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Design & Technology
AQA A-Level

Accuracy in design and manufacture

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. Why is accuracy important in manufacturing?

A It makes the product look more colourful

B It ensures parts fit and function correctly

C It reduces the use of automated machinery

Q2. How can testing during production help eliminate errors?

A By checking for faults early and allowing corrections

B By making production faster

C By removing the need for quality control

Q3. What is the main purpose of using jigs and fixtures in manufacturing?

A To speed up design sketching

B To increase the variety of materials used

C To improve consistency and reduce human error

Q4. Which of the following is a benefit of using templates during manufacturing?

A Ensures identical shapes or markings every time

B Reduces the amount of colour variation

C Allows random changes in each product

Q5. The image below shows a galvanised low carbon steel frame for a wheelbarrow

Explain how jigs and templates may have been used to accurately produce multiple copies of the frame **(6 marks)**

Q6. Explain how increased accuracy within production processes can reduce waste and improve efficiency **(6 marks)**

Answers

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

Q5.

- A template may be used to check the angle of bend in the tube when creating the front section of the frame.
- A jig would be used to hold the steel brackets in place when being welded to the tubular frame.
- A jig would be needed to hold the frame in the correct orientation when all holes are being drilled.
- A template may be used to mark holes for drilling on the frame.
- A bending jig to shape/curve the steel framework.
- A cutting jig to cut the lengths of steel initially.

Q6.

Reducing Waste:

- The use of jigs and templates will reduce variation in repeated processes and waste materials.
- Using jigs and fixtures will allow the use of temporary fixings to join standardised components that can be interchanged and replaced rather than replacing whole products during QC checks.
- The use of Go no-go gauges allows quick and effective QC checks on dimensional accuracy within set tolerances to control production processes.
- Setting accurate temperature tolerances in forming processes reduces variation in produced products and waste products.
- Use of Six Sigma monitoring processes can reduce errors in final production and therefore reduce waste materials.
- Ensuring accuracy in tooling reduces errors in produced components
- Accurate tessellation of components reduces waste materials in production processes.
- Pre-production modelling allows accurate material volume ordering reducing surplus material for storage.

Improving Efficiency:

- Reduced storage for failed products (clearer workspaces).
- Quicker identification of production processes errors due to tight QA procedures.
- Better tracking of errors and prediction of errors.
- Introduction of automated QC checks without human interaction give tighter tolerances