

# Mark Scheme (Results)

## Summer 2007

GCSE

### GCSE Engineering & Manufacturing (5318/06)

**Mechanical, Automotive (5318/06)**  
**SECTION A**

<i>Question</i>			<i>Expected answers</i>	<i>Mark allocation</i>	
<b>5318_06_Q01a</b>			Tick the two boxes below where the products belong to the mechanical sector.		
1	(a)		<ul style="list-style-type: none"> <li>• Metal Door Handle</li> <li>• Hydraulic Valve</li> </ul> <p><i>If three boxes ticked max marks = 1 mark.</i> <i>If 4 boxes or more ticked no marks.</i></p>	2x1	(2)
<b>5318_06_Q01b</b>			Tick the two boxes below where the products belong to the automotive sector.		
1	(b)		<ul style="list-style-type: none"> <li>• Gearbox</li> <li>• Safety Air Bag</li> </ul> <p><i>If three boxes ticked max marks = 1 mark.</i> <i>If 4 boxes or more ticked no marks.</i></p>	2x1	(2)
<b>(Total 4 marks)</b>					

Question			Expected answers	Mark allocation	
5318_06_Q02a1			Naming each component		
2	(a)	1	<ul style="list-style-type: none"> <li>Washer (accept any answer that makes reference to a specific washer) e.g.  Plain washer Flat washer Tap washer</li> <li>Spacer / metal spacer</li> </ul>	1x1	(1)
5318_06_Q02b1			Explaining what each component is used for		
2	(b)	1	<p>An answer that makes reference to TWO of the following points:</p> <ul style="list-style-type: none"> <li>Rotating fastener / used with nut / used with bolt or screw</li> <li>Damage</li> <li>Spreading load</li> <li>Joining component</li> <li>Spacer</li> </ul> <p><i>E.g. Used with rotating fastener (1) to spread load (1)</i></p> <p><i>If the component named in part 2(a) is incorrect, no marks for part 2(a), but if it is a component from the Mechanical, Automotive sector or no answer allow follow through, for a correct answer to 2(b) which relates to that given in part (a), up to 2 mark.</i></p> <p><i>Do not accept explanation of use of NUT as given in question</i></p>	2x1	(2)

Question			Expected answers	Mark allocation	
5318_06_Q02a2			Naming each component		
2	(a)	2	<ul style="list-style-type: none"> <li>• Hex socket screw / bolt</li> <li>• Allen head screw / bolt</li> <li>• socket head cap screw / bolt</li> <li>• machine screw</li> <li>• socket head screw / bolt</li> <li>• cap screw / bolt</li> <li>• cap headed screw / bolt</li> <li>• allen key screw / bolt</li> <li>• cap headed screw / bolt</li> </ul> <p><i>Do not accept just screw or bolt</i></p>	1x1	(1)
5318_06_Q02b2			Explaining what each component is used for		
2	(b)	2	<p>An answer that makes reference to TWO of the following points:</p> <ul style="list-style-type: none"> <li>• fixing two pieces of materials together</li> <li>• screwing into a threaded hole</li> <li>• used with a key / tool</li> <li>• for temporary fixing / joining</li> </ul> <p><i>E.g. used with a key (1) to join two or more components together (1)</i></p> <p><i>If the component named in part 2(a) is incorrect, no marks for part 2(a), but if it is a component from the Mechanical, Automotive sector or no answer allow follow through, for a correct answer to (b) up to 2 mark.</i></p> <p><i>Do not accept explanation of use of NUT as given in question</i></p>	2x1	(2)
(Total 6 marks)					

Question	Expected answers		Mark allocation	
5318_06_Q03	Draw a straight line to link each term listed below to a key area. Each key area can be used more than once.			
3		<p><i>No mark awarded where 2 or more lines are drawn from a term. Lines do not have to be straight but term and key area must be clearly linked.</i></p> <div> <p><b>Term</b></p> <p><b>Key area</b></p> </div>	6x1	(6)
(Total 6 marks)				

