DESIGN TECHNOLOGY

Overall grade boundaries

Higher Level

Grade:	1	2	3	4	5	6	7
Mark range:	0-15	16-27	28-38	39-51	52-62	63-75	76-100

Standard Level

Grade:	1	2	3	4	5	6	7
Mark range:	0-14	15-24	25-36	37-48	49-59	60-70	71-100

Introduction

This was the final examination session of the existing course. Teachers, by now, will have engaged with the new Guide (first examination May 2003) and will probably be more worried about the challenges of that than worrying about what is now the old Guide. Examination papers are very important in supporting teachers in preparing candidates for examination sessions. A set of specimen examination papers is available for teachers and has been circulated to Schools. In relation to current practice it is clear that the papers, as one would expect, do not hold any great surprises for candidates who are generally well prepared for the challenge of the papers. The G2 forms received from teachers are always extremely valuable in providing feedback to the examining team and are studied carefully during grade award meetings. As pointed out in previous reports not all schools take this opportunity to feedback comments on the paper and perhaps only feel moved to comment when they have an adverse reaction to an element of the paper. The examining team would again plead for teachers to feedback both positive and negative comments to the examining team to constructively inform the development of the subject. Only two G2s were received from teachers for this session and whilst this might suggest total satisfaction with the papers the examining team would welcome comments.

Standard Level Paper 1

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 7	8 - 8	9 – 10	11 - 14	15 - 18	19 - 21	22 - 30

General Comments

No G2s were received. The correct answer for each question is shown below. The candidature was extremely small so to list the difficulty and discrimination indices is a meaningless exercise for this session.

Question Number	Correct Response	Question Number	Correct Response
1	C	16	C
2	A	17	D
3	A	18	A
4	B	19	B
5	C	20	A
6	B	21	C
7	B	22	B
8	D	23	C
9	A	24	D
10	D	25	A
11	A	26	B
12	C	27	A
13	B	28	C
14	B	29	C
15	D	30	D

Standard Level Paper 2

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 3	4 - 7	8 – 12	13 - 16	17 - 21	22 - 25	26 - 40

General Comments

No G2s were received. With a small candidature it must be realised that few comments can be made about the papers.

The data-based question (Question 1) seemed to be well-received by candidates. In some previous May and November sessions there has been some evidence that weaker candidates have been put off by not being able to answer one element of a question and have not persisted in attempting to answer later elements of the question. There was less evidence of this in this session. As before, the labelling of sections of the questions as (a), (b), (c) with sub-sections labelled (i), (ii), etc. should help to signpost questions. Mark allocations and the action verbs are important indicators of the nature and extent expected of candidate responses. It is worth teachers emphasising this to candidates.

In general, candidates made a reasonable attempt at the paper. There was less evidence of structure in the answers to the Section B extended response questions and teachers should encourage candidates to consider some structure to help them get a balance in the answers and achieve higher marks. The dominating discriminating elements of Paper 2 continue to be Question 1 and the last section of the Section B questions. Electronics questions (e.g. question 5) often elicit no response from candidates at a number of schools and it is clear that candidates are by no means comfortable with electronics.

Grade boundaries are determined by matching the Grade Descriptors for Group Four to the evidence available from marked scripts. Papers are set in a way that ensures that they provide enough evidence to enable the use of the Grade Descriptors and also to ensure that there is appropriate syllabus coverage and that the papers are appropriately discriminating.

Section A

To gain full marks for questions based on calculations candidates need to ensure that they state the appropriate units for the numerical answer. Where candidates are picking up data from tables or diagrams, they need to ensure they understand the significance of the units stated. They may need to convert units, e.g. mm to metres, to use them in calculations. This exercise is not seen as inappropriate by the examining team but rather, reflects the 'messiness' of designing in the real world. In some cases, e.g. 1 a and 1 b(ii) candidates had worked out the answer to a calculation correctly but had been sloppy by not stating the units and hence, lost a mark. A candidate only loses a mark once across the paper for this.

