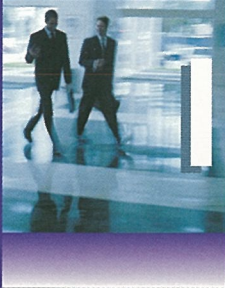


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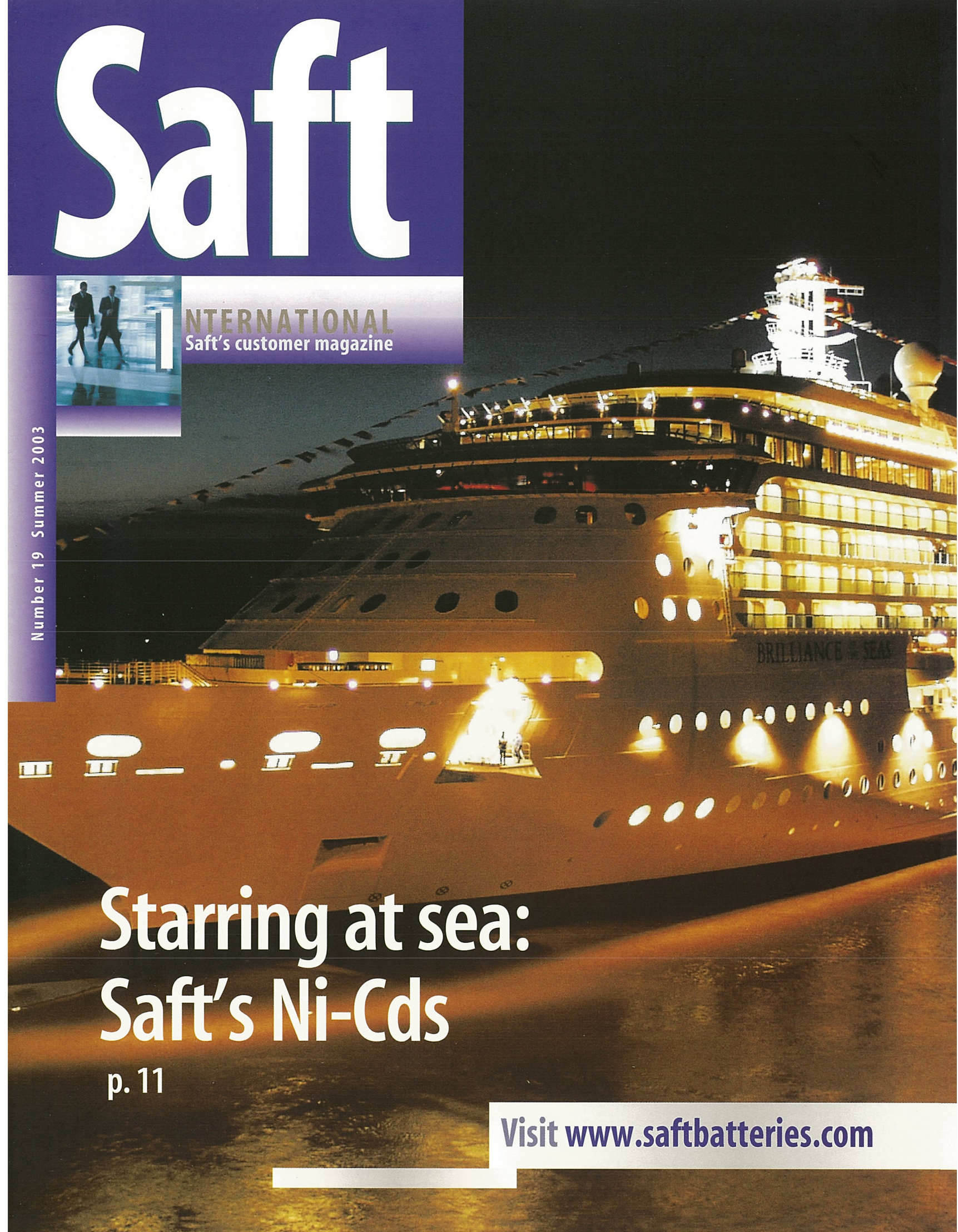
INTERNATIONAL
Saft's customer magazine

Number 19 Summer 2003

Starring at sea: Saft's Ni-Cds

p. 11

Visit www.saftbatteries.com



Strength in diversity

What strikes me most in reviewing this issue of Saft International is the increasing number of different applications where Saft products and systems are not just present but in fact are vital — even mission-critical.

The markets we've decided to address are very diversified, and the role of batteries in them is growing. This issue gives you a good sense of how many different applications our batteries serve. You'll read how:

- Airline crews help save lives at 33,000 ft,
- Riders of "pedelecs" and e-bikes go farther
- Rockets launch payloads into suborbital trajectories
- Lighthouses burn brightly into the night
- Spacecraft broadcast digital radio signals
- Urban planners plot new cityscapes
- Regional aircraft require less maintenance
- Architects benefit from flexible emergency lighting designs
- Diesel locomotives rely on backup power
- Base stations in a mobile network operate more reliably
- Cruiseliners prepare for power emergencies, and
- Torpedoes silently hone in on their enemies.



John Searle

All with Saft batteries. This market diversity — coupled with the fact that we are a truly multi-technology company with more than twelve different battery chemistries — is a further guarantee of our strength. You'll also read at the back of the issue how our technological and geographical scope has recently expanded still further with the strategic acquisitions of three assets: in Spain, Germany and Poland.

In a still-difficult global context, it is reassuring to know you can continue to rely on Saft for your most demanding power solutions when a battery or a battery system is required.

