



Oxford Cambridge and RSA

Tuesday 3 June 2025 – Afternoon

**Level 1/Level 2 Cambridge National in Engineering
Manufacture**

R014/01 Principles of engineering manufacture

Time allowed: 1 hour 15 minutes



You can use:

- a calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [].
- This document has **16** pages.

ADVICE

- Read each question carefully before you start your answer.

Section A

Put a tick (✓) in the box next to the **one** correct answer for each question.

1 Which of these is a type of welding process?

(a) CAD

☐

(b) MAG

☐

(c) PLA

☐

(d) QTC

☐

[1]

2 Which of these is a smart material?

(a) Epoxy resin

☐

(b) Photochromic pigment

☐

(c) Stainless steel

☐

(d) Tungsten carbide

☐

[1]

3 Which of these describes a wasting manufacturing process?

(a) The addition of material to create a product

☐

(b) The joining of two materials together to produce a product

☐

(c) The removal of material to create a product

☐

(d) The use of casting to produce a product

☐

[1]

4 Which category of **lean waste** means to add more components than the customer wants?

(a) Movement

☐

(b) Over-processing

☐

(c) Over-production

☐

(d) Waiting

☐

[1]

5 What does this symbol represent on an engineering drawing?



- (a) Countersink
- (b) Knurl
- (c) Thread
- (d) Tolerance

☐
☐
☐
☐

[1]

6 Which of these is an additive manufacturing method?

- (a) Fused deposition modelling
- (b) Injection moulding
- (c) Press forming
- (d) Strip heating

☐
☐
☐
☐

[1]

7 Which of these processes uses a cutting tool to remove material from a rotating workpiece?

- (a) Drilling
- (b) Laser cutting
- (c) Shearing
- (d) Turning

☐
☐
☐
☐

[1]

8 Which of these items of equipment do you need to create a screw thread?

- (a) Nuts and bolts
- (b) Saw and blade
- (c) Tap and die
- (d) Tin snips and guillotine

☐
☐
☐
☐

[1]

- 9 Which of these material types is a combination of two or more elements, where at least one is a metal?

- (a) Alloy
- (b) Composite
- (c) Thermoplastic
- (d) Thermoset

☐
☐
☐
☐

[1]

- 10 According to BS 8888, what is the correct abbreviation for **drawing**?

- (a) DGR
- (b) DGW
- (c) DRG
- (d) DRW

☐
☐
☐
☐

[1]

5
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Section B

11 A manufacturing company makes metal exterior body panels for buses.

(a)

(i) Identify **one** process that would be suitable for finishing the bus body panels.

.....
..... **[1]**

(ii) Explain **two** reasons why finishing processes are necessary when manufacturing the bus body panels.

1
.....
.....
.....
2
.....
.....
..... **[4]**

(b) State **three** reasons why a quality system should be implemented for the bus body panels.

1
.....
2
.....
3
..... **[3]**

- (c) The bus body panels will be manufactured using a just in time (JIT) approach.

Explain **one** advantage of using a just in time (JIT) approach to manufacture the bus body panels.

.....

.....

.....

..... [2]

12 You are vacuum forming the hard hat shown below.



(a)

- (i) Identify **one** specific polymer material that would be suitable for producing the vacuum-formed hard hat.

..... [1]

- (ii) State **two** typical forms of supply of the material identified in part (a)(i).

1

.....

2

.....

[2]

- (b) Identify **two** safety measures that should be taken when vacuum forming the hard hat. For **each**, explain why it is necessary.

Safety measure 1

.....

Why it is necessary

.....

Safety measure 2

.....

Why it is necessary

.....

[4]

(c) State **three** characteristics of a suitable mould for producing the vacuum-formed hard hat.

1

.....

2

.....

3

.....

[3]

13

- (a) This cutting tool for a milling machine is made from silicon carbide.



Evaluate how the **properties** of this material make it suitable for this application.

[4]

- (b) State **two other** common applications of silicon carbide.

1

2

[2

- (c) Silicon carbide is an example of an engineering ceramic.

Describe **four** steps required to produce a ceramic part using powder metallurgy.

1

.....

2

.....

3

.....

4

.....

[4]

14

- (a)** Describe what an **international standard** is in relation to manufacturing.

..... [2]

- (b)** Explain how globalisation has impacted the cost of buying manufactured products.

..... [2]

- (c)** Discuss how globalisation has influenced employment opportunities within manufacturing.

[6]

15

(a) Describe what each of these material properties mean:

(i) Elasticity

.....
 [1]

(ii) Ductility

.....
 [1]

(iii) Malleability

.....
 [1]

(b) State **three** types of non-ferrous metals.

1
 2
 3 [3]

(c) State **two** applications of cast iron. For **each** application, explain a different reason why this material is used.

Application 1

Why cast iron is used

.....

Application 2

Why cast iron is used

.....

[4]

16

- (a) Describe **two** products that would typically be made using one-off manufacture.

An example is given for you:

Example: A 3D printed joystick, made to fit a prototype games controller.

1

.....

.....

.....

2

.....

.....

.....

[4]

- (b) Explain **one** advantage of using CAM to manufacture products.

.....

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.....

.....

[2]

- (c) Explain **one** advantage and **one** limitation of using templates to manufacture products.

Advantage

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Limitation

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.....

.....

[4]

END OF QUESTION PAPER

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