

8 A GUIDE TO POLYETHYLENE BLOW MOULDING

BLOW MOULDING TROUBLESHOOTING GUIDE

| Problem/Issue | Causes | Potential Solutions/Actions |
|---|--|--|
| Bottle Blow-outs | Contamination | Check for contamination in resin and regrind. |
| | Moisture | Check resin for presence of moisture. |
| | Bridging in extruder feed section | Increase rear barrel zone temperature slightly to prevent voids forming in the melt. |
| | Damaged moulds | Repair mould edges and pinch-offs to prevent holes forming along the seam. |
| | Fill pressure too low (applicable to reciprocating screw blow moulding machines) | To prevent air entrapment, increase fill pressure until drooling occurs at dies, then reduce pressure a little until drooling just stops. |
| | Mould closing speed too fast | Reduce mould closing speed to prevent formation of weak welds at the seams which may split when the bottle is trimmed and/or use clamp pause. |
| | Pinch-off too sharp or too hot | Increase pinch-off land width so that it does not cut parison. Increase cooling in pinch-off area. |
| Bottle Volume (Too low or too high) | Bottle weight incorrect | Check bottle weight every hour and maintain to target. |
| | Cycle time | Faster cycle times may increase parison and bottle temperatures and result in greater shrinkage. |
| | High pressure blow psi setting | Should be at recommended setting to insure good contact of parison with the mould surface and consistent cooling. |
| | Poor parison/mould contact | Clean mould vents Increase high pressure blow psi setting. |
| | Extruder profile temperature | A higher stock temperature will result in higher parison and bottle temperatures and result in greater shrinkage. |
| | Mould temperature | A higher mould coolant temperature will result in a higher bottle temperature and greater shrinkage. |
| | Storage temperature | Higher ambient bottle storage temperatures and longer storage times will result in greater shrinkage. |
| | Annealing conditions | Higher annealing temperatures and slower belt speeds will result in greater shrinkage. |
| | Mould volume incorrect | Resize mould. |
| | Volume inserts | Install or remove volume inserts. |
| Bubbles | Moisture in resin | Reduce cooling in feed throat if condensation is occurring here. Check for moisture in resin and ensure resin handling system is water tight. |
| | Bridging in extruder feed throat | Increase rear barrel zone temperature slightly. |
| | Fill pressure too low (applicable to reciprocating screw blow moulding machines) | To prevent air entrapment, increase fill pressure until drooling occurs at dies, then reduce pressure a little until drooling just stops. |
| | Worn screw and/or barrel | Screw and/or barrel may need to be replaced. |
| Contamination | Dirty regrind | Keep contaminants out of regrind; isolate regrind. |
| | Hopper magnets fully loaded | Clean hopper magnets regularly. |
| | Dust | Install filters on air intakes and clean regularly. |
| | Contaminated resin | Check for dirt, dust or other contamination in the resin. |

8 A GUIDE TO POLYETHYLENE BLOW MOULDING

| Problem/Issue | Causes | Potential Solutions/Actions |
|---|--|---|
| Die Lines | Contamination or degraded resin | Lower mandrel and purge, or if contamination is adhered, remove tooling and clean. Check for foreign matter in virgin resin and in regrind. |
| | Low melt temperature | Check heaters and controllers, adjust so that stock temperature is in the recommended range. |
| | Damaged die or mandrel | Replace tooling if scratches or nicks are present. |
| Indented Parting Line | Blow air pressure too low | Increase blow air pressure. |
| | Air entrapment | Clean mould vents. |
| | Moulds not closing completely | Increase clamp pressure |
| | | Reduce blow air pressure |
| | | Check mould alignment or damage that may prevent moulds closing |
| | | Clean mould faces |
| Increase preblow cushion time. | | |
| Mould temperature too high | Check mould cooling, especially around parting line Reduce mould temperature. | |
| Melt temperature too high | Reduce feed zone temperature | |
| | Reduce die tip temperature. | |
| Neck Finish | Incorrect bottle weight | Underweight bottles can result in improper shearing and overweight can cause neck finish trimming issues. |
| | Blow pin alignment or damage | Align blow pin centrally and at the correct elevation or replace if damaged. |
| | Damaged shear steels | Replace shear steels. |
| | Damaged pinch-off lands in thread area | Replace pinch-off lands. |
| | Moulds misaligned | Check and replace mould pins and bushings. |
| Parison Swing or Hooking | Incorrect die adjustment | Centre the die and ensure parison bolts are tightened. |
| | Off-centre pressure ring | Centre the pressure ring. |
| | Die temperature variation | Check head and manifold heaters and controllers, ensure die tip heaters are turned off after startup. |
| (parison swing at start-up is normal) | Air currents | Shield parisons from air draughts. |
| | Dirty die/mandrel | Clean the die gap. |
| Poor Weld at Pinch-off/ Weak Seams | Melt temperature too low | Increase melt temperature. |
| | Melt temperature too high | Reduce melt temperature. |
| | Mould close speed too fast | Reduce mould close speed; introduce a clamp pause. |
| | Mould temperature too high | Reduce mould temperature. |
| | Pinch lands damaged | Refurbish or replace pinch lands. |
| | Moulds not closing completely | Check mould alignment or damage that may prevent moulds closing |
| | | Clean mould faces. |
| | Flash volume too large or too small | Reduce or increase flash volume. |
| Excessive preblow or high pressure air too high coming on too early | Reduce preblow air and/or increase blow delay time. | |

