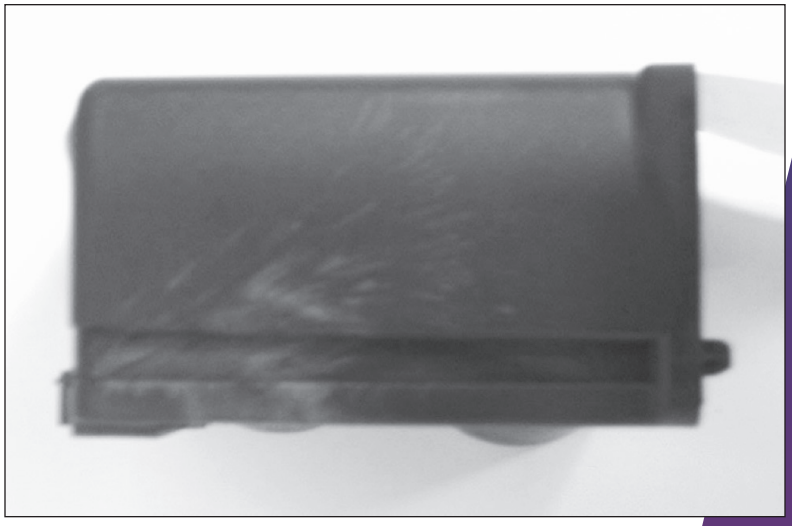
ASCEND PERFORMANCE MATERIALS

Problem:

Silver Streaks

Silver streaks, otherwise known as “splay,” are surface appearance problems caused by entrapped volatiles in the melt front.



Silver streaks

TECH TIPS

Your Vydyne® technical services team offers step-by-step troubleshooting tips to help locate and solve problems that may occur during injection molding in order for you to get production back up and running.

Problem:

Silver Streaks

Root causes

Several factors can cause silver streaks

- Excessive temperatures in the barrel, nozzle and hot runner system
- High shear rates through the nozzle, runners and gates.
- High material moisture
- Excessive barrel residence time
- Material contamination
- Entrapped air due to flow over ribs, bosses, gussets, etc.
- Large/variable regrind size

How to troubleshoot

Evaluate the molding process

Overheated material is one of the most common causes of silver streaks. When nylon overheats, it can degrade and off-gas. The resulting volatiles will end up at the mold surface along the flow path. Against a dark background, these will appear as silver streaks. Follow the Material Suppliers recommended guidelines for melt temperature and barrel profile.

- Confirm the melt temperature using a pyrometer on purge. Measure melt temperature after purging while the machine is on cycle. This keeps a consistent material residence time.
- If using a hot runner system, temperatures in the manifold should be set to the desired melt temperature. Manifolds should be designed to maintain melt temperature developed in the barrel. If excessive manifold/drop temperatures are required this suggests a hot runner issue that needs to be investigated. The drops may be set up to 45°F (25°C) higher as needed to avoid freeze-off, etc.
- Make sure cycle times are consistent without stoppage. Long residence times can cause the material to overheat in the barrel or manifold. When possible, design and run the tool in automatic cycle with the use of conveyor belts and/or robotics to eliminate inconsistent cycle times.
- Optimize the shot-to-barrel ratio. When using Vydyne materials, two to five shots in the barrel are recommended. Having more than five shots in the barrel may run the risk of material overheating and degrading if cycle time is long. Fewer than two shots in the barrel can cause poor melting, mixing and inconsistent melt uniformity.
- High screw decompression (suck-back) settings can allow air to be drawn into the manifold or barrel. This trapped air then flows with the melt and can manifest itself as silver streaks on the part surface.
- An injection rate that is too fast can pull air from inside bosses, ribs and other part geometry. Slower or profiled fill speed can sometimes eliminate the problem.
- If excessive back pressure or high screw speed is used, material degradation can cause splay. Back pressure should be set only high enough to achieve consistent screw recovery.

Evaluate the mold design

- Improper gate or runner designs can cause high shear stress on the molten polymer. This can cause jetting or polymer degradation, which may result in entrapped air and silver streaks. The use of mold filling software can predict correct runner sizes and prevent trial and error after tool build.
- Sharp corners on ribs, walls and other standoffs can be areas of high shear stress and create melt turbulence. Add generous radii at ribs, bosses, etc. to reduce melt turbulence.
- A blind hole or rib also can trap air that may find its way into the flow front. These areas need to be well vented to eliminate air from entering the melt flow front and turning into silver streaks.
- All runners need to be properly vented to remove air from the melt front. This air can become entrapped in the melt and show up as silver streaks on the part.

Evaluate the material

- Excessive moisture during processing can cause silver streaks. The moisture will vaporize and create volatiles in the melt. Proper drying techniques, combined with well-maintained drying equipment, are crucial to ensure moisture levels in the recommended range of 0.1% to 0.2%. If you suspect wet material, check the following:
- Temperatures at the drier hopper inlet should be in the range of 160°F to 180°F (71°C to 82°C).
- Using a handheld dew-point meter, keep dew-point temperatures in the range of –20°F to –40°F (–29°C to –40°C). If the dew point is too high, make sure the desiccant beds are regenerating properly.
- Evaluate pellet residence time in the drier. Vydyne pellets should stay in the drier long enough to remove excess moisture and pre-heat the pellets. This facilitates the pellet feed and melting process.
- Contamination also causes silver streaks. Maintaining a clean drier hopper and area around the machine can reduce the risk of contamination.
- Regrind pellet size is very important. Pellets that are too large or irregular in shape result in low bulk density. This can cause poor feeding, and poor melting may result. This will contribute to air being conveyed too far down the barrel to vent. This air must then pass through the parts and be vented out. Air that is not properly vented in the runner or cavity may then cause silver streaks.
- For more information, please consult the Vydyne Processing Guidelines, which can be found online at **www.vydyne.com**.

About Ascend

Ascend Performance Materials is the world's largest fully integrated producer of nylon 6,6 resin. We manufacture and reliably supply world-class plastics, fibers and chemicals that are used in thousands of everyday applications such as car parts, electronics and cable ties.

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Rev. 04/2020 TT009

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