

GCSE

Edexcel GCSE

Design & Technology

Resistant Materials Technology (1973/3973)

This Examiners' Report relates to Mark Scheme Publication  
code: UG 017835

Summer 2006

Examiners' Report

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information please call our Customer Services on 0870 240 9800, or visit our website at [www.edexcel.org.uk](http://www.edexcel.org.uk).

Summer 2006

Publications Code UG 017835

All the material in this publication is copyright

© Edexcel Ltd 2006

## Index

### GCSE Design and Technology: Resistant Materials Technology Examiners' Reports

Unit 1973 Full Course	Foundation Tier (2F).....	1
	Higher Tier (2H) .....	5
	Coursework (01).....	7
Unit 3973 Short Course	.....	21
Grade Boundaries, Full Course	.....	29
Grade Boundaries, Short Course	.....	30



**GCSE Design and Technology: Resistant Materials Technology**  
**Principal Examiner's Report**  
**Unit 1973, Foundation Tier**

### **General Comments**

This is the fourth 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 sufficient detail. Candidates should be prepared for this examination using the specification as a guide. 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 but where commercially produced products were introduced candidates showed limited knowledge. Where questions asked for an explanation or description candidates could give a reason but lost the second mark because they did not justify or qualify their answers. 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. Centres are also reminded that candidates must write in pen rather than pencil and that no correction fluid or pens should be used. Candidates must also be encouraged to use only the space provided for their responses.

It must be stressed to candidates that the question needs to be read carefully in order to score marks, without wasting too much time on responses that do not score marks.

### **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 but it was obvious once again that a fair proportion of candidates finished early. It was obvious that some areas of the specification are not being taught to candidates in centres and as a result some centres disadvantaged their candidates. This was particularly evident in question 2 where few candidates had any detailed knowledge of adhesives or the construction of ply. A similar criticism can be made, as it is evident that some centres are not teaching candidates about the properties of materials. 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 large proportion of candidates scored well on one of the two designs required 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 This question is now very familiar and on the whole it was answered much better in comparison to last year with most candidates being able to name some of the tools shown and they were able to describe their use. Too often however, responses were too generic 'chiselling' and 'drilling'.
- a.i Most candidates could name all of the tools correctly but the Chuck Key caused the most problems. Some candidates thought incorrectly that the chisel was a file.
- a.ii There were varying descriptions of the use of the chisel that did not relate to the removal or cutting of wood. The chuck key also caused problems for many candidates.
- b Most candidates were correctly able to give two safety precautions that must be taken when drilling.
- c Mixed responses to this question; most scored marks for the slower speed of the drill. The size of the pilot hole and the clearance hole caused the most loss of marks.
- d Quite a number of candidates scored all three marks for the advantages of CNC machinery but many lost marks for basic generic generalisations such as 'cheaper' or 'easier'.
- e Most candidates scored some of the marks available to this part question, but marks were lost since they did not give a suitable method

of communication or a justification for it. The most common correct answer was email but rarely was a reason given. Many candidates did not read the question and pick up that the 'manufacturers' was the context for their answer and just gave a way in which ICT is used to communicate.

## Question 2

- a.i There were far too many incorrect guesses from the list of adhesives and fewer than half the candidates scored for this part question.
- a.ii Most candidates scored one mark for drawing an odd number of layers to show ply construction. Very few were aware that the grain needs consideration and many scored no marks for showing the process of laminating the salad servers. Indeed many responses were observed showing how plywood is made from felled trees or how the spoons themselves were made.
- b Most candidates scored one of the three marks available for the properties of ply. It was evident that candidates did not know the meaning of the word properties. The most common answer was easy to bend/shape.
- c Two advantages were given for the use of acrylic but there were very few candidates who explained why it was suitable. Hygienic and easier to form/shape were the most common answers.
- d About half the candidates could give a suitable alternative plastic material for the salad servers the most common incorrect answers being polyester resin or generic terms like thermoplastic. Too many candidates responded with 'acrylic' when the question clearly said 'Name **one** other plastic material...'
- e Many candidates gave three types of pollution that needed to be controlled during manufacture.
- f The most common answer here was to make other things or to make MDF but few score the second mark for each answer as they did not describe the point. Many candidates simply said use the waste wood to make more salad servers, which scored no marks.
- g Here too the candidates did not read the question to ascertain the context of the question relative to manufacturers and so did not score marks for general comments about the mark meaning the product could be recycled or similar answers relating to customers.
- h Quite a few candidates knew that managed forests replant trees after felling and therefore scored full marks. Most candidates scored half marks for description of the forest being replaced.