A handwritten signature in black ink that reads "John Searle". The signature is fluid and cursive, with a large initial "J".

John Searle
Chief Executive Officer

S A F T

Saft International – A magazine for Saft's customers and business partners.

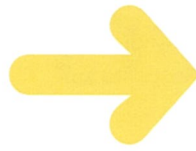
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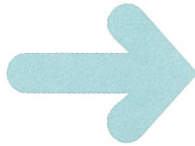
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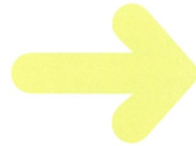
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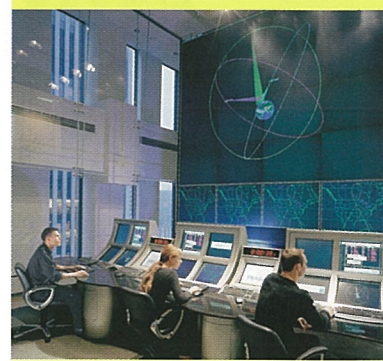
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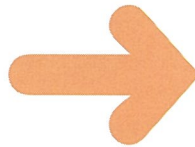
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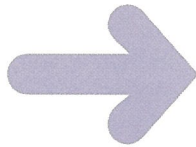
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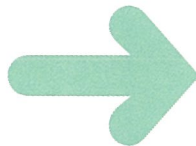
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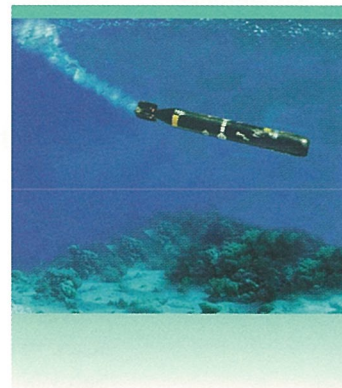
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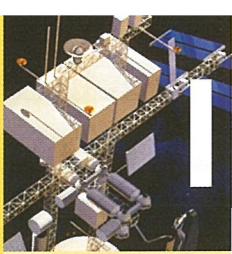
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Ride "pedelecs" signed Sachs...farther

Germany's Sachs has built a reputation over its longer-than-100-year history of supplying efficient, high-quality road machines — but with just two wheels. Its Alu Electras ride far indeed, thanks to Saft's Ni-MH batteries. And the battery (also a Saft Ni-MH) on its new extended-range Alu Touring "pedelecs" (electric-assisted bikes), boosts that range still farther.



Awarded "very good": In a 2002 competition sponsored by ExtraEnergy (an independent non-profit organization that promotes "muscle-electric" vehicles), Sachs's ELO-Bike Touring model took first place in a field of 13 and was rated "very good".

The term "pedelec" describes the bikes' combined energy sources: pedaling and electricity. The user has to supply the former energy (leg power) while the latter comes from Saft's nickel-metal hydride batteries. Saft developed the Ni-MH electrochemistry for batteries used in a variety of high-energy applications. Sachs chose Saft's Ni-MH batteries as standard on its longer-range bikes. For a number of years Saft has supplied starter batteries for Sachs's gas-engine bikes. Now, on its Alu Touring models, featuring a range of up to 80 km (more than 45 miles), Sachs has moved the motor up to the front wheel and switched to Saft's Ni-MH batteries for power. And on Sach's new Alu Electra e-bike, requiring no pedaling effort and sporting an aluminum frame (hence the "alu"), the range reaches 20-35 km.

MH bikes, the Sachs machine with Ni-MH takes riders more than 50 percent farther — depending on terrain, headwinds and other geographical factors affecting a ride. Its Saft battery can be recharged 500 times or more. Sachs's Hanns-Peter Greisinger, purchasing manager, notes that Sachs evaluated Saft's quality procedures and the Sachs people were "impressed".

Added range

The Alu Electra e-bike, meanwhile, can speed along at 20 km/h (12 mph), taking riders "effortlessly" — to use the Sachs expression — past "long lines...of cars" stuck in traffic jams. It is available with Saft's Ni-MH batteries. The Alu Electra also helps fight pollution in yet another way, Sachs points out: Riders avoid increased exposure to the nasty rush-hour traffic fumes because the Alu Electra goes so fast. Sachs views its Alu Touring model as a

"real alternative to the car, bus and scooter". A pedal-assisted electric motor cuts the rider's effort in half — and, Sachs adds, "The rechargeable battery is very efficient in its power consumption." The higher-energy Saft battery on the Alu Touring bike can take a rider on trips of up to 80 km (45 miles) before it needs to be recharged.

Sachs sells its e-bikes for roughly €1900 and expects its main markets to be at home, in Germany, but also in the Netherlands, Austria, Italy and Great Britain, according to Greisinger. Of the 10,000 two-wheelers it sells every year, Sachs hopes to hit 500 for its Alu Electra model and 1000 for Alu Touring. Buyers of half of this number are expected to prefer the extended-range Ni-MH batteries, signed Saft. ■

Quality: "impressed"

Each bike battery, with 20 Ni-MH 1.2 volt cells delivering a total of 24 volts and 15 ampere hours, weighs just 6.4 kg (about 14 lbs). Compared to non-Ni-

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Emergency lighting at new heights

Higher-temperature operation and longer lifetimes are two pioneering battery features that emergency-lighting distributors heard about directly from Saft at an end-June meeting.



