

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

General Certificate of Secondary Education **GCSE 1492**

General Certificate of Secondary Education **GCSE 1496**

Mark Schemes for the Units

January 2008

1492/1496/MS/R/08J

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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

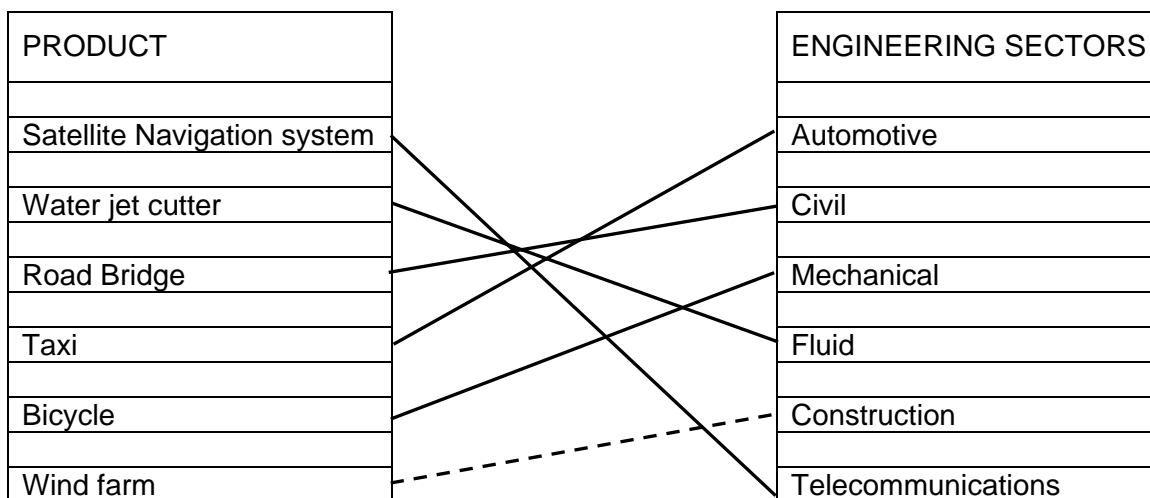
Applied GCSE (Double Award) Engineering (1492)
Applied GCSE (Double Award) Manufacturing (1496)

MARK SCHEMES FOR THE UNITS

| Component | Page |
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| 4868 Application of Technology | 1 |
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4868 Application of Technology

1 (a)



1 mark for each correct link. [5]

(b) **One mark** for each of two products made in the stated sector. [2 x 1]
One mark for identifying a technology associated with the stated sector. [1]

Two marks for each of 2 clear descriptions of a benefit to the sector including the stated technology. One mark only for general vague response. [2 x 2]

Examples:

| Sector | Product | Technology | Benefits |
|--------------|----------------|--------------------------|--|
| Marine | Cruise liner | Aluminium alloy hull | Easily maintained Non rust Consistent material Widely available |
| Computer | Internal modem | Surface mount technology | Fewer rejects Fully automated |
| Aeronautical | Airplane wing | Aerodynamic shape | Lift, Airflow, reduced drag |

One mark benefits:
 Cheaper/saves money
 Repetition of technology ie surface mounted

Total maximum mark for this question is: 12

- 2 Annotate to show where marks awarded**
T - technology used in product or its production
M - material or component
S - detail of structure or form identified

Must relate to product shown

Rather than ticks, use T, M or S to identify where marks have been awarded

T - maximum 4 [4]

One mark for each named example of technology, one for detail on how/why used

M - maximum 4 [4]

One mark for each named example of a material in component. One mark for how used

S - maximum 4 [4]

One mark for sketch showing overall structure. One for each structural feature identified, one more for explaining how a structural feature meets its purpose/reflects the technology used

For example the camera shown could gain marks as follows:

Drawing (S)

Electronic flash (T or M) for light pictures (second T or M)

Lens (S or M)

Lightweight (S or M) pressed A1 (M) case (S or M)

Lithium ion battery (M and T) compartment at back (S)

USB port (T) at back (S) for fast transfer of pictures (T)

