

# US companies pursue hybrid-electric propulsion

A round-up of news about electrical specialists, systems and components includes company acquisitions, low-harmonic air-cooled AC drives, main propulsion motors, diesel-electric propulsion plants as well as hybrid-electric propulsion

by Doug Woodyard

An agreement between UQM Technologies and ReGen Nautic will see the US companies collaborate in developing hybrid-electric marine propulsion systems. Energy-saving power trains for yachts, trawlers and large sailing vessels promise reductions in overall weight and maintenance costs, increased cruising speeds and silent operating modes.

For UQM Technologies the agreement marks a move into the marine hybrid electric market. Combining the application knowledge of ReGen Nautic and UQM's electric motor and controller expertise will help create systems that improve efficiency and performance, says UQM president

and chief executive officer Eric Ridenour.

The companies will work together to integrate UQM PowerPhase hybrid electric systems for a range of marine propulsion applications. Incorporating UQM motors and controllers in systems will allow the capture and storage of more energy while reducing the weight of a vessel. Better overall performance, enhanced reliability, easier operation and higher safety are also cited.

UQM Technologies, based in Longmont, Colorado, develops and manufactures power-dense, high efficiency electric motors, generators and power electronics controllers for diverse markets. A focus is on developing products for the alternative energy sector, including propulsion systems.

Located in Fort Lauderdale, Florida, ReGen Nautic USA has developed hybrid-electric propulsion systems for large leisure craft and trawlers. The company customises automation systems to the vessel design, manufactures high voltage boxes and licences the software for integration and safety systems.

A recent collaboration by ReGen Nautic with Goldfish Boat created what is claimed to be the

world's fastest all-electric tender, the 6.9m-long vessel achieving a speed of 45 knots. Its electric propulsion system, housed in a traditional outboard motor casing, is based on a 145kW UQM motor coupled with a ReGen Nautic high voltage switching box and energy management computer.

Testing continued during the Norway Boat Show in September, where ReGen Nautic chief executive officer Pierre Caouette also highlighted 'the very smooth ride' delivered by the system.

Another reference, the 12.6m-long Grand Banks trawler *Watt Power!*, was retrofitted with a serial hybrid-electric propulsion configuration featuring two motors and a 34kW battery bank that can be recharged from a 100kW generator in around 15 minutes. Clean and quiet electric-only manoeuvring is facilitated in port.

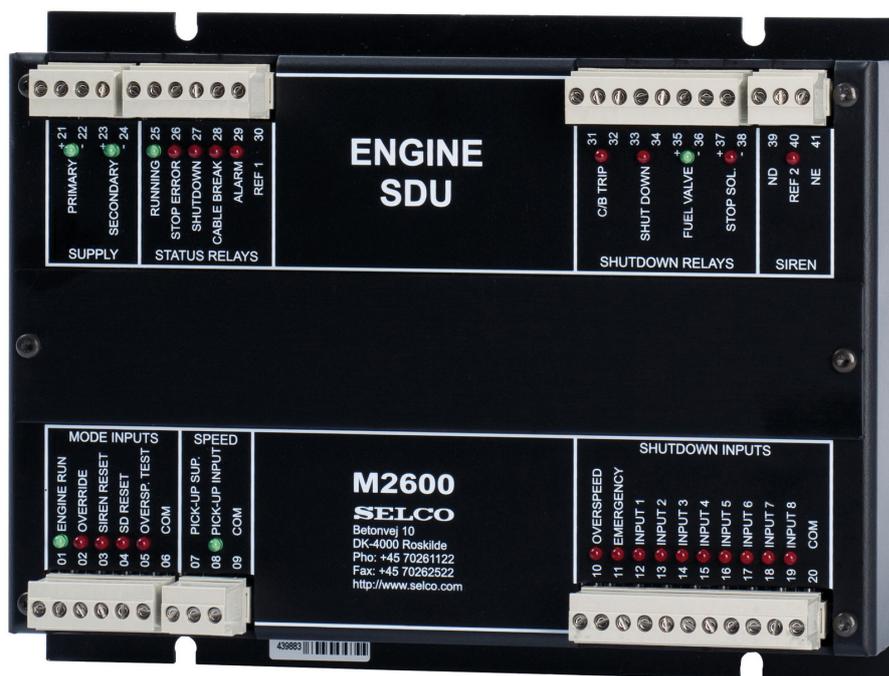
The vessel was originally powered by twin 155kW Caterpillar diesel engines, one of which was removed and replaced by a 145kW electric motor in a partial serial configuration. The operating range was extended to 2,000 miles (the normal range of a Grand Banks 42 vessel is around 600 miles). The subsequent conversion to a serial hybrid system was based on comparative data between the diesel and hybrid-electric systems.

## Selco to boost Littelfuse Startco business

Danish marine electrical system specialist Selco A/S has been acquired by US-based Littelfuse Inc and will become part of the Littelfuse Startco protection relay business based in Canada. Selco will continue all its operations in Denmark under the same management and using the same global network of agents and distributors.

