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**

Mark Scheme for the Units

June 2006

1492/1496/MS/R/06

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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General Certificate of Secondary Education

Applied GCSE (Double Award) Engineering (1492)
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MARK SCHEMES FOR THE UNITS

Mark Scheme 4868/4880
June 2006

Question	Response	mark
1	For each chosen sector 1 mark for correctly identifying product for sector (not repeated) 1 mark for named technology clearly used in that sector or used by the product stated. 2 marks for each of 2 benefits – may be to producer, customer or end user, workforce, product or environment. Eg Biological and chemical sector fizzy drinks bottle PET plastic Lightweight yet transparent as glass Can be recycled to make textiles Automotive engineering Alloy wheels Steel alloy, Mg, Cr High strength to weight ratio Attractive appearance appeals to end users Look for a "point" = 1 mark and some "extension" = 2nd mark or 2nd (different) point for 2nd mark.	 1 1 2 2 1 1 2 2

2	1 mark for each possible use of the technology in the stated stage of production. Eg (less detail acceptable) **CAD in product design:** • create and amend designs on screen • view 2D designs as 3D objects • Not just fast, quick, or accurate **Computer spreadsheet in product design:** • to check expected product cost is keeping within guidelines • allocate designer time and costs • plan and track design budget. **Internet in marketing –** • company website • emails to prospective customers • on-line buying facility **Stock Control in assembly** • keep track of parts used • order automatically when needed • enable JIT **Control technology in assembly:** • Place components accurately on circuit boards • Measure quantities accurately before mixing • count screws into packets **Barcoding in packaging and dispatch:** • Track parcels as they are transported • Check out packages for each order • Identify individual orders	1 1 1 1 1 1 1 1 1 1

3	3 marks for each method of assessment: 1 for showing understanding of property 1 for how assessment carried out 1 for what is being observed/measured/compared e.g. **heaviness** can be assessed by weighing the product with scales / compared to similar product or prescribed data / basic testing **surface feel** can be assessed by running a finger across the surface to check for roughness/ bumps/ softness/warmth to touch / safety/hazard **scratch and wear resistance** can be measured by rubbing a test piece with abrasive repeatedly. Checking subsequent damage/results / comparing with an original / or until fails **the structure** may be assessed by disassembly looking for how held together/ thickness of components / comparison with similar product / template comparison / visual checking / NDT / testing to destruction / testing with pressure / weights etc.	3 3 3 3

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1 mark for each point covered relevant to each section (do not award twice for same point, but be flexible across areas.) 2 marks for points with expansion on purpose, justification, use.
Notes: responses will vary depending on product shown.
Correct and specific terms should be used where appropriate to engineering/manufacturing eg polyurethane, fixing, adhesive.
Materials should be specific (or with an important property given as below) components should be named (rather than generic terms), how used could, for example, involve structure, purpose or quality.

For example from the kettle shown in the question:

Thermochromic panel changes colour over 80^0C. energy saving – know when it's already hot enough	Technology (+ how used) (2)
Double-walled with air gap for insulation • *Conserves energy* • *Cool to touch for safety*	Technology (+ how used) (2)
Self coloured polymer body – injection moulded Material/technology (2)	Technology/technology (2)
Efficient ceramic element placed inside to prevent scaling and metal in water	Technology/structure(+just) (2)
ON/OFF switch	component (1)
Ergonomically moulded handle Structure (1)	Structure (1)
Kettle lifts from base, no cord trailing	Structure (+ how used) (2)
Efficient ceramic element placed inside to prevent scaling and metal in water	Material/technology (+ how used) (2)
Volume indicator helps to save energy (only fill when empty)	Structure (+ how used) (2)
General layout sketch	Structure (1)

Technologies 4
Materials 6
Structure/form 4

5	a) (i) CAD Computer aided design (ii) 2 marks for each benefit described • designs can be modified without redrawing • files can be sent electronically for approval/comment /CAM (speed) • collaborative working without meeting • testing without making / modelling • cost improvements ref. meetings/travel/less staff 1 for simple statement/single word +1 for justification (2 x 2) b) (i) CAM Computer aided manufacture: (ii) 2 marks for each benefit described • designs can be used direct from CAD files • product can be changed by changing the file • fewer skilled workers required • product consistent quality in continuous production (1 for simple statement/single word) (2 x 2) (Not improved speed) c) CIM/CIE: computer integrated engineering/manufacturing: development, design, production planning, material sourcing and control, processing, assembly, finishing, packaging and dispatch all linked through using ICT with a single set of data. Key points for a mark each: • integration • Whole production process, • ICT • Single data set (4 x 1)	1 4 1 4 4

