OCR
RECOGNISING ACHIEVEMENT

GCSE

Applied Engineering (Double Award)
Applied Manufacturing (Double Award)

General Certificate of Secondary Education **GCSE** **1492**
General Certificate of Secondary Education **GCSE** **1496**

Report on the Units

June 2007

1492/1496/MS/R/07

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General Certificate of Secondary Education

Applied GCSE (Double Award) Engineering (1492)
Applied GCSE (Double Award) Manufacturing (1496)

REPORT ON THE UNITS

1492: GCSE Engineering

General Comments

Centres are to be congratulated on a general improvement in standards this year, with both good quality portfolio work and examination papers in evidence.

4868 Application of Technology (Written Examination)

General Comments

Changes to the paper: In previous years, this written examination paper was designed to cover the common content of Unit 3 of GCSE Manufacturing and GCSE Engineering, with questions aimed at allowing candidates to demonstrate their knowledge and understanding in both subjects. Following a QCA scrutiny, there are now separate papers for each subject with some common questions. January 2007's paper was the first to follow this new approach.

Centres have become increasingly adept at preparing candidates for individual question types, in particular the product analysis question where most gain more than half of the available marks. It was felt that this question now requires recall rather than analysis and to maintain the ramp of difficulty, it was repositioned to Q2. Learning by rote is leading to problems for an increasing number of candidates who, presumably triggered by a key word or phrase, produce a near perfect response to a question from a previous paper. The main verbs in questions are now highlighted and it was clear that some Centres are encouraging candidates to take note of this and read what is required. This approach supported candidates' responses.

On the whole, candidates responded well to the changes in the paper, gaining marks for their engineering knowledge.

Comments on Individual Questions

Q1)   The main change in the format of this question was that specific products from Engineering sectors are given for parts (a) and (b)
   (a)   Most candidates answered this part well gaining full marks. Those who did not most frequently had the mountain bike as automotive engineering.
   (b)   As in January, many candidates failed to gain marks because they stated different products from those given in part (a).
      There were some excellent responses, for example disc brakes and suspension units for mountain bikes and for the family saloon car reversing sensors.
   (c)   Most candidates who attempted this part question gained 2 marks.

Q2) Most candidates were well-prepared for this question and there was a wide range of products, though mobile phones continued to dominate. As stated in the question marks were not awarded for points copied from the example given. This limited marks awarded for mobile phones. In other cases the marks awarded to candidates were limited because of the technology used in the product selected. Some had attempted to memorise large amounts of complex information unsuccessfully. More able candidates used correct terminology with confidence and showed understanding. Weaker candidates were nevertheless able to gain marks from simple statements. Surprisingly some candidates left this question blank. They tended to be from centres where candidates chose a wide range of products with varying success. This suggests that they have not had experience of product analysis.

Q 3)

    (a-d)   Almost all candidates were able to suggest an appropriate product, though most then gave a material (as in January's paper), some of which could not be considered 'modern technology'. Marks were not awarded for generic materials e.g. 'plastic'.

    (e)   Many candidates gave benefits to an employer rather than the workforce, possibly reflecting previous sessions' papers.

Q 4) This question was generally answered well, with a marked reduction in the one-word and sci-fi responses seen in previous sessions. Many candidates described what they had seen on visits or on video. This clearly helped them understand how robots are used in engineering contexts. Centres are to be commended for this.

    (b)   Some candidates failed to respond in terms of the **introduction** of robotics and gave generic disadvantages.

    (d)   Most candidates managed to gain at least one mark, often by mentioning barcoding.

Q 5) The first question addressing engineering knowledge elicited a very disappointing response. It was expected that candidates would draw on their coursework experience, but few did.

    (a)   Very few candidates gained more than 2 marks, including those performing well across the rest of the paper.

    (b)   Almost all candidates could answer well for one material, many for two.

    (c)   Most candidates gained marks in this part question.

Q 6) The second question addressing engineering knowledge elicited a much better response. Again it was expected that candidates would draw on their coursework experience, and almost all candidates did so. More able candidates gave well-thought out responses, using correct terminology. Others gained marks for simple descriptions, clearly based on their own experience. It is, however, disturbing that from a small number of centres, candidates appeared to have very limited practical experience.

