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Examiners' Report Summer 2009

GCSE

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

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Summer 2009

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General Comments

As they did last year, moderators reported that a wide and interesting range of coursework was seen and some high quality standards were in evidence particularly in product manufacture. Just as the current legacy specification is about to become defunct, the vast majority of centres are 'getting it right', with fewer disagreements occurring between moderator and centre marks. Centres are now adept at targeting marks, especially in areas that have caused problems in the past, but this at times produces extremely formulaic, templated work that is replicated from student to student.

All coursework seen was potentially appropriate to the requirements of this GCSE course in Resistant Materials Technology, but some students were unable to reach higher levels of response, settling for simplistic outcomes to their chosen design brief. A feature of work seen this year was the appropriate use of CNC equipment. Centres followed advice and limited the use of laser cutters and other computer controlled equipment to allow students to demonstrate other skills, a requirement for reaching the higher marks ranges.

Photographic evidence of product manufacturing remains excellent and this is vital to moderation, highlighting the technical content and quality of construction. Almost all centres now understand that good quality photographic images are essential if moderators are to agree marks awarded by a centre and to this end produce a range of images to show the use of tools and processes. Photographic evidence is also commonly used to show modelling, safety and testing.

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 missing items. were acted upon quickly.

Administration

The vast majority of centres followed Edexcel's instructions and procedures efficiently, with few problems. Moderators reported difficulties in a minority of cases. The most common of these were:

- Addition errors in CMRBs
- Errors in transferring marks from CMRBs to OPTEMS
- No annotation in CMRBs
- Low levels of response credited highly
- Student and teacher authentication in CMRBs not signed
- Selected sample not supplemented with highest and lowest scoring candidates' 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. For full marks, a target market should be identified but a significant number of candidate failed to do this. Where a target market group was identified in a design specification, candidates were given credit for this.

Information

Evidence presented in this criterion was mixed in both quality and quantity. In the best examples of information gathering, students focused closely on the problem in hand and were highly selective in their choice of what appeared in their work. There was evidence from some students of copious amounts of irrelevant information being presented that was no more than padding. Some students seemed to spend a lot of time on this section without realising that their time could have been better spent on other aspects of their work, where the potential marks return was higher. Research should be used to inform the product specification and design ideas, but there was little evidence of this generally. It appears that this section was treated by many as a hoop to jump through without much true application.

Specification

Most students were able to produce a useful specification that contained some points of information that were technical and measurable, but many were poorly organised and did not always reflect the needs of the design brief.

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 so that a statement is justified. For the high mark in this section, students need to have considered budgetary constraints, which should include justification of why a particular cost is attached to an intended product, which should be evidenced from research.

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 students 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.

Develop

The best work in this section showed how students had continued to design, develop and refine their work, producing a final design proposal that could be carried forward to the manufacturing stage. Most candidates however, showed only limited development in their work, using this 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. While this information is part of development, 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.

Modelling is a feature of this criterion and is an important part of testing a proposed design against aspects of the specification. Many students 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.

Review

This assessment section remains a problem for many students. Most annotated their work with details of how designs functioned, but failed to actually review them against points of specification. Tick boxes or marks out of ten were used to evaluate designs, but these techniques are subjective and do not offer any opportunity for objective explanation or justification of how a design achieves or fails to achieve a specification point.

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 in other years, these assessment criteria were very well evidenced by the vast majority of students who are expert in the use of ICT particularly. Centres usually awarded marks appropriately, sometimes harshly, but never leniently. Good students 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.

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

Although performances in this section have improved, it is still problematical for many students and centre assessors, even after years of advice given through Principal Moderator reports and Inset on how to achieve full marks. To score full marks for their work, students must label or use a key to identify input(s), process(es), output(s) and feedback paths that identify where performance checks are made in a plan for production of their product.

Some centres produced pre-printed, templated sheets for students to fill in, but this produced formulaic work that was almost identical from student to student.

Schedule

As with systems and control, this criterion also continues to cause problems, but less so. Most students 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 instead, timings for the whole of the project.

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 students accurately in this criterion, where there was evidence that they had 'used' an industrial method in their work. The use of CAM equipment, vacuum forming equipment, jigs for repeated accuracy in multiple production, other machinery that would be used where repeatability was necessary such as routers, centre lathe (used beyond simple procedures), all fulfil the requirements of 'using' an industrial application.

Students 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 consistently and it is pleasing to report that the vast majority of marks awarded by centre assessors in this section were agreed by moderators. In this criterion, for the high marks students 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 students who appear to have been guided well by centres. Evidence was presented by students 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 students during the manufacture of their product.