### Question 3

- a Most candidates scored well on this question this year. Ideas were clear and annotated though some had far too much annotation that was not always relevant. The best designs showed the day and date clearly though some lost marks for not clearly indicating a method of changing them. Poor designs did not show both pieces of information. The majority of ideas showed a suitable storage method for the pens and many went beyond the specification. Very few candidates scored marks for the last point failing to name materials, generally giving generic names like wood or plastic, and even fewer gave consideration to the ability of the design to be made in school with some complex shapes that simply could not be injection moulded in industry let alone in school.  
The second design often showed a different method of displaying or changing the information and storing the pens and therefore scored well here too.
- b Many candidates could not evaluate their designs, merely repeating what the point asked e.g. my desk top calendar shows the day and the date. Few candidates took the point into more detail to score the marks available.
- b.i Some candidates scored one mark for this part question by saying that their design displayed the information on a printed surface or similar. They did not add sufficient information to say if it was clear or large enough to read.
- b.ii Here too candidates scored only one mark for saying that their design could be changed easily but did not give additional information to say how it would be changed.
- b.iii This part question was well answered by many candidates where they described where and how the pen holder worked.

### Question 4

- a Many candidates had been much better prepared for this question this year with most scoring 50% or more. The materials and function heading caused the most problems for candidates. Market was consistently scoring full marks as it was within their experience and they could relate to the product.
- b About half the candidates gave the reason that the bottle could be used for different flavoured contents but only a few gave a suitable second reason. The best second answer was that it gave customers information about the drink or that it could be easier to recycle.



- c Blow mould was well known by many centres and candidates scored at least half the marks available by giving the process provides a hollow shape. Good second reasons were that it is suitable for mass production or that it gave the same shapes accurately each time.
- d Here properties were not generally known by candidates. Though many candidates scored one mark for either it is light or easy to recycle or does not rust, contaminate the contents.
- e.i The drinks can being familiar to the candidates was borne out by the majority of candidates scoring full marks for observing that the top had a rim or was larger than the bottom thus allowing easy stacking.
- e.ii The reasons for this however, were not as well answered with most giving space saving as the most common answer but did not score the second mark for saying what advantage this had. Only a few candidates gave a suitable second advantage.
- f.i A large number of candidates scored full marks for either saying that the bottle was clear so that customers could see the contents or that the label could be changed to inform customers of the different flavours inside the bottle.
- f.ii Most candidates scored full marks here for explaining the workings of the tamper evident cap on the bottle.



**GCSE Design and Technology: Resistant Materials Technology**  
**Principal Examiner's Report**  
**Unit 1973, Higher Tier**

### **General Comments**

This is the fourth 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 sufficient detail. Candidates should be prepared for this examination using the specification as a guide. 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 but where commercially produced products were introduced candidates showed limited knowledge. Where questions asked for an explanation or description candidates could give a reason but lost the second mark because they did not justify or qualify their answers. 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. Centres are also reminded that candidates must write in pen rather than pencil and that no correction fluid or pens should be used. Candidates must also be encouraged to use only the space provided for their responses.

It must be stressed to candidates that the question needs to be read carefully in order to score marks, without wasting too much time on responses that do not score marks.

### **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. Centres are also reminded that candidates must write in pen rather than pencil and that no correction

fluid or pens should be used. Candidates must also be encouraged to use only the space provided for their responses.

### Question 1

- a Most candidates completed this question well but a number of points were placed in the wrong heading; materials being described under the heading of market.
- b A good number of varied responses but on occasion too many simple unqualified terms such as 'cheaper' were given and therefore cannot be awarded any marks.
- c Again a number of generic responses appeared too often such as 'cheaper' and 'fast' and without any qualification cannot be awarded any marks.
- d Generally well answered by most candidates who correctly gave lightweight, recyclable and will not rust as the most frequent answers.
- e.i. The drinks can being familiar to the candidates was borne out by the majority of candidates scoring full marks for observing that the top had a rim or was larger than the bottom thus allowing easy stacking.
- e ii. The reasons for this however, were not as well answered with most giving space saving as the most common answer but did not score the second mark for saying what advantage this had. Only a few candidates gave a suitable second advantage.  
Most candidates were correctly able to describe how each of the two stated purposes were fulfilled, with the majority of candidates scoring at least one of the two marks available for this part question.

