

Crops

Nat'l Biodiesel Board looks at B20 concerns

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By DAN CRUMMETT

BIODIESEL has come under scrutiny recently with concerns that some light-duty passenger car engines using specific emission technology might run into oil dilution problems with blends of more than 20% biodiesel in their fuel tanks.

Jennifer Weaver, original equipment manufacturer outreach and education program manager for the National Biodiesel Board, has been following the situation and has been in touch with a number of diesel-engine makers, including the European passenger car builder Volkswagen, whose engineering and products have been the source of the concerns.

Weaver says the issues regarding oil dilution come into play with the use of higher biodiesel blends (B20 and higher)



in some of the new light-duty diesel vehicles that use late in-cylinder injection of raw fuel to burn off material collected on new particulate traps required to meet coming stringent standards for

particulate matter in the United States.

"This is predominantly limited to the light-duty diesel product offerings from Volkswagen, Audi, Mercedes and BMW," she notes. "The medium- and heavy-duty diesel-engine manufacturers do not generally use late in-cylinder injection of raw fuel and haven't reported problems with B20 compatibility or excessive engine oil dilution in their new diesel models."

Weaver adds, "It is important to note that some amount of oil dilution in diesel engines will occur over time with normal operation even with regular diesel fuel, leading to oil degradation and the need for oil replacement. But,

with the use of in-cylinder post-injection, the oil dilution impacts will increase whether fueled with biodiesel blends or petrodiesel alone. The late-injection events increase the opportunity for unburned fuel to reach the cylinder walls and in turn enter the lubricating oil. With conventional diesel, some of it can boil out of the lube oil, making the long-term dilution effect less, but they still occur. However, with biodiesel, this effect is accentuated because of biodiesel's higher boiling point [i.e., a safer fuel] relative to petroleum diesel, which can lead to more fuel being retained in the lube oil."

If late in-cylinder injection is used, engine oil dilution can potentially be addressed through changing the oil more often. Volkswagen's concern lies in the fact that its normal 10,000-mile service interval (longer than the industry standard) may allow more than the desired amount of oil dilution to occur, although data has not been made available to the public to validate this concern, Weaver explains.

"In the U.S. and around the world, other diesel OEMs are using particulate traps with exhaust stream injection of fuel to regenerate the traps [vs. late in-cylinder injection.] The exhaust stream injection technology has shown no problems with higher blends of biodiesel such as B20," she explains.

The final reports from Volkswagen on its testing of 2010 emission-compliant diesel engines with B20 are not yet available, but other than engine oil dilution, no other issues have arisen, she adds.

OEMs: B20 not an issue in big diesels

AFTER speaking with the National Biodiesel Board about concerns over European passenger car engines that use higher than B20 blends of biodiesel, Farm Progress asked a pair of original equipment manufacturer representatives dealing with larger off-road diesels in the United States about their thoughts on the matter.

Edward Lyford-Pike, Cummins' chief engineer for advanced alternative fuels, says automotive diesel engines built after 2007 that use a diesel particulate filter, or DPF, must regenerate that filter periodically. That is done either by injecting fuel into the exhaust stream to keep the heat on the DPF high enough to burn off residue, or with a post-ignition pulse of raw fuel to evaporate between the combustion chamber and the DPF to fuel the heat reaction.

Also, he explains, biodiesel is less volatile than No. 2 diesel fuel and has a narrower boiling point, and even though biodiesel is somewhat more likely to collect unburned in the engine crankcase, it has not been an issue with any Cummins products.

"With petroleum diesel, any fuel that may have escaped the combustion process and found its way into the crankcase will evaporate quickly when the engine comes up to temperature. With higher blends of biodiesel, above B20, this evaporation might not happen as easily; this lack of evaporation is slightly more likely in lighter-duty diesels," he explains.

Cummins uses the "post injection" technology on its midrange 2007 automotive engines, which have up to B20 biodiesel approval. Engineers there say there are no problems with oil dilution beyond the 5% allowable level their designers consider acceptable. Once you begin to exceed the 20% biodiesel content, however, any engine in general can have problems with excess oil dilution, says Lyford-Pike.

"Also, on our automotive side, we have tested 2007 and later engines on biodiesel internally and in the field and have not seen any problems with midrange engines using up to B20 biodiesel blends in trucks and buses. Oil dilution was higher, but never exceeded our 5% limits and did not require more frequent drain intervals. Such things are 'application and calibration dependent,'" he explains.

Designed right

At John Deere's Construction and Forestry Division, engine/drivetrain manager Joe Mastanduno says large diesel engines such as his company's are designed for heavy loads and long-duration duty cycles, which allows them to operate at more constant temperatures and avoid problems the light-duty auto diesels may encounter.

"For instance, most of the big diesel engines operate with a common-rail fuel system that injects fuel at pressures up to 25,000 pounds per square inch, which vaporizes fuel much better than unit injectors used on smaller automobile engines," he explains.

— Dan Crummett

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