

Processing power

The latest developments in additives and dispersions aim to help tire manufacturers overcome their biggest silica challenges

by Karl Vadaszffy

Rikki Lamba is MD of additives at Polymer Solutions Group, which produces rubber chemical additives used to improve performance and processability, as well as rubber chemical dispersions that improve processability.

“Plastic and rubber formulations contain numerous ingredients in low concentrations, so they are very difficult to mix,” Lamba says. “Our dispersions business combines and converts them into easier-to-handle forms and easier-to-disperse matrices. Our additive products, on the other hand, are designed to optimize the mixing process as well as improve product performance.”

PSG’s main additive product line is Promix, which is mostly used to improve the mixing of halobutyl tire innerliners, and also improves processability and performance. For example, Promix reduces air permeability by 20-30%. “Some are hesitant to increase the use of additives in critical compounds like the innerliner,” explains Lamba. “Increasing the loading of a low-cost chemical can reduce cost while improving performance. Here, more is better.”

Another key rubber product line is SureMix, which Lamba calls “an absolute paradigm shift in the rubber industry”. It’s a process aid, with a multichemical composition designed for silica tires. SureMix makes the compounds softer and easier to process, while improving the stiffness of the compound after it has cured. “Yesterday the trend was to use silica to improve fuel economy,” Lamba says. “Today and tomorrow, it’s to improve wet traction and durability. SureMix enables that.”

Lamba explains that to improve wet traction, higher loadings are required, which in turn make a difficult-to-mix compound impossible to mix. For durability and wear, he says that a higher surface area is needed, which further compounds the mixing challenges.

The original premise for developing SureMix was to reduce mixing times and processing costs. In fact Mooney viscosity can be reduced by 15-25%. Additional benefits have since been discovered. If the silica compound isn’t used right away, it stiffens and has to be reworked. SureMix reduces flocculation, maintaining compound consistency.

PSG’s latest product, SureMix CO₂, imparts a longer scorch time, lower viscosity and a



Above: Polymer Solutions Group’s managing director of additives, Rikki Lamba

Below: SureMix enables a reduction in mixing time and processing costs, increased green compound shelf life, reduced energy consumption, increased silica loading or surface area, lower rolling resistance and enhanced tire handling and wet grip

rapid cure. It also offers CO₂ reduction as a result of a lower rolling resistance.

“Everybody is using higher silica loadings,” says Lamba, “but they struggle to cost-effectively mix and process it. SureMix CO₂ reduces the viscosity of a 100phr silica compound to that of an 80phr compound. Furthermore rolling resistance also approaches that of an 80phr compound. Therefore one can achieve the wet-grip benefits without the associated viscosity, processing and rolling-resistance penalties of higher silica loading.” (see graph below)

Lamba reveals some exclusive news. First, responding to the trend toward very high surface area carbon black in truck and bus radial tire compounds, the use of SureMix has resulted in the elimination of a mixing pass. “We successfully mixed carbon black compounds with four or five parts of SureMix, matching the original viscosity while eliminating one pass,” he explains. “We have also significantly reduced extrusion scrap.”

He’s also excited to reveal that lab tests are currently being conducted to reduce the material and environmental abatement costs currently associated with the use of silanes to couple silica. With what Lamba calls “SureMix 2.0 Reimagined”, he reveals that lab results have demonstrated a silane reduction of substantially more than 20%. **tire**

