



Cycletime Tips - Automotive

Volume 39: Gate Design vs. Material

Upon researching acceptable gate design options for your new mold, undoubtedly you've discovered that most any gate type is deemed acceptable for your project. In defense of the material suppliers, they don't know your project's constraints as well as you do. In order to defend ourselves and thwart any opportunity for error, we will need to ask ourselves some basic questions.

Gate Location

As discussed in an earlier installment, our goals for location of the gate should be guided into two general areas. Placing at or near the thickest wall section in the part will help in minimizing sink marks as well having an impact on the second objective – symmetrical cavity pressure distribution.

In semicrystalline materials, this becomes one of the primary considerations when diagnosing warpage. Molecular orientation and molded-in stress levels are the fears here. Tool wear can also become an issue if we over-pressurize certain areas of the mold while other areas are very short. This also reveals itself in the form of flash and burns (and even short shots).

Your customer frequently makes demands of you to not locate the gate in what would be ideal from the polymer's point of view. We also try to reduce tool cost by avoiding optimum gate location. A spiritless approach to this will ultimately generate higher cost parts in the form of higher cost materials and extended cycle times.

Polymer Shear

Everyone has a desire to optimize tool design to decrease labor costs on any given process. Subgates are a fantastic tool for doing such a thing. As discussed earlier, gate shear comes in the form of gate blush on the part surface. Gate blush is a function primarily of melt viscosity, gate diameter, fill rate, and gate land. When we consider these characteristics, our options are limited if we have an excessive shear issue.

Sadly, we may not be able to affect enough change on the defect in a subgated mold by altering one of these variables. Restrictive gates like this will allow only minimal increases in diameter before automatic degating becomes troublesome. This applies to three-plate/direct gated parts and cashew gates. Benchmarking and past experience is a huge help, but quality mold filling simulation can be helpful when no knowledge base exists. The fact is that certain materials are more "blush friendly" than others – take the time to flesh this out before we propose a gate type or location.

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