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First customer in the world of a 2005 Escape Hybrid SUV is San Diego environmentalist Bill Hammons with Ford's Mary Ann Wright. The car never needs to be plugged in and has a range of 500 miles. > story

AROUND THE INDUSTRY

Saft Powers Amazonas in GEO

Hispasat's Amazonas satellite is the second communications spacecraft launched in the world equipped with a lithium-ion battery. Manufactured by EADS Astrium, the satellite is based on the new Eurostar E3000 platform, with Saft's rechargeable Li-ion battery cells.

The Amazonas battery is made of Saft's Li-ion VES 140 cells and modules which are manufactured at Saft's Bordeaux, France, industrial plant. The battery modules are designed, integrated, and tested at Saft's Pontiers, France, facility. The overall battery design, assembly, integration, and testing are performed by EADS Astrium's facility in Toulouse, France.

Amazonas delivers 9.5kW, appropriate for the specific needs of satellite communication across the entire region. Saft's Li-ion technology led to a 30%

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Advanced Battery Technology

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reduction of the overall battery weight compared to its nickel-hydrogen technology predecessors. The satellite flies 22,000 miles above the Earth in its designated orbital slot. By reducing battery weight and space, Hispasat was able to add more revenue-generating services to the payload.

Amazonas will provide enterprise links, Internet service, and television broadcast. The satellite is designed to provide at least 15 years of coverage and revenue generation. Like other GEO satellites, Amazonas uses its batteries only when the Earth hides it from the Sun during the equinoxes around September 21 and March 21. The rest of the time, it relies on solar panels. A GEO satellite uses its batteries over a 22-day period on each side of the equinox.

EaglePicher Acquires Kokam Engineering

EaglePicher Inc. of Phoenix, Arizona, has acquired a controlling interest in Kokam Engineering Co. Ltd. of Seoul, South Korea. The transaction is expected to close in December. In addition, EaglePicher has signed an exclusive agreement to license Kokam's advanced rechargeable lithium-ion battery technology for government applications worldwide. EaglePicher will sell Kokam products globally outside of North Asia for industrial, commercial, and selected defense applications. Kokam will distribute selected EaglePicher-branded products in North Asia.

Kokam's technology results in flexible form factors and exceptionally high rate capability compared to other lithium-ion technology. Initial uses for this technology include electric and hybrid electric vehicles, motive, remote power, uninterruptible power supplies, radio-controlled devices, and external medical applications. EaglePicher will also apply this technology to defense applications.

Kokam has 175 employees and two battery manufacturing operations in Korea.

California to Allow Hybrids in Carpool Lanes

California Governor Arnold Schwarzenegger signed California Assembly Bill (AB) 2628 in late September to encourage the purchase of hybrid cars, cut greenhouse gas emissions and boost the state's energy independence.

The bill, introduced by Assemblywoman Fran Pavley (D-Agoura Hills) allows hybrids that get more than 45mpg and meet tough emissions restrictions to use high-occupancy vehicle lanes. The bill requires federal approval for it to go into effect because federal funds are used in the construction of HOV lanes.

Circuit City Offers N-Charge Power System in Stores

Circuit City Stores Inc. will roll out the Valence Technology Inc. second-generation N-Charge™ Power System in all of its locations. The N-Charge is a rechargeable universal battery solution that provides five hours of additional notebook run time.

"Our engagement with Circuit City significantly extends the reach of our N-Charge product and represents an important milestone in expanding our customer base for this product family," said Valence Chairman and CEO Stephan Godevais. "We are excited to be working with Circuit City – one of the largest consumer electronics retailers in the country and a company that continues to find innovative ways to add value for its customers."

Middle East Battery Company Sales Increase 50%

The Dammam-based Middle East Battery Co. (MEBCO) had a 50% increase in sales of its locally produced, maintenance-free car batteries, as compared to the same period last year (Q2 2003). Actual sales exceeded forecasts by 14%.

The company has produced more than 5.5 million batteries since it was established as the Middle East's first maintenance-free battery production facility. ACDelco batteries are specifically engineered to suit the harsh conditions of the region's climate, produced in the region for the region, using state-of-the art quality processes and the best materials to ensure a long life.

"The ACDelco maintenance-free battery offers a much longer life than the average car battery sold in the Middle East market because it has the lowest self-discharge, water loss, and failure rates," said Glenn Heller, regional sales and marketing manager for Aftersales, GM.

Valence Obtains NEBS Battery Certification

Valence Technology Inc.'s K-Charge™ Power System has achieved the Network Equipment Building System (NEBS) level 3 certification required by major telecommunications carriers to ensure that products meet carrier class standards for safety, reliability, and compatibility with their present equipment.

"At twice the performance and two thirds the weight of comparable lead-acid systems, the K-Charge Power System offers a compelling value proposition by dramatically reducing the overall cost of ownership and maintenance requirements for telecommunications and utility customers," said Stephan Godevais, chairman and CEO of Valence.

Administered by Telecordia Technologies, NEBS comprises an extensive range of rigorous tests, including GR-63-CORE and GR-1089-CORE standards, evaluating and measuring environmental, safety, and quality standards of telecommunications equipment regarding product functionalities.



ZAP Outlines New Zibo Enterprises Energy Division

ZAP has taken an equity position in Zibo Enterprises Co. Ltd. (China), a manufacturer of advanced battery technology. In September, ZAP unveiled its ZAP Portable Energy™, a lithium-ion battery system developed in conjunction with Zibo Enterprises.

The ZAP Portable Energy is designed to extend the running time for low-powered electronic devices such as cell phones, digital cameras, and hand-held computers. ZAP and Zibo are discussing future products related to the development of advanced batteries designed for larger formats.

Ultralife Announces Resignation of Joseph Barrella

Ultralife Batteries Inc. announces that Joseph N. Barrella, senior vice president of new business development, has resigned to pursue other business opportunities, effective immediately. Barrella was one of the founders of the company and served on Ultralife's board of directors until June of this year.

"As a pioneer in the development and commercialization of lithium batteries, Joe made numerous contributions to the evolution of Ultralife into the profitable, power source solutions company that it is today," said John D. Kavazanjian, president and chief executive officer.

Patrick R. Hanna, Jr., vice president of corporate business strategy, will assume Barrella's former responsibilities .

Ener1 Names Greatbatch to Advisory Committee

Ener1, Inc. has named Mr. Wilson Greatbatch to the company's independent advisory committee. Greatbatch invented the first successful implantable cardiac pacemaker and the lithium battery technology that is considered today's international standard for pacemakers and implantable cardioverter defibrillators.

"It is a true honor to have one of America's greatest inventors and entrepreneurs join our company as a strategic advisor," said Kevin Fitzgerald, chairman and chief executive officer of Ener1.

Ener1 is pursuing product opportunities for its high-rate lithium batteries in the medical device market, such as pacemakers and defibrillators. The market is estimated at more than \$5 billion dollars, with the defibrillator share growing at an estimated 15 to 25% annually. Ener1 believes its lithium battery technologies are well suited for cardiac devices that require safe, highly reliable, long- life power sources with fast charge capabilities. In addition to medical, other markets for the company's lithium batteries include power tools, industrial equipment, military and automotive.

Greatbatch has more than 300 U.S. and International patents to his credit. He currently serves as chief executive officer of Greatbatch Enterprises Corp., a research and development company that he founded to design and develop components and devices for the medical device industry, as well as electrical energy for future generations. He has received awards from the National Academy of Engineering, Massachusetts Institute of Technology (MIT) (Lifetime Achievement Award) and many other prestigious institutions.

Ford Helps Heal the Bay

Ford Motor Co. donated a 2005 Escape Hybrid to Heal the Bay, the Santa Monica-based environmental group dedicated to improving water quality along California's coastline. Customers Klaus and Jami Heidegger placed the winning bid for the vehicle at Heal the Bay's auction this past June. The auction raised \$40,000 at the group's annual charity event.

"The new 2005 Ford Escape Hybrid is the industry's first no-compromise, full-hybrid SUV and the cleanest, most fuel efficient SUV on the road," says Mary Ann Wright, director of sustainable mobility technologies and hybrid programs and Escape Hybrid's chief engineer.

The Escape earned the highest fuel economy numbers for an SUV as certified by the U.S. Environmental Protection Agency. The front-wheel-drive model achieves 36 mpg city and 31 mpg highway.

Heal the Bay, founded in 1985, is dedicated to making Santa Monica Bay and Southern California coastal waters safe and healthy again. The organization focuses on education, outreach, research and advocacy through programs like Coastal Cleanup Day and the Santa Monica Pier Aquarium.

For more information, visit www.healthebay.org

Lithion Batteries on a Mars Mission

Lithium-ion batteries onboard the Mars Explorer Rovers (MERs) were built by Lithion Inc. of Pawcatuck, Connecticut, a provider of high energy density batteries for aerospace and marine applications, and a division of Yardney Technical Products Inc.

The primary objectives for the MERs were to explore the surface of the planet for at least 90 Martian days. The Spirit Rover has survived 181 days past its "90-day warranty" and Opportunity has survived 161 days past its' similar warranty. After almost nine months of successful operations, NASA officials have decided to fund the project through March 2005.

The two 28V, 8Ah Li-ion batteries are used to provide power to the MER during the Martian night, and to provide peak power to the MER during the day when several scientific instruments are being used. The Li-ion batteries have

maintained peak performance, and the mission planners have optimized the charging/discharging cycles to allow the vehicles to continue to roam the planet. Lithion's power/energy margin estimates were revised well past the 60-plus days initially projected for margin.

"We are very pleased with the performance of our batteries. We knew the constraints on this mission were subject to the severe weather we would encounter once we moved out of the summer months," says Lithion Vice President and General Manager Vince Yevoli. "With the ingenuity of the NASA mission planners, we've been able to get a good charge on the battery. That's all they need to get us through the winter. My bet is we'll still be there in the spring!"

Solicore Receives UL Approval of Flexicon Batteries

Solicore Inc. of Lakeland, Florida, a leading provider of ultra-thin, flexible, lithium-polymer batteries, has been awarded Underwriter's Laboratory (UL) approval for its Flexion lithium-polymer batteries.

"Underwriter's Laboratory is a very well-recognized and trusted approval agency for the entire electronics industry," said Solicore Executive Vice President of Technology and Manufacturing Wade Guindy. "By having UL approval, our customers will immediately know that our Flexion batteries are extremely safe and well-suited for their applications."

The agency approvals involve a range of stringent safety testing, including battery crush tests, nail penetration tests, and other safety-related abuse tests.

Enova Introduces Hybrid Drive Systems

Enova Systems of Torrance, California has a new hybrid drive systems for heavy-duty, urban transit, and delivery vehicles from Class 5 through Class 7, as well as mid-sized to large urban transit buses.

Ideally suited for heavy duty urban delivery and urban transit applications, these systems include a high torque electric drive system, all electric accessories, energy management, energy storage, and power generation. They can also be configured to generate alternating current electricity for other applications such as plug-in power tools.

Enova's new diesel generator delivers 60kW of continuous power and integrates seamlessly with Enova's 120kW and 240kW drive systems and its other digital power management components. The generator is powered by a 2.5 liter Euro-3 turbo diesel and power generation is controlled by the on-board energy management system. The driver has the option of turning off the generator when silent operation is preferred. In an urban transit or urban delivery cycle, the systems are expected to deliver 40 to 60% in fuel savings, reduced brake maintenance costs, and significant reduction in nitrous oxide (NOx), carbon

monoxide (CO), and other particulate matter emissions when compared with conventional internal combustion diesel powered vehicles in a similar environment.

“As both U.S. and international governments and communities continue to mandate alternative energy solutions for these significant consumers of fossil fuels, demand for our hybrid systems will continue to accelerate,” commented Ed Riddell, President and CEO of Enova.

ITC Rejects Determination of Alkaline Batteries

The U.S. International Trade Commission (ITC) issued notice of its decision to terminate the investigation as to whether the importation into, and sale in the United States of, certain zero-mercury-added alkaline batteries infringed on Energizer Holdings Inc.'s Patent 5,464,709. The Commission rejected the initial determination of the administrative law judge in favor of Energizer, and determined that Energizer's claims were invalid for indefiniteness.

Gayle Stratmann, Energizer vice president and general counsel said, “We are disappointed with the Commission's ruling. We will wait to review the Commission's opinion when it is issued, and determine at that point our strategy for appealing the ruling.”

UQM Receives Contract From Denver RTD

UQM Technologies Incorporated has received a contract from the Denver Regional Transportation District for one 35kW UQM® generator and two power electronic motor controllers to control the operation of the electric propulsion motors currently installed in a 45 foot hybrid electric mall shuttle bus. Denver RTD introduced its hybrid electric fleet of MallRide shuttles in 2000, the first large-scale deployment of hybrid electric buses for transit use in the United States.

A total of 36 MallRide shuttles operate on the 16th Street Mall in downtown Denver, providing a free ride for passengers across the 1.3-mile-long mall connecting Denver Union Station and RTD Civic Center Station for express and regional RTD services.

The hybrid electric MallRide shuttle buses are powered by a compressed natural gas fueled 2.5 liter Ford industrial engine that operates at 2,200 r.p.m. to generate electricity to recharge the bank of batteries that power the shuttle. Regenerative braking is also used to recharge the battery pack. Each 45 foot MallRide shuttle bus can transport up to 116 passengers and features a low floor design (14 inches above street level) that makes it easier for passengers to step on and off the bus.

“We are pleased that Denver RTD is evaluating UQM® generators and motor controllers for use in their hybrid electric Mall Ride shuttle fleet. Our equipment

is well-suited for this demanding application,” said William G. Rankin, President of UQM Technologies, Inc.

Denver Regional Transportation District is a public agency created in 1969 to operate a public transportation system serving the seven-county greater Denver metropolitan area.

ELECTRIC VEHICLES

World’s First Hybrid SUV Delivered to Customer

Bill Hammons made history when he picked up his new Escape Hybrid SUV from Pearson Ford in San Diego, California, on September 15. As the first Escape Hybrid customer in the world, Hammons ushers in a new era in vehicle ownership for the environmentally minded consumer.

Hammons, an avid environmentalist, is president of the San Diego Electric Vehicle Association. For over 30 years, he has been heavily involved with energy conservation and recycling and often participates in environmental events in his community. He previously owned two Ford battery electric vehicles that required charging overnight and had a limited range. The Escape Hybrid never needs to be plugged in and has a potential range of more than 500 miles in stop-and-go driving.

“The new 2005 Ford Escape Hybrid is the industry’s first no-compromise, full-hybrid SUV and raises the bar in technological innovation,” says Mary Ann Wright, Ford’s director of sustainable mobility technologies and hybrid programs and Escape Hybrid’s chief engineer, who delivered the vehicle to Hammons.

The Ford Escape Hybrid is the cleanest and most fuel efficient SUV on the road, featuring the product strengths that have made Ford Escape one of the nation’s best-selling small SUVs. The Escape Hybrid has a full-hybrid system that enables it to run on its gasoline engine, electric battery power, or both together. Its responsive steering and handling and available four-wheel drive deliver a driving experience unlike any other hybrid vehicle available, says Ford. It has earned the highest fuel economy numbers for an SUV as certified by the U.S. Environmental Protection Agency – the front-wheel-drive model achieves 36 mpg city and 31 mpg highway.

FAW Chooses Enova for Hybrid Drive Systems

China’s First Auto Works (FAW), a major bus manufacturer in Asia and Europe, has signed a two-phase development agreement with Enova Systems of Torrance, California, for hybrid-electric motors and power controllers for its newest hybrid buses.

Enova is working with both FAW and Southwest Research Institute (SwRI) of Texas to integrate and validate the new Enova parallel hybrid drive system for these buses. In the first phase, Enova's Panther™ 90kW drive system will be customized to FAW's specification and evaluated for performance in three FAW buses. During the second phase, anticipated to start in early 2005, Enova will enhance its parallel hybrid motor and controller for FAW buses for increased production. These buses are anticipated to be used to shuttle athletes and guests at the 2008 Beijing Summer Olympics and the 2010 World's Expo in Shanghai. China is seeking up to 1,000 full-size hybrid-electric buses to support these global events.

Dr. Li Jun, chief engineer of FAW Research and Development Center, commented, "After analyzing many hybrid-electric drive systems for FAW, we chose Enova based on their hybrid technology performance and recommendations from SwRI."

Southwest Research Institute has extensive experience in the design, development, and evaluation of vehicle systems and hardware. Enova has worked with SwRI on various hybrid drive technologies.

