

BATTERY POWER PRODUCTS & TECHNOLOGY

Solutions for OEM Design Engineers, Integrators & Specifiers of Power Management Products

Chevrolet Volt Battery Packs Will be Manufactured by General Motors in the US

The Chevrolet Volt, an extended-range electric vehicle that delivers up to 40 miles of gasoline-free and emissions-free electric driving, will use battery packs manufactured in the US by General Motors, chairman and CEO Rick Wagoner announced at the North American International Auto Show in January.

GM will establish the first lithium-ion battery pack manufacturing facility operated by a major automaker in the US to produce the Volt's battery pack system. It consists of lithium-ion cells that are grouped into modules, along with other key battery components.

The plant will be located in Michigan, subject to negotiations with state and local government authorities. Facility preparation will begin in early 2009, with production tooling to be installed mid-year and output starting in 2010.

"The design, development and production of advanced batteries must be a core competency for GM, and we've been rapidly building our capability and resources to support this direction," Wagoner said. "This is a further demonstration of our commitment to the electrification of the automobile and to the Chevrolet Volt, a commitment that now totals more than \$1 billion."

The Volt's lithium-ion battery cells will be supplied by LG Chem. Compact Power, Inc., a subsidiary of LG Chem based in Troy, Mich., will build battery packs for Volt prototype vehicles until GM's battery facility is operational. A joint engineering contract with Compact Power and LG Chem also has been signed to further expedite the development of the Volt's lithium-ion battery technology.

GM has been testing battery packs for the Volt, powered by cells from LG Chem, for the past 16 months. These tests, both on the road and in the lab, have provided invaluable insight into lithium-ion battery technology.



General Motors Battery Lab engineers prepare batteries for testing in the thermal chamber at the GM Tech Center in Warren, Mich.

Imara Corp. Introduces Advanced Lithium-Ion Battery Technology for High-Power Applications

Imara Corp., a research, design and manufacturing company, has developed next generation lithium-ion battery technology. Imara's patented and proprietary battery technology breaks through current barriers of performance and energy capability, enabling new applications in power tools, outdoor power equipment, specialty applications, hybrid vehicles and grid storage.

The initial core technology, exclusively licensed from the Stanford Research Institute (SRI), was developed and funded in conjunction with the US Department of Energy as part of the Partnership for the Next Generation Vehicle (PNGV) initiative. Imara's technology has been demonstrated across multiple lithium-ion chemistries. It is being scaled to high-volume production and will be shipping by the fourth quarter of 2009.

Imara is currently developing next-generation batteries and packs for power tools, where there is an ongoing need for higher power-to-weight energy storage solutions. Imara's lithium-ion batteries "cut the cord" by providing a combination of run-time and cycle-life, improving power tools' performance rankings while delivering lower lifetime battery costs for heavy-duty applications such as cutting, grinding and sanding.



Please look at the mailing label below and read the code in the red box.
Code=A: You are receiving the complimentary issue due to your involvement in the industry. To start your free subscription today, please go to www.BatteryPowerOnline.com and subscribe.
Code=B: Your subscription is about to expire. Go to www.BatteryPowerOnline.com and renew your subscription today.
Code=C: Your subscription is active and current.

INSIDE

Battery Power 2009	p 9
Ensuring Safety in Battery Pack Assembly	p 10
Increasing Cycle Life in Lithium Ion Battery Sub-Systems	p 11
A System Versus "Silo" Approach to Lithium Battery Safety	p 13
Will the Economy Discharge The Battery Industry?	p 15
Tools Available to Help Warehouse, Battery Room Managers Save Money in Weak Economy	p 22

PRODUCTS & SERVICES

New Batteries On the Market	p 3
Charging & Testing	p 4



eTec's New Fast-Charger

Integrated Circuits & Semiconductors	p 6
Battery Components	p 7
Power Supplies & Power Conversion	p 8

DEPARTMENTS

Industry News	p 17
Ask the Experts	p 18
Marketplace	p 21

13TH ANNUAL STATIONARY BATTERY CONFERENCE

BATTCON 2009



ORLANDO, FL | APRIL 27TH • 29TH

"I found it to be a great resource, with all this battery expertise in one place."

"The Q&A sessions and panels are invaluable; you get a varied point of view."

"It's good to talk to others about problems you're having with a battery system and see if someone has a better idea or solution."

"I appreciate that the food and lodging are included in the registration fee."

The World's Leading Stationary Battery Conference



The Battcon® International Stationary Battery Conference and Trade Show is a three day, noncommercial, technical event for storage battery users from a broad range of industries. It's the premier conference for end-users, technologists, and manufacturers. ■ Now in its 13th year, Battcon provides you even greater opportunities to

discover what's new in your industry. You'll see the latest products, network, and find solutions for technical problems. Year after year, attendees rate the conference and trade show as above average. Don't miss this chance to hear the experts speak, meet with representatives from leading companies, and network with your peers.

To be a presenter, see the Call for Papers page at www.Battcon.com. Battcon always sells out, so register early!

BPP&T

Editor & Publisher
David Webster

Director of Content
Shannon Given

Associate Editors
Jeremy Martin, Nick Depperschmidt

Assistant Editors
Heather Krier, Joanna Larez

News Editors
Jeremy Fleming, Karen Poulson,
Jessi Albers, Sue Hannebrink,
Laura Mayo

Manager of Administration
Marsha Grillo

Advertising, Sales and Marketing
Jessi Albers, Director of Sales
Jeremy Fleming, Account Executive
Jennifer Graham, Marketing Assistant
Jessica Thebo, Marketing Manager
Julie Hammond, Production Manager

Director of Support Services
Marc Vang

Circulation
Andy Gurokovich

BATTERY POWER PRODUCTS & TECHNOLOGY (ISSN #1092-3616) is published bi-monthly by Webcom Communications Corp., 7355 E. Orchard, #100 Greenwood Village, CO 80111. Free for the qualified US \$58.00 non-qualified US and \$72.00 elsewhere.

Periodicals Postage paid at Englewood, CO and additional mailing offices.

POSTMASTER:

Send address changes to:
Webcom Communications
7355 E. Orchard, #100
Greenwood Village, CO 80111

Photocopy Rights: Permission to photocopy for internal or personal use, or the internal or personal use of specific clients is granted by *Battery Power Products & Technology* for users through Copyright Clearance Center, provided that the base fee of \$2.50 per copy of the article, plus \$1.00 per page is paid directly to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923 USA (978) 750-8400. For government and/or classroom use, the Copyright Clearance Center should be contacted. The rate for this use is 0.03 cents per page. Please specify ISSN #1092-3616 *Battery Power Products & Technology*.

Reprints: For reprint requests contact The YGS Group at 1808 Colonial Village Lane, Lancaster, Pa., 17601 USA (717) 399-1900.

© Copyright 2009 Webcom Communications Corp. Material in this publication may not be reproduced in any form without written permission. Requests for permission should be directed to the customer service manager.

Webcom Communications Corp.
7355 E. Orchard Rd., # 100
Greenwood Village, CO 80111
Phone 720-528-3770
Fax 720-528-3771
www.BatteryPowerOnline.com
Office hours:
7 a.m. to 5 p.m. MST

New Batteries on the Market

EnerSys Adds 800 WPC Model to its DataSafe 16 Volt Front Terminal UPS Battery Line

EnerSys has added a new product to its DataSafe 16 V Front Terminal UPS Battery line: the 16HX800F-FR. The DataSafe 16HX800F-FR is a valve-regulated lead acid (VRLA) battery that produces 800 WPC for 15 minutes to 1.67 volts per cell at 77°F.

DataSafe 16 V are VRLA batteries that provide more power than 12 V batteries and use less space. They are specially designed to back up the primary power system for UPS applications and supply power for 15 minutes until the backup generator is fully operational.

The DataSafe 16HX800F-FR can produce the necessary power to handle the runtime for large UPS systems without having to use smaller 12 V batteries that require more strings and therefore drives up the system cost. They have up to 50 percent fewer connections, which simplify wiring and helps reduce costs.

The high power rating of the 16 V batteries also give users a more economical and space efficient option to large single cell VRLA batteries in high power rated UPS systems.

EnerSys was the first to introduce a 16 V front terminal battery for UPS applications. With the addition of the DataSafe 16HX800F-FR, EnerSys offers the 16 V VRLA batteries in three sizes: 500 watts per cell (WPC), 800 WPC and 925 WPC. They require 44 sq. ft. to support a typical 750 kVA UPS system with a full 15 minutes of runtime.

With the same dimensions (27.2 inches by 7.0 inches) and 20 pounds lighter (220 lbs.), the DataSafe 16HX800F-FR fits in the same rack system as the 925 DataSafe 16 V batteries. Cabinets are available in gray or black to match other data center equipment. Complete front access in the 16 V front-terminated DataSafe models makes access and maintenance easier than top-terminated 12 V batteries.



Saft Launches Production of New Battery Range Specifically Designed for Telecom Networks

Saft has completed its investment in its new Tel.X nickel-based product range designed specifically for telecom network applications. The investment program supports a new \$9 million production line at its US manufacturing facility in Valdosta, Ga.

The Tel.X battery range is designed to deliver reliable backup power for the growing number of decentralized facilities, supporting fixed, wireless, cable and cellular networks, which are in remote or demanding outdoor locations.

The new manufacturing line will enable Saft to expand its customer base in a market where performance, reliability and low TCO (total cost of ownership) are crucial. Its focus is on providing a high quality, maintenance-free battery solution for applications subjected to extreme temperature as well as high levels of humidity. With an extended range of capacities, smaller batteries and long service life, the Tel.X batteries are well

suited for the majority of telecom network applications.

Tel.X has a long service life, more than 20 years in normal temperatures and more than 14 years at more than 40°C. So, in many cases the battery can be expected to outlive other parts of the installation, during which time, under normal operating conditions, it will not need topping-up with water.

The battery also offers high volumic energy density, of up to 100 Wh/L while weighing around 30 percent less than a conventional battery. It is designed for use in standard 19-inch and 23-inch racks and cabinets, where its compact size makes it easy to fit and install as a direct replacement for VRLA batteries and it is compatible with all telecom rectifiers.

Tel.X is well suited for backup power applications in outdoor installations, such as cabinets and end terminals in fiber-optic 'triple-play' networks as well as BTS (Base Transceiver Station) and BSC (Base Station Controller) installations in wireless networks.

Pure Energy Launches New C and D Size Rechargeable Alkaline Batteries

Pure Energy Visions Corp. is launching a new line of C and D size rechargeable alkaline batteries. Pure Energy's C and D rechargeable alkaline batteries offer significant performance advantages including increased capacity and significantly longer charge retention compared to other C and D size rechargeable NiMH and NiCd batteries. Pure Energy's C and D size batteries have capacities of 3,200 mAh and 8,000 mAh respectively compared to capacities ranging from 2,500 to 2,900 mAh for C and D rechargeable NiMH batteries. Rechargeable Alkaline C and D size batteries are also ready to use out of the package and have a seven year shelf life; 40 times longer than NiMH C and D size batteries.

These performance advantages will make rechargeable alkaline C and D size batteries well suited for several consumer products including a variety of audio products, toys and flashlights. Flashlights in particular will benefit from the use of Rechargeable Alkaline batteries as the rapid shelf-discharge properties of NiCd and NiMH batteries are a source of frustration for consumers.

Energizer Takes Zinc Air Battery Technology to A New Form and Introduces a Thinner and Much More Powerful Battery

Energizer has unveiled a new Zinc Air Prismatic battery that will offer OEMs design flexibility, while providing greater run times or enabling smaller devices.

The battery offers high energy density as well as a thin form factor. Product innovations include a new 5 mm thin prismatic (rectangular) construction, with the highest energy density of any consumer portable power solution (either disposable or rechargeable) resulting in up to three times more runtime compared to similarly sized alkaline or lithium ion batteries.

Compared to lithium ion rechargeable batteries, the Zinc Air Prismatic offers much lower cost for the OEM, a similar thin form factor and eliminates the need for charge circuitry and a charging device.

The Zinc Air Prismatic battery uses oxygen from the air as an energy source to provide power and is designed with air access holes that are sealed with a tab until the consumer is ready to use the battery. One of the keys to fully utilizing the high energy density of this system is effectively managing the air access to the battery to optimize performance.

Energizer is developing simple and cost effective air management solutions to enable the use of this battery technology in a wide range of portable electronic devices.

Are you an A, B or C? Your subscription to Battery Power magazine may be about to expire. Check your status in the colored box located in the mailing label on the front cover. Subscribe online at www.BatteryPowerOnline.com.

ECotality's eTec Launches New Minit-Charger FC Fast-Charger

Electric Transportation Engineering Corp. (eTec), a wholly owned subsidiary of ECotality, Inc., has launched the new Minit-Charger FC battery fast-charging system. The FC is specifically designed for heavy-duty material handling applications and reduces a facility's electrical consumption by featuring the highest energy conversion efficiency (97 percent) and power factor amongst chargers in its class. Utilizing Minit-Charger's patented advanced algorithm technology, the Minit-Charger FC system is 50 percent to 65 percent smaller and 50 percent to 70 percent lighter than other fast-charge systems that provide a power output of up to 320 amps.

The Minit-Charger FC is a UL certified, high-frequency, single-connector charger designed for heavy-duty applications. Providing up to 320 amps of output, the FC Charger can fast-charge battery systems of

48 volts (or less) more than four times faster than conventional chargers. The FC Charger features a light and compact design that allows the system to be pole or wall mounted in order to save valuable floor space. The FC Charger also features the patented Minit-Trak data management system that provides the most comprehensive performance evaluation of a battery's state-of-health and state-of-charge and the Battery Data Control (BDC) system that automatically adjusts charging rates to increase and maximize battery life.



Granite Digital Introduces Line of Automotive Battery Chargers, Battery Maintainers and Battery Testers

Granite Digital has introduced its new line of Save A Battery 12 volt chargers, maintainers and testers. Designed to support all lead acid, AGM and Gel Cell batteries, they not only charge and maintain automotive type batteries but they also test, monitor, audible alarm, rejuvenate, condition, power cycle and diagnose electrical and charging systems. The built-in digital LCD display works as a voltmeter to pinpoint most electrical and charging system problems.

The Modular Cable System (supplied with all models) offers versatile connection styles including battery terminal, battery clip-on and cigarette lighter connections in both short or long cable lengths. Gold contacts are used to provide better conductivity in harsh garage and shop environments. All cable ends have a simple attaching loop that makes it easy to permanently fasten them to just about anything and moisture covers to keep the contacts clean.

A unique mounting system allows the chargers, maintainers and testers to be mounted on a wall or in a vehicle. The units can be removed and used remotely and then slipped back on the mounting bracket for long-term monitoring and maintaining.



Coulomb Technologies Announces First ChargePoint Network Availability for Electric Vehicle Drivers

Coulomb Technologies has unveiled the first availability of the ChargePoint Network for plug-in vehicle owners. Developed to be the world's most advanced vehicle charging infrastructure, the ChargePoint Network is designed to provide drivers of plug-in vehicles convenient, affordable and safe access to public charging. Subscribers can sign up for options to fit their lifestyle including a limited time offer "Basic Access" subscription plan, which includes free charging through 2009.



Consumers subscribe to the ChargePoint Network and receive a ChargePoint Smart Card that allows them to charge their car at any Smartlet Charging Station nationwide. The first ChargePoint charging stations are now installed and available for charging in downtown San Jose, with many more to roll out in the coming weeks. To locate available charging stations, visit www.mychargepoint.net and click "Find Stations".

"2009 is the year of the emergence of smart electric vehicle charging infrastructure," said Richard Lowenthal, CEO of Coulomb Technologies, "and we are thrilled to be part of San Jose's progressive Green Mobility initiative. We value learning from the experience of early adopters of the electric vehicle movement. In anticipation of the rollout of a nationwide network of charging stations, we encourage people to visit the ChargePoint website, learn about the Coulomb Technologies network of smart charging stations, and provide feedback and suggestions."

"Electric vehicles are a key component of San Jose's Green Vision goals to be the world leader in clean tech innovation and reduce our greenhouse gas emissions and our dependence on foreign oil," said Chuck Reed, Mayor of the City of San

Jose. "We are delighted to partner with Coulomb to provide this demonstration charging network and help create the infrastructure to transform the way residents drive."

Reach a Targeted Audience with Battery Power's New Line of Web Seminar Services

Battery Power Products & Technology now offers relevant, insightful web-based discussions on the latest technical advancements best practices, products and services, as well as safety, training and maintenance courses for batteries, battery systems, charging, testing, battery manufacturing and power management systems.

With the new web seminar capability, you will be able to produce and sponsor your own web seminar through Battery Power Magazine. You will have the ability to reach and engage targeted attendees from organizations worldwide. Our extensive range of industry publications and databases, enable us to market to your defined audience.

For more information on hosting a Webinar, please contact Shannon Given at shannon@infowebcom.com, 720-528-3770 ext 104 or Jeremy Fleming at jeremy@infowebcom.com, 720-528-3770 ext 121.

Electrochem Introduces Line of Custom Battery Charging Solutions

Electrochem has released its new line of custom charging solutions to accompany its offering of rechargeable battery packs. Electrochem's charging capabilities ranges from simple single bay chargers to complex multi-bay chargers incorporating smart electronics and battery management. Their expansion into offering charging systems complements their secondary battery portfolio of lithium, nickel and lead acid chemistries.

With extensive experience in battery chemistries, Electrochem approaches each charging solution with a custom design to ensure the optimal performance of the Electrochem battery pack.

Electrochem's engineering team performs a thorough design process that covers a range of considerations, including electrical characteristics, physical attributes, mechanical requirements and user interface needs. Because of the more complex nature of the secondary battery packs that Electrochem provides, their custom charging solutions correspondingly incorporate many "smart" features such as monitoring of the battery's voltage, temperature and/or time under charge to determine the optimum charge current and termination of charging when a combination of the voltage, temperature and/or time indicates that the battery is fully charged. Custom chargers from Electrochem are available as a part of a total solution with a custom designed rechargeable battery pack.

Charging & Testing



Data Translation Announces High Voltage, Precise Lithium-Ion Cell Measurement Instruments

Data Translation has released the VOLTpoint, a new series of precision voltage measurement instruments for lithium-ion cell-by-cell determination.

Each VOLTpoint is a stand-alone box offering 48 separate 24-bit resolution inputs over a complete sampling range of ± 100 volts, each with its own A/D converter for direct connection to a PC via USB or Ethernet (LXI compatible).

Direct voltage inputs of any value in the range of ± 100 volts can easily and quickly be applied from a single cell or from a series of stacked cells. Each of 48 separate input channels with 1,000 volt channel to channel galvanic isolation ensures highly precise and consistent readings.

VOLTpoint is available in two versions. The DT9873 for USB is priced at \$7,995 and the DT8873 for Ethernet (LXI) is priced at \$8,495.

New AC Electronic Load From Chroma

Chroma's 63800 series AC Electronic Loads are designed for testing uninterruptible power supplies (UPS), batteries, off-grid inverters, AC sources and other power devices such as switches, circuit breakers, fuses and connectors.

Equipped with unique timing measurement functions, the 63800 Loads allow users to measure critical timing parameters such as battery discharge time, the trip time for fuse and breaker testing and UPS transfer time.

The Chroma 63800 Loads can simulate load conditions under high crest factor and varying power factors with real time compensation even when the voltage waveform is distorted. This special feature provides real world simulation capability and prevents overstressing thereby giving reliable and unbiased test results.

The 63800's design uses DSP technology to simulate non-linear rectified loads in a unique RLC operation mode. This mode improves stability by detecting the impedance of the UUT and dynamically adjusting the load's control bandwidth to ensure system stability.

SAKOR Technologies, Inc. Introduces a Hybrid Vehicle Battery Test System

SAKOR Technologies, Inc. has introduced its Hybrid Vehicle Battery Test System, a complete offering for high-voltage battery testing. The system is extremely energy efficient and can effectively perform all types of performance and durability cycling, including complex profiles and road load simulations.

At the heart of the system lies a high-efficiency, line-regenerative DC power source. During discharge modes, absorbed power is regenerated back to the AC mains instead of being dissipated as wasted heat, which is common practice among other battery testing systems. This

method generates greater power efficiency and measurably reduces overall operating costs.

Driven by a DynoLAB EM controller, the Hybrid Vehicle Battery Test System inherits DynoLAB's ability to automate all types of performance, durability and continuous cycling operations including full road load simulation. In fact, the system can function both as a battery tester and as a battery simulator. Integration with a HybriDyne Hybrid Driveline Dynamometer creates a system capable of testing complete hybrid drivelines and subsystems with or without actual batteries in circuit. The system may be configured to provide dynamic response (i.e. voltage sags and current surges) just as would be seen in-vehicle. Unlike the performance of an actual battery, the simulator output remains



repeatable from cycle to cycle, regardless of charge status, resulting in more consistent and accurate test data.

The Hybrid Battery Test System is available with voltages of up to 1,000 VDC. Typical systems range in size from ± 200

amps to $\pm 2,400$ amps (continuous), and most units offer overload (surge) currents of up to 200 percent of the rated current.

PRED MATERIALS INTERNATIONAL, INC.
www.predmaterials.com

Top quality battery materials & equipment for lab & factory

When everything depends on quality:
 Specialty battery materials for the Mars Lander and Rover were supplied by Pred Materials.

Illustration: Courtesy NASA/JPL-Caltech

Pred Materials supplies battery materials and equipment for labs and full scale production. Our battery product line offers lab scientists and production teams the quality and technology they need for demanding applications. Some examples:

Manual Coin Crimpers • Cylindrical Can Crimpers • Electrode Powders
 Coin Cell Disassemblers • Semi-Automatic Winders • Metal Foils
 Manual Punches • Electrolyte Filling Machines • Aluminum Laminate Packaging

For the lab: Manual Crimper, Coin Cell Disassembler

For the factory: Forming Machine, Sealing Machine

Hohsen

Hohsen Corp. of Japan and Pred Materials, its exclusive North American distributor, are proud to offer large-scale battery manufacturing equipment made by Hi-Mecha and other top quality producers, in addition to Hohsen's comprehensive line of battery lab tools and components.

T - 212.286.0068
F - 212.286.0072

Pred Materials International, Inc.
 60 East 42nd Street, Suite 1456
 New York, New York 10165

steve@predmaterials.com
www.predmaterials.com

Battery Components

Electricfil Introduces Self-Adapting Smart Battery Sensor

With its Smart Battery Sensor (SBS), Electricfil Automotive offers an effective way to get longer battery life, reliable cranking power and lower CO₂ emissions, without adding battery calibration constraints.

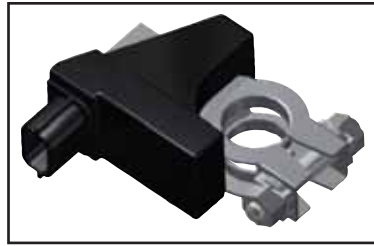
Electricfil's Smart Battery Sensor (SBS) combines a number of non-intrusive sensing solutions to continuously measure battery current, voltage and temperature. Patented algorithms developed by Electricfil and tested by a major battery manufacturer use these measurements to calculate state-of-health, state-of-charge and state-of-function information for delivery to the energy management system via a 2- or 3-wire LIN or CAN compatible interface.

In this way, closed-loop control of the engine and alternator can reduce fuel consumption and CO₂ emissions by as much as 3 percent. Energy consumption and production can be balanced, extending battery life and ensuring that power is always on hand for quick and reliable engine starting, even on today's most electricity-hungry cars.

Electricfil's SBS is also the first battery sensor to automatically adapt to any new battery due to patented self-learning algorithms, totally eliminating the need for dealer servicing.

In addition, a non-contact current sensor eliminates the drawbacks of shunt-based sensors, opening the way to non-intrusive battery management.

The result is dependable starting power, fuel economy, lower CO₂ emissions and longer battery life without adding constraints. This product will be available in different packages for easy mounting on the terminal, alongside the battery or on the battery cable.

**New Optical State of Charge Sensor**

JSA Photonics has introduced an optical state of charge sensor for lead acid and other suitable electrolyte batteries. The patented solution is based on fiber optic sensing technology originally developed at Sandia National Laboratory (SNL) that effectively measures SOC and enables inexpensive, accurate and continuous monitoring of battery capacity. Flexible sensor configurations provide the SOC measurement capability to sealed batteries at manufacture as well as retrofitting of existing wet batteries, providing functional assurance and reduced maintenance costs to the user. The SOC sensor offers additional benefits including cell temperature sensing, enabling tailored charging programs for fast and efficient charging and electrolyte level sensing to detect fault conditions well before they occur. The software, interface control and GUI provides power, easy calibration and continuous monitoring of SOC, temperature and electrolyte levels for one to several thousand batteries for on-site as well as Internet monitoring.

SigFx, LLC Unveils Intelligent, Safe Battery Management Technology That Doubles Battery Runtimes

SigFx, LLC is introducing an intelligent energy management system called SaFPWR. The SaFPWR energy management system extracts more power from a lithium polymer battery, prolongs the battery cell life and improves safety. The SaFPWR monitors and collects data on the internal and external environments of the battery and their interrelationship. The system also collects data on the use of the device it is serving to maximize the operating efficiency and safety of the device. SaFPWR uses this data to more than double the runtime of the device it serves and virtually eliminate the safety issues present in today's battery market.

Currently, SaFPWR is available for the Apple iPhone, iPod touch and iPod classic. SaFPWR is also available in an external and primary extended runtime battery pack for laptop computers.

Rugged, Low Profile Lithium Coin Cell Holders

Keystone Electronics Corp. has introduced #2450 Lithium Coin Cells with low profile holders. These new holders are extremely rugged and well suited for retaining cells securely under shock and vibration in high-density applications for PCB requirements.

These polarized coin cell holders feature dual-spring contacts and are supplied on tape and reel and in bulk. The holders may be used with most vacuum and mechanical pick-and-place assemblies. The holders are manufactured with 0.008 inch thick Phosphor Bronze, Gold plate over a glass-filled LCP base, and rated UL 94V-0.

Whatever it takes!

Count on our
**Interconnect Components
and Hardware
to get the job done!**

Our Catalog M55 also includes:

- Battery Clips, Contacts & Holders
- Fuse Clips & Holders • Spacers & Standoffs
- Terminals & Test Points • PC Board Hardware
- Panel Hardware • Terminal Boards
- Pins, Plugs, Jacks & Sockets
- Multi-Purpose Hardware

Call or Click for Catalog M55
Engineering Services Available

RoHS Compliant - ISO 9001 Certified

KEYSTONE
ELECTRONICS CORP.

(718) 956-8900 • (800) 221-5510 • FAX (718) 956-9040
e-mail: kec@keyelco.com • Website: keyelco.com

Battery Holders, Clips & Contacts

Available from our global distributor network

HP Announces Next Generation Tower UPSs from 750 VA to 1,400 VA

Introducing the next-generation tower HP uninterruptible power systems (UPS). The HP Tower UPS units, T750 G2, T1000 G3, and T1500 G3 are designed for small-to-medium businesses, remote offices and retail environments needing power protection in a compact tower design. The UPS units protect computer equipment and critical data against damage due to inconsistent and fluctuating power. These line-interactive UPSs have power ratings of 750 VA, 1,000 VA and 1,400 VA.



HP Power Manager software is included with all HP UPSs and provides the flexibility to monitor power conditions and control an HP UPS locally or remotely. The software enables broadcast alarms, orderly shutdowns in the event of a power failure, and schedule power-on to the UPS and attached equipment. The HP Power Manager software allows for customized alert generation with modifiable dialog boxes, command execution, and email, pager, mobile phone and broadcast messages.

Standard on all HP UPS units is the exclusive battery pre-failure warranty, which ensures that when a customer receives notification from HP Power Manager software that the battery may fail, the battery is replaced free of charge under the warranty. An additional \$250,000 load protection guarantee is offered in North America.

Emerson Network Power Juices Up Liebert UPS Units

As small and medium businesses rely more and more on IT systems to support business-critical applications and initiatives such as VoIP, reliable UPS performance is the key to increasing availability, reducing downtime risks and enabling future growth. Emerson

Network Power is filling the market's need for trustworthy, powerful and affordable UPS systems by introducing the enhanced Liebert PSA and Liebert PSI-XR UPS units, designed to provide reliable power protection for home offices and small data centers or IT rooms.

The Liebert PSA and Liebert PSI-XR also meet strict environmental guidelines by complying with the Restriction of Hazardous Substances Directive (RoHS). RoHS prohibits the use of six hazardous materials in the manufacturing of electronics, making them more environmentally friendly at the end of their life.

The Liebert PSI-XR is best suited for IT applications housed in network closets, IT rooms and small data centers. It provides more than five minutes of battery backup at full load with optional external battery cabinets that can extend that runtime to meet equipment needs. In addition, its improved remote communications and shutdown options provide remote monitoring and power management. The Liebert PSI-XR is available in rack-mounted or tower configurations and can be configured at 110, 120 or 127 VAC with a wide range of output capacities.

The Liebert PSA delivers power protection to small office computers and electronic equipment, providing up to five minutes of battery backup at full load, full sequenced battery testing, and advanced shutdown, surge protection and status monitoring. It is available with various output capacities in both 120 VAC and 230 VAC models.



Compact 12 Watt and 20 Watt DC/DC Converters Offer Wide 4:1 Input Range

XP Power has made two additions to their low power DC/DC converter product line-up. Encapsulated in a DIP24 metal package, the 12 watt JTF12 series measures 1.25 inches by 0.8 inches by 0.4 inches (31.75 mm by 20.32 mm by 10.4 mm). The 20 watt JTM20 series uses the 1-inch by 2-inch (25.40 mm by 50.80 mm) industry standard mounting format. These new converters offer a high efficiency of up to 91 percent by using the latest design techniques and components and are suitable for a large variety of applications and products. Additionally, by using popular mechanical formats, these isolated and regulated converters are also well suited as low cost drop-replacements for existing designs, saving the need to re-design the PCB layout.

Offering a wide 4:1 input range, both series have 9 to 36 VDC or 18 to 75 VDC inputs that cover the nominal input voltages of 12, 24 or 48 VDC. Comprising of single and dual output variants, there are a total of 28 models across the two series. Single output models offer 3.3, 5, 12 or 15 VDC while dual output voltages are +/- 5, +/- 12 or +/- 15 VDC. Output voltages are fully regulated to within +/- 0.5 percent over all input ranges and to less than +/- 1.0 percent across all load conditions. Both devices feature an input to output and input/output to case isolation of 1,600 VDC for up to 1 minute.

With a maximum case temperature of 105°C, the units can operate at full output power from -40°C to

60°C without derating. No additional heat sinking or forced airflow is required making the converters suitable for most operating environments.

These DC/DC converters comply with MIL-STD-217F for predicted lifetime. The JTF12 has a MTBF in excess of 1 million hours and the JTM20 is rated at 560,000 hours.

A remote on/off signal is included as standard, allowing engineers to design-in the ability to sequence converter start-up or control the outputs.

Available now from Newark or direct from XP Power, the JTM12 single output units are priced at \$32 for a 500 piece order. The JTM2012 dual output model is priced \$44 for a 500 piece order.

Mid-Size DC Power System up to 400 Amps Can be Configured to Satisfy the Majority of Telecom Applications

Unipower Corp. has released a new modular DC power system designed specifically to meet the exacting requirements of telecom systems applications where reliability, flexibility and battery back up are key factors.

The Gravitas X410R DC power system is built around a compact 2-foot by 2-foot by 7-foot (48 U) freestanding enclosure incorporating eight positions for hot-swap rectifiers, AC input distribution/protection, DC load distribution/protection, low voltage battery disconnect, battery distribution/protection, system controller and two or three shelves of front-connect batteries rated up to 185 AH each. A vertical space of 12 U rack height has been allocated below the power components for optional equipment such as inverters or DC/DC converter shelves and their distribution/protection panels, customer supplied equipment or for an available third battery tray.

The new DC power system supports 48 VDC loads up to 400 A (21.7 kW) and can accommodate a variety of AC inputs from either single or three-phase sources.

An important feature of the new Gravitas DC Power System is the facility for up to 36 load circuit breakers. This is more breaker capability than many other similar systems available, representing a real advantage for many applications. These 36 field-replaceable breakers can be connected to external loads as well as internally installed equipment.

The Gravitas X410 is available either as an open rack or as a fully enclosed system with top cover, removable side panels, lockable, hinged rear door and a convenient lockable, double front door.

All Unipower Corp. Gravitas power systems meet the requirements of all relevant safety standards including UL60950-1, CSA22.2 No. 60950-1 and EN60950-1 and are RoHS compliant.



Job Opening - Electrical Engineer

House of Batteries is a master Distributor and custom battery pack assembler since 1965. We stock over 2M batteries and assemble over 250,000 custom battery packs per month in our SoCal and Mexico facilities. We're franchised for every major battery manufacturer for every battery chemistry. We currently have 3 Electrical Engineers working for us and we need to add a 4th that can help us with circuit design for rechargeable Lithium battery packs.

Applicant should have an Electrical Engineering degree, Auto Cad experience, experience in building prototype assemblies, circuit design experience, 5 years minimum experience in the Electronics industry. Applicant must be fluent in english.

House of Batteries
10910 Talbert Ave. • Fountain Valley, CA. 92708
Phone: 800-432-3385
Email resumes to Don West at
dwest@houseofbatteries.com
Check us out at www.houseofbatteries.com

Introducing a New Product?

Send Your New Product Announcements
to Shannon Given, Director of Content,
at Shannon@infowebcom.com

BATTERY POWER 2009

October 20 - 21 • Denver • BatteryPowerOnline.com

Battery Power 2009, an international conference highlighting the latest developments and technologies in the battery industry, will be held October 20-21 in Denver, Colorado.

This seventh annual event will feature more than 30 presentations on portable, stationary and electric vehicle battery technology, as well as battery manufacturing, materials and research & development. Topics will include new battery designs, emerging technologies, battery materials, power management, charging and testing systems, battery health, as well as the latest market trends affecting the industry.



The conference is designed for OEM design engineers, system engineers, technical and management professionals involved in battery powered products and systems, battery manufacturing, battery technology research and development and power management technology.

Call for Presentations

The Battery Power 2009 conference committee is currently accepting presentation abstracts. The 2009 event will explore the important topics impacting the battery industry from design issues in battery packs and emerging charging technologies to predicting battery failure and battery hybrid technologies. There are a limited number of speaking slots in each track, so it is imperative that you submit an abstract before the deadline on March 14th, 2009.

Here are some topics we are looking for:

Market Trends: Upcoming and Emerging Technologies, Market Opportunities, Battery Market Trends, Regulatory Issues, Current and Future Battery Cost and Performance

Batteries: Emerging Battery Technology, Recycling, Battery Pack Design Issues, Li-Ion Pack Production, Battery Hybrid Technology, Thin Film Technology, High Temperature Batteries, Automotive Hybrid Technology/Applications, Off-Grid Battery Trends/Technologies, Energy Harvesting, Developing Batteries of Next Generation Wireless Applications, Cell/Battery R&D, Battery Safety, Improvements in Power Performance, Battery Manufacturing

Integrated Circuits: Power Management, Circuit Topologies, Power Conversion, Fuel Gauging, Circuit Protection/Safety

Battery Components and Materials: Emerging Chemistries, Smart Battery Pack Electronics, Nanomaterials/Nanotechnology in Batteries, Development of High Power Materials, Capacitors

Charging, Testing & Monitoring: Smart Battery Pack Charging Systems, Avoiding/Predicting Battery Failure, Charging Multiple Packs, Battery Testing, Monitoring Battery Health, Capacity Testing, Battery Evaluation, State-of-Charge, Rapid Charging, Charging Efficiency, Software

Panel Discussion Opportunities: Raw Material Supplies, Battery Design Analysis – OEM Requirements, Global Activity from Leading OEMs

For more information on submitting an abstract visit www.batterypoweronline.com/bppt-conf09/bp09_papers.php or contact Shannon Given, program manager at shannong@infowebcom.com.

Our Commitment to You

Whether this is your first time participating at the Battery Power conferences, or if you have attended in the past, the 2009 event will provide you with the most up-to-date developments and technologies in the battery and power management market.

If you are involved in the battery industry or if your products and systems run on batteries, this is a must attend event.

10 Great Reasons Why You Should Attend Battery Power 2009

- Discover How New Technology is Impacting Power Management
- Network with Potential Business Partners
- Attend Exceptional Pre-Conference Activities
- See the Latest Products and Technologies Unveiled
- Learn to Optimize Your System Performance and Dependability
- Assure Compliance with Latest Safety Requirements and Standards
- Discuss Your Specific System Needs with Technology Experts
- Improve System Longevity and Power Delivery
- Maximize Return on Battery Technology System Investments
- Find the Latest Market, Pricing and Manufacturing Trends Worldwide

Registration

Exceptional Early Bird and Team Discounts are available. Register by May 22nd and save \$500 off a full conference pass. Register two or more people from the same company and save even more. Register online today at www.batterypoweronline.com/bppt-conf09/bp09_reg.php.

Hotel

Battery Power 2009 will be held at the Hyatt Regency at the Denver Tech Center. Directly to the west is the inviting view of the Colorado Rockies & front range foothills. A limited number of rooms have been reserved for attendees who make reservations with the Hyatt Regency Tech Center. Mention Webcom Communications to receive a discounted room rate of \$175.00 per night. To receive this discount, reservations must be made by September 28th, 2009.



Exhibits and Sponsorships

Battery Power 2009 will be an excellent event to promote new technologies to leading decision makers in the power industry. New technologies are becoming more important due to the need for improved battery life/performance, the demand for hybrid & electric vehicles and the need for safe and environmentally friendly power products. There will be OEM design engineers, developers and integrators of rechargeable battery products, manufacturers of batteries, IC and chipset providers, system engineers of electric vehicles, specialized energy materials suppliers and battery component providers present at this important event.

Contact Jeremy Fleming to find out more about Battery Power 2009 and our affordable exhibit/sponsorship opportunities at 720-528-3770 or jeremyf@infowebcom.com.

Ensuring Safety in Battery Pack Assembly

Katherine Mack, Vice President, Sales & Marketing
Rose Electronics

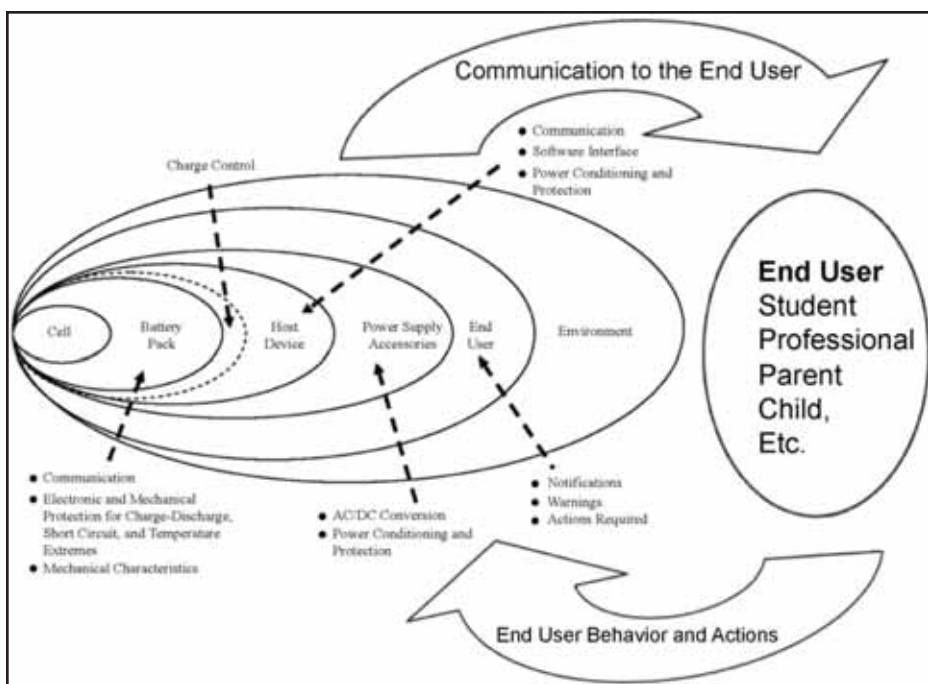
Battery problems can occur at every level of the battery manufacturing and use process. All facets of battery manufacturing and use must work together for a safe end product. Even extensive cell, pack and system testing will not completely prevent any and all battery issues from occurring, but it will greatly limit them.

The culprit of recent battery incidents and recalls is wide and varied. Accomplished manufacturers of cylindrical 18650-size cells have now produced well over 2 billion cells and are far along the learning curve for producing cells. However, even accomplished cell and pack manufacturers still experience in-house and field failures. To complicate matters, new players are sprouting up in the lithium ion cell market. Lithium-ion cells and packs are being produced by "beginners" with no experience and sometimes a disregard for safety measures due to price pressures.

The reason for recalls at the cell level include issues such as tiny particles getting caught in electrode material causing internal cell shorts, and electrode slitters not making clean cuts which cause burring on electrode edges resulting in internal short circuits. At the pack level, poor battery design has caused issues in that when a product is dropped at a certain angle, the safety devices are compromised. Solder balls have come loose on safety boards and caused internal shorts inside packs. At the system level, charge regimes such as pulse charging of batteries weaken separator material in cells and allow internal shorts. In addition, counterfeit cells and packs made to inferior standards (some packs not even containing required safety devices) have entered the market.

The battery industry is essentially self-policing. Starting at the cell level, reputable cell manufacturers dictate assembly procedures to their pack assemblers and approve applications. However, not all manufacturers share the same philosophy. Recent factory fires and cell shortages have exacerbated the black/gray market cell industry. Testing and adherence to established agency standards such as UL and CSA are recommended, but not absolutely required for most applications. Pass criteria for these abuse tolerance tests generally revolve around the lack of an explosive or flame event on a yes/no basis for a defined parameter. Given this, cells and packs can be designed for the sole purpose of passing a particular test. The only actual requirements for testing battery packs for safety fall under the UN Transportation guidelines, a system which is, in reality, also self-policing.

Ensuring a safe product begins at the cell level and ends with the user. It is about understanding the intended use of a product, and mitigating reasonable and foreseeable misuse that may occur. IEEE P1625, the Standard for Rechargeable Batteries for Portable Computing, was the first standard to encompass all levels of the battery manufacturing process and include the customer experience. IEEE P1725, the Standard for Rechargeable Batteries for Cellular Telephones, followed. This graph from the recently updated P1625-2008 standard IEEE illustrates the thought process:



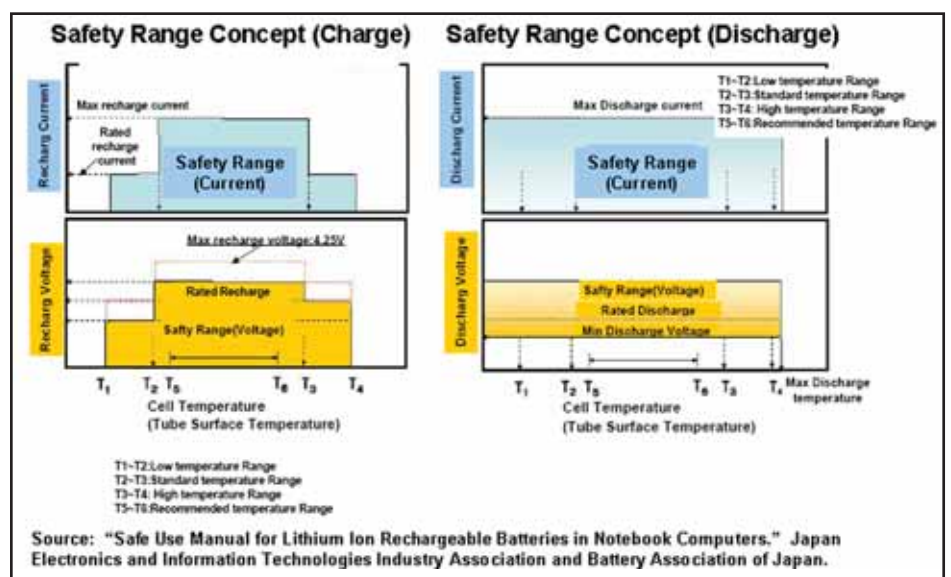
In addition, the Japan Electronics and Information Technologies Industry Association (JEITA) and the Battery Association of Japan (BAJ) have also formulated a standard for lithium ion batteries for notebook computers. Their standard also encompasses a holistic approach to designing a successful battery.

Ensuring safety at the cell level includes the addition of internal vent mechanisms, the use of internal positive temperature coefficients (PTCs), good separator design

and a consistent manufacturing process. Testing to and for agency approvals help to mitigate failures as these include testing for overcharge, forced discharge, crush, thermal abuse, external and internal short circuit. Testing not only new cells, but cells that have aged or experienced a number of cycles, helps to eliminate possible field issues.

At the pack level, the addition of safety components goes a long way in lessening risk. A safety circuit, protecting packs against overcharge, overdischarge and overcurrent, is mandatory. A secondary protector, such as a current and/or temperature-based component (PTC or a thermostat) is absolutely recommended. A thermistor to monitor battery temperature while charging is also desired, especially for NiMH chemistries. For larger packs, a one-shot chemical fuse is suggested. Good manufacturing practices and good design, such as use of trained operators, the addition of extra insulation and recessing contacts also add to a pack's safety rating. Verification that safety devices are actually working packs is also needed: overcharge/overdischarge, short circuit, continuous charge tests are among industry standard.

At system level, the charger is the first line of defense. A charger matched to the specifications of the battery is non-negotiable. Different cell chemistries all have their own recommended charge methodologies. In lithium ion cells, the overcharge condition is the condition in which cells are most volatile. Charge method, voltage, charge rate and temperature all must be considered. Test verification of charger with the battery must be performed. Ensuring that the end unit does not cause any unforeseen current spikes or shorts (mechanical or electrical) is compulsory. In addition, the battery must be appropriate for the environment in which it is used. A battery specified to operate in 0°C to 45°C has no business being used where temperatures will be above or below these levels. The following graph from JEITA/BAJ illustrates the safety range for voltage for both charge and discharge.



All the cell, pack and system testing is for naught, though, if the user does not understand or respect the battery for the high energy system that it is. Shipping issues and improper packaging have caused the greatest number of single battery incidents. Shorting can occur in single shipments, bulk shipments and where batteries are contained in or packed with equipment. Shipping issues are not limited to battery packs; they can just as easily occur with coin cells or so-called consumer single cells. Without proper packaging, incidents will occur. The recent harmonization of the DOT with new requirements from IATA and ICAO mandate specific labeling and testing of packs and packaging for battery shipments. Shipping personnel must be trained, customers must be educated and regulations must be adhered to.

So how to ensure a safe battery pack? Ensure all levels of battery manufacturing are addressed: cell, pack, system, user and environment. There is no substitute for using experienced, high quality, reputable cell and pack vendors. Utilize accepted industry practices. Design in early. Don't use price as the lead item. Design and test per industry standards, and perhaps more importantly, test per your application requirements. A holistic approach in designing systems involving batteries is an absolutely necessary path for a satisfactory user experience.

Katherine Mack has more than 20 years of experience in designing and developing custom battery systems for industrial and medical OEMs requiring portable power. Katherine has focused her career particularly on portable cell chemistries, cell vendors and smart battery solutions. She was an original member of the IEEE P1625 Working Group for establishing Safety Standards for Mobile Computing.

Contact Rose Electronics at www.rose-elec.com.

Increasing Cycle Life in Lithium Ion Battery Sub-Systems

Phil Lyman, President and CEO
Boundless Corp.

Exponential population growth, geopolitical conflict and escalating costs force fossil fuel prices to record highs. Heightened concern about climate change and its effect on the environment instigates stronger regulatory support for clean energy solutions. As a result, global industries require new power solutions based on innovative energy storage. Market demand is emerging to replace fossil fuel and lead-acid batteries with energy storage that is cleaner and more efficient. As a viable alternative, advanced battery technologies provide new power sources for the electric propulsion of vehicles and machines of all types. According to the battery industry's experts, the fastest growing application segment for advanced battery technology (lithium ion specifically) is industrial applications. The numbers vary depending on the resource but the growth potential is obvious. Higher on-board energy, longer range/run-time, increased cycle life and the opportunity to charge quickly are important, quantifiable attributes of the newer chemistries. It all comes down to a return on investment (ROI) and every ROI tool must include the equipment's length of service.

Advanced battery technologies need "smart battery" management electronics to assure safe, reliable and long-life performance. Numerous types of Battery Management Systems are available in today's marketplace. Some systems have been designed for specific applications or for a specific cell technology but a truly Intelligent Battery Management System (iBMS) is key to ensure optimum performance of advanced battery technology cells (ABTC), in particular lithium-ion (Li-ion). A software-driven iBMS architecture offers maximum flexibility, protects individual battery cells from damage, increasing safety and overall system reliability. A fully functional iBMS not only protects cells from over-discharge and improper charging but also provides protection from the negative effects of battery cell "divergence" during use. Through the use of a numerous control systems and enacting management algorithms a good iBMS will provide effective cell-to-cell equalization. In addition a fully-functioned iBMS will provide other key system functions such as fault management, state of charge determination, health monitoring, thermal control, vehicle/machine "handshakes" and off-board network communication. Flexibility to work with any chemistry combined with breadth of features, yields system and vendor flexibility for an OEM such that they may always offer the best energy storage solutions across a broad spectrum of equipment requirements. Complete, custom OEM energy storage solutions, require an integrated iBMS, an advanced cell technology that is optimally matched to an OEM's application. OEM manufacturers are seeking clean energy high performance solutions to upgrade equipment from fossil fuels and low performance lead acid batteries. High performance cells combined with a fully featured iBMS can take market share from both lead acid and fossil fuel energy storage options in mobile machine markets.

Maximizing Cycle Life - It's Not Just the Cells

Application engineers designing today's advanced power solutions have at their disposal a large number of tools and tricks to optimize the energy storage subsystem to each OEM's application. Each application brings with it a number of key parameters that must be carefully assessed in designing a solution. As with most engineering challenges, there is not one answer

nor can a single solution solve and maximize all variables at once. In solving OEM customer problems, a well versed applications engineer is key to best selecting the trade-offs and optimizing the final solution.

There are a number of key battery parameters which, in a good iBMS, are tunable and can be crucial in optimizing battery cycle life. While not always intuitively obvious, some of the parameters have substantial impact on the final system characteristics. Major parameters that typically have impact on cell cycle life include charge/discharge voltages, charge rate, operating temperature, depth of discharge and more subtle system-level parameters such as cell to cell equalization. The level of control provided by the iBMS can have dramatic effect on the life of a system. In some applications, careful tuning of these key parameters can double or quadruple the published cycle life of a specific cell.

Boundless Continued on Page 12

World's #1 Rechargeable Battery Provider
Top-Notch Customer Service and Technical Support

We believe that providing superior tech support, delivering product as promised and reliability that exceeds spec is just the way one does business in a technical world. It's the marketing guys that love the awards. But we know it's the day-to-day that makes us the #1 provider of batteries to your market.

C'mon. Challenge us. Contact us at us.sanyo.com with your toughest spec.

SANYO
Batteries
The Biggest & The Best

us.sanyo.com

Lithium Ion Battery Opportunities
Warren, Michigan

From alternative propulsion solutions to fuel cells, the future of driving rests with the ingenuity of our talented people around the globe. We're looking for individuals to lead projects to develop lithium ion battery high volume solutions for hybrid and electric vehicle applications:

Senior Technical Specialist (ENG0007995)
Battery Module Process Manufacturing Engineer (MAN0005799)
Battery/Cell Engineering Group Manager (MAN0005715)
Cell Process Manufacturing Engineer (MAN0005800)

Candidates should be degreed and have five plus years' experience in process development / manufacturing engineering experience with lithium ion batteries, electrochemistry or equivalent training. Knowledge of automotive or high volume quality systems, and a master's degree is a definite plus.

To find out more visit gm.com/careers, search for the req number of interest and apply online.

GM

©2011 GM. The policy of General Motors is to extend opportunities to qualified applicants and employees on an equal basis regardless of an individual's age, race, color, sex, religion, national origin, disability, sexual orientation, gender identity/expression or marital status.

EVE
ENERGY VERY ENDURING

ENERGY VERY ENDURING

- Over 20 years R&D experience
- More than ten million batteries serving on meter
- Manufacturer
- Provide 42 kinds of Li/SOCI₂ batteries
- Provide 41 kinds of Li/MnO₂ batteries
- 16 patents

Address: Guangdong, China
Tel: +86-752-2610582
Fax: +86-752-2606033
E-mail: sales@evebattery.com
[Http://www.evebattery.com](http://www.evebattery.com)

CE UL RoHS CCC

Li-ion is often misused as a battery type by misinformed OEM customers. While the layman term is what is most commonly referenced when talking about lithium batteries, it is really the true chemical compounds of the anode, the cathode and the separator that make up a cell. Cobalt Oxide, Iron Phosphate and Manganese Oxide are the most commonly used cathode materials. "Poly" or lithium-ion polymer batteries are often seen as a specific type of cell while in reality the term polymer in the name describes the separator structure. Poly cells with Cobalt Oxide or Iron Phosphate cathodes are used in cells today. No matter the makeup, each of the lithium ion cell variants require careful tuning of their key parameters to maximize cycle life.

In addition to the important decisions surrounding cell chemistry selection, new adopters of lithium-ion technology can benefit from careful coordination between the system-level performance objectives, battery sizing and battery management system.

Optimizing Cycle Life in Cobalt Oxide Lithium Ion Cell Sub-Systems

Most cell vendors specify 4.2 volts per cell as the charge limit for cells with Cobalt Oxide cathodes. Life test studies performed as far back as the 1990s by NASA and other satellite system developers showed dramatic cycle life improve-

ments could be made by reducing charge voltages with only small losses in capacity. Typically, cell vendors publish cycle life data that shows the relationship between temperature, depth of discharge and cycle life. This same data with lower charge limits is very relevant in developing systems with maximized cycle life. The primary engineering tradeoff made by undercharging is the reduction in battery capacity. By charging to 4.1 volts, system capacity is decreased by roughly 10 percent of the available capacity, but extends cycle-life significantly. Most Cobalt Oxide cells exhibit a relationship of roughly 1 percent capacity loss per 10 mV reduction in charge limit. The effects vary with different cell chemistries and cell manufacturing parameters.

Over-sizing batteries offers benefits that are generally under appreciated by OEM customer. Larger batteries cost more up-front, but can offer significant payback over the life of operation. The payback, in the form of longer cycle life, results from two factors. First, for a given run-time, the battery can operate at a lower depth-of-discharge and cycle-life improves non-linearly as depth of discharge is reduced. Second, internal heat generation and battery temperature are reduced as the rate of discharge (C-Rate) is lower on a relative basis. Battery life exhibits logarithmic improvement with respect to both average depth-of-discharge and temperature. So, an investment in battery size can greatly improve battery life and is readily recaptured through the lifecycle of the system.

Battery Management System selection has the most pronounced effect on reliability and life of a lithium-ion energy storage solution. In addition to control of the parameters above, the iBMS is responsible for cell to cell equalization. The iBMS' equalization functionality ensures that individual cells are not over-worked, abused or damaged in any way. Over and under-voltage protection prevent irreversible electrochemical degradation in Li-ion cells. Lack of proper cell-level management and subjection of cells to damaging conditions quickly offsets benefits from over-sizing and reduced charge voltage. While equalization is common in most high end BMS solutions, the control system logistics vary widely in different BMS designs. The key measurement and control elements of a BMS's equalization algorithms are critical in keeping the cells within their optimal functioning parameter in all charge and discharge scenarios. Effective cell to cell equalization depends on many system variables outside of the scope of this article. This is an area where a proven BMS provider can save an OEM company many months of testing and qualification. The effect of a poorly designed or a poorly functioning equalization scheme in a BMS will result in decreased capacity and potentially cell damage.

In conclusion, within the datasheet for a lithium ion cell are many specifications that describe cell operational characteristics. The datasheet is unfortunately only a guideline in designing an OEM battery which will optimize the energy storage available for the customer. Many of the parameters specified in the datasheet should be seen as worst case scenarios or not-to-exceed limits rather the design base lines. Extending cycle life can be accomplished through careful tuning of a number of key parameters within the system's iBMS and a good lithium ion system's engineering is key to quick success.

Phil Lyman, the founder of Boundless Corp., has more than 25 years of experience in energy storage projects with lithium ion projects dating back to the mid-1990s in spacecraft and other mission critical applications. Boundless provides a fully functional iBMS for advanced battery technologies.

Contact Boundless Corp at www.boundlesscorp.com.

Free Subscription Application

Complete form and fax to 720-528-3771 or submit online at www.BatteryPowerOnline.com

Do you wish to receive Battery Power Products & Technology Magazine Free of Charge? (Outside US \$72) Yes No

Please select your desired format (check only one): Electronic Copy Hard Copy

X Signature (required) _____ Date _____

Print Name _____

Title _____

Company _____

Address _____

City _____ State _____ ZIP _____

Business Phone _____ Business Fax _____

E-mail (required for electronic format) _____

You may receive renewal reminders via email. If you do not want to receive other business related, third party email offers, please check here.

A. Primary product or service? (Check one)

- | | | |
|---|---|---|
| <input type="checkbox"/> 1 Consumer electronics & power tools | <input type="checkbox"/> 6 Aerospace/aviation products | <input type="checkbox"/> 14 Batteries |
| <input type="checkbox"/> 2 Communications systems & equipment | <input type="checkbox"/> 7 Medical Equipment | <input type="checkbox"/> 15 Battery assemblies |
| <input type="checkbox"/> 3 Wireless products | <input type="checkbox"/> 8 Test & measurement equipment | <input type="checkbox"/> 16 Distributor of batteries/components |
| <input type="checkbox"/> 4 Computers/peripherals | <input type="checkbox"/> 9 Military products | <input type="checkbox"/> 17 Chargers |
| <input type="checkbox"/> 5 Automotive | <input type="checkbox"/> 10 Industrial power/utility | <input type="checkbox"/> 19 Power management ICs |
| | <input type="checkbox"/> 11 Electrical Power/Utility | <input type="checkbox"/> 21 Technical/engineering consulting firm |
| | <input type="checkbox"/> 12 Security | |

B. Principal job function? (Check one)

- | | |
|---|--|
| <input type="checkbox"/> 23 Design/development engineering (including mgmt) | <input type="checkbox"/> 26 Engineering services |
| <input type="checkbox"/> 24 Industrial power supply engineering/operations | <input type="checkbox"/> 27 Research & development |
| <input type="checkbox"/> 25 Manufacturing/production/testing | <input type="checkbox"/> 28 Corporate management |
| | <input type="checkbox"/> 29 Purchasing/procurement |
| | <input type="checkbox"/> 30 Marketing/Sales |
| | <input type="checkbox"/> 31 Engineering consulting |

MAGNETICS CONFERENCE

April 15-16 • Chicago, IL 2009

The Premier Global Conference Focused on the Latest Advancements in
Magnetic Applications, Materials & Technology

Register Now!

- One-Day and Exhibit Only passes available
- Discounted rates for multiple attendees from the same company
- Register at www.MagneticsMagazine.com or call 800.803.8488

Conference Program:

- Visit www.MagneticsMagazine.com
- For questions contact Heather Krier at heatherk@infowebcom.com

Sponsorships & Exhibits:

- Contact Sue Hannebrink at sueh@infowebcom.com

Who Should Attend?

- Developers, integrators and operators of products/systems
- Professionals involved in magnetic test & measurement
- Manufacturers of magnets, magnetic assemblies and components
- Suppliers of magnets, magnetic materials and assemblies

Magnetics 2009 will focus on the latest advancements in magnetic applications, technology and materials. Serving OEM developers of products that utilize magnets and magnet systems, design engineers, OEM developers involved in EMC technology and magnetic effects, magnetics manufacturers and integrators, and material suppliers in the magnetics industry.

Webcom Communications Corp. • 7365 E. Orchard Rd. Ste 100 • Greenwood Village, CO 80111 • phone: 800.803.8488 • fax: 720.528.3771

www.MagneticsMagazine.com

A System Versus "Silo" Approach to Lithium Battery Safety

Donald A. Kutz, Founder
iTECH

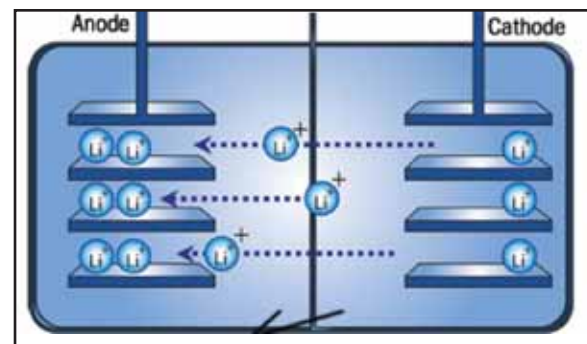
The Problem

The wide use of lithium based battery chemistries continues to raise our concern for the safety of when using these batteries. There are many millions of these batteries in use, and although the number of reported safety events has been low, the volatile results of an event keep a focus on this issue. Their tendency to be lulled into complacency is easy to understand. The typical process for a lithium ion battery implementation results in a "silo" approach. Every party works independently to complete his responsibility. The tendency is to let the "other guy" worry about and handle the safety issues. The cell supplier receives agency approvals from UL. The pack assembler designs the safety circuit and performs compliant testing per DOT. The customer does functional testing. These are normal business practices, but are inadequate when considering lithium ion chemistries. The results of a poor design or manufacturing process, it can create a catastrophic explosion or a fire. The "silo" approach opens the door to such a possibility.

The interaction between the host, battery and battery charger are not often considered. No one single entity is looking at the entire process and use of the battery. While there is no perfect solution to eliminate all possibilities, we surely can reduce the conditions that could cause an event. Systems applications, host communications protocol and customer use are areas that need additional scrutiny. A top down systems design approach is needed to address any and all potential safety weak spots.

First, let's look at what can go wrong with a lithium ion battery. The battery charg-

ing process activates lithium ion movement from the cathode to a graphite anode. A separator in an electrolytic solution provides the conduit for the ion movement. During this movement it is possible to have solid lithium trapped in the separator, if the construction of the cell is not controlled. External influences such as high temperature or over charging can also create these metal build-ups. The metal build-ups can ultimately create a failure of the separator with shorting of the cathode to the anode leading to a battery event.



During discharge the opposite occurs with movement of ions from the anode to the cathode, through the separator and electrolytic solution. Although the discharge process does not create shorts, it is the condition of the battery before use that can lead to an event while the battery is in the host device. A battery can already be in thermal runaway when inserted in the host for use.

The cathode is generally a layered oxide, such as lithium cobalt oxide. The manufacturer's choice of material for the anode, cathode and electrolyte determine the voltage, capacity, life and safety of a lithium ion battery. Top-tier cell manufacturers often


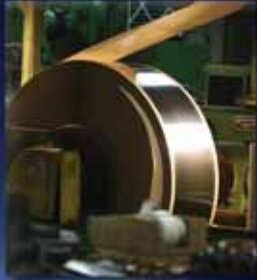
iTech Continued on Page 14


www.ulbrich.com

Your Metal Source for Battery Cans, Inlays, and Tabs.

- Supply material on traverse wound spools
- Supply 20lbs. and up of weld free coils
- Supply natural round edges from rolled wire
- Meet exacting thickness tolerances
- Meet stringent cleanliness requirements
- Meet rigorous straightness and property requirements

**Aluminum Alloys • Copper Alloys
Nickel Alloys • Stainless Steel**
Applications Cans, Inlays, Tabs



We Deliver Precision®

Ulbrich Stainless Steels and Special Metals, Inc.
E-Mail: info@ulbrich.com • 800-243-1676

Don't let Technology pass you by.



Testing Instrumentation

for Your Battery and Ultra-capacitor Needs



Battery & Ultra-capacitor Testers

- Automated Multi-Channel Testing Systems for Battery, Supercapacitor, and more...
- INDUSTRY LEADING Customer Support
- Logical, Powerful, and Easy to Use Control Software
- Multiple Current and Voltage Ranges for Improved Accuracy
- Linear Bipolar, Linear Unipolar, and PWM Circuitry Available to Cover a Wide Range of Applications
- Multi-Channel Potentiostat/Galvanostat Circuitry for Combinatorial Electrochemistry
- Flexibility Allows for General Cycling or Advance Electrochemical Experimentation
- Vast Experience in Multiple Markets from Advanced R&D to Manufacturing




Serving All of Your Testing Needs

www.arbin.com

Phone: 979-690-2751 Fax: 979-690-2761 Email: info@arbin.com

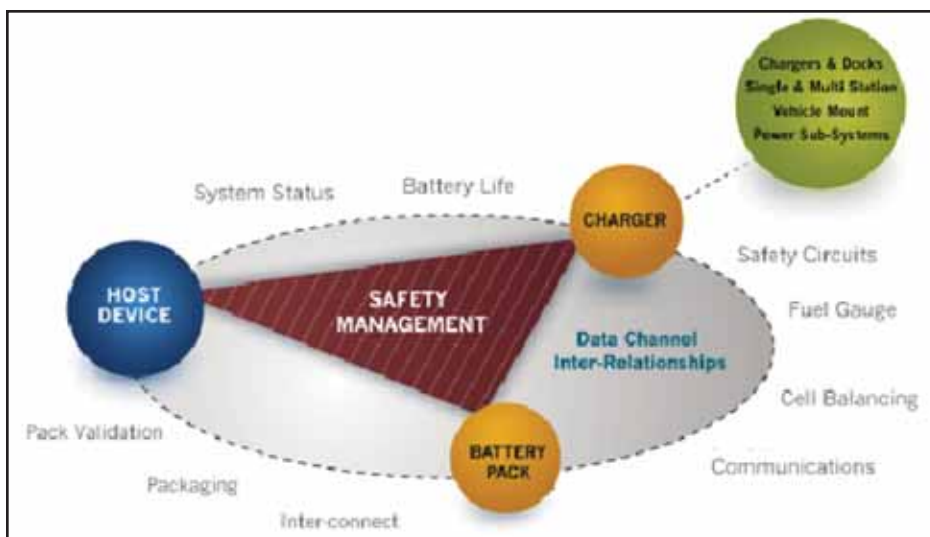
build in several layers of safety protection in the cell and can include:

- An over temperature mechanism for shutting down the separator
- A tear-away tab for internal pressure
- A pressure relief vent
- A thermal interrupt for over current/overcharging shutdown

Contaminants inside the cells can defeat these safety devices. For example, the mid-2006 recall of approximately 10 million Sony batteries used in many laptops was stated to be as a result of internal contamination with metal particles. Under some circumstances, these can pierce the separator, causing the cell to short, rapidly converting all of the energy in the cell to heat resulting in an exothermic oxidizing reaction, increasing the temperature to a few hundred degrees Celsius in a fraction of a second. This causes the neighboring cells to heat up, causing a chain thermal reaction.

During the past decade there have been other recalls of lithium-ion batteries in cellular phones and laptops owing to overheating problems. In October 2004, Kyocera Wireless recalled approximately one million batteries used in cellular phones, due to counterfeit batteries produced in Kyocera's name. In December 2006, Dell recalled approximately 22,000 batteries from the US market (http://en.wikipedia.org/wiki/Lithium_ion_battery - cite_note-46). In March 2007, Lenovo recalled approximately 205,000 9-cell lithium-ion batteries due to an explosion risk. In August 2007, Nokia recalled more than 46 million lithium-ion batteries, warning that some of them might overheat and possibly explode. In spite of these companies intense scrutiny, some field problems were experienced with battery safety.

The demand for higher watt/hour batteries is driving a new breed of construction and materials. While these materials may be intended to also improve the safety margin of the battery, events often do not show up until many months and even years of battery use.



A Systems Approach to Safety

A "Safety Management" program should be part of any design, manufacturing or procurement activity to reduce the possibility of an event. This program is not stand-alone, but rather is integrated into existing processes. The "Safety Management" dia-

BATTERY POWER PRODUCTS & TECHNOLOGY

Digital e-Zine

All the content and features of the print version with enhanced capabilities:

- **Faster Delivery**
- **Clickable Advertisements**
- **Easy to Navigate Pages**
- **Environmentally Friendly**

Download the latest digital issue at
www.BatteryPowerOnline.com.

Sign up for a free digital subscription at
www.BatteryPowerOnline.com/bppt_sub.php.

gram illustrates such a program. The battery pack, the host, the charger and any accessories should be part of the program.

Some important advantages of this approach are:

- All interface elements to the battery are considered
 - Conditions present during system use are analyzed
 - Protocol authentication prevents the use of unapproved battery sources
 - Safety layers are challenged early in the design
 - Complacency is replaced by checks and balances
- Safety systems management includes the entire life cycle of the cell, battery pack and host use.

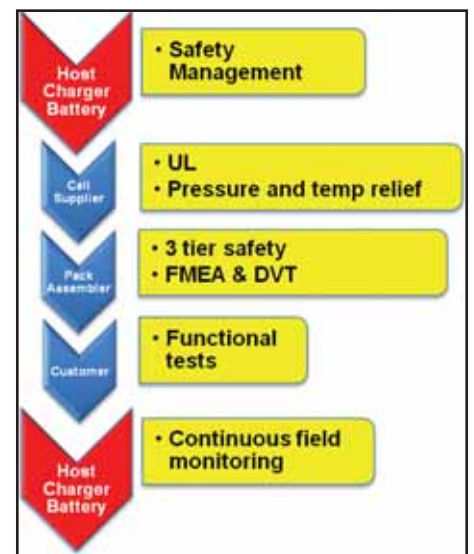
A new product process should include the key elements of good design practices, with emphasis on safety. These practices should include:

- Review of cell suppliers design and processes
- Design collaboration with cell suppliers, pack assembler and customer, including function, use and packaging
- Three tiers of safety
- FMEA (field mode effects analysis)
- DVT (design verification testing) including extreme and historical use
- Worst case margin analysis
- Third party testing for UL and DOT

The cell suppliers and pack assembler should be required to certify they are compliant with these requirements. Cell suppliers are often reluctant to offer this information, thus the burden falls upon the pack assembler or customer. The cell supplier controls the process to ensure that variations do not occur. Several suppliers have said that in spite of these good practices, an event could occur in every 2,000,000 to 3,000,000 cells. This may seem low, but this translates to potentially 100 to 200 catastrophic events per year. It is this possibility that creates the need for a holistic view of safety management.

A typical process for including safety management in your product should include the following:

1. Cell supplier certification of internal safety devices, including parameters for failure
2. Pack assembler designs safety circuit to level 3
3. Pack assembler performs FMEA against safety probabilities and step 1. This includes the host and any accessories
4. DVT testing to include worst case applications use, without limitations of normal specifications
5. Incorporation of a protocol authentication system, in addition to the safety circuitry
6. Independent DOT pack testing
7. Cp and CpK metric monitoring of all fabrication processes



8. Periodic sample use tests
9. Feedback from the customer's field data
10. A commitment to not be complacent about safety

Summary

A systems approach needs to be used when designing, building and using lithium battery packs. The assumption that the "other guy" did the due diligence testing should not be made. The results of an event can be catastrophic. While a 0.0001 percent failure would be accepted in most functional tests, it is problematic for lithium ion if not addressed. The systems approach will not reduce the probability to zero, but will go a long way to head off any early failures while improving long-life reliability. Continuous improvement and vigilance is needed. Remember, don't let the "other guy" be responsible for your lithium battery safety.

Donald A. Kutz is the founder of iTECH, a manufacturer of battery, charger and accessory power solutions. He has guided their technical team in providing leading edge portable power products for key OEM markets.

Contact iTECH at www.itecheng.com.

Will the Economy Discharge the Battery Industry?

Sara M. Bradford, Principal Consultant, Energy & Power Systems Group
Frost & Sullivan

The sluggish global economic situation has started to make its mark on several key battery markets as manufacturers begin to witness soft demand from both the original equipment and aftermarket sales of their products. To combat this challenge, manufacturers practice cost-efficiency strategies such as lean manufacturing, reducing inventory levels, diversifying product lines and shrinking advertising expenditures.

Automotive Batteries

This battery market will likely be hardest hit by the current economic downturn.

Key Industry Trends

- Housing crisis in the US results constricted consumer spending on big-ticket items such as vehicles
- Finance credit freeze impacting auto manufacturers and parts suppliers across the globe
- Sales of hybrid vehicles down by 11 percent in 2008, compared 38 percent growth in unit sales from 2006 to 2007

Impact will be felt by both original equipment and aftermarket sales of batteries.

The current market slowdown in the US has resulted in a dramatic reduction of new vehicle sales, which leads to a decrease in demand for original equipment lead acid batteries. With consequent drop in demand, 2009 is expected to be a rough year for the starting, lighting and ignition (SLI) lead acid battery market. This accelerated decline is expected to slow down at least one quarter after recovery of the market,

inflicting more pressure on manufacturers.

To review history, in 2000 battery lead times were as high as 40 to 50 weeks when abnormal demand outstripped capacity across the board. Even at a lower demand level, lead times were estimated at 30 weeks for some larger manufacturers. However, the economic downturn of 2001 and the current economic situation has impacted delivery lead times, decreasing back-to-industry standards in the range of 6 to 12 weeks. This indicator demonstrates expected impact on the battery industry in 2009.

Maintaining profitability in a price-competitive market is also a major challenge facing the automotive SLI lead acid battery aftermarket. Price is a key competitive factor as there is minimal product differentiation that creates intense competition for shrinking demand levels.

In this scenario, price and service support determine success in the marketplace. Consolidation in distribution channels has increased the bargaining power of channel members with respect to battery suppliers. Large distribution channel members demand competitive prices, high fill rates, and prompt service from their suppliers. In addition, manufacturers avoid carrying large inventories. In an economic condition of fluctuating demand, battery vendors cannot maintain high levels of inventory as this results in increased carrying costs. Thus, while price is under pressure, costs are increasing.

Additionally, lead price volatility impacts material costs for battery manufacturers and again, profits can erode. This could impact several competitors in the market. Particularly for large North American battery manufacturers, this situation will create harsh financial burdens.

Frost & Sullivan Continued on Page 16

Remote 2009
CONFERENCE AND EXPO

SCADA, Device Networking, M2M, Wireless Technology, Onsite Power, And Security for Remote Sites and Equipment

2009 Call for Papers
Onsite Power/Battery Sessions Needed!

No other industry conference brings together technology users that manage remote sites like the Remote 2009 Conference and Expo. Our highly technical sessions will provide cutting-edge technology direction and application strategies from the companies and users driving the growth in onsite powering, SCADA, M2M, remote networking, data communications, system & site security, emerging wireless technology, remote monitoring and automated control of distributed equipment, networks and facilities.

Call for Papers Deadline April 27th, 2009

FOR MORE INFORMATION VISIT:
WWW.REMOTEMAGAZINE.COM

Chroma
 Systems Solutions

866-600-6050
 chromausa.com

DC Loads

NEW 63600 Series

63600 Series DC Loads designed for testing multi-output AC/DC power supplies, DC/DC converters, chargers, batteries, adapters, and power electronic components. Excellent for research, development, production, and incoming inspection applications. The 63600's state of the art design uses DSP technology to simulate non-linear loads using a unique CZ operation mode allowing realistic loading behavior.

- ▶ Operation to 0v
- ▶ Constant Impedance Mode
- ▶ Three Current Ranges Per Load
- ▶ Digitized Volt & Current Readback (2µs sampling)

Model	63640-80-20	63640-80-60	63640-80-80
Config	Dual	Single	Single
Voltage	0~80v	0~80v	0~80v
Current	0~0.2/2/20A	0~0.6/6/60A	0~0.8/8/80A
Power	2X100W	300W	400W

AC Loads

NEW 63800 Series

Designed for testing uninterruptable power supplies, off-grid inverters, AC sources, switches, breakers, fuses, and connectors. Equipped with unique timing measurement functions allowing for measurement of battery discharge time and UPS transfer time.

- ▶ Auto Bandwidth Adjustment
- ▶ Constant & Rectified Load Mode
- ▶ Auto Power Factor Correction
- ▶ Timing Measurement for Battery and UPS

Model	63803	63804
Frequency	45~440Hz, DC	45~440Hz, DC
Voltage	50~350Vrms (500Vpeak)	50~350Vrms (500Vpeak)
Current	0~15Arms (45Apeak, cont.)	0~45Arms (135Apeak, cont.)
Power	1800W	4500W

AC Power Sources
 DC Power Sources
 DC Electronic Loads
 AC Electronic Loads
 Digital Power Meters
 Automated Test Systems
 Regenerative Burn-In Systems

SoftPanels

Easily control instruments using point-and-click software.

Chroma Systems Solutions | 7 Chrysler | Irvine, CA 92618 | www.chromausa.com

Current challenges for automotive SLI battery manufacturers include the following:

- Lead prices create material cost instability
- Currency fluctuations impact revenue growth
 - Lower volume due to decreased OE product, destocking and deferred orders for aftermarket customers

Although the average price of batteries is expected to stabilize, maintaining profitability without affecting competitiveness will remain a stiff challenge for market competitors in 2009. Frost & Sullivan expects the current economic situation to impact all automotive battery chemistry markets, including SLI lead acid and nickel-metal hydride.

Consumer Primary Batteries

This battery market will likely be constricted by the current economic downturn, but will maintain marginal growth.

215th ECS Meeting
San Francisco, CA
 May 24-29, 2009

Deadlines
Registration
 Deadline for advance meeting registration is April 24, 2009.
Hotel
 The Hilton San Francisco is the meeting hotel. Reservations are due April 24, 2009.

Short Courses
 The following courses are planned, as of press-time: Advanced Impedance Spectroscopy, Solid State Lighting, Fullerenes and Carbon Nanotubes, Electrochemical Nanotechnology, and Basic Electrochemical Measurements

General Topics
 - Batteries, Fuel Cells, and Energy Conversion
 - Biomedical Applications and Organic Electrochemistry
 - Corrosion, Passivation, and Anodic Films
 - Dielectric and Semiconductor Materials, Devices, and Processing
 - Electrochemical / Chemical Deposition and Etching
 - Electrochemical Synthesis and Engineering
 - Fullerenes, Nanotubes, and Carbon Nanostructures
 - Physical and Analytical Electrochemistry
 - Sensors and Displays: Principles, Materials, and Processing

Membership
 For more information on becoming a member, for discounts and other great benefits, please see www.electrochem.org/membership.

Visit the ECS website for meeting details.
www.electrochem.org

Key Industry Trends

- High cost of raw materials
- Consumer spending decline
- Reduced battery inventory levels

Demand for battery-powered devices and applications directly affect the sale of batteries. Reduced consumer spending on items that require primary batteries (such as toys, audio/video devices, radios, lighting devices and others) has a direct implication on the primary battery market. The soft economic situation is slowing consumer electronic device sales, with affect batteries used for memory backup as well as primary power applications.

As a mature technology, 2009 market growth for primary batteries is expected to be constricted but not severely impacted by the current sluggish global economic situation. There are few substitutions for consumer primary batteries; therefore, the market is expected to only fluctuate in revenue and unit shipment growth. The strongest market challenge is high raw material prices for zinc, nickel and manganese ore, which impact all manufacturers in the industry.

To endure the current volatility, primary battery manufacturers are addressing the following points:

- Increase prices
- Control advertising expenses
- Improve packaging, reduce costs
- Strengthen distribution channel relationships
- Improve product line segmentation - positioning products as high performance, regular and value brands
- Improve manufacturing process, move towards lean manufacturing

Frost & Sullivan expects weak consumption levels to impact the primary battery market in 2009. Retailers did reduce inventory levels through the second half of 2008, therefore demonstrating well below normal seasonal battery levels. This could positively impact the primary battery market during the early part of 2009.

Industrial Batteries

This battery market will be impacted by the current economic downturn and will maintain positive growth.

Key Industry Trends

- A drop in economic activity with manufacturing and service sectors

being affected

- Sluggish economic conditions discourage major investments in infrastructure development
 - Delay in infrastructure build out for 3G/4G wireless
 - Sales of Class 6-8 trucks down significantly
- Impact will be felt by original equipment sales of batteries.*

The industrial battery market will likely be impacted by the soft economic conditions in 2009. The faltering global financial situation is now felt by most countries. Prospering nations have announced revised predictions for their gross domestic product (GDP). New equipment orders are starting to decline for industrial application such as backup power and traction vehicles.

The following market perspectives will create stable demand for industrial batteries:

- Replacement market for installed equipment
- Increased awareness of power quality and consequences of power outage and downtime
- Telecommunication infrastructure upgrades

The aftermarket for batteries is expected to grow faster than the OE market as end users seek cost-efficient solutions to combat budget restraints due to the economic downturn.

Additionally, end users realize the monetary consequences of downtime. Research indicates that the cost of downtime for a multi-national corporate datacenter is estimated to be between \$10 and \$15 million an hour.

WiMax systems are currently pushing the boundaries of data transfer around the world. As Wi-Fi networks rapidly catch on in developing regions such as Asia Pacific and Western Europe, and maintenance and Wi-Fi network upgrades take place in North America and eastern Europe, the demand for industrial batteries used with DC power systems for such networks is also likely to increase.

Conclusion

Early 2009 will demonstrate continued weakness for automotive battery sales due to softening OE sales, lower volume sales, and fluctuating currency rates. Frost & Sullivan expects increases in HEV and electric battery development to provide some reprieve in the industry and establish a solid foundation for future industry growth.

Consumer and industrial battery markets will likely feel the economic impact starting in early 2009 and improve mid-year onwards. Impact levels are not expected to be as harsh as the automotive sector. The current 'fear factor' is expected to subside and confidence rebound, therefore creating growth opportunities for strong and cost-efficient battery manufacturers.

Sara Bradford is industry director for the Frost & Sullivan North American Energy and Power Systems Practice. She focuses on monitoring and analyzing emerging trends, technologies and market dynamics in the battery, alternative energy, fuel cell, power supplies/power quality and energy industries worldwide.

For more information regarding this article, please contact Johanna Haynes at johanna.haynes@frost.com.

Solutions in Advanced Technology
 Webcom Communications serves advanced technology fields worldwide through its magazines, Web portals, e-newsletters, directories, database products and industry events.

In-Depth Publications

Industry Directories & Data

Web Content & Product Search

Visit Us Online at www.infowebcom.com

Send Industry News Items
 to Shannon Given,
 Director of Content, at
Shannong@infowebcom.com

Quallion LLC Receives Lithium Ion Battery Contract from Boeing for C-17 Backup Power Supply System

Custom lithium ion battery manufacturer Quallion LLC was recently awarded a contract from The Boeing Company to retrofit the emergency battery power supply for the C-17 Globemaster III. Quallion's technology will replace the legacy backup power supply system for the military-transport aircraft.

"Lithium ion batteries are attracting new interest for their ability to help aircraft manufacturers achieve substantial savings in weight and maintenance costs," said Paul Beach, Quallion's senior executive vice president. "Compared to other battery chemistries, lithium ion delivers far greater energy density, charge retention and specific power and does not require scheduled cycling, prolong priming or other costly maintenance."

Quallion has experience and a history of innovation with lithium ion chemistries. This depth of expertise combined with a core competency in cell, battery and electronics design is critical to customers developing advanced aircraft power systems that require strict materials control, the capability to function in harsh conditions and high reliability.

A123Systems to Build US-Based Lithium Ion Battery Mass Production Facilities

A123Systems has submitted an application under the US Department of Energy's Advanced Technology Vehicles Manufacturing Incentive Program to qualify for \$1.84 billion in direct loans to support the construction of new world-class lithium ion battery manufacturing facilities in the US, with the first construction location in southeast Michigan.

If A123's application is approved, this program would enable the company to dramatically expand production capacity in the US, with full production volumes designed to supply battery systems for 5 million hybrid vehicles or half a million plug-in electric vehicles per year by 2013.

"We're entering an exciting new phase for the automotive industry where we increase the electrification of vehicles, reducing consumption of gasoline through advanced batteries. This new facility would greatly accelerate this change and help ensure that the American economy replaces its dependence on foreign oil with reliance on advanced, homegrown batteries," said David Vieau, A123Systems president and CEO.

At full operation, A123 expects the combined plants would occupy as much as 7 million square feet and create more than 14,000 jobs. These plants would produce battery cells and systems to meet the needs of A123's broad automotive customer portfolio, which currently includes more than seven vehicle manufacturers and 19 vehicle models ranging from HEVs (hybrid electric vehicles) to EVs (electric vehicles).

Valence Signs Supply Agreement with PVI for Lithium Phosphate Energy Storage Solutions

Valence Technology, Inc. has entered into a multi-year non-exclusive supply agreement with PVI for Valence's U-Charge XP Energy Storage Systems. PVI develops and manufactures commercial electric vehicles including electric buses under the GEPEBUS brand and trucks in partnership with Renault Trucks.

Under the terms of the supply agreement, Valence will provide lithium phosphate battery systems and engineering support to power four commercial EV platforms. Valence will begin shipments to PVI in the fourth quarter of fiscal 2009. Based on PVI projections, revenue for Valence from this supply agreement could represent approximately \$3 million in fiscal 2010.

"This is a major milestone in our company's history," said Alastair Johnson, vice president, worldwide sales and marketing for Valence. "Since this represents our first supply agreement with a major automotive OEM supplier, we are delighted to be associated with PVI, especially given their work with leading companies such as Renault Trucks. PVI has a long and successful track record of developing innovative commercial vehicles. This agreement speaks to the value that a vehicle developer such as PVI places on Valence's safe battery chemistry, proven production capacity and technical vehicle integration support."

PVI and Renault Trucks recently announced an agreement to develop concept trucks and demonstrators of light commercial EV vehicles including an all-electric version of the Maxity. The first demonstrator will be powered by Valence lithium phosphate batteries. The all-electric Maxity represents a significant advancement of how goods can be transported in urban environments with zero emissions.

Balqon Corp. Installs AeroVironment's PosiCharge Fast Charge System at Port of Los Angeles to Power Electric Trucks

Balqon Corp., a developer of heavy duty electric trucks, tractors and electric drive systems, has purchased a new high voltage version of AeroVironment, Inc.'s (AV) PosiCharge fast charge systems as part of a program to replace internal combustion yard tractors with electric propulsion vehicles at the Port of Los Angeles.

Yard tractors, or "hostlers," are used by the Port of L.A. and other ports around the world to move containers from docks to on-site storage yards where the containers await transportation to their ultimate destinations. The high-volume flow of containers through ports often requires that hostlers operate with only limited breaks. PosiCharge fast charge systems support electric material handling vehicles used in high velocity factories, distribution centers and airports to support mission-critical operations. The PosiCharge fast charge system developed for heavy-duty electric yard tractors can charge up to four heavy-duty Balqon electric trucks at a time and provide enough energy during short periods of time to enable the productive flow of containers through the port while eliminating emissions.



PosiCharge fast charge systems allow industrial and heavy-duty electric vehicle operators to eliminate battery swapping, thereby recovering run time, enhancing productivity, optimizing assets and improving worker safety. PosiCharge systems fast charge battery packs in the vehicle during scheduled breaks, so the battery pack never leaves the vehicle. The result is instant productivity improvement, a cleaner and safer work environment and a streamlined workflow that no longer stops for battery changing. With proprietary technology that safeguards batteries by customizing each charge, PosiCharge systems can actually extend a battery's useful life compared to traditional charging solutions, further optimizing operations.

CFDRC's Bio-Battery Program Wins Prestigious National Achievement Award By US Army

CFDRC's Bio-Battery Program was recently selected as a National Achievement Award winner by the Army SBIR Program. This prestigious award was given to the top 10 programs out of 755.

The Bio-Battery team is developing a device that harvests energy from biological fuels such as sugars and converts them directly into electrical energy. This product is adaptable for many low power applications in both the military and commercial markets. CFDRC's Bio-Battery offers several advantages over conventional fuel cells and Li-ion batteries, these include reduced size and weight, flexible shape, environmental-friendliness and improved renewability and reliability.

The first target application is as a mission-extender for portable soldier power. The Bio-Battery will meet a long-standing, critical need for the soldiers. Namely reducing the number and total weight of batteries required during extended mis-

Industry News Continued on Page 18



Based in Rolling Meadows, IL, Charles Marine & Industrial is a provider of high quality, innovative industrial battery chargers, transformers and AC and DC electrical products including inverters, isolation and boosting transformers and cable products.

More information about Charles Industries is available at www.charlesindustries.com

Charles Industries

5600 Apollo Drive
Rolling Meadows, IL 60008
(847) 258-8455
www.charlesindustries.com



Battery Analysis Gets Personal!



BNS Solutions PBA-1000 is part of the Differential Systems line of personal instrumentation, a series of engineers tools integrated with a PC for efficient, practical, cost-effective engineering development.

No longer do engineers have to fight for time on the lab or production testers. The PBA-1000 allows engineers to gather critical data for battery system design right on their benchtop. It takes little more benchspace than a notebook, yet when the PBA-1000 is connected to a PC, it is powerful and flexible enough to run full battery charge and discharge cycles, collecting performance data as it goes.

**www.bnssolutions.com
508.668.6132**

sions. To this end, CFDRRC has recently begun a Phase III program with CERDEC (Communication-Electronic Research, Development and Engineering Center) targeting insertion in the portable soldier power arena.

Potential future markets include portable low-power electronics devices and implantable power sources to power medical devices.

International Battery Receives Funding from DOD for Exchange Program of Green Technology for the War Fighter

International Battery, Inc. (IB) has been awarded \$2.4 million by the Defense Department to demonstrate the improved efficiency and environmental advantages of lithium batteries versus traditional lead batteries in military use.

IB, a worldwide producer of high-capacity, large-format rechargeable battery systems, was awarded the funding for the Lithium Ion Battery Exchange Program in the Fiscal Year 2009 Continuing Appropriations Act (HR 2638) as part of the US Army's Research, Development, Test and Evaluation (RDTE) Combat Vehicle and Automotive Advanced Technology Program. The Lithium Ion Battery Exchange Program is designed to demonstrate the increased capability of the Lithium Ion 6TLi Battery as opposed to the current lead acid battery in Army Theaters of Operations. The 6TLi Battery Exchange Program will provide added capability of four times the energy, half the weight, a significantly longer life and enhanced combat readiness as compared to the current lead acid battery systems. The 6TLi battery has been engineered to the same dimensions of the current lead acid battery, allowing soldiers in the field to perform seamless exchanges.

The battery provides an environmentally safe alternative to the hazardous material such as lead or acid currently found in military battery systems.

By implementing this advanced battery technology, the US Army can lower its major disposal charges associated with lead acid battery systems. IB will help the Department of Defense demonstrate the financial benefits of exchanging lead acid for lithium ion battery systems as well as support the war fighter with increased energy and power for multiple military applications.

Saft Li-Ion Battery Fulfills Technical Requirement for Orbital Pegasus Rocket Launch

In the months leading up to a recent launch of its Pegasus rocket, Orbital Sciences Corp. determined a need for a more mass-efficient power source than is needed on a typical flight of its air-launched space launch vehicle. To meet the challenge, Orbital turned to a Saft lithium-ion (Li-ion) battery that was supplied for a previous mission several years before, but was not used. After five years in storage, the Saft battery was integrated with the rocket and performed as if it was new.



Photo Courtesy of Orbital Sciences Corp.

"For the latest successful launch of our Pegasus rocket, we realized we needed a lighter yet powerful battery and decided to retest and certify a spare five-year-old Saft battery that was in refrigerated storage," said Mr. Kettner Griswold, Orbital's Pegasus Program chief engineer. "After thorough testing, we used the battery and, as expected, the battery performed just as planned, maintaining the same level of performance as the day it was manufactured."

"Saft has been a trusted supplier to Orbital on a number of programs such as DART and Optus D1, D2 and D3 satellites," said Thomas Alcide, general manager of Saft's Specialty Battery Group. "This opportunistic use of our battery demonstrates the excellent storage life, dependability and robustness of Saft's space batteries."

Saft's Li-ion technology has been used in space for several years and the fully integrated battery systems are deployed in key space applications such as launchers, satellites, ATVs, probes, power tools and planetary rovers.

Ask the Experts is a new feature to Battery Power Products & Technology magazine. It is designed to assist you in any battery/power related questions you may have.

We encourage you to send us your questions and we will find an industry expert to answer them. The questions and answers may appear in an upcoming issue of Battery Power magazine or in the Battery Power e-Report, a monthly e-newsletter that is issued the first Tuesday of every month.

Send questions to:
Shannon Given, Director of Content, at Shannong@infowebcom.com.

Q: Is there a source where battery manufacturers list their internal resistance?
Michael Kleczewski, Staff Engineer, Kohler

A: Internal resistance can be calculated as a function of AC or DC impedance. Companies will typically provide that information in specifications.
Paul Beach, Vice President, Quallion LLC

Q: Is there a product out there that can be used in a UPS battery cabinet to prevent accidentally causing a short between the battery and cabinet? When using the Alber CellCorder it is easy to see how one could accidentally hit the cabinet with the probe or volt lead causing an arc. Any material or product that you can use against the wall of each shelf to prevent this.
Bob Spratt, Battery Technician, Integrated Power Solutions

A: There is no real "insulator" for the cabinets or shelves that is currently available. However, some of the ohmic battery analyzers on the market are protected through their internal electronics and the techniques used to minimize the risk of damage should this occur. In fact, one such device is protected up to 600 VDC and also offers insulated accessories.
Todd Stukenberg, Executive Director of Marketing, Midtronics

Q: Our company is considering the implementation of an automated meter reading system for our water customers. These units transmit meter data to a polling system that queries once an hour. We have been told the battery systems in these meters run for 20 years before needing replacement. I find this a little difficult to swallow. I have been working with battery powered systems for many years and have found very few systems that, without a charging system, last much longer than seven years. The companies that are pushing this cost saving technology for water meters include: Sensus, Neptune and Elster/Amco but there are many players in this field. Are the claims for real? What type of battery technology is being used in these systems? What can I realistically expect for battery life/change interval?
Ron Crim, Electrical & Controls Project Manager, Irvine Ranch Water District

A: System longevity is a key consideration for utility companies when selecting an automated meter reading (AMR) system. Battery replacement costs are estimated at \$20 per meter; therefore, AMR designers are constantly evaluating battery run time and reliability. Recent developments, such as two-way real-time communication between the utility and its customer, place more demand on the batteries that power this new generation of "smart" meters.

If high-quality batteries are used, it is possible to sustain high performance for up to 20 years, even in the most demanding environmental conditions. Industrial primary lithium batteries are most frequently used for applications that must withstand extreme temperatures, humidity and dust.

Lithium thionyl chloride (Li-SOCl₂) batteries are favored for long-duration AMR applications because they combine high energy density (typically 1,200 Wh/l), the ability to operate under extreme temperature conditions (ranging from -60°C to 85°C), low self-discharge rates (less than 1 percent per year) and high voltage readings compatible with electronic cut-offs (nominal voltage of 3.6 V).

Making the right battery choice for a 20-year application calls for the AMR designer and the battery supplier to work in cooperation to ensure that the key factors, base current, pulse current, cut-off voltages and environmental conditions, are properly assessed and taken into account for the battery sizing.

For example, walk-by AMR modules with pulses of a few milliamps to support radio communication over a few meters, and AMR modules requiring pulses of a few amps to power GPRS transceivers, will require different battery designs. Additionally, prolonged exposure at low temperatures (for outdoor use), versus potentially high temperatures (for meters located in utility rooms), can have an impact on the battery performance and operating life. Leading battery companies have developed life models that enable expected battery run time to be accurately predicted by evaluating its specific utilization profile.

Finally, the know-how in selecting high-quality grade components and highly reproducible industrial processes is instrumental in demonstrating excellent track records over long periods of service. For instance, the use of stainless steel cases for high resistance to ambient humidity, glass-to-metal sealing and laser welded enclosures to prevent slow electrolyte evaporation, or proper manufacturing of the battery electrolyte to avoid low voltages after rest periods, are important elements of the battery manufacturer's expertise.

Field-proven results indicate that 20-year durations are achievable if the aforementioned parameters are well managed.

Nicolas Paquin, Product Manager, Saft

Magna and Ford Motor Company Partner to Introduce Zero-Emission Battery Electric Vehicle

Magna International has announced a vehicle-development partnership with Ford Motor Company to introduce a zero-emission lithium-ion battery electric vehicle (BEV) to be delivered to market in 2011.

The electric vehicle, which Ford announced at this year's North American International Auto Show in Detroit as a key vehicle in their electrification strategy, will be a small car with an expected range of up to 100 miles without using a drop of gasoline and without compromising customer performance expectations. The Ford BEV is expected to offer consumers a familiar driving experience; it will operate similar to a conventional vehicle, but with smoother acceleration, less noise and zero emission.

"This vehicle adds an important piece to Ford's product lineup with a zero-emission vehicle that will be both affordable and meets customers' needs," said Don Walker, co-CEO of Magna International. "In addition, the joint partnership demonstrates valuable OEM/supplier collaboration by sharing in the expertise and investment that the auto industry now requires for new advancements in energy independence and reduced CO2 emissions."

Magna will be responsible for providing critical components that make-up the power-train and battery modules in the vehicle. In addition, Magna will also play a key role in the engineering required to integrate the electric propulsion system and other new systems into the vehicle architecture.

Fleet of Commercial Trucks to be Powered by Johnson Controls-Saft And Azure Dynamics Advanced Hybrid Technology

Johnson Controls-Saft and Azure Dynamics, Inc. (AZD) has unveiled a new supply agreement that will provide some of the world's most advanced lithium-ion (Li-Ion) hybrid battery technology to power commercial vehicles in North America. The five-year supply agreement signals progress in the development of a US supply base to help build an infrastructure for development and manufacture of hybrid electric vehicles.

"As more and more consumers demand energy-efficient vehicles, it is also critical that commercial fleets do their part to reduce their reliance on foreign oil while also improving the impact they have on the environment," said Mary Ann Wright, who leads the Johnson Controls-Saft joint venture and is vice president and general manager of Johnson Controls hybrid business. "This is great progress for the US supply base."

Most current hybrid electric vehicle (HEV) technology uses nickel metal hydride batteries. Lithium-ion offers a lighter, more powerful design with a longer life than most current technologies and is viewed as the technology of choice to power plug-in hybrid electric vehicles in the near future.

The 345-volt battery system will utilize advanced Li-ion cell technology optimized for life, power and reliability. The cell design was supported through Johnson Controls-Saft's partnership with the US Advanced Battery Consortium and the Department of Energy to develop advanced energy storage technology for electrified powertrain vehicles. The battery pack is designed to mount under the vehicle body and can withstand road debris and water spray and submersion. Azure will utilize the pack on its current Balance Hybrid Electric and future hybrid platforms. The company's vehicles are in operation for major fleet customers like AT&T, Con Edison, FedEx Express and Purolator Couriers.

In addition to fuel savings and environmental benefits, Azure's Balance Hybrid Electric technology can reduce vehicle maintenance costs by approximately 30 percent, further reducing overall fleet operating costs.


The complete battery systems, including electronics, electrical and mechanical components will be assembled at the Johnson Controls-Saft facility in Milwaukee, Wis.

Alliance Formed to Manufacture Advanced Automobile Batteries in the US

US battery and materials companies, with support from one of the country's largest national laboratories, have formed the National Alliance for Advanced Transportation Battery Cell Manufacture, known as the "Alliance," to manufacture advanced lithium ion battery cells for transportation applications in the US. Lithium ion batteries are anticipated to replace gasoline as the principal source of energy in future cars and military vehicles. Today, US automobile manufacturers and defense contractors depend upon foreign suppliers, increasingly concentrated in Asia, for lithium ion battery cells.


The founding members of the Alliance include 3M, ActaCell, All Cell Technologies, Altair Nanotechnologies, Dontech Global, EaglePicher Corp, EnerSys, Envia Systems, FMC, MicroSun Technologies, Mobius Power, SiLyte,

Industry News Continued on Page 20



EDS

BRIGHTER THAN EVER



THE BEST WAY TO STRETCH A BUCK IN THE ELECTRONICS INDUSTRY.


It would cost a bundle to have twelve meetings in twelve cities. Do it all in one trip to EDS — the cost-effective, once-a-year opportunity to conduct business and network with leading manufacturers, distributors and representatives. EDS is the largest and most exciting electronics component event in the country!

REGISTER TODAY:
edsconnects.com
 (312) 648-1140

YOU WON'T WANT TO MISS EDS 2009:

- Exposure to new business opportunities, products and channel partners
- Hot new seminar topics, panels and speakers focusing on the most important issues in today's business environment, including:
 - Strategies for surviving in this marketplace
 - Emerging opportunities in solid state lighting
 - Alternative sources of energy, and how the channel can benefit
- Expanded media exposure for participating companies
- The return by popular demand of eXtreme Networking — a fast-paced series of invaluable 4 minute sessions with potential partners

MAY 12-14, 2009 | **LAS VEGAS NEVADA, USA**
 PARIS/BALLY'S HOTEL COMPLEX



Superior Graphite and Townsend Advanced Energy. Additional battery developers and materials suppliers are anticipated to join the Alliance. The US Department of Energy's Argonne National Laboratory, a national research laboratory and developer of new battery technologies, has been active in encouraging the Alliance and will continue to serve in an advisory role as the Alliance begins operations.

The Alliance seeks to develop one or more manufacturing and prototype development centers in the US, which will be shared by Alliance members. Developing the capability to mass manufacture advanced battery cells is anticipated to require an investment of \$1 billion to \$2 billion over five years. Most of that investment is expected to come from the federal government, because lacking current orders for advanced transportation batteries, no US-based battery companies can assume the risk of making such an investment. The Alliance will

permit the most efficient use of available government support by having Alliance members share in the use of a large ultra-modern manufacturing facility rather than having to compete for smaller, less ambitious forms of government support.

BYD Auto Plans to Enter US Market in 2011 with Extended-Range EVs

BYD Auto Company, one of China's independent automobile manufacturers, plans to enter the US market in 2011 with a range of pure electric and plug-in hybrid vehicles.

BYD's future lineup will include the F3DM, a mass-produced plug-in hybrid sedan, and the battery-powered e6, a mid-size five-passenger crossover vehicle with a remarkable range of up to 250 miles on a single charge.

Underpinning the company's strategic vision of

"green tech for tomorrow" is BYD's own Fe battery. The Fe battery is safe, environmentally friendly and affordable. It can be quick-charged to 50 percent of capacity in 10 minutes and will have a life cycle of more than 10 years.

The Fe battery is used in the e6 electric crossover vehicle, as well as BYD's new Dual Mode family of plug-in hybrid vehicles, including the compact F3DM sedan and the mid-size F6DM sedan, which can run in either pure-electric or hybrid-electric mode.

Pennsylvania Grants Axion Power \$800,000 to Study its Batteries in Electric Vehicles

Axion Power International, Inc., a developer of battery technologies and advanced energy storage devices, has released the potential energy efficiencies and cost savings its advanced lead-acid battery will bring to the rapidly-expanding electric car market has earned the company an award from the Pennsylvania Alternative Fuels Incentive Grant program. The \$800,000 first-year grant is part of the State's overall effort to invest in businesses that are creating important and innovative clean energy and bio-fuels technologies. The award proceeds will be used to demonstrate the advantages the Axion proprietary PbC battery technology provides in a variety of electric vehicle types including: hybrids (HEVs), such as the popular Toyota Prius; "plug-ins" (PHEVs) used in commuter, delivery and other vehicles; and in EV's and converted EV's. The PbC battery technology, which replaces simple lead-based negative electrodes used by other manufacturers with its more sophisticated activated carbon electrode assemblies, has significantly enhanced performance characteristics when compared with other advanced lead-acid batteries. Those enhancements include deeper cycling, longer life, elimination of sulfation and shedding on the negative plate, lighter weight and easier more rapid recharging capabilities.

Ricardo Launches a Comprehensive and Integrated Development Center For Hybrid and Electric Vehicle Battery Systems

Ricardo, Inc., an independent engineering firm specializing in total vehicle fuel economy and efficiency, has launched the Battery Systems Development Center at its Van Buren Twp., Mich., headquarters. The Battery Systems Development Center is the focal point of Ricardo's design, analysis, simulation and integration of advanced high-power battery packs and their electronic management systems. Combined with the company's expertise in the development of electronic controls, hybrid transmissions and vehicle systems, it provides Ricardo with the capability of providing fully integrated, turnkey battery systems.

In the Battery Systems Development Center, prototype battery pack systems undergo exhaustive development in specially built development chambers equipped with robust safety and filtration systems. Each will feature high-capacity battery cyclers, high-voltage instrumentation, hardware-in-the-loop systems and other equipment to enable the development of battery systems in simulated vehicle environments. Once a battery pack design is verified in a safe, simulated environment, the battery system can be integrated into and further developed on a vehicle in Ricardo's adjoining garage facility.

Are you ready for something new?

Join the Advanced Technology Network.

Sign up today for one of Webcom's conferences. Featuring in-depth educational opportunities, purposeful networking and technology-focused market insight.

Choose from several industry-specific events held throughout the year. They provide attendees with the most current information related to the specific technology markets they serve.