Breakthrough advances in electrodes and electrolyte technologies have driven the capabilities of Saft's to new performance levels. As the most important people affected by these advances are Saft's customers, they were among the very first to hear the news. It was announced at a Europe-wide Emergency Lighting Unit (ELU) seminar that Saft held for its customers at the end of June. The event drew some 50 key individuals representing 80% of Europe's ELU distribution industry. It was held at Angouleme, France, enabling participants

to visit Saft's nearby plant where its ELU batteries are manufactured. In fact, those attending witnessed the inauguration of the production lines of some of the new batteries, the VHT range of nickel-metal hydride (or Ni-MH) cells that deliver the new performance levels. The Ni-MH technology targets high-end ELU niche markets.

Heat challenges

Most self-contained emergency lighting fixtures rely on nickel-cadmium

(or Ni-Cd). Saft's Ni-Cd cells have a proven track record for being reliable at the regulatory 40°C temperature (and even up to 55°C) over a four-year lifetime. Standard Ni-MH packs provide more energy in a smaller space, but traditionally have not performed well in high-temperature environments, especially over a four-year period. Saft's engineers have focused on customizing the Ni-MH electrodes and
(Cont'd. page 6)

Thorn likes reliable Ni-Cds

In emergency lighting, there are Ni-Cds (or nickel-cadmium batteries). And then there are reliable Ni-Cds. Thorn only chooses those that will meet the European regulatory requirements, and Saft's offer meets these criteria.

As the leading manufacturer in a pan-European emergency lighting industry, Thorn knows how to comprehensively benchmark its suppliers and their products. Its emergency lighting fixtures need batteries that will operate effectively when called upon in an emergency, even in the most demanding applications — after four-year exposure in blistering desert-like environments of up to 55°C. Some Ni-Cds can do that, but not all; Saft's certainly can.

Thorn Lighting Group (www.thornlighting.com) is a leading supplier of professional lighting equipment for commercial, industrial and outdoor applications, with a market-

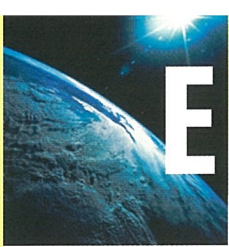
leading position across Europe. It sells many tens of thousands of emergency lighting fixtures every year. Comments Chris Hodgson, Thorn's group buyer, "We benchmarked several companies on a 'head-to-head' basis. Saft sent five technical people to brief us and our colleagues at our sister company, TridonicAtco, where Saft was already a supplier." The Thorn technical review assured Hodgson and his colleagues that the reliability and performance of Saft's Ni-Cd VT D 137 cells meet the E.U. regulations. As a longstanding and leading industry participant, Thorn is committed to meeting and exceeding the most demanding technical standards to ensure complete customer satisfaction.

Logistics advantage

Emergency lighting represents a significant part of the Thorn group's more than €500

million a year in sales. Its customers appreciate Thorn as an international brand with quality products and longstanding reputation for excellent customer service and applications solutions. Thorn's Hodgson, meanwhile, appreciates Saft's flexible supply logistics. Their factory in France manufactures the Ni-Cd VT D 137 cells, and Thorn's emergency-lighting manufacturing facility in the U.K. can order and receive pallets of batteries with just four or five days notice. Thorn's supply route to its customer usually passes through the wholesaler channel, and since the building industry requires 10-day "just-in-time" deliveries, supplier performance is critical to achieving its "on-time in-full" performance targets. So reliable Ni-Cd technology combined with good logistics equals safer emergency lighting for Thorn and its customers. ■

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Evolving planet

(Cont'd. from page 5)

electrolyte to enable the batteries to withstand the high temperatures in which ELUs must operate. The negative metal-hydride electrode in the VHT range has additives that slow down the corrosion typical of other MH electrodes when exposed to high temperatures. The nickel positive is now made using foam technology to get more energy. (The positive nickel electrode in Ni-Cd ELUs is sintered.) And the electrolyte has been optimized, using Saft-patented technology.

As a result, the new VHT range (including both AAs and Cs cells



— see photos, previous page) now passes the four-year operating test. Charging procedures have also been optimized, a key part of extending the Ni-MH's lifetime in ELU applications.

Ni-Cd: still longer

At the same ELU seminar, Saft unveiled its new Ni-Cd VT D series, which is specially designed to accept a permanent overcharge in high-temperature environments. Saft has even improved the mechanics of this range so that ELU installations can rely on the Ni-Cds for up to twice the typical four-year regulatory lifetimes. The VT Ds will be sampled later this year and move into volume production in 2004.

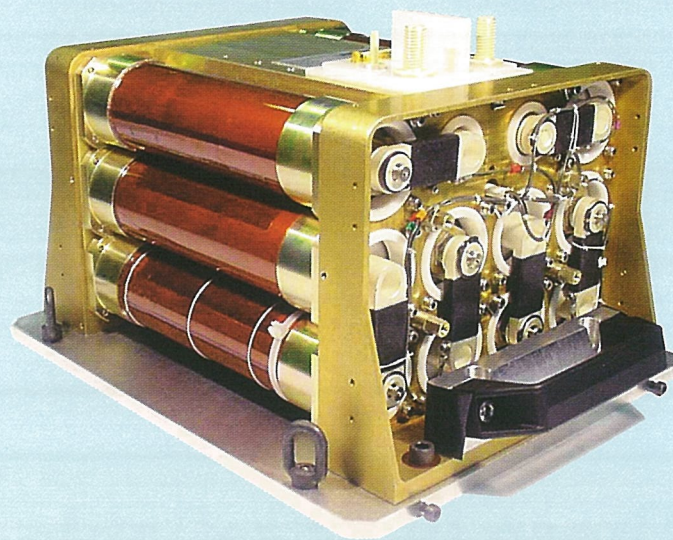
In addition to ELU applications, the new Saft batteries are also drawing interest from customers in professional lighting and power backup systems (for the VHTs) plus security devices and memory backup systems (for the VT Ds).

