

Examiners' Report Summer 2008

GCSE

GCSE Manufacturing 2351

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Chief Examiner's Report June 2008

There were two qualifications examined in this series at GCSE level.

GCSE Engineering (Double Award) and GCSE Manufacturing (Double Award)

Unit 3: Application of Technology (5318)

The award of this unit was split into six sectors with an individual paper for each

5318/01	Printing and Publishing Paper and Board
5318/02	Food & Drink, Biological & Chemical
5318/03	Textiles and Clothing
5318/04	Engineering and Fabrication
5318/05	Electrical and Electronic, Process Control, Computers, Telecommunications
5318/06	Mechanical, Automotive

All six papers were harmonised for structure and difficulty.

Each paper had two sections. Questions in Section A related generally to information about the chosen sector. Section B illustrated a product from the chosen sector and questions were related to that product. The product was pre-released in October 2007 and acted as a focus for research in preparation for the exam. Again this year a Support Paper was available to help centres prepare for the exam. This paper was widely available on the website as a 'stand alone document' and was also attached to the pre-release material so every centre had access to this. It was also attached to this report for last year. Candidates were able to take their own research notes into the examination, but this was not to be submitted with the examination paper for marking.

The question paper within both sections was ramped in difficulty throughout.

All Principal Examiners' reports indicate that all the questions within the respective paper were accessible to their intended candidature, although all indicated that some lower achievers were able to access marks from the later questions in the paper. This was particularly the case for question 13 where in the first part it involved knowledge about the care of the environment and obviously the general and media exposure to these issues enabled candidate responses.

Generally speaking those candidates who had had opportunities to study and research the target product answered well. It was clear in their responses that they understood the process of manufacturing/engineering when applied to their product and sector. Good candidates were also able to give variety in their responses across the range of questions.

It was pleasing to note that all Principal Examiners reported a view that this year candidates performed better than previous years. This was confirmed by a general increase in the mean mark for all sectors except paper 02 Food and Drink where there was a very slight drop in the mean mark.

In general terms a typical grade F candidate was able to identify products from a given sector, name and describe, with some exceptions in some sectors, the use of components/equipment etc and in nearly all cases link applications of technology to key areas of technology. In a range of other questions where explanations and descriptions were required often candidates were only able to give one word if not simple answers. Variations in answers throughout the paper were limited. Application of technology was also limited throughout their responses. Often no responses were suitable for the latter questions in the paper particularly question 11. They showed limited recall and application of knowledge and understanding.

In general terms a typical grade C candidate was able to gain a range of marks from the same areas and aspects of the paper as a grade F candidate, but with further detail in their responses to those questions demanding an explanation or description. They were able to explain a range of benefits of using ICT and communications technology. Their responses when explaining the benefits of systems and control technology were limited. Good responses were given when explaining the aspects of the product through sketches and notes. Some were still unsure of the stages in manufacture, particularly what happens in some of the stages of manufacturing. There was a limited range of responses when demonstrating their knowledge of the use of automation in the production stage of their product; many were not able to even give a second example.

In general terms a typical grade A candidate was able to access marks for many aspects of the paper including most of those achieved by grade C candidates. Their explanations and descriptions were complete and had many references to the "real" manufacturing and application of technology of their product. Throughout the papers candidate responses evidenced a variety of application of technology. Many candidates were able to explain the effects of the use of CAM and quality control. Often their evaluations on the effect modern materials have had on the environment and product costs were well presented.

All of these points were considered during the awarding of the results. Overall there was a decrease of around 24 % in candidature over that for June 2007.

The Support Paper that had been prepared for centres is included as appendix 1 of this report. This in turn will be updated and available to help centres prepare for the use of the pre-release material. A 'Revision Guide' is also available and can be found on the SEMTA websites www.gcseinengineering.com and www.gcseinmanufacturing.com.

Comments on individual sectors are given on the next pages.

Principal Moderator's Report Summer 2008

GCSE Manufacturing

Introduction

Presentation of portfolios
Assessor annotation
Witness Testimony

Assessment of the Units

Unit 1: Designing Products for Manufacture
Unit 2: Manufactured Products

Introduction

A team of ten moderators was involved in the moderation of portfolios from some 82 centres covering the two internally assessed, externally moderated units. There was a good level of consistency within the moderation process and this was assisted by the use of a standardisation event at which it was possible to share expertise and understanding, and the tutorship of the two team leaders, the Chief Examiner and the Chair of Examiners.

There has been a significant reduction in the number of centres submitting portfolios of this qualification. The reasons for this reduction are many and varied. However moderators still recognised a range of abilities and the number of candidates has not reduced in the same proportion to the number of centres.

It was pleasing to note that some clearly identifiable centres provided very high quality samples of work that met the requirements of the specifications, moderators reporting a general improvement in the overall standard of work produced. However it is disappointing to note that a significant number of centres continued to misinterpret the content of the specifications and are not conforming to the procedures laid down by the awarding body. Where ever possible moderators ensured that candidates were not disadvantaged by incorrect procedures, however where the specification was not interpreted correctly, as identified later in this report, candidates were inevitably disadvantaged. Much of this report reiterates problems identified in previous years reports.

The majority of the comment relating to failure to observe general procedures is common to both GCSE Engineering and Manufacturing, suggesting that centres are possibly working to requirements and instructions relating to other qualifications.

Some centres continue to use inappropriate assignments that were not designed specifically to address the assessment criteria of the units within this programme. Many of these assignments reflected a CDT or handicrafts approach which demonstrated little understanding of industrial manufacturing. This practice often resulted in significant disadvantage to candidates, although in some instances it appears that this approach is governed by the low academic ability of the candidates who are unlikely to benefit from a study of manufacturing activities.

A few centres still did not manage to send work to moderators before the deadline of 15th May '08, and the moderation team endeavoured to deal with late work in order to issue results on time. This caused a significant work load for moderators who tried to ensure that candidates were not disadvantaged by centres inability to conform to Awarding body requirements. It was also noted that a few centres were not clear which programme they had entered candidates for, initially registering candidates for Engineering and only later, during the moderation window, changing the registration to Manufacturing.

Both of the internally assessed unit require candidates to build a portfolio of evidence. Where candidates produced clearly ordered portfolios which grouped evidence to meet individual assessment criteria, assessors' tasks appeared to have been very much simplified and also candidates presented evidence to meet each of the assessment criteria. However some centres did not develop portfolio building skills and candidates presented collections of ill-defined work. In these cases assessment was frequently not accurate and candidates were assessed incorrectly.

There continues to be confusion over the form of assessment for this qualification. Although candidates are expected to produce a portfolio of evidence to meet the assessment criteria, this should be as the result of assessment activities which are separated from teaching and learning activities. The portfolios should not be a record of course work, but should record what the individual candidates did during assessment processes and how they met the assessment criteria. Learners should be taught the content of the 'What you need to learn' section of the specification, and be provided with the opportunity to practice skills and techniques before being presented with an assignment designed to assess their knowledge and skills. In many cases it is clear that teaching is undertaken at the same time as assessment. This is inappropriate and frequently resulted in significant loss of marks. The assessment of these units is best carried out after all teaching and learning activities have been undertaken. This enables candidates to perform to the highest possible degree of skill and independence. If teaching and learning takes place during the assessment activity it is difficult for candidates to work independently and also they will not have had the opportunity to practice their skills.

Some centres clearly used group discussion and statements provided by teachers in the portfolios. This resulted in severe loss of marks since the portfolio should record the individuals' achievement during the assessment process. Assessors should refer to pages 9 and 10 of the specification for guidance on supervision of students, authentication of work submitted and application of the mark bands.

Both of the internally assessed unit require candidates to build a portfolio of evidence. Where candidates produced clearly ordered portfolios which grouped evidence to meet individual assessment criteria, assessors' tasks appeared to have been very much simplified and also candidates presented evidence to meet each of the assessment criteria. However some centres did not develop portfolio building skills and candidates presented collections of ill-defined work. In these cases assessment was frequently not accurate and candidates were assessed incorrectly.

Portfolios should be securely bound and include:

- Candidate Authentication Sheet
- Title page with the relevant specification name and number, candidate name, candidate number, centre name, centre number, and date;
The title page must be in addition to the Mark Record Sheet which does not form part of the portfolio and is removed when the work has been moderated. In many cases work did not carry any means of identification after the Mark Record Sheet had been removed
- Mark Record Sheet for the unit to be moderated
- Clear page numbering
- Contents list

It is disappointing to note that in many cases this information was either not available or, in some cases, was incorrect.

It is inappropriate to use plastic wallets as binders for multiple sheets of evidence. The use of plastic wallets is not forbidden, but should be restricted to containing materials which can be read without removal. Similarly bulky folders, such as lever arch files, are not acceptable because they are difficult to transport and frequently become damaged, subsequently failing to bind sheets adequately. Moderators reassembled these portfolios in an appropriate order wherever possible. However this was not always possible.

Some moderators reported that it was difficult to reconcile marks awarded by assessors with the evidence provided by the candidates. This may be due to assessors' judgements being formulated in respect to other criteria than those prescribed by the specifications. Centre should recognise that moderators can only recognise achievement where there is clear and auditable evidence to meet the criteria of the relevant units.

Some assessors continue to fail to provide indication of where achievement had been recognised. It is a regulatory body requirement that assessors provide page numbers to indicate where evidence had been recognised. In cases where page numbering was not provided the moderators applied individual judgement to identify where evidence was considered to have been recognised. However in these cases it was not possible to comment on assessment decisions with any certainty.

A few centres failed to provide any indication of where achievement had been recognised and moderators found it necessary to remark work instead of trying to agree assessment decisions. All portfolios should include an annotated Mark Record Sheet and the assessor should ensure that:

- All marks are recorded accurately and the arithmetic is correct
- The total mark is transferred correctly onto the OPTEMS or via EDI
- The candidate and the assessor, as appropriate, sign any required authentication.
- Consistent and accurate assessment usually occurred when assessors identified sections of portfolios which met the two different features of each assessment criterion.

It is disappointing to continue to report that some centres failed to record marks accurately, moderators noting that marks recorded on candidate work did not agree with those recorded on OPTEMS forms and also that some centres were not able to provide accurate totals for marks awarded. In these cases moderators sometimes were able to verify appropriate marks by communicating with the centre or assessor individually. However in some cases it was necessary to use the marks recorded on the Awarding bodies system.

Some centres still did not provide any evidence of Candidate Authentication and moderators spent considerable amounts of time contacting centres in order to obtain the necessary authentication forms. In many cases these forms submitted were not correctly signed either by the candidate or the assessor/teacher. It is a JCQ requirement that all candidate work should be accompanied by a correctly completed Candidate Authentication Sheet.

Assessor Annotation

Assessor annotation continues to cause problems. The GCSE Code of Practice requires that assessors record full details of the nature of any assistance given to individual candidates that is beyond that of teaching the group as a whole. Many assessors did not record the degree of assistance provided to individual candidates and significantly similar pieces of evidence for different candidates were often awarded different grades without the assessor substantiating the decisions. This frequently resulted in moderators awarding substantially lower marks due to the lack of appropriate evidence.

Assessor annotation to identify where achievement has been recognised is a mandatory requirement for internally assessed work. The minimum requirement for annotation is to complete the annotation column on the Mark Record Sheet by listing the portfolio page numbers where evidence can be found for each of the assessment criteria. A significant number of centres did not provide annotation and therefore moderators were not able to identify where assessors had recognised achievement. In these cases it was necessary for the moderator to remark the work in order to provide a reliable moderator mark for the available evidence.