### Question 2

- a A very good number of candidates scored both marks on this question with almost all candidates scoring at least one mark.
- b It was clear that a few centres had taught this aspect of the specification very well indeed, and where this was to be the case, the candidates scored very well. It was also very clear where centres had not and far too many candidates did not understand the concept of case hardening whatsoever.
- c Most candidates scored well on this question but some candidates simply listed a series of 'personal injuries'.

- d Most candidates were able to score at least one of the two marks available here. The second mark was lost because no explanation was given.
- e.i. Most candidates were able to score at least one mark here. Too often, however, responses tended to be too generic with 'cheaper' and 'faster' being the most frequent.
- e.ii Most candidates scored at least two marks on this part question. Marks lost tended to be as a result of the same answer being repeated or expressed in a different way.
- f This part question was not correctly read by all candidates since many answers were related to the end user of the product and not the focused on the retail outlet.

### Question 3

- a Responses to the design question were better this year than last. Many candidates still do not fully respond to the question, missing some of the key specification points. This is particularly so with the later specification points. Few made any attempt at resolving this part of the question. Batch design was ignored by most candidates and therefore their marks were restricted.

Ideas were generally clear and annotated though some had far too much annotation that was not always relevant.

- b Many candidates could did not fully evaluate their designs, merely repeating what the specification point initially asked for. Few candidates took the point into more detail to score the marks available.
  - b.i Some candidates scored one mark for this part question by saying that their design was able to hold one of the two items listed in such a way that it could be easily accessed.
  - b.ii Here too candidates scored only one mark for saying that their design could be cleaned due to the shape or design.
  - b.iii This part question was generally well answered by many candidates where they described both how the mirror was held and adjusted.

### Question 4

- a Too many candidates described steel as being strong which is considered to be too generic and therefore they failed to score any marks for giving a property even though they quite correctly went on to

correctly give a reason. Some candidates thought that mild steel would not rust.

- b.i. Few candidates scored full marks here. Some scored one mark for reference to the wear.
- b.ii. Poorly done on the whole with very few candidates scoring the single mark available with not rusting being amongst the most frequent incorrect answer.
- c Most candidates understood and correctly stated the disadvantages of aluminium over mild steel but without necessarily going on to fully explain their answers, and therefore limiting the marks available.
- d Well answered by most candidates but not always fully explained.
- e.i Mostly well done but many candidates thought that carbon fibre does not use natural resources.
- e.ii A wide range of responses to this question however, a number of repeat responses were given by many candidates.

**GCSE Design and Technology: Resistant Materials Technology  
Principal Moderator's Report  
Unit 1973, Coursework**

### **General Comments**

As in the previous two years, moderators report that standards seen in Resistant Materials Technology coursework ranged from outstanding, where the quality of work far exceeded the requirements of Edexcel's specification for the course, to work that was inappropriately simplistic and undemanding and did not match the requirements of KS4 guidelines for this subject.

Many centres, continuing to act on advice offered via Inset or in response to previous Principal Moderator's reports, were able to further improve the performance of candidates through detailed awareness of how to effectively target the minutiae of the assessment criteria where marks are focused on specific responses.

Once again, this year potentially appropriate coursework tasks were identified by most candidates, or were set by centres that notionally allowed access to the full range of marks available. Unfortunately, significant numbers of candidates were unable to make the most of their opportunities to achieve higher reward from their coursework outcomes because of low levels of response which produced products that lacked the skill levels and complexity of task to justify higher marks. Examples of low level responses included the ubiquitous acrylic clocks, CD racks, simple trophies and the ever popular pull along toy assembled from wooden blocks and purchased wheels. Despite the obviousness of poor response levels, some centres continue to award high credit in these situations.

