Notes on Overmolding Die Cast Parts: A Preliminary Guide

A soft-to-the-touch overmolded urethane exterior can add impressive user benefits to a die cast housing: enhanced grip and feel, added case damage protection, water resistance, and, in the case of electronic enclosures, even added heat dissipation. A die cast housing itself, of course, will provide built-in EMI/RFI shielding, plus, in thin-wall magnesium, one of the highest strength-to-weight ratios of any cast material.

Dual Process Advantages

While die casting offers similar opportunities to plastic molding in reducing part counts and assembly time by the design of as-cast features into a housing itself, overmolding allows the additional integration of mechanical features in the overmold which would otherwise require added cost and assembly, such as rubber seals, hinges & doors.

High-tech die cast housings can incorporate detailed features with tolerances critical to exacting shut-offs required in the overmolding process, with dimensional consistency vital to a part destined for use as a cast insert in the overmold tool. Tiny "gripper" teeth can be cast along a part's entire perimeter, designed to attach the low durometer elastomer overmold to the die casting.

Guidelines for Die Cast Overmolds

Designers experienced in designing a die cast and overmolded part have suggested a series of guidelines which those product engineers new to the process marriage should be aware of in their planning for a success in producing an overmolded die cast housing.

First and foremost, all planning should be a fully concurrent effort from initial product concept to final production. The development team should include the mechanical designers, the die caster, die cast toolmaker, post-casting CNC manager, overmold toolmaker, production molder, and a material expert. The mechanical product designer must become knowledgeable in all of these areas to assure a robust design. Passing the design "over the wall" to the toolmakers, casters and molders is a recipe for problems.

The following specific design considerations should be addressed.

- **Part Tolerances**: Careful review of the tighter tolerances required for the die cast part to serve as a repeatable cast insert in the overmold tool. The die castings can require a maximum 0.070-in. gap between the outside surface of the casting and overmold cavity.
- **Part Flatness**: Determination of the part flatness necessary to insure good shut-off between the die casting and the overmold steel tooling.
- **Parting-Line Tolerances**: The nature of the die casting process results in larger, or "plus" side, parting-line tolerances only. How do you compensate for dimensional part variations at the parting line in designing the overmold tool?
- **Shut-Offs**: How much tool steel and how tight a fit is required for a repeatable shut-off? If the overmolding "flashes" you will have a process out of control.
- **Insert Fitting**: How close do you decide to fit the die cast insert to the overmold tool?