

Zebra battery charged with success

Is the lead-acid technology used for submarine batteries for over 100 years about to be consigned to the history book? Rolls-Royce believes so, as it packs a lot more life and energy into its latest introduction – the Zebra battery

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As the main energy source for conventional submarines – and for stand-by duty in the marine world at large – lead-acid battery technology has stood the test of time. But it has not been without its problems. Extra performance has been sought from high-energy density batteries, but their life expectancy has invariably proved to be unacceptable.

All that has now changed. Rolls-Royce has signed an exclusive 10-year agreement to market a new long-life marine battery worldwide. The technology is known as 'Zebra', and provides submarine and surface ships with new levels of performance, life, safety and cost-effectiveness.

An extension of automotive development, Zebra is a sodium/nickel chloride battery that is light and maintenance-free. The new battery embraces the latest ecological thinking and its benign construction materials are non-combustible and fully recyclable. Until the battery is charged, there are no reactive materials present in these sealed zero-emission units, and the whole concept of fault-tolerant design bodes well for long-term reliability in service.

To cope with virtually every marine battery application, Zebra battery modules can be configured in a chain or chains – in series – to obtain the required voltage. To achieve the necessary energy output, modules can then be connected in parallel.

Further evidence of power flexibility comes from the wide range of power options that are available to meet the requirements of specific vessels. Zebra modules can be supplied in configurations

Zebra modules can be supplied in configurations from 24V to 1,000V

extending from 24V to 1,000V and from 2kWh to 50kWh.

Compared with lead-acid units of an equivalent energy storage capacity, the new batteries are about 50 per cent lighter.

Zebra has been selected to power the Nato Submarine Rescue System (Page 10)



They require no topping-up, agitation or direct battery cooling. In addition, Zebra batteries bring an end to the traditional need for compartmental protection from acid spillage.

A battery with high energy density contributes directly to the operational capability of conventional submarines by enhancing ship mobility and patrol endurance. In nuclear applications, the battery supports both nuclear and ship safety, with the high energy density increasing submerged endurance after an emergency shutdown.

For air-independent propulsion (AIP) submarines, the new battery offers many other benefits, compared with the lead-acid unit. It adds significantly to the vessels' sprint and speed performance and, because it is smaller, frees valuable space for other uses. In all types of submarines, Zebra battery modules can be isolated in the event of a failure and replaced at the next planned upkeep – which means that the refit programme is no longer driven by a need to replace the main battery.

Rolls-Royce has already delivered a standard Zebra battery to the Commonwealth of Australia for testing and evaluation, and is supporting its programme for future and current requirements, which includes a feasibility review of Zebra for submarine main battery applications.