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Examiners' Report Summer 2007

GCSE

GCSE Design & Technology
Resistant Materials Technology (1973/3973)

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General Comments

Moderators report that a wide and diverse range of coursework was seen this year and some excellent standards were achieved by those centres that continued to build on previous year's experiences. Centre assessors that attended INSET events, and read and assimilated Principal Moderator's coursework reports, displayed higher level of accurate marking of candidates' work than those that had not. It was pleasing to note that more candidates were able to target marks effectively through a better understanding of what is required in the assessment criteria. Coursework was generally appropriate to the level of response expected, but some centres allowed candidates to pursue simplistic, undemanding coursework projects that limited their chances of gaining high marks. As more centres become equipped with sophisticated CNC machinery and laser cutters, whole cohorts of candidates in some centres focused their coursework on this equipment, designing for the machinery rather than using it where appropriate. Where this strategy was used, high quality outcomes were seen, but they could not be awarded high marks for making, because candidates' skills input was minimal.

The quality of photographs continues to be excellent in the vast majority of work submitted for moderation and moderators reported that most centres had supplied a series of images of the final product and of its progress during construction that greatly assisted the moderation process. A minority of centres submitted poor quality images which were unhelpful to moderation. Almost all centres now understand that good quality photographic images are essential if moderators are to agree marks awarded by a centre.

The majority of centres are now in line with the Edexcel's guidance on the number of pages that should be included in the design portfolio and most candidates completed their work on 15 – 20 A3 sheets. Some centres allowed candidates to present design folios of unnecessary length, which almost always contained large amounts of work in the 'Information' section that was worth little or no credit. Extra work and effort would be more valuable if focused on other assessment criteria where there is scope to earn more credit.

Most design folios were well organised, with headings, page and candidate numbers in place, but some centres still do not adhere to the advice offered by the Edexcel on presenting portfolios for moderation. Plastic sleeves with several sheets inside each one, sharp metal paper fasteners and expensive, individually zipped portfolios are problems for moderators that could be avoided with some forethought by centres.

Although most centres present appropriate work for moderation, there is still a significant number of centres that allowed candidates to pursue work that is not up to the required standard for GCSE and does not match the requirements of the course. Work that is limited in complexity and challenge is acceptable if it matches the abilities of candidates and is marked appropriately. Unfortunately, in most cases where such work was seen, over-marking was evident. Some centres opted to set a theme for all candidates in a cohort, which is acceptable, but moderators noted that in some cases this strategy resulted in very similar materials appearing in design

folders and some candidates appeared to be 'stifled' by the limitations of the set brief.

Overall, most centres were successful in their approach to coursework and are thanked for their efforts in ensuring design folios arrived on time for moderation, correct paperwork was included and requests for extra photographs etc. were acted upon quickly.

Administration

The vast majority of centres followed Edexcel's instructions and procedures efficiently, with few problems. Moderators reported similar difficulties in a minority of cases to last year. They were:

- Addition errors in CMRBs
- Errors in transferring marks from CMRBs to OPTEMS
- No annotation in CMRBs
- Low levels of response credited highly
- Candidate and teacher authentication in CMRBS not signed
- Selected sample not supplemented with highest and / or lowest scoring candidate's work

Criterion 1

Identify needs, use information sources to develop detailed specifications and criteria.

Needs

The majority of candidates were able to score well in this assessment criterion by identifying an appropriate problem and need and writing a design brief to address this. A significant number failed to identify a target market group and thus were denied access to the higher marks.

A few candidates identified the target market group in their design specification and were rewarded for this, but it would have been helpful to moderation if this information had been presented where it was asked for in the assessment criteria.
Where candidates had been presented with a centre or Edexcel generated task, it was important that they personalised the problem in order to ensure that their work could proceed in a direction that was not replicated by others.

Candidates should outline a problem that they have recognised, and from this identify a need for a product that could solve the problem. It is important that the need is justified by a candidate and focuses on a market group. The justification should be in the form of more than one sentence, which contain different statements of need, complete with reasons to explain the need. Where a teacher sets a problem, candidates should personalise this by changing the general statement given to suit their own view of the problem. Candidates should then write a detailed brief that addresses all needs previously identified and explained. The brief should be clear and focused, but should not attempt to offer a design solution.

Candidates should not include statements of specification in the design brief, as this will elicit no credit in this criterion.

Information

Evidence presented in this criterion was mixed in both quality and quantity. In the best examples of information gathering candidates focused on the problem in hand and were highly selective and succinct in their choice of what appeared in their work. Too many candidates, however, still use information that has little currency value in an effort to 'pad-out' design folders.

In order to access the high marks in this section, candidates are expected to gather information that can be used to inform subsequent stages in their design developments. Analysis of existing similar products, market research, and information regarding relevant materials and manufacturing processes would be useful approaches to this section.

Production of large amounts of general information downloaded from Internet sites and materials databases, or the use of magazine cutouts without any selectivity or appropriate annotation is a waste of a candidate's time and energy and will elicit no credit.

