Your notes

GCSE Engineering: revision notes

Shaping and forming

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Casting

- Casting pours molten metal into a mould. In **sand casting**, a pattern makes a cavity in sand; the sand is broken to release the part. It suits one-off or low-volume, large parts, but has a rough finish.
- **Die casting** injects molten metal (such as aluminium or zinc) into a reusable steel die. It gives accurate parts with a good finish, suited to high volumes, but dies are expensive.

Forming metals

- **Forging** shapes hot metal by hammering or pressing it. The grain structure follows the shape, making parts strong, such as spanners and crankshafts.
- Pressing (stamping) shapes sheet metal between dies, such as car body panels.
- Bending folds sheet metal, often on a press brake. **Extrusion** forces material through a shaped die to make long parts with a constant cross-section, such as aluminium window frames.

Forming polymers

- **Injection moulding**: thermoplastic granules are melted and injected into a mould under pressure. It makes complex parts at very high volume and low unit cost, but moulds are very expensive.
- **Vacuum forming**: a heated thermoplastic sheet is sucked over a mould, such as for packaging trays.
- **Blow moulding**: air inflates a heated tube of plastic inside a mould, making hollow items such as bottles.
- **Extrusion** also makes plastic pipes and window frames.

Scale of production

- One-off: single items, often by hand. Batch: a set quantity. Mass: large numbers, often on production lines. High tooling costs are only worthwhile for high volumes.

Key terms

Sand casting	Pouring molten metal into a sand mould made using a pattern.
Die casting	Injecting molten metal into a reusable steel die.
Forging	Shaping hot metal by hammering or pressing.
Extrusion	Forcing material through a die to make a constant cross-section.
Injection moulding	Injecting melted thermoplastic into a mould under pressure.
Vacuum forming	Sucking a heated plastic sheet over a mould.
Blow moulding	Inflating heated plastic inside a mould to make hollow items.

Quick questions

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

1. Which process makes plastic bottles?
2. Which process makes long parts with a constant cross-section?
3. Why are forged parts strong?
4. Which process suits high-volume, complex plastic parts?
5. What is a disadvantage of sand casting?
6. What is used in sand casting to form the cavity?
7. Which process makes packaging trays from plastic sheet?
8. Why is die casting suited to high volumes?

Answers

1. Blow moulding
2. Extrusion
3. The grain structure follows the shape
4. Injection moulding
5. A rough surface finish
6. A pattern
7. Vacuum forming
8. The steel die is reusable and gives accurate parts

What to do next

Practise 10 questions on this topic

Your notes

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

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