Current 2009 events:

2009 MOTOR, DRIVE & AUTOMATION SYSTEMS CONFERENCE
Today's Leading Conference on the Latest Advancements in Electric Motor, Drive & Automation Systems Technology
March 3-4 • Orlando, Florida • www.dtrm.com

Motor, Drive & Automation Systems

March 3-4, Orlando, FL

MAGNETICS CONFERENCE 2009
April 15-16 • Chicago, IL

Magnetics Conference

April 15-16, Chicago, IL

SaaS 2G & SLAM 2009
Software as a Service, Sales, Licensing, Alliances and Marketing for Software and SaaS Companies
April 28-29 • Boston

SaaS & SLAM

April 28-29, Boston, MA

2009 ANTENNA SYSTEMS CONFERENCE
The World's Premier Conference on the Latest Advancements in Antenna Systems & Technology

Antenna Systems Conference

September 1-2, Philadelphia, PA

SOFTWARE BUSINESS 2009
Strategies for C-Level Executives of Mid-Size Software & SaaS Companies
September 29-30, San Diego

Software Business Conference

September 29-30, San Diego, CA

BATTERY POWER 2009
October 20-21 • Denver

Battery Power Conference

October 20-21, Denver, CO

Thermal Management & Technology Symposium
October 20-21, 2009 Denver, Colorado

Thermal Management and Technology

October 20-21, Denver, CO

Remote 2009 CONFERENCE AND EXPO
SCADA, Device Networking, WPL, Wireless Technology, Critical Power, and Security for Remote Sites and Equipment

Remote Conference & Expo

October 29-30, San Antonio, TX

The Advanced Technology Network:
Where opportunity meets technology

To learn more please visit www.infowebcom.com
or call 800 803 9488 / 720 528 3770

Webcom Communications, 7355 E. Orchard Road, Suite 100, Greenwood Village, CO 80111 USA
Phone: +720 528 3770 Fax: +720 528 3771 www.infowebcom.com

Index of Advertisers

Alber Corp.	2	www.alber.com	Hioki USA Corp.	24	www.hiokiusa.com
Arbin Instruments.	13	www.arbin.com	House of Batteries.	8	www.houseofbatteries.com
Battery Solutions.	21	www.batteryrecycling.com	Keystone Electronics Corp.	7	www.keyelco.com
Bio-Logic USA LLC.	21	www.bio-logic.us	Pred Materials International Inc.	5	www.predmaterials.com
BNS Solutions.	17	www.bnssolutions.com	Sanyo Energy USA Corp.	11	www.sanyobatteries.com
Charles Industries.	17	www.charlesindustries.com	Storage Battery Systems.	23	www.sbsbattery.com
Chorma System Solutions.	15	www.chromausa.com	Ulbrich Stainless Steels.	13	www.ulbrich.com
EVE Battery.	11	www.evebattery.com	Webcom Communications	4, 6, 12, 14, 16, 20	www.infowebcom.com
General Motors.	11	www.gm.com/careers	Yasui Seiki Co.	21	www.yasui.com

Calendar of Events

April

- 13-17 - MRS Spring, San Francisco, Calif.
- 27-29 - **Battcon 2009**, Orlando, Fla.
- 29-1 - **ENTELEC**, Houston, Texas

May

- 3-6 - **Battery Council International**, Las Vegas, Nev.
- 12-14 - **EDS 2009**, Las Vegas, Nev.
- 24-25 - **2009 Electrochemical Society Annual Spring Meeting**, San Francisco, Calif.

June

- 1-4 - **UTC Telecom**, Las Vegas, Nev.
- 8-9 - **Advanced Automotive Battery Conference 2009**, Long Beach, Calif.
- 8-11 - **SuperComm 2009**, Chicago, Ill.

August

- 16-20 - **APCO**, Las Vegas, Nev.

October

- 20-21 - **Battery Power 2009**, Denver, Colo.

Send Calendar of Event Items to
Shannon Given at
ShannonG@infowebcom.com

Battery Recycling!

All types of batteries recycled.
Responsible, Environmentally Friendly,
Call **Battery Solutions, Inc.** Today!
248-446-3001 Fax 248-446-1927
service@batteryrecycling.com
www.batteryrecycling.com



Yasui Seiki Co.,(USA)

Lab Services: Electrode Coating, Patch Coating, Tape casting, Fuel Cell Coatings, Adhesion Primer Coating, all from 1 micron to 200+ microns thickness. Locations in Indiana-USA, Kanagawa-Japan and Nagasaki-Japan.

Custom Equipment: Slurry preparation, Coating/Casting Machines, Lamination, Calendering, and Slitting equipment. Highest quality production is with our technology and machines.

See Website Tel 812.331.0700 ♦ Fax 812.331.2800
www.yasui.com ♦ coating@yasui.com

A Powerful New Generation of Potentiostats

Higher Voltage and Current

Fast, Sensitive, Stable... All This, and Exceptional Power, too!

Features:

- EIS max frequency: 7 MHz
- Reference voltage: +/-48 V
- Measurement potential resolution: 750 nV
- Current ranges: 1 A to 10 pA f.s.
- Current resolution: fA
- Floating mode
- Analog filtering
- Full stability control

SP-300

NEW

*Reference Control
+/-48 Volts*

*Current Ranges
1 A to 10 pA f.s.*

Designed by Electrochemists... for Electrochemists

Outside USA: Bio-Logic SAS • Tel: +33 476 98 68 31 • Web: www.bio-logic.info

USA Customers:

BioLogic USA

Science Instruments
Phone: 865.769.3800
Web: www.bio-logic.us

Tools Available to Help Warehouse, Battery Room Managers Save Money in Weak Economy

Harold Vanasse, Vice President of Sales and Marketing
Philadelphia Scientific

The economy's historic weakness is prompting every level of corporate management to do more with less. Most companies have postponed planned and in many cases, much needed, equipment replacements. In this environment, proper maintenance and proven cost-saving technologies are vital as equipment is stretched to its limits. This is no less true in battery room management.

A variety of tools are available to warehouse and battery room managers, enabling them to extend the lives of their batteries, ensure the highest possible level of performance, increase worker productivity and improve warehouse safety and compliance with OSHA regulations.

Watering Batteries Still Done the Old-Fashioned Way

Watering batteries, an essential battery maintenance function for most companies with forklift fleets, is still done the old fashioned way by most American companies. An operator uses a watering gun or hose and waters each battery cell individually, setting the water level by eye. This process is extremely time consuming, typically taking 10 minutes or more to water each battery. With dozens of batteries in the average fleet, watering can waste hours of manual labor that could be more productively utilized.

In addition to being time consuming, there are many safety and environmental concerns related to manual watering. Human error can result in the over or under filling of batteries or the failure to water one or more cells. When a battery is over filled creating a boil over, the spilled battery acid creates a dangerous condition for employees. Hazardous waste clean-up is costly, too, requiring the added expense of repairing corroded battery trays, racks and floors. Overfilling shortens battery life, typically decreasing a battery's capacity by 3 percent to 5 percent. Over time, boil overs can decrease the life of a battery by six months or more.

Reduced capacity also can occur if a battery is under filled. With manual watering, it's very easy for the operator to accidentally skip a cell or to misjudge the water level. If this occurs even once, the battery will not return to its previous performance-reducing run-time and shortening the life span of the battery.

Benefits of Single-Point Battery Watering

Single-point battery watering systems, the earliest versions of which were available 90 years ago, are a simple, cost effective solution to the problems caused by manual watering. Instead of having to individually fill the battery cells, each cell is outfitted with its own watering valve, with all valves connected to a single piece of tubing. Operators simply attach a water supply hose to a quick-connect fitting on the tubing, release the water into the tube and each cell is filled simultaneously.

Rather than the 10 or more minutes it takes to water a battery manually, single-point systems complete the job in 15 to 20 seconds, approximately 30 to 40 times faster than manual watering. Depending on the number of batteries in a plant, thousands of employee hours can be saved every year in unnecessary battery maintenance and upkeep, resulting in significant labor savings.

Single-point watering systems eliminate the possibility of human error because the watering system is almost completely automated. When the cell is full, a sensing device, either a traditional float-type device or a more advanced water injector with a level-sensing valve, shuts off the water flow, so the fear of electrolyte spillage and the accompanying environmental concerns is removed.

Warehouses and distribution centers using single-point watering systems avoid cell damage caused by under or over watering, keeping batteries functioning longer and reducing the need for replacement batteries. The potential savings in battery replacement costs can total tens of thousands of dollars each year for large operations. Most battery users find that the labor savings alone achieved through the use of a single-point watering system will pay for the system in 12 months or less.

American companies are years behind their European counterparts when it comes to best battery maintenance practices. In Germany, for example, single-point watering systems are used on an estimated 70 percent of forklift batteries compared to about 30 percent in the US. Recently, however, American companies in a broad range of industries have discovered the benefits of single-point watering.

Before switching to a single-point watering system, the Hatfield, Pa. warehouse of Atlas Cold Storage (now VersaCold Logistics Services), one of North America's leading logistics providers, was watering batteries by hand.

"It was slow going," said maintenance supervisor Paul Worman. "It used to take us five minutes or more to fill each battery. With 76 batteries, filling 1,200 cells took most of a day."

Worman installed single-point battery watering systems from Philadelphia

Scientific, featuring Water Injectors that snap on to each battery cell and are connected to one another with corrosion-resistant plastic tubing with a water input fitting. Within 15 seconds, the battery is filled without any spillage. "It's hard to imagine going back to the old way of watering," Worman said.

Single-point watering systems also are safer than hand watering and can help warehouses and distribution centers meet OSHA standards for workplace safety. Dillard Plywood operates two plants in western Oregon in which a fleet of 18 to 20 forklift trucks transport plywood to various processing stations. According to lead electrician Rick Pruitt, "Over watering batteries caused electrolyte spills, and the acid was creating a hazardous condition for employees. It was eating away the wooden slats supporting the batteries in our battery room and spilling onto the concrete floor, too. Our single-point watering system has eliminated the problem of spilling."

Battery Organizing Systems

Battery room and warehouse managers can also more effectively manage their battery usage and the useful life of their forklift batteries by organizing and sequencing the use of their batteries.

When forklift truck drivers enter a battery room to get replacement batteries, they usually take the nearest available battery. That means the batteries nearest the entrance get used more than those at the far end of the room. Sometimes the ones at the far end don't get used at all.

There are several battery organizing systems on the market that can eliminate the uncertainty of battery selection. For example, the iBOS (intelligent battery organizing system) from Philadelphia Scientific works by determining which fully charged battery is next in line for use by the truck driver. The system's electronic monitors collect charger data and send it to a central controller, which then sends a message to a scrolling LED display informing the forklift driver which battery to take. If the driver misunderstands or ignores the display's instruction and selects the wrong battery, a loudspeaker points out the error.

While battery organizing systems can range dramatically in complexity and cost, most will pay for themselves within two years, and do so in two ways. First, using batteries in proper rotation enables managers to maximize battery run time and battery life. Without an organizing system, batteries seldom realize their full run time and battery life potential. Secondly, battery organizing systems improve corporate asset management by diagnosing problems. Many organizing systems collect a large amount of data from the chargers, and some are designed to reduce the data to a compact executive summary report. Such a capability is valuable for leasing companies, companies with multiple sites, companies operating during peak seasonal periods or for any medium to large facility with a hectic schedule.

William Morrison Supermarkets, a large supermarket chain in the United Kingdom, operates a frozen food distribution center outside Manchester in which about 100 lift trucks operate. A few years ago, the distribution center began experiencing problems with shortened battery life but was unable to pinpoint the problem. A number of remedies were tried, but none worked. Realizing that the under-charged batteries were costing time and money, the battery supplier, Chloride Motive Power, recommended the installation of an iBOS.

After installation, iBOS reports highlighted the key problem: some of the chargers were not functioning properly, halting their charging process when batteries were only at about 50 percent capacity. Between the improved battery maintenance, improved driver productivity and battery purchase avoidance, managers at the facility estimated a total savings of \$432,000.

Easy-to-Implement, Cost-Effective ROI

Battery maintenance has not typically been viewed as a key strategy in improving efficiency in the past. But today's arsenal of battery maintenance tools can save warehouse and distribution operations tens of thousands of dollars - even hundreds of thousands - per year. Better battery maintenance may be one of the simplest and most cost-effective strategies a manager can implement to demonstrate an impressive ROI.



Contact Philadelphia Scientific at www.phlsci.com.



SBS®

STORAGE BATTERY SYSTEMS, INC.

Providing Power Solutions™ Since 1915



**INNOVATIVE TECHNOLOGY FOR EMERGENCY
POWER / BATTERY DIAGNOSIS & MONITORING.
EXCLUSIVELY FROM SBS.**



SBS-IBEX Battery Diagnostic Tester

SBS-IBEX Tests:

- Internal Resistance (mΩ)
- Conductance (Seimens)
- Voltage (V)
- Internal Temperature (°C)

Exmons Multi User Battery Management Software



The SBS-IBEX is a cutting edge digital battery diagnostic tester that meets all IEEE Standards. Recommended for all stationary applications such as telecom back up power, utility switching power, uninterruptable power systems (UPS) and more! The SBS-IBEX is the only diagnostic tester to provide accurate test results utilizing the world's first ripple-removing algorithm (KR PAT No. 0494489) within 4 seconds or less while the system is on-line. Comes complete with the worlds best battery management software (Exmons)!



SBS-2500 Digital Hydrometer

Test Specific Gravity of Lead-Acid & Ni-Cad Batteries

- Measure Specific Gravity & Temperature
- Accuracy (to 99.999%)
- Data Storage & Downloading Capabilities
- Speed (5x faster conventional methods)
- Merge Data w/ SBS-IBEX Results In Custom Excel Spread Sheet

SAVE TIME & MONEY.

SBS GIVES YOU THE EDGE.

SBS provides the fastest delivery times, typically less than a week, from our multi-million dollar inventory of Batteries, Chargers, Racks, Spill Containment Systems, Enclosures, Testing Equipment & More. Combined with the highest quality products and superior customer service SBS gives you the edge.

Visit us at www.sbsbattery.com

1-800-554-2243

Call Monday - Friday, 8am-5pm CST

Diagnose A Problem Before It Begins



starting at **\$2,495**
at



3554 Battery HiTester

- 60 Volt Range
- Auto-hold & Auto-Data Storage
- Enhanced resistance against UPS noise
- Store up to 4800 sets of data
- USB PC Interface
- Data management PC software



3197

Power Quality Analyzer

Measures:

- Power & Power Factor
- Active/Reactive Energy
- Demand kWh
- Load Changes (graph display)
- Transient voltage/Inrush current



3453

Digital MΩ HiTester

Efficient Insulation Measurement

- 125 V/40 M, 250 V/2000 M, 500 V/2000 M, 1000 V/4000 M
- Backlit Digital Display
- Built-in memory
- Auto discharge



3454-11

Digital MΩ HiTester

Insulation Resistance Tester

- 250 V DC/500 V DC/1000 V DC
- Comparator function
- AC Voltage up to 750V
- Built-in safety cover
- Auto discharge



3455-01

High Voltage HiTester

5KV Compact Performance

- Test Voltage 250V to 5kV
- Measure insulation of high voltage equipment up to 5T Ω
- Auto Calculate & Display PI and DAR
- Data Storage & USB Interface

Producing High Quality Products For 75 Years

HIOKI

6 CORPORATE DRIVE • CRANBURY, NJ
PHONE: 609.409-9109
FAX: 609.409-9108

www.hiokiusa.com



ISO 14001

FOR A

CLEAN

ENVIRONMENT

"we're doing our part"