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## Blow molding troubleshooting guide



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# Rigid Packaging

Plastics – Global

# Introduction

This guide indicates possible causes and corrective actions for problems typically encountered in the blow molding process. It is not, however, intended to provide a complete listing of all blow molding challenges and problems.

For additional troubleshooting information, contact your Dow representative. In the United States, you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the [back cover](#).

## Plastics covering the extremes and everything in between

To meet and exceed the incredible demands placed on today's blow molded applications, Dow offers a product portfolio comprising everything from industry essential resins to innovative high performance materials.

## Industry Essential Resins

### UNIVAL™ High Density Polyethylene Resins

Developed for blow molded bottles, drums, and other industrial containers, UNIVAL™ High Density Polyethylene (HDPE) Resins provide excellent rigidity/top-load strength, superior environmental stress crack resistance (ESCR), high impact and melt strength, and moderate swell. UNIVAL resins are used to produce containers up to 20 gallons in size for the Dairy, Water, and Juice; Household and Industrial Chemical (HIC); Pharmaceutical, Cosmetic, and Toiletry; and Industrial Drum and Container markets.

### DOW™ Polypropylene Resins

DOW™ Polypropylene Resins offer an optimal balance of price and performance, making them an outstanding choice for inter-material substitution in blow molding applications that have historically used metal, glass, or other polymers. DOW Polypropylene Resins offer consistent processability, high heat resistance, good clarity and gloss, low water absorption, high stiffness/hardness, excellent moisture barrier and chemical resistance, enhanced mold filling and release ability, and excellent fatigue resistance.

### DOW High Density Polyethylene Resins

DOW HDPE Resins provide the toughness, rigidity, and strength required by today's blow molding operations. In fact, their excellent combination of stiffness and ESCR makes them the materials of choice for many personal care, HIC, and other blow molded applications.

## Introduction (continued)

### High Performance Resins

#### INSPIRE™ Performance Polymers

This family of differentiated, propylene-based materials delivers distinct performance, processing, and cost advantages versus conventional blow molding materials such as HDPE, polypropylene (random and impact copolymers), and polyethylene terephthalate (PET). INSPIRE™ Performance Polymers for blow molding applications are designed to provide an outstanding balance of stiffness and toughness for reduced package weights with improved top load strength, drop height resistance, shape retention, and stackability; contact clarity up to transparency (dependent on package/contents); and heat resistance for retention of package integrity during the retort, pasteurization, hot fill, and/or shipping and handling processes.

#### CONTINUUM™ Bimodal Polyethylene Resins

As the newest Dow innovation for rigid packaging, CONTINUUM™ Bimodal Polyethylene Resins emphasize the three cornerstones of blow molded bottle performance: excellent impact strength, superior ESCR, and the high stiffness required for outstanding top load performance. Their unique combination of performance and processability also makes them a strong option for lightweighting applications.

### Experts with answers when you need them

Our long-term involvement with and commitment to the blow molding industry allows Dow to offer unparalleled levels of technical service. These far-reaching capabilities include, but are not limited to:

- Material science expertise (resin selection and development)
- Physical and mechanical property testing
- Analytical and gel testing
- Taste and odor testing
- Processing/fabrication consulting (including troubleshooting recommendations)
- Application development consulting
- In-house, developmental fabrication
- Specialized training for sales and technical personnel
- Operator training
- Safety audits
- Industrial hygiene recommendations
- Assistance with U.S. Food and Drug Administration (FDA), environmental, and other regional regulatory issues

This level of support can only be provided by a truly committed organization...an organization with the global strength and energy of The Dow Chemical Company.

Blow molding troubleshooting guide

# Table of contents

# Table of contents

## Parison problems

Air Bubbles (See Bubbles) .....	9
Blow-out .....	9
Bubbles .....	9
Clear (See Shiny or Clear) .....	23
Cuffing (See Curling/Rolling) .....	10
Curling/Rolling .....	10
Curtaining .....	11
Die Lines .....	12
Drawdown (See Sag) .....	23
Flash – Excessive .....	13
Flash – Tail .....	13
Flash – Top .....	14
Holes .....	15
Hooking .....	15
Melt Fracture .....	16
Melt Stretching (tubular) .....	16
Melt Surface Appearance .....	17
Needle Penetration .....	18
Non-uniform Parison .....	18
Output Fluctuations .....	19
Parison Length – Head-to-head (multiple heads) .....	21
Parison Length – Shot-to-shot (See Output Fluctuations) .....	19
Pinch-off Thickness .....	21
Rings – Horizontal .....	22
Rolling (See Curling/Rolling) .....	10
Sag .....	23
Shiny or Clear .....	23
Smoking .....	24
Stretch (See Sag) .....	23
Stringing .....	24
Swell – High .....	25
Swell – Low .....	25

## Parison problems (continued)

Tail Lengths (See Parison Length – Head-to-head) . . . . .	21
Webbing . . . . .	26

## Container problems

Alligatoring (See Melt Fracture) . . . . .	37
Blowing Incomplete . . . . .	28
Blow-outs or Holes . . . . .	29
Bubbles . . . . .	30
Cap Leakage (See Neck Finish) . . . . .	39
Cold Spots (See Surface Appearance) . . . . .	45
Container Temperature . . . . .	31
Definition of Detail . . . . .	32
Delamination . . . . .	32
Detail – Poor (See Definition of Detail) . . . . .	32
Die Lines . . . . .	12
Dirt or Streaks . . . . .	32
Drawdown (See Sag) . . . . .	23
Environmental Stress Crack Resistance (ESCR) – Low . . . . .	33
Fish Scales (See Melt Fracture) . . . . .	37
Flash – Excessive . . . . .	13
Flash – Tail . . . . .	13
Flash – Top . . . . .	14
Folds (See Curtaining) . . . . .	11
Gloss – Poor . . . . .	34
Handles – Lost . . . . .	35
Herringbone (See Melt Fracture) . . . . .	37
Holes (See Blow-outs or Holes) . . . . .	29
Impact Strength . . . . .	36
Melt Fracture . . . . .	37
Mold Bottom – Thick . . . . .	37
Mold Bottom – Thin . . . . .	38
Neck Finish . . . . .	39

## Container problems (continued)

Orange Peel (See Surface Appearance) . . . . .	45
Parting Line – Hole or slit . . . . .	40
Parting Line – Thinning or stretching . . . . .	40
Part Volume – High . . . . .	41
Part Volume – Low . . . . .	41
Part Weight . . . . .	42
Pinch-off . . . . .	42
Pits (See Surface Appearance) . . . . .	45
Roughness (See Surface Appearance) . . . . .	45
Scales (See Surface Appearance) . . . . .	45
Seal (See Pinch-off) . . . . .	42
Sharkskin (See Melt Fracture) . . . . .	37
Shrinkage . . . . .	43
Specks . . . . .	43
Sticking . . . . .	44
Streaking (See Dirt or Streaks) . . . . .	32
Streaking (See Die Lines) . . . . .	12
Striations (See Die Lines) . . . . .	12
Surface Appearance . . . . .	45
Tail Lengths . . . . .	46
Temperature (See Container Temperature) . . . . .	31
Top Load Strength . . . . .	46
Toughness (See Impact Strength) . . . . .	36
Trimming . . . . .	47
Unmelts . . . . .	48
Wall Thickness – Thin in general . . . . .	49
Wall Thickness – Thin at die orifice end (See Sag) . . . . .	23
Wall Thickness – Uneven . . . . .	49
Warpage . . . . .	50
Webbing (See Curtaining) . . . . .	11
Weld – Poor (See Pinch-off) . . . . .	42

