BLOW MOLDING POLYPROPYLENE

Polypropylene offers many advantages over other blow molding resins. A high heat distortion temperature allows its use in hot-fill applications. The ability to be autoclaved without excessive haze or color development enables it to be used in medical applications. It also has excellent environmental stress-cracking resistance, as well as chemical-and solvent-resistance.

Polypropylene has good contact clarity, low color, and very low moisture transmission rates, all of which make it ideal for blow molding applications. This report outlines equipment requirements and provides suggested operating ranges and conditions for blow molding polypropylene. It also provides suggestions for troubleshooting the blow molding process.

MACHINE DESIGN

Screw Type A general-purpose, single-stage metering screw is normally adequate.

Compression Ratio The screw compression ratio for polypropylene may vary between 3:1 and 4:1. When a choice of screws is available, 3.5:1 is a good starting point.

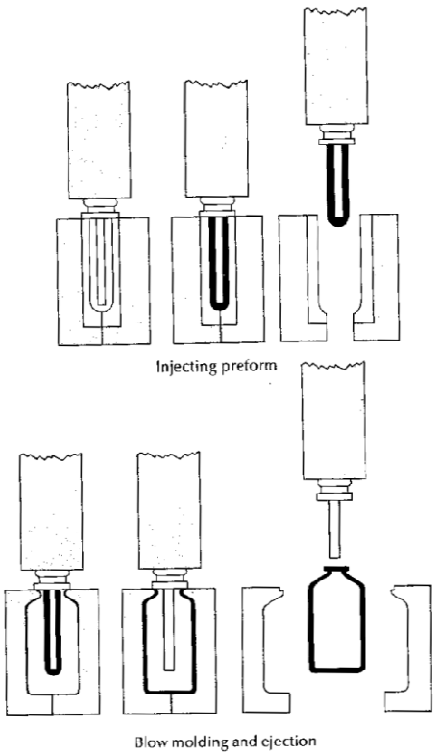
Metering Zone The screw should have a rapid transition zone and a long metering zone. The metering zone, typically 8 to 12 flights, is required to ensure melt homogeneity.

Extruder L/D The length:diameter ratio of the screw should be between 20:1 and 30:1, but preferably 24:1 to 30:1

Breaker Plate and Screen Pack The breaker plate's function is to support the screen pack, straighten out spiral melt flow induced by the screw, and develop back pressure. The screen pack filters out foreign material. It also increases back pressure, thus improving mixing, and melt homogeneity.

Injection Blow Molding PP

Injection blow molding is similar to extrusion blow molding, except that the parison is formed via reciprocating screw injection molding. The parison is formed in a parison mold around a mandrel and is then taken to a blow station with another mold. The advantages of injection blow molding include good wall thickness control (especially in intricate parts), no pinchoff scrap, and close-tolerance neck finish. The disadvantages include higher tooling costs, lower output, limitation of applications to center-neck bottles, and the inability to mold handled bottles.



Injection blow molding

PP Injection Blow Molding Suggested Starting Operating Conditions

Melt Temperature - Although the optimum conditions will vary for each mold or machine, the suggested melt temperature should be in the 230° to 240°C range.

Temperature Profile -The barrel temperatures should be set to provide a melt temperature in the suggested range. A starting profile might be 225/230/235/235°C.

Injection Pressure-The injection pressure must be adjusted for each part to give the desired parison weight and wall thickness.

Blowing Pressure-It is suggested that the blow pressure start at 8.5 Kg/cm^2 and be kept in the 5 to 11 Kg/cm^2.

OPTIMIZING CYCLE TIME

Cycle time optimization should be approached in the following steps:

1. Reduce cooling time in 1-sec increments until warpage occurs, then add 1 sec.
2. Reduce blowing time in 1/2.sec intervals until incomplete blowing occurs.
3. Adjustments in extruder output (screw rpm) may be necessary to compensate for these changes in cooling and blowing times.

Troubleshooting Common Blow Molding Problems

In troubleshooting any type of process, it is important first to identify exactly what the problem is and then to ascertain in which part of the process it is originating. The problem may either result from improper machine operation or be resin-related. Before processing changes are made, one should make sure the machine is being operated under proper conditions.

If changes in machine conditions are required, they should be made slowly and systematically. Change only one variable at a time, allowing the machine time to stabilize to each new condition before you proceed.