

Hybrid & Electric Vehicles

Drives by Capstone

US 1 Industries Is to Field a Turbine Class 8 As First of CalMotors-Parker Hannifin Line
Capstone Turbine (NASDAQ:CPST) and CalMotors are collaborating on a range of series hybrid electric drivetrains for heavy vehicles, with the first to be tested in a diesel-fueled Class 8 tractor-trailer operated by Indiana-based US 1 Industries.

The Capstone-CalMotors pact covers a range of traction motor sizes, from 70 kilowatts to more than 300 kilowatts, Capstone says. The motors and associated controllers are transport-hardened versions of industrial units by Parker Hannifin.

The partners are targeting both new vehicles and retrofits. "We've come full circle," says Capstone sales VP Jim Crouse, acknowledging his firm's second major foray into electric drive vehicles. This time, he told *F&F* last week, "The market drivers are there."

LNG to Be Offered Too

The initial US 1 truck, a 2004 Freightliner, is to be tested with a C65 Capstone Microturbine-based genset for Los Angeles-area port drayage. With prismatic lithium iron phosphate batteries from Shenzhen-based *China Thunder Sky*, it will have plug-in (PHEV) charge capability. Once vehicles are in production, "We would be looking at a five-year payback," says US 1 CFO Hal Antonson. His firm operates some 1,400 trucks across the U.S., and sees the electric drive as applicable anywhere they operate within a radius of approximately 25 miles.

"This could be a viable undertaking without government participation," Antonson says.

"This thing seems to pencil out without any subsidies, even in volumes of a couple of hundred units," says CalMotors CEO Mike Kasaba. "If you start to look at subsidies on top of that, that's all gravy."

Later CalMotors will offer a liquefied natural gas-fueled version (Capstone promotes its turbines as being to run on almost any fuel). "Definitely we've going with LNG too," Kasaba says. "We want to have both options."

"It would be very desirable to switch" to a gaseous fuel, Antonson says.

He told *F&F* that US 1 was interested in a battery-electric truck, but decided on the series hybrid when it learned about the fuel-versatile Capstone turbine.

Battery progress helped CalMotors decide on a series hybrid. According to Kasaba, "The market was



very much into parallel hybrids early on. Batteries now are becoming more affordable so you can make bigger battery packs." Thus series hybrids are "much much more attractive." Prismatic designs allow for simpler battery packs with less concern for EMI (electromagnetic interference), Kasaba says.

Besides Thunder Sky, CalMotors has evaluated lithium batteries from A123 and Nevada's K2.

More Markets for Capstone Turbines

"This relationship with CalMotors provides Capstone with the products and application expertise to increase our presence in the expanding series hybrid electric drive market," Capstone president and CEO Darren Jamison said in a release. "Capstone has had good success in the hybrid transit bus market with its clean 30kW and 65kW microturbines used as low emission electric vehicle range extenders... These drive components will allow Capstone to further penetrate the HEV market segments, including commercial truck and marine applications."

"Capstone is currently working with CalMotors on three new vehicle applications," sales VP Crouse said in the announcement. "These include Class 4 commercial trucks and Class 8 tractors for new OEM applications as well as retrofit to existing vehicles."

"We are also pursuing marine applications for both auxiliary power and propulsion."

More Motors from Parker Hannifin

CalMotors will provide application assistance to integrate "Capstone Drive Solution" components into new and retrofit vehicles. "CalMotors has a wide range of experience with the Parker motor drive systems, and has redesigned the Parker products to address the vibration, temperature, and use characteristics of demanding mobile applications," says the release.

Parker Hannifin is readying a new line of purpose-built traction motors for introduction this year, says product manager Jay Schultz.

The multifaceted firm (it supplies natural gas vehicle and hydraulic hybrid componentry too) will be exhibiting at **HTUF**, Calstart's Hybrid Truck User Forum, in Michigan **September 28-30**.

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