LyondellBasell Technical Tip

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Troubleshooting Tips for Injection Blow Molding

INTRODUCTION

Injection blow molding incorporates particular characteristics and advantages over other processes. This process, which can produce a fully finished, close-tolerance container without scrap, is maximized when the correct polymer is selected and the production equipment is optimized. By utilizing the appropriate temperature profiles, pressures, mold designs, associated tooling dimensions and trouble-shooting techniques, this process can successfully yield the sought after results.

PRODUCING QUALITY BOTTLES

The utilization of quality control procedures can monitor the process and identify any required adjustments. Here is a brief description of how these procedures can be used.

- Implement a quality assurance system that analyzes and reports bottle quality during the manufacturing process. This system identifies any trends and allows for process corrections prior to potential quality problems.
- Develop and publish the quality standards for the desired bottle. Include dimensional and visual requirements. Dimensional requirements may be in the neck area, wall thickness, volume and/or bottle weight. Visual requirements may be the color of the bottle, contamination, warpage, etc.
- Specifications are required for each quality standard. Specifications communicate the determined quality requirements clearly. When generating the specifications, consider the container's end use and any government regulations that may exist. Once the specifications are determined, tolerances can be defined. A tolerance is an acceptable deviation from the desired quality specification.

LUBRICANT

Producing injection blow molded containers using low density, linear low density and high density polyethylene resin requires, in many cases, a lubricating agent to aid in processing. Lubrication is required, in most cases, to prevent the polymer from sticking to the metal surfaces.

An insufficient amount of lubricant causes the parison to stick to the core rods or the parison mold. Sticking causes processing problems such as unblown bottles or stringing as the molds open.

As rule of thumb for polyethylene, a concentration of 0.2% calcium stearate or zinc stearate is necessary to provide lubrication. This level may be adjusted to achieve the desired result, which may be higher, or lower according the size of the container and/or the design of the core rods. It is important to blend the lubricant sufficiently to achieve the consistency required to produce quality bottles continually.

TROUBLESHOOTING TECHNIQUE

Develop a simple, consistent plan when troubleshooting. For example, record molding conditions on a routine basis for reference, make only one change at a time, allow sufficient time following each change for the effect of the change to become apparent, record changes in log book, etc. The key is to have a checklist for review when troubleshooting. Attached is a proposed checklist that may not be all-inclusive, but provides a good starting point.

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PROBLEM SOLVING

Polymer sticking to core rods

- Melt temperature is too hot
- Parison mold temperature is too hot
- High or low packing or holding pressures
- Hot core rods
- Hot core rod tip
- Low lubricant level in resin

Polymer sticking to parison mold

- Melt temperature is too hot
- Parison mold temperature is too hot
- Packing or holding pressure is too low
- Packing or holding time is too short
- Low lubricant level in resin

Short Shots

- Loss of heat in the parison mold
- Loss of heat in the extruder or manifold
- Loss of injection pressure
- Loss of holding pressure
- Loss of screw RPM
- Foreign material is blocking the nozzle orifice.
- Nozzle is frozen off due to low temperature in base
- Manifold is too cold
- Nozzle orifice is too small
- Not enough preform time
- Hopper is empty

Neck folds and shoulder cuts

- Neck zone temperature is too cold
- Melt temperature is too cold
- Core-rod temperature is too cold
- Injection pressure is too high
- Holding pressure is too high
- Holding time is too long
- Cure time is too long

Parison Flashing

- Melt temperature is too hot
- Parison mold temperature is too hot
- High injection pressure
- High holding pressure
- Low clamping pressure
- Nozzle is damaged or not seated correctly
- Mold construction is poor
- Long, high-pressure, preform time
- Mold coolant lines are plugged

Pigtails

- Reverse RPM is too high
- Decompress time is too long.

Incomplete Threads

- Neck zone is too cold
- Melt is too cold
- Injection pressure is too low
- Holding pressure is too low
- Holding time is too short
- Poor venting in parison mold
- Insufficient blow pressure

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Rocker bottoms
- Blow time is too long
- Poor blow mold venting
- Poor cooling in blow mold bottom
- Melt temperature is too high
- Cycle is too fast

Warped side walls
- Insufficient blow time
- Insufficient blow pressure
- Poor mold venting
- Poor mold cooling
- Low melt temperature
- Parison temperature is too low
- Cycle is too fast

Poor gates (fish eyes, flash, tails, etc.)
- Too much decompress, RPM or time (fish eyes only)
- Not enough slug on parison bottom (fish eyes and holes only)
- Too much slug on bottom of parison (tails only)
- Not enough decompress, RPM or time (drool and tails)
- Bottom zone is too cold (tails)
- Manifold is too hot (fish eyes)
- Manifold too cold (tails)
- Inadequate external tip cooling (fish eyes)
- Insufficient packing time
- Insufficient cure time
- Insufficient hold pressure

For more information about blow molding, contact your LyondellBasell sales or technical service representative.

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