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Watertown retiree studies biofuels

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SISSETON, S.D. — People often come to Al Kasperson with questions about machines.

That's logical.

He was department supervisor for automotive maintenance and repair at Lake Area Technical Institute from 1979 to 2000. The institution was responsible for any of the auto mechanics in his neck of the woods.

"I'm just an old farm boy who likes to play," Kasperson says.

In retirement in Watertown, S.D., Kasperson, 68, has been on the board of the Alternative Fuels Institute. He's contracted to teach classes for General Motors and Toyota technicians. He was a founder for DK Diesel Injection Inc., a diesel service company in Watertown. He recently helped Downstream Alternative Inc., writing a manual for technical changes in diesel fuel.

He says he first became aware of ethanol in 1978 and wasn't an immediate advocate. But as he learned more about it, he became more impressed with its fuel cleanliness. In 1988, he conducted some of the nation's first small engines tests on the 10 percent ethanol blends, in a project for the Renewable Fuels Foundation in Washington.

In recent years, he's run several trials on ethanol-blended fuels for the American Coalition of Ethanol, based in Sioux Falls, S.D., and for the South Dakota Corn Utilization Council.

The project he's talked about the most lately is a smaller-scale deal.

Last December, two brothers from a farm in nearby Roberts County, S.D., got curious about their two similar 2005 Chevrolet pickup trucks. Both were 5.3-liter engines. One was a flex-fuel truck, designed to use blends of ethanol up to the E85 level. The other was a nonflex-fuel truck, rated to handle only E10 percent blends of ethanol.

But the brothers wanted to know: What was the difference?.

"I had had some curiosity about that before," Kasperson says. "But I'd definitely never concentrated on that exact question. I kind of went to work on that."

What's the difference?

There are various parts suppliers for Chevy trucks, and Kasperson knows where to look to find them. "When you've been in the mechanical field for 40 years, you get to know these people."

First, there's automotive recycling industry.

"We used to call it the 'wrecking' industry," Kasperson says.

Each of these retailers has a subscription service to an international system of auto parts. One of the parts lists came from the Automotive Engine Rebuilders Association, a network of professionals with specification manuals on engines and parts.

Then there are other retail companies — the chain after-market auto parts stores, and of course the dealerships themselves.

The results? Kasperson found no significant differences in the parts list for anything that would touch ethanol in the two Chevy trucks.

"Except that the flex-fuel vehicle had a higher flow-rate injector, versus the nonflex-fuel vehicles," he quickly says. More fuel can flow through in the same period of time because it has a larger orifice. That's a design difference.

The engine blocks were all the same.

Cylinder heads had three different casting numbers, depending on where they were manufactured, but were all the same.

The two-wheel-drive, four-wheel-drive, it didn't matter, Kasperson says. The compression ratio is 9.45-to-1 on both of them. "And that was from 1999 to 2005," he says. "Same."

Valve stem clearance is the same for both vehicles. Combustion chamber temperatures are the same. The angle of the valves is the same.

There are five fuel tank options on parts numbers for the two trucks. All are made of the same materials.

"They're made of the same material," he says.

"Well, I say if it's made out of the same material, why can't we put ethanol in it."

Fuel line materials are all the same, but the part numbers are different because of locations of tanks and different distances.

The nonflex-fuel vehicle owner went to higher blends, to E30 and E40 without any problems," Kasperson says. He notes that vehicles still under warranty may not be covered for vehicle performance by the vehicle manufacturer if they use higher blends of ethanol.

Kasperson wondered about other vehicles.

He soon was looking at a 3-liter Ford Taurus. He chose flex-fuel and nonflex-fuel vehicles available to him in the same models. Again, everything was the same between the flex- and nonflex.

Kasperson has revealed his findings since December, first at the Roberts County Farmers Union and then at various other meetings. Since then, he's been the featured speaker for 11 meetings around South Dakota, from Watertown to Pierre, to North Sioux City, Mitchell and Aberdeen. He's been working with the South Dakota Farmers Union, which is spreading education on blender pumps.

Besides talking about parts, he also talks about engine wear.

In Sisseton, S.D., he talked about tear-down results on a 2000 Tahoe that had belonged to Ron Fagen, the Granite Falls, Minn., owner-developer of several ethanol plants. The nonflex-fuel Tahoe had been driven 105,496 miles, with the vast majority of the fills with E85. The only fills that included something other than E85 was when that fuel simply wasn't available.

"If you can see any damage there from the ethanol, I'd like you to explain it to me," Kasperson says, showing photographs and a collection of pistons from the vehicle. "They almost look like new," he says.