Specification

Most candidates were able to produce a useful specification that reflected some points of the information gathered previously, but many were poorly organised and did not always reflect the need identified.

The specification is a very important part of the design activity as it is referenced at several points such as ideas, develop, review, tests and checks, evaluate and modifications, so it is in a candidate's interest to ensure that the specification is as strong as possible.

A strong specification should include reference to form, function, user requirements and budgetary constraints. Each specification point should contain more than one related piece of information about the intended design solution. It should also include measurable points, so that during an evaluation of the performance of a product, true comparisons of achievement can be made.

For the high marks in this section, candidates need to have considered budgetary constraints, which should include justification of why a particular cost is attached to an intended product. This could be derived from market research, consideration of materials and component costs, or by looking at prices of similar commercial products.

Criterion 2

Develop ideas from the specification, check, review and modify as necessary to develop a product.

Ideas

Moderators reported that this assessment criterion produced a very wide spread of responses. High quality work included consideration of the product specification and offered several alternative ideas that were detailed and realistic. Many candidates produced a large number of alternative ideas, but failed to progress beyond a medium level of response, relying on quantity rather than quality to gain marks.

It is not necessary to offer a wide range of completely different ideas in this section, as higher marks are achieved through presenting a range of ideas that are realistic and coherent and these can be in the form of sub-systems or part-ideas that show a good understanding of a variety of materials, components and processes. Ideas should be detailed and show progression from, or links to, each other and they should always match the specification.

It is important at this stage to ensure that candidates are responding to their chosen task at a level appropriate to KS1V demands, as failure to do so will have repeated consequences that exclude them from access to higher marks in other assessment criteria as their work progresses.

Develop

As in previous years, some centres failed to differentiate between this criterion and 'ideas' when awarding marks and credited the same work twice. Most candidates used this assessment section to supply details of materials, manufacturing processes, formal drawings and cutting lists relating to what was considered their 'best idea', without attempting to develop their designs any further.

It is important to realise that develop means change and there must be evidence of design ideas being moved on and refined into a final design proposal that is different from the initial alternative ideas already presented, but will contain many of the best features considered previously. It is not acceptable to simply take an existing idea and offer it as a final proposal without further development.

Modelling is a feature of this criterion and is an important part of testing a proposed design against aspects of the specification. Many candidates used appropriate modelling materials, evidenced in photographs, to produce scale models of their designs and evaluated these against aspects of the product specification, while others used 3D CAD to model their designs and it is pleasing to see an increase in the use of CAD programs such as ProDESKTOP, Solid Works and 2D Design. A significant number of candidates however, failed to effectively model their work and were not able to clearly identify a final design proposal that could be easily referred to in the 'Make Products' section as a comparison with the final outcome.

It is essential that the final design proposal arrived at through development, is appropriate to the level of demand for this GCSE course and contains the necessary details needed to manufacture the product. These details will include materials, dimensions, constructional techniques, manufacturing processes and finishes.

Review

This assessment section remains a problem for many candidates. Most annotated their work with details of how it operated, but failed to actually review their designs against points of specification. To achieve the high mark in this criterion, ideas should be reviewed or evaluated against the specification as they develop. Some centres awarded marks for review based on the final summative evaluation, which is not acceptable.

Criterion 3

Use written and graphical techniques including ICT and CAD where appropriate to generate, develop, model and communicate.

Written communication, other media, ICT

As usual, these assessment criteria were very well evidenced by the vast majority of candidates who are adept in the use of ICT. Centres awarded marks appropriately. Better candidates used specialist technical vocabulary to communicate clearly and logically and presented their work using a range of media such as photographs, charts and tables, models, cut and paste information etc.
The use of 2D and 3D CAD and CAM continues to grow as centres become better equipped.

Criterion 4

Produce and use detailed working schedules, which include a range of industrial applications as well as the concepts of systems and control. Simulate production and assembly lines using appropriate ICT.

Systems and Control

This criterion continues to cause problems for many candidates and centre assessors who still fail to understand how to access the marks available after several Principal Moderator reports and INSET events that highlight this assessment section. For high marks it is necessary to produce an outline plan, systems and control / table, for the manufacture of the candidate's final product that explains the input(s), process(es) and output(s), and feedback paths that identify where performance checks are made. Moderators reported that many candidates drew comprehensive and detailed flow diagrams of their manufacturing but failed to label the input, process output and feedback. Some drew a decision diamond to indicate feedback and were credited for this, while others who were more successful created graphical keys to identify the relevant sections. Labels or a key must be used if maximum marks are to be achieved.

Schedule

As with Systems and Control, this criterion also continues to cause problems. Most candidates were able to produce a work schedule that included a sequence of manufacturing activities that related to time, but gave no indication of quality control. Where Gantt charts were used as a planning tool, many students failed to focus only on product manufacture, producing, timings for the whole of the project instead. It is useful to consider that 'Schedule' and 'Systems and Control' concentrate on manufacturing rather than designing and can include details of tools, equipment and processes that can be used to evidence 'Select' in the 'Select and Use' assessment criterion.