Question		Expected answers		Mark allocation	
5318_06_Q04					
Name one other product from this sector, apart from pneumatic cylinders, that utilises in its manufacture control technology and modern materials.					
4	(a)	i	<p>Appropriate product such as e.g.</p> <ul style="list-style-type: none"> <li>• motorbike</li> <li>• fire extinguisher</li> <li>• trolley jack</li> <li>• foot pump</li> <li>• bbq</li> <li>• filing cabinet</li> <li>• car</li> <li>• gearbox</li> <li>• toolbox</li> <li>• hydraulic cylinder</li> </ul> <p><i>Accept brand name of a specific product.</i></p> <p><i>This list is not exhaustive; accept any product that contains mechanical or automotive componentry or association with the sector.</i></p>	1x1	(1)
Explain how the product can be used.					
4	(a)	ii	<p>Appropriate explanation of what the product does, may include reference to features and function</p> <p><i>E.g. To transport you (1) from one place to another (1) Used in an emergency (1) to put out fires (1) Used on a car (1) to jack it up (1)</i></p> <p><i>If product given in 4(a)(i) is not from this sector but is from one of the other engineering manufacturing sectors then allow follow through up to one mark. No answer to 4(a)(i) no marks for 4(a)(ii)</i></p>	2x1	(2)

Question			Expected answers	Mark allocation	
State one stage in the manufacture of the product you names in 4(a)(i) where control technology is used.					
4	(b)	i	<ul style="list-style-type: none"> <li>production planning (1) materials - supply and control (1) processing/production (1) assembly/finishing (1) packaging/dispatch (1)</li> </ul> <p><i>If product given in 4(a)(i) is not from this sector but is from one of the other engineering manufacturing sectors then allow follow through.</i></p> <p><i>No answer to 4(a)(i) no marks for 4(b)ii</i></p> <p><i>Accept a process that is within any of the stages (e.g casting/fabrication/robots assembly/spraying) must be appropriate to the product stated in 4(a)(i)</i></p>	1x1	(1)

Question		Expected answers			Mark allocation
Explain one advantage to the manufacturer of using control technology at this stage.					
4	(b)	ii	<p>One mark for identifying advantage One mark for why</p> <p>Appropriate advantage to the manufacturer e.g.</p> <p><b>production planning, materials - supply and control, processing/production, assembly/finishing, packaging/dispatch</b></p> <p><b>Production planning</b></p> <ul style="list-style-type: none"> <li>• speed (1) - faster than human application (1)</li> </ul> <p><b>materials - supply and control</b></p> <ul style="list-style-type: none"> <li>• cost control (1) - by less waste/faulty parts (1)</li> <li>• waste control (1) - by monitoring processes and quality control of processes (1)</li> </ul> <p><b>processing/production</b></p> <ul style="list-style-type: none"> <li>• energy conservation (1) - by control of energy into process (1)</li> <li>• waste control (1) - by monitoring processes and quality control of processes(1)</li> <li>• competitiveness (1) - faster rates of production (1)</li> <li>• product consistency (1) - by control of processes (1)</li> <li>• cost control (1) - by less waste/faulty parts (1)</li> <li>• efficiency (1) - by less waste/faulty parts (1)</li> <li>• speed (1) - faster than human application (1)</li> </ul> <p><b>assembly/finishing</b></p> <ul style="list-style-type: none"> <li>• energy conservation (1) - by control of energy into process (1)</li> <li>• waste control (1) - by monitoring processes and quality control of processes(1)</li> <li>• product consistency (1) - by control of processes (1)</li> <li>• cost control (1) - by less waste/faulty parts (1)</li> <li>• efficiency (1) - by less waste/faulty parts (1)</li> <li>• speed (1) - faster than human application (1)</li> </ul> <p><b>packaging/dispatch</b></p> <ul style="list-style-type: none"> <li>• packaging consistency (1) - by control of processes (1)</li> <li>• cost control (1) - by less waste/faulty parts (1)</li> <li>• efficiency (1) - by less waste/faulty parts (1)</li> <li>• speed (1) - faster than human application (1)</li> <li>• energy conservation (1) - by control of energy into process (1)</li> <li>• waste control (1) - by monitoring processes and quality control of processes (1)</li> </ul> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i> <i>If the answer in part 4(b)(i) is a Manufacturing stage allow follow through up to 2 marks.</i></p> <p><i>No answer to 4(b)(i) no marks for 4(b)(ii)</i></p>	1x1 1x1	(2)