Blow molding troubleshooting guide

## Parison problems



## PROBLEM: Blow-out – Blow-out of parison

CAUSE(S)	ACTION(S)
Pinch-off too sharp or hot.	<ul style="list-style-type: none"><li>• Increase land width of pinch-off.</li><li>• Increase cooling, preferably in pinch-off area.</li><li>• Use clamp pause on mold lock-up.</li><li>• Slow mold closing speed.</li></ul>
Blow pressure too high, parison inflation too rapid.	<ul style="list-style-type: none"><li>• Gradually reduce blow pressure to decrease inflation rate.</li></ul>
Insufficient mold clamping.	<ul style="list-style-type: none"><li>• Increase clamp pressure.</li></ul>
Parison too short and not fully captured in pinch-off.	<ul style="list-style-type: none"><li>• Lengthen parison.</li><li>• Close mold before full snapback of parison occurs.</li></ul>
Blow-up ratio too high.	<ul style="list-style-type: none"><li>• Larger head tooling may be required.</li></ul>

## PROBLEM: Bubbles

CAUSE(S)	ACTION(S)
Moisture in resin.	<ul style="list-style-type: none"><li>• Check resin for moisture.</li><li>• Hold resin in warm area for 24 hours before using (moisture absorption in winter months).</li></ul>
Moisture in melt from condensation in feed throat.	<ul style="list-style-type: none"><li>• Decrease feed throat cooling.</li></ul>
Feed contamination.	<ul style="list-style-type: none"><li>• Check resin for contamination.</li></ul>
Poor temperature control.	<ul style="list-style-type: none"><li>• Optimize extruder temperatures for better melt temperature control.</li></ul>
Air leaking into system.	<ul style="list-style-type: none"><li>• Check tooling for cracks or poor sealing at joints.</li><li>• Tighten die tip bolts.</li></ul>
Air entrapment. (Large bubbles that sometimes burst when leaving the die orifice may be caused by trapped air.)	<ul style="list-style-type: none"><li>• Increase back pressure.</li><li>• Increase extruder feed zone temperature.</li><li>• Lower screw speed if possible.</li></ul>
Worn extruder.	<ul style="list-style-type: none"><li>• The screw and barrels may need to be replaced – monitor for decreased throughput over time.</li></ul>

## PROBLEM: Curling/Rolling

CAUSE(S)	ACTION(S)
Melt temperature too high.	<ul style="list-style-type: none"><li>• Slowly decrease melt temperature throughout system.</li></ul>
Die tip temperature too high.	<ul style="list-style-type: none"><li>• Reduce die tip temperature.</li></ul>
Cold mandrel or bushing.	<ul style="list-style-type: none"><li>• Permit sufficient warm-up time before attempting production.</li><li>• Ensure that die bushing heater is operative (if so equipped).</li></ul>
Back pressure on screw set too high.	<ul style="list-style-type: none"><li>• Slowly decrease screw back pressure.</li></ul>
Material sticking to die.	<ul style="list-style-type: none"><li>• Increase extrusion pressure/rate.</li><li>• Decrease extrusion back pressure.</li></ul>
Die gap too small.	<ul style="list-style-type: none"><li>• Increase container weight to increase die gap.</li></ul>
Misaligned die and mandrel.	<ul style="list-style-type: none"><li>• Check positioning of die and mandrel. Die bushing may need to be machined to bring mandrel to a flush or lower position with die face.</li></ul>
Foreign matter or degraded resin in die bushing.	<ul style="list-style-type: none"><li>• Clean the die.</li></ul>
Melt clings to die or mandrel and flows to the coolest side.	<ul style="list-style-type: none"><li>• Adjust die temperature.</li><li>• Align split collar heater bands randomly along the circumference of the die head. Do not have the splits lined up – this could cause a localized cold spot along the extrusion head/die face.</li></ul>
Damaged tooling.	<ul style="list-style-type: none"><li>• Check tooling for damage.</li></ul>
Improper knife cut.	<ul style="list-style-type: none"><li>• Increase distance between knife and die face.</li><li>• Check knife edge for sharpness and cleanliness.</li></ul>

## PROBLEM: Curtaining

CAUSE(S)	ACTION(S)
High parison temperature.	<ul style="list-style-type: none"><li>• Reduce parison temperature. High parison temperatures can yield a parison that can collapse before it is blown.</li><li>• Decrease extruder back pressure.</li></ul>
High extrusion rate.	<ul style="list-style-type: none"><li>• Reduce extrusion rate. High extrusion rates can generate more hoop stress in the parison, causing it to collapse.</li></ul>
High resin melt index.	<ul style="list-style-type: none"><li>• Consult your Dow representative about using a lower melt index resin. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li><li>• Increase regrind level.</li></ul>
High die swell.	<ul style="list-style-type: none"><li>• Consult your Dow representative about using a lower die swell resin. In the U.S., you can also call the The Dow CIG at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li><li>• Increase container weight.</li><li>• <i>See Swell – High, page 25.</i></li></ul>
Low pre-blow air pressure/time.	<ul style="list-style-type: none"><li>• Increase pre-blow air pressure/time.</li></ul>
Poor tooling design.	<ul style="list-style-type: none"><li>• Check land length between bushing and mandrel.</li><li>• Note and consult industry experts.</li></ul>

## PROBLEM: Die Lines – Die lines in parison

CAUSE(S)	ACTION(S)
Contaminated or degraded resin.	<ul style="list-style-type: none"><li>• Check for dirt, dust, and lint in unprocessed resin.</li><li>• If using regrind, check for foreign matter.</li></ul>
Foreign matter lodged between die and mandrel.	<ul style="list-style-type: none"><li>• Check head tooling for contamination.</li><li>• Increase die gap briefly to purge particles, then reset to original gap.</li></ul>
Carbon or degraded resin in head.	<ul style="list-style-type: none"><li>• Clean die and mandrel with copper, brass, or material softer than machine parts to prevent marring and scratching.</li></ul>
Low melt temperature.	<ul style="list-style-type: none"><li>• Check melt temperature.</li><li>• Increase back pressure on extruder.</li></ul>
Melt overheating.	<ul style="list-style-type: none"><li>• Check blow head, accumulator, and cylinder for dead areas and pockets.</li><li>• Check for cylinder hot spots and overheating, and reduce the temperature or eliminate the hot spots.</li></ul>
Burned out heater band (it will appear as rippled streaking in the parison, causing cold spots).	<ul style="list-style-type: none"><li>• Replace non-functioning band.</li></ul>
Damaged die or mandrel.	<ul style="list-style-type: none"><li>• Repair or replace tooling if needed.</li><li>• Check head design for streamlining with no sharp corners or ledges.</li></ul>