Question 1

(a) Candidates were asked to state a dimension from the diagram – 100 mm + 20 mm = 120 mm. This was reasonably straightforward for most but not all candidates.

(b) (i) Candidates were asked to calculate distance X, i.e. the breadth of two cartons. Most candidates achieved this correctly.

(ii) Candidates were asked to calculate the number of cartons that can be cut from the roll. It was surprising how difficult candidates found this task.

(c) (i) Candidates were asked to state the minimum number of creases that need to be made to allow the carton to be folded into shape. This proved surprisingly difficult for some candidates.

(ii) Candidates were asked to draw a 3D view of the assembled package. Most of the drawings were extremely clear and it was easy to see those candidates who were not able to locate the position of the window correctly.

Question 2

(a) Most candidates correctly identified stiffness as another mechanical property which must be considered in this design context.

(b) Few candidates related cutting and abrading as examples of wasting.

Question 3

This question was surprisingly difficult for candidates.

Question 4

This question required candidates to list two ways in which energy considerations can influence the design of a product. The question was well answered by most candidates.

Question 5

The shame is that one can almost hear the shutters going down in examination rooms around the world – Electronics!!

(a) This question required candidates to draw a symbol for a component to be used as the input device for a device to monitor the noise level of the aircraft.

(b) This required candidates to state the major component of the processing device. This was poorly answered by many candidates.

(c) This required candidates to draw a symbol for a component to be used as an output device.

Section B

At both Standard Level and Higher Level there has been an ongoing debate in the examining team about how the three quality marks awarded for Section B questions should be allocated. The decision was taken to stick with the practice of the three quality marks being awarded for clarity of argument (1 mark), designer's logic (1 mark) and communication (1 mark) for the duration of this guide. However, from May 2003 the marks will be contained within the mark scheme and thus the marks indicated to candidates will be 20 rather than 17 as is currently the case.

In section B, Question 7 was not answered.

Question 6

(a) A straightforward question on design communication in an international context. This posed few problems for candidates

(b) This required candidates to state four advantages of using plastics for making signs. This posed few problems for most candidates.

(c) This question asked candidates to explain the design considerations that a designer would take into account when designing a bank for wheelchair users. Most candidates were able to explain a number of appropriate issues.

Question 7

No candidates attempted this question.

Question 8

(a) (i) A straightforward outline of the difference between mechanisation and automation was required.

(ii)This part asked candidates to outline how CAD can contribute to a mechanised system. Some candidates confused CAD, CAM and CIM but most answered the question reasonably.

(b) This question asked candidates to describe two effects of automating a production process on the workforce. Noticeably those candidates marking (i) and (ii) next to their responses tended to put two distinct effects down on the paper, whereas those just using free text to respond often did not have two clear effects.

(c) This question was poorly answered by many candidates. Those laying out the response more tidily in tabular form achieved better overall marks, since it seemed to guide them to respond more evenly across all the issues.

Standard Level Paper 3

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 4	5 - 9	10 - 16	17 - 21	22 - 26	27 - 31	32 - 45

The format for Paper 3 options is that question 1 is a database question providing a context in the form of a table, bar chart, photograph, flow chart, etc. The database acts as a stimulus and context for the question. The last question in each option is an extended response question worth 4 marks and in the examinations from 2003 will be increased to 6 marks to provide a better opportunity for candidates to demonstrate their understanding through a more extended response. It is through the 'sting in the tail' of the database question and the extended response question that the more able candidates are able to demonstrate their ability and weak candidates are discriminated from stronger candidates. Options A, B, E and F were the most popular. Options D and G were attempted by a small number of candidates but option C was not attempted by any candidate. Candidates must resist the temptation when they see a particular word to jump in and define that word without reading the question. Candidates will only achieve the marks if they answer the question.

HIGHER LEVEL

Higher Level Paper 1

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 10	11 - 16	17 - 21	22 - 25	26 - 30	31 - 34	35 – 40

General Comments

Two G2s were received for this session. One commented that the paper was of a similar standard to the previous year. Both thought the level of difficulty was appropriate. One thought that syllabus coverage, clarity of wording and presentation of paper were satisfactory, one thought they were good. One G2 commented that Question 22 was not particularly clear and that answers D and A could be correct. The candidates did not find this a problem and the vast majority selected the 'right' answer with only 5 selecting 'A', the strong distractor. The candidature was small and so the difficulty and discrimination indices are meaningless and not included in the report for this session.