Make Products

As with the previous criterion, centres were generally accurate in awarding marks in this assessment section, which elicited some excellent final outcomes from students. Most choices of project were appropriate to the level of demand for this course, allowing students the opportunity to access the full range of marks available, only a minority of products produced were inappropriate. It is expected that students of lower ability will produce work of lower demand, but it is not acceptable to award high marks for such work, as a few centres did. In order to access higher marks in this section, students must make a high quality product which relates to most of the features of the design proposal, which 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.

Evidence for this assessment section is provided through photographs and moderators were pleased with the quality and quantity of images presented by the vast majority of students in support of their efforts in producing a practical outcome.

Work Safely

Many students 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 students 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 the low mark 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 students work at critical control points. Ensure that student's 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 very well by most students, 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 mark, students 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 very well by most students, 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 students included user views in their evaluations and this helped the objectivity of this section.

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

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

Modifications

As was the case in previous years, most students 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 and Technology: Resistant Materials Technology
Principal Examiner's Report - June 2009
1973, Foundation Paper 2F

General Comments

This is the seventh year that this specification has been examined, and the penultimate. The specification tests candidates' knowledge and understanding of resistant materials and products, processes and the effects of producing and using them on society and the environment. The written paper tests their application of this knowledge and understanding through their responses to questions about products and the processes involved in their manufacture, both in school and as part of large quantity production.

As in previous years it remains the case that candidates' knowledge of processes continues to lack in depth and detail in order to be able to access the whole range of marks available on the paper. However, given the length of time that the specification has been in operation there appears to be some improvement. Candidates should be prepared for this examination using the specification as a guide to identify what has to be taught. It is not sufficient to rely upon and assume that candidates will gain sufficient knowledge and understanding through practical designing and making in their coursework. Candidates have to be taught on a more formal basis the contents of the specification.

Most candidates performed reasonably well where questions were targeted at school workshop production and processes but where commercially produced products were introduced candidates showed limited knowledge, understanding and ability to be able to apply this to an unfamiliar product. Where questions asked for an explanation or description candidates continue to give a reason and lose the second mark because they did not justify or qualify their answers, although in some centres this is clearly improving but this is an area where candidates' performance can be significantly improved. 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 i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. The use of colour in the design responses is now almost extinct but candidates must be encouraged to use only the space provided for their responses.

Foundation Tier (2F)

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 clearly not covered by some centres and candidates struggled as a result.

There was no evidence to suggest that candidates had been entered for the wrong tier 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 made responses to all questions suggesting that the length of the paper is appropriate. It was obvious that some areas of the specification are not being taught to candidates in centres and as a result some centres disadvantage their candidates. A similar criticism can be made, as it is evident that some centres are not teaching candidates about the properties of materials and the correct terminology / definitions. All too often the generic term 'strong' appears, which in almost all cases will score no marks.

The design question was either well understood by candidates or there was very little evidence that candidates could produce two different ideas rather than one idea developed. In the design question a proportion of candidates scored well but some candidates were unable to make a

reasonable attempt to evaluate their design in part b. Question 4 was well answered and it is evident that centres are preparing candidates for product analysis reasonably thoroughly.

Question 1(a) Mean score 6.55 from 10 marks

Most candidates scored well on this question, with the exception of the tap, which was often described as a file or drill. Only a few knew it was a tap and used for cutting screw threads.

Question 1(b)(i) Mean score 0.49 from 1 mark

A multiple choice question.

Question 1(b)(ii) Mean score 0.84 from 1 mark

This was very well answered by the majority of candidates with the most common answer being 'it will go hard'.

Question 1(b)(iii) Mean score 0.75 from 2 mark

Many candidates gave poor responses to this part question with many incorrect responses making reference to 'making it more comfortable to hold' and 'will not get any splinters'.

Question 1(c) Mean score 0.23 from 1 mark

Many candidates failed to respond here, but it was often well done by the rest.

Question 1(d) Mean score 2.81 from 3 marks

Almost all candidates scored full marks on this question.

Question 1(e) Mean score 0.67 from 2 marks

This question was well answered by a good number of candidates.

Question 1(f) Mean score 0.33 from 2 marks

This question was not well done by many candidates with many giving vague, generic responses such as 'faster' and 'easier'.

Question 2(a) Mean score 0.50 from 1 mark

A good, encouraging number of candidates scored well on this part.

Question 2(b)(i) Mean score 0.99 from 2 marks

A good number of candidates demonstrated a very good understanding of brass and consequently scored well.

Question 2(b)(ii) Mean score 0.78 from 2 marks

There were many correct answers given, mainly relating to the pins not snapping or breaking when being pulled out and pushed into the plug socket.

