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SAFT
INTERNATIONAL

TECHNOLOGIES PAGE **6**

Battery solutions **for renewable energy systems**

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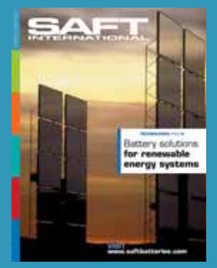
A bright future



Since the last edition of Saft International, Saft has experienced a period of strong growth during which there have been exciting successes and some challenges.

Our major challenge over the past year has been rapidly rising and volatile raw material prices, which the manufacturing industry in general and the battery industry in particular has been faced with. Such huge increases have required Saft to adjust prices and although this is never easy, I am pleased that our customers have generally understood the necessity of these actions and the impact that this has had on our company.

Saft's major competitive advantage remains our technological leadership, and this is maintained by a high level of R&D spend every year. The concrete results of this investment are the many new contracts we announce for innovative projects using new technologies.

Energy storage for renewable energy systems is one particular focus of these efforts, but the telecom networks, aviation and defence markets, to name but a few, will also benefit from innovative battery systems in the future.

Saft's joint venture Johnson Controls-Saft was only created in January 2006, but has already made some very important breakthroughs. The most significant is our announcement of the world's first series contracts for hybrid vehicles using lithium-ion batteries. These first contracts for new generation batteries are significant for the future of hybrid vehicles. The market potential is very large and Johnson Controls-Saft is now positioned as the leader in lithium-ion. The volume deployment of large lithium-ion batteries will also accelerate their availability for Saft's traditional applications.

Saft intends to maintain and reinforce our position as world leader in high technology batteries, in order to continue to support our customers' development

I wish you a happy and successful 2008.

John Searle
Chief Executive Officer 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** ©: Corbis UK Ltd / Jupiterimages. DR X, Saft. TENESOL - Total Energie. Independant Witness. Astrium. iStockphoto / Ravi Tahilramani. Thales Alenia Space. BAHRAT / P. Mathur. FMC Technologies. iStockphoto / Sean Locke. KTM Fahrrad GmbH. Hydrometer. Boeing. Statron. TELELIFT GmbH. Martin Adolfosson. By courtesy of StatoilHydro. Photo Icade. Courtesy of Flo Healthcare – all rights reserved. U.S Department of Defense. ALSTOM Transport / P.Sautelet. ALSTOM Transport / TOMA – C.Sasso. Lockheed Martin.

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STRATEGY

Saft's new plant in Zhuhai now supplying batteries to the fast-growing Chinese market.

In a move to get closer to OEMs and provide better customer service, Saft has made a major investment in a new production facility in Zhuhai, China. **Up and running since 2006, the plant mainly supplies primary lithium batteries for metering applications – Zhuhai is gaining market share in China and also helping to help meet demand in the rest of the world – and is delivering Ni-Cd railway batteries as well.**

Saft's new manufacturing plant, in the Zhuhai free-trade zone just over the border from Macau, (about 100 km or 60 miles south of Guangzhou, formerly Canton, and 50 km west of Hong Kong), operated by a wholly-owned subsidiary, Saft (Zhuhai Free Trade Zone) Batteries Co Ltd, was inaugurated in May 2006. Saft chose this location in Guangdong province – one of the most highly industrialized zones in the People's Republic of China – because of the excellent quality of its infrastructure, its proximity to existing customers and its pool of skilled labour. The purpose-built facility, built on a 7,000-sq. metre site, includes brand-new manufacturing lines using Saft's latest technology.

Serving two markets

Saft is now present in two markets offering strong growth potential in China, whose economy continues to break growth records. These are primary lithium batteries, a segment where Saft is world leader and where local growth stands at about 20% per year, and the booming market for railway battery systems, as China expands its infrastructure and launches numerous projects for subways and high-speed trains. Zhuhai has already given Saft extra production capacity to serve China's growing metering market and the new plant also supports sales of railway batteries as well.

Metering batteries…

Production at Zhuhai got under way in April 2006 even before the plant was inaugurated and first deliveries (of LSG 14250 primary lithium batteries for electricity meters) were made to the subsidiary's Chinese distribution partner, Sonic, in August.

Modern electricity meters are often electronic rather than mechanical. They offer additional functions like remote or automatic meter reading (without access to the premises), meter condition monitoring, fraud / tampering detection, multi-rate tariffs, etc. These meters need batteries to operate and to store or transmit data. Chinese regulations stipulate that these batteries must last at least 6 years.

Saft's primary lithium batteries "Made in China" were rapidly approved by OEM customers. "Deliveries have been ramped up steadily over the past year. Production has gone from 1 to 3 shifts per day and we are looking at 24x7 production by the end of 2007", says the subsidiary's General Manager Pierre-Marc Leroy. "We started with 30 employees and this has grown to 110. Things are really moving!"

Distributor Sonic is just as up-beat: "It is a positive move to manufacture in China because the absence of import taxes means lower prices, and delivery is faster", says Managing Director Patrick Cheng. "But our success is mainly due to the continuing focus on quality. Customers here have always appreciated Saft's long experience, but it was vital to demonstrate to OEMs that batteries manufactured at Zhuhai meet the same rigorous quality standards as those we import from France. We have now gained their confidence. Today we have over 200 OEMs signed up and a market share of about 60% in this segment, up from 20% a few years ago, and our target is 70% next year. I think Saft has a big future".

Zhuhai is part of Saft's worldwide strategy too: "The plant was set up to meet growing domestic demand, but we are now starting to export as well, to help Saft's lithium plants in Poitiers and South Shields meet demand in the rest in the world", adds Pierre-Marc Leroy.

…and railway back-up systems

As for railway battery systems, Saft's Chinese subsidiary regularly supplies batteries produced in Bordeaux, but by late November 2006 they were rolling off the Zhuhai line as well, ready for the OEM acceptance process. Saft's first customer here was one of its traditional manufacturing partners Alstom, which is expanding in China.

Getting closer to Chinese customers by investing in a local production base was obviously a good move; in June 2007 Saft won a contract from China's leading rolling-stock manufacturer, Changchun Railway Vehicle Company (CRC), to supply on-board Ni-Cd battery systems for 24 new trainsets for the Beijing metro. The new CRC trains are due to be in service for the 2008 Olympics. The low-maintenance battery systems, based on Saft's compact and light-weight SRM rechargeable rail batteries, will provide reliable back-up power to support emergency lighting and air-conditioning in the event of an interruption to the main power supply.

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Expanding customer services

"This new plant is firm evidence of Saft's long-term commitment to the Chinese market", says Pierre-Marc Leroy. "It enables us to demonstrate a significant increase in local added value by manufacturing and assembling battery systems in China, using locally-sources mechanical and electro-technical components. In future, Saft's own Chinese engineers will be able to provide a full range of support services including installation, commissioning and training".

Local presence, global reach

With the new Zhuhai facility, Saft now has 16 manufacturing sites. The company has a truly global presence, with about 3,900 employees working in 18 countries and a production and sales network that enables Saft to serve customers all over the world.

TECHNOLOGIES

Saft Li-ion batteries for advanced PV systems in Guadeloupe

Saft has joined forces with Tenesol, Technofi and French power utility EDF on a two-year project to test the technical and economic feasibility of using Li-ion battery storage with grid-connected photovoltaic (PV) systems for residential and small commercial buildings.
The aim is to enhance the efficiency of future PV solutions.

The main objective of the project, which is backed by the French Environment and Energy Management Agency (ADEME), is to study the optimal use of solar energy in order to avoid the current use of fossil fuel turbines and to validate the potential enhancement of energy quality and dispatch-ability due to battery storage. The second aim is to gain operational experience so as to determine the optimal parameters for future grid-connected PV systems management.

In Guadeloupe, Saft and solar-panel manufacturer Tenesol will deliver 14 PV systems, each made up of a set of solar panels together with 250 V, 11 kWh Li-ion storage batteries.

Looking to the future

Renewable energy systems make exceptional demands on storage batteries, which have to cope with difficult operating conditions, tough cycling and the generally intermittent character of the power supply and load conditions. Saft is playing a leading role in developing Li-ion solutions that match these requirements. One result of research here has been the unique Intensium Flex concept, which will be tested during the Guadeloupe project.