Question Number	Correct Response	Question Number	Correct Response
1	C	21	B
2	D	22	D
3	A	23	C
4	A	24	B
5	C	25	A
6	A	26	C
7	B	27	B
8	B	28	C
9	A	29	A
10	A	30	D
11	D	31	D
12	B	32	D
13	C	33	B
14	D	34	A
15	A	35	B
16	B	36	D
17	D	37	D
18	B	38	C
19	A	39	C
20	C	40	C

Higher Level Paper 2

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 5	6 - 10	11 - 14	15 - 21	22 - 28	29 - 35	36 – 52

General Comments

Two G2s were received. Neither compared the standard of the paper with that of the previous year. In terms of suitability of the question paper 1 considered the level of difficulty to be appropriate and one considered it too difficult. One considered syllabus coverage and clarity of wording satisfactory and one thought them good. Both thought the presentation of the paper was satisfactory.

The data-based question (Question 1) was perceived by the examiners to be extremely discriminating, which could well explain the 'too difficult' comment on the G2. Good candidates were able to work through the question and achieve very good marks. In some previous sessions there has been some evidence that weaker candidates have been put off by not being able to answer one element of a question and have not persisted in attempting to answer later elements of the question, and this was again the case. The examining team continues to plead that teachers encourage candidates not to be put off and there was some evidence that candidates this year are heeding this advice. As before, the labelling of sections of the questions as (a), (b), (c) with sub-sections labelled (i), (ii), etc. is designed to help to signpost questions. Mark allocations and the action verbs are important indicators of the nature and extent expected of answers. It is worth teachers emphasising this to candidates.

In general candidates made a reasonable attempt at the paper. There was evidence of a lack of structure in the answers to the Section B extended response questions and teachers should encourage candidates to consider some structure to help them get a balance in the answers and achieve higher marks. The dominating discriminating elements of the paper are Question 1 and the last section of the Section B questions. As in previous sessions it is clear that candidates are by no means comfortable with electronics. Some schools do particularly well at this element. In the new Guide Electronics has been removed from the core into an Option – Electronic Products. This should facilitate those schools who do Electronics and do it well.

Grade boundaries are determined by matching the Grade Descriptors for Group Four to the evidence available from marked scripts. Papers are set in a way that ensures that they provide enough evidence to enable the use of the Grade Descriptors and also to ensure that there is appropriate syllabus coverage and that the papers are appropriately discriminating. This paper seems to have achieved these objectives.

Section A

Question 1 discriminated well. Parts 1(c) (ii) and d (i) were particularly discriminating. In answering Part 1 (c) (i), the location of the cam on some candidate's responses were particularly amusing and brightened up a dismal December! Again some good candidates failed to achieve high marks not because they lacked knowledge and understanding but because their answers were not precise enough. To gain full marks for questions based on calculations candidates need to ensure that they state the appropriate units for the numerical answer – it was obvious that candidate's were taking care to put in the units with their answers. Where candidates are picking up data they need to ensure understand the significance of the units stated. They may need to convert units, e.g. mm to metres, to use them in calculations. This exercise is not seen as inappropriate by the examining team but rather, reflects the reality of design..

Question 1

(a) This question required candidates to analyse the drawings of two alternative design solutions and to outline why one required less material than the other. Most candidates were able to do this satisfactorily.

(b) Candidates were required to suggest two reasons why the designer had chosen plywood for the base rather than softwood. Some good answers were provided although it was clear that some candidates did not appreciate the differences in appearance or material properties of plywood and softwood.

(c) (i) The question required a labelled 3D sketch to show how the cam and the motor gearbox unit could be attached to the puppet to make the arm move up and down. Some candidates produced superb diagrams for their answers. The locations of the cam on some responses were very entertaining as mentioned above.