Q 7) This question was similar to previous sessions' on modern and smart materials, the exception being that specific materials were given for candidates to describe.

    (c)   Most candidates knew what an LCD display is, though some clearly had LEDs in mind from their responses.

Q 8)   To help candidates structure their answers, the question repeats the advice given on the front cover of the paper.
Please note that the instruction 'discuss' means that you should:
- Identify three relevant issues/points raised by the question;
- Explain why you consider two of these issues to be relevant; and
- Use one specific example or piece of evidence to support your answer.

This is reflected in the structure of very few candidate responses.

This question was left blank by a number of candidates, though many who did respond gained marks.

(a)   Few candidates showed understanding of what is meant by Computer Integrated Engineering and most did not consider engineering operations. The majority of responses described general benefits and disadvantages of using automated equipment, with emphasis on redundancies and environmental pollution.

(b)   Candidates who answered well had clearly read the question and reflected on their local environment. One, for example, described a recent incident involving toxic chemical spillage into a river and how the problem was tackled, another described traffic control systems.

Portfolio units 4866 and 4867

General Comments:

It was pleasing this year to see a vast improvement in candidate performance especially at the higher levels for coursework. Several candidates managed to gain maximum marks for the work presented in portfolios. Such an improvement is to be congratulated. It is hoped that this upward surge continues in future sessions, with centres referring to exemplar material provided by OCR to assist candidate understanding of specification requirements.

Good practice was shown by Centres who used A3 or A4 presentation folders and placed candidates' sheets in individual plastic wallets. Problems occurred when centres used a single wallet per strand and multiple pieces of work were placed in this.

The use of dividers and other methods of separating the five strands of work in the candidates portfolio was much appreciated as this helped focus the moderator and made the process of approving centres marks much easier.

The majority of Centres completed and forwarded the required documentation to moderators by the set deadline, however some Centres were more casual about submitting the paperwork by the required date and this did slow down the moderating process.

It was particularly helpful where Centres had made use of a URS form to identify and locate evidence.

This year it appeared that Centres were familiar with the requirements of forwarding CCS160 forms.

The number of Centres not completing CSF forms was minimal but when this happens it once again slows down the process due to them having to be returned to Centres for completion.

Centres with 10 or fewer candidates should follow OCR requirements and forward all work to the moderator along with the required paperwork on the set deadline in May.

Centres should carefully consider which project will be attempted in Unit 4867 as it is a requirement that the making of the engineered product should use at least one process from each of the following categories; material removal, jointing and assembly, treatment processes and surface finishing.

Unit 4866 Design and Graphical Communication

Strand a

In the vast majority of cases candidates did produce a design specification from a given brief. However, in some cases, it is difficult to distinguish who the customer is. A range of associated information was presented with conclusions supported through the use of graphs and pie charts. More able students justified these decisions. Good practice was seen through candidates returning to their customer and discussing findings, which then led to a revised specification being produced.

Strand b

Candidates attempted strand (b1) very well by presenting a range of ideas to their identified specification. In (b2) it was pleasing to see more use made of CAD packages when developing ideas. However candidates also developed ideas using traditional drawing skills and a range of different drawing methods were seen in a range of folders. An improvement was seen this year with candidates explaining why drawing techniques had been used to present ideas rather than evaluating how ideas met the specification. Unfortunately the justification of drawing techniques used when presenting ideas is not evident in all candidates' folders.

Strand c

The majority of candidates managed to identify health and safety issues which were related to their design solution, however in some cases these tended to be a list of key points and were not developed or fully explained. There was an improvement this year on quality control issues. Evidence was found in many folders of quality control procedures. Good practice saw this information detailed and explained for each stage of making in a production plan format or similar. However very few candidates evaluated these quality control procedures. Far too many candidates who attempted strand (c3) only presented definitions of quality assurance or total quality management rather than relating these procedures to the work produced.

Strand d

Candidates who presented work in strand (d1) as an extension and development of the work produced in strand b managed to score well. However on too many occasions there was no evidence of any extra work being produced in strand d and Centres rewarded candidates for a second time for the same work. This led to mark adjustments when moderation was carried out. Similarly candidates who had converted work done in strand b into a power point presentation without any extra development also had their marks adjusted.