Question			Expected answers	Mark allocation	
State one type of modern material used in the manufacture of the product you named in 4(a)(i)					
4	(c)	i	<ul style="list-style-type: none"> <li>• polymer / plastic (although plastic is not technically correct accept the term plastic)</li> <li>• adhesive</li> <li>• coating</li> <li>• metal</li> <li>• composite</li> <li>• shape memory alloy</li> <li>• ceramic</li> <li>• Other appropriate modern material - a material currently used for the given application</li> </ul> <p><i>Accept brand name of a specific material</i></p> <p><i>If product given in 4(a)(i) is not from this sector but is from one of the other engineering manufacturing sectors then allow follow through.</i></p> <p><i>No answer to 4(a)(i) no marks for 4(c)(i)</i></p>	1x1	(1)
Describe how this modern material improves the characteristics of the product.					
4	(c)	ii	<p>One mark for identifying improvement One mark for how</p> <ul style="list-style-type: none"> <li>• smaller size (1) - minituration (1)</li> <li>• lower weight (1) - better strength to weight ratio (1)</li> <li>• better appearance (1) - smoother/brighter finishes (1)</li> <li>• extends the life-time of product (1) - better wear characteristics (1)</li> <li>• improves wear resistance (1) - harder materials/better surface finish (1)</li> <li>• reduces cost (1) - overall product easier/earlier machine ability (1)</li> </ul> <p><i>If answer in part 4(ai) is inappropriate but the material given in 4(ci) is appropriate allow follow through up to 2 marks. If no answer is given in part 4(ai) but the answer to part (cii) relates to the material stated in part 4(ci) allow follow through up to 1 mark. If no answer or incorrect given in part (ci) no marks awarded for 4(cii).</i></p>	1x1 1x1	(2)
<b>(Total 9 marks)</b>					

Question			Expected answers	Mark allocation	
5318_06_Q05a					
Give one example of where computer aided manufacture (CAM) is used by a manufacturer.					
5	(a)	i	<ul style="list-style-type: none"> <li>• materials supply / purchasing (generating orders)</li> <li>• materials control (MRP1, automatic material issuing)</li> <li>• stages in production / processing (CNC department, machine shop)</li> <li>• process control (data logging)</li> <li>• storage (automated warehouse)</li> <li>• distribution (automatic order picking)</li> <li>• packaging (automatic labelling)</li> </ul>	1x1	(1)
Explain the benefits to the manufacturer of using Computer-aided manufacture (CAM) relating to the example given in 5(a)(i).					
5	(a)	ii	<p>One mark for identifying the benefit One mark for how</p> <ul style="list-style-type: none"> <li>• reduced ordering times (1) - automatic monitoring (1)</li> <li>• improve quality / accuracy (1) - control of processes (1)</li> <li>• reduced wastage (1) - optimise production methods</li> <li>• improved efficiency (1) - faster / quicker throughput (1)</li> <li>• better process control (1) - in process monitoring (1)</li> <li>• reduced labour (1) - automated processes (1)</li> <li>• lower costs (1) - reduced wastage/faster/continuous production (1)</li> <li>• safer processes (1) - less manual input</li> </ul> <p><i>Do not accept easier without explanation.</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i></p> <p><i>If answer in part 5(ai) is inappropriate allow follow through up to 2 marks. If no answer given in part 5(ai) allow follow though up to 1 mark.</i></p>	1x1 1x1	(2)

Question			Expected answers	Mark allocation	
5318_06_Q05b					
Give One example of how computer aided design (CAD) is used by a manufacturer.					
5	(b)	i	<ul style="list-style-type: none"> <li>to create virtual products drawings / 2 or 3D designs</li> <li>modelling</li> <li>show ideas / designing a product</li> <li>show new product concepts</li> <li>modify existing products</li> </ul> <p><i>Do not accept software packages without explanation. E.g. 2D design software / package</i></p>	1x1	(1)
Explain the benefits to the manufacturer of using Computer-aided design (CAD) related to the example given in 5(b)(i)					
5	(b)	ii	<p>One mark for identifying benefit One mark for how</p> <ul style="list-style-type: none"> <li>conversion from 2D to 3D (1) - for modelling (1)</li> <li>quicker development time (1) - through simulation (1)</li> <li>easier to communicate i.e. ICT (1) - transfer of data (1)</li> <li>easy to make modifications / edit / change (1) - no paper hard copies (1) / computer data (1)</li> <li>lower initial development costs (1) - concurrent design processes (1)</li> <li>easy storage of data/information and retrieval (1) - interaction with databases (1)</li> <li>accurately drawn (1) - entry of accurate data or sizes (co-ordinates) (1)</li> </ul> <p><i>Do not accept easier without explanation.</i></p> <p><i>Low response (1) or detailed response (2) Two low responses (1) eg quicker and more accurate - 1 mark only</i></p> <p><i>If answer in part 5 (i) is inappropriate allow follow through up to 2 marks. If no answer given in part 5b(i) allow follow through up to 1 mark.</i></p>	1x1 1x1	(2)

