

**GCSE**

**Engineering**

Unit **A622/02**: Engineering Processes

General Certificate of Secondary Education

**Mark Scheme for June 2016**

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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	Mark	Guidance	
1	(a)	<p>One mark for each correctly named sector</p> <p>Paint - Chemical and Process            Wheelchair - Medical and Pharmaceutical            Microwave oven - Electrical and Electronics            Disc brake - Automotive or Aerospace            Mobile 'phone - Computers, Communication and IT</p> <p style="text-align: right;">(5x1)</p>	5		
	(b)	<p>No mark for sector</p> <p>One mark for each of two appropriate products relevant to the sector chosen</p> <p style="text-align: right;">(2x1)</p>	2	ecf if incorrect sector given in part (a)	
2	(a)	(i)	<p>One mark for each appropriate stage</p> <p>Stage 2 - Mark shape and position of holes            Stage 4 - Drill the holes for the thread            Stage 6 - Remove all sharp edges</p> <p style="text-align: right;">(3x1)</p>	3	accept other logical order/stages in a workable sequence
		(ii)	<p>One mark for each appropriate tool named (Taper)tap; tap wrench/holder/vice/clamp</p> <p style="text-align: right;">(2x1)</p>	2	NOT 'thread'
	(b)	<p>One mark for each of two possible processes</p> <p>Pressing/stamping; laser cutting; CNC milling; water jet cutting; plasma cutting</p> <p style="text-align: right;">(2x1)</p>	2		

Question			Answer	Mark	Guidance
3	(a)	(i)	Ferrous metal - cast iron; high speed steel	1	
		(ii)	Polymer - ABS; nylon	1	
		(iii)	Alloy - bronze; high speed steel; cast iron	1	
		(iv)	Ceramic - glass; tungsten carbide	1	
		(v)	Composite - concrete; GRP	1	
	(b)		One mark for example and up to two further marks for an explanation including reference to a <u>mixture of metals</u> but <u>not containing iron.</u> ( may also include reference to enhanced properties) (3x1)	3	Ensure that all responses are annotated during marking
4	(a)	(i)	Goggles/visor; apron/overalls	1	
		(ii)	One mark for each of two relevant safety precautions Examples: clear working area; work securely clamped; machine guard in place; drill chuck key removed; correct speed of drill; have been trained on machine (2x1)	2	NOT – Keep hands away from moving parts / drill
	(b)	(i)	One mark for each of three joining & assembly processes Examples: Soldering; brazing; welding; threading/nuts and bolts; riveting; glueing (3x1)	3	
		(ii)	One mark for each of two tools/items of equipment relevant to the process given (2x1)	2	NOT materials/consumables – e.g. solder; brazing/welding rod
	(c)		<b>Computer Numerical Control</b>	1	

Question		Answer	Mark	Guidance
5	(a)	<p>Up to two marks for a description of any part of the chosen stage of design</p> <p>Examples;                      Client brief - the client gives the manufacturer details of what is required                      Modifying designs - design ideas are changed to improve the final design                      Prototyping - the first example of the product is made for testing/approval                      Research - the designer looks for other examples of similar products and finds what materials are available</p> <p style="text-align: right;">2 x (1+1)</p>	<b>4</b>	
	(b)	<p>Explanation must include reference to the ICDT used (1) and a description of its application</p> <p>Example:                      PowerPoint presentations (1) can be used to show ideas to client. these can be emailed to the client (1) or video-conferencing could be used so that feedback can be instant (1)</p> <p style="text-align: right;">(3x1)</p>	<b>3</b>	<p>Simple reference to use of CAD – one mark only</p> <p>Accept references to use in research stage of designing</p>

Question	Answer	Mark	Guidance
6	<p>One mark for each relevant component named and up to two further marks for a description of its use.</p> <p>Examples:</p> <p>(a) Mechanical - Bolt - used to fix an item in place by putting the bolt through a hole and screwing it into a tapped hole</p> <p>(b) Electrical/electronic - LDR - the resistance changes depending on how light it is so it can be used to switch on lights when it goes dark</p> <p>(c) Pneumatic/hydraulic - Cylinder - a piston moves out when compressed air goes in so it can be used to push waste products off a conveyor</p> <p style="text-align: right;">3 x (1+2)</p>	9	ecf mark(s) for use if component incorrectly named.
7	<p>(a) Explanation to include reference to batch/volume production (1); removing sample product at staged/random intervals (1); checking sample for accuracy to ensure continuing quality through production run.(1)</p> <p style="text-align: right;">(3x1)</p>	3	
	<p>(b) Up to two marks for each justified effect</p> <p>Examples:</p> <p>Much scrap could be produced wasting material and time</p> <p>Faulty products could be sold or go through the production line resulting in more waste products</p> <p>The company will get a reputation for poor quality</p> <p>Cost of disposal of waste could rise</p> <p>Products may need to be re-made, costing even more money</p> <p>Workers may need to be paid overtime to catch up production</p> <p style="text-align: right;">2 x (1+1)</p>	4	

Question		Answer	Marks	Content	Guidance
					Levels of response
8*		Up to six marks for a discussion or critical evaluation of issues relating to possible benefits to the environment of using modern technologies		<p>Response may include reference to the following points:</p> <p>Better quality/longer lasting products could mean less waste</p> <p>Clean air technologies reduce pollution</p> <p>New techniques mean more materials can be recycled</p> <p>More efficient use of fuels reduce pollution</p> <p>Modern renewable energy sources cut down greenhouse gasses</p> <p>Less use of fossil fuels that are running out</p> <p>More modern materials using less raw material</p> <p>Recycling/re-use means less landfill</p> <p>Hazardous materials can be used less/disposed of safely</p>	<p>Level 3 (5 - 6 marks)</p> <p>Thorough analysis showing a clear understanding of issues relating to possible benefits to the environment of using modern technologies. 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>Level 2 (3 - 4 marks)</p> <p>Adequate discussion showing an understanding of issues relating to possible benefits to the environment of using modern technologies. 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>Level 1 (0 - 2 marks)</p> <p>Basic discussion showing limited understanding of issues relating to possible benefits to the environment of using modern technologies. 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 for paper</b>	<b>60</b>		

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