

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel GCSE**

**Manufacturing (Double Award)**

**Engineering (Double Award)**

**Unit 3: Application of Technology in Engineering and Manufacturing  
Paper E: Electrical and Electronics, Process Control, Computers,  
Telecommunications**

Wednesday 15 May 2013 – Afternoon

**Time: 1 hour 30 minutes**

Paper Reference

**5EM03/3E**

**You must have:**

Notes and sketches collected during your pre-release research.  
Ruler, pen, pencil, rubber.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** the questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

## Information

- The total mark for this paper is 110.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed  
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

## SECTION A

Answer ALL questions.

Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

1 All the products below belong to a manufacturing sector.

(a) Put a cross  in the **two** boxes below where the products belong to the **electrical and electronics, telecommunications** sector.

(2)

Birthday card	<input type="checkbox"/>
Cod liver oil	<input type="checkbox"/>
Train ticket	<input type="checkbox"/>
Multi-meter	<input type="checkbox"/>
Pasta sauce	<input type="checkbox"/>
Consumer unit	<input type="checkbox"/>

(b) Put a cross  in the **two** boxes below where the products belong to the **process control, computer** sector.

(2)

Business card	<input type="checkbox"/>
Metal curtain rail	<input type="checkbox"/>
13A Plug top	<input type="checkbox"/>
Domestic heating control	<input type="checkbox"/>
Wireless mouse	<input type="checkbox"/>
Beach sandals	<input type="checkbox"/>



(Total for Question 1 = 4 marks)



2 The tables below show some tools and components used during the manufacture of electrical and electronics, process control, computers, telecommunications products.

(a) Complete Table 1 by naming each tool.


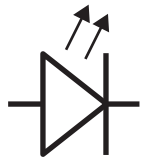
(2)

Tool	Tool name	Use
		To bend, re-position and cut wire.
		To aid in the removal of solder from circuit boards.

**Table 1**

(b) Complete Table 2 by explaining what each component is used for.

(4)

Component symbol	Component name	Use
	Resistor	
	LED	

**Table 2**

**(Total for Question 2 = 6 marks)**



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**3** Draw a straight line to link each **Term** listed below to the most appropriate **Key Area**.

Each Key Area can be used more than once.

**Term**

**Key Area**

Computer-aided design

Automated conveyors

Polymer

Embedded computers

3D prototyping

Aluminium alloy

Kevlar

Information and  
communication technology  
(ICT)

Control technology

Modern materials

**(Total for Question 3 = 7 marks)**



**4** Hot air guns belong to the electrical and electronics, process control, computers, telecommunications sector and use information and communication technology (ICT) in their manufacture.

(a) Name **two other** products from this sector where ICT is used in their manufacture.

(2)

Product 1

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Product 2

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(b) (i) Name **one stage** where ICT is used in the manufacture of **Product 1**.

(1)

(ii) Explain **two** benefits to a **manufacturer** of using ICT at the stage named in 4(b)(i).

(4)

1

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2

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(c) (i) Name **one modern material** used in the manufacture of **Product 1**.

(1)

(ii) Describe how this modern material changes the characteristics of **Product 1**.

(2)

(Total for Question 4 = 10 marks)



5 Computer-aided manufacture (CAM) and computer-aided design (CAD) are both used by manufacturers of electrical and electronics, process control, computers, telecommunications products.

(a) (i) State **one** use of CAM during manufacturing.

(1)

(ii) Explain **one** benefit to a manufacturer of using CAM in processing and production.

(2)

CAD is used when modifying existing products.

(b) (i) State **one other** use of CAD during manufacturing.

(1)

(ii) Explain **one** benefit to a **manufacturer** of using CAD when modifying existing products.

(2)

(c) Explain **one** benefit to the **consumer** when a manufacturer uses CAM.

(2)

(Total for Question 5 = 8 marks)





6 Sourcing and handling information and data is important to manufacturers.

(a) Describe the term **spreadsheet**.

(2)

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(b) A database is also an example of sourcing and handling information and data.

(i) State **one** traditional method it has replaced.

(1)

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(ii) Explain **two advantages** to the **distributor** when a manufacturer uses databases.

(4)

1 .....

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2 .....

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(iii) Explain **one disadvantage** to a **manufacturer** of using databases.

(2)

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**(Total for Question 6 = 9 marks)**



**7** Systems and control technology is an essential feature in electrical and electronics, process control, computers, telecommunications companies.