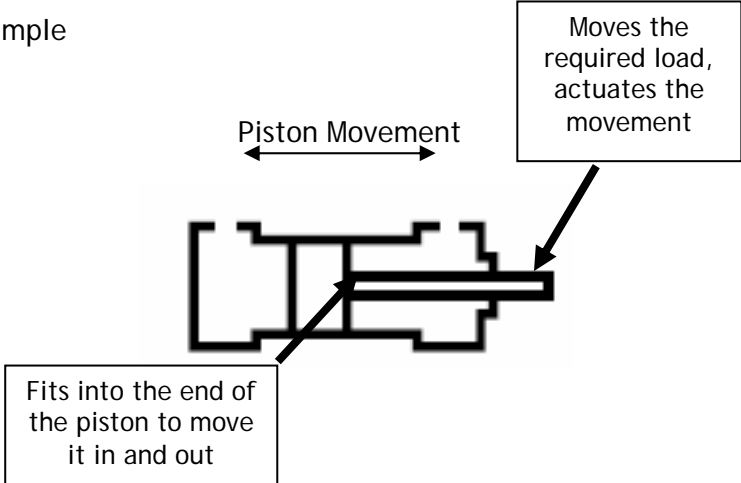
<i>Question</i>		<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q05c		Explain one benefit to the distributor of the manufacturer using Computer-Aided Manufacture (CAM)		
5	(c)	<p>One mark for identifying benefit One mark for how</p> <ul style="list-style-type: none"> <li>• less returns (1) - more consistent products (1)</li> <li>• lower purchase price (1) - increased sales (1)</li> <li>• shorter order times (1) - greater use if ICT (1)</li> <li>• more sales (1) - better quality (1)</li> <li>• increased sales (1) - more profit (1)</li> <li>• better reputation / customer satisfaction (1) - more reliability (1)</li> <li>• increased profits (1) - less waste product (1)</li> <li>• better control of stock (1) - computer links to manufacture (1)</li> </ul> <p><i>Benefit must relate to distributor</i> <i>Low response (1) or detailed response (2)</i> <i>Two low responses (1) e.g. it is cheaper and quicker - 1 mark only</i></p>	1x1 1x1	(2)
(Total 8 marks)				

Question		Expected answers		Mark allocation	
5318_06_Q06					
Name <u>two</u> examples of communications technology.					
6	(a)	<p>Mark allocation 1 per relevant example</p> <ul style="list-style-type: none"> <li>• Mobile phone / infrared / bluetooth</li> <li>• Email / messaging</li> <li>• Internet / wireless / Wi-fi</li> <li>• Video conferencing</li> <li>• Electronic point of sale (EPOS)</li> <li>• EDI</li> <li>• ISDN</li> <li>• Texting</li> <li>• Phone</li> <li>• Walkie talkie</li> <li>• Fax</li> </ul> <p><i>Do not accept: TV, CAD, radio, computer / laptop / database</i></p>	1x1 1x1	(1) (1)	
Describe the traditional communications method it has replaced.					
6	(b)	<ul style="list-style-type: none"> <li>• Mobile phone - Landline, Pager, Public address system</li> <li>• Email - Fax, Letter, memo, report sheets, telephone</li> <li>• Internet - Books, journals, buyers guides, catalogues, brochures</li> <li>• Video conferencing - Travel to central location</li> <li>• Electronic point of sale (EPOS) - Stock taking, manual ordering, income calculations</li> <li>• EDI - postal documents</li> <li>• ISDN - analogue transmission</li> <li>• Texting - phone / conversation</li> <li>• Phone - telegram</li> <li>• Walkie talkie - face to face</li> <li>• Fax - letters / memos / post</li> </ul> <p><i>Mark allocation 1 per relevant example must relate to technology given in 6(a) plus manufacturer If part (a) not answered no mark awarded.</i></p>	1x1 1x1	(1) (1)	