Industrial Applications

Most centres assessed candidates accurately in this criterion, where there was evidence that they had 'used' an industrial method in their work. The use of CAD machinery, vacuum forming equipment, jigs for repeated accuracy in multiple production, and other machinery that would be used where repeatability was

necessary such as routers, and centre lathe (used beyond simple procedures), all fulfil the requirements of 'using' an industrial application.

Candidates who presented written and graphical evidence of industrial applications often failed to relate their descriptions of commercial methods of manufacture to their own work, discussing instead concepts such as injection moulding in general terms.

Criterion 5

Select and use tools, equipment and processes effectively and safely to make single products and products in quantity. Use CAM appropriately.

Select and Use

Moderators reported that most centres are now familiar with what is required in this assessment section and awarded marks appropriately. For the high marks candidates are required to provide explicit evidence of their ability to select and use skilfully the range of tools, equipment and processes used in the manufacture of their product. Evidence of 'select' was successfully produced by the majority of candidates who appear to have been guided well by centres. Evidence was presented by candidates in assessment areas such as 'Systems and Control' and 'Schedule' as well as through photographs, charts and detailed lists. Evidence for 'use skilfully', was presented in the form of detailed photographs that exemplified the skills and accuracy of construction achieved by individual candidates during the manufacture of their product.

As mentioned under 'General Comments', once again this year a significant number of centres allowed candidates to pursue projects focused on the capabilities of laser cutting, and CD racks, acrylic clocks and lighting projects were often the outcome of this. Unfortunately, the production by machine of repeated unit shapes that only require simple assembly and no other skills cannot reach the higher marks in this assessment section as candidates must also demonstrate their ability to use the selected tools, equipment and processes with a high degree of skill and accuracy when making their product.

Simplistic and undemanding work that is well made using appropriate tools, equipment and processes but is unchallenging, cannot elicit high levels of credit so centres must ensure that the work candidates embark upon at the beginning of a project is appropriate to the capabilities of individuals and will allow them to achieve their potential.

Make Products

Once again, centres were generally accurate in awarding marks in this assessment criterion, which elicited some excellent final outcomes from candidates. Most choices of project were appropriate to the level of demand for this course, allowing candidates the opportunity to access the full range of marks available, but a significant number of products produced were inappropriate. It is understandable that candidates of lower ability will produce work of lower demand that does not always reach the requirements of KS1V work, but it is not acceptable to award high marks for such work.

To access the high level of marks candidates must make a high quality product which relates to most of the features of the design proposal. This means that there must be evidence of making a product that meets most of the quality requirements of the final design proposal in terms of sizes, tolerances, function, reliability, and matches most details of materials, construction, fixtures, fittings and form. Where a detailed final design proposal is not in evidence in the 'Develop' criterion, marks in this assessment section will be limited.

Work Safely

Many candidates provided explicit evidence of their regard for safe working practices through annotated photographs, reference to safety in schedule, or by tabulating risk assessment as part of their work in select and use. Not many candidates scored in the high category of marks however, as they failed to consider the safety of others working around them.

Some centres awarded maximum marks in this criterion and annotated the CMRB as 'teacher observation'. This approach is worth only low marks and the statement must detail what has been observed. Explicit evidence must be presented for higher marks.

Criterion 6

Devise and apply tests to check the quality of candidates' work at critical control points. Ensure that candidates' products are of suitable quality for the intended use. Suggest modifications that would improve the product's performance.

Tests and Checks

This assessment criterion was not targeted well by candidates, who described only limited testing which did not always relate to the specification and was hardly ever annotated to explain why testing was being carried out. Testing was often subjective and superficial and was sometimes based on tests carried out and credited in 'Develop'. To access the high marks, candidates are required to develop and use appropriate testing techniques to check the product against the measurable points of the specification after the product has been completed.

Evaluate

This assessment section was not carried out well by candidates, who tended to make subjective and superficial comments and only briefly made reference to the product specification or the tests and checks carried out previously. Some candidates included user views in their evaluations and this helped the objectivity of this section.

Some centres used this section to reward candidates under 'Review', which was not acceptable.

Evidence to justify the award of high marks in this section requires candidates to consider their test results and user views when presenting a summative evaluation and to relate their findings to measurable points of specification.

Modifications

As was the case in previous years, most candidates were able to suggest some modifications that would improve their product, but many were cosmetic and did not focus on improving the performance or quality of the product.

Each modification suggestion should follow on from points of evaluation, which in turn should be linked to tests and checks.

GCSE Design & Technology: Resistant Materials Technology
Principal Examiner's Report June 2007
Unit 1973, Paper 2F

General Comments

It remains the case that candidates' knowledge of processes continues to lack in depth and sufficient detail in order to be able to access the whole range of marks available on the papers. Candidates should be prepared for this examination using the specification as a guide. It is not sufficient to assume that candidates will gain sufficient knowledge and understanding through practical designing and making in their coursework.

