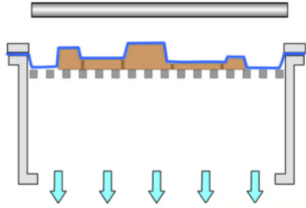




## Vacuum forming

1



1. place former on the platen and lower it with the lever
2. secure HIPS in place with toggle clamps to create air tight seal
3. heat HIPS until softened
4. raise the platen and turn vacuum on to pull the HIPS around the formers
5. lower the platen and leave to cool before unclamping the HIPS

Formers must have a draft angle so they can be removed from the HIPS. **Webbing** can occur if formers are too close together, too high or the HIPS wasn't heated properly.

<b>Former</b>		The item to be vacuum formed
<b>Platen</b>		Inside the vacuum former to put formers on. It is raised and lowered by the lever.

## Thermoforming Polymers

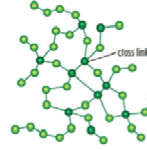
- Can be reheated and reshaped
- Can be recycled



**Examples:**  
Acrylic, PVC, HIPS, HDPE, Styrofoam, PET

## Thermosetting Polymers

- CAN'T be reheated or reshaped
- CAN'T be recycled





**Examples:**  
Urea formaldehyde, polyester resin

## Properties of Materials

3

<b>Hard</b>	Able to withstand being dented
<b>Tough / impact resistant</b>	Able to withstand breaking on impact
<b>Thermal conductor</b>	Allows heat to pass through e.g. metals such as copper
<b>Electrical conductor</b>	Able to conduct electricity e.g. metals such as copper
<b>Insulator</b>	Does not allow electricity or heat to pass through e.g. fabric, timbers, polymers
<b>Corrosion resistant</b>	Able to resist corrosion (will not react with oxygen and water)
<b>Malleable</b>	Able to be permanently deformed in all directions without breaking
<b>Durable</b>	Able to withstand deterioration over time



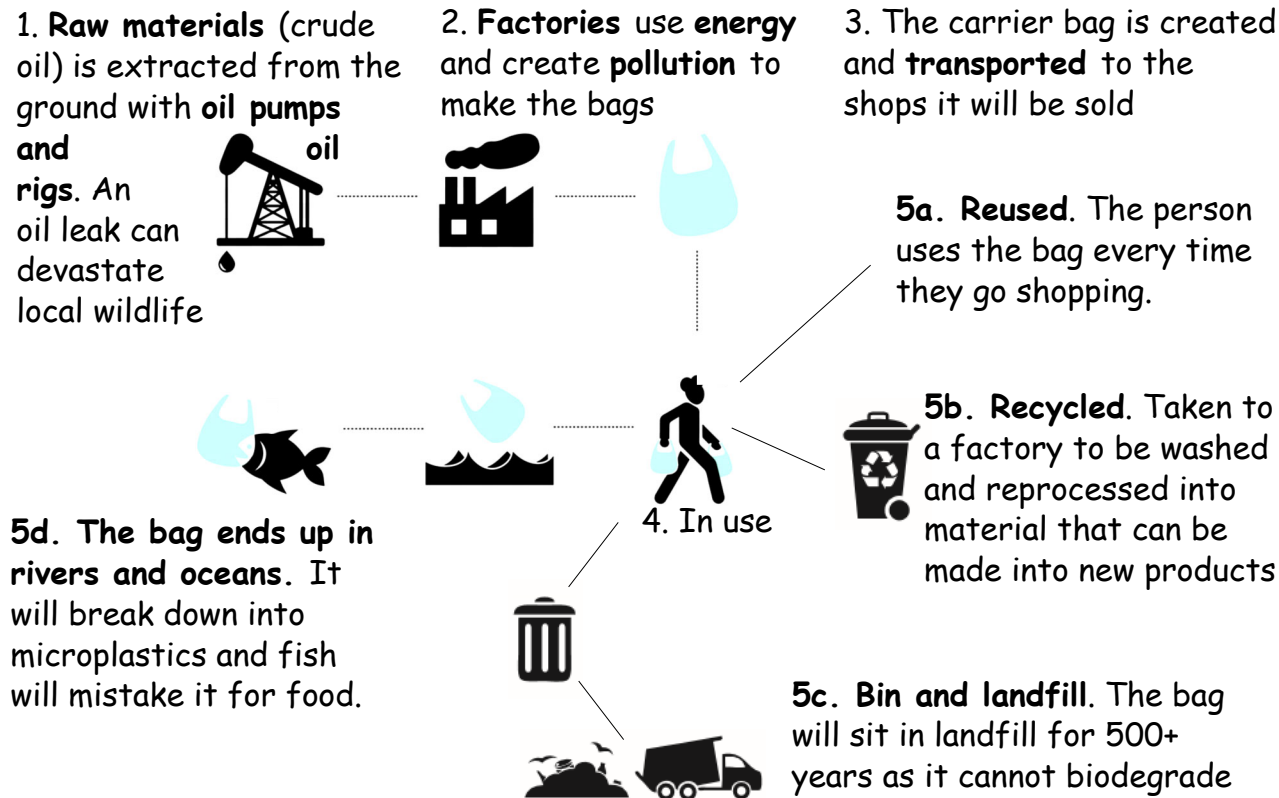
E.g. cast iron <b>Ferrous Metals</b> E.g. stainless steel		Metals which contain iron and will rust and will attract a magnet <b>4</b>
E.g. copper <b>Non-ferrous Metals</b> E.g. aluminium		Metals which contain DO NOT iron and will NOT rust and will NOT attract a magnet
E.g. ferrous alloy: stainless steel <b>Alloys</b> E.g. non-ferrous alloy: brass, bronze		Metals that are a mixture of two or more other metals or elements

E.g. oak, beech <b>Hard-woods</b> E.g. ash, mahogany		Timbers from deciduous trees that lose their leaves in winter. They produce expensive, close grained woods. <b>5</b>
<b>Soft-woods</b> E.g. cedar, pine		Timbers from coniferous trees that have needles and cones. They produce cheaper woods with lots of knots.
<b>Manufac-tured Boards</b> E.g. plywood, MDF		Boards that we make from scraps of other timbers e.g. MDF, chipboard,

6

<b>Reduce</b> Use less (materials, energy, resources)	<b>Reuse</b> Use the product for a different purpose	<b>Recycle</b> Reprocess the material to make a new product	<b>Rethink</b> Find a better way (e.g. use different materials)	<b>Repair</b> Fix the product instead of throwing it away	<b>Refuse</b> Don't buy / use something that is unsustainable
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**Life Cycle Analysis of a Carrier Bag**



Advantages of recycling and reusing	Disadvantages of recycling and reusing
Less waste material goes to landfill	Recycling process can be difficult to separate materials and people can put the wrong items in recycling bins
Reduces the need for transportation	
Helps to reduce global warming caused by emissions from processing raw materials	Although less than creating new items, the recycling process still uses energy, transportation
Reduces the demand for new raw	Quality of the recycled material may be

**Renewable energy sources**

Solar    Wind    Hydroelectric  
Tidal    Biodiesel    Biomass



7

**Advantages:**

More environmentally friendly  
Some can be stable and a reliable source (e.g. tidal)

**Disadvantages:**

Some can vary (wind)  
Can be expensive to set up  
Some only available in certain areas

**Environmental Impact of Kinder Eggs**

8



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 that causes global warming.