## PROBLEM: Flash – Excessive flash

CAUSE(S)	ACTION(S)
High extrusion rate.	<ul style="list-style-type: none"><li>• Decrease extrusion pressure or rate.</li></ul>
Low melt temperature.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li></ul>
Mold not aligned with die.	<ul style="list-style-type: none"><li>• Check mold alignment.</li></ul>
Mandrel not centered.	<ul style="list-style-type: none"><li>• Center mandrel in die.</li></ul>
Narrow die gap.	<ul style="list-style-type: none"><li>• Increase container weight.</li></ul>
High pre-blow air pressure or time.	<ul style="list-style-type: none"><li>• Decrease pre-blow air pressure or time.</li></ul>
Parison diameter too large.	<ul style="list-style-type: none"><li>• Change tooling to smaller diameter set.</li></ul>
Excessive resin die swell.	<ul style="list-style-type: none"><li>• Consult your Dow representative about lower die swell resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li><li>• Increase regrind level.</li></ul>
Flash pockets too shallow.	<ul style="list-style-type: none"><li>• Consult mold manufacturer.</li></ul>
Improper mold closure.	<ul style="list-style-type: none"><li>• Increase locking and check for mold mismatch.</li></ul>

## PROBLEM: Flash – Tail flash not separating from part

CAUSE(S)	ACTION(S)
Parison too short.	<ul style="list-style-type: none"><li>• Lengthen parison.</li></ul>
Flash pocket too deep.	<ul style="list-style-type: none"><li>• Consult mold manufacturer.</li></ul>
Poor pinch-off.	<ul style="list-style-type: none"><li>• See <i>Pinch-off Thickness</i>, <a href="#">page 21</a>.</li></ul>
Poor mold lock-up.	<ul style="list-style-type: none"><li>• Check mold lock-up pressure along tail section using carbon paper and increase or balance pressure as required.</li></ul>

**PROBLEM: Flash – Top flash not separating from part**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Dull cutting ring.	<ul style="list-style-type: none"><li>• Sharpen or replace cutting ring.</li></ul>
Insufficient contact between cutting ring and striker plate.	<ul style="list-style-type: none"><li>• Adjust down position of blow pin.</li></ul>
Poor pinch-off.	<ul style="list-style-type: none"><li>• Increase downward force of blow pin.</li><li>• <i>See Pinch-off Thickness, page 21.</i></li></ul>
Poor mold lock-up.	<ul style="list-style-type: none"><li>• Check and balance mold lock-up pressure along top section as required.</li></ul>

## PROBLEM: Holes – Holes in parison

CAUSE(S)	ACTION(S)
Contamination.	<ul style="list-style-type: none"><li>• Check for degraded material.</li><li>• Check for hang-up in tooling, head, or screw.</li><li>• Check for foreign material in resin.</li></ul>
Trapped air.	<ul style="list-style-type: none"><li>• Permit extruder to run for a few minutes.</li><li>• Problem could be caused by letting hopper run out of resin before refilling.</li><li>• <i>See Bubbles, page 9.</i></li></ul>
Moisture in resin.	<ul style="list-style-type: none"><li>• Check for moisture. If present, dry resin, or consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

## PROBLEM: Hooking – Parison hooking

CAUSE(S)	ACTION(S)
Non-uniform parison walls.	<ul style="list-style-type: none"><li>• <i>See Non-uniform Parison, page 18.</i></li></ul>
Dirty die/mandrel channel.	<ul style="list-style-type: none"><li>• Clean channel.</li></ul>
Defective head/die heater(s).	<ul style="list-style-type: none"><li>• Replace heater(s) as necessary.</li></ul>
Loose mandrel.	<ul style="list-style-type: none"><li>• Tighten mandrel.</li></ul>
Head temperature not uniform.	<ul style="list-style-type: none"><li>• Stagger heat band gaps on head.</li></ul>
Air flowing on parison.	<ul style="list-style-type: none"><li>• Shield parison from moving air; reduce or eliminate blow air leaks.</li></ul>
Warped die or mandrel.	<ul style="list-style-type: none"><li>• Replace damaged component(s) as necessary.</li></ul>
	<ul style="list-style-type: none"><li>• <i>See Curling/Rolling, page 10.</i></li></ul>

**PROBLEM: Melt Fracture** – Rough surfaces/ripples on the finished container due to flow instabilities through a die clearance (also known as alligatoring, herringbone, fish scales, sharkskin, etc.).

CAUSE(S)	ACTION(S)
Extrusion speed too fast.	<ul style="list-style-type: none"> <li>• Reduce extrusion rate.</li> <li>• Reduce melt temperature.</li> <li>• Reduce extrusion pressure.</li> </ul>
Melt flow is unstable.	<ul style="list-style-type: none"> <li>• Increase or decrease melt temperature.</li> <li>• Increase or decrease parison forming time.</li> <li>• Check to ensure that head choke and manifold chokes are open as much as possible.</li> <li>• Clean tooling.</li> </ul>
Material melt index too low.	<ul style="list-style-type: none"> <li>• Consult your Dow representative about material options. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li> </ul>
Parison die land too short.	<ul style="list-style-type: none"> <li>• Repair or replace tooling.</li> </ul>
Die gap too small.	<ul style="list-style-type: none"> <li>• Increase container weight.</li> </ul>

**PROBLEM: Melt Stretching (tubular)** – Excessive tubular melt stretching after emerging from die orifice.

CAUSE(S)	ACTION(S)
Melt temperature too high.	<ul style="list-style-type: none"> <li>• Reduce die temperature and/or melt temperature.</li> </ul>
Melt extrusion too slow.	<ul style="list-style-type: none"> <li>• Increase extrusion rate.</li> <li>• <i>See Sag, page 23.</i></li> </ul>



**PROBLEM: Melt Surface Appearance** – Dull, rough, or striated melt surface.

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Insufficient melt temperature.	<ul style="list-style-type: none"><li>• Increase die temperature and melt temperature to produce melt which is clear and glossy when leaving die orifice.</li></ul>
Incorrect extrusion rate.	<ul style="list-style-type: none"><li>• Adjust rate up or down as required.</li></ul>
Dirty die/head tooling.	<ul style="list-style-type: none"><li>• Clean die/head tooling.</li></ul>
Melt fracture.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li><li>• Decrease machine rpm.</li><li>• Increase die gap.</li><li>• <i>See Melt Fracture, page 16.</i></li></ul>

**PROBLEM: Needle Penetration** – Poor blow needle penetration. Parison deflects without becoming punctured.

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Needle is blunt.	<ul style="list-style-type: none"><li>• Sharpen needle or increase penetration speed.</li></ul>
Incorrect melt temperature.	<ul style="list-style-type: none"><li>• Raise or lower melt temperature.</li></ul>
Incorrect needle penetration rate and/or timing.	<ul style="list-style-type: none"><li>• Change needle strike rate and/or timing in sequence of operation to correct as required.</li></ul>

