



Oxford Cambridge and RSA

Thursday 19 May 2016 – Afternoon

**LEVEL 1/2 CAMBRIDGE NATIONAL 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. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- 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 each 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** the questions.

1 A list of different types of engineering material is given below.

- Alloy**
- Ceramic**
- Composite**
- Ferrous metal**
- Non-ferrous metal**
- Polymer**

(a) Complete the table below by stating the correct material type for each material given. Each type may be used more than once or not at all. The first one has been done for you.

Material	Material type
Tungsten carbide	Ceramic
Nylon	
Cast iron	
Copper	
Bronze	
High speed steel	

[5]

(b) Give the names of the **two** different categories of polymers.

1

2

[2]

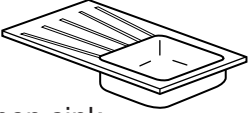
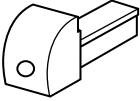
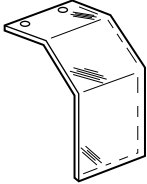
(c) Explain, using **one** example, what is meant by the term 'composite material'.

.....

[3]

2 The table below shows three engineered products.

- (a) Complete the table by naming a suitable, specific material for each product. Give **one** reason why the material named is suitable for the product. The first one has been done for you.

Product	Suitable material	Reason
 Kitchen sink	Stainless steel	Does not rust when it gets wet.
 Bench vice jaw		
 Lathe chuck guard		

[4]

- (b) Explain, using **one** example, the use of a smart material in a product.

.....

.....

.....

..... [3]

- (c) Give **three** characteristics of materials that should be considered when choosing a material for use in an engineered product.

1

2

3

[3]

3 Fig. 1 shows the body of a small clamp marked onto a piece of 10 mm thick mild steel.

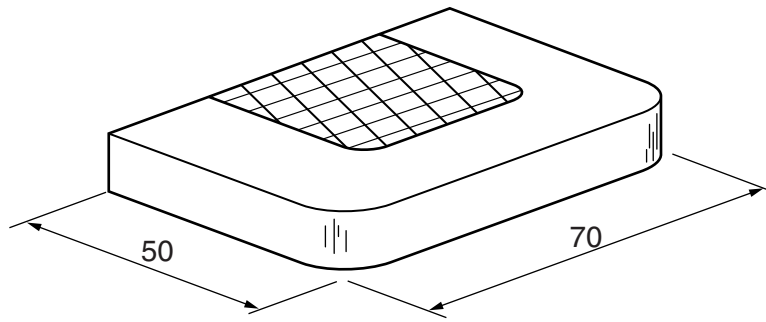


Fig. 1

- (a) Complete the table below by giving the stages needed to remove the cross-hatch section of the clamp body using **hand tools**.
Name **one** tool used for each stage.
The first and last stages have been done for you.

	Process	Hand tool used
Stage 1	Drill two holes to make the inside corners of the cut-out	Twist drill
Stage 2		
Stage 3		
Stage 4		
Stage 5	Remove all sharp edges	Smooth file

[6]

- (b) Give **one** surface finish, other than painting, that could be used on the clamp body.

..... [1]

4 Fig. 2 shows an aluminium alloy casting for a nameplate.

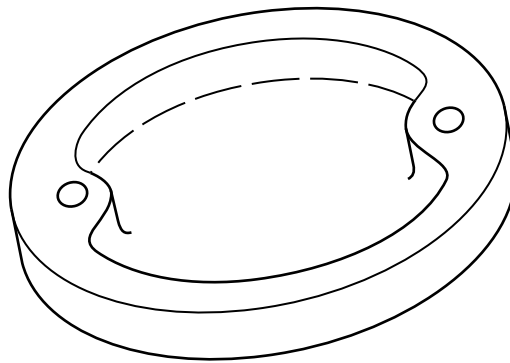


Fig. 2

(a) (i) Name the process used to make a one-off prototype of the nameplate.

..... [1]

(ii) Give **two** processes that could be used to make the nameplate in large quantities.

1

2

[2]

(b) Two fixing holes need to be drilled in a batch of the nameplates.

(i) Describe **two** methods that could be used to accurately position the holes in the nameplates.

1

.....

.....

2

.....

.....

[4]

(ii) Give **three** safety precautions that must be taken when using a drilling machine.

1

2

3

[3]

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

(a) Name **three** other types of CNC machine.

- 1
- 2
- 3 **[3]**

(b) Describe **two** advantages of CNC machines when compared to conventional machines.

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

(c) Give **three** ways that the introduction of CNC machines might affect the workforce.

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

6 (a) Describe **two** ways in which modern technologies have helped reduce the overall cost of production in engineering manufacture.

1

.....

.....

2

.....

.....

[4]

(b) Explain how digital communications might be used in Computer Aided Design (CAD).

.....

.....

.....

[3]

END OF QUESTION PAPER



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