During the end-June seminar, participants also heard an evaluation of the future of lithium-ion batteries in the ELU market as well as an overview of regulatory obligations for used fittings and spent batteries.

And, to take advantage of the seminar's location in France's cognac-producing region, participants toured a distillery before enjoying dinner at a congenial restaurant featuring regional cuisine. Yes, Saft is taking the ELU industry to new highs! ■

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Lithium-ion heading for space

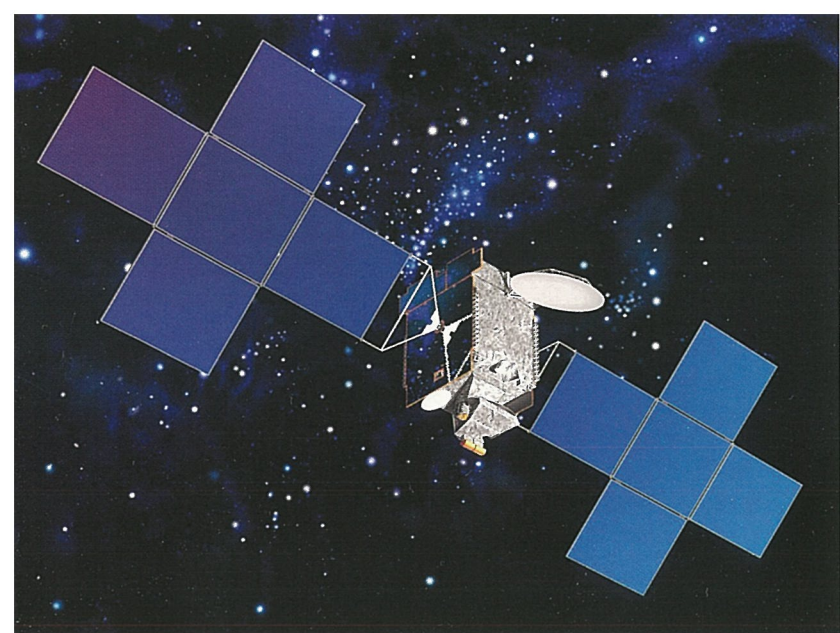


As part of its fast-advancing space program, South Korea successfully launched a landmark liquid-fuel three-stage rocket into its planned suborbital trajectory. Saft's lithium-ion batteries (photo) flew on the rocket, turning in a perfect performance.

A representative from the customer — the Korean Aerospace Research Institute — wrote to thank Saft after the launch last November. In an e-mail he said: "I appreciate your cooperation for supplying the Li-ion batteries on time for assembling the rocket and satisfying the quality" requirements for the KSR-III rocket. (KSR stands for Korea Sounding Rocket, a term used for launchers on suborbital missions.) He added, "I hope to continue... [doing] business with you in the near future."

The battery was ordered and delivered in a very short time frame last year. Each of the 10 cells on Saft's VEL 140 S delivered 340 amps for five minutes. The battery powers the engines' hydraulic actuator pump. The technology was identical (except for the electrolyte) to the Li-ion batteries that Saft supplied for Stentor, the French experimental satellite that was lost in the failed Ariane 5 launch last January. ■

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Enjoy ad-free radio digitally, from space

Are you radio-tired of ads that irritate you as you drive? Want to listen just to your preferred program, without ad interruptions? Your in-car answer to these questions may come from way overhead: Satellites in geosynchronous orbit. With Saft batteries on-board in space.

SIRIUS is the name of a space-based digital radio broadcaster. Across all of North America, it delivers perfect-quality streams of music and other content to drivers who have equipped their cars for this “blistering” listening experience. The digitally-hot SIRIUS satellite relies on its solar array panels for power when it’s in view of the sun. When it isn’t, it shifts over to Saft’s batteries, which seamlessly pick up the space-based power delivery requirement. In other words, SIRIUS listeners on the ground don’t know when the music they’re enjoying comes through thanks to solar-panel power or Saft batteries in space. And, what counts is the listeners’ experience — especially the experience of those seeking to avoid advertisements. They like the ad-free environment, and so are willing to pay more for their subscription to digital space-based music.

The listening difference

SIRIUS, from its orbit over North America, makes a big difference, at least to its subscribers/listeners. In addition to being 100% free of commercials (some broadcast radios have up to 18 minutes an

hour of ads), it dedicates 40 streams to sports, news and entertainment. It features live in-studio performances and interviews (photo, right) that add a new dimension to the music-listening experience. Saft’s nickel-hydrogen batteries replace the energy of solar arrays when the SIRIUS geostationary satellite is not in range of the sun’s beams — around the equinox in fall and spring (September and March 21). At this time of the year, the geostationary satellite’s solar panels get less and less exposure to sunlight, and the Saft batteries take up the job: supplying power to the satellite’s media emission services.

Lithium-ion option

Saft’s space sales director, Annie Sennet, comments: “The high power demanded by the SIRIUS satellite for broadcasting the radio signals has yielded Saft’s highest-capacity nickel-hydrogen batteries in space to date — 178 Ah cells, to meet the customer’s requirements. We were excited to have our cells aboard SIRIUS and are currently having our latest-technology Li-ion cells considered aboard another direct-to-home satellite radio supplier.”

