CONCOR Tool and Machine

QUALITY FEED SCREWS AND BARRELS

The more you know, the better we look.

9665 N Concor Road • Hayward, WI 54843-7671 • 715-462-3756
Fax 715-462-3205 • sales@concortool.com • www.concortool.com

Tech Tips

Reprinted from PLASTICS ENGINEERING, June 1994

Cushion is the amount of forward stroke remaining after mold fill and pack; its primary purpose is to compensate for machine and valve inconsistencies. Excessive cushion can cause color bleeding and degradation, as flow is normally to the center. With excessive cushion, material that remains in the cushion area tends to cool and increase viscosity during recovery. Even if it is removed during injection, the material increases the potential for residual stress; in many cases, it causes color bleeding or degradation. Self cleaning during each shot, which can be achieved by minimizing cushion and streamlining flow profiles, is desirable because it eliminates potential for degrading and streaking. Today, most molders use excessive cushion because of variations in performance of flow-type closing valves.

Prior to injection, the amount of captured material in the accumulation area will be determined by three factors: length of machine stroke, pressure established at the end of recovery, and viscosity.

First, consistent stroke length. Few machines are capable of holding position at the end of recovery; instead, they drift. The higher the back pressure, the greater the drift. Drift can be reduced by minimizing back pressure, and can be eliminated in machines that maintain back pressure at the end of recovery. Drift tends to compress material upstream on the screw, and therefore can affect shot size by influencing closure time and position.

Back pressure is always negative. If high back pressures are required to make a part, the screw design is wrong and should be replaced. In most molding machines, 80% of total energy is used by the screw drive. Raising back pressure reduces efficiency of the screw design and therefore increases overall energy consumption.

Molding machines that have the proper screw design and are capable of delivering consistent pressure to the accumulation area can eliminate the second most common reason for shot variation - pressure variation resulting from screw surging, as exemplified in recovery time variations. In a precise volume; varying pressures with viscoelastic fluids alters the mass weight in proportion to their variation.

Variation in viscosity are also caused by poor screw design. “General purpose screw design” is, at best, inadequate. It reduces effiency and, in many cases, causes off-specification parts. The screw design should determine the amount of viscosity variation and should require minimal, if any, adjustment of back pressure. A properly design tip reduces viscosity variations and permits dispersive mixing with minimal increase in energy. With proper screw design, back pressures higher than 100 psi hydraulic are not required.