(ii) This was not answered well by many candidates. Some candidates just responded that the arm moves up and down! Some candidates were able to use the data from Figure 2 and calculate the range of movement.

(d) (i) Many candidates just wrote down an answer without showing their calculation. Teachers need to stress to candidates that they must show their calculations as marks are awarded for this; generally, 1 mark for using the right calculation, and 1 mark for the right answer including units.

(e) Some excellent answers showing good use of the data on page 4. Some poor answers with candidates clearly not understanding why particular components were provided.

Question 2

This question required candidates to outline two hedonic properties the designer needed to take into account in order for mycoprotein products to compete successfully against traditional products. It was not obvious that some candidates knew what hedonic properties are!

Question 3

Candidates were asked why sintering is an appropriate manufacturing technique for making superconductors. A small number of candidates provided excellent answers.

Question 4

This question required candidates to explain one way in which modern control systems can improve the quality control aspects of manufacturing. This question was extremely discriminating and only a small proportion of candidates appreciated the significance of control in quality assurance.

Question 5

Section (a) of this question required candidates to outline the difference between mechanisation and automation. This was answered reasonably by the majority of candidates. In section (b) candidates were asked to state two effects of automating a production process on the nature of the workforce. Candidates generally were able to identify loss of jobs but struggled for a second effect.

Section B

The ongoing debate in the examining team about how the three quality marks awarded for Section B questions should be allocated ends after this session because from May 2003 the marks will be contained within the mark scheme and thus the marks indicated to candidates will be 20 rather than 17 as is currently the case. For this session, as before, the three quality marks were awarded for clarity of argument (1 mark), designer's logic (1 mark) and communication (1 mark).

In section B, Question 6 was much more popular than Question 7. No candidates attempted Question 8. There was no noticeable difference in overall performance between candidates answering Question 6 or Question 7 which seemed to be of equal difficulty.

Question 6

(a) This question required candidates to outline why stainless steel is used for medical equipment and was answered well by most candidates.

(b) (i) Asked candidates to define renewable resource. This was answered well by most candidates.

(ii)Required candidates to identify one material from the pie chart that originates from a renewable resource. Surprisingly many candidates offered plastic as a response.

(c) Required candidates to outline two reasons why the weight of an aluminium drinks can has reduced from 1980 to 2000. Some candidates provided excellent responses to this, others did not.

(d) This question required candidates to discuss the reasons for the popularity of paper and board compared to plastics for use as packaging materials. Some candidates provided excellent discussions covering reuse, recycling, cost, ease of printing on the package. Some candidates covered just recycling.

Question 7

(a) The candidates were asked to state two characteristics of glass that make it the preferred choice of material. This was straightforward for most candidates.

(b) Required candidates to relate the properties of network covalent bonds which make glass appropriate for the application. Some candidates answered well, others were unable to relate microstructure to properties.

(c) Candidates were asked to outline one reason why the designer has decided to add four feet to the design. Better candidates were able to answer this.

(d) This question asked candidates to discuss the strategies that designers might have used in collecting data for the design of the work surface protector. Better candidates gave extremely full answers.

Question 8

This question was not attempted by candidates and so there are no additional comments to make.

Higher Level Paper 3

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 4	5 - 8	9 - 13	14 - 19	20 - 24	25 – 30	31 – 40

General Comments

Two G2s were received. One thought the paper was of a similar standard to the previous year. Both thought level of difficulty, syllabus coverage, clarity of wording and presentation of paper were satisfactory.

A general criticism of candidates in this session is that the use of specific technical terms that characterises the '7' student was limited. This was accompanied by a fairly widespread lack of precision in answers, especially with higher order questions. Options E and F were more popular than D and G for this session.

Internal Assessment (IA)

Higher and Standard Level

Component Grade Boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-4	5-7	8-10	11-13	14-15	16-18	19-24

The administrative arrangements continue to pose problems to new centres although existing centres generally cope well. The most common problems are not clearly labelling parts of the folio work relating to the assessment criteria and not highlighting a spread of marks on the 4/PSOW form.

