 26	27 - 38	39 - 50	51 - 62	63 - 73	74 - 100

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 13	14 - 26	27 - 35	36 - 48	49 - 61	62 - 74	75 - 100

General Comments

The overall standard of performance was commensurate with that of previous years although candidates seemed to struggle a little more with some of the questions on Paper One.

Feedback from teachers via the G2 form was sparse – four teachers responded at Higher Level but none teachers at Standard Level although the candidature was quite small at this level. Feedback for Higher Level indicated that the written papers were, in general, fair to candidates and were at the same level or slightly more difficult than in previous years. Members of the Grade Award Panel expressed concern at the level of responses to extended response questions i.e. nine mark questions on Paper Two Section B and six and nine mark questions on Paper Three. It was clear that able candidates had sufficient knowledge to understand and answer these questions but did not structure their responses to differentiate succinctly when discussing or explaining two or three issues relating to the given context. Often answers were of a quite general nature which did not score highly and is the principle reason for “bunching” of grades around the 4/5 boundary.

It is pleasing to note that the general standard of Internal Assessment (IA) work presented for moderation was an improvement on the previous year. Although the number of candidates continues to increase at Higher Level this is almost exclusively by existing centres increasing their number of entries rather than new schools joining the programme. This means that schools with an established Practical Scheme of Work continue to perform well even though delivering the programme to a higher number of students is harder work for teachers.

Higher level and standard level internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 8	9 - 17	18 - 25	26 - 32	33 - 39	40 - 46	47 - 60

General comments

Sample work moderated during the November session displayed a wide range of abilities, some exemplar teaching strategies, original project ideas and a wide range of appropriate presentation techniques.

Schools adopted two approaches to meet the assessment criteria, the first being to produce two design and make projects, the second being to complete a design and make project, but also include additional design tasks and lab based investigations. Both approaches are appropriate. However, the second method provides greater opportunities for students to address each assessment criterion more than once, and so improve their marks. Schools that adopt the approach of lab and project work tended to score slightly higher marks overall, as they are able to concentrate on one or two criteria at a time.

Coursework should be used as a support exercise in order to help candidates understand the theoretical nature of the subject and develop project skills. Lab based activities that relate to theory can often be used for assessment, although it is important to plan how each Aspect is to be addressed.

Teachers are to be reminded that candidate work should not be assessed where too much guidance has been provided, as the work must be of that of an individual candidate. This is often the case when assessing Planning Aspect 1 and 2, especially where teacher instructions are detailed.

Teachers support materials, notes and project briefs should be attached to the sample of work to guide the moderator. Marks selected for moderation need to be highlighted on the 4/PSOWDT form for each assessment criterion.

Most samples were presented in an organized structure, however some teachers need to be reminded that work for each criterion needs to be flagged. Teachers are also reminded to complete all sections of the 4/PSOWDT, including details of the project, ICT usage, topics covered in each IA and the time taken for each piece of work submitted.

Teachers are encouraged to send an individual candidate sample per folder/folio with the form 4/PSOWDT attached. Dividers should be used to indicate the start of different investigations and all work sent to moderators should be in A4 format. Only work which is highlighted for moderation is needed in the sample.

The strengths and weaknesses of the candidates in the treatment of individual criteria

Planning (P)

The majority of candidates were able to achieve a minimum of at least a "Partial" for this criterion. However, some candidates did not perform so well, especially when repeating a common problem set by the class teacher. When using the assessment criteria for a design project, candidates should consider the feasibility of the study, identify the user, analyse the situation, write a clear brief which identifies the intended goal and produce a detailed and justified specification. Where detail was missing students were often able to achieve a mark of "Partial". Some work was very detailed and included reference to photographic evidence of problems and market research. The quality of specifications is mixed; the best work makes use of research data, identifies quantitative constraints and includes detailed justification.

Research (R)

Not all candidates had considered the need to plan data collection from a variety of sources or include a list of apparatus and order of method for an experiment that controlled variables. A detailed analysis of the problem is required if students are to score highly for Aspect 1. For a design project, students need to include reference to primary and secondary data sources which are focused towards the task.

The best work in this section included suitable market research, product analysis, information regarding user needs and constraints for where items were to be used. Work which includes reference to a wide range of materials and joining techniques is inappropriate unless it is deemed specific enough to address the problem.