Good practice saw candidates developing the work produced in strand b and presenting a range of annotated drawings, including CAD, and models to the client. Digital photographs were used to support such presentations. More able candidates justified their final solution to the customer and used feedback to highlight further improvements that could be made to the product.

Strand e

Engineering processes that would be used to produce the candidate's final product were identified in the majority of cases. However to gain maximum marks in (e1) these processes should not only be listed they should be explained. Similarly in (e2) the various quality assurance procedures that could be carried out at each stage of production should be explained and not left as a list of possibilities. More able candidates did explain work presented in (e1 & e2) and then went on to evaluate and justify this in (e3). It was disappointing that this year few candidates related making their product to "real world" procedures. Good practice saw candidates explaining real world production methods and then relating these to their particular product.

Unit 4867 Engineered Products

Strand a

Good practice, for a1, saw candidates describe an engineering process that might be used later in the project. Several candidates did not attempt this section however full marks, on occasion, were for work in strand a. When this happened, marks had to be adjusted because if there is no evidence in strand a1 then the remainder of marks across this strand must be adjusted accordingly.

Candidates appear to have a good understanding of how to produce production plans. Many of the plans seen followed the requirements of the assessment grid identifying engineering processes and quality control.

Candidates who scored well in this section evaluated their production plan. Unfortunately a high percentage of candidates did not attempt strand a3.

Strand b

There was a mixed response to strand b1 with some candidates ignoring this part and starting the strand at b2. Other candidates gave a short response to the importance of accurate production planning and meeting the specification, thinking that it was sufficient just to list a few key points for a specification. Good practice saw candidates identifying key issues and describing these points in detail with reference to their own plans and product specification.

B2 was well answered with candidates including times in their production plan, sometimes supporting Gantt charts were presented. Strand b3 was poorly answered with few candidates evaluating their production plan.

Strand c

Key control points and health and safety issues were identified and it was pleasing to see that these topics were related to the product being made. Despite this several candidates failed to gain full marks in c1 as they did not describe the importance of health and safety.

Detail was given by the candidates regarding quality control tests that were carried out. Best practice saw candidates making use of photographs to show QC tests being carried out and safe working practice in action.

Strand d

There were a variety of responses in this strand ranging from a list of bullet points to a basic general description. However best practice included a written description of relevant ICT use with supporting photographs to help explain the processes. Good answers not only explained why ICT was used but evaluated the processes stating the benefits of the system.

Strand e

The majority of candidates, at varying levels, were able to describe how they had produced their product. Once again good practice made use of digital photographs to support the text in e1. Some candidates explained why the tools and equipment used were appropriate to the task, however many did not fully answer strand e2, as they did not develop explanations once tools had been identified.

A small number of candidates attempted e3 by identifying real world engineering procedures and relating these to their own work.

1496: GCSE Manufacturing

General Comments

Centres are to be congratulated on a general improvement in standards this year, with both good quality portfolio work and examination papers in evidence.

4880 Application of Technology (Written Examination)

General Comments

Changes to the paper: In previous years, this written examination paper was designed to cover the common content of Unit 3 of GCSE Manufacturing and GCSE Engineering, with questions aimed at allowing candidates to demonstrate their knowledge and understanding in both subjects. Following a QCA scrutiny, there are now separate papers for each subject with some common questions. January 2007's paper was the first to follow this new approach.

Centres have become increasingly adept at preparing candidates for individual question types, in particular the product analysis question where most gain more than half of the available marks. It was felt that this question now requires recall rather than analysis and to maintain the ramp of difficulty, it was repositioned to Q2. Learning by rote is leading to problems for an increasing number of candidates who, presumably triggered by a key word or phrase, produce a near perfect response to a question from a previous paper. The main verbs in questions are now highlighted and it was clear that some Centres are encouraging candidates to take note of this and read what is required. This approach supported candidates' responses.

On the whole, candidates responded well to the changes in the paper, gaining marks for their manufacturing knowledge. Most candidates attempted every question and there were fewer 'doodles' on the papers.

