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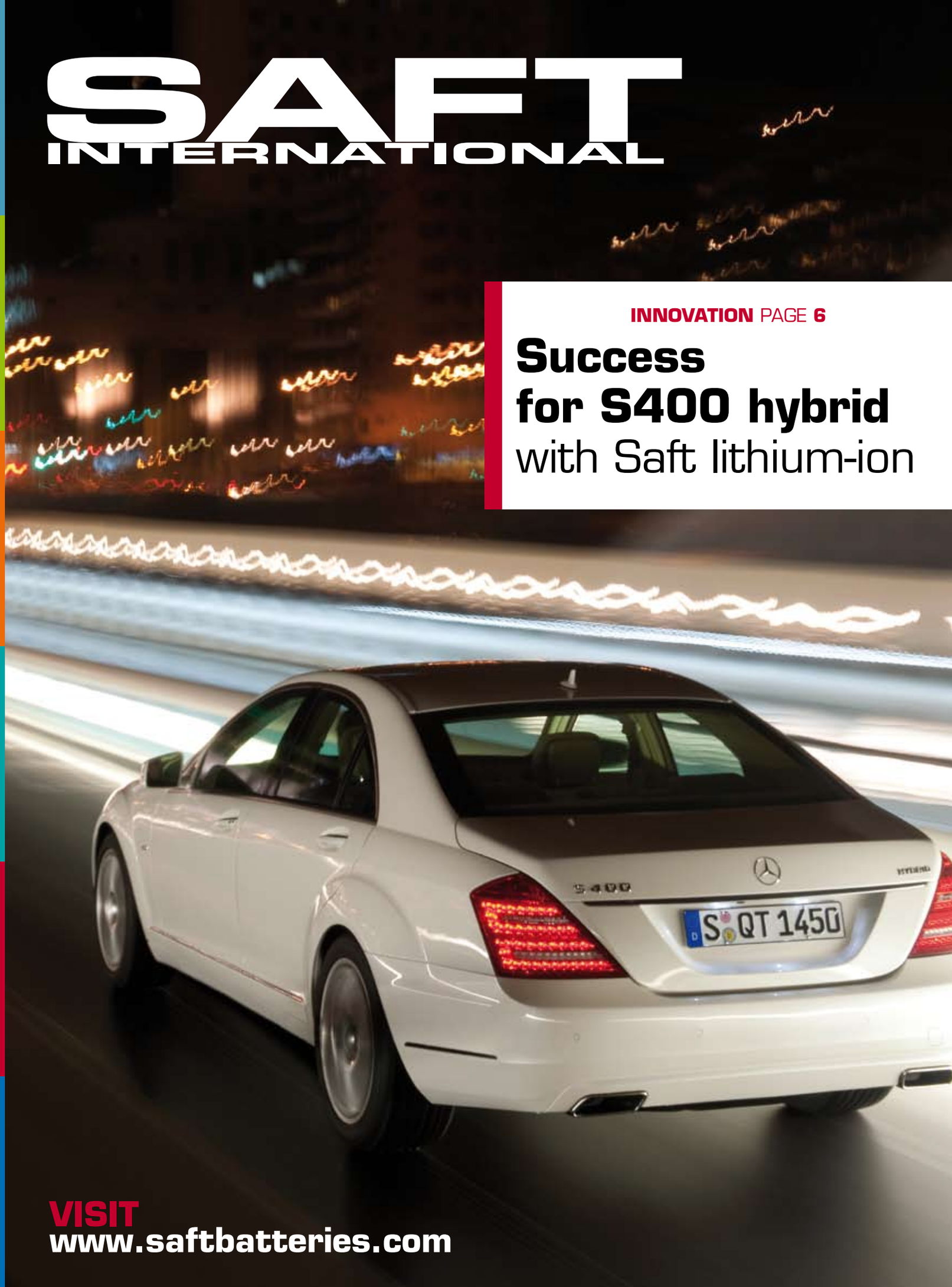

INNOVATION PAGE **6**

Success for S400 hybrid with Saft lithium-ion

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Building for the future

Saft experienced a more difficult year in 2009 as did many industrial companies. I am however satisfied with our performance which shows our Group's resilience, due to our diverse product range, geographical reach and strong market position.

During difficult times we continue to improve our competitiveness in order to meet our customers' needs.

We also continue to invest in R&D, which is the key to our future development and I therefore anticipate an increase of around 10% in R&D headcount in 2010.

With help from the United States Department of Energy, Saft has decided to make major investments in two new production sites there: a Saft plant for large format lithium-ion batteries for some new markets developing there - renewable energy storage, telecom network support, aviation and hybrid military vehicles - in Jacksonville, Florida; and a Johnson Controls-Saft plant in Holland, Michigan, as we build Li-ion capacity for the electric and hybrid vehicle markets.

So, in 2009 we have put into place the key building blocks to deliver our strategy for clean vehicles and renewable energy storage, which will change the dimension of our company from 2012 onwards.

Our strengths have seen us through 2009 and we are better positioned than ever before to provide our customers with the advanced technologies they need now and in the future.

John Searle
Chairman of the Management Board
Saft Groupe

IN THIS ISSUE

Saft International – A magazine for Saft's customers and business partners. **Editor-in-chief:** Jill Ledger. **Managing Editor:** Catherine Jouatel. **Texts:** Graham Lord. **Graphic design:** D Parquet and ML Lanceau. **Photo credits** ©: Daimler AG - Sandia National Laboratories - ©2009 ESA - CNES - ARIANESPACE / Photo Optique Video CSG / P BAUDON - AEG MIS - Cardiac Sciences Corporation - Alternative Energies - Ford - Neil Pulling - Schneider Electric - iStockphotos/Diane White Rosier - ROSEN Swiss AG - GIFAS : Photo standAero-PME_Falcon - Lockheed Martin - Agence Alexis - PRI productions/Saft

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INNOVATION

Li-ion battery storage and new-generation interactive PV electronics for tomorrow's smart grids

Saft is working with photovoltaic systems specialist Apollo Solar on the U.S. Department of Energy's 'Solar Energy Grid Integration Systems' (SEGIS) project to develop even smarter smart-grid equipment and boost the efficiency of 'time-shifting' energy storage.

The aim of the SEGIS programme, funded by America's DOE and managed by Sandia National Laboratories, is to develop high-performance products such as inverters that will allow photovoltaics to become a more integral part of household and commercial smart-energy systems. The programme covers everything from micro and residential applications to utility-scale equipment.

Saft is working in collaboration with Apollo Solar, a Connecticut-based company specializing in the design and manufacture of power electronics for solar energy systems. Apollo Solar has been selected by the DOE to design and develop a cheaper and more efficient smart grid inverter that will enhance the value of solar electric systems for home and business users. Saft is providing a state-of-the-art Li-ion battery system for energy storage.

A battery for time-shifting

The role of the 48V battery system, which will be sized at around 10 kWh, will be to provide the storage capability that enables the solar energy to be effectively 'time shifted', making it available for home consumption during periods of peak demand or for injection into the grid when needed either for supply support or to generate the most economic value for the utility.

And the added value for householders? With the increasing deployment of smart metering, a shift to time-of-use (or real-time) electricity rates is likely. Residential energy storage allows PV power output to be shifted to coincide with the peak period with the highest rates, while also providing improved power quality and secure supply for the rising number of digital devices in the home.

"The SEGIS programme aims to maximise the value of distributed solar electric generation, offer greater control of electricity consumption and its cost and to anticipate the emergence of future smart grids", says John Pfeifer, President and CEO of Apollo Solar. "The inclusion of Li-ion energy storage and its capability for time-shifting was therefore a key success factor in our project proposal."

Li-ion: electrochemistry of the future

Why Saft? The two companies first worked together 15 years ago, "and they're giving us wonderful technical cooperation on this project – the battery has to be the right match for the inverter", adds John Pfeifer. "DOE and Sandia set SEGIS up as a collaborative programme and they're both happy we're working with Saft too".

And why Li-ion? "Li-ion is the battery of choice for the future and we are demonstrating enabling technology for the future of the smart grid. This isn't an application where size and weight count so much; what we need is reliability and safety, and low cost per kWh of storage".

