Chapter 5

BLOW MOULDING PROCESSES

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SUMMARY

Blow moulding is a relatively young process which has developed steadily and now includes many hybrid processes which have in common only the single feature that they use a gas to inflate the soft plastic preform orparison. Machines using these variations on the basic theme are now available, in series production, and seem likely to establish themselves in specific market areas.

Major emphasis is placed on extrusion and extrusion accumulator processes as these represent the major part of everyday blow moulding.

1. INTRODUCTION

Continuous extrusion blow moulding and its development, continuous extrusion accumulator blow moulding, for large components, have been joined by a number of hybrid variations over the past several years.

One direct development is co-extrusion blow moulding, in which a normal one-material parison is replaced by a parison involving two, three or even five layers of different plastic materials, where the combined properties of the resulting laminate are significantly better or more economic than the original.
The advantages of true biaxial orientation are well known, but only over the past ten years or so have manufacturers offered equipment to produce bottles where the inherent properties of PVC, PET and PP can be more fully achieved by this process—more commonly known as 'stretch blow'.

Materials exhibiting minimal melt strength but nevertheless offering very desirable properties have led to the development of several types of injection blow moulding machine, where established injection moulding technology, including hot runner manifold systems, could be applied directly to the blow moulding process. A further variation on this method of obtaining a preform is via dip blow moulding, where a mandrel is inserted into a melt pool.

As the advantages of these developments are clear, it seems inevitable that further sophisticated combinations of processes will be developed. It can only be a matter of time before someone offers a machine producing blow moulded components via an injection, co-extrusion, stretch blow process!

2. MATERIALS USED IN BLOW MOULDING

In principle, any thermoplastic material which has sufficient melt strength to form a parison can be blow moulded. In practice, only very few common thermoplastic materials are used in significant quantities. Today, high density polyethylene and rigid poly(vinyl chloride) are still much the major part of total tonnage, although in the past few years other materials, for example poly(ethylene teraphthalate) for stretch blown bottles, have rapidly become significant. The more expensive engineering thermoplastics continue to find small specialised areas of blow moulding where their high price can be offset by the unique properties they offer.

2.1. Material Consumption Levels

The graph in Fig. 1 shows the growth patterns for all the major blow moulding plastics up to the late 1970s. It is clear that PVC and HDPE continue to find new markets, while PP has yet to achieve its predicted significance. Polyester (PET) is the only significant new growth material in the blow moulding sector, too new to appear on our graph.