Comments on Individual Questions

Q1)   The main change in the format of this question was that specific products from Manufacturing sectors are given for parts (a) and (b)
     (a)   Most candidates answered this part well gaining full marks.
     (b)   As in January, many candidates failed to gain marks because they stated different products from those given in part (a).
     (c)   Few candidates who attempted this part question gained 2 marks.

Q2)   Most candidates were well-prepared for this question and there was a wide range of products, though mobile phones continued to dominate. As stated in the question marks were not awarded for points copied from the example given. This limited marks awarded for mobile phones. In other cases the marks awarded to candidates were limited because of the technology used in the product selected, for example a pair of compasses. Some had attempted to memorise large amounts of complex information unsuccessfully. More able candidates used correct terminology with confidence and showed understanding. Weaker candidates were nevertheless able to gain marks from simple statements.
     Surprisingly some candidates left this question blank. They tended to be from centres where candidates chose a wide range of products with varying success. This suggests that they have not had experience of product analysis.

Q 3)
(a-d)   Almost all candidates were able to suggest an appropriate product, though most then gave a material (as in January's paper), some of which could not be considered 'modern technology'. Marks were not awarded for generic materials e.g. 'plastic'.
(e)   Many candidates gave benefits to an employer rather than the workforce, possibly reflecting previous sessions' papers.

Q 4)   This question was generally answered well, with a marked reduction in the one-word and sci-fi responses seen in previous sessions. Many candidates described what they had seen on visits or on video. This clearly helped them understand how robots are used in engineering contexts. Centres are to be commended for this.
(b)   Some candidates failed to respond in terms of the introduction of robotics and gave generic disadvantages.
(d)   Most candidates managed to gain at least one mark, often by mentioning barcoding.

Q 5)   The first question exploring specific manufacturing knowledge elicited an encouraging response. It was expected that candidates would draw on their coursework experience, which most did.
(a)   Many good responses, showing understanding of stages of production and giving appropriate ICT examples.
(b)   Many candidates did not address the 'saving money' aspect required, giving a generic response.
(c)   This question was not well-answered with a number of candidates referring to alternative energy sources, or automation replacing manual processes.

Q 6)   The second question addressing manufacturing knowledge was generally well-answered. Again it was expected that candidates would draw on their coursework experience, and almost all candidates did so. More able candidates gave well-thought out responses, showing clear understanding. Others gained marks for simple descriptions, clearly based on their own experience

(b)   Around half of the candidates gave an appropriate response.

Q 7)   This question was similar to previous sessions' on modern and smart materials, the exception being that specific modern and smart materials were given for candidates to describe.
(b)   Most candidates could describe the properties and uses of one of the materials given, but many struggled with a second. Gortex was the most popular choice.
(c)   Most candidates knew what an LCD display is, though some clearly had LEDs in mind from their responses.

Q 8)　To help candidates structure their answers, the question repeats the advice given on the front cover of the paper.

Please note that the instruction 'discuss' means that you should:

- Identify three relevant issues/points raised by the question;
- Explain why you consider two of these issues to be relevant; and
- Use one specific example or piece of evidence to support your answer.

This is reflected in the structure of very few candidate responses.

This question was left blank by a number of candidates, though many who did respond gained marks.

(a)　Few candidates showed understanding of what is meant by Computer Integrated Manufacturing and most did not consider manufacturing operations. The majority of responses described general benefits and disadvantages of using automated equipment, with emphasis on redundancies and environmental pollution.

(b)　Candidates who answered well had clearly read the question and reflected on their local environment. One, for example, described how more efficient car engines mean that people can afford to use their cars more, increasing local traffic noise and affecting air quality.

Portfolio units 4878 and 4879

General Comments:

It was pleasing this year to see an improvement in candidate performance at the higher levels for coursework. Several candidates managed to gain maximum marks for their portfolios. Such work is to be congratulated and it is hoped that this upward surge continues in future sessions, with centres referring to exemplar material provided by OCR.

Good practice was shown by Centres who used A3 or A4 presentation folders and placed candidates' sheets in individual plastic wallets. Problems occurred when centres used a single wallet per strand and multiple pieces of work were placed in this.