8 A GUIDE TO POLYETHYLENE BLOW MOULDING

| Problem/Issue | Causes | Potential Solutions/Actions |
|--|---|--|
| Rough Surface on Bottle | Moisture condensation on moulds | Dry the mould cavities or reduce humidity in moulding room. |
| | Blow air pressure too low | Increase blow air pressure |
| | | Check for leakage around neck rings, shear steel and blow pins. |
| | | Inspect pneumatic system including air regulator, valves and air filter. |
| | Inadequate mould venting | Inspect and clean or repair mould vents. |
| Melt temperature too low | Increase melt temperature. | |
| Variable Parison Lengths | Bottle weight | Ensure weights are adjusted to target. If all bottle weights are varying, check shot pressure and accumulator precharge. |
| | Choke adjustment | Tail lengths can be changed by adjusting the chokes. |
| | Extruder screw rpm | Output is controlled by the screw rpm. Increase speed if tails too short and vice versa. |
| | Barrel and/or screw wear (over-riding temperatures) | Replace barrel and/or screw. |
| | Virgin/regrind ratio and consistency | Ensure consistent blending of virgin and regrind resin. |
| | Surging | Check for resin melting in barrel throat and ensure proper cooling. |
| | Incorrect temperature profile | Check heaters and controllers, adjust so that stock temperature is in the recommended range. |
| | Uneven head temperatures | Check temperatures, heaters and controllers. |
| | Incorrect tension in V-belts | Tighten or replace V-belts. |
| | Dirty hydraulic oil filter | Replace oil filter. |
| | (varying tail lengths at start-up is normal) | Worn seals, excessive oil by-pass in shot cylinder |
| Worn thrust bearing centering bushing | | Replace the centering bushing. |
| Webbed Handles | High melt temperature | Reduce melt temperature to increase parison swell. |
| | Preblow air pressure too low | Increase preblow air pressure, increase preblow time. |
| | Parisons hooking | Adjust die to straighten parison. |
| | Air currents | Shield parisons from air draughts. |
| | Mandrel sleeve incorrectly positioned | Adjust sleeve to the full up position. |
| | Mould/head alignment incorrect | Realign mould to catch the handle. |
| | Low shot pressure | Check the Manitrol valve for proper setting. |
| | | Check the shot cylinder for leaks around seals and rings. |
| | | Check hydraulic pump for worn parts. |
| | Pneumatics issue | Check for low charge in nitrogen accumulator – if charge is lost, check for broken or leaking nitrogen bag. |
| Check that the air lubricator is dispensing the correct amount of oil | | |
| Check that the preblow air regulator diaphragm is not ruptured or has a dirty seat | | |
| Ensure that the Ross valve is clean. | | |
| | Check for dirt or faulty electrical connection in high/low pressure selector valve spool. | |

Disclaimer

The proposed solutions in this guide are based on conditions that are typically encountered in the manufacture of products from polyethylene. Other variables or constraints may impact the ability of the user to apply these solutions. Qenos also refers the user to the disclaimer at the beginning of this document.