Development of advanced storage systems will be a key factor in boosting PV use. The market is currently growing by more than 30% annually and the IEA forecasts that PV systems will meet 20% of world electricity demand by 2040. Grid-connected systems will account for the largest share of this market. Very few of today's PV systems (mainly stand-alone units) are battery supported, but Saft believes that storage will make a major contribution to worldwide integration of PV systems.

Saft has supplied Li-ion battery systems as a partner in five currently running or planned projects and will continue to develop them to supply alternative solutions.

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Li-ion battery storage for more efficient renewable energy systems

Under the weight of public opinion opposed to uncontrolled use of fossil fuels, governments and industry alike are moving to develop and improve renewable energy systems such as solar and wind power. One of the key factors in making renewable systems more efficient is the ability to store energy to warranty energy supply and power quality with a flexible energy management. Batteries are one of the answers, and Saft, which is a partner in both wind and solar power projects, is a major part of that answer.

PARTNERSHIP

Saft partners with Independent Witness (IWI Global) for better NASCAR driver safety

Stringent quality and reliability were the key when Saft batteries were chosen by Independent Witness to power its auto-racing "black box". The result will be safer NASCAR race cars and reduced risk of critical injury from accidents.

Independent Witness, a specialist in incident data recording (IDR) technology, has chosen Saft LST 14500 lithium-thionyl chloride batteries as the primary power source for its Witness™ Asset Protection System for auto-racing applications. The Witness "black box" records time, date, force and direction of impact during a crash and the data is used to design safer race cars and reduce the risk of critical injury.

The Witness™ "black box" [see inset picture] is mounted in the frame of the car where it continually monitors and records vital safety information. This data is ultimately used in the design of new race car safety features.

More power, longer life

The battery-powered device must operate in a variety of temperatures for extended periods while maintaining absolute accuracy of reporting, so it needs a premium power source. Standard AA-size alkaline cells did not meet the standards Independent Witness demanded, so Saft proposed a battery pack that fits the existing space while providing more than double the power and a longer lifetime.

Starting in 2002, every NASCAR race car has been equipped with the Witness "black box". After an incident or at the conclusion of the race, data is analyzed so such that NASCAR can design safer cars and more effective safety devices. Numerous other motor-sport organizations use Independent Witness technology, including the World Rally Championship, a division of Formula 1 Racing, Grand AM, GM Racing and among others Ford Racing.

Quality and reliability

"As the exclusive provider of IDR technology to NASCAR's top three sponsored series, it is critical that our products never fail", says Scott McClellan, CEO / Founder, Independent Witness. "We selected Saft batteries to meet our stringent quality and reliability standards to ensure that we provide our customers with a premium data recording device".

In addition to motor sports, Saft batteries power Witness "black boxes" that have been adapted to monitor NASA's space shuttle boosters, to equip public transportation, taxicab and product delivery fleets and to record strong motion seismic activity on structural assets. Going beyond safety enhancement, "black box" data is regarded as accurate and reliable enough to be used in deciding insurance claims and various court cases.

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PARTNERSHIP

Staircase to the heavens: Eurostar leading the way

Based on several years of successful collaboration on lithium-ion (Li-ion) batteries for space, Astrium has signed a long-term agreement with Saft for use of the technology on the Eurostar E3000 platform. **Some 50 Eurostar-series satellites have been ordered so far.**

The Eurostar series platform has been designed with geostationary (or GEO) telecoms applications in mind. Its modular design enables a generic architecture to be customized to specific customer requirements. A Eurostar-based satellite was the first communications satellite to feature fully digital electronics and the first to successfully demonstrate on-orbit performance of Li-ion batteries, "a major technological breakthrough in satcoms power", according to Astrium. The batteries' cell modules were supplied by Saft.

"The on-orbit performance of Saft's Li-ion modules was first demonstrated during the operations of the Eutelsat W3A satellite," observes Alain Brunschvig, Eurostar Supply Manager for Astrium. W3A was launched in March 2004 and since then, four more Eurostars have been successfully operating with Li-ion: Hispasat's Amazonas, Eutelsat's Hot Bird 8 and two military GEO. Saft supplies the modules to Astrium's Toulouse facility, where they are made up into batteries.

"Saft has a very good product," adds Alain Brunschvig, "with excellent end-of life potential, which is crucial to the success of long-life missions of 15 years or more."
Good thermal management of the battery has been achieved thanks to the cooperation between Astrium and Saft.

He also points out that the spacecraft with Saft's Li-ion technology have now reached the historically crucial on-orbit lifetime of three years, which will encourage other operators to choose the technology.

Strategic power orientation

"We completely support Saft's Li-ion solutions for GEOs," says Alain Brunschvig. "They bring high benefits in terms of capacity, footprint, power dissipation and weight for large spacecraft. But we've also been migrating them to smaller satellites with just 3 or 4 kW of power."

Regarding his company's relationship with Saft, he underscores his satisfaction with the cooperation and communication between the two partners. "We've optimized the utilization of Saft cell modules to obtain the smallest, lightest possible on-board power source," keeping equipment to the "strict minimum". Li-ion battery technology is especially attractive to high-power satellites (with over 10 kW of power requirements) because of the lower volume and mass required for power storage.

The E3000… and soon, Alphabus and recently Arabsat and Yahsat

The latest member of the Eurostar series, the E3000, has already been chosen by a number of satellite operators: Eutelsat, Hispasat, Inmarsat, Intelsat, Paradigm, SES Astra, Telesat and recently Arabsat and Yahsat. Successfully introduced in orbit in 2004, it is setting new standards, in part due to its Saft Li-ion technology. Ten E3000s have been launched so far, of which five are powered by Li-ion, and twelve more are on order. The Eurostar E3000 platforms feature extensive mass and power scalability. Their enhanced payload accommodation makes them a highly efficient, single-product solution across the whole scope of communications missions, from conventional mid-range to the most sophisticated.

In addition, jointly with Thales Alenia Space, Astrium is developing a common platform, known as the Alphabus. It will be a 8-metric-ton bird with very high power requirements. Greater power translates into a larger footprint across the Earth's service, enabling operators to reach more end-users and increase revenues from space-based services.

Astrium likes to emphasize the "daily-life benefits" from the spacecraft that it delivers to its customers. "Space technology is so much a part of our daily lives," the company says, "that we may not even recognize it — present as it is in so many of the activities that we take for granted today." Watching satellite TV, consulting the weather forecast, phoning someone (around the world or down the street), accessing the Internet, holding video conf-calls, and checking an in-car navigation system for routing information: all benefits to end-users.

Modular batteries for space

Saft's VES Li-ion space batteries are attracting interest for all these applications — GEOs, MEOs (dozens of Galileo navigation and localization satellites will be flying within a few years), and LEOs, plus others on still different missions.

Saft's Li-ion power for space applications comes in three cell-types: the VES 140 and 180 for GEOs and MEOs, and the VES 100 for LEOs, GEOs and MEOs. Medium-prismatic Li-ion batteries are used for LEOs, launchers and space vehicles. All three VES types are used for space vehicles. Saft's long-term agreement with Astrium, signed in February 2006, stems from close cooperation over the last decade. Together, the partners have qualified a complete product range, successfully testing the Li-ion technology in orbit.

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More and more satellite makers choosing Saft Li-ion

More and more satellite makers are switching to Li-ion batteries that store the same amount of energy as Ni-Cd or Ni-H_2 batteries in much smaller and lighter packages. **This allows them to produce more powerful satellites by dedicating more of the crucial mass to revenue-generating payload.**

Saft is the world's leading developer and supplier of rechargeable power solutions for this critical application with its tough charge / discharge cycles, with an impressive series of launches in 2006-2007.

Saft batteries are providing the on-board power for the new Calipso LEO Earth observation satellite, based on an Thales Alenia Space Proteus platform launched in August 2006 on a 3-year polar-orbit mission. This one has been followed by Corot (based on the same plate-form) launched in December 06. Three more Saft-powered Proteus platforms will be launched by end-2008.