**PROBLEM: Non-uniform Parison**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Improperly designed head.	<ul style="list-style-type: none"><li>• Check head design.</li></ul>
Non-uniform heating in head.	<ul style="list-style-type: none"><li>• Check heat distribution in head.</li></ul>
Mandrel improperly centered in die ring.	<ul style="list-style-type: none"><li>• Center die and ensure die head bolts are tight after adjusting.</li></ul>
Melt flow too rapid.	<ul style="list-style-type: none"><li>• Reduce extrusion rate.</li></ul>
Melt temperature too high.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li></ul>
Die land length too short.	<ul style="list-style-type: none"><li>• Consult your Dow representative about using different tooling land designs. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

## PROBLEM: Output Fluctuations

CAUSE(S)	ACTION(S)
High screw speed.	<ul style="list-style-type: none"><li>• Decrease screw speed. (High screw speeds can cause surging in some equipment.)</li></ul>
Screw not feeding properly.	<ul style="list-style-type: none"><li>• Raise rear zone temperature (to melt closer to the rear of the screw).</li></ul>
Material bridging in hopper.	<ul style="list-style-type: none"><li>• Check hopper feed for bridging.</li></ul>
Blockage in feed throat.	<ul style="list-style-type: none"><li>• Check feed throat for blockage.</li></ul>
Low extrusion back pressure.	<ul style="list-style-type: none"><li>• Increase extrusion back pressure.</li></ul>
High extrusion pressure.	<ul style="list-style-type: none"><li>• Decrease extrusion pressure by decreasing polymer flow rate or increasing parison temperature.</li></ul>
Low screw speed.	<ul style="list-style-type: none"><li>• Increase screw speed.</li></ul>
Incorrect screw design.	<ul style="list-style-type: none"><li>• Check screw design and consult your Dow representative for recommendations. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Screw fouled.	<ul style="list-style-type: none"><li>• Clean screw.</li></ul>
Excessive regrind.	<ul style="list-style-type: none"><li>• Decrease regrind level.</li></ul>
Incorrect temperature distribution.	<ul style="list-style-type: none"><li>• Check heat controllers.</li></ul>
Surging rpm.	<ul style="list-style-type: none"><li>• Check for electrical malfunction.</li></ul>
Slippage on screw caused by excessive use of specific additives.	<ul style="list-style-type: none"><li>• Check additives and consult your Dow representative. In the U.S., you can also call The Dow CIG at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

*Continued on next page*

## PROBLEM: Output Fluctuations (continued)

CAUSE(S)	ACTION(S)
Blowing air leaking into barrel.	<ul style="list-style-type: none"><li>• Check head air for leakage.</li></ul>
Timer malfunction resulting in cycle time variation.	<ul style="list-style-type: none"><li>• Replace defective timer.</li></ul>
Virgin/regrind stratification in feed hopper.	<ul style="list-style-type: none"><li>• Ensure proper blending of virgin and regrind.</li></ul>
Worn barrel and/or screw.	<ul style="list-style-type: none"><li>• Replace barrel and/or screw.</li></ul>
Hydraulic system malfunctioning.	<ul style="list-style-type: none"><li>• Check hydraulic system and correct as required.</li></ul>

## **PROBLEM: Parison Length – Head-to-head (multiple heads)**

### **CAUSE(S)**

Improper temperature from head to head.

Improper melt flow from head to head.

### **ACTION(S)**

- Check head heaters.
- Check heat controllers.

- Adjust head choke valves.
- Check for contamination.
- Adjust die/mandrel.

## **PROBLEM: Pinch-off Thickness – Pinch-off too thick**

### **CAUSE(S)**

Pinch-off edges too wide or inadequate mold closure.

### **ACTION(S)**

- Sharpen pinch-off edges.
- Increase mold closing pressure.
- Check mold parting line for poor match.

**PROBLEM: Rings – Horizontal rings**

**CAUSE(S)**

Programming changes too drastic.

**ACTION(S)**

- Decrease flow to programming cylinder.
- Decrease weight change between steps.

## PROBLEM: Sag – Excess sag, stretch, or drawdown

CAUSE(S)	ACTION(S)
Melt temperature too high.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li><li>• Reduce extrusion back pressure.</li></ul>
Melt index too high.	<ul style="list-style-type: none"><li>• Consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li><li>• Increase regrind level.</li></ul>
Extrusion rate too slow.	<ul style="list-style-type: none"><li>• Increase extrusion rate.</li></ul>
Parison drop time too long.	<ul style="list-style-type: none"><li>• Decrease parison drop/hang time.</li></ul>
Parison weight too heavy.	<ul style="list-style-type: none"><li>• Reduce parison weight.</li></ul>
Mold closing too slowly.	<ul style="list-style-type: none"><li>• Increase low pressure close.</li><li>• Lubricate tie bar bushing.</li><li>• Decrease mold open time.</li></ul>

## PROBLEM: Shiny or Clear

CAUSE(S)	ACTION(S)
High melt temperature.	<ul style="list-style-type: none"><li>• Decrease melt temperature.</li><li>• Decrease extrusion back pressure.</li><li>• Check head heaters.</li><li>• Check heat controllers.</li></ul>
High extrusion rate.	<ul style="list-style-type: none"><li>• Decrease extrusion pressure/rate.</li><li>• Adjust head choke valves.</li></ul>

## PROBLEM: Smoking

CAUSE(S)	ACTION(S)
Heat controller malfunction.	<ul style="list-style-type: none"><li>• Check heat controllers.</li></ul>
Contamination in resin.	<ul style="list-style-type: none"><li>• Check for contamination.</li></ul>
Melt temperature too high.	<ul style="list-style-type: none"><li>• Decrease melt temperature.</li></ul>
Extrusion pressure/rate too high.	<ul style="list-style-type: none"><li>• Decrease extrusion pressure or rate.</li></ul>
Ratio of regrind to virgin material too high.	<ul style="list-style-type: none"><li>• Decrease regrind level.</li></ul>

## PROBLEM: Stringing – Parison stringing

CAUSE(S)	ACTION(S)
Melt temperature too high.	<ul style="list-style-type: none"><li>• Gradually lower melt temperature.</li></ul>
High fill pressure.	<ul style="list-style-type: none"><li>• Reduce fill pressure until weeping stops.</li></ul>
Melt index too high.	<ul style="list-style-type: none"><li>• Consult your Dow representative about lower melt index resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>



## PROBLEM: Swell – High swell

CAUSE(S)	ACTION(S)
High extrusion pressure/rate.	<ul style="list-style-type: none"><li>• Decrease extrusion pressure or rate.</li></ul>
Low melt temperature.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li></ul>
Narrow die gap.	<ul style="list-style-type: none"><li>• Increase container weight.</li></ul>
Excessive pre-blow air pressure or time.	<ul style="list-style-type: none"><li>• Decrease pre-blow air pressure or time.</li></ul>
Parison diameter too large.	<ul style="list-style-type: none"><li>• Change tooling to a smaller die and mandrel set.</li></ul>
Excessive resin die swell.	<ul style="list-style-type: none"><li>• Modify tooling design.</li></ul>

## PROBLEM: Swell – Low swell

CAUSE(S)	ACTION(S)
Low extrusion pressure/rate.	<ul style="list-style-type: none"><li>• Increase extrusion pressure or rate.</li></ul>
High melt temperature.	<ul style="list-style-type: none"><li>• Decrease melt temperature.</li></ul>
Wide die gap.	<ul style="list-style-type: none"><li>• Decrease container weight.</li></ul>
Low pre-blow air pressure or time.	<ul style="list-style-type: none"><li>• Increase pre-blow air pressure or time.</li></ul>
Parison diameter too small.	<ul style="list-style-type: none"><li>• Change tooling to a larger die and mandrel set.</li></ul>
Insufficient resin die swell.	<ul style="list-style-type: none"><li>• Modify tooling design.</li></ul>

## PROBLEM: Webbing

### CAUSE(S)

Folds in parison.

