

# Examiners' Report Summer 2007

GCSE

## GCSE Engineering (2316)

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# Contents

Chief Examiner's Report	1
<b>Coursework Units</b>	
Principal Moderators Report	3
Unit 1 - 5316 Design and Graphical Communication	10
Unit 2 - 5317 Engineered Products	16
<b>Unit 3 Examinations - Application of Technology</b>	
Paper 5318/01: Printing and Publishing Paper and Board	20
Paper 5318/02: Food & Drink, Biological & Chemical	23
Paper 5318/03: Textiles and Clothing	26
Paper 5318/04: Engineering Fabrication	29
Paper 5318/05: Electrical and Electronic, Process Control, Computers, Telecommunications	32
Paper 5318/06: Mechanical, Automotive	34
Statistics Unit 1 & Unit 2	37
Statistics Unit 3, Papers 5318	38
<b>Appendix 1</b>	
Support Paper for Teachers of GCSE Engineering/Manufacturing	
Use of Pre-release for the External Examination Unit 5318	40



# Chief Examiner's Report

June 2007

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 November 2006 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.

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.

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 most 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 last question in the paper. 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 communications technology and apply this to compare with traditional approaches. Their responses when explaining the benefits of data handling systems 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 the production planning stage. There was a wider range of responses when demonstrating their knowledge of the use of quality control procedures in the production of their product, although many were still limited.

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. Their responses when explaining the benefits of CAM and CAD to the distributor and manufacturer respectively were in detail and demonstrated knowledge of advantages. Throughout the papers candidate responses evidenced a variety of application of technology. Many candidates were able to explain the benefits of the use of quality control. Often their evaluations on the effect modern technology has had on workforce, working environment and the global environment were well presented.

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](http://www.gcseinengineering.com) and [www.gcseinmanufacturing.com](http://www.gcseinmanufacturing.com).

Comments on individual sectors are given on the next pages.

## Contents:

### Introduction

Presentation of Portfolios

Witness Testimony

### Assessment of the Units

Unit 1: Design and Graphical Communication

Unit 2: Engineered Products

## Introduction

Moderators generally reported an improvement in the overall presentation of evidence for these internally assessed units. It was pleasing to note that an increasing number of centres provided very high quality samples of work that met the requirements of the specification. Many centres used templates and other facilities which have been provided by the Awarding Body and other interested parties in order to ease the collection and documentation of evidence.

However, it is disappointing to report that there are still a significant number of centres who misinterpret the content of the specifications and do not conform to the procedures laid down by the Awarding Body. Where ever possible, moderators ensured that candidates were not unfairly disadvantaged by the incorrect procedures. However, where the specification was not interpreted correctly as identified later in this report candidates were inevitably disadvantaged.

This report will highlight areas of good practice, but unfortunately it will also be necessary to reiterate problems identified in previous reports and moderators expressed their disappointment in the number of centres that repeated poor practice recognised in previous years.

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

It is a major cause of concern that some centres are still using inappropriate assignments which do not reflect the content of the specifications. It is vitally important that centres design assignments that accurately address the assessment criteria. Moderators frequently reported that candidates had undertaken a worthwhile engineering activity that unfortunately, did not address the assessment criteria and therefore did not provide evidence of achievement for this qualification.

A significant number of centres did not manage to send work to moderators before the deadline of 15<sup>th</sup> May 2007, 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 the Awarding Body requirements.

Both of the internally assessed units 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.

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. Sometimes 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 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 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 as follows:



## 10 Authentication Procedures

- 10.1 The *Code of Practice* requires all candidates to sign that the work submitted is their own and teachers/assessors to confirm that the work assessed is solely that of the candidate concerned and was conducted under required conditions. All teachers who have assessed the work of any candidate entered for each component must sign the declaration of authentication. Failure to sign the authentication statement may delay the processing of the candidates' results.
- 10.2 The teacher should be sufficiently aware of the candidate's standard and level of work to appreciate if the coursework submitted is beyond the talents of the candidate.
- 10.3 In most centres teachers are familiar with candidates' work through class and homework assignments. Where this is not the case, teachers should require coursework to be completed under direct supervision.
- 10.4 In all cases, some direct supervision is necessary to ensure that the coursework submitted can be confidently authenticated as the candidate's own.
- 10.5 If teachers/assessors have reservations about signing the authentication statements, the following points of guidance should be followed.
  - If it is believed that a candidate has received additional assistance and this is acceptable within the guidelines for the relevant specification, the teacher/assessor should award a mark which represents the candidate's unaided achievement. The authentication statement should be signed and information given on the relevant form.
  - If the teacher/assessor is unable to sign the authentication statement in respect of a particular candidate, then the candidate's work cannot be accepted for assessment. The awarding body will provide instructions as to how work that cannot be accepted for assessment should be recorded on the optical mark sheet or encoded on the EDI file.
  - If malpractice is suspected, the Examinations Officer should be consulted about the procedure to be followed. (See Paragraphs 8.2 and 8.3 above).
- 10.6 Each candidate is also required to sign a declaration confirming that the work is his/her own. This is the centre's responsibility. (See Appendix 1 for further details).

(JCQ Instructions for conducting coursework/portfolios September 2006)

## Presentation of Portfolios

JCQ Instructions for conducting coursework/portfolios September 2006 prescribe the content of a candidate's portfolio and are intended to support the Awarding Bodies' advice and instructions. It is therefore disappointing to report that a significant number of centres/candidates did not present portfolios in an appropriate manner.

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.

All portfolios submitted for assessment must be the candidate's own work. Written material may be handwritten or word processed.

Portfolios must include a title and, where relevant, a table of contents and bibliography. Material included as appendices (such as tables of statistics, diagrams, graphs, illustrations, photographs, maps etc) will be given credit only if it is pertinent to the work and is referred to in the text.

Written work should be submitted in plain covers or folders, together with the cover sheets provided by the awarding body. The cover must be marked clearly with the candidate's name and number, the number of the centre, the specification title or code and the component/unit title or code. Bulky covers or folders must not be included. If the coursework is word processed, the candidate must ensure that his/her name appears on each page as a header or footer.

