



Philosophy of Troubleshooting BMC Transfer Molding Problems

There is no "cure-all" for eliminating molding problems. Every mold is distinctive and has its own peculiarities, even molds which are exact duplicates. The same holds true for molding presses. Therefore, what works for one mold or press may not work for another.

Problems can differ with conditions such as the shop climate, material or equipment resulting in numerous variables, many of which are not obvious and are difficult to identify. The troubleshooting suggestions that follow have been used to successfully resolve the stated problem. However, due to the reasons mentioned above, several of them may seem to be contradictory.

The most important thing to remember is this; make some reasonable adjustment and carefully observe the results. Document the change and keep track of the response by comparing parts from before and after the adjustment to determine if the effect is favorable. This will lead to other changes that should eventually produce a solution to the problem.

Thermoset materials cure as a result of a chemical reaction. Temperature has a major role in the speed of the reaction and to a lesser degree so do pressure and time. Therefore all three items need to be verified before troubleshooting any molding problem.

For **transfer molding**, this means there are several items on the mold and press that should be checked before troubleshooting any molding problem. If problems are found they should be corrected and the parts re-evaluated before proceeding.

Slug weight- Check the charge weight of the BMC slug to conform it meets the cost weight so material is not wasted or short shots are produced.

Mold – Don't just read the press temperature controller. Check the actual mold temperature and its uniformity across the entire mold face using a calibrated pyrometer and surface probe. Compare this temperature with what the temperature was the last time this mold was run in this press. The temperatures should be the same or very close. If not, determine why there are differences before starting to mold

Press - Check actual settings for, close time, transfer time, transfer and clamping pressures. Compare the current settings with the setting used the last time this mold was in the press. They should be the same or very close. If not, determine why there are differences before starting to mold.

Transfer Processing Problems

Please **NOTE** the following:

- Increased cycle time should not be used as a solution for a molding problem, except as the very last resort to maintain the integrity of the molded parts.
- Various processing changes are suggested as possible solutions for the different problems encountered during the molding of thermoset parts. In general these changes should not exceed the recommended ranges presented in the previous sections on transfer startup procedures.
- This troubleshooting guide lists the processing problems in alphabetical order.
- For each problem, the possible solutions are listed in the order of the most frequent to the least frequent solution for that problem.
- Change only one processing variable at a time and process a few cycles before thoroughly evaluating the results and before changing another processing variable.
- Please keep in mind, that in order to resolve any given processing problem one may need to apply a combination of the possible solutions that are listed.
- Plenco's Technical Service Group available to assist you in troubleshooting processing problems.

CRAZE CRACKING - Is hairline cracks that appear on the surface of the part but do not propagate through the entire thickness of the part.

POSSIBLE SOLUTIONS

1. Check mold for back draft or undercuts and remove them.
2. Eliminate any sharp transitions from thick to thin cross sections.
3. Decrease the rate of ejection.
4. Increase the temperature differential between the cores and cavities.
5. Allow the parts to cool at a controlled, uniform rate.
6. Relocate the gate and if possible increase gate size.
7. Use shrink fixtures to hold the parts flat while they cool.

CONTAMINATION - Any visible foreign material in the surface of the molded part.

POSSIBLE SOLUTIONS

1. Check all unmolded material for foreign matter and if possible remove it. If it can't be removed, quarantine the remaining material.
2. Check all equipment used in molding the material for potential sources of contamination and remove them.
3. Check for air borne particulates from other processes and eliminate their source.

DIESELING - A burnt spot on part, often accompanied by non-fills.

POSSIBLE SOLUTIONS

1. If mold is vacuum vented, check system to insure that it is pulling a minimum of 21" of Hg in the mold. If it is not, resolve the problem with the vacuum system.
2. Decrease transfer pressure.
3. Increase the mold temperature differential between the cores and cavities. If that does not resolve the problem try decreasing it.
4. Vent the ejector pins.
5. Vacuum Vent the mold.

DRAG MARKS - Surface scratches that occur during part ejection.

POSSIBLE SOLUTIONS

1. Vent the ejector pins.
2. Check mold for back draft or undercuts and remove them.
3. Check mold for amount of draft and if possible increase it.

DULL APPEARANCE - The surface of the part has a hazy or satiny appearance instead of a glossy appearance.

NOTE: Make sure part is completely filled out and mold is not stained.

POSSIBLE SOLUTIONS

1. Increase mold temperature.
2. Increase transfer pressure.
3. Check condition of mold plating and re-plate if necessary. If mold is unplated, polish or plate it.
4. Polish the mold.

FLASH (EXCESSIVE) - Parts where the flash is thicker than 0.15 mm (0.006") or with flash extending out into the land areas are considered to have excessive flash.

POSSIBLE SOLUTIONS

1. Decrease transfer pressure.
2. Decrease charge weight.
3. Increase mold temperature.
4. Check parting line for wear or damage and repair as needed.
5. Increase clamp tonnage if possible.