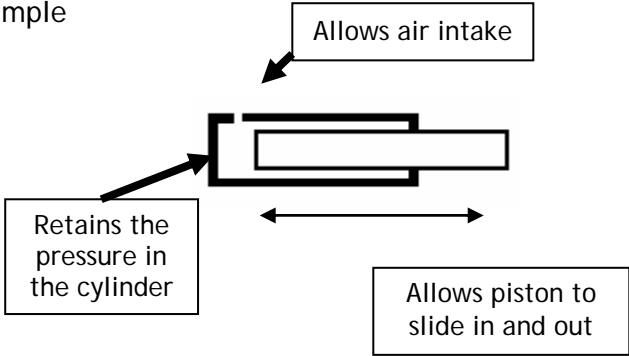
Question		Expected answers	Mark allocation	
5318_06_Q06		Explain one benefit to the manufacturer of using this replacement new technology		
6	(c)	<ul style="list-style-type: none"> <li>• Mobile phone - flexibility / roaming location</li> <li>• Email - immediate permanent record</li> <li>• Internet - immediate vast access to information</li> <li>• Video conferencing - no travel expenses / less time wasted in travelling</li> <li>• Electronic point of sale (EPOS) - faster / more accurate</li> <li>• EDI - immediate transfer of information / no hard copies needed / less storage space</li> <li>• ISDN - more data transferred in parallel</li> <li>• Texting - stored record of transaction</li> <li>• Phone - immediate two way conversation</li> <li>• Walkie talkie - flexibility / roaming location / cost</li> <li>• Fax - hard copy record</li> </ul> <p>Other benefits may be seen in the light of:</p> <p><i>Speed, accuracy, JIT, information retrieval, meets consumer demands, quicker, increased sales, reduced stock levels, reduced running costs, reduced lead times, calculation of sales, stock taking quicker/easier, storage space reduced or any other appropriate reason</i></p> <p><i>Benefits must relate to the manufacturer</i>  <i>If only the replacement or original technology is given and the benefit is appropriate allow follow through up to 1 mark.</i></p> <p><i>2 low responses - 1 mark only</i></p>	2x1 2x1	(2) (2)
(Total 8 marks)				

Question		Expected answers	Mark allocation
5318_06_Q07		Explain the benefits information and data handling system have on:	
Production efficiency			
7	(a)	<p>One mark for benefit One mark for how</p> <ul style="list-style-type: none"> <li>• Accurate information (1) - updated regularly (1)</li> <li>• Detailed information (1) - high storage space (1)</li> <li>• Fast access to data (1) - search / sort query (1)</li> <li>• Improved planning (1) - short lead times(1)</li> <li>• Forecasting (1) - collects volumes of data / modelling (1)</li> <li>• Cost of control (1) - better scheduling (1)</li> <li>• Waste control (1) - process monitoring / control (1)</li> <li>• Reduced stock holding(1) - tracks trends / JIT (1)</li> <li>• Training records (1) - skills monitoring (1)</li> <li>• Wage information (1) - ease of cost monitoring (1)</li> </ul> <p><i>Any other appropriate response. Low response (1) or detailed statement (2) 2 low responses - 1 mark only</i></p>	<p>1x1 1x1 (2)</p>
Marketing			
7	(b)	<p>One mark for benefit One mark for how</p> <ul style="list-style-type: none"> <li>• Accurate sales information (1) - instant feedback (1)</li> <li>• Detailed customer information (1) - tailoring products to target market (1)</li> <li>• Information for marketing strategies/campaigns (1) - tailoring products to target market (1)</li> <li>• Information for advertising campaigns (1) - choosing correct media (1)</li> <li>• Profit information available (1) - models sales demand (1)</li> <li>• Ordering to meet sales faster (1) - meeting demand (1)</li> </ul> <p><i>Any other appropriate response. Low response (1) or detailed statement (2) 2 low responses - 1 mark only</i></p>	<p>1x1 1x1 (2)</p>
			(Total 4 marks)
Total marks for Section A			45

SECTION B

Question		Expected answers	Mark allocation	
5318_06_Q08		In the boxes below, explain, using notes and sketches: (a) The function of the piston rod.		
8	(a)	An answer that makes reference to three of the following points: <ul style="list-style-type: none"> <li>• Fits between component parts</li> <li>• Piston movement</li> <li>• Transfers motion from piston to application</li> <li>• Pushes the air</li> </ul> <p><i>Answer must contain both notes and sketches. Max two marks if only notes or only sketches used.</i></p> <p>Example</p> 	3x1	(3)