Most students analysed data throughout research, but the best work also included a summary of data before finalising design specifications. Where the analysis of data was weak or limited students often achieved a mark of 'Not at All'.

Development (D)

There was evidence of some excellent work for this criterion, although some schools still fail to address development to appropriate standard.

The best work included a wide range of creative and original concept ideas, often sketched in isometric with different views for extra detail. Presentation included a range of rendering techniques and detailed annotation. Modelling strategies aided the refinement of ideas, culminating in sufficient detail for the intended outcome to be realised. Most work included use of CAD to present orthographic drawings.

Evaluation (E)

More time needs to be devoted to this criterion if candidates are to achieve high marks. As this is normally the last element undertaken when completing project work, candidates generally leave insufficient time to complete testing. Ideally candidates need to test their outcomes in the area designed for, or with the user for whom it had been designed. The best examples included detailed strategies for testing, including testing against specifications, user trials, expert feedback and performance tests.

Recommendations for the design project need to include a revised the specification, sketched modifications and consider the need for scaling up production. This is often poorly completed as it is the final aspect of the project.

Manipulative Skills (MS)

In most cases thorough planning had taken place, but there is a need for some schools to be more detailed in their identification of materials and processes in order to plan time effectively. Photographic evidence of candidates using equipment at different stages of realization is encouraged. Health and Safety risks need to be considered and evidence of safe working should be obvious. Outcomes need to be of sufficient complexity for the level studied, but not overly complex as students need to ensure folio work is given adequate time to address each aspect.

Recommendations and guidance for the teaching of future candidates

- Schools are reminded to clearly indicate the work for that is for moderation.
- Use of the OCC exemplar material is to be encouraged by teachers in helping them understand and meet the standards of assessment.
- With a new guide to be released early 2014 for first teaching Sept 2014, teachers are advised to attend training for delivery of the new course.

Higher level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 10	11 - 14	15 - 19	20 - 23	24 - 27	28 - 31	32 - 40

General comments

Only 4 G2's were received for this paper. It is important that as many schools as possible return these forms as they are carefully considered at the Grade Award meeting as they do help the team in determine grade boundaries. Similarly we would encourage that reflections be posted on the OCC as we look to improve papers in the future for our candidates.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 8

One G2 expressed concern about the use of an EU energy label in this question stating that it would pose issues for candidates not from this region. After consideration, it was felt that as an international syllabus, for international students undertaking an international course that candidates should be familiar with issues from regions around the world. This did not appear to be a problem for the majority of candidates, as they did not find the question difficult (Difl=90.30; Disc=0.18)

Question 27

One G2 commented that Figure 12 was not relevant to the question. Whilst we acknowledge that the image was superfluous, it has not affected candidates' responses. This was a moderately difficult question that poorly discriminated (Difl=46.27; Disc=0.04). Allowances will be made in boundary setting taking into account second language English students.

Question 35

One G2 expressed concern that candidates would not be able to answer this question. After careful consideration it was felt that if students understand the relevance of the U value (the measure of heat loss in a material), they would be able to answer this question correctly. Those that did know this fact got this question correct.

Question 38

Upon carefully reviewing this question the decision was made that the original answer D, was incorrect and that A was in fact correct. This correlates with candidates' responses.

Higher level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 5	6 - 11	12 - 18	19 - 25	26 - 32	33 - 39	40 - 60

General comments

Four teachers provided comments on the paper via the G2 form. These comments are valuable to the Grade Award team when deciding on grade boundaries though the small number of respondents may not be representative of the views of other teachers. It is assumed that teachers who did not complete the G2 form are generally satisfied with the paper. All four teachers thought that the paper was appropriate with three considering it similar in standard to last year and one considered it slightly more difficult. One teacher thought that the clarity of wording was fair, one though it good and one very good. One teacher considered the wording for questions 3 (a) and 3 (b) poor (no doubt resulting in the "fair" opinion mentioned) – this will be addressed in the individual question analysis section. As far as accessibility of the paper to the wider spectrum of candidates is concerned all teachers agreed it was accessible and did not discriminate on the grounds of religious belief, gender or ethnicity. Evidence from marking the scripts suggested that candidates felt comfortable with the majority of questions – very few questions remained unanswered.