DC jack in (S M or T) for battery charging (second M or T)

LCD colour screen (T or M) at back to view pictures (second T or M)

Infra-red remote receiver (T or M)

Total maximum mark for this question is: 12

- 3 (a) (i) One mark for each of two stated benefits (NOT quicker unless specific)
 Eg
 Quick to change designs
 Don't have to redraw to amend/develop etc
 Portable
 Does 3D easily
 Can link to CAM
 Takes up less storage room [2 x 1]

- (b) One mark for each correctly completed cell in table

| Type of component | Component name |
|-----------------------|---|
| Pneumatic/hydraulic | Cylinder, piston filter, reservoir, pressure gauge, etc |
| Electronic Electrical | LED, Resistor, switch, fuse, diode, battery, motor, buzzer, bulb, wire, thermistor, transistor, chip, IC, LCD display etc |
| Mechanical | Spring, Bolt, Screw, nut, rivet, pin, clip, key, gear etc |

[5]

- (c) (i) One mark for e-mail or project management package [1]
- (ii) Two marks for clear explanation. Need not be complete but should give 2 key points.
 Marks may be awarded for example (email) for:
 Opening application (1), select attachment (1) icon/from menu (1), selecting the file to be sent (1), selecting destination (1), selecting send (1), or Open file (1) selecting send as email (1) [2]

- (d) One mark for each device identified (NOT CPU, computer)
 Eg
 Plotter
 Scanner
 Monitor
 Hard drive
 Graphics tablet
 Touch screen [2 x 1]

Total maximum mark for this question is: 12

- 4 (a) (i) Two marks for each of 2 clear descriptions relating technology to traveller safety. Can be avoiding health risks.
Award one mark only for stating a safety feature or technology though technology may be implicit.
- Two mark examples**
 Non-fogging side mirrors/electrically heated glass (2)
 Airbags/seatbelts that deploy automatically in case of crash (2)
 Nitrogen gas air bag technology (2)
 Curtain style air bags (2)
 Front and rear crumple zones (2)
 Inertia reel safety belts (2)
 SIPs (2)
 Cup holders to avoid hot liquid spillage
 Freezing/chilling + microwave heating - less microbial growth in food
 Individually wrapped sterilised cutlery etc avoids contamination
- One mark examples**
 Seat belts, Chilled food, Microwave ovens, Air bag [2 x 2]
- (ii) Two marks for each of 2 clear descriptions relating to technology to passenger comfort.
Award one mark only for stating a comfort feature or technology.
- Two mark examples:**
 spring/hydraulic/suspension systems give a smoother ride.
 Air conditioning systems keep temperature comfortable
 Polymer foams/breathable fabrics improve seat comfort
 Heated seats
 Seats can be adjusted for comfort
 Flip down DVD player makes journey less boring
- One mark examples:**
 Softer seats, Smoother suspension [2 x 2]
- (b) (i) Two marks for each of 2 clear descriptions relating transport use to environmental damage. For 2 marks the link must be clear.
- Two mark examples:**
 Use of hydrocarbon fuels - particulate/CO₂/CO/NO₂ etc emissions to air – cause global warming
 Aircon increases fuel consumption (as above)
 Response on use of resources in consumer product
- One mark examples:**
 Exhaust fumes, Use fossil fuels [2 x 2]
- (ii) Two marks for clear description of how damage is reduced. Guide: reduce, reuse, recycle.
- Two mark examples:**
 Engine management systems to reduce fuel consumption/emissions
 Catalysts to clean exhaust
 Response along lines of using materials that are sustainable/can be recycled/making sure they can be separated easily etc
- One mark examples:**
 Electric/hybrid cars (second if they expand)
 Road tolls/congestion charge, Car sharing [2]

Total maximum mark for this question is: 14

- 5 (a) One mark for each correctly completed cell in the table
Examples below not exhaustive

| Property | Product | Benefit |
|--|---|---|
| Thermochromic dye Changes colour at a specific temperature | Tell tale on furnace door | Gives visual indication of heat risk |
| Shape memory alloy Returns to set shape at a specific temperature | Electric kettle thermal cut out OR Shrink fitted wearing bush | Less complex to make than bimetallic contact strip OR Much greater difference in size than thermal expansion |

