

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
LEVEL 1/2**

**R109/01**

**CAMBRIDGE NATIONAL IN  
ENGINEERING MANUFACTURE**

**Engineering materials, processes  
and production**

**WEDNESDAY 23 MAY 2018: Morning**

**DURATION: 1 hour  
plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**None**

**READ INSTRUCTIONS OVERLEAF**



## **INSTRUCTIONS TO CANDIDATES**

**Use black ink. HB pencil may be used for graphs and diagrams only.**

**Complete the boxes on the front page 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).**

## **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 (\*).**

**Answer ALL the questions.**

**1 Many different materials are used in the manufacture of engineered products.**

**(a) (i) Give THREE examples of non-ferrous metals.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**3** \_\_\_\_\_

**[3]**

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

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(b) (i) Describe the main difference between thermoplastics and thermosetting plastics.**

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**[2]**

**(ii) Name THREE thermoplastics.**

**1** 

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**2** 

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**3** 

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**[3]**

- 2 (a) Complete the table below by giving ONE typical use for each of the materials given.

One has been done for you. [3]

Material	Typical use
Tungsten carbide	Cutting tool tips
Stainless steel	
Carbon fibre	
Cast iron	

- (b) Explain why sustainability is an important characteristic of engineering materials.

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[2]

**(c) Three types of smart materials are listed below.**

**Shape memory alloy (SMA)**

**Thermochromic materials**

**Quantum tunnelling composite (QTC)**

**Choose ONE type of smart material from the list and describe its use in a product.**

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**[3]**

**(d) Describe ONE simple workshop test that could be used to test the hardness of a metal.**

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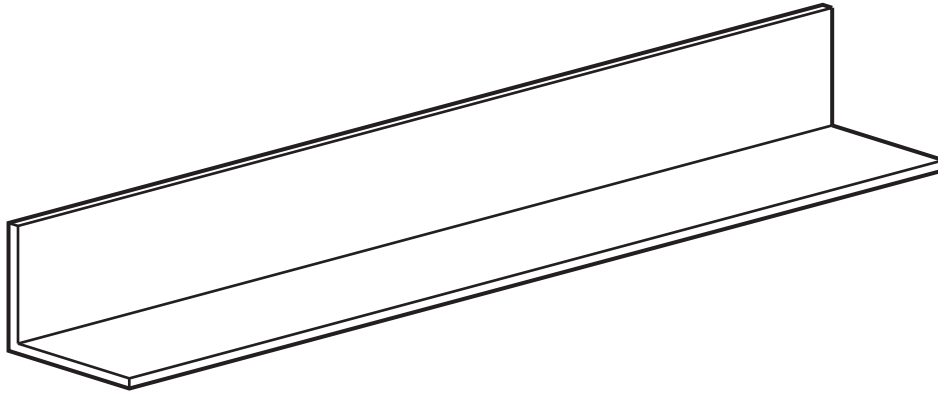
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**[2]**

- 3 Fig. 1 shows an aluminium alloy angle section made by the extrusion process.**

**FIG. 1**



- (a) Describe how the extrusion process would be used to produce the aluminium alloy angle section.**

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[3]

**(b) Extrusion is a forming process.**

**(i) Name TWO other forming processes for metal.**

1 \_\_\_\_\_

2 \_\_\_\_\_

**[2]**

**(ii) Describe TWO benefits of using forming processes in engineering production.**

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

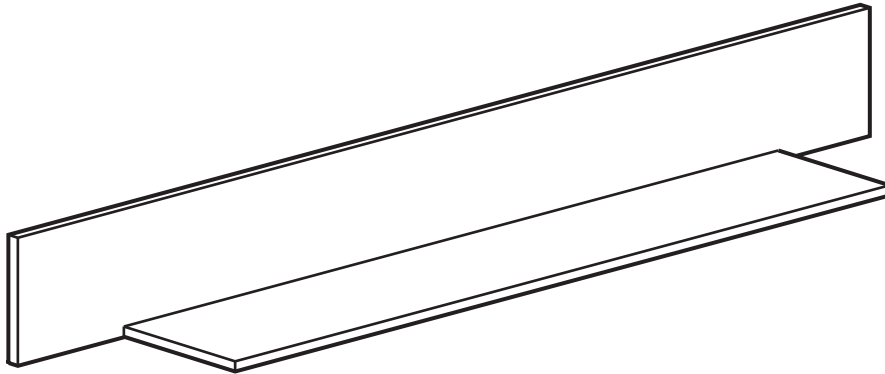
\_\_\_\_\_

**[4]**



- (c) The ends of the angle section are to be modified as shown in Fig. 2.

**FIG. 2**



**Give ONE process that could be used to modify the ends of the angle section.**

\_\_\_\_\_ [1]

**4 Heat treatment processes are used to modify the properties of engineering materials.**

**(a) (i) Name the heat treatment process that would be used to soften brass before bending and describe how it would be carried out.**

**Process** \_\_\_\_\_ **[1]**

**Description** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(ii) Name THREE other heat treatment processes.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**3** \_\_\_\_\_

**[3]**

**(iii) Give THREE safety precautions needed when carrying out heat treatment processes.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**3** \_\_\_\_\_

**[3]**

**(b) Name ONE surface finishing process suitable for use on brass.**

\_\_\_\_\_ **[1]**

**5 Water jet cutting is carried out on Computer Numerical Control (CNC) machines.**

**(a) Describe TWO benefits of using water jet cutting in engineering production.**

**1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[4]**

**(b) Give TWO applications of lasers in engineering production.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**[2]**

- (c) Introducing modern technologies into engineering production has resulted in a loss of jobs for some workers.**

**Describe TWO other effects on the workforce of introducing modern technologies into engineering production.**

**1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[4]**

[illegible]

14

**(b) Email is one example of digital communication.**

**(i) Give TWO other examples of digital communication.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ **[2]**

**(ii) Describe how email might be used in material supply and control.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

**END OF QUESTION PAPER**

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