

Specialist Technical Principles Packaging manufacture



A: Commercial packaging comes in a wide variety of formats, including boxes and blister packs. In a blister pack, the vacuum formed 'blister' allows the customer to see the product they are buying. It also provides protection for the product, securing any small parts to protect them against damage in transit.



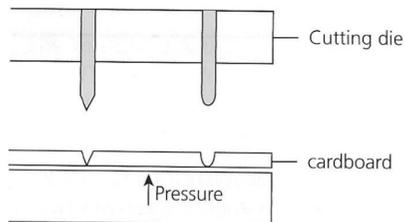
B: Die cutting

Die cutting is used to make multiple, identical shapes. It works in a similar way to a biscuit cutter.

A shaped blade called a die is used to cut material. The material to be cut is placed under the die and the die is lowered.

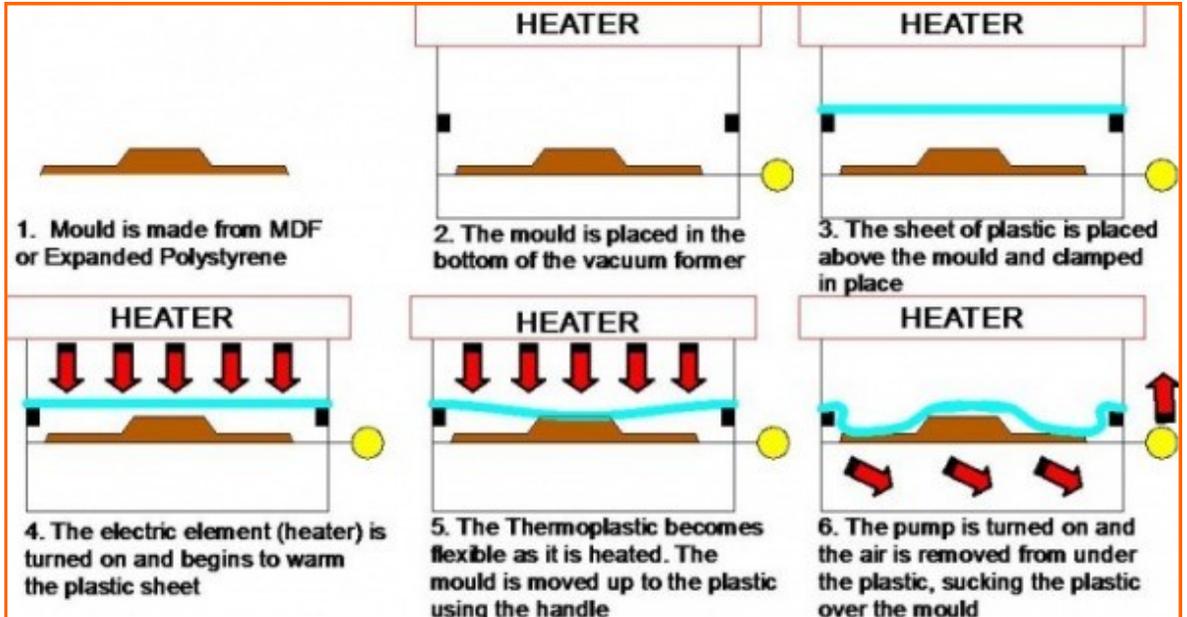
For creasing, blunt blades are used. The blade does not cut through the material but creases it. This is useful for materials that need to be folded such as surface developments or popup mechanisms.

Cutting can also be done with a **CNC** cutter.



C: Vacuum forming

Vacuum forming is used to produce 3D complex shapes in a thermoplastic polymer sheet. High-impact polystyrene (HIPS) sheet and Polyvinyl chloride (PVC) are commonly used for this in schools. Before a vacuum formed product can be made, a mould must be produced. The accuracy and finish of the mould for vacuum forming is very important, as any imperfections will show up on every product it produces. The key features of a mould are: sloping sides (3-4°) to allow the polymer sheet to be removed, rounded corners, to prevent the polymer sheet from thinning and possibly splitting, vent holes to allow the air to be removed from inset sections and it should have a smooth surface.