The use of dividers and other methods of separating the five strands of work in the candidates portfolio was much appreciated as this helped focus the moderator and made the process of approving centres marks much easier.

It was particularly helpful where Centres had completed the URS form to identify and locate evidence. There was good practice where Centres had numbered pages and used evidence only once.

The majority of Centres completed and forwarded the required documentation to moderators by the set deadline, however some Centres were more casual about submitting the paperwork by the required date and this did slow down the moderating process.

Issues did arise where internal standardisation had not been carried out or where there had been no internal checking of marks transferred from the CSF forms onto the MS1.

This year it appeared that Centres were familiar with the requirements of forwarding CCS160 forms.

The number of Centres not completing CSF forms is only very few but when this happens it once again slows down the process due to them having to be returned to Centres for completion.

Centres with 10 or less candidates should follow OCR requirements and forward all work to the moderator along with the required paperwork on the set deadline in May.

In Unit 4878 those candidates following a food option are required in strand b to produce design ideas, including copied recipes does not answer this requirement. It may be more appropriate for candidates to produce their own recipe or try out a range of suitable dishes.

In Unit 4879 candidates must show evidence that they have produced a batch of items made up of at least three components or ingredients which should be manufactured by a team with tasks allocated to individuals. In many portfolios it was difficult to establish what had been produced and by whom. Good practice used photographic evidence to show the batch of items produced.

The portfolios for Unit 4879 should be presented as individual candidates work. Despite this unit being a team task candidates are required to present their own original folder of work covering all sections of the assessment grid.

Unit 4878 Designing Products to Manufacture

Strand a

Strand a1 was well answered with the vast majority of candidates working from a given design brief. Initial specifications varied in content from a short list of bullet points to those that listed and explained key points. Associated information in a2 regularly featured questionnaires and bar charts to outline potential user views. However it is important that the customer/client is consulted in this strand so that a developed specification can be created. Candidates who scored well in this strand provided statements to indicate how customer feedback and associated information were used.

In a2 candidates should be selective in the collection of associated information, an analysis of existing products can prove to be useful in identifying features to consider when designing. Good practice saw this associated information used to develop the final specification with justification.

However some material presented in this strand may be considered as padding and had little relevance to the product being designed.

Strand b

B1 was well attempted with all candidates presenting ideas that would answer their design brief. It is important that they annotate such ideas making reference to points identified in the specification. Several candidates made use of a chart where design ideas were listed and awarded marks against points from the specification. Good practice was seen when candidates used such a table but also presented and evaluated the final design idea.

Strand c

In c1 candidates found no problem in identifying health and safety issues in the work environment, however several failed to relate these issues to the manufacture of their product. In c2 quality control procedures were identified but in some cases they were not explained. Good practice was seen when candidates made use of digital photographs to highlight issues.

Those candidates who attempted c3 tried to evaluate quality control procedures but a high percentage failed to grasp the idea of total quality management. Several candidates provided a definition of total quality management but many failed to relate this to their product.

Strand d

D1 was attempted by the majority of candidates with work presented being developed from material presented in strand b. Good use of modelling in a variety of forms, CAD to prototypes, was also seen in d2. Some candidates also made use of power point presentations to explain their design solution to the customer. However some candidates failed to develop work in this strand and produced power point slides that featured pages of their folder rather than the final idea. Several candidates failed to feedback to a client or there was not really a client at all just an imaginary target market.

Strand e

Those candidates that attempted e1 appeared to score well and a good understanding of manufacturing processes was evident. Centres should note that e1 expects candidates to identify processes that would be used to produce the product in quantity. In e2 a variety of methods were used to show the stages of manufacture and quality assurance procedures. Good practice was seen by candidates who used a combination of production plans and digital photographs to answer e2.

A limited number of candidates discussed real world manufacturing especially in relation to their product. On occasion real world manufacturing was explained regarding a visit that had been carried out or a video that had been seen. Candidates taking this approach should then relate such material to their particular project. Centres are encouraged to give candidates the widest possible experience when following the course but where information is presented in the coursework portfolio reference should be made to the product being produced.