Kasperson says people also wonder — particularly — about what ethanol might do to catalytic converters, which are expensive to replace. So Kasperson cut open a catalytic converter from the Tahoe, using a "die grinder" and found no apparent effect from the ethanol.

"Nothing happens to the exhaust system, and here you're running E85 in a nonflex vehicle. What can I say?"

Emissions, consumption

Kasperson says ethanol has some advantages in the marketplace that need to be known.

The Environmental Protection Agency completed a report in November 2007 that shows E85 produces a 40 percent reduction in carbon monoxide.

"There's always a reduction in emissions when you're using alternative fuels," Kasperson says, noting that the Colorado School of Mines in Golden, Colo., was showing these reductions in studies in the mid-1990s.

The EPA report shows that the E20 blend produces a 10 percent reduction in carbon monoxide. Various toxic gases are reduced by various amounts, but the smallest reduction was 14 percent, he says. The only gas that didn't show a positive change was aldehyde, but catalytic converters take care of that.

While all of that may be interesting, Kasperson realizes performance and fuel efficiency are going to be the primary decision-makers for most motorists.

So during the past seven years, Kasperson has been conducting tests on that. Results are available on www.ethanol.org, involving E10, E20 and E30. American coalition for ethanol. The EERC and the University of Minnesota at Mankato, which was completed in November and December.

Recently, he's been comparing results for unleaded, E25, E55, E75 and E85 blends, with these tests completed Jan. 11.

Kasperson used his same elaborately careful method of purging and filling his fuel tank. For each test, he parks the vehicle in the same spot in his shop, just east of Interstate 29. He removes the “cutout relay” for the fuel pump, which then allows him to use a “fuse jumper lead” to activate the fuel pump and pump the fuel out via the “fuel rail,” where the injectors are connected.

“When it’s empty, it’s empty,” he says.

He drives the same 50 miles route on Interstate 29 — from exit 177 to exit 127 — and comes back to Watertown, where he parks in the same place and collects the mileage data immediately. He then goes back to his shop and dumps out all of the fuel, collecting usage data to on the fuel, accurate to quarter-ounce.

“If the wind speeds exceeds 25 mph, we shut down,” he says of the experiments. “If it rains, or snows, we shut down.”

He completed the tests Jan. 11. The results showed on the 2000 Tahoe that the miles per gallon was 15.25 with regular unleaded, and the cost was 21 cents per mile, at \$3.20 per gallon. With E85, the cost per mile was 14.30 miles per gallon, but the cost of fuel was \$2.95 per gallon, so the cost per mile was 20.6 cents, a little more than one-third cent less.

With E55, the cost per mile was 20.32 cents, which is a half-cent a mile better than with unleaded.

With E75, the mileage dropped, but the cost per mile dropped to 20.19 cents, so the savings was a bit over three-quarters of a cent.

With E85, the mileage dropped, but the fuel price because of the tax structure didn’t drop as much for \$2.469 per gallon, so the cost per mile was just a bit more than 21 cents per mile, more than three-quarters of a cent more per mile than the regular unleaded.

“However, it’s an American-made product, and the more American-made products we keep locally will help the economy because it turns over six to eight times,” Kasperson says.

Power potential

Kasperson notes that recent studies have shown E30 blend may have a power benefit over other blends.

He says this may be explained by drawing an analogy.

People who work to get more power out of a pickup truck, car or dragster may use a mechanical “blower” to add oxygen.

“But if we put more oxygen in the fuel instead of through a blower, why shouldn’t we get more horsepower?” he says. “It’s an air-fuel mixture that’s taking place.”

He notes that the ethanol impact on power has been demonstrated at Dynotune USA of Watertown, S.D., which is run by Andy Wicks.

Kasperson says the only problem he's seen with higher blends of ethanol for nonflex vehicles is when you hit the E40 or E45 range, where the "check engine" light sometimes comes on.

"In many cases, it doesn't," he says.

He tells the story about a man from Mitchell who would call him and complain that he'd bought E30 from a blender pump and that his check engine light had come on.

"I suggested that maybe his vehicle had a problem with that (light) before they put the ethanol in," Kasperson says. The fellow bought a relay for the emissions carbon canister for \$16, and the problem was solved. "It was an emissions-related problem, not ethanol," he says.

Kasperson says this retirement phase of his life in the automotive industry has been fascinating. As he provides his findings on an industry that is local, he also gets to meet a variety of people.

"It's the people I meet that makes it fascinating," he says

- See more at: <http://www.agweek.com/event/article/id/11645/#sthash.L4TuASNZ.dpuf>