Question 2(c) Mean score 0.98 from 2 marks

Many candidates scored well here with the most common responses being related to grip.

Question 2(d)(i) Mean score 1.04 from 2 marks

Generally answered with many candidates giving at least one property of copper, often either 'good conductor' or 'malleable'.

Question 2(d)(ii) Mean score 0.80 from 2 marks

There were quite a few good descriptions in response to this question, but as is quite often the case with questions of this type: many candidates make a response, most commonly related to electric shocks, but do not go on to fully explain their response, and so limit themselves to only one of the two marks available.

Question 2(e) Mean score 0.57 from 2 marks

Many candidates answered this well, but there were also lots of responses such as 'you know its British' and 'you know who to phone if it breaks'.

Question 2 (f) Mean score 0.35 from 3 marks

This was a poor answered question by the majority of candidates with most getting confused between the consumer and the manufacturer.

Question 2(g)(i) Mean score 0.69 from 2 marks

This too was quite well answered with most answers from the mark scheme in evidence.

Question 2(g)(ii) Mean score 0.61 from 4 marks

Not well done by the majority, again with very few fully described responses. Most common responses related to the reduction in landfill

Question 3 Mean score 6.51 from 22 marks

Question 3(a)

Design idea 1:
A high number of candidates achieved good marks with Design Idea One. Candidates gained marks for showing a board to write on in their designs which at the basic level scored some marks and most candidates provided a space to hold menus. A high number of candidates had been able to name a specific material and did gain credit for this. Too many still use the generic terms of plastic, wood or metal. It is noticeable that a high number of candidates do not give any evidence of a process.

Design idea 2:
Too many candidates chose to repeat design idea 1 except they rearranged the positing of the menus rather than finding a different way to hold them. Overall little effort was made to radically change the ideas and so the marks given for design idea 2 reflected this.

Question 3(b)(i)

Some candidates gave a good evaluation of their design as having a suitable surface to write on.

Question 3(b)(ii)

There were not many scoring full marks for this part question as candidates simply state that their design was portable and freestanding.

Question 3(b)(iii)

Here too those who had not given sufficient detail in their design did not score well, though there were a few good evaluations relating to how the menus were to be easily removed.

Question 4(a) Mean score 1.65 from 6 marks

For 'needs of the user', The most common answer to this was 'easy to refill' but many confused the needs of the user with those of the bird.

For 'environmental considerations', material recycling was the most common answer to protect the environment or use of materials from sustainable sources.

For 'quality', shiny surface/looks good, smooth finish to prevent injury the most common answers.

Question 4(b) Mean score 0.38 from 2 marks

Not well done on the whole by the majority of candidates.

Question 4(c) Mean score 0.45 from 2 marks

Correct responses to this question usually related to the accuracy of the finished part or that they could be made in high volume.

Question 4(d) Mean score 0.87 from 4 marks

Candidates understanding of properties of materials remains poor with many generic properties given such as 'strong'. Quite often characteristics were also given such as 'see-through' or 'so you can see when it is empty'.

Question 4(e) Mean score 0.30 from 2 marks

A poor set of responses with few correct responses seen for both marks.

Question 4(f) Mean score 0.19 from 2 marks

Very poor on the whole with very few correct responses seen.

Question 4(g) Mean score 1.78 from 4 marks

Quite a few candidates did not refer to both points for the two specifications given and therefore candidates limited the marks they could access.

GCSE Design and Technology: Resistant Materials Technology
Principal Examiner's Report - June 2009
1973, Higher Paper 2H

General Comments

This is the seventh year that this specification has been examined. The specification tests candidates' knowledge and understanding of resistant materials and products, processes and the effects of producing and using them on society and the environment. The written paper tests their application of this knowledge and understanding through their responses to questions about products and the processes involved in their manufacture, both in school and as part of large quantity production.

It remains the case that candidates' knowledge of processes continues to lack in depth and detail in order to be able to access the whole range of marks available on the paper. Candidates should be prepared for this examination using the specification as a guide as to identify what has to be taught. It is not sufficient to rely upon and assume that candidates will gain sufficient knowledge and understanding through practical designing and making in their coursework. Candidates have to be taught on a more formal basis, the contents of the specification.

Most candidates performed reasonably well where questions were targeted at school workshop production and processes but where commercially produced products were introduced candidates showed limited knowledge. Where questions asked for an explanation or description candidates continue to give a reason and lose the second mark because they did not justify or qualify their answers, although in some centres this is clearly improving but this is an area where candidates' performance can be significantly improved. 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 i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. The use of colour in the design responses is now almost extinct but candidates must be encouraged to use only the space provided for their responses.