Insufficient swell.

### ACTION(S)

- *See Curtaining, page 11.*

- *See Swell – Low, page 25.*

Blow molding troubleshooting guide

## Container problems

**PROBLEM: Blowing Incomplete** – Container does not blow or incomplete blowing

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Blow air restricted.	<ul style="list-style-type: none"><li>• Check air system.</li></ul>
Pinch-off area too sharp.	<ul style="list-style-type: none"><li>• Provide broader pinch-off area.</li></ul>
Poor mold venting.	<ul style="list-style-type: none"><li>• Clean/wipe out mold vents.</li></ul>
	<ul style="list-style-type: none"><li>• <i>See Blow-outs or Holes, page 29.</i></li></ul>

## PROBLEM: Blow-outs or Holes

CAUSE(S)	ACTION(S)
Contamination. (This is the cause a majority of the time.)	<ul style="list-style-type: none"><li>• Check for contamination in resin feed.</li><li>• Clean off burnt resin on tooling face.</li><li>• Open tooling and purge head.</li></ul>
Blowing air pressure too high.	<ul style="list-style-type: none"><li>• Decrease blowing air pressure.</li></ul>
Moisture in resin.	<ul style="list-style-type: none"><li>• Check resin for moisture.</li></ul>
Pinch-off too sharp, which cuts parison and causes blow-out.	<ul style="list-style-type: none"><li>• Increase width of pinch-off land.</li></ul>
Pinch-off too hot.	<ul style="list-style-type: none"><li>• Check cooling water flow to mold.</li><li>• Check melt temperature.</li><li>• Check cooling channels for blockage.</li><li>• Check cycle time.</li><li>• Check part design.</li></ul>
Parison too short.	<ul style="list-style-type: none"><li>• Ensure proper parison length.</li></ul>
Blow-up ratio too high.	<ul style="list-style-type: none"><li>• Check head tooling (a change to a larger diameter die may be required).</li></ul>
Resin swell too low.	<ul style="list-style-type: none"><li>• Use higher swell resin to ensure proper parison size and prevent missed handle, accompanied by blow-out. Consult your Dow representative for more information. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Clamp pressure too low.	<ul style="list-style-type: none"><li>• Adjust clamp pressure.</li></ul>
Melt temperature too low.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li></ul>
Extruder feed zone temperature too low.	<ul style="list-style-type: none"><li>• Increase extruder feed zone temperature.</li></ul>
Pinch-off too wide.	<ul style="list-style-type: none"><li>• Decrease width of pinch-off land.</li></ul>
Mold closing speed too fast.	<ul style="list-style-type: none"><li>• Reduce mold closing speed and/or use clamp pause.</li></ul>

## PROBLEM: Bubbles

CAUSE(S)	ACTION(S)
Moisture in resin.	<ul style="list-style-type: none"><li>• Check resin for moisture.</li><li>• Hold resin in warm area for 24 hours before using (moisture pick-up).</li></ul>
Moisture in melt. (Can be caused by too much water cooling on the throat, which produces condensation in the barrel and moisture in the melt.)	<ul style="list-style-type: none"><li>• Adjust throat cooling.</li></ul>
Air leaks into system.	<ul style="list-style-type: none"><li>• Check tooling for cracks or poor sealing at joints.</li><li>• Increase extruder feed zone temperature.</li><li>• Tighten die tip bolts.</li><li>• Increase back pressure.</li></ul>
Poor temperature control.	<ul style="list-style-type: none"><li>• Optimize extruder temperatures for better melt temperature control.</li></ul>
Contamination.	<ul style="list-style-type: none"><li>• Check and eliminate contamination source.</li></ul>

**PROBLEM: Container Temperature – Part too hot**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Mold temperature too high.	<ul style="list-style-type: none"><li>• Decrease mold temperature.</li></ul>
Cycle time too short.	<ul style="list-style-type: none"><li>• Increase blow time to extend cycle time.</li></ul>
Clogged coolant lines/ channels.	<ul style="list-style-type: none"><li>• Clean lines/channels.</li></ul>
Blow air pressure too low.	<ul style="list-style-type: none"><li>• Increase blow air pressure.</li></ul>
Melt temperature too high.	<ul style="list-style-type: none"><li>• Reduce parison melt temperature.</li></ul>

## PROBLEM: Definition of Detail – Poor definition of detail

CAUSE(S)	ACTION(S)
Blow air pressure too low.	<ul style="list-style-type: none"><li>• Increase blow air pressure.</li></ul>
Poor mold venting.	<ul style="list-style-type: none"><li>• Clean vent.</li><li>• Consult mold manufacturer.</li></ul>

## PROBLEM: Delamination

CAUSE(S)	ACTION(S)
Low melt temperature.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li><li>• Increase extruder feed zone temperature.</li><li>• Increase extrusion back pressure.</li></ul>
Resin contamination.	<ul style="list-style-type: none"><li>• Check for contamination.</li></ul>
Moisture in resin.	<ul style="list-style-type: none"><li>• Check for moisture in resin.</li></ul>
Low mold temperature.	<ul style="list-style-type: none"><li>• Increase mold temperature.</li></ul>
Low melt index resin.	<ul style="list-style-type: none"><li>• Consult your Dow representative about higher melt index resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

## PROBLEM: Dirt or Streaks – Dirty or streaked containers

CAUSE(S)	ACTION(S)
Contamination.	<ul style="list-style-type: none"><li>• Inspect area for cleanliness.</li><li>• Check regrind.</li><li>• Purge die and clean hopper.</li></ul>



**PROBLEM: Environmental Stress Crack Resistance (ESCR) – Low ESCR**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Resin density too high.	<ul style="list-style-type: none"> <li>• Consult your Dow representative about lower density or higher ESCR resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li> </ul>
Improper container design.	<ul style="list-style-type: none"> <li>• Eliminate sharp corners.</li> <li>• Eliminate thick sections which cool slower than rest of container.</li> </ul>
Mold temperature too high.	<ul style="list-style-type: none"> <li>• Decrease mold temperature.</li> </ul>
Resin melt index too high.	<ul style="list-style-type: none"> <li>• Consult your Dow representative about lower melt index resins. In the U.S., you can also call The Dow CIG at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li> </ul>
Melt temperature too low.	<ul style="list-style-type: none"> <li>• Increase melt temperature.</li> </ul>
Melt temperature too high.	<ul style="list-style-type: none"> <li>• Decrease melt temperature.</li> </ul>
Folds in bottom of container.	<ul style="list-style-type: none"> <li>• <i>See Curtaining, page 11.</i></li> </ul>
Bottom pinch-off extends up container sidewall.	<ul style="list-style-type: none"> <li>• Use smaller diameter die.</li> </ul>