A view was expressed on a G2 form that when evaluating past scripts against the published markschemes it would appear that candidates need to use the exact wording as stated in the markscheme to achieve a correct answer and that no allowance is made for expressing the meaning of the answer in the candidate's own words. Examiner marking instructions state that candidates should be given credit for answering a question in their own words as long as the question is answered accurately except where specific terminology from the subject guide is required. Examiners use the annotation "WTTE" meaning "words to that effect" in this regard.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 1

Although this question seemed to be accessible for all candidates as they were able to tackle each sub-part, many candidates failed to gain full marks as they needed to appreciate the full requirements of each of the sub questions. The data provided was not particularly complex and this may have lulled some candidates into a false sense of security as some candidates clearly did not assimilate the data and made assumptions when answering questions.

(a) Part (i) proved easy for nearly all candidates but in part (ii) many candidates just stated "aesthetics" which was too vague. Part [iii) posed few problems for the majority of candidates.

(b) The question for part (i) was clearly understood by most candidates but many did not make reference to the shape of the building to gain both available marks. Some candidates confused their answers for part (i) and part (ii) and did not differentiate their responses adequately. Candidates should appreciate that providing similar answers to two questions is not what is required.

(c) For part (i) most candidates failed to gain the relatively easy mark as they only focused on the floors in the spire. Ironically, many candidates who failed to gain the mark for part (i) did gain marks for part (ii) by explaining why some floors remained unoccupied.

(d) Part (i) was generally answered well, but for part (ii) many candidates focused on the energy requirements for the use of the blinds rather than the wider picture in relation to spatial energy.

(e) The majority of candidates coped well with both parts of this question.

Question 2

Part (a) posed few problems and for part (b) many candidates showed clear understanding of the difference between qualitative and quantitative data and how they relate to ergonomic inquiry but most answers were not planned astutely in order to use an appropriate context to show how the a balance is important.

Question 3

For part (a) many candidates failed to understand the definition of toughness as set out in the Glossary of the Subject Guide and referred to strength instead. One teacher referred to ambiguity in this regard but question setters always use what is set out in the Glossary to structure such questions. Although there may be differing opinions on the accuracy of some of the definitions in the Glossary the point of including this section to the Subject Guide is to show teachers and students what the interpretation is of such terminology in relation to this particular course. Teachers and students have welcomed this clarity over the years as sometimes there can be a different emphasis given to technological terms in different parts of the world.

The question for part (b) was problematic for many candidates and one teacher commented on the G2 form that the question was confusing to understand. Many candidates correctly stated that the tensile strength of timber is greater along the grain but did not visualize a wooden beam structure which is cut to size on site across the grain. It is true that this was a more technical type of question relying on practical knowledge of working with natural timber rather than just syllabus recall.

Question 4

Part {a} was answered well by most candidates and as there was many possible answers to the question and in part (b) the majority of candidates were able to achieve the marks.

Question 5

Although the question for part {a} was a fairly common one many candidates still confused the structure of plywood with LVL timber. In part (b) most candidates made reference to the relatively weak structure of particle board though many candidates failed to relate this to requirements as for external structures where moisture would be an issue.

Question 6

For part (a) nearly all candidates gained a mark for the question as there were a number of possible responses that could be made. There was a mixed range of answers to part (b) though it was a straightforward question for those candidates who focused correctly on the energy inefficiency of both fuel types and could differentiate between the levels of inefficiency for each.

Section B

Question 7

This was the most popular question followed by question 8 and then question 9.

For (a) parts (i) and (ii) many candidates failed to appreciate the (subtle?) difference between the two questions and confused their responses accordingly. Perhaps it would have been better if the questions had been the other way round so that having identified the relevant corporate strategy candidates then outlined why the company had decided on it?

Part (b) (i) was a relatively easy question for candidates who knew about high pressure die casting and in part (ii) most candidates gained at least one mark for reference to circular or rotational motion but, in general, answers were not well constructed to gain all three marks by referring to the transfer of energy in the correct sequence ending with linear motion or forward velocity.

For (c) part (i) many candidates failed to appreciate that the question related to the necessity to purchase special Porsche cycle shoes rather than the benefit of using cycle shoes in general. Part (ii) was an accessible question and the majority of candidates provided a full response but a high score was only achievable if candidates ordered their answer astutely to provide a discussion organised into three clusters as indicated in the markscheme.

Question 8

All three components of part (a) were answered well by the majority of candidates.

For (b), part (i) most candidates gained at least one mark but few gained all three marks by focusing on one aspect of the discussion and developing their answer into three distinct points. The majority of candidates coped well with the second part of the question.