The Planning (a) criteria continues to be a problem for many centres - candidates must be given the opportunity to form their own hypothesis. There is no problem with a group working on a common theme or design context as long as it allows individuals to develop their own design brief or state the aims and objectives of the task. In the new subject guide, Topic One places a greater focus on the difference between the design brief and the specification, which should help those students who find it difficult to differentiate between the two.

Planning (b) related to design project work is often used to describe the realisation stages after they have been completed, rather than at the planning stage. Candidates should be familiar with the criteria used to assess practical work and ensure that they have sufficient evidence to satisfy it. This is especially important with the design project, a compulsory part of coursework assessment which must satisfy all the criteria.

Some centres place great emphasis on the use of the group 4 project as evidence for all the assessment criteria. This is fine as long as there is clear evidence of the individual input into the project by each candidate. In some cases a common objective was stated for all candidates and it was not possible for the moderator to identify the contribution made by the individual candidates selected for moderation.

If Planning (a) is weak this often leads to a poor evaluation section as the two elements are closely linked. This is especially the case with the design project where the evaluation needs to focus on how well the brief and specifications have been met.

The revised marking matrix has addressed the problem of many candidates achieving ‘0’, despite having produced some valid work, thereby not differentiating them from those candidates who have done nothing of value.

Compiling a balanced practical programme is essential to address the aims and objectives of the subject. The timing of the design project in the programme is crucial - too early in the course and students lack sufficient experience of utilising the design process; too late, and often there is insufficient time to devote to it. The better design projects evolved from courses where there had been sufficient lead-time for students to gain knowledge and skills prior to tackling it.

It should be noted that as Design Technology is a group 4 subject it shares common aims and objectives with other group 4 subjects. When choosing design projects attention should be paid to the appropriateness of the project for satisfying these aims and objectives.

Work submitted, as part of the practical programme should be practical in nature, not merely literature-based research, for example a description of the historical development of a product.

Centres have continued to develop interesting and challenging practical programmes. It is clear from written examinations that candidates who are experiencing a good practical programme and understanding the principles and practices of the subject were well placed for answering questions on the written papers.

Conclusion

The action verbs (e.g. state, outline, describe, explain) are reasonably understood by candidates although new schools would be wise to reinforce their meanings with candidates in preparing for examinations. There was more evidence to suggest that candidates recognise the significance of the mark weightings and spaces provided in relation to the expectations of answers.

Good candidates took the advice from previous reports of 'sign-posting' answers with headings and bullet points or using tables to identify distinct points. Teachers should continue to stress this to candidates and encourage candidates to confirm their understanding of the extent of the answer required by checking the mark allocation for the question. Answers from better candidates were notably more succinct, used appropriate terminology, provided clear and well-annotated diagrams where appropriate and structured their answers demonstrating a 'designer's logic' earning the additional 'quality marks' on offer for each of the three questions on Paper 2 Section B at Higher Level and Standard Level.

Teachers should continue to familiarise themselves with the group 4 grade descriptors. The examining team continues to strive to:

- ensure appropriate syllabus coverage;
- use accessible design contexts understandable around the globe;
- ensure parity between optional questions;
- make the expression of questions as straightforward as possible (particularly for second language candidates);
- ensure that the various examination elements discriminate appropriately between stronger and weaker candidates;
- ensure that there are opportunities for candidates to provide evidence for the different aspects of the group 4 grade descriptors within the examination papers to enable the grade descriptors to be used in the setting of the grade boundaries at the grade award meeting.

With more new schools participating each May and November the subject continues to grow. The overall evidence of the November 2002 session is that candidates were well prepared for the examinations, presumably benefiting from this being the last November session for this Guide and the tenth set of examination papers.

The single most significant change in the new Guide (first examination May 2003) is the shift towards 'greenness'. This will be reflected throughout the various assessment elements of the programme. The examining team has produced a set of specimen papers for teachers and candidates. Paper 2 will become even more of an opportunity for candidates to apply science in demonstrating their ability to make and justify design decisions.