A feature of this year's coursework has been the growth in the use of CNC machinery in the form of laser cut products. While the appropriate use of such equipment needs to be embraced, it is concerning that many candidates were apparently encouraged to design their project work for the equipment, rather than using it to enhance their work where and when appropriate. The advent of the laser cutter has removed much of the skills input that some candidates previously had and in some instances, there was evidence that candidates hardly touched materials except for the assembly of parts to construct a finished product after e-mailing CAD files to a remote machine and operator and receiving the completed parts back by post.

It was also noticeable that a significant number of centres are using template sheets in design folders, where candidates fill in dialogue boxes, following step-by-step instructions to address assessment criteria such as Systems and control, Schedule, Safety, Tools and Equipment lists, Tests and Checks and Evaluation. This practice was particularly noticeable where whole cohorts followed the same theme in their work and resulted in almost identical and formulaic responses by candidates in the aforementioned assessment sections. Unfortunately, in some cases, centres failed to properly understand what was

required in some criteria and penalised candidates by their regimented approach.

The presentation of coursework folders is now almost universally good and the majority of centres are adept at showing evidence of candidates' work through well organised design folios that use clear page numbering, section headings that identify assessment criteria and content that is selective and focused on quality rather than quantity. Almost all centres used Edexcel's guideline on the number of pages that should be included in a design portfolio and were able to complete their work within 15 - 20 A3 sheets.

As in the previous two years, the quality and range of photographs presented to support marks awarded by centres has continued to improve and has now reached excellent levels in the vast majority of cases. As always, high quality images of candidates' work are essential to the moderation process when assessing 'Modelling', 'Select and Use', 'Make Products' and 'Testing' and it is pleasing to note that the majority of candidates take pride in presenting a range of photographs 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.

In general, most centres were successful in their approach to coursework and made an effort to ensure that design folios arrived on time for moderation, correct paperwork was included and requests for extra photographs etc. were acted upon quickly.

Disappointingly however, after several years of running this course, many centres continue to over-assess candidates work, failing to recognise that the evidence presented does not support the marks awarded, or match the requirements of the assessment criteria.

## 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**

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

### **Needs**

Most centres are aware of the requirements of this assessment criterion and consequently, the vast majority of candidates were able to score well by identifying an appropriate problem and need and writing a design brief to address this. Where candidates failed to score maximum marks, it was nearly always because they failed to identify a target market group.

More problems occurred where whole cohorts of candidates were presented with a centre generated task which was too prescriptive and difficult for individuals to personalise and take ownership of. A statement such as "I have been asked to design and make a ..." does not allow a candidate scope to recognise and describe a problem or identify a need, and where such an approach was followed, candidates were limited in their achievement.

### **Information**

It was encouraging to see that the majority of centres now understand what is required in this criterion. Selectivity and appropriateness are key to the information gathered, which must focus directly on the identified needs. There is no currency value in presenting general research gathered from Internet sites, materials databases or books and magazines. Information should come from a focused range of at least three sources and could include research into the context/environment where the product will be used, analysis of existing similar products, market research, research into relevant materials and components etc.

Most candidates were able to gain good marks in this assessment section.

### **Specification**

Most candidates were able to produce a useful specification that focused on the needs previously identified, but many were superficial and limited. Not many candidates were able to qualify their initial statements with further supportive information to justify the initial points made.

The specification is an important aspect of the design activity and should be referenced at several points such as ideas, develop, review, tests & checks, evaluate and modifications. A strong specification should include reference to form, function, user requirements and budgetary constraints and each specification point should contain more than one related piece of information about the intended design solution. A statement such as "The bearing should be made from nylon" is not qualified until a further statement such as "because it needs no lubrication and is quiet" is added. Where possible,

measurable points should be included in a specification, so that these can be referenced when evaluating ideas, development and the final product. Many candidates failed to gain a mark for 'budgetary constraints', because they did not justify a cost for their product, by referencing their market research or the product analysis carried out on similar products.

## **Criterion 2**

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

### **Ideas**

Although some high quality design work was seen, not many candidates were able to achieve maximum marks in this assessment section. Moderators reported that the majority of candidates disappointingly lacked flair in their work and appeared unwilling to take risks with their designs, settling for medium levels of achievement and safe solutions.

