



### Computer aided design - CAD

Design software such as 2D design or Sketchup, allow the designer to draw a product in detail. Products can be designed and modified quickly. CAD allows for the testing of prototypes during the design process, without the need to make it.

### Computer aided manufacture - CAM

Once a prototype design has been produced, it can be manufactured on a CNC machine or Laser Cutter. Computer Aided Manufacture (CAM) has meant that products and components can be made repeatedly to the same high standard.

### Focused Topics

#### THERMOSETTING PLASTICS

THESE ARE PLASTICS THAT ONCE HEATED AND MOULDED, CANNOT BE REHEATED AND REMOULDED. THE MOLECULES OF THESE PLASTICS ARE CROSS LINKED IN THREE DIMENSIONS AND THIS IS WHY THEY CANNOT BE RESHAPED OR RECYCLED. THE BOND BETWEEN THE MOLECULES IS VERY STRONG.

UREA FORMALDEHYDE	SOME ADHESIVES (GLUES)	POLYESTER RESINS
POLYURETHANE	SILICONE	MELAMINE FORMALDEHYDE
BAKELITE	MELAMINE RESIN	DUROPLAST



#### THERMOPLASTICS

THESE PLASTICS CAN BE RE-HEATED AND RE-SHAPED IN VARIOUS WAYS. THEY BECOME MOULDABLE AFTER REHEATING AS THEY DO NOT UNDERGO SIGNIFICANT CHEMICAL CHANGE. REHEATING AND SHAPING CAN BE REPEATED. THE BOND BETWEEN THE MOLECULES IS WEAK AND BECOMES WEAKER WHEN REHEATED, ALLOWING RESHAPING. THESE TYPES OF PLASTICS CAN BE RECYCLED.

ACRYLIC (KNOWN ALSO AS PERSPEX)	POLYPROPYLENE (PP)	NYLON
POLYVINYL CHLORIDE (PVC)	LOW DENSITY POLYTHENE (LDPE)	
POLYSTYRENE	HIGH IMPACT POLYSTYRENE (HIPS)	TEFLON



### Key Terms

**Automation-** Using automatic equipment in production – e.g. robots

**Computer aided design (CAD)-**The process of creating a 2D or 3D design using computer software.

**Computer aided manufacture (CAM)-**The manufacture of a part or product from a computer aided design (CAD) using computer-controlled machinery, such as a 3D printer.

**Laser cutting-** a technology that uses a laser to cut materials

**Thermoplastic-** types of plastic which become soft when they are heated

### Tasks

**Task 1:** Create a mind map about the thermoset plastics.

**Task 2:** Create a mind map about the thermoplastics.

**Task 3:** Create 6 questions that can be answered from the information on the knowledge organiser.

**Task 4:** Create a quiz based on task 1, 2 or 3. Get someone to test you.

**Task 5:** Create a mind map for the information you remember and red pen anything you've forgotten.

**Task 6:** Teach it. Create a task that can be used to teach some of the information from here.

### To go further:

Introduction to 3D modelling: SketchUp



Precious Plastic - The basics of plastic



## CAD

Computer Aided Design. This allows users to draw, design and model products using specialist software. Designers can create 2D and 3D models and manipulate their designs to test different ideas before manufacture.

## CAM

Computer Aided Manufacture. This uses Computer Numerical Control (CNC) to create CAD designs. The CAM machines, such as laser cutters and 3D printers interpret the coordinates to create the design.



## ADVANTAGES

- Increased efficiency and productivity.
- Fewer errors, improved accuracy.
- Reduced labour costs as fewer people.
- Can perform work that is dangerous for humans.
- Can be cheaper over time than using people.



## DISADVANTAGES

- Expensive to set up and maintain.
- Replaces humans meaning job losses.
- No human judgement if something goes wrong.
- Required highly skilled people to operate them.