FLOW LINES - Visible lines on the surface of the part that show the flow pattern of the material as it filled the cavity.

POSSIBLE SOLUTIONS

1. Increase transfer pressure.
2. Decrease mold temperature.
3. Relocate gate and if possible increase gate size.

KNIT LINES - Areas where multiple flow fronts meet but do not fuse or knit together.

POSSIBLE SOLUTIONS

1. Decrease transfer pressure.
2. Decrease mold temperature.
3. Change location of gates and/or vents to move knit line to non-critical areas of the parts.

LAKING - Irregular dull areas on the surface of the part.

POSSIBLE SOLUTIONS

1. Increase clamp tonnage if possible.
2. Verify that the correct charge weight is being used and change as needed.
3. Verify that clamp pressure is being maintained on the mold during the entire cycle and correct as needed.
4. Increase transfer pressure.
5. Increase mold temperature.
6. Check parting line for wear or damage and repair as needed.

NONFILLS OR SHORT SHOTS - Areas of surface porosity due to parts not being completely filled out.

POSSIBLE SOLUTIONS

1. Increase charge weight.
2. Increase transfer pressure.
3. Decrease mold temperature.
4. Check the vents and correct as needed

PIN CRACKING - Small surface cracks around and/or above ejector pins.

POSSIBLE SOLUTIONS

1. Decrease the rate of ejection.
2. Check mold for back draft or undercuts and remove them.
3. Check mold for amount of draft and if possible increase it.
4. Increase mold temperature.
5. Increase cycle time.
6. Vent the ejector pins.
7. Relocate ejector pins or increase the diameter and/or number of pins.

PRE CURE - Localized areas of dull rough porosity.

POSSIBLE SOLUTIONS

1. Increase transfer pressure.
2. Decrease mold temperature.

SCUMMING - Dulling or streaks in the part that usually transfer a similar pattern onto the tool surface.

POSSIBLE SOLUTIONS

1. Increase clamp tonnage if possible.
2. Verify that clamp tonnage is being maintained on the mold during the entire cycle and correct as needed.
3. Increase mold temperature.
4. Relocate gate if possible.

SHRINKAGE - There are two problems which will cause a part to not meet its dimensional requirements, the part has excessive shrinkage (undersize) or the part has insufficient shrinkage (oversize).

POSSIBLE SOLUTIONS FOR EXCESSIVE SHRINKAGE (UNDERSIZE)

1. Increase transfer pressure.
2. Increase mold temperature.
3. Check the vents and correct as needed
4. Increase cure time.

POSSIBLE SOLUTIONS FOR INSUFFICIENT SHRINKAGE (OVERSIZE)

1. Decrease mold temperature.
2. Check the vents and correct as needed.
3. Decrease cure time.

SINK MARKS - Slight depressions on the surface of the part that resemble dimples.

POSSIBLE SOLUTIONS

1. Increase charge weight.
2. Increase mold temperature.
3. Increase transfer pressure.
4. Check the vents and correct as needed.

STICKING IN MOLD - Part will not release from the cavity and a piece or all of the part will remain stuck until it is manually removed.

POSSIBLE SOLUTIONS

1. Check mold for wear and correct as needed.
2. Increase mold temperature.
3. Decrease charge weight.
4. Check condition of mold plating and re-plate if necessary. If mold is unplated, polish or plate it.
5. Increase cure time.

TRAPPED GAS (BURN MARK) - A porous, dull, discolored and sometimes scorched area on the surface of a part.

POSSIBLE SOLUTIONS

1. If mold is vacuum vented, check if system is pulling a minimum of 21" Hg in the mold. If not, resolve problem with vacuum system.
2. Check the vents and correct as needed.
3. Decrease transfer pressure.
4. Decrease mold temperature.
5. Decrease clamp tonnage.
6. Increase size of gate and runner.

WARPAGE - Part is twisted or warped rather than straight or flat. This can occur when ejected from the mold or after cooling.

POSSIBLE SOLUTIONS FOR PART WARPAGE WHEN EJECTED FROM MOLD

1. Check mold for wear and correct as needed.
2. Check condition of mold plating and re-plate if necessary. If mold is unplated, polish or plate it.
3. Add undercuts to hold the parts on movable half of the mold until they are ready to be ejected.

POSSIBLE SOLUTIONS FOR PART WARPAGE AFTER COOLING

1. Increase mold temperature.
2. Decrease transfer pressure.
3. Check the vents and correct as needed
4. Increase cure time.
5. Use shrink fixtures to hold parts flat as they cool.
6. Relocate the gate and if possible increase gate size.

Date Printed: November 10, 2015

Date Revised: October 6, 2015

Supersedes Revision Dated: August 15, 2007

This information is suggested as a guide to those interested in processing Plenco Thermoset molding materials. The information presented is for your evaluation and may or may not be compatible for all mold designs, runner systems, press configurations, and material rheology. Please feel free to call Plenco with any questions about PLENCO molding materials or processing and a Technical Service Representative will assist you.