Enova's heavy-duty drive systems are in use in the U.S., the United Kingdom, Japan, Italy and other countries. The Panther™ 90kW, 120kW, and 240kW drive systems power buses, trucks, tractors and other industrial vehicles in pure electric, series-hybrid, parallel hybrid, and fuel-cell hybrid configurations.

PRODUCT NEWS

Cobasys NiMHax® Battery Pack Solutions

Cobasys NiMH-based NiMHax® battery packs for all transportation applications range from 144V and 30kW for light duty automotive applications to 672V and 280kW for large commercial applications (trucks and buses). The NiMHax standard pack solutions are plug-and-play units which include battery management systems (BMS), thermal management, hardware, software, packaging and all components necessary to integrate these packs into hybrid vehicle applications.

The NiMHax packs are designed to be liquid cooled which offers packaging and thermal management advantages over air cooling. Liquid cooling also allows the packs to be mounted in many different locations inside or outside the vehicle since large air ducting is not needed to provide battery cooling. The compact size and low weight of the NiMHax packs offer tremendous power, capacity, packaging, size, weight, and life advantages over traditional lead acid packs.

Cobasys designs and manufactures advanced NiMH battery system solutions for transportation, including hybrid electric vehicles, electric vehicles, and 42V applications in addition to stationary backup power supply systems for large

UPS systems, telecommunications, and distributed generation requirements. Cobasys is a joint venture between ChevronTexaco (CVX) and Energy Conversion Devices, Inc.

For more information, contact Ray Wagner, vice president of marketing, phone: (248) 637-7404, www.cobasys.com.

AMERSORB Separator with +80% Porosity

AMER-SIL S.A has a high performance polymeric separator called AMERSORB, well adapted to both gel and AGM VRLA batteries (application PCT N EP03/5002). Due to its very high pore volume and optimized pore size distribution, the ribbed and corrugated AMERSORB patterns lead to very low acid displacement and electrical resistance, as well as an efficient and controlled oxygen transfer rate.

Contrary to current AGM materials (100% glass or loaded with organic fibres or silica), the flat AMERSORB membrane can avoid drainage and stratification of the liquid electrolyte in AGM batteries, due to the very high capilarity resulting from its specific pore size distribution. The material keeps its initial thickness (available from 0.6mm to 4.5mm, without glassmat) after filling and during the whole battery life in order to maintain the initial compression of each cell, thus limiting contact loss and softening of the positive active mass.

Contact: AMER-SIL S.A., GD Luxembourg, c/o Dr. V. Toniazzo, email: amer-sil@amer-sil.com, www.amer-sil.com

NEC Organic-Radical Battery

The *Nikkei Weekly* reports that Japanese electronics manufacturer NEC has developed a battery for consumer electronics that can be recharged in 30 seconds.

The battery delivers up to 80 hours of playback time on a MiniDisc player with one 30-second charge, making it similar in power to the nickel-hydrogen cells widely used in digital cameras and portable consumer goods.

NEC believes that its 'organic radical battery' can be used as an uninterrupted power supply for computers. The battery can also discharge in a short time, making it useful in applications requiring a large amount of power.

ZIRCAR Compositized 1800C Thermal Insulation

ZIRCAR Ceramics Inc.'s Alumina Insulation Type AL-28/1800. AL-28/1800 was developed using a new process wherein precisely controlled raw materials are pyrotechnically treated, resulting in a compositized

fiber/binder microstructure. This produces a strong, stable product for OEM furnace builders and other producers of ultra-high temperature thermal process systems.



AL-28/1800 exhibits a bulk density of 0.44g/cc (28pcf) with a composition of 80% Al₂O₃, 20% SiO₂. At 1800°C AL-28/1800 exhibits 3% linear shrinkage and a 1700°C sag resistance of 0.2%. Its MOR is 1.82MPa (264psi) with a compressive strength of 1.38MPa (199psi).

AL-28/1800 is now produced in a variety of standard flat boards in sizes up to 18" x 24" x 2". It is easily fabricated into custom insulation components and is readily cemented into "butcher block" furnace roofs.

For more information, visit www.zircarceramics.com.



Precision-Expanded Materials for Fuel Cells and Batteries

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Compiled by Eddie T. Seo Littleton, CO, USA seoeddie@gmail.com

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