

**Wednesday 13 January 2016 – Afternoon**

**LEVEL 1/2 CAMBRIDGE NATIONAL AWARD/CERTIFICATE IN  
ENGINEERING MANUFACTURE**

**R109/01** Engineering materials, processes and production

Candidates answer on the Question Paper.

**OCR supplied materials:**

None

**Other materials required:**

None

**Duration:** 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The total number of marks for this paper is **60**.
- The number of marks for each question is given in brackets [ ] at the end of the question or part question.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication will be assessed in questions marked with an asterisk (\*).
- This document consists of **8** pages. Any blank pages are indicated.

Answer **all** questions.

1 Alloys, ferrous metals, non-ferrous metals and polymers are types of engineering materials.

(a) Complete the table below by giving **two** examples of each type of material.

Material type	Examples	
Alloy		
Ferrous metal		
Non-ferrous metal		
Polymer		

[8]

(b) Describe what is meant by the term 'alloy'.

.....

..... [2]

2 (a) Describe what is meant by the term ‘thermochromic material’.

.....  
..... [2]

(b) Give **three** reasons why cast iron is used to make machine bases.

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

(c) State **two** materials that can be supplied in powder form.

1 .....  
2 ..... [2]

(d) Describe **one** destructive testing process on an engineering material.

.....  
.....  
.....  
..... [3]

3 (a) (i) Name the engineering component shown in Fig. 1 below.

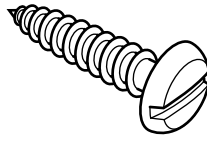


Fig. 1

..... [1]

(ii) Explain how this engineering component would be used to join two sheet metal parts together.

.....  
.....  
.....  
..... [3]

(b) Give **two** other methods of joining sheet metal parts.

1 .....  
2 ..... [2]

(c) Forging is a metal forming process.

Describe **two** benefits of using forging to make metal parts.

1 ..... [2]  
.....  
.....  
2 ..... [2]  
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.....

4 Fig. 2 is a line diagram of an injection moulding machine.

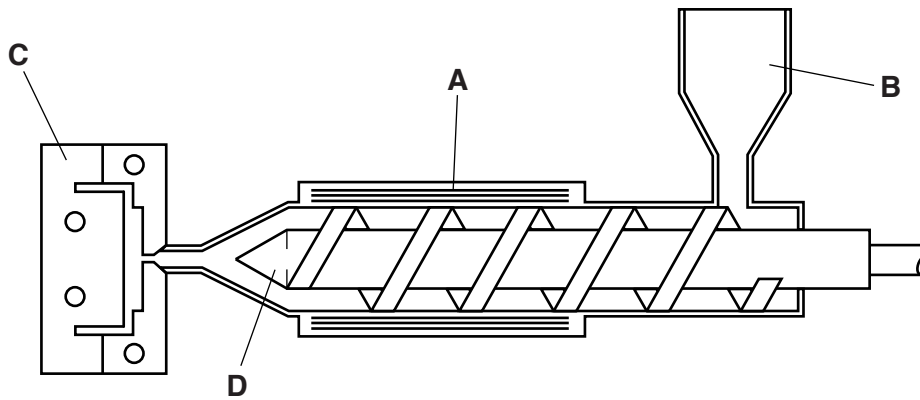


Fig. 2

(a) (i) Name the **four** parts of the injection moulding machine that have been labelled in Fig. 2.

- A .....
  - B .....
  - C .....
  - D .....
- [4]

(ii) Name **three** other plastics moulding processes.

- 1 .....
  - 2 .....
  - 3 .....
- [3]

(b) Give **three** reasons why plastics might be preferred to metals for making engineered products.

- 1 .....
  - 2 .....
  - 3 .....
- [3]

5 Computer numerically controlled (CNC) machines are widely used in engineering production.

(a) (i) Water jet cutting and milling are carried out on CNC machines.

Describe **one** advantage of water jet cutting when compared to milling.

.....  
.....  
..... [2]

(ii) Explain what is meant by the term 'multi-axis machining centre'.

.....  
.....  
.....  
.....  
.....  
..... [3]

(b) Name **two** additive manufacturing processes.

1 .....  
2 ..... [2]

(c) Explain how designers use modern technologies to develop new engineered products faster.

.....  
.....  
.....  
.....  
..... [3]

6 (a) (i) Explain what is meant by the term 'global manufacturing'.

.....  
.....  
..... [2]

(ii) Give **two** reasons why a company might use global manufacturing.

1 .....  
.....  
2 .....  
..... [2]

(b)\* Discuss the effects on the workforce of introducing modern technologies into engineering manufacture.

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..... [6]

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