## PROBLEM: Gloss – Poor gloss

CAUSE(S)	ACTION(S)
Parison temperature too low.	<ul style="list-style-type: none"><li>• Raise melt temperature.</li></ul>
Melt index too low.	<ul style="list-style-type: none"><li>• Consult your Dow representative about higher melt index resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Die heat too low.	<ul style="list-style-type: none"><li>• Increase die heat.</li></ul>
Moisture on mold.	<ul style="list-style-type: none"><li>• Check mold for sweating and raise mold temperature.</li><li>• Check for cooling water leaks.</li></ul>
Poor mold venting.	<ul style="list-style-type: none"><li>• Sand blast molds.</li><li>• Clean vents.</li><li>• Vent molds.</li></ul>

## PROBLEM: Handles – Lost handles

CAUSE(S)	ACTION(S)
Low diameter swell.	<ul style="list-style-type: none"><li>• Adjust pre-blow air pressure or time.</li><li>• Increase blowing air pressure.</li><li>• Increase shot pressure.</li><li>• Lower melt temperature.</li><li>• Decrease regrind level.</li><li>• Consult your Dow representative about higher die swelling resins. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li><li>• Decrease container weight.</li></ul>
Parison hooking.	<ul style="list-style-type: none"><li>• See <i>Hooking</i>, <a href="#">page 15</a>.</li></ul>
Misaligned molds.	<ul style="list-style-type: none"><li>• Realign molds to catch handles.</li></ul>
Excessive sag.	<ul style="list-style-type: none"><li>• Decrease mold open time and/or increase mold close speed.</li></ul>
Poor pinch-off.	<ul style="list-style-type: none"><li>• Check pinch-offs for damage.</li></ul>
Parison mold stringing.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li></ul>

## PROBLEM: Impact Strength – Low impact strength

CAUSE(S)	ACTION(S)
Poor pinch-off.	<ul style="list-style-type: none"><li>• See <i>Pinch-off</i>, page 42.</li></ul>
Poor weld.	<ul style="list-style-type: none"><li>• See <i>Pinch-off</i>, page 42.</li></ul>
Resin melt index too high.	<ul style="list-style-type: none"><li>• Consult your Dow representative about resin selection. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Resin density too high.	<ul style="list-style-type: none"><li>• Consult your Dow representative about resin selection. In the U.S., you can also call The Dow CIG at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Excessive percentage of regrind.	<ul style="list-style-type: none"><li>• Reduce regrind level.</li></ul>
Mismatched molds.	<ul style="list-style-type: none"><li>• Realign molds.</li></ul>
Container thickness variation.	<ul style="list-style-type: none"><li>• Measure container thickness at failure site.</li><li>• See <i>Wall Thickness – Uneven</i>, page 49.</li></ul>

**PROBLEM: Melt Fracture** – Rough surfaces/ripples on the finished container due to flow instabilities through a die clearance (also known as alligatoring, herringbone, fish scales, sharkskin, etc.).

CAUSE(S)	ACTION(S)
Extrusion speed too fast.	<ul style="list-style-type: none"> <li>• Reduce extrusion rate.</li> <li>• Reduce melt temperature.</li> <li>• Reduce extrusion pressure.</li> </ul>
Melt flow is unstable.	<ul style="list-style-type: none"> <li>• Increase or decrease melt temperature.</li> <li>• Increase or decrease drop time.</li> <li>• Check to ensure that head choke and manifold chokes are open as much as possible.</li> <li>• Clean tooling.</li> </ul>
Material melt index too low.	<ul style="list-style-type: none"> <li>• Consult your Dow representative about material options. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li> </ul>
Parison die land too short.	<ul style="list-style-type: none"> <li>• Repair or replace tooling.</li> </ul>
Die gap too small.	<ul style="list-style-type: none"> <li>• Increase container weight.</li> </ul>

**PROBLEM: Mold Bottom** – Thick bottom mold

CAUSE(S)	ACTION(S)
Low melt temperature.	<ul style="list-style-type: none"> <li>• Increase melt temperature.</li> <li>• Increase extrusion back pressure.</li> </ul>
Low pre-blow air pressure.	<ul style="list-style-type: none"> <li>• Increase pre-blow air pressure.</li> </ul>
Insufficient mold flash pocket volume.	<ul style="list-style-type: none"> <li>• Check mold flash pocket volume.</li> </ul>
Low blowing air pressure.	<ul style="list-style-type: none"> <li>• Increase blowing air pressure.</li> </ul>
Die gap too large.	<ul style="list-style-type: none"> <li>• Decrease container weight.</li> </ul>
Damaged pinch-offs.	<ul style="list-style-type: none"> <li>• Check pinch-offs for damage.</li> </ul>

**PROBLEM: Mold Bottom – Thin bottom mold**

**CAUSE(S)**

**ACTION(S)**

High melt temperature.

- Decrease melt temperature.
- Decrease extrusion back pressure.

High pre-blow air pressure.

- Decrease pre-blow air pressure.

High mold temperature.

- Decrease mold temperature.

Damaged pinch-offs.

- Check pinch-offs for damage.

## PROBLEM: Neck Finish – Neck finish or cap leakage

CAUSE(S)	ACTION(S)
Worn or damaged blow pin or shear steel.	<ul style="list-style-type: none"><li>• Replace blow pin and/or shear steel.</li></ul>
Blow pin alignment.	<ul style="list-style-type: none"><li>• Align blow pin.</li></ul>
Mold alignment (mismatch).	<ul style="list-style-type: none"><li>• Replace guide pins and bushings.</li></ul>
Wrong blow pin and shear steel dimensions.	<ul style="list-style-type: none"><li>• Replace with correct blow pin and shear steel.</li></ul>
Wrong neck plate dimensions.	<ul style="list-style-type: none"><li>• Replace neck plates.</li></ul>
Wrong cap dimensions.	<ul style="list-style-type: none"><li>• Check and ensure correct size caps are being used.</li></ul>
Curtaining (vertical web inside neck).	<ul style="list-style-type: none"><li>• <i>See Curtaining, page 11.</i></li></ul>
Excessive shrinkage.	<ul style="list-style-type: none"><li>• <i>See Shrinkage, page 43.</i></li></ul>
Trimmer damage due to difficult flash removal.	<ul style="list-style-type: none"><li>• <i>See Trimming, page 47.</i></li></ul>

## **PROBLEM: Parting Line – Hole or slit in parting line**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Melt temperature too low.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li></ul>
Mold closing too rapidly.	<ul style="list-style-type: none"><li>• Reduce mold closing speed and/or use clamp pause.</li></ul>
Maladjusted trimming equipment.	<ul style="list-style-type: none"><li>• Adjust trimming equipment.</li></ul>
Excessive pinch-off land length.	<ul style="list-style-type: none"><li>• Reduce pinch-off land length.</li></ul>