Revenue-generating payload

Thales Alenia Space also chose Saft back-up power for their Syracuse 3B (following the 3A launched in 2005) secure military communications satellite launched by an Ariane 5 (itself using Saft batteries) for the French Defence Ministry.

Also in August 2006, Saft Li-ion batteries went into service aboard the most powerful satellite ever ordered to serve Europe: the Eutelsat's HOT BIRD™8 GEO broadcast satellite based on Astrium's Eurostar E3000 platform. The Saft cell modules are integrated into Astrium batteries.

In the same month, Koreasat 5, based on Thales Alenia Space's 4000 C1 platform, was launched from the Odyssey platform. Korea's first hybrid civil and military communications GEO satellite has Saft Li-ion batteries for back-up when its solar panels are eclipsed. The batteries are in 3 packs each made up of 10 modules in series, with each module having 3 VES140S cells in parallel.

In October 2006, Saft high-performance Li-ion batteries were aboard when the Optus D1 GEO communications satellite built by industry leader Orbital Sciences Corp. was lifted into orbit from Europe's Spaceport in French Guyana. In July, Orbital had already become the first to launch Saft's advanced Li-ion technology into geosynchronous orbit aboard a U.S. government satellite, and it plans five more Saft-powered satellites over the next two years.

In April 2007, the Italian Space Agency's AGILE orbiting gamma-ray and hard X-ray observatory, built by an international consortium led by Carlo Gavazzi Space, SPA became the first LEO satellite to be powered by a battery system based on Saft's MP 176065 Li-ion cells.

In October 2007, Ariane 5 performed a dual launch with two Orbital Science Corportation Star 2 Satellites: Optus D2 and Intelsat 11 (previously called Panamsat 11). The two satellites are powered with a Saft Li-ion 4P10S VES140.

In December 2007, Ariane 5 performed a launch with Li-ion battery powered telecommunication satellite Horizon 2 which was manufactured by Orbital Sciences Corporation and belongs to Intelsat.

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PARTNERSHIP

Spacebus family relies on robust Li-ion battery range

The core Spacebus satellite platforms developed by Thales Alenia Space for a variety of applications now benefit from Saft's lithium-ion (Li-ion) batteries. **These batteries are designed specifically for the different platforms' capacities and requirements.**

Thales Alenia Space is one of the world's leading space telecom players, with orders from Europe, the United States, Russia, Latin America, Africa and the Middle East, and growing business with Asian customers, especially from China.

Ranked N°1 in the world in 2006 in terms of satellites ordered with 30% market share, Thales Alenia Space offers an extended platform range, from small to powerful satellites – up to 6,000 kg, with 16 kW end-of-life power – featuring greater operational flexibility, proven reliability and extended life. The current line of Spacebus geostationary telecom satellite platforms is the culmination of over 20 years of continuous development and now features in-flight proven avionics 4000.

This feature is ideal for such applications as telecommunications (including voice, data and Internet services) and broadcasting as well as HTDV and mobile TV and 61 Spacebus satellites have been already ordered.

"We are very pleased with the capabilities that Saft's Li-ion battery range gives us at Thales Alenia Space in terms of customized solutions for our customers," says Isabelle Bachelier, Battery Commodity Leader, Purchasing Directorate, based at the Thales Alenia Space facility in Cannes, France.

Thales Alenia Space manufacturing operations cover four European countries, reflecting the broad geographical presence of the company's high-tech parents. Thales Alenia Space, which employs 7,200 people worldwide, is Europe's largest supplier of space-based infrastructure. "We have implemented with Saft a generic Li-ion battery range approach which allows us to capitalize more efficiently on our in-orbit heritage for our customers future programmes," Isabelle Bachelier points out. Saft's basic range covers at least 80-90% of customer requirements. The Li-ion cells can be supplied in a choice of 2P, 3P or 4P modules as well as four battery configurations: 9S, 10S, 11S and 12S. "Thales Alenia Space is very attentive to a successful qualification of Saft's VES180 cell for space activities as this cell should improve the massic energy of 20% of Li-ion batteries in our Spacebus platforms", says Isabelle Bachelier.

Why Li-ion in space…and where?

Batteries for high-tech space applications have a particularly tough life. There's no "repair service" in orbit if a battery's performance starts to falter. So manufacturers of space-application batteries must deliver additional guarantees of reliability, performance and durability. A GEO platform, for example, is expected to operate over a lifetime of 15 years without any on-site maintenance. Satellites designed for low-Earth and middle-Earth orbits (LEOs and MEOs) must meet similar requirements. And sometimes spacecraft do not go into Earth orbit at all: The European Space Agency's Smart 1, which flew to the moon before going into orbit around it, was the first lunar probe to use Saft Li-ion batteries.

Li-ion battery technology shrinks the volume that the batteries occupy on the satellite platform. It also reduces weight, enabling spacecraft operators to increase the revenue-generating payload and lower the overall launch weight, resulting in lower costs for lifting a satellite into orbit.

Saft's VES Li-ion space batteries are attracting interest for all these applications — GEOs, MEOs (dozens of Galileo navigation and localization satellites will be flying within a few years), and LEOs around the Earth, as well as a variety of other missions.

Modular batteries for space

Saft Li-ion batteries for space applications come in three main cell-types: the VES 140 and 180 for GEOs and MEOs, and the VES 100 for LEOs, GEOs and MEOs. Medium-prismatic Li-ion batteries are used for LEOs, launchers and space vehicles. All three VES types are used for space vehicles.

With Saft's modular approach, everyone wins: satellite operators and spacecraft manufacturers as well as end-users hooked up to their "dish" for services from space infrastructure in telecoms, broadcast and other applications. With Saft's space Li-ion technology, capacity and footprint grow while costs shrink. Now that really is win-win!

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Saft gets two U.S. awards for top quality and service

The U.S. Defense Supply Center Richmond (DSCR), has honoured Saft with its Silver Best Value Medallist award for exceptional product quality and delivery performance. **The award was made in early June this year by DSCR, the aviation supply and demand supply manager for the Defense Logistics Agency (DLA).**

"We are delighted to receive this prestigious award, which recognizes our constant efforts to raise the bar in customer service standards", said Saft Specialty Battery Group General Manager Tom Alcide. Each year, DSCR honours defence suppliers for excellent performance as measured by the Automated Best Value System, based on the DLA database.

In October, Saft was also awarded a 4-star Award of Excellence by Raytheon Network Centric Systems (NCS). Only two companies received the coveted award, which is for product quality and on-time delivery as well as price and management responsiveness. "We are proud to have won a Raytheon award two years in a row", said Jim Miller, General Manager of Saft's Space and Defense Division in Cockeysville (Maryland). "Now that we've won the 3-star and 4-star awards, we'll be aiming for the ultimate standard: 5-star performance". Saft supplies long-life Li-ion batteries for Raytheon's Improved Target Acquisition System (ITAS) used with TOW missiles.

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TECHNOLOGIES

Quality for India's defence radars

Bharat Electronics, a half-century-old company based in India, is a supplier to the Indian defence forces. **For its portable electronics, it has selected Saft's high-quality batteries, both nickel-cadmium and lithium.**

BEL (as Bharat Electronics Ltd is known locally) is a pioneer in India's design and manufacture of BattleField Surveillance Radar. It installs Saft's lithium-ion batteries built from MP (or medium prismatic) cells in its portable surveillance and acquisition radar. The radar can be carried in just three packs for deployment by the Indian army in any location.

The BFSR-SR radar is a Battle Field Surveillance Radar – Short Range. It features light weight, man portable and round-the-clock operation in all weather conditions. It can see out as far as 18 km and can track 50 targets, including pedestrians, vehicles, tanks and still more. The resulting colour images are displayed in high resolution on a portable PC screen. The radar's two Saft Li-ion batteries deliver 24 volts each.

Created to meet the growing needs of Indian defence services for electronic systems, BEL employs the best engineering talent available in the country. It manufactures state-of-the-art products in such defence electronics applications as communications and radar, to mention only two.

World-class standards

The technical specifications (known as Joint Services Specification, or "JSS") of the Indian army are the most stringent in the defence industry worldwide. And BEL meets them.