Most candidates performed reasonably well where questions were targeted at school workshop production, but where questions about commercially produced products were introduced candidates showed limited knowledge. Where questions asked for an explanation or description candidates often gave a reason and lost the second mark because they did not justify or qualify their answers. Notice should be taken of the information in the Teacher's Guide (pages 11 to 15) that gives clear guidance as to the distinct meaning of the wording and word hierarchy used in questions for this examination ie give/ state/ name/ describe/ explain. This should form part of the teaching practice to candidates in preparation for this paper. Centres are also reminded that candidates must write in pen rather than pencil and that correction fluid should not be used. Colour in the design responses is also to be discouraged as candidates cannot score any marks for this.

Most candidates scored some marks across all the questions, though there were areas where knowledge of certain materials and processes.

There was no evidence to suggest that candidates had been entered for the wrong tiers this year and centres are demonstrating increasing expertise in preparing candidates for questions. There was also no evidence of centres or candidates misunderstanding the instructions. Candidates responded to all questions suggesting that the length of the paper is correct. The design question was well understood by candidates but many candidates could not produce two *different* ideas. A large proportion of candidates scored higher marks than in previous years though some candidates were unable to evaluate their designs in part (b). Question 4 was well answered and it is evident that centres are preparing candidates for product analysis reasonably thoroughly.

Question 1

This question is now very familiar and on the whole, it was well answered with most candidates able to name most of the tools shown and describe their use.

(a)(i)
The vacuum forming machine caused the most problems for candidates.

(a)(ii)
There were varying descriptions for the use of the mallet.

(b)(i)
Most candidates were able to give an answer relating to stopping the blade from rusting. Many general responses about protecting the blade were seen.

(b)(ii)
A number of candidates were able to correctly identify mild steel as an alloy.

(c)(i)
Many candidates were able to correctly identify one marking-out tool.

(c)(ii)
Mixed responses to this question; most scored marks for 'more accurate' or 'identical shape produced'.

(d)
Generally, most candidates scored very well on this question, with many scoring all three marks.

(e)(i)
A number of candidates scored both marks for the advantages of CNC machinery but many lost marks for basic generalisations such as 'cheaper', 'easier' or 'faster'.

(e)(ii)
Most candidates scored some of the marks available for this question, but marks were lost because answers were not fully explained. Most answers made reference to the set up costs or the time taken to set the machine up.

Question 2

(a)
There were many incorrect guesses from the list of hardwoods.

(b)(i)
Most candidates scored one mark for giving one other property. Many candidates repeated the property of hardness. Sharpness was often incorrectly cited as a property.

(b)(ii)
Most candidates scored one or two of the three marks available for the reasons why the metal must have the property of hardness. It was evident that candidates did not understand what is meant by 'properties'. The most common answer was that it should not bend or snap when being used.

(c)(i)
Many candidates repeated that the ABS needed the property of plasticity, already given in the question while 'smooth' was often given as a property.

(c)(ii)
A number of candidates scored one mark but failed to fully explain their answers.

(d)
Most candidates scored at least one mark for this question with 'less likely to break' being the most common answer, followed by the fact that the product would have been tested and passed.

(e)
Always a well answered type of question due to the overlap in Science and Geography. Most candidates scored two marks for responses related to deforestation and the increase of greenhouse gases.

(f)
Again a reasonably well answered question, with many candidates scoring two marks often for responses relating to fewer manual workers required, redundancy or a lesser skilled work force.

Question 3

(a)
Most candidates scored well on this question this year. Ideas were generally clear and annotated, though some had too much annotation that was not always relevant. The best designs showed how the five bottles were to be held and how the product was to be flat packed for construction without any tools. Poor designs did not show any information relating to the flat pack nature of the product. Very few candidates scored marks for the last point, failing to name materials and generally giving generic names like wood or plastic. Few candidates gave consideration to the ability of the design to be made as a one-off product.

The second design often showed a different method of holding the wine bottles but again lacked the detail in relation to the flat pack nature required.

(b)
Many candidates did not evaluate their design proposals, merely repeating what the point asked eg my design can hold five bottles. Few candidates took the point into more detail to score the marks available.

(b)(i)
Candidates often scored one mark for this question by saying that their design was stable because it had a wide base area.

(b)(ii)
Candidates scored poorly here for, in a large number of responses, they repeated the fact that it was flat pack and could be assembled without any tools.

(b)(iii)
This part question was well answered by some candidates who expressed how the bottle was to be easily removed due to space and clearance around the bottle in relation to the holder itself.

Question 4

(a)
Many candidates were better prepared for this question this year. The 'quality' and 'market' headings caused the most problems for candidates while the environment section was the better attempted section.

(b)
Too many candidates responded with the answer that it would not rust. 'Hard' and 'tough' were also common answers.

(c)
Injection moulding was well known by many candidates who scored at least half the marks available by giving a reason related to mass/batch production and the fact that it results in a very accurate product.

(d)
Properties were not generally known by candidates, though many candidates scored two marks for it being transparent so you could see how much ink was left inside.

(e)
The large majority of candidates all scored at least one mark for saying that it shows the colour of the ink inside.

(f)
The term 'self-finishing' was not a term that the large majority of candidates had come across before.

