

GM and TARDEC Team to Work on Fuel Cells Technology

General Motors and the U.S. Army Tank Automotive Research, Development & Engineering Center (TARDEC) are expanding their collaboration in the development of hydrogen fuel cell technology.

Through a new Cooperative Research and Development Agreement, GM and TARDEC will jointly test new hydrogen fuel cell-related materials and designs to evaluate their performance and durability before assembling them into full-scale fuel cell propulsion systems.

This collaborative effort will enable GM and TARDEC to jointly develop technology that meets both of their requirements, accomplishing more tangible results than either entity could achieve on its own, said GM spokesman Dan Flores. The project is expected to continue for up to five years, he said.

"GM welcomes the opportunity to further expand our work with TARDEC developing fuel cell technology," said Charlie Freese, executive director of GM's Global Fuel Cell Engineering activities.

"We believe hydrogen fuel cell technology holds tremendous potential to one day help reduce our dependence on petroleum, and we are committed to building on our leadership through the continued development."

This is the second fuel cell-related announcement GM has made this year, Flores said.

In July, GM and Honda announced a long-term, definitive master agreement to co-develop a next-generation fuel cell system and hydrogen storage technologies, aiming for the 2020 time frame.

GM is an acknowledged leader in fuel cell technology, Flores said. According to Clean Energy Patent Growth Index, GM ranked No. 1 in total fuel cell patents

filed between 2002 and 2012. GM's Project Driveway program, launched in 2007, has accumulated nearly 3 million miles of real-world driving in a fleet of 119 hydrogen-powered vehicles, more than any other automaker.

GM is currently building a new Fuel Cell Development Laboratory in Pontiac, where the majority of the automaker's fuel cell development work will take place.

TARDEC and GM's respective fuel cell laboratories are about 20 miles apart, which greatly promotes daily collaboration, Flores said, and GM and TARDEC engineers are developing extensive plans to share physical material and data between the locations.

TARDEC opened a new Fuel Cell Research Laboratory in the recently opened Ground System Power and Energy Laboratory building in Warren, said TARDEC spokesman Bruce Huffman. The state-of-the-art facility enables TARDEC to test and integrate the fuel cell systems it has been developing for military applications for more than a decade.

"The Army continues to investigate technologies and partnerships that give the United States a decisive advantage," said TARDEC Director Paul Rogers. "Our relationships – like this one with GM – are maturing and accelerating technologies critical to the transportation and energy capabilities of the future."

Additionally, TARDEC is evaluating GM fuel cell vehicles in a comprehensive demonstration in Hawaii, Huffman said. The technology has possible military applications ranging from ground vehicles to mobile generators.

Fuel cell technology helps address the two major challenges with automobiles today – petroleum use and carbon dioxide



TARDEC engineer Thiago Olson integrates a fuel cell onto a robot.

emissions, Flores said. Fuel cell vehicles can operate on renewable hydrogen that can be made

from sources like wind and biomass. The only emission from fuel cell vehicles is water vapor.

Packing Rice for the Hungry

More than 1.1 million meals were donated to local food banks across North America in September as part of Faurecia North America's corporate-giving initiative, Faurecia Unites with Employees for Local Service (FUELS).

Faurecia and its employees have provided more than 2.4 million meals since the program began in 2010, said company spokesperson Stacie Tong.

Throughout September, which marks Hunger Action Month, more

than 20,000 Faurecia employees from its 47 locations in North America used a variety of creative methods to gather donations, including dunk tanks, chili cook-offs, bake sales, car washes and raffles to help hungry families.

Beyond food and dollar donations, Faurecia employees spent more than 1,300 hours volunteering with local partner food banks, lending their hands to everything from packaging rice and potatoes to packing boxes and serving meals.

Bosch Fund Grants \$200,000 to Kids' Discovery Village

The Bosch Community Fund (BCF), the company's U.S.-based foundation, has awarded a \$200,000 grant to Discovery Science Center's (DSC) Kids' Discovery Village.

