Your notes

GCSE Engineering: revision notes

Selecting materials

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Factors in choosing materials

- Function: what the part must do, and which properties it needs (such as strength, hardness or conductivity).
- Cost: the price of the material and of processing it.
- Availability and forms of supply: metals come as sheet, plate, bar, rod, tube and sections (such as angle and I-beams); polymers come as granules, sheet, rod and film.
- Manufacturing: how easily it can be cut, formed or joined, and whether it suits the scale of production.
- **Aesthetics**: appearance, colour and finish.
- Environment: whether it is recyclable, how much energy it takes to extract and process, and whether it is finite.

Examples of choices

- Car body panels: pressed steel sheet, because it is strong, cheap and easy to form, or aluminium to save weight.
- Electrical cables: copper for conductivity, with a PVC coating as an **insulator**.
- Plug casings: urea formaldehyde, a thermoset that is hard, heat resistant and an electrical **insulator**.
- Aircraft parts: aluminium alloys and carbon fibre composites, for their high **strength-to-weight ratio**.

Stock sizes and cost

- Buying standard **stock sizes** reduces cost and waste. Engineers compare cost per kilogram and how much waste a design creates.

Key terms

Form of supply	The shape a material is sold in, such as sheet, bar or tube.

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Stock size	A standard size of material available to buy.
Strength-to-weight ratio	How strong a material is compared with its weight.
Finite resource	A resource that will run out.
Insulator	A material that doesn't conduct electricity or heat well.
Aesthetics	How a product looks and feels.

Your notes

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Why are electrical cables made of copper?
2. Why are cables coated in PVC?
3. Why is urea formaldehyde used for plug casings?
4. Which form of supply is typical for polymers?
5. Why buy standard stock sizes?
6. Why are aircraft parts often made of aluminium alloys?
7. What is a finite resource?
8. Which factor is about how a product looks?

Answers

1. It is an excellent electrical conductor
2. PVC is an electrical insulator
3. It is hard, heat resistant and an electrical insulator
4. Granules
5. To reduce cost and waste
6. High strength-to-weight ratio
7. A resource that will run out
8. Aesthetics

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

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