

Knowledge organiser: pewter pendant (Skills Focus)

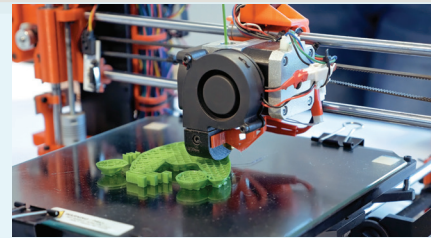
CAD stands for computer-aided design

- It is any use of software that helps the design process, including drawing and modelling.
- Compared to drawing by hand, CAD drawings can be:
 - edited if changes are needed, rather than starting again
 - more accurate
 - saved and shared electronically
 - sent to computer-controlled machines to be made.



CAM stands for computer-aided manufacturing

- It means that a computer controls the tool or process – it is sometimes called **computer numerical control (CNC)**.
- The machine can often be controlled using a drawing sent from CAD software.
- CAM machines include:
 - laser cutters
 - 3D printers
 - CNC routers
 - robot arms
 - CNC lathes, milling machines, grinders.



CAM advantages and disadvantages

Advantages

- CAM machines can usually carry out tasks faster.
- They make complicated shapes more easily.
- Every part made is the same.
- They are more accurate.
- They can run 24 hours a day, seven days a week.

Disadvantages

- CAM machines can have a high initial set-up cost.
- For one-off products, CAM might take more time than making the product by hand due to the need to programme the machine.
- Can replace a person causing people to lose their jobs.

Types of polymers

Polymers can be split into two main types:

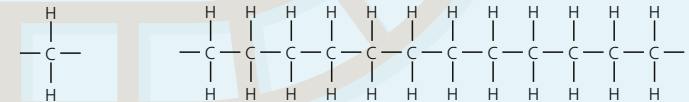
- **Thermoplastic polymers** become softer and flexible when heated.
- **Thermosetting polymers** cannot be reshaped when heated – instead they may start to char and burn.



We will be making a thermosetting polymer called **casein** as part of this project.

Monomers, polymers and plastics

- Polymers are made of a large number of similar, smaller chemical units called monomers.
- These monomers bond together to form polymer chains.



A simple monomer

The structure of the polymer polyethylene

- Monomers can come from two sources:
 - Natural – from nature
 - Synthetic – made by humans

Safety in the workshop – pewter casting

Pewter casting can be dangerous. Make sure you follow all workshop safety rules.

- Pewter casting can cause severe burns.
- Never touch the liquid.
- Make sure that the mould is dry – moisture can turn to steam, pushing the metal out of the mould.
- If pouring pewter, wear personal protective equipment – goggles (or even better a full face visor) and heat-proof gloves.
- Always allow the mould to cool thoroughly before you open it.



Metal shaping processes

- **Wasting** means removing material.
- Wasting processes include:
 - hacksaws and junior hacksaws
 - drills
 - files
 - milling machines (for flat surfaces and slots)
 - lathes (for parts with a circular profile).
- Parts can be shaped by **bending** – by forcing them round a former or using a press.
- **Brazing** and **welding** are used to join parts.