Portfolios submitted for external moderation will normally be returned to centres, but the awarding body is required to retain some items for awarding, regulation and archive purposes. The centre will be informed if work is retained. Coursework submitted in digital form will constitute a copy and will not be returned to centres. In this case, centres must ensure that a copy is retained in the centre under secure conditions

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.

## Assessor Annotation

Assessor annotation continues to cause problems. It is a requirement 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 the OPTEM forms and also that some centres were not able to provide accurate totals for marks awarded.

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### 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.**

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.

### 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:

<b>Breadth:</b>	Range of ideas Alternative Solutions Range of information services
<b>Coherence:</b>	Structured and consistent work
<b>Evaluation:</b>	Judging the validity of results Self criticism Identifying solutions
<b>Independence:</b>	Free from outside control; not subject to another's authority Without support and guidance
<b>Originality:</b>	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: Design & Graphical Communication

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. Moderators also used the Portfolio Marking Guidance to identify the type of evidence required to meet mid band requirements.

Candidates must be provided with a written client brief which should be included 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.

The design activity must be based on an **Engineering solution**. This is **not** a general product design but should be based on an Engineering problem. Therefore the design options should include various methods of overcoming engineering problems. The solutions should include the use of some scientific principles and calculations. Those candidates undertaking general product design and mainly considering only aesthetic values were significantly disadvantaged. Candidates who were set simple engineering problems to overcome frequently achieved better results than those being asked to design, or redesign, an engineered product. Candidates who were set the task of designing products such as MPS players and 'personal communications devices' were frequently only able to consider aesthetic values and therefore generally failed to meet many of the higher mark bands. These types of products would often be difficult for an experienced and fully qualified engineer to meet many of the assessment criteria at the higher levels.

It is disappointing to note that many candidates are still being requested to design articles such as bottle openers, CD racks, shelves and stands. This type of focus usually triggers a simple 'product design' approach which mainly involves aesthetic appreciation. Also in these cases candidates were frequently not able to consider appropriate scientific principles. Candidates **must** consider engineering features in order to succeed in this unit. The engineering features relating to a 'cycle stand' would most probably include an appreciation of stability, centre of gravity, strength, maximum stress and possibly strain. Therefore they must be taught the appropriate scientific principles **before** undertaking the design activity.

Many centres failed to provide the candidates with an opportunity to use typical standard symbols. A good design brief would require a candidate to consider mechanical and either electrical/electronic or pneumatic/hydraulic features. A product or service that only includes mechanical features would limit candidates' ability to achieve some of the higher mark bands. Candidates should be able to recognise and use symbols for components and features such as:

- Electrical/electronic components - resistors, thermistors, LEDs, capacitors, bulbs, batteries, motors, buzzers, variable resistors, diodes
- Mechanical features - holes, screw threads (internal and external)
- Dimensions - tolerance dimensions, radii, centres, springs
- Pneumatic/hydraulic valves, cylinders, reservoirs, pipe work, filters.

It is important that centres recognise that is **not** a 'design and make' activity, although the manufacture of a prototype could demonstrate that the product meets the clients brief, and could form a useful part of the presentation.

Some candidates work identified unfair leading by teachers. In order to meet the higher mark bands the majority of the work should be produced by the individual candidate, assistance by the teacher inevitably restricting achievement to the lower levels. Group work and brainstorming may be appropriate at the very beginning, but the generation of ideas and solutions must be that of the individual. Where moderators recognised significant similarities, the portfolios were referred to the awarding body for appropriate action. It is disappointing to note that a significant number of assessors failed to recognise individual work. In some cases assessors continued to award high marks when the candidates work recognised that group work, sometimes led by the teacher, had been undertaken.

#### **Assessment Objective a) an analysis of the brief with key features of the product or service**

The majority of candidates were only able to list the key features and the client's needs. In many cases the use of longer sentences was wrongly considered by the assessor to indicate greater analysis and explanation. It is pleasing to recognise that some of the candidates were skilled in the use of English Language, however, in order to meet the higher mark bands candidates are expected to explain how identified key features and client needs would affect the design.

It is not expected that a candidate should explain all of the key features and client needs in order to be awarded higher achievement. However, a candidate should have listed a significant number of the key features of the design brief and also explain the main clients' needs and the main key features of the product.

The specification recognises the following as client's needs: Cost, Quantity required, Intended market, Timescales, Function,  
The key features include: styling, aesthetics, size, quality standards and performance.

At this stage the analysis of the brief should enable a candidate to understand the range of the design activity. For example if a candidate is requested to design an MP3 player, some of the first questions should be:  
How does it work? What is it required to do? If the teacher cannot answer these questions, the focus of the clients brief is incorrect and a different design activity should be considered.

### **Assessment Objective b) details of the product criteria and production constraints**

The criterion demands that the candidate produce a design specification which includes details of the product criteria and production constraints.

Many candidates found difficulty in meeting the higher mark bands of this objective, concentrating significantly on aesthetic values.

The specification requires candidates to consider **product criteria** that include: criteria related to the products function, styling aesthetics, size, performance, intended markets and maintenance, and **production constraints** that include: criteria related to scale of production, cost, production methods and materials, quality standards and regulations.

A well prepared design specification helps candidates to produce suitable design solutions and to check that possible design ideas will meet the client's needs. Therefore it will be useful in achieving success against assessment criteria (c), (d) and (g).

### **Assessment Objective c) a range of ideas and design solutions**

Many candidates produced design ideas which lacked sufficient detail. A common failing was that candidates produced only one design idea, or produced one idea in greater detail and others in outline only. This made it difficult for them to achieve at the higher levels for criterion (d), testing and selection of the final design solution.

Many candidates again concentrated on aesthetic qualities and failed to consider engineering details or simple scientific principles. However, in some cases the scientific principles involved were of such complexity that candidates would not be expected to be able to understand them. In these cases the focus of the assignment was inappropriate. In many cases candidates were disadvantaged by a being asked to design a product which utilised scientific principles which were too complex for this level of candidate. It is recognised that candidates may be motivated to design a product such as 'a personal communication device'. However it is unlikely that they would have sufficient detailed knowledge to facilitate this activity. Similarly the design of bridges is likely to entail detailed stress analysis more suited to degree level candidates, and therefore would severely disadvantage GCSE candidates. However it would be acceptable for candidates to incorporate in their designs components or features which incorporate scientific principles which they do not understand. If a candidate incorporated a PLC (programmable Logic Controller) into a locking system it would not be necessary to be able to explain how the PLC worked. However it would be necessary to understand such features as input and output signals and appropriate voltages.

