Your annual additives report

In last month’s issue, leaders from the plastic additives and fillers world spoke with us about the trends defining their business. Legislative and regulatory issues are driving much of the new additives’ development, as is consumer demand for environmentally friendly goods. In this, our annual Additives Report, we bring together some of the most recent developments, and you’ll see that these new products largely reflect the influence of those trends.

Glass bumps talc to cut weight and emissions

A global supplier of interior automotive plastic trim components achieved weight reductions of 5%-13% in a number of components by replacing talc filler with 3M’s glass bubbles in a proprietary polypropylene compound. Tier One supplier Hanil E-Hwa (Seoul, South Korea) molds the parts. Hanil E-Hwa’s customers include Hyundai Motors, Kia Motors, Hyundai Heavy Industries, and Daewoo Heavy Industries.

Su-Wan Song, an R&D research team engineer from Hanil E-Hwa, says his company was asked by customers to help develop new lightweight plastic compounds. The Tier One called on 3M to be part of its material development team. 3M’s glass bubbles have been used by the automotive industry to reduce part weight and increase fuel efficiency since the 1970s. These are made from a water-resistant and chemically stable soda-lime-borosilicate glass. Hanil E-Hwa wanted to develop three material specifications for use across a number of vehicle platforms. Its ultimate objective for the new material was to achieve weight reduction targets, while maintaining mechanical properties similar to their current talc-filled polypropylene.

Hanil E-Hwa engineers eventually narrowed their options to three potential solutions, using polypropylene as the base resin: the first option was to use no filler; the second involved foaming the compound, to create a cellular structure; and the third option was to replace most of the talc filler with glass bubbles, in order to achieve weight reduction targets. Song says the compound without filler offered improved scratch resistance, but resulted in reduced dimensional stability, with weight reduction of just 5%.

“‘The foamed polypropylene offered the greatest weight reduction [20%-30%], but produced a poor surface quality. It was also the highest-cost alternative, requiring an investment in new tooling and facilities,” he recalls.

Using 3M glass bubbles to replace talc resulted in weight reductions of 5%-13%, while making it possible to use existing molds and molding machinery. While some loss of mechanical properties was noted, these were still within acceptable limits, and ultimately new specifications were written around the 3M glass-bubble-filled material.

Hanil E-Hwa has filed a patent application on the new compound, which is used on several new vehicle models in 2010. According to Song, weight savings on the parts where talc was replaced by glass is on average about 1 kg per vehicle.

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