Question		Expected answers	Mark allocation	
5318_06_Q08		In the boxes below, explain, using notes and sketches: (b) The function of the Body.		
8	(b)	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• Holds assembly together</li> <li>• Enables fixing to machinery</li> <li>• Enables fixing of pneumatic feed/allows air intake</li> <li>• Retains pressure in cylinder</li> <li>• Allow piston to slide in and out</li> </ul> <p><i>Answer must contain both notes and sketches. Max two marks if only notes or only sketches used.</i></p> <p>Example</p> 	3x1	(3)
(Total 6 marks)				

<i>Question</i>			<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q09ai			Write in the table above two missing stages in manufacturing pneumatic cylinders.		
9	(a)	i	<ul style="list-style-type: none"> <li>• Marketing</li> <li>• Assembly/Finishing</li> </ul> <p>Must be in this order</p>	1x1 1x1	(2)
5318_06_Q09aii			State the stage where piston rod is machined		
9	(a)	ii	<ul style="list-style-type: none"> <li>• Production/processing</li> <li>• Stage 5 / stage five</li> <li>• 5 / five</li> </ul>	1x1	(1)

Question			Expected answers	Mark allocation	
5318_06_Q09bi			Describe the following <u>two</u> stages in the manufacture of pneumatic cylinders. <b>Production planning</b>		
9	(b)	i	<p>Appropriate descriptions including three of the following points:</p> <ul style="list-style-type: none"> <li>• Scheduling production (1)</li> <li>• Converting order to production (1)</li> <li>• Materials requirements (1)</li> <li>• Labour requirements (1)</li> <li>• Deadlines (1)</li> <li>• Throughputs (1)</li> <li>• Machinery / equipment requirements (1)</li> <li>• Quality checks (1)</li> <li>• Control points (1)</li> <li>• Health and safety (1)</li> <li>• Any other appropriate response</li> </ul> <p><i>The stage where the specification of the cylinder is used by the planning team to set out all operations and schedule (1) the cylinders through the production department to meet the required delivery deadlines (1). This could include ordering any special materials or tooling (1) for making the cylinders.</i></p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses or up to 3 for detailed response</i></p>	3x1	(3)

Question			Expected answers	Mark allocation	
5318_06_Q09bii			Packaging and dispatch		
9	(b)	ii	<p>Appropriate descriptions including three of the following points:</p> <ul style="list-style-type: none"> <li>• Application of protective packaging (1)</li> <li>• Assembling orders (1)</li> <li>• Application of codes, dates, tech info (1)</li> <li>• Picking orders (1)</li> <li>• Assembly loads (1)</li> <li>• Packing into outer boxes (1)</li> <li>• Making records (1)</li> <li>• Application of labels to boxes (1)</li> <li>• Sending to client (1)</li> <li>• Final visual checks (1)</li> <li>• Collation of multiple items (1)</li> <li>• Any other appropriate response</li> </ul> <p><i>The stages where the finished cylinders have any labels added (1), and are prepared for shipment by the use of any protective materials such as foam packaging or grease to prevent corrosion (1). The packaged cylinder is loaded onto the preferred method of despatch and carrier to be sent to the customer for distributor (1).</i></p> <p><i>1 x 1 mark low response, 3 x 1 mark 3 low responses or up to 3 for detailed response</i></p>	3x1	(3)
(Total 9 marks)					

<i>Question</i>			<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q10ai			Name the specific material commonly used on pneumatic cylinders to make the:		
			<b>Seals on the piston</b>		
10	(a)	i	<p>Specific materials to make the seal on the piston</p> <ul style="list-style-type: none"> <li>• Polyurethane</li> <li>• Nitrile rubber / Nitrile / rubber / polyisoprene / butyle / butyle rubber</li> <li>• Polymyte</li> <li>• PTFE / polytetrafluoroethylene</li> <li>• Neoprene / polychloroprene</li> </ul> <p><i>A description that includes the key words above award 1 mark.</i></p>	1x1	(1)
5318_06_Q10aii			Name the specific material commonly used on pneumatic cylinders to make the:		
			<b>Cylinder body</b>		
10	(a)	ii	<ul style="list-style-type: none"> <li>• Aluminium</li> <li>• Aluminium alloy</li> <li>• Zinc alloy</li> <li>• Steel</li> <li>• Stainless steel</li> </ul> <p><i>A description that includes the key words above award 1 mark.</i></p>	1x1	(1)