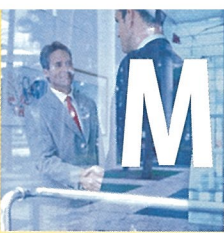


“This is an emerging market in satellite services,” Sennet continued, “that has started to catch on in the consumer market, especially as daily commutes and time spent in the car become a bigger part of everyone’s day. For such applications, the more targeted the signal has to be, the more powerful a satellite needs to be.”

Music & more

The Saft-powered SIRIUS satellite delivers music and much more to Earth-bound subscribers. One music library that SIRIUS users have access to includes more than half a million songs. SIRIUS positions itself as a satellite entertainment service. Sixty of its music channels never have ads. Forty world-class channels deliver news, sports and entertainment channels. All powered by Saft batteries — when the satellite’s orbit requires on-platform power. ■

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Turkish rail backup power

Twenty-six Toshiba electric locomotives running on Turkey's railway are having their previous pocket-plate Ni-Cd batteries replaced by Saft's advanced SRM-technology batteries.

The railway, known by its Turkish initials as TCDD (or Türkiye Cumhuriyeti Devlet Demiryolları), is now benefiting from a reliable source of low-maintenance backup power on its E43000 Toshiba locos. The SRM design features sintered positive and plastic-bonded negative electrodes. This technology makes them up to 20% smaller and lighter than conventional batteries with similar performance — a major factor for today's rolling-stock applications where low weight and top energy efficiency are crucial.

Two thousand kilometers of TCDD's 11,000-km network are electrified. Main-line electrification began in the mid-1980s, starting with the Istanbul-Ankara line. The long-term goal — which is almost completed today — is electrification of TCDD's backbone network: from the Bulgarian border to Istanbul, Ankara, Sivas, Çetinkaya, Malatya and then down to Iskenderun.



Greater reliability, less maintenance

The Saft SRMs are also extremely reliable, yielding a service life of up to 15 years. That's six times longer than the minimum lifetime required by industry specifications. The Ni-Cds also don't suffer from the "sudden-death" failure that can afflict lead-acid batteries. Emergency discharges can be performed within a wide temperature range (from -50°C to +70°C), while charging can be

90% complete in just five hours. And the SRMs, which tolerate cycling that can be deep and often uncontrolled, resist arid conditions and heavy vibration over long periods without any effect on their operational capability.

TCDD engineers will also appreciate the stretched-out maintenance exams, which can take place at the normal rolling-stock checks. The SRMs' electrolyte doesn't need to be changed during their entire lifetime and their distilled water needs to be replenished only every two years.

The new Saft batteries have also enabled TCDD engineers to return to the originally specified 120 V charging (as opposed to the 110 V level that the previous batteries had required). Each loco is being equipped with eighty-two SRM 105 P cells (13 crates of six cells and one crate of four cells), each with 105 Ah capacity. The cells additionally feature plastic containers that come in compact, stainless-steel crates. ■

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Northern Ireland's SRX power

Spanish rolling-stock manufacturer CAF is building 23 three-car diesel multiple units (DMUs) for the Northern Ireland Railways. The three-car DMUs will be equipped with Saft's SRX batteries for starting and auxiliary power and run at speeds of up to 160 km/h (100 mph) between Belfast and Dublin as well as on the railway's suburban Belfast routes. The rechargeable Ni-Cd SRX is a high-power battery that Saft developed specifically to deliver short-duration, high-current discharges of up to one minute and at five times its 190 Ah capacity. All 23 DMUs are to be in service by October 2005 after a first delivery in May 2004. ■

Going solar in Scotland

Scotland's Northern Lighthouse Board is converting many of its facilities from gas to solar power. Saft's Sunica batteries are specially designed to support the conversion.

Along 10,000 km of coastline, the Board operates more than 200 lighthouses along with a range of other infrastructure such as buoys and beacons. A program began in 1984 to convert many of the original "minor lights" (lighthouses with ranges of between five and 30 or more kilometers) to electric from gas power. The original lead-acid batteries were found to be too expensive because of the regular replacements that were required. So in 1987 the board chose Saft's nickel-cadmium Sunica batteries, which offer an enhanced life span of up to 20 years.

Now, there are 83 land-based sites with solar power. Sunica's energy storage effi-

ciency enables the batteries to accumulate sufficient reserves from the lighthouse's solar panels to ensure reliable operation at night and even throughout the much less sunny months of winter. The Sunica pocket-plate batteries feature constant charging efficiency, continuous operation at any state of charge and minimal self-discharge rates. They provide high performance even at very low charge states and operate efficiently at both high and low temperatures. And their long cycle life extends even to when the charge/discharge cycle involves 100% depth of discharge. ■

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Extreme power

“Kilts” boost mobile phone reliability with Ni-Cd

A mobile base station in Scotland (where men in local style traditionally wear “kilts”, not trousers) is increasing reliability while reducing capital expenditure for operator T-Mobile. How? By installing Saft’s Ni-Cd batteries.



Scotland stretches way out north, well into the upper reaches of the North Sea where islands such as Orkney and the Shetlands lie. It’s a place where winter nights freeze ice-cold and summer mid-days can fry super-hot.

Germany’s T-Mobile — whose slogan is “Get more from life” — years ago won a license for GSM service across the U.K. They began delivering voice service to subscribers, although not just those in urban and metropolitan areas but also to those in remote places, such as Britons living in northern islands — and visitors there.

Beating lead-acid... at a “key site”

To reach residents of Orkney and the Shetlands (as well as those visiting them), T-Mobile built a base station far up north. By switching to Saft’s NCX rechargeable nickel-cadmium (or Ni-Cd) batteries designed for telecoms infrastructure applications, the Scotland T-Mobile base station now reliably ensures up to 20 hours of operation in the event of a mains failure. The previously installed valve-regulated lead-acid



(VLRA) batteries provided two-thirds less operating time — only six hours — and with considerably less reliability. The station sits at 287 meters (about 300 yards) above sea level on a hilltop where the local utility supplies mains power. Should the mains fail, a Saft 48 V battery kicks in to ensure the resilience of the



Starry nights on brightly lit liner

Passengers and crew on four luxury cruiseliners in Royal Caribbean International's fleet will be benefiting from the reliability of Saft's Ni-Cd batteries for backup power. Two of the "Radiance-class" liners have already

entered service. Saft's lighter, more-compact SPH batteries (replacing lead-acid batteries) can supply 188 kW for a minimum of 30 minutes to support the ship's key electrical services, including emergency steering and lighting. ■

local phone communications network. T-Mobile's Stephen Rennie observes that the station "is a key site for T-Mobile, even though it serves a relatively small number of customers. This is because many of the local communities — especially on the islands of Orkney and the Shetlands — rely on it as a vital communications link."

Reliable back-up power

Servicing remote base stations is difficult. "The previous lead-acid battery," says T-Mobile's Stephen Rennie, "...only [provided] six hours of operation [when the network went off-line], and we wanted to achieve a much greater safety margin before a mains power failure causes the radio station to go off-line." "By switching to Saft's NCX 500 Ah battery," Rennie continues, "we now have

up to 20 hours of reliable back-up power." As a result, local utilities have more time to restore power supply, or get a generator to the site. And customer service levels improve.

Electrochemistry edge

Saft's NCX is a sturdy cell-type block battery that Saft has designed to meet demanding requirements of remote or "outside-plant" telecoms requirements, including local or access terminals, base transceiver stations, base-station controllers, optical node units and still more infrastructure equipment. It fits most existing valve-regulated lead-acid battery installations.

By combining stable sintered/plastic-bonded plate technology with flooded electrolyte and corrosion-free chemistry, Saft's NCX eliminates problems such as

dry-out, grid corrosion, plate growth and thermal runaway.

Less maintenance, longer service life

"The previous VRLA back-up battery only provided six hours of operation," says T-Mobile's Rennie — with reliability posing further problems, given the station's temperature extremes. Saft's Ni-Cds provide greater reliability and more than triple performance time, which now reaches up to 20 hours. Maintenance costs fall as service life increases. Greater return on life-cycle investment, more efficient operation and higher reliability. What could be better than Saft batteries with T-Mobile services? ■

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Power solutions

In the air: Tempus 2000 helps save lives



You're a flight attendant, and suddenly — mid-Atlantic, for example — a passenger seems to faint. What do you do? Simple. Roll out Tempus 2000, a device from the U.K.'s Remote Diagnostic Technologies (RDT) that helps save lives. And its power comes from Saft's rechargeable lithium-ion (Li-ion) batteries.

The device is powered by a Saft battery with four series-connected MP 176065 cells operating at 3.6 volts. The battery's rendered still safer thanks to a ruggedized case and customized electronics. Its "fuel gauge" indicates the state of charge on an LED.

From nearly any remote location, the Tempus 2000 can connect a passenger's heartbeat via satellite to doctors on the ground. Saft's Li-ion batteries enable flight attendants to take RDT's portable Tempus 2000 right to the spot where a passenger is suffering a possible heart attack or other malaise. They can then transmit cardio and other data to a ground medical center. There, specialists analyze the data and help the crew deliver the appropriate response.

During a recent flight, the Tempus 2000 and its Saft MPs (or medium prismatic batteries) made history. A passenger on a Chicago-to-Manchester flight was one of the first-ever on a commercial airline to have an electrocardiogram (EKG) taken in-flight with data transmitted to physicians on the ground in the U.S. The high quality of the EKG enabled doctors to advise cabin crew on appropriate emergency treatment.

British certification

For onboard equipment such as the Tempus 2000, airlines need to obtain certification from aviation authorities, such as the British Civil Aviation Authority, or CAA. One key reason that RDT came to Saft with its Tempus 2000 was that Saft batteries are certified not just by the CAA, but also by related European, American and Russian civil aviation authorities. In fact, Saft's lithium primary batteries were the first to be CAA-approved.

Saft helped RDT obtain approval for the battery-related aspects of its in-flight medical kit efficiently. Says RDT's managing director, Graham Murphy, "With Saft's competence in airworthiness approvals, we were able to get the Tempus 2000 on a number of British airlines faster, since Saft knew the aviation authorities' battery hurdles." Additionally, Tempus 2000 and its Saft batteries enable a person with no medical experience to collect and transmit the vital signs of a sick person, including blood pressure, pulse and heart condition, from any remote location. ■

Quality data transmission

The passenger (center in photo), who survived, later commented, "I was amazed at how quickly the flight attendant reacted, and how quickly the equipment was set up and information communicated." The MedLink ground-based physician working on the case said, "The EKG was virtually the same quality as what I see in the emergency room" — without any long-distance transmission distortion. MedLink is the world's leading response center for the aviation and other industries. The airline's chief medical officer added, "We've used Tempus many times, [and] I'm delighted that this was so effective."

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Found you! Eureka, from Italy

Where are you? Space-based resources like the Global Positioning System (or GPS) have proved highly useful in navigating. Now, with some ground-based improvements made in Italy, they're also turning out to be useful in measuring how many people see outdoor advertising.