Higher Tier 2H

It was evident that the majority of centres had entered candidates correctly for this tier of the examination. A number of candidates showed a greater understanding of what the key words in questions were asking of them i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. Candidates must also be encouraged to use only the space provided for their responses.

Question 1(a) Mean score 3.12 from 6 marks

For 'needs of the user', many candidates did not realise that the user was the human, so a lot of answers were about the birds using the feeder and losing marks as a result.

The 'environmental considerations' point and reason were generally answered well although a common incorrect answer was to do with the environmental impact of the feeder and how it should fit into the environment or not be toxic to the birds.

The point and reason for 'quality' was not answered well by a number of candidates who related their answers to quality testing, to make sure it fitted together well and references to CE or Kite Marks.

Question 1(b) Mean score 0.89 from 2 marks

Many candidates scored well, but a number of incorrect responses referred to durability, aesthetic appeal and strength.

Question 1(c) Mean score 1.08 from 2 marks

Most candidates scored at least one mark for this question, and there was a good range of answers. This question also had a notable number of responses relating to 'quick' or 'cheap' which scored no marks.

Question 1(d) Mean score 1.46 from 4 marks

Most candidates scored well on this questions, the most common answers identified acrylic as weatherproof or waterproof which protects the seeds, scoring half marks. A high proportion of candidates made reference to transparency of the material in order to be able to see when the bird feeder needed to be refilled and so were not awarded marks. There were also a lot of answers referring to ability to be injection moulded as a property. There were a significant number of responses giving malleability as a property, incorrectly.

Question 1(e) Mean score 0.79 from 2 marks

A number of candidates appear to have misunderstood this question and gave answers that related to the testing of the product once it had been manufactured, rather than details of quality checks during manufacture. Despite this, quality of finish, assembly, size and tolerance were the most common answers given. Some candidates showed a clear lack of understanding of appropriate quality control checks.

Question 1(f) Mean score 0.57 from 2 marks

Easy to cut and easy curves were the most common answers here with most scoring at least one mark. Where two marks were scored the answers were very good and showed understanding. Some lack of appreciation of the distinction between CAD and CAM was evident from some responses. Some candidates responded incorrectly, stating the shape of the body as being too intricate or complex to cut by hand.

Question 1(g) Mean score 3.31 from 4 marks

Generally, candidates scored very well but a significant number of candidates did not appear to understand how the feeder functioned and gave responses referring to birds entering the feeder rather than feeding from seeds coming out of the feeding hole. Reference to the hanging chain and the ability to be put up high were the most common answers to this question scoring full marks. There was some repetition of the stem of the question referring to hanging which prevents the cat getting at the birds though. A significant few thought the chain would swing the feeder thus preventing cats' access to the birds.

Question 2(a) Mean score 1.16 from 3 marks

Most candidates scored marks here but some candidates wrote their answers as a set of safety instructions like 'carry the chisel blade downward' or 'never chisel towards yourself' which scored no marks. There were a few students repeating the same answer in different ways.

Question 2(b) Mean score 1.37 from 2 marks

This was quite well done by many candidates.

Question 2(c) Mean score 0.85 from 2 marks

Generally well understood and accurately described either as heating and quenching or case hardening. Common incorrect answers gave add carbon to the iron or beat the steel to work harden it.

Question 2(d) Mean score 1.38 from 4 marks

'Identical' and 'accurate' were the most common answers scoring only one mark. There were very few good answers referring to speed of production/mass, batch, quantity production and quality of finish. The majority of responses compared the process against making it by hand. E.g. 'cheaper than making it by hand' or 'faster than making it by hand'. Again, most candidates failed to go on to explain the advantages they had given.

Question 2(e) Mean score 1.64 from 3 marks

Some good responses here, but again a distinct lack of full understanding was evident. The most common correct answers were 3D visualisation, views all round, sizes and colour/texture. Some common incorrect answers were 'easier/quicker to design', 'easier to draw' or 'quicker than drawing by hand'.

Question 2(f)(i) Mean score 1.86 from 4 marks

Half marks for the majority of responses here as there was no description of how ICT helped manufacturers manage their business. Lots of candidates identified the use of data/spread sheet, or monitor wages, input/output. There was a lot of generic reference to ICT being used to manage paperwork or save paper/time in storing/finding documents. The most common answers were 'email to communicate with others' and a few EPOS/JIT descriptions.

Question 2(f)(ii) Mean score 0.43 from 4 marks

There was limited evidence of any understanding of CIM, most responses appeared to be guesswork, which suggest too few centres are actively teaching candidates about CIM. Some did gain a single mark for 'less workforce' and the odd reference to faster production. Examiners saw very few answers to this question, which could be awarded three or four marks.

Question 3 Mean score 13.46 from 22 marks

Question 3(a)

This question was generally answered quite well. Some designs were excellent although a few were very difficult to understand as the candidate wrote so much around them, not all reading from the bottom. Good, clear annotation, related to each of the specification points helps not only the candidate, but also helps examiners when allocating marks.

Marks tended to be lost on the flat packing specification point; screws were the most common idea. There were a few other suggestions such as dowels but KD fittings in general were not common responses. Various materials were named but relevant processes were not e.g. using lasers to cut straight lines in wood materials. For design 2 candidates often repeated the same ideas as design idea 1 for the hooks/box for shoes.

Question 3(b)(i)

Scored well for most candidates where they described that the two coats could be hung/removed without interference from each other. Poor responses, where candidates simply stated that the design meets this point, without any further explanation.

Question 3(b)(ii)

This too scored well and was generally the best answered of the evaluation questions.

Question 3(b)(iii)

Here, most candidates score one mark for mention of screws as the main joining method. There were a small number who added pilot holes for the screw but very few describing and other forms of KD fitting. Most relied on reference to the sides of the unit being flat or rectangular hence they could be flat packed.

Question 4(a) Mean score 1.84 from 4 marks

Many answers gave similar responses to those in question 1d, there appeared to be little evidence of the differentiation of thermoplastics having been taught. Toughness and durability were often mixed up with dropping and breaking or withstanding wear and tear. Despite this, most candidates scored half marks. Many incorrect answers referred to ABS being available in many colours.

Question 4(b) Mean score 1.09 from 3 marks

Properties and characteristics were also mixed up by many candidates, repeats of tough, durable, strong and hard were all seen. There were some responses that related to remouldable, recyclable and plastic memory. Only a few gave flexibility or the long tangled chains allowing mouldability.

Question 4(c) Mean score 0.64 from 2 marks

This question was the most poorly answered with responses referring to the probability that acrylic would melt from the heat of the torch bulb or the flame. The most common correct answers gave brittle and easy to break or not as tough and would not withstand shocks for the full two marks to this question.

Question 4(d) Mean score 0.92 from 2 marks

Some confused answers here too with candidates giving copper as a non-ferrous metal so a good electrical conductor or the fact the ferrous metals are magnetic thus affecting their ability to conduct. Conductivity was the most common score for one mark some others scored for ferrous metals rusting or the converse.

Question 4(e) Mean score 1.97 from 3 marks

Most candidates scored one or two marks for less virgin materials needed, less going to landfill or reduced pollution. Recycling was often incorrectly related to the materials for the torch rather than the packaging for the torch so referred to oil for plastics etc. and gaining no marks.

Question 4(f) Mean score 2.27 from 4 marks

Most candidates scored half marks for fewer batteries need to be made or less demand on material to make new batteries or pollution reduced as a result of less chemicals going into landfill. Most did not back up their answer for the full marks. Many incorrect responses talked about costing less to buy and not causing pollution by recharging!

Question 4(g) Mean score 2.05 from 4 marks

Here too candidates did not qualify their answers, only the first part of the answer was given e.g. people are lazy, did not understand recycling, recycling facilities not provided. The majority of candidates answered that items could not be recycled.

GCSE Design and Technology: Resistant Materials Technology
Principal Moderator's Report - June 2009
3973, Paper 01 (Coursework)

General Comments

Very few cntres submitted work for moderation in Resistant Materials Technology this year. The performance of most students was good and some high standards of work were seen. Despite the limited time constraints, almost all manufactured products were complete and functioning as required, which is a commendable achievement. Some short course project work was of very high quality and every bit as complex and good as that seen in the full course of study.

Only two centres used Edexcel's approved Task Sheets, which were designed to aid organisation of design portfolios and restrict the number of sheets used in order to guide the use of time and effort.

Nearly all centres applied the mark scheme broadly in line with Edexcel's standards and where marks were not agreed by the moderator, this was usually by a relatively low number. It was quite common to increase marks in some assessment criteria where centres were slightly harsh in their treatment of some candidates.

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 students 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 needs to illustrate the complexity and quality of construction and manufacture of coursework.

Centres are reminded of the importance of submitting work on time.

Administration

Administration was generally good although there were some problems in the following areas of administration:

- Addition errors in CMRBs
- Errors in transferring marks from CMRBs to OPTEMS
- No annotation in CMRBs.

Criterion 1

Information

Most students were able to target marks effectively in this assessment section and achieved at least the medium level of response. It is essential that a high degree of selectivity is applied to the information collected 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.