Selco's arc protection, generator controls and process alarm products complement the Littelfuse Startco portfolio of products and provide a strong base for further expansion of the US company's circuit protection component and protective relay business.

- Selco products and solutions for marine and offshore applications cover power generation control and protection, engine supervision, alarm process monitoring and arc fault protection. A recent addition to the programme, the M2500 Diesel Engine Controller, is a stand-alone system offering an intuitive user interface with a graphical display and several LEDs showing the status



Selco's M2500 engine controller

and common alarms of engine and controller.

The M2500 can be configured using keys on the front of the unit, via an SD card or with a PC via a USB connection. No additional software is needed as the configuration application is saved on the M2500 itself and run through a web browser. Uploading and downloading configurations is also possible using the onboard SD RAM slot.

An event log function is provided, where all actions (such as start and stop sequences as well as alarms) are registered with date and time.

The log is saved on the controller and a copy saved on the SD RAM card. A slim-line design, similar to that of the Selco M2000, enables the M2500 to fit into a small and narrow switchboard mounted on the engine.

Covering the demands of classification societies, Selco has developed a back-up unit for engine shutdowns, the M2600, which can be used as safety back-up for the M2500 and any other engine controller or as a stand-alone unit. Parameters such as engine speed, override functions, shutdown delays can be configured via DIP switches.

The M2500 Engine Controller and M2600 Shutdown Unit form a complete control, alarm and safety system for marine propulsion

and auxiliary engines, says Selco, which cites ease of use and adaptability to different engine types.



A Selco M2600 engine shutdown unit

## Indar motors promise quiet cruising

A new 132-cabin luxury cruise vessel, *Le Boreal*, built by Fincantieri in Italy for Compagnie du Ponant of France is designed for exclusive itineraries, including the Greek and Turkish islands and the Amazon. With high-class accommodation and amenities for up to 264 passengers, the 142m-long vessel has a speed of 16 knots.

A low noise and vibration specification influenced the selection of two Indar 2,300kW/660V main propulsion motors from Ingeteam's 'silent propulsion' range, the company applying its experience in designing and manufacturing quiet motors compliant with ICES No. 209 standard. The same equipment was supplied to sistership *L'Austral* and similar units to various oceanographic vessels.

- Spanish specialist Ingeteam produces diverse alternating and direct current motors for shipboard drive applications, including propulsion motors under its Indar brand. Its references embrace fishing and oceanographic vessels, tankers, bulk carriers, ferries and dredgers.

Synchronous or asynchronous motors covering a power range from 400kW to 15MW with voltages from 690V AC to 15kV AC are available in horizontal and vertical configurations for main propulsion, thruster and pump drives.

DC motors with power ratings from 400kW to 4,000kW promise extremely precise speed regulation based on advanced converters. Such motors are applied in fishing vessels and particularly appreciated for low noise emission installations, notably on oceanographic vessels.

Submersible oil- or air-filled motors used in dredgers are designed for working at depths down to 1,000m and cover a power range from 1,000kW to 10MW with voltages from 690V to 15kV AC.

Ingeteam also develops and supplies low and high voltage frequency converters, claiming a leading position in vector control using 'three-level' technology to control rectifiers and inverters via optic fibre, and exploiting advanced semi-conductors (IGBTs, IEGTs and IGCTs). The Ingredrive modular family of frequency converters

are designed to control synchronous and asynchronous motors.

Three-level Ingredrive MV medium voltage NPC-type converters are based on three types of semi-conductors – HV-IGBTs, press-pack IEGTs and press-pack IGCTs – to form the MV100, MV300 and MV500 series. These cover a power range from 750 kVA to 27 MVA, with voltage ranges of 2.3kV, 3.3kV and 4.16kV.

Low voltage Ingredrive LV frequency converters – the LV200 and LV400 series – feature a two-level topology based on IGBTs with power ranges from 250kW to 4,000kW and are respectively air cooled and water cooled. The thyristor-based LV600 series of direct converters cover a power range up to 15MW.

Medium and high power direct-current converters in the Ingredrive DC range control excitations (DC100 series), control single-direction or reversible motors based on thyristors (DC300 series) or based on IGBTs (DC200 series).

## Vacon drives wind turbine support barge

Vacon low-harmonic air-cooled AC drives serve the propulsion plant and crane of the self-propelled heavy lift jack-up barge *Wind*. Designed for servicing wind turbines at sea, the facility is operated at North Sea sites by the Danish company DBB Jack-Up Services.

The speed of the propulsion thrusters, dynamically controlled by the Vacon drives, can be optimised to the actual speed of the vessel, yielding energy savings. The energy consumed for propulsion has fallen from approximately 1,100kW to 800kW at nominal speed compared

with the previous diesel engine-driven solution.

A DP capability – important when operating close to turbine structures in challenging conditions – enables swift changes in speed and direction. The torque of the thrusters is closely monitored by the Vacon drives to ensure they