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Article published Monday, September 17, 2007
TARTA ROLLS OUT EXPERIMENT AT TOLEDO SPEEDWAY

Modified minibus gives biofuel spiked with hydrogen a test ride


By **DAVID PATCH**
BLADE STAFF WRITER



TARTA bus driver Mark Easterwood has been a Toledo Speedway spectator many a time, but until last week he'd never been on the racetrack itself.

That changed when Mr. Easterwood took the wheel of a Toledo Area Regional Paratransit Service minibus modified to add power.

During the sustained-speed test runs, the minibus was hooked up to computers that recorded the engine's performance with and without the hydrogen fuel additive.
(THE BLADE/HERRAL LONG)

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The transit authority has assigned that bus to test the effectiveness of supplementing biodiesel fuel blends with hydrogen to improve engine performance.

"That was a riot," Mr. Easterwood said after getting the minibus up to 50 mph on the banked track. For a race-car driver, that speed likely would feel like standing still, but it seemed much faster in a vehicle with a relatively high center of gravity.

Sustaining 50 mph in the bus seemed risky enough, in fact, that two executives from H2 Engine Systems, Inc., who earlier had taken turns at the wheel for 30-mph and 40-mph tests around the track, decided 47 mph would be enough for the day's third and final sustained-speed test.



John Sumner puts the modified Toledo Area Regional Paratransit Service minibus through its paces at Toledo Speedway.

"A little slow for this track, isn't it?" remarked John Everton, the company's president, while executive vice president David Macpherson piloted the minibus around the racetrack during the 30-mph test.


"This is the senior citizen day," Mr. Macpherson chuckled in response.

But the racetrack, Mr. Everton explained, was the only convenient place where the modified vehicle could run at a

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constant speed with no interference from other vehicles, stop signs, or traffic lights.

"You can't get this sort of data driving on Central Avenue," Mr. Everton said while watching a computer screen displaying myriad performance parameters that a computer downloaded hundreds of times each second from engine-compartment sensors.

The data that Mr. Everton and his company seek are the extent to which a modest percentage of hydrogen injected into an engine's fuel intake improves engine performance from fuels comprised partially or entirely of soybean oil, ethanol, or other agricultural material.

"You can feel the surge in power when the hydrogen kicks in," Mr. Macpherson said. But exactly how much of a boost is provided must be quantified, not anecdotal, he told the TARTA board of trustees Sept. 6.

That led to the series of three-minute tests, twice at each of three speeds, without and then with the hydrogen.

The minibus, decked out in colorful markings advertising its use of biodiesel made from locally grown soybeans, was an incongruous sight as it circled the track usually occupied by race cars traveling twice its speed or more.

There was only one spectator in the stands during last week's first set of tests: Kim Copeland, Toledo Speedway's office manager.

"Usually the only bus affiliation we get is the Figure 8 school-bus race," Ms. Copeland said, alluding to demolition derby-like races using retired school buses.

On occasion, race teams or, less commonly, individuals wishing to do performance tests, rent the track, she said, but it's unlikely a bus had ever been performance-tested there before.

Renting the Toledo Speedway for an hour costs \$75, which H2 Engine Systems paid for from its \$190,000 TARTA contract to study hydrogen-supplemented engine performance.

More rounds of racetrack tests are to be conducted as the firm develops data and makes software adjustments, Mr. Everton said.

The study is funded from a \$1.5 million federal grant issued to the transit agency in 2004 to study alternatives to traditional petroleum fuel. Most of the money was spent for a biodiesel fueling island at TARTA's main garage and for University of Toledo testing of 40 regular-service buses that now burn a 20-percent blend of biofuel and regular diesel oil.

University of Toledo researchers are scheduled to report on their tests' progress to the TARTA trustees Oct. 4.

For the hydrogen study, H2 Engine Systems designed and installed a tank and connections to introduce hydrogen into the fuel system. While pure hydrogen gas is explosive, once mixed with biodiesel its concentration is 4 percent or less, eliminating "any fears of a Hindenburg disaster with a TARTA bus," Mr. Everton told the transit board last week.

The hydrogen is replenished from a compressed-gas cylinder stored at the transit authority's garage. For a long-term application, Mr. Everton said, it should be possible to generate hydrogen on board from water by electrolysis, using electricity tapped from the alternator and releasing oxygen into the atmosphere.



John Everton, president of H2 Engine Systems, checks controls under the modified minibus. The company is studying hydrogen-supplemented engine performance for TARTA.

(THE BLADE/HERRAL LONG)

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While hydrogen has been tested before with regular diesel fuel, Mr. Everton said he's unaware of anyone else testing hydrogen's potential for enhancing biodiesel performance.

And while his company's current work addresses its use in a vehicular application, he believes there's a potential for using hydrogen-enhanced biofuel to generate electricity "cheaper than you can get it from the utilities.

"We see hydrogen injected into biodiesel or ethanol providing combined heating, cooling, and power for large buildings like schools," Mr. Everton said.

"It's clean, green, and carbon-neutral. The commercial success is not going to be on doing buses," he said.

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