

Luxury yacht controlled by PLCs from ABB



Sunseeker International is a renowned builder of large luxury yachts. For its latest addition to the range, the 28 Metre Yacht, Sunseeker wanted a monitoring and control system that would be both flexible and capable of offering easy access to data from all the major systems of the vessel.

With Sunseeker's conventional yacht design of this size, all of the control systems are hardwired to dedicated rocker switches at the helm. This is wasteful of space, uses more wiring and is not very flexible. Furthermore, the monitoring of system information such as voltage is carried out using dedicated meters, gauges and LED indicators.

Two PLCs monitor and control all boat systems

The chosen solution is based on two ABB AC500 programmable logic controllers (PLCs), with the main controller located centrally in the vessel and a second PLC located in the engine room. Both PLCs use the DC523 configurable I/O modules. This system is used to collect information from equipment installed throughout the yacht

and for controlling on-board systems such as bilge pumps, windscreen wipers, lighting and air conditioning.

The PLCs also monitor all of the alarm and status signals on the yacht, ranging from water level switches in the bilges to exhaust temperature alarms or pressure monitoring of fire systems. The PLCs are used to monitor these signals directly or, where required, to provide simple delays to avoid nuisance alarms or to more complex logic functions for conditional alarms.

The other main function of the PLC system is to provide automatic control of the yacht's on-board power management system.

The main PLC controls all of the equipment located in the forward half of the boat, interfacing to all of the switches and controls on the helm console. There is also a data link to the NMEA2000 communication network which is used to provide data such as tank levels and DC voltages and current.



The engine room PLC is used to control all local equipment and has a MODBUS link to the main controller at the helm, allowing information and control signals to be passed between the two CPUs. The engine room PLC also communicates with the power management system to gather voltage, current and frequency data via RS485.

Data is displayed on a 15" full-colour touch screen integrated into a glass panel at the helm and a separate display panel in the crew quarters. The two touch screens are linked to both PLCs via MODBUS TCP so that control of equipment and data can be displayed simultaneously. Using the PLCs allows for control via the touch screens or from conventional switches.

Flexible and configurable

One of the major benefits of using the ABB PLCs is the fact that its bus communication cuts long cable runs such as that from the engine room to the helm. This also makes it easy to add an extra signal. Modern momentary action switches can be used to control any equipment and multiple control locations are easy to configure.

The PLC's CPU can also be chosen to suit the control application, making the system cost effective. The CPU also has many communication ports as standard and SD cards can be used to update software and firmware. The configurable I/O cards mean that Sunseeker can have just the right number of I/O ports that it needs for the application.

The system is also very easy to expand. Additional I/O cards can be simply added to the system when needed. The PLC system has approximately 200 discrete I/O points per boat - all of the analogue signals used on the boat are connected to the PLC via data communication links.

All of the PLC programming was carried out using the ABB Control Builder Plus software. The software allowed Sunseeker to configure the system to operate exactly as required. Sunseeker found that the programming software was easy to use, from the initial configuration of I/O and controllers right through to compiling and testing of the code. The software is very flexible and allows code to be written in different ways, such as function blocks or ladder logic.

The AC500 range has a number of controllers available which vary in specification, allowing Sunseeker to specify a lower spec controller where required. This is much more cost effective than using a higher specification controller which is then under used.

Challenge

- Provide versatile, capable control system for new luxury yacht, avoiding expensive long cabling runs

Solution

- Two ABB AC500 PLCs, one for general control of boat facilities, the other for engine room management
- Communication between PLCs and control consoles over MODBUS
- Touch screens to display data and operate the boat's facilities

Benefits

- Bus communication cuts long cable runs
- Easy to expand by adding additional I/O cards
- Easy programming of PLCs using modular software
- Choice of CPU to suit application

For more information please contact:

ABB Limited

Daresbury Park
Daresbury
Warrington
Cheshire
WA4 4BT
Tel: +44 (0) 1925 741 111
Fax: +44 (0) 1925 741 212

www.abb.co.uk/energy

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