Your notes

GCSE Engineering: revision notes

Additive manufacture, CAD and CAM

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Additive manufacturing

- **Additive manufacturing** builds parts layer by layer, instead of removing material. It is often called 3D printing.
- Fused deposition modelling (FDM) melts a plastic filament (such as PLA or ABS) and deposits it layer by layer.
- Stereolithography (SLA) uses a UV laser to set liquid resin, giving fine detail.
- Selective laser sintering (SLS) uses a laser to fuse powdered material, including metals and nylon.
- Advantages: complex shapes that can't be machined or moulded, very little waste, no tooling needed, easy customisation and **rapid prototyping**.
- Disadvantages: slow for large numbers, limited materials and sizes, visible layer lines, and parts may be weaker between layers.

CAD and CAM

- CAD (computer-aided design) is used to draw and model parts in 3D. Designs can be changed quickly, shared electronically and tested virtually before anything is made.
- CAM (computer-aided manufacture) uses the CAD data to control machines such as CNC mills, lathes, laser cutters and 3D printers.
- Together, CAD and CAM reduce errors, speed up development and make parts consistent. But software and machines are expensive and staff need training.

Rapid prototyping

- Prototypes let engineers test form, fit and function early, finding problems before expensive tooling is made.

Key terms

Additive manufacturing	Building parts layer by layer.
FDM	Fused deposition modelling, which deposits melted filament in layers.
SLA	Stereolithography, which uses a UV laser to set liquid resin.
SLS	Selective laser sintering, which fuses powder with a laser.
CAD	Computer-aided design.
CAM	Computer-aided manufacture.
Rapid prototyping	Quickly making test models of a design.

Quick questions

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

1. How does additive manufacturing make parts?
2. What does FDM use?
3. Which process uses a UV laser to set liquid resin?
4. What is an advantage of 3D printing?
5. What is a disadvantage of 3D printing?
6. What does CAD stand for?
7. What does CAM do?
8. What is rapid prototyping?

Answers

1. Layer by layer
2. A melted plastic filament
3. Stereolithography (SLA)
4. Complex shapes with very little waste
5. Slow for large numbers
6. Computer-aided design
7. Uses design data to control machines
8. Quickly making test models of a design

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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