For Saft's part, its Li-ion MP family serves a variety of needs in military and civilian applications. Prismatic cells are flat, rather than round, potentially enabling more energy to be captured in a smaller space than what cylindrical cells can achieve.

BEL chose Saft's MP on the grounds of reliability and ability to work in the temperature range of -20° to +55°C. One other important decision factor was the engineering support Saft provided in developing the battery with the Indian engineers.

With Saft's MP cells, both battery and system integration improve. On the safety side, each Saft MP cell features a circuit-breaker, a safety vent and a shut-down effect separator. At battery level, safety is further extended with protection circuits.

Applications where the MP has found a natural "home" include not just portable radars, as in the BEL example, but also in military radio communications, ruggedized handheld terminals, transportable medical equipment, and other civil applications.

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Oil subsea systems rely on Saft Li-ion technology

Saft Li-ion batteries help improve subsea oil and gas production control technology.
Electric subsea technology based on Li-ion technology has major operational and environmental advantages over conventional control systems, and specially-designed Saft battery modules have been helping Norway's FMC Technologies demonstrate this to the oil industry out in the North Sea.

FMC Technologies

Saft has joined forces with FMC Technologies, a leading supplier of subsea production equipment, to increase the advantages of electric technology over conventional electro-hydraulic and ROV-operated well-control systems. In the first prototype stage, six Saft rechargeable Li-ion battery modules will power electrically operated valves controlling production flow on Statoil's Norne oil and gas field 350 metres below the North Sea.

Low-power electric subsea control systems using local power storage via rechargeable batteries, already proven on Statoil's Statfjord field, provide a safer operating environment and prevent corrosion from stray high-voltage currents. They also reduce costs (topside power generation, transformers, power cables, umbilicals, etc.). But Saft and FMC felt that using Li-ion technology would make the systems even more efficient.

The advantages of Li-ion technology

"The recent development work with Saft has shown that Li-ion battery technology will offer significant benefits in operational performance by enabling us to store much more energy within a compact, lightweight package with high-cycling capacity than with traditional cells", says Vidar Sten Halvorsen of FMC Technologies.

Li-ion technology also makes it easier to monitor battery cells' state of charge and state of health. Remote monitoring and control will be even more vital as the oil industry works at increasing depth.

And the environment? Saft Li-ion cells are hermetically sealed and maintenance free, ensuring that no gas can escape into the local environment.

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Purpose-designed batteries

The battery modules developed by Saft in conjunction with FMC Technologies comprise seven VL41M cells in series (nominal 24 V and 800 Wh), housed in a robust nitrogen-filled enclosure designed to withstand extreme water pressures. The modules will be maintained on a float charge from the subsea tree's local 24 V DC supply and will deliver up to 120 A for the high-torque motors that operate the control valves.

INNOVATION

Saft's double-play for the telecoms industry

With telecoms rapidly adopting new battery technologies, Saft offers a range of rechargeable batteries developed to meet the specific needs of outdoor and remote network plant. These Li-ion and Ni-Cd solutions, providing the power or energy in a much smaller and lighter format, are ideal for networks in hot zones where cabinets can reach temperatures that make lead-acid batteries age rapidly, resulting in low reliability and premature failure.

Saft is now building on its telecoms success by launching 2nd-generation Li-ion batteries and a new Ni-Cd range, offering operators and OEMs even more powerful and longer-life solutions that enhance Total Cost of Ownership (TCO).

Rechargeable Ni-Cd solutions for broadband and triple-play

As more countries deploy or extend ADSL and VDSL networks there is growing demand for batteries that meet the demanding requirements of outdoor and remote telecom facilities: reliable power back-up over a long service life in often extreme conditions. Saft has now built on the success of its NCX rechargeable Ni-Cd battery systems by developing the even longer-life Tel.X solution.

New Tel.X range: long, reliable service under tough conditions

Saft's new Tel.X battery is the first high volumic energy density, long-life, maintenance-free Ni-Cd battery specifically designed for the remote and outdoor equipment that plays an increasingly important role in today's decentralized telecom networks. Tel.X will provide vital back-up power for cabinets and end terminals in fibre-optic triple-play networks as well as base transceivers and station controllers in wireless networks.

Due to be available by the 2nd half of 2008, Tel.X delivers predictable performance over a wide -20°C to +50°C temperature range and can withstand extremes from -50°C to +70°C. This is vital in cabinets without temperature control.

A win-win solution

Other key features are:
- Exceptionally long service life (over 20 years at normal temperatures and more than 14 years at 40°C)
- Maintenance-free under normal operating conditions (no water top-up)
- High reliability
- High volumic density of up to 100 Wh/L with weight 30% less than a lead-acid battery
- Format designed for standard 19" and 23" racks and cabinets (easy replacement of lead-acid batteries) and compatible with all telecoms rectifiers
- Optimum TCO
- Capacity range: 80 to 180 Ah

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Saft back-up power for Telefonica's broadband services in Spain

As the leading operator in the Spanish- and Portuguese-speaking world, Telefonica needs to deliver reliable quality. So the company specified Saft NCX rechargeable Ni-Cd batteries for the outdoor cabinets that are a vital link in Spain's fast-growing ADSL and VDSL network. Saft's 48V battery systems provide up to 4 hours of back-up power, ensuring continuity of broadband service if the main power supply goes down.

The batteries power cabinets in some of the hottest parts of Spain, so Telefonica specified not only low maintenance but long, predictable service life in a demanding environment (summer temperatures inside the cabinets can reach 60°C). Even under those conditions, Saft NCX batteries have a lifetime of more than 10 years, offering Telefonica optimum TCO.

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Intensium 1 Power Plus: 2nd generation Li-ion technology offering more to wireless and wireline networks

With rechargeable Li-ion battery systems established in the telecoms industry as a preferred solution to beat the tough conditions in outdoor cabinets, Saft has now launched its 2nd-generation Intensium 1 Power Plus battery, offering 30% more power and double the service life.

Compact, zero-maintenance power

Since Saft launched its Intensium 1 Power range of Li-ion batteries, a number of network operators and OEMs have chosen Saft Li-ion batteries to deliver reliable back-up power over a long service life, especially under the rigorous conditions involved in outdoor cabinet applications. Intensium was engineered to provide exceptional power and energy density in a compact, zero-maintenance, rack-mounted modular system. Particular emphasis was placed on the needs of fast-growing wireless networks.

Three of the top five telecom OEMs have selected Intensium systems to equip new compact micro or macro Base Transceiver Stations (BTS) used in GSM or UMTS networks. These BTS will be deployed in rural and highway sites as well as urban sites with difficult access. The units need up to 3 kW of power for short duration back-up to ensure continuity of service in case of AC supply failure. This gives the BTS time to either bridge to reserve generation or go to clean standby mode.

To the next level: Intensium 1 Power Plus

Saft's new Intensium 1 Power Plus solution takes Li-ion telecom batteries to the next level by doubling service life to an anticipated 20 years at 20°C and 10 years at 40°C. The new batteries also offer 30% more power (max. power up from 3 kW to 4 kW), and the standard 48 V system has been complemented by a 24 V version.

Saft is also upgrading its manufacturing plant in Poitiers, France, including new dedicated assembly equipment to ramp up production to meet expected demand growth.

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MARKETS

KTM re-enters the e-bike market with a new City Bike concept powered by Ni-MH Smart Mobility technology

Austrian bicycle manufacturer KTM has now decided that the time and the technology are right to re-enter the e-bike market. **Its sporty new machine relies on Saft's Ni-MH Smart Mobility batteries.**

KTM's new e-bike, which was unveiled at the Eurobike and IFMA trade fairs in September 2007, is driven by a powerful Heinzmann motor coupled to Saft's rechargeable Ni-MH 36 V, 9 Ah Smart Mobility batteries. The initial production run of 1,000 will be marketed in Austria and Germany.

"The bike is aimed at over-50s (it has no top tube, so it's easy to mount) and younger bikers as well (it's a powerful machine with a sporty design)", says Development Manager Thorsten Cornils. "During customer tests, it recorded between-charge distances of 40-50 km under e-power, depending on use mode". "The battery can be removed and taken up to an apartment for charging, so users don't need a garage. And the carrier is designed to take a second battery for bikers who want greater range", he adds.

Three-way cooperation

KTM specified robust batteries (to withstand jolts and vibration) with high capacity (9 Ah modules), very low impedance (for better performance with relatively high current) and the ability to communicate with the bike (a "fuel gauge" on the handlebars receives digital data from the battery bus).

"Our motorization partner, Heinzmann, who is also a Saft customer, assured us that Saft had the top technological expertise that we wanted", says Thorsten Cornils. "We worked closely with both companies to determine just the right battery parameters and to optimise communication between components. This three-way cooperation has been invaluable. We are very happy with the result".

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Smart Mobility

The new-generation Smart Mobility battery is a development of Saft's earlier plug-and-play solution supplied in 12, 24 and 36-V modules.

It comes in a robust aluminium casing for "rough" biking, and in addition to charge / discharge management it has a memory unit that records the battery's working life (charged / discharge history, current rate, operating temperature, storage periods...) to help optimise battery use. This unit allowed Saft to propose an extended 2-year (or 500-cycle) warranty, as it is possible to track the real use of the battery. It will also be very helpful in handling after-sales queries. And because the battery "knows" when it has been stored for winter, it will modulate the first spring-time charge accordingly.

Another key feature of this new battery design is the ability to replace the internal core pack while keeping the same casing and electronics. This lowers the cost of replacement and therefore the overall life-cycle cost.

KTM, **based in Mattighofen, near Salzburg, made its reputation with motorcycles but since the 1960s the firm has also been making a broad range of bicycles. The fast-expanding company specializes in high-spec, high-quality machines, producing more than 150,000 bikes a year for customers throughout Europe.**

Long-life "fit and forget" primary lithium for radio-link automated meter-readers

Hydrometer, a leading manufacturer of automated meter reading (AMR) devices, has turned to Saft primary lithium batteries for reliable, maintenance-free and long-life operation. **Saft will be providing a million AA-size LS14500 cells. The batteries will power the latest time- and labour-saving drive-by meter reading technique.**

During 2007, Saft will be supplying more than a million primary lithium cells to power Hydrometer's high-tech automated meter reading Hydro-Radio modules and Sharky BR773 heat meters. The Saft cells will provide the AMRs with a reliable, maintenance-free "fit and forget" source of autonomous power over a 12-year service life. Hydrometer has ordered a million AA-size LS14500 cells with a nominal 2.45 Ah capacity, as well as a smaller number of A-size LS17500 and C-size LS26500 cells.

Convenient drive-by meter reading

The Hydrometer AMR modules can be used for the latest drive-by meter-reading techniques. The modules provide a short-range radio link that enables electricity, gas, water and heat meters – such as Hydrometer's well-known Sharky range – to be read, billed and monitored with maximum accuracy, minimum effort and without access to the premises. AMR modules are usually read by hand-held terminals, but the latest trend is towards "drive-by" reading, where the data is received by a GPRS mobile receiver in a passing vehicle.

High performance, long life

Metering is a very demanding application and Hydrometer specified cells with high reliability and reproducible performance. For the AA size, a base current of a few micro-amps was required with pulses of about 10 milliamps for a few seconds and a cut-off voltage of 2.5V. Saft's analysis showed that its LS series Li-SOCl2 cells would satisfy performance specifications while easily exceeding the required 12-year service life, even with an extreme temperature range. The cells are supplied with tabs for easy integration into Hydrometer electronic boards. They will be fitted to AMRs for utility end-users all over the world.

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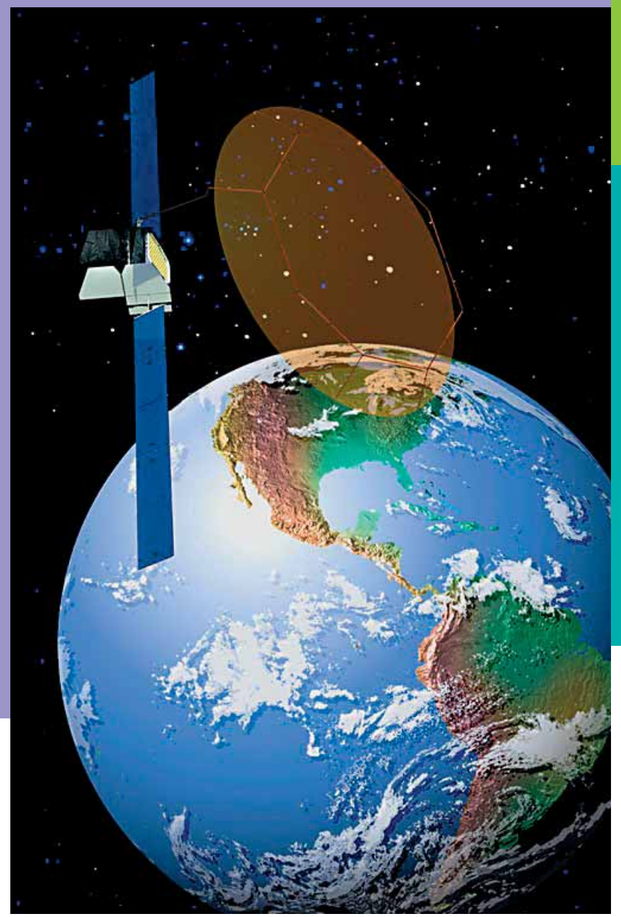
Battery life modelling

The Saft Group is the world's leading manufacturer of batteries for meters and AMRs.

In order to match metering application requirements more closely, the Saft Group has now developed a unique model – based on field and lab data collected over 30 years – to predict primary lithium battery service life for specific utilization profiles. Results from the model, which factors in base current, pulse currents, cut-off voltage and temperature range, are combined with bench-test results to give an accurate life prediction.

EXTREME POWER

Boeing MSV satellites: Li-ion power for greater payload



High-energy, low-weight Saft Li-ion batteries have been selected by Boeing to power two GEO-Mobile satellites for the Mobile Satellite Ventures telecommunications network. **This multi-million dollar deal is Saft's largest U.S. commercial satellite contract for Li-ion batteries and its first with Boeing.**

The two GEO-Mobile satellites, among the largest and most powerful ever built, will be part of an advanced commercial telecommunications network. Saft's VES140 40-Ah rechargeable Li-ion cells (in a 6P12S configuration) will power critical systems, ensuring continuous operation of the satellites while their solar panels are in eclipse. And they will do it for up to 18 years.

Win-win power/weight ratio

Saft's win-win solution provides high specific energy of 120 Wh/kg in a light and compact format, offering a very significant weight advantage (30-50%) over the previously used Ni-H_2 battery chemistry and allows Boeing and MSV to dedicate more of the satellite's crucial mass to revenue-generating payload. This is a big plus as the voice and data satellites are required to supply 11,000 watts of power.

Boeing's GEO-Mobile satellites, based on the company's powerful 702 infrastructure, will be part of the world's first commercial mobile satellite service using both space and ground-based elements. The telecommunications network, based on MSV's patented Ancillary Terrestrial Component (ATC) technology, combines the best of satellite and cellular technology to ensure reliable and widespread delivery of advanced voice and data.

Ideal technology for space applications

"Saft has been working with Boeing for many years and this contract is the result of a group effort to get Li-ion batteries aboard their GEO-Mobile satellites", says Saft CEO John Searle. "Li-ion technology, with its superior performance and reduced bulk and weight, is the ideal battery solution for space applications". This partnership with Boeing adds to Saft's impressive list of spacecraft programmes and strengthens Saft's position as a leading supplier of Li-ion battery systems for the U.S. space market.