<i>Question</i>			<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q10bi			State two general properties of stainless steel:		
10	(b)	i	<ul style="list-style-type: none"> <li>• Resistant to corrosion / resist corrosion / does not rust /corrosion resistant/ anti-corrosive / stays bright and shiny</li> <li>• Tensile strength /strength - (do not accept single word- 'strong')</li> <li>• Can be heat treated / heat treatable</li> <li>• Can be machined /machineable / easy to work with</li> <li>• Hard/resistance to wear / wear resistance / hard wearing</li> </ul> <p><i>Do not accept tough.</i></p> <p><i>1 mark per response up to 2</i></p>	2x1	(2)

Question			Expected answers	Mark allocation	
5318_06_Q10bii			State one place where stainless could be used in the manufacture of the pneumatic cylinder and give reason why.		
10	(b)	ii	<p>1 mark for place:</p> <ul style="list-style-type: none"> <li>• Piston rod</li> <li>• Piston rod nut</li> <li>• End cover nuts</li> <li>• End cover screws / bolts</li> <li>• Tie rods</li> <li>• body</li> </ul> <p>2 marks for reasons why:</p> <ul style="list-style-type: none"> <li>• Does not wear (1) because its hard / due to friction(1)</li> <li>• Does not corrode (1) and contaminate/looks good (1)</li> <li>• Good strength / strong (1) and will not break (1)</li> <li>• Readily available (1) and machined easy (1)</li> </ul>	1x1	(3)
5318_06_Q10c			Explain how the use of modern materials has helped the manufacturer of pneumatic cylinders develop new products.		
10	(c)		<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• Improved wear resistance (1)</li> <li>• Longer lasting cylinders (1)</li> <li>• Pneumatic products needed less maintenance (1)</li> <li>• Lighter cylinders and other pneumatic products (1)</li> <li>• Easier manufacturing (1)</li> <li>• Better functionality (1)</li> <li>• More variation of products (1)</li> <li>• Expanding markets i.e. food industry, health etc (1)</li> <li>• Smaller cylinders / components (1)</li> </ul> <p><i>Up to 3 x 1 mark low responses or up to 3 marks for a detailed response</i></p>	3x1	(3)
(Total 10 marks)					

Question			Expected answers	Mark allocation	
5318_06_Q11			Describe two quality control procedures used at the production stage of the manufacture of the pneumatic cylinders that utilise monitoring control		
11	(a)	i-ii	One mark for identifying QC procedure One mark for how <ul style="list-style-type: none"> <li>• Check physical damage (1) - by visual inspection (1)</li> <li>• Size checks (1) - by direct measurement or gauging (1)</li> <li>• Functional checks (1) - use test rig (1)</li> <li>• Positional and dimensional checks (1) - use of co-ordinate measuring machine (1)</li> <li>• length of material / surface finish (1)- use of variable quality indicator / probe (1)</li> <li>• how many holes drilled in components (1) - use of attribute data (1)</li> <li>• leaks in cylinders (1) - pressure tests (1)</li> <li>• properties testing (1) in system testing (1)</li> </ul> <p><i>Must have relevant monitoring / control technology link</i></p>	2x1 2x1	(2) (2)
Explain one benefit of applying each quality control procedure, described in (a) above, to the <u>manufacturer</u> :					
11	(b)	i-ii	One mark for identifying benefit to the manufacturer One mark for how <ul style="list-style-type: none"> <li>• Reduced customer complaints (1) - better products(1)</li> <li>• Control of costs - cheaper product / more profit (1)</li> <li>• Avoids faulty parts being assembled - early detection (1)</li> <li>• Increased sales - consistent product / lower prices (1)</li> <li>• User confidence - consistent product / less returns (1)</li> <li>• Reduced waste - control of manufacturing process (1)</li> <li>• Reliable product (1) - monitoring standards testing / parts (1)</li> <li>• No breaking parts (1) - monitoring component / parts (1)</li> <li>• Any other appropriate response</li> </ul> <p><i>2 x 1 mark for Low response or 2 x 2 marks for detailed responses</i>  <i>If no answer or inappropriate answer is given in part 11(a) allow follow through up to 1 mark each benefit.</i></p>	2x1 2x1	(2) (2)