The use of scientific principles does not necessarily involve the application of complex formulae; however, simple statements such as 'I think that it should be strong enough' cannot meet the higher levels for this aspect of the criterion. If a component needs to withstand a certain force (weight) it would be possible for a candidate to identify the weight and to model the feature subjected to this loading. This may be either by the production of a prototype or by analytical modelling such as computer software.



Many candidates produced simple designs that failed to consider how the features could be achieved either from a manufacturing point of view or a functional aspect.

In order to meet mark band 3 candidates must produce 'imaginative' designs which do not rely on established market-leading products, or that offer a new slant on an existing product or service. A significant number of candidates continued to research existing products in order to select the 'best' solution. This approach did not necessarily meet mark band level 3, unless the candidate provided evidence of individual design activities.

Some candidates were set inappropriate tasks such as the design of simple vices. With the plethora of holding devices available in the DIY field it is difficult to imagine that a candidate could show much innovation or imagination. Similarly candidates were frequently provided with design briefs which were so open-ended that almost anything would meet the client's needs. A holding device might conceivably be a 'zip-tie' or a computer controlled fixing device incorporated in a machine centre.

#### **Assessment Objective d) evidence of how you tested and selected the final design solution**

In order to meet this objective candidates are required to devise suitable methods to compare the characteristics and features of their different design solutions with the design specification in order to identify the solution that best meets the client requirements. Frequently candidates were not able to use the design specification as a basis for these testing activities. The purpose of a design specification is to clearly state the criteria which any design solution should/must meet.

Those centres which used modified forms of the template produced in the Resources Pack appeared to have benefited the candidates since it provided a structured approach to the testing procedures. However, it must be recognised that the use of simple tables with the awarding of arbitrary scores would be sufficient to meet mark band level 1. In order to meet the requirements of mark band level 3 the specification recognises a need for objective testing and an explanation and justification of how the final design solution was chosen, and how it meets the design criteria. This may be achieved by an explanation of why the design met specific design criteria.

Many candidates failed to state which design solution best met the design criteria. It is important that candidates state clearly which design idea is to be selected as best meeting the design criteria. In order to meet this aspect of the assessment criterion at level 1, candidates are required to provide a brief outline of how their chosen final design solution meets the design criteria. This could be a simple statement recognising which design criteria are, or could be met. Once this statement has been made it should be possible for candidates to then provide a detailed description or justification of how the final design solution meets the design criteria.

If this criterion were to be addressed in respect of a 'cycle maintenance stand' it would be necessary for the candidate to be able to show, not only that the product would support the identified range of cycles, but also that it meets criteria such as stability i.e. that the stand and cycle would not fall over when maintenance activities were being carried out. This would entail advance level mathematical modelling or manufacture of a working prototype. Similarly the candidate would be expected to demonstrate a consideration of such features as: cost, size, weight, maintenance, corrosion resistance etc.

#### **Assessment Objective e) evidence of how you selected and used engineering drawing techniques**

It is not a requirement that candidates should make a verbal presentation to an identified audience. However, the final design solution should be submitted to a client audience and knowledge of the make up of the client audience will help candidates to meet the higher mark bands of part of this criterion. Candidates may be significantly helped by a brief which identifies the make up of the group to whom the final proposals will be submitted.

Candidates often failed to state why they were using different techniques within the range. In order to meet the higher mark bands candidates should present evidence to demonstrate that they have considered the purpose of the drawing and the intended audience. In order to meet the higher mark bands candidates would normally be expected to use a significant number of techniques from the range identified on page 17 of the specification. This range includes: freehand sketches, perspective views, block and flow diagrams, schematic and/or circuit diagrams, orthographic projection, assembly and exploded diagrams. In many cases only two of the above lists of techniques were used by candidates who were wrongly recognised as achieving mark band 3 by assessors.

Centres should recognise that the use of CAD is to be encouraged. However, CAD does not constitute a drawing technique in itself. Candidates should recognise which technique they are to use through the application of CAD. Many assessors wrongly recognised higher achievement for a candidate stating the reasons for using a specific CAD software package.

#### **Assessment Objective f) engineering drawings and technical details**

Once again many candidates provided high quality graphic illustrations produced both manually and with the aid of CAD. These illustrations mainly consisted of various perspective drawings.

This criterion specifically relates to Engineering Drawings which comply to appropriate sector specific standards. These standards may be:

BS8889 - which mainly relates to orthographic projection

BS3939 - which mainly relates to circuit diagrams

BS2917 (or other acceptable Fluid Power Standards such as DIN and CETOP) - which mainly relate to fluid power circuit diagrams.

Many candidates used commercial software packages which do not produce technical drawings which conform to any sector specific standard. It is important in these cases that they recognise where these drawings depart from the standard.

Candidates are not expected to have occupational competencies or to be working to commercially accepted standards. However, all engineering drawings and diagrams should comply with sector specific standards and conventions. Many candidates produced drawings that did not have the minimum of title, name block, scale and borders.

Many candidates were not provided with a client's brief which encouraged them to use a suitable range of components. Candidates must be given the opportunity to use common standard symbols for electrical, electronic or mechanical features.

**Assessment Objective g) evidence of how the solution meets the criteria with suggested modifications to improve its fitness for purpose**

This criterion is best treated as the candidate's opportunity to 'sell' their design solution to a client. Thus, where candidates considered that they needed to present their final design solution to a client either verbally or by a written presentation, evidence was frequently generated to meet the higher levels. Candidates who prepared statements to describe how their solution met the key features of the design brief and the design specification and presented their final solution as a completed project often achieved the highest level. This activity also promoted the opportunity for feedback and for the candidate to identify relevant modifications to possibly improve the products fitness for purpose.