6	(a) **How / why used** Robot technologies are used for a range of <u>repetitive</u> jobs in <u>continuous</u> production, for example welding car body panels. They can be <u>programmed</u> for different jobs and can be used in <u>environments</u> where humans may be harmed. Look for reference to: • Repetitive production • Continuous production • Programmed to do different jobs • Harmful environments Comments related to faster / more products produced / more accurate **must** be a *comparative* comment. E.g. Robotics can produce more products which are the same in a faster time ***than*** a manual workforce. **Award up to 1 mark for <u>ONE</u> example of use E.g.** • **Used to make cars** • **Used to spay paint car bodies** **Company** (b) 2 marks for each benefit described. e.g. • consistency of product quality • overall cost savings compared with manual methods • flexible automatic production, compared with buying new dedicated machines • can be programmed to make different specs on same line One benefit only per part question with 2nd mark for justification **Workforce** (c) 2 marks for each benefit described. e.g. • workers retrained to work with robots will earn more • avoid risks of working in hazardous environments • if company competitive they will not lose their jobs • less repetitive work	4 2 2 2 2

7	**Possibly treat (a) as a whole and reward any correct point. 2nd / 3rd marks for justification.** a) 3 marks for each factor described clearly e.g. • market for product – will new technology open up new markets? • Equipment costs/Operational costs/breakeven point • Effect on product quality/production rate/reject rate • Space/operator/ equipment availability • Environmental considerations less waste / less pollution from workers cars / more noise from machines / more waste produced from more products – subsequent disposal • Loosing customers who prefer the "personal touch" • Costs associated with training workforce accordingly b) 3 marks for clear explanation e.g. • Some tasks cannot be carried out mechanically, for example tensioning elastic in modern underwear • some products are aimed at exclusive markets/only made as one-offs, for example hand made shoes, haute couture 1 for appropriate example plus up to two more for justification	3 3 3 3

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Both a) and b) discussion. Award 6 marks:
3 for raising relevant issues
2 for explaining why they are relevant and 1 for a specific example supporting the answer.
Allow flexibility in interpretation

a) global environment

Control systems can reduce emissions from production plants/vehicles etc	Less damage to the environment than predicted in the past	Production of unnecessary products
New materials reduce the amount of waste/can be recycled/ come from sustainable sources	Less depletion of natural resources	
Improved communications means production no longer has to be local.	Large companies have moved production to areas where environmental protection laws are less harsh	Same environmental effect, just different place
Modern manufacturing methods make it easy to modify products	Become out of date more quickly – increases consumerism	
More advertising methods encourages increased consumerism	More resources used	

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b) society

Internet sales	Can order new products from across the world	
Large companies have outlets worldwide	Difference between cultures less marked	
High quality products available at lower prices/economies of scale	Increased affordability to new groups of people	Mobile phones used to be a luxury.
Communications technology - many more ways of communicating	Advertising and product promotion is becoming very sophisticated	Pressure to consume more
Production lines work continuously	Workers have to keep up	Increasing stress on individuals

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General Certificate of Secondary Education
Applied Engineering (Double Award) 1492
June 2006 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
4866	Raw	50	46	40	34	29	23	18	13	8	0
	UMS	100	90	80	70	60	50	40	30	20	0
4867	Raw	50	45	40	35	30	24	18	13	8	0
	UMS	100	90	80	70	60	50	40	30	20	0
4868	Raw	100	74	63	52	42	35	28	22	16	0
	UMS	100	90	80	70	60	50	40	30	20	0

Entry Information

Unit	Total Entry
4866	2418
4867	2381
4868	2351

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 %	0.17	2.29	9.07	23.43	41.49	62.17	77.70	89.64	100

2525 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see;
www.ocr.org.uk/OCR/WebSite/docroot/understand/ums.jsp

Statistics are correct at the time of publication

General Certificate of Secondary Education
Applied Manufacturing (Double Award) 1496
June 2006 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	18	13	8	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	74	63	52	42	35	28	22	16	0
	UMS	100	90	80	70	60	50	40	30	20	0

Entry Information

Unit	Total Entry
4878	1963
4879	1989
4880	1977

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 %	0.15	2.10	10.93	27.86	45.98	63.41	77.98	90.32	100

2088 candidates were entered for aggregation this series

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