Specification

Specifications were fairly well written, but statements were often superficial and lacked measurable points that could be used in evaluating the final product. The specification should include reference to form, function, user requirements and budgetary constraints and should contain points that have developed from information gathered previously. A specification should include technical and measurable points wherever possible, so that ideas and their development can be objectively evaluated against these.

Criterion2

Ideas

This was generally the weakest area of response from students. A significant number produced superficial work in this criterion and many settled on the first idea they produced, adding other ideas cosmetically. 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 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.

Develop

When developing ideas, some excellent modelling was in evidence in the form of 3D CAD and physical construction, and students used this to good effect when developing their final design proposal. Unfortunately, some students did not offer any true development and were happy to use a previously created idea and repeat it in full in this section.

Students should understand that ‘develop’ means ‘change’ and should include evidence of elements of previous design ideas being used to produce the final design proposal.

Criterion 3

Written Communication

As in previous years, in this assessment section, the majority of students scored high marks through their logical use of appropriate technical vocabulary. Only a few students 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 students 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. These were 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. In this assessment section, students 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

Industrial Applications

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

Students only require evidence of having used a single industrial method in their product manufacture in order to gain the high mark 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 e.g. CNC equipment, vacuum forming, use of jigs, etc.

Criterion 5

Select and Use

In this criterion, students 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 students over the few working hours available to them during the course. Some students produced low-level work, but it was usually marked appropriately. Only a few students were over rewarded in this assessment section for work that was undemanding for GCSE.

Make Products

As with 'select and use' centres awarded marks accurately and consistently in this assessment criterion. Students produced a wide range of outcomes that matched their final design proposal, created as part of 'develop'. Most projects were appropriate to the level of complexity demanded for this course and this allowed candidates' access to the full range of marks available.

Criterion 6

Tests and checks

This assessment section 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.

Evaluate

Many students 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.

GCSE Design and Technology: Resistant Materials Technology
Principal Examiner's Report - June 2009
3973, Foundation Paper 2F

General Comments

This is the seventh year that this specification has been examined, and the penultimate. The specification tests candidates' knowledge and understanding of resistant materials and products, processes and the effects of producing and using them on society and the environment. The written paper tests their application of this knowledge and understanding through their responses to questions about products and the processes involved in their manufacture, both in school and as part of large quantity production.

As in previous years it remains the case that candidates' knowledge of processes continues to lack in depth and detail in order to be able to access the whole range of marks available on the paper. However, given the length of time that the specification has been in operation there appears to be some improvement. Candidates should be prepared for this examination using the specification as a guide as to identify what has to be taught. It is not sufficient to rely upon and assume that candidates will gain sufficient knowledge and understanding through practical designing and making in their coursework. Candidates have to be taught on a more formal basis, the contents of the specification.

Most candidates performed reasonably well where questions were targeted at school workshop production and processes but where commercially produced products were introduced candidates showed limited knowledge and understanding and ability to be able to apply this to an unfamiliar product. Where questions asked for an explanation or description candidates continue to give a reason and lose the second mark because they did not justify or qualify their answers, although in some centres this is clearly improving but this is an area where candidates' performance can be significantly improved. 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 i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. Candidates must be encouraged to use only the space provided for their responses.

Foundation Tier (2F)

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 made responses to all questions suggesting that the length of the paper is correct. It was obvious that some areas of the specification are not being taught to candidates in centres and as a result some centres disadvantage their candidates. A similar criticism can be made, as it is evident that some centres are not teaching candidates about the properties of materials and the correct terminology / definitions. All too often the generic term 'strong' appears which in almost all cases will score no marks. The design question was either well understood by candidates or there was very little evidence that candidates could produce two different ideas rather that one idea developed. Question 3 was well answered and it is evident that centres are preparing candidates for product analysis reasonably thoroughly.

Question 1(a) Mean score 5.30 from 6 marks

Most candidates scored well on this question.

Question 1(b)(i) Mean score 0.49 from 1 mark

A multiple choice question.

Question 1(b)(ii) Mean score 0.90 from 1 mark

This was very well answered by the majority of candidates with the most common answer being 'it will go hard'.

Question 1(b)(iii) Mean score 0.67 from 2 mark

Many candidates gave poor responses to this part question with many incorrect responses making reference to 'making it more comfortable to hold' and 'will not get any splinters'.

Question 1(c) Mean score 0.37 from 1 mark

Many candidates failed to respond here, but it was often well done by the rest.

Question 2(a) Mean score 0.50 from 1 mark

A good, encouraging number of candidates scored well on this part.

Question 2(b)(i) Mean score 0.73 from 2 marks

A good number of candidates demonstrated a very good understanding of brass and consequently scored well.

Question 2(b)(ii) Mean score 0.80 from 2 marks

There were many correct answers given, mainly relating to the pins not snapping or breaking when being pulled out and pushed into the plug socket.