It is disappointing to report that some centres failed to record marks accurately, moderators noting that marks recorded on candidate work did not agree with those recorded on OPTEMS forms and also that some centres were not able to provide accurate totals for marks awarded. This lack of attention to detail is unexplainable.

Electronic evidence is currently not admissible for this qualification and therefore it is inappropriate to provide and make reference to evidence contained in electronic storage media such as 'floppy disks' and CD-ROMs.

Witness Testimony

The preparation and provision of Witness Testimony continues to cause major problems in assessment. Candidates should assemble their portfolio and include in it all relevant Witness Testimony. Assessors should then assess the evidence produced.

Frequently assessors' decisions did not match the evidence provided by Witness Testimony. This was probably due to assessors awarding marks based on holistic decisions made during the delivery and assessment of the unit. It is important that assessors recognised that they should only make assessment decisions based on the content of the portfolio.

Whenever process skills are assessed, it is vitally important that Witness Testimony is completed by assessors in order to authenticate Candidate work and provide evidence that Candidates have achieved the level of performance required in the assessment grid. This Witness Testimony must be detailed and state exactly what a Candidate has done and how this meets specified assessment criteria during assessment activities.

In many cases assessors commented on candidate performance during teaching and learning activities. This form of evidence is not relevant. The witness testimony should relate to candidate performance during assessment.

It is strongly recommended that assessors use the appropriate forms provided in order to record in detail Candidate activity and the degree of independence demonstrated in the activities.

All witness testimony must be signed and dated by the witness.

Witness testimony should normally be supported by other forms of evidence such as annotated photographs, records of measurements etc. In some cases assessors provided statements that Candidates had met all required quality standards. In these instances the statements should be supported by records of measurements and comparison with the required standards. Similarly it is inappropriate for an assessor to record that a Candidate worked safely at all times. Witness testimony must state details of Candidate activity and equipment used accompanied by dates when observations were made. General 'all encompassing' statements are inadmissible.

It should be noted that the Mark Record Sheet does not form part of the Candidates portfolio and therefore it is not appropriate to use this form to record assistance provided and skills achieved.

There is a wealth of teacher support materials which include templates suitable for the presentation of evidence. However some teachers appear to have provided too much assistance and guidance on the completion of these templates. It is inappropriate to advise candidates on the statements and content of sections of the templates. The candidates should be able to complete templates such as tables without guidance such as banks of possible statements.

Assessment of the Units

Many centres provided evidence of having benefited from the wealth of exemplar materials now available. This included the use of templates which greatly assisted the candidates in the documentation of suitable evidence. However a significant number of centres do not appear to have availed themselves of this valuable material. This has inevitably disadvantaged some candidates.

A significant number of centres failed to differentiate between learning and teaching activities and assessment activities. Candidates who performed well generally showed clear evidence that they had been taught and provided with opportunity to practice their skills before being presented with an assignment intended to provide the evidence to meet the assessment criteria. Candidates who were subjected to continuous assessment whilst still undergoing teaching and learning activities generally performed poorly. The assessment of these units is best carried out after all teaching and learning activities have been undertaken. This enables candidates to perform to the highest possible degree of skill and independence. If teaching and learning takes place during the assessment activity it is difficult for candidates to work independently and also they will not have had the opportunity to practice their skills.

It continues to cause disappointment to find a greater number of low ability candidates selected for this programme. The programme should reflect the rigours of any other GCSE programme and should also reflect vocational practice found throughout the manufacturing industry. Where centres subjected candidate to simple handicraft exercises candidates achieved poor results.

This is a vocational qualification and centres need to provide candidates with access to up-to-date vocational resources. Where teachers do not have industrial knowledge it is important that centres generate good links with industry in order that candidates may understand industrial processes. Too often candidates demonstrate little understanding of the manufacturing industry or practices other than those applicable to the school workshop. In order to meet the higher grades candidates must be able to show some application of industrial procedures.

The assessment of these units is best carried out after all teaching and learning activities have been undertaken. This enables candidates to perform to the highest possible degree of skill and independence. If teaching and learning takes place during the assessment activity it is difficult for candidates to work independently and also they will not have had the opportunity to practice their skills.

In general terms progression across the mark bands is characterised by:

- Increasing breadth and depth of understanding
- Increasing coherence, evaluation and analysis
- Increasing independence and originality.

Therefore summative assessment should occur after all teaching and learning experiences have been undertaken in order that the Candidate may demonstrate the highest achievable levels of understanding and independence and originality.

When considering work to meet the higher mark bands it may be helpful for centres to consider the following explanations which are provided in the specification:

Breadth:	Range of ideas Alternative Solutions Range of information services
Coherence:	Structured and consistent work
Evaluation:	Judging the validity of results Self criticism Identifying solutions
Independence:	Free from outside control; not subject to another's authority, Without support and guidance
Originality:	Inventiveness, ingenuity, creativity, innovation, imaginativeness, uniqueness.

Candidates achieved most success when they were presented with completely unrelated assignments for each of units one and two.

Moderators generally recognised an improvement in the quality of evidence provided by many candidates. However many centres still failed to award marks as explained in the Guidance for Teachers - Assessment Guidance - Awarding Marks.

When assessing the evidence assessors **must** refer to the evidence requirements for the unit. Marks are awarded for evidence to meet the bullet points listed in the evidence requirements (listed on pages 22 to 27 for unit 1, pages 35 to 40 for unit 2. This guidance identifies **two** aspects to each assessment criterion, and also explains the procedures for awarding marks when a particular criterion has not been fully met. Therefore in order to be awarded full marks for any individual criterion a Candidate must produce evidence to meet both of the bullet points identified in the specific criterion in the **evidence requirements** for that unit.

Unit 1: Designing Products for Manufacture

Moderators were again instructed to work very closely with the evidence descriptors provided in the Guidance for Teachers section of the specification. This section provides examples of the type and level of evidence required to meet each of the mark bands for specific assessment outcomes. Many centres are still not applying the specification correctly, particularly in relation to the awarding of marks. This has caused many candidates to be disadvantaged.

Candidates are required to develop a design specification for a product, develop design and manufacturing proposals and draw up a final design and manufacturing solution.

Candidates **must be provided** with a written client design brief and they should include this brief in their portfolio.

It is not appropriate to allow candidates to choose their own design topic. However it is acceptable to provide candidates with a number of different briefs from which they are required to select **one** most appropriate brief, since this approach helps to ensure candidates undertake individual, rather than group, design activities.

Some centres continue to provide assignments which focus on inappropriate products which do not provide sufficient opportunities to meet the requirements of some of the assessment criteria. These inappropriate products may be too vague, such as a storage unit, or use industrial processes with which the candidates are not likely to be familiar. In the case of the storage unit, candidates frequently did not identify simple features such as 'what is to be stored in the unit'.

The design activity must be based on a **manufacturing solution**. This is not a general product design but should be based on how best to manufacture the required number of products in order to meet the clients needs. Therefore the design options should include various manufacturing methods. It is important that Candidates consider production details and constraints and Quality Standards. Many centres provided Candidates with design briefs that provided only opportunity to consider aesthetic qualities and therefore the Candidates were significantly disadvantaged.

Many centres focussed the 'design activities' on products which either were to be made in the workshop or had already been made by the candidates. In these cases candidates found it very difficult to separate what they had done from the design process. Inevitably these candidates were significantly disadvantaged.

Centres are strongly recommended to follow closely the Evidence Requirements listed on pages 22 to 27 of the specification. The 'What you need to Learn' section, on pages 15 to 18 of the specification, provides the more information relating to the detail and depth of coverage required. Therefore, for example, where the assessment grid requires analysis of the clients brief, a full analysis should cover:

- Function
- Performance
- Intended markets
- Quantity
- Styling/aesthetics appearance
- Quality standards
- Cost - factory gate and/or retail cost
- Timescales

a) An analysis of the client design brief and important information about key features

The clients needs include: cost, quantity required, intended market, timescales and function.

The key features of the product include: styling, aesthetics, size, quality standards and performance.

It is helpful for candidates to present this analysis under specific headings, i.e. Clients Needs/Key Features. If this analysis is not identified under specific headings, then the assessor should look for evidence under the lists above and map this on the mark record sheet.

Candidates were generally able to list some of the client's needs and the key features of the product. However the degree of analysis, required to meet higher mark bands, was not achieved by many candidates. In many cases well written lists were wrongly awarded the highest marks. In order to achieve the higher marks candidates are expected to provide descriptions of the main client needs and the main key features of the product which more clearly define the identified aspects of the brief. Similarly, in order to the highest marks candidates must provide evidence of analysis of the relevant main features which explains clearly how these features would affect the design activity.

- b) details of the product design and material constraints and
- c) details of the production requirements and quality standards

Both criteria (b) and (c) together form a design specification. Centres continue to be unable to differentiate between a product specification and a design specification.

The **product details** include all of the aspects of design and function which make the product suitable - What does it do? What special features does it need?

The **materials constraints** include: materials availability, properties, characteristics and performance, materials cost, health and safety or hygiene requirements, handling and storage.

Many candidates concentrated on product's styling and aesthetic appearance without considering materials availability, properties, characteristics and performance, materials cost, health and safety/hygiene requirements handling and storage. The 'What you need to learn' section of the unit provides details of the content of a product design specification, and it is recommended that Candidates have access to this information. When teaching Product Design Specifications, teachers should provide good examples of this type of document which may be obtained from manufacturers of related products.

Production requirements include: quantity (which decides the scale of production), size, weight, cost, time to manufacture.

Quality standards include: tolerances, materials specifications, finish, performance and requirements.

Where quality standards include appropriate Regulations and Standards, in order to meet the higher mark bands, it is important that candidates describe (MB 2) or explain (MB3) the specific regulation/standard. The statement "will meet the appropriate British Standard(s), will only meet MB 1. A generic explanation of British/ISO Standards, Kite Marks etc, does not constitute higher achievement. The naming of the standard would constitute MB2 (description) and an explanation of the salient points would meet MB 3 (explanation) since it would explain what effect this requirements would have on the design.

Lack of knowledge of different possible manufacturing processes manufacturing processes made it difficult for candidates to achieve the higher ranges of this criterion. Candidates need to have been taught which processes would be appropriate for different scales of production, and the accompanying constraints of these production processes. This knowledge would then allow them to decide which would be the most cost effective and efficient way to manufacture the product in order to meet the clients' needs and the key features of the product. Hence there was generally a poor response to the requirement of a design specification that included details of production requirements.

A significant number of candidates failed to identify other than basic quality standards, and very few candidates demonstrated any knowledge of sector specific standards, being limited to classroom/school workshop/kitchen experience and knowledge. Some of this information may be obtained from internet and library searches. However a much more useful source of information is the relevant industry.

Candidates should provide sufficient detail to enable them to decide the most cost effective way to manufacture the required scale of manufacture of the product to the required quality standards.

d) A range of design ideas and evidence of testing them

Candidates are expected to produce a minimum of two different design ideas which would reflect different manufacturing processes.

Candidates should develop design ideas that contain information about:

- Production - the most suitable process, tools, equipment and machinery
- Materials - their size, properties, characteristics and suitability for manufacturing processes
- Cost - of materials, resources and production processes, labour and estimated cost of each item
- Market - size and type
- Quality standards - for finish, tolerances, performance and quality of material.

It would be helpful if assessment tasks clearly addressed the above points. In many instances candidates did not produce evidence of a consideration of the above points, largely due to the fact that they had not been asked for this information.

The majority of candidates produced various basic design ideas that considered different features of the product, but lacked sufficient detail. Few candidates considered the possibility of using different manufacturing techniques and how these techniques may affect the design of the product.

