

Li-ion technology for surface ships

Advanced energy storage for new generation AES



Saft: naval battery expert

Progressive solutions for evolving needs

As surface ships turn all-electric...

Advances in efficient energy storage and distribution technologies are central to the move towards fully integrated, all-electric ship (AES) architecture. This evolution will also improve survivability and endurance in conflict.

Saft researches, designs, manufactures and deploys lithium-based systems to navies worldwide. Complete, customised units include electronic and thermal controls to help meet the new efficiency demanded by the next generation of warship.

Integral to ship design

Electric power systems support weapons, navigation, communications and environmental controls and enable greater design flexibility to benefit a wide range of vessels:

- aircraft carriers
- amphibious ships
- destroyers and frigates
- corvettes and patrol craft
- fleet auxiliaries
- mine warfare
- offshore patrol

Total capability

With manufacturing plants in Cockeysville, USA and Poitiers, France, together with worldwide experience on key defence projects, Saft has both the technical capability and international standing necessary to bring vital projects to fruition and the international support network to service them.

Part of Pose²idon

Saft is part of the European *Power Optimised Ship for Environment with Electric Innovative Designs ON board* (Pose²idon) project. A primary aim of the organisation is to achieve size reduction of generating equipment and propulsion motor and Saft is instrumental in developing new battery system technologies to achieve this goal.

...Saft enables efficiency and reliability in distributed power storage networks

Saft's cutting-edge lithium-ion technology will bring significant operational advantages to on-board power distribution systems. Where the best balance of size, volume and performance are essential, lithium-ion provides:

- extended lifetime
- maintenance-free operation
- reduced footprint
- lower mass and volume
- suitability for high power applications

Ready for future applications

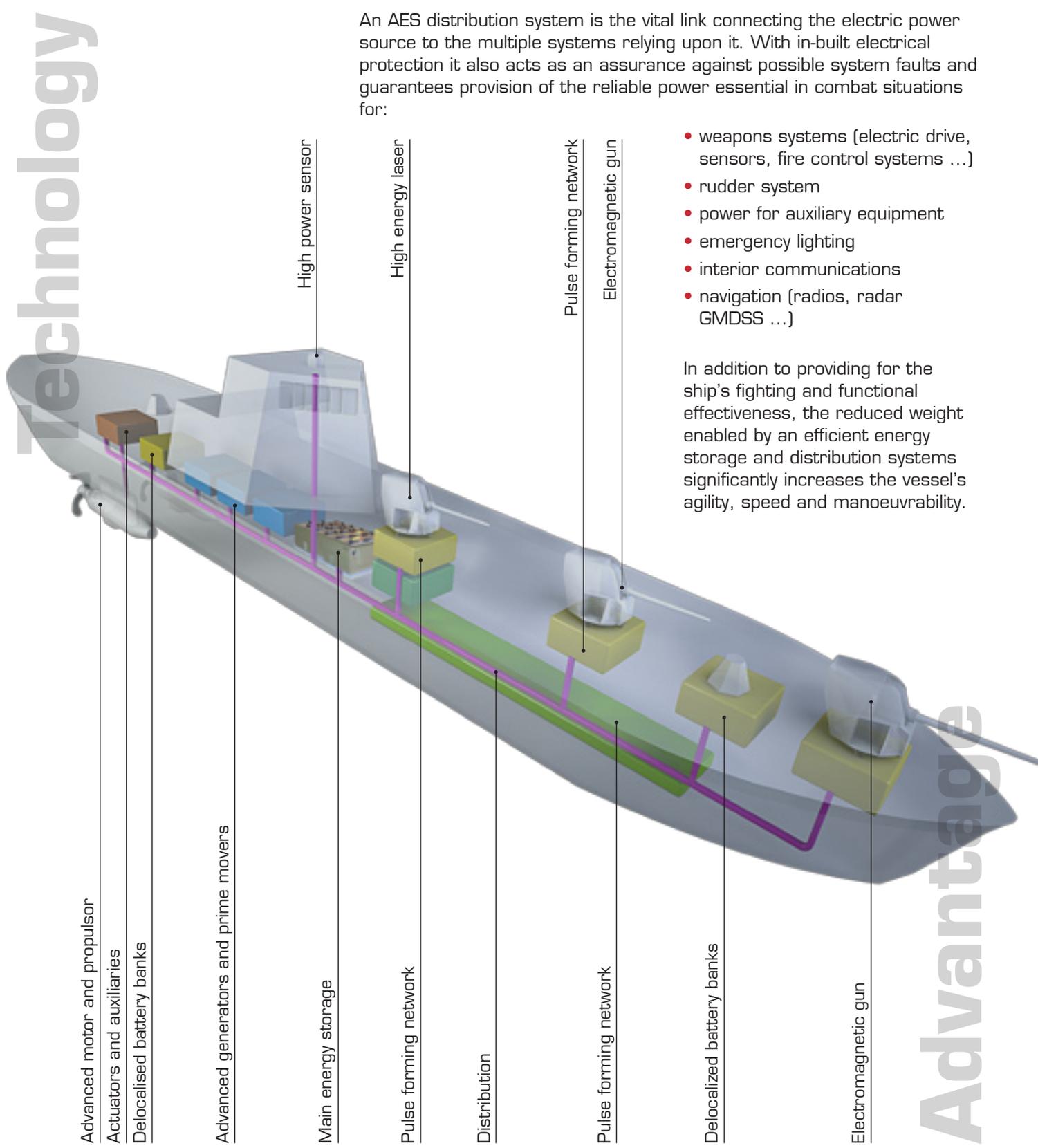
Saft Li-ion is already operational in long range AUVs, SDVs and exercise torpedoes and meets exactly the operational profile of future applications:

- electromagnetic launchers
- electrical actuators
- electric guns
- power and energy tanks
- centralised power systems
- reduced propulsion systems
- high power turbine power reserves



A single source

To maximise system integrity



An AES distribution system is the vital link connecting the electric power source to the multiple systems relying upon it. With in-built electrical protection it also acts as an assurance against possible system faults and guarantees provision of the reliable power essential in combat situations for:

- weapons systems (electric drive, sensors, fire control systems ...)
- rudder system
- power for auxiliary equipment
- emergency lighting
- interior communications
- navigation (radios, radar GMDSS ...)

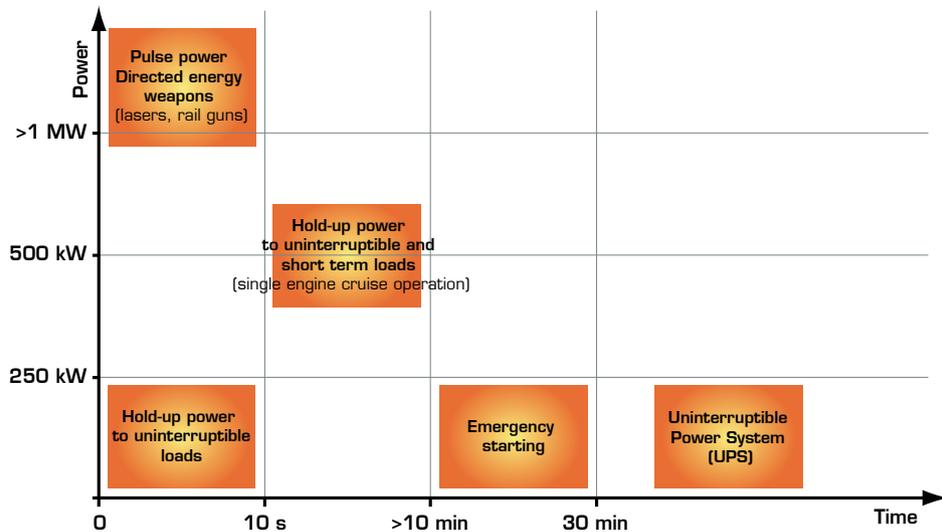
In addition to providing for the ship's fighting and functional effectiveness, the reduced weight enabled by an efficient energy storage and distribution systems significantly increases the vessel's agility, speed and manoeuvrability.

Technology

Advantage

Saft Li-ion technology

For optimum size, volume, performance

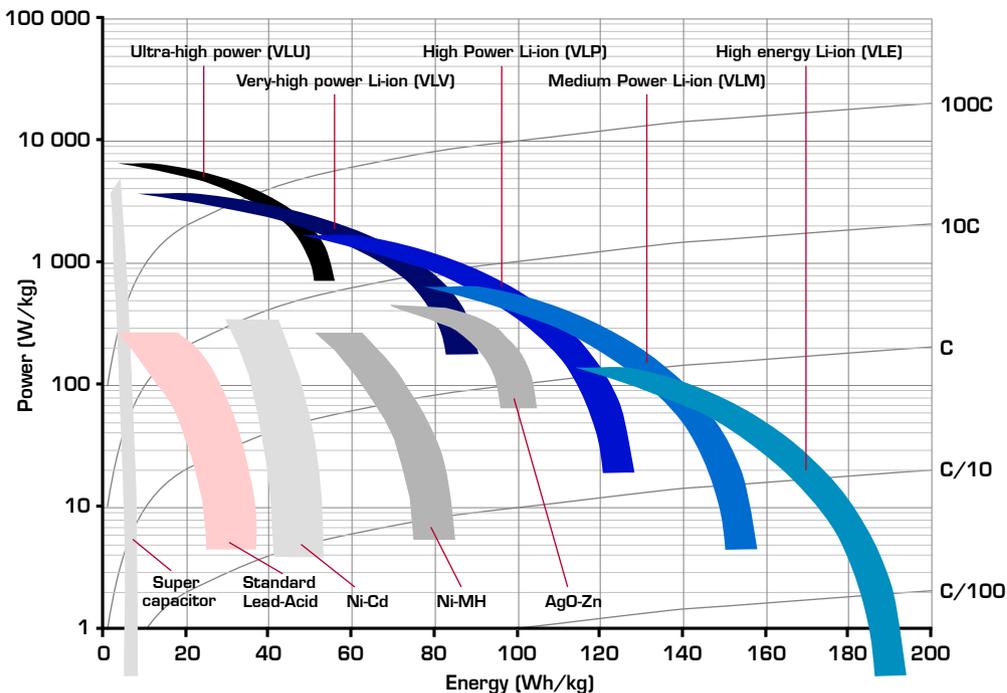


Flexible design

Saft batteries can be configured to meet demands from high energy/low current/long discharge applications to those operating with very high power pulse output, where they can match the performance of super-capacitors.

Saft's battery-based energy storage modules (ESM) include significant power conversion electronics to interface with the power distribution module. Power ratings and energy capacity of an ESM will depend on the intended application:

Li-ion: full coverage of every storage requirement



Versatile operational capability

Saft's Li-ion technology can meet the extreme demands made in typical combat operating situations: alternate high-speed followed by longer periods of low speed activity. Li-ion represents the best option for missions where reliable power is essential.

- high energy and power density
- excellent performance in defence applications
- customised for AES architecture
- no reconditioning, no memory effect
- highly reliable
- resistant to wide operating temperature fluctuations

Favourable life cycle cost

A Li-ion battery system is key to achieving optimum functionality at low operational cost. This technology is lightweight and modular, and as a compact, zero-maintenance solution it enables larger payloads to be accommodated in available hull space.

- no need to top up the electrolyte
- long storage and operational life
- contained in safe, sealed units

Saft defines, designs, delivers

The Saft concept: integrated energy systems

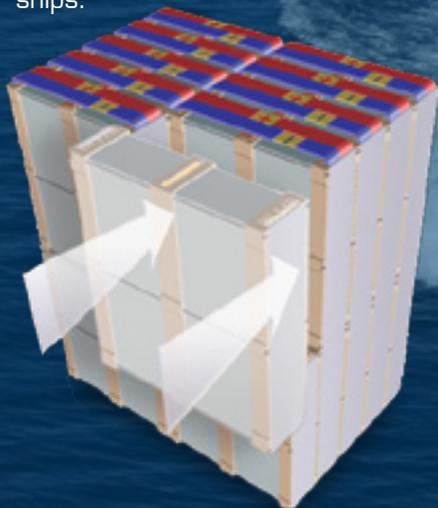
Using Saft's manufacturing process, cells built on large, cost-efficient manufacturing lines are configured to meet precise requirements.

The performance profile of Li-ion technology is ideally suited to meet intensive charge/discharge cycles experienced in typically demanding and extended mission durations.

Cells are mechanically and electrically assembled into modules or customised battery systems, including electronic devices to govern performance, thermal and safety management.

An investment in the future

Saft's experience continues to grow. Involvement in actual operations, valuable customer and operator feedback, and Saft's own extensive R&D programmes together provide a platform of quality from which the company is managing the evolution towards all-electric ships.



Environment	Mission	Design
Temperature	Autonomy	Dimension
Vibration	Speed	Payload configuration
Shocks	Civil/military	Safety

Saft's engineering team

Battery specifications

Selection of the best cells

Saft's engineers define the best Li-ion cell for your mission requirements...

...draw and simulate the battery system to give an overview...

...produce battery systems and integrate battery electronics...

...and deliver products to customers for immediate implementation.





About Saft

Saft batteries are used in high performance applications, such as industrial infrastructure and processes, transportation, space and defence. Saft is the world's leading manufacturer of nickel-cadmium batteries for industrial applications and of primary lithium batteries for a wide range of end markets. The group is also the European leader for specialised advanced technologies for the defence and space industries. With approximately 4,000 employees worldwide, Saft is present in 18 countries. Its 15 manufacturing sites and extensive sales network enable the group to serve its customers worldwide. Saft is listed in the SBF 120 index on the Paris Stock Market. For more information, visit Saft at www.saftbatteries.com

Saft

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