Eureka” is the word in ancient Greek that meant “Found!” And in the case of a project known as Audiposter, Eureka is the name of an Italian company that developed firmware that can calculate a receiver’s position — even when satellites are not easily visible, as happens often in urban environments. (Firmware is computer programs contained permanently in a hardware device, such as a read-only memory.)

Another Italian company, Eurisko, wanted to measure how often an outdoor billboard was viewed in the same way that radio and TV audiences can be measured. With the Eureka-enhanced GPS receivers, Eurisko can pinpoint an individual’s location and compare it with a data base storing the position of billboards all across town. All the person wearing it has to do is to indicate the type of transport he or she is using (and even errors made in doing this can be easily corrected as data come in).

First worldwide

The project started in 2000, and right from the beginning Saft’s lithium-ion MP 144350 batteries were used for the portable GPS receiver that the user wears (photos). In an initial production run, 750 receivers were built, each weighing just 200 gr but with an operating time of more than three days on a single charge. And during that period, the receiver samples satellite signals once every second. The survey is now expanding to reach 36 towns across Italy and will run through mid-2004. A number of audience-measuring experts have expressed their interest in the technology, which is the world’s first to provide such useful data.

Urban sociology

In addition to providing information on how much a given billboard is worth, in

terms of advertising revenue, compared to any other one, the data analysts were interested to find out how Italians vary their itineraries over a two-week period. (European data privacy regulations naturally protect the selected users whose movements are tracked.) When analyzed, the data can show how drivers hunt for car parks, what traffic conditions are like, how many people visit which local markets, and what people do when they’re bored or killing time. The resulting data base can be used to optimize public transportation routes, decide where to put shopping malls and change a city’s road network. Indeed, from a little high-tech gadget, it may even be urban sociologists who shout, “Eureka!” They’ll have found valuable, reliable data on how city-dwellers live and move about. ■

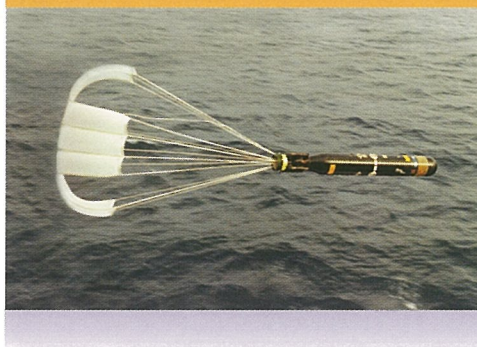
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“Biting-edge” seamanship: **Sting Ray** upgrades

Light-weight torpedoes manufactured by BAE Systems are intended for air- and sea-launch against enemy submarines. Sting Ray, the torpedo, is undergoing its first modification (or Mod 1) upgrade, including Saft’s magnesium-silver chloride batteries. They will help keep Sting Ray at the “biting edge” of Britain’s torpedo technology.

For over two decades, Britain’s Royal Navy and Royal Air Force have relied on the Sting Ray to protect their naval forces. Their performance capabilities enable them to eliminate threats that are immediate, short-range dangers. In February, the U.K.’s Defense Ministry awarded BAE Systems a contract worth £441m (roughly €625m) to supply the next-generation Sting Ray. The “biting-edge” torpedo features digital homing as well as guidance and control systems that extend Sting Ray’s performance into complex shallow-water environments. As prime contractor, BAE Systems has overall responsibility for the new Sting Ray program. And it has chosen Saft as its battery supplier, a role which BAE Systems’ Chris Kelly — procurement manager at the company’s Underwater Systems division — terms significant. “Saft is one of the dozen major players in this program,” he notes. BAE Systems, which designed the battery for the original Sting Ray more than 20 years ago, requires Saft to produce the batteries



for the Mod 1 program while respecting the prime contractor’s design completely. According to Kelly, “Saft passed” the quality and reliability tests set by BAE Systems as part of its design authority.

Long service life

When the Mod 1 Sting Rays enter operational service in 2006, the torpedoes — and their Saft batteries — will not require any major maintenance for more than 20 years, BAE Systems says. The Sting Ray program fits neatly into the U.K. Defense Ministry’s “SMART” acquisition policy, providing a

very cost-effective through-life solution for the U.K.’s light-weight torpedo needs. The policy calls for purchasing “faster, cheaper, better” — and Saft is now part of this equation.

Saft’s batteries provide a Sting Ray with 300-volt power yet weigh only 49 kg (about 110 lbs) without electrolyte — since the sea water that they are fired into is their electrolyte. Because the torpedoes are electric, they approach their targets “silently” at high subsea speed, making them much more difficult to detect. They also reach terrific speeds that could rival any car on a highway. “We’re pleased to be supplying BAE Systems with this Sting Ray battery,” says Saft’s André Petit. “We’re the preferred supplier for other electric-powered torpedoes, and this contract is logical in light of our experience in the industry. We’ll be working hard to meet the prime contractor’s requirements, I assure you.” Saft is the only supplier with the complete range of battery technologies used in this application. ■

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Upgrading A244 light-weight torpedoes

Since mid-2001, the underwater systems operations of Italy's Whitehead Alenia — or "WASS", as it's abbreviated in Italian — has been working with Saft to upgrade its electric torpedoes, in particular with the latest silver-chloride/magnesium technology.