[6]

- (b) (i) One mark for a named composite material, eg GRP, concrete, "carbon fibre", manufactured board, PU foam (other foam) (accept naturally occurring such as wood, bone) [1]

- (ii) 2 marks for description of how components are combined, eg A in a matrix of B, A particles/fibres held in a resin/B [2]

- (iii) 3 marks for clear description: eg their properties are a combination of desirable properties of components
1 only for simple statement eg that they are better than single materials, or they have better properties
2 for missing comparison, eg they are stronger and lighter [3]

- (c) One mark for each appropriate factor:
For example (from spec)
Cost, availability, ease of use, or similar to
Familiar to workforce
Suitability for current equipment etc [2 x 1]

Total maximum mark for this question is: 14

- 6 (a) (i) One mark for each suitable assembly process stated
 Eg Populating circuit boards
 Flow soldering
 Welding
 Dispensing pie filling
 Adding trims [1]
- (ii) One mark for each suitable finishing process stated
 Eg controlling temperature profile of a continuous furnace
 Surface coating
 Polishing
 Glazing
 Steam pressing [1]
- (iii) Two marks for clear explanation, should include an example of input or output from PLC
 May focus on sensing packages and counting into cartons OR controlling conveyors OR palletising [2]
- (iv) Two marks for each of two benefits clearly described including how/why/when
Two mark examples:
 PLCs are easy to set up compared with specialised control systems
 PLCs contain everything needed to handle high power loads
 Use logic notation so very little electrical design is required/can change program relatively easily
 The program can often control complex sequencing
 PLCs can handle multiple inputs and outputs at the same time
 They can operate in adverse conditions,/hazardous environments
 PLC is mechanically/electrically rugged
 PLC can be battery powered so OK if power cut
 PLC can carry out repetitive operations to consistent high quality
- One mark examples:**
 Repeated operations
 Consistent quality
 Cheaper/more efficient than people
 Consistency of output [2 x 2]
- (b) (i) Two marks for each factor clearly described. (One mark only for a simply stated factor eg a single word like costs. Second mark when includes eg compared with/specifcics/timing/planning)
 Eg cost of buying and running robots
 Potential savings in long term (or set time)
 Amount of flexibility required
 How closely need to mirror manual process, robot arms etc are ready designed for this use. PLCs would need complex assembly of components/sensors and complex logic program.
 Robot is usually a free standing item with its own sensors, actuators etc,
 PLC needs wiring up - longer to set up
 Availability of programming expertise
 One mark for Robots can work continuously or similar unqualified point [2 x 2]

Total maximum mark for this question is: 12

- 7 (a) 1 mark for each of 6 relevant points (eg below)

Look for:

Surface mount technology:

Preparation

- printed circuit board has flat, solder pads without holes
- solder paste is applied to all the solder pads with a stainless steel stencil
- if double sided, adhesive dots put on other side
- some components loaded onto paper reels
- component reels/cartridges loaded onto pick and place machines
- boards on conveyor belt

Programming

- direct from CAD file
- using dedicated software
- On screen placement converted to CND/machine file

Processing

- NC pick-and-place machines remove the parts from the reels or tubes and place them on the PCB
- second-side components are placed first, and the adhesive dots are quickly cured with application of low heat/UV
- the boards are flipped over and first-side components are placed by additional NC machines
- reflow soldering oven
- boards washed to remove flux residue
- visually inspected
- tested

CNC machining:

Preparation

Components for machining are delivered to the cell manually loaded in batches

Programming

Directly from files created by CAM software packages or punched tape/floppy disks used to transfer G-codes into the controller

Processing

One part at a time with tool changes if needed

Machine runs automatically unless a tool breaks

Can automatically detect problems and call operator checking each part with lasers and sensors

Robotic welding:

Preparation

- load body panels onto conveyor belt
- fit appropriate welding end to robot arm

Programming

- link the robot controller to the computer
- Ethernet, FireWire, USB or serial port
- the computer has interface software
- use a 'teach pendant'/handheld control and programming unit
- disconnect