For (c), part (i) many candidates did not read the question carefully enough and outlined a general advantage of JIT which was more relevant to the manufacturer than the consumer. For part (ii) all candidates clearly understood the concepts of user trial, user research and expert appraisal but not many focused their answer on the given context to differentiate between the value of research information gained from each of them. Generalised answers which described the strategies gained only about one mark for each strategy.

Question 9

For (a), part (i) many candidates did not realise that the question referred to the scale of production rather than the type of production so although skilled craftsmen were obviously involved, the product would be batch produced. Part (ii) was not well answered as candidates did not focus on one use of mechanisation in the production process e.g. a sanding machine or power drill.

For (b), hardly any candidates gained full marks for part (i). It is true that candidates needed to have knowledge of the grain structure of timber and the problem of short/diagonal grain. This is an example of why candidates should look carefully at all the sub-parts of section B questions before deciding which one suited them. In contrast, part (ii) was answered well by nearly all candidates as it related to quite a familiar concept of the relationship of the use of permanent joining techniques to planned obsolescence.

For (c), for part (i) surprisingly few candidates focused on the nature of the assembly of the product as outlined in the stem of the question and so did not relate the high cost of distribution to the size of the piece and space required to store and distribute it. The answer to part (ii) needed to be planned very carefully in order to avoid repetition in each of the three considerations suggested. Candidates should decide on which three concepts relating to the effect of external loading they consider appropriate and then identify three distinct points to make about each concept (as shown in the markscheme).

Recommendations and guidance for the teaching of future candidates

- For Question 1 candidates should spend time assimilating all the data supplied before looking at individual questions and considering which aspects of the data is relevant.
- Some parts of Question 1 require candidates to consider the design context and speculate on aspects of the design. Candidates should avoid generalisations.
- Candidates should read each of the Section B questions carefully before deciding which one to tackle. Some candidates just choose the design context they feel more comfortable with rather than analysing the requirements of the various aspects of the questions and considering the nature of the responses that should be made. The Section B questions are designed to cover different topics in the syllabus though the nine mark question will have most impact on the final mark achieved. In many instances candidates perform well on the shorter questions but relatively poorly on the final question.
- Candidates need to be familiar with the type of answer required for each question based on the Command Term (see Objective levels in the Guide, pages ....) used at the start of the question. Candidates should take into account the amount of marks allocated to each question which matches the depth of response required.

Higher level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 4	5 - 8	9 - 13	14 - 18	19 - 24	25 - 29	30 - 40

General comments

Overall Option E was by far the most popular option closely followed by Option C. There were just one or two responses to each of Options A, D and none from B – far too few to make any meaningful comment. Therefore this report will comment on Options C and E.

A general comment that can be made about candidate performance is that too many times the detail in the stem of the question is ignored e.g. outline one advantage, or the focus is missed e.g. the consumer.

The strengths and weaknesses of the candidates in the treatment of individual questions

Option C (Cad/Cam)

Question 15 focused on FDM rapid prototyping. The majority of candidates were able to state an advantage of using the technology in section (a). Some failed to gain the mark by not referring to an advantage to the designer.

In section (b), many candidates failed to note that the extrusion head moves back and forth, whilst building up layers of molten plastic, which cool rapidly to form the prototype.

Section (c) required an expanded answer relating to one reason why the support material is required. The majority of candidates were unable to restrict themselves in this way, consequently losing marks.

The majority of candidates gave a suitable advantage of replacing hydraulic robots with electrical robots in Question 16(a), however in section (b), the concept of learning and adapting actions through feedback was not well outlined by many.

Question 17 focused on the CIM system of production. In section (a) many candidates, once again, failed to restrict themselves to one advantage and compounded this by ignoring the fact that the question asked for an advantage to the consumer. However, section (c) was generally well answered.

Question 18 was worth six marks and asked candidates to discuss two advantages of using virtual reality software. Whilst there appeared to be a sound knowledge of the subject matter, once again the problem of concentrating on two advantages caused candidates difficulties, resulting in insufficient depth of response.

Question 19 comprised three sections each worth two marks. Section (a) was poorly answered, with many candidates not referring to a social aspect but to a technical one. This was also true of section (b), where candidates failed to refer to an implication of the use of

CAD for training, but to an outcome of its use. Finally, in section (c), only a minority of candidates focused on the higher volume of production leading to greater use of resources.

