

ALWAYS ON THE RIGHT COURSE

Powerful ship controls with
the Bachmann M1 system

Schottel has become the market leader in the field of ship propulsion systems on account of its continuous further development of products, its insistence on the highest quality standards, as well as its worldwide presence and proximity to the customer. In order to meet the more demanding requirements placed on the control systems, Schottel has recently started to rely on the Bachmann M1 system. The product line ranges from thrusters up to 1.4 MW to fully controllable rudder propellers up to 6 MW, right through to complete propulsion systems up to 30 MW.



Schottel has been developing and producing propulsion and maneuvering systems for ships of all sizes, application fields and waters for over 50 years. With over 800 employees worldwide, the company manufactures a wide range of rudder and control systems.

www.schottel.de

Some time ago Schottel decided to extend and optimize its Masterstick control system. This was because of the increased demand on the computing and processing speed of the controller and the resulting need for increased CPU performance. This was previously not fully achievable with the system used.

Masterstick – the simple way to steer a ship

The Masterstick is a control system that can control up to six ship propulsion systems at the same time. The drive thrust and ship's direction are controlled in combination by a joystick. The ship's direction of movement is a result of the movement of the joystick. The degree of deflection determines the thrust. Using an operator console (panel) the captain can select diffe-

rent drive and control modes as well as other options. The console also serves to provide the captain with different visual information.

Performance – robust design – openness

The requirements placed on the new control system were very high. After intensive searching and comprehensive tests, Schottel decided to go with Bachmann's M1 system. »The high computing power, the compact and robust design and the total openness of the M1 system absolutely impressed us,« explains Christian Böttinger, project manager for the Masterstick at Schottel. This enabled the company to implement a quick migration and meant considerable savings in time and costs: The complex control systems that already existed in C-code could be



integrated into the software of the new controller simply and quickly without any major changes.

High computing power required

A further challenge to the ship's steering is the implementation of the extremely complex and computing intensive controller for the »Auto-heading« function that automatically maintains the ship's course. To do this, a quick and precise piloting of the drives is required, which permanently reads and calculates information from a compass that is attached to the automation system. The results from the calculation are then continually transferred in turn to the manually preset course so that the selected course is always held. The difficulty with all of this is in assigning the manipulated variables to the drives in real-time, according to the ship and

drive specific parameters. To do this the drive's actual values such as the steering angle, pitch signal (the propeller's pitch control) or the rotation speed must be taken into account in the calculations in addition to the compass signal at all times. The control of the port and starboard swaying of tugboats presents a similarly complex problem. This too requires real-time computing power. If a drive fails, an optimal heading must still be precisely and quickly determined, especially when towing ships for example into a harbor, which requires an extremely high degree of maneuverability.

Impressive range of features

The extensive array of interfaces on the MX213 CPU allow an extremely slim design of the required controller hardware. This allows the



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Stefan Buch,
Manager for electric and electronic development, Schottel

compass to be directly connected to the CPU via one of the integrated RS232 interfaces. Because the processor module can operate up to eight different CAN buses, the six important drive systems can also be operated directly without further intelligence. The integrated web functionality of Bachmann's CPU also impressed Schottel. »We were thrilled with how fast visualizations could be generated and saved to the processor module's compact flash card as a Java applet using Bachmann's SolutionCenter,« says project leader Böttinger. With systems that are

not equipped with a touch panel, a standard web browser allows for access to these applets. »These access possibilities and the security standards right up to the SSL encryption also greatly ease and simplify remote maintenance,« Christian Böttinger adds.