Unit 4879 Manufactured Products

Strand a

A1 was well answered by the majority of candidates, however there are still some who fail to provide evidence for this section by not describing a manufacturing process. Most candidates provided a production plan featuring manufacturing processes, a variety of styles were witnessed including basic lists, flow charts and tables. It is important that candidates incorporate quality control procedures in the production plan. Candidates who scored well in this strand explained and evaluated the production plan in a3.

Strand b

There was an improvement this year in the number of candidates who attempted to describe the importance of accurate production planning and meeting the product specification. However there are still many candidates who ignore b1.

The schedule of manufacture for many candidates tends to be included as units of time in the production plan produced as part of a2. Several candidates also produce additional schedules in the form of Gantt charts. It is important that candidates attempt the second requirement of b2 and that is to allocate roles to team members.

Candidates who scored well in this strand reflected on the schedule of manufacture and explained how it could be improved. They also stated why specific roles had been given to particular team members.

Strand c

Candidates provided evidence of health and safety issues but several failed to fully meet the requirements of c1 as they failed to describe the importance of health and safety. Some candidates did not relate health and safety issues to the batch of products being manufactured. C2 was quite well answered with candidates using quality control checks. Good practice was seen by candidates who used digital photographs to show quality control procedures being carried out and the application of health and safety regulations. Some candidates answered c3 by explaining how production planning and scheduling could be improved. Others went on to define total quality management in general terms but very few candidates applied this to their products.

Strand d

Candidates this year appeared to have a better understanding regarding the features of good teamwork in the manufacture of a product and scored well in d1. However some candidates only produced a list of features without explaining the key points. Only a limited number of candidates attempted strand d3 where they are required to reflect on ways of improving the production of the product by more effective use of the team. Very few candidates explained the effect of buying in components or ingredients.

Strand e

E1 was attempted by the majority of candidates with varying levels of success due to the amount of information that was provided. Some candidates presented little more than a revised production plan, others presented a detailed diary of events. Higher attaining candidates developed this work in e2 when they explained why tools, equipment and processes used were appropriate to the task. Good practice saw such work being supported through the use of digital photographs to record each stage and provided evidence to show the batch of products produced by the team.

In e3 more able candidates did make reference to real world manufacturing and the majority did try to relate such information to the product being manufactured. However this remains a section that more candidates should be encouraged to attempt.

General Certificate of Secondary Education
Engineering (Specification Code 1492)
June 2007 Assessment Series

Unit Threshold Marks

	Unit	Maximum Mark	a*	a	b	c	d	e	f	g	u
4866	Raw	50	45	40	35	30	24	19	14	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
4867	Raw	50	45	40	35	31	25	19	14	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
4868	Raw	100	74	64	54	45	39	33	27	21	0
	UMS	100	90	80	70	60	50	40	30	20	0

Specification Aggregation Results

Entry Information

Unit	Total Entry
4866	1801
4867	1791
4868	1729

Specification Aggregation Results

GRADE	A*A*	AA	BB	CC	DD	EE	FF	GG	UU
UMS	270	240	210	180	150	120	90	60	0
Cum %	0.78	4.93	14.80	33.37	50.94	66.96	80.21	90.58	100

1853 candidates aggregated this session

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication

**General Certificate of Secondary Education
Manufacturing (Specification Code 1496)
June 2007 Assessment Series**

Unit Threshold Marks

	Unit	Maximum Mark	a*	a	b	c	d	e	f	g	u
4878	Raw	50	45	40	35	30	24	19	14	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
4879	Raw	50	45	40	35	30	24	19	14	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
4880	Raw	100	77	66	55	45	39	33	28	23	0
	UMS	100	90	80	70	60	50	40	30	20	0

Specification Aggregation Results

Entry Information

Unit	Total Entry
4878	1275
4879	1282
4880	1308

Specification Aggregation Results

GRADE	A*A*	AA	BB	CC	DD	EE	FF	GG	UU
UMS	270	240	210	180	150	120	90	60	0
Cum %	0.94	6.31	18.08	36.71	54.72	71.86	84.88	92.36	100

1345 candidates aggregated this session

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication