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By Albert Himy

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This redesigned 24V Deka Powr Mate unit uses four gel golf car batteries and has an on-board charger. > story

AROUND THE INDUSTRY

Oak Ridge Develops Thin-Film Battery

Oak Ridge Micro-Energy Inc. of Oak Ridge, Tennessee, is developing a thin film rechargeable lithium microbattery for devices which will be implanted deep inside the body and enable physicians to assess and treat a variety of medical conditions in a noninvasive manner. The devices will have the ability to frequently monitor and treat potentially life-threatening conditions and to communicate with an external system. They can either serve as a sensor, measuring parameters such as temperature and radiation dosage, or as an activator for localized drug therapies and nerve or tissue stimulation. The battery for these devices measures about 0.25" x 0.08" x 0.0003" thick.

"We are pleased with our development progress and are hopeful that this project will provide a significant revenue stream as soon as third quarter 2004," says Mark Meriwether, president and chief executive officer. "This joint project

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[with an unnamed company] will lead to the world's first miniature implantable medical device of extremely small size that is fully contained and self-powered by our thin-film battery."

Miklich Departs OMG, Search Begins

Thomas R. Miklich, OM Group Inc.'s chief financial officer, will depart the Cleveland, Ohio, company effective April 1, 2004. He has held the position since 2002, previously serving on its board for ten years. Spencer Stuart, a national executive search firm, has been retained to help OMG find a successor.

James P. Mooney, chairman and chief executive officer, thanked Miklich for "his years of service on the board as well as his valuable insight and steady hand that helped guide OMG through a difficult restructuring. His willingness to remain with the company and oversee our financial reporting requirements will ensure a smooth executive transition by allowing more than enough time to complete a thorough search."

OM Group Inc. produces and markets value-added metal-based specialty chemicals and related materials.

Thai Storage Battery Increases Production

Thai Storage Battery plans to increase its production capacity by 50%, reports the Bangkok Post. The company's 3K batteries rank second in Thailand with a 26% share of the automobile replacement battery market.

Director Veerawat Korphaibool said that after three years the local battery market has recovered and was expected to grow 6% in 2003 to 3 to 3.5 million units. Demand is projected to increase this year by 6% to 10%.

He said the 3K factory in the Bang Poo Industrial Estate had been running at maximum capacity, producing batteries for automobiles and motorcycles at a rate of 2.4 million units each per year for the last several months.

"We could possibly raise capacity for automobile batteries to 300,000 units a month from the current 200,000 units," he said, adding that the expansion could take place some time next year.

Korphaibool declined to give specific details on the possible investment but said the company had spent approximately \$2.6 million to purchase 17 rai of land near the existing factory for the expansion phase.

Nokia Batteries Don't Explode

Test-Aankoop, a Belgian consumer organization, performed new tests on mobile phone battery safety, using only original Nokia batteries in the testing. The test

results proved all Nokia original batteries to be fully protected against short-circuiting and safe for consumer use.

The new round of tests come after controversy erupted in November when Test-Aankoop released a report that inadvertently included non-original batteries. The original report claimed that two Nokia batteries lacked proper safety valves to prevent overheating and could explode. It was discovered that counterfeit Nokia batteries were used in the test and Test-Aankoop will perform new tests.

The mobile phone maker has announced aggressive measures against the manufacturers and distributors of counterfeit products. Plans for regional anti-counterfeit measures are in place and more information will be given as soon as the programs have been officially announced.

Nokia said that it was cooperating with authorities in taking legal measures against counterfeiters, adding that tens of thousands of counterfeit batteries have already been seized in recent raids in Holland, the United Kingdom, and other countries in the EU.

ELECTRIC VEHICLES

Battery Maker Debuts Taxis

Battery maker BYD Co. Ltd. Shenzhen, China, plans to put 200 electric taxis into service during the first quarter of this year, reports China Daily.

"We have made a breakthrough in the quality and functions of rechargeable lithium-ion batteries for electric cars; a maximum speed of 125 km/hr could be realized and every recharge could support another 400km drive," Chairman Wang Chuanfu said at a recent forum.

Co-sponsored by the local government, the project will mark the introduction of BYD's electric cars in the local market, followed by Beijing, Shanghai, Guangzhou and Xi'an. According to Wang, BYD has designed four models, and will debut the 1.6-liter BYD316 in the first quarter of this year. The company has co-operated with Motorola, Delphi, and Autoliv.

Last January, BYD tapped China's fast-growing car market by acquiring 77% of a state-owned car maker in Northwest China's Shaanxi Province for 269 million yuan (US\$32.41 million). The acquisition provided BYD the resources to develop energy-saving and clean electric cars.

The company has obtained 1,500 mu (100 hectares) in Xi'an High-tech Industrial Park and plans to invest 2 billion yuan (US\$240 million) to set up a production plant there in five years, said Wang. Upon completion, the production capacity could reach 200,000 units a year.

New Book on Fundamentals of Energy

Energy: Technology and Directions for the Future by John R. Fanchi, Ph.D., presents the fundamentals of energy for scientists and engineers. The book, to be out in January, is a survey of energy sources from Elsevier that will be for use in the 21st century energy mix.

Readers will learn about the history and science of several energy sources as well as the technology and social significance of energy. Included are thermodynamics, electricity distribution, geothermal energy, fossil fuels, solar energy, nuclear energy, alternate energy (wind, water, biomass), energy and society, energy and the environment, sustainable development, the hydrogen economy, and energy forecasting. The approach is designed to present an intellectually rich and interesting text that is also practical. This is accomplished by introducing basic concepts in the context of energy technologies and, where appropriate, in historical context. Scientific concepts are used to solve concrete engineering problems.

The technical level of presentation presumes that readers have completed college-level physics with calculus and mathematics of several variables. The selection of topics is designed to provide the reader with an introduction to the language, concepts and techniques used in all major energy components that are expected in the 21st century. Future energy professionals will need to understand the origin and interactions of these components to thrive in an energy industry that is evolving from one dominated by fossil fuels to a multi-source industry.

Contact Bob Dodd, Elsevier, 200 Wheeler Rd., Burlington, MA 01803, phone: (781) 313-4726, fax: (781) 313-4882, or email: r.dodd@elsevier.com.

Redesigned Battery Provides 24V Unit

East Penn's redesigned Deka Powr Mate™ battery uses four heavy-duty deep cycle gel golf car-type batteries (shown on page 1) in series to provide a 24V unit. This unit is also equipped with an on-board, capacity-matched charger. It features improved secure-fit hold-downs, a protective hinged cover, and an integrated connector and charger with an LED display. Without removing the unit from the equipment batteries can be replaced. These come in two popular sizes to fit any pallet jack application where dependable light to medium use is required.

The Powr Mate can be plugged into any 15-amp 120V AC outlet to eliminate the need for a remote, centralized charging area and features an auto stop/start charger. Engineered for safety, these gelled electrolyte batteries are spillproof, leakproof, and significantly reduce gassing corrosion. Maximum power, longer life, and ease of operation are provided with no watering.

Contact East Penn Manufacturing Co. Inc., Lyon Station, PA 19536, phone: (610) 682-6361, fax: (610) 682-4781, or visit www.dekabatteries.com.

Easy Battery Filling

A specially designed mobile water filling station helps maintenance staff fill Saft rechargeable nickel-cadmium batteries on board rail vehicles to the correct level of electrolyte quickly and efficiently, reports IRJ.

The mobile unit is intended to be used with Saft's new generation Matrics (mass transit and rail integrated compact system) MRX battery, which has an integrated water filling system as standard; but it can be used with the SRX high power and SRM emergency power battery ranges.

The filling station comprises a 60-liter container for de-ionized water, two electric pumps, fill and return hoses, a pressure regulator, and a flow counter to display the quantity of water dispensed. All are mounted on a mobile hand trolley that can be powered from the mains or from its own battery to provide five hours of autonomy.

The operator connects the fill and return hoses to the battery and presses a start button. The pump then delivers water at up to 0.7 liters per minute until the flow from the return hose indicates that the battery is full to the correct level. At this point the filling process stops automatically.

Contact Saft, 12 rue Sadi Carnot, 93170 Bagnolet, France, phone: +33 (0)1 49 93 19 18, fax: +33 (0)1 49 93 19 50, or visit www.saftbatteries.com.

Batteries, Battery Management, and Power Sources

EHM Technology has a new line of batteries for original design and replacement applications in all industrial, telecommunication and consumer markets.

Concurrent with the new product announcement is the availability of the company's free 14-page, four-color companion catalog featuring a broad range of battery products, including alkaline, carbon zinc, lithium (both primary and rechargeable), nickel cadmium, nickel metal hydride and sealed lead acid. Also available are coin cells, button cells, and standard cells with PC mountable and custom terminations. Battery packs with or without protective circuitry are also shown.

Contact EHM Technology Inc., 244 Whitewater Dr., Bolingbrook, IL 60440, phone: (630) 771-0579, fax: (847) 952-9023, www.ehmtech.com.

Battery System with Integral Racking System

EnerSys Reserve Power Group has a battery system that combines an enhanced cell design with an integral racking system. The PowerSafe DDm provides long service life and desirable performance for a variety of applications that require large capacity valve-regulated batteries including telecommunications, power generation, and distribution and uninterruptible power supply (UPS) applications.

The cell design incorporates 0.25 positive plates for a battery life of up to 20 years. The battery cells have welded epoxy, dual post seals that are 100% water bath tested in the factory. Lead-casted terminal posts include a large threaded copper insert that enhances the high-rate performance with maximum conductivity.

DDm battery cells are encased in dedicated protective steel cans, or modules, that provide uniform and consistent compression for the life of the cell as well as protection during transport and installation. The design incorporates thermal management allowing maximum airflow, and the one-piece container improves leak resistance.

The EnerSys batteries do not have to be removed from the modules during installation. Users set up the rack and install the modules in configurations of two, three, four, or six cells wide, and up to eight cells high. The system provides complete front access of the batteries for ease of maintenance. Top termination is standard for shorter connection to the overhead bus, with optional side termination available. The company offers a wide range of models from 200Ah to 2,000Ah in a single cell.

For information, contact EnerSys, Inc., Box 14145, Reading, PA 19612, phone: (800) 538-3627, fax: (610) 372-8613, www.enersysinc.com

BatteryCorp Launches Telecom Batteries

BatteryCorp has launched its Mega series of high capacity, front terminal VRLA batteries. The series integrates its advanced web-based optimization management system (OMS) with the battery, empowering customers to track everything from state of health to date of recycling. OMS also tracks other critical data such as installation date, all test dates and results, preventive maintenance history and warranty information.

These OMS-ready batteries offer a 25% front cost saving, a full four-year warranty, and increased capacity for cell site survivability demands. The Mega series ships complete with interconnect hardware in strings for immediate delivery.

Contact BatteryCorp Inc., 44 Oak Street, Newton, MA 02464, phone: (617) 965-1110, fax: (617) 928-9881, or visit www.batterycorp.com.

Charger Accepts Wide Range of Voltages

Intersil's AnyAdapter ISL6292 lithium ion/polymer battery charger IC accepts a wide range of voltage sources. The low-noise linear source is suited to smart phones or PDA applications and comes in a flat no-lead package that offers high thermal efficiency.

Working from a 4.2V to 7V input, the ISL6292 operates in the traditional pre-charge, constant-current, constant-voltage sequence with the device's Thermaguard temperature-controlled charge-rate protection circuitry.

The internal, current-trimmed current-sense circuit guarantees 10% charging accuracy at 4.1V or 4.2V. It provides a fully programmable end-of-charge point, but allows charging to continue until the chip's safety timer automatically terminates it.

Priced at 95 cents each in 1,000s, the ISL6292 is also offered in a 16-pad 4 x 4mm QFN and a 16-pad 5 x 5mm QFN. Evaluation boards are available, the ISL6292EVAL1 for the 3 x 3 DFN, and the -EVAL2 for the 4 x 4 QFN.

Contact Intersil Corp., 675 Trade Zone Blvd., Milpitas, CA 95035, phone: (888) 352-6832 or (408) 935-4300, fax: (408) 945-9305.



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TECHNICAL REPORT

The Future of the Silver-Zinc Battery

by **Albert Himy**

Alexandria, VA USA

To paraphrase a famous saying, the premature death of the silver-zinc battery has been exaggerated. It is a system still kicking and living in many applications where no other battery system could be used. Although the lithium-ion battery system is making good progress, its substitution for large silver-zinc batteries is not seen to materialize in the short term.

While a large lithium-ion battery has still to show all the safety aspects required for use in military applications, the silver-zinc battery is on the verge of making a radical change from the current designs where the zinc electrode and the separator material are the primary causes of failure and short life. Upon repeated cycling the zinc electrode degrades very fast and, under certain uncontrolled conditions, developed zinc dendrites pierce the separator and cause a short in the cell, thus a premature failure. Moreover, the separator used, being the traditional cellophane, degrades in the concentrated potassium hydroxide electrolyte whether the cell is used or not, thus limiting the calendar life to approximately two years.

The conditions for improvement of the cycling life and calendar life therefore reside in obtaining a radical change in the three weak points of the system, viz., the zinc electrode, the separator and electrode. The zinc electrode can be made in such a way to withstand the shape change inherent in the traditional zinc electrode. This can be done in conjunction with a low concentration of potassium hydroxide where the zinc oxide dissolution is minimal. At the same time a separator can be found to resist the low concentration of electrolyte, something the cellophane cannot do since its degradation is faster with lower concentration of electrolyte.

These conditions have been obtained to a certain extent in the nickel-zinc system that uses the same zinc electrode and the low electrolyte concentration. Some companies have been able to achieve a remarkably long cycle-life, between 500 and 1000 cycles, with a different type of zinc electrode. On the other hand, a new non-cellulosic separator material has been found to achieve a longer cycle-life (over 100%) in ordinary silver-zinc cells, using ordinary traditional zinc electrodes, cellophane, and high electrolyte concentration.

A combination of all these features can make a silver-zinc cell radically

different from the traditional one, with a tremendous increase in cycle-life and calendar life. The new zinc electrode will have less tendency to dissolve and create zinc dendrites. The low electrolyte concentration would not dissolve much zinc oxide and would not attack the new separator material.

Although the system may lead to somewhat higher internal resistance, there are several applications where only low rates are used. Even if high rates are needed, the cell can be designed accordingly to accommodate them, possibly at some expense of energy densities, but a trade-off with longer cycle life and calendar life may be warranted.

If the nickel-zinc cell can give 600-1000 cycles, it is reasonable to expect that the improved silver-zinc cell may yield at least 300-400 cycles but not more, given the fact that there is still a silver penetration failure mode to contend with — a problem the nickel-zinc does not have.

Such concepts are being investigated, not so much at the research or even development stage but already at the engineering level to be applied to practical cells in the short term. Because of the proprietary nature of these elements, it is too premature to get into more details at this time. Even if the lithium-ion system is successfully realized, its high cost may be an obstacle compared to that of the improved silver-zinc system, which may have been given a new lease on life before completely dying.

Mr. Himy has written four books on silver-zinc batteries based on 26 years of working with all types and sizes of them, from button cells to submarine cells.



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