


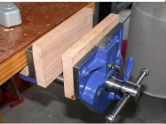


1

Year 9 SPRING EXAM Product Design Knowledge Organiser

| | | |
|--------------------------|---|---|
| Coping Saw |  | A saw with a very narrow blade stretched across a D-shaped frame, used for cutting curves in wood |
| Sand-paper |  | A low grade abrasive material used to smooth woods and plastics |
| Wet and dry paper |  | A high grade abrasive material used to achieve a high quality finish |
| Vice |  | Used to hold work in place when sawing and filing |

How to cut acrylic:

1. with hand tools (above)
2. with CAD/CAM:



Step 1: create the design on 2D Design computer software

Step 2: put the correct **colour, size and thickness** of acrylic on the laser cutter bed

Step 3: **program** the laser cutter for the right **settings** for **speed and power**

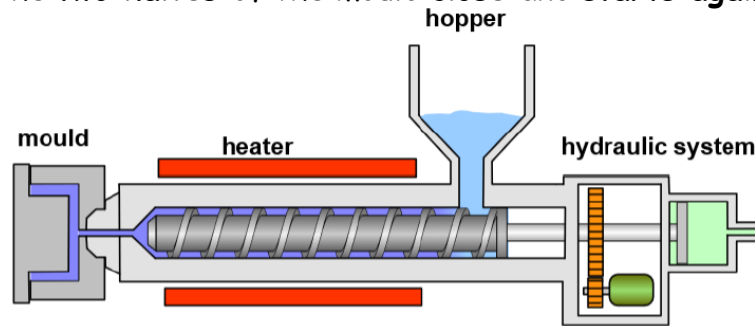
Step 4: turn the **extraction** on and **run** the program

The adhesive you use to glue acrylic together is Tensol Cement because it is a solvent-based adhesive that melts the surface to fuse them together. It does not need to be mixed first.

2

The Process of Injection Moulding


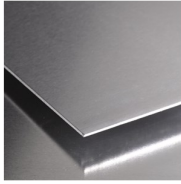
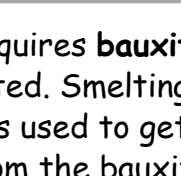
- 1 **Granules** (small beads) of polymer are fed into a **hopper**. A **colour pigment** is added at this stage if a specific colour is required.
- 2 The granules are **fed forwards towards the mould** using an **Archimedes screw**.
- 3 The **heat chamber** that surrounds the screw gradually **melts** the polymer as it moves towards the mould.
- 4 The screw **moves away from the mould** as the volume of molten polymer **builds up next to the mould**.
- 5 A **hydraulic system** rams the screw towards the **mould**, pushing the molten polymer into the mould.
- 6 The **polymer cools quickly** in the mould. The **two halves** of the mould are **opened**. The **ejector pins** push the formed object from the mould.
- 7 The **two halves** of the mould **close** and starts again.



Acrylic is readily available in 3mm and 5mm sheets which means the overall cost is lower. One solid thick piece of 30mm is difficult to source and expensive.

Layering different sheets means you can select colours to achieve different effects.

3

| | | |
|--|---|--|
| E.g. cast iron Ferrous Metals |  | Metals which contain iron and will rust and will attract a magnet |
| E.g. stainless steel Non-ferrous Metals |  | Metals which contain DO NOT iron and will NOT rust and will NOT attract a magnet |
| E.g. copper Alloys |  | Metals that are a mixture of two or more other metals or elements |
| E.g. ferrous alloy: stainless steel Alloys |  | |
| E.g. non-ferrous alloy: brass, bronze | | |

Aluminium requires **bauxite ore** to be extracted. Smelting or electrolysis is used to get aluminium from the bauxite.



Aluminium is commonly found in China, Australia and USA. The extraction sites create a lot of **noise and pollution** and destroy natural **habitats**.

Smelting and electrolysis need a lot of **electricity**. These factories are usually powered from **non-renewable** sources like coal, oil and gas which we have a limited supply of and generates pollution.

The ore and aluminium are likely to be **transported** between a number of **factories** (e.g. for it to be printed) which will cause more pollution.