Processing

- the body panels are taken to the robot on a conveyor belt
- lifted into position with a mechanical grip
- sensors check position is OK and move until it is in the correct position
- the arc weld arm automatically moves to each position in turn
- finished panels are moved along on another conveyor

[6]

- (b) 1 mark for a safety benefit given
 Eg
 Automatic machine guards/remote operation keep operator well away from danger of...
SMT - solder fumes/hot surfaces
Machining - fast moving parts, swarf
Welding - hot surfaces/fumes/intense light [1]
- (c) 2 marks for clear description of how production efficiency is improved including **how/why/when**. 1 mark only for part (eg 'fewer rejects')
SMT
 Eg simpler automated assembly, reduced processing operations
 Programming means that process is consistently carried out - fewer rejects
 small errors in component placement are corrected automatically (the surface tension of the molten solder pulls the component into alignment with the solder pads)
 - fewer rejects
 Fewer holes need to be drilled through abrasive boards - reduces processing time
 components can be fitted to both sides of the circuit board - reducing material handling/number of operations
CNC machining
 Programming means that process is consistently carried out - fewer rejects
 Automated checking of parts - machine will be stopped if error - fewer rejects
 Processing time is dramatically reduced - faster turnaround

Robotic welding
 Programming means that process is consistently carried out - fewer rejects
 As above [2]
- (d) 3 marks for clear explanation
 ONE mark only for reduced cost of product unless justified in terms of improved production efficiency with a different reason from given in (ii)

SMT - improved product performance/reliability through:
 (Any one of the following for example)
 Better mechanical performance under shake and vibration conditions smaller, lighter components used so product size reduced
 Small errors in component placement are corrected automatically
 lower lead resistance and inductance (leading to better performance for high frequency parts)
 ONE mark only for reduced cost of product unless justified in terms of improved production efficiency with a different reason from given in (ii).

CNC milling - improved product performance/reliability through:
 (Any one of the following for example)
 Parts can be produced to tighter tolerances
 With the increased automation of manufacturing processes with CNC machining, considerable improvements in consistency and quality have been achieved.

Robotic welding - improved product performance/reliability through:
 (Any one of the following for example)
 Consistent quality of product - reliability
 As above for CNC
 Time to market for upgraded products reduced (changing program) [3]

Total maximum mark for this question is: 12

8 Annotate to identify where marks awarded using:

I x 3 relevant issues

R x 2 why relevant

E x 1 example or evidence to support answer

(a) Impact of using technology on availability of customised products.

| | I | R | E |
|--|--|--|---|
| | Traditionally many products were hand made to order ie custom made | Automated production means many products are identical | |
| | CAD/CAM allows designs to be modified readily | So can make bespoke product with little additional effort/cost | eg hats/shirts etc with embroidered slogans, etched i-pods |
| | | | New motor vehicles are produced to specific customer requirements |
| | www means can order customised products from more sources | Increased availability | |

[6]

(b) Impact of one named product on society eg mobile phone.

| | I | R | E |
|--|---|--|---------------------------------|
| | Allows people to keep in touch away from fixed land lines | Communication possible when not before | Named appropriate product |
| | Children can keep in touch with parents | Reassures parents | eg let them know where they are |
| | | Makes people feel more secure, safe | |
| | Can get up to date information wherever/whenever | Can be intrusive/noisy | Football scores, special offers |
| | Many people are carrying a valuable item New threats like happy slapping/phone bullying New technology feeds demand | May increase risk of crime or antisocial behaviour Makes people feel threatened | |