(g)(i)
Most candidates scored at least one mark for describing either the shape of the cap or the fact that the two combined were trapped between the cloth of the shirt.

(g)(ii)
Most candidates scored one mark for relating to the fact that the ball bearing rotates in the nib.

GCSE Design & Technology: Resistant Materials Technology
Principal Examiner's Report June 2007
Unit 1973, Paper 2H

Question 1

(a)
There were many good responses to this question. However, marks were not awarded if candidates confused which of the three categories a specification point should be placed in, thereby indicating lack of understanding.

(b)
A lack of knowledge of silver steel resulted in few candidates scoring both marks available for this question.

(c)
A lack of knowledge regarding injection moulding processed products resulted in candidates losing marks. This was evident in the low number of correct responses, other than accuracy, and by the many generic one word answers given.

(d)
Many candidates correctly identified one property of acrylic and gave a reason. Giving a second property with a correct reason was seen less frequently. Common answers were 'hard – so it won't break' or 'stiff – so it won't bend'.

(e)
Nearly all candidates achieved 'cap match colour of ink' though fewer candidates achieved the second mark.

(f)
Many candidates could not give a reason beyond 'does not need any further finish'.

(g)(i)
Many candidates referred to how it 'clipped' onto the shirt without any further description, thereby by missing out on marks.

(g)(ii)
Very few candidates could describe fully the ball action that allows the ink to produce a steady flow.

Question 2

(a)
Most candidates scored well on this question though there were still repeated answers and safety precautions given.

(b)
This question was not answered well. Centres are encouraged to explore machining on a centre lath more with the candidates in the future.

(c)
Many candidates identified at least one correct response here.

(d)
Many candidates responded with an answer about protecting the handle without any of the qualification or explanation necessary to score higher marks.

(e)(i)
If answered, many candidates did not demonstrate the advantages of using CNC beyond 'fast', 'quick' and 'cheap' or relating it to mass production. Those candidates that did, failed to go on to fully explain their answers.

(e)(ii)
A number of candidates were able to score well on this question. The most frequent incorrect answers related to accurate dimensions and 'quick to do'.

(f)
There were many candidates who could describe what electronic links did but failed to give an example of the technology used, therefore resulting in half marks.

Question 3

(a)
Most candidates scored well on criteria 1, though many failed to show it to be securely in criteria 2, often indicating fixed to tree or wall without mentioning 'above ground'/'on a branch' etc. Criteria 3 was the most successfully answered. For criteria 4, many candidates either gave a generic material or a catalogue of predetermined materials with processes. Very few repeated answers were given for the second design idea.

(b)
The written sections tended to parallel the content of candidates' design drawings without adequately explaining *how* their design proposals either failed or succeeded in meeting the design specification.

Question 4

(a)(i)
Many candidates had a sound understanding of the properties of aluminium.

(a)(ii)
Many correct answers were seen but too many candidates repeated opposites, eg ferrous metals rust and non-ferrous metals do not rust.

(b)
Candidates demonstrated lack of in-depth knowledge of hardwoods and softwoods and the differing advantages of each type.

(c)
Many candidates demonstrated little knowledge of British Standards.

(d)
Many candidates demonstrated a sound understanding of green issues related to pollution.

(e)

Many candidates demonstrated a poor understanding of environmental issues relating to energy beyond 'global warming'.

GCSE Design & Technology: Resistant Materials Technology
Principal Moderator's Report 2007
Unit 3973, Paper 01 (Coursework)

General Comments

Twelve centres prepared candidates for entry to the Short Course this year. Most candidates performed well and some excellent standards were produced by well-motivated candidates who targeted the assessment criteria effectively, but it was obvious from these good performance levels that some candidates had spent much longer than the recommended twenty hours developing their coursework. Although it is commendable that candidates are producing such standards, it is not necessary to demonstrate such high levels of complexity in a Short Course project, which is designed to be completed within 20 hours. Some Short Course project work was of very high quality and would have achieved highly had it been submitted for the Full Course.

A few centres used Edexcel's approved Task Sheets, which were helpful in organising portfolios and keeping the number of sheets candidates used down in number to avoid needless 'padding'.

Most centres applied the mark scheme appropriately, but in some cases, candidates were over-rewarded where there was not enough evidence in design folders to support the marks given. This was particularly noticeable in criteria 2 where large numbers of marks were available for 'design' and 'develop'.

Almost all centres presented a range of good quality photographs to support marks awarded to candidates and this was extremely helpful during moderation, particularly in assessment areas such as 'Select and Use', 'Make Products' and 'Testing'. The majority of candidates now present a range of photographic images that are both informative and of high quality, which is especially important where high marks have been awarded and evidence is needed to illustrate the complexity and quality of construction and manufacture of coursework.

