Design & Technology
(Product Design)

DTBase©

OCR A-Level

Jigs, Fixtures, Formers and Moulds in Production (7.3b)

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don’t spend too much time on one question

Good luck!

Q1. What is the primary function of a **jig** in commerical manufacturing?

A To act as a container for molten material

B To hold a workpiece and guide a tool to ensure repeated accuracy

C To provide a decorative surface finish

Q2. A hydraulic press in sheet metal forming is best described as:

A A tool used to bend and shape sheet metal using high force and a matching die set

B A device that applies adhesive to join metal parts

C A digital system that prints metal layers for prototyping

Q3. Which of the following is a key benefit of using a **mould** in prototype production?

A It guarantees that the prototype will be made from the correct material

B It ensures each copy of the part is identical in shape and dimensions

C It eliminates all material waste during manufacturing

Q4. When bending sheet metal to a specific angle, a **former** is used to:

A Measure the thickness of the metal

B Provide a consistent shape around which the material is formed

C Apply a protective coating to the finished part

Q5. The image below shows a step stool.

Q5a. Identify two different types of jig that could be used in the manufacture of the step stool.

For each type of jig state one way in which it would be used in the manufacturing process. **(4 marks)**

Q5b. Discuss the importance of jigs in commercial production. **(6 marks)**

Q6. Explain the purpose of a template. **(2 marks)**

Q7. A manufacturer uses a jig when welding a bike frame together. Explain two reasons why a jig would be used. **(4 marks)**

Answers

Q1. B
Q2. A
Q3. B
Q4. B

Q5a.
Possible responses may include:

- Drilling Jig (1). Could have been used where the work piece is inserted into the jig and clamped/a template or drill plate is placed over the top to ensure that the holes are in the correct place (1).
- Cutting jig (1). Could have been used to slide the workpiece into and cut the length to a specific measurement/ensure the angle of each cut was exactly the same (1).
- Sanding jig (1). Could have been used to slide the workpiece into and sand the length to a specific measurement/ensure the angle of each piece was exactly the same (1).
- Any other valid suggestion.

Q5b.
Indicative content:

Importance of jigs in commercial production may include:

- Speeds up production as there is no time wasted measuring and marking out. This is important for commercial production as it reduces costs because less time is needed to manufacture each part, so the time in the factories is less and a smaller, less skilled work force is required.
- Ensures quality and accuracy as commercial products should be made exactly the same to prevent errors. Without jigs there is a greater chance of human error. This is very important as consumer complaints could lead to negative brand association and a fall in sales. Safety could also be compromised which would lead to huge implications for the manufacturer.
- Reduces waste from incorrectly made parts.
- Any other valid suggestion.

Q6.
Indicative content

The guidance provided is illustrative and not exhaustive. Credit any worthy points made in support of the band descriptors above.

- Templates are used to save time when marking out.
- You can draw round a template to produce multiple copies of a part or design.
- They are used to allow repetition and improve accuracy between identical parts.
- They are reusable so you do not have to redraw identical parts fresh each time. Accept other valid responses.

Q7.
A manufacturer uses a jig when welding a bike frame together.

Explain two reasons why a jig would be used.

Indicative content:

- Jigs can be used to hold components in place while joining/fabrication is undertaken reducing labour costs.
- Jigs can be used to guide tools during fabrication reducing errors from slippage.
- Jigs remove the risk of components moving during fabrication, this reduces errors and improves quality control.
- Jigs increase speed of repeating a process as they aid simple line up of components.
- Jigs increase accuracy of repeat components as they remove some of the need for measurements.

This list is not exhaustive. Accept any other valid responses.