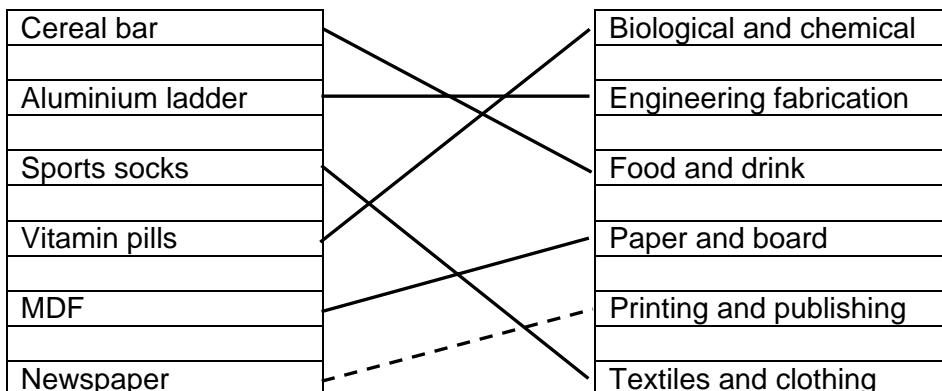
[6]

Total maximum mark for this question is: 12

4880 Application of Technology

1 (a)

1 mark for each correct link.



[5]

- (b) No marks for selecting sector
 One mark for each of two different (not above) products made in the stated sector
 One mark for identifying a manufacturing technology associated with the stated sector. Accept proprietary names at this level
 Two marks for each clear description of a benefit to the sector in using the stated technology

[2x1]

[1]

[2x2]

examples:

| Sector | Product | Technology | Benefits |
|-------------------------|-----------------|--------------------------------|---|
| Printing and publishing | Colour leaflet | Offset lithography printing | Sharper and cleaner than letterpress printing. Longer plate life than direct litho. Can be used on a wide range of surfaces |
| Textiles and clothing | School trousers | Gerber cutter/automated cutter | Cuts many at same time Linked to CAD for efficient lay plan |
| Food and drink | biscuits | Continuous oven | Enables flow production. Temperature profile can be adjusted to close tolerances. Can adjust speed/temp to suit current conditions |

Maximum Total Mark is 12

- 2 Annotate to show where marks awarded.**
T – technology used in product or its production
M – material or component
S – detail of structure or form identified.

Must relate to product shown

Rather than ticks, use T, M or S to identify where marks have been awarded

T – maximum 4

[4]

One mark for each named example of technology, one for detail on how/why used

M – maximum 4

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One mark for each named example of a material or component. One mark for how used

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For example the camera shown could gain marks as follows:

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Maximum Total Mark is 12

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 Eg
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 Don't have to redraw to amend/develop etc
 Portable
 Does 3D easily
 Can link to CAM
 Takes up less storage room [2x1]
- (b) One mark for each of 2 devices NOT computer or CPU
 Eg plotter, colour monitor, touch screen, data projector... [2x1]
- (c) (i) One mark for an application that could be used
 Eg: e-mail, project management package [1]
- (ii) Two marks for clear explanation. Need not be complete but should give 2 key points
 Marks may be awarded for example (email) for:
 Opening application (1)
 Select attachment icon/from menu (1)
 Selecting the file to be sent (1)
 Selecting destination (1)
 Selecting send (1)
 Select file in file manager (1)
 Selecting send as email (1) [2]
- (d) (i) One mark for each suitable application identified eg web browser, search engine, spreadsheet, presentation software, word processor, project planner [3x1]
- (ii) Two marks for clear description. Need not be complete but should give 2 key points.
 Marks may be awarded for example for:
 For research (1) into...(1), to calculate material costs (2), when preparing to present my design (1) to the client (1), etc. [2]