Modifications should be made **in response to feedback**. However, this feedback need not necessarily be provided at the end of the activity. The most practical, and industry standard, method of obtaining feedback is to refer to the client/s during the design process. Records of this contact could be used as evidence of having made modification in response to feedback.

## Unit 2: Engineered Products

The assessment requirements of this unit demand that the candidate produces one engineered product. Some centres continued to produce evidence of producing a range of different products which were most probably made during teaching/learning activities. This approach significantly disadvantaged candidates. Moderators generally exercised Benefit of the Doubt and selected the product which covered the widest range of assessment criteria to the highest level. However, some candidates inevitably were disadvantaged because not all assessment criteria were covered to their greatest ability in the selected product. It should be recognised that this situation is more advantageous than the return of the portfolios because the requirements of the specification were not met.

Some centre continued to produce evidence of the manufacture of products which did not allow the candidates to use an appropriate range of processes. The guidance for teachers explains that the product should endeavour to reflect the diverse realms of engineered products, for example by including mechanical and electrical components where feasible to do so. The 'What you need to Learn' section of the specification states that the chosen product must be able to use the following processes:

- Material removal, such as turning, drilling, etching , milling and grinding
- Shaping and manipulation, such as hammering, forming and bending
- Joining and assembly, such as crimping, soldering, adhesion, wiring, threaded fasteners, welding and brazing
- Heat and chemical treatment, such as annealing, tempering, hardening, etching, plating
- Surface finishing, such as polishing and coating.

Candidates who made products such as a 'plumb-bob' or 'simple garden tools such as hand forks and trowels' encountered severe difficulties in meeting many of the assessment objectives and were therefore severely disadvantage.

The most successful products were those that incorporated mechanical and electrical/electronic features. However, some centres concentrated on local skills and specialities such as hydraulics and pneumatics with equal success. The least successful products were traditional apprentice tests such as plumb-bobs, Gee clamps and tool maker's vices.

Candidates must be provided with a detailed product specification and the necessary engineering drawings to enable the product to be made to the required standards. Some centres again failed to provide candidates with the required information and therefore candidates were severely disadvantaged. In many cases it was not possible to understand how the candidates had met the quality requirements for the product because they were not included in the product specification (or Drawings). This failing also raised doubts about the candidate's ability to interpret drawings and specifications, since the information would most probably have been provided by the teacher. This would imply that independence was not demonstrated.

The drawings supplied to the candidates should conform to an appropriate sector specific standard. In many cases the drawings provided by the centres did not conform to any sector specific standard or convention and were frequently in the form of perspective views. It is recognised that in many small engineering situations 'fag packet' sketches are used to produce acceptable products. However, this unit requires that candidates can interpret technical drawings and therefore orthographic projection to an appropriate standard (BS8888) should be used.

#### **Assessment Objective a) how you used a product specification and interpreted engineering drawings**

Candidates were most successful when good, clear orthographic projection was used to provide manufacturing details and production requirements and a separate product specification was provided. However, it is also essential that assessors provide evidence of the degree of guidance and support needed by the candidates. It must be recognised that simple statements that indicate 'independence' are not reliable and therefore should be accompanied by other forms of evidence. This may be in the form of reference to other activities undertaken such as determining tapping sizes or turning speeds.

#### **Assessment Objectives b) information about details of resources and processing requirements and c) information about production details and constraints**

Candidates were most successful when they were provided with a template for an industry standard production plan, such as those provided in the resources pack, and were then required not only to complete this production plan, but also to provide justification for the selection of resources and processing requirements. Too often assessors recognised the highest level of achievement for production plans which consisted of simple statements without the extra justification for the resources and processing requirements.

Teachers and assessors are recommended to visit the various web sites available which include exemplar materials generated to provide examples of how this criterion might be fully met.

Candidates need to produce a production plan that identifies details of resources used, processing requirements, production requirements and production constraints. The specification recognises these as:

- **Resources** - materials, parts and components
- **Processing requirements** - processes, tools, equipment and machinery
- **Production details** - sequence of production, scheduling, health & safety factors
- **Production constraints** - realistic deadlines, how quality will be checked and inspected, health & safety factors.

- There is frequently evidence to suggest that 'production planning' has been undertaken after the candidates have completed the manufacture of the relevant product. Centres should recognise that production planning should take place before the commencement of manufacturing operations. In many cases there was evidence that candidates carried out planning retrospectively, using statements such as 'first we did...'. This retrospective completion of planning documents resulted in candidates being disadvantaged. It is recognised that candidates have limited experience in the field of manufacture. However, they should have had sufficient practice in manufacturing operations in order to enable them to make realistic plans from analysis of the drawings and specifications at the appropriate time... Where candidates received substantial assistance from the assessor or other supervisors their achievement was not considered to be at the higher mark band.

#### **Assessment Objective d) how you selected and used materials to safely make your product**

Engineering product specifications and drawings normally detail which materials are to be used in making an engineered product. This particular assessment objective relates to the candidates ability to select from a range of engineering materials the appropriate materials to meet the product specification and to use them safely. This could mean that a candidate can identify brass from a range of materials and choose a suitable piece of raw material to ensure the minimum amount of waste. Candidates would also be expected to be able to identify other suitable materials and to justify why the chosen materials would be most appropriate.

The evidence of safe use and skill and accuracy was most effectively provided by a combination of annotated photographs and witness testimony.

#### **Assessment Objective e) how you selected and used parts and components to safely makes your product**

It is disappointing to note that many candidate continued to be asked to make inappropriate products which did not include the use of components. It was therefore difficult for them to achieve success in this assessment objective. However, many assessors continued to award high marks for this criterion even though components were clearly not included in the product.

Candidates were most successful when they made a product involving the use of electrical/electronic components.

### **Assessment Objective f) how you selected and used processes, tools and equipment to safely make your product**

Many candidates again did not provide sufficient evidence to meet the assessment decisions made by centres. This assessment objective was most successfully met by a combination of annotated photographs and witness testimony.

Witness testimony should state:

- What the candidate did
- The degree of skill and accuracy demonstrated
- How they worked safely
- What safety equipment was used
- The degree of independence and confidence demonstrated
- The degree of assistance and guidance provided/needed.