Many candidates and centres continue to think that a product such as a CD rack or a bird table/nesting box would be manufactured in a small workshop by individual craftsmen. This may be acceptable for a specific and limited market. However in order to meet production schedules other less labour intensive methods would normally be used, even in underdeveloped parts of the world where labour costs are currently very low. Very few candidates appeared to have even rudimentary understanding of labour costs.

Candidates need to devise suitable methods to test and compare their different design solutions against the design specification in order to identify the solution that best meets the client requirements. The use of simple tables with the awarding of arbitrary scores was sufficient to meet mark band level 1. However in order to meet the requirements of mark band level 3 there is a need for objective testing and an explanation and justification of how the final design and manufacturing solution was chosen, and how it meets the design criteria.

Frequently moderators exercised benefit of the doubt when considering simple evidence such as a statement that this was the cheapest method of production. However in this type of situation the moderator could only consider the lowest level of achievement. In order to meet the higher levels a candidate would be expected to provide auditable evidence of costing for each design idea in order to demonstrate which manufacturing solution best met the clients' needs.

e) Evidence of how you tested and justified your final design solution

The first feature of these criteria is very similar to the second feature of criterion (d). However candidates must state clearly which design solution they have chosen and why the best meets the design criteria. Simple selection constitutes low level achievement full justification would indicate high level achievement.

The final design and manufacturing solution should be tested against the design criteria and the student is required to formally justify this solution, evaluating its strengths and weaknesses compared with alternative design solutions which had been rejected.

This testing need not necessarily be physical testing in all cases. Cost could be modelled in order to demonstrate that the product could be made in sufficient numbers within the clients cost limits.

Candidates who were directed to try to 'sell' their design solution to a client usually were most successful with this criterion. They need to consider reasoned argument to convince the client that their final manufacturing solution would best meet the clients' needs, and also to be able to explain why other manufacturing solutions were not applicable.

f) Evidence of how you selected and used presentation techniques

Candidates must state why they chose specific presentation techniques from the following range: annotated sketches, photographs and ICT generated drawings, samples and swatches, technical drawings and diagrams, written material, spoken presentations, mock-ups models and prototypes. Candidates do not need to use a specific number of techniques in order to meet the higher levels of achievement, but would most probably more than three techniques (spoken, written and sketches). In order to be awarded the highest marks candidates would be expected to describe/explain all aspects of the design solution must be clearly.

Evidence of clarity of presentation and degree of skill demonstrated will most probably be presented in the form of witness testimony.

Candidates are required to present the final solution to an audience, preferably a client or someone playing the client role. Many candidates produced satisfactory evidence of having made a presentation and this was often accompanied by witness testimony that proved very useful. However many candidates were still unable to state or explain why they used specific techniques.

Candidates should never be directed to use specific presentation techniques. If candidates select a particular technique they should be encouraged to consider why this technique was suitable and if another technique could be more effective. Centres should note that PowerPoint is not always the most appropriate method of presenting information. It uses many different techniques from the list of techniques on page 18 of the specification.

g) Evidence of how you responded to external feedback and modified your design solution

Feedback may occur at any time during the design activity. It may be in the form of information gathered during research, as a result of interim discussion with the client (real or role play).

This assessment objective was best met by candidates who presented their final design solutions to clients with a detailed knowledge of the relevant vocational area and who were able to provide factual and relevant feedback.

The evidence produced was generally records of modifications accompanied by witness testimony detailing the response to questioning. Centres should recognise that this criterion could be met by feedback from role play clients during the design process.

In order to fully meet this criterion Candidates need to:

- Provide an evaluation of all significant feedback provided, with either modifications or justification for not modifying the design
- A full explanation of the modifications and how these would affect the design solution and the end product.

Unit 2: Manufactured Products

In this unit there should not be any design activity by the candidates. The candidates are required to manufacture the products as required by the assessor. Therefore the candidates must receive a written **Product Specification** and a **Production Plan** and the **Quantity required** for the manufacture of a quantity of one product. They must also be allocated to a team.

Candidates should be provided with relevant Health and Safety information and manuals and standards.

It is essential that evidence to meet all of the criteria is specific and auditable.

Witness Testimony is a valuable addition to much of the evidence produced by the candidate. Annotated photographs are very useful in producing evidence of candidates' practical activities.

Although candidates make the batch of products in a team, they must produce individual evidence of what they did and how this meets the assessment criteria.

It is important that candidates are presented with sufficient information to allow them to judge if the product quality is satisfactory. Therefore accepted tolerances must be provided.

Witness Testimony is a valuable addition to much of the evidence produced by the candidate. This witness testimony must be detailed and state exactly what the candidates have done and how this meets identified criteria. Annotated photographs are very useful in producing evidence of candidate's practical activities, particularly if they are endorsed by the assessor.

Centres are recommended to follow closely the Evidence Requirements listed on pages 34 to 41 of the specification. The 'What you need to Learn' section, on pages 29 to 31 of the specification, provides the detail and depth of coverage. Therefore, for example, where the assessment grid requires a schedule for manufacture, a full schedule should include:

- All preparation, processing and assembly stages
- The sequencing and timing of stages
- Critical production and quality control points
- Production and quality control procedures
- Allocation of roles and responsibilities.

Moderators continued to report that some candidates had been unfairly led by teachers even though assessors often awarded marks for independence that was not supported by any other form of evidence. In many cases centres did not provide sufficient information for the candidates and therefore some candidates were disadvantaged. It often appears that the teacher is the main lead in the manufacturing process. Candidates should be provided sufficient written information to make one product to the required standard without intervention from the teacher.

However there was pleasing evidence that some centres were beginning to recognise that quality indicators should be measurable. An example of this type of good practice was the provision of colour charts in order to enable candidates to identify an appropriate colour for a cooked product, instead of 'a nice golden brown'. This type of provision made it possible for candidates to provide clear and auditable evidence that they had met the required quality standards.

Unfortunately some centres continue to treat this unit as a 'handicrafts' exercise and produced artefacts which clearly do not demonstrate an appropriate degree of skill and accuracy or any specific knowledge of the manufacturing industry. In some cases it was difficult to imagine that the candidates would derive any pleasure or pride from the making of the chosen objects. Where ever possible the activity should mimic vocational practices and products manufactured should represent saleable quality. However it was recognised that an increasing number of centres were able to meet the main requirements of the specification.

However it is disappointing to report that there are still a significant number of centres producing unsatisfactory articles without reference to manufacturing practices.

A large part of the assessment of this unit relates to the assessment of practical activities. It is important that candidates produce evidence of what they actually did, not what they intend to do. This is particularly important when considering safe and efficient working.

Some centres used Witness Testimony as a valuable addition to much of the evidence produced by the candidate. This was sometimes supported by annotated photographs to produce of Candidates practical activities. However it is disappointing to note that many centres continue to disadvantage candidates by the production of brief statements of a general nature.

Moderators continue to report that substantially similar witness testimony is provided to candidates who have been awarded significantly different marks. Centre **must** recognise that assessors are required to assess the portfolios, and that marks awarded should relate to evidence contained within the portfolio. Success can only be achieved by candidates who produce specific and auditable evidence to meet the assessment criteria. Unfortunately some assessors resorted to making statements that some candidates had worked well during the practical sessions, but failed to produce the required evidence. Moderators can only recognise achievement by the analysis of evidence.

Although Candidates are required to make a number of products in a team, they must produce individual evidence of what they did and how this meets the assessment criteria. Each individual candidate must produce a portfolio which records evidence of the individual performance to meet each of the assessment criteria. All evidence must be specific and auditable.

The evidence to meet this unit **must be generated** by the undertaking of a **specific** assessment task. The portfolio **must not** be a compilation of evidence relating to a range of different manufacturing activities, undertaken throughout the course of study.

Centres are recommended to follow closely the Evidence Requirements listed on pages 34 to 41 of the specification. The 'What you need to Learn' section, on pages 29 to 31 of the specification, provides the detail and depth of coverage. Therefore, for example, where the assessment grid evidence of safe manufacture, it is expected that a candidate should produce evidence of:

- Carrying out a risk assessment
- Care for themselves and others in a manufacturing environment
- Has followed safety procedures and instructions
- Kept a safe place of work
- Checked safety equipment, health, safety and hygiene procedures and systems are operational
- Used safety equipment, health and safety and hygiene procedures and systems correctly during combining, assembly and finishing procedures (See page 31 of the specification)

a) Worked as part of a team

This criterion requires a candidate to produced evidence of their role within the team and also success in meeting individual and team targets (see page 36 of the specification).

Evidence of candidates role may be provided by candidates own account or by peer group assessment or witness testimony provided by the assessor or observer. A candidate does not need to work consistently at the higher level in order to receive this recognition.

Centres should recognise that the role relates to the individuals contribution towards the team effort. Candidates may be mislead by being encouraged to appoint positions such as production manager, quality checker etc. The three levels of role are:

- Passive - does not actively seek to improve the teams performance, takes orders
- Active - finds opportunities to improve own performance
- Leading - identifies opportunities for the team to improve its performance by demonstrating leadership

In order to meet the second feature of this criterion it is important that clear records of target setting and achievement are provided. These targets should be production targets. Team building and motivation are not considered to be production targets.

Teams must set and record individual targets. These may then be transferred onto a schedule and those teams which provided an effective schedule for manufacture which identified key targets were best able to provide appropriate evidence of meeting targets. It would be helpful for candidates to tabulate targets and to monitor achievement when undertaking the manufacturing activity. This type of evidence would also help to develop evidence of monitoring schedules and possibly generate evidence of the modification of schedules and production plans.

b) Used a production plan and developed a schedule for manufacture

An important element of this criterion would be provided by witness testimony relating to guidance and support required and the amount of input provided to the generation of the team schedule.

The schedule may be a team effort, but individual input must be recorded. It may be helpful to encourage the candidate to produce their own schedule for discussion by the team to help produce a team schedule.

An effective schedule should include:

- Information about the preparation, processing and assembly stages of manufacture
- The sequence and timing of stages
- Critical production and quality control points
- Production and quality control procedures
- The allocation of roles and responsibilities

In order to meet MB 2 the schedule **must** be capable of being followed by a 3rd Party. In order to meet MB 3 the schedule would include: all preparation and assembly stages, sequence and timing of stages, critical **production and quality control procedures**, production and quality control procedures, allocation of roles and responsibilities **and** that there has been consideration of how the product can be made most effectively. This might be demonstrated by ensuring that all team members are fully employed throughout the activity. However the schedule does not need to be perfect and most probably will be modified as the result of experience. Any planning is a 'best guess', and, for instance, timings may be different from original estimates.

The given production plan must include detailed information about the type and quantity of product to be manufactured. It would be helpful if the candidates were to include this production plan in their portfolios and that there was a clear indication of what had been provided by the assessor. Candidates can then use this to develop a schedule for manufacture of the products. Where candidates failed to produce effective schedules it was most frequently because they had not been given sufficient clear information.

Individual achievement and effort should be recorded whilst the schedule is being developed. In many cases it was not possible to identify who had contributed to the production of the schedule. This was most effectively met by candidates who produced their own schedules and then used these to produce a team schedule, producing evidence of individual effort and also the best possible schedule for the manufacturing activities.

The development of an effective schedule for manufacture is vital for success in the following assessment objectives. Therefore if a team cannot produce an effective schedule the assessor should consider providing recorded assistance. This would effectively reduce the individual's ability to meet the higher mark bands for this objective only, but may significantly improve the opportunity for success in the following objectives.

c) Used quality control techniques

It is important that candidates are provided with measurable quality indicators. Candidates should produce records of quality checks as identified in the schedule for manufacture when inspecting, testing and comparing samples of the product material, component/ingredients at critical control points. Candidates should monitor and record the progress of production.