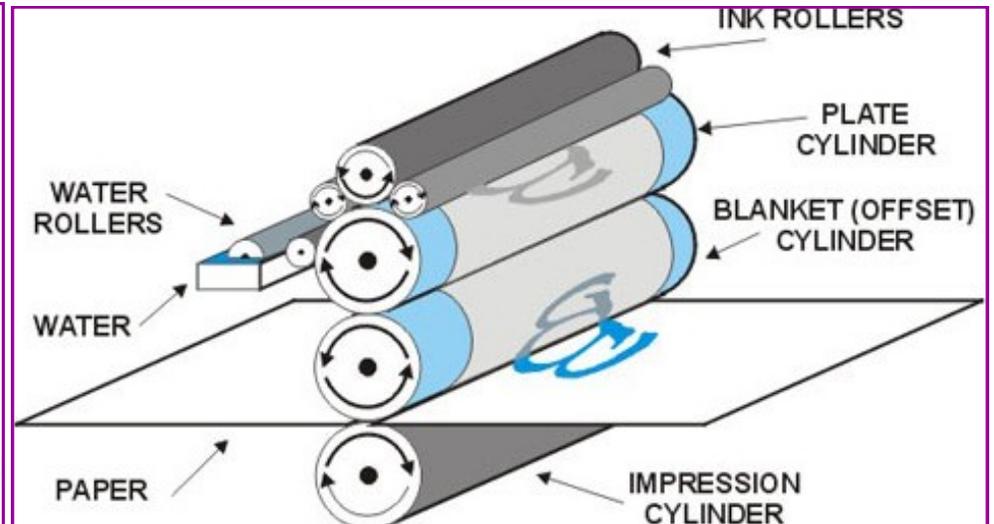
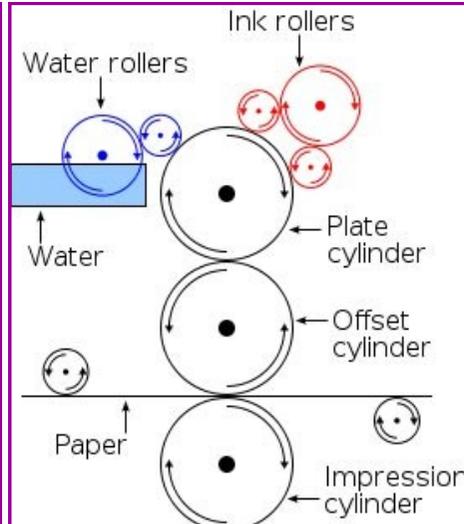


D: Offset lithography

Used for medium and long print runs of products such as magazines, posters, packaging and books.

The process is based on the principle that oil and water do not mix. The images are put on aluminium plates by exposing them to UV light. The plates are then chemically treated so that the non-image areas are water absorbent. The plate is then attached to a cylinder.

Ink and water are applied via rollers to the plate cylinder. Parts of the plate cylinder are kept wet by the water rollers so the ink does not stick to these areas. This creates the image area. The inked plate cylinder transfers the image to the rubber blanket cylinder (offset cylinder). At this point the image is reversed. Finally it is transferred to the material. The process is repeated for each of the colours required.



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E: Keywords

- Die cutting: a process that uses metal blades and a press to cut a shape in paper or card
- Offset lithography: a transfer printing process used to print products in large quantities
- Vacuum forming: a process where a heated polymer sheet is formed onto a mould using a vacuum
- Commercial: making or intending to make a profit
- CNC: computer numerical control; using a computer to control a machine tool

F: Video and web-links

- Offset lithography: <https://www.youtube.com/watch?v=5LMU-zB8Sro&t=17s>
- Offset lithography: <https://www.youtube.com/watch?v=601EFhOTiR4>
- Die cutting: <https://www.youtube.com/watch?v=PfO1gGLEnqc>
- Vacuum forming: <https://www.youtube.com/watch?v=Oi5KLNxVlc0&t=4s>

Revision Checklist

I understand the use of the die cutting process in the manufacture of commercial packaging	
I can describe the vacuum forming process using sketches and notes	
I understand the use of the vacuum forming process in the manufacture of blister packs	
I understand the use of offset lithography to apply a finish to commercial packaging	

Test yourself

1. In offset lithography, why is the image reversed on the offset cylinder?

2. Describe how the die cutting process works.

3. Draw and label all the features of a mould for the vacuum forming process.

4. What are the advantages of packaging a children's toy in a blister pack for:
 - a. the consumer

 - b. the manufacturer