Question		Expected answers	Mark allocation
Explain one benefit of applying each quality control procedure, described in (a) above, to the <u>consumer</u> :			
11	(c)	<p>One mark for identifying benefit to the consumer One mark for how</p> <ul style="list-style-type: none"> <li>• Safer product to use (1) - confidence in product reliability(1)</li> <li>• Consistent product (1) - ensures standards are met (1)</li> <li>• Longer useable life (1) - don't have to buy as often (1)</li> <li>• Product reliability (1) confidence in the company (1)</li> <li>• Lower prices (1) - less scrap / waste / more efficient (1)</li> <li>• Any other appropriate response</li> </ul> <p><i>2 x1 mark for low responses, 2 x 2 marks for detailed responses</i> <i>If no answer or inappropriate answer is given in part 11(a) allow follow through up to 1 mark each benefit.</i></p>	<p>2x1 (2) 2x1 (2)</p>
(Total 12 marks)			

<i>Question</i>			<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q12a			The utilisation of modern technology in the manufacture of pneumatic cylinders has brought changes. Explain these changes in:		
<b>The type and sizes of the workforce</b>					
12	(a)	i	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• Smaller in size (1)</li> <li>• Higher level of skills (1)</li> <li>• Work patterns - shifts (1)</li> <li>• Better educated (1)</li> <li>• Higher level of development skills required (1)</li> <li>• Less employment for unskilled (1)</li> <li>• Updating and training often required (1)</li> <li>• Any other appropriate response</li> </ul>	2x1	(2)
<b>The working environment</b>					
12	(a)	ii	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• Cleaner (1)</li> <li>• Safety (1)</li> <li>• Quieter (1)</li> <li>• Healthier (1)</li> <li>• Any other appropriate response</li> </ul>	2x1	(2)
<b>The global environment</b>					
12	(a)	iii	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• Distribution - network increased (extra fuel) (1)</li> <li>• carbon emissions (1)</li> <li>• Operational efficiencies - less fossil fuels (1)</li> <li>• Recyclable materials (1)</li> <li>• Reduced waste - landfill (1)</li> <li>• Increased consumption of raw materials (1)</li> <li>• Any other appropriate response</li> </ul>	2x1	(2)

<i>Question</i>		<i>Expected answers</i>		<i>Mark allocation</i>	
5318_06_Q12bc					
Describe one disadvantage that modern technology has had on the workforce					
12	(b)		<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• Less staff required (1)</li> <li>• Re-training required (1)</li> <li>• Redundancy threat (1)</li> <li>• Increased travel to work / centralisation (1)</li> <li>• Working pattern / 24/7 operation (1)</li> <li>• Any other appropriate response</li> </ul>	2x1	(2)
Describe one advantage that modern technology has had on the global environment.					
12	(c)		<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• Plant more fuel efficient (1)</li> <li>• lower emissions &amp; less consumption (1)</li> <li>• Increased productivity (1)</li> <li>• less fuel used (1)</li> <li>• Reduced wastage (1)</li> <li>• product, packaging etc (1)</li> <li>• less landfill, incineration (1)</li> <li>• Improved manufacturing control (1)</li> <li>• less pollution (1)</li> <li>• Any other appropriate response</li> </ul>	2x1	(2)
<b>(Total 10 marks)</b>					

<i>Question</i>		<i>Expected answers</i>	<i>Mark allocation</i>	
5318_06_Q13a		Describe how CAD is used by the manufacturer to increase market share		
13	(a)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• To design new or improved products quickly (1)</li> <li>• better distributor acceptance (1)</li> <li>• improved consumer acceptance (1)</li> <li>• To design new or improved packaging (1)</li> <li>• quicker to market (1)</li> <li>• 2D, 3D modelling to show customers (1)</li> <li>• Any other appropriate response</li> </ul>	4x1	(4)
5318_06_Q13b		Describe how CAM is used to control manufacturing costs:		
13	(b)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• Machine settings are ideal (1)</li> <li>• Less energy lost / waste (1)</li> <li>• Only correct number manufactured (1)</li> <li>• Controlled environment uses less fuel / energy / utilities (1)</li> <li>• Correct ordering of materials (1)</li> <li>• Lower staffing requirement (1)</li> <li>• Costs more visible / easier traced (1)</li> <li>• Immediate alerts to out of standard performance (1)</li> <li>• Manufactured just in time (1)</li> <li>• Lower unit cost after initial investment (1)</li> <li>• Continuous operation (1)</li> <li>• Less downtime (1)</li> <li>• Any other appropriate response</li> </ul>	4x1	(4)
(Total 8 marks)				
Total Marks for Section B			55	
Total Marks for the whole Paper for section A and B			100	