MB 1 may be met by the use of simple quality control techniques which lack precision, such as 'go-not-go', templates and simple measurement by ruler. MB 2 involves greater precision of measurement. MB 3 requires candidates to make objective decisions relating to quality indicators.

Some centres provided a prototype for comparison with the production artefacts. This type of checking does not identify the degree of accuracy and may have disadvantaged the candidates. However the provision of 'go/not go' gauges is an acceptable MB1 testing activity. Candidates do not need to make their own gauges.

Where templates are used these should identify acceptable deviations. This may be provided in the form of ideal, maximum and minimum profiles.

As previously reported it was pleasing to note that some centres were now providing candidates with clearly measurable quality indicators. However some centres continue to make statements such as 'it must be a quality product'. Although this is a common statement in the popular press, it carries little meaning. The quality required must be clearly stated in terms which allow candidates to perform measurements and quantifiable judgements in order to decide whether the required quality standards have been met.

Candidates were best able to meet the requirements of this objective when clear measurable quality standards were provided in the production plan. Many assignments failed to recognise the need for appropriate tolerances and therefore candidates were unsure of whether they had met the required quality standards.

Many candidates did not understand the importance of quality indicators, and their individual role in the achievement of the required quality standards for the products. Centres are advised to teach the benefits of Total Quality (TQ) and how the overall quality of a product depends on each individual's adherence to quality requirements.

Where assignments identified appropriate tolerance levels it was easier for candidates to tabulate the results of quality control techniques and also to identify problems. This made it possible for the more able candidates to explain appropriate measures necessary to rectify problems and prevent them from happening again.

Some products were clearly of unmarketable standard, although the assessor, over generously, awarded marks for using quality control techniques. The most important aspect of this criterion is that the candidate should understand the need for quality control and should record the outcome of all such checks (see page 30 of the specification).

d) Prepared and used materials and components safely

The evidence of support and guidance needed and the degree of skill exercised is most likely to occur in witness testimony which should be supported by other forms of evidence such as annotated photographs and candidates notes.

There must be specific evidence that the individual candidate has prepared some materials/components safely and with skill.

Second feature of this criterion

In order to meet MB 2 candidates should have demonstrated sufficient skill to meet the majority of the quality requirements related to the use of materials/components.

In order to meet MB 3 candidates must demonstrate optimum safe use of materials/components. This may be by minimising waste and/or maximising production.

Moderators reported that it was frequently difficult to identify evidence of candidates having prepared and used materials and components safely. However many assessors awarded high marks for this objective, even though candidates presented little evidence to support the decisions. It is important that the assessor judges the evidence provided in the portfolio, not the perceived performance during the production activity.

The assessment objective requires student to use knowledge of the working properties of materials and components in order to achieve optimum use.

Materials processing activities might include: trimming, cleaning or degreasing, preparing blanks, annealing or freezing. Candidates must provide evidence that they have undertaken such activities. This evidence was most effectively provided by a combination of annotated photographs and witness testimony that detailed the degree of assistance provided and also the degree of competence exhibited.

In some cases candidates were awarded marks against this criterion when it was not possible to discern that materials had been prepared by the candidate. In fact in some cases candidates reported that the teacher had provided all materials.

e) Prepared and used tools, equipment and machinery safely

The evidence of support and guidance needed and the degree of skill exercised is most likely to occur in witness testimony which should be supported by other forms of evidence such as annotated photographs and candidates notes.

There must be specific evidence that the individual candidate has prepared tools, equipment and machinery.

Second feature of this criterion

In order to meet MB 2 candidates should have demonstrated sufficient skill to meet the majority of the quality requirements related to the use of tools, equipment and machinery.

In order to meet MB 3 candidates must demonstrate optimum safe use of materials/components. This may be by minimising waste and/or maximising production.

Very few candidates produced evidence of the preparation of tools, equipment and machinery. It is apparent that in many cases these activities were undertaken by centre staff. This is acceptable, but candidates should not then be awarded marks for undertaking these activities. In some cases candidates produced notes explaining how they could prepare equipment etc. It is important to recognise that marks can only be awarded when the candidate has evidence of actually carrying out activities such as cleaning, setting up and safety and hygiene checks.

Candidates generally provided appropriate evidence of the use of tools, equipment and machinery in the form of annotated photographs supported by detailed witness testimony.

Many Candidates provided risk assessments but failed to provide evidence that they had followed safety procedures and instructions.

As with other criteria, some assessors awarded different marks to candidates whilst providing significantly similar witness statements to each. Witness testimony must state what a student did and how this met a specific assessment criterion in order to justify marks awarded. Summative assessment should then award marks in relation to the evidence provided in the portfolio.

f) Manufactured your products safely to meet production requirements and conform to standards

This assessment objective was most successfully met by a combination of annotated photographs and witness testimony.

This witness testimony stated:

- What the student did
- The degree of skill and accuracy demonstrated
- How they worked safely
- What safety equipment was used
- The degree of independence and confidence demonstrated

Where clear quality standards were stated in the given information, candidates were able to tabulate measurements and the result of tests and therefore easily demonstrate whether they met some or the main quality standards, or consistently conformed to the main quality standards as required to meet the different mark band levels.

g) Modified the production plan and schedule for manufacture

Candidates often recognised that quality requirements were not met consistently but were not able to make the step of converting this knowledge into suitable modification of either the production plan or the schedule for manufacture.

Where Candidates were provided with a suitable table for the recoding of quality data and causes of variance they were often able to record appropriate modifications to achieve the required quality or in some cases to improve the quality of future products.

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 01 - Printing and Publishing, Paper and Board

General Comments:

Overall, the two sections within this paper produced a good range of responses.

Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions at the ends of Section A and B were difficult for many candidates and consequently many gave inappropriate responses.

It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Most candidates would benefit from being taught examination skills and techniques as often they do not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Section A

Question 1

The majority of candidates correctly identified the products belonging to the Printing and Publishing sector in part (a) and Paper and Board sector in part (b).

Question 2

The majority of candidates correctly identified one of the symbols that represent environmental features on some packaged products, namely the 'recycling symbol' or 'Möbius Loop'. Very few candidates identified the 'Green Dot' as the second symbol, which is surprising, as this has been an established symbol since the early 1990s.

Many candidates could not describe the use of the 'Reminder symbol' or the 'Horseshoe magnet'; for the former, many responses were associated with 'Keep Britain Tidy' or 'throw away in bins', as opposed to recycle in bottle banks (which is the correct answer); for the later, many 'magnetic contents' type responses were evident, which gained no credit as the symbol is intended to inform that the content is steel which can be recycled.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa. The term 'Assembly robot' was identified as belonging to the ICT Key area by a significant proportion of candidates, which is incorrect.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials, but a number of candidates insisted on using the excluded product, fast food packaging, as the subject for the question. In part (b), candidates generally provided answers based upon processes used within the production stage for the given product.

An explicit manufacturing stage was seen less than the aforementioned, but often resulted in a more detailed answer for (b)(ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for part (b). Part (c) was well answered by the majority of candidates, with 'cardboard' the most popular answer for (i) and strength/durability or improves appearance/colour type answers the most popular for (ii).

Question 5

For part (a)(i), many responses were related to stock control/levels or accessing the contact details of a supplier, and hence the explanation in (ii) was generally appropriate, i.e. 'reduced ordering times'.

For part (b), 'mobile phone' or 'e-mail' were the most popular responses, however, a significant proportion stated computer software such as spreadsheets, which is incorrect. Many responses to the associated benefits were simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, i.e. 'easier as you can roam around whilst talking', and this explanation allowed access to second mark.

For part (c), many candidates noted the general benefits of ICT, i.e. work can be saved, edited/changed more easily, without relating the benefit to the retailer, and hence responses that were awarded good marks included 'can see 3D virtual models of a brand new product before deciding whether or not to sell it' and 'shorter ordering times as ordering is done Just In Time'.

Question 6

Most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

A significant proportion of candidates gave answers associated with communications technology for (a); otherwise this section was reasonably well answered, with 'robots' the most popular answer.

Part (b) was quite well answered with a lot of candidates using the term 'manual', i.e. 'manual placing', for which credit was awarded. For Part (c), the benefit was generally written in simple terms, such as 'quicker production' or 'more accurate', although it is pleasing to note that some candidates did mention JIT techniques in context.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able candidates.

The question required an ability to provide specific responses, by drawing upon specialist knowledge.

Candidates who provided answers that related to the benefits of CAM for the manufacturer and the consumer scored well.

Many candidates provided highly generic responses.

For Part (a) responses such as 'lower costs because less staff are needed as the machines can manufacture automatically once set up' were awarded full marks; a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Part (b) was not answered as well, as lots of responses focused on the manufacturer again, as in part (a); the most popular responses for those who recognised the consumer angle were 'products made to a good standard so less are taken back to the shop' or 'products cost less as the manufacturer can make them more efficiently'; again, a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Section B

Based upon the 'mass produced fast food packaging'

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the expanded polystyrene container and the lid.

The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that provided incorrect responses described the manufacturing process rather than the function.

However, it should be noted that full marks can only be attained with both notes and sketches; a significant number of candidates omitted one or the other.

Question 9

A number of candidates were unable to correctly identify the missing stages in the list. Many tried to give 'Quality Control' as a stage. The correct sequence of stages is clearly outlined in the specification and centres should refer to it. Typically, such candidates were unable to correctly identify the stage where the fast food packaging would be advertised in catalogues.

A very significant percentage of candidates could not adequately describe the Production stage in part (b)(i), providing only generic responses such as 'making it'; some candidates were able to note specific processes, such as cutting/folding/vacuum forming, and others gave responses such as 'inspecting its okay' or 'checking quality', which were awarded credit, but only the highest ability candidates qualified the answer 'following a sequence'.

Part (b)(ii) was generally well answered, with many candidates gaining at least 2 marks, through responses associated with packaging in quantity and transportation.

Few candidates gained full marks as responses such as invoicing and bar coding were rarely seen and answers were rarely developed.

Question 10

Part (a)(i) was well answered. However, many candidates gave generic responses such as 'plastic' when a specific material was required. Popular responses for (a)(ii) included 'more lightweight', 'better at keeping food warm', and 'easier to recycle'; few candidates noted improved hygienic qualities of the given material, which is surprising, considering the pre-release product in question.

Part (b) was also generally well answered; those that had studied the pre-release material were able to offer detailed responses in relation to why vacuum forming is a suitable process for the production of the lid of the cup.

The most popular answers were 'because it's a fast process and you know you will get the same shape every time' or 'as it can be left to manufacture large quantities of packaging automatically and there is very little waste'. Some candidates only gained 1 mark as there was no explanation or second reason given and poor answers explained how the vacuum forming process operates or the suitability of the material.

Part (c) was very well answered with popular responses including cutting, printing, moulding (sometimes more specific), folding and gluing. Part (d) was also generally well answered, with 'lower cost', 'easier to print on' and 'better looking' the most popular answers, but again, such answers were rarely qualified, limiting the number of marks awarded.

Question 11

A very significant number of candidates were unable to correctly state specific examples of automation in part (a), instead stating generic processes for manufacturing fast food packaging.

Further, such responses were often not associated with the production stage of manufacturing. Correct responses included 'robots' or 'conveyor belts', however, these were rarely described for the second mark.