Higher achieving candidates were able to relate their designs to points of specification and use research to underpin the technical details of proposals, but many more appeared to have already decided what their design solution was to be and did not test their ideas against points of their specification. Candidates frequently produced a lot of work in this section, but it often did not proceed beyond the medium level of response. Many centre assessors rewarded candidates for quantity rather than quality, making statements in annotation such as "eight ideas produced" as justification, regardless of their quality.

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 prevent them from accessing higher marks in other assessment criteria as their work progresses.

### **Develop**

The majority of candidates were able to score reasonable marks in this criterion through illustrating change in their designs as they developed a final proposed solution. Centres appear to be aware now that 'develop' should include evidence of elements of previous design ideas being used to produce the final design proposal.

Modelling was in evidence as an important part of 'develop' which is used to test design proposals. Some candidates produced models of their design proposals, but failed to explain the point of doing so. There should be a reason for modelling and this should be explained e.g. to test proportions, materials, function etc. Develop should also include details of dimensions, materials, processes and equipment to be used during product manufacture and should culminate in a clear illustration of the final design proposal that contains enough information for a skilled third party to manufacture the product.

As was the case in previous years, a significant number of centres over-rewarded candidates where they produced little evidence of development and simply selected a design idea to repeat in total, without making any changes. Some centres awarded marks in this assessment section for work that had already been credited under 'Ideas'.

## Review

Not many candidates were able to review their design and develop sections effectively, although the vast majority gained some credit in this criterion.

Most candidates use this section to explain details of materials and construction processes regarding their proposed designs, but fail to evaluate their work against the points of specification. As was the case last year, the majority of candidates who did consider their specification, did so subjectively and often used tick-boxes or marks out of ten, to assess one idea against another, without any valid criteria or supporting evaluative statements.

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 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 has been the case over the last two years, the majority of candidates targeted marks effectively in this assessment section and centres awarded marks appropriately. Good 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.

Most candidates are expert users of ICT and some excellent standards were seen in this regard. The use of 2D and 3D CAD and CAM continues to grow as centres become better equipped. Only a very few centres presented work that contained no ICT at all.

#### **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**

After so much focus at Inset and in previous Principal Moderator's reports, centres and candidates continue to find problems with this criterion.

Many candidates were able to draw 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. Some centres used template sheets with headings to coach candidates through this section, but they were not always successful as candidates were often unable to determine what information should be placed under each heading. Hardly any candidates scored full marks in this assessment criterion

#### **Schedule**

As with systems and control, this criterion once again caused many candidates difficulties and almost no candidates gained full credit for their efforts. A key factor in 'Schedule' is the use of time, but this was often missed out by candidates who frequently presented otherwise appropriate flow charts of manufacturing activities, mentioning materials and processes, but giving no indication of time or quality control. Gantt charts were popular as a planning tool, but many students failed to focus on the specific timings associated with manufacturing, producing timings for the whole of the project, including research, designing, evaluation etc.

Schedule and systems and control should focus on manufacturing 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**

Once again, many centres under-assessed candidates in this criterion where there was often photographic evidence that they had 'used' an industrial method in their work. Candidates 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

Any reference to batch or high volume production as part of Industrial Applications must relate to a candidate's product and describe how that product would be manufactured beyond a one-off prototype. Generic descriptions of processes and applications are worthless.

### 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

In this section, moderators reported that once again a wide range of interesting work was seen, the majority of which was complete, functioning and appropriate.

Centres assessment of 'Select and Use' was generally accurate and candidates are now more adept at presenting explicit evidence of having selected tools, equipment and processes used in the manufacture of their product.

Evidence for 'use skilfully', was, in most cases, effectively presented via a range of detailed photographs that highlighted evidence of skills and complexity of task relating to the manufactured product.

As mentioned under 'general comments', a significant number of centres allowed candidates to pursue projects focused on the capabilities of laser cutting, and CD racks 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

Simplistic and undemanding work that is well made using appropriate tools, equipment and processes but is unchallenging, cannot elicit high levels of credit in this assessment criterion, 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

As in Select and Use, 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 surprisingly, so long after the establishment of this course of study, a significant number of products produced were still inappropriate. It is understandable that candidates of lower ability will produce work of lower demand that does not always reach the requirements of KS4 work, but it is not acceptable to award high marks for such work, as some centres did.

It is essential that candidates are guided in their final choice of product in order to ensure that they are working at an appropriate level to their potential.