Even smarter smart grids

Saft will soon be delivering a prototype battery and the Apollo Solar R&D team will use it to fine-tune the system electronics. The inverter design will eliminate the transformer, resulting in improved efficiency, higher reliability and lower cost. "The system will also feature two-way interactive communication. This means the utility can direct the flow of energy more efficiently, on a demand-response basis, and also regulate the voltage and frequency of the AC line", explains John Pfeifer. "Solar is free energy. The only problem is that the sun doesn't shine at night. The system we are putting together solves that problem!"

The prototype system is expected to be delivered in May and the partners are well positioned to progress to the next phase of SEGIS, which will focus on the field demonstration, deployment and commercialisation of the products being developed.

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Time-shifting: supply stability and value creation

Saft is already demonstrating the time-shifting approach in Sol-ion, a Franco-German project dedicated to the development of a new concept in energy conversion and storage for grid connected photovoltaic (PV) systems in Europe.

INNOVATION

Mercedes-Benz S400 HYBRID: world's first production series hybrid car to use Li-ion technology

The first production series hybrid automobile to be equipped with Li-ion batteries, the Mercedes-Benz S400 HYBRID, is on the roads in Europe, the U.S. and Asia. **The luxury vehicle, using batteries developed together with Johnson Controls-Saft, is a huge success with motorists.**

Sales of the new Li-ion hybrid, which went on the market in June 2009, have been much higher than Daimler expected. "The S400 HYBRID is environment-friendly and cost-effective at the same time," says Dr. Christian Mohrdieck, Director Fuel Cell & Battery Drive Development at Daimler AG, "and that is very appealing to motorists. We have demonstrated that even a large luxury car can be green". The S400 HYBRID got excellent press and several awards for the car and the battery technology, including the prestigious "Yellow Angel" award from the German Automobile Club. Today, a significant share of overall Mercedes-Benz S-Class orders are for the hybrid S400.

A new fuel economy benchmark

The S400 HYBRID is equipped with a 3.5-litre V6 petrol engine and a hybrid module with a 15 kW electric motor. The compact hybrid module combines the functions of an automatic start-stop system, a boost function and energy recuperation. The internal combustion engine and the hybrid module develop a combined output of 299 hp and a combined maximum torque of 284 lb-ft (385 Nm). The electric motor contributes 20 hp and 118 lb-ft (160 Nm) to the power-train. The S400's combined fuel consumption of 29 miles per gallon sets a new world benchmark in this vehicle segment.

An exemplary development project

"Several years ago Saft began working with Daimler to assess the different technologies available for hybrids. When the decision was made to use Li-ion batteries instead of Ni-MH, the newly-formed Johnson Controls-Saft joint venture worked closely with Daimler on a detailed industrial project for the S400 HYBRID," says Franck Cecchi, Chief Operating Officer at Johnson Controls-Saft. "Once a production agreement was reached, Johnson Controls-Saft built a dedicated €15-million factory (the first ever devoted to Li-ion batteries for automotive applications) in Nersac, France, which began series production in April 2009". Mercedes-Benz S400 HYBRID cars were on the roads in Europe by June 2009 and soon in showrooms in the U.S. and then Asia.

"Before long, demand for the S400 HYBRID was so strong that Daimler asked us to increase battery production," adds Franck Cecchi. "We had to reorganise production at the Nersac plant and invest in new equipment so as to add capacity to the line."

Saft and Li-ion, the obvious choice

When Daimler decided to launch a hybrid, the German car-maker had no hesitation in turning to Saft. "We had worked with them for many years and were confident in their technological expertise. We also had good personal relationships with our counterparts at Saft; it's important to know you're dealing with competent and reliable people," says Dr. Mohrdieck. And when Saft formed a joint venture with Johnson Controls to develop Li-ion technology for automotive applications Daimler was delighted. "It was just what we required: Saft's battery technology plus the automotive-supply competency of Johnson Controls. When we ran our battery cell selection process, theirs were among the best in terms of performance - power, lifetime, safety and of course cost."

Why choose Li-ion? The key criterion was power density: a Li-ion battery is significantly smaller and lighter for the same performance than a Ni-MH battery. "With Ni-MH we would never have been able to get such a powerful battery into the space allotted. Then there was the 'killer' criterion: Ni-MH wouldn't have been able to meet our cold-start requirements. The S400 HYBRID needs 4-5 kW of power at -25°C, even at the end of the battery's lifetime (10 years or more). Ni-MH electrochemistry cannot deliver this," explains Dr. Mohrdieck.

Looking to the future

As the first series-production hybrid car in the world to be equipped with Li-ion technology, the S400 HYBRID is a major milestone on the road towards emission-free mobility. And Daimler is continuing down that road: the company plans to launch additional hybrid models in other Mercedes-Benz classes.

Johnson Controls-Saft will be continuing too. "Li-ion is the battery technology of the future and has a very bright future in automotive applications," concludes Franck Cecchi. "Indeed, during the first half of 2010 our Nersac plant will begin series production of the same type of Li-ion battery for the forthcoming BMW 7 Series hybrid as well."

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Win-win partnership

The resounding success of this breakthrough Li-ion hybrid vehicle is mainly due to close partnership. "There was very intensive technical cooperation right from the start. Johnson Controls-Saft engineers, and managers too, were very attentive to our needs. They came to Germany very regularly, and my development team was always welcome at Nersac, as were Daimler production engineers. We learnt a great deal about battery technology and we contributed production know-how, such as quality management; automotive quality requirements are very special. Together we have developed a win-win partnership. I would like to thank all people involved at Johnson Controls-Saft for their continuing huge efforts to make this project a joint success," says Dr. Christian Mohrdieck.

TECHNOLOGIES

EADS Astrium chooses Saft technology for future Ariane 5 ECA launchers

Under a multi-million dollar contract with EADS Astrium, Saft's specialised in-flight battery systems will power key elements of the Ariane 5 ECA launch vehicle for its next 35 missions through to 2015.

This latest order builds on the success of the 2005 contract, under which Saft has already developed, manufactured and supplied batteries for 30 Ariane 5 launchers. The new order also consolidates Saft's position as market leader in the launcher battery sector.

Two battery technologies

"This major contract with Astrium confirms Saft as a trusted supplier to Europe's Ariane programme. The key factors in this success are the total reliability demonstrated by our batteries throughout the long-term development programme, combined with our ability to offer a variety of technologies to meet the specific needs of each launcher application", says Philippe Jehanno, General Manager of Saft's Space and Defence Division.

Saft will provide a total of 17 battery systems in all stages of each launcher, to power key elements including: main cryogenic stage (EPC), boosters (EAP) and Vehicle Equipment Bay (VEB). The systems will involve both AgOZn primary batteries and rechargeable Ni-Cd batteries

Synergy for success

Another of Saft's assets in successfully completing major projects like Ariane is the ability to work as a very closely integrated team, with technical and commercial staff as well as management all in one place. "This is vital because all our space business is customized solutions for specific requirements", says Space & Defence Key Account Manager David Masgrangeas. "Often these are development projects, where the customer will have to change the technical specifications several times and ask us to modify our solutions. Obviously the contractual terms have to change as well, and preferably in close to real time. That means close communication, so Saft engineers and sales staff usually go and see the customer together".

The Ariane 5 ECA batteries will be designed and manufactured at Saft plants in Poitiers, France, with the first delivery scheduled for June 2010 and the last about six years later.

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Saft Li-ion technology: five years in orbit

The first Saft Li-ion batteries were lifted into orbit five years ago and today installed energy capacity aboard GEO satellites powered by Saft Li-ion exceeds 500 kWh.

Saft has just celebrated the fifth anniversary in orbit of its Li-ion technology. Satellite power supply using Li-ion was a technological revolution that began in March 2004 with the launch of Eutelsat W3A, built by EADS Astrium, the world's first commercial GEO satellite to rely on Li-ion technology

This paved the way for the rapid uptake of Li-ion technology by the satellite industry, leveraging an innovation that enabled a reduction in mass and ensured greater reliability. In just five years the installed energy aboard GEO satellites with Saft Li-ion batteries has exceeded the 500 kWh Mark.

INNOVATION

Ni-Cd storage batteries keep solar-powered information displays running year-round for Germany's railways

Saft is supplying specialized Sunica.plus Ni-Cd storage batteries for self-contained solar-powered information displays being installed at **railway stations across Germany by Ulm-based AEG Gesellschaft für moderne Informationssysteme mbH (AEG MIS).**

The AEG MIS information points, or steles, use state-of-the-art cholesteric liquid crystal display (ChLCD) technology, which requires no power to display information. The photovoltaic-generated (PV) power is only needed to update the display, and updates can be sent by SMS.