Parts (b) and (c) were answered better, although many candidates repeated responses from part (b) in part (c) and benefits were written in simple terms such as 'quicker production' or 'more accurate' for (b) and 'higher quality product' or 'receive product more quickly' for (c), without further explanation.

Question 12

Part (a)(i) was generally answered well. Part (a)(ii) elicited a mixed response, with a significant element explaining the overall effects of CAM for a company rather than the effects of CAM on the type and size of the workforce. Further, the second effect was often a repeat of the first, and many responses were too generic for a higher ramped question.

Unfortunately, part (b)(i) was left blank by a significant proportion of candidates, with correct answers focusing almost exclusively on an increase/decrease in global warming/emissions.

Part (b)(ii) was similar to part (a)(ii) in that the second effect was often a repeat of the first. Several responses for this question related to recycling or the effects of using control technology for a company or a workforce; all the aforementioned were incorrect, as the answer had to explain the effects of control technology on the global environment. The most popular correct answers were associated with the release of gases into the atmosphere or the use of fossil fuels. Some candidates gained one mark but not the second mark as a result of not expanding their answer.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good exam technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess. For part (a) some good answers were seen; the most popular 'positive' responses were based around recycling, biodegradability and less landfill.

Candidates seemed to have a good knowledge of concerns about plastics (i.e. hydrocarbon based, give off toxic gas if burned, animals get tangled up in them) and used this to provide negative, but correct, answers. Some students gave further negative answers associated with the amount of packaging for consumer products. Most candidates found question (b) difficult; some noted that production may be simpler due to modern materials, resulting in lower product costs, but development costs was poorly understood, with many candidates choosing to ignore this part of the question. Some candidates did mention long-term savings and the highest ability candidates noted that newly developed materials could be used in other products to make further profits. Popular, but incorrect, responses focused on how costs have been reduced as a result of the benefits of modern processing technologies, with no mention of modern materials.

In both parts of the question few candidates were able to provide responses that generated full marks, and a significant proportion of candidates used bullet points to respond to both (a) and (b), which, for an 'explain' question, is unlikely to generate full marks.

Again, centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates.

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 02 - Food and Drink, Biological and Chemical

General Comments:

Section A and Section B of this paper produced a good range of responses.

Generic responses were often given to questions especially by lower ability candidates; terms such as 'quicker / faster/cheaper' were used limiting the marks awarded. Some candidates were not able to differentiate between the various types and forms of technology appropriately losing them marks through out of context and incorrect responses.

Some candidates had not adequately researched the product in Section B, losing them marks on the questions where detailed knowledge was required. Some candidates made generic responses to questions where a specific product related answer was required. Many candidates would benefit from being taught the research skills, assimilating product and processing data and information.

The more demanding questions at the ends of Section A and B proved a challenge for many candidates, numerous giving either low level or inappropriate responses, however significant numbers did not answer in the context of 'state', 'describe', 'explain'. Most candidates would have benefited from being taught appropriate examination skills and techniques.

Section A

Question 1

The majority of candidates correctly identified the products belonging to the Food and Drink sector in part (a) and Biological and Chemical sector in part (b).

Question 2

The majority of candidates correctly identified both pieces of equipment in table 1(a).

The majority of candidates gave appropriate explanations of the use of equipment in table 2(b). Some answers as to the uses of the mixer and refrigerator did not achieve full marks as they were too generic i.e. 'to mix ingredients', 'to store food' these lacked any extension or explanation.

Question 3

A straightforward and generally well answered question. Some candidates did confuse ICT terms with Control technology terms and vice versa.

Question 4

This question was attempted by the majority of candidates and the products used in previous papers were often used.

4(a)(i) Most candidates answered this question well with little difficulty.

4(a)(ii) Answered correctly by the majority but few omitted the obvious 'to eat'

4(b)(i) A number of responses were one word answers such as 'OVEN', 'MIXING' but were acceptable.

4(b)(ii) generic responses were often used e.g. mixing - quicker, easier.

4(c)(i) The question asked for one modern material, however a significant number of responses were based on currently used materials such as flour, sugar, yeast etc and although accepted it showed that these candidates had little knowledge of modern materials used in the product they chose.

4(c)(ii) There was a significant range of responses. Those candidates who were able to name a 'modern material' generally gave better and more detailed answers to the improvements to the key features of the product than those naming a 'currently used material'.

Question 5

Most candidates attempted this question.

5 (a)(i) The term 'database' was often repeated but without any explanation. Ordering and stock control related responses were common and often led to good answers i.e. reduced ordering times, faster delivery in (a)(ii).

5 (a)(ii) The explanations relating to the benefits were often generic e.g. faster quicker, cheaper and lacked any real application to manufacturing.

5 (b)(i) Generally well answered with 'email' being a popular choice, 'mobile phones' 'walkie - talkies' and 'phones' were also used. It was encouraging to also see EPOS occasionally. A few candidates identified digital cameras as examples of communication technology which were incorrect.

5 (b)(ii) Candidates often referred to their own experiences rather than to manufacturing applications.

5 (c) This question was attempted by most candidates, some confused retailer and manufacturer and gave inappropriate responses. Numerous candidates stated the general benefits of ICT, i.e. work can be saved, edited/changed more easily, without relating to the direct benefits to the retailer. Some candidates referred to making the packaging as an example of CAD and went on to claim that the benefits were that you could print it out - easier and quicker. A number of candidates also mistakenly identified aspects of production and identified lower costs or better quality as a benefit.

Question 6

Most candidates attempted this question. Generally answered well but there were a few candidates who gave 'computer' as an example of control technology without any explanation. However, most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

Communications technology was often referred to and not systems and control technology as stated in this question. Databases and spread sheets were sometimes mentioned without any explanation.

Robots were a popular choice and the related answers were appropriate i.e. replaced manual handling with able to work longer and making fewer mistakes stated as being the benefits.

Question 7

This question was reasonably well answered. A small number of candidates read the question as CAD and answered accordingly.

The question required an ability to provide specific responses, by drawing upon specialist knowledge and not generic answers, such as those e.g. in part (a) lower costs, less wages stated without specific applications to manufacturing e.g. lower costs because less staff are needed as the machines can manufacture products automatically once set up.

In Part (b) there was some confusion differentiating between consumers and retailers some candidates took consumer to mean retailer. The most popular responses for those who recognised the consumer were 'products made to a good standard so less are taken back to the shop' or 'products cost less as the manufacturer can make them more efficiently', more consistent quality, however few candidates could think beyond the ideas of 'consistent' or 'reliable'.

Candidates who provided answers that related to the benefits of CAM for the manufacturer and the consumer scored well.

Section B

Based upon the 'mass produced chocolate chip muffins'

Question 8

8(a) Generally this question was well answered, but it was evident that those who had not adequately researched the product were not able to provide comprehensive or correct responses, therefore not gaining the full marks.

A significant number of candidates responded to this with reference to the appearance of the product, the colour of the product and taste as functions which were not correct.

8(b) A well answered question by most candidates although some did not expand their answers, responding with only single word responses e.g. taste, colour, and appearance.

Question 9

9(a)(i) & (a)(ii) Correctly answered by the majority of candidates.

9(b)(i) A very significant percentage of candidates could not adequately describe the processing - production stage, providing only generic responses such as 'making it', 'this is where the product gets processed', these were not acceptable, 'making of parts and components to a specified standard' was acceptable, but required some detailed explanation especially as to the manufacture of the chocolate chip muffin should have been researched.

References to quality checks, following a specification, correct procedures, references to specific parts of the process e.g. mixing, baking etc were given credit.

9(b)(ii) A significant percentage of candidates could not adequately describe the packaging and dispatch stages, providing only generic responses e.g. 'packing the product', 'dispatching the product' etc. The protection, presentation and transportation seemed to be most common acceptable generic answer given, but required some detailed explanation especially as the packaging and dispatch of the chocolate chip muffin should have been researched.

Those expanding their answers were given credit e.g. applying labels; correct packaging materials, correct storage conditions, checking codes, stock control, assembling orders, sending to customers etc.

Question 10

10(a)(i) Most candidates achieved one mark on this question, few candidates used the generic term of 'additives', which was not acceptable, therefore did not gain any marks. Some candidates referred to packaging materials which were accepted where appropriate.

10(a)(ii) Most candidates provided appropriate follow through when a correct response was made in (a)(i), although generic responses were sometimes used e.g. cheaper etc.

10(b) A significant number of candidates did not attempt this question, but from those who did, the vast majority correctly identified the functions of humectants.

Answers to this part of the question clearly exposed those candidates who had not researched the product adequately and those who had.

10(c) Attempted and answered well by the majority of candidates many gaining two marks. Although the question primarily sorts responses relating to 'health and safety' issues, credit was given to those responding to 'food safety' issues. A wide range of appropriate answers were given, showing that candidates had a good understanding of both aspects.

10(d) Some candidates did not attempt this part of the question and some provided long answers that generated few marks because they missed the important points. Generic responses were frequently used e.g. quick, easy and cheap. Those gaining good marks had a good understanding of modern materials, what they do and their effects and the relationship to increasing sales.

Question 11

11(a) A very significant number of candidates were unable to correctly state specific examples of automation, instead stating generic processes for manufacturing chocolate chip muffins. Examples such as weighing machines, conveyor belts, electric mixers, depositors were sometimes given as examples of automation and where relevant marks were credited.

Some candidates simply gave CAD or CAM etc as examples of automation.

11(b) This part of the question was generally well answered. Generic benefits were often given such as safer, efficient, quicker, but often without adequate explanation.

11(c) This part of the question was answered similar to (b)(i) but with many of the responses repeated e.g. the benefits to the manufacturer and consumer being largely the same. This suggested that a significant number of candidates either did not read the question properly or were unable to differentiate between them.

This is an example of a good differentiating question with the more able candidates providing full and coherent answers

Question 12

12(a)(i) This was a generally well answered, the majority stating a smaller workforce as the main change. A number of candidates explained the overall effects of CAM for a company rather than the effects of CAM on the type and size of the workforce.

12 (a)(ii) This question was answered well by the better candidates although it is clear that some candidates equate the declining workforce as a loss of social life. Some candidates repeated the answers given in (a)(i) with a slight change e.g. smaller workforce followed by fewer workers. Better candidates included training, more skills etc. in their answers. The same effect was often largely repeated in both parts of the question.

12(b)(i) Again was well answered by the better candidates.

12(b)(ii) There were some very good answers with candidates showing clear informed opinions about the environment and associated issues. The vast majority of candidates mentioned landfill, less waste, pollution, release of gases into the atmosphere, the use of fossil fuels, global warming etc. The same effect was frequently repeated in both parts of the question.

Many responses were too generic for a higher ramped question.

Question 13

13(a) The majority of candidates sitting the examination paper this year attempted this part of the question. However the full four marks were difficult for most candidates. This question required an explanation that most candidates were unable to provide in sufficient detail. Some long answers missed the important points where some shorter answers could only generate 1, 2 or 3 marks.

13(b) This part of the question was answered very poorly by the majority of candidates or not answered at all. Many who attempted gave both lengthy and wordy answers which involved a great deal of repetition and often candidates got 'tangled up' and 'lost the thread' of what they were attempting to say. Most of the candidates struggled with development costs, but fared better with production costs. Popular, but incorrect, responses focused on how costs have been reduced as a result of the benefits of modern processing technologies, with little or no mention of modern materials. Better candidates related to modern materials and factors such as longer shelf life and more efficient processing reducing waste products. Four marks were difficult to pick up for most candidates. This question again required explanations that few candidates were able to provide in sufficient detail.

Centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 03 - Textiles and Clothing

General Comments:

Overall, the two sections within this paper produced a good range of responses.

Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions at the ends of Section A and B were difficult for many candidates and consequently many gave inappropriate responses.

It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Most candidates would benefit from being taught examination skills and techniques as often they did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Section A

Question 1

The majority of candidates correctly identified the products belonging to the Textiles sector in part (a) and Clothing sector in part (b). Less able candidates were caught out by 'carbon fibre' in part (a).

Question 2

The majority of candidates correctly identified both components. A significant amount responded in their explanation of 'elastic' in a non- Textiles context.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa.

Question 4

This question was attempted by the majority of candidates and often the products named were from previous papers.

4(a)(i) Some candidates still named a material and not a product.

4(a)(ii) Answered correctly by the majority.

4(b)(i) A number of simple responses such as 'Sewing the product' or 'Cutting Fabric' but were accepted as being part of the process. Many responded with an incorrect answer of 'sewing machine'. If the response related to a product being sewn, that however was accepted.

4(b)(ii) generic responses were often used e.g. Quicker, easier

4(c)(i) Very good responses here, often linking to materials named in past papers.

4(c)(ii) Generally well answered by candidates.

Question 5

Most candidates attempted this question.

5(a)(i) The term 'database' was often repeated without explanation. A high proportion of candidates gave incorrect answers that related to 'spreadsheets', 'CAD' or 'computers'.

5(a)(ii) The explanations were often generic e.g. faster, quicker, cheaper.

5(b)(i) Generally well answered, the most popular response being 'E-mail' along with 'mobile phones' and 'phones'.

5(b)(ii) Candidates often cannot able to access the second mark, by not clearly explaining the benefit and its application.

5(c) The majority of the candidates gave low responses, where the benefit to the retailer was 'quicker', 'easier', 'reduced time', 'can see stock levels'.

Question 6

Most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

A significant proportion of candidates gave answers associated with communications technology; otherwise this section was reasonably well answered, with 'robots' the most popular answer.

The benefit was generally written in simple terms, such as 'quicker production' or 'more accurate', or 'fewer mistakes'.

Question 7

This question was reasonably well answered. In part (a) the question required an ability to provide specific responses, by drawing upon specialist knowledge and not giving generic responses such as 'lower costs', 'less wages'.

Part (b) was not answered as well, as lots of responses confused the consumer with retailer.

Candidates who provided answers that related to the benefits of CAM for the manufacturer and the consumer scored well.

Section B

Based upon the 'mass produced trainers'

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the collar/lining and the boxed toe bumper. The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that could not access full marks were those who did not provide a sketch.

Question 9

9(a)(i) and (ii) A number of candidates were unable to correctly identify the missing stages in the list.

9(b)(i) A very significant percentage of candidates could not adequately describe the Production stage, providing only generic responses such as 'making it'; some candidates were able to note specific processes.

9(b)(ii) A significant amount of candidates could not describe the Assembly and Finishing stage, providing generic responses such as 'put together' or 'adding all the bits'.

Question 10

10(a)(i) was well answered. This year, there were fewer candidates giving generic responses, with a high proportion naming a specific material. There was evidence that detailed research had taken place.

10(a)(ii) Good responses for 'improvement' were given with the explanation of 'how' being mainly generic e.g. 'Better'.

10(b) was also generally well answered; those that had studied the pre-release material were able to offer detailed responses in relation to 'comfort feature', 'support' and 'balance'. Some candidates only gained 1 mark as there was no explanation or second reason, only naming the feature.

10(c) Attempted and answered well by the majority of candidates.

Question 11

11(a) A very significant number of candidates were unable to correctly state specific examples of automation, instead stating generic processes for manufacturing hiking boots. Correct responses included 'automated sewing machines' or 'cutting equipment'.

11(b) Candidates generally answered well in this part of the question. Generic benefits were often given such as safer, quicker but without adequate explanation.

11(c) Candidates generally answered well, as in part (b) but many giving repeated benefits of the manufacturer and consumer.

Question 12

12(a)(i) Was generally answered well, with many giving the response as 'smaller workforce' as the change.

12(a)(ii) Was well answered by the more able candidates. Some candidates repeated the answers given in (a)(i).

12(b)(i) was often left blank by a significant proportion of candidates, with those who did answer often miss-reading the question therefore relating their answer to the workforce.

12(b)(ii) was similar to part (a)(ii) in that the second effect was often a repeat of the first. Several responses for this question related to recycling with the most popular answers being associated with the release of gases into the atmosphere or the use of fossil fuels. Some candidates gained one mark but not the second mark as a result of not expanding their answer.

Question 13

13(a) The majority of candidates sitting the examination paper this year attempted this final question. However the full four marks were difficult to pick up for most candidates. Many candidates accessed one or two marks with reference to recycling or waste but they could not expand further to gain the full marks.

13(b) Not many candidates gained more than two marks and in general this part of the question was answered badly. Many candidates left this part of the question blank; those who did attempt the question could not provide answers of sufficient detail.

Centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 04 - Engineering Fabrication

General Comments:

Overall, the two sections within this paper produced a good range of responses.

Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap/accurate' that gained limited marks. Some candidates based their responses on an incorrect context or misread the question and therefore did not gain marks. The more demanding questions at the ends of Section A and B were difficult for many candidates and consequently many gave inappropriate responses.

It was very pleasing, however, to see that the majority of candidates attempted most questions and empty spaces were kept to a minimum. However many candidates failed to answer Q11 - Automation.

Most candidates would benefit from being taught examination skills and techniques as often they did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Section A

Question 1

The majority of candidates correctly identified the products belonging to the Engineering Fabrication sector in part (a) and part (b).

Question 2

The majority of candidates correctly identified one of the components - the gear. Typical responses were 'gear' or 'cog'. Not as many candidates identified the 'bearing' as the other component, which is surprising, as this has been used in past papers. Many candidates gave an answer of 'washer'.

Many candidates could not describe the use of the 'Split Pin'. Candidates gave responses such as 'joining materials together of keeping materials apart. Some candidates however did give good responses that talked about holding components in place and the actual operation of the split pin i.e. placing through a pre drilled hole and bending the legs to prevent removal.

The 'Compression Spring' also caused some problems. Candidates gave responses such as 'used in car suspension' and 'to keep material apart'. These responses gained some marks, however the better responses came when answers such as 'used to absorb shock and vibration' were given and then an example of its use.

Question 3

A straightforward and generally well answered question. However, a significant element confused ICT terms with Control terms and vice versa.

The term 'Assembly robot' was identified as belonging to the ICT Key area by a significant proportion of candidates, which is incorrect.

A number of candidates linked the Term 'PLC' with 'ICT' again which is also incorrect.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials, but some candidates insisted on using a part belonging to the excluded product, wheelbarrow, as the subject for the question.

In part (b), candidates generally provided answers based upon processes used within the production stage for the given product or an explicit manufacturing stage. Both resulted in a detailed answer for (b)(ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for part (b).

Part (c) was well answered by the majority of candidates, with 'aluminium' or 'steel' the most popular answers for (i) and strength/durability or lightweight type answers the most popular for (ii).

Question 5

For part (a), many responses were related to stock control/levels or accessing the contact details of a supplier, and hence the explanation in (b) was generally appropriate, i.e. 'reduced ordering times'.

For part (b), 'mobile phone' or 'e-mail' were the most popular responses, however, a significant proportion stated computer software such as spreadsheets, which is incorrect. Many responses to the associated benefits were simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, i.e. 'easier as you can roam around whilst talking', and this explanation allowed access to second mark.

For part (c), many candidates noted the general benefits of ICT, i.e. work can be saved, edited/changed more easily, without relating the benefit to the retailer, and hence responses that were awarded good marks included 'can see 3D virtual models of a brand new product before deciding whether or not to sell it' and 'shorter ordering times as ordering is done Just In Time'.

Many candidates gave inappropriate answers relating to CAD and the ability to send drawings and produce drawings using ICT. This was not related to the distributor.

Question 6

Most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

A significant proportion of candidates gave answers associated with communications technology for (a); otherwise this section was reasonably well answered, with 'robots' the most popular answer.

Part (b) was quite well answered with a lot of candidates using the term 'manual', i.e. 'manual placing', for which credit was awarded. For Part (c), the benefit was generally written in simple terms, such as 'quicker production' or 'more accurate', although it is pleasing to note that some candidates did mention JIT techniques in context.

Again many candidates gave the answer of CAD, spreadsheets or databases which was inappropriate. However these candidates were awarded marks for Follow Through if benefits were explained.

Question 7

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able candidates. The question required an ability to provide specific responses, by drawing upon specialist knowledge. Candidates who provided answers that related to the benefits of CAM for the manufacturer and the consumer scored well. Many candidates provided highly generic responses.

For Part (a) responses such as 'lower costs because less staff are needed as the machines can manufacture automatically once set up' were awarded full marks; a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Part (b) was not answered as well, as lots of responses focused on the manufacturer again, as in part (a); the most popular responses for those who recognised the consumer angle were 'products made to a good standard so less are taken back to the shop' or 'products cost less as the manufacturer can make them more efficiently'; again, a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Section B

Based upon the 'mass produced metal wheelbarrow'

Question 8

A well answered question for both parts. Most candidates were able to effectively explain, using notes and sketches, the function of both the wheel and the hand grips. The vast majority of candidates had clearly undertaken research based upon the pre-release material; those that provided incorrect responses described the materials used to make the product rather than the function. There were unusual numbers of candidates who did not give notes and sketches this year and therefore were unable to gain full marks.

Question 9

A number of candidates were unable to correctly identify the missing stages in the list. Some tried to give 'Quality Control' as a stage. The correct sequence of stages is clearly outlined in the specification and centres should refer to it. Typically, such candidates were unable to correctly identify the stage where the metal wheelbarrow would be advertised.

A very significant percentage of candidates could not adequately describe the production stage in part (b)(i), providing only generic responses such as 'this is where the wheelbarrow parts are made'; some candidates were able to note specific processes, such as machining, pressing forming, moulding, and others gave responses such as 'inspecting its okay' or 'checking quality', which were awarded credit, but only the highest ability candidates qualified the answer 'following a sequence'.

Part (b)(ii) was generally well answered, with many candidates gaining at least 2 marks, through responses associated with 'putting all the parts together and applying a suitable finish to the pan'. Some candidates even gave examples of assembling the various parts of the wheelbarrow.

Question 10

Part (a)(i) was well answered. However, some candidates gave generic responses such as 'plastic' when a specific material was required. A number of candidates gave specific materials such as 'Tubular Steel' or 'Galvanised Steel' which in general was a better response than simply 'Mild Steel'.

This allowed candidates to produce responses for (a)(ii) such as 'strong and lightweight' and 'strong and corrosion resistant'. However, some candidates did not read the question and gave improvements relating to the wheelbarrow pan rather than the frame.

Part (b) was also generally well answered; those that had studied the pre-release material were able to offer detailed responses in relation to why injection moulding is a suitable process for the production of the hand grips. The most popular answers were 'because complex shapes can be produced quickly and they will be identical every time' or 'it is suitable for mass production and there is very little waste'. Some candidates simply explained the injection moulding process and failed to give any reason for the suitability of the process.

Part (c) was very well answered with popular responses such as tube bending, press forming, galvanising, cutting and welding. Part (d) was well answered with popular responses including references to increase strength, reduced weight, improved aesthetics and increased product range. Answers such as 'lower cost' and 'better looking' were rarely qualified, limiting the number of marks awarded.

