

# **Manufacturing**

General Certificate of Secondary Education

Unit **B232**: Manufacturing Processes

## **Mark Scheme for June 2013**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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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Question		Answer	Marks	Guidance
1	(a)	Packaging – Egg box Machinery and equipment – Crane Paper and print – Magazine Clothing and textiles – Swimming costume Electronic and communications – Mobile phone Electrical – Toaster	[6]	
	(b)	Examples could include:  Packaging – Robot arm for ‘pick and place’ Machinery and equipment – CNC Miller/lathe/machining centre for Machine parts Paper and print – Digital printers for producing colour pamphlets Clothing and textiles – Computer controlled sewing machine Electronic and comms. Robot arm for ‘pick and place’ Electrical – Robots for assembly and quality control	[2]	One mark for computer controlled M/C or equipment One mark for description of use  Machine/equipment must clearly relate to sector chosen.  Award ecf for correct description of use even if different sector is chosen provided that it is relevant
2	(a)	Answers could include:  research client brief, presenting design ideas, prototyping, 2D design.  (1 + 1)	[2]	Award one mark per activity related to the design stage.
	(b)	Answers could include:  production planning, assembly, finishing, packing  (1 + 1)	[2]	Award one mark per activity related to the manufacturing stage. Don't accept repetition for (2a).  Can accept ‘piecing together’ as part of assembly and spray painting / polishing and the like as part of finishing.

Question		Answer	Marks	Guidance
	(c) (i)	Examples could include:  CMM, control system feedback, pass/fail, camera systems, electronic scales	[2]	Award one mark for modern technology used; one mark for description of use
	(ii)	Examples could include:  Barcode scanners, robot packing, tracking systems, GPS, intelligent conveyors	[2]	Award one mark for modern technology used: one mark for description of use
3	(a) (i)	Example could include:  Modelling – using cheaper materials to test the process Rapid prototyping CAD/CAM machining one offs Vacuum forming Clay models for visual approval  (1+1) x 2	[4]	No mark for naming product.  Award one mark for process; one mark for description
	(ii)	Examples could include:  Wearing goggles to protect the eyes from flying debris from the process. Ensuring the safety guards are in place and closed to ensure no-one could get their hands caught in machinery. Wearing gloves when handling hot moulds.	[2]	Award one mark for naming a safety precaution; one mark for description:
	(b)	Answers could include:  Improve quality of product. Cut down amount of scrap produced; save cost of materials/time/disposal; avoid problems with assembly of parts; keep good reputation of company.	[3]	Award one mark for each valid reason

Question		Answer	Marks	Guidance
4	(a)	Material E	[1]	
	(b)	Explanation to include reference to the material not being readily available and difficult to store.	[3]	One mark for each of two points mentioned and one mark for explanation.  Reference to material not being safe to work with is acceptable if justified. (Award one mark only if no other points made).  Accept 'poor value for money.'
	(c)	Properties may include:  Not Corrosive Easy to form into shape/make attractive shapes Readily recycled Little waste produced Colours available Suitable for mass production methods Relatively inexpensive  (3x1)	[3]	Do not accept 'cheap'.  Can accept 'cheaper than some metals.'

Question		Answer	Marks	Guidance
5	(a)	Nuts; bolts; washers; washers; handles; fasteners; cakes cases; buttons; zips; food trays; hinges; knock-down fittings (list is not exhaustive) (1 + 1)	[2]	Answers such as 'ready-made car alarms' / 'clocks' could be accepted as they would be relevant to the motor manufacturing industry
	(b)	Answers could include:  May not have machinery needed to make parts; staff not skilled in parts manufacture; more staff/training needed; no need for storage of parts (JIT); more space available for manufacturing not storing; quality of parts guaranteed (2 x 3)	[6]	Award one mark for point made; one mark for justification; one mark for clear/detailed explanation.
6	(a)	No mark for naming product  One mark for modern material/technology, one mark for description of use.  Examples: Material: SMA, Thermochromic paint/dye; Kevlar; probiotics; printable vinyls; insulating materials, carbon fibre  Technology; laser cutting; LED lighting; movement/light/gas sensors; flexography; digital printing (2 x 2)	[4]	Materials and technologies should clearly link to product named.  Accept correct answers even if their positions are reversed.
	(b)	Increased speed of product/output Smaller workforce needed/more automation Possibility of 24/7 working More consistently accurate products/better quality Cleaner working conditions Ability to link to CIM Use of CAD/CAM for manufacture ( 1 + 1 )	[2]	Do not accept simple answers such as 'faster,' 'cheaper.'  Can accept 'reduced costs' if fully justified.

Question		Answer	Marks	Guidance
7	(a) (i)	Switch (any type) photo-electric cell; sensor (any type)	[1]	Accept answers such as 'keyboard,' 'mouse,' 'temperature probe,'
	(ii)	Buzzer; bell; light; signal to solenoid; motor,	[1]	Accept answers such as 'monitor,' 'VDU,' 'conveyor belt.'
	(b)	<p>Examples could include:</p> <p>Quality control – sensor gives position of product; robot arm pickers up product and holds to scanner; results of scan accepts or rejects product.</p> <p>Assembly – Position parts in assembly jig; start sequence; automated nut driver tightens to pre-set torque; sensor stops driver and ejects assembly.</p> <p>Packaging – items weighed on conveyor, required amount tipped into packaging, weight checked; accepted package sealed.</p>	[3]	<p>No mark for stating stage of manufacture.</p> <p>Description to include reference to input/output and use of feedback where applicable</p>
	(c)	<p>One mark for system and up to two further marks for a clear explanation.</p> <p>Example: Conveyor systems taking products through a welding area where air quality is poor; workforce not needing to enter hazardous conditions. Air monitoring system to check and control air quality; employees working in better conditions; fume and dust extraction.</p>	[3]	

Question		Answer	Marks	Content	Guidance
					Levels of response
8*		Six marks for a discussion or critical evaluation of issues relating to the effects of modern technologies on the quality of manufactured products.	[6]	<p>Response may include reference to the following points:</p> <p>Reduced 'human error' Greater accuracy of parts/products Better quality control testing Consistency of products made Ability to 'imitate' quality eg plastics made to look like hardwoods Loss of 'hand made' quality Perception of low quality 'mass-produced products</p>	<p><b>Level 3 (5–6 marks)</b> Through analysis showing a clear understanding of the effects of modern technologies on the quality of manufactured products. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p><b>Level 2 (3–4 marks)</b> Adequate discussion showing an understanding of the effects of modern technologies on the quality of manufactured products. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p><b>Level 1 (0–2 marks)</b> Basic discussion showing some understanding of effects of modern technologies on the quality of manufactured products. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive.</p>
		<b>Total</b>	<b>60</b>		

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