The grant furthers Bosch's commitment to promoting science, technology, engineering and math (STEM) and sustainability education, said company spokesperson Cheryl Kilborn. Five K-12 focused, interactive exhibits, funded by the BCF grant, will teach children about sustainable materials, solar energy, insulation, plant life and space design.

The grant was awarded in conjunction with Bosch's support of the U.S. Department of Energy's Solar Decathlon 2013 and XPO – a clean, renewable and efficient energy exposition – which took place Oct. 3-6 and Oct. 10-13 in Irvine, Calif.

"Bosch is dedicated to supporting projects like the Kids' Discovery Village that encourage education and promote the importance of energy efficiency and utilizing renewable resources," said Mike Mansuetti, president, Robert Bosch. "The BCF seeks opportunities that help encourage the next generation of talented workers to take an interest in STEM and sustainability, both of which are key to the future of the many industries in which Bosch operates."

Launched in 2011 and becoming operational in 2012, the BCF has been able to support communities in which Bosch operates with a focus on STEM education and environmental sustainability, Kilborn said. Over the past year, the BCF awarded \$2.3 million in grants that support 52 projects.

Demand for Pickup Engine Outpaces Ford's Expectations

Ford has installed its 500,000th 6.7-liter Power Stroke V8 turbocharged diesel engine, which went into a new 2014 Ford Super Duty F-350 Lariat pickup truck.

The engine was installed on Sept. 24 at the Kentucky Truck Plant in Louisville.

"This is a significant milestone for an engine that was introduced just a few years ago," said Doug Scott, Ford Truck Group Marketing manager.

"Demand for the engine has outpaced our expectations; our customers love the combination of performance, towing capability, and fuel economy."

The 6.7-liter Power Stroke V8 diesel engine delivers 400 horsepower at 2,800 rpm and 800 lb.-ft. of torque at 1,600 rpm, along with class-leading fuel economy while adding more fueling flexibility and easily meeting stringent emissions requirements, said Mike Levine, Ford Truck Communications manager.

The 6.7-liter diesel shares Super Duty's legendary reliability and durability while enabling up to 24,700 pounds towing capability for the F-450 pickup and up to 26,600 pounds for the F-550 chassis cab.

Ford is the only heavy-duty pickup truck manufacturer that designs and builds its own diesel engine and transmission combination, ensuring the powertrain will work seamlessly with all chassis components and vehicle calibrations, from concept to driveway, Levine said. This approach enables Ford engineers to optimize the vehicle's performance across the entire lineup.

Benefits of the 6.7-liter Power Stroke V8 turbocharged diesel engine include:

- Compacted graphite iron engine. Stronger than cast iron, the

block structure is optimized for reduced weight and maximum strength to meet the demands of higher horsepower and torque;

- Advanced inboard exhaust and outboard intake architecture – an automotive-industry first for a modern production pickup truck diesel engine – that reduces overall exhaust system volume, which leads to better throttle and turbo response;

- Engine architecture that enables easier service work for all major engine components, potentially reducing downtime;

- A turbocharger that's uniquely center-mounted on a pedestal low in the back of the valley for improved NVH control;

- A high-pressure fuel system that injects fuel at more than 29,000 psi. The system delivers up to five injection events per cylinder per cycle, using eight-hole piezo injectors to spray fuel into the piston bowl. The direct-injection system is calibrated and phased for optimum power, fuel efficiency and NVH performance;

- Aluminum cylinder heads for reduced weight; the mid-deck construction with dual water jackets provides increased strength and optimal cooling;

- Compatibility up to B20 biodiesel, allowing greener fueling options of up to 20 percent biodiesel and 80 percent petroleum diesel.

"Our Super Duty customers are no-nonsense, no-compromise individuals," said Joe Bakaj, vice president of Powertrain Engineering. Those are the attributes our team took to heart when engineering this diesel engine so we can deliver Built Ford Tough capability, reliability and enhanced productivity."

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