

Philosophy of Troubleshooting Transfer Molding Problems

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

Problems 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 resolve the stated problems. However, due to the reasons mentioned above several of them may seem to be contradictory.

The most important things to remember are make some reasonable adjustments, carefully observe the results, and give it time. Document the changes 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 because 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.

Before troubleshooting transfer-molding problems, the preforms, preheater, mold and the press need to be checked.

If problems are found, they should be corrected, and the parts re-evaluated before proceeding.

Preforms – Check the preform hardness using a Durometer. Take three readings per preform being careful to avoid gaps between the material granules. A reading of 50 or higher is desired.

Preheater – Clean any build up off the grid plates. Then check the actual grid height, preheat time and general operation of the preheater. Adjust or repair as needed, then check the preform temperature and uniformity of preheat using a calibrated pyrometer and needle probe then adjust preheater setting if necessary.

Mold – Do not 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 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, the actual settings for close time, breathe cycle and clamping pressure then compare with the setting used last time this mold ran in this press. The settings 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 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 before changing another processing variable.

Please keep in mind to resolve any given processing problem, one may need to apply a combination of the possible solutions that are listed.

PLENCO's Technical Service Team is available to assist you in troubleshooting processing problems.

BALL & SOCKET – An internal circular failure pattern observed on transfer molded parts after breaking of the thickest cross-sectional area. One surface will resemble a ball and the other surface will resemble a socket. The texture and color of the socket area will differ from that of the ball.

POSSIBLE SOLUTIONS

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

BULGE OPPOSITE INSERT – Bulges that appear on the side opposite and directly over molded-in inserts.

POSSIBLE SOLUTIONS

1. Heat inserts before using.
2. Use a shorter insert.
3. Increase mold temperature.
4. Increase preheat temperature.

CURE BLISTER – Area of gas entrapment (blister) caused by not completely curing the part before removing it from the mold. This generally shows up as a bulge on opposite sides of the thickest cross-sectional area of the part. When broken open there maybe plasticized uncured material present, as well as a large void in the center of the bulge.

POSSIBLE SOLUTIONS

1. Increase preheat temperature by lowering capacitance grid.
2. Increase preheat temperature by increasing preheat time.
3. Increase mold temperature.
4. Increase cure time.

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

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

POSSIBLE SOLUTIONS

1. Increase mold temperature.
2. Increase preheat temperature.
3. Increase transfer pressure.
4. Check condition of mold plating and re-plate if necessary.
5. If mold is not plated, polish or plate it.
6. Polish the mold.

EXCESSIVE FLASH - 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 preheat temperature.
4. Increase mold temperature.
5. Check parting line for wear or damage and correct as needed.
6. 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 preheat temperature.
3. Decrease mold temperature.

HARD SPOTS (PRECURE) - Slight bumps on the surface of the part that are usually uneven, pointed, and rough and have definite outlines.

POSSIBLE SOLUTIONS

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

MOLD STAINS - A buildup of volatiles on the molding surface that will cause that surface area of the part to be dull and pit marked. This can eventually lead to part discoloration and parts sticking in the mold.

POSSIBLE SOLUTIONS

1. Check mold venting and correct as needed.
2. Polish the mold.
3. Increase preheat temperature.
4. Decrease transfer pressure.
5. Decrease transfer speed.

MOTTLED SURFACE APPEARANCE - A non-uniform coloring or texture on the surface of the part.

POSSIBLE SOLUTIONS

1. Increase charge weight.
2. Decrease preheat temperature.
3. Decrease mold temperature.

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

POSSIBLE SOLUTIONS

1. Increase charge weight.
2. Increase preheat temperature.
3. Increase transfer pressure.
4. Decrease mold temperature.
5. Check mold venting and correct as needed.

ORANGE PEEL - Surface appearance that look like an undersurface craze or numerous small ripples and resembles the skin of an orange.

POSSIBLE SOLUTIONS

1. Increase transfer pressure.
2. Increase preheat temperature.
3. Increase mold temperature.
4. Increase transfer pressure.

RUBBERY PARTS OR RUNNER. Parts and/or runner that are rubbery on ejection from mold.

POSSIBLE SOLUTIONS

1. Increase mold temperature.
2. Increase preheat temperature.
3. Use a higher rigidity-molding compound.

SHRINKAGE - There are two problems that 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. Increase preheat temperature.
4. Check mold venting and correct as needed.
5. Increase cure time.

POSSIBLE SOLUTIONS FOR INSUFFICIENT SHRINKAGE (OVERSIZE)

1. Decrease mold temperature.
2. Check mold venting 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. Use a deflection molding compound.
5. Check mold venting and correct as needed.

SKIN BLISTERS – Small areas of gas entrapment (blisters) on the surface of the part that when broken open, appear to have occurred just under the "skin" of the part. The blisters are spaced randomly about the surface of the part, and many times will appear on only one surface.

POSSIBLE SOLUTIONS

1. Decrease transfer pressure.
2. Add or change breathe cycle.
3. Increase charge weight.
4. Decrease mold temperature.
5. Check mold venting and correct as needed.

SUBGATES STICKING IN MOLD – Subgates will not release from the mold and a piece, or the entire subgate will remain until it is manually removed.

POSSIBLE SOLUTIONS

1. If this is a new tool, check the subgate design and correct as needed.
2. If this an existing tool, check the subgates for wear. Repair or replace as needed.
3. Use a molding compound with higher deflection.

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

POSSIBLE SOLUTIONS

1. If the mold is vacuum vented, check vacuum draw – 21in. HG minimum required.
2. Check mold venting and correct as needed.
3. Decrease preheat temperature.
4. Decrease transfer pressure.
5. Decrease mold temperature.
6. Decrease transfer speed.

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.
3. Add undercuts to hold part until properly ejected.
4. Increase cure time.
5. Increase mold temperature.

POSSIBLE SOLUTIONS FOR PART WARPAGE AFTER COOLING

1. Increase mold temperature.
2. Increase preheat temperature.
3. Check mold venting and correct as needed.
4. Increase cure time.
5. Use a shrink fixture.