Maximum Total Mark is 12

- 4 (a) (i) Two marks for each of 2 clear descriptions relating technology to traveller safety. Can be avoiding health risks
Award one mark only for stating a safety feature or technology though technology may be implicit
- Two mark examples**
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Airbags/seatbelts that deploy automatically in case of crash (2)
Nitrogen gas air bag technology (2)
Curtain style air bags (2)
Front and rear crumple zones (2)
Inertia reel safety belts (2)
SIPS (2)
Cup holders to avoid hot liquid spillage
Freezing/chilling + microwave heating – less microbial growth in food
Individually wrapped sterilised cutlery etc avoids contamination
- One mark examples**
Seat belts, Chilled food, Microwave ovens, Air bags [2x2]
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- Two mark examples:**
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Air conditioning systems keep temperature comfortable
Polymer foams/breathable fabrics improve seat comfort
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Use of hydrocarbon fuels – particulate/ CO₂/CO/NO₂ etc) emissions to air
Aircon increases fuel consumption (as above)
Response on use of resources in consumer product
- One mark examples:**
Exhaust fumes, Use fossil fuels [2x2]
- (ii) Two marks for clear description of how damage is reduced. Guide: reduce, reuse, recycle
- Two mark examples:**
Engine management systems to reduce fuel consumption/emissions
Catalysts to clean exhaust
Response along lines of using materials that are sustainable/can be recycled/making sure they can be separated easily etc.
- One mark examples:**
Electric/hybrid cars (second if they expand)
Road tolls/congestion charge, Car sharing [2]

Maximum Total Mark is 14

- 5 (a) One mark for each correctly completed cell in the table
Accept some overlap between cells

Examples below not exhaustive

| Smart material | 'smart' property | Two components made with the smart material | Application of the smart material |
|----------------------|---|---|--|
| Shape memory alloy | Returns to shape at a specific temperature | Temperature switch | Electric kettle as a temperature switch OR to cut off the power when water reaches boiling point |
| | | Train wheel hubs | Shrink fitting on site |
| Thermo-chromic dye | Changes colour at specific temperature | Baby bath safety sticker | Warns when too hot |
| | | Fabric printing ink | Can see logo on garment when heats up |
| Modified starch | Can change thickness with temperature or when whisked | Pizza topping cheese | Topping firm in hot oven runny to eat |
| | | Instant dessert powder | Whisk to thicken |
| Anti-microbial fibre | Encapsulated slow release antimicrobials/kills bacteria | Yarn for sports socks | Keeps feet fresh |
| | | Kitchen cloth yarn | Hygiene in kitchen |

[10]

- (b) (i) One mark for a named composite material, eg GRP, concrete, "carbon fibre", manufactured board, PU foam (other foam) (accept naturally occurring such as wood, bone) [1]
- (ii) 3 marks for clear description: eg their properties are a combination of desirable properties of components
1 only for simple statement eg they are better than single materials, or they have better properties
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Maximum Total Mark is 14

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Eg Populating circuit boards
Flow soldering
Welding
Dispensing pie filling
Adding trims [1]
- (ii) One mark for each suitable finishing process stated.
Eg controlling temperature profile of a continuous furnace.
Surface coating
Polishing
Glazing
Steam pressing [1]
- (iii) Two marks for clear explanation, should include an example of input or output from PLC
May focus on sensing packages and counting into cartons OR controlling conveyors OR palletising [2]
- (iv) Two marks for each of two benefits clearly described including how/why/when
Two mark examples
PLCs are easy to set up compared with specialised control systems
PLCs contain everything needed to handle high power loads;
Use logic notation so very little electrical design is required/can change program relatively easily
The program can often control complex sequencing
PLCs can handle multiple inputs and outputs at the same time.
They can operate in adverse conditions/hazardous environments
PLC is mechanically/electrically rugged
PLC can be battery powered so OK if power cut
PLC can carry out repetitive operations to consistent high quality
One mark examples:
Repeated operations
Consistent quality
Cheaper/more efficient than people
Consistency of output [2x2]
- (b) Two marks for each factor clearly described. (One mark only for a simply stated factor eg a single word like costs. Second mark when includes eg compared with/specifics/timing/planning)
Eg cost of buying and running robots
Potential savings in long term (or set time)
Amount of flexibility required
How closely need to mirror manual process, robot arms etc are ready designed for this use. PLCs would need complex assembly of components/sensors and complex logic program
Robot is usually a free standing item with its own sensors, actuators etc,
PLC needs wiring up - longer to set up
Availability of programming expertise
One mark for Robots can work continuously [2 x 2]