The inclusion of a diary of candidate's activities in the manufacture of the product was often useful. However, it should be recognised that these diaries need to be supported by evidence of assessment decisions relating to:

- The degree of independence demonstrated when selecting appropriate processes
- The safe use of processes, tools and equipment
- The degree of skill of skill and accuracy exercised.

### **Assessment Objective g) how you tested your product and how it complied to the standards required**

Assessors frequently awarded the higher mark band to candidates who clearly had not consistently achieved the main standards required of the product. Similarly candidates should demonstrate objective testing against all requirements of the product specification.

The provision of a detailed product specification assisted many candidates to tabulate results of testing procedures to ensure that the product met the required standards. Unfortunately a significant number of centres still did not provide the candidates with sufficiently detailed quality standards and this disadvantaged the candidates significantly.

Centres should recognise that the final product needs to be checked to ensure that it meets the requirements of the specification in relation to its function.

## 5318/01: 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 did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

### Specific Comments

#### Written Test

- Q1** 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).
- Q2** The majority of candidates correctly named, and described, the use of the two pieces of equipment shown, namely a ruler and a compass.
- Q3** A straightforward and generally well answered question. However, a significant element confused ICT terms with control terms and vice versa.
- Q4** Surprisingly, many candidates did not state a product, did not state a product from the correct sector or stated materials and/or processes rather than a product. Further, a significant number of candidates insisted on using the excluded product, blister packaging, as the subject for the question. Good responses included products used in the pre-release materials for past papers or specimen assessment materials. In part (b) many candidates confused Control Technology with ICT; 'design' and 'CAD' were popular answers. Part (c) was generally well answered.
- Q5** A well answered question, although a significant element of candidates confused CAD with CAM and vice versa. This may be because they failed to read the question carefully. In part (c) many candidate responses did not consider benefits to the retailer, instead repeating answers from 5 (a) (ii).
- Q6** Most candidates were able to name an example of at least one communications technology, the method it has replaced and explain a benefit. A significant element incorrectly answered 'CAD' and 'CAM'.



- Q7** Centres are reminded that the paper is ramped in difficulty and 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 data handling systems during the production or marketing stages of manufacturing scored well. Many candidates provided highly generic responses.

## SECTION B

### Based upon the mass produced blister packaging pre-release material

- Q8** A well answered question for both parts. Candidates were able to effectively explain, using notes and sketches, the function of both the Backing Board and the Blister. 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.
- Q9** 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 Blister is attached to the Backing Board. A very significant percentage of candidates could not describe Production planning in Part (c) (i), providing only generic responses such as 'planning for making'. Further, in Part (c) (ii), a significant percentage of candidates gave answers that related to the product in the pre-release material, rather than the manufacturing stage, as the product was itself a piece of packaging.
- Q10** Part (a) was well answered. However, many candidates gave generic responses such as 'plastic' when a specific material was required. Part (b) was also well answered; those that had studied the pre-release material were able to offer detailed responses in relation to why the properties of thermoplastics make them suitable for packaging. Part (c) was generally well answered - poor responses typically described a material without relating it to the question.
- Q11** A very significant number of candidates were unable to correctly state specific quality control procedures in part (a), instead providing generic responses such as 'by checking'. It is surprising that candidates are not thoroughly revising the use of crop marks, registration marks etc., as they are well documented and effective methods of quality control used widely in this manufacturing sector. Parts (b) and (c) were answered better although many candidates repeated responses from part (b) in part (c).
- Q12** Part (a) (i) and (iii) were generally answered well. Part (a) (ii) elicited a mixed response, with a significant element repeating their answer for (a) (i). However, more able candidates correctly identified that most changes are generally regarded as positive, with 'health and safety improvements' the most popular response. For parts (b) and (c) many candidates gained one mark but not the second mark as a result of not expanding their answer by describing the disadvantage/advantage.

**Q13** The majority of candidates sitting the 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. In part (a) the majority of responses described how CAD can be used by the manufacturer but did not state how such use can increase market share. Part (b) was answered better than part (a) with many candidates able to provide simple responses associated with labour costs. However, a significant number of candidates were unable to provide further responses and very few identified how CAM can control costs through a variety of production efficiencies. 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.

## 5318/02: Food & Drink, Biological & Chemical

### General Comments

The paper generally worked well. It was accessible to all levels of candidates and differentiated between them.

There was evidence that candidates confused CAD and CAM. There was also evidence of candidates not fully understanding what modern technology is and how and where it can be applied in manufacturing with enough detail.

Sound knowledge and understanding of the product and its manufacture studied (digestive biscuit) was not always evident.

Modern materials were not always correctly identified and their functions not fully understood.

There were many examples of low level responses to questions including 'faster, quicker, easier, cheaper' given but with little or no explanation to support the claim. Production stages were not always fully understood, lacking sufficient detail.

There was evidence of candidates not reading questions and interpreting the questions correctly, also that the whole question had not been fully read before starting to answer, leading to repetition or confused responses.

Generic responses were often given to questions requiring some degree of application to a specific context.

### Specific Comments

#### Written Test

- Q1** An appropriate first question, with most candidates gaining full marks from part (a). A few candidates were not able to correctly identify the products in part (b).
- Q2** A sound early question the majority of candidates gave correct answers to (b) (i). Some candidates found difficulty identifying the freezer in the second part. The explanations given relating to the uses were usually comprehensive, gaining full marks.
- Q3** A straight forward question, well answered by the majority of candidates who gained full marks.
- Q4** Part (a) was well answered by the majority, although some obvious responses such as eat were often omitted. Part (b) were generally answered well, but often lacked depth and in (ii) 'quicker, easier' was common responses. Candidates often answered with a currently used material rather than a modern material in part (c). The improvements to characteristics often lacked detail, suggesting that the candidate did not fully understand the material chosen.

- Q5 When answering (a) (i) and (b) (i), some candidates confused CAM and CAD. Some responses referred to classroom experiences rather than manufacturing practices especially when referring to CAM. When answering the CAD section some responses referred to the making of packaging rather than the design. There were some high level answers relating to benefits, but quicker, easier, faster were commonly used.
- Q6 This was well answered by the majority, often gaining full marks. Some candidates confused the "new" with "old" and answered accordingly.
- Q7 Often poorly answered, there was little evidence to show that information and data handling systems were fully understood and how and where they could be applied and utilised to benefit companies. Generic and lower level answers were often given.