"ChLCDs are reflective display systems, made visible by reflection of the incident ambient light. Information is readable under nearly all light conditions, with no need for backlighting", explains Alexander Stumpp, project manager in charge of development of the PV product line at AEG MIS. "This is the first time ChLCD technology has been used in this application".

Solar panel + storage battery

The new steles are initially being installed at some railway stations in Germany (Sachsen-Anhalt), mostly unmanned sites, to provide up-to-date train information to passengers through the built-in display and/or via an intercom connection to a central control centre. The self-contained information displays can be installed in locations without mains power. The solar panel and 12V rechargeable battery ensure that the system can keep running for up to two weeks without sun.

Public transport operators know that their customers have two priorities: transport that runs on time, and real-time information when it doesn't. "The next stage will be to equip bus stops too", says Alexander Stumpp. "There's a big future for solar-powered displays like these. In addition to their environmental advantage, stand-alone steles are usually cheaper than running electric power cables out to the desired location". As well as transport information, the steles are suitable for urban information boards, traffic guidance systems, tourist information signs, etc.

Beating the cold with Ni-Cd

When AEG MIS first developed their innovative displays they tested them with lead-acid batteries but they encountered a significant performance fall-off in the cold months. So they looked at Ni-Cd technology, which is more reliable in cold weather. "At a PV seminar I met an engineer from a German research institute who was using Saft batteries and recommended them. Saft engineers took a close look at our application and explained the battery options very clearly", says Alexander Stumpp. "We selected their Sunica.plus technology for its superior performance over lead-acid, especially across the wide temperature ranges experienced around Germany and central Europe generally" he continues. "We were impressed by Saft's knowledge and experience of PV applications, which has proved invaluable." Saft is supplying a 12 V battery comprising 10 Sunica.plus 45 cells, with a nominal capacity of 45 Ah.

Sunica.plus for renewable energy applications

Saft Sunica.plus Ni-Cd batteries are designed specifically for renewable energy applications. Their key feature is excellent chargeability that enables highly efficient operation under fluctuating charging conditions. They also offer good cycling capability to withstand daily and seasonal cycling at variable depths of discharge and state of charge,

An additional benefit of the Sunica.plus design is that it provides absolute reliability and the capability to function in extreme temperatures (from -50°C to +70°C) while ensuring continuous operation at any state of charge.

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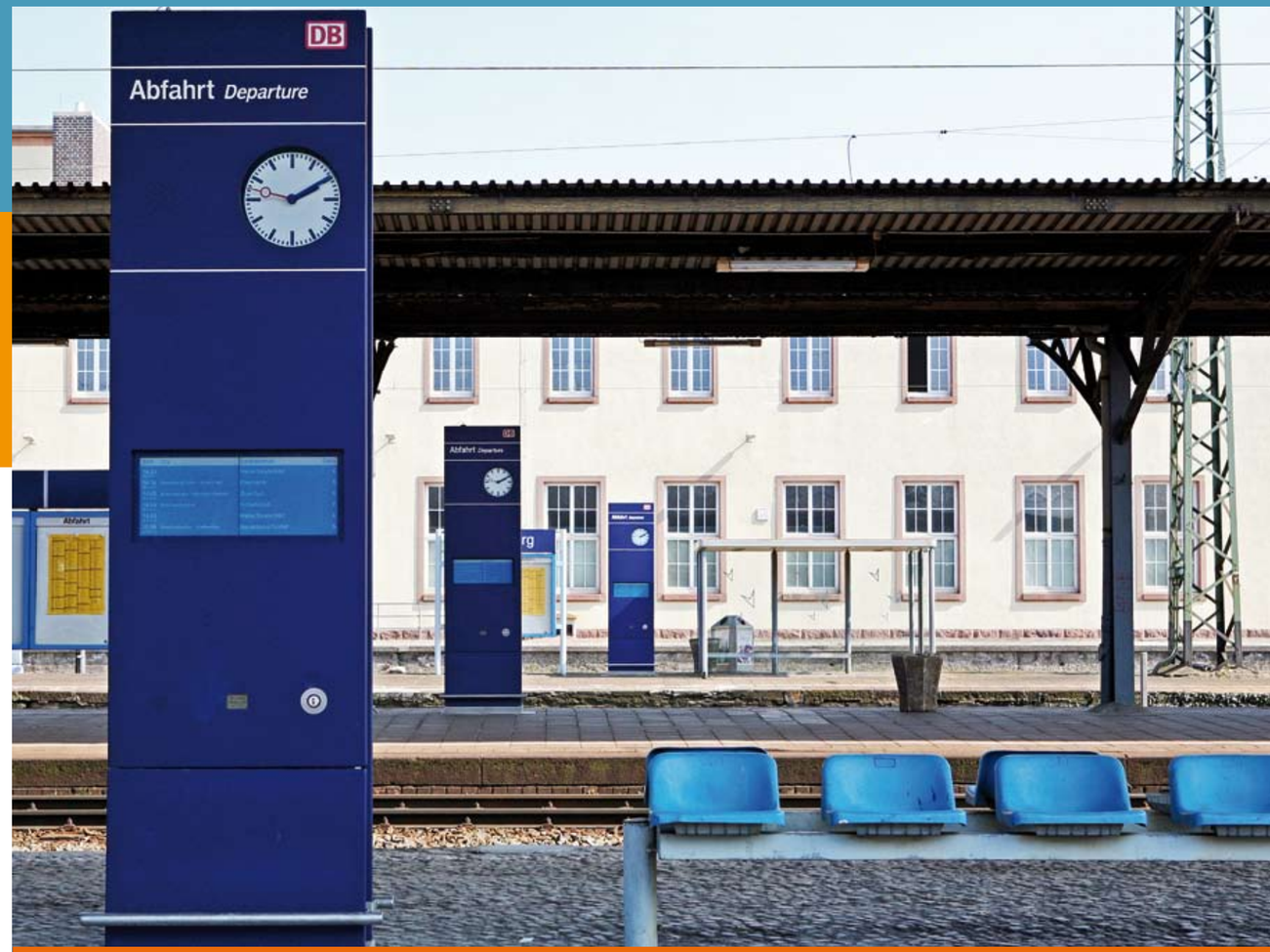

SME Innovation Prize

AEG MIS produces LCD information systems as well as the associated software, exporting to Europe and soon the Middle East.

The company's flagship is its Geavision range for indoor and outdoor applications on stationary and mobile supports and using a variety of technologies (transmissive, reflective, transflective and TFT flat screen). One of the firm's recent initiatives is its "Green Systems" – a new generation of energy-saving (and thus environment-friendly) PV-backed information displays, with screens from 16" to 32"", that need no power to display data. It is the only company in Europe producing PV-powered displays of this size. In 2008, AEG MIS won an Initiative Mittelstand (SME) Innovation Prize for its Magic Sun Display ChLCD stele. Since 2009, the Magic Sun, too, has been equipped with Saft batteries.

MARKETS

Automated external heart defibrillators rely on primary lithium technology to save lives

For more than ten years now, Saft has been providing turnkey Li-SO_2 batteries for Cardiac Science's Powerheart® automated external defibrillators (AEDs). **In an application where fast response is critical, equipment and battery reliability is a real lifesaver.**

You can't help noticing AEDs. They're being installed everywhere: in schools and universities, railway stations and airports, shopping malls, corporate offices, public buildings and even on ships and planes.

Defibrillation therapy is designed to restore normal heart rhythm to victims of sudden cardiac arrest, via electric shocks. Originally intended for use by doctors and trained first responders, portable defibrillators were initially used in ambulances. Today's automated units, which perform a diagnosis and apply appropriate treatment, are designed for use by a layperson with minimal training; they are carried in fire and police vehicles, and are deployed in a multitude of public locations.

Long-term relationship

Cardiac Science, through its predecessor companies, was founded in 1913 and was a pioneer in ECG technology. The company developed the first fully automated bedside defibrillator. It is a world leader in diagnostic and therapeutic cardiology products and services (AEDs, ECG devices, stress-testing systems, and heart monitors) and exports to countries worldwide.

