

Web Exclusive

Lubricant additive addresses fuel dilution issues with biodiesel blends

By Ron Kotrba

For those concerned about using a B20 blend in late-model diesels that employ post-injection for controlling emissions, Chevron Oronite Company LLC developed a unique engine oil additive to help combat serious engine wear associated with methyl ester dilution in the engine oil crankcase.

Some OEMs use post-injection in their strategies to “regenerate” or burn off soot accumulated in diesel particulate filters (DPF). Injecting fuel late in the combustion cycle does not combust the fuel but vaporizes it as the fuel is carried downstream through the exhaust to create an exothermic reaction, which burns off the collected soot in the DPF. This periodic soot burn-off is called regeneration. OEMs have a choice to utilize post-injection or fuel injection downstream of the engine, as in the exhaust system directly, but it is more cost-effective to use post-injection because there is no additional hardware needed to perform regeneration.

Fuel dilution has always been an issue with diesels, but never more so than with post-injection. Petrol diesel dilutes engine oil too, but it volatilizes off and eventually is released through the breather system. For biodiesel, however, the story is significantly different.

Biodiesel has a higher and narrower boiling range than petroleum diesel, and its physical properties lead to larger droplet sizes exit-

ing the fuel injectors. This means that, while the petrol portion of the blend vaporizes and follows its destination to the exhaust stream as the piston is at the bottom of the cylinder, the methyl ester fraction—with its higher, narrower boiling range and larger droplet size—remains in liquid form collecting along the exposed surface area of the cylinder wall, and as the piston rises, much of the biodiesel bypasses the rings to enter the crankcase. Once in there, the biodiesel does not volatilize off like mineral diesel does. With the heat of the crankcase, there is concern about oxidation of the oil/biodiesel mix and engine wear resulting from the organic acids.

“In the case of biodiesel, once it gets in the crankcase and as it starts to degrade, it forms organic acids and starts to polymerize,” said Gary Parsons, global OEM and industry liaison manager for Chevron Oronite. “The organic acids can aggressively attack certain metals, particularly lead in the lead bearings. And then as it polymerizes and oxidizes, it can lead to increased deposits in the engine—in particular, deposits on the pistons.”

The engine oil additive Chevron Oronite developed is designed to counter the effect of the acids, so they don't aggressively attack the metal; and also to prevent oxidation and formation of deposits.

Historically, in the context of acids, the lubricant additive business has largely been

focused on formulations that help combat sulfuric acid damage. Before many of the recent sulfur limitations on diesel fuel went into effect, sulfur content in diesel fuel ranged from unlimited to 5,000 ppm to 500 ppm; but now, on road ultra low sulfur diesel only contains 15 ppm sulfur maximum. “Much of the historical effort had been in neutralizing sulfuric acids, and now much of the sulfur issues have gone away,” Parsons said. “But now we're talking about putting this organic material in the oil, which forms organic acids, so part of what we've done is we've tailored our formulation to address those organic acids in order to prevent oxidation of the fatty acid methyl ester in the oil. That's why it's called for special research and development in that area—because it's different than what's been done historically.”

The product, which is commercially available and marketed under the Oronite Lubricating Oil Additive, or OLOA, trademark, has been receiving global attention since its commercial debut last year. “People are starting to see that there's going to be more biodiesel in the market, and more exposure and potential risk, so we're seeing more and more interest because of that,” Parsons said. “Until now, the use of biodiesel has largely been driven by economics or people who just want to do good things for the environment—not by mandates.”