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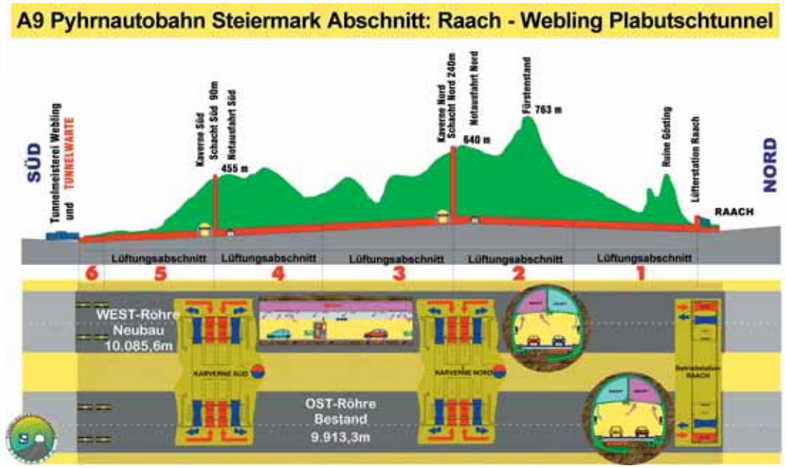
25 years of Ni-Cd emergency back-up power in tough tunnel environments

Saft rechargeable Ni-Cd batteries were installed in the Pack tunnel in 1982 and are still performing well nearly 25 years on.
Today, Saft batteries provide emergency back-up power in well over 50 road tunnels in Austria.



Saft's Ni-Cd batteries are designed to provide up to two hours of emergency back-up power in the event of a mains power failure (for safety-lighting, signaling and communication systems, fire alarms, emergency doors, exhaust air valves, etc.). The operator of the Pack tunnel, ASFINAG, was so delighted with Saft performance that in 2004 it naturally turned to Saft again for back-up batteries for the new, second tube of the 10-km Plabutsch tunnel.

Performance even better than expected

An ASFINAG's spokesman explains: "In the late 1970s, when we were first considering battery options for the Pack tunnel, we established a minimum 10-year service life as one of the key criteria. In view of the demanding conditions, we believed this to be a very optimistic goal, especially for lead-acid batteries. However, when the LCC (Life Cycle Costing) analysis provided by Saft's agent Statron showed that we could expect 20-year plus service life from Ni-Cd batteries, they became the obvious choice. There were of course other important factors such as: ease of maintenance; a wide range of operating temperatures; the capability to withstand the environmental conditions in the battery room; and a predictable service life with no risk of sudden-death failure".

Nearly 25 years down the track, the original Saft batteries are still functioning well, at about 70-80 % of nominal capacity. So ASFINAG naturally chose the same type of batteries for all the other tunnels in the section, including Plabutsch, which is Europe's longest double-tube road tunnel.

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Ni-Cd tunnel battery systems

Typically, up to nine Saft battery systems are installed in each tunnel, each system comprising hundreds of SBM and SBL Ni-Cd batteries with capacities ranging from 68 to 690 Ah. These are block design batteries with robust pocket-plate construction and developed specifically to deliver reliability, long service-life and low maintenance.

EVOLVING PLANET

Fast-charging Ni-Cd batteries help hospitals boost AGV efficiency and save money

Switching to Swisslog TransCar Automated Guided Vehicles (AGVs) powered by Saft rechargeable Ni-Cd STM battery modules can enable hospitals to take advantage **of "opportunity charging" to boost internal transport efficiency and reduce the number of AGVs required.**

Swisslog, the international manufacturer of turnkey logistics systems and container transportation systems for hospitals, recently switched to Saft's rechargeable Ni-Cd battery modules for its new-generation Telelift TransCar LTC2 automated guided vehicles (AGVs). The fast charging and deep cycling capability of the Saft STM modules enables Transcar users to take advantage of an "opportunity charging" system, giving round-the clock operation that would not be possible with lead-acid batteries. Whenever the system control centre (which also monitors battery levels) determines that the AGV will have down time, even just a few minutes, it can route the vehicle to a charging station.

State-of-the-art AGVs

AGVs like the Swisslog system are designed to transport a variety of items (refuse, clean and soiled linen, medical supplies, patient meals) through a hospital safely, accurately and continuously, delivering and retrieving 4-wheel carts of varying configurations and loads. The latest TransCar is based on compact, low-profile, bi-directional vehicles using a contour-following laser guidance system. The easily-expandable system requires no wall targets, embedded wires, floor tape or other building modifications.

The Saft Ni-Cd batteries in the TransCar provide power for traction and the guidance system as well as for the 450-kilo capacity lifting platform that raises the hospital carts off the floor.

The advantages of Ni-Cd technology

In this application, Saft Ni-Cd modules have a clear advantage over lead-acid batteries, which cannot be fast charged and would have to be replaced by freshly-charged batteries every 8 hours. This involves additional costs: spare batteries, labour to change them and longer AGV down time. By using Swisslog AGVs powered by deep-cycling

Saft Ni-Cd batteries, a hospital can take advantage of opportunity charging to maximize AGV availability (at least 22 hours a day) and reduce the number of AGVs it requires.

Density, power and low maintenance

Battery discharge rate naturally depends on the load carried and the distance travelled by the AGV. To ensure maximum availability, Swisslog aims to maintain the battery system at 50-80% state of charge, which is achieved by opportunity charging, even for short down-time periods. A 100-A source can charge about a third of the STM module capacity in under 20 minutes.

Saft STM modules have been developed specifically to meet the needs of electric vehicles: energy density (for range), power (for acceleration) and low maintenance (for reduced operating costs). Each TransCar AGV is equipped with 4 Saft STM 5-100 modules in series to create a 24 V, 100 Ah battery system. The batteries feature sintered positive electrodes and plastic-bonded negative electrodes.

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Lower costs for Houston hospital

The 485-bed Memorial Hermann Southwest Hospital in Houston, Texas recently switched from a 26-year old wire-guided AGV to Swisslog's Transcar system with Saft Ni-Cd. Increased availability thanks to opportunity charging means that the hospital now gets more work out of just 16 vehicles than it did with its old fleet of 60-plus units, whose carts also had to be manually loaded. Hospital management estimates savings at more than €8.5 million over 15 years.

Smart Ni-MH power for Sweden's innovative hot-spot phone booths

To cope with growing demand for "everywhere Internet", Sweden's telecoms incumbent Telia Sonera has come up with a novel solution. **They are equipping phone booths all over the country with broadband WiFi modems – powered by Saft Ni-MH Smart Modules.**

Internet surfing in public areas is now possible thanks to Telia Sonera

Telia Sonera's idea is quite simple: determine which existing phone booths are in or adjacent to sites where people could sit and surf or chat with a laptop (parks, town squares, shopping centres, university campuses, etc.) and then equip those booths with WiFi devices (modem, antenna, etc.). "This type of WLAN in public areas is a new development", says the project's Technical Manager Stig Olausson. "Tests have been done in the UK and Germany but this is the first large-scale implementation".

Internet in the park...

The only problem was... power. Unlike fixed line phones, modems need an external power source. Rather than building a grid for the booths, Telia Sonera is powering the devices with batteries that are recharged at night via a cable to the nearest streetlight. Pretty nifty...

Starting in summer 2007, the first hot-spot booths are being set up in Stockholm, Göteborg and Malmö, and additional Wi-Fi booths will later be installed in 20 other cities. To power the first batch of 550 booths, Saft (through its local distributor Celltech) is supplying 725 12-V Smart Modules (400 in 14.5 Ah and 325 in 9 Ah).

Telia Sonera needed high-capacity batteries (the modem draws 0.5 A continuously) "They must also charge / discharge at temperatures from -40°C to +40°C (our winters can be really cold and summer very hot). And batteries used in the north must be able to charge quickly because during short summer nights streetlight current is available for a very limited period", adds Stig Olausson. In these cases, two smaller batteries will be used for faster simultaneous charging. Saft's Smart Modules not only control charge / discharge but communicate with computers in the Stockholm control centre so that cycling and condition of batteries in remote regions can be monitored in real time.