Saft has been working with Cardiac Science since the mid-1990s, providing batteries for three generations of Powerheart AEDs, using the same LO 26 SHX cells but with different battery architecture. "We originally chose Saft for their reputation, but we still tested their cells extensively before we signed up," says Cardiac Science Principal Electrical Engineer David Wright. "We haven't been disappointed."

Military-qualified technology

Saft's LO 26 SHX cell meets the U.S. military's shock, vibration, extreme temperature, and environmental requirements. In addition to their use in AEDs, the cells are used for radio communications and other military applications (sonobuoys and missiles) as well as in beacons and emergency location transmitters.

Turnkey solution

Saft initially provided primary lithium Li-SO_2 4-cell packs which Cardiac Science then assembled into complete batteries. As Cardiac Science became more confident in their partner's expertise and technology they asked Saft to provide turnkey battery packs (integrating Cardiac Science electronics) that simply plug into the AED. Subsequently, Saft was asked to provide a 6-cell pack to give some Powerheart models greater longevity. "By eliminating the assembly of battery packs in our facility we were able to reduce costs and focus on other value-adding activities," says David Wright. "We have looked at alternatives but Saft's Li-SO_2 solution, with its long shelf life and high pulse capability, is still the best solution."

The latest Powerheart G3 AEDs feature one-button operation and easy-to-follow voice commands that guide users through the rescue process. Patented RescueReady® technology ensures that the AED will be ready when needed to save a cardiac arrest victim. The AED conducts daily self-testing for the presence and functionality of the device's pre-connected defibrillation electrodes, and self-contained battery system and hardware components further ensure reliability. Saft is now qualifying a 4-cell pack in a smaller casing with improved connections.

Customer-supplier synergy

Over the years Cardiac Science and Saft have forged a close partnership, particularly at the engineering level, and this has resulted in a number of changes to improve reliability and safety. An example of this is a special interconnect board for the 4-cell pack to replace exposed wiring, making the pack simpler, safer, and easier to manufacture as well. A board for the 6-cell pack is now being tested.

Because of the ultra-high quality specifications, Cardiac Science has requested that the AED batteries be manufactured on a dedicated line, walled off in a corner of Saft's Valdese plant. Saft is happy to oblige: "AEDs are a life-critical application and we respect our customer's desire to be 100 percent sure of the batteries they are using," says Process Engineer Kiyandi Newberry.

Cardiac Science is pleased with this unusual arrangement. "We still audit the manufacturing operations for QA, especially when Saft changes the line or process in any way, but we have little to worry about," says David Wright. "I've been very impressed on my visits to Valdese. The people working on our batteries are very dedicated. They clearly take a special pride in manufacturing something that helps save lives."

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Evolution

Initially, defibrillation (first demonstrated in 1899) was performed open-chest in operating theatres. By the early 1950s, non-invasive therapy was being performed via electrodes applied to the chest. Then came a major breakthrough in the 1960s, with smaller battery-powered units carried in ambulances. Today's automated external defibrillators analyze the heart rhythm by themselves, diagnosing the shockable rhythms and charging to treat. No clinical skills are required, enabling bystanders to respond effectively to emergencies.

EVOLVING PLANET

Environment-friendly electro-solar "sea buses" help extend urban transport networks

Cities worldwide are enhancing urban transport and fostering sustainable development by switching to clean, quiet electric vehicles. **France's port-city of La Rochelle has now launched a new "sea-bus" service with two ferries powered by Saft Ni-Cd batteries.**

Since May 2009, the zero-emission electric passenger boats, designed and built by local firm Alternatives Energies, have been an integral part of La Rochelle's urban transport system, providing a shuttle service connecting the Old Port with the Les Minimes boat harbour to seaward.

The two new 18-tonne catamarans, "Copernic" and "Galilée" are powered by Saft Ni-Cd batteries with solar-panel back-up, coupled with an EVE Systems onboard energy-management system. They have an operating speed of 6 knots (about 10 km/h) and enough power to reach 9.5 knots, allowing them to cope with the sea conditions (current and waves) at Les Minimes. The boats have a range of 100 km between charges and can carry up to 75 passengers. The e-ferries, which were inaugurated in May in the presence of their "godfather", explorer and global-warming activist Jean-Louis Etienne and godmother, eco-yachtswoman Catherine Chabaud, operate year-round, with 15 round-trips a day in the summer season.

Alternatives Energies develops and produces passenger boats powered by batteries and solar panels, designing the vessels and subcontracting construction under their coordination/supervision. The firm, a leading European player, built France's first electric public-transport boats, which shuttle across La Rochelle's Old Port.

Cleaner, more comfortable, cheaper to operate

The two new electric ferries replaced diesel-powered boats. Clean and entirely without pollution, the electric boats also represent real progress in passenger comfort as they greatly reduce noise and vibrations. Passengers also appreciate the absence of diesel exhaust. The catamaran hulls were also specially designed to reduce energy consumption, with the result that the energy cost is six times less than that of the previous diesel boats.

"This solution is very attractive compared to boats powered by internal combustion engines", says Alternatives Energies Vice President Philippe Pallu de la Barrière. "Electric boats help us to come a little closer to our target of zero greenhouse gas emissions in cities." The result: in their first two months of operation, the sea-buses carried 200,000 passengers, as many as the old diesel boat carried in a year!

Reliability and durability

The batteries supplied by Saft are made up of three systems: two at 480 V are dedicated to propulsion and one 24 V service battery powers the on-board electronics. The batteries are charged overnight; there is no need to recharge during daytime operation because the solar panels on the cabin roof provide up to 20% of the power needed.

"We are very pleased that we chose Saft as partner. Their Ni-Cd batteries achieve the best compromise between weight, power capacity, lifespan and recharge speed", says Philippe Pallu de la Barrière. They meet our rigorous demands in terms of durability, ease of operation and maintenance as well as reliability. Our customers are public transport operators who need to run services on time. We sell reliability to our customers, so we need reliability from our partners".

10 years of partnership and progress

Saft has worked with Alternatives Energies ever since the La Rochelle Old Port ferry was launched in 1998. "Those boats have to recharge rapidly between short crossings because they operate from 7am to 2am, at least in summer. So we needed batteries that could handle very tough cycling. Saft's STH batteries were exactly what we needed (and they've only been replaced once in 10 years) so we stuck with Saft", smiles Philippe Pallu de la Barrière. "Our next project, in 2007, involved two boats for a Paris Canal service. These travel further and have longer to recharge at night, so they needed batteries with more autonomy but a slower charge/discharge rate. Saft's solution here was STM batteries. They have performed very well in Paris so we used them in the Minimes sea-buses as well".

The last ten years have seen constant improvement in efficiency of all components: hull, motor, batteries and energy management. "This emerging segment has had a very good learning curve", concludes Philippe Pallu de la Barrière. "For example, our new sea buses consume 15% less energy than the Paris canal boats, for equivalent size and speed".

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"Like electric on-road vehicles, emission-free e-boats running on rechargeable batteries and solar energy instead of fossil fuels are a very positive way to reduce greenhouse gases and curb the global warming that is threatening the planet we all live on".

French explorer and environmental activist, Jean-Louis Etienne.

Pioneer electric city

La Rochelle has been a pioneer in electric mobility. The city already has electric cars and motor-scooters on self-service hire at seven stations in the city centre, deliveries in the central zone are usually carried out by electric transport, older municipal vehicles are steadily being replaced by electric units and La Rochelle is also experimenting with a tram. The aim of the municipal authorities is to make e-mobility an integral part of the transport matrix.

Next stop: Marseille

Alternatives Energies latest project (still with Saft) is a ferry service across the Old Port in Marseille, again replacing a diesel boat. The ferry, which went into service on 1 February 2010, travels more slowly (the port is crowded and it doesn't have far to go). The new boat (13m long, 4.7m wide, 83.5 kWh, 45 passengers, speed 4 knots) has electric motors at the bow and stern that can pivot 180° and a driving cabin at each end, so the boat doesn't need to turn around. "After that we hope to move upscale", says Philippe Pallu de la Barrière, "with a boat between 22m and 28m long carrying 120-160 passengers, probably in Paris or the port of Lorient."

E-transport with a big future

The advantages of electric boats (no pollution or odour, less vibration and noise, greater safety, low maintenance) mean they have a bright future.

Over the full lifetime, the cost/passenger/kilometre is the same as for an equivalent boat with internal combustion engine (ICE). This is a remarkable feature, as on the road, the cost for an e-bus is twice the cost of an ICE-powered bus.

E-boats have a big future in inland waterways, near-coastal zones and "aquatic" cities like Amsterdam and Venice. Of course they will only ever account for a small share of public transport, but their use could easily be boosted by government regulations, eco-subsidies and public awareness of the GHG issue.

So far electric ferries are more expensive to build but cheaper to run (fuel and maintenance). But battery leasing, such as the service offered by EDF Group subsidiary Sodetrel, can reduce capex and spread the cost over time. Also, new technologies are bound to reduce the capex gap and increase both speed and range. Where are the limits? "Today we can do 12 km/h for 100-140 km. To perform much better than this we may need completely new battery technology", explains Philippe Pallu de la Barrière.

EVOLVING PLANET

Li-ion batteries for Ford's Transit Connect electric van

Johnson Controls-Saft has now been chosen to supply Li-ion batteries for the Azure Dynamic Force Drive™ powering the Ford Transit Connect Battery Electric Vehicle (BEV).

This urban, zero-emission, light commercial van, officially unveiled at the Chicago Auto Show in February 2010, has a high-voltage electric motor powered by a Johnson Controls-Saft battery pack that is charged by plugging into a 120- or 240-volt socket.

Commercial vehicles, a growth segment

The Transit Connect BEV, due to be available to commercial fleets in late 2010, is the first of four electric vehicles Ford plans to build in its global commercial-vehicle programme between now and 2012. With increasing awareness of the dangers of global warming, electric commercial vehicles are likely to be a high-growth segment, along with private vehicles: commercial transport in an urban environment accounts for 12% of total miles driven yet is responsible for 25% of total greenhouse emissions.

In addition to its environmental advantages the Transit Connect BEV, which has a range of about 80 miles (128 km) between charges, will eliminate the uncertainties associated with petrol (gasoline) costs and help fleet owners to forecast more accurately their cost of doing business.

Project synergies

"We've worked with Johnson Controls-Saft on our Balance™ Hybrid Electric delivery and shuttle bus project and are confident that their batteries offer a light, powerful design with a longer life than most current battery technologies", says Azure Dynamics CEO Curt Huston. "Both Azure and Ford have existing relationships with Johnson Controls-Saft, bringing further synergies to the project".

The Transit Connect BEV will use the same battery technology as that currently installed in the Ford Escape test fleet of plug-in hybrid electric vehicles, also supplied by Johnson Controls-Saft. The battery systems – including electronics, electrical and mechanical components – will be assembled at the new Johnson Controls-Saft plant in Michigan, which should start producing in 2011.

The two partners have a combined investment of several million dollars in manufacturing and infrastructure development. "Johnson Controls and Saft are strongly committed to the commercialisation of hybrid and electric vehicles," says Ray Shemanski, who heads the joint venture. "We were very proud to be chosen for the BEV and look forward to strengthening our partnership with Azure and Ford to advance these leading-edge technologies."

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Truck of the Year

The BEV is the first electric model in Ford's popular Transit Connect series. In early 2010, at the North American International Auto Show, the standard (i.e. with internal-combustion engine) Transit Connect was voted "North American Truck of the Year" by a panel of 50 motoring journalists.

Johnson Controls-Saft to build a Li-ion EV and HEV battery plant in the U.S.

Johnson Controls-Saft will soon begin construction of its first American manufacturing plant dedicated to advanced Li-ion batteries for hybrid and electric vehicles.

The $200-million factory will be built in Michigan, America's 'automobile state'. Construction is expected to begin in the next few months and the plant should begin producing in 2011.

"This new plant will allow us to serve our global customers, and particularly the contracts we have with Ford and Azure Dynamics for vehicles due to be on the roads in 2010 and 2012," says Ray Shemanski. "It is a very strategic investment. We see increasing opportunities for our cutting-edge Li-ion technology as the clean vehicle market develops."

MARKETS

Ni-Cd, a reliable solution for a demanding light-rail application

A Saft MATRICS MRX battery system has completed a successful field trial in Karlsruhe, Germany, demonstrating the advantages of Ni-Cd technology over lead-acid batteries in tram-train applications.

The year-long trial, in service on the pioneering Karlsruher Verkehrsbetriebe tram-train network, clearly showed the reliability, performance, low-maintenance and life-cycle cost (LCC) advantages of Saft's specialised rechargeable Ni-Cd batteries in this demanding light-rail application.

With more and more cities (re)turning to trams in a bid to ease congestion and reduce urban pollution, tram-trains have a bright future. A tram-train is a public transport system whose vehicles are designed to run on an urban tramway network and suburban or inter-city railway tracks as well. Its advantages over separate systems are convenience (passengers travelling from outside a city need not change from train to tram) and efficiency (better use of existing infrastructures).

Dual-voltage systems

The city of Karlsruhe was the first in Europe to link its street tramway and the main-line railway by running trams on both networks. The main line remains open at all times to all types of train – including local trains, heavy freight and high-speed express trains – and can be used by tram-trains featuring dual equipment so that they can handle both voltages.

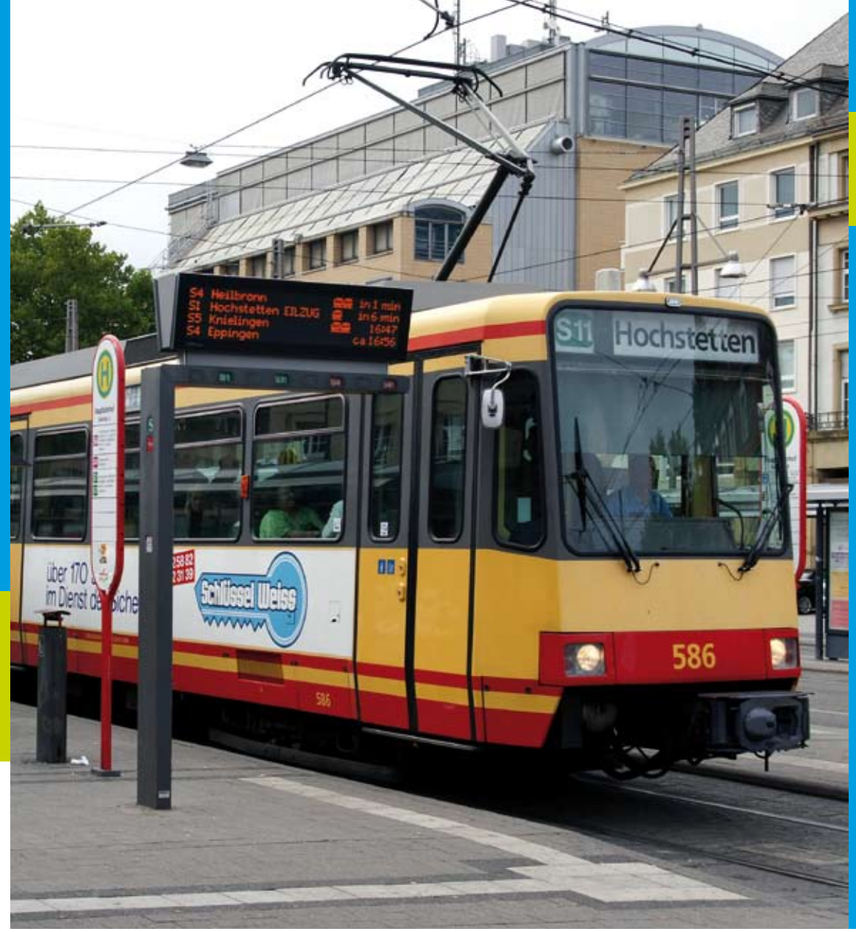
But… in order to change over from the 750 V DC power supply on the tram tracks to the 15 kV AC used by main-line trains the tram-train has to coast across a cut-off section of 50 to 250 metres where no external power is available. This means the onboard battery system (with a nominal voltage of 24 V) has to deliver a minimum of 20 V for a cut-off period of between 20 to 25 seconds to support all electrical loads: interior lights, door controls, external lights, train control systems and the converter-control system for the drives.