## SECTION B

### Based upon the mass produced digestive biscuits pre-release material

- Q8 Section (b) answers were generally better than section (a). This suggested that candidates had not studied the functions of the raw materials used in manufacture to sufficient depth. However candidates generally gained good marks in both (a) and (b). Marks were sometimes lost on section (b) because sketches were not always used, despite being asked for.
- Q9 Many candidates made the correct selections relating to stages of manufacture in section (a), gaining full marks. In section (b) (i) descriptions were often poor and lacked detail. Descriptions in section (b) (ii) were generally more detailed, although transport was frequently included but was not required.
- Q10 Some candidates did not understand what ingredients did or what their functions were. Basic responses were often used such as to rise, make bigger, but lacked explanations to maximise marks. Some answers given were very different from those expected and many were only able to name basic raising agents.  
Modern materials and their uses were not fully understood by many candidates, some confused machines with materials. The answers given were often of a lower level than those expected from a researched manufactured product.
- Q11 This question was poorly answered by many candidates. There was frequently little use of industrial terms or references to the specific monitoring control technology used. Generally, parts (b) and (c) were answered best, but there was some repetition answers from candidates.

- Q12** Part (a) (i) was attempted by the majority and well answered by good candidates gaining full marks. Part (a) (ii) was also attempted by many and was well answered by good candidates, but there was some repetition e.g. smaller workforce. Part (a) (iii) was again attempted by many with good candidates gaining maximum marks, however, the term "global environment" had many interpretations and answers were broad and varied as a result. Parts (b) and (c) answers were appropriate to the question but again some repetition was evident, however, defining the environmental advantages proved difficult for some candidates.
- Q13** Attempted by many, and generally answered well by good candidates. Some lower level candidates confused CAD with CAM and were not clear on market share and cost control, giving only basic and sometimes generic or irrelevant answers.

## 5318/03: Textiles and Clothing

### General Comments

In general some candidates were able to access questions throughout the paper and many evidenced a good understanding of the specification content. However, the more demanding questions at the end of Section B were difficult for most candidates and many gave inappropriate responses.

Some candidates gave responses based on the previous year's mark scheme and did not gain marks because the context of this year's questions were different from the previous year. Lower ability candidates often gave generic responses to questions, such as 'quick, fast, accurate, cheap' which gained them limited marks. Many lost marks through not reading the questions properly, e.g. answering 'CAM' related questions with responses related to 'design'. Most candidates would benefit from being taught exam skills.

Modern materials were known and referred to, but their functions and justifications for use were not always fully explained.

Some candidates' research of the Pre- release product, had improved from last year, but was limited in areas of detail in particular 'coatings' on fabric. Entries were higher than previous years.

### Specific Comments

#### Written Test

- Q1** Questions 1 (a) and (b) were well answered and many candidates achieved full marks.
- Q2** This was generally well answered although many did not know 'pinking shears' only commonly referred to as 'scissors'. Some described an 'over locker' as a sewing machine.
- Q3** Again this was well answered and many candidates achieved full marks. Some lost marks through leaving a term unlinked.
- Q4** Part (a) (i) was generally well answered although some did not name a product but a material. In (b) (i) most candidates answered well, however, the 'benefits' were less well answered, especially by lower ability candidates. Candidates often could not name a specific stage in (c) (i) and the advantage of control technology was often answered as a generic response rather than specific to the stage.
- Q5** This question was often not well answered, particularly by lower ability candidates. Many confused CAD and CAM, in some cases giving a response to the CAM question with an answer that was too much CAD related. Low responses were triggered with answers such as 'accurate, quicker and less waste'.

- Q6** Part (a) (i) was often not well answered, particularly by low ability candidates. However, some candidates could describe at least one communication technology and could explain its benefit. Many said email for (a) but others said phone or fax. Only a few said video conferencing. They could answer replacements but could not always be able to respond to the 'benefit' in an appropriate way, often only triggering one mark. However, candidates improved on their understanding of the question from 2006, in response to the 'manufacturer'.
- Q7** Again this question was generally not well answered. Answers to 'production efficiency' were triggered by simple answers of 'faster' or 'less waste' for minimum marks. 'Marketing' received simple responses relating to 'surveys' or 'seeing what the customer wants'.

## **SECTION B**

### **Based upon the mass produced weather protective jackets pre-release material**

- Q8** Parts (a) and (b) were generally well answered and many candidates achieved full marks. There were some very good sketches but also some very weak or non-existent ones. In (a) most addressed the tightening or loosening of the cuff and the prevention of rain getting into the sleeve so could access all the marks with a relevant sketch. A fair number, however, described the 'workings' of Velcro itself and therefore failed to trigger any marks. In (b) many did not address the added protection of the storm flap to the zip, so could not access all marks.
- Q9** Part (a) (i) was generally well answered, although weaker candidates could not name the stage in (a) (ii). Part (b) (i) was generally well answered, with most students triggering marks through 'check what has to be made' or 'see if you have all materials'. Very few accessed marks through health and safety or control points. Part (b) (ii) was answered very well, with most answers being triggered through the same areas of adding bag, put in a box and send to the client.
- Q10** Part (a) (i) was generally well answered, especially by candidates who undertook the research outlined in the Pre-release. These candidates could give a specific material for the weather protective jacket. Part (a) (ii) was answered less favourably, with very few accessing marks through 'mesh'. Centres may need to focus more on the research for the Pre-release material. Part (b) (i) was answered very well; candidates recognised the functions clearly through protection to fabric and wearer. Part (b) (i) was often well answered. Part (c) candidates often responded with the answers referring to the consumer rather than the manufacturer and therefore failed to trigger many marks.
- Q11** This question was often not attempted. Low level responses and repetition often occurred e.g. (a) (i-ii) 'check they are all there' etc. In Part (b) (i-ii) and (c) (i-ii) most candidates could not specifically identify a benefit of quality control other than reduces waste or 'get a better product'.