Question 20, section (a), required candidates to give an explanation of one reason why some products continue to be produced by traditional methods. Along with not adhering to one reason, many candidates ignored the stem of the question which stated 'even though they could be produced by CAM'. Section (b) also had many candidates ignoring the fact that the question asked them to focus on manufacture and based their answer on designing.

Question 21 is a 9-mark question asking for an explanation of three ways in which CAD/CAM has impacted on the market for furniture from a consumer perspective. It is sad to report that many candidates had difficulty on focussing their answers on the three highlighted points within the stem of the question. Good candidates produced well-organised answers with sufficient depth to achieve full marks. However, lack of organization and repetition was evident from many candidates.

Option E (Human Factors Design)

Question 29 gave some anthropometric detail of a wheelchair user. Section (a) asked candidates to state the type of data scale used which was not widely known. In section (b), the majority of candidates could outline the reason why the 5th percentile was used for the given situation. However, in section (c), the same logic was not well applied as to why the 95th percentile should have been used for data on toe projection, consequently losing candidates full marks.

Question 30 referred to the 'four pleasure framework' and used a mobile phone as a focus. In section (a), the majority of candidates were able to state that ideopleasure involves values in design. However, many failed to outline one way in which mobile phone design incorporates aspects of the 'four pleasure framework', by either mixing up the meanings of the aspects or by giving disorganised answers covering many features.

Question 31 concentrated on a kitchen aid – the Magipull. Section (a) was well answered by most candidates. However, section (b) found candidates struggling to outline a potential disadvantage, preferring to state why it would not be used by able-bodied people.

Question 32, once again, required candidates to organise their responses in order to compare two human factor design features of the two pieces of cutlery. The majority of candidates were able to discuss one human factor – usually grip – but then repeated this in terms of opposites – slipping – for the second factor. Well organised candidates were able to access the higher mark ranges.

Question 33 focused on the design of a hotel lounge bar. Section (a) was well answered, as was section (b), with only a minority of candidates failing to outline a psychological factor relating to the shape of the chairs. However, section (c) produced many responses that failed, once again, to outline how the designer had used texture to enhance intimacy, with many candidates discussing colour instead.

The subject knowledge for Question 34 was apparently well understood for both sections (a) and (b). However, candidates often failed to gain the full three marks for each section by not concentrating on one way and by not organising their responses effectively. Repetition of points in a summery sentence was a common problem, in an attempt to gain the third mark.

Question 35 – a 9-mark question – had as its focus an explanation of three advantages of using paper prototyping. This is a seemingly straightforward question but it was remarkably badly answered by a number of students. The main problem was that many candidates explained how paper prototyping was used rather than explaining the advantages of using it.

Again clarity of response and organization of the answer was critical to achieving top marks. Those candidates who were poorly organised often repeated themselves and did not reach sufficient depth of response. The skill of reading the question is one that teachers should focus on in preparing candidates for the examination.

Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 7	8 - 11	12 - 13	14 - 16	17 - 20	21 - 23	24 - 29

General comments

There were no G2 response forms received for this session. Can we please encourage that as many schools as possible return these forms with appropriate comments, or that schools post their reflections on the OCC DT forum. These comments are carefully considered at Grade Award meetings.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 5

This question has a relatively poor discrimination (Difl=56.67; Disc=0.10), but did not to be a difficult question with the majority of candidates getting the correct response.

Question 15

Although this question had a negative discrimination factor (Difl=86.67; Disc=-0.10), it was a relatively easy question and most students got the answer correct. It was important to realize that the keyword in this question that needed to be considered was ‘selecting’ in the stem.

Question 27

Upon careful review of this question it was decided to that it should be removed from the paper as responses A, C and D could be accepted as correct.

Standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 3	4 - 7	8 - 10	11 - 15	16 - 21	22 - 26	27 - 40

General comments

There were no G2 comments about this paper.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 1

Most candidates seemed to be able to tackle each sub-section, but many failed to gain full marks either due to a lack of clarity and depth, but also at times were let down by technique.

(a) Nearly all candidates were able to a mark for part (i) and (ii), although many read 'life cycle analysis' to be 'product cycle' for part (iii) and thus answered incorrectly.

(b) For part (i), most candidates were able to recognize that adjustability was a key factor, but failed to outline why sufficiently to gain the extra mark. Candidates were able to state for part (ii) that less resources would be required to few outlined that this would reduce environmental impact during the manufacturing stage.