Maximum Total Mark is 12

- 7 (a) One mark for a suitable product for method, one for realistic production volume for that product. One mark for each clear reason given justifying the choice made

| Method of manufacture | Product | Volume of production | Reasons |
|-----------------------|-------------------------|----------------------|---|
| Manual | Wedding cake | One-off | Unique/special product required. There is time to correct errors or to make sure it is high standard |
| | Custom/bespoke clothing | Low | |
| Fully automated | News-paper | High | Large number of identical products are required in a short time. The same process is required for every print run |
| | Chocolate bar | High | |
| Semi automated | PC power supplies | Medium | Some larger/less often used components are manually inserted because don't want to buy in specialist equipment if not used every day. Batch size doesn't justify outlay/automation not possible |
| | Car | High | |

[12]

Maximum Total Mark is 12

- 8 Annotate to identify where marks awarded using:**
I x 3 relevant issues
R x 2 why relevant
E x 1 example or evidence to support answer.

Impact of using technology on availability of customised products

(a)

| I | R | E |
|--|--|---|
| Traditionally many products were hand made to order ie custom made | Automated production means many products are identical | |
| CAD/CAM allows designs to be modified readily | So can make a bespoke product with little additional effort/cost | eg hats/t-shirts etc with embroidered slogans, etched i-pods |
| | | New motor vehicles are produced to specific customer requirements |
| www means can order customised products from more sources | Increased availability | Impact of using technology on availability of customised products |

[6]

- (b)** Impact of one named product on society
 Eg mobile phone

| I | R | E |
|---|--|---------------------------------|
| Allows people to keep in touch away from fixed land lines | Communication possible when not before | |
| Children can keep in touch with parents | Reassures parents | eg let them know where they are |
| | Makes people feel more secure, safe | |
| Can get up to date information wherever/ whenever | Can be intrusive/ noisy | Football scores, special offers |
| Many people are carrying a valuable item New threats like happy slapping/phone bullying New technology feeds demand | May increase risk of crime or antisocial behaviour Makes people feel threatened | |

[6]

Maximum Total Mark is 12

Grade Thresholds

General Certificate of Secondary Education
Engineering (Specification Code 1492)
January 2008 Examination 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 | 65 | 56 | 47 | 41 | 35 | 29 | 23 | 0 |
| | UMS | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 0 |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

| | Maximum Mark | A*A* | AA | BB | CC | DD | EE | FF | GG | UU |
|------|--------------|------|-----|-----|-----|-----|-----|----|----|----|
| 1492 | 300 | 270 | 240 | 210 | 180 | 150 | 120 | 90 | 60 | 0 |

| | Maximum Mark | A* | A | B | C | D | E | F | G | U |
|--|--------------|----|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

The cumulative percentage of candidates awarded each grade was as follows:

| | A*A* | AA | BB | CC | DD | EE | FF | GG | UU | Total No. of Cands |
|------|------|-----|-------|-------|-------|-------|-------|-------|-------|--------------------|
| UMS | 270 | 240 | 210 | 180 | 150 | 120 | 90 | 60 | 0 | |
| Cum% | 0.0 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 2 |

2 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

Grade Thresholds

General Certificate of Secondary Education
 Manufacturing (Specification Code 1496)
 January 2008 Examination 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 | 83 | 71 | 59 | 48 | 42 | 36 | 30 | 24 | 0 |
| | UMS | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 0 |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |
| | Raw | | | | | | | | | | |
| | UMS | | | | | | | | | | |

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

| | Maximum Mark | AA** | AA | BB | CC | DD | EE | FF | GG | UU |
|------|--------------|------|-----|-----|-----|-----|-----|----|----|----|
| 1496 | 300 | 270 | 240 | 210 | 180 | 150 | 120 | 90 | 60 | 0 |

| | Maximum Mark | A* | A | B | C | D | E | F | G | U |
|--|--------------|----|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

The cumulative percentage of candidates awarded each grade was as follows:

| | A*A* | AA | BB | CC | DD | EE | FF | GG | UU | Total No. of Cands |
|------|------|-----|-------|-------|-------|-------|-------|-------|-------|--------------------|
| UMS | 270 | 240 | 210 | 180 | 150 | 120 | 90 | 60 | 0 | |
| Cum% | 0.0 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 1 |

1 candidate was entered for aggregation this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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