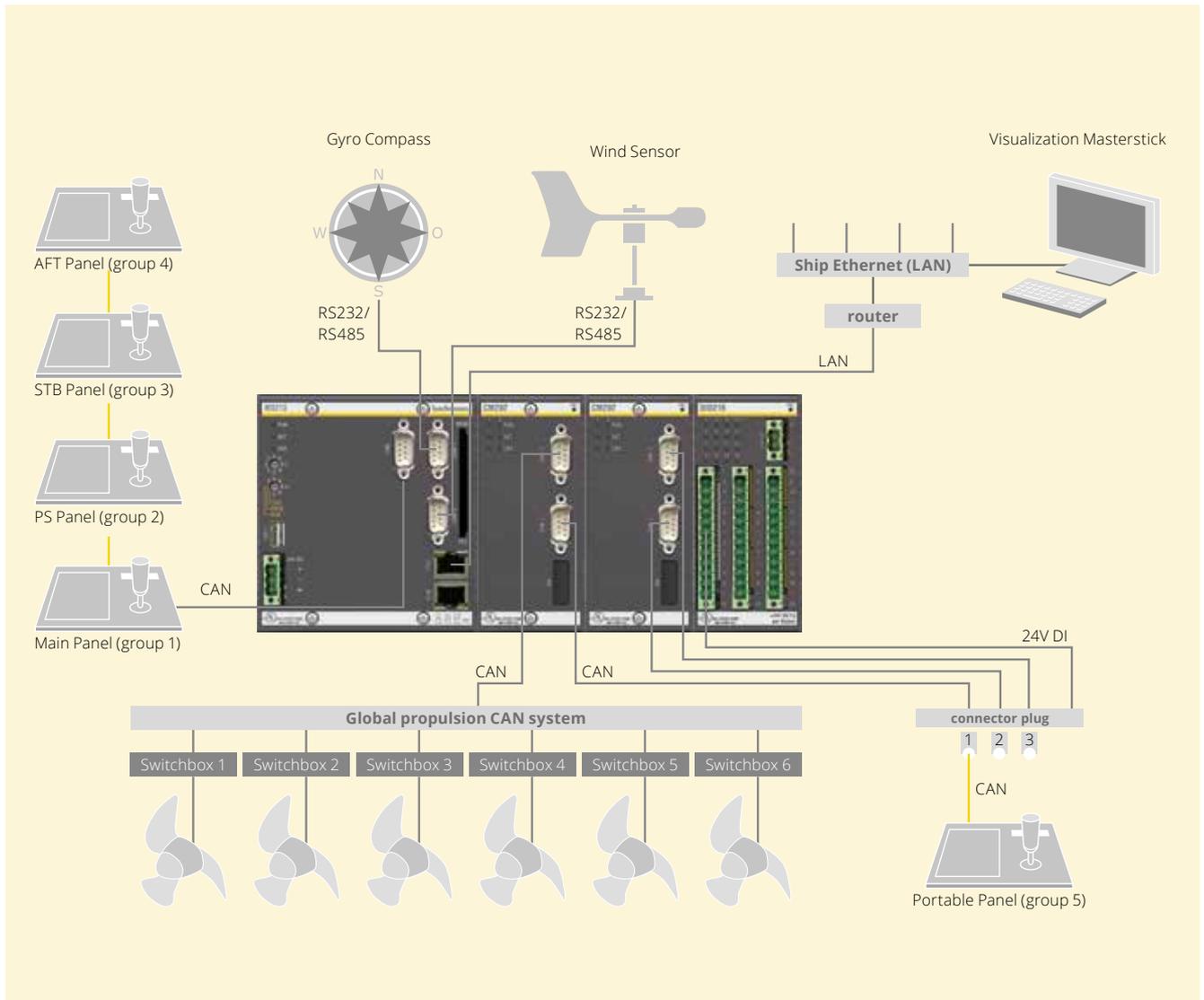
Brilliant functionality

Beside the high performance, the range of interfaces and the robustness of the system, the Schottel engineers appreciate the powerful SolutionCenter engineering tool. This enabled



► **The Masterstick:** Simultaneous control of six ship propulsion systems.





▲ The high performance and the wide range of interfaces allow an extremely compact design for the ship's control system.

the »Masterstick« project to be implemented on a standard controller system in a very short time. The key benefit was the fact that Schottel's core expertise in closed-loop control technology, which had been collected over many years and had resulted in a large number of tested closed-loop control C routine modules, could be ported easily and efficiently onto the M1 controller. Schottel's control engineers were

also impressed by the integration of MATLAB®/ Simulink® into the M1 system, which dramatically saved time during calibration. »Last but not least, the excellent and competent customer and application support from Bachmann engineers confirmed to us that our decision to go with the M1 system was the right one.« Stefan Buch, manager of Electric and Electronic Development at Schottel, sums up.