Administration

The vast majority of centres followed Edexcel's instructions and procedures efficiently, with few problems although moderators reported some difficulties in the following areas of administration:

- Addition errors in CMRBs
- Errors in transferring marks from CMRBs to OPTEMS
- No annotation in CMRBs
- Low levels of response credited highly
- Candidate and teacher authentication in CMRBS not signed
- Selected sample not supplemented with highest and / or lowest scoring candidate's work

Criterion 1

Information

Most candidates were able to target marks effectively in this assessment section and were able to achieve at least the medium level of response. It is essential that a high degree of selectivity is applied to the information collected, which should be from more than two sources so that it is appropriate and useful when writing the specification and producing designs. Information gathered in this criterion should be presented on no more than two comprehensive pages.

Information could come from sources such as research into the context/environment where the product will be used, analysis of existing similar products, market research, research into relevant materials and components.

Specification

Specifications are improving, but are still not particularly well written. Many points were superficial and lacked measurable parameters that could be used in evaluating the final product. The specification should include reference to form, function, user requirement and budgetary constraints and should contain points that have developed from information gathered previously.

Candidates would benefit from breaking the specification down into well-organised sub-sections so that they can focus on individual sections. Some suggestions for sub-headings are 'function', 'user requirements', 'performance requirements', 'materials and size', 'safety and quality', 'scale of production', 'budgetary constraints'.

A specification should include technical and measurable points wherever possible, so that ideas and their development can be objectively evaluated using clear design parameters. Specification points should contain more than a single piece of information, so that each statement is justified.

Criterion 2

Ideas

This was generally the weakest area of response from most candidates as many settled on the first idea they produced, which limited their potential to gain marks. There was some high quality work, which included consideration of the product specification and offered several alternative ideas that were detailed and realistic, but this was in the minority. It is not necessary to offer a wide range of completely different ideas in this section, as higher marks are achieved through presenting a range of ideas that are realistic and coherent. These can be in the form of sub-systems or part-ideas that show a good understanding of a variety of materials, components and processes. Ideas should be detailed and show progression from, or links to, each other and they should always match the specification.

It is important to understand that the same standards of D&T competency are expected for the grades range in the Short Course, as in the Full Course, but it is also expected that candidates will produce less work to achieve them.

Develop

When developing ideas, some excellent modelling was in evidence in the form of 3D CAD and physical construction, and candidates used this to good effect when developing their final design proposal. Unfortunately, some candidates seemed not to understand the concept of development and were satisfied to use a previously created idea and repeat it in full in this section.

Candidates should understand that 'develop' means 'change' and should include evidence of elements of previous design ideas being used to produce the final design proposal. It is not acceptable to select a previously designed alternative idea and repeat it in total, without moving the design on.

Candidates should ensure that a clear and detailed 'final design proposal' is an outcome of this assessment criterion, as it will be used in evaluating the prototype in terms of matching its intended features.

Modelling is an important part of 'develop' and can include the use of 3D materials (evidenced via photographs) or 2D and 3D CAD to test ideas against the specification requirements. Modelling should be thought of as rapid representation of ideas or their sub-systems. There must be a point to modelling and this should be explained, eg to test proportions, materials, component values, ingredients etc. 'Develop' should also include details of dimensions, materials, processes and equipment to be used during product manufacture.

There should be enough information presented in this section to enable a skilled third-party to make the product without further reference to the designer.

Criterion 3

Written Communication

As in previous years the majority of candidates scored high marks through their logical use of appropriate technical vocabulary. Only a few candidates were unfamiliar with terminology and descriptive terms relating to their proposed product.

In order to score high marks the necessary information that relates to the product should be clearly communicated so that the reader can readily understand all of the information presented without making assumptions about what may or may not be meant by particular statements.

Other media and ICT

The majority of candidates are expert users of ICT and were able to score well in this section through their use of appropriate computer packages and their ability to present work using media such as photographs/cut-outs/models/mock-ups have been used to inform the development/evaluation of ideas already presented. More than one form of ICT should be used to generate, develop, model or communicate information or ideas relevant to their product.

Criterion 4

Systems and Control

Although many candidates still do not understand the concept of systems and control, they managed to score well in this criterion as it is combined with 'Schedule'.

Candidates should produce an outline plan for one manufacturing activity for their product. The plan should explain (label) the input(s), the process(es), the output(s) and feedback of the activity to show where performance/quality checks will be triggered. An indication of the correct sequence of operations undertaken during the manufacturing activity that relates time and quality control should also be included.

Where time plans are used (Gantt charts or similar), they should only focus on product manufacture and should not include the whole design, make, evaluate activity.

Industrial Applications

There is a better understanding within centres of what is required in this assessment section and full marks were awarded appropriately where candidates had presented evidence of having used one industrial application in the manufacture of their product.

Candidates only require evidence of having used a single industrial method in their product manufacture in order to gain high marks in this criterion.

Appropriate industrial methods are sometimes difficult to determine, but in general can be said to be the use of processes, equipment and machinery found in commercial activities that allow accurate, repeated production to take place eg CNC equipment, vacuum forming, use of jigs, etc.

Any reference to batch or high volume production as part of Industrial Applications must relate to a candidate's product.

Criterion 5

Select and Use

Candidates presented some excellent work that was supported by clear photographs, that gave detailed information about the quality of work produced.

