

THE ADVANCED LEAD-ACID BATTERY CONSORTIUM

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ALABC UltraBattery Hybrid Surpasses 100,000 Miles of Fleet Duty

Consortium's Partnership with U.S. DOE Demonstrates Real-World Durability of Lead-Carbon Battery Technology

RESEARCH TRIANGLE PARK, NC (June 4, 2013) – Three years ago, the Advanced Lead Acid Battery Consortium (ALABC) was asked to demonstrate the durability of lead-carbon batteries in the high-rate, partial state-of-charge operation of a hybrid electric vehicle. Today, in a project co-funded by the U.S. Department of Energy and managed by Ecotality North America, the Consortium has proven just that with a Honda Civic HEV retrofitted with lead-carbon UltraBattery modules (provided by East Penn Manufacturing) that has recorded over 100,000 miles of courier duty in the local area of Phoenix, AZ.

The HEV demonstrator, which was first retrofitted and put into fleet duty by Ecotality in November 2011, achieved the benchmark – and continues to run smoothly – in the varying temperatures and elevations of the Phoenix area in just under two-years of operation with no significant loss in battery capacity. The vehicle, which is based on a Honda Civic hybrid, also has achieved comparable MPG performance with that of the same model powered by Nickel-Metal Hydride (NiMH) batteries but at a significantly lower cost.

The breakthrough technology that made it possible is the lead-carbon UltraBattery technology, developed by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Furukawa Battery of Japan and supplied by East Penn Manufacturing of Lyon Station, PA. This unique battery design combines a traditional lead-acid battery with a carbon-enhanced supercapacitor in one singular and highly-effective component. The ALABC tested Furukawa's UltraBattery modules in 2010 in a Honda Insight demonstrator and also reached the 100,000-mile mark, but the results were achieved on a test track in Millbrook, UK.

"When we first achieved 100,000 with the UltraBattery Insight vehicle in Millbrook, we raised several eyebrows," said program manager Dr. Boris Monahov, "but we realized that automakers wanted to see how the modules would operate in real-world conditions, and preferably in a bigger hybrid electric vehicle with more power demand on the battery. That's when we approached the U.S. DOE and Ecotality about operating a vehicle in a fleet in and around Phoenix."

In a funding arrangement with the DOE, ALABC representatives engaged Ecotality North America to retrofit a Honda Civic HEV by replacing its NiMH batteries with UltraBattery modules supplied by East Penn. Ecotality ran extensive tests on East Penn's UltraBattery design and was able to reach 167,000 miles in laboratory testing simulating actual vehicle operations. Following the simulation tests, Ecotality engineered the actual conversion of the vehicle and put it into daily route duty in a courier fleet. Today, the demonstration vehicle continues to run on a daily schedule and the batteries are operating better than expected.

Don Karner, who managed the vehicle conversion and its operation at Ecotality, has worked with several alternative fuel vehicles and battery chemistries during his 25 years of advanced fuel vehicle development and testing, and is intrigued by what he has witnessed with the performance of the UltraBattery modules.

"The UltraBattery is really a new spin on an old, but reliable technology," said Karner. "If the OEMs are going to make significant reductions in the cost of producing hybrid electric vehicle batteries in the near term, they will need to take a closer look at the performance of these new lead-carbon batteries."

East Penn obtained a license in 2008 to produce the UltraBattery energy storage technology, and it has used UltraBattery modules in its own demonstration hybrid (also based on a Honda Civic HEV). That vehicle undergoes consistent road testing and battery system analysis at East Penn's manufacturing complex in Lyon Station, PA, and it has already racked up 65,000 miles of real-world duty. After reaching 50,000 miles, the battery pack of this car showed no performance degradation and the individual battery voltages of the pack actually converged as they aged – proving UltraBattery technology can diminish the complexity and expense of other battery technologies and their battery monitoring systems.

"The data that is being collecting on these UltraBattery packs could turn even the harshest critic of a lead-based battery technology in HEVs into a true believer, said East Penn Chief Operating Officer Bob Flicker. "Both battery packs are over two years old in a demanding partial state-of-charge operation and are proving that the UltraBattery goes well beyond conventional lead-acid designs. On top this product's cost optimization and the sustainability of its recycling in an existing lead-acid reclamation infrastructure, this positions the UltraBattery as a powerful power alternative in the world of hybrid electric vehicles."

East Penn, along with its subsidiary Ecoult, is also evaluating their UltraBattery units as the main power source in a successful smart grid demonstration facility in Lyon Station. This stateof-the-art energy storage facility, which was also supported by a grant from the Department of Energy, is the second DOE Smart Grid Demonstration Program to be launched using UltraBattery technology.

As for the ALABC's 100,000-mile demonstration vehicle, the Consortium intends to continue running it to see how long the batteries will last. The ALABC will also seek additional research and development projects to not only study the performance of UltraBattery modules and other lead-carbon designs, but also other applications of these batteries in automotive and energy storage capacities.

"The ALABC is committed to developing advanced lead-acid and lead-carbon power supply technologies for cost-effective hybrid automotive applications," said Dr. Monahov, "and vehicles like the UltraBattery Civic demonstrate the ability of advanced lead-acid batteries to be an attractive and cost-effective alternative to other advanced battery chemistries in today's and tomorrow's low carbon emission vehicles."

About the ALABC

The Advanced Lead Acid Battery Consortium is an international research cooperative comprised of lead producers, battery manufacturers, equipment suppliers, and research facilities organized to enhance the performance of lead-acid batteries for a variety of markets, including hybrid electric vehicle (HEV) applications and various energy storage systems. Founded in 1992 as a program of the International Lead Zinc Research Organization (ILZRO), the ALABC pools the resources of its global membership in order to perform specific research on advanced lead-acid batteries that otherwise would not be possible by any single entity. For more information about the ALABC and its accomplishments, visit www.alabc.org.