

Molded Case Cover

Visual Defect Analysis, solution and Recommendations

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October 16, 2004

Background information

Cover for the molded case is molded in a 700 ton Van Dorn using Rhetech 8 melt black precolored Polypropylene. A small percentage of blowing agent is also added to reduce sink marks in certain areas of the part. Typical molding problems experienced were gate blush, hesitation marks, heat bloom and overall unacceptable surface appearance.

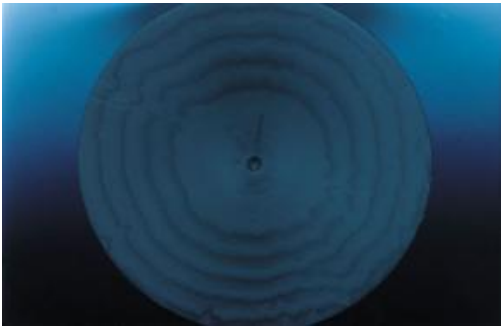
Observation and analysis and recommendations

After reviewing the material, additive, tooling, process, and process settings thoroughly, it was determined that some of the aesthetic problems, specifically the heat bloom were attributed to unusually long extension nozzles and difficulties in maintaining uniform melt temperatures in extension nozzles and heated sprue bushing. Machine nozzle with extension measured to be 26 inches long and heated sprue bushing measured 7 inches in length. Bore diameter varied throughout the extension and sprue bushing. Melt temperature measured to be slightly over 460 degrees Fahrenheit.

Heat bloom is a result of having long extension nozzles with small bore diameters which generally freezes the material during molding cycle. This necessitates increasing the nozzle temperature settings and raise overall melt temperature of the material to prevent freezing and using excessive injection pressure.

Our first recommendation was to purchase a one piece long extension nozzle with 3/8 inch diameter bore to reduce the injection pressure, lower the melt temperature and keep the material from freezing. It was also recommended to open up the heated sprue bushing to 3/8 diameter. However, technical difficulties prevented us from doing so. Subsequent molding trials appeared to have eliminated heat bloom and we were able to lower the melt temperature by 60 degrees.

The next visual problem encountered was hesitation marks (also known as Chevroning and tiger stripping) which generally appear as round progressive circles emanating from the center and extending towards the outer area.



Heat Bloom

Hesitation Marks
No Heat Bloom

Possible cause of hesitation marks

Stagnation of melt flow in mold
Too low mold temperature
Injection rate too low
Nozzle orifice too small

Our recommendation was to open up the heated sprue bushing gate orifice diameter, try high flow material and heat up the mold so that the material can fill the mold in one steady, constant flow pattern and does not hesitate as the molten plastics enters the mold, cools off slightly and then continues to fill in intermittent fashion. It appears that inadequate cooling on the ejector half of the mold keeps the heat considerably high in the sprue area creating the sink marks. This needs to be addressed.

Hesitation effect was reduced considerably and acceptable parts were molded. If all the recommended changes were implemented, it is our belief that the part quality will continue improving.

Further recommendations

Open up the heated sprue bushing bore diameter as large as possible.
Open up the heated sprue bushing gate orifice to .250 in. or better.
Reduce the blowing agent loading to bare minimum.
Our recommendation is to stay away from reverse gating of the parts (which necessitates the use of reverse ejection as well as deep reach long nozzles).
Instead sprue gate the part into a recess and hide the gate by using gel or metal sticker.
If the part design dictates the reverse gating, our recommendation is to used valve gate and texture the valve gate pin so that it matches the texture of the rest of the part and is almost invisible.

Material recommendations

	Current	Alternate 1	Alternate 2	Alternate 3
Material	PP Copolymer (8 Melt)	PP Copolymer (12 Melt)	PP Copolymer (8 Melt)	PP Copolymer (12 Melt)
Grade	P254-01 Black	BP AMOCO 3434	PROBLEND 20MI	West Chem pp
Supplier	Rhetech	Polyone	Southland Polymer	West Chem
Price/LB Delivered	82 cents	66 cents	73 cents	65 cents
Savings/LB	XXX	11 cents	9 cents	17 Cents
Remarks	Precolored Black	Natural*	Black concentrate already mixed with virgin material**	Repro Precolored Black

* Material from Polyone will require coloring with black concentrate, which will add approximately 5 cents per pound.

** No special mixing required. No additional cost. (Known as salt & Pepper)