Overall, centres awarded marks consistently and in line with Edexcel's standards. Almost all project work taken to a final conclusion was of an appropriate level of demand for the Short Course in GCSE Resistant Materials Technology and contained enough rigour to challenge candidates over the few working hours available to them during the course. Some candidates produced low-level work, but it was usually marked appropriately. Only a few candidates were over rewarded in this assessment section for work that was undemanding and inappropriate.

With the increased use of CNC equipment and laser cutters in centres, a significant number of candidates to pursued projects focused on the capabilities of this equipment, and CD racks and acrylic clicks were frequently the result of such

strategies. Unfortunately, the production by machine of repeated unit shapes that require little or no other skills input cannot reach the higher marks in this assessment section as candidates must also demonstrate their ability to use the selected tools, equipment and processes with a high degree of skill and accuracy when making their product. Where CNC equipment is used, centres should ensure that there are plenty of other opportunities within a piece of work for candidates to demonstrate their potential. Candidates should present evidence of having selected most tools equipment and processes that are appropriate and necessary for carrying out the various tasks involved in making their product.

Candidates must also demonstrate their ability to use the selected tools, equipment and processes with a high degree of skill, accuracy and safety. For high marks in this assessment criterion, it is important that when candidates demonstrate their skilful use of tools, equipment and processes, the level of demand of the product is appropriate to the demands expected in high quality GCSE work.

Simplistic and undemanding work that is well made using appropriate tools, equipment and processes but is unchallenging, cannot elicit high levels of credit, so centres must ensure that the work candidates embark upon at the beginning of a project is appropriate to the capabilities of individuals and will allow them to achieve at least their potential in the time allocated to manufacturing as part of the short course in D&T.

'Select' and 'Use' can be evidenced in 'Systems & Control', 'Schedule', photographs charts and specific listings.

Make Products

As in 'Select and Use', this year centres have improved their accuracy in awarding marks in this assessment criterion, which produced a wide range of final outcomes from candidates that matched the final design proposal created as part of 'Develop'. Most projects were appropriate to the level of complexity demanded for this course and this allowed candidate's access to the full range of marks available.

In this assessment section, candidates should provide evidence of making a product that meets most of the quality requirements of their final design proposal in terms of sizes, tolerances, finish, and function.

The complexity of the product should reflect the shorter time available to candidates entered for the Short Course, in that there should be evidence of challenging making work, but there should be less of it than in the Full Course.

The final outcome should relate fully to the features of the final design proposal and this should include any modifications made in light of experience gained in the making process and should match details of specified materials, constructions, form and aesthetics.

If candidates are not able to produce a final design proposal as part of 'Develop', they will be unable to match their prototype to the features of that proposal, so it is essential that this is evidenced in a candidates work.

Evidence of 'Make Products' should be presented in photographic form and a single clear image is the minimum requirement. However, it is ideal for candidates to

include a range of photographs as part of their design folder to illustrate and support aspects of making that they wish to highlight.

Criterion 6

Tests and checks

As has been the case over the last two years, this criterion was not well addressed by most candidates, whose efforts often lacked organisation and did not relate to measurable points of the specification. Descriptions of tests were not detailed and often reflected an intention to test rather than describing what had already been carried out.

Where tests are carried out they should be described in detail and justified to say why they are being carried out.

Credit for testing can only be gained where specific tests relate to the performance or quality of the final product and they must be physical tests.

Evaluate

Many candidates struggled to evaluate their product effectively and comments were often superficial and did not relate to testing carried out previously. There was little mention of third-party comments or suggestions for realistic modifications to improve the product performance.

Evaluation should relate to some of the measurable points of the product specification and should be as objective as possible, with most statements being supported with evidence.

Candidates should try to organise their evaluation statements to avoid descriptions of their actions regarding problems encountered during manufacture, rather than evaluative statements based on previous tests and checks.

It is important that statements of evaluation are objective and not based on personal preferences and once more, the quality of the product specification will determine the quality of response – a well structured specification with measurable points allows more objective evaluation to take place.

GCSE Design & Technology: Resistant Materials Technology
Principal Examiner's Report
Unit 3973, Paper 2F

General Comments

Most candidates showed a range of experiences throughout the paper and as a result could score some marks across all the questions. There were some obvious areas of materials and processes that were not covered by some centres which penalised their candidates.

There was no evidence to suggest that candidates had been entered for the wrong tiers this year and centres are demonstrating increasing expertise in preparing candidates for questions. There was also no evidence of centres or candidates misunderstanding the instructions. Candidates responded to all questions suggesting that the length of the paper is correct. The design question was well understood by candidates but many candidates could not produce two *different* ideas. A large proportion of candidates scored higher marks than in previous years though some candidates were unable to evaluate their designs in part (b). Question 4 was well answered and it is evident that centres are preparing candidates for product analysis reasonably thoroughly.

Question 1

This question is now very familiar and on the whole, it was well answered with most candidates able to name most of the tools shown and describe their use.

(a)(i)
The vacuum forming machine caused the most problems for candidates.

(a)(ii)
There were varying descriptions for the use of the mallet.