- Q12** This question was difficult for many candidates, but well answered by those who understood the question. Responses to part (a) were well answered and many candidates achieved full marks or triggered one mark on each of (i), (ii), (iii). Part (b) and (c) mainly elicited responses related to the previous question without advancing into further detail, usually homing in on responses such as 'lose jobs' or 'causes pollution'.
- Q13** As in previous years this was the least well answered question in the paper. Very few candidates understood the question and gave low appropriate responses related to the use of CAD and CAM e.g. in (a) an understanding of changing ideas quickly and in (b) of less waste. This question was often misread or misinterpreted by candidates, particularly in (b) where candidates did not relate their responses to cost.



## 5318/04: Engineering Fabrication

### General Comments

Overall this paper produced a wide range of responses across the whole paper and for the two sections within it. It was extremely pleasing to evidence that the majority of candidates attempted all questions, and empty spaces were kept to a minimum throughout the paper.

### Specific Comments

#### Written Test

- Q1** The majority of candidates correctly identified the products belonging to the fabrication sector in part (a). However, some candidates failed to pick up on the products in part (b) predominantly manufactured from metal i.e. the BMX bike and Power-kite buggy. There were many responses against the distractors from an extreme sports theme.
- Q2** Many candidates were able to gain marks for naming and identifying the use for a washer.  
Many candidates gave an answer of screw or bolt which failed to gain any marks but were able to gain marks for explaining their uses.  
Some candidates used the stem of the example as the use.
- Q3** A straightforward and well answered question.
- Q4** The majority of candidates were able to name and explain an appropriate product. Many examples were taken from past papers or specimen assessment materials. Part (b) gave candidates the most problems where they were unable to state the stages where 'control technology' is used. However, candidates were rewarded for identifying the process that used control technology. Part (c), some candidates stated a modern material that was not particularly suited to the product named.
- Q5** Part (a) most candidates were able to name an example of where CAM is used and explain a benefit. Part (b), again, most candidates were able to name an example of how CAD is used and explain a benefit.  
In part (c) many candidates were unable to explain a benefit to the distributor. This may be because they failed to read the question carefully and answered with another benefit to the manufacturer.
- Q6** The format of the question changed this year and allowed a significant number of candidates to produce good responses to parts (a), (b) and (c). Candidates were able to focus on one communication technology at a time and identify a method it replaced and a benefit.

- Q7** This question posed the least appropriate responses for Section A. This could be down to a lack of understanding of information and data handling systems in relation to production efficiency and marketing indicating that the paper was ramped correctly.  
The most common answers for (a) was discussing monitoring of material levels.  
The most common incorrect answer for (b) was using the internet to advertise the product.

## SECTION B

### Based upon the mass produced metal cantilever toolbox pre-release material

- Q8** Generally well answered for both parts of the question. Some candidates were unable to gain the full three marks for each part as they failed to use both notes and sketches. Some candidates simply copied the sketches and notes from (a) when completing question 8 (b).  
Centres are reminded that this question is awarded up to two marks for either notes or sketches - both are therefore required for maximum marks.
- Q9** A significant number of candidates were unable to correctly identify the missing stages in the list. These stages are clearly outlined in the specification. Considerably more candidates were able to correctly identify the stage where the hinges are riveted to the main body of the tool box.
- Q10** Part (a) was generally very well answered with candidates correctly stating specific materials for the main body and the rivets on the parallel motion linkage.  
Part (b) (i) was extremely divided; those that had studied the metal cantilever tool box in detail were able to identify a specific material used for powder coating metal. Part (b) (ii) was generally answered quite well.  
Candidates were able to explain two reasons for powder coating with popular responses referring to corrosion resistance and aesthetics.  
In part (c) many candidates were able to apply their knowledge and understanding of modern materials to the metal cantilever tool box effectively. However, it is clearly apparent that many candidates do not have a sufficient working knowledge of modern materials.
- Q11** The majority of candidates were unable to correctly identify, describe or explain the benefits of 'quality control' in part (a). Many popular incorrect responses included the use of CAM as quality control. Some candidates gained marks by describing how quality control was achieved. A typical response was checking the tool box was the correct size or testing the handles and hinges were working. Many candidates produce the same response for the benefits to the manufacturer and consumer.

- Q12** Many candidates were able to gain marks for part (a) (i) by explaining changes in the size of the workforce, but there was limited reference to the change in type of workforce. Part (a) (ii), some candidates used a similar response to Part (a) (i) with a typical response of a reduction in the workforce. Part (a) (iii) was well answered with many candidates aware of the environmental damage and the operational efficiencies created by the utilisation of modern technology. Part (b) and (c) again was well answered but some candidates simply repeated their response from part (a).
- Q13** The majority of candidates sitting the paper this year attempted this question. This is pleasing, as it is always good exam practice for candidates to attempt all questions even with an informed or 'educated' guess. Part (a) was better answered than part (b), with many candidates able to describe how CAD is used by the manufacturer to increase market share. However, a significant number of candidates did not have sufficient knowledge to understand the term 'market share'. Many candidates described how CAM is used to control manufacturing costs in part (b) was correctly identified but often candidates were unable to offer any description of sufficient depth.

## 5318/05: Electrical and Electronic, Process Control, Computers, Telecommunications

### General Comments

Overall, this paper enabled a good range of responses across the whole paper. Research into digital multimeter was evident in responses to Section B. Compared to previous years it was pleasing to see the majority of questions attempted by candidates. However, as with past papers the ramped nature of the paper meant that candidates found it hard to maximise marks in the latter part of the paper. It was disappointing that entries to this examination were down from previous years.

### Specific Comments

#### Written Test

- Q1** A very straight forward question, the majority of candidates were able to identify the correct sector for both part (a) and (b). Most candidates achieved full marks.
- Q2** Good responses to the identification part of the question but the uses challenged some candidates.
- Q3** Very good responses, question posed few problems to candidates.
- Q4** Parts (a) and (b) were generally well answered. However, there was evidence that candidates were unsure about the use of 'control technology'. Generic terms such as 'plastic' were given as modern materials but overall good responses were received for characteristic improvements.
- Q5** Candidates generally knew the difference between CAD and CAM and were able to pick up a good range of marks. However, some low level responses were evident such as 'faster, easier, and cheaper'.
- Q6** Good responses to this question, candidates generally had little problem distinguishing between a new communications technology and one it has replaced.
- Q7** Generally not well answered. Low level responses were again in evidence. However, when answered well, good answers were given and full marks awarded.