Battery challenges

The Karlsruhe tram-trains were fitted with lead-acid batteries that suffered from low power, poor reliability, frequent maintenance and unexpected service-life incidents. For example, the lead-acid battery's capacity was limited to 230 Ah by the need to fit in the under-floor battery box. This meant that if the tram-train stopped on the neutral section, available voltage could be insufficient to restart the converter, thus immobilizing the tram-train. In addition, lead-acid batteries cannot withstand deep discharges without irreversible capacity loss. There were cases where a tram-train was parked overnight on a main-line track where the external power was turned off for track maintenance but onboard loads (such as lights) were inadvertently left on. This results in irreversible capacity loss and reduces drastically the life of the battery. Lead-acid batteries' poor performance at low temperature causes problems in winter, and this technology is also prone to 'sudden death', resulting in unexpected service interruption.

An idea whose time has come...

Karlsruhe pioneered the tram-train concept in Europe. The Karlsruhe model, launched in September 1992, has since been adopted by Kassel and Saarbrücken (Germany) and the Hague (Netherlands). Other cities either planning, building or trialling this sytem include Chemnitz, (Germany), Sheffield and Huddersfield (UK), Alicante (Spain), Sassari (Italy), Paris and Mulhouse (France), Mendoza (Argentina) and Adelaide (Australia). Transport companies in the US (Texas and New Jersey) are also exploring the tram-train concept.



MRX batteries

Saft MATRICS MRX batteries have been purpose-designed to deliver maximum performance, reliability and low LCC in rail applications. They provide the low maintenance and long service life benefits of sintered/PBE technology within a slim, light-weight block battery package that shows a major size and volume advantage compared with conventional batteries.

The MATRICS MRX design is extremely reliable and resists extreme temperatures ranging from -50°C to +70°C

The MATRICS MRX also includes an integrated water filling system. This simple to use feature fills all the cells from one central point – without any moving parts - and substantially reduces the battery maintenance requirements by enabling cells to be topped-up quickly, safely and accurately, maximising the battery's useful life.

For public transport operators, service reliability is crucial. Breakdowns not only damage the reputation of the tram-train service but also incur extra costs for towing vehicles and replacing failed batteries in the field. So it is hardly surprising that operators like Karlsruher Verkehrsbetriebe look for better solutions.

The advantages of Ni-Cd

Ni-Cd batteries offer a number of advantages here: resistance to deep discharge; good performance at high and low temperatures; long predictable service-life (at least 15 years) with no risk of 'sudden death'; low maintenance costs. Based on the same discharge rate, Ni-Cd gives a higher capacity than lead-acid.

Saft worked with Karlsruher Verkehrsbetriebe to carry out a LCC analysis of the MATRIX MRX alternative. This showed that although the capital cost of Ni-Cd batteries was higher than lead-acid, when operation, maintenance and replacement costs over a 12-year period were considered Ni-Cd batteries would actually cost less overall.

But what about performance and reliability? Karlsruher Verkehrsbetriebe decided to do a field evaluation over all seasons of the year and asked Saft to provide a trial system: 19 MATRICS MRX200 batteries to fit within the existing box, with a nominal capacity of 200 Ah.

Successful field test

The result? Even though the Ni-Cd battery appears to have a lower capacity than the 230 Ah lead-acid battery it has replaced, in practice it delivered superior performance. Furthermore, the low- temperature performance of lead-acid batteries is significantly poorer than Ni-Cd, so the gap in performance was even greater in cold weather.

"Saft's Ni-Cd battery performed very well during the field test, with no problems or outages, which is more important than anything else, including cost, since fewer outages mean more passenger availability", says Rainer Supper, Karlsruher Verkehrsbetriebe's deputy workshop manager responsible for electrics. "We didn't need to touch the Saft battery for a whole year and it only needed topping up with three litres of water. And thanks to the centralised water-filling system, topping up only took 15 minutes. With our lead-acid batteries each cell has to be opened individually for refilling and this has to be done three times per year. With three major maintenance sessions during the year, at least an hour of time could be saved per tram-train".

The success of the first field test prompted Karlsruher Verkehrsbetriebe to order two further test batteries at the end of 2008, to confirm the evaluation results, and so far all three batteries are performing well. And in April 2009, the Saarbrucken tram-train system also began a similar evaluation.

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EXTREME POWER

Sunica.plus Ni-Cd storage batteries for solar energy rural electrification in Madagascar

Many people on Earth still have no access to grid electricity. **Saft and partner Schneider Electric, the global specialist in energy management, have set up a solar photovoltaic rural-electrification scheme in Madagascar providing clean, safe, renewable energy for 120 villagers.**

Saft's specialised Sunica.plus batteries store solar-generated electricity for night-time use by people living in the isolated village of Marovato on Madagascar's east coast. A small step towards achieving the UN's Millennium Development Goals, and there are more steps to come.

The photovoltaic (PV) power project is part of Schneider Electric's Energy Access programme – known as BipBop, for Business, Investment, People at the Bottom of the Pyramid – that aims to create a virtuous circle combining business, technical innovation and social responsibility.

The equipment at Marovato comprises an array of 24 BP Solar photovoltaic panels with an average output of 7 kWh, a Schneider Electric Xantrex charger/inverter and a 24 V battery storage system, comprising 18 Saft Sunica.plus 920 Ah cells. When power is required in the village (mainly in the evenings), it is provided by the batteries, which are recharged by the solar array during daylight hours. The charger/inverter channels the DC electric power from the panels to the batteries and then from the batteries to the village dwellings, converting it to AC in the process.

The new power plant, which has been operational since July 2009, provides Marovato's 120 villagers with electricity for around six hours per day as an alternative to the kerosene and hand-gathered wood traditionally used by villagers. It generates peak power of 1,400 W. In comparison, the village previously used only 490 W.

Stringent battery requirements

Why choose Sunica.plus? "Saft is a long-standing partner of Schneider Electric. They have worked with us on a variety of projects for more than 10 years", says BipBop project manager Thomas André. "Once again, they came up with the optimum solution to our needs. Stand-alone PV systems need batteries that meet stringent requirements regarding life-time, cycling, maintenance and harsh conditions." And if PV projects are to empower local people, the equipment has to be simple, robust and reliable.

Sunica.plus batteries are based on Saft's mature, proven pocket plate Ni-Cd technology. They are optimised for use in PV and wind energy applications where they perform beyond conventional limits. The robust Sunica.plus design ensures 20 years of reliable operation, even in the harshest conditions, with only minimal maintenance.

And the system is a huge success. "A couple of months after commissioning we sent an expert out to check the system and all components are working perfectly. There was only one problem", smiles Thomas André, "The villagers were so overjoyed to have access to power at last that they over-consumed at first. But it didn't take them long to realise the limits of PV systems". Spurred on by this success, Schneider Electric is already planning the next phase: a similar facility for a neighbouring and much larger village.

Millennium Development Goals

"After access to clean water, access to electricity is one of the top priorities for many people in developing economies," says Gilles Vermot Desroches, Senior Vice President, Sustainable Development at Schneider Electric. "Our BipBop programme brings together forward-thinking partners like Saft to create solutions that disadvantaged communities can take ownership of. By including not just efficient technologies, but also training, knowledge transfer and well-targeted funding, the programme provides a truly sustainable business model. I believe this project is the first step in what will be a very long and successful programme of providing the world's poor with safe, reliable, efficient, productive and green electricity."

Projects like Marovato are right in line with the UN's Millennium Development Goals. Rural electrification schemes meet several of these goals: health (fewer toxic fumes from oil lamps and candles, refrigeration for medicines), education (light to read by), women's autonomy (less time used in gathering biomass fuel) and economic development (more time to produce saleable handicrafts).

Devising a sustainable business model

"There's a huge need for this sort of solution, but future growth, as with most renewable energies, will depend on technology (higher efficiency and lower cost) and financing (development aid and government subsidies…)", explains Thomas André.

Schneider Electric's strategy here is to apply an industrial-project approach so as to reassure institutional and international investors (providing capex) that the projects are viable over the long term and to provide a business model for local firms likely to invest in the long-term operation of the facilities.

"This is where Saft's Sunica.plus batteries come in", concludes Thomas André. "They may cost a bit more but that is clearly offset by reliability and long service life, so Total Cost of Ownership (TCO) – or cost per kWh of the power produced if you like – is much more attractive. That's what sustainable development is all about!"