Question 11

A very significant number of candidates were unable to correctly state specific examples of automation in part (a), instead stating generic processes for manufacturing the wheelbarrow. Correct responses included 'robots' or 'conveyor belts', however, these were rarely described for the second mark.

Parts (b) and (c) were answered better, although many candidates repeated responses from part (b) in part (c) and benefits were written in simple terms such as 'quicker production' or 'more accurate' for (b) and 'higher quality product' or 'receive product more quickly' for (c), without further explanation.

Question 12

Part (a)(i) was generally answered well. Part (a)(ii) elicited a mixed response, with a number of candidates explaining the overall effects of CAM for a company rather than the effects of CAM on the type and size of the workforce.

Further, the second effect was often a repeat of the first, and many responses were too generic for a higher ramped question. Unfortunately, part (b)(i) was left blank by a significant proportion of candidates, with correct answers focusing almost exclusively on an increase/decrease in global warming/emissions.

Part (b)(ii) was similar to part (a)(ii) in that the second effect was often a repeat of the first. Several responses for this question related to recycling or the effects of using control technology for a company or a workforce; all the aforementioned were incorrect, as the answer had to explain the effects of control technology on the global environment.

The most popular correct answers were associated with the release of gases into the atmosphere or the use of fossil fuels. Some candidates gained one mark but not the second mark as a result of not expanding their answer.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good exam technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess.

For part (a) some good answers were seen; the most popular 'positive' responses were based around recycling, biodegradability and less landfill and material re use. Candidates seemed to have a good knowledge of concerns about plastics i.e. hydrocarbon based, give off toxic gas if burned; animals get tangled up in them and used this to provide negative, but correct, answers. Some students gave further negative answers associated with the amount of packaging for consumer products.

Most candidates found question (b) difficult; some noted that production may be simpler due to modern materials, resulting in lower product costs, but development costs was poorly understood, with many candidates choosing to ignore this part of the question. Some candidates did mention long-term savings and the highest ability candidates noted that newly developed materials could be used in other products to make further profits. Popular, but incorrect, responses focused on how costs have been reduced as a result of the benefits of modern processing technologies, with no mention of modern materials.

In both parts few candidates were able to provide responses that generated full marks. Again, centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates.

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 05 - Electrical and Electronics, Process Control, Computers,
Telecommunications

General Comments:

Overall, the two sections within this paper produced a good range of responses.

Lower ability candidates often gave generic responses to questions, such as 'quick/fast/cheap' which gained limited marks. Some candidates based their responses on an incorrect context and therefore did not gain marks. The more demanding questions at the end B were difficult for many candidates and consequently many gave inappropriate responses.

It was extremely pleasing, however, to see that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper.

Most candidates would benefit from being taught examination skills and techniques as often they did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Section A

Question 1

The majority of candidates correctly identified the products belonging to the electrical and electronics sector in part (a) and process control sector in part (b).

Question 2

The majority of candidates correctly identified the speaker; however, the LDR gave some candidates problems giving responses such as transistor or thyristor. Part (b) was again well answered by the majority of candidates but few gained full marks by not giving a fuller answer and relying on just a brief statement.

Question 3

A straightforward and generally well answered question with a good representation of full marks being allotted.

Question 4

Good responses to (a) included products used in the pre-release materials for past papers or specimen assessment materials. In part (b), candidates generally provided answers based upon processes used within the production stage for the given product. An explicit manufacturing stage was seen less than the aforementioned, but often resulted in a more detailed answer for (b)(ii). A broad range of answers in the mark scheme meant that generally good marks were awarded for part (b). Part (c) was well answered by the majority of candidates, with ABS the most popular answer for (i) and strength/durability or improves appearance/colour type answers the most popular for (ii).

Question 5

For part (a), many responses were related to stock control/levels or accessing the contact details of a supplier, and hence the explanation in (b) was generally appropriate, i.e. 'reduced ordering times'.

For part (b), 'mobile phone' or 'e-mail' were the most popular responses, however, a significant proportion stated computer software such as spreadsheets, which is incorrect. Many responses to the associated benefits were simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, i.e. 'easier as you can send information in a faster time than ordinary mail', and this explanation allowed access to second mark.

For part (c), many candidates noted the general benefits of ICT, i.e. work can be saved, edited/changed more easily, without relating the benefit to the retailer, and hence responses that were awarded good marks included 'shorter ordering times as ordering is done Just In Time' .

Question 6

Most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

A significant proportion of candidates gave incorrect answers such as CAD, CNC or database for (a); otherwise this section was reasonably well answered, with 'robots' and PLC's being the most popular answers.

Part (b) was quite well answered with a lot of candidates using the term 'manual' or 'human', i.e. 'manual/human placing', for which credit was awarded. For Part (c), the benefit was generally written in simple terms, such as 'quicker production' or 'more accurate', although it is pleasing to note that some candidates did mention JIT techniques in context.

Question 7

The majority of candidates attempted this question which was pleasing as in previous years it has been poorly attempted. The question required an ability to provide specific responses, by drawing upon specialist knowledge.

Candidates who provided answers that related to the benefits of CAM for the manufacturer and the consumer scored well. Many candidates provided highly generic responses.

For Part (a) responses such as 'lower costs because less staff are needed as the machines can manufacture automatically once set up' were awarded full marks; a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Part (b) was answered well with most candidates achieving at least one mark.

Section B

Based upon the 'mass produced soldering iron workstation'

Question 8

A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the soldering iron bit and the stand. The vast majority of candidates had clearly undertaken research based upon the pre-release material. Again, as in previous years, some candidates failed to provide a sketch which meant full marks for the question could not be awarded.

Question 9

A number of candidates were unable to correctly identify the missing stages in the list. The correct sequence of stages is clearly outlined in the specification and centres should refer to it.

A very significant percentage of candidates could not adequately describe the production stage in part (b) (i), providing only generic responses such as 'making it'; some candidates were able to note specific processes, such as cutting/folding/vacuum forming, and others gave responses such as 'inspecting its okay' or 'checking quality', which were awarded credit.

Part (b) (ii) was generally well answered, with many candidates gaining at least 2 marks, through responses associated with packaging in quantity and transportation. Few candidates gained full marks as responses such as invoicing and bar coding were rarely seen and answers were rarely developed.

Question 10

Part (a)(i) was well answered. However, some candidates gave generic responses such as 'plastic' when a specific material was required. Popular responses for (a)(ii) included 'more lightweight', 'easy to shape/form', and 'larger range of colours'.

Part (b) was also generally well answered; those that had studied the pre-release material were able to offer detailed responses in relation to thermostatic control and how it is used. Some candidates only gained 1 mark as there was no explanation or second reason given. The second part of part (b) was answered well with answers relating in the main to the 'stand' and the 'fuse in plug' but, some candidates referred to H&S/PPE such as 'goggles' or 'gloves' which are not safety features of the soldering iron workstation.

Part (c) was also generally well answered, with 'lower cost', 'more colours' and 'better looking' the most popular answers, but again, such answers were rarely qualified, limiting the number of marks awarded.

Question 11

A very significant number of candidates were unable to correctly state specific examples of automation in part (a), instead stating generic processes for manufacturing. Correct responses included 'robots' or 'conveyor belts', however, these were rarely described for the second mark. CAM and CNC were sometimes stated incorrectly.

Parts (b) and (c) were answered better, although many candidates repeated responses from part (b) in part (c) and benefits were written in simple terms such as 'quicker production' or 'more accurate' for (b) and 'higher quality product' or 'receive product more quickly' for (c), without further explanation.

Question 12

Part (a)(i) was generally answered well. Part (a)(ii) elicited a mixed response, with a significant element explaining the overall effects of CAM for a company rather than the effects of CAM on the type and size of the workforce. Further, the second effect was often a repeat of the first, and many responses were too generic for a higher ramped question.

Part (b)(ii) was similar to part (a)(ii) in that the second effect was often a repeat of the first. The most popular correct answers were associated with the release of gases into the atmosphere or the use of fossil fuels. Some candidates gained one mark but not the second mark as a result of not expanding their answer.

Question 13

The majority of candidates sitting the examination paper this year attempted this final question. This is pleasing as it is good exam technique for candidates to attempt all questions, even if the response is an informed or 'educated' guess.

For part (a) some good answers were seen; the most popular 'positive' responses were based around recycling, biodegradability and less landfill. Most candidates found question (b) difficult; some noted that production may be simpler due to modern materials, resulting in lower product costs, but development costs was poorly understood, with many candidates choosing to ignore this part of the question.

Some candidates did mention long-term savings and the highest ability candidates noted that newly developed materials could be used in other products to make further profits. In both parts few candidates were able to provide responses that generated full marks.

Again, centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates.

Principal Examiner's Report Summer 2008
GCSE Engineering/Manufacturing
Unit 3: Application of Technology (5318)
Sector 06 - Mechanical, Automotive

General Comments:

Overall this paper produced a good range of responses across the whole paper and the two sections within it.

There was evidence that candidates were not able to identify and explain the use of the split pin in question 2. The more demanding questions at the end of Section B were difficult for most candidates and many gave inappropriate responses. Some candidates gave general responses or based their responses on incorrect contexts and did not gain marks.

It was extremely pleasing, however, to evidence that the majority of candidates attempted all questions and empty spaces were kept to a minimum throughout the paper. Lower ability candidates often gave generic responses to questions, such as 'quick, fast, and cheap' which gained those limited marks.

Most candidates would benefit from being taught exam skills as often they did not read the questions properly.

Section A

Question 1

A good range of responses, well answered by many but distracters caught poorer candidates out in a few cases. The vast majority of candidates selected appropriate products belonging to the mechanical sector for part a) and for the automotive sector for part (b).

A significant amount however did think that a computer monitor belonged to the mechanical sector and safety overalls or especially mobile phones belonged to the automotive sector. In this latter case obviously the hydraulic pump and steering wheel were the correct answers.

Question 2

Part (a) seemed to be answered better than part (b). A large range of answers were however accepted for the gear. Often candidates did not know about the use of the split pin. Some answers like 'to split the metal' or 'to remove riveters' demonstrated some of the desperation these candidates had when trying to answer this part.

Question 3

Generally this question was answered very well. Whilst the materials links were generally good sometimes there was confusion between ICT and control technology.

Control technology is an embedded part of this unit and should be emphasised throughout the delivery.

Question 4

A wide range of appropriate products were evidenced some from last year's pneumatic cylinder or a foot pump or the trolley jack from previous years. Some answers were very similar to the pre-release product such as 'pop riveter'. Explanations were generally sufficient to be awarded a range of marks.

Centres are reminded that products from this sector are wide and varied so candidates should always be able to gain some marks from these types of questions.

Often candidates were unable to give a stage in part (b) where control technology would be used. The most obvious answer here would be within production. Whilst many were very able to state a stage where control technology would be used for part (b) and state a suitable material for part (c) often they failed to maximise their marks when explaining the advantage or describing how the material improves the features respectively.

Candidates should, in this question concentrate on the product stated in part (a) and not the pre-release product.

Question 5

For part (a), many responses were related to stock control/levels or accessing the contact details of a supplier or customers, and hence the explanation in (b) was generally appropriate, i.e. 'reduced ordering times'. Some answers were however close to the use of a spreadsheet. For part (b), 'mobile phone' or 'e-mail' were the most popular responses.

Many responses to the associated benefits were simple terms such as 'quicker' or 'easier', but a good proportion of these answers were qualified, i.e. 'easier as you can roam around whilst talking', and this explanation allowed access to second mark.