Explain **one** benefit to a manufacturer of using programmable logic controllers (PLCs) in relation to:

(a) safety during manufacture

(3)

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(b) production efficiency.

(3)

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**(Total for Question 7 = 6 marks)**

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**TOTAL FOR SECTION A = 50 MARKS**



## SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass-produced hot air guns.

The diagram below shows a hot air gun.



**8** Describe, using notes and sketches:

(a) the function of the nozzle

(3)

Nozzle

(b) the function of the casing

(3)

Casing



(c) the function of the control switches

(3)

Control switches

**(Total for Question 8 = 9 marks)**

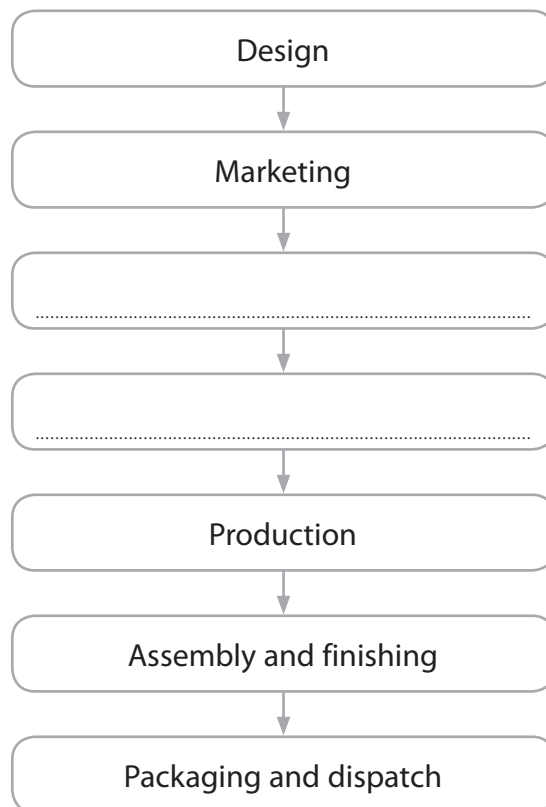


P 4 2 1 2 4 A 0 1 3 2 4

9 (a) The incomplete flow diagram below indicates some of the main stages in the manufacture of hot air guns.

(i) Complete the flow diagram by adding the **two** missing main stages in the manufacture of hot air guns.

(2)



(ii) State the stage where the hot air guns would be placed into cardboard boxes.

(1)

Stage

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(b) Describe the following **two** stages in the manufacture of hot air guns.

(i) Design

(3)

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(ii) Marketing

(3)

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**(Total for Question 9 = 9 marks)**

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10 (a) State a **specific** metal commonly used for the nozzle of the hot air gun.

(1)

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(b) Wave soldering and pick and place of components are processes used to produce circuit boards for the hot air gun.

(i) State **three** production processes, **other than** wave soldering and pick and place of components, used during the manufacture of hot air guns.

(3)

Process 1

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Process 2

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Process 3

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(ii) Explain why the process of wave soldering is suitable for the printed circuit board.

(3)

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(iii) Explain why the manufacturer should use a pick and place process for the production of the circuit board.

(3)

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**(Total for Question 10 = 10 marks)**



11 Process control and quality control are used in the manufacture of hot air guns.

(a) (i) Explain the term **process control**.

(2)

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(ii) Explain **two** reasons why a **manufacturer** uses process control during automated stages of manufacture.

(4)

1 .....

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2 .....

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(b) Describe **two** examples of quality control used during the **production** stage of the manufacture of hot air guns.

(4)

1 .....

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2 .....

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**(Total for Question 11 = 10 marks)**

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12 (a) The use of modern technology in the manufacture of mass-produced hot air guns has brought changes.

(i) State **two** changes the use of modern technology has had on the **type** of workforce manufacturers require.

(2)

Change 1

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Change 2

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(ii) Describe **two** changes the use of modern technology has had on the production environment.

(4)

Change 1

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Change 2

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(iii) Explain **one** environmental benefit that has resulted from the use of modern technology.

(2)

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(b) The use of barcodes is an important part of control technology in the manufacture of hot air guns.

Describe the advantages to a **manufacturer** of using barcodes at the packaging and dispatch stage.

(4)

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**(Total for Question 12 = 12 marks)**



**13** Modern materials are used in the manufacture of hot air guns.

Explain how the use of modern materials has impacted on customer satisfaction.

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**(Total for Question 13 = 4 marks)**





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