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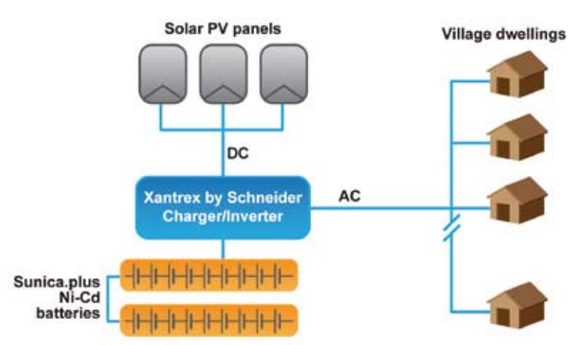

During daylight hours, the photovoltaic system charges the 18-cells SUN+ 920 battery that will power the village dwellings at night time.

TECHNOLOGIES

Cutting-edge pipeline inspection tools rely on long-life primary lithium

The ROSEN Group, a leading provider of pipeline inspection services, relies on Saft primary lithium battery solutions to power its sophisticated pipeline pigs, which sometimes have to work under extreme conditions. **After ten years of partnership, ROSEN has now asked Saft to power its latest dual-technology inspection tool.**

Any business that operates pipelines – oil, gas and chemicals companies for example – has to comply with increasingly stringent asset integrity regulations, often stemming from environmental concerns, and needs to quantify an ever-wider range of hazards. In addition, many pipelines are now more than 40 years old and accurate monitoring is increasingly important given the eco-consequences of rupture/leakage and the high costs of repair/replacement. The main method for monitoring pipelines, particularly those that are buried, is in-line inspection (ILI) using intelligent electronic pipeline pigs. They often have 'Saft inside'.

Asset integrity management

ROSEN is a world leader in ILI, providing services for both piggable and unpiggable (i.e. with sharp bends or differing diameters, for example) pipelines, tanks, coiled tubing and other facilities. These solutions are developed by the ROSEN Technology and Research Center (RTRC) in Lingen (Germany) and Stans (Switzerland) and marketed in more than 80 countries. Saft LSH20 primary lithium batteries are currently used in several ROSEN products.

"Saft has been providing batteries for ROSEN tools for the past ten years. We teamed up with Saft because of their reputation for expertise, and we are very happy with the way they've come up with solutions to meet the increasingly complex needs of this application", says Corporate Marketing Manager Wolfgang Krieg. "Our customers, which include all of the oil Majors, are satisfied with our products, including the batteries, so we are satisfied with Saft".

Quality, reliability and safety

Primary lithium gives ROSEN's ILI tools the energy and long life they need. "Battery cost is not the crucial factor for us. Our engineers' imperatives are quality, reliability and safety. This is a very competitive market segment and we need the best. If our pigs run out of power, our customer has to do the inspection run all over again", says Wolfgang Krieg.

With growing demand for energy, oil and gas companies are launching projects all the time and there is increasing demand for ILI. In addition, operators want tools that can perform two or more tasks in the same run and do it under increasingly extreme conditions. Deep-offshore projects, for example, involve crushing seabed pressures and oil or gas can come out of a well at 200°C.

Dual-technology tools

Among ROSEN's latest products is a new-generation dual-technology tool called RoCorr·MFL/UT. This device, powered by battery packs of between 20 and 40 Saft LSH20 cells (depending on inspection process complexity and pipeline length), combines two inspection technologies -- magnetic flux leakage (MFL) to detect corrosion and ultrasonic testing (UT) to detect metal loss, or wall thinning. "Depending on the customer's needs, our pigs can also be customized to use other technology combinations, thus performing several inspections (corrosion/metal loss, leak evaluation, crack detection, defect size and geometry, coating analysis, optical observation…) in one run", adds Wolfgang Krieg.

And the story continues… Saft has been working to qualify a Li-ion battery solution for use in a similar ROSEN product and in late 2009, engineers from both partners held a first round-table at Saft's Poitiers plant to iron out the details of the project.

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ROSEN ILI tools

Diameter:
from 3" to 60"

Length:
up to 5 m

Weight:
from 2 kg to 15 t

Speed:
optimum inspection 1 to 3 m/sec

Inspection distance:
up to 1,000 km

Li-ion for subsea production

Saft recently joined forces with a leading supplier of subsea oil and gas production equipment to demonstrate the advantages of electric technology (with Li-ion batteries) over conventional electro-hydraulic and ROV-operated well-control systems. Li-ion technology stores much more energy than traditional cells, within a compact lightweight package and with higher cycling capacity. The battery modules developed by Saft for the demonstration on a North Sea field comprise VL41M cells housed in a robust nitrogen-filled enclosure designed to withstand extreme water pressures. The modules are maintained on a float charge from the subsea Xmas tree's local 24 V DC supply and deliver up to 120 A for the high-torque motors that operate the control valves.

Intelligent pipeline pigs

Pipeline pigs are devices that are inserted into and travel the length of a pipeline (or between compressor stations) pushed along by the product flow. They were originally developed to remove deposits that could obstruct flow. Today pigs are used for a number of reasons throughout a pipeline's life: to batch or separate dissimilar products; to detect any pipe displacement; and for internal inspection.

In-line inspection provides information on the condition of the pipe and/or its contents. Usually the ILI tool gathers and stores data, which is retrieved and analyzed at the end of the inspection run. The most common data requirements are geometry/diameter measurement and corrosion/metal-loss, but intelligent pigs can perform a range of other troubleshooting tasks, such as curvature monitoring, pipeline profile, temperature/pressure recording, bend measurement, photographic inspection, crack detection, wax deposition measurement, leak detection, product sampling and mapping.

MARKETS

Saft celebrates the 100th anniversary of the Paris Air Show

In mid-2009 Saft marked the 100th anniversary of the Paris Air Show by signing new contracts and cementing its position as a leading supplier of battery systems for aviation and space applications.

Saft is world leader in aerospace batteries, supplying advanced-technology systems for all types of civil and military aircraft as well satellites and launchers. So the Paris Air Show is a 'must' for Saft. "About 15 of Saft's space customers were present along with 40 of our aviation customers. And Saft batteries were aboard nearly 60% of the aircraft doing flying displays and on static display", says CEO John Searle.

Two-thirds of the world's civil and military aircraft rely on Saft's specialized Ni-Cd aviation batteries for starting and back-up power and Saft is leading the technology revolution in Li-ion batteries for aviation as well. And as space-industry OEMs look for solutions with higher specific energy in smaller and lighter packages, Saft's advanced expertise, particularly in Li-ion technology, is in great demand for both satellites and launch vehicles.

New contracts

During the Air Show period Saft announced new aerospace business including:

- a contract to develop next-generation Li-ion technology for future NASA missions
- a partnership with Russia's space industry to develop and test a hybrid lithium battery system for new-generation light launchers
- an order for Ni-Cd and AgOZn battery systems for Europe's next 35 Ariane launch vehicles
- several new orders for Li-ion satellite batteries
- Saft's first contract to supply battery systems for a commercial jet aircraft designed and manufactured in China, the ARJ21 regional jet
- delivery of 28V and 270V Li-ion battery systems for the initial production phase of the F-35 Lightning II Joint Strike Fighter.

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F-35: first fighter aircraft to rely on Li-ion technology for mission-critical applications

Saft Li-ion batteries in 28 V and 270 V configurations have been chosen to power the F-35 Lightning II Joint Strike Fighter (JSF) through phases I, II and III of its Low Rate Initial Production (LRIP) programme.

This is the first time that a fighter aircraft has relied on Li-ion technology to support mission-critical roles. During early stages of development, Ni-Cd technology was chosen for the 28 V battery system, but the need to lighten the aircraft prompted a switch to Li-ion technology.

In 2002, during the System Design and Development (SDD) phase of the electrical power management system, Saft was awarded contracts for the 28 V batteries that provide start-up power for the APU as well as the 270 V batteries that provide back-up power to operate flight control surfaces.

The initial 28V battery was derived from the very successful F-22 Raptor programme, using Saft's Aircraft Maintenance Free Battery (AMFB) Ni-Cd technology. The AMFB battery carried the JSF programme successfully through the plane's first flight. At this stage it was decided to reduce the aircraft's weight so Saft proposed a very high power 28 V Li-ion battery, and this solution was used for the rest of the SDD phase, beginning in late 2004. The same technology is being used in the LRIP phases.