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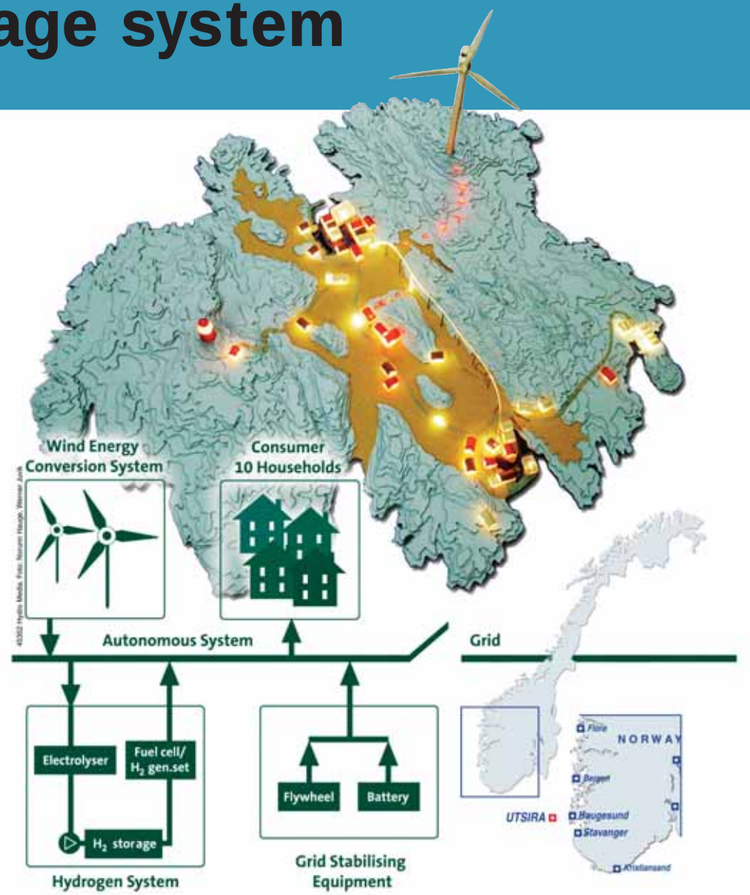
Telia Sonera is the leading telecommunications company in the Nordic and Baltic region, with strong positions within mobile communications in Eurasia, Turkey and Russia. At the end of 2006, Telia Sonera launched mobile services in Spain. The company provides reliable, innovative and easy-to-use services for transferring and packaging voice, images, data, information, transactions and entertainment.

EVOLVING PLANET

Electricity for off-grid communities, thanks to an innovative wind power-hydrogen storage system

For nearly three years now, the ten households on Norway's Utsira Island have been powered by wind energy coupled with hydrogen storage, with buffer power support from Saft Ni-Cd batteries. **This award-winning pilot scheme, a world first, is helping open the way for renewables.**



The small community on their remote off-grid island gets all its electricity from renewable sources, and Saft batteries provide buffer power support to ensure complete system reliability. The Utsira project, jointly developed by the Norwegian energy group StatoilHydro and ENERCON, is the world's first practical demonstration of how wind power and hydrogen storage can work together to provide an efficient and reliable stand-alone energy supply. The project, which won the 2004 Platts Global Energy Award for the best renewable energy project, is due to run until autumn 2008.

Wind turbines + hydrogen storage + battery buffer

With only 220 inhabitants, the rocky windswept island off Norway's west coast has modest power requirements, and peak load of 900 kW can usually be met by wind power. During windy days, the two 600-kW Enercon wind turbines generate more electricity than the islanders need, so StatoilHydro developed a way to store part of that energy in the form of hydrogen produced by water electrolysis. Ten households with a peak power of 55 kW are connected to the stand alone system. When the wind dies, a hydrogen motor and fuel cell convert the hydrogen back into electricity. To ensure stability of the island grid, short-term storage for smoothing of wind energy (in the seconds range) is handled by a 200-kW Enercon flywheel, and for longer support (up to 30 minutes) the batteries cut in. The 37-kWh Saft battery system, a vital buffer in the island's energy chain, ensures complete grid reliability in the event of heavy load variations, component failure and bridging between generation methods.

The main criteria for the batteries were cycle life and robustness rather than energy density. After intensive tests, Saft Ni-Cd batteries with their high-cycling capability in high-rate applications were selected as the optimum combination of cost, reliability and performance. The battery system (140 Ni-Cd cells in series with a nominal voltage of 168 V and power capacity of 40 kW) is kept on a float charge and is typically called on for a few minutes support once a day.

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All-electric energy-saving canal boats for Paris

Saft's rechargeable Ni-Cd batteries are taking to the water, providing efficient and environment-friendly power for two new all-electric water buses that started operation in October 2007 on the Saint-Denis Canal in Paris. **An innovative project that was made feasible by Saft's low weight, high-power battery solution.**

The new water buses provide a shuttle service for employees of the real-estate group ICADE commuting to the company's Millénaire Park offices in the 19th arrondissement of Paris. The service connects the Corentin-Cariou metro station to the dock at Millénaire Park, a trip of about 7 minutes, and then continues on to the "Portes de Paris" Park just outside the city limits.

The catamaran-type boats, La Montjoie and L'Estrée, each equipped with 2 steerable electric motors, can carry up to 75 passengers at speeds of 6-12 km / h over the 1.1 km route (top speed is 16 km / h). The high energy storage capacity and light weight of the Saft rechargeable Ni-Cd batteries enable the water buses to operate for about 6 hours (30 round trips) between charges.

Battery weight: the key to success

The water buses were designed and built by Alternative Energies. Contractor EVE System focused on the on-board energy storage management, working in close partnership with Saft's technical teams to design the integrated Ni-Cd battery system. At 2,150 kg, the system is about 30% lighter than lead-acid batteries with equivalent power, and without this weight saving a 75-passenger electric boat would not have been feasible.

The boats' battery systems are based on Saft's STM modules, specifically developed for all-electric propulsion applications and featuring light weight, high energy density (for range), high power (for acceleration) and low maintenance (for economical operation) combined with fast-charging and deep-cycling capability.

The propulsion battery system comprises two strings of 64 STM 5-140 modules connected in parallel, providing a nominal 400 V and 110 kWh capacity. Saft has also supplied smaller STM-based systems providing back-up power for the boats' radios and other electronic devices.

Optimum operational availability

The deep-cycling capability of Saft's STM modules enables the boats to operate for a 6-hour shift on a single, full overnight charge. Unlike lead-acid batteries, the system can be fast-charged, so a short charging break is enough to let the boats operate for a further 3 hours. This feature also means that the operator can take full advantage of "opportunity charging" if the boat stays at the dock for longer than normal, such as outside peak travel times.

…and outsourced maintenance

To enhance project economics, ICADE leases the battery systems on a 'full-service' basis from Sodretel, which has responsibility for maintenance and servicing of the batteries over a 5-year period. This subsidiary of France's power utility EDF worked with EVE System to ensure that maintenance operations would be simple and cost effective.

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Environment-friendly urban transport

Compared to Paris buses and the other canal boats in the city, these all-electric "canal cats" require less than a third as much energy per passenger. And just to reinforce the environment-friendly nature of the project, battery power can be complemented (weather permitting) via solar PV panels on the cabin roof that can supply more than 10% of the energy required.

INNOVATION

Ni-MH: the “right stuff” for high-tech medical workstations

Medical workstation manufacturer Flo Healthcare recently teamed up with Saft on a new solution using Ni-MH packs charged in parallel, significantly increasing the runtime of its next-generation mobile wireless workstations.

Mobile workstations are used in most modern hospitals to collect data and keep the caregivers right up-to-date on patient condition and treatment. Units like Flo Healthcare’s latest model are fully integrated, ergonomic mobile workstations that are designed to be the most versatile hospital computer cart available.

Better health care

These mobile workstations are able to go where nurses need them most – right to the point of care. The workstations allow wireless transmission of patient data to the hospital’s clinical information system, thus making data available in real time to all relevant medical personnel. Larger hospitals deploy several hundred carts equipped to input a variety of data.

Atlanta-based Flo Healthcare, a market leader, builds the carts and integrates IT equipment that is customized to the system needs of each hospital. The carts come fully assembled and ready to roll “right out of the box”. The wireless mobile workstations are powered by 4 to 6 Saft 12-cell Ni-MH VH D 9500 packs delivering 9,500 mAh at 14.4 V each. Flo Healthcare’s main market is in North America with expansion focused on export sales, particularly in Europe.