Question 2(c) Mean score 0.90 from 2 marks

Many candidates scored well here with the most common responses being related to grip.

Question 2(d)(i) Mean score 1.20 from 2 marks

Generally answered with many candidates giving at least one property of copper, often either 'good conductor' or 'malleable'.

Question 2(d)(ii) Mean score 0.77 from 2 marks

There were quite a few good descriptions in response to this question, but as is quite often the case with questions of this type: many candidates make a response, most commonly related to electric shocks, but do not go on to fully explain their response, and so limit themselves to only one of the two marks available.

Question 3 (a) Mean score 1.33 from 6 marks

For 'needs of the user', The most common answer to this was 'easy to refill' but many confused the needs of the user with those of the bird.

For 'environmental considerations', material recycling was the most common answer to protect the environment or use of materials from sustainable sources.

For 'quality', shiny surface/looks good, smooth finish to prevent injury the most common answers.

Question 3(b) Mean score 0.53 from 2 marks

Not well done on the whole by the majority of candidates.

Question 3(c) Mean score 0.60 from 2 marks

Correct responses to this question usually related to the accuracy of the finished part or that they could be made in high volume.

Question 3(d) Mean score 0.50 from 4 marks

Candidates understanding of properties of materials remains poor with many generic properties given such as 'strong'. Quite often characteristics were also given such as 'see-through' or 'so you can see when it is empty'.

Question 3(e) Mean score 0.53 from 2 marks

A poor set of responses with few correct responses seen for both marks.

Question 3(f) Mean score 0.30 from 2 marks

Very poor on the whole with very few correct responses seen.

Question 3(g) Mean score 2.23 from 4 marks

Quite a few candidates did not refer to both points for the two specifications given and therefore candidates limited the marks they could access.

GCSE Design and Technology: Resistant Materials Technology
Principal Examiner's Report - June 2009
3973, Higher Paper 2H

General Comments

This is the seventh year that this specification has been examined. The specification tests candidates' knowledge and understanding of resistant materials and products, processes and the effects of producing and using them on society and the environment. The written paper tests their application of this knowledge and understanding through their responses to questions about products and the processes involved in their manufacture, both in school and as part of large quantity production.

It remains the case that candidates' knowledge of processes continues to lack in depth and detail in order to be able to access the whole range of marks available on the paper. Candidates should be prepared for this examination using the specification as a guide as to identify what has to be taught. It is not sufficient to rely upon and assume that candidates will gain sufficient knowledge and understanding through practical designing and making in their coursework. Candidates have to be taught on a more formal basis, the contents of the specification.

Most candidates performed reasonably well where questions were targeted at school workshop production and processes but where commercially produced products were introduced candidates showed limited knowledge. Where questions asked for an explanation or description candidates continue to give a reason and lose the second mark because they did not justify or qualify their answers, although in some centres this is clearly improving but this is an area where candidates' performance can be significantly improved. 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 i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. Candidates must be encouraged to use only the space provided for their responses.

Higher Tier 2H

It was evident that the majority of centres had entered candidates correctly for this tier of the examination. A number of candidates showed a greater understanding of what the key words in questions were asking of them i.e. give/ state/ name/ describe/ explain. This should form part of the teaching practice to students in preparation for this paper. Candidates must also be encouraged to use only the space provided for their responses.

Question 1(a) Mean score 2.73 from 6 marks

Question 1(a)(i)

For 'needs of the user', many candidates did not realise that the user was the human, so a lot of answers were about the birds using the feeder and losing marks as a result.

The 'environmental considerations' point and reason were generally answered well although a common incorrect answer was to do with the environmental impact of the feeder and how it should fit into the environment or not be toxic to the birds.

The point and reason for 'quality' was not answered well by a number of candidates who related their answers to quality testing, to make sure it fitted together well and references to CE or Kite Marks.

Question 1(b) Mean score 0.95 from 2 marks

This scored well for many candidates but many incorrect responses referred to durability, aesthetic appeal and strength.

Question 1(c) Mean score 1.23 from 2 marks

Most candidates scored at least one mark for this question, and there was a good range of answers. This question also had a notable number of responses relating to 'quick' or 'cheap' which scored no marks.

Question 1(d) Mean score 1.45 from 4 marks

Most candidates scored well on this questions, the most common answers identified acrylic as weatherproof or waterproof which protects the seeds, scoring half marks. A high proportion of candidates made reference to transparency of the material in order to be able to see when the bird feeder needed to be refilled and so were not awarded marks. There were also a lot of answers referring to ability to be injection moulded as a property. There were a significant number of responses giving malleability as a property, incorrectly.

