OCR
RECOGNISING ACHIEVEMENT

GCSE

Design and Technology

General Certificate of Secondary Education

Unit **A544:** Industrial Technology Technical Aspects of Designing and Making

Mark Scheme for January 2011

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OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

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Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Question			Expected Answers	Marks	Rationale
1	(a)	(i)	**Complete the table by giving the correct name for each component.** D – wing nut B – Grub screw E – Self tapping screw C – Pop (blind) rivet F – Bolt	(5x1)	Accept: B Allen screw C Rivet E Screw
		(ii)	**Complete Fig. 1 by giving the name of Tool 2 and the component it is used with.** Name – Allen key (hexagon wrench/key) Used with - B	(1+1)	
	(b)		**Describe one method used to stop nuts working loose.** Annotated (1) sketch (1) showing suitable method; Locknuts; self-locking nut (Nyloc); locking washer; castle nut and pin; thread sealant	(1+1)	Do NOT accept permanent method eg welding/soldering etc.
	(c)		**Explain why manufacturers often use standard pre-manufactured components.** Clear explanation (1) with reference to bulk buying for economy; no need to have facilities for making; able to use standard sizes; ease of dismantling/maintenance; application of JIT; consistency of quality.	(3)	Cheaper (etc) must be qualified to gain mark. Up to two marks for statement of factors/issues. Clearly presented explanation needed for full marks.
			Total	**[12]**	
2	(a)		**Give two reasons why mild steel is a suitable material for the hosepipe support.** Cheaper than other metals; easy to work; stronger than most other metals; easy to finish for corrosion resistance.	(1+1)	Both cheap and strong for one mark only if no further qualification

Question			Expected Answers	Marks	Rationale
	(b)		**Explain the term 'ferrous alloy'.** Mixture of metals (1) containing iron (1)	(1+1)	
	(c)		**Use sketches and notes to show a design for a bending jig that could be used to produce batches of the hosepipe support shown in Fig. 2.** **The jig must:** • **hold the mild steel strip firmly for bending** • **ensure that all the hosepipe supports are identical** • **allow the hosepipe supports to be produced quickly** Annotated sketch (1) showing a workable design. One mark for each specification point met. (3x1)	(4X1)	
	(d)		**Use sketches and notes to describe two methods of stopping the hosepipe support bending in use.** Annotated sketch (1) of suitable solution (1); Increase thickness; add support; change section; completely different design.	(1+1) (1+1)	Allow two methods <u>clearly</u> shown on one sketch. Fit deeper into ground – 1 mark only.
			Total	**[12]**	
3	**(a)**		**Complete the process chart below to show the sequence of operations to make the special nut. Stages one and four have been completed for you as an example.** 2 – Knurling 3 – Centre drilling 5 – Suitable tool shape 6 – Tap (drawn or stated) 7 – Parting-off tool Parting(cutting) off	(6x1)	Accept: 2 Reference to 'grip' for knurling 3 Reference to indent for guiding drill Do not accept simply 'drilling' for stage 3 Accept copy of tool from stage 1 for stage 5

Question			Expected Answers	Marks	Rationale
	(b)		**Give three safety precautions that must be taken when using a centre lathe.** Use of guards; goggles; no loose clothing/long hair; remove chuck key; work tight in chuck; tool tight in toolpost; one person at m/c/clear working space.	(3x1)	
	(c)		**Give three factors that should be considered when deciding what speed a centre lathe should turn at.** Material being turned; process being carried out; diameter or work; finish required	(3x1)	
			Total	**[12]**	
4	(a)	(i)	**State what the letters CAD stand for.** Computer Aided Design	(1)	NO alternatives
		(ii)	**Give three benefits to the designer of using CAD.** Easy to make changes; ability to change view(3D); ability to 'import'; easy to share designs with others (electronically); easy to save designs and changes; use of 'cut and paste'; use of rapid prototyping	(3x1)	NOT 'quick'; 'easy'; etc. Responses must relate **only** to **CAD** (not CAM)
	(b)		**Name two specific plastics suitable for making the charging station.** HIPS; ABS; Polyamide/nylon; PP	(1+1)	Not polyethylene

Question	Expected Answers	Marks	Rationale
(c*)	**Explain why injection moulding is the most suitable process.** Explanation may include consideration of the following points: Parts made in one 'shot' Suitable for batch production Inexpensive process compared to others Good for producing shapes objects Minimal waste of materials/waste recyclable Highly automated process – unskilled operators Allows mass production if needed High cost of tooling Level 1 (0-2 marks) Shows limited understanding of the injection moulding process and its application to plastics manufacture. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive. Level 2 (3-4 marks) Shows some understanding of the injection moulding process and its application to high-volume plastics manufacture. 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, grammar and punctuation.		

Question			Expected Answers	Marks	Rationale
4	(c*)		Level 3 (5-6 marks) Shows clear understanding of the injection moulding process and gives details relating to its application in high-volume plastics manufacture. 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.	(6)	
			Total	**[12]**	
5	(a)		**Name two hand tools that could be used to cut the outline of the direction arrow.** Hand shears/tinsnips; hacksaw/junior; sheet saw/padsaw	(1+1)	Do not accept file Not both hacksaw and junior hacksaw
	(b)		**Give two suitable finishes, other than painting, for the direction arrow.** Plastic/powder coating; lacquer/varnish; anodising; plating/chroming	(1+1)	
	(c)		**Name two industrial processes that could be used to mass produce the direction arrow.** Pressing; laser cutting; CAM machining; water jet cutting	(1+1)	Accept ‘stamping/die cutting’ for pressing

Question	Expected Answers	Marks	Rationale
(d)*	**Discuss the issues a manufacturer should consider when introducing high-volume production methods.** Discussion may include consideration of the following points: Cost of special equipment/machines Energy costs Retraining of workforce for new skills Size of workforce Factory layout Cell or line production Computer networking Use of JIT - logistics Demand for output – maximising use of machines Level 1 (0-2 marks) Shows limited understanding of high-volume production methods or issues associated with them. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive. Level 2 (3-4 marks) Shows some understanding of high-volume production methods and issues associated with introducing them. 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, grammar and punctuation.		

Question			Expected Answers	Marks	Rationale
5	(d*)		Level 3 (5-6 marks) Shows clear understanding of high-volume production methods and gives details relating to the issues associated with introducing them. 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.	(6)	
			Total	**[12]**	
			Total marks for paper	**[60]**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Telephone: 01223 552552
Facsimile: 01223 552553