(c) Part (i) proved easy for nearly all students. Most candidates gained 1 mark in part (ii) by stating that consumers are becoming more aware/pro-active on environmental issues, but failed to explain what Nike have done in response to this.

Question 2

Many candidates for part (a) simply related 'planned obsolescence' to a predetermined lifetime for a product. The definition set out in the Glossary of the Subject Guide is more expansive than this and responses were expected to reflect this.

The question for part (b) was a difficult for many candidates. Most failed to understand what the question was asking and their responses were off course or lacked the depth to gain all three marks. Many were able to recognize that designers are asked to produce products as cheaply as possible, but failed to discuss how they resolve this issue.

Question 3

For part (a) many candidates were able to gain a mark for stating that adding scrap glass reduces the amount of raw material required.

For part (b) most students failed to recognise that glass is strong in compression and explain why this makes it beneficial when constructing walls from this material.

Section B

Question 5

This was the most popular question followed by question 4 and then 6.

Question 4

Part (a) (i) and (i) was done reasonably well by candidates, with most outlining why fasteners allow for disassembly and therefore easier recycling. Many candidates read the question for part (iii) to be about mechanical problems with using fasteners and therefore their responses failed to match the mark scheme.

Many students were able to state the 50th percentile for part (b) (i), but few stated that it was related to adults. For part (ii), those that structured their responses tended to get the marks.

Very few candidates gained high marks for part (c) (ii). Many were simply off-course simply commenting on the aesthetics or the ergonomics of the product and not what factors have made it popular for over sixty years.

Question 5

Most candidates were able to gain marks on each three parts of (a), although few gained both marks for part (ii) and (iii) as they failed to organize their responses to match the clusters in the mark scheme.

For part (b) (ii) most students obviously understood the basics about the structure and bonding of thermoplastics (linear chain molecules with weaker secondary bonds), but failed to structure their response to gain all three marks.

For part (c) (ii), most students were able to suggest that if the backpack is adjustable then it would be suitable for a range of people. Few were able to look beyond this point and therefore did not touch on environmental or economic issues. Careful planning of a response should encourage candidates to initial identify three separate reasons that they can then expand upon.

Question 6

Part (a) (ii) was not answered particularly well with most candidates simply stating that customers want low cost items. They failed to recognize that this product would probably be an impulse buy for purchasers.

For part (b) (i) many candidates simply defined what an innovator was, failing to answer why they may have difficulty in obtaining financial support. For part (ii), many students knew what and inventor and entrepreneur is, but failed to discuss these in terms of Ejogo and his vending machine.

Part (ii) was an accessible question but many candidates failed to discuss the cost implications in relation to a network of machines. Many simply looked at the Umbrolly as a product and thus their responses were off course. It is important that candidates read the stem with care and plan their answers accordingly.

Recommendations and guidance for the teaching of future candidates

- It is important candidates are familiar with the Command Terms in the Subject Guide that determine the depth of response. It is highly recommended that centres make use of past papers, so that candidates know 'how' to answer the questions in order to maximize their chances of scoring higher marks.
- Candidates should read each of the questions in Section B before they make the decision to tackle one. It is important that they chose a question because it optimizes their chances of responding to all of the sections in the question successfully rather than making a choice because they are more familiar with the context.
- Careful planning and better structuring of responses is required especially in the final question of the paper.

Standard level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 3	4 - 6	7 - 8	9 - 13	14 - 17	18 - 22	23 - 30

General comments

No G2s were received for this paper which is an awful shame as it means the examining team has absolutely no feedback to help inform future practice. Overall Options C and E were neck and neck in terms of popularity at Standard Level. There were no responses to Options A, B or D – so it is impossible to make any comment about these options. Therefore this report will comment on Options C and E only.

The strengths and weaknesses of the candidates in the treatment of individual questions

Option C (Cad/Cam) - Questions 13-18

The first question in Option C - question C13 - focused on FDM rapid prototyping manufacturing technology. Section (a) asked for one advantage to the designer of using such technology. Many, but not all, candidates were able to state one advantage to the designer of using such technology and all but the weakest candidates were able to gain the one mark on offer for this question. Section (b) asked for a description of the function of the extrusion head in the FDM process. Although this seemed a very straightforward question, few candidates were able to provide answers that matched the mark scheme and achieve the two marks on offer. Section (c) offered three marks, one for each of three distinct points in an explanation of one reason why support material is required when using FDM rapid prototyping techniques. This was generally better answered than section (b) of the question but, as usual, better structured answers tended to avoid repetition and tended to score better. Most responses lacked depth.