The assessment statement to access the high level of marks highlights the requirement that candidates 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. Where a detailed final design proposal is not in evidence in the 'Develop' criterion, marks in this assessment section will be limited. Evidence for this assessment section is provided through photographs and it is pleasing to note that moderators were pleased with the quality and quantity of images.

## Work Safely

The majority of 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, but not many gained maximum credit because they failed to consider the safety of others in their evidence.

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 candidates work at critical control points. Ensure that candidate's products are of suitable quality for the intended use. Suggest modifications that would improve the product's performance.*

## Tests and Checks

Candidates continue to find problems with this assessment section, and many do not include enough detail in their descriptions of testing to support the marks awarded by centres. Many candidates designed questionnaires to collect responses from potential users who gave opinions on the final product outcome, but questions were often superficial and such feedback had little relevance to the physical performance of the product.

Where tests are carried out, they should be set against points of specification, 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. Marks cannot be awarded for notional, testing that may be highlighted in 'schedule'

Candidates should use their product specification as a basis for tests and checks, and tick-boxes and marks out of ten for tests should be avoided.

## Evaluate

This criterion also remains a problem to many candidates, who would benefit from better organised responses based on objective discussion of whether or not they had met specification points. Not many candidates related evaluative statements to the measurable points of the product specification and many responses were subjective and self-congratulatory. A significant number of responses were rambling and repetitive accounts that described actions regarding problems encountered during manufacture, rather than evaluative statements based on previous tests and checks. Not many candidates used feedback from potential users, which would have provided objectivity and could have been a source for future modifications.

## Modifications

Most candidates attempted to suggest modifications to their final product, but many of these were cosmetic and inappropriate, and were not based on improving the performance or quality of the product. Suggestions for modifications were often part of a rambling and repetitive assessment section 6 that would have benefited from being presented under separate headings, so that weaker candidates in particular could address this challenging section more effectively.

Each modification suggestion should follow on from points of evaluation, which in turn should be linked to tests and checks. It is important to realise that the whole of criterion 6 is linked and each sub-section is interdependent on the previous one.





**GCSE Design and Technology: Resistant Materials Technology**  
**Unit 3973, Foundation Tier**  
**Unit 3973, Higher Tier**  
**Unit 3973, Coursework**

## **Introduction**

The low number of entries for the short course makes it difficult to provide comments on the performance of the candidates. However, the comments made on the full course common questions or elements are relevant and helpful for the short course and should be read in conjunction with any general comments provided below.

## **General Comments**

### **Foundation Tier (2F)**

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 but it was obvious once again that a fair proportion of candidates finished early. Generally candidates are scoring more marks this year that may be due to the selection of the products that are more familiar to candidates. It was obvious that some areas of the specification are not being taught to candidates in centres and as a result some centres disadvantaged their candidates. This was particularly evident in question 2 where few candidates had any detailed knowledge of adhesives or the construction of ply. A similar criticism can be made, as it is evident that centres are not teaching candidates about the properties of materials. Question 3 was well answered and it is evident that centres are preparing candidates for product analysis reasonably thoroughly.

### **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. Centres are also reminded that candidates must write in pen rather than pencil and that no correction fluid or pens should be used. Candidates must also be encouraged to use only the space provided for their responses.

It must be stressed to candidates that the question needs to be read carefully in order to score marks, without wasting too much time on responses that do not score marks.

## Coursework

The performance of candidates this year strongly mirrored that of last year's cohort. Fifteen centres submitted work for moderation in the short course in Resistant Materials Technology and it was pleasing to note that, most candidates produced coursework outcomes appropriate to their potential level of achievement.

The majority of candidates identified and pursued appropriate tasks, which potentially allowed them access to the full range of marks. Most topics were focused on twenty hours work and the majority of candidates achieved commendable work within that time. Some short course project work was of very high quality and would have achieved high marks in the full course. Some candidates went beyond the requirements of the short course and it was obvious that many had spent well in excess of the recommended 20 hours on their work. Although it is commendable that candidates are producing such standards, it is not necessary to demonstrate such high levels of complexity in the short course project, which is designed to be completed within 20 hours.

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.

