MeltFlipper® Case Study

Customer: Nypro

Case Study: Eliminating Material Degradation through MeltFlipper® Technology

Figure 1 shows a geometrically balanced 32-cavity runner system producing a medical device out of flexible PVC material. The problem the customer was experiencing was burning/material degradation occurring in the runner system which followed directly into the inside most cavities, which caused high reject rates due to part flashing and streaking. Note that the burning begins along the length of the runner, not at a corner. This is due to the continuous shear development and laminar flow of the material. The shear was spiking the temperature of the polymer to the point where it was actually degrading the material. Because viscosity of the material varied from inside to outside cavities, the molder would flash the inside cavities by using high pressure in an effort to pack the outside cavities, which were typically short shots. Therefore, the molder put the tool in a larger tonnage press to try to hold the mold shut and eliminate the flash while packing the outside cavities. Unfortunately this did not solve the flashing or burning problem.

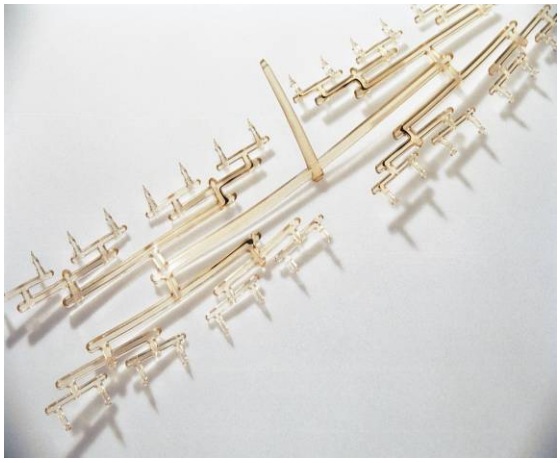

Figure 1: Illustration of a 32 cavity geometrically balanced mold

The molder also tried adding radii on the corners to eliminate those areas as the cause of the shear burning, but this did not solve the problem since shear is developed throughout the entire runner system - not at a corner in the runner system. The molder also made an attempt to add cold slug wells in the runner to eliminate the burning. However, this also did not improve the situation. Because the cold slug wells are filled instantaneously, and because of plastic's laminar flow, the same high-sheared material followed behind the material in the wells. As it can be seen in Figure 2, the degraded material flowed directly around the cold slug wells and into the part cavities.

Figure 2: Illustration showing material degradation due to shear burning in a 32-cavity flexible PVC mold.

1524 East 10th Street * Erie PA 16511 * Tel: 814.899.6390 * Fax: 814.899.7117
www.beaumontinc.com * e-mail: info@beaumontinc.com

Adding MeltFlipper technologies into strategic positions within the runner system controlled and managed the melt down the runner and distributed the high shear across all cavities. By dividing the shear between the various runner branches, the long continuous development of heat is minimized, thereby eliminating the burning on the inside cavities (Figure 3).

The MeltFlipper runner insert also improved material uniformity, so there was no longer flashing on the inside cavities or short-shots on the outside cavities. Resolution of these issues allowed the molder to reduce clamp tonnage by 50 tons, run the tool in a less expensive press, and reduce injection pressure by 300 psi - all while running 32 cavities within specification.

Figure 3: Illustration showing how the MeltFlipper technology eliminated the material degradation due to shear burning in a 32-cavity flexible PVC mold.