ALABC Progress Towards Improved VRLA Battery Performance

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The world market for 12-V SLI batteries currently stands at around $12 billion. The lack of a serious challenge from other battery types has allowed lead-acid products to serve this market exclusively, with minimal demand for product improvement through research and development, and a sharp competition has, over time, cut sales prices to commodity levels.The electrochemical storage of energy in automobiles now faces the possibility of a major change, in the form of the proposed 36/42 V electrical systems for vehicles that remain primarily powered by internal combustion engines, and of the hybrid electric vehicle (HEV).

A new phase of the Advanced Lead-Acid Battery Consortium (ALABC)'s technical program commenced in January of this year and is scheduled to run through December 2005. The primary aim of the program is to secure the future of the lead-acid battery industry by ensuring that VRLA systems will be able to serve the needs of the future automobile electrical systems adequately. However, much of the development is expected to be of value in improving the battery's performance in other applications, especially where high power and partial-state-of-charge are required.

To date, 45 organizations have pledged their support to the new phase, recognizing that the new program will be a key element in the effort to resist the challenge from alternative chemistries; currently all hybrid electric automobiles employ nickel metal hydride batteries.

The new phase of the ALABC r & d program has begun to shed light on those aspects of the function of a VRLA battery which currently limit its life in the high-rate partial-state-of-charge operation which is characteristic of batteries in 36/42 V and HEV duty. The program is also pursuing the several technologies which show promise of overcoming those limits.

Seven projects, with a total cost of just over $5 million US, have been launched to tackle the key technical areas affecting the capability of VRLA batteries to perform high-rate PSoC duty. Radical revisions are being made to plate design (e.g. the use of twin current collector tabs, as shown in the figure), active material composition and structure, the design of separator materials and the management of the battery during service. As in previous phases, additional support is being gathered from contractor cost share.

An important part of the strategic plan for the program is that most of the research teams are led by battery manufacturing companies and they are supported by top-notch battery research teams and by the best materials producers available. This will ensure both that the research maintains the best possible focus, and that the transfer of the developed technology will be rapid and efficient.

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