Charging algorithms matched to the batteries

For many years Flo Healthcare, like its competitors, used sealed lead-acid (SLA) batteries but recently decided to switch to Ni-MH technology, which has a power-to-weight advantage over SLA. Flo Healthcare had not yet come up with a workable solution to its particular needs. “A reliable power source is vital to critical health applications, but above all the cart’s IT equipment and rechargeable power source must work perfectly together”, says Flo Healthcare’s Systems Engineer Karl Haiden.

“Saft had a reputation for cutting-edge expertise, so we asked its technical team to come and look at the power and charging solutions we were trying to use”, adds Karl. “They were very responsive and quick to recognize how our product’s system could be improved. Saft suggested using its VH D 9500 packs in parallel and offered to share the concept of its proprietary charge algorithms, enabling us to overcome a parallel charging technical issue. Saft’s technical experts helped us create a mobile wireless workstation that offers longer runtimes, lighter weight, and faster charge times than its previous version”.

Multiple advantages

The use of high energy-density Ni-MH packs reduces the overall cart weight by 33% compared to SLA and also greatly increases the number of charge-discharge cycles. The ability to parallel charge the packs increases cart runtime. The cart’s microcontroller-based system allows Flo Healthcare to offer hospitals scalable power: units can be customized using 4 to 6 packs in parallel (the usual option is 4) to increase deliverable runtime on demand.

Innovation as differentiator

Flo Healthcare’s new workstation is preferred by most nursing staffs for its ergonomics, esthetics and ease of use. Hospital IT professionals appreciate how Flo delivers reliable, integrated ready-to-use solutions with a choice of technologies. “The move to Ni-MH was a differentiator for us and Saft helped us achieve it”, adds General Manager Keith Washington. “Saft showed it has the expertise and the willingness to solve existing and future technical challenges we encounter. That’s very reassuring for a company like ours that uses innovation as a market differentiator”.

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Saft is supplying specially designed Li-ion batteries for an international Boeing-led project **to develop environmentally progressive technologies for aerospace applications.**

Saft Li-ion batteries help power Boeing’s hybrid fuel-cell/electric aircraft

Boeing Research and Technology Europe (BR&TE), together with selected partners in Spain, Austria, France, Germany, the United Kingdom and the United States, has developed a manned single-seat propeller-driven aircraft powered only by a fuel cell and lightweight Li-ion batteries. Saft was chosen to design and assemble both the auxiliary batteries and the back-up battery. The project has been under way since 2003. The systems integration has been completed and ground tests are due to start this autumn in preparation for the flight tests.

“Given the efficiency and environmental benefits of emerging fuel-cell technology, Boeing wants to be at the forefront of developing and applying it to aerospace products”, says BR&TE managing director Francisco Escarti. This project is an important step in that direction for all companies taking part, including Saft.

The demonstrator aircraft uses a Proton Exchange Membrane (PEM) fuel cell + lithium-ion battery hybrid system to power an electric motor, which is coupled to a conventional propeller. The fuel cell provides all power needed for the cruise phase of flight but during take-off and climb, when most power is required, the system draws on Saft Li-ion batteries 237V 20 Ah (66S 1P VL20P) batteries.

The hybrid aircraft, with a wingspan of 16.3 metres (53.5 feet) and a cruising speed of 100 kph (62 mph) will pave the way for using this technology in small manned and unmanned aircraft.

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On the hybrid battlefield with Li-ion

BAE Systems is to supply hybrid vehicles with Saft’s lithium-ion (Li-ion) rechargeable batteries for the U.S. Army.

With its next-generation technology, the Army’s manned ground vehicles (MGVs) will achieve their aim of being easily transportable, deployable, lethal and survivable. Saft’s very high-power Li-ion modules play a critical role in acheving this.

To supply the U.S. Army’s needs, BAE Systems has teamed up with General Dynamics to develop a family of MGVs for the FCS Lead System Integrator team of Boeing and SAIC. All Saft Li-ion batteries feature complete electronic controls (CANProbe ™) that provide both safety features and comprehensive battery status. The cell to be used is part of Saft’s VL V range, the world’s most powerful Li-ion cells, thanks to their superior thermal characteristics and very low impedence.

Technology enabler

BAE and General Dynamics are supplying a family of MGVs. This next generation of hybrid combat vehicles will provide the majority of firepower in the FCS-equipped brigade combat teams. They will be critical nodes in the overall network that enables soldiers to complete their missions more effectively. The Saft lithium-ion batteries are one of the key enablers for the hybrid drive system. This hybrid system will allow both improved efficiency and silent capabilities, providing the soldier of the future with enhanced capability.

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MARKETS

New Paris tram relies on low-maintenance Saft batteries

The new Alstom T3 tram that went into service in December 2006 on a stretch of the inner ring boulevard around Paris is equipped with Saft Ni-Cd batteries optimized for low maintenance.

The CITADIS T3 trams, which have been a great success, carry up to 100,000 passengers per day between the Pont du Garigliano and the Porte d'Ivry. All 21 of the T3 tramcars in service are equipped with Saft 19 MRX 260 batteries in integrated trays. The MRX has a centralized water-filling system that saves time and reduces maintenance costs. The batteries provide back-up power for emergency lighting, ventilation and passenger communication as well as emergency braking.

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Saft back-up power for Alstom railway speed record

When a French railways high-speed train (TGV) smashed the world railway speed record **on 3 April 2007, the train's manufacturer, Alstom, chose Saft back-up batteries for the attempt.**

The specially modified V150 prototype 25,000-hp TGV made up of 2 engines and 3 double-level cars, reached 574.8 km / h (356 mph) on the track between Paris and the eastern city of Strasbourg.
Trains in normal service on the recently opened high-speed track will be allowed to reach 320 km / h.
The record-breaking train, like all of France's high-speed trains, was equipped with Saft Ni-Cd Matrics MRX-type batteries, which provided optimum back-up power for the TGV's auxiliaries and braking.

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Customized Li-ion and Ni-Cd batteries on Joint Strike Fighter's first flight Show

Saft was chosen by the transatlantic aerospace systems and equipment manufacturer GE Aviation (formerly Smiths Aerospace) to supply both Li-ion and Ni-Cd batteries for the Lockheed-Martin F-35 Lightning II, which made its flight on 15 December 2006 in Fort Worth, Texas.

Saft's Li-ion 270 V High-Power Batteries and Ni-Cd 28 V Aircraft Maintenance-Free Batteries (AMFB) provided essential power for the JSF's flight-control surfaces as well as for start-up, in-flight battery power distribution and back-up in the event of main power failure.

Saft began work on design, development and qualification of these high-reliability batteries in 2002. This is the first time that a fighter aircraft has used Li-ion technology in mission-critical applications.

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Saft launches Li-ion aviation battery programme at Paris Air Show

During the June 18-24 Paris Air Show, Saft announced that it was cooperating with leading European aircraft manufacturers to perfect its leading-edge Li-ion technology for aviation applications.

Capturing synergies

Saft has been at the forefront of aircraft battery technology (mainly Ni-Cd electrochemistry) since 1932 and has more recently become a leading developer and supplier of Li-ion battery systems for numerous applications.

This extensive dual expertise is being leveraged, together with the experience of leading aeronautics players, in two research programmes, ELISA and BATTLION, to develop an innovative Li-ion battery system to meet the requirements of both civil and military aviation applications.

Focusing on integration

The new battery system will be connected to the DC bus, thanks to an integrated charge control and monitoring system. It features both state-of-health (SOH) and state-of-charge (SOC) indicators and communicates with an aircraft's management system. In addition to the zero-maintenance advantage and the weight- and size savings brought by Li-ion technology, the new system will reduce costs by integrating the control electronics and charger inside the battery system box.

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Saft.
From strength to strength

Strong today with its leadership in traditional technologies and markets, Saft's future looks even stronger.

Saft is the world's leading designer, developer and manufacturer of advanced technology batteries for industrial and defence applications. Addressing high performance niche markets, with highly customised, added-value battery solutions, Saft has a significant level of recurrent business and long-standing customers.

Saft is market leader in its traditional markets and technologies, and is also taking the lead in new technologies to benefit from advantage of emerging markets and applications in the future.

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