A feature of this year's coursework has been the growth in the use of CNC machinery in the form of laser cut products. While the appropriate use of such equipment needs to be embraced, it is concerning that many candidates were apparently encouraged to design their project work for the equipment, rather than using it to enhance their work where and when appropriate. The advent of the laser cutter has removed much of the skills input that some candidates previously had and in some instances, there was evidence that candidates hardly touched materials except for the assembly of parts to construct a finished product.

Some candidates failed to understand that although less work is expected in the short course, it must be of a similar high standard as the full course in order to achieve high marks. Where weaker candidates submitted work for moderation, the standard and quality was often very poor and it was obvious that they did not have enough time to produce anything of worth, reinforcing the fact that to achieve well in the short course, candidates need to be able.

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

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 'Modelling', '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 needs to illustrate the complexity and quality of construction and manufacture of coursework,

Most centres applied the mark scheme consistently and accurately, but in some cases, candidates were under-rewarded where there was enough evidence in design folders to support the award of slightly higher marks than those given. Only a few centres awarded marks generously.

## **Administration**

The vast majority of centres followed Edexcel's instructions and procedures efficiently, with few problems although there were a few 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

## **Detailed Comments**

### **Criterion 1**

#### **Information**

Once again this year, 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, especially when using Edexcel's template pages, that a high degree of selectivity is applied to the information collected, so it is imperative that information is focused, relevant, succinct and informative.

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.

More problems occurred where whole cohorts of candidates were presented with a centre generated task which was too prescriptive and difficult for

individuals to personalised and take ownership of. A statement such as “I have been asked to design and make a ....” does not allow a candidate scope to recognise and describe a problem or identify a need, and where such an approach was followed, candidates were limited in their achievement.

## Specification

Most candidates were able to produce a useful specification that focused on the needs previously identified, but many were superficial and limited. Not many candidates were able to qualify their initial statements with further supportive information to justify the initial points made.

The specification is an important aspect of the design activity and should be referenced at several points such as ideas, develop, review, tests & checks, evaluate and modifications. A strong specification should include reference to form, function, user requirements and budgetary constraints and each specification point should contain more than one related piece of information about the intended design solution. A statement such as “The applied finish should be waterproof” is not qualified until a further statement such as “because the product will be used outside” is added. Where possible, measurable points should be included in a specification, so that these can be referenced when evaluating ideas, development and the final product

## Criterion 2

### Ideas

Although some high quality design work was seen, not many candidates were able to achieve maximum marks in this assessment section. Moderators reported that the majority of candidates disappointingly lacked flair in their work and appeared unwilling to take risks with their designs, settling for medium levels of achievement and safe solutions.

Higher achieving candidates were able to relate their designs to points of specification and use research to underpin the technical details of proposals, but many more appeared to have already decided what their design solution was to be and did not test their ideas against points of their specification

Candidates frequently produced a lot of work in this section, but it often did not proceed beyond the medium level of response.

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 majority of candidates were able to score reasonable marks in this criterion through illustrating change in their designs as they developed a final proposed solution.

Centres appear to be aware now that 'develop' should include evidence of elements of previous design ideas being used to produce the final design proposal.

Modelling was in evidence as an important part of 'develop', which is used to test design proposals. Some candidates produced models of their design proposals, but failed to explain the point of doing so. There should be a reason for modelling and this should be explained e.g. to test proportions, materials, function etc. Develop should also include details of dimensions, materials, processes and equipment to be used during product manufacture and should culminate in a clear illustration of the final design proposal that contains enough information for a skilled third party to manufacture the product.

## **Criterion 3**

### **Written Communication**

In this criterion, the vast 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.

Several centres under-rewarded candidates in this section, where there was enough evidence to demonstrate candidates' abilities to communicate effectively using notes and annotation.

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**

As with 'written communication', some centres under-marked this section. The majority of candidates are competent users of ICT and were able to demonstrate 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

As shown in last year's evidence, this year many candidates scored well in this criterion as it is combined with schedule. Many candidates were able to draw 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

In this assessment section, 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

Once again, many centres under-assessed candidates in this criterion where there was often photographic evidence that they had 'used' an industrial method in their work. Candidates 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

Any reference to batch or high volume production as part of Industrial Applications must relate to a candidate's product and describe how that product would be manufactured beyond a one-off prototype. Generic descriptions of processes and applications are worthless.