## SECTION B

### Based upon the mass produced digital multimeter pre-release material

- Q8** Generally well answered by candidates. Some candidates did not include sketches and therefore disadvantaged themselves by not being able to achieve full marks.
- Q9** A straight forward answer with many perfect responses to part (a) of this question. Significant numbers of candidates gave very poor, low level responses to part (a) and therefore gained limited marks.
- Q10** In part (a) candidates were able to name specific components and was generally answered well.  
Candidates were also able to correctly name two materials that made up solder.  
Good responses were also received for the function of solder with candidates scoring well.  
Part (c) enabled candidates to apply their knowledge of modern materials to the digital multimeter effectively.
- Q11** Part (a) attracted many correct responses but weaker candidates were unable to describe 'quality control procedures'. It was hoped that candidates would be able to identify a QC procedure and explain how it is performed, but, very few were able to give a model answer.
- Q12** Most candidates were able to attempt all parts of this question. There were considerable differences in quality of answer between lower and higher grade candidates as expected. Good responses given for part (a) with a large number of candidates achieving full marks.  
In part (b) and (c) candidates were not able to give good responses to the disadvantages and advantages in this question. Low level responses were mainly given.  
However, this is to be expected by the nature of the paper's ramping.
- Q13** Candidates found this to be the most challenging question on the paper. However, some good responses were received, especially from the more able candidates, and, as such, provided good differentiation.

## 5318/06: Mechanical, Automotive

### General Comments

Overall this paper produced a good range of response 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 socket head cap screw 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.

### Specific Comments

#### Written Test

- Q1** 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) whilst some dropped marks when selecting the products from the automotive sector. Road bridge and to a lesser degree Cargo pants caught some out.
- Q2** Often candidates did not recognise the socket head cap screw. A significant number of candidates were unable to state the correct term. Some candidates were over influenced by the example given.
- Q3** Generally this question was answered very well. Whilst the materials links were generally good, there was confusion between ICT and control technology. Control technology is an embedded part of this unit and should be emphasised throughout the delivery.
- Q4** A wide range of appropriate products were evidenced some from last year's foot pump or the trolley jack or the fire extinguisher from previous years. Some answers were very similar to the pre-release product such as 'hydraulic cylinder'. 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. Many generic responses rather than specific materials and improvements were seen in part c). Candidates should, in this question concentrate on the product stated in part (a) and not the pre-release product.

- Q5** Most candidates were able to gain some marks from this question from their general understanding of computers in manufacturing. A lot of the candidates however, seemed to find this question difficult to answer. The response to the question was varied and indecisive apart from the application of CNC or other machining departments where CAM could be applied in part (a) (i). When an answer was given, the benefits were often not outside the simple response about speed and costs. Part (b) however, was answered a little better. Part (c) was mainly answered correctly by only the higher achievers.
- Q6** 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. Some were unable to answer the question or gain marks as it appeared they did not know about communications technology.
- Q7** Some candidates failed to attempt this question. Some good responses were given by the higher achievers. Often others did not put their answers in the context of data handling. General responses to activities about marketing were not rewarded.

## SECTION B

### Based upon the mass produced pneumatic cylinders pre-release material

- Q8** This question was well answered, with many candidates able to gain all marks by using notes and sketches to explain the functions of the piston rod and body. Marks were awarded for what the candidates communicated and not how they communicated, although those who only gave either notes or only gave sketches were unable to gain maximum marks.
- Q9** Whilst the responses to this question were better than in previous years some candidates still struggled to recall the stages of manufacture as outlined in the unit specification. It was disappointing to see many responses for part (b) (i) that indicated a design process and not a proper engineering planning process.  
Centres should ensure that candidates are made aware of industrial practices in planning as opposed to the planning, that takes place during design at key stage 3 in D&T.
- Q10** Part (a) of this question provided an opportunity for many candidates to gain two marks. The responses expected needed to be specific materials although a range of 'generic material' answers were accepted for the cylinder body. Part (b) caused problems for many. It is apparent that many centres had not covered why stainless steel would be used in engineering products in their delivery.  
The most able candidates were able to gain full marks for part (c) when they responded with a full explanation.
- Q11** Many candidates struggled to clearly give a varied response throughout this question. Whilst responses did indicate the procedure albeit often in terms of what would be measured, very few were able to complete their description by giving how this was done. Those who were able to offer benefits to the manufacturer were unable to give a different answer applicable to the consumer in part (c).

- Q12** Most responses by weaker candidates for this part of the question gave very simple statements and only attracted minimum marks. The differentiation aspects of this question allowed those who knew about the impact on the global environment to be rewarded. Some were confused with part (a) (iii) when they tried to answer about the global economy which was a question in a previous paper. In both parts that were about the workforce responses, gained more marks than those parts about the global environment.
- Q13** Generally poor responses, but as a progressive question it differentiated ability levels. Many wrote a lot for part (a) but failed to target their response to the effect on the context of increasing market share when linked to the use of data handling systems and therefore failed to score any marks. A similar situation arose in part (b) where the response did not focus on the use of data handling systems  
Most candidates found this question challenging and as such very few were able to access all of the marks. A pleasing aspect did exist again in this paper that some lower achievers were able to gain 'odd' marks for this question.



# Statistics

## Coursework

### Unit 1: 5316 - Designing products for Engineering

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: 5317 - Engineering Products

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw Boundary mark	42	39	34	29	24	19	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	80	73	66	59	51	44	37	30
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	67	58	50	42	34
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	76	68	60	52	46	40	35	30
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	84	76	68	60	53	46	39	32
Uniform boundary mark	100	90	80	70	60	50	40	30	20

**5318/05 - Electrical and Electronic, Process Control, Computer,  
Telecommunications**

Grade	Max Mark	A*	A	B	C	D	E	F	G
Raw Boundary mark	100	75	68	61	54	47	41	35	39
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	76	68	60	52	46	40	34	28
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

This will be included later

The complete final version will be uploaded on the Edexcel  
Website.



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