Question 1(e) Mean score 0.73 from 2 marks

A number of candidates appear to have misunderstood this question and gave answers that related to the testing of the product once it had been manufactured, rather than details of quality checks during manufacture. Despite this, quality of finish, assembly, size and tolerance were the most common answers given. Some candidates showed a clear lack of understanding of appropriate quality control checks.

Question 1(f) Mean score 0.36 from 2 marks

Easy to cut and easy curves were the most common answers here with most scoring at least one mark. Where two marks were scored the answers were very good and showed understanding. Some lack of appreciation of the distinction between CAD and CAM was evident from some responses. Some candidates responded incorrectly, stating the shape of the body as being too intricate or complex to cut by hand.

Question 1(g) Mean score 3.27 from 4 marks

Generally, candidates scored very well but a significant number of candidates did not appear to understand how the feeder functioned and gave responses referring to birds entering the feeder rather than feeding from seeds coming out of the feeding hole. Reference to the hanging chain and the ability to be put up high were the most common answers to this question scoring full marks. There was some repetition of the stem of the question referring to hanging which prevents the cat getting at the birds though. A significant few thought the chain would swing the feeder thus preventing cats' access to the birds.

Question 2(a) Mean score 1.16 from 3 marks

Most candidates scored marks here but some candidates wrote their answers as a set of safety instructions like 'carry the chisel blade downward' or 'never chisel towards yourself' which scored no marks. There were a few students repeating the same answer in different ways.

Question 2(b) Mean score 1.05 from 2 marks

This was quite well done by many candidates.

Question 2(c) Mean score 0.95 from 2 marks

Generally well understood and accurately described either as heating and quenching or case hardening. Common incorrect answers gave add carbon to the iron or beat the steel to work harden it.

Question 2(d) Mean score 0.64 from 4 marks

'Identical' and 'accurate' were the most common answers scoring only one mark. There were very few good answers referring to speed of production/mass, batch, quantity production and quality of finish. The majority of responses compared the process against making it by hand. E.g. 'cheaper than making it by hand' or 'faster than making it by hand'. Again, most candidates failed to go on to explain the advantages they had given.

Question 3(a) Mean score 1.64 from 4 marks

Many answers gave similar responses to those in question 1d, there appeared to be little evidence of the differentiation of thermoplastics having been taught. Toughness and durability were often mixed up with dropping and breaking or withstanding wear and tear. Despite this, most candidates scored half marks. Many incorrect answers referred to ABS being available in many colours.

Question 3(b) Mean score 1.18 from 3 marks

Properties and characteristics were also mixed up by many candidates, repeats of tough, durable, strong and hard were all seen. There were some responses that related to remouldable, recyclable and plastic memory. Only a few gave flexibility or the long tangled chains allowing mouldability.

Question 3(c) Mean score 0.59 from 2 marks

This question was the most poorly answered with responses referring to the probability that acrylic would melt from the heat of the torch bulb or the flame. The most common correct answers gave brittle and easy to break or not as tough and would not withstand shocks for the full two marks to this question.

Question 3(d) Mean score 0.95 from 2 marks

Some confused answers here too with candidates giving copper as a non-ferrous metal so a good electrical conductor or the fact the ferrous metals are magnetic thus affecting their ability to conduct. Conductivity was the most common score for one mark some others scored for ferrous metals rusting or the converse.

GCSE DESIGN AND TECHNOLOGY: RESISTANT MATERIALS TECHNOLOGY
(Full Course: 1973)

Grade Boundaries – June 2009

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2009 examinations.

Both foundation and higher options are out of 100 marks.

	A*	A	B	C	D	E	F	G
Foundation				52	42	33	24	15
Higher	82	71	60	49	40	35		

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2009 examination.

(Coursework 01 out of 102)
(Paper 2F out of 88)
(Paper 2H out of 88)

	A*	A	B	C	D	E	F	G
Coursework	92	80	68	56	45	34	23	12
Foundation				44	37	30	24	18
Higher	63	54	45	36	29	25		

GCSE DESIGN AND TECHNOLOGY: RESISTANT MATERIALS TECHNOLOGY
(Short Course: 3973)

Grade Boundaries – June 2009

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2009 examinations.

Both foundation and higher options are out of 100 marks.

	A*	A	B	C	D	E	F	G
Foundation				51	42	33	24	15
Higher	83	71	59	48	38	33		

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2009 examination.

(Coursework 01 out of 84)
(Paper 2F out of 44)
(Paper 2H out of 44)

	A*	A	B	C	D	E	F	G
Coursework	76	66	56	46	37	28	19	
Foundation				20	17	14	11	8
Higher	31	26	21	17	13	11		

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