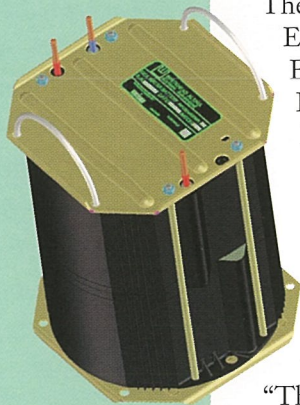
Engineers and technicians in Saft's defense unit began development on a new sea-water (electrolyte) torpedo battery based on silver-chloride/

magnesium electrochemistry. The battery is for the A244 light-weight torpedo's third modification. Compared to the torpedo's standard V616 battery, the new Saft battery — called the Super V616 — delivers 50% more power and energy. At 310 volts and with 43 kilowatts, the 246-cell battery delivers 6.75 kWh over a nine-minute operating period.

Computer modeling tools helped determine current leakage and model different water-flow distribution. They also played a part in understanding various velocity system components as well as in determining water velocity, pressure drops, and more.

Last December, the manager of White Alenia's mechanical design department visited Saft to view qualification tests of the first two batteries. Their performance met the A244 requirements; large-scale production has begun with deliveries to follow.

The A244 has been cleared for several types of anti-submarine warfare on fixed- and rotary-wing aircraft. It has a range of some 6.5 km (about four miles) and its electric motor achieves a speed of up to 36 knots. After release from the launch vehicle, the torpedo descends by parachute to water level, where the parachute is jettisoned and the seeker is activated by its battery with the arrival of sea water — its electrolyte. ■



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Range and efficiency: the Embraer 170 edge

Brazil's Embraer is now set to begin delivering its soon-to-be-certified aircraft as part of its Embraer 170/190 family of "more-than-regional" jets.

Airlines in Europe and the U.S. — the first to take delivery of the jet — will also benefit from Saft's ultra-low-maintenance (ULM) batteries that help reduce the aircraft's operating costs.

The Embraer 170 flies farther than its immediate competition and is more efficient in terms of operating costs — and that includes its aviation battery. Embraer's 234 firm orders (and 289 options) for the new Embraer 170/190 family are a guarantee of the aircrafts' future in the challenging aviation market.

The family includes the 70-passenger Embraer 170, the 78-passenger Embraer 175, the 98-passenger Embraer 190 and the 108-passenger Embraer 195.

The Embraer 170 can fly 2,100 nautical miles. This capability, compared with operating costs, has made it the backbone of US Airways' Express fleet with an order for eighty-five Embraer 170s. US Airways' CEO David Siegel said,

"This aircraft will strengthen the company as it is the right aircraft for the right market."

On June 10, JetBlue Airways announced an order for 100 Embraer 190s with an option for an additional 100. David Neeleman, CEO of JetBlue Airways, said, "JetBlue will bring its superior product and award-winning customer service to the many mid-size markets desperately in need of low fares and high-quality service." Previously the 170/190 family had also been ordered by SWISS, Air Caraïbes, Alitalia, GECAS and Poland's LOT.

ULM technology

Operators of all of Embraer's 170/190 family will benefit from Saft's ULM rechargeable Ni-Cd batteries. The 27 Ah unit was jointly designed and developed by a working team that comprised representatives from Embraer, Hamilton Sundstrand, Eldec and Saft.

(Cont'd. page 16)



Partnership

(Cont'd. from page 15)

The ULM technology enables Embraer and its airline customers to take advantage of a higher-capacity battery that is lighter in weight per ampere-hour. The technology also features extended maintenance intervals and superior performance in low-temperature environments, also reducing life-cycle costs significantly compared with conventional Ni-Cd batteries.

Doubled maintenance interval

Key to the ULM's improved performance and reduced life-cycle cost is its plastic-bonded negative electrode, which dramatically reduces water consumption by cutting current drawn during overcharge.

The ULM's negative plate also weighs less, packs higher energy density and enables increased electrolyte reserves. The ULM's sintered positive electrode combined with a special electrolyte increases charge efficiency. The combination of all these features doubles the interval between maintenance checks.

Saft's ULM technology is quickly becoming established as the industry standard for Ni-Cd aviation batteries requiring extended maintenance intervals. Since their launch in 1995, over 8,000 ULMs have been put into service by both large and small aircraft operators. ■

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Toolbox

Operations expand in Europe



End-June, Saft invited its customers in Spain to celebrate the opening of its new subsidiary, based in Madrid. These new assets are just one part of three acquisitions made by Saft earlier this year.

Emisa (a well-known brand in Spain) brings Saft the battery technology and marketing expertise that it has developed in single-cell Ni-Cd batteries and rectifiers. To make a home for these Emisa assets, a new subsidiary — Saft Baterias — was set up.

In Germany, the Friwo operations that Saft has acquired supply batteries for torpedoes with electric motors. Friwo's Silberkraft-brand batteries are used in STN Atlas's torpedoes.

In Poland, Centra is a well-known name in the Polish railway battery business. The Centra sales assets form a nice fit with Saft's manufacturing operations in the Czech Republic.

All the assets previously belonged to Exide. ■

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ERJ 145 also to use Saft ULMs



A new ERJ 145 battery with 44 Ah is the first Saft ULM battery to be approved by Embraer as original equipment for its family of regional jet airliners.

A pressurized jet for regional transport, the ERJ 145 is characterized by its high performance and low operating costs. Available in Extended Range (ER), Long Range (LR) and Extra Long Range (XR) versions, the ERJ 145 is equipped with

quiet, fuel-efficient turbofan engines. The cabin of the ERJ 145 has a maximum pressure differential of 8.4 psi, offering passengers the comfort of a smooth, relaxed flight above bad weather. Since the first delivery in December of 1996, more than 600 of these successful Embraer jet aircraft have been delivered to airlines around the world. Customers include Continental Express and AMR Eagle as well as European and Asian regional airlines. ■