## **PROBLEM: Parting Line – Thinning or stretching at parting line**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Mold not closing completely.	<ul style="list-style-type: none"><li>• Increase clamp pressure.</li><li>• Check for mold adjustment, alignment, or damage that may hold molds open; align pinholes.</li><li>• Clean mold faces.</li><li>• Align blow pins properly.</li><li>• Decrease blow air pressure.</li></ul>
High mold temperature.	<ul style="list-style-type: none"><li>• Decrease mold temperature.</li></ul>
Blowing air pressure too low.	<ul style="list-style-type: none"><li>• Increase blowing air pressure.</li></ul>
Poor cooling of the mold, especially at parting line.	<ul style="list-style-type: none"><li>• Check mold cooling at parting line.</li><li>• Check molds for sand blasting or venting.</li></ul>
Mold temperature too low.	<ul style="list-style-type: none"><li>• Check mold cooling at parting line.</li></ul>



## **PROBLEM: Part Volume – Part volume too high**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Part weight too low.	<ul style="list-style-type: none"><li>• Increase part weight.</li></ul>
Mold too cold.	<ul style="list-style-type: none"><li>• Increase mold temperature.</li></ul>
Cycle too long.	<ul style="list-style-type: none"><li>• Reduce cycle time.</li></ul>
Wrong mold volume.	<ul style="list-style-type: none"><li>• Resize mold.</li></ul>
Volume-reducing inserts not used.	<ul style="list-style-type: none"><li>• Install inserts.</li></ul>
Blow air pressure too high.	<ul style="list-style-type: none"><li>• Reduce blow air pressure.</li></ul>
Part storage area too cold.	<ul style="list-style-type: none"><li>• Increase storage area temperature or dwell time.</li></ul>

## **PROBLEM: Part Volume – Part volume too low**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Part weight too high.	<ul style="list-style-type: none"><li>• Reduce part weight.</li></ul>
Mold too hot.	<ul style="list-style-type: none"><li>• Reduce mold temperature.</li></ul>
Cycle too short.	<ul style="list-style-type: none"><li>• Increase cycle time.</li></ul>
Mold volume incorrect.	<ul style="list-style-type: none"><li>• Resize mold.</li></ul>
Volume-reducing inserts used.	<ul style="list-style-type: none"><li>• Remove inserts.</li></ul>
Blow air pressure too low.	<ul style="list-style-type: none"><li>• Increase blow air pressure.</li></ul>
Part storage area too hot.	<ul style="list-style-type: none"><li>• Reduce storage area temperature or dwell time.</li></ul>
Melt temperature too high.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li></ul>

## **PROBLEM: Part Weight – Improper part weight**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Improper mandrel position.	<ul style="list-style-type: none"><li>• Adjust mandrel to increase or decrease part weight.</li></ul>
Continuous extrusion, rpm is too high or too low.	<ul style="list-style-type: none"><li>• Increase or reduce extruder rpm.</li></ul>
Material or tooling too hot.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li><li>• Reduce head temperature.</li></ul>

## **PROBLEM: Pinch-off – Poor weld or seal at pinch-off; Pinch-off areas too thin or too thick**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Parison temperature too high.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li></ul>
Parison temperature too low.	<ul style="list-style-type: none"><li>• Increase melt temperature.</li></ul>
Mold temperatures too high.	<ul style="list-style-type: none"><li>• Reduce mold temperatures.</li></ul>
Mold closing speed too fast.	<ul style="list-style-type: none"><li>• Slow down mold closing speed or use clamp pause.</li></ul>
Mold clamping pressure too high.	<ul style="list-style-type: none"><li>• Reduce mold clamping pressure.</li></ul>
Seams not uniform because of improper line-up of mold and parison.	<ul style="list-style-type: none"><li>• Ensure that blow head is located exactly vertical and improve adjustment of mold to die.</li></ul>
Pinch-off blade land too short.	<ul style="list-style-type: none"><li>• Check pinch-offs of mold for clearance and damage.</li></ul>
Poorly designed pinch-off blade.	<ul style="list-style-type: none"><li>• Check pinch-off flash areas for capacity.</li></ul>
Blowing air pressure too high.	<ul style="list-style-type: none"><li>• Check blowing pressure and air start time.</li></ul>

## PROBLEM: Shrinkage – Excessive shrinkage of container

CAUSE(S)	ACTION(S)
Parison temperature too high.	<ul style="list-style-type: none"><li>• Check heating system for uneven heating.</li><li>• Reduce melt temperature.</li></ul>
Material density too high.	<ul style="list-style-type: none"><li>• Consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Insufficient mold cooling.	<ul style="list-style-type: none"><li>• Check mold cooling.</li></ul>
Cooling cycle too short.	<ul style="list-style-type: none"><li>• Increase blowing time.</li></ul>
Part cooling too slowly.	<ul style="list-style-type: none"><li>• Decrease container weight.</li></ul>
Blowing air released too soon.	<ul style="list-style-type: none"><li>• Increase blowing time.</li></ul>
Blowing air pressure too low.	<ul style="list-style-type: none"><li>• Increase blowing air pressure.</li></ul>
Poor parison-to-mold contact.	<ul style="list-style-type: none"><li>• Clean mold vents.</li></ul>

## PROBLEM: Specks – Black specks in containers

CAUSE(S)	ACTION(S)
Resin contamination.	<ul style="list-style-type: none"><li>• Check resin mix being used.</li></ul>
Degraded resin hung up in die.	<ul style="list-style-type: none"><li>• Use proper startup and/or shutdown procedures.</li></ul>
Degraded resin hung up on screw.	<ul style="list-style-type: none"><li>• Clean screw.</li></ul>

## PROBLEM: Sticking – Container sticks in mold

CAUSE(S)	ACTION(S)
Insufficient exhaust time.	<ul style="list-style-type: none"><li>• Increase exhaust time.</li></ul>
Parison hooking.	<ul style="list-style-type: none"><li>• Adjust parison drop.</li></ul>
Poor mold design.	<ul style="list-style-type: none"><li>• Check mold design.</li><li>• Eliminate hang-up spots.</li></ul>
Damaged mold.	<ul style="list-style-type: none"><li>• Check pinch-offs for knife edges and burrs.</li><li>• Eliminate hang-up spots.</li></ul>
Tail too short.	<ul style="list-style-type: none"><li>• Increase screw rpm.</li><li>• Increase blow time.</li></ul>
Mold temperature too high.	<ul style="list-style-type: none"><li>• Reduce mold temperature.</li><li>• Increase cycle time.</li></ul>
Parison temperature too high.	<ul style="list-style-type: none"><li>• Reduce parison temperature.</li></ul>
Wall of part too thick.	<ul style="list-style-type: none"><li>• Align parison and check for contamination in tooling.</li></ul>
Blowing air pressure too low.	<ul style="list-style-type: none"><li>• Increase blowing air pressure.</li></ul>
Material density too low.	<ul style="list-style-type: none"><li>• Consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Mold not opening far enough.	<ul style="list-style-type: none"><li>• Adjust mold open stop position.</li></ul>
Swing arm out of adjustment.	<ul style="list-style-type: none"><li>• Adjust swing arm.</li></ul>