Satisfying changing specifications

"The F-35 project is an important breakthrough for Saft. It is the first time that a fighter aircraft has relied on Li-ion batteries in critical applications", says Bruce McRae, Saft North America Aviation Sales & Marketing Director. "The successful deployment of the Li-ion technology is also a good example of Saft's flexible approach that enables us to respond to a customer's changing requirements. When the weight issue arose, our expertise in multiple technologies allowed Saft to replace the Ni-Cd system by adapting our Li-ion technology to a new set of performance targets, and the programme schedule as well."

The SDD phase was completed in 2008 and Saft was awarded orders for the 28 V and 270 V Li-ion batteries for the LRIP I, II and III phases. Initial delivery began in 2009.

The F-35, which is being developed by an international consortium with Lockheed-Martin, Northrop Grumman and BAE Systems as major partners, made its maiden flight in December 2006.

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EVOLVING PLANET

Li-ion goes e-motor-racing on ice with Andros

Saft Li-ion batteries powered all eight cars in this winter's ground-breaking Andros Electric Trophy ice-racing event. Drivers report that e-vehicles are now very close to petrol-engined racers in performance. A real breakthrough for Li-ion technology

The winter of 2009-2010 saw the world's first competition for 100% electric concept cars, the Andros Electric Trophy, organised by the Max Mamers Organisation (2MO). "It was a great success," says former French rally champion and head of 2MO Max Mamers. "Li-ion technology gives the cars more power and energy for an equivalent weight".

Thrills and spills

The power, speed and endurance of the e-racers surprised both spectators and drivers. The challenge was to give the e-racers enough 'get up and go' to satisfy drivers and spectators avid for thrills and spills. Mission accomplished: "E-racing has come of age. We have shown that electric cars can be exciting as well as practical and ecological."

The Andros Trophy, run in French ski resorts for the past 21 years, is a motor-sports event for petrol-engined cars, buggies and bikes. Last year, two e-racers competed with some success against the conventional cars, so this winter Andros introduced races between full-electric vehicles.

The races were held over seven week-ends between 5 December and 30 January, in resorts such as Alpe d'Huez, Isola 2000 and SuperBesse. Drivers were experienced rally and circuit competitors, including a number of "ice girls". The cars, specially developed for the event, were mechanically identical and were rented out to sponsors and their drivers for the season.

Why electric racers? "Because electric propulsion is the most energy-efficient and also eco-friendly, which is important in our protected mountain environments. Because e-vehicles have a big future and because sports competition (whether motor-racing, America's Cup or even football…) almost always has technical spin-offs in everyday products. It's a good way to validate new technical solutions. We're doing our bit to help develop e-transport," adds Max Mamers.

Eco-friendly performance racing

2MO started working on the project about 5 years ago, looking at motors and torque and evaluating battery solutions, particularly Ni-MH, with Saft as partner. A year ago they raced two cars but they needed more energy. "Today's new-generation Andros cars are technically better than we thought possible. Saft has supplied us with Li-ion battery system that actually delivers more than we asked for." In mid-February 2MO organised a demonstration weekend for the press with five cars at Val Thorens. Between them they covered 500 km at racing speeds, at temperatures down to -15°C, without a single breakdown.

The Andros Car 03 Evo2

Each 800-kilo 2-wheel-drive car is powered by a 320 V 24 kWh lithium-ion battery in a 27-module pack (VL41M cells) including the electronic battery management system. The Siemens-built asynchronous electric motor delivers a maximum of 122 hp and a torque of 200 Nm at a constant 5,000 rpm. The overall electronic management was developed by Segula Technologies Matra and the eight vehicles were designed and built by French motor-racing specialist Exagon Engineering.

"Last year the cars could only do 7 or 8 laps of a 1-km track at full power. This year, with Li-ion batteries, they can do 37 laps between charges. Of course if you don't drive at full power the cars can go much further than that," adds Max Mamers. The cars can reach 100 km/h is less than 6 seconds (the batteries deliver full power during acceleration, permitting them to equal the skating performance of racing cars with thermal engines) and they race around the track at 160 km/h (100 mph).

Close teamwork

For Exagon Engineering, which designed and built the Andros e-racer, this success is due to technical cooperation. "We are delighted with Saft as a partner. Ice-racing is a particularly demanding discipline but Saft provided us with superb products and backed them up with total customer service," says General Manager Luc Marchetti.

For Exagon, the project posed three major challenges: safety, reliability and teamwork. Safety was crucial because of the huge amount of energy stored on board. "Saft was very aware of this and devised a customized emergency battery cut-off device as well as a special electro-magnetic field filter." As for reliability, "the extreme conditions of temperature and humidity under which the batteries had to perform meant that we needed top quality. Saft's cells were superb in that respect." And teamwork was vital because the project was working at the technological cutting edge. "Engineers from Saft's SDU in Bordeaux developed the batteries with us, advised us on integration, helped us test and adjust the battery in the car and provided support during multiple trials on the track at Magny Cours. They were totally available, nothing was too much trouble. They really love a challenge!"

Max Mamers, too, is very happy with the result "The Trophy will be continuing with the same car next year and we'll be racing at least 12 vehicles," he smiles.

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The drivers' verdict: "We were really amazed"

The Andros Electric Trophy was won by Nicolas Prost, son of former F1 champion Alain Prost. "I and the other drivers thought electric racers might be a bit tame but we were really amazed at how far electric-drive technology has come. These are real racing cars! Once you're at the wheel you forget you're not driving a petrol-engined machine. The Andros car is a terrific success. Of course that's hardly surprising because the project involved three top players: we had an Exagon racing chassis, a Siemens motor and Saft batteries. Furthermore, the project has been a 'sports laboratory' that will have spin-off for ordinary motorists: electric vehicles are going to play a big role, particularly in urban transport. And I'd love to drive an Andros around town!"

CREATING GROWTH

Saft starts building a Li-ion "factory of the future" in Florida

Construction is now under way in Jacksonville (Florida) for Saft's Li-ion 'factory of the future', a high-volume manufacturing plant that will produce advanced Li-ion cells and manufacture batteries for aviation applications, smart grid support, broadband backup power and storage for renewable energy systems.

On the picture, from left to right: David Howell, Team leader, Hybrid and Electric Systems Vehicle Technologies Program U.S. Department of Energy - Jerry Mallot, President Cornerstone regional development partnership and executive vice president Jacksonville regional chamber of commerce - Richard Clark: Jacksonville city council president - Peter Denoncourt, Saft program manager - John Searle, Saft CEO - Tom Alcide, Saft America CEO - Adele Griffin, Office of US senator Lemieux - Michelle Barth, Regional Director, Office of US senator Bill Nelson.

This will be Saft's first high-volume factory devoted to Li-ion batteries. The plant will employ state-of-the-art automated equipment and the latest techniques, such as laser welding, to be able to manufacture several million cells per year in seven sizes including large-format (VL30E to VL80E). "This will allow us to meet future demand from growing markets, particularly for broadband telecoms and renewable energy applications that often need substantial amounts of energy storage," says Programme Manager Peter Denoncourt.

The total estimated cost of the project is around $200 million but the outlay for Saft has been reduced thanks to a $95 million grant from the U.S. Department of Energy under the American Recovery and Reinvestment Act.

Construction of the 23,000-m2 plant, located in the Cecil Commerce Center industrial zone, began with a ground-breaking ceremony on 15 March attended by officials of the Department of Energy, State and Federal parliamentarians and the President of Jacksonville's City Council. Construction is now ongoing; the building should be ready for equipment installation in mid-November 2010 and Saft plans to start production in mid-2011.

"This new Jacksonville facility will accelerate the market for and reduce the costs of large format Li-ion batteries and it will enhance Saft's ability to rapidly supply competitive energy solutions to customers in both the U.S. and world markets," says Saft America CEO Thomas Alcide.

Top priorities: quality…

"As we will be producing high-tech products in high volume, quality control is top priority right from the design stage," emphasises Peter Denoncourt. "We have insisted on Quality Plans from the company building the plant as well as from our equipment suppliers."

The plant's workspace has to comply with very stringent cleanliness standards so that Saft can guarantee customers a low self-discharge rate. Manufacture of Li-ion cells also requires a carefully controlled 'dry environment' because lithium reacts strongly to moisture and this has a strong negative impact on battery quality.

… and the environment

Saft will be using environmentally conscientious practices and materials to make Jacksonville an energy-efficient facility. "As in all Saft plants, raw materials will be recycled wherever possible to reduce waste and careful attention will be paid to controlling emissions and discharge," adds the Programme Manager.

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