## Criterion 5

### Select and Use

In this section, moderators reported that once again a wide range of interesting work was seen, the majority of which was complete, functioning and appropriate.

Centres assessment of 'Select and Use' was generally accurate and candidates are now more adept at presenting explicit evidence of having selected tools, equipment and processes used in the manufacture of their product.

Evidence for 'use skilfully', was, in most cases, effectively presented via a range of detailed photographs that highlighted evidence of skills and complexity of task relating to the manufactured product.

As mentioned under 'general comments', a significant number of centres allowed candidates to pursue projects focused on the capabilities of laser cutting, and CD racks 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

Simplistic and undemanding work that is well made using appropriate tools, equipment and processes but is unchallenging, cannot elicit high levels of credit in this assessment criterion, 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

As in Select and Use, 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 surprisingly, so long after the establishment of this course of study, a significant number of products produced were still inappropriate. It is understandable that candidates of lower ability will produce work of lower demand that does not always reach the requirements of KS4 work, but it is not acceptable to award high marks for such work, as some centres did.

It is essential that candidates are guided in their final choice of product in order to ensure that they are working at an appropriate level to their potential.

The assessment statement to access the high level of marks highlights the requirement that candidates 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

## **Criterion 6**

### **Tests and checks**

Candidates continue to find problems with this assessment section, and many do not include enough detail in their descriptions of testing to support the marks awarded by centres. Many candidates designed questionnaires to collect responses from potential users who gave opinions on the final product outcome, but questions were often superficial and such feedback had little relevance to the physical performance of the product.

Where tests are carried out, they should be set against points of specification, 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. Marks cannot be awarded for notional, testing that may be highlighted in 'schedule'

Candidates should use their product specification as a basis for tests and checks, and tick-boxes and marks out of ten for tests should be avoided.

### **Evaluate**

This criterion also remains a problem to many candidates, who would benefit from better-organised responses based on objective discussion of whether or not they had met specification points. Not many candidates related evaluative statements to the measurable points of the product specification and many responses were subjective and self-congratulatory. A significant number of responses were rambling and repetitive accounts that described actions regarding problems encountered during manufacture, rather than evaluative statements based on previous tests and checks. Not many candidates used feedback from potential users, which would have provided objectivity and could have been a source for future modifications.

When considering modifications, candidates should present more than one suggestion for changes. Each suggestion should arise from a different evaluation point and should include reasons for the proposed improvements.



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

Grade Boundaries - Summer 2006

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

*(Foundation Tier out of 100)*

C	D	E	F	G
56	46	37	28	19

*(Higher Tier out of 100)*

A*	A	B	C	D	E
82	71	60	49	40	35

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2006 examination.

*(Coursework 01 out of 102)*

A*	A	B	C	D	E	F	G
92	80	68	56	45	34	23	12

*(Paper 2F out of 88)*

C	D	E	F	G
52	45	38	31	24

*(Paper 2H out of 88)*

A*	A	B	C	D	E
62	53	44	35	29	26

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

Grade Boundaries - Summer 2006

Overall Grades

The figures given below are the minimum subject marks required for each overall grade in the summer 2006 examinations.

*(Foundation Tier out of 100)*

C	D	E	F	G
54	44	35	26	17

*(Higher Tier out of 100)*

A*	A	B	C	D	E
83	71	59	48	39	34

Component Marks

The figures given below are the minimum marks required for each component grade in the summer 2006 examination.

*(Coursework 01 out of 84)*

A*	A	B	C	D	E	F	G
76	66	56	46	37	28	19	10

*(Paper 2F out of 44)*

C	D	E	F	G
24	20	17	14	11

*(Paper 2H out of 44)*

A*	A	B	C	D	E
31	26	21	17	14	12



Further copies of this publication are available from  
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467  
Fax 01623 450481

Email [publications@linneydirect.com](mailto:publications@linneydirect.com)

Order Code UG 017835 Summer 2006

For more information on Edexcel qualifications, please visit [www.edexcel.org.uk/qualifications](http://www.edexcel.org.uk/qualifications)  
Alternatively, you can contact Customer Services at [www.edexcel.org.uk/ask](http://www.edexcel.org.uk/ask) or on 0870 240 9800

Edexcel Limited. Registered in England and Wales no.4496750  
Registered Office: One90 High Holborn, London, WC1V 7BH