

Blow Molding

Machine & Die Design

Machine

The requirements for the machine drive unit are the same for the blow molding process as for the extrusion process. For more detail on those elements of the blow molding unit, refer to the **Extrusion** section of the manual.

In blow molding we find four types of machines which each yield advantages and disadvantages.

Accumulator head

- Advantages
 - Better control on parison length/part weight
 - Short "hang time"
 - Ability to process at higher temperature (better flowability)
 - Many machines in the field
- Disadvantages
 - Risks of higher shear through the die
 - Risks of degrading the material in the head

Multiple Head

- Advantages
 - More output (parts/hour)
- Disadvantages
 - Risks of unbalanced melt flow
 - Risks of melt temperature differences between the heads
 - Risks of "hot spots"
 - Risks of high shear when separating the melt

Reciprocating screw

- Advantages
 - Better control on parison length/part weight
 - Short "hang" time for parison
 - Can process at higher temperature (better flowability)
 - Less risk of degrading the material in the head

- Disadvantages
 - Risks of higher shear through the die
 - Limited numbers of machine manufacturers in the field

Continuous extrusion

- Advantages
 - Many machines in the field
 - Lower shear through the die
 - Less risk of degrading the material in the head
- Disadvantages
 - Possible long "hang" time of parison
 - Variation in the parison length/ part weight
 - May need to process at low temperature

Die design

Although continuous extrusion is more favorable, some accumulator head designs can be used for blow molding of Elastollan® TPU's.

In general, the mandrel and the die used to process Elastollan® TPU must be streamlined so that there are no sharp angles (or corners) and no "dead spots" in which material can accumulate. All angles (or corners) should be rounded.

Mandrel and dies designed for polyolefin materials should be avoided because of their continuous increase rates of shear through the die lips.

For best results, the entrance angle into the die should not be more than 30°. In general, the die land length can be between 5 and 15 times the profile wall thickness, depending on the linear production rate.

Figure 52 shows a typical blow molding head.

Two important factors that cannot be overemphasized are the need for good temperature control (multi-zone control) and good insulation around the adapter and die. This will ensure a uniform flow through the adapter and die sections.

Custom Screw Design Service

For information, please see the Injection Molding section of this binder.

Figure 52
Diagrammatic View of a
Torpedo Head