(b)(i)
Most candidates were able to give an answer relating to stopping the blade from rusting. Many general responses about protecting the blade were seen.

(b)(ii)
A number of candidates were able to correctly identify mild steel as an alloy.

(c)(i)
Many candidates were able to correctly identify one marking-out tool.

(c)(ii)
Mixed responses to this question; most scored marks for 'more accurate' or 'identical shape produced'.

Question 2

(a)
There were many incorrect guesses from the list of hardwoods.

(b)(i)
Most candidates scored one mark for giving one other property. Many candidates repeated the property of hardness. Sharpness was often incorrectly cited as a property.

(b)(ii)
Most candidates scored one or two of the three marks available for the reasons why the metal must have the property of hardness. It was evident that candidates did not understand what is meant by 'properties'. The most common answer was that it should not bend or snap when being used.

(c)(i)
Many candidates repeated that the ABS needed the property of plasticity, already given in the question while 'smooth' was often given as a property.

(c)(ii)
A number of candidates scored one mark but failed to fully explain their answers.

Question 3

(a)
Many candidates were better prepared for this question this year. The 'quality' and 'market' headings caused the most problems for candidates while the environment section was the better attempted section.

(b)
Too many candidates responded with the answer that it would not rust. 'Hard' and 'tough' were also common answers.

(c)
Injection moulding was well known by many candidates who scored at least half the marks available by giving a reason related to mass/batch production and the fact that it results in a very accurate product.

(d)
Properties were not generally known by candidates, though many candidates scored two marks for it being transparent so you could see how much ink was left inside.

(e)
The large majority of candidates all scored at least one mark for saying that it shows the colour of the ink inside.

(f)
The term 'self-finishing' was not a term that the large majority of candidates had come across before.

(g)(i)
Most candidates scored at least one mark for describing either the shape of the cap or the fact that the two combined were trapped between the cloth of the shirt.

(g)(ii) Most candidates scored one mark for relating to the fact that the ball bearing rotates in the nib.

GCSE Design & Technology: Resistant Materials Technology
Principal Examiner's Report
Unit 3973, Paper 2H

Question 1

(a)
There were many good responses to this question. However, marks were not awarded if candidates confused which of the three categories a specification point should be placed in, thereby indicating lack of understanding.

(b)
A lack of knowledge of silver steel resulted in few candidates scoring both marks available for this question.

(c)
A lack of knowledge regarding injection moulding processed products resulted in candidates losing marks. This was evident in the low number of correct responses, other than accuracy, and by the many generic one word answers given.

(d)
Many candidates correctly identified one property of acrylic and gave a reason. Giving a second property with a correct reason was seen less frequently. Common answers were 'hard – so it won't break' or 'stiff – so it won't bend'.

(e)
Nearly all candidates achieved 'cap match colour of ink' though fewer candidates achieved the second mark.

(f)
Many candidates could not give a reason beyond 'does not need any further finish'.

(g)(i)
Many candidates referred to how it "clipped" onto the shirt without any further description, thereby by missing out on marks.

(g)(ii)
Very few candidates could describe fully the ball action that allows the ink to produce a steady flow.

Question 2

(a)
Most candidates scored well on this question though there were still repeated answers and safety precautions given.

(b)
This question was not answered well. Centres are encouraged to explore machining on a centre lath more with the candidates in the future.

(c)
Many candidates identified at least one correct response here.

(d)
Many candidates responded with an answer about protecting the handle without any of the qualification or explanation necessary to score higher marks.

Question 3

(a)(i)
Many candidates had a sound understanding of the properties of aluminium.

(a)(ii)
Many correct answers were seen but too many candidates repeated opposites, eg ferrous metals rust and non-ferrous metals do not rust.

(b)
Candidates demonstrated lack of in-depth knowledge of hardwoods and softwoods and the differing advantages of each type

GCSE Design & Technology: Resistant Materials Technology
(Full Course: 1973)

Grade Boundaries – Summer 2007

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2007 examinations.

(Foundation Tier out of 100)

C	D	E	F	G
53	43	33	24	15

(Higher Tier out of 100)

A*	A	B	C	D	E
80	69	58	47	38	33

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2007 examination.

(Coursework 01 out of 102)

A*	A	B	C	D	E	F	G
92	80	68	56	45	34	23	17

(Paper 2F out of 88)

C	D	E	F	G
46	38	31	24	17

(Paper 2H out of 88)

A*	A	B	C	D	E
59	50	41	32	25	21

GCSE Design & Technology: Resistant Materials Technology
(Short Course: 3973)

Grade Boundaries – Summer 2007

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2007 examinations.

(Foundation Tier out of 100)

C	D	E	F	G
52	42	33	24	15

(Higher Tier out of 100)

A*	A	B	C	D	E
81	69	57	46	36	31

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2007 examination.

(Coursework 01 out of 84)

A*	A	B	C	D	E	F
76	66	56	46	37	28	19

(Paper 2F out of 44)

C	D	E	F	G
21	17	14	11	8

(Paper 2H out of 44)

A*	A	B	C	D	E
29	24	19	15	11	9

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