Question 14 section (a) asked candidates to state one disadvantage of subtractive manufacturing techniques for the environment. This was generally well answered and most candidates were able to achieve one mark for an answer identifying waste production as a major disadvantage of subtractive techniques. Question 14 section (b) asked for one advantage of a laser cutter over a plotter cutter and was often not well-answered although there was no discernible pattern to the wrong answers.

Question 15 focused on CIM. Section (a) offered one mark for an advantage of a CIM system for consumers and a second mark for a brief explanation. Few candidates were able to identify an advantage of CIM for consumers. There were some good answers though and some candidates achieved full marks for this question. Section (b) asked candidates to list two benefits of being able to rapid prototype a product. A few candidates achieved full marks for this question but many were not able to produce responses matching the mark scheme.

Question 16 was worth two marks and asked candidates for one advantage of finite element analysis (FEA) to designers when choosing a suitable material for a load-bearing structure. It offered one mark for an advantage of FEA and one mark for brief explanation. This was not a difficult question for candidates and many candidates were able to identify and explain an appropriate advantage and achieve the two marks on offer.

Question 17 was worth six marks and asked candidates to discuss two advantages of using virtual reality software in assigning new buildings. Whilst the subject did not seem to pose particular problems, the issue of depth of response was evident. Well-organised responses achieved high marks with candidates providing sufficient depth of response.

The final question in Option C - question 18, a nine–mark question – brought Option C to a close. It offered unto three marks for each of three ways in which CAD/CAM had impacted on the market for furniture from a consumer perspective. The key to answering this question was recognising that CAD/CAM had enabled the high-precision manufacturing required for the development of flat-pack furniture and how that had offered enormous consumer choice and had driven the market for value-for-money consumer products. Good candidates produced well-organised answers with sufficient depth to achieve full marks. Lack of organisation was evident from many candidates who often repeated themselves and did not achieve the requisite depth of response for achieving the nine marks on offer.

Option E (Human Factors Design)

Question 25 showed a drawing of a person in a wheelchair annotated with data for critical percentiles.

Section (a) asked candidates to state the type of data scale used for the data. Most candidates (incorrectly) stated interval scale. Only a very small number of candidates correctly identified a ratio scale.

Section (b) asked candidates to identify why the 5th percentile was used for the measurements associated with reach. Many candidates were on the right lines with this but expressed their responses very poorly to the point of ambiguity and failed to achieve thee marks on offer.

Section (c) asked candidates to explain why data for the 50th and 95th percentiles were used for data projection. This was very badly answered and few responses came close to the mark scheme.

Question 26 Section (a) asked candidates to state one risk assessment strategy that would be used to identify patterns of behaviour that preceded accidents. There were many wrong answers and few correct answers (i.e. scenario analysis) offered.

Section (b) asked candidates to describe the purpose of behavioural testing to determine product safety – which did not seem a particularly difficult question but was not well- answered by candidates, many of whom failed to achieve the two marks on offer.

Question 27 showed a photograph of a Magipull ting pull can opener designed for people who have difficulty opening ring pull cans with their fingers.

Section (a) of this question asked candidates to identify why some able-bodied people may have difficulty opening ring pull answers with their fingers offering one for reason and one for a brief explanation. Most candidates were able to offer reasonable answers and achieve the two marks on offer for this question.

Section (b) asked for an outline of one potential disadvantage of using the Magipull ring pull can opener for able-bodied people. This question generated some good answers from candidates that matched the mark scheme and many candidates achieved the two marks on offer.

Question 28 was a two-mark question asking candidates to describe how poor organisation of a product's user interface imposed a memory burden on users. This was well-answered by many candidates.

Question 29 required a comparison of two human factor considerations for two types of cutlery (Sure grip and Baroque). This seemed a fairly straightforward question but judging by the candidate performance was clearly a problem. Those candidates developing well-structured responses scored much better.

Question 30 – a nine-mark question – brought Option E to a close. It asked candidates to explain three advantages of paper prototyping in the design of the controls for electronic products. Good candidates latched onto the idea of participatory design in their responses and scored well.