**PROBLEM: Surface Appearance** – Part roughness, orange peel, pits, scales, cold spots, etc.

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Moisture on mold.	<ul style="list-style-type: none"><li>• Check mold for sweating; raise mold temperature and/or reduce the relative humidity in the molding room.</li><li>• Decrease mold open time.</li><li>• Check for cooling water leaks.</li></ul>
Low blow pressure or blow rate.	<ul style="list-style-type: none"><li>• Increase blow pressure.</li><li>• Ensure that blow pin is large enough to handle required amount of air to fully and rapidly blow part.</li><li>• Check for restriction or partial plugging of air lines.</li></ul>
Parison temperature too low.	<ul style="list-style-type: none"><li>• Raise melt temperature.</li></ul>
Poor venting of mold.	<ul style="list-style-type: none"><li>• Sand blast mold.</li><li>• Vent mold.</li></ul>
Insufficient back pressure.	<ul style="list-style-type: none"><li>• Reciprocating unit: Adjust back pressure.</li><li>• Continuous extrusion unit: Change screen pack to finer mesh.</li></ul>
Die heat too low.	<ul style="list-style-type: none"><li>• Increase die heat.</li></ul>
Melt index too low.	<ul style="list-style-type: none"><li>• Consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

## PROBLEM: Tail Lengths – Tail lengths not uniform

CAUSE(S)	ACTION(S)
Manifold chokes out of adjustment.	<ul style="list-style-type: none"><li>• Adjust manifold chokes, making short tails longer first.</li></ul>
Non-uniform part weight.	<ul style="list-style-type: none"><li>• Adjust part weight to +/- 3 percent of target weight.</li></ul>
Non-uniform head heating.	<ul style="list-style-type: none"><li>• Check heaters.</li></ul>
Head chokes out of adjustment.	<ul style="list-style-type: none"><li>• Reset head chokes.</li></ul>

## PROBLEM: Top Load Strength – Top load strength too low

CAUSE(S)	ACTION(S)
Uneven wall distribution.	<ul style="list-style-type: none"><li>• Reduce parison drop time.</li><li>• Clean dies and heads.</li><li>• Reprogram parison programmer.</li></ul>
Low part weight.	<ul style="list-style-type: none"><li>• Increase part weight.</li></ul>
Incorrect resin for application.	<ul style="list-style-type: none"><li>• Consult your Dow representative regarding proper resin selection. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>

## PROBLEM: Trimming – Poor trimming

CAUSE(S)	ACTION(S)
Container weight out of specification.	<ul style="list-style-type: none"><li>• Check container weight.</li></ul>
Parison falls outside flash pocket.	<ul style="list-style-type: none"><li>• See <i>Hooking</i>, page 15.</li><li>• See <i>Flash – Excessive</i>, page 13.</li></ul>
Container too warm.	<ul style="list-style-type: none"><li>• See <i>Container Temperature</i>, page 31.</li></ul>
Mold or platen.	<ul style="list-style-type: none"><li>• Damaged or dull pinch-off on mold.</li><li>• Contamination on mold face.</li><li>• Worn bushings or bearings on press.</li><li>• Mismatch of mold cavity halves.</li><li>• Improper assembly of mold sections, neck block, neck rings, or shear steels.</li><li>• Mold stack height variations between molds (within 0.001 inch, mold-to-mold). Molds should be maintained as a matched set.</li><li>• Tie bars improperly adjusted. When tie bars are properly adjusted, the platens will lock up parallel to each other. All mold corners will contact simultaneously with no additional movement or scissoring action.</li></ul>
Trimmer.	<ul style="list-style-type: none"><li>• Damaged (or misaligned) trim tool.</li><li>• Conveyor buckets not centered on trim tool.</li><li>• Broken springs on tail trim tool.</li><li>• Bent conveyor bucket.</li><li>• Improper adjustment of the S Bar.</li></ul>
Blow pin alignment.	<ul style="list-style-type: none"><li>• Align or replace blow pins.</li></ul>
Damaged cutting ring.	<ul style="list-style-type: none"><li>• Replace cutting ring, check for proper mold alignment.</li></ul>
	<ul style="list-style-type: none"><li>• See <i>Pinch-off</i>, page 42.</li></ul>

**PROBLEM: Unmelts – Unmelted pellets in blown part**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Melt not homogeneous (insufficient mixing in screw).	<ul style="list-style-type: none"><li>• Increase back pressure by choke adjustment.</li><li>• Use finer screen pack.</li></ul>
Incorrect melt temperature.	<ul style="list-style-type: none"><li>• Optimize heater setting.</li></ul>
Worn screw or barrels.	<ul style="list-style-type: none"><li>• Replace screw or barrels. Check output.</li></ul>
Dirty extrusion tooling.	<ul style="list-style-type: none"><li>• Clean die head/extrusion tooling.</li></ul>



**PROBLEM: Wall Thickness – Wall section too thin in general**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Improper parison size.	<ul style="list-style-type: none"><li>• Enlarge parison.</li><li>• Reduce melt temperature.</li><li>• Increase extrusion rate.</li></ul>

**PROBLEM: Wall Thickness – Uneven wall thickness of finished container**

<b>CAUSE(S)</b>	<b>ACTION(S)</b>
Die not centered.	<ul style="list-style-type: none"><li>• Center die around mandrel.</li></ul>
Parison temperature too high.	<ul style="list-style-type: none"><li>• Check heating system for uneven heating.</li><li>• Reduce melt temperature.</li></ul>
Head temperature too high.	<ul style="list-style-type: none"><li>• Check head heaters.</li></ul>
Blowing air pressure too low.	<ul style="list-style-type: none"><li>• Increase blowing air pressure.</li><li>• Check mold venting.</li><li>• Check for air leakage.</li></ul>
Improper tooling design.	<ul style="list-style-type: none"><li>• Ovalize tooling.</li></ul>
Damaged die or mandrel.	<ul style="list-style-type: none"><li>• Check die/mandrel for damage.</li></ul>
Improper parison programming.	<ul style="list-style-type: none"><li>• Adjust parison programming accordingly.</li></ul>

## PROBLEM: Warpage – Warpage of container

CAUSE(S)	ACTION(S)
Parison temperature too high.	<ul style="list-style-type: none"><li>• Reduce melt temperature.</li></ul>
Mold temperature too high.	<ul style="list-style-type: none"><li>• Check mold for proper cooling.</li><li>• Increase cycle time to obtain proper mold cooling.</li></ul>
Wall of container too thick.	<ul style="list-style-type: none"><li>• Check for proper resin distribution.</li><li>• Check tooling design.</li><li>• Center mandrel.</li></ul>
Blowing air pressure too low.	<ul style="list-style-type: none"><li>• Check blowing air pressure.</li></ul>
Material density too low.	<ul style="list-style-type: none"><li>• Consult your Dow representative. In the U.S., you can also call The Dow Customer Information Group (CIG) at 1-800-441-4369 or 989-832-1426. For contact information in other global regions, please refer to the <a href="#">back cover</a>.</li></ul>
Poorly designed part.	<ul style="list-style-type: none"><li>• Check material distribution in part for unnecessarily thick or thin sections.</li></ul>
Cycle time too short.	<ul style="list-style-type: none"><li>• Increase cycle time.</li></ul>

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