For part (c), many candidates noted the general benefits of ICT, i.e. work can be saved, edited/changed more easily, without relating the benefit to the distributor, and hence responses that were awarded most marks included 'the distributor will have less returns as it helps produce more consistent products' and 'shorter ordering times as systems monitor stock levels and react quickly'. Part (c) was mainly answered correctly by only the higher achievers. Very few gave the benefit and how it was achieved.

Question 6

Although often good responses were seen many candidates were unable to give two varied answers between example 1 and 2. Hence the benefits given were also limited. Most candidates were able to name an example of at least one systems and control technology, the method it has replaced and explain a benefit.

A significant proportion of candidates gave answers associated with communications technology for (a); otherwise this section was reasonably well answered, with 'robots' or other forms of automation being the most popular answer.

Part (b) was quite well answered with a lot of candidates using the term 'manual', i.e. 'manual placing', for which credit was awarded.

For Part (c), the benefit was generally written in simple terms, such as 'quicker production', some related to improvements in quality.

Question 7

Some candidates failed to attempt this question. This is the hardest question in section A of the paper.

Some good responses were given by the higher achievers. Often others did not put their answers in the context of the consumer for part (b). Specialist knowledge is required for this question about the application of CAM. Many candidates provided very generic responses.

For Part (a) responses such as 'improved quality because the machines can manufacture automatically and more accurately' were awarded full marks; a small proportion of candidates read the question as CAD and answered accordingly, which was incorrect.

Part (b) was not answered as well, as lots of responses focused on the manufacturer again, as in part (a); the most popular responses for those who recognised the consumer angle were for example 'products cost less as the manufacturer can make them more efficiently'; again, a small proportion of candidates read the question as CAD and answered accordingly, which again was incorrect.

Section B

Based upon the 'mass produced lazy tong riveters'

Question 8

A simple question well answered with many candidates able to gain all marks by using notes and sketches to explain the functions of the handle grip and lattice. Marks were awarded for what the candidates communicated and not how they communicated, although those who either only gave notes or only gave sketches were unable to gain maximum marks. Those that provided incorrect responses described the features of the handle grip or the lattice and what it was made from rather than the function.

Question 9

Whilst the responses to this question were better than in previous years some candidates still struggle to recall the stages of manufacture as outlined in the unit specification.

Candidates should be encouraged to use the correct technical terms to describe these stages although many variations such as 'supply of parts' were rewarded for part (a)(i).

It was disappointing to see many responses for part (b)(i) not score maximum marks as production is almost the key stage within manufacturing, particularly when it is considered in the context of engineering.

Question 10

Part (a) of this question provided an opportunity for many candidates to gain three marks, the responses expected needed to be specific materials. It was hard to understand how candidates who had carried out the pre-release work would think that titanium was a suitable material for the handle grip.

Part (b) caused problems for many. It is apparent that many centres had not covered heat treatment in their delivery. Many candidates guessed and thought the main reason for hardening was to improve the strength characteristics, whilst this could be an outcome from hardening it was not the reason in the case of the lazy tong riveter.

It was also surprising how many candidates were unable to give two other processes used in the manufacture of the lazy tong riveters when there was so many to pick from.

The most able candidates were able to gain full marks for part (c) when they responded with a full explanation associated with increasing sales.

Question 11

Many candidates struggled to clearly give a varied response throughout this question. Often correct responses included 'robots' or 'conveyor belts', however, these were rarely described for the second mark.

Parts (b) and (c) were answered better, although many candidates repeated responses from part (b) in part (c) and benefits were written in simple terms such as 'quicker production' or 'more accurate' for (b) and 'higher quality product' or 'receive product more quickly' for (c), without further explanation. The benefits to the manufacturer and consumer given were often the same.

This suggested that a significant number of candidates either did not read the question properly or were unable to differentiate between them.

Question 12

Most responses by weaker candidates for all parts were very simple statements and only attracted minimum marks. The differentiation aspects of this question allowed those who knew about the impact on the type and size of the workforce and the global environment to be rewarded. A significant amount of candidates explained the overall effects of CAM for a company rather than the effects of CAM on the type and size of the workforce.

Some candidates were confused when answering part (b) as their answer was about the global economy, which was a question in a previous paper, and not the global environment.

The more popular correct answers were associated with the release of gases into the atmosphere or the use of fossil fuels. Some candidates gained one mark but not the second mark as a result of not expanding their answer.

Question 13

Generally responses were poor but as a progressive question it differentiated ability levels. Most candidates found this question challenging and as such very few were able to access all of the marks.

For part (a) some good answers were seen; the most popular 'positive' responses were based around recycling, biodegradability and less landfill. Candidates seemed to have a good knowledge of recycling and concerns about plastics (i.e. hydrocarbon based, give off toxic gas if burned) and used this to provide negative, but correct, answers.

Many wrote a lot for part (b) but failed to target their response to the development costs which was poorly understood, and many candidates choose to ignore this part of the question. They did fair better when discussing how the use of modern materials and components had impacted on production costs.

A pleasing aspect did exist again in this paper that some lower achievers were able to gain 'odd' marks for this question. Again, however, centres are reminded that the paper is ramped in difficulty and latter questions in each section are aimed at more able candidates.

Statistic

Coursework internally assessed

Unit 1: 5351 - Designing products for Manufacture

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	42	40	34	28	23	19	15	11	7
Uniform boundary mark	100	90	80	70	60	50	40	30	20

Unit 2: 5352 - Manufactured products

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	42	37	33	29	25	20	15	11	7
Uniform boundary mark	100	90	80	70	60	50	40	30	20

Statistics

Unit 3 - 5318 External examination with pre-release

5318/01 - Printing and Publishing, Paper and Board

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	87	78	69	61	53	46	39	32
Uniform boundary mark	100	90	80	70	60	50	40	30	20

5318/02 - Food & Drink, Biological & Chemical

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	93	84	75	66	57	49	41	33
Uniform boundary mark	100	90	80	70	60	50	40	30	20

5318/03 - Textiles and Clothing

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	80	71	62	53	49	45	41	37
Uniform boundary mark	100	90	80	70	60	50	40	30	20

5318/04 - Engineering Fabrication

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	87	78	69	61	54	47	40	33
Uniform boundary mark	100	90	80	70	60	50	40	30	20

Statistics

5318/05 - Electrical and Electronic, Process Control, Computers, Telecommunications

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	90	81	72	64	56	48	41	34
Uniform boundary mark	100	90	80	70	60	50	40	30	20

5318/06 - Mechanical, Automotive

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw boundary mark	100	83	75	67	59	52	45	39	33
Uniform boundary mark	100	90	80	70	60	50	40	30	20

APPENDIX 1

Support Paper for Teachers of GCSE Engineering/Manufacturing Use of Pre-release for the External Examination Unit 5318

The examination for Unit 3 is offered as six different sector pathways. Centres are free to select which sector paper they wish to enter their candidates for. The deadline for entries to be received by Edexcel is 21st March of each year. The pre-release material is posted on the website by the end of September for the examination in June the following year. Where centres have estimated entries for the Engineering or Manufacturing qualification, a complete copy of the pre-release material can be downloaded from the Edexcel website. This pre-release will be in the form of a booklet and will cover all six sectors.

Teachers at new centres should ensure that their Examinations Officer has informed the ECC (Entries Department) at Edexcel of their intention to enter candidates.

The pre-release consists of guidance for the candidates and notes to the centre. Staff at the centre should therefore open this material as soon as it arrives in the centre and read the information for all six sectors before deciding which sector is most suitable for them to support the needs of their candidates.

Generally speaking, Engineering is split into three sectors, Engineering Fabrication, Mechanical/Automotive, and Electrical and Electronic/Computer/Process Control/Telecommunications. Manufacturing is split into three sectors, Food and Drink/Biological and Chemical, Printing and Publishing/Paper and Board, and Textiles and Clothing.

Regardless of the route the centre is planning for the other two units in the qualification, the sector for this unit can be chosen to suit the best support a centre can offer rather than being defined by any preconceived ideas.

The product selected by Edexcel for each of the sectors is a product that is in general use, easy to recognise and easy to obtain. Most of these products would be of a reasonable price to purchase, such as the Cordless Electric Drill, or are already available or owned by centres or candidates, such as the Mountain Bike. Whilst the internet is a valuable source of information researching for this product, centres should not rely totally on this and may need to be diligent in their own research before deciding which sector is best for their candidates. For some sector products there may be a wealth of materials on the internet, such as food industry information. However, searching for manufacturers of traditional engineering type products may prove more difficult. Often adding the word "manufacturer" when carrying out searches using 'advanced search tools' on search engines supplies better results than not entering or using this word alongside the product name. After defining the sector specific paper, centres need to develop a support strategy for their students.

They need to consider the local support that can be gained from either industry, colleges or even universities, together with the information known to be available from the teacher's initial search and investigation to decide which sector paper to use.

In an area where manufacturer support for the exact product may be difficult to come by, such as the Trolley Jack in the 2005 pre-release, the centre needs to source local engineering support that uses similar processes and techniques to that found in almost any engineering manufacture. A typical way to support the candidates, in this case, would be to visit the local company before the planned visit, establish what the company can show/offer, and then match or simulate this to the manufacturing process in e.g., the Trolley Jack.

Different groups of candidates could be asked to get information on a particular aspect on application of technology from the company visit and briefed to give feedback to the rest of the group on return back to the centre. The teacher's role would be to draw out the similarities between the technology seen and that of the Trolley Jack. Back at the centre the product, in this case, the Trolley Jack, should be made available and dismantled. Again the teacher should be able to relate what is required for the manufacture and application of technology from that seen on any visits to local companies.

The delivery of the vocational curriculum requires that centres support candidates in the context of their course by applying work-related learning techniques to their area of study. Engineering and Manufacturing has the support of SEMTA and local SET Points, as well as all other local support mechanisms such as the Education Business Links Organisations (EBLO) and Work Related Learning Officers, either in schools or LEA. Food manufacturing, for example, has the support of appropriate trade associations and professional bodies such as, for the mass-produced sliced and wrapped loaves of bread in the 2004 pre-release, the Federation of Bakers, and similar baking industry associations may be useful sources. Often Vocational Learning Support Networks 14-16 are available and supported by the Learning & Skills Development Agency (LSDA).

Once the centre has facilitated the research required by the pre-release material and instructions, the teachers should encourage the candidates to consider the usefulness of any materials gained. Often materials will be found on websites; centres need to ensure that the candidates print/copy only pages that are relevant to that required and defined by the pre-release. They should not print masses of web pages. If studied closely the pre-release highlights the areas of knowledge required for the examination and can become the focus for collecting information. Just like an internally assessed unit, the candidates should be encouraged to produce a portfolio of their research. This can then be taken into the examination and used by the candidates when answering the questions in the paper. The research notes and sketches therefore need to be well organised, or they may be more of a hindrance than help. After studying the application of technology associated with the manufacture of the Trolley Jack candidates in 2005 were asked, for instance, to answer questions about coatings used. Therefore this was listed in the pre-release instructions as an important aspect to research for Section B of that paper.

The experience of reviewing responses in previous examinations indicates that centres may be allowing candidates to take into the examination more than their own research notes and sketches, such as practice or previous examination papers, or materials from the Candidate Kit supplied by Edexcel as support materials.

This can damage candidate opportunities when they give a very detailed answer, obviously taken from the practice papers or Candidate Kit, but fail to put their answer into the context of the question being asked. Centres should think about their responsibility in this matter, as candidates may be disadvantaged and not be awarded marks to match their potential. In short, staff in centres should prepare themselves to prepare